FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

Jamul Indian Village



VOLUME II
APPENDICES
June 2016

FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

Jamul Indian Village

National Indian Gaming Commission
90 K Street, Suite 200
Washington DC 20002

VOLUME II
APPENDICES

June 2016

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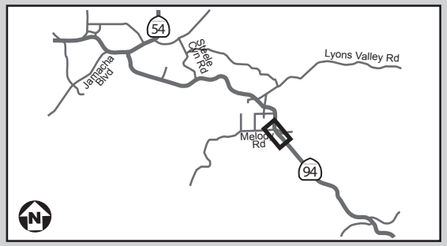
APPENDIX 1

ACCESS ROAD MITIGATION OPTION PLAN



LEGEND

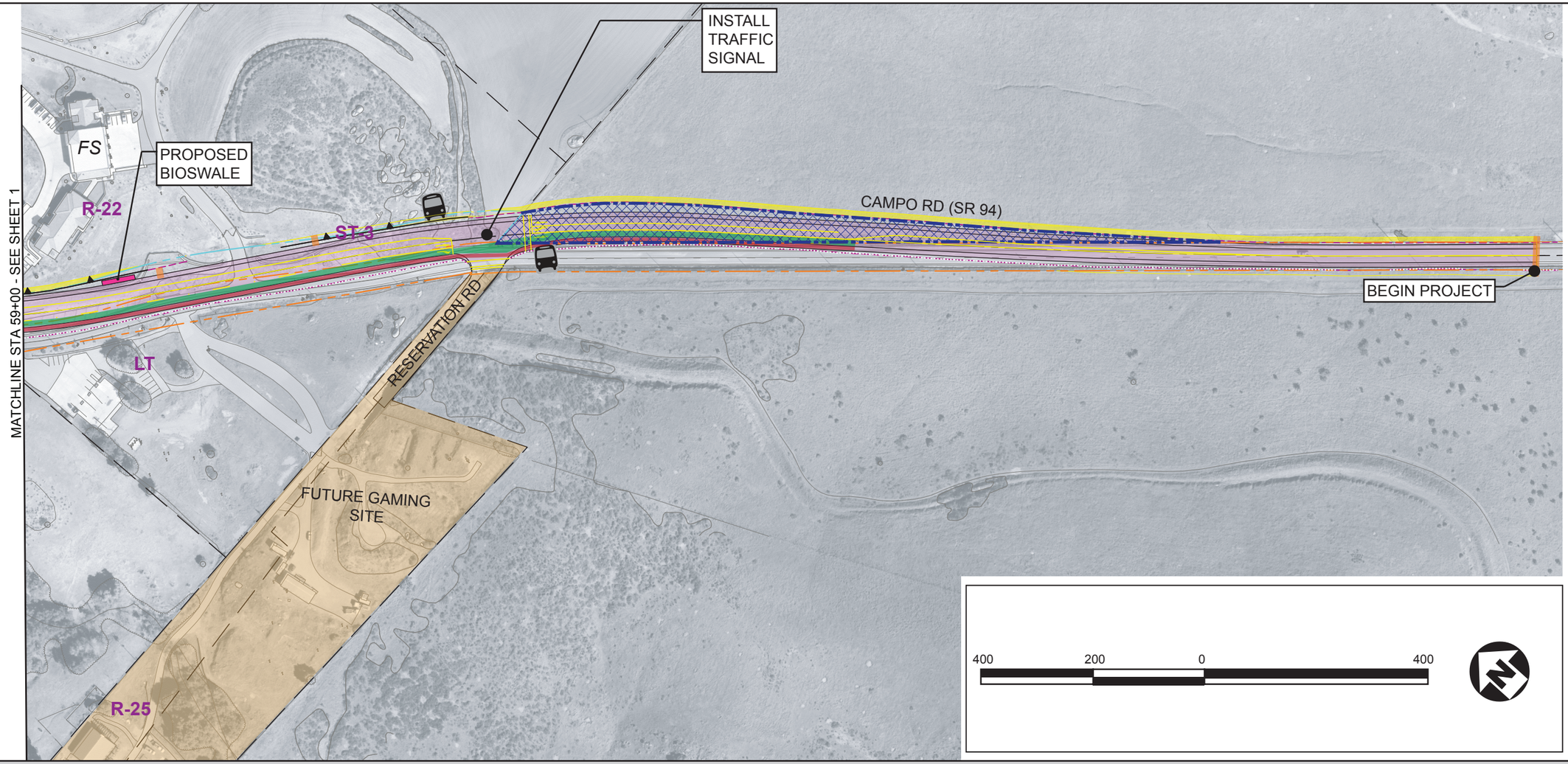
- Proposed Culvert Widening or Replacement
- Proposed Street Improvement
- Proposed Outside Mainline Shoulder Widening
- Proposed Outside Lane Widening
- Proposed Retaining Wall
- Proposed Grading Limits (cut)
- Proposed Grading Limits (fill)
- Existing Right-of-way
- Existing Irrevocable Offer of Dedication
- Proposed Bioswale
- Proposed Acquisition Area
- Proposed Temporary Easement
- Proposed Restriping
- Property Boundary

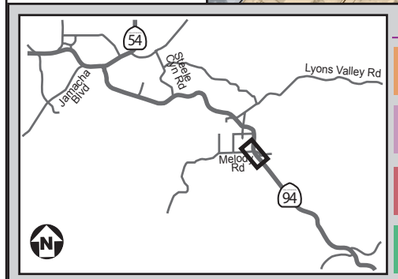
LAND USE LEGEND

SF Single Family Residential

SOURCE: Caltrans, 2014; Kimley-Horn and Associates, 2014; EDS, 2015

Access Road Option1: Improve Reservation Road (Sheet 1)





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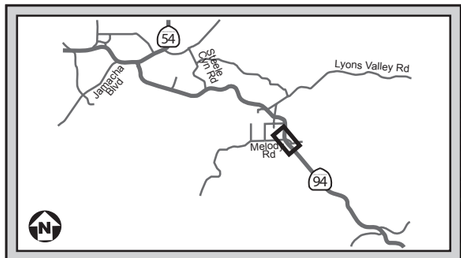
- Proposed Bus Stop to be Upgraded
- Future Gaming Site
- Proposed Restriping
- Property Boundary

LAND USE LEGEND

- *FS* Fire Station

SOURCE: Caltrans, 2014; Kimley-Horn and Associates, 2014 ; EDS, 2015

Access Road Option 1: Improve Reservation Road (Sheet 2)



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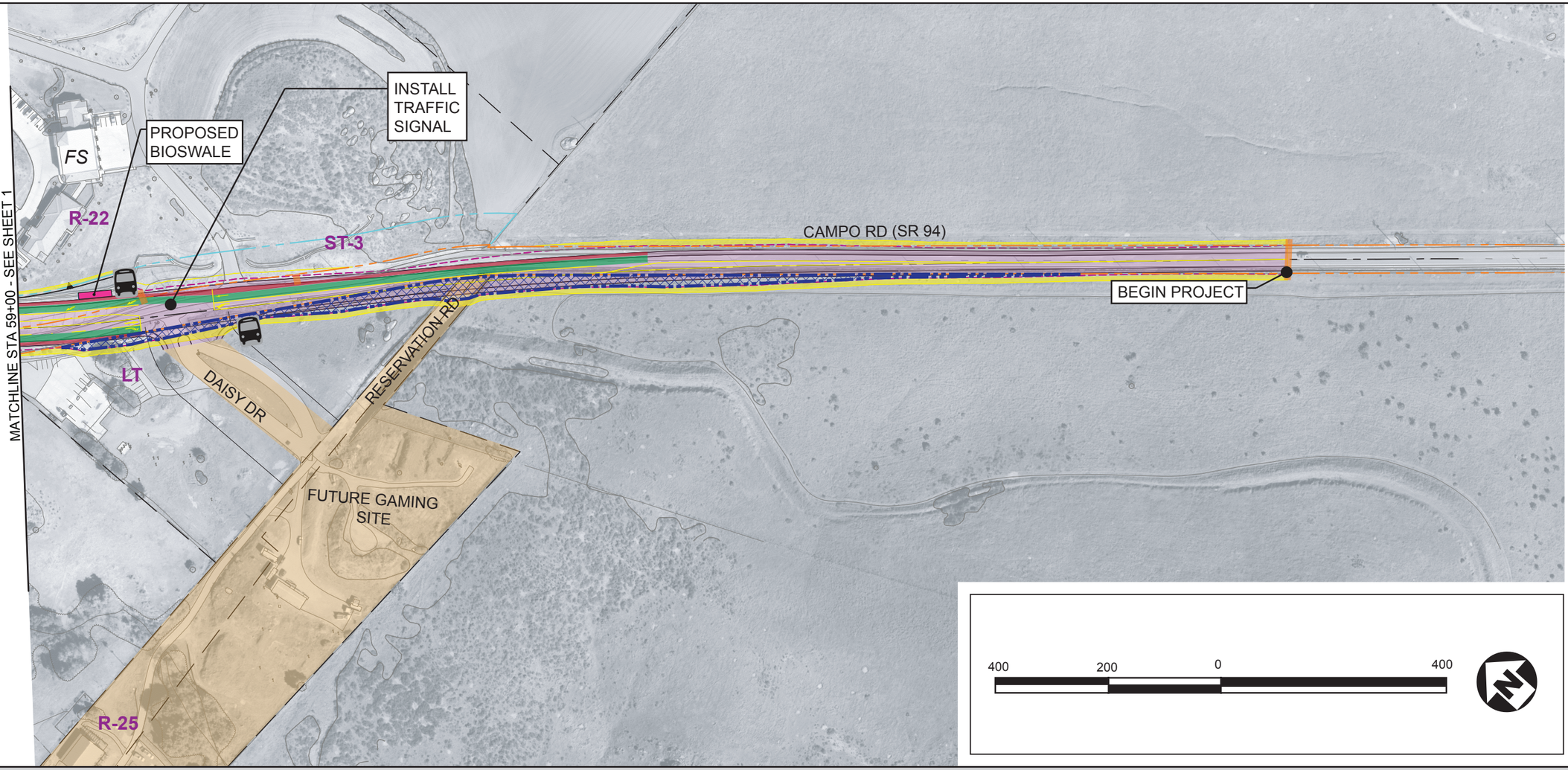
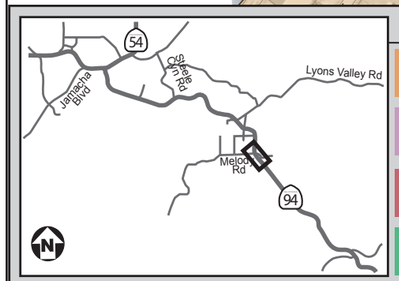
LAND USE LEGEND

SF Single Family Residential

SOURCE: Caltrans, 2014; Kimley-Horn and Associates, 2014; EDS, 2015

Access Road Option 2: Improve Daisy Drive (Sheet 1)





LEGEND

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- Proposed Street Improvement
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- Proposed Grading Limits (cut)
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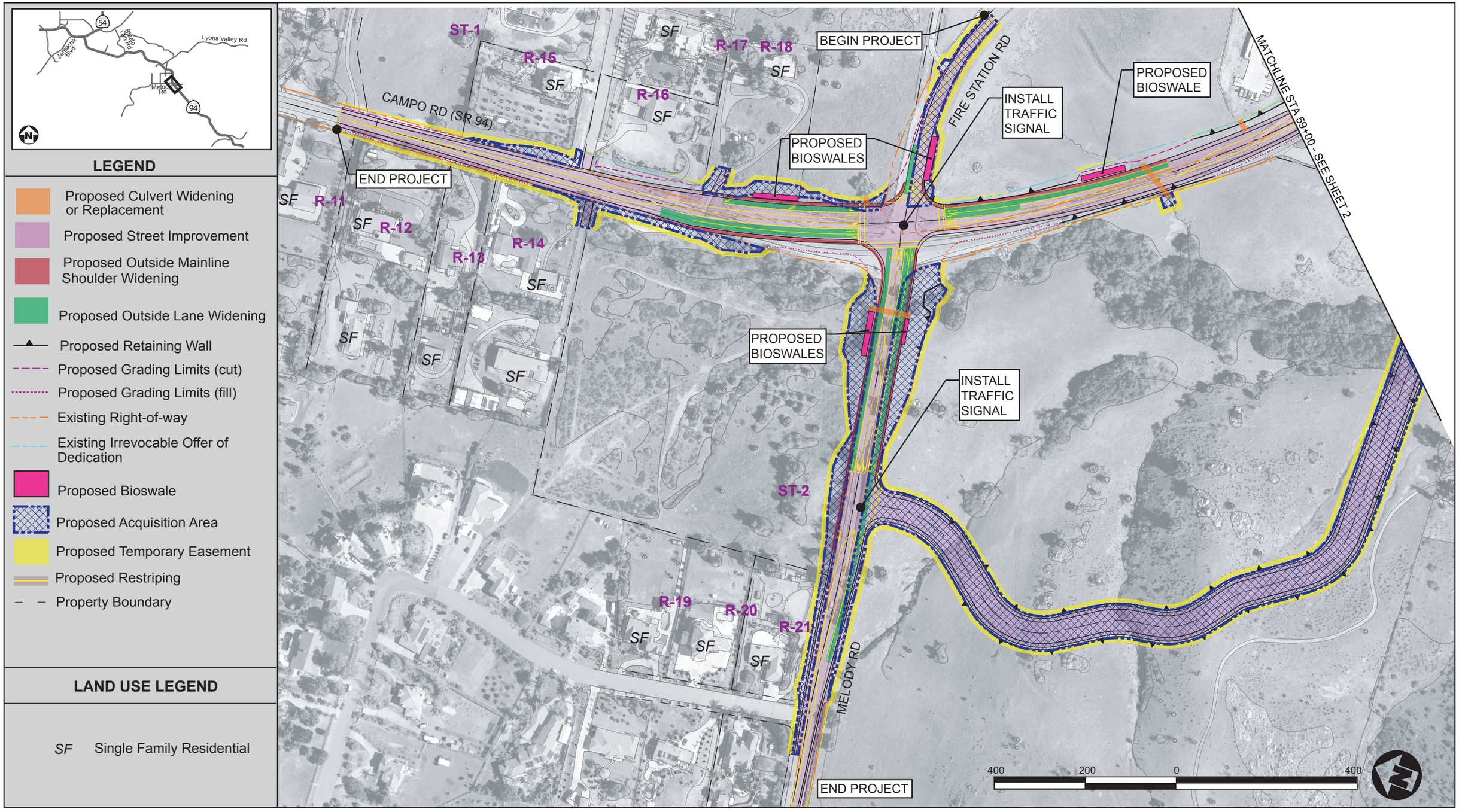
- Future Gaming Site
- Proposed Restriping
- Property Boundary

LAND USE LEGEND

- *FS* — Fire Station

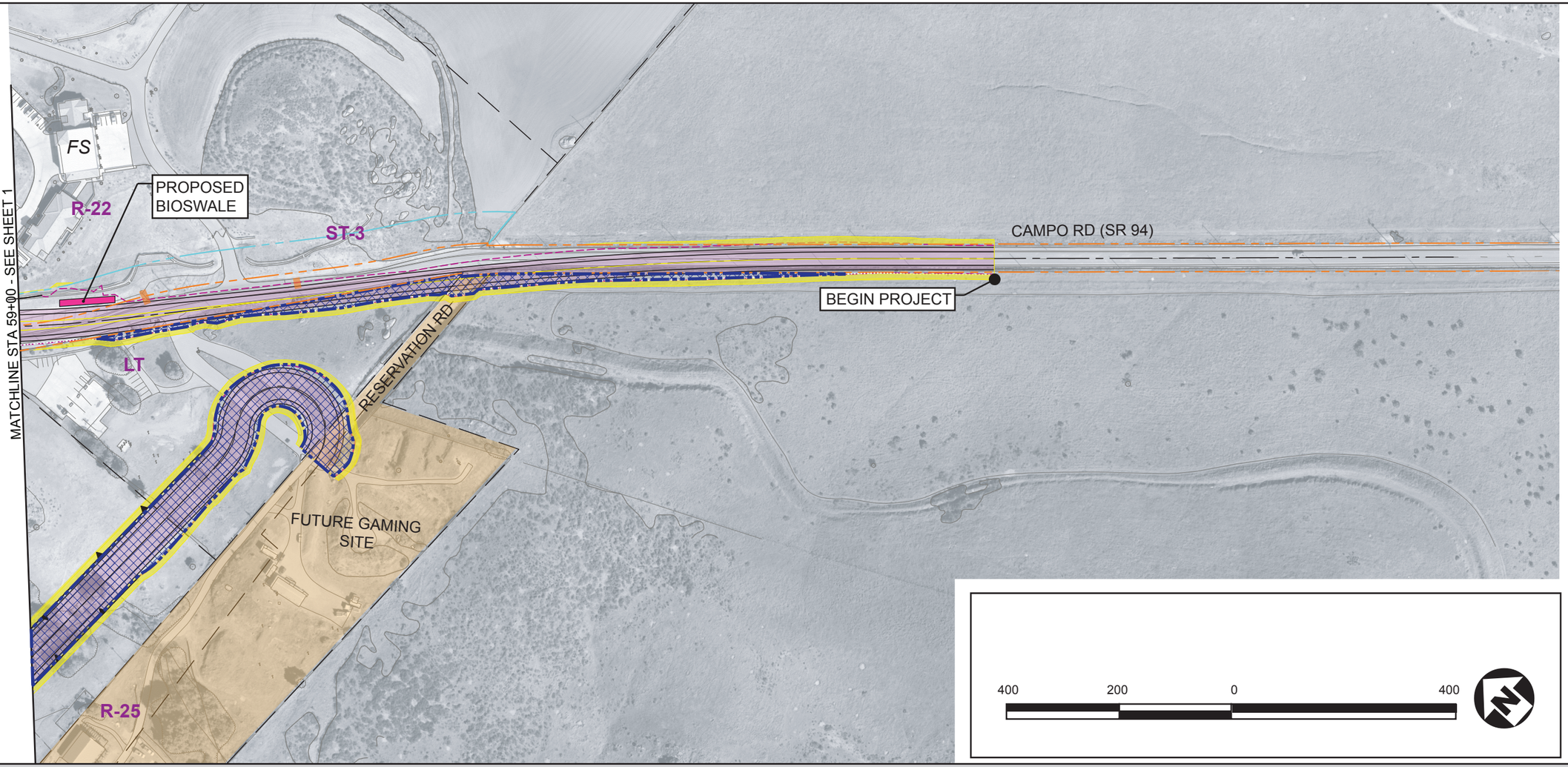
SOURCE: Caltrans, 2014; Kimley-Horn and Associates, 2014; EDS, 2015

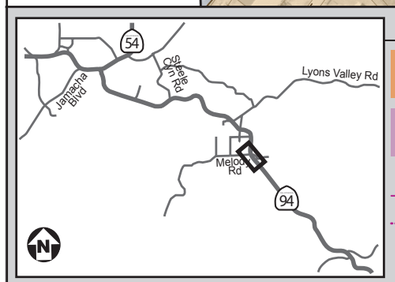
Acces Road Option 2: Improve Daisy Drive (Sheet 2)



SOURCE: Caltrans, 2014; Kimley-Horn and Associates, 2014; EDS, 2015

Access Road Option 3: New Access from Melody Road (Sheet 1)





LEGEND

- Proposed Culvert Widening/Replacement
- Proposed Local Street Improvement
- Proposed Grading Limits
- Proposed Cut Limits
- Existing Right-of-way
- Existing Irrevocable Offer of Dedication
- Proposed Bioswale
- Proposed Acquisition Area
- Proposed Temporary Easement
- Proposed Restriping
- Property Boundary
- Future Gaming Site

LAND USE LEGEND

FS	Fire Station

SOURCE: Caltrans, 2014; Kimley-Horn and Associates, 2014; EDS, 2015

Access Road Option 3: New Access from Melody Road (Sheet 2)

APPENDIX 2

GEOTECHNICAL STUDY

GEOTECHNICAL EVALUATION
JAMUL GAMING FACILITY DEVELOPMENT PROJECT
JAMUL INDIAN VILLAGE
SAN DIEGO COUNTY, CALIFORNIA

PREPARED FOR:

JAMUL INDIAN VILLAGE
STATE ROUTE 94 AND MELODY ROAD
JAMUL AREA, SAN DIEGO COUNTY, CALIFORNIA

PREPARED BY:

CONSTRUCTION TESTING & ENGINEERING, INC.
14538 MERIDIAN PARKWAY, SUITE A
RIVERSIDE, CA 92518

CTE JOB NO. 40-2739G **October 6, 2011**

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EXECUTIVE SUMMARY

As requested, Construction Testing & Engineering, Inc. (CTE) has performed an independent analysis and assessment of the project geotechnical data provided for the project. The geotechnical data were used for and applied to our evaluation. The evaluation was performed to provide an independent review of the recommendations and design parameters provided and, if appropriate, provide updated recommendations based on our findings.

To accomplish the requested evaluation, CTE utilized the design recommendations, analyses, field exploration, subsurface in-situ testing, and laboratory testing conducted previously as part of the geotechnical and other investigations referenced below. Using these data, this updated report is being provided based on the 2010 CBC and preliminary construction plans.

The evaluation indicates that the structures may be supported on conventional shallow spread footings bearing on compacted fill or bedrock. Undocumented fill should be removed and wasted elsewhere.

Based on our investigation, the proposed development is considered feasible from a geotechnical standpoint, provided the recommendations herein are implemented during project design and construction.

1.0 INTRODUCTION AND SCOPE OF SERVICES

1.1 Introduction

This report presents the results of an independent evaluation of the engineering recommendations, analyses, field explorations and field in-situ testing as well as laboratory testing of subsurface deposits located at the subject site. Utilizing these results, an independent analysis was performed. Alternate recommendations or modifications, as appropriate, are provided for structure foundations, and other geotechnical design parameters.

1.2 Scope of Services

Our scope of services included:

- Review project geotechnical data provided by the Jamul Indian Village.
- Perform a review of field exploration and in-situ field testing performed as part of the previous referenced geotechnical site investigations.
- Perform a review and analysis of laboratory testing performed previously on site soil and bedrock deposits and presented in previous site geotechnical reports.
- Perform an assessment of geologic conditions pertinent to the site.
- Preparation of this report providing a summary of the evaluation and analysis performed, and providing conclusions and geotechnical engineering recommendations for the site.

1.3 Site Location and Project Description

The site is located at the Jamul Indian Reservation. It slopes down from the east and west towards an intermittently flowing drainage that traverses the site in a north-south direction. The majority of the site is sparsely vegetated with scrub and trees. Site elevations range from approximately 1150 feet MSL at the top of the western slope and approximately 960 feet MSL at the top of the eastern slope to about 860 feet MSL at the bottom of the drainage at the south side of the project.

Based on the preliminary drawings, we understand that it is proposed to construct the gaming facility in one of three alternative sizes. The largest of these, the proposed project, as well as a mid-sized project (Alternative #1) would consist of a three-story structure over a reinforced-concrete parking garage. The third alternative would consist of a two-story structure with adjacent surface parking. Cuts on the order of 30 feet and fills on the order of 10 to 15 feet are anticipated.

2.0 FIELD AND LABORATORY INVESTIGATIONS

2.1 Field Investigation

The field investigations (Law Crandall, 2001, 2002; CTE 2011; Petra, 2007, 2008), included a site reconnaissance, the excavation of exploratory hollow stem auger borings, test pits, air track borings, seismic refraction lines and *in-situ* percolation testing of subsurface deposits. The explorations were excavated to investigate and obtain samples of the subsurface soils and to evaluate depth to and type of bedrock. Soils encountered within the borings were classified in the field in accordance with Unified Soil Classification System. In general, soil samples were obtained at 2-1/2 to 5-foot intervals with standard split spoon (SPT and California Modified) samplers. Specifics of the soils encountered can be found in the Boring Logs, Test Pit Logs, Air Track logs, and Seismic Refraction Results from the geotechnical report which was provided. These data are attached to this update report.

2.2 Laboratory Analyses

Laboratory tests were conducted on representative soil samples to evaluate their physical properties and engineering characteristics. Specific laboratory tests included:

- In-place moisture and density
- Expansion index
- Direct shear
- Gradation
- Chemical analyses.

These tests were conducted to determine the material strengths, physical properties, and corrosivity of the on-site soils. Test method descriptions and laboratory results are presented in the referenced reports. Laboratory data are attached.

3.0 GEOLOGY

3.1 Geologic Setting

The site lies approximately between Elevation 860 and 1150 feet MSL on moderately steep slopes in the Jamul Mountains, south of Jamul in San Diego County, California. In the vicinity of the site, pre-tertiary granitic and metavolcanic bedrock is locally overlain by Quaternary alluvial and colluvial deposits which are locally covered by shallow fill. The site is located in the Peninsular Ranges geomorphic province of California. The dominant structural trend of the Peninsular Ranges is characterized by faults associated with the Rose Canyon and Elsinore fault zones, along with other similar northerly and northwesterly-trending fault zones in southern and Baja California that form steep "tread and riser" topography that rises to the east. Geologic maps and major fault zones are presented on Plate 2 and Figure 2 of the referenced geotechnical report (Law Crandall, 2001).

3.2 Geologic Materials

Surficial materials include undocumented fill, alluvium, colluvium and possible landslide deposits. Undifferentiated granitic and volcanic bedrock underlies the the site and can be observed along ridges, the bottom of natural drainages and along slopes above the site.

Undocumented Fill

The fill at the site consists of silty sand and sand. It is composed of locally derived stream terrace deposits and colluvium generated from cutting into the natural slope during grading for previously existing structures.

Alluvial Deposits

Alluvial deposits are present along the drainage which traverses the site. The alluvial soils are composed of sand and silty sand with scattered gravel.

Colluvium

Colluvium locally covers the granitic bedrock on the slopes. The colluvial materials consist of sand and silt mixtures.

Possible Landslide Deposits

Possible landslide deposits at the site were mapped based on surficial expression and stereoscopic photographs. Landslide deposits are composed of intermixed surficial soil and granitic bedrock.

Granitic Bedrock

Pre-Tertiary granitic bedrock underlies the site soil deposits. The granitic bedrock is considered as undifferentiated igneous crystalline bedrock that locally forms bold outcrops. The granitic bedrock is composed mainly of diorite with contact metamorphic zones. The bedrock is hard and dense.

Metamorphic Bedrock

Pre-Tertiary volcanic and metamorphic bedrock is exposed on the southwest corner of the site. The bedrock forms outcrops and is hard and dense. It is composed of intermixed volcanic and sedimentary rocks that have experienced low-grade metamorphism.

3.3 Ground Water

Evidence of springs or seeps was not observed. During the geotechnical investigation and percolation testing, relatively shallow ground water was observed in the borings. It is anticipated that water will flow in the drainages during seasonal rains. Ground-water conditions may vary due to seasonal variations, local irrigation and other factors. Furthermore, the potential for a perched water condition exists at the contact between granitic bedrock and the overlying soil deposits and landslide deposits.

3.4 Geologic Hazards

From our investigation, it appears that geologic hazards at the site are limited primarily to those caused by strong shaking from earthquake-generated ground motions. Presented here are the geologic hazards that are considered for potential impacts to site development.

Tsunamis and Seiche Evaluation

The site is about 15 miles inland from the Pacific Ocean at an elevation of approximately 900 feet above sea level. Therefore, risk of damage from seismic sea waves (tsunamis) is not anticipated. The site is not downslope of a large body of water that could adversely affect the site in the event of earthquake-induced failures or seiches (wave oscillations in an enclosed or semi-enclosed body of water).

Landsliding

Based on surface expression, possible landslides have been mapped in the northeast corner of the site.

Compressible and Expansive Soils

Encountered site soils consisted of non-expansive sands and hard bedrock with low compressibility. Therefore, compressible and/or expansive site materials are not anticipated to adversely impact the proposed development.

4.0 FAULT RUPTURE AND EARTHQUAKE HAZARD EVALUATIONS

4.1 Local and Regional Faulting

Based on review of readily available geologic literature and the computer program EQFAULT (Blake, 2000a), the subject site is located approximately 15.5 miles from the Rose Canyon fault. As defined by the California Geological Survey, an active fault is one that has had surface displacement within the Holocene Epoch (roughly the last 11,000 years). This definition is used in delineating Earthquake Fault Zones as mandated by the Alquist-Priolo Special Studies Zones Act of 1972 and revised in 1994 and 1997 as the Alquist-Priolo Earthquake Fault Zoning Act and Earthquake Fault Hazard Zones. The intent of this act is to require fault investigations on sites located within Earthquake Fault Hazard Zones to preclude new construction of certain habitable structures across the trace of active faults. Based on our review of available literature, the site is not located within an Alquist-Priolo Earthquake Fault Zone. Based on our observations, no evidence of active faulting is present on the site.

The California Geological Survey broadly groups faults as "Class A" or "Class B" (Cao et al, 2003). Class A faults are identified based upon relatively well constrained paleoseismic activity, and a fault slip rate of more than 5 millimeters per year (mm/yr). In contrast, Class B faults have comparatively less defined paleoseismic activity and are considered to have a fault slip rate less than 5 mm/yr. The following Table 1 presents the 10 nearest faults to the site and includes magnitude and fault classification.

TABLE 1
NEAR SITE FAULT PARAMETERS

FAULT NAME	DISTANCE FROM SITE (mi)	MAXIMUM EARTHQUAKE MAGNITUDE	CLASSIFICATION
Rose Canyon	15.5	7.2	B
Coronado Bank	27.5	7.6	B
Elsinore-Julian	32.2	7.1	A
Elsinore-Coyote Mountain	34.6	6.8	A
Earthquake Valley	35.6	6.5	B
Newport-Inglewood (Offshore)	45.2	7.6	B
Elsinore-Temecula	47.3	6.6	A
San Jacinto-Coyote Creek	52.0	6.8	A
San Jacinto-Borrego	52.2	6.6	A
San Jacinto-Anza	55.7	7.2	A

California Geologic Survey, Probabilistic Seismic Hazards Mapping Ground Motion Page (online pshamap.asp), indicates ground motions with 10 % probability of exceedance in 50 years for the site as underlain by firm rock are shown in Table 2.

TABLE 2
SITE GROUND MOTION WITH 10% PROBABILITY OF EXCEEDANCE IN 50 YEARS

PARAMETER	UNIT GRAVITY (firm rock)
Ground Acceleration	0.211
Spectral Acceleration at Short (0.2 second) Duration	0.499
Spectral Acceleration at Long (1.0 second) Duration	0.192

4.2 Seismic Design Criteria

The seismic ground motion values listed in the following Table 3 were derived in accordance with the California Building Code (CBC), 2010. This was accomplished by establishing the Site Class based on the soil properties at the site, and then calculating the site coefficients and parameters using the United States Geological Survey (USGS) Java Ground Motion Parameter Calculator – Version 5.0.9a and site coordinates of 32.7029° North latitude, 116.8686° West longitude. These values are intended for the design of structures to resist the effects of earthquake ground motions.

TABLE 3 SEISMIC GROUND MOTION VALUES		
PARAMETER	VALUE	CBC REFERENCE
Site Class	B	Table 1613.5.2
Mapped Spectral Response Acceleration Parameter, S_S	0.948g	Figure 1613.5(3)
Mapped Spectral Response Acceleration Parameter, S_1	0.327g	Figure 1613.5(4)
Seismic Coefficient, F_a	1.0	Table 1613.5.3(1)
Seismic Coefficient, F_v	1.0	Table 1613.5.3(2)
MCE Spectral Response Acceleration Parameter, S_{MS}	0.948g	Section 1613.5.3
MCE Spectral Response Acceleration Parameter, S_{M1}	0.327g	Section 1613.5.3
Design Spectral Response Acceleration, Parameter S_{DS}	0.632g	Section 1613.5.4
Design Spectral Response Acceleration, Parameter S_{D1}	0.218g	Section 1613.5.4

4.3 Liquefaction Evaluation

Liquefaction occurs when saturated fine-grained sands, silts or low plasticity clays lose their physical strength during earthquake-induced shaking and behave as a liquid. This is due to loss of point-to-point grain contact and transfer of normal stress to the pore water. Liquefaction potential varies with groundwater level, soil type, material gradation, relative density, and the intensity and duration of ground shaking. Since the site soils and bedrock are very dense, the potential for liquefaction should be considered very low. However, the soils present in the drainage area may be subject to liquefaction. This area, however, will not be used for construction.

4.4 Seismic Settlement Evaluation

Seismic settlement (dynamic densification) occurs when loose to medium dense granular soils densify during seismic events. The underlying site materials were generally very dense and are not considered likely to experience significant seismic settlement. Therefore, in our opinion, the potential for seismic settlement resulting in damage to site improvements is considered low.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 General

Based on our review of existing documents, the proposed construction on the site is feasible from a geotechnical standpoint, provided the recommendations in this report are incorporated into design and construction of the project. Recommendations for the design and construction of the proposed development are included in the subsequent sections of this report.

5.2 Site Preparation

General

Prior to grading, the site should be cleared of existing debris, pavement, foundations and deleterious materials. In areas to receive structures or distress-sensitive improvements, expansive, surficial eroded, desiccated, burrowed, or otherwise loose or disturbed soils should be removed to the depth of competent material. Organic and other deleterious materials not suitable for use as structural backfill should be disposed of offsite at a legal disposal site. Septic systems and leach fields, if encountered, should be abandoned in accordance with San Diego County regulations.

Preparation of Areas to Receive Fill

Prior to fill placement, exposed excavation bottom surfaces should be scarified to a minimum depth of six inches, brought to optimum moisture content or slightly above, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D 1557.

Excavation

The existing fill soils, colluvium, alluvium and highly weathered bedrock are not expected to pose unusual excavation difficulties and conventional heavy-duty earthmoving equipment may be used. The less weathered bedrock, however, is likely to be excavatable with heavy-duty earthmoving equipment to relatively shallow depths. Blasting of less weathered bedrock should be anticipated in deeper cuts.

Temporary, unsurcharged, excavation walls may be sloped back at an inclination of ¾:1 (horizontal:vertical) in the competent bedrock materials and 1:1 in existing fill, colluvium, alluvium and highly weathered bedrock. Where space for sloped embankments is not available, shoring will be necessary.

Where sloped excavations are used, the tops should be barricaded to prevent vehicles and storage loads within 10 feet of the tops of excavated slopes. If temporary construction slopes are to be maintained during the rainy season, berms are recommended along the tops of the slopes to prevent water from entering the excavation and eroding the slope faces.

Rippability

A seismic refraction survey was conducted at the site to evaluate rippability of the subsurface materials. The seismic refraction method uses the first-arrival times of refracted seismic waves generated to evaluate the thickness and seismic wave velocities of subsurface layers. Seismic waves generated at the surface are refracted at boundaries separating materials of contrasting velocities. The refracted seismic waves are detected by geophones and recorded in

seismograph. The travel times are used in conjunction with the shot-to-geophone distances to obtain thickness and velocity information on the subsurface materials.

The refraction method requires that subsurface velocities (material density) increase with depth. In general, seismic wave velocities can be correlated to rock hardness. The relationship between rock rippability and seismic velocity is empirical and assumes a homogeneous rock mass. Localized areas of differing composition, texture or structure may affect both the measured data and the actual rippability of the rock mass. The rippability of the rock is also dependant on the excavation equipment used and the skill and experience of the equipment operator.

The following rippability chart assumes that a Caterpillar D-9 dozer ripping with a single shank is used. The cutoffs presented in Table 4 are approximate and the rock characteristics, such as fracture spacing and orientation, play an important role in evaluating rippability. These characteristics may also vary with location and depth.

TABLE 4

RIPPABILITY

Seismic Wave Velocity (feet/second)	Rippability
0 to 2,000	Easy Ripping
2,000 to 4,000	Moderate Ripping
4,000 to 5,500	Difficult Ripping, Possible Local Blasting
5,500 to 7,000	Very Difficult Ripping, Probable Local to General Blasting
Greater than 7,000	Blasting Generally Required

For trenching operations, the rippability figures should be scaled downward. Velocities as low as 3,500 feet per second may indicate difficult ripping during trenching operations. In addition, the presence of boulders, which can cause difficulties in a narrow trench, should be anticipated. The above classifications should be used with discretion, and contractors should not be relieved of making their own evaluation of rippability of the on-site materials prior to submitting their bids.

Cut/Fill Transition

In the event that a cut/fill transition is encountered below a structure, the bedrock materials should be excavated three feet below the bottom of the footings or H/3, whichever is greatest, where H is the thickness of the adjacent fill. The excavated bedrock material should be replaced with compacted fill. The width of the excavation should extend at least three feet beyond the outer edge of the footing.

Oversize Material

Rock fragments from possible blasting operations can, in general, be used within the lower portion of site fills provided the method of placement and compaction is approved by CTE. The oversize rock disposal should not extend below a 1:1 plane projected downward and outward from the base of a proposed structure. Rock designated for disposal areas should be placed with sufficient sandy soil to fill voids.

Fill should be placed and compacted over and around the rock. The amount of rock greater than 1-1/2 inches should not exceed 40% of the total dry weight of the fill unless the fill is specially designed and constructed as rock fill. Rocks or other materials greater than four inches but less than four feet in dimension generated during grading may be placed in windrows and capped with finer materials in accordance with our recommendations and the approval of the governing

agencies. Select native or imported granular soil (SE>30) should be placed and flooded over and around windrowed rock such that the voids are filled.

Windrows should be staggered so that successive windrows are not in the same vertical plane. Rocks greater than four feet in dimension should be broken down to four feet or smaller before placement or disposed of off site.

Slopes

Permanent slopes should be constructed at 2:1 or flatter. Slopes should be planted as soon as possible after construction. Where fills slopes are constructed, colluvium and other materials considered unsuitable should be removed. Where the exposed slope is steeper than 5:1 or where recommended by CTE, the original ground on which fill is to be placed should be keyed and benched. The benches should extend in the underlying bedrock. The key should be at least 15 feet wide and sloped at a minimum of 2% towards the slope. Benches should not exceed four feet in height. Fill slopes should be overbuilt by two feet and cut back to facilitate compaction at the face.

For areas above slopes, positive drainage should be provided away from slopes. This may be accomplished utilizing a brow ditch at the top of slopes to redirect surface runoff away from the slope face. Site runoff should not be permitted to flow over the tops of slopes.

Subsurface Drainage

Where fill soils are to be placed over existing drainages, existing colluvium and alluvium should be excavated to competent bedrock and a subdrain placed prior to filling. The subdrain should be placed in the middle of the drainage at the low point. The actual subdrain location should be evaluated by CTE.

The subdrain should consist of a four-inch diameter perforated pipe placed with perforations down. The pipe should be sloped at least 2% and surrounded by one cubic foot per foot of filter

material wrapped in geo-fabric. The filter gravel should meet the requirements of Class II Permeable Material as defined in the Caltrans Standard Specifications. If Class II Permeable Material is not available, ¾-inch crushed rock or gravel may be used. The crushed rock should have less than 5% passing the #200 sieve. The subdrain should have an outlet that should be maintained after construction. Subdrains should also be placed at the base of keys prior to constructing fill slopes.

Fill Placement and Compaction

Fill should be compacted to at least 90 percent of the maximum dry density (as determined by ASTM D 1557) at a moisture content of optimum or slightly above. The upper foot of subgrade for pavements should be compacted to 95% of the maximum density at a moisture content above optimum. The optimum lift thickness for fill soils will be dependent on the type of compaction equipment being utilized. Generally, fill should be placed in uniform horizontal lifts not exceeding eight inches in loose thickness. Placement and compaction of fill should be performed in general conformance with geotechnical recommendations and local ordinances.

Material for Fill

Soils generated from on-site excavations are anticipated to be suitable for use as structural fill, provided they are free from deleterious material. Rocks or other soil fragments greater than four inches in size should not be used in the fills. Proposed import material should consist of non-expansive soil with an Expansion Index less than 20. Imported material be evaluated by CTE prior to being brought on site.

Utility Trenches

Utility trenches should be excavated as previously discussed. Utility-trench backfill should be placed in loose lifts no greater than eight inches and compacted to a relative compaction of 90%

or more, as evaluated by ASTM D 1557. Trench backfills should be mechanically compacted. Flooding or jetting should not be allowed.

Temporary excavations up to 5 feet high may be cut vertically. Deeper excavations should be shored or cut at an inclination of 1:1 or flatter.

5.3 Temporary Shoring

General

Where there is not sufficient space for sloped embankments and where shoring will not also serve as a permanent retaining structure, temporary shoring will be required. For vertical excavations less than 15 feet in height, cantilevered shoring may be used. One method of shoring would consist of steel soldier piles placed in drilled holes and backfilled with concrete. For vertical excavations greater than 15 feet, temporary shoring consisting of rock bolts or soil nails may be used. The actual method of shoring should be provided and designed by a contractor experienced in installing temporary shoring under similar soil/rock conditions. Once the final excavation and shoring plans are complete, we recommend that we review the plans so that we may provide additional data required as design progresses.

Lateral Pressures

For design of cantilevered shoring, a triangular distribution of lateral earth pressure may be used. It may be assumed that the retained soils with a level surface behind the cantilevered shoring will exert a lateral pressure developed by a fluid with a density of 25 pounds per cubic foot (pcf).

Soldier Piles

For the design of soldier piles spaced at least two diameters on-centers, the allowable lateral bearing value (passive value) of the soils below the level of the excavation may be assumed to

be 800 pounds per square foot (psf) per foot of depth, up to a maximum of 6,000 psf. To develop full lateral value, provisions should be taken to assure firm contact between the soldier pile and the undisturbed soils. The concrete placed in the soldier pile excavations should be of sufficient strength to adequately transfer the imposed loads to the surrounding materials.

The minimum depth of embedment for soldier piling should be in accordance with the design requirements as determined by the structural engineer or shoring contractor. However, for cantilevered shoring, a minimum embedment of 10 feet is recommended.

Lagging

Continuous lagging will be required between the soldier piles. The lagging should be installed as the excavation proceeds. The soldier piles should be designed for the full anticipated lateral pressure. However, the pressure on the lagging will be less due to arching in the soils. We recommend that the lagging be designed for the recommended earth pressure but limited to a value of 400 psf. If caving occurs, it may be necessary to carefully backfill portions of the lagging with clean sand or sand-cement slurry (CLSM) after installation.

5.4 Retaining Walls and Walls Below Grade

We understand that the below-grade walls will be up to approximately 30 feet below existing grade and that the floor will be a slab-on-grade. Single-level walls below grade should be designed to resist an at-rest triangular distribution of lateral-earth pressure plus lateral surcharge from adjacent loads. The recommended equivalent fluid pressure for the case where the grade is level behind the wall is 50 pcf for restrained walls with a level backfill and 72 pcf for walls with a 2:1 backfill slope. The recommended earth pressures assume that a drainage system will be installed behind the base of the wall so that external water pressure will not develop. The wall should be founded as previously recommended.

In addition to the above-recommended earth pressures, walls adjacent to areas subject to vehicular traffic should be designed to resist a uniform lateral pressure of 72 psf acting as a result of a uniform load equivalent to a two-foot thick soil surcharge as recommended by Caltrans. If traffic is kept back 10 feet or more from the wall, the traffic surcharge may be neglected.

Walls below grade should be properly drained. Drainage behind the wall may be provided with a continuous-gravel backdrain or a geosynthetic-drainage composite. In our opinion, Miradrain 6000 or equivalent, attached to the back of the wall before backfilling, would provide satisfactory drainage. The drainage composite should be placed continuously along the back of the wall and connected to a four-inch diameter perforated discharge pipe. The pipe should be sloped at two percent or more and surrounded be one cubic foot per foot of filter gravel. The drain should discharge to an appropriate outlet. The wall should be appropriately waterproofed.

The filter gravel should meet the requirements of Class II Permeable Material, as defined in the current State of California Department of Transportation, Standard Specifications. If Class II Permeable Material is not available, ¾" crushed rock or gravel can be used. The crushed rock or gravel should be wrapped in a filter fabric such as Mirafi 140N or equivalent.

Cantilever retaining walls may be designed in accordance with the following recommendations. For the design where the surface of the backfill is level, it may be assumed that the soils will exert an active lateral pressure equal to that developed by a fluid with a density of 30 pcf. This pressures should be increased to 45 pcf for walls retaining soils inclined at 2:1. A traffic surcharge as previously described should be added to the above pressures, if applicable. of soil.

Lateral pressures on cantilever retaining walls (yielding walls) due to earthquake motions may be calculated based on work by Seed and Whitman (1970). The total lateral thrust against a

properly drained and backfilled cantilever retaining wall above the groundwater level can be expressed as:

$P_{AE} = P_A + \Delta P_{AE}$

Where:

P_A = Static Active Thrust = 30 pcf
ΔP_{AE} = Dynamic Active Thrust Increment = $(3/8)\ k_h\ \gamma H^2$
k_h = ½ Peak Ground Acceleration = ½ (S_{DS}/2.5) = 0.253g,
H = Total Height of the Wall
γ = Total Unit Weight of Soil ≈ 125 pounds per cubic foot

The below ground walls for the gaming facility and parking garages are assumed to be non-yielding (or "restrained'). As such, the total lateral thrust due to earthquake motions may be calculated based on work by Wood (1973, Earthquake-Induced Soil Pressures on Structures, Report EERL 73-05. Pasadena: California Institute of Technology) and Whitman (1991, "Seismic Design of Earth Retaining Structures," in *Proceedings*, Second International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics, St. Louis, Missouri):

$P_{KE} = P_K + \Delta P_{KE}$

Where:

P_K = Static Restrained Wall Thrust =50 pcf
ΔP_{KE} = Dynamic Restrained Thrust Increment = $k_h\ \gamma H^2$
k_h = ½ Peak Ground Acceleration = ½ (S_{DS}/2.5) = 0.253g,
H = Total Height of the Wall
γ = Total Unit Weight of Soil ≈ 125 pounds per cubic foot

The increment of dynamic thrust in both cases should be distributed as an inverted triangle, with a resultant force located at 0.6H above the bottom of the wall.

The above design values for wall backfill pressure assume backfill with an Expansion Index of 20 or less and free-draining conditions. Wall backfill should be compacted to at least 90 percent relative compaction, based on ASTM D1557. Backfill should not be placed until walls have

achieved adequate structural strength. Heavy compaction equipment, which could cause distress to walls, should not be used.

Structure walls more than one level below grade and/or permanently shored walls may be designed to resist a trapezoidal distribution of lateral earth pressure plus lateral surcharge from adjacent loads. The maximum pressure is equal to 22H psf where H is the height of the wall. The trapezoidal load is distributed with a lower and upper height equal to 0.2H and the central height equal to 0.6H. The recommended earth pressure assumes that a drainage system will be installed behind the wall so that external water pressure will not develop against the walls.

As discussed previously, soil nails or tiebacks may be used to support the excavation sidewalls. Actual design and construction should be done by a contractor experienced in shoring installation. For preliminary design purposes, an ultimate bond stress of 40 psi may be used for soil nails installed in decomposed granitic bedrock. Soil nails should be corrosion protected. CTE should review design plans prior to installation.

In addition to the recommended earth pressures, the upper ten feet of wall adjacent to vehicular traffic areas should be designed to resist a uniform lateral pressure of 100 psf acting as a result of an assumed 300 psf surcharge behind the wall due to normal traffic. If traffic is kept back at least 10 feet, the surcharge may be neglected.

5.5 Foundations

General

The gaming facility and parking garages may be supported on spread footings founded in undisturbed bedrock. The remaining structures and retaining walls may be founded on spread footings in compacted fill or undisturbed bedrock.

Allowable Bearing Capacity

Footings for the gaming facility and parking garages founded in undisturbed bedrock may be designed to impose a dead-plus-live load of 15,000 psf. Footings founded in compacted fill may be designed to impose a nominal dead-plus-live load pressure of 3,000 psf. Footings should be established at a depth of at least two feet below the lowest adjacent grade. Footings near slopes should be provided with a minimum eight-foot horizontal distance from the face of the slope to the outer bottom edge of the footing. Footing excavations should be deepened as necessary to extend into satisfactory bearing materials. A one-third increase in the bearing value may be used for wind or seismic loads. When founded as above, settlement is estimated to be less than one inch. Differential settlement is estimated to be less than ½ inch.

Lateral Loads

Lateral loads may be resisted by friction and the passive resistance of the materials. A coefficient of friction of 0.5 may be used between footings and undisturbed bedrock. The passive resistance of undisturbed bedrock may be assumed to be equal to the pressure developed by a fluid with a density of 500 pcf. A coefficient of friction of 0.4 may be used

between footings and compacted fill. A passive resistance of fill of 300 pcf may be used. A coefficient of friction of 0.4 may be used between slabs-on-grade and the underlying materials. A one-third increase in the passive value may be used for wind or seismic loads. The passive resistance may be combined with the frictional resistance without reduction in determining the total lateral resistance.

Footing Observation

To evaluate the presence of satisfactory materials at design elevations, footing excavations should be observed by personnel of CTE. Footing excavations should be cleaned of loosened

soil and debris before placing steel or concrete. Soft or loose soils or unsatisfactory materials should be removed and may be replaced with a two-sack sand-cement slurry (CLSM) or structural concrete

5.6 Concrete Slab-On-Grade

Floor slabs may be supported at grade. The minimum floor slab thickness should be in accordance with the design requirements as determined by the structural engineer or architect. However, a minimum thickness of 4-1/2 inches is recommended. The thickness for the basement slab of the parking garages should be determined by the structural engineer based on wheel-loading requirements. A modulus of subgrade reaction (k) of 180 pci may be used for the design of the slab.

Concrete slabs-on-grade should be placed on the exposed subgrade as previously recommended. They should be reinforced with a minimum of number 3 reinforcing bars supported on chairs and placed on 24-inch centers, each way at or above mid-slab height, but with proper concrete cover. Additional steel reinforcement may be recommended by the structural engineer. The correct placement of the reinforcement in the slab is vital for satisfactory performance under normal conditions. Wire mesh is not recommended since it is seldom properly placed. Control joints should be spaced per the structural engineer's recommendations.

In areas to receive moisture-sensitive floor covering or used to store moisture-sensitive materials, a polyethylene or visqueen moisture retarder (10-mil or thicker) should be placed beneath the slab. A four-inch layer of ¾" by #4 gravel or crushed stone should underlie the moisture retarder. To protect the membrane during steel and concrete placement, a maximum two-inch layer of coarse sand should be placed over the moisture retarder.

Alternatively, a 15-mil vapor retarder (Stego Wrap or equivalent) may be used without the two-inch thick sand cover. However, care should be taken during construction to avoid tearing or puncturing the membrane.

It is recommended that a water-cement ratio not exceeding 0.5 be used for concrete and that the slump not exceed four inches. The slab should be moist-cured for at least five days in accordance with the methods recommended by the American Concrete Institute. On-site quality control should be used to confirm the design conditions.

5.7 Pipe Bedding andThrust Blocks

We recommend that pipes be supported on a minimum of 6 inches of sand, gravel, or crushed rock. The pipe bedding material should be placed around the pipe, without voids, and to an elevation of at least 12 inches above the top of the pipe. The pipe bedding material should be compacted in accordance with the recommendations in the earthwork section of this report.

Thrust forces may be resisted thrust blocks and/or the friction between the pipe and adjacent soil. Thrust blocks may be designed using a passive resistance equal to the pressure developed by a fluid with a density of 300 pcf. A friction value of 0.25 may be used between the pipe and adjacent soil.

5.8 Pavements

We understand that roadways are planned for the proposed development. Recommendations for pavement design are presented below.

Subgrade Preparation

To provide support for pavements, the subgrade soils should be prepared as recommended in the earthwork section. Compaction of the subgrade, including trench backfill, will be important for pavement support. The pavement subgrade should be prepared immediately before placement of the base course. Positive drainage of the paved areas should be provided to

reduce moisture infiltration into the subgrade which can decrease the life of pavements.

Asphalt Concrete

The pavement surface and base thicknesses depend on the expected wheel loads and volume of traffic (TI). Assuming the pavement subgrade will consist of the on-site soils compacted as recommended, the recommended pavement structural sections are presented in the following Table 4.

TABLE 4

Traffic Use	Traffic Index	AC Thickness (inches)	Base Thickness (inches)
Automobile Traffic/Parking	5.0	3	6
Heavy Traffic/Driveways	7.0	4-1/2	8

The pavement sections were designed in accordance with Caltrans criteria, a design R-value of 35, a 20-year design life and the noted Traffic Index. We recommend that the actual R-value of the subgrade soils be confirmed prior to final pavement design.

Portland Cement Concrete

Assuming that the paving subgrade is prepared as recommended, areas subject to medium to heavy traffic (i.e. fire lanes and driveways) may be paved with seven inches of portland cement concrete placed on uniformly compacted subgrade soils.

This pavement section is based on the design procedure from the Portland Cement Association and the recommended subgrade conditions. The design assumes that the pavement will be subjected to truck traffic of less than 25 trucks per day and that the portland cement concrete will have a flexural strength (modulus of rupture) of 600 psi. A modulus of subgrade reaction (k

value) of 180 pci was assumed for the top of the compacted subgrade. It was also assumed that aggregate interlock would be used for control joints. The pavement is based on a theoretical 35-year design life.

Base Course

The base course should meet the specifications for Class II Aggregate Base as defined in Section 26 of the Caltrans Standard Specifications, current edition. Alternatively, the base course could meet the specifications for untreated base materials as defined in the current edition of the Standard Specifications for Public Works Construction ("Greenbook"). The base course should be compacted to at least 95% of the maximum density as evaluated by ASTM D1557.

Alternate Pavement

We understand that consideration is being given to paving with a porous paving product such as Gravelpave or equivalent. If used, it should be placed on subgrade and base compacted as recommended above. The pavement should be placed per the manufacturer's specifications. Six inches or more aggregate base should underlie the pavement in parking areas.

5.9 Corrosive Soils

Sulfate-containing solutions or soil can have a deleterious effect on the in-service performance of concrete. In order to evaluate the foundation environment, samples of site soils were laboratory tested for pH, resistivity, soluble sulfate and chloride.

Based on ACI 18 Building Code and Commentary Table 4.3.1, the sulfate exposure is considered *negligible*. Based on the results of the resistivity and chloride tests, site soil appears to be moderately corrosive to ferrous metals. CTE does not practice in the field of corrosion engineering. Therefore, a corrosion engineer could be consulted to determine the appropriate protection, if any, for metallic improvements in contact with site soils.

Based on the test results, we recommend that consideration be given to using plastic pipe instead of metal. We further recommend that Type II cement be used and that at least a three-inch thick concrete cover be maintained over the reinforcing steel in concrete in contact with the soil.

5.10 Exterior Flatwork

Exterior concrete flatwork should have a minimum thickness of four inches, unless otherwise specified by the project architect. To reduce the potential for distress to exterior flatwork caused by minor settlement of foundation soils, we recommend that such flatwork be installed with crack-control joints at appropriate spacing as desired by the structural engineer. Flatwork, such as driveways, sidewalks, and architectural features, should be installed with crack control joints. The upper 6 inches of flatwork subgrades should be scarified and compacted in accordance with the earthwork recommendations provided herein. Positive drainage should be established and maintained adjacent to flatwork as per the recommendations of the project civil engineer of record.

5.11 Drainage

Positive drainage should be established around site structures and is defined as drainage away from structures and improvement as recommended by the project civil engineer of record. To facilitate this, the proper use of construction elements such as roof drains, downspouts, earthen and/or concrete swales, sloped external slabs-on-grade, and subdrains may be employed. The project civil engineer should thoroughly evaluate the on-site drainage and make provisions as necessary to keep surface water from entering structural areas.

5.12 Plan Review

CTE should be authorized to review project grading and foundation plans and the project specifications before the start of earthwork to identify potential conflicts with the recommendations contained in this report.

6.0 LIMITATIONS

The recommendations provided in this update report are based on the anticipated construction and the subsurface conditions identified in the referenced reports. The interpolated subsurface conditions should be checked in the field during construction to document that conditions are as anticipated.

Recommendations provided in this update report are based on the understanding and assumption that CTE will provide the observation and testing services for the project. Earthwork should be observed and tested to document that grading activity has been performed according to the recommendations contained within this update report. The project geotechnical engineer should observe foundation excavation and steel and concrete placement.

The geotechnical analyses presented in this report have been conducted according to current engineering practice and the standard of care exercised by reputable geotechnical consultants performing similar tasks in this area. No other warranty, expressed or implied, is made regarding the conclusions, recommendations and opinions expressed in this update report.

Variations may exist and conditions not observed or described in this report may be encountered during construction.

This update report is applicable to the site for a period of three years after the issue date provided the project remains as described herein. Modifications to the standard of practice and

regulatory requirements may necessitate an update to this report prior to the three years from issue.

Our conclusions and recommendations are based on review of referenced reports. If conditions different from those described in this report are encountered, our office should be notified and additional recommendations, if required, will be provided upon request. CTE should review project specifications for earthwork and foundation activities prior to the solicitation of construction bids.

We appreciate this opportunity to be of service on this project. If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Respectfully submitted,
CONSTRUCTION TESTING & ENGINEERING, INC.

Clifford A. Craft, GE #243
Senior Geotechnical Engineer



Vincent J. Patula, CEG #2057
Senior Engineering Geologist



APPENDIX A

REFERENCES

REFERENCES

1. Blake, T. F., 2000a, "EQFAULT," Version 3.0, A Computer Program for the Deterministic Prediction of Peak Horizontal Acceleration from Digitized California Faults.

2. Blake, T. F., 2000b, FRISKSP, Version 4.00, A Computer program for Determining the Probabilistic Horizontal Accelerations.

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4. California Department of Transportation (Caltrans), Standard Specifications, Latest Edition.

5. California Division of Mines and Geology, 1997, "Guidelines for Evaluating and Mitigating Seismic Hazards in California," Special Publication 117.

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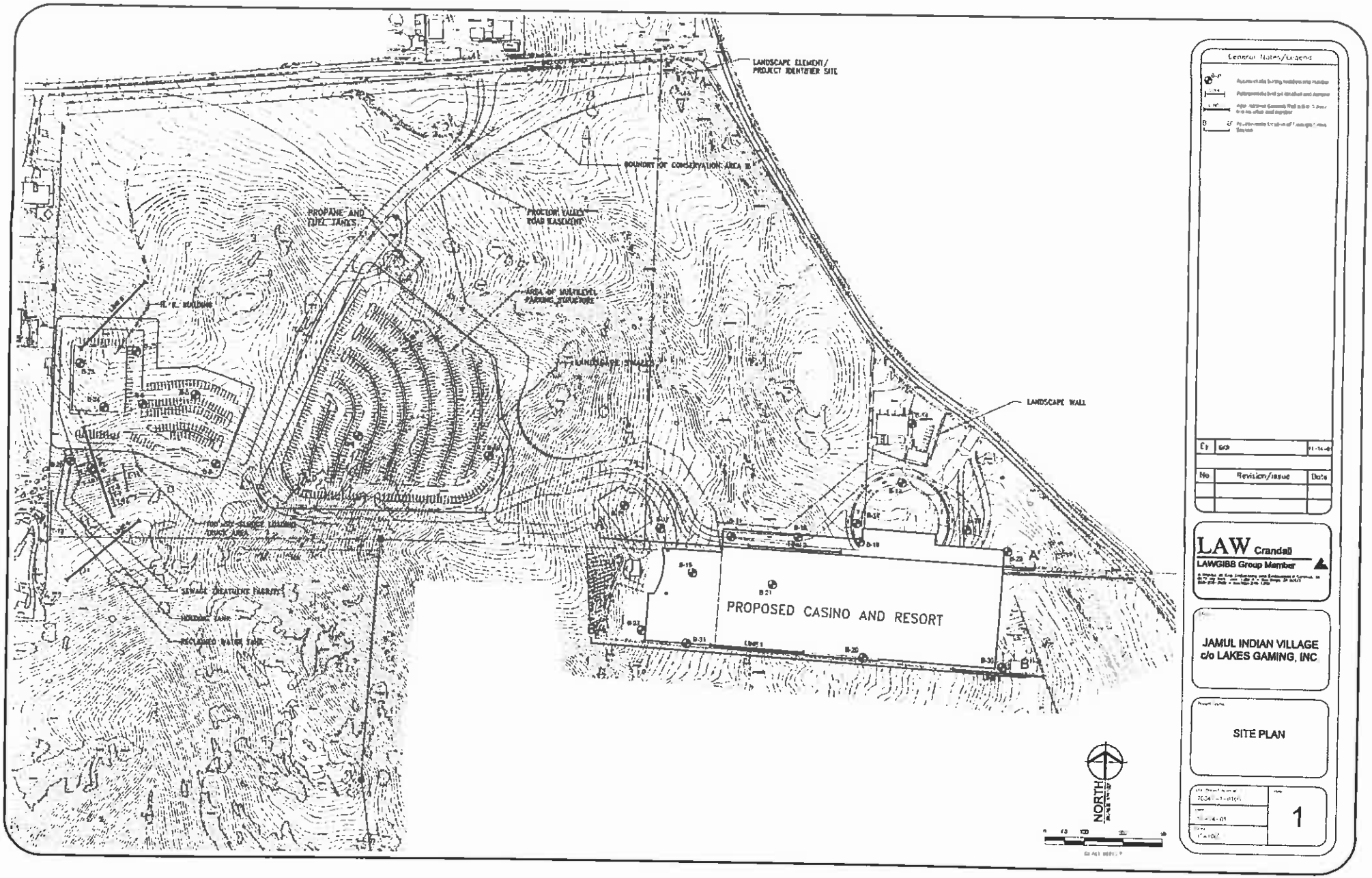
16. Whitman, Robert V., 1991, "Seismic Design o f Earth Retaining Structures," in Proceedings, Second Internation Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics, St. Louis, Missouri.

17. Wood, J.H. 1973, Earthquake-Induced Soil Pressures on Structures, Report EERL 73-05. Pasadena: California Institute of Technology

APPENDIX B

FIELD AND LABORATORY DATA



General Notes/Legend

By		

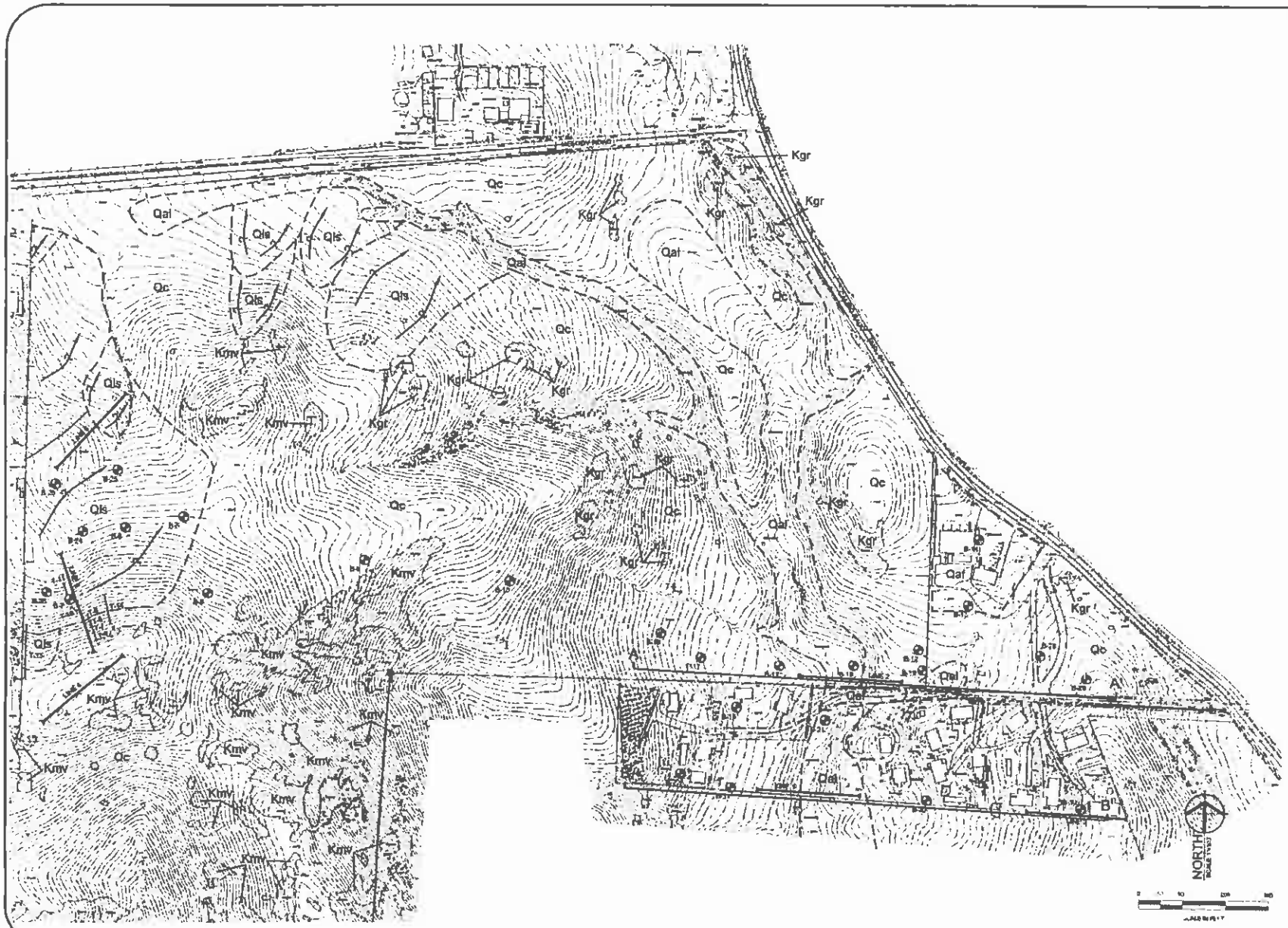
No	Revision/Issue	Date

LAW Crandall
LAWGIBB Group Member

JAMUL INDIAN VILLAGE
c/o LAKES GAMING, INC

SITE PLAN

1



General Notes/Legend

No.	Revision/Issue	Date

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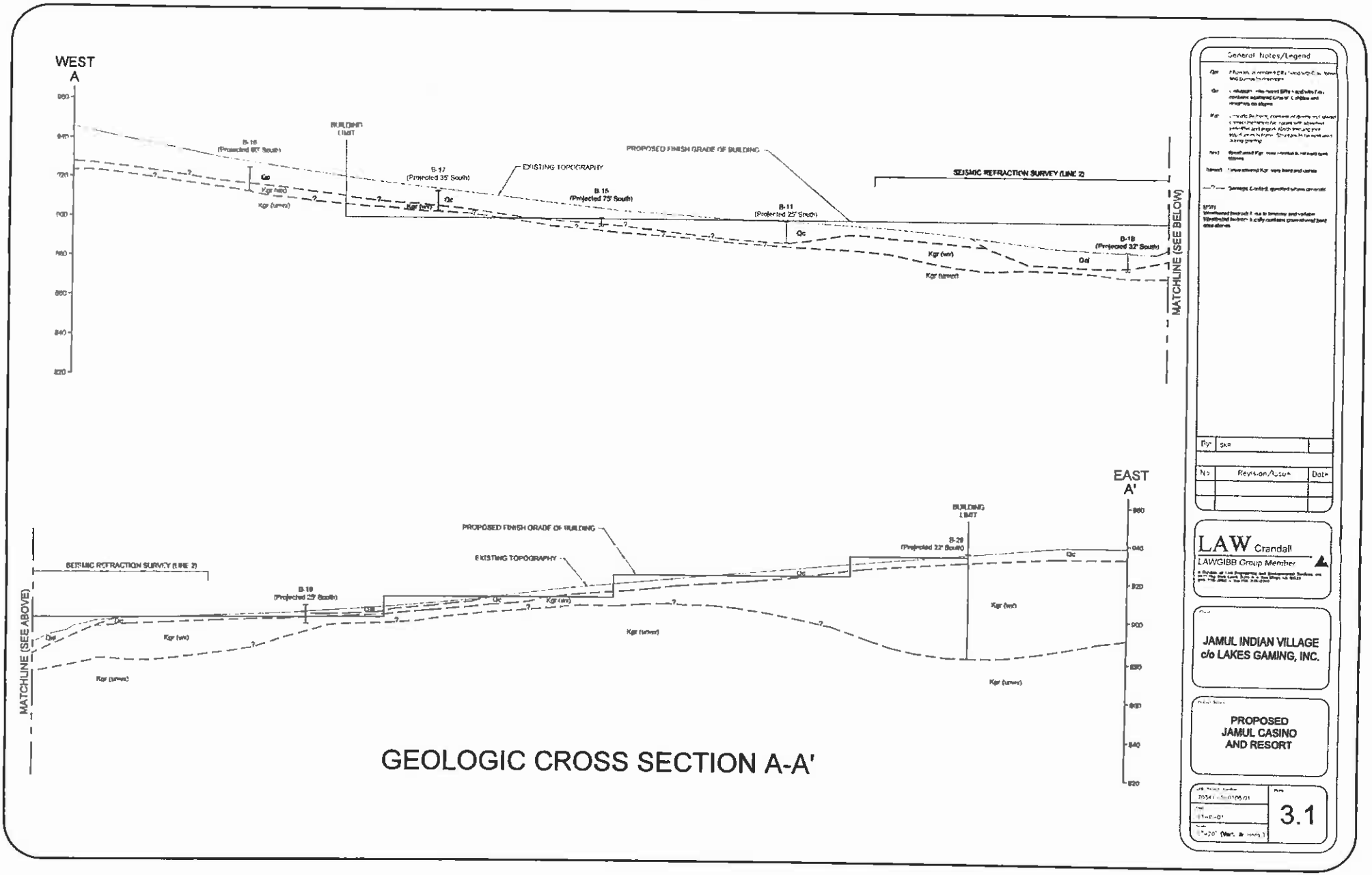
LAWGIBB Group Member

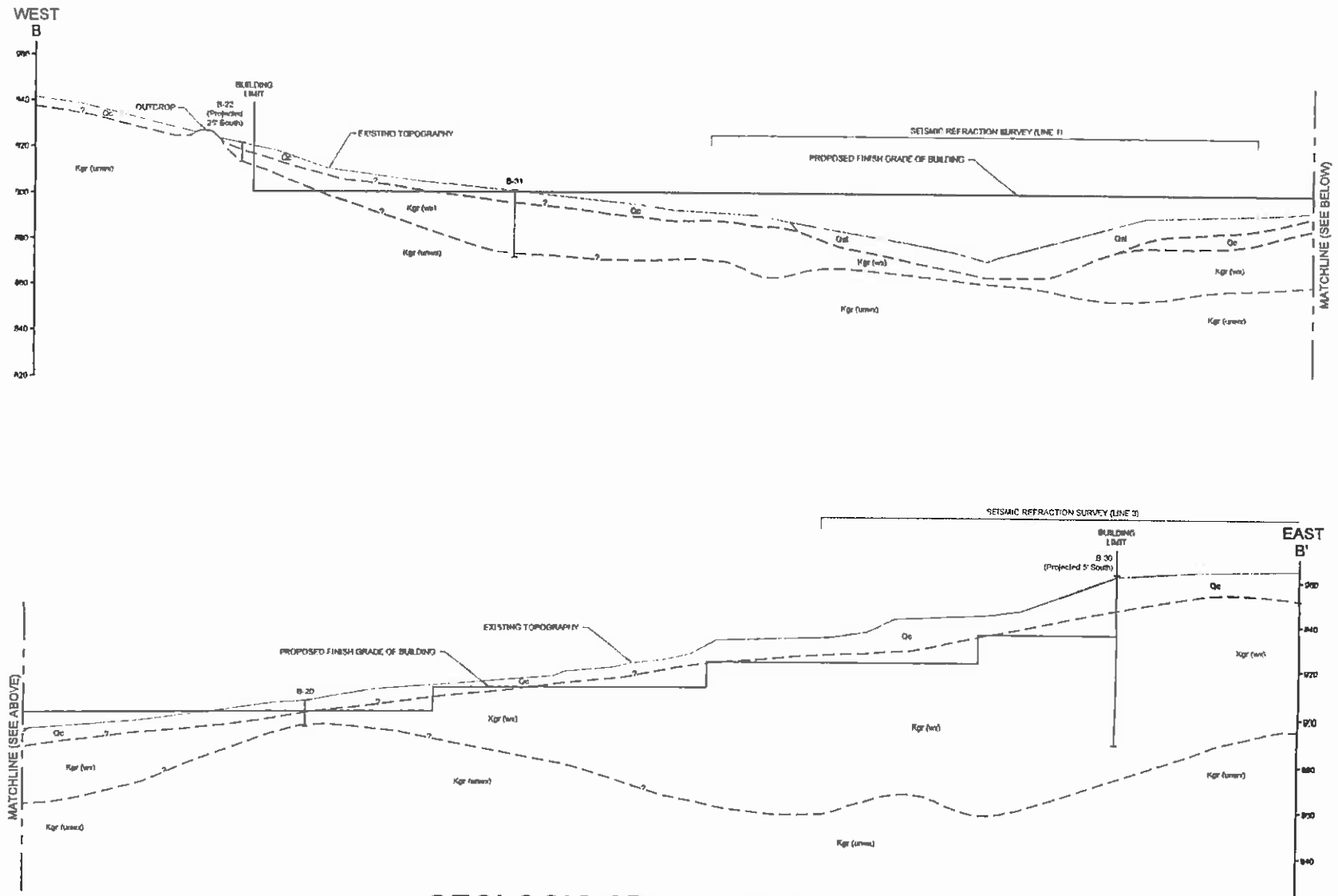
JAMUL INDIAN VILLAGE
c/o LAKES GAMING, INC

GEOLOGIC MAP

2



GEOLOGIC CROSS SECTION A-A'



GEOLOGIC CROSS SECTION B-B'

General Notes/Legend

No	Revision/Issue	Date

LAW Crandall
LAWGIBB Group Member

JAMUL INDIAN VILLAGE
c/o LAKES GAMIN, INC

PROPOSED
JAMUL CASINO
AND RESORT

3.2

 Crandall Sampler

 No Recovery

 Standard Penetration Test (SPT) Sampler

 Bulk Sample

 Shelby Tube Sampler

- #200 = % Passing No. 200 Sieve

LL = Liquid Limit

PI = Plasticity Index

ND = Not Detected

TV = Torvane

PP = Pocket Penetrometer

Blow Count - Number of blows required to drive the Crandall or SPT sampler 12 inches using a 140 pound hammer falling 30 inches.

KEY TO BORINGS

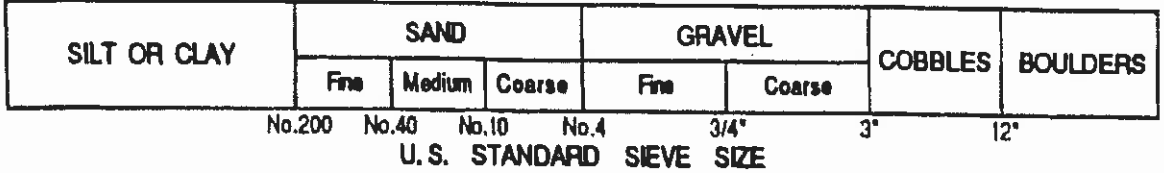
LAW/CRANDALL

FIGURE A - 2.1

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel - sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel - sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel - sand - silt mixtures.
			GC	Clayey gravels, gravel - sand - clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand - silt mixtures.
			SC	Clayey sands, sand - clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS



UNIFIED SOIL CLASSIFICATION SYSTEM

Reference:
The Unified Soil Classification System, Corps of Engineers, U.S. Army
Technical Memorandum No. 3-357, Vol. 1, March, 1953 (Revised April, 1960)

LAW/CRANDALL

FIGURE A-2.2

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 1

DATE DRILLED: October 5, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 989

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
		4.7	--			SM	COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, brown, dry
							reddish brown
985		5.7	98	26		SM	slightly moist RESIDUAL SOIL - SILTY SAND - fine to medium, translocated Clay, soil development, mottled light brownish gray and red (oxidized)
	5	3.2	119	74			
980		3.0	--	50 for 5"	⊠		disturbed sample
	10						BEDROCK
		4.2	120	50 for 5"			DIORITE - highly weathered and oxidized, light brownish gray
975							fine grained crystals, light gray
	15	1.7	--	50 for 5"			dark gray, very hard
970		--	--	50 for 0"	⊠		no recovery - sampler bouncing on hard bedrock
	20						Boring terminated at a depth of 20 feet. Ground water or water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.1

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 2

DATE DRILLED: October 5, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 979

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
						SM	COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, brown, dry
							reddish brown
975		6.6	112	62		SM	RESIDUAL SOIL - SILTY SAND - fine to medium, translocated Clay, porous, soil development, reddish brown
	5						
		9.7	101	72 for 10"			mottled light brownish gray and red (oxidized)
970		8.4	104	85 for 10"			
	10						BEDROCK
							DIORITE - highly weathered and fractured, light brownish gray and oxidized
		0.5	--	50 for 1"			disturbed sample
965							
	15						
		3.3	115	50 for 4"			less weathered and fractured
960							
	20	4.4	120	50 for 2"			very hard drilling
							Boring terminated at a depth of 20.5 feet. Ground water or water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.2

BORING 3

DATE DRILLED: October 5, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 948

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
		11.4	–			SM	COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, red, dry
945		10.1	109	37		SM	RESIDUAL SOIL - SILTY SAND - fine to medium, dark brown, slightly moist
	5						BEDROCK DIORITE - fine grained crystals, mostly dark minerals, very hard drilling

Boring terminated at a depth of 5.5 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.3

JOB Z0341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 4

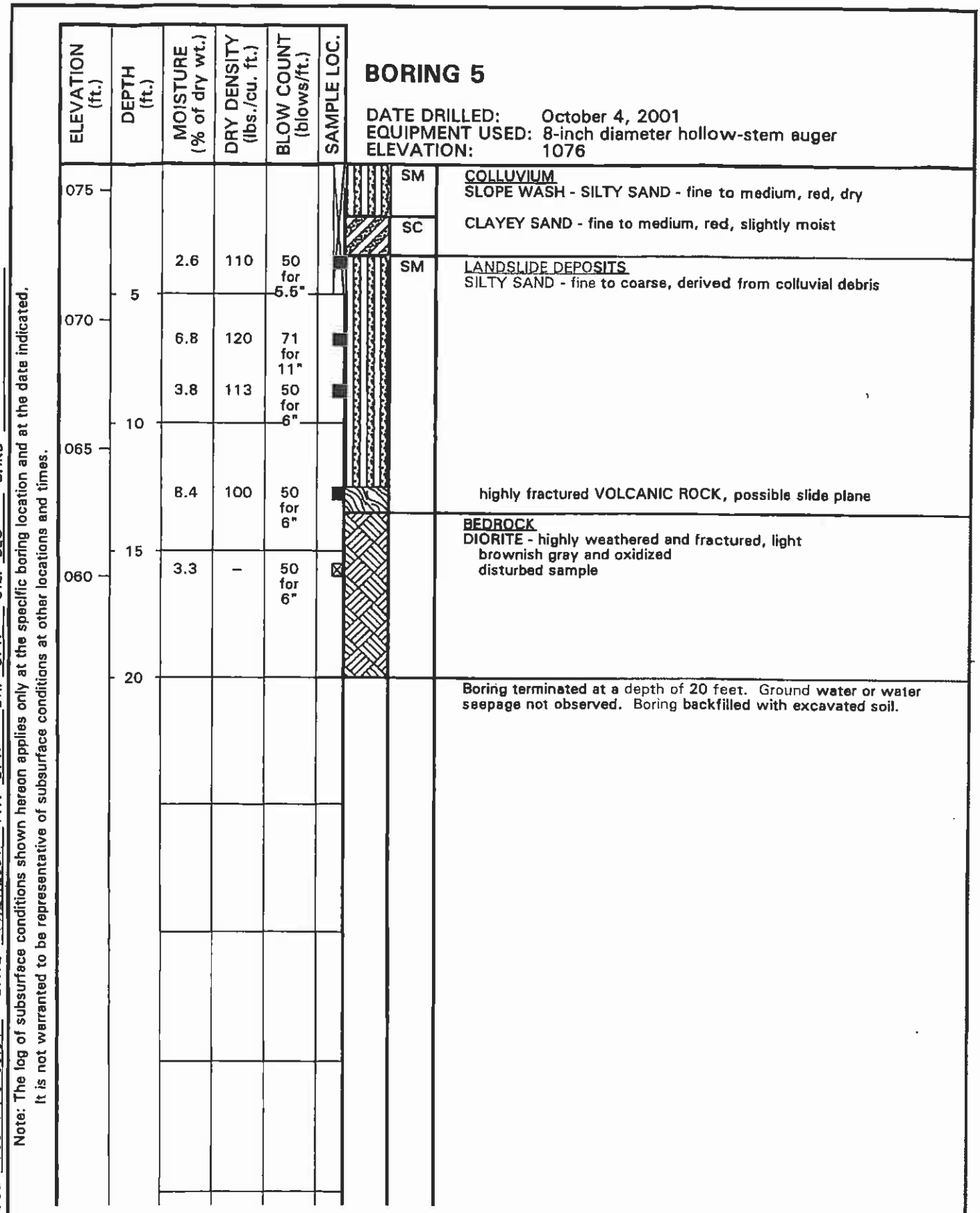
DATE DRILLED: October 5, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 1001

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
1000		2.2	–			SM	COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, light brown, dry
		2.7	106	21			reddish brown
	5						
995		6.1	113	68 for 11"		SM	RESIDUAL SOIL - SILTY SAND - fine to medium, translocated Clay, porous, soil development, light brownish gray, slightly moist
		4.5	117	90 for 9"			BEDROCK DIORITE - highly weathered and fractured, light brownish gray and oxidized
	10						Boring terminated at a depth of 10 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.4



JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.5

BORING 6

DATE DRILLED: October 4, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 1080

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
		4.1	--			SM	COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, red, dry
		5.0	137	47		SM	LANDSLIDE DEPOSITS SILTY SAND - fine to medium, derived from colluvial debris highly fractured VOLCANIC ROCK layer from 4.5 feet to 7 feet
1075	5						highly weathered GRANITIC ROCK layer
		--	--	50 for 0"			no recovery
1070	10						
		--	--	50 for 2"			no recovery, possible slide plane
1065	15						BEDROCK DIORITE - highly weathered and fractured, light brownish gray and oxidized disturbed sample
		--	--	50 for 2"			

Boring terminated at a depth of 17 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LAW/CRANDALL

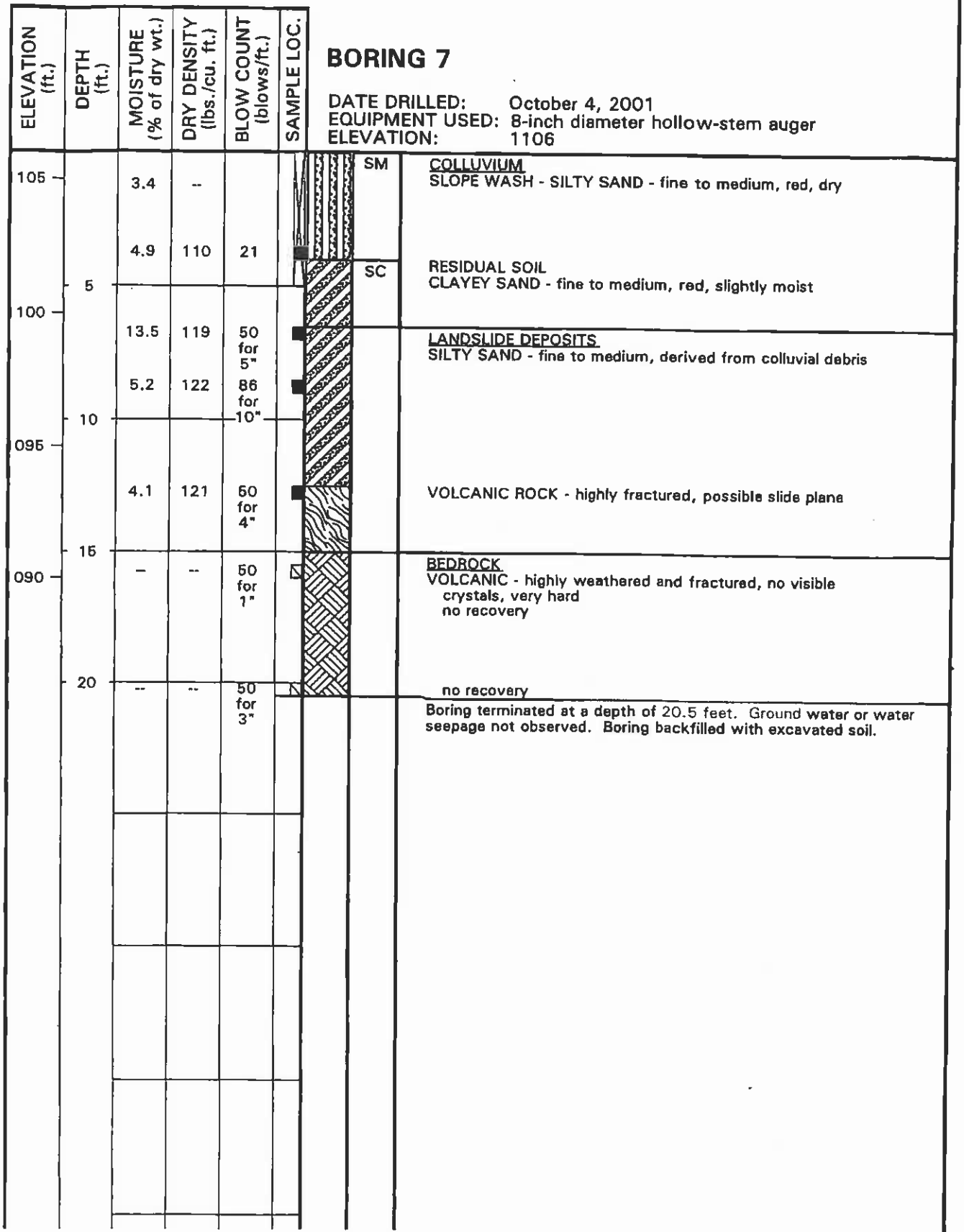
FIGURE A-1.6

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 7

DATE DRILLED: October 4, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 1106



COLLUVIUM
SLOPE WASH - SILTY SAND - fine to medium, red, dry

RESIDUAL SOIL
CLAYEY SAND - fine to medium, red, slightly moist

LANDSLIDE DEPOSITS
SILTY SAND - fine to medium, derived from colluvial debris

VOLCANIC ROCK - highly fractured, possible slide plane

BEDROCK
VOLCANIC - highly weathered and fractured, no visible crystals, very hard
no recovery

no recovery

Boring terminated at a depth of 20.5 feet. Ground water or water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.7

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 8

DATE DRILLED: October 4, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 1098

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.	
095		6.3	122	21		SM — COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, red, dry
	5					SM — RESIDUAL SOIL - SILTY SAND - very fine to fine, trace Clay, mottled brown and light greenish gray, slightly moist
		8.5	110	84 for 9"		
090		4.5	112	50 for 6"		BEDROCK DIORITE - highly weathered and fractured, light brownish gray and oxidized
	10					
085		4.5	124	50 for 6"		very hard drilling

Boring terminated at a depth of 13 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

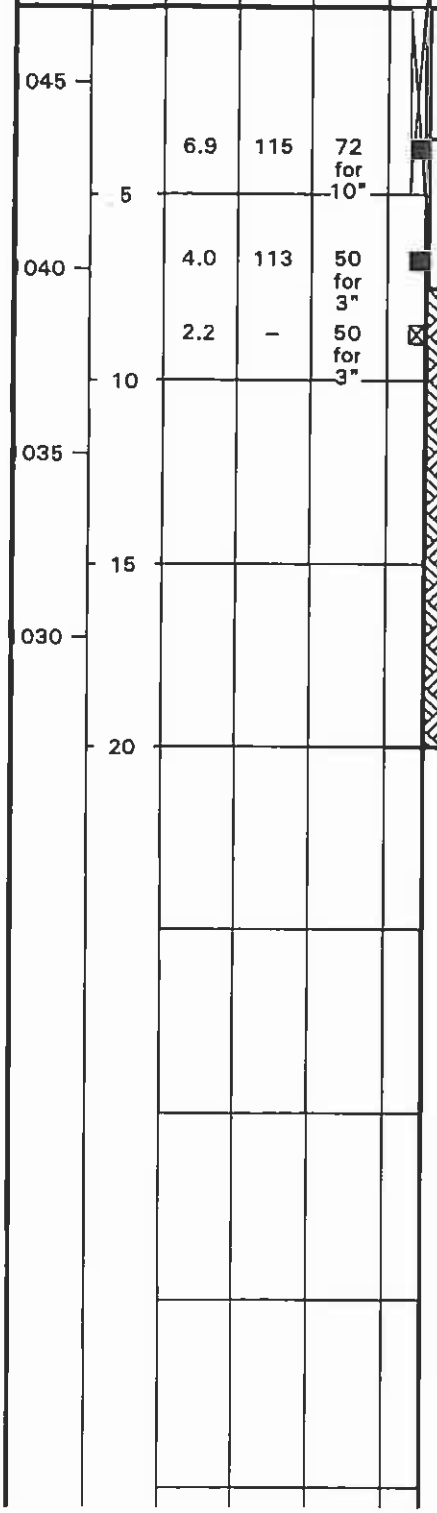
LOG OF BORING

LAW/CRANDALL

FIGURE A-1.8

BORING 9

DATE DRILLED: October 3, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 1047



SM

COLLUVIUM
SLOPE WASH - SILTY SAND - fine to medium, red, dry

reddish brown, some charcoal

SM

RESIDUAL SOIL - SILTY SAND - very fine to fine, trace Clay, mottled brown and light greenish gray, slightly moist

BEDROCK
DIORITE - highly weathered and fractured, light brownish gray and oxidized
disturbed sample

very hard drilling

Boring terminated at a depth of 20 feet. Ground water or water seepage not observed. Boring backfilled with excavated soil.

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.9

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 10

DATE DRILLED: October 3, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 1003

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
		2.8	--			SM	COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, reddish brown, dry
000		4.2	107	38		SM	RESIDUAL SOIL - SILTY SAND - very fine to fine, trace Clay, mottled brown and light greenish gray, slightly moist
	5	--	--	86 for 9"			BEDROCK DIORITE - highly weathered and fractured, light brownish gray and oxidized no recovery
995		2.0	123	50 for 3"			
	10						
990		3.1	126	50 for 9"			very hard drilling
	15	--	--	50 for 1"			no recovery
985							
	20						Boring terminated at a depth of 20 feet. Ground water or water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.10

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 11

DATE DRILLED: October 3, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 899

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.	
		2.9	--			SM — COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, reddish brown, dry
895	5	4.0	108	44		SM — RESIDUAL SOIL - SILTY SAND - fine to medium, translocated Clay, porous, soil development, some charcoal, light brownish gray, slightly moist
		11.2	115	58		Volcanic Rock residuum, trace Clay, mottled light brown and greenish gray
890	10	--	--	43		
						BEDROCK DIORITE - highly weathered and fractured, light brownish gray and oxidized

Boring terminated at a depth of 10.5 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.11

BORING 12

DATE DRILLED: October 2, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 909

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
		10.7	--			SM	COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, reddish brown, dry
905	5	11.5	113	47		SM	mostly fine Sand RESIDUAL SOIL - SILTY SAND - fine to medium, translocated Clay, porous, soil development, some charcoal, light brownish gray, slightly moist denser, hard drilling
		10.4	114	77			
900	10	9.7	114	42			BEDROCK DIORITE - highly weathered, hard, light gray, black, and red (oxidized) some wet Clay on outside of sampler, water seepage
							Boring terminated at a depth of 10 feet due to drilling refusal on bedrock. Some water seepage observed at 8.5 feet. Boring backfilled with excavated soil.

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.12

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 13

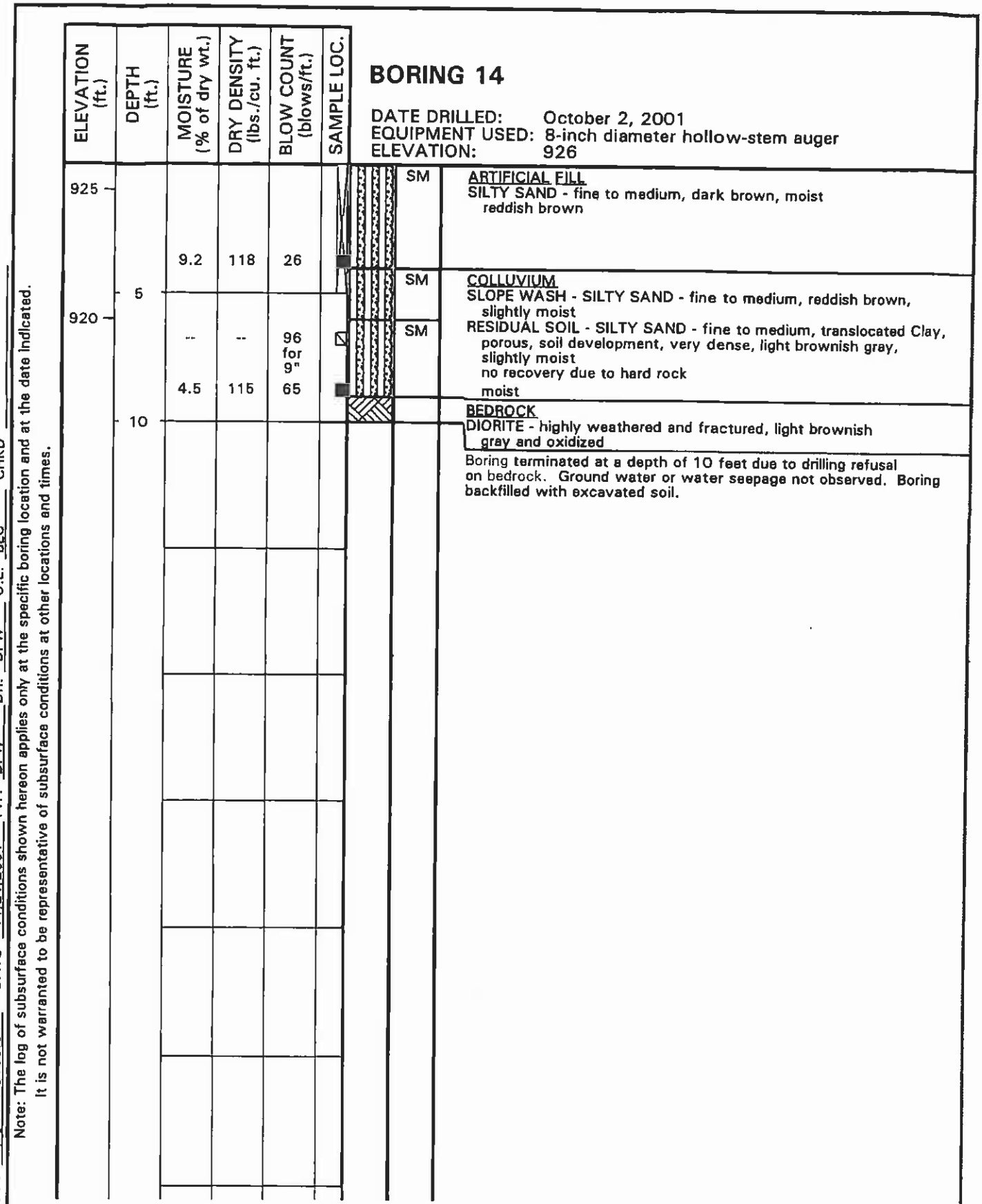
DATE DRILLED: October 2, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 918

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
915	0	3.9	120	90		SM	ARTIFICIAL FILL SILTY SAND - fine to medium, trace construction debris, reddish brown, dry
	5	3.5	122	70 for 10"			BEDROCK DIORITE - fine grained crystals, mostly dark minerals, very hard drilling, light gray, black, and red (oxidized) less weathered and oxidized
910		–	--	50 for 2"			no recovery
	10						
905							
	15						Boring terminated at a depth of 16 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.13



JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.14

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 15

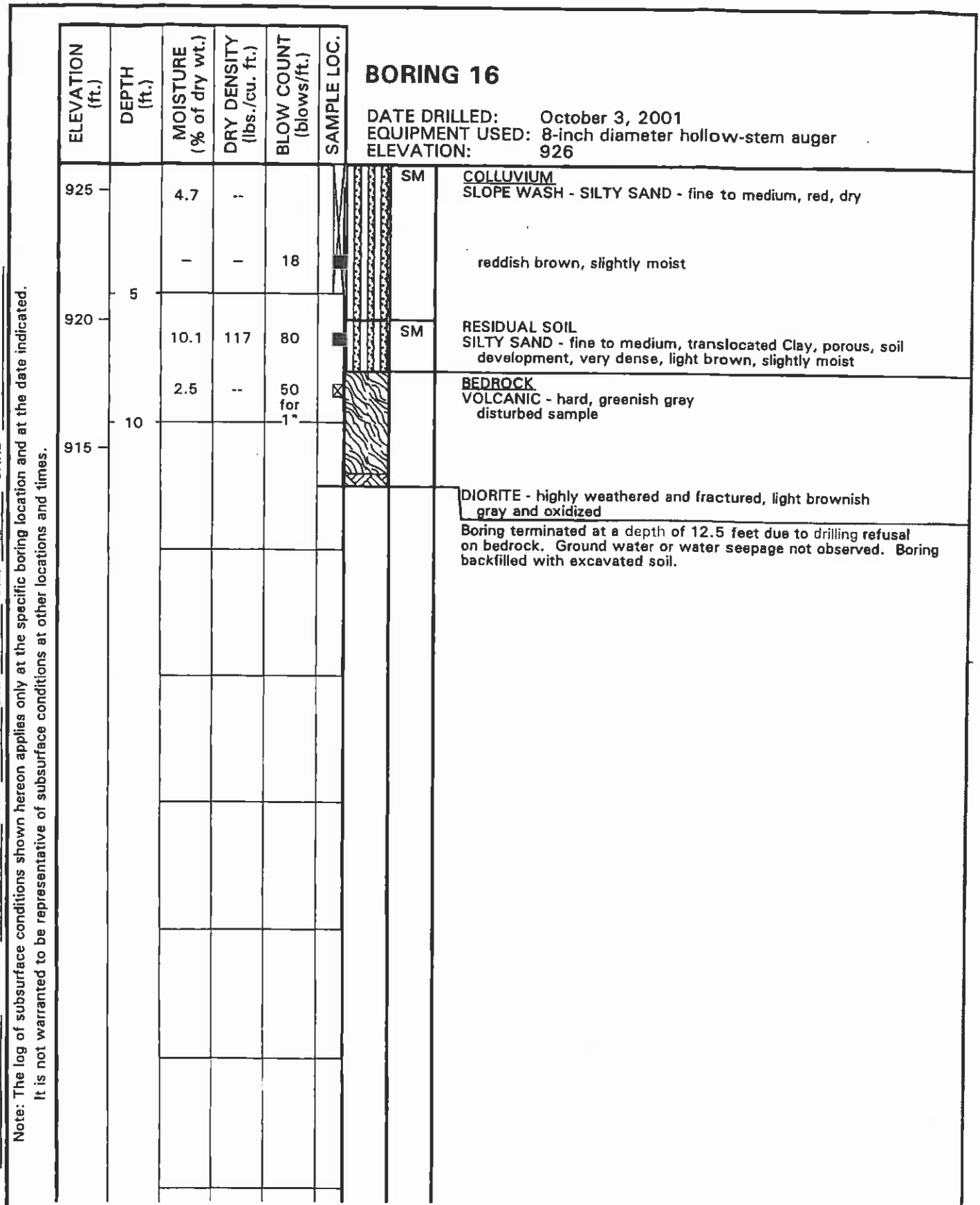
DATE DRILLED: October 1, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 900

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
		2.2	--			SM	1" Conrete veneer COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, reddish brown, slightly moist
		4.3	127	64 for 11"			BEDROCK DIORITE - hard, light gray and black
							Boring terminated at a depth of 4 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.15



JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

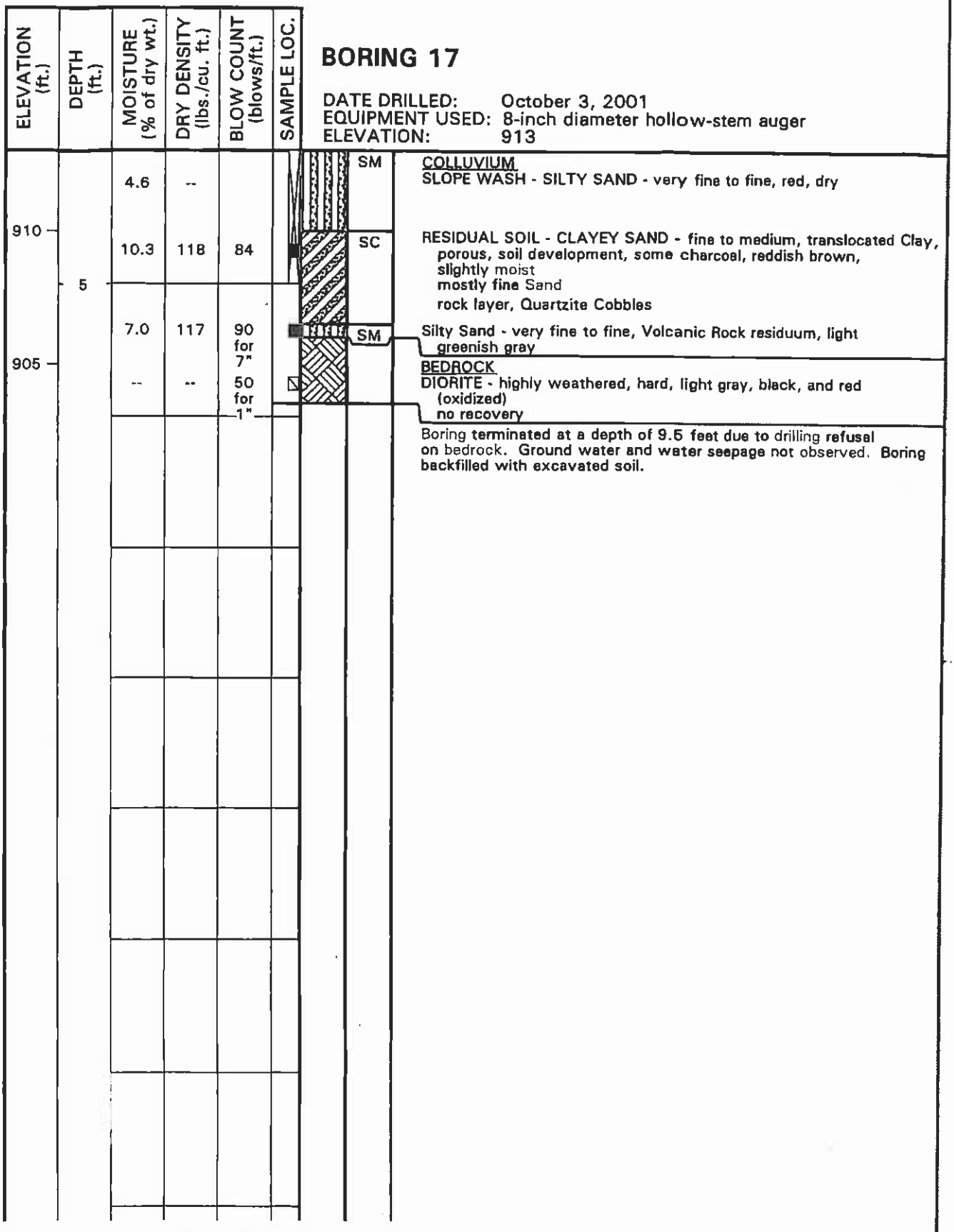
LOG OF BORING

LAW/CRANDALL

FIGURE A-1.16

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.



BORING 17

DATE DRILLED: October 3, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 913

COLLUVIUM
SLOPE WASH - SILTY SAND - very fine to fine, red, dry

RESIDUAL SOIL - CLAYEY SAND - fine to medium, translocated Clay, porous, soil development, some charcoal, reddish brown, slightly moist
mostly fine Sand
rock layer, Quartzite Cobbles

Silty Sand - very fine to fine, Volcanic Rock residuum, light greenish gray

BEDROCK
DIORITE - highly weathered, hard, light gray, black, and red (oxidized)
no recovery

Boring terminated at a depth of 9.5 feet due to drilling refusal on bedrock. Ground water and water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.17

BORING 18

DATE DRILLED: October 2, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 885

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
		4.5	--			SM	ALLUVIUM SILTY SAND - fine to coarse, unconsolidated, reddish brown, slightly moist
		7.2	95	7			
880	5						
		7.2	99	14			rock layer, Quartzite Cobbles
		--	--	56			BEDROCK DIORITE - highly weathered and fractured, light brownish gray and oxidized
875	10						Boring terminated at a depth of 10 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

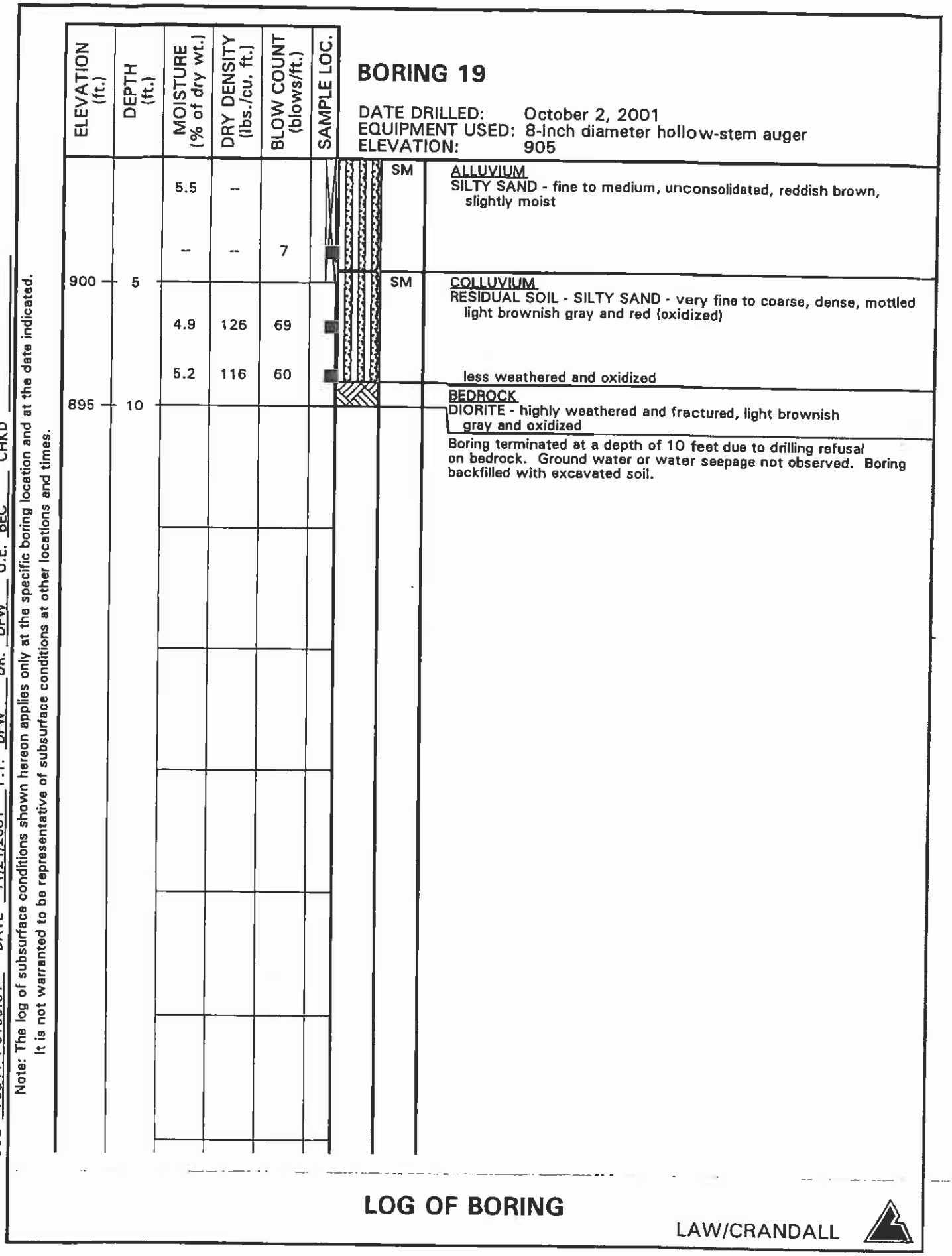
JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.18



LOG OF BORING

LAW/CRANDALL

FIGURE A-1.19

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 20

DATE DRILLED: October 1, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 904

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
						SM	COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, trace Gravel, reddish brown, slightly moist
900	5	10.8	122	32		SM	RESIDUAL SOIL - SILTY SAND - fine, some Clay, white mineral growths, dense, mottled light brownish gray and red (oxidized), slightly moist harder drilling, less oxidized
		--	--	85 for 11"			BEDROCK DIORITE - highly weathered and fractured, very hard, light gray and black
895	10	6.1	115	94 for 10"			less weathered
							Boring terminated at a depth of 10 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.20

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 21

DATE DRILLED: October 1, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 882

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.	
		6.2	--			SM
880		13.3	113	9		
	5					SC
875		13.3	116	13		
		14.5	115	33		SC
	10					
870		14.4	119	35		
	15					
		13.2	114	50 for 4"		
865						

ALLUVIUM
SILTY SAND - fine to medium, some rootlets, reddish brown, dry

some Clay, organic odor, dark brown, moist

CLAYEY SAND - fine to medium, some Silt, dark brown, moist

layer of Dioritic Cobbles

COLLUVIUM
RESIDUAL SOIL - CLAYEY SAND - fine to medium, reddish brown, moist

BEDROCK
DIORITE - fine grained crystals, mostly dark minerals, highly weathered and oxidized, light brownish gray

Boring terminated at a depth of 17.5 feet due to drilling refusal on bedrock. Ground water observed at 13.5 feet. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.21

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 22

DATE DRILLED: October 1, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 926

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
925		1.0	--			SM	COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, reddish brown, dry
		-	--	90 for 9"			no recovery due to hard bedrock BEDROCK DIORITE - highly weathered and fractured, very hard, light gray and black
	5						
920							less weathered
							Boring terminated at a depth of 8 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.22

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHK'D

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 23

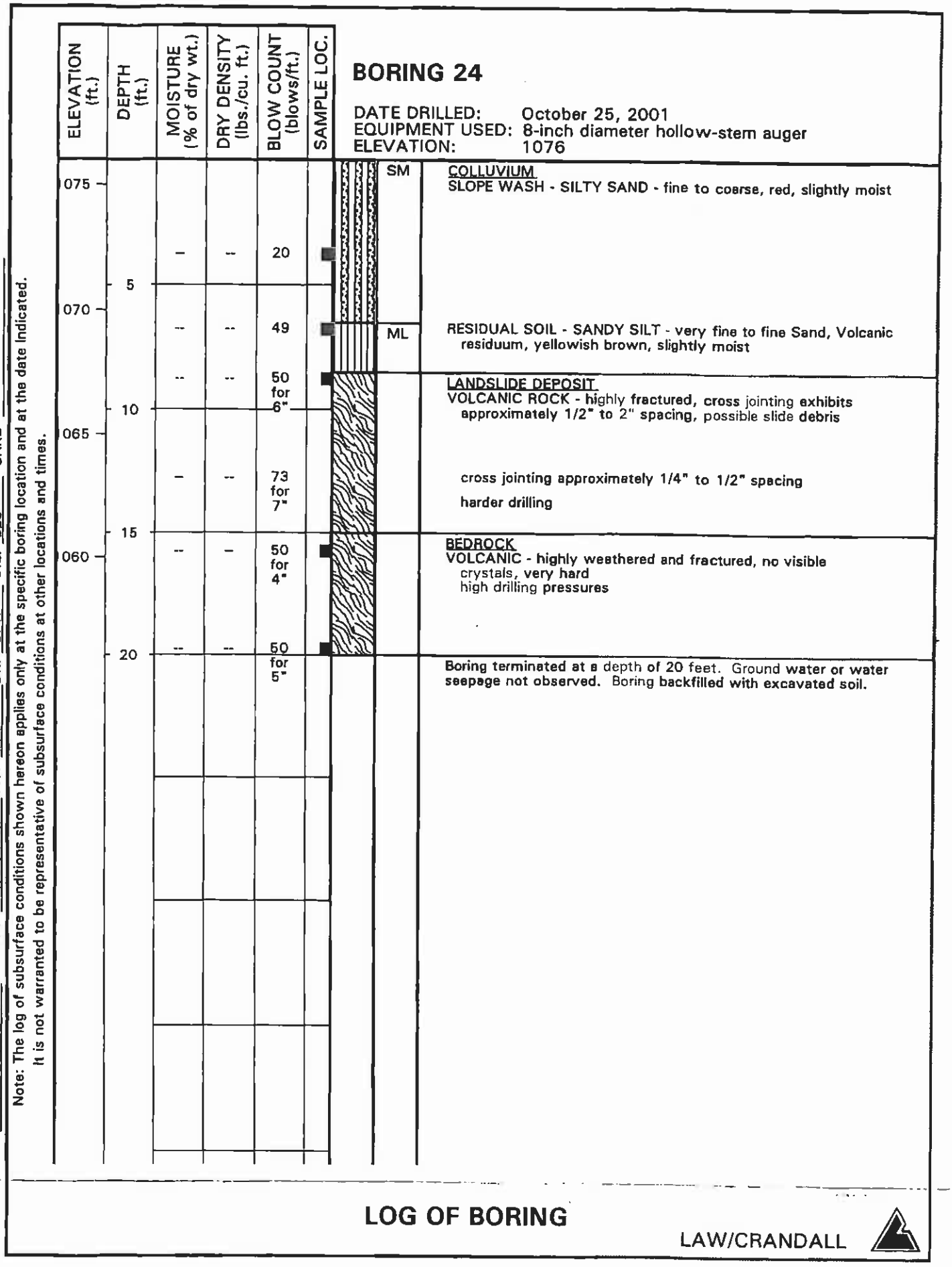
DATE DRILLED: October 25, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 1070

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
		--	--	23	■	SM / CL	COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, red, slightly moist RESIDUAL SOIL - SILTY CLAY - trace fine Sand, reddish brown, slightly moist
065	5						harder drilling
		–	–	50 for 4"	▨		BEDROCK VOLCANIC - highly weathered and fractured, very hard, gray and greenish gray no recovery
		--	--	50 for 5"	▨		no recovery
060	10						Boring terminated at a depth of 10 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.23



LOG OF BORING

LAW/CRANDALL

FIGURE A-1.24

BORING 25

DATE DRILLED: October 25, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 1058

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.	
055	5	--	--	47	■	SM — COLLUVIUM SLOPE WASH - SILTY SAND - fine to medium, red, slightly moist
						ML — RESIDUAL SOIL - CLAYEY SILT - trace fine Sand, Volcanic residuum, yellowish brown, slightly moist
		--	--	72 for 9"	■	LANDSLIDE DEPOSIT VOLCANIC ROCK - highly fractured, cross jointing exhibits approximately 1/2" to 1" spacing, possible slide debris
050		--	--	50 for 5"	□	no recovery
	10					BEDROCK VOLCANIC - highly weathered and fractured, no visible crystals, very hard

Boring terminated at a depth of 10 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

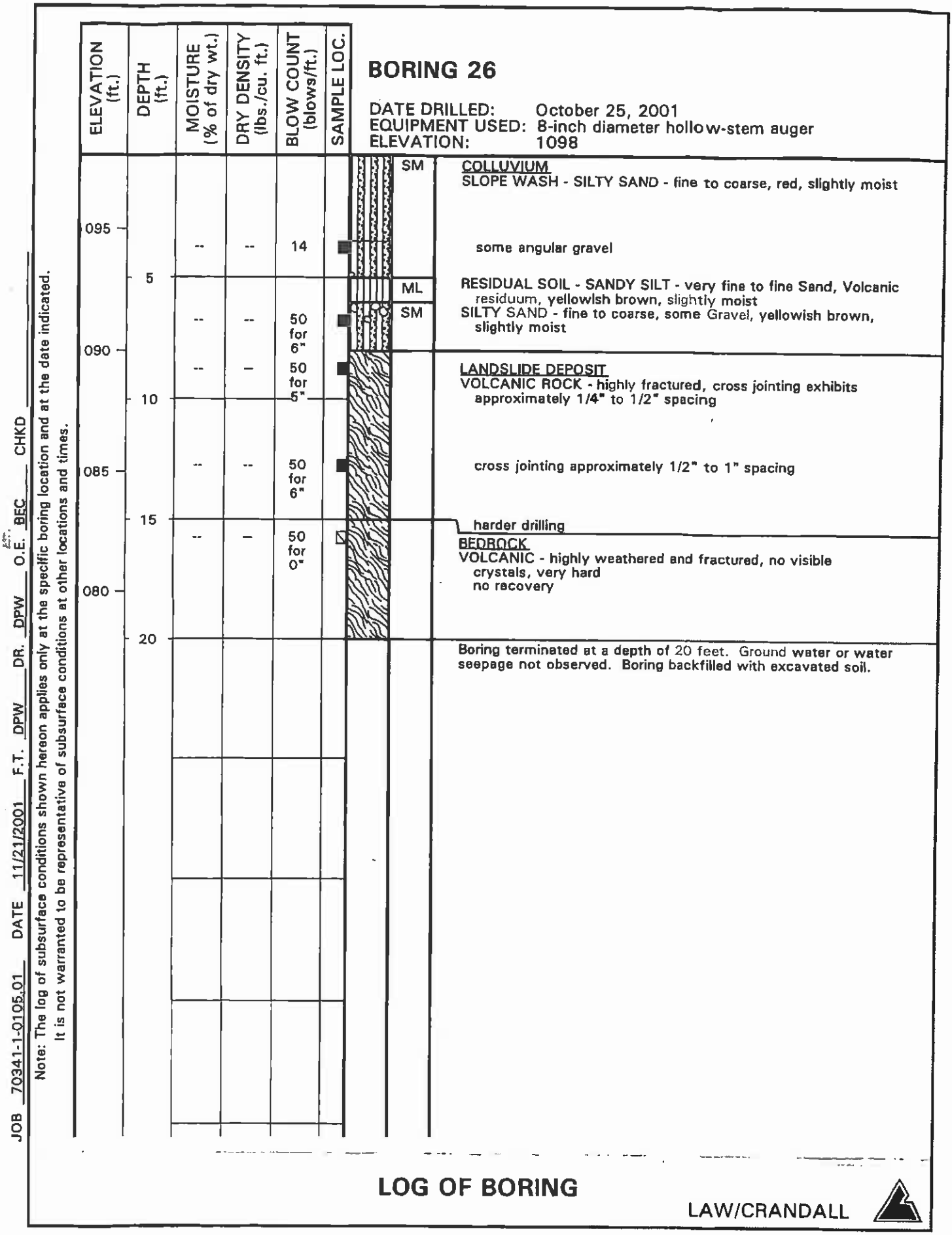
JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.25



LOG OF BORING

LAW/CRANDALL

FIGURE A-1.26

JOB 70341-1-0105.01 DATE 11/21/2001 F.T. DPW DR. DPW O.E. BEC CHKD

Note: The log of subsurface conditions shown hereon applies only at the specific boring location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING 27

DATE DRILLED: October 25, 2001
EQUIPMENT USED: 8-inch diameter hollow-stem auger
ELEVATION: 1021

ELEVATION (ft.)	DEPTH (ft.)	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	BLOW COUNT (blows/ft.)	SAMPLE LOC.		
020						SM	COLLUVIUM - Slope Wash SLOPE WASH - SILTY SAND - fine to coarse, red, dry
		--	--	43		SM	RESIDUAL SOIL - SILTY SAND and highly weathered and fractured bedrock Cobbles, yellowish brown
	5						BEDROCK DIORITE - fine grained crystals, mostly dark minerals, very hard drilling

Boring terminated at a depth of 5.5 feet due to drilling refusal on bedrock. Ground water or water seepage not observed. Boring backfilled with excavated soil.

LOG OF BORING

LAW/CRANDALL

FIGURE A-1.27

LAW/CRANDALL
Engineering and Environmental Services

Project:	Proposed Jamul Indian Casino & Resort	**Date:**	November 2, 2001
Station ID:	B-28	**Report By:**	D. Walsh
Elevation:	926	**G.W. Level**	N/A
Crew:	Wayne/Glenn (MJ Baxter)	**Equipment:**	Ingersoll Rand LM 600C

Description of Material Encountered

Depth		Depth	
1 ft		34 ft	
2 ft	Casing from 0-4'	35 ft	
3 ft		36 ft	
4 ft		37 ft	
5 ft		38 ft	
6 ft	Weathered Diorite	39 ft	
7 ft		40 ft	
8 ft	Average Sec/Ft - 5.8	41 ft	
9 ft		42 ft	
10 ft		43 ft	
11 ft		44 ft	
12 ft		45 ft	
13 ft		46 ft	
14 ft	Weathered Diorite	47 ft	
15 ft		48 ft	
16 ft	Average Sec/Ft - 5.4	49 ft	
17 ft		50 ft	
18 ft		51 ft	
19 ft		52 ft	
20 ft		53 ft	
21 ft		54 ft	
22 ft		55 ft	
23 ft		56 ft	
24 ft		57 ft	
25 ft	Weathered Diorite	58 ft	
26 ft	Average Sec/Ft - 7.3	59 ft	
27 ft		60 ft	
28 ft		61 ft	
29 ft		62 ft	
30 ft		63 ft	
31 ft	Boring Terminated at 30 feet	64 ft	
32 ft		65 ft	
33 ft		66 ft	

LAW/CRANDALL
Engineering and Environmental Services

Project:	Proposed Jamul Indian Casino & Resort	**Date:**	November 2, 2001
Station ID:	B-29	**Report By:**	D. Walsh
Elevation:	937	**G.W. Level**	N/A
Crew:	Wayne/Glenn (MJ Baxter)	**Equipment:**	Ingersoll Rand LM 600C

Description of Material Encountered

Depth		Depth	
1 ft		34 ft	
2 ft		35 ft	
3 ft	Casing from 0-5'	36 ft	
4 ft		37 ft	
5 ft		38 ft	
6 ft		39 ft	Weathered Diorite
7 ft	Weathered Diorite	40 ft	
8 ft		41 ft	Average Sec/Ft - 6.8
9 ft	Average Sec/Ft - 4.8	42 ft	
10 ft		43 ft	
11 ft		44 ft	
12 ft		45 ft	
13 ft		46 ft	
14 ft	Weathered Diorite	47 ft	
15 ft		48 ft	Weathered Diorite
16 ft	Average Sec/Ft - 5.6	49 ft	
17 ft		50 ft	Average Sec/Ft - 7.4
18 ft		51 ft	
19 ft		52 ft	Suface of Unweathered Diorite
20 ft		52 ft	Boring terminated at 52 feet.
21 ft		54 ft	
22 ft		55 ft	
23 ft		56 ft	
24 ft		57 ft	
25 ft		58 ft	
26 ft		59 ft	
27 ft	Weathered Diorite	60 ft	
28 ft		61 ft	
29 ft	Average Sec/Ft - 6.4	62 ft	
30 ft		63 ft	
31 ft		64 ft	
32 ft		65 ft	
33 ft		66 ft	

LAW/CRANDALL
Engineering and Environmental Services

Project:	Proposed Jamul Indian Casino & Resort	Date:	November 2, 2001
Station ID:	B-30	Report By:	D. Walsh
Elevation:	962	G.W. Level	N/A
Crew:	Wayne/Glenn (MJ Baxter)	Equipment:	Ingersoll Rand LM 600C

Description of Material Encountered

Depth		Depth	
1 ft		34 ft	
2 ft		35 ft	
3 ft	Casing from 0-5'	36 ft	
4 ft		37 ft	
5 ft		38 ft	
6 ft		39 ft	Weathered Diorite
7 ft	Weathered Diorite	40 ft	
8 ft		41 ft	Average Sec/Ft - 6.9
9 ft	Average Sec/Ft - 4.4	42 ft	
10 ft		43 ft	
11 ft		44 ft	
12 ft		45 ft	
13 ft		46 ft	
14 ft		47 ft	
15 ft	Weathered Diorite	48 ft	
16 ft		49 ft	
17 ft	Average Sec/Ft - 4.7	50 ft	
18 ft		51 ft	Weathered Diorite
19 ft		52 ft	
20 ft		53 ft	
21 ft		54 ft	
22 ft		55 ft	Average Sec/Ft - 6.3
23 ft		56 ft	
24 ft		57 ft	
25 ft		58 ft	
26 ft		59 ft	
27 ft	Weathered Diorite	60 ft	
28 ft		61 ft	Weathered Diorite
29 ft	Average Sec/Ft - 5.4	62 ft	Average Sec/Ft - 6.5
30 ft		63 ft	
31 ft		64 ft	
32 ft		65 ft	
33 ft		71 ft	Boring Terminated at 71 feet.

LAW/CRANDALL
Engineering and Environmental Services

Project:	Proposed Jamul Indian Casino & Resort	**Date:**	November 2, 2001
Station ID:	B-31	**Report By:**	D. Walsh
Elevation:	898	**G.W. Level**	Elevation 970
Crew:	Wayne/Glenn (MJ Baxter)	**Equipment:**	Ingersoll Rand LM 600C

Description of Material Encountered

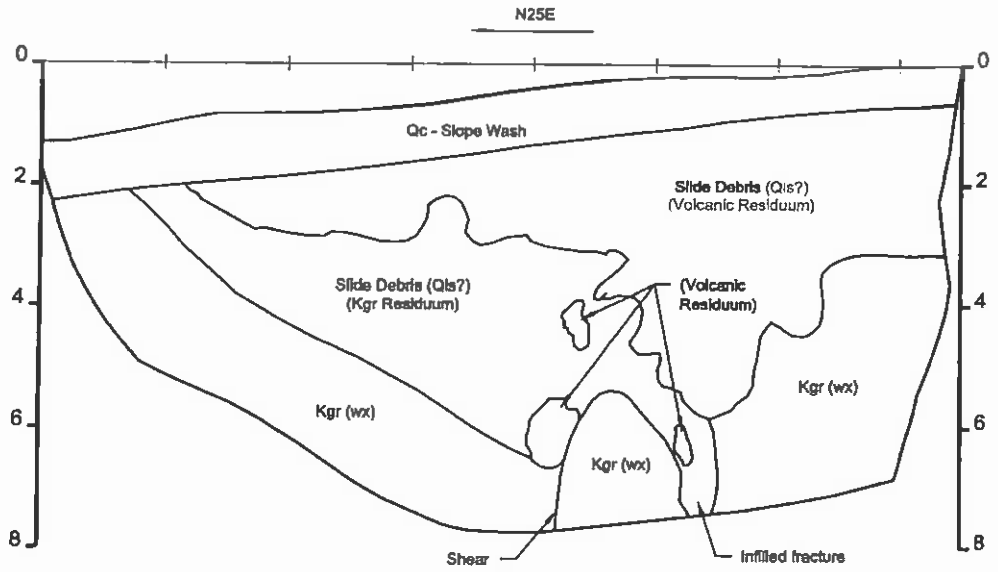
Depth		Depth	
1 ft		34 ft	
2 ft		35 ft	
3 ft	Casing from 0-5'	36 ft	
4 ft		37 ft	
5 ft		38 ft	
6 ft		39 ft	
7 ft	Weathered Diorite	40 ft	
8 ft		41 ft	
9 ft	Average Sec/Ft - 7.6	42 ft	
10 ft		43 ft	
11 ft		44 ft	
12 ft		45 ft	
13 ft		46 ft	
14 ft		47 ft	
15 ft		48 ft	
16 ft	Weathered Diorite	49 ft	
17 ft		50 ft	
18 ft	Average Sec/Ft - 9.9	51 ft	
19 ft		52 ft	
20 ft		53 ft	
21 ft		54 ft	
22 ft		55 ft	
23 ft		56 ft	
24 ft	Weathered Diorite	57 ft	
25 ft		58 ft	
26 ft		59 ft	
27 ft	Average Sec/Ft - 15.4	60 ft	
28 ft	Surface Water of unweathered Diorite	61 ft	
29 ft	Water table perched on unweathered	62 ft	
30 ft	Diorite	63 ft	
30 ft	Boring teminated at 30 feet	64 ft	
32 ft		65 ft	
33 ft		71 ft	

LAW/CRANDALL
Engineering and Environmental Services

Key to Test Pits

Q_c	Slope Wash - unconsolidated silts & sands.
Q_{ls}?	Landslide deposits - Queried as existence not substantiated
Q_c	Residual soil - consolidated silts, clays, & sands with soild development features
Kgr	Plutonic Granitic Bedrock
Kmr	Volcanic & Metavolcanic Bedrock
(wx)	Weathered
(unwx)	Unweathered
———	Geologic contact
----------	(dashed where uncertain)

JOB 70341-1-0105 DATE 11-16-01 DR. SKR O.E. BEC CHKD.

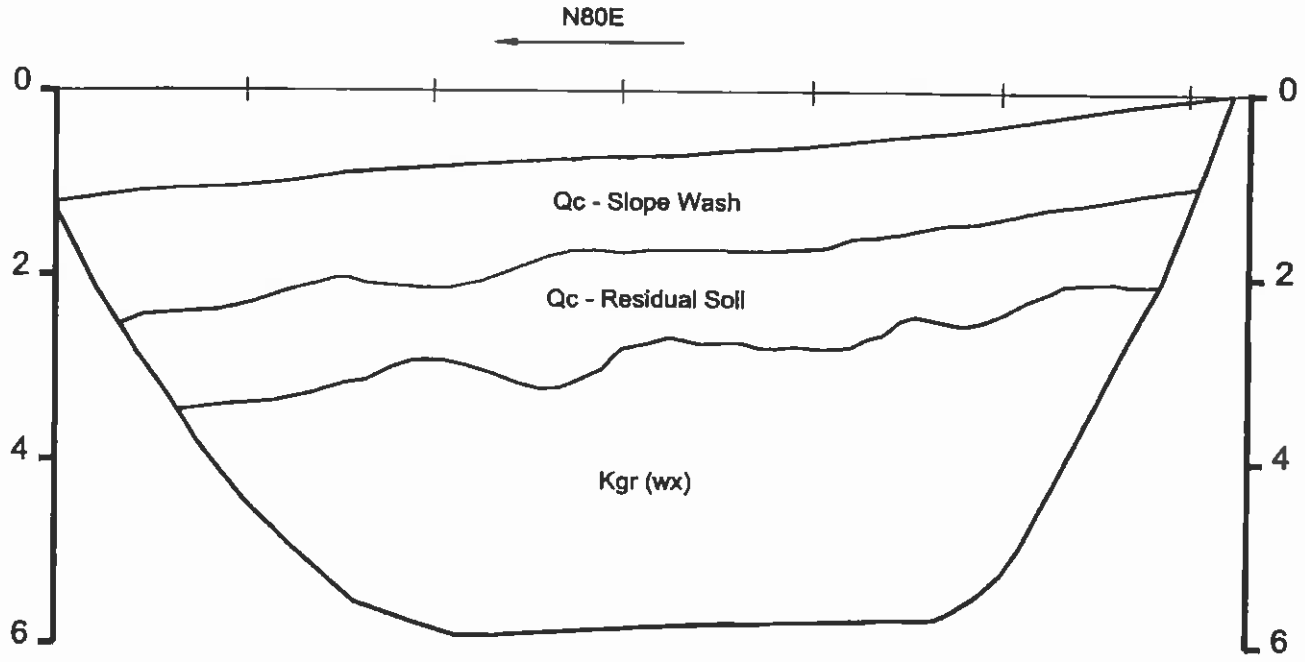


LOG OF TEST PIT 1

LAW/CRANDALL

FIGURE: A-3.1

JOB 70341-1-0105 DATE 11-16-01 DR SKR O.E. BEC CHKD.

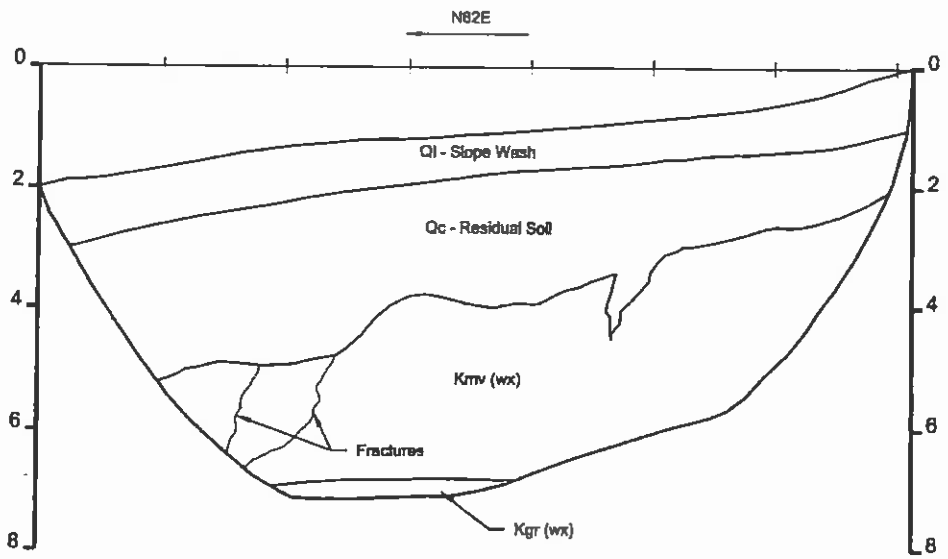


LOG OF TEST PIT 2

LAW/CRANDALL

FIGURE: A-3.2

JOB 70341-1-0105 DATE 11-16-01 DR SKR O.E. BEC CHKD.

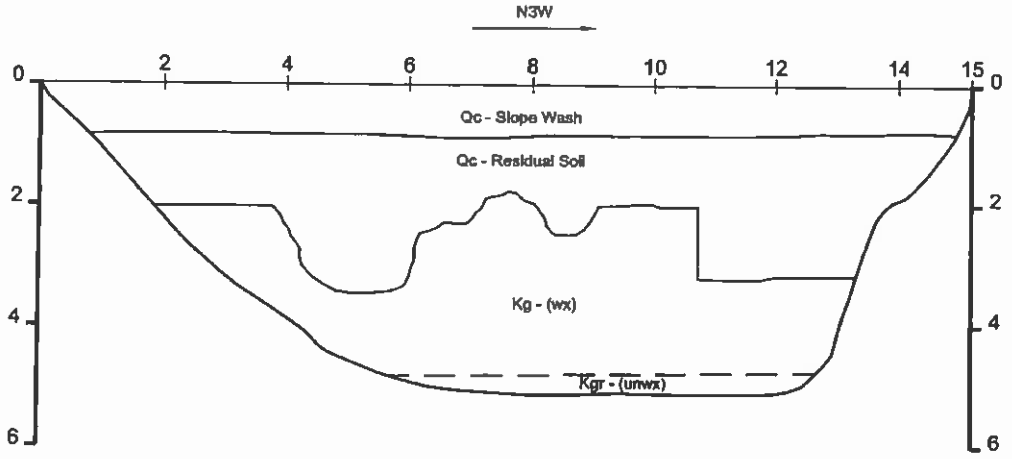


LOG OF TEST PIT 3

LAW/CRANDALL

FIGURE: A-3.3

JOB /0341-1-0105 DATE 11-16-01 DR SKR O.E. BEC CHKD.

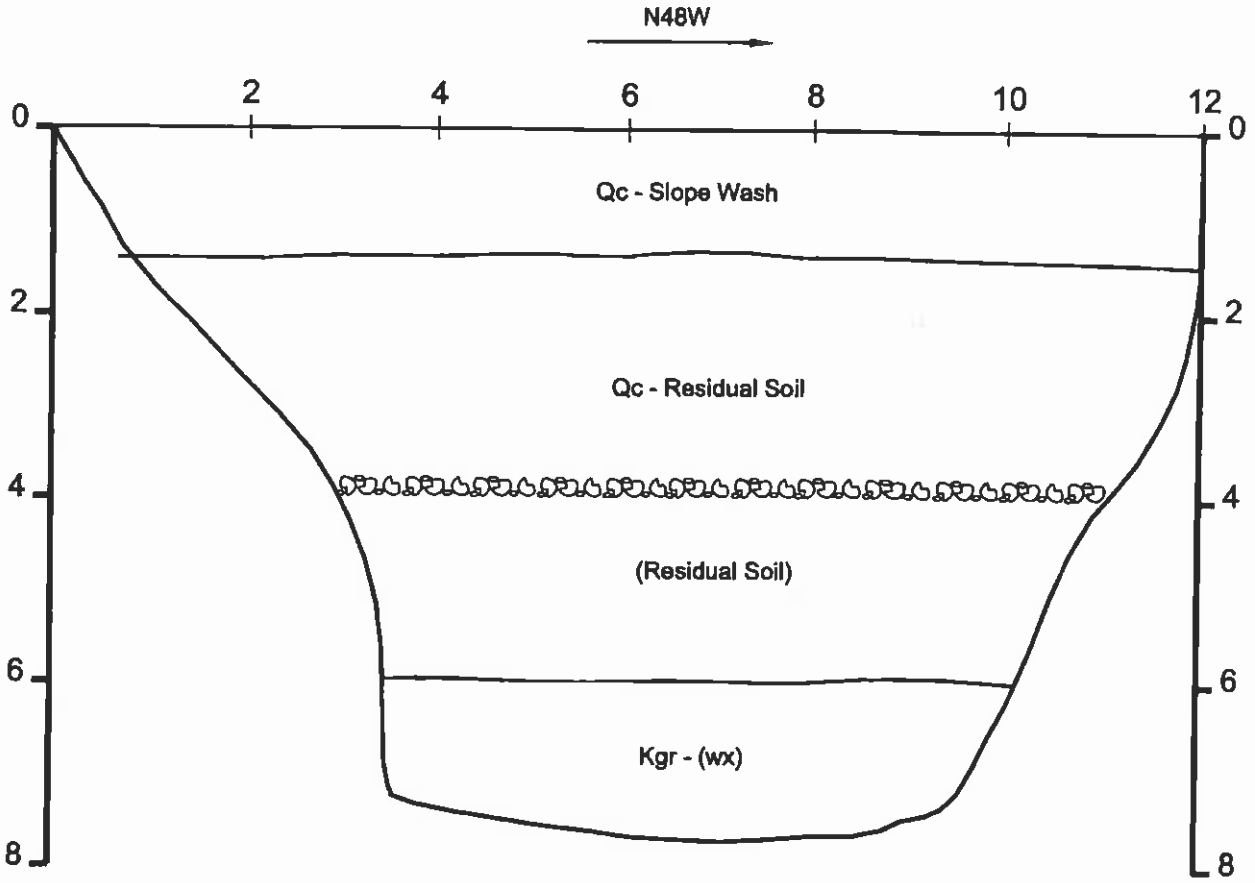


LOG OF TEST PIT 4

LAW/CRANDALL

FIGURE: A-3.4

JOB 70341-1-0105 DATE 11-16-01 DR SKR O.E. BEC CHKD.

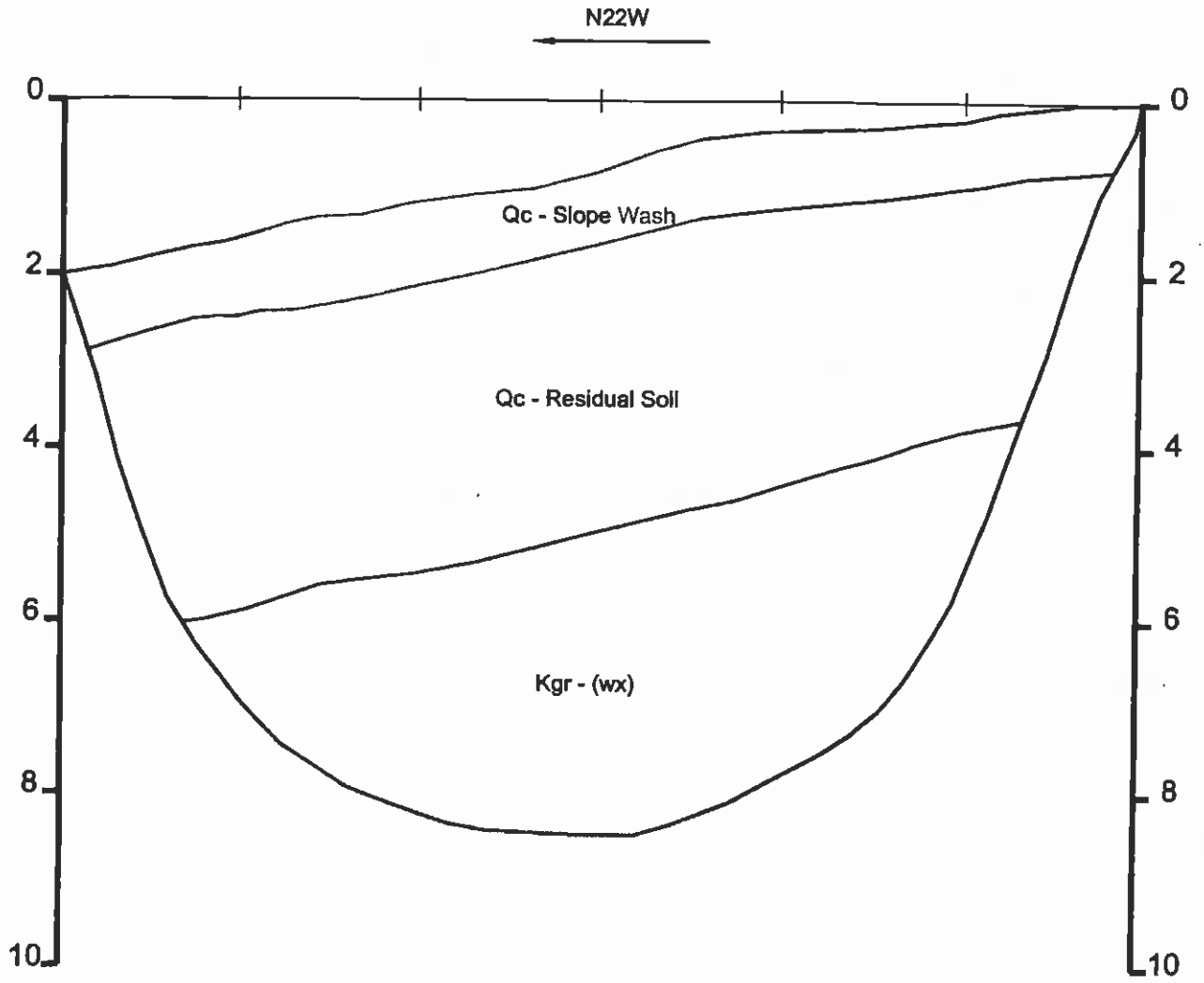


LOG OF TEST PIT 5

LAW/CRANDALL

FIGURE: A-3.5

JOB 70341-1-0105 DATE 11-16-01 DR. SKR O.E. BEC CHKD.

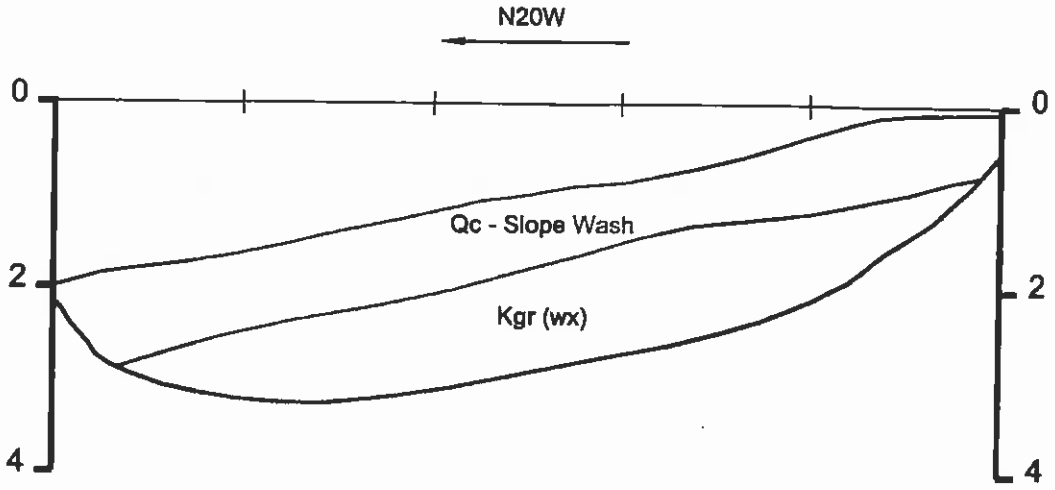


LOG OF TEST PIT 6

LAW/CRANDALL

FIGURE: A-3.6

JOB 70341-1-0105 DATE 11-16-01 DR. SKR O.E. BEC CHKD.

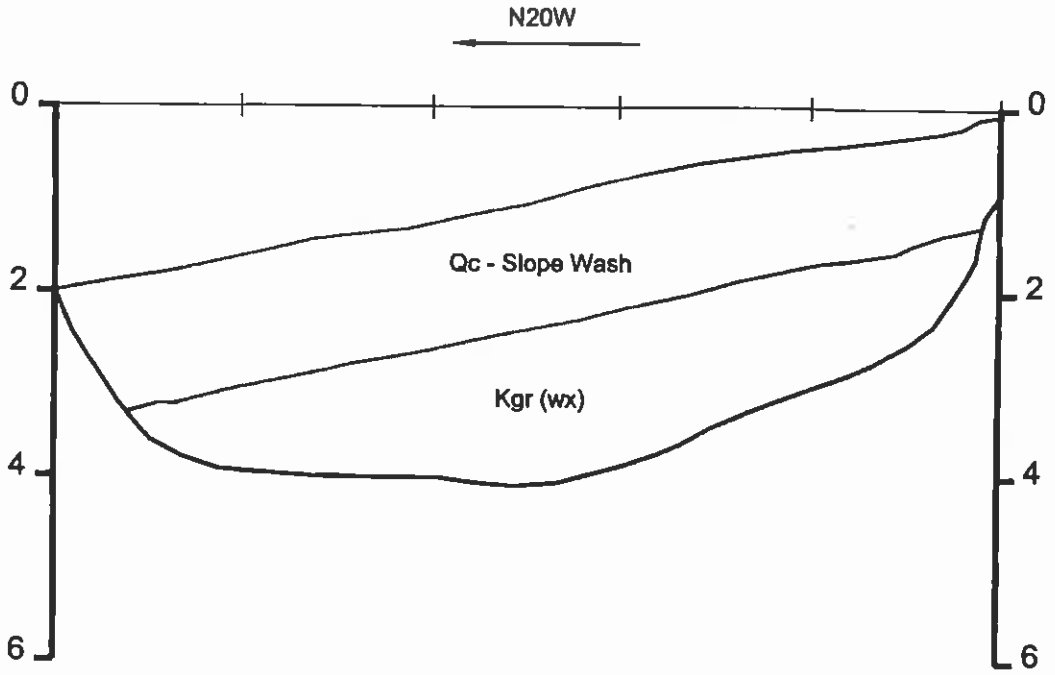


LOG OF TEST PIT 7

LAW/CRANDALL

FIGURE: A-3.7

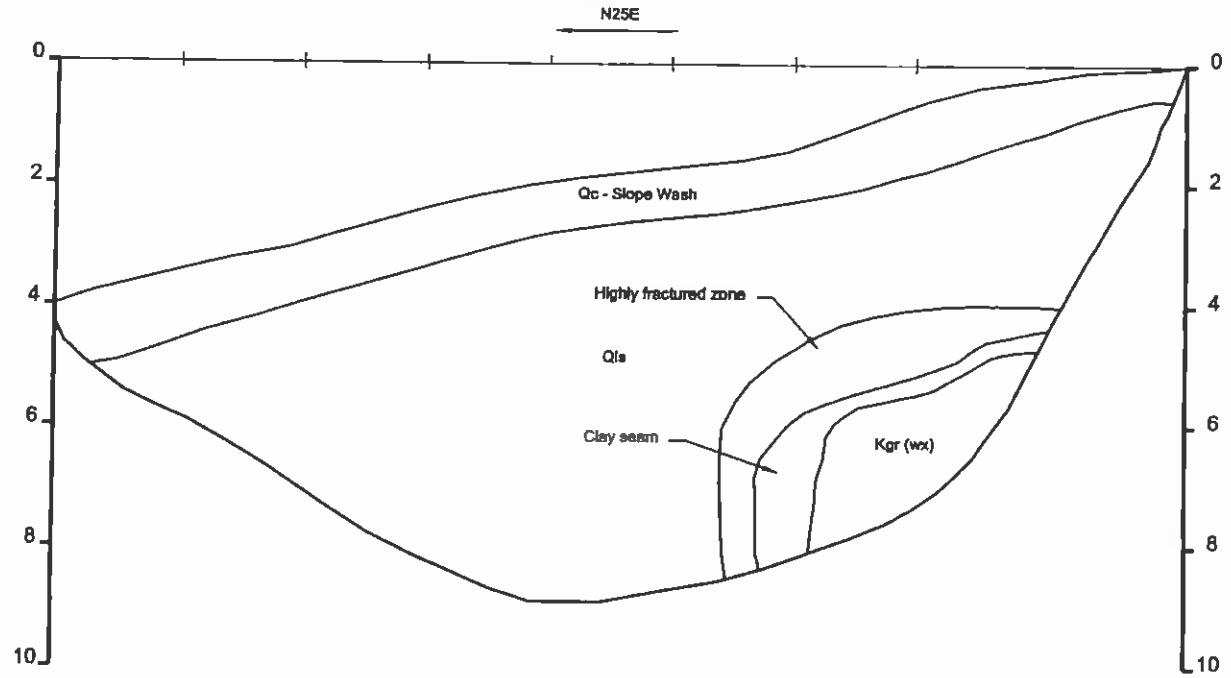
JOB 70341-1-0105 DATE 11-16-01 DR SKR O.E. BEC CHKD



LOG OF TEST PIT 8

LAW/CRANDALL

FIGURE: A-3.8



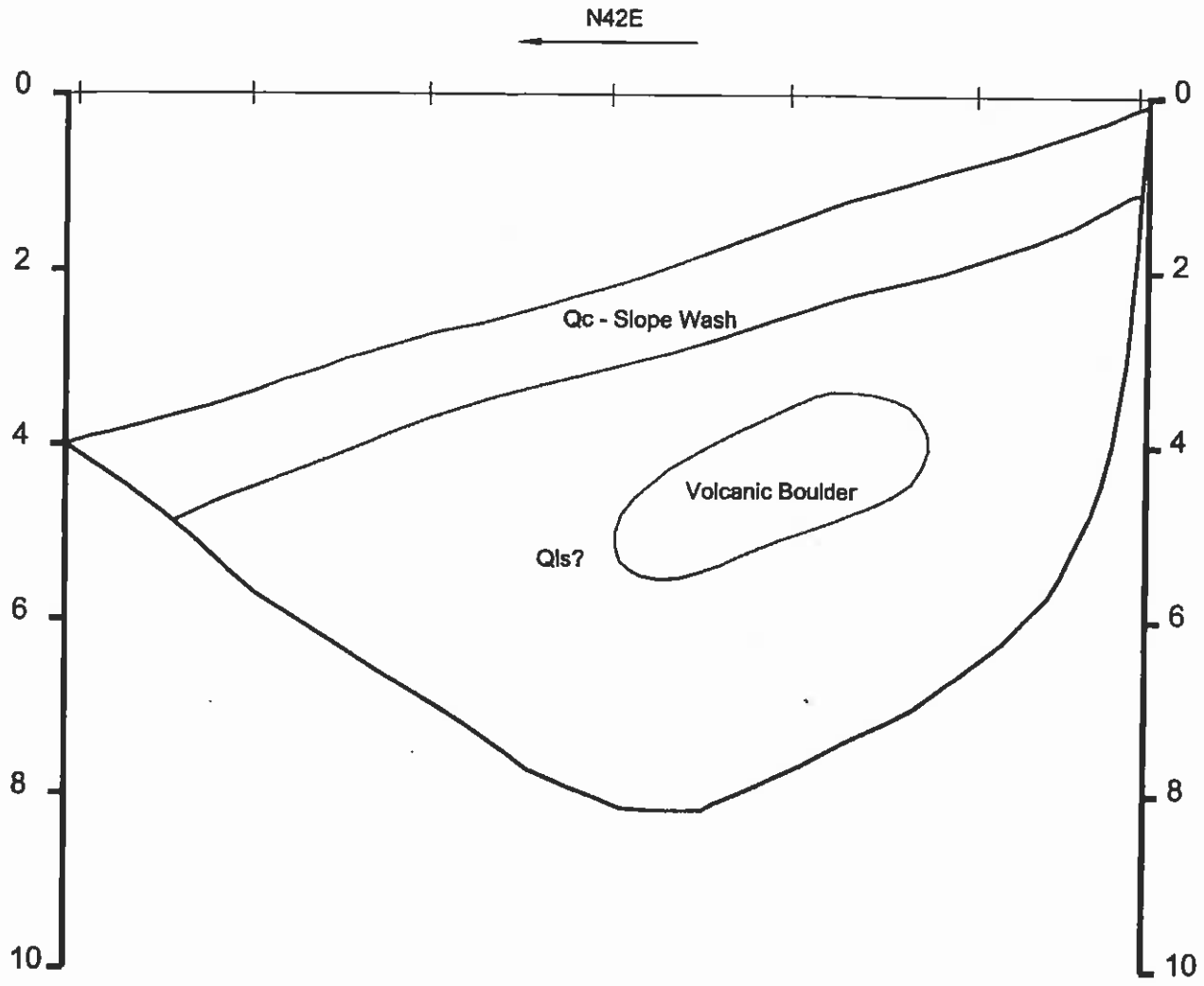
LOG OF TEST PIT 9

JOB 70341-1-0106 DATE 11-16-01 DR SKR O.E. BEC CHKD

LAW/CRANDALL

FIGURE: A-3.9

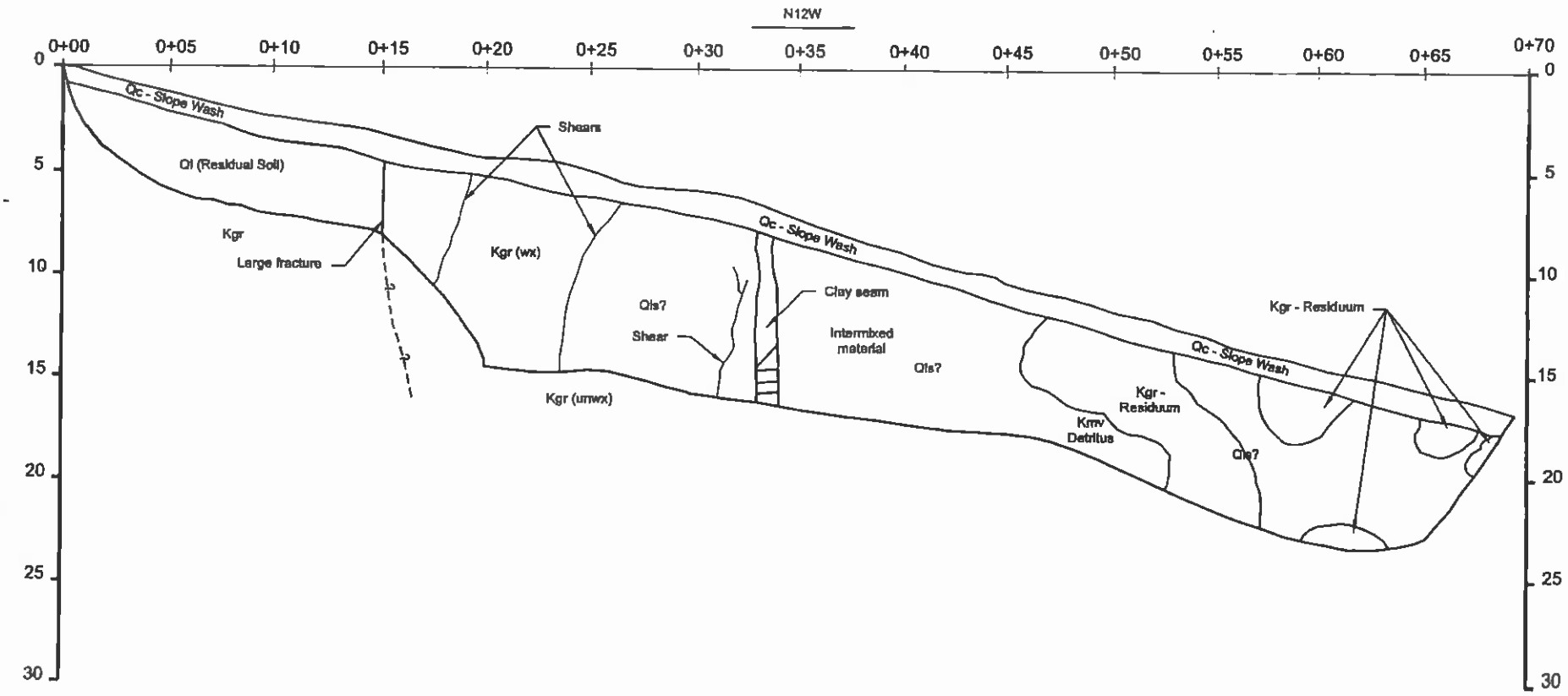
JOB 70341-1-0105 DATE 11-16-01 DR SKR O.E. BEC CHKD.



LOG OF TEST PIT 10

LAW/CRANDALL

FIGURE: A-3.10



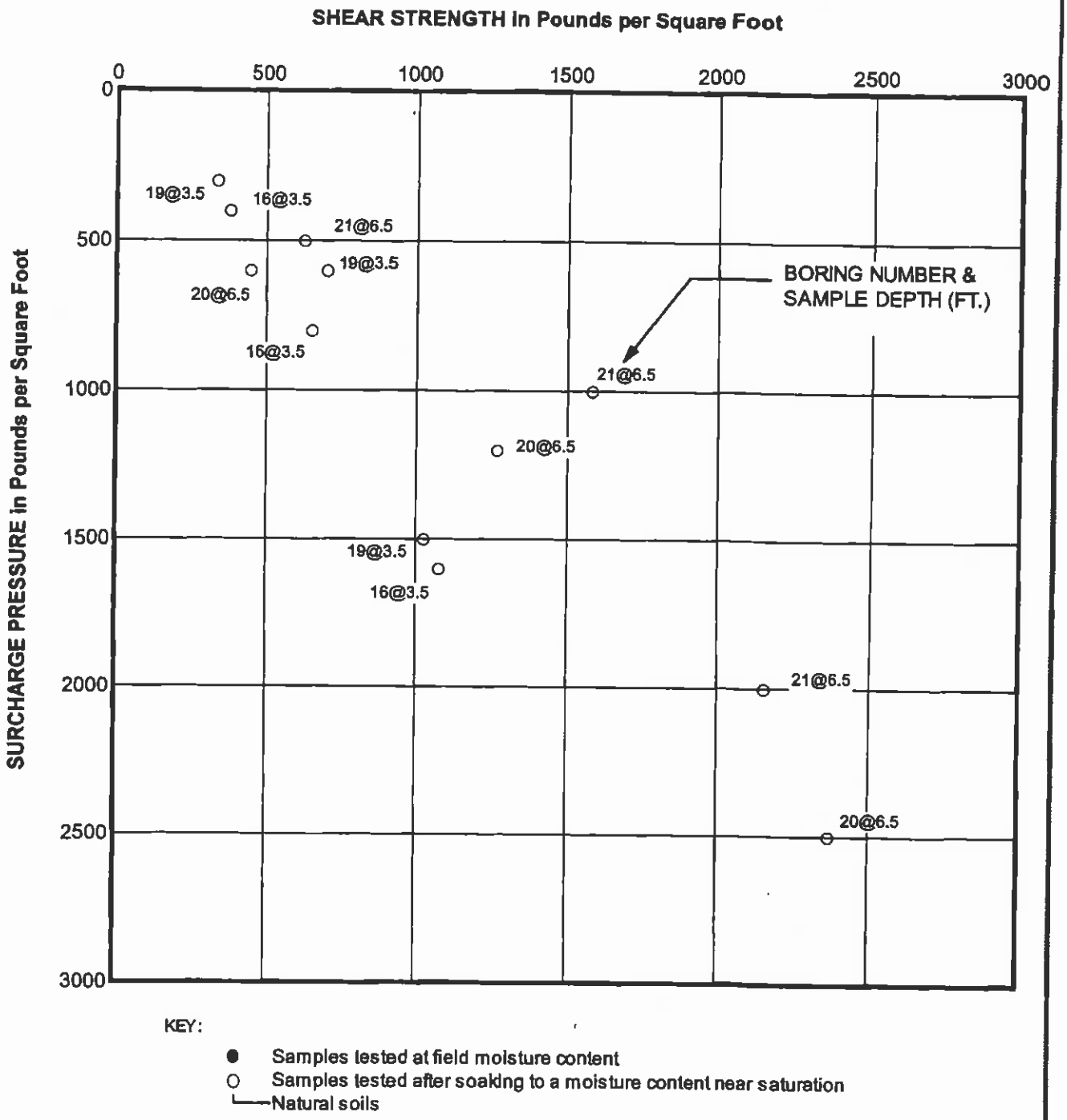
LOG OF TEST PIT 14

JOB 70341-1-0105 DATE 11-16-01 DR. SKR O.E. BEC CHKD.

LAW/CRANDALL

FIGURE: A-3.14

JOB 70341-1-0105.01 DATE 11/19/01 DR BEC OE CAC CHKD



DIRECT SHEAR TEST DATA

LAW/CRANDALL

FIGURE A - 5

JOB 70341-1-0105.01 DATE 11/19/01 DR BEC OE CAC CHKD

BORING/TEST PIT NUMBER AND SAMPLE DEPTH:	B-2 at 0 to 5'	B-5 at 0 to 5'	B-10 at 0 to 5'
SOIL TYPE:	SILTY SAND	SILTY SAND	SILTY SAND
R-VALUE:	39	47	33

BORING/TEST PIT NUMBER AND SAMPLE DEPTH:	B-14 at 0 to 5'	T-14 at 0 to 5'
SOIL TYPE:	SILTY SAND	SILTY SAND
R-VALUE:	40	65

TEST METHOD: California Test Method 301

R-VALUE TEST DATA

LAW/CRANDALL

FIGURE A - 6

JOB 70341-1-0105.01 DATE 11/19/01 DR BEC OE CAC CHKD

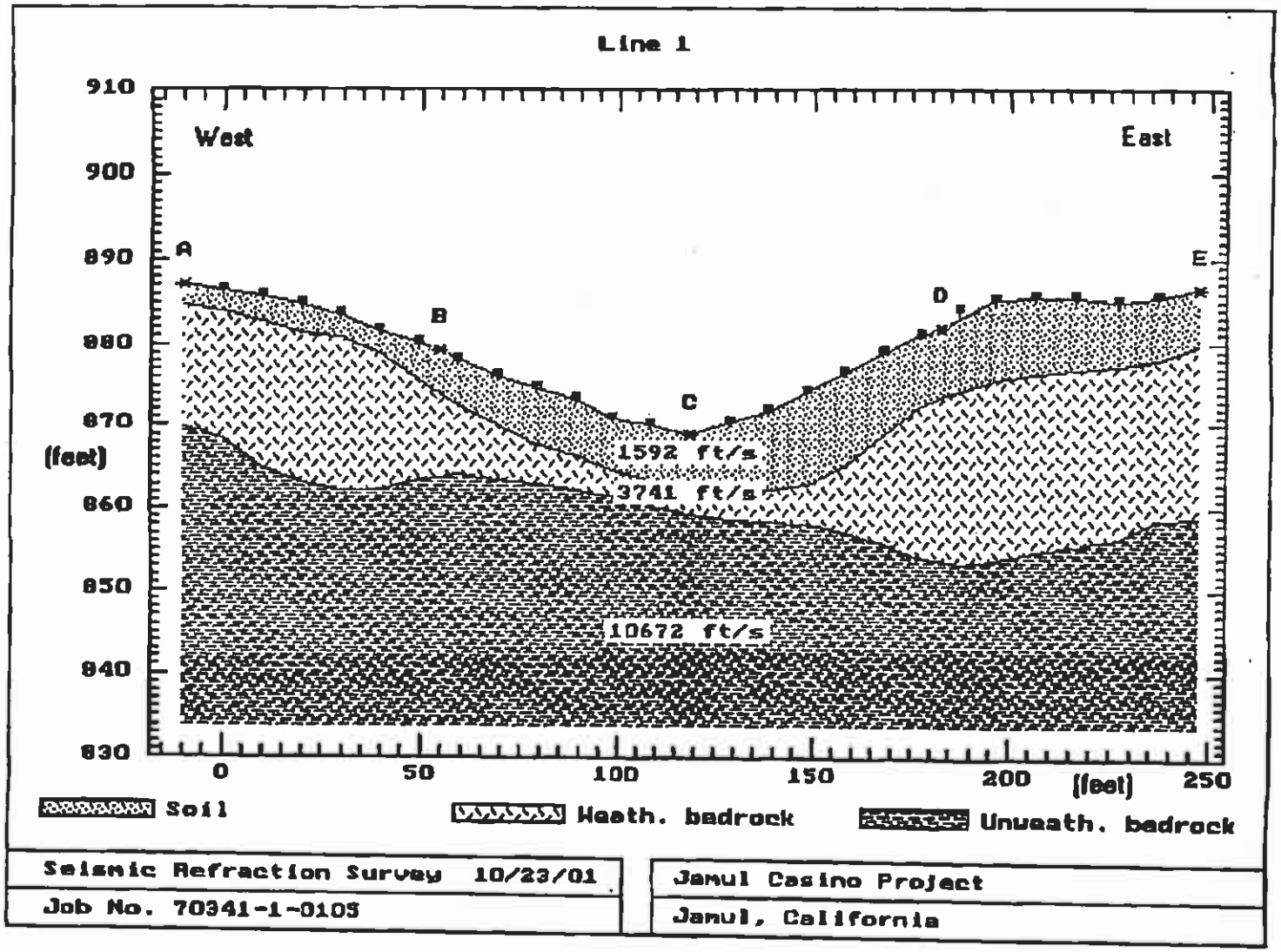
BORING NUMBER AND SAMPLE DEPTH:	4 at 0 to 5'	7 at 0 to 5'	15 at 0 to 5'
SOIL TYPE:	SILTY SAND	SILTY SAND	SILTY SAND
pH:	7.1	7.3	6.8
Minimum Electrical Resistivity:	9,300 ohm-cm	9,200 ohm-cm	2,300 ohm-cm
Soluble Sulfate:	not detected	55 ppm	85 ppm
Chloride:	20 ppm	20 ppm	100 ppm

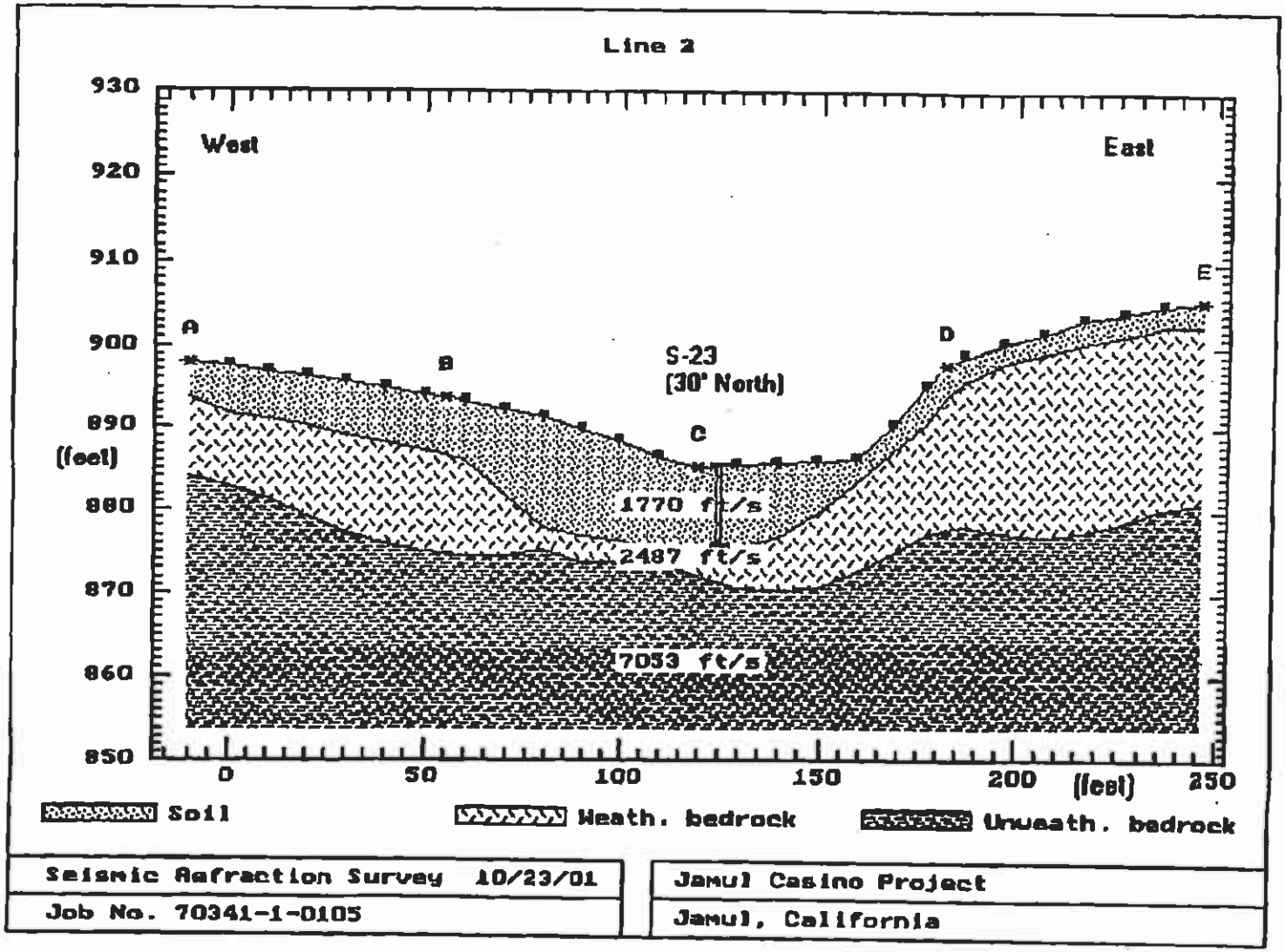
TEST METHOD: California Test Methods 417, 422, and 643

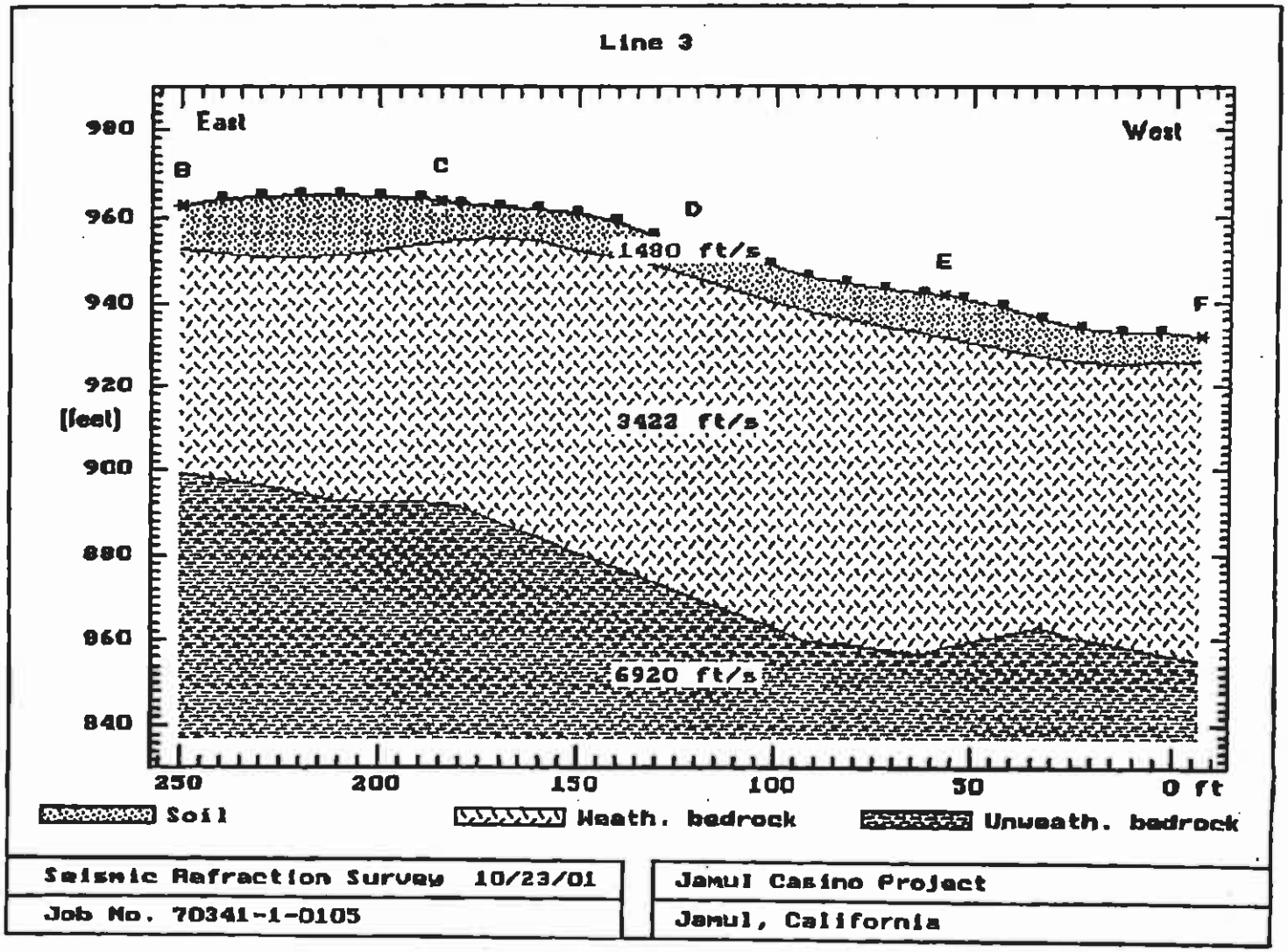
SOIL CORROSIVITY TEST DATA

LAW/CRANDALL

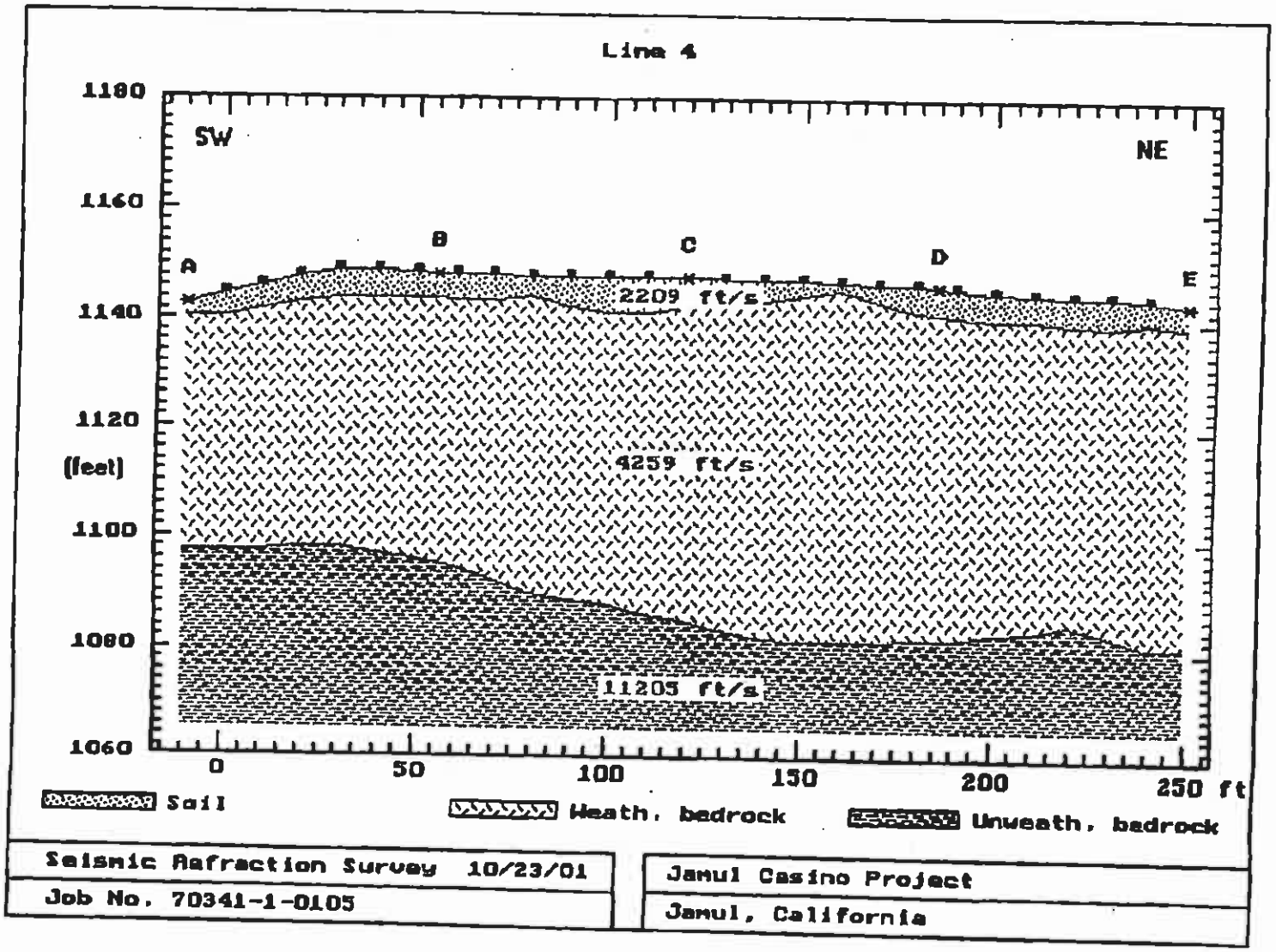
FIGURE A - 7

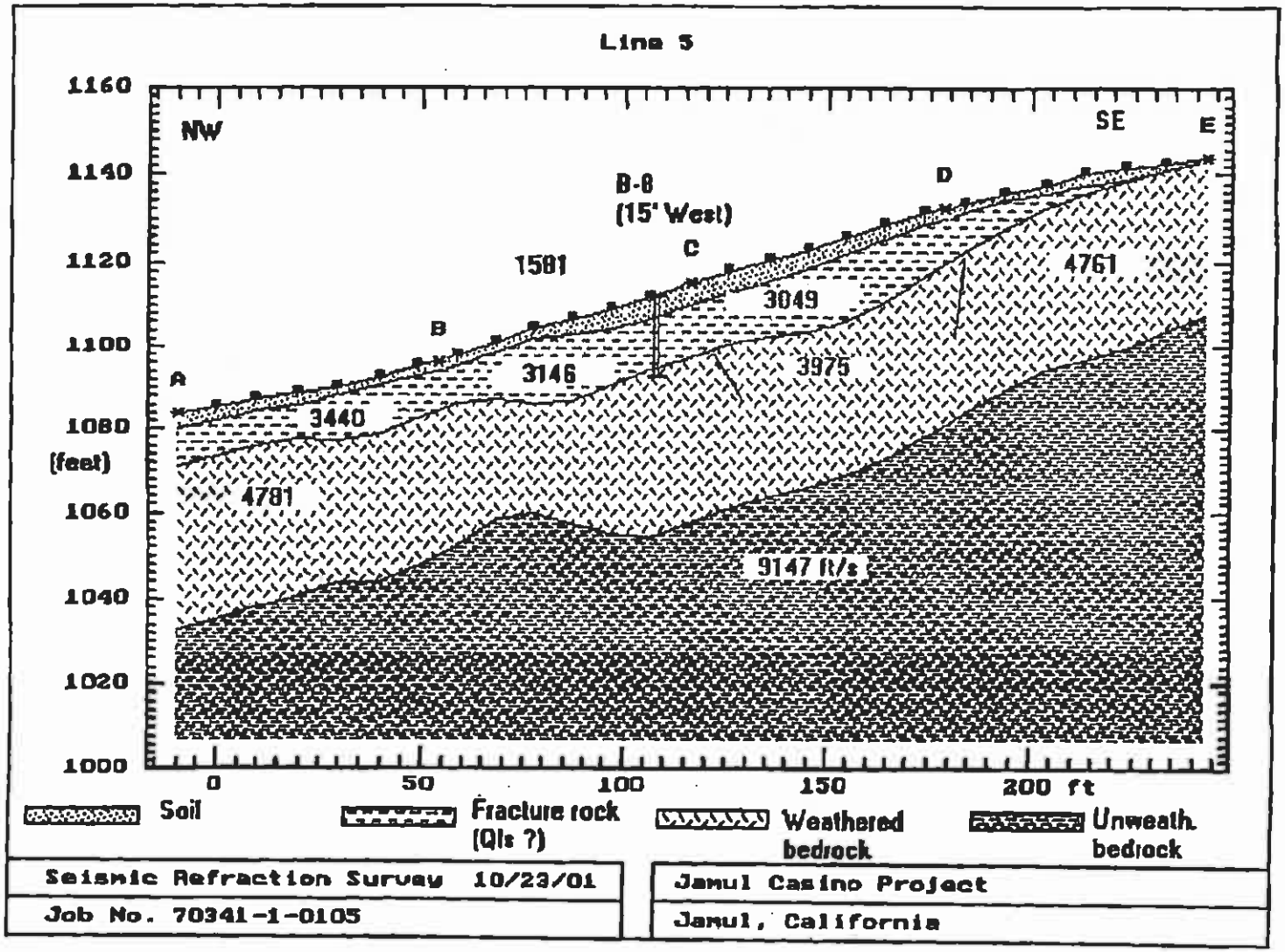

Line 1
910
900
890
880
870
860
850
840
830
(feet)
West
East
A
B
C
D
E
1592 ft/s
3741 ft/s
10672 ft/s
0
50
100
150
200
250
(feet)
Soil
Weath. bedrock
Unweath. bedrock
Seismic Refraction Survey 10/23/01
Job No. 70341-1-0103
Jamul Casino Project
Jamul, California

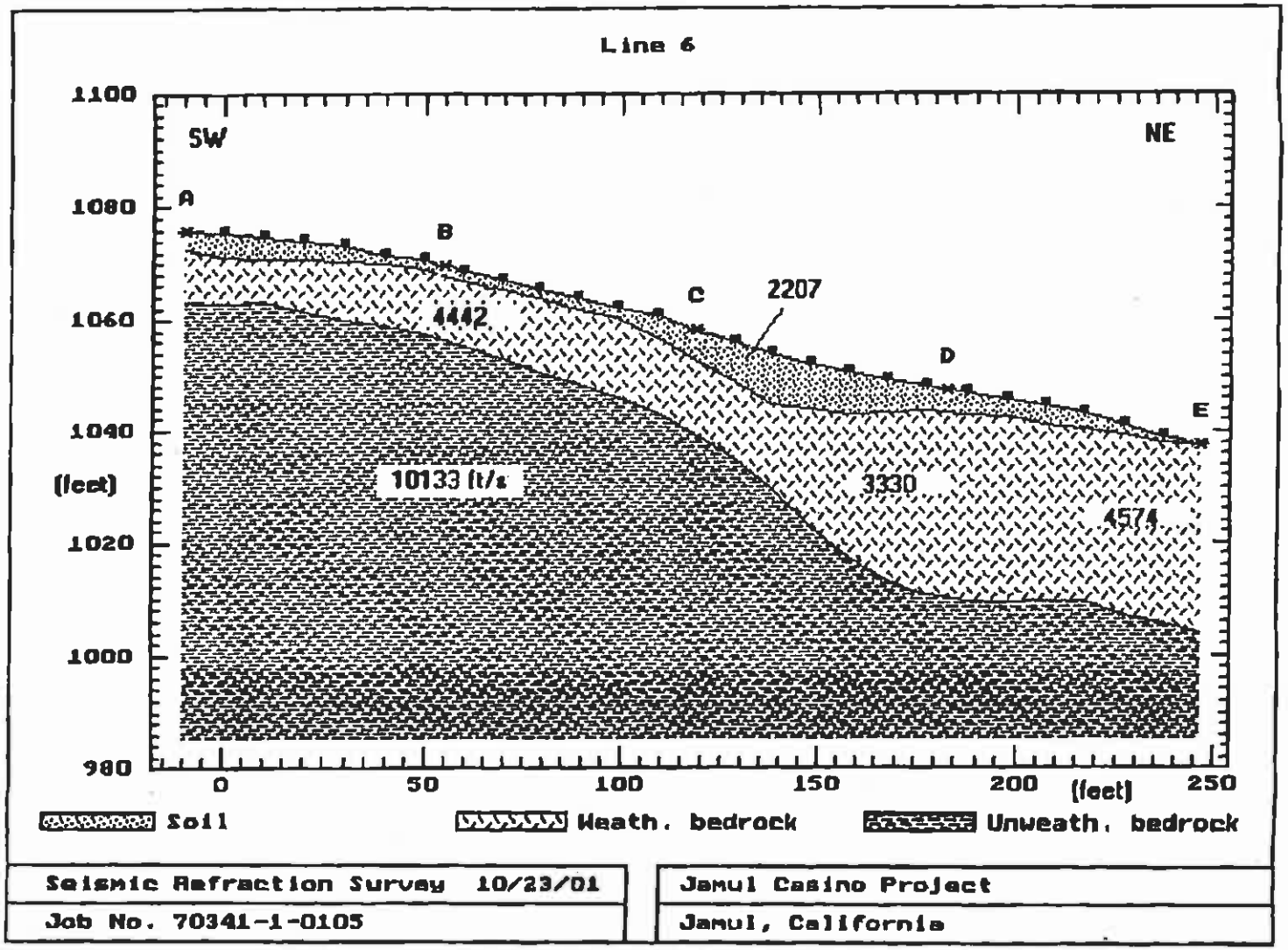

Line 2
930
920
910
900
890
(feet)
880
870
860
850
West
East
A
B
C
D
E
S-23
(30° North)
1770 ft/s
2487 ft/s
17053 ft/s
0
50
100
150
200
(feet)
250
Soil
Weath. bedrock
Unweath. bedrock
Seismic Refraction Survey 10/23/01
Job No. 70341-1-0105
Jamul Casino Project
Jamul, California



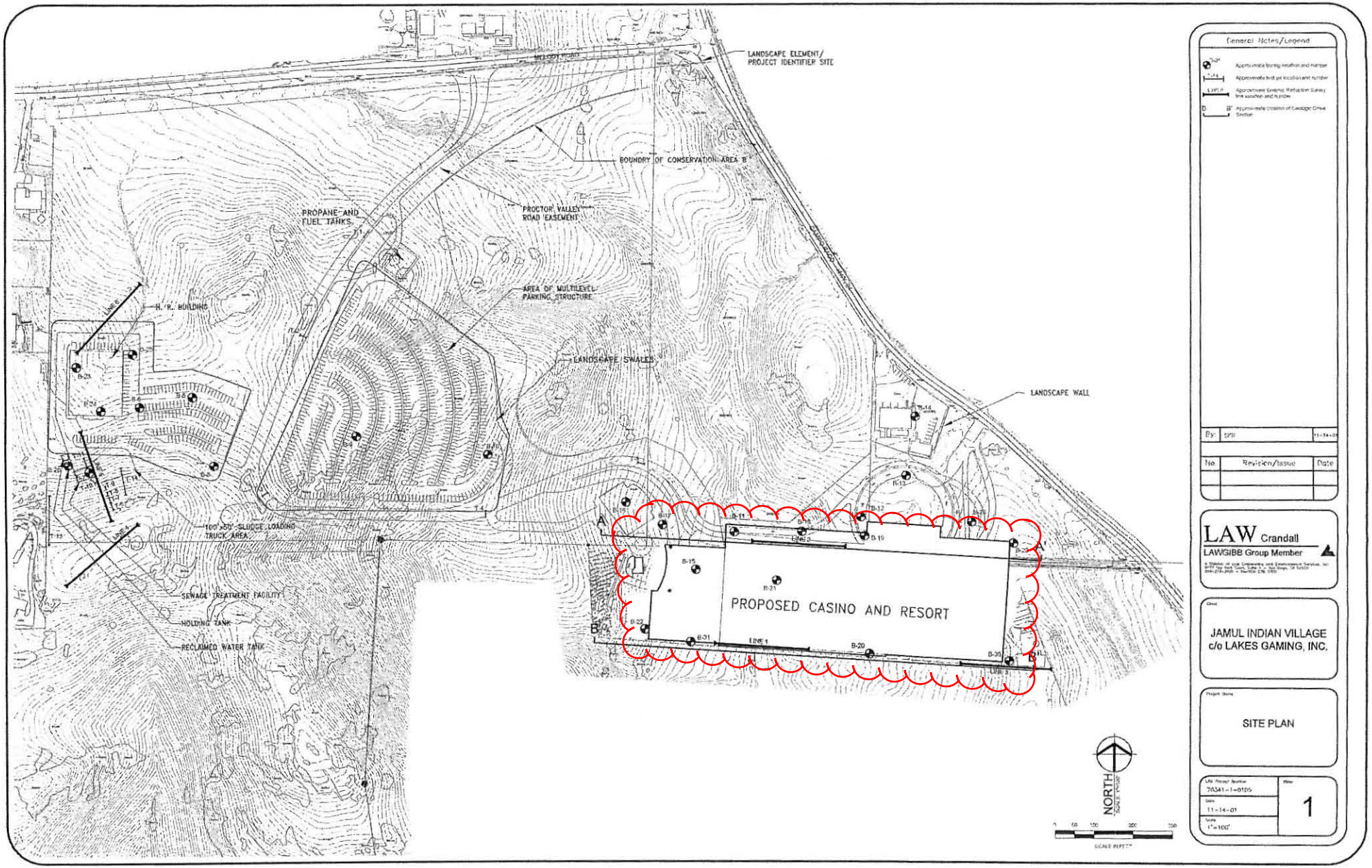
Seismic Refraction Survey 10/23/01	Jamul Casino Project
Job No. 70341-1-0105	Jamul, California


Line 4
1180
1160
1140
1120
(feet)
1100
1080
1060
SW
NE
A
B
C
D
E
2209 ft/s
4259 ft/s
11205 ft/s
0
50
100
150
200
250 ft
Soil
Weath. bedrock
Unweath. bedrock
Seismic Refraction Survey 10/23/01
Job No. 70341-1-0105
Jamul Casino Project
Jamul, California


Line 5
1160
1140
1120
1100
1080
(feet)
1060
1040
1020
1000
NW
SE
E
D
B-8
(15' West)
C
B
A
1581
4761
3049
3146
3975
3440
4781
9147 ft/s
0
50
100
150
200 ft
Soil
Fracture rock
(Qls ?)
Weathered
bedrock
Unweath.
bedrock
Seismic Refraction Survey 10/23/01
Job No. 70341-1-0105
Jamul Casino Project
Jamul, California



Seismic Refraction Survey 10/23/01	Jamul Casino Project
Job No. 70341-1-0105	Jamul, California



General Notes/Legend

No.	Revision/Issue	Date

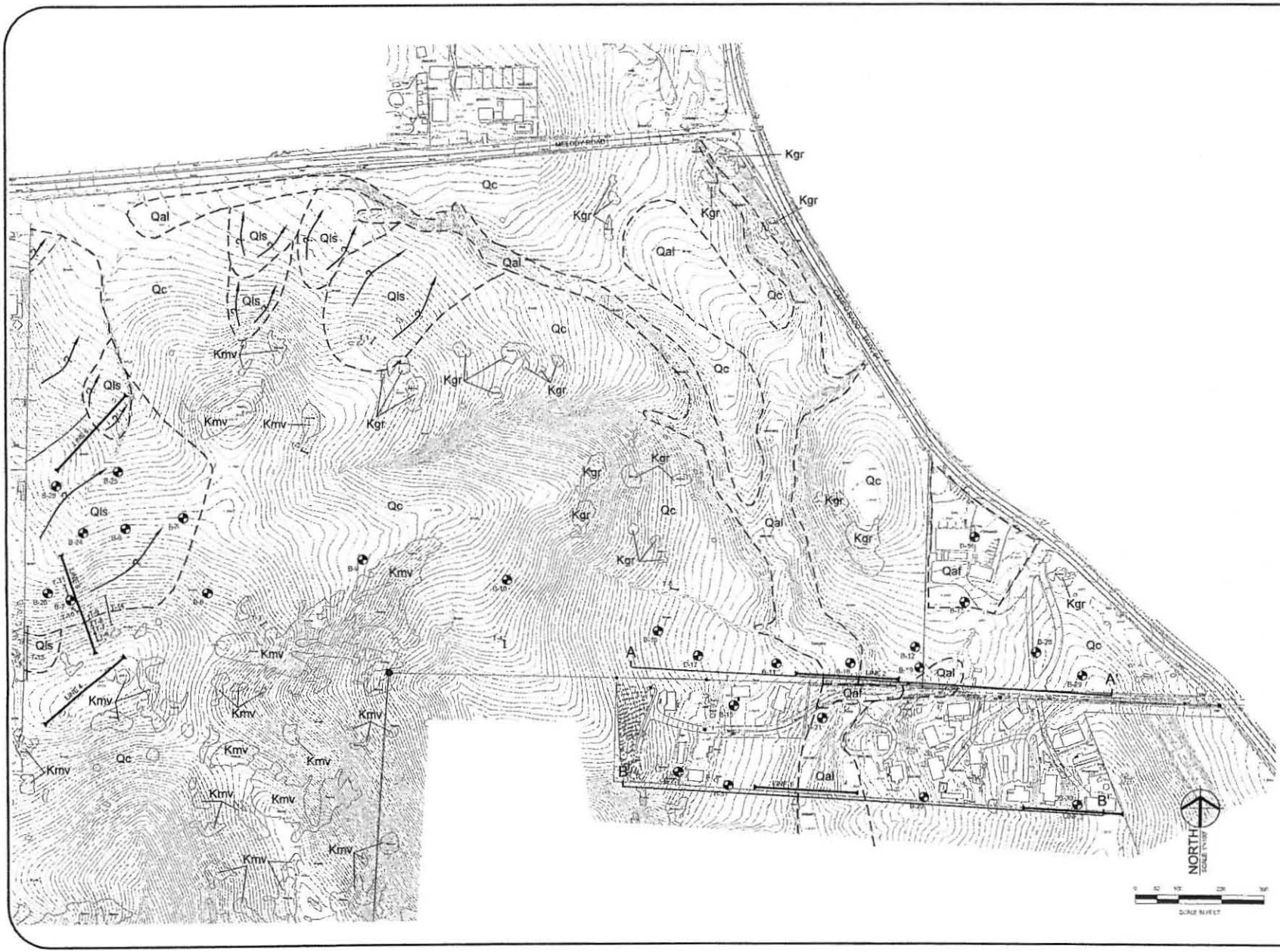
LAW Crandall
LAW/GIBB Group Member

Client
JAMUL INDIAN VILLAGE
c/o LAKES GAMING, INC.

Project Name
SITE PLAN

Job Project Number	70341-1-0105
Date	11-14-01
Scale	1"=100'

Plate 1



General Notes/Legend

Qal	Artificial Fill, other forms where fills may exist, but were not mapped
Qls	Alluvium, unconsolidated Sands, Silts and Gravels
Qaf	Landslide Deposits, ignored as existence is not substantiated
Qc	Colluvium, Sheetwash Soil and Slope Wash Sands and Silts with Gravel
Kgr	Pretrias Granite Bedrock, mainly hard clasts with spaced mini-mylonic zones, including fault, dikes, augen and sweetfire
Kmv	Volcanic and Metavolcanic Bedrock, consisting of fine-grade metamorphics of intermixed volcanic and sedimentary rocks
B-31	Approximate boring location and number
T-14	Approximate test pit location and number
LINE 2	Approximate Seismic Refraction Survey line location and number
B B'	Approximate location of Geologic Cross Section

By:	SKR	11-14-01
No	Revision/Issue	Date

LAW Crandall
LAWGIBB Group Member

Client
JAMUL INDIAN VILLAGE
c/o LAKES GAMING, INC

Project Name
GEOLOGIC MAP

LAW Project Number 70341-1-0105	Plate 2
Date 11-14-01	
Scale 1"=100'	

APPENDIX 3

BOTANICAL SURVEYS

APPENDIX 3A

4-Acre Parcel Early Spring 2011 Surveys

BOTANICAL SURVEY FOR THE 4-ACRE PARCEL, JAMUL, CALIFORNIA



May 2011

Prepared for:

Environmental Data Systems, Inc.

and

Jamul Indian Village

Prepared by:

Natural Investigations Company
1017 Carter Street, Folsom, CA 95630

1. INTRODUCTION

1.1. PROJECT LOCATION AND DESCRIPTION

The Project location is just south of the town of Jamul in unincorporated San Diego County (hereafter, "County"), California (Exhibit 1). The Study Area of this assessment consists of a 4-acre parcel (APN 597-06-004) (Exhibit 2). The project consists of an access road from State Route 94 to the Jamul Indian Village (Rancheria) site; however, design plans have not yet been finalized.

1.2. PURPOSE AND SCOPE OF ASSESSMENT

Natural Investigations Co. has prepared this botanical survey for Environmental Data Systems Inc., and its Client, Jamul Indian Village, in support of the environmental compliance process.

The scope of work is to perform the first of 3 botanical surveys (early spring, mid-spring, and late spring season surveys) during the 2011 blooming period within the Study Area, so that all possible special-status plant species might be detected. These botanical reports will be appendicized to a separate Biological Assessment for consultation with USFWS and CDFG.

Surveys were floristic in nature and conducted in a manner that would ensure location of any rare, threatened, or endangered species that may be present in the Study Area. Surveys for rare plants were conducted in accordance with the standardized guidelines issued by the U.S. Fish and Wildlife Service (1996), California Department of Fish and Game (2000), and the California Native Plant Society (2001). This report conforms to the scientific writing style established by Council of Science Editors (2006).

2. ENVIRONMENTAL SETTING

The Study Area is located within the Peninsular Ranges geographic subregion, which is contained within the Southwestern geographic subdivision of the larger California Floristic Province (Hickman 1993). The region is in climate Zone 21 – "Ocean-influenced southern California", characterized by infrequent frost, with mild to hot, dry summers and mild, wet winters moderated by marine air influx (Hickman, 1993; Brenzel, 2001). The topography of the Study Area is relatively flat and slopes generally to the south and southwest. The elevation ranges from approximately 900 feet to 940 feet above mean sea level. The general direction of surface runoff in the Study Area is to the southwest via an unnamed, intermittent drainage tributary to Jamul Creek.

The Study Area is not currently in active use, other than having a two-lane access road that currently traverses the site; this access road connects State Route 94 to the Jamul Indian Village. Previously, the parcel served as the Jamul fire station; this portion of the parcel is now vacant has no improvements other than a concrete building pad, pavement and landscape plants. Weeds and tall grass appear to have been periodically mowed or cut back.

The surrounding land uses are as follows: to the south, Jamul Indian Village, and the Rancho Jamul Ecological Reserve and the Hollenbeck Canyon Wildlife Area, and private rangeland; to the north, cattle pasture and residential subdivisions and the town of Jamul; to the east, Highway 94, the new fire station, private estates (Peaceful Valley Ranch Estates), and hayfields; and to the west, cattle pasture and private estates. To the south of the 4-acre parcel is the Jamul Indian Village (Indian Reservation).

3. METHODOLOGY

3.1. PRELIMINARY DATA GATHERING AND RESEARCH

Prior to conducting the field survey the following information sources were reviewed:

- Any readily-available previous biological resource studies pertaining to the Study Area or vicinity
- United States Geologic Service (USGS) 7.5 degree-minute topographic quadrangles of the Study Area and vicinity
- Aerial photography of the Study Area
- California Natural Diversity Database (CNDDB), electronically updated monthly by subscription to CDFG.

The following biological assessments were previously performed within the Study Area and vicinity:

- Beauchamp, R.M. 2000. A biological inventory and wetlands delineation of the Jamul Rancheria Parcels in Jamul, San Diego County, California. Pacific Southwest Biological Services Inc.
- Bureau of Indian Affairs. 2003. Jamul Indian Village Environmental Impact Statement. [Floristic surveys conducted in 2001-2002 of the Jamul Indian Village project area (the 87-acre parcel, the 4-acre parcel, the 10-acre parcel, and the Jamul Indian Village)]
- Natural Investigations Company. 2006. Jamul Indian Village Off-reservation Biological Resources Assessment. Volume I, Appendix D, in Jamul Indian Village (2006) Final TEIS/R. [Floristic surveys conducted in 2006 on the Highway 94 corridor and 4-acre parcel]

3.2. FIELD SURVEY

Surveys were floristic in nature and conducted in a manner that would ensure location of any rare, threatened, or endangered species that may be present in the Study Area. Surveys for rare plants were conducted in accordance with the standardized guidelines issued by the U.S. Fish and Wildlife Service (1996), California Department of Fish and Game (2000), and the California Native Plant Society (2001). This report conforms to the scientific writing style established by Council of Science Editors (2006).

Dr. G.O. Graening (see qualifications in Section 10) conducted the botanical field surveys on March 23 and 24, 2011. Dr. Graening also performed botanical surveys of the 4-acre parcel in 2006, 2007, and 2009, and last year (February 24 2010 and May 4, 2010). A complete coverage, variable-intensity pedestrian survey was performed of the Study Area, modified to account for differences in terrain, vegetation density, and visibility.

Survey efforts emphasized the search for any special-status species or habitats that had documented occurrences, in databases queried, within the Study Area or vicinity. All visible flora observed were recorded in a field notebook, and identified to the lowest possible taxon; a hand lens was used where necessary. When a specimen could not be identified *in situ*, a photograph or voucher specimen (depending upon scientific permit requirements) was taken and identified later in the laboratory using a dissecting scope where necessary. Dr. Graening holds the following scientific collection permits: CDFG Scientific Collecting Permit No. SC-006802 and CDFG Plant Voucher Specimen Permit 09004. Taxonomic determinations and nomenclature followed these references: Pavlik (1991), Hickman (1993), Brenzel (2001), Stuart and Sawyer (2001), Lanner (2002) Calflora (2010), University of California at Berkeley (2010a,b). Scientific names are introduced first and common names are used thereafter for ease of reading.

Plant specimens difficult to identify were sent fresh to the Jepson Herbarium (University of California at Berkeley), where senior botanist Margriet Wetherwax made final determinations (see Section 10 for qualifications). Any collected plant specimens worthy of curation were deposited in the Jepson Herbarium by M. Wetherwax.

3.3. MAPPING AND OTHER ANALYSES

Locations of special status species' occurrences and habitat boundaries within the Study Area were recorded on color aerial photographs, and then digitized to produce the final habitat maps. The boundaries of potentially jurisdictional water resources within the Study Area were identified and measured in the field,

and similarly digitized to calculate acreage and to produce informal delineation maps. Geographic analyses were performed using geographical information system software (ArcGIS 9.3, ESRI, Inc.). Vegetation communities (assemblages of plant species growing in an area of similar biological and environmental factors), were classified by Vegetation Series (distinctive associations of plants, described by dominant species and particular environmental setting) using the CNPS Vegetation Classification system (Sawyer and Keeler-Wolf, 1995).

4. RESULTS

4.1. INVENTORY OF FLORA FROM FIELD SURVEY

All plants sighted during the field surveys of the Study Area conducted March 23 and 24, 2011, are compiled in Exhibit 3. No special-status plant species were observed within the Study Area during these surveys. Note that the dates of field surveys may not coincide with every blooming period of regionally-occurring special-status plant species.

4.2. VEGETATION COMMUNITIES

The Study Area currently contains two terrestrial natural community/habitat types, listed in descending areal preponderance: ruderal/developed; and annual grassland (see Exhibit 4).

Ruderal and urbanized areas constitute the majority of the Study Area, and consist of disturbed or converted natural habitat that is now either in a weedy and barren (ruderal) state, plowed, graded, or urbanized with pavement, landscaping, and structure and utility placement. Vegetation within this habitat type consists primarily of nonnative weedy or invasive ruderal species or ornamental plants lacking a consistent community structure. This habitat type provides limited resources for wildlife and is utilized primarily by common species tolerant of human activities.

Annual grassland habitat consists of open fields of non-native pasture grasses and weedy forbs. These annual grasslands have replaced native habitats of perennial bunchgrasses or coastal scrub. Grazing disturbances, rather than periodic wildfires, keep this plant community from undergoing successional changes to woodland. Plant species common in this community include European annual grasses (*Avena, Bromus, Hordeum, Festuca*). Common forbs include turkey mullein (*Eremocarpus setigerus*), yellow star thistle (*Centaurea solstitialis*), and black mustard (*Brassica nigra*). The conversion of native habitats to annual grasslands greatly reduces wildlife biodiversity and habitat value. However, common, disturbance-tolerant wildlife species can occur in these habitats.

Two special-status communities were reported by CNDDB (CDFG 2010) within a 5-mile radius of the Study Area: Southern Coast Live Oak Riparian Forest and Southern Interior Cypress Forest. No special-status communities are present with the Study Area. Southern Coast Live Oak Riparian Forest is present in the vicinity of the Study Area (on the 87-acre parcel, the 10-acre parcel, and the Jamul Indian Village).

4.3. LISTED SPECIES / SPECIAL-STATUS SPECIES

For the purposes of this assessment, “special status” is defined to be species that are of management concern to state or federal natural resource agencies, and include those species that are:

- Listed as endangered, threatened, proposed, or candidate for listing under the Federal Endangered Species Act;

Historical Special-status Species’ Occurrences

A list of special-status plant and animal species that historically occurred within the Study Area and vicinity was compiled based upon the following:

- Any previous and readily-available biological resource studies pertaining to the Study Area;
- Informal consultation with USFWS by generating an electronic Species List (available on the applicable Field Office website); and
- A spatial query of the CNDDB.

Floristic and faunal surveys conducted in 2001-2002 of the Jamul Indian Village project area (the 87-acre parcel, the 4-acre parcel, the 10-acre parcel, and the Jamul Indian Village), did not detect any threatened or endangered species (BIA, 2003). Floristic surveys conducted in 2006 for SR-94 traffic improvements, which included the Alternative 1 and 2 Study Areas (i.e., the Highway 94 corridor and 4-acre parcel), did not detect any rare, threatened, or endangered plant species in the Study intersections (Natural Investigations Co., 2006). Floristic surveys conducted in 2007, which included the Alternative 1 and 2 study areas (i.e., the Highway 94 corridor and 4-acre parcel), did not detect any rare, threatened, or endangered plant species (Natural Investigations Co., 2007a). Floristic surveys conducted in 2009 did not detect any special-status species (Natural Investigations Co., 2009). Floristic surveys conducted in 2010 did not detect any rare, threatened, or endangered plant species (Natural Investigations Co., unpub. data).

The CNDDB was spatially queried and any reported occurrences of special-status species were plotted in relation to the Study Area boundary using GIS software (Exhibit 6). The CNDDB reported special-status species with historical occurrences within the Study Area. Within a 5-mile buffer of the Study Area boundary, the CNDDB reported over 300 special-status species occurrence records.

The County's SanBIOS database (2010) was also spatially queried and any reported occurrences of special-status species plotted (Exhibit 7). The County's database reported no special-status species with a historical occurrence within the Study Area. Several special-status species occurrences were reported by SanBIOS database on adjacent properties.

A federal species list was also generated from the USFWS website using the USGS 7.5-minute quadrangle in which the Study Area is located, plus the surrounding quadrangles.

Special-status Species Observed During Field Survey

No special-status plant species were observed within the Study Area during the most recent field surveys (March 23 and 24, 2011).

Analyses of Likelihood of Occurrence of Listed Species / Special-status Species

4.3.0.1. Listed Plant Species

Several plants designated as special status were reported in the vicinity of the Study Area by the CNDDB, and suitable habitats may exist within the Study Area: San Diego sagewort; Otay tarplant; Palmer's grapplinghook; Ramona horkelia; decumbent goldenbush; Gander's pitcher sage; felt-leaved monardella; San Miguel savory. Special-status plants are not expected to thrive in the Study Area because of the preponderance of invasive and non-native plants, and habitat degradation associated with urbanization; previous botanical surveys did not detect any rare plants.

Botanical surveys conducted in 2001-2002 of the Jamul Indian Village project area (the 87-acre parcel, the 4-acre parcel, the 10-acre parcel, and the Jamul Indian Village), did not detect any threatened or endangered plants (BIA, 2003). Botanical surveys conducted in 2006 for SR-94 traffic improvements, which included the Highway 94 corridor and 4-acre parcel, did not detect any threatened or endangered species in the Study intersections (Natural Investigations Co., 2006). Botanical surveys conducted in 2007 and 2009, which included the Highway 94 corridor and 4-acre parcel, did not detect any threatened or endangered plants (Natural Investigations Co., 2007a, 2009).

San Diego Thorn Mint (*Acanthomintha ilicifolia*)

San Diego Thorn Mint is an annual herb that occurs on clay, gabbro, and calcareous soils in openings within coastal sage scrub, chaparral, and native grassland habitats of coastal San Diego County. Potentially suitable habitat for San Diego thorn mint does not occur within the Study Area. Non-paved lands within the Study Area are dominated by non-native annual grasses. A botanical inventory of the FEIS project site (the 87-acre, 10-acre, 4-acre parcels) in April 2000 by Beauchamp did not detect this plant. This plant was also not detected in subsequent surveys (Natural Investigations 2006, 2007a), including the current botanical survey for this study.

Otay Tarplant (*Deinandra conjugens*)

The Otay tarplant, federally listed as endangered, is a glandular, aromatic, annual herb; the blooming period for this species is May to June (CNPS, 2010). The majority of occurrences are associated with clay soils in grasslands, coastal sage scrub, or maritime succulent scrub at elevations between 25 and 300 m. This species has a limited distribution consisting of approximately 25 historical populations near Otay Mesa in southern San Diego County and one population in Mexico near the U.S. border; the Study Area is outside of the designated critical habitat. some grassland habitat does occur within the Study Area, but the plant has never been detected during field surveys over the last decade.

Dwarf Burr Ambrosia (*Ambrosia pumila*)

Dwarf burr ambrosia is federally listed as threatened. CDFG (2010a) describes its habitat requirements as, "*chaparral, coastal scrub, valley and foothill grassland; sandy loam or clay soil; in valleys; persists where disturbance has been superficial; sometimes on margins or near vernal pools*." Numerous botanical surveys over the last decade have not detected this species.

Mexican flannelbush (*Fremontodendron mexicanum*)

Mexican flannelbush is federally listed as endangered. CDFG (2010a) describes its habitat requirements as, "*closed-cone coniferous forest, chaparral, cismontane woodland; usually scattered along the borders of creeks or in dry canyons; sometimes on gabbro soils; 10-490m*." Numerous botanical surveys over the last decade have not detected this species.

4.4. TREE RESOURCES

Tree resources within the Study Area were inventoried, and consist of the following:

- 2 coast live oaks (*Quercus agrifolia*): the first tree has a diameter at breast height of 38" (multi-stem, one stem 15" and the other 23"); the second tree has 46 inch diameter at breast height
- 1 sycamore (*Platanus racemosa*)
- 5 Aleppo pines (*Pinus halepensis*), 2 of which have died
- 2 Pepper trees (*Schinus molle*)

5. CONCLUSION

Numerous common native and non-native plants were sighted during the field surveys of the Study Area on March 23 and 24, 2011. No special-status plant species were observed within the Study Area during these surveys. Because that the dates of field surveys may not coincide with every blooming period of regionally-occurring special-status plant species, additional botanical surveys are recommended. These mid-spring and late-spring season surveys are in progress, and are being performed by Pacific Southwest Biological Services, Inc.

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7. QUALIFICATIONS OF BIOLOGIST

REPORT AUTHOR, FIELD SURVEYOR: G.O. Graening, Ph.D.

G. O. Graening holds a PhD in Biological Sciences and a Master of Science in Biological and Agricultural Engineering. Dr. Graening is an adjunct Professor at California State University at Sacramento, and is an active researcher in the area of conservation biology and groundwater ecology; his publication list is available online at http://www.csus.edu/indiv/g/graeningg/pubs.htm. Dr. Graening is also a Certified Arborist (ISA # WE-6725A) and a Registered Environmental Assessor I (DTSC # 08060). Dr. Graening has 12 years of experience in environmental assessment, including independent contractual work as well as previous employment with *The Nature Conservancy*, Tetra Tech Inc., and CH2M Hill, Inc.

CONSULTING TAXONOMIST: Margriet Wetherwax, M.S.

Ms. Wetherwax holds a Masters Degree in Advanced Plant Systematics and a Bachelor of Science in Botany. Since 1995, Ms. Wetherwax has been employed at the Jepson Herbarium (University of California at Berkeley) as a plant taxonomist and museum scientist. Ms. Wetherwax is managing editor and illustration editor of the Jepson Flora Project and The Jepson Desert Manual, as well as a contributing author to The Jepson Manual: Higher Plants of California and the Flora of North America North of Mexico Project.

8. EXHIBITS

EXHIBIT 1: LOCATION OF PROJECT

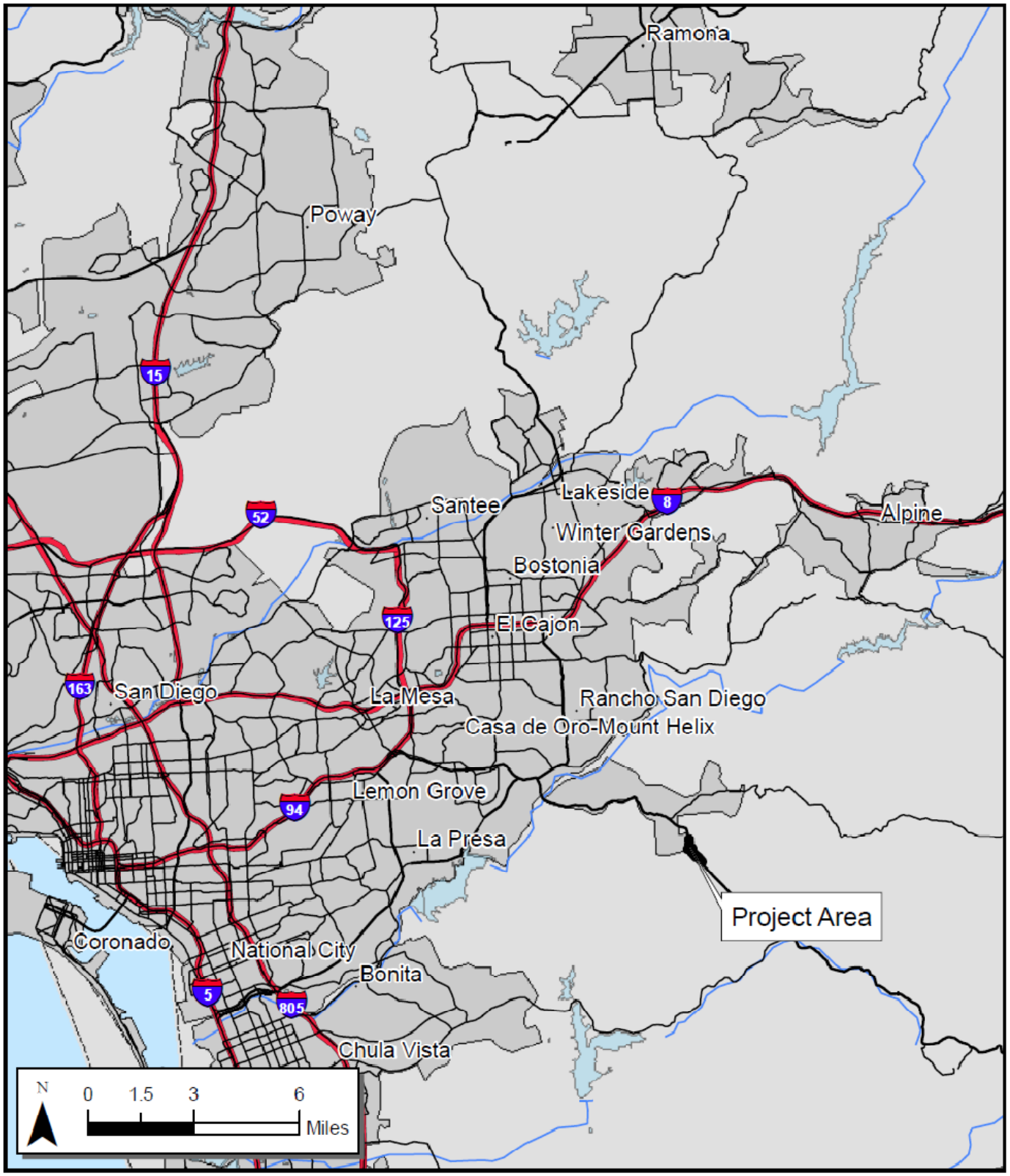


EXHIBIT 2: AERIAL PHOTO OF STUDY AREA

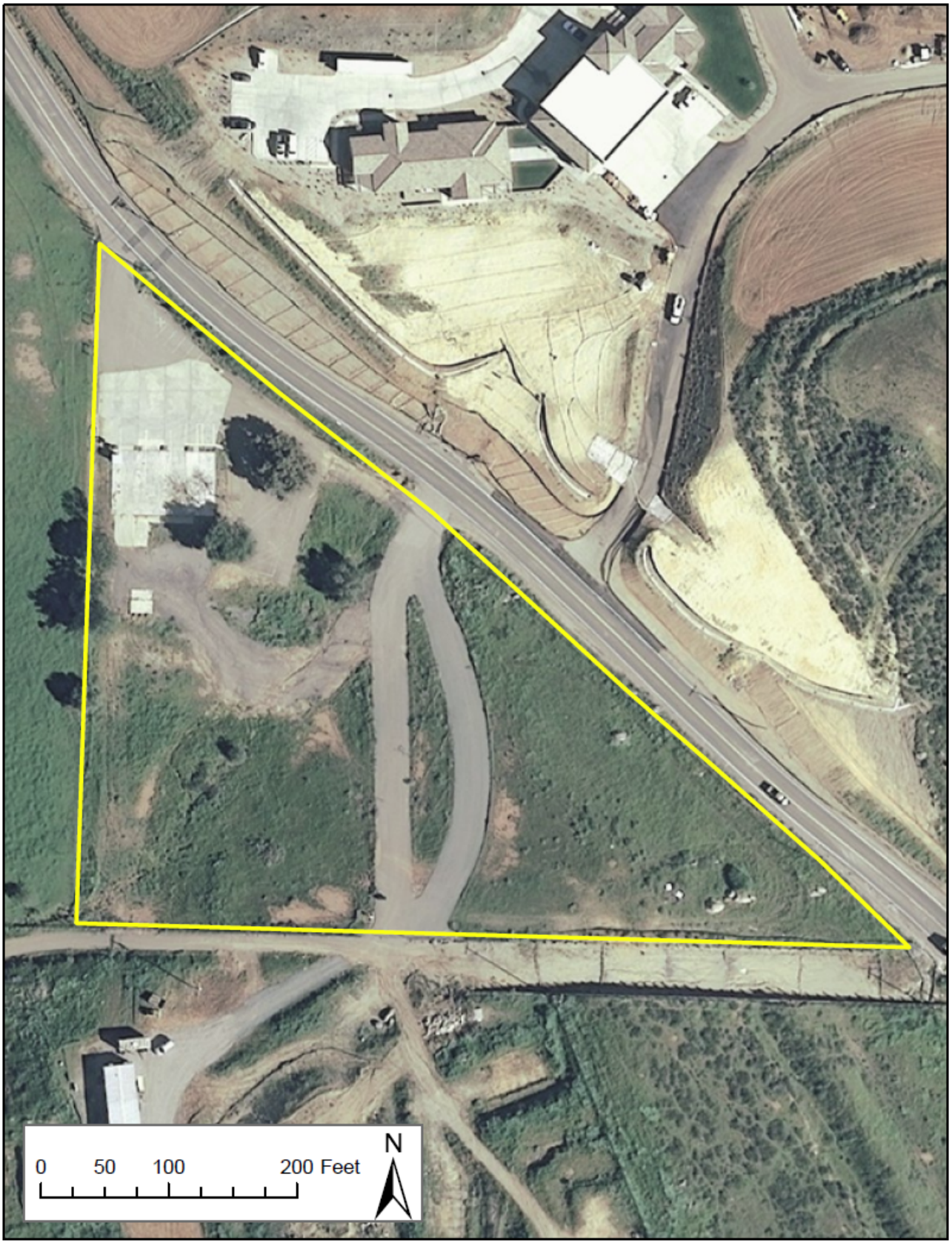


EXHIBIT 3: LIST OF FLORA OBSERVED WITHIN THE STUDY AREA DURING FIELD SURVEYS

Scientific Name	Common Name
Amsinckia menziesii	Menzies' fiddleneck
Anagallis arvensis	Scarlet Pimpernel
Artemisia californica	California Sagebrush
Avena barbata	Slender wild oats
Avena fatua	Wild oat
Brassica nigra	Black mustard
Bromus spp.	Brome grasses
Cirsium sp.	Thistle (invasive)
Chamaesyce sp.	Spurge
Convolvulus arvensis	Field bindweed
Conyza canadensis	Horseweed
Datura stramonium	Jimsonweed
Eremocarpus setigerus	Turkey mullein
Eriogonum fasciculatum	Buckwheat
Erodium spp.	Filarees
Heterotheca grandiflora	Telegraphweed
Hordeum murinum	Barley
Juniperus sp.	Juniper (ornamental)
Lavandula officinalis	Lavender
Lolium perenne	Ryegrass
Lotus sp.	Lotus
Lupinus sp.	Lupine
Malva parviflora	Cheeseweed
Marrubium vulgare	White horehound
Medicago polymorpha	California Bur-clover
Nerium oleander	Oleander
Nicotiana sp.	Tree tobacco (invasive)
Pennisetum sp.	Fountain Grass
Pinus halepensis	Aleppo pine
Plantago major	Common plantain
Platanus acerifolia	London plane tree
Quercus agrifolia	Coast live oak
Raphanus sativus	Wild Radish
Salsola tragus	Russian thistle or tumbleweed
Schinus molle	Peruvian peppertree (ornamental)
Solanum sp.	Nightshade
Taraxacum officinale	Dandelion
Vulpia myuros	Foxtail Fescue
Washingtonia robusta	Mexican Fan Palm
Xanthium strumarium	Cocklebur (invasive)

EXHIBIT 4: MAP OF VEGETATION COMMUNITIES / HABITAT TYPES WITHIN STUDY AREA

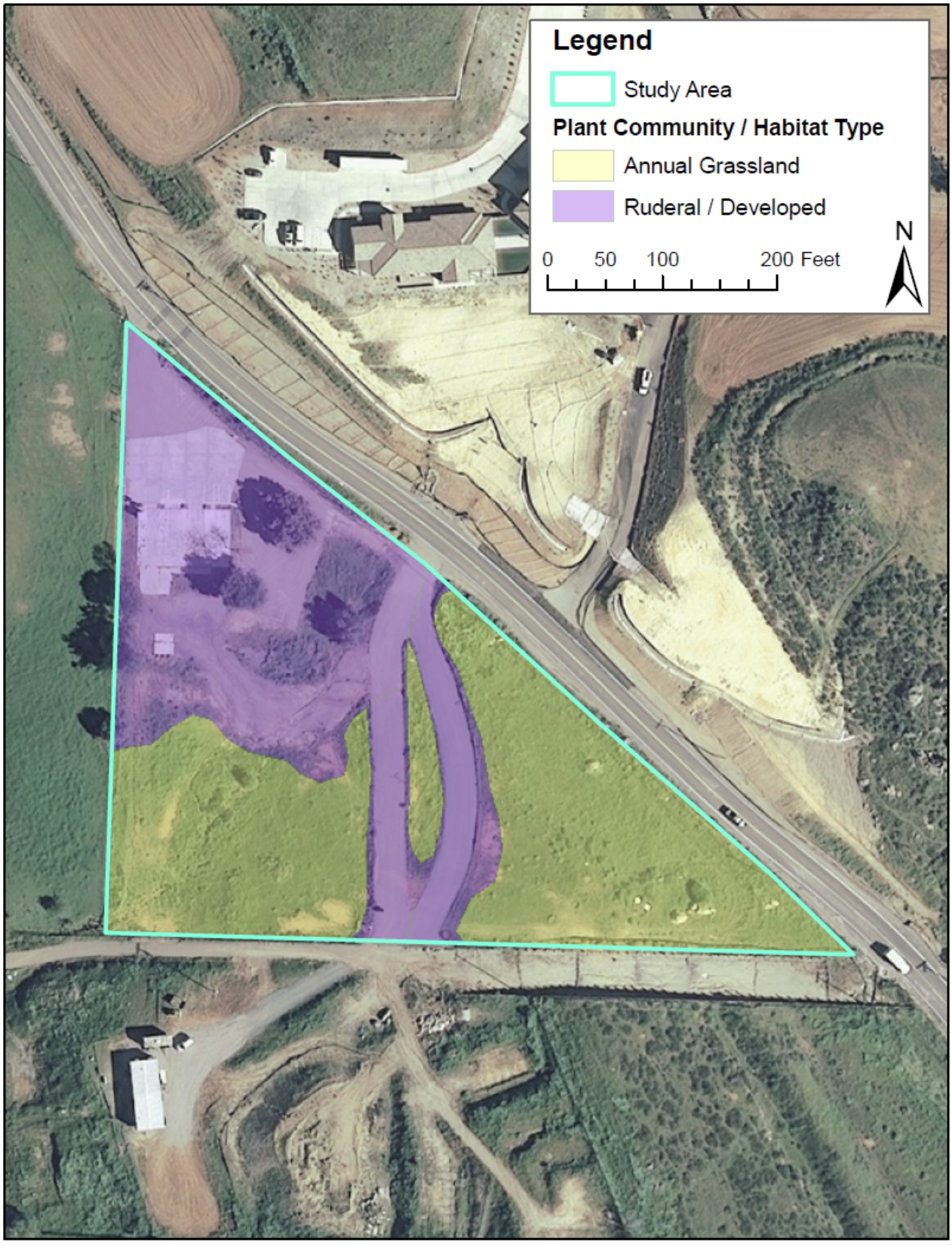
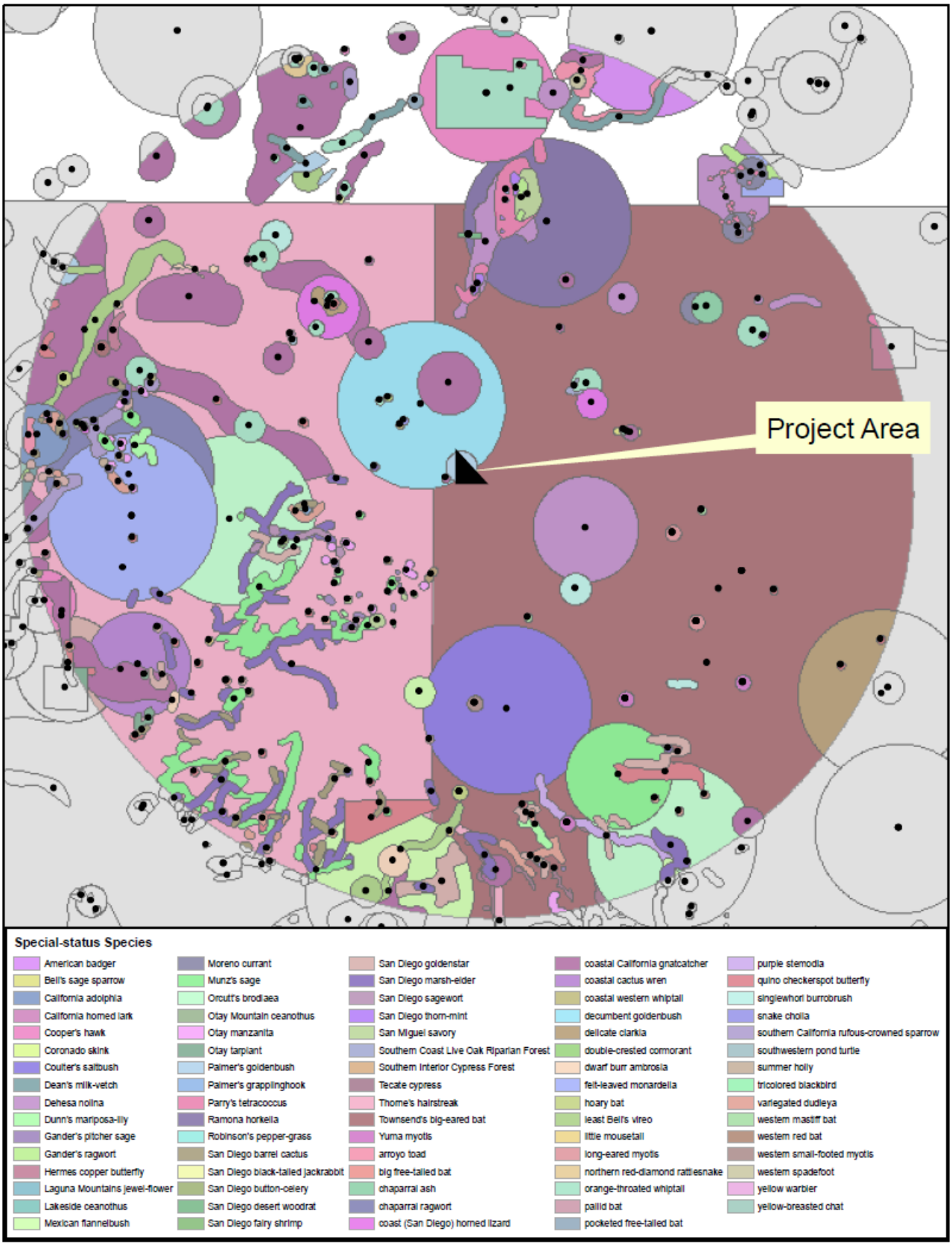


EXHIBIT 5: CNDDB RECORDS OF SPECIAL-STATUS SPECIES WITHIN A 10-MILE RADIUS OF THE STUDY AREA



APPENDIX 3B

4-Acre Parcel Mid-Late Spring 2011 Surveys

A Botanical Inventory of the 4 acre parcel
Jamul, San Diego County, California

UTM #11-S: 512,050mE, 3,618,450mN

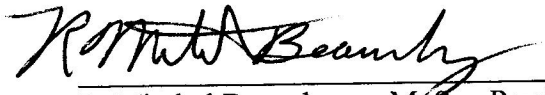
Prepared for

Mr. Joe Broadhead
Environmental Data Systems
1007 7th Street, Suite 308
Sacramento CA 95814
Telephone 916 456 2603

Prepared by

Pacific Southwest Biological Services, Inc.
Post Office Box 985
National City CA 91951-0985
Telephone 619 477 5333
Facsimile 619 477 5380
e-mail: bio@psbs.com

PSBS # T707
2 June 2011



R. Mitchel Beauchamp, M.Sc., President
County of San Diego Certified Biological Consultant

A Botanical Inventory of the 4 acre parcel
Jamul, San Diego County, California

IINTRODUCTION

A biological inventory of a 4 acre, triangular-shaped parcel located on the northeastern side of the Jamul Rancheria trust land was made by the biological consulting staff of Pacific Southwest Biological Services, Inc., (Pacific Southwest) at the request of EDS of Sacramento. . The inventory involved identification of all vascular plants observed on the parcels.

SITE PHYSIOGRAPHY

The parcel is located along the west side of State Route 94 and adjacent to Jamul Reservation trust land. The parcel is 4 acres in size. Geology mapped for the parcel is Jurassic-Triassic Metavolcanic rocks (Strand 1962). The soils mapped for the parcel are: Las Posas fine sandy loam, 5 to 9 percent (LpC2) in the southeastern corner of the parcel and Fallbrook sandy loam, 15 to 30 percent slopes, eroded (FaE2) in the majority of the parcel. The elevation range of the parcel is 947 at the northern end and 917 feet at the southwestern corner.

Rainfall prior to the survey was above normal rainfall averages for the 2010 – 2011 season.

METHODS

A botanical inventory of the parcel was performed by R. Mitchel Beauchamp, senior biologist of Pacific Southwest in compliance with U.S. Fish and Wildlife Service botanical survey guidelines (Appendix 2). That assessment was performed on 13 April 2011 and 1 June 2011 and involved walking about the site recording all plant taxa observed. A checklist of observed plants was compiled (Appendix 1).

VEGETATION

Disturbed Areas

The area of the parcel formerly occupied by the fire station and associated structures consists of paved areas and persisting landscaping.

Non-native Grassland

The southern, majority of the parcel is covered with non-native grasses, largely bromes and wild oats. The small knoll at the southeast corner has persisting Purple Needlegrass (*Nassella pulchra*), suggesting a cover of native grassland prior to the grazing and disturbance of the site.

SENSITIVE SPECIES

PlantsPlants

Several endemic plant species occur on the parcels. None are listed as Rare, Threatened or Endangered by state or federal agencies, however. Appendix 3 indicates those taxa known within the vicinity of the subject parcel.

FINDINGS

No sensitive plant taxa were encountered during the surveys and none were anticipated due to the prior disturbed condition of the site.

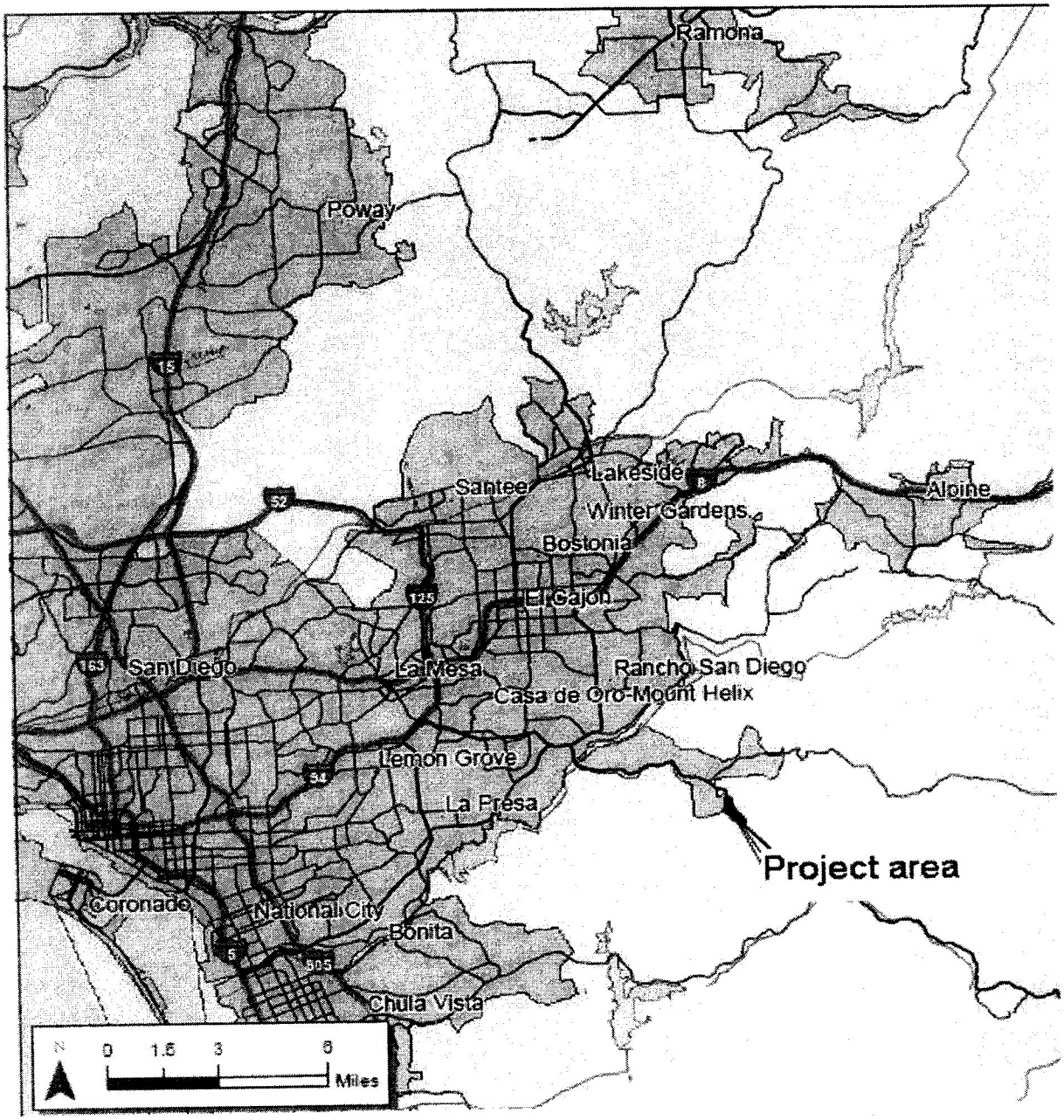


Figure 1.
Jamul Project Sites

N

1" = 3

4-23-11 MAP SOURCE: DELORME 3-D TOPO QUADS PACIFIC SOUTHWEST BIOLOGICAL SERVICES, INC.

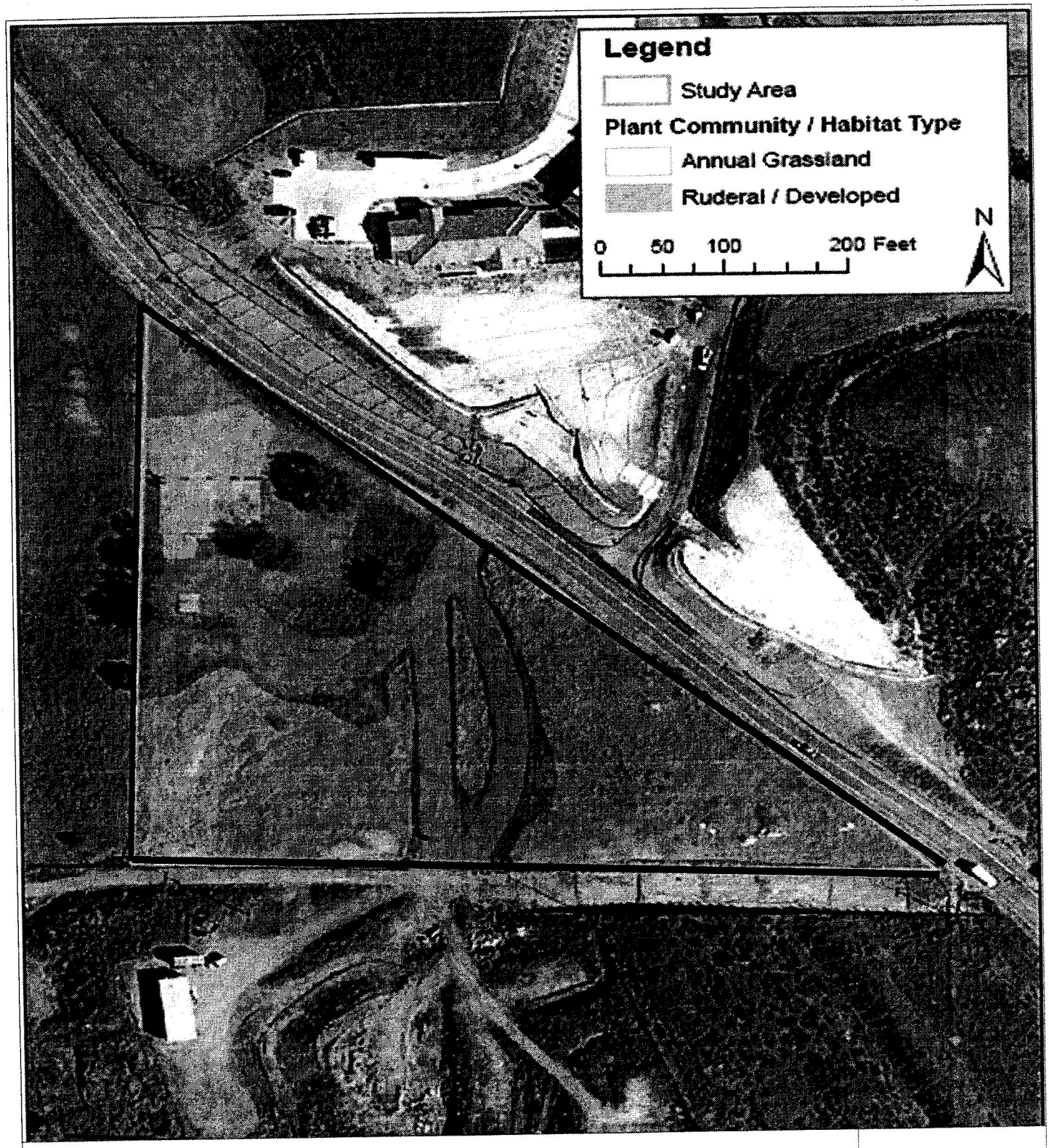


Figure 2.
Jamul Triangle Parcel

N
1" = 100'

4-23-11 MAP SOURCE: DELORME 3-D TOPO QUADS PACIFIC SOUTHWEST BIOLOGICAL SERVICES, INC.

Appendix 1. Floral Checklist of Species Observed at the 4-acre Jamul Parcel

GYMNOSPERMS
Cupressaceae
Juniperus chinensis L. Cultivated Junper

Pinaceae
Pinus halepensis Mill. Aleppo Pine

DICOTYLEDONS
Adoxaceae
Sambucus mexicana Presl Mexican Elderberry

Aizoaceae
Aptenia cordifolia Bolus Red Apple Ice Plant

Anacardiaceae - Sumac Family
**Schinus molle* L. Peruvian Pepper Ttree

Asteraceae - Sunflower Family
Artemisia californica Less. California Sagebrush
**Cirsium vulgare* (Savi) Ten. Bull Thistle
**Conyza canadensis* (L.) Cronq. Hhorseweed
**Chrysanthemum coronarium* L. Garland Daisy
**Euryopsis pectinatus* Thunb. Bush Daisy
Gutierrezia sarothrae (Pursh) Britt. & Rusby Mmatchweed
**Hedypnois cretica* (L.) Willd. Crete Hhedypnois
Heterotheca grandiflora Nutt. Telegraphweed
**Hypochoeris glabra* L. Smooth Cat's-ear
Isocoma menziesii (Hook. & Arn.) Nesom var. *vernonioides* (Nutt.) Nesom Coastal Goldenbush
Lessingia filaginifolia (Hook. & Arn.) M.A. Lane var. *filaginifolia* Cudweed-aster

Boraginaceae - Borage Family
Amsinckia menziesii (Lehm.) Nelson & J.F. Macbr. var. *intermedia* (F. & M.) Ganders Rancher's Fireweed

Brassicaceae - Mustard Family
Guillenia lasiophylla (Hook. & Arn.) Greene California Mustard
**Hirschfeldia incana* (L.) Lagr.-Fossat Short-pod Mustard
**Raphanus sativus* L. Wild Radish

Caryophyllaceae - Pink Family
**Spergularia marina* (L.) Griseb. San Spurry

Chenopodiaceae - Goosefoot Family
**Salsola tragus* L. Russian -thistle

Euphorbiaceae - Spurge Family
Chamaesyce melanadenia (Torr.)Millsp. Sandmat
Eremocarpus setigerus (Hook.) Benth. Doveweed

Fabaceae - Legume Family
Lotus salsuginosus Greene ssp. *salsuginosus* Alkali Lotus
Lotus scoparius ssp. *brevialatus* (Ottley) Munz Deerweed
Lupinus bicolor Lindl. Mminiature Lupine
**Medicago polymorpha* L. California Bur-clover

Appendix 1. Floral Checklist of Species Observed at the 4-acre Jamul Parcel (continued)

Fagaceae - Oak Family
Quercus agrifolia Neé Coast Live Oak

Geraniaceae - Geranium Family
**Erodium botrys* (Cav.) Bertol. Long-beak Filaree
**Erodium cicutarium* (L.) L'Hér. Red-stem Filaree
**Erodium moschatum* (L.) L'Hér. White-stem Filaree

Lamiaceae - Mint Family
*Lavandula officinalis L. Lavander
**Marrubium vulgare* L. Horehound

Malvaceae - Mallow Family
**Malva parviflora* L. Cheeseweed

Platanaceae
**Platanus acerifolia* L. London Plane Tree

Polygonaceae - Buckwheat Family
Eriogonum fasciculatum Benth. var. *fasciculatum* Flat-top Buckwheat

Solanaceae - Nightshade Family
Datura wrightii Regel Western Jimsonweed
**Nicotiana glauca* Grah. Tree Tobacco

MONOCOTYLEDONS
Arecaceae –Palm Family
**Washingtonia robusta* Wendel. Mexican Fan Palm

Amaryllidaceae - Amaryllis Family
**Amaryllis belladonna* L. Pink Lady

Poaceae - Grass Family
**Avena barbata* Link Slender Wild Oat
**Bromus diandrus* Roth Ripgutgrass
**Bromus hordeaceus* L. Soft Chess
**Bromus madritensis* L. ssp. *rubens* (L.) Husnot Red Brome
**Hordeum murinum* ssp. *leporinum* (Link) Arcang. Hare Barley
**Lamarckia aurea* (L.) Moench Golden-top
**Lolium perenne* L. Perennial Ryegrass
Nassella pulchra (A.S. Hitchcock) Barkworth Purple Needlegrass
**Pennisetum setaceum* Forsk. Fountain Grass
**Schismus barbatus* (L.) Thell. Mediterranean Schismus
**Vulpia myuros* (L.) Gmelin var. *hirsuta* (Hacketl) Asch & Graetoner Foxtail Fescue

* - Denotes non-native plant taxa

Appendix 2. Federal Botanical survey Guidelines

Federal protocol for botanical surveys has been promulgated (September 23, 1996). These guidelines describe protocols for conducting botanical inventories for federally listed, proposed and candidate plants, and describe minimum standards for reporting results. The Service will use, in part, the information outlined below in determining whether the project under consideration may affect any listed, proposed, or candidate plants, and in determining the direct, indirect, and cumulative effects.

Field inventories should be conducted in a manner that will locate listed, proposed, or candidate species (target species) that may be present. The entire project area requires a botanical inventory, except developed agricultural lands. The field investigator(s) should:

1. Conduct inventories at the appropriate times of year when target species are present and identifiable. Inventories will include all potential habitats. Multiple site visits during a field season may be necessary to make observations during the appropriate phenological stage of all target species.

2. If available, use a regional or local reference population to obtain a visual image of the target species and associated habitat(s). If access to reference populations(s) is not available, investigators should study specimens from local herbaria.

3. List every species observed and compile a comprehensive list of vascular plants for the entire project site. Vascular plants need to be identified to a taxonomic level which allows rarity to be determined.

4. Report results of botanical field inventories that include:
a. a description of the biological setting, including plant community, topography, soils, potential habitat of target species, and an evaluation of environmental conditions, such as timing or quantity of rainfall, which may influence the performance and expression of target species
b. a map of project location showing scale, orientation, project boundaries, parcel size, and map quadrangle name c. survey dates and survey methodology(ies)
d. if a reference population is available, provide a written narrative describing the target species reference population(s) used, and date(s) when observations were made
e. a comprehensive list of all vascular plants occurring on the project site for each habitat type
f. current and historic land uses of the habitat(s) and degree of site alteration
g. presence of target species off-site on adjacent parcels, if known
h. an assessment of the biological significance or ecological quality of the project site in a local and regional context

5. If target species is(are) found, report results that additionally include:
a. a map showing federally listed, proposed and candidate species distribution as they relate to the proposed project
b. if target species is (are) associated with wetlands, a description of the direction and integrity of flow of surface hydrology. If target species is (are) affected by adjacent off-site hydrological influences, describe these factors.
c. the target species phenology and microhabitat, an estimate of the number of individuals of each target species per unit area; identify areas of high, medium and low density of target species over the project site, and provide acres of occupied habitat of target species. Investigators could

provide color slides, photos or color copies of photos of target species or representative habitats to support information or descriptions contained in reports.
d. the degree of impact(s), if any, of the proposed project as it relates to the potential unoccupied habitat of target habitat.

6. Document findings of target species by completing California Native Species Field Survey Form(s) and submit form(s) to the Natural Diversity Data Base. Documentation of determinations and/or voucher specimens may be useful in cases of taxonomic ambiguities, habitat or range extensions.

7. Report as an addendum to the original survey, any change in abundance and distribution of target plants in subsequent years. Project sites with inventories older than 3 years from the current date of project proposal submission will likely need additional survey. Investigators need to assess whether an additional survey(s) is (are) needed.

8. Adverse conditions may prevent investigator(s) from determining presence or identifying some target species in potential habitat(s) of target species. Disease, drought, predation, or herbivory may preclude the presence or identification of target species in any year. An additional botanical inventory(ies) in a subsequent year(s) may be required if adverse conditions occur in a potential habitat(s). Investigator(s) may need to discuss such conditions.

Appendix 3. Sensitive Plant Taxa know from the Vicinity of the Subject Parcel

Scientific and Common Name	Sensitivity Code & Status (Federal, State, Local, other)	San Diego County List/ Group	Habitat Preferences/ Requirements	Verified On Site Yes/No (Direct/ Indirect Evidence)	Potential to Occur On Site (Obs-LMH)	Factual Basis for Determination of Occurrence Potential
Acanthomintha ilicifolia San Diego Thorn-mint	FT/SE/1B (2-3-2)	List A	Chaparral, coastal scrub, valley & foothill grassland, vernal pools, endemic to active vertisol clay soils of mesas & valleys, usu on clay lenses within grassland or chaparral communities, 10-935 m.	NO	Low	Site lacks clay soils
Adophia californica California Adolphia	None/None/2 (1-3-1)	List B	Chaparral, coastal sage scrub, valley & foothill grassland, from sandy/gravelly to clay soils within grassland, coastal sage scrub, or chaparral; various exposures, 15-300 m.	NO	Low	Site lacks clay soils
Ambrosia monogyra Singlewhorl Burrobush	None/None/2.2			NO	Moderate	Not observed In drainages
Ambrosia pumila San Diego Ambrosia	FE/None/1B (3-3-2)	List A	Chaparral, coastal scrub, valley & foothill grassland, vernal pools, esp in sandy loam or clay soil, in valleys; persists where disturbance has been superficial, 20-415 m.	NO	Low	Site lacks alluvial bench formations
Arctostaphylos otayensis Otay Manzanita	None/None/1B (3-2-3)	List A	Chaparral, cismontane woodland/metavolcanic; 275-1700 m.	NO	Low	Site lacks Chaparral Vegetation and rocky substrate
Artemisia palmeri San Diego Sagewort	None/None/2 (2-2-1)	List B	Chaparral, coastal sage scrub, riparian scrub & woodland/sandy, mesic, 15-915 m.	NO	High	Not observed in riparian systems in the area
Astragalus deanei Dean's Milk-vetch	FSC/None/1B (3-3-3)	List A	Chaparral, coastal scrub, riparian forest, endemic to SD Co., esp open brushy s-facing slopes in Diegan coastal sage, occ on recently burned hillsides, 75-670 m.	NO	Low	Site is outside plant's range in middle Sweetwater River drainage
Atriplex coulteri Coulter's Saltbush	None/None/1B(2-2-2)	List A	Coastal bluff scrub, coastal dunes, coastal scrub, valley & foothill grassland, esp. on ocean bluffs, ridge tops, alkaline low places, 10-440 m.	NO	Low	Site lacks coastal alkaline conditions

Brodiaea orcuttii Orcutt's Brodiaea	FSC/None/1B (1-3-2)	List A	Vernal pools, valley & foothill grassland, closed-cone conif forest, cismontane woodland, chaparral, meadows, esp mesic, clay habitats, occ serpentine, in vernal pools & small drainages, 30-1615 m.	NO	Moderate	Site lacks undisturbed clay soils
Calochortus dunnii Dunn's Mariposa Lily	None/Rare/1B (2-2-2)	Narrow Endemic, List A	Closed-cone conif forest, chaparral, esp. on gabbro or metavolcanic soils; also known from sandstone, oft assoc w/chaparral, 375-1830 m.	NO	Low	Site lacks metavolcanic or significant areas of gabbroic-derived soils
Ceanothus otayensis Otay Mountain Ceanothus	None/None/1B (3-2-2)		Chaparral (metavolcanic or gabbroic), known in CA only fr San Miguel & Otay Mtns., 600-1100 m.	NO	Low	Site lacks Chaparral Vegetation and rocky substrate
Clarkia delicata Delicate Clarkia	None/None/2 (1-2-1)	List B	Cismontane woodland, chaparral, only in SD Co., 235-1,000 m.	NO	Low	Site lacks intact woodland understory habitat
Comarostaphylos diversifolia ssp. *diversifolia* Summer-Holly	FSC/None/1B (2-2-2)	List A	Chaparral, oft in mixed chaparral in CA, sometimes post-burn, 30-550 m.	NO	Low	Site lacks Chaparral vegetation and rocky substrate
Cordylanthus orcuttianus Orcutt's Bird's-beak	None/None/2 (3-3-1)	List B	Coastal scrub. In CA, known only fr SD Co.; also in Baja. Found in coastal scrub assoc on slopes, also reported fr intermittent moist swales, & in washes, 100-200 m.	NO	Low	Site lacks alkaline and bentonitic soils
Cupressus forbesii Tecate Cypress	FSC/None/1B (3-3-2)	List A	Closed-cone conif forest, chaparral, esp. on north-facing slopes, groves oft assoc w/chaparral, 250-1500 m.	NO	Low	Site lacks Chaparral vegetation and rocky substrate
Deinandra [Hemizonia] conjugens Otay Tarplant	FT/SE/1B (3-3-2)	Narrow Endemic, List A	Coastal scrub, valley & foothill grassland. In CA, known only fr SD Co. Coastal plains, mesas, river bottoms, oft in open dist areas, clay soils, 25-300 m.	NO	Low	Site lacks undisturbed clay soils
Dudleya variegata Variegated Dudleya	FT/SE/1B(3-3-2)	Narrow Endemic, List A	Chaparral, coastal scrub, cismontane woodland, valley & foothill grassland, vernal pools. In CA, known only fr SD Co. Rocky or clay soils, vernal pool margins, 3-550 m.	NO	Low	Site lacks undisturbed clay soils
Ericameria palmeri ssp. *palmeri* Palmer's Goldenbush	None/None/1B (3-2-1)	Narrow Endemic, List B	Coastal scrub, chaparral, granitic soils, steep hillsides, mesic areas; 100-600 m.	NO	Moderate	Occurs as a single stand in alignment of open field route to west.

Eryngium aristulatum var. *parishii* San Diego Button-celery	FE/SE/1B (2-3-2)	List A	Vernal pools, coastal scrub, valley & foothill grassland, esp in SD mesa hardpan & claypan vernal pools & southern interior basalt flow vernal pools; usu surr by scrub, 15-620 m	NO	Low	Site lacks level areas and vernal pool formations
Ferocactus viridescens San Diego Barrel Cactus	FSC/None/2 (1-3-1)	List B	Chaparral, Diegan coastal scrub, valley & foothill grassland, oft on exposed, level or s-facing sloping areas; oft in coastal scrub near crest of slopes, 3-485 m.	NO	Low	Site lacks intact Coastal Sage Scrub vegetation and lies too far east of know range
Fremontodendron mexicanum Mexican Flannelbush	FE/Rare/1B (3-3-2)		Closed-cone conif forest, chaparral, cismontane woodland. Usu scattered along borders of creeks or in dry cyns; sometimes on gabbro soils, 10-490 m.	NO	Low	Site lacks Chaparral habitat and rocky substrate
Harpagonella palmeri Palmer's Grapplinghook	None/None/4 (1-2-1)	List B	Chaparral, coastal scrub, valley & foothill grassland, esp clay soils, open grassy areas, 15-830 m.	NO	Low	Site lacks clay soils
Isocoma menziesii var. *decumbens* Decumbent Goldenbush	None/None/1B (2-2-2)	List A	Coastal sage, sandy soil, often in disturbed sites, 10-910 m.	NO	Low	Site lacks intact Coastal Sage Scrub vegetation
Iva hayesiana San Diego Marsh-elder	FSC/None/2 (2-2-1)	List B	Marshes & swamps, playas, esp in river washes, 10-500 m.	NO	Moderate	Not observed in channels on site or in the vicinity
Lasthenia glabrata ssp. *coulteri* Coulter's Goldfields	FSC/None/1B (2-3-2)	List A	Coastal salt marshes, playas, valley & foothill grassland, vernal pools, usu in alkaline soils in playas, sinks, grassland, 1-1400 m.	NO	Low	Site lacks mesic alkaline habitats
Lepechinia ganderi Gander's Pitcher Sage	None/None/1B (3-1-2)	Narrow Endemic, List A	Closed-cone conif forest, chaparral, coastal scrub, valley & foothill grassland/gabbroic or metavolcanic. SD Co., Baja. Known in CA fr fewer than 10 occurs, 305-1005 m.	NO	Low	Site lacks Chaparral Vegetation and rocky substrate
Lepidium virginicum var. *robinsonii* Robinson's Pepper-grass	None/None/1B (3-2-2)	List A	Alkaline sites on the coastal sides of the main mountain ranges, below 800 m..	NO	Low	Site lacks undisturbed Coastal Sage Scrub
Muilla clevelandii San Diego Goldenstar	FSC/None/1B (2-2-2)	List A	Chaparral, coastal scrub, valley & foothill grassland, vernal pools, esp. mesa grasslands, scrub edges; under 50 m.	NO	Low	Site lacks intact clay soils

Myosurus minimus ssp. *apus* Little Mousetail	FSC/None/3 (2-3-2)	List A	Vernal pools. This ssp. has taxonomic probs. Distinguishing betw this and *M. sessilis* is difficult. Hybrid? Alkaline soils, 20-640 m.	NO	Low	Site lacks level land and vernal pool formations
Nama stenocarpum Mud Nama	None/None/2 (3-2-1)	List B	Marshes & swamps. Lake shores, river banks, intermitt. wet areas, 5-500 m.	NO	Low	Site lacks ponding features
Navarretia fossalis Spreading Navarretia	FT/None/1B (2-3-2)	List A	Vernal pools, chenopod scrub, marshes & swamps, playas, esp in SD hardpan & SD claypan vernal pools, in swales & vernal pools, often surr . by other habitat types, 30-1300 m.	NO	Low	Site lacks level land and vernal pool formations
Opuntia californica var californica Snake Cholla	None/None/1B (3-3-2)	Narrow Endemic, List A	Chaparral, coastal scrub, 30-150 m.	NO	Low	Site lacks intact shrubland vegetation
Salvia munzii Munz' Sage	None/None/2 (2-2-1)	List B	Chaparral, coastal sage scrub. Known only fr SD Co. & Baja. Rolling hills & slopes, 120-1065 m.	NO	Low	Site lacks Metavolcanic -derived soils
Satureja chandleri San Miguel Savory	None/None/4 (1-2-2)	List D	Chaparral, cismontane woodland, coastal scrub, riparian woodland, valley & foothill grassland, esp gabbroic or metavolcanic substrate, 120-1005 m.	NO	Low	Site lacks Chaparral and rocky substrate
Senecio aphanactis Rayless Ragwort	None/None/2 (3-2-1)	List B	Chaparral, cismontane woodland, coastal scrub/alkaline, 15-800 m. Rare in LA, OR, & RIV Cos.	NO	Low	Site lacks undisturbed habitats
Senecio ganderi Gander's Ragwort	FSC/SR/1B (3-2-3)	List A	Chaparral, esp. recently burned sites, gabbroic outcrops, 400-1200 m.	NO	Low	Site lacks significant areas of gabbroic -derived soils
Stemodia durantifolia Purple Stemodia	None/None/2 (3-3-1)		Sonoran desert scrub (often mesic, sandy), 180-300 m.	NO	Low	Site lacks ponding sites
Streptanthus bernardinus Laguna Mountains Jewelflower	None/None/None	List A	Chaparral, lower montane conif forest, 670-2500 m.	NO	Low	Site lacks Chaparral vegetation
Tetracoccus dioicus Parry's Tetracoccus	FSC/None/1B (3-2-2)	List A	Chaparral, coastal scrub, esp stony fine sandy decomposed gabbro soil, 165-1000 m.	NO	Low	Site lacks significant areas of gabbroic -derived soils

APPENDIX 3C

Access Roadways Early Spring 2011 Surveys

BOTANICAL SURVEY FOR THE JAMUL ACCESS PROJECT, SAN DIEGO COUNTY, CALIFORNIA

May 2011

Prepared for:

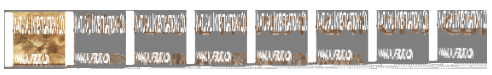
Environmental Data Systems, Inc.

and

Jamul Indian Village

Prepared by:

Natural Investigations Company
1017 Carter Street, Folsom, CA 95630



1. INTRODUCTION

1.1. PROJECT LOCATION AND DESCRIPTION

The Project location is just south of the town of Jamul in unincorporated San Diego County (hereafter, "County"), California (Exhibit 1). The Study Area of this assessment consists of a 20-acre road corridor project area that is an expansion of the CalTrans right-of-way of State Route 94, from a 1/4-mile north of Melody Road to a 1/2 mile south of the Jamul Indian Village (Indian reservation), and the frontage and driveways of affected parcels and ancillary roads (especially Melody Road). These affected parcels consist primarily of a 4-acre parcel (APN 597-06-004), an 87-acre parcel (APN 597-06-005); and a 10-acre parcel (APN 597-04-213) (Exhibit 2). The project consists of an access road from State Route 94 to the Jamul Indian Village; however, design plans have not yet been finalized.

1.2. PURPOSE AND SCOPE OF ASSESSMENT

Natural Investigations Co. has prepared this botanical survey for Environmental Data Systems Inc., and its Client, Jamul Indian Village, in support of the environmental compliance process.

The scope of work is to perform the first of 3 botanical surveys (early spring, mid-spring, and late spring season surveys) during the 2011 blooming period within the Study Area, so that all possible special-status plant species might be detected. These botanical reports will be appendicized to a separate Biological Assessment for consultation with U.S. Fish and Wildlife Service and California Department of Fish and Game.

Surveys were floristic in nature and conducted in a manner that would ensure location of any rare, threatened, or endangered species that may be present in the Study Area. Surveys for rare plants were conducted in accordance with the standardized guidelines issued by the U.S. Fish and Wildlife Service (1996), California Department of Fish and Game (2000), and the California Native Plant Society (2001). This report conforms to the scientific writing style established by Council of Science Editors (2006).

2. ENVIRONMENTAL SETTING

The Study Area is located within the Peninsular Ranges geographic subregion, which is contained within the Southwestern geographic subdivision of the larger California Floristic Province (Hickman 1993). The region is in climate Zone 21 – "Ocean-influenced southern California", characterized by infrequent frost, with mild to hot, dry summers and mild, wet winters moderated by marine air influx (Hickman, 1993; Brenzel, 2001). The topography of the Study Area is rolling and slopes generally to the south and southwest. The elevation ranges from approximately 800 feet to 1,000 feet above mean sea level. The general direction of surface runoff in the Study Area is to the southwest via an unnamed, intermittent drainage tributary to Jamul Creek.

Land uses in the Study Area are a mixture of residential estates on large lots and denser urban subdivisions, cattle and horse pastures, and fallow lands/open space. Weeds and tall grass appear to have been periodically mowed or cut back.

The surrounding land uses are as follows: to the south, the Rancho Jamul Ecological Reserve and the Hollenbeck Canyon Wildlife Area, and private rangeland; to the north, residential subdivisions and the town of Jamul; to the east, the new fire station, private estates (Peaceful Valley Ranch Estates), and hayfields; and to the west, cattle pasture and private estates.

3. METHODOLOGY

3.1. PRELIMINARY DATA GATHERING AND RESEARCH

Prior to conducting the field survey the following information sources were reviewed:

- Any readily-available previous biological resource studies pertaining to the Study Area or vicinity
- United States Geologic Service (USGS) 7.5 degree-minute topographic quadrangles of the Study Area and vicinity
- Aerial photography of the Study Area
- California Natural Diversity Database (CNDDB), electronically updated monthly by subscription to CDFG.

The following biological assessments were previously performed within the Study Area and vicinity:

- Beauchamp, R.M. 2000. A biological inventory and wetlands delineation of the Jamul Rancheria Parcels in Jamul, San Diego County, California. Pacific Southwest Biological Services Inc.
- Bureau of Indian Affairs. 2003. Jamul Indian Village Environmental Impact Statement. [Floristic surveys conducted in 2001-2002 of the Jamul Indian Village project area (the 87-acre parcel, the 4-acre parcel, the 10-acre parcel, and the Jamul Indian Village)]
- Natural Investigations Company. 2006. Jamul Indian Village Off-reservation Biological Resources Assessment. Volume I, Appendix D, in Jamul Indian Village (2006) Final TEIS/R. [Floristic surveys conducted in 2006 on the Highway 94 corridor and 4-acre parcel]

3.2. FIELD SURVEY

Surveys were floristic in nature and conducted in a manner that would ensure location of any rare, threatened, or endangered species that may be present in the Study Area. Surveys for rare plants were conducted in accordance with the standardized guidelines issued by the U.S. Fish and Wildlife Service (1996), California Department of Fish and Game (2000), and the California Native Plant Society (2001). This report conforms to the scientific writing style established by Council of Science Editors (2006).

Dr. G.O. Graening (see qualifications in Section 10) conducted the botanical field surveys on March 23 and 24, 2011. Dr. Graening also performed botanical surveys of the Study Area, or portions thereof, in 2006, 2007, and 2009, and last year (February 24 2010 and May 4, 2010). A complete coverage, variable-intensity pedestrian survey was performed of the Study Area, modified to account for differences in terrain, vegetation density, and visibility.

Survey efforts emphasized the search for any special-status species or habitats that had documented occurrences, in databases queried, within the Study Area or vicinity. All visible flora observed were recorded in a field notebook, and identified to the lowest possible taxon; a hand lens was used where necessary. When a specimen could not be identified *in situ*, a photograph or voucher specimen (depending upon scientific permit requirements) was taken and identified later in the laboratory using a dissecting scope where necessary. Dr. Graening holds the following scientific collection permits: CDFG Scientific Collecting Permit No. SC-006802 and CDFG Plant Voucher Specimen Permit 09004. Taxonomic determinations and nomenclature followed these references: Pavlik (1991), Hickman (1993), Brenzel (2001), Stuart and Sawyer (2001), Lanner (2002) Calflora (2010), University of California at Berkeley (2010a,b). Scientific names are introduced first and common names are used thereafter for ease of reading.

Plant specimens difficult to identify were sent fresh to the Jepson Herbarium (University of California at Berkeley), where senior botanist Margriet Wetherwax made final determinations (see Section 10 for qualifications). Any collected plant specimens worthy of curation were deposited in the Jepson Herbarium by M. Wetherwax.

3.3. MAPPING AND OTHER ANALYSES

Locations of special status species' occurrences and habitat boundaries within the Study Area were recorded on color aerial photographs, and then digitized to produce the final habitat maps. The boundaries of potentially jurisdictional water resources within the Study Area were identified and measured in the field, and similarly digitized to calculate acreage and to produce informal delineation maps. Geographic analyses were performed using geographical information system software (ArcGIS 9.3, ESRI, Inc.). Vegetation communities (assemblages of plant species growing in an area of similar biological and environmental factors), were classified by Vegetation Series (distinctive associations of plants, described by dominant species and particular environmental setting) using the CNPS Vegetation Classification system (Sawyer and Keeler-Wolf, 1995).

4. RESULTS

4.1. INVENTORY OF FLORA FROM FIELD SURVEY

All plants sighted during the field surveys of the Study Area conducted March 23 and 24, 2011, are compiled in Exhibit 3. No special-status plant species were observed within the Study Area during these surveys. Note that the dates of field surveys may not coincide with every blooming period of regionally-occurring special-status plant species.

4.2. VEGETATION COMMUNITIES

The Study Area currently contains 4 terrestrial natural community/habitat types, listed in descending areal preponderance: ruderal/developed; annual grassland, riparian, and coastal scrub (see Exhibit 4)

Ruderal and urbanized areas constitute the majority of the Study Area, and consist of disturbed or converted natural habitat that is now either in a weedy and barren (ruderal) state, plowed, graded, or urbanized with pavement, landscaping, and structure and utility placement. Vegetation within this habitat type consists primarily of nonnative weedy or invasive ruderal species or ornamental plants lacking a consistent community structure. This habitat type provides limited resources for wildlife and is utilized primarily by common species tolerant of human activities.

Annual grassland habitat consists of open fields of non-native pasture grasses and weedy forbs. These annual grasslands have replaced native habitats of perennial bunchgrasses or coastal scrub. Grazing disturbances, rather than periodic wildfires, keep this plant community from undergoing successional changes to woodland. Plant species common in this community include European annual grasses (*Avena, Bromus, Hordeum, Festuca*). Common forbs include turkey mullein (*Eremocarpus setigerus*), yellow star thistle (*Centaurea solstitialis*), and black mustard (*Brassica nigra*). The conversion of native habitats to annual grasslands greatly reduces wildlife biodiversity and habitat value. However, common, disturbance-tolerant wildlife species can occur in these habitats.

Two special-status communities were reported by CNDDB (CDFG 2010) within a 5-mile radius of the Study Area: Southern Coast Live Oak Riparian Forest and Southern Interior Cypress Forest. No special-status communities are present with the Study Area. Southern Coast Live Oak Riparian Forest is present in the Study Area (on the 87-acre parcel, the 10-acre parcel, and the Jamul Indian Village). Patches of coastal scrub occur throughout the Study Area.

4.3. LISTED SPECIES / SPECIAL-STATUS SPECIES

For the purposes of this assessment, "special status" is defined to be species that are of management concern to state or federal natural resource agencies, and include those species that are:

- Listed as endangered, threatened, proposed, or candidate for listing under the Federal Endangered Species Act;

Historical Special-status Species' Occurrences

A list of special-status plant and animal species that historically occurred within the Study Area and vicinity was compiled based upon the following:

- Any previous and readily-available biological resource studies pertaining to the Study Area;
- Informal consultation with USFWS by generating an electronic Species List (available on the applicable Field Office website); and
- A spatial query of the CNDDB.

Floristic surveys conducted in 2001-2002 of the Jamul Indian Village project area (the 87-acre parcel, the 4-acre parcel, the 10-acre parcel, and the Jamul Indian Village), did not detect any threatened or endangered species (BIA, 2003). Floristic surveys conducted in 2006 for SR-94 traffic improvements, which included the Alternative 1 and 2 Study Areas (i.e., the Highway 94 corridor and 4-acre parcel), did not detect any rare, threatened, or endangered plant species in the Study intersections (Natural Investigations Co., 2006). Floristic surveys conducted in 2007, which included the Alternative 1 and 2 study areas (i.e., the Highway 94 corridor and 4-acre parcel), did not detect any rare, threatened, or endangered plant species (Natural Investigations Co., 2007a). Floristic surveys conducted in 2009 did not detect any special-status species (Natural Investigations Co., 2009). Floristic surveys conducted in 2010 did not detect any rare, threatened, or endangered plant species (Natural Investigations Co., unpub. data).

The CNDDB was spatially queried and any reported occurrences of special-status species were plotted in relation to the Study Area boundary using GIS software (Exhibit 5). The CNDDB reported special-status species with historical occurrences within the Study Area. Within a 5-mile buffer of the Study Area boundary, the CNDDB reported over 300 special-status species occurrence records.

The County's SanBIOS database (2010) was also spatially queried and any reported occurrences of special-status species plotted. The County's database reported no special-status species with a historical occurrence within the Study Area. Several special-status species occurrences were reported by SanBIOS database on adjacent properties.

A federal species list was also generated from the USFWS website using the USGS 7.5-minute quadrangle in which the Study Area is located, plus the surrounding quadrangles.

Special-status Species Observed During Field Survey

No special-status plant species were observed within the Study Area during the most recent field surveys (March 23 and 24, 2011).

Analyses of Likelihood of Occurrence of Listed Species / Special-status Species

4.3.0.1. Listed Plant Species

Several plants designated as special status were reported in the vicinity of the Study Area by the CNDDB, and suitable habitats may exist within the Study Area: San Diego sagewort; Otay tarplant; Palmer's grapplinghook; Ramona horkelia; decumbent goldenbush; Gander's pitcher sage; felt-leaved monardella; San Miguel savory. Special-status plants are not expected to thrive in the Study Area because of the preponderance of invasive and non-native plants, and habitat degradation associated with urbanization; previous botanical surveys did not detect any rare plants.

San Diego Thorn Mint (*Acanthomintha ilicifolia*)

San Diego Thorn Mint is an annual herb that occurs on clay, gabbro, and calcareous soils in openings within coastal sage scrub, chaparral, and native grassland habitats of coastal San Diego County. Potentially suitable habitat for San Diego thorn mint does not occur within the Study Area. Non-paved lands within the Study Area are dominated by non-native annual grasses. A botanical inventory of the

FEIS project site (the 87-acre, 10-acre, 4-acre parcels) in April 2000 by Beauchamp did not detect this plant. This plant was also not detected in subsequent surveys (Natural Investigations 2006, 2007a), including the current botanical survey for this study.

Otay Tarplant (*Deinandra conjugens*)

The Otay tarplant, federally listed as endangered, is a glandular, aromatic, annual herb; the blooming period for this species is May to June (CNPS, 2010). The majority of occurrences are associated with clay soils in grasslands, coastal sage scrub, or maritime succulent scrub at elevations between 25 and 300 m. This species has a limited distribution consisting of approximately 25 historical populations near Otay Mesa in southern San Diego County and one population in Mexico near the U.S. border; the Study Area is outside of the designated critical habitat. some grassland habitat does occur within the Study Area, but the plant has never been detected during field surveys over the last decade.

Dwarf Burr Ambrosia (*Ambrosia pumila*)

Dwarf burr ambrosia is federally listed as threatened. CDFG (2010a) describes its habitat requirements as, "*chaparral, coastal scrub, valley and foothill grassland; sandy loam or clay soil; in valleys; persists where disturbance has been superficial; sometimes on margins or near vernal pools*." Numerous botanical surveys over the last decade have not detected this species.

Mexican flannelbush (*Fremontodendron mexicanum*)

Mexican flannelbush is federally listed as endangered. CDFG (2010a) describes its habitat requirements as, "*closed-cone coniferous forest, chaparral, cismontane woodland; usually scattered along the borders of creeks or in dry canyons; sometimes on gabbro soils; 10-490m*." Numerous botanical surveys over the last decade have not detected this species.

5. CONCLUSION

Numerous common native and non-native plants were sighted during the field surveys of the Study Area on March 23 and 24, 2011. No special-status plant species were observed within the Study Area during these surveys. Because that the dates of field surveys may not coincide with every blooming period of regionally-occurring special-status plant species, additional botanical surveys are recommended. These mid-spring and late-spring season surveys are in progress, and are being performed by Pacific Southwest Biological Services, Inc.

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7. QUALIFICATIONS OF BIOLOGIST

REPORT AUTHOR, FIELD SURVEYOR: G.O. Graening, Ph.D.

G. O. Graening holds a PhD in Biological Sciences and a Master of Science in Biological and Agricultural Engineering. Dr. Graening is an adjunct Professor at California State University at Sacramento, and is an active researcher in the area of conservation biology and groundwater ecology; his publication list is available online at http://www.csus.edu/indiv/g/graeningg/pubs.htm. Dr. Graening is also a Certified Arborist (ISA # WE-6725A) and a Registered Environmental Assessor I (DTSC # 08060). Dr. Graening has 12 years of experience in environmental assessment, including independent contractual work as well as previous employment with *The Nature Conservancy*, Tetra Tech Inc., and CH2M Hill, Inc.

CONSULTING TAXONOMIST: Margriet Wetherwax, M.S.

Ms. Wetherwax holds a Masters Degree in Advanced Plant Systematics and a Bachelor of Science in Botany. Since 1995, Ms. Wetherwax has been employed at the Jepson Herbarium (University of California at Berkeley) as a plant taxonomist and museum scientist. Ms. Wetherwax is managing editor and illustration editor of the Jepson Flora Project and The Jepson Desert Manual, as well as a contributing author to The Jepson Manual: Higher Plants of California and the Flora of North America North of Mexico Project.

8. EXHIBITS

EXHIBIT 1: LOCATION OF PROJECT

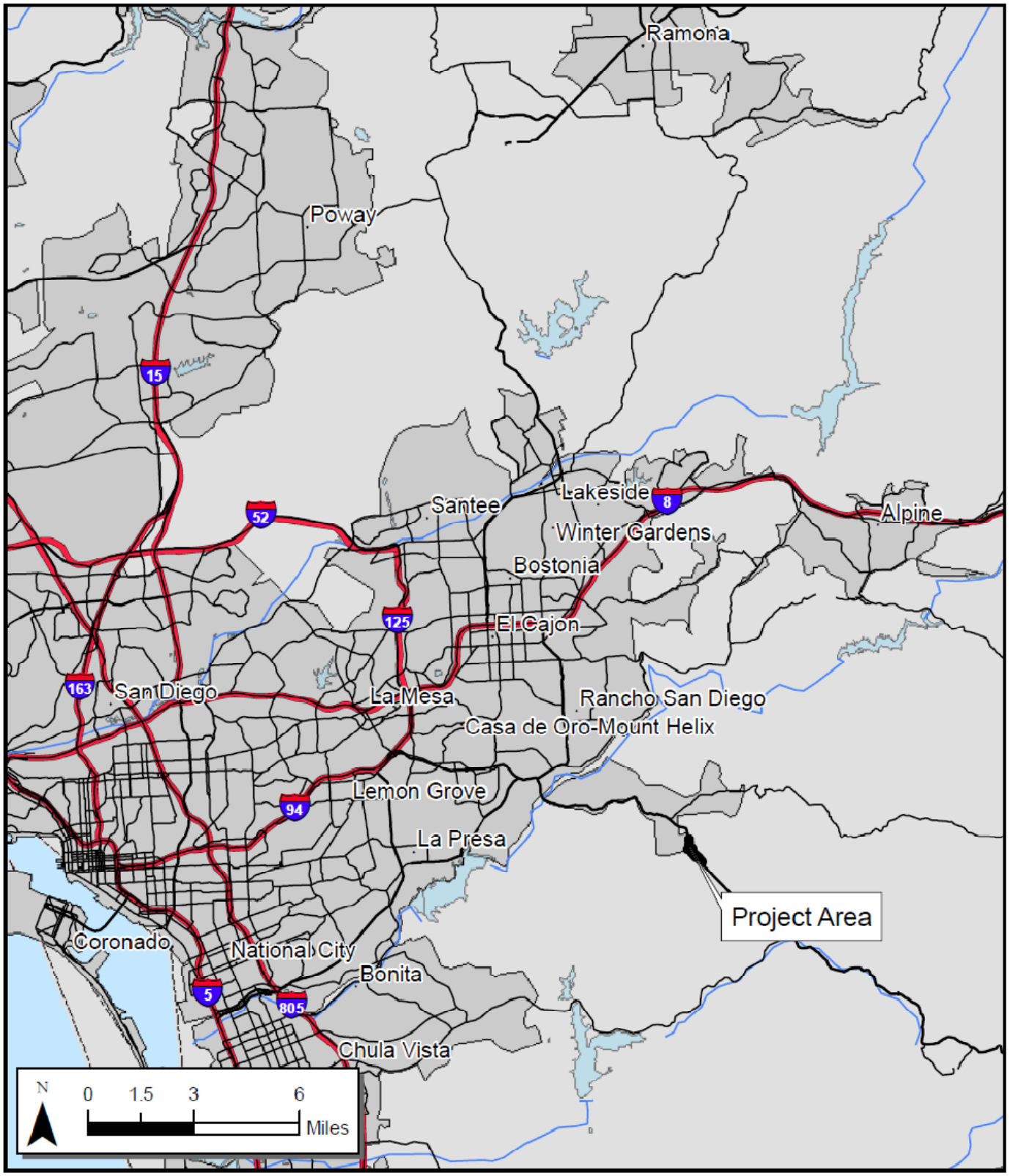


EXHIBIT 2: AERIAL PHOTO OF STUDY AREA

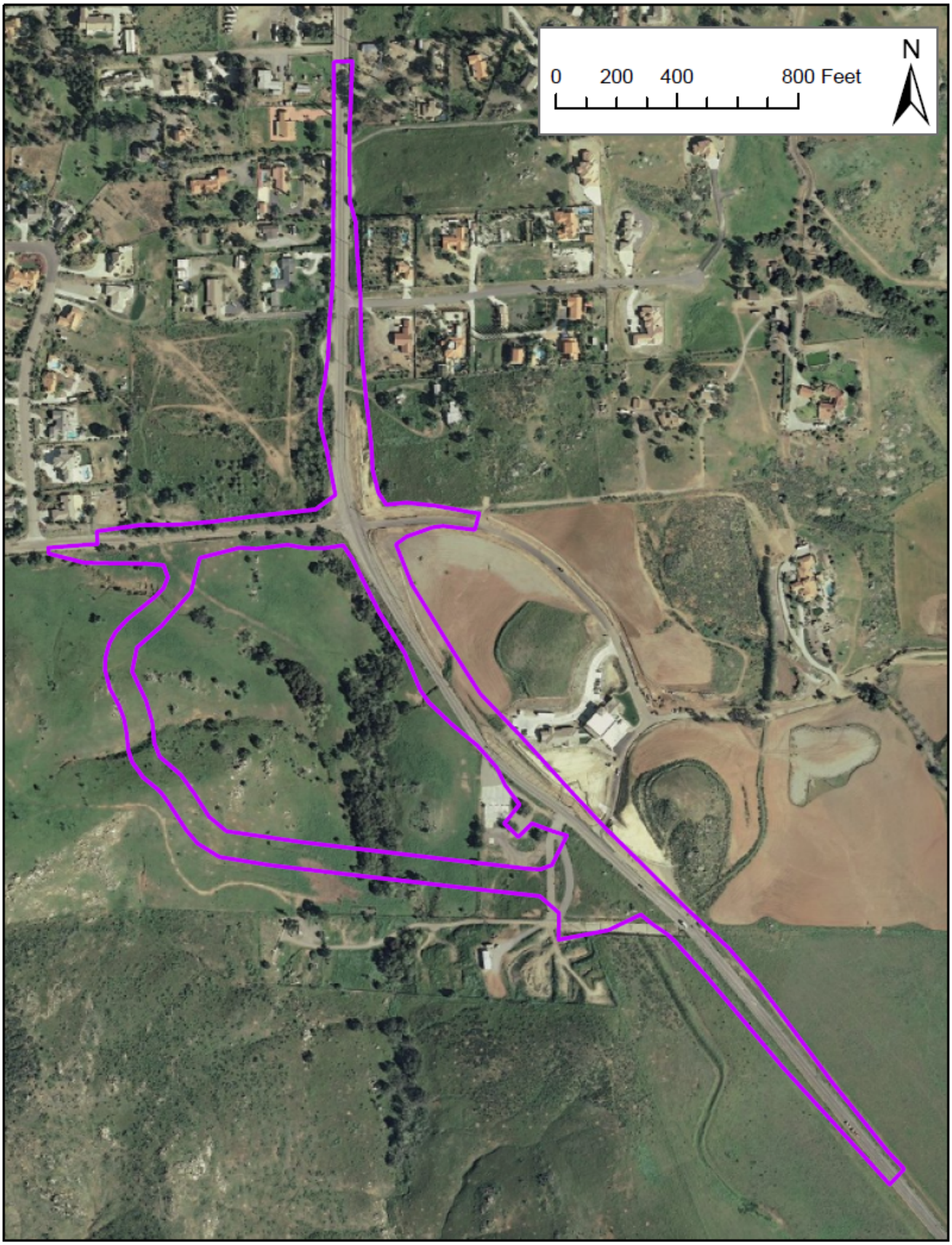


EXHIBIT 3: LIST OF FLORA OBSERVED WITHIN THE STUDY AREA DURING FIELD SURVEYS

Scientific Name	Common Name
Amsinckia menziesii	Menzies' fiddleneck
Anagallis arvensis	Scarlet Pimpernel
Artemisia californica	California sagebrush
Avena barbata	Slender wild oats
Avena fatua	Wild oat
Bromus spp.	Brome / chess grasses
Carduus pycnocephalus	Italian thistle (invasive)
Centaurea sp.	Thistle (invasive)
Chamaesyce sp.	Spurge
Chenopodium sp.	Goosefoot
Citrus sp.	Citrus orchard
Claytonia parviflora	Miner’s lettuce
Convolvulus arvensis	Field bindweed
Conyza spp.	Horseweed
Cynodon dactylon	Bermuda grass
Datura sp.	Jimsonweed
Eriogonum fasciculatum	California buckwheat
Erodium spp.	Filarees
Eremocarpus setigerus	Turkey mullein
Eschscholzia californica	California poppy
Eucalyptus	Blue gum eucalyptus
Galium angustifolium angustifolium	narrow leaved bedstraw
Gnaphalium spp.	Cudweed & everlasting
Hedypnois cretica	Cretanweed
Heterotheca grandiflora	Telegraphweed
Hordeum murinum	Barley
Hypochaeris glabra	Smooth catsear
Iris sp.	Iris (ornamental)
Lemna minuscula	Duckweed
Lolium perenne	Ryegrass
Lotus purshianus	Spanish clover
Lupinus hirsutissimus	stinging annual lupine
Malosma laurina	Laurel sumac
Malva parviflora	Cheeseweed
Marrubium vulgare	White horehound
Medicago polymorpha	California burclover
Nicotiana sp.	Tree tobacco (invasive)
Olea europaea	Olive, ornamental
Opuntia sp.	Cholla
Pennisetum setaceum	Crimson fountaingrass
Plagiobothrys collinus	Cooper's popcornflower
Plantago erecta	California plantain
Plantago major	Common plantain
Plantago ovata	Woolly Plantain
Quercus agrifolia	Coast live oak
Raphanus sativus	Wild Radish
Rhamnus crocea	redberry buckthorn
Rorippa nasturtium-aquaticum	watercress
Rumex crispus	Curly dock
Salix lasiolepis	Arroyo willow
Salix gooddingii	Goodding’s black willow

Scientific Name	Common Name
Salsola tragus	Russian thistle
Sambucus mexicanus	Blue elderberry
Schinus molle	Peruvian peppertree (ornamental)
Scrophularia californica	California figwort
Toxicondendron diversilobum	Poison oak
Triticum sp.	Wheat (grain crop)
Urtica urens	Dwarf nettle
Vulpia myuros	Foxtail fescue
Xanthium strumarium	Cocklebur (invasive)

EXHIBIT 4: MAP OF VEGETATION COMMUNITIES / HABITAT TYPES WITHIN STUDY AREA

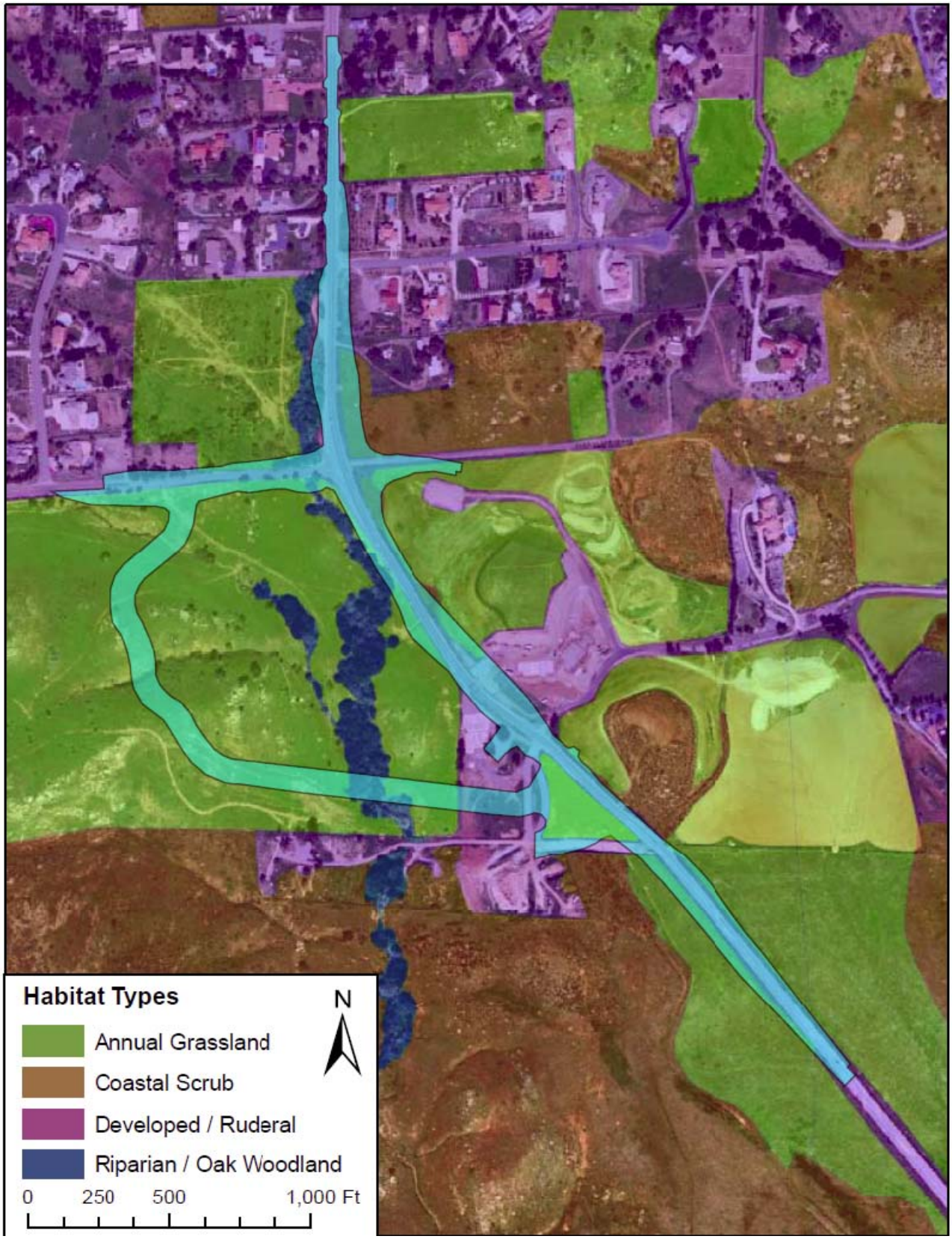
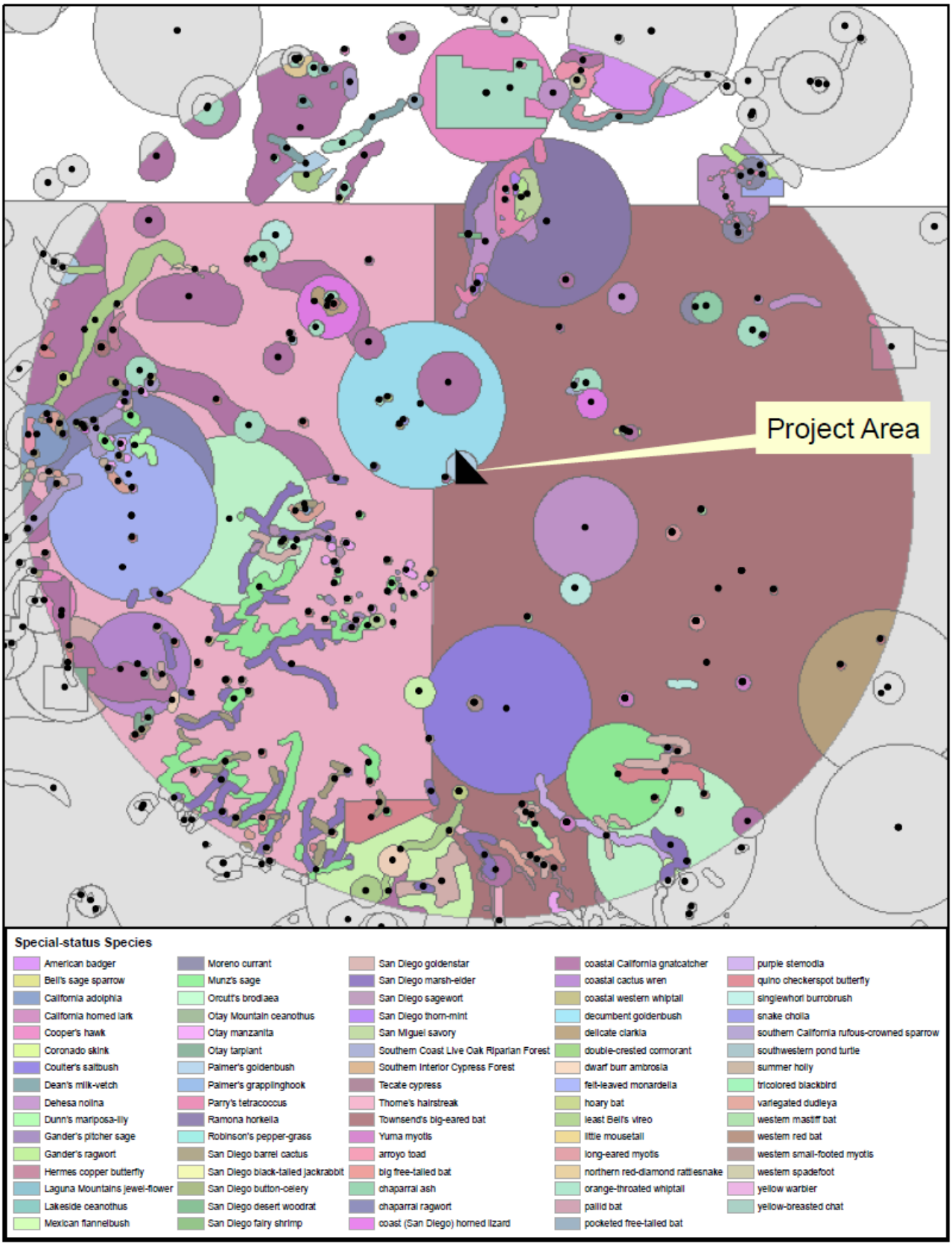


EXHIBIT 5: CNDDB RECORDS OF SPECIAL-STATUS SPECIES WITHIN A 10-MILE RADIUS OF THE STUDY AREA



APPENDIX 3D

Access Roadways Mid-Late Spring 2011 Surveys

A Botanical Inventory of
Roadways and Proposed Routes Associated
with the Jamul Rancheria, Jamul,
San Diego County, California

UTM #11-S: 512,000mE, 3,618,420mN

Prepared for

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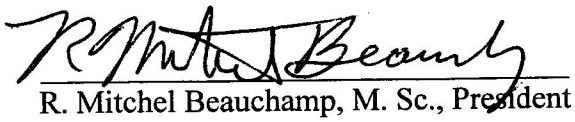
PSBS # T7070
2 June 2011



R. Mitchel Beauchamp, M. Sc., President
County of San Diego Certified Biological Consultant

A Botanical Inventory of Roadways and Proposed Routes Associated with the Jamul Rancheria, Jamul, San Diego County, California

IINTRODUCTION

A biological inventory of along existing and on proposed routes involved with proposed development activity at the Jamul Rancheria trust land was made by the biological consulting staff of Pacific Southwest Biological Services, Inc., (Pacific Southwest) at the request of EDS of Sacramento. The inventory involved identification of all vascular plants observed along the roads and routes.

SITE PHYSIOGRAPHY

The two roadways involved are State Route 94 and Melody Road, also referred to as Proctor Valley Road on some maps. A proposed access route through an open field south of Melody Lane was also examined. The aggregate area of the roads and routes totals about 20 acres (Figure 1).

Geology mapped for the area of the road and routes is Mesozoic granodioritic rocks in the northern portion of the study area and Jurassic-Triassic Metavolcanic rocks in the southern portion (Strand 1962).

The soils mapped for the area are: Las Posas fine sandy loam, 15 to 30 percent slopes (LpE2) in the village area, Las Posas fine sandy loam, 5 to 9 percent (LpC2) in the eastern annual grassland area, Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes (CmrG) in the western portion of the northwestern parcel, Exchequer rocky silt loam, 30 to 70 percent (ExG) at the southern end of the northwestern parcel, Fallbrook sandy loam, 15 to 30 percent slopes, eroded (FaE2) in the northwestern and northern parcels, Wyman loam, 5 to 9 percent slope (WmC) in the field north of Melody Road, and Ramona sandy loam , 5 to 9 percent slopes eroded (RaC2) in the north western parcel (Bowman 1973). The elevation range of the parcels is 1139 feet at the southwestern peak and 873 feet at the downstream end of the drainage through the village.

Rainfall prior to the survey was above normal rainfall averages for the 2010 – 2011 season

METHODS

A botanical inventory of the parcel was performed by R. Mitchel Beauchamp, senior biologist of Pacific Southwest in compliance with U.S. Fish and Wildlife Service botanical survey guidelines (Appendix 2). That assessment was performed on 13 April 2011 and 1 June 2011 and involved walking along the identified portions of the roadways and the proposed route in the open field...A distance of 10 feet from the edge of payment was used as the census area along the roadways. An accumulating listing was made of all plant taxa observed. A checklist of observed plants was compiled (Appendix 1).

VEGETATION

Coastal Sage Scrub

The open field area has a very disturbed remnant of Coastal Sage Scrub elements, ie. Flat-top Buckwheat / California Sagebrush and Laurel-leaf Sumac. Past and current cattle grazing has destroyed the structural nature of this vegetation, leaving a field of scattered,

isolated shrubs amidst open areas charged with manure and a thriving infestation of Filaree (*Erodium moschatum*).

Riparian Woodland

The principal drainage through the northern and northwestern parcel has a woodland of Arroyo and Black Willows (*Salix lasiolepis, S. gooddingii*), along with Coast Live and Engelmann Oaks (*Quercus agrifolia, Q. engelmannii*). The woodland varies in its width, from a narrow 5-foot wide channel to a luxuriant woodland 90-feet wide. The understory has been sterilized by the cattle grazing. The area of the crossing is limited to Coast Live Oaks and Black Willow.

Mule-fat Scrub

One of the reaches of the drainages on the open field in the area of the prposed route crossing has a depauperate cover of Mule-fat (*Baccharis salicifolia*) and lies upstream of the more diverse Willow Riparian Woodland.

Disturbed Areas

The majority of the habitat within the 10 foot wide zone observed along State Route 94 and Melody Lane is highly disturbed by road maintenance activities. Most of the plants are non-native annuals.

SENSITIVE SPECIES

Plants

Several endemic plant species occur on the parcels. One listed as Rare, Threatened or Endangered by state or federal agencies occurs. Appendix 3 indicates other taxa known within the vicinity of the subject parcel.

Palmer's Goldenbush (*Ericamaria palmeri* ssp. *palmeri*) is a Narrow Endemic rated by California Plant Society as 1B (3-2-1) and occurs in the western San Diego and northwestern Baja California region. On the project site the taxon occurs as a single clone, about 2 meters in diameter, on the southern portion of the alignment on an southeast facing slope and that been heavily grazed.. Apparently the aromatic aspect of the plant has precluded its being grazed by cattle. Mitigation by the County of San Diego for impacts to this species has been one of revegetation using the plant in the area of the project, the nearest known being about at Jamacha Road and State Route 94.

FINDINGS

The mid-spring and late surveys revealed that no sensitive plants occur along the paved roadways. Within in the Open Field is a stand of *Ericameria palmeri* occurs, persisting from the past and present cattle grazing.

Literature Cited

U.S. Fish and Wildlife Service. 1996. Guidelines for conducting and reporting botanical inventories for federally listed, proposed, and candidate plants. Sacramento, California. 2 pp

PSBS# T 707E

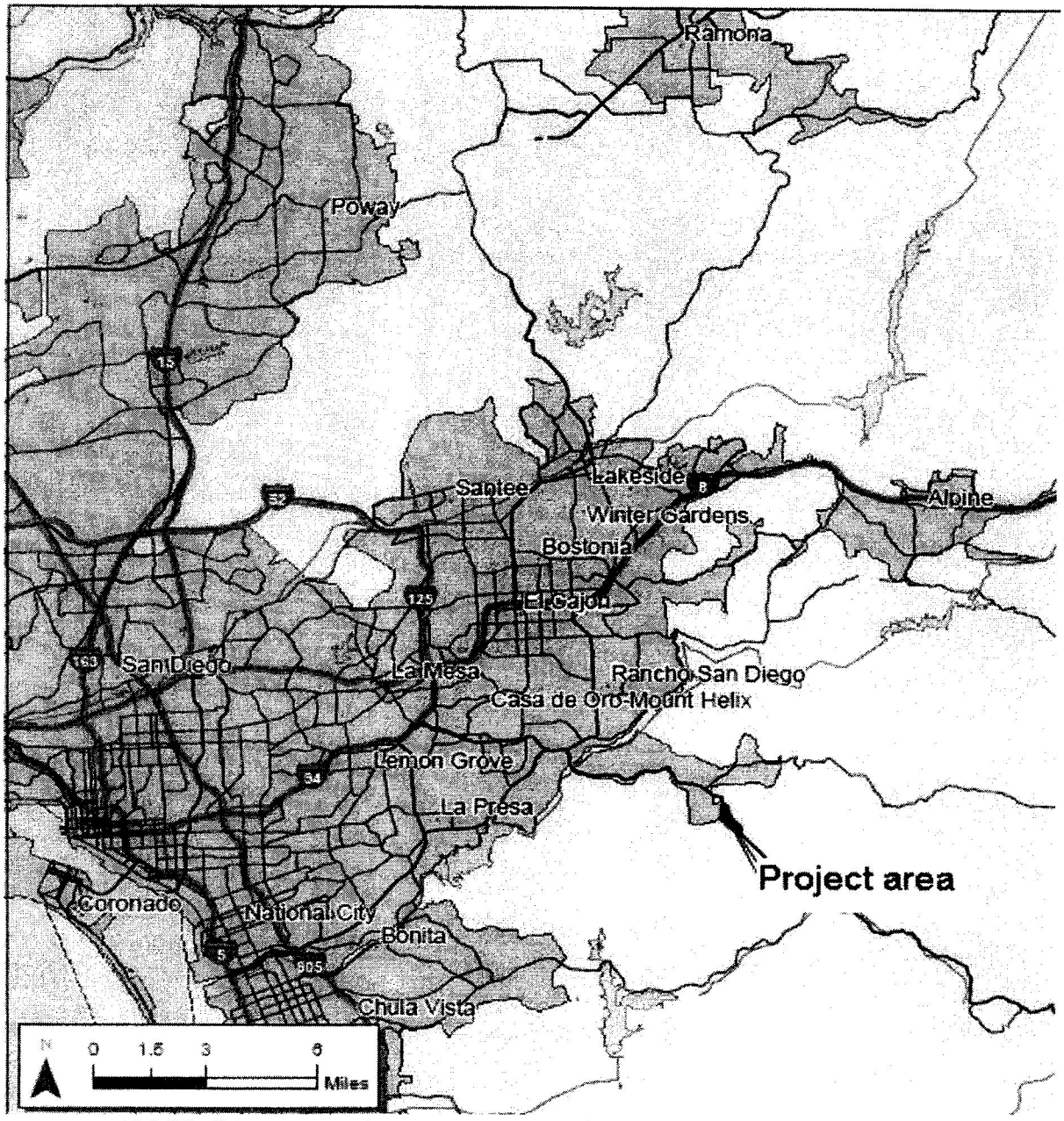


Figure 1.
Jamul Project Sites

N
1" = 3

4-23-11 MAP SOURCE: DELORME 3-D TOPO QUADS PACIFIC SOUTHWEST BIOLOGICAL SERVICES, INC.

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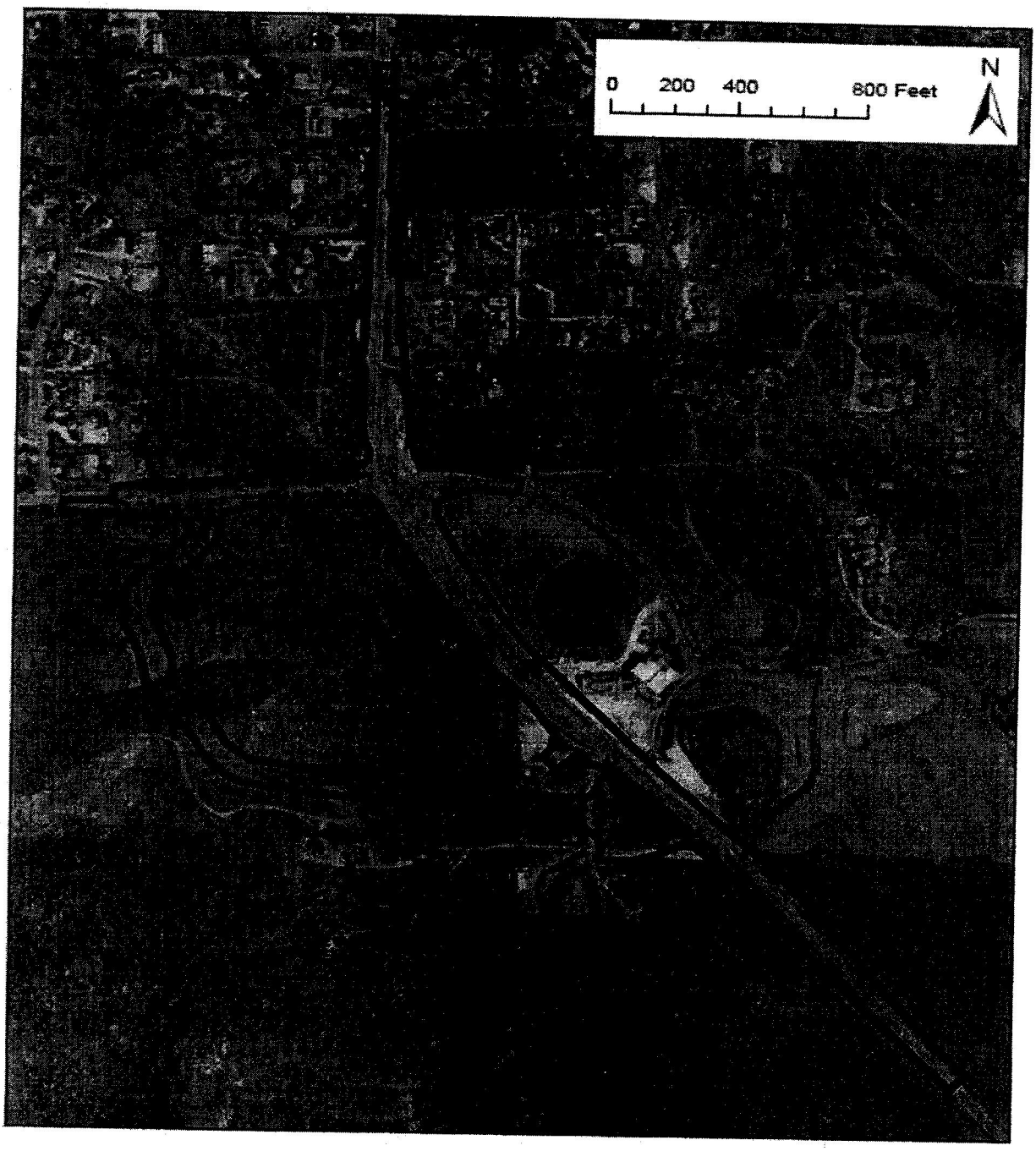

Figure 2.
Jamul Routes and Roads

N
1" = 400'

4-23-11 MAP SOURCE: DELORME 3-D TOPO QUADS PACIFIC SOUTHWEST BIOLOGICAL SERVICES, INC.

Appendix 1. Floral Checklist of Species Observed along the Assessed Roadways and Routes at the Jamul Rancheria

DICOTYLEDONS
Adosaceae
Sambucus mexicana Presl Mexican Elderberry

Anacardiaceae - Sumac Family
Malosma laurina (Torr. & Gray) Abrams Laurel sumac
**Schinus molle* L. Peruvian pepper tree
Toxicodendron radicans (L.) Kuntze ssp. *diversilobum* (T. & G.) Thorne. Western poison-oak

Apiaceae - Carrot Family
Sanicula arguta (Torrey & Gray) Coult. & Rose sharp-tooth sanicle

Asteraceae - Sunflower Family
Artemisia californica Less. California sagebrush
**Centaurea melitensis* L. tocalote
**Cirsium vulgare* (Savi) Ten. bull thistle
**Conyza canadensis* (L.) Cronq. horseweed
Ercqmeria palmeri (Gray) Hall ssp. *palmeri* Palmer's Goldenbush
**Filago gallica* L. Narrow-leaf filago
Gnaphalium bicolor Bioletti bicolor cudweed
Gnaphalium californicum DC. California everlasting
Gutierrezia sarothrae (Pursh) Britt. & Rusby matchweed
**Hedypnois cretica* (L.) Willd. Crete hedypnois
Heterotheca grandiflora Nutt. telegraph weed
**Hypochoeris glabra* L. smooth cat's-ear
Isocoma menziesii (Hook. & Arn.) Nesom var. *vernonioides* (Nutt.) Nesom coastal goldenbush
Lessingia filaginifolia (Hook. & Arn.) M.A. Lane var. *filaginifolia* cudweed aster
**Picris echioides* L. bristly ox-tongue
**Silybum marianum* (L.)Gaertn. Milk-Thistle
Stephanomeria virgata Nutt. Tall Wreath Plant
**Sonchus asper* (L.) Hill prickly sow thistle

Boraginaceae - Borage Family
Amsinckia menziesii (Lehm.) Nelson & J.F. Macbr. var. *intermedia* (F. & M.) Ganders rancher's fireweed
Plagiobothrys collinus (Philbr.) J.M. Johnston var. *californicus* (A. Gray) Higgings California popcornflower

Brassicaceae - Mustard Family
Guillenia lasiophylla (Hook. & Arn.) Greene California mustard
**Hirschfeldia incana* (L.) Lagr.-Fossat short-pod mustard
**Raphanus sativus* L. radish
**Sisymbrium irio* L. London rocket

Cactaceae - Cactus Family
Opuntia prolifera (Engelm.) Ckll. Coast Cholla

Caryophyllaceae - Pink Family
Spergularia marina (L.)Griesb. San Spurry

Chenopodiaceae - Goosefoot Family
Chenopodium album L. White Goosefoot
**Salsola tragus* L. Russian thistle

Appendix 1. Floral Checklist of Species Observed along the Assessed Roadways and Routes at the Jamul Rancheria (continued)

Euphorbiaceae - Spurge Family
Chamaesyce melanadenia (Torr.) Millsp. Sandmat
Eremocarpus setigerus (Hook.) Benth. Doveweed

Fabaceae - Legume Family
Lotus purshianus (Benth.)Clem & Clem. Spanish-Clover
Lotus salsuginosus Greene ssp. *salsuginosus* alkali lotus
Lotus scoparius ssp. *brevialatus* (Ottley) Munz deerweed
Lupinus bicolor Lindl. miniature lupine
**Medicago polymorpha* L. California burclover
**Melilotus indica*

Fagaceae - Oak Family
Quercus agrifolia Neé coast live oak

Gentianaceae – Gentian Family
Centaurium venustum (Gray) Rob. Canchalagua

Geraniaceae - Geranium Family
**Erodium botrys* (Cav.) Bertol. long-beak filaree
**Erodium cicutarium* (L.) L'Hér. red-stem filaree
**Erodium moschatum* (L.) L'Hér. white-stem filaree

Lamiaceae - Mint Family
**Marrubium vulgare* L. horehound
Salvia apiana Jeps. White Sage

Malvaceae - Mallow Family
**Malva parviflora* L. Cheeseweed, little mallow
Sidalcea malvaeflora (DC.)Gray ex Benth. ssp. *sparsifolia* C.L. Hitchc. Checkers

Myrsinaceae
**Anagallis arvensis* L. Scarlet Pimpernel

Onagraceae - Evening-Primrose Family
Camissonia bistorta (Torrey & Gray) Raven California sun cup

Plantaginaceae - Plantain Family
Plantago erecta Morris dot-seed plantain

Prymaceae – Monkeyfower Family
Diplacus aurantiacus (Curt.)Jeps. ssp. *australis* (McMinn) Beeks. ex Throne Bush Monkeyflower

Polygonaceae - Buckwheat Family
Eriogonum fasciculatum Benth. var. *fasciculatum* flat-top buckwheat

Rhamnaceae - Buckthorn Family
Rhamnus crocea Torrey & Gray spiny redberry

Salicaceae - Willow Family
Salix gooddingii Ball Goodding's black willow

Appendix 1. Floral Checklist of Species Observed along the Assessed Roadways and Routes at the Jamul Rancheria (continued)

Scrophulariaceae - Figwort Family
Scrophularia californica Cham. & Schldl. ssp. *floribunda* (Greene) Shaw California figwort

Solanaceae - Nightshade Family
Datura wrightii Regel Western jimsonweed
**Nicotiana glauca* Grah. tree tobacco

Urticaceae - Nettle Family
**Urtica urens* L. dwarf nettle

MONOCOTYLEDONS

Cyperaceae – Cyperus Family
**Cyperus alternifolius* L. African Umbrella Sedge

Poaceae - Grass Family
**Avena barbata* Link slender wild oat
Bothriochola barbinodis (Lag.)Herter Plumed Beardgrass
**Bromus diandrus* Roth ripgut grass
**Bromus hordeaceus* L. soft chess
**Bromus madritensis* L. ssp. *rubens* (L.) Husnot red brome
**Hordeum murinum* ssp. *leporinum* (Link) Arcang. hare barley
**Lamarckia aurea* (L.) Moench golden-top
**Lolium perenne* L. perennial ryegrass
**Pennisetum setaceum* Forsk. fountain grass
**Polypogon monspliensis* (L.)Desf. Rabbits-foot Grass
**Schismus barbatus* (L.) Thell. Mediterranean schismus
**Vulpia myuros* (L.) Gmelin var. *hirsuta* (Hacketl) Asch & Graetoner foxtail fescue

* - Denotes non-native plant taxa

Appendix II. Federal Botanical survey Guidelines

Federal protocol for botanical surveys has been promulgated (September 23, 1996). These guidelines describe protocols for conducting botanical inventories for federally listed, proposed and candidate plants, and describe minimum standards for reporting results. The Service will use, in part, the information outlined below in determining whether the project under consideration may affect any listed, proposed, or candidate plants, and in determining the direct, indirect, and cumulative effects.

Field inventories should be conducted in a manner that will locate listed, proposed, or candidate species (target species) that may be present. The entire project area requires a botanical inventory, except developed agricultural lands. The field investigator(s) should:

1. Conduct inventories at the appropriate times of year when target species are present and identifiable. Inventories will include all potential habitats. Multiple site visits during a field season may be necessary to make observations during the appropriate phenological stage of all target species.

2. If available, use a regional or local reference population to obtain a visual image of the target species and associated habitat(s). If access to reference populations(s) is not available, investigators should study specimens from local herbaria.

3. List every species observed and compile a comprehensive list of vascular plants for the entire project site. Vascular plants need to be identified to a taxonomic level which allows rarity to be determined.

4. Report results of botanical field inventories that include:
a. a description of the biological setting, including plant community, topography, soils, potential habitat of target species, and an evaluation of environmental conditions, such as timing or quantity of rainfall, which may influence the performance and expression of target species
b. a map of project location showing scale, orientation, project boundaries, parcel size, and map quadrangle name c. survey dates and survey methodology(ies)
d. if a reference population is available, provide a written narrative describing the target species reference population(s) used, and date(s) when observations were made
e. a comprehensive list of all vascular plants occurring on the project site for each habitat type
f. current and historic land uses of the habitat(s) and degree of site alteration
g. presence of target species off-site on adjacent parcels, if known
h. an assessment of the biological significance or ecological quality of the project site in a local and regional context

5. If target species is(are) found, report results that additionally include:
a. a map showing federally listed, proposed and candidate species distribution as they relate to the proposed project
b. if target species is (are) associated with wetlands, a description of the direction and integrity of flow of surface hydrology. If target species is (are) affected by adjacent off-site hydrological influences, describe these factors.

c. the target species phenology and microhabitat, an estimate of the number of individuals of each target species per unit area; identify areas of high, medium and low density of target species over the project site, and provide acres of occupied habitat of target species. Investigators could provide color slides, photos or color copies of photos of target species or representative habitats to support information or descriptions contained in reports.
d. the degree of impact(s), if any, of the proposed project as it relates to the potential unoccupied habitat of target habitat.

6. Document findings of target species by completing California Native Species Field Survey Form(s) and submit form(s) to the Natural Diversity Data Base. Documentation of determinations and/or voucher specimens may be useful in cases of taxonomic ambiguities, habitat or range extensions.

7. Report as an addendum to the original survey, any change in abundance and distribution of target plants in subsequent years. Project sites with inventories older than 3 years from the current date of project proposal submission will likely need additional survey. Investigators need to assess whether an additional survey(s) is (are) needed.

8. Adverse conditions may prevent investigator(s) from determining presence or identifying some target species in potential habitat(s) of target species. Disease, drought, predation, or herbivory may preclude the presence or identification of target species in any year. An additional botanical inventory(ies) in a subsequent year(s) may be required if adverse conditions occur in a potential habitat(s). Investigator(s) may need to discuss such conditions.

9. Guidance from California Department of Fish and Game (CDFG) regarding plant and plant community surveys can be found in Guidelines for Assessing the Effects of Proposed Developments on Rare and Endangered Plants and Plant Communities, 1984.

Appendix 3. Sensitive Plant Taxa know from the Vicinity of the Subject Parcel

Scientific and Common Name	Sensitivity Code & Status (Federal, State, Local, other)	San Diego County List/ Group	Habitat Preferences/ Requirements	Verified On Site Yes/No (Direct/ Indirect Evidence)	Potential to Occur On Site (Obs-LMH)	Factual Basis for Determination of Occurrence Potentia
Acanthomintha ilicifolia San Diego Thorn-mint	FT/SE/1B (2-3-2)	List A	Chaparral, coastal scrub, valley & foothill grassland, vernal pools, endemic to active vertisol clay soils of mesas & valleys, usu on clay lenses within grassland or chaparral communities, 10-935 m.	NO	Low	Site lacks clay soils
Adophia californica California Adolphia	None/None/2 (1-3-1)	List B	Chaparral, coastal sage scrub, valley & foothill grassland, from sandy/gravelly to clay soils within grassland, coastal sage scrub, or chaparral; various exposures, 15-300 m.	NO	Low	Site lacks clay soils
Ambrosia monogyra Singlewhorl Burrobush	None/None/2.2			NO	Moderate	Not observed In drainages
Ambrosia pumila San Diego Ambrosia	FE/None/1B (3-3-2)	List A	Chaparral, coastal scrub, valley & foothill grassland, vernal pools, esp in sandy loam or clay soil, in valleys; persists where disturbance has been superficial, 20-415 m.	NO	Low	Site lacks alluvial bench formations
Arctostaphylos otayensis Otay Manzanita	None/None/1B (3-2-3)	List A	Chaparral, cismontane woodland/metavolcanic; 275-1700 m.	NO	Low	Site lacks Chaparral Vegetation and rocky substrate
Artemisia palmeri San Diego Sagewort	None/None/2 (2-2-1)	List B	Chaparral, coastal sage scrub, riparian scrub & woodland/sandy, mesic, 15-915 m.	NO	High	Not observed in riparian systems in the area
Astragalus deanei Dean's Milk-vetch	FSC/None/1B (3-3-3)	List A	Chaparral, coastal scrub, riparian forest, endemic to SD Co., esp open brushy s-facing slopes in Diegan coastal sage, occ on recently burned hillsides, 75-670 m.	NO	Low	Site is outside plant's range in middle Sweetwater River drainage
Atriplex coulteri Coulter's Saltbush	None/None/1B(2-2-2)	List A	Coastal bluff scrub, coastal dunes, coastal scrub, valley & foothill grassland, esp. on ocean bluffs, ridge tops, alkaline low places, 10-440 m.	NO	Low	Site lacks coastal alkaline conditions

Brodiaea orcuttii Orcutt's Brodiaea	FSC/None/1B (1-3-2)	List A	Vernal pools, valley & foothill grassland, closed-cone conif forest, cismontane woodland, chaparral, meadows, esp mesic, clay habitats, occ serpentine, in vernal pools & small drainages, 30-1615 m.	NO	Moderate	Site lacks undisturbed clay soils
Calochortus dunnii Dunn's Mariposa Lily	None/Rare/1B (2-2-2)	Narrow Endemic, List A	Closed-cone conif forest, chaparral, esp. on gabbro or metavolcanic soils; also known from sandstone, oft assoc w/chaparral, 375-1830 m.	NO	Low	Site lacks metavolcanic or significant areas of gabbroic-derived soils
Ceanothus otayensis Otay Mountain Ceanothus	None/None/1B (3-2-2)		Chaparral (metavolcanic or gabbroic), known in CA only fr San Miguel & Otay Mtns., 600-1100 m.	NO	Low	Site lacks Chaparral Vegetation and rocky substrate
Clarkia delicata Delicate Clarkia	None/None/2 (1-2-1)	List B	Cismontane woodland, chaparral, only in SD Co., 235-1,000 m.	NO	Low	Site lacks intact woodland understory habitat
Comarostaphylos diversifolia ssp. *diversifolia* Summer-Holly	FSC/None/1B (2-2-2)	List A	Chaparral, oft in mixed chaparral in CA, sometimes post-burn, 30-550 m.	NO	Low	Site lacks Chaparral vegetation and rocky substrate
Cordylanthus orcuttianus Orcutt's Bird's-beak	None/None/2 (3-3-1)	List B	Coastal scrub. In CA, known only fr SD Co.; also in Baja. Found in coastal scrub assoc on slopes, also reported fr intermittent moist swales, & in washes, 100-200 m.	NO	Low	Site lacks alkaline and bentonitic soils
Cupressus forbesii Tecate Cypress	FSC/None/1B (3-3-2)	List A	Closed-cone conif forest, chaparral, esp. on north-facing slopes, groves oft assoc w/chaparral, 250-1500 m.	NO	Low	Site lacks Chaparral vegetation and rocky substrate
Deinandra [Hemizonia] conjugens Otay Tarplant	FT/SE/1B (3-3-2)	Narrow Endemic, List A	Coastal scrub, valley & foothill grassland. In CA, known only fr SD Co. Coastal plains, mesas, river bottoms, oft in open dist areas, clay soils, 25-300 m.	NO	Low	Site lacks undisturbed clay soils
Dudleya variegata Variegated Dudleya	FT/SE/1B(3-3-2)	Narrow Endemic, List A	Chaparral, coastal scrub, cismontane woodland, valley & foothill grassland, vernal pools. In CA, known only fr SD Co. Rocky or clay soils, vernal pool margins, 3-550 m.	NO	Low	Site lacks undisturbed clay soils

Ericameria palmeri ssp. *palmeri* Palmer's Goldenbush	None/None/1B (3-2-1)	Narrow Endemic, List B	Coastal scrub, chaparral, granitic soils, steep hillsides, mesic areas; 100-600 m.	YES	OBSERVED	Occurs as a single stand in alignment of open field route
Eryngium aristulatum var. *parishii* San Diego Button-celery	FE/SE/1B (2-3-2)	List A	Vernal pools, coastal scrub, valley & foothill grassland, esp in SD mesa hardpan & claypan vernal pools & southern interior basalt flow vernal pools; usu surr by scrub, 15-620 m	NO	Low	Site lacks level areas and vernal pool formations
Ferocactus viridescens San Diego Barrel Cactus	FSC/None/2 (1-3-1)	List B	Chaparral, Diegan coastal scrub, valley & foothill grassland, oft on exposed, level or s-facing sloping areas; oft in coastal scrub near crest of slopes, 3-485 m.	NO	Low	Site lacks intact Coastal Sage Scrub vegetation and lies too far east of know range
Fremontodendron mexicanum Mexican Flannelbush	FE/Rare/1B (3-3-2)		Closed-cone conif forest, chaparral, cismontane woodland. Usu scattered along borders of creeks or in dry cyns; sometimes on gabbro soils, 10-490 m.	NO	Low	Site lacks Chaparral habitat and rocky substrate
Harpagonella palmeri Palmer's Grapplinghook	None/None/4 (1-2-1)	List B	Chaparral, coastal scrub, valley & foothill grassland, esp clay soils, open grassy areas, 15-830 m.	NO	Low	Site lacks clay Soils
Isocoma menziesii var. *decumbens* Decumbent Goldenbush	None/None/1B (2-2-2)	List A	Coastal sage, sandy soil, often in disturbed sites, 10-910 m.	NO	Low	Site lacks intact Coastal Sage Scrub vegetation
Iva hayesiana San Diego Marsh-elder	FSC/None/2 (2-2-1)	List B	Marshes & swamps, playas, esp in river washes, 10-500 m.	NO	Moderate	Not observed in channels on site or in the vicinity
Lasthenia glabrata ssp. *coulteri* Coulter's Goldfields	FSC/None/1B (2-3-2)	List A	Coastal salt marshes, playas, valley & foothill grassland, vernal pools, usu in alkaline soils in playas, sinks, grassland, 1-1400 m.	NO	Low	Site lacks mesic alkaline habitats
Lepechinia ganderi Gander's Pitcher Sage	None/None/1B (3-1-2)	Narrow Endemic, List A	Closed-cone conif forest, chaparral, coastal scrub, valley & foothill grassland/gabbroic or metavolcanic. SD Co., Baja. Known in CA fr fewer than 10 occurs, 305-1005 m.	NO	Low	Site lacks Chaparral Vegetation and rocky substrate
Lepidium virginicum var. *robinsonii* Robinson's Pepper-grass	None/None/1B (3-2-2)	List A	Alkaline sites on the coastal sides of the main mountain ranges, below 800 m..	NO	Low	Site lacks undisturbed Coastal Sage Scrub

Muilla clevelandii San Diego Goldenstar	FSC/None/1B (2-2-2)	List A	Chaparral, coastal scrub, valley & foothill grassland, vernal pools, esp. mesa grasslands, scrub edges; under 50 m.	NO	Low	Site lacks intact clay soils
Myosurus minimus ssp. *apus* Little Mousetail	FSC/None/3 (2-3-2)	List A	Vernal pools. This ssp. has taxonomic probs. Distinguishing betw this and *M. sessilis* is difficult. Hybrid? Alkaline soils, 20-640 m.	NO	Low	Site lacks level land and vernal pool formations
Nama stenocarpum Mud Nama	None/None/2 (3-2-1)	List B	Marshes & swamps. Lake shores, river banks, intermitt. wet areas, 5-500 m.	NO	Low	Site lacks ponding features
Navarretia fossalis Spreading Navarretia	FT/None/1B (2-3-2)	List A	Vernal pools, chenopod scrub, marshes & swamps, playas, esp in SD hardpan & SD claypan vernal pools, in swales & vernal pools, often surr . by other habitat types, 30-1300 m.	NO	Low	Site lacks level land and vernal pool formations
Opuntia californica var californica Snake Cholla	None/None/1B (3-3-2)	Narrow Endemic, List A	Chaparral, coastal scrub, 30-150 m.	NO	Low	Site lacks intact shrubland vegetation
Salvia munzii Munz' Sage	None/None/2 (2-2-1)	List B	Chaparral, coastal sage scrub. Known only fr SD Co. & Baja. Rolling hills & slopes, 120-1065 m.	NO	Low	Site lacks Metavolcanic -derived soils
Satureja chandleri San Miguel Savory	None/None/4 (1-2-2)	List D	Chaparral, cismontane woodland, coastal scrub, riparian woodland, valley & foothill grassland, esp gabbroic or metavolcanic substrate, 120-1005 m.	NO	Low	Site lacks Chaparral and rocky substrate
Senecio aphanactis Rayless Ragwort	None/None/2 (3-2-1)	List B	Chaparral, cismontane woodland, coastal scrub/alkaline, 15-800 m. Rare in LA, OR, & RIV Cos.	NO	Low	Site lacks undisturbed habitats
Senecio ganderi Gander's Ragwort	FSC/SR/1B (3-2-3)	List A	Chaparral, esp. recently burned sites, gabbroic outcrops, 400-1200 m.	NO	Low	Site lacks significant areas of gabbroic -derived soils
Stemodia durantifolia Purple Stemodia	None/None/2 (3-3-1)		Sonoran desert scrub (often mesic, sandy), 180-300 m.	NO	Low	Site lacks ponding sites
Streptanthus bernardinus Laguna Mountains Jewelflower	None/None/None	List A	Chaparral, lower montane conif forest, 670-2500 m.	NO	Low	Site lacks Chaparral vegetation

Tetracoccus dioicus Parry's Tetracoccus	FSC/None/1B (3-2-2)	List A	Chaparral, coastal scrub, esp stony fine sandy decomposed gabbro soil, 165-1000 m.	NO	Low	Site lacks significant areas of gabbroic -derived soils

APPENDIX 4

TRAFFIC IMPACT STUDY

Final Traffic Impact Study

SR 94 Improvement Project

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June 2014

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1.0 INTRODUCTION

This study, prepared by Kimley-Horn and Associates, evaluates the traffic related impacts associated with the SR 94 Improvement referenced in this document as the Proposed Project, and recommends mitigation measures for any significant traffic impact resulting from the Proposed Project. The Proposed Project is the construction of access road improvements on State Route 94 (SR-94) associated to the Jamul Indian Village (JIV) Gaming Project and five off-site mitigation measures per the certified *Jamul Indian Village Final Tribal EE*, dated January 2013.

Project Description

The Jamul Indian Village (JIV) is proposing to construct signalized driveway access to their separately and independently approved future gaming facility and also to improve five intersection locations along State Route 94 (SR-94), as a result of traffic generate from the operation of their future gaming facility. The California Department of Transportation (Caltrans) is required to review encroachments on State right of way and anticipates the JIV to apply for one or more encroachment permits to perform the proposed construction. In conjunction with the proposed improvements and impact to State right of way, the requirements of the California Environmental Quality Act (CEQA) must be met before the issuance of a future encroachment permit. With Caltrans' oversight, the JIV is preparing the necessary environmental and engineering technical studies and will prepare an Environmental Impact Report (EIR) on Caltrans' behalf under CEQA and Caltrans guidelines to address the potential impacts from the proposed access alternatives and five intersection improvement locations. Caltrans will be the lead agency on the EIR and will independently review the EIR to ensure that the EIR meets CEQA requirements. The JIV is located approximately 1-mile south of Jamul, California (Postmiles: 20.4-21.4).

The JIV is proposing three alternatives to access the future gaming facility adjacent to their property along SR-94. In addition, improvements to five intersections along SR-94 west of the future gaming facility will be a project feature of each of the three proposed access road alternatives. These access alternatives are proposed at the following locations: (1) the existing "Reservation Road", which connects the JIV property to SR-94, (2) an adjacent 4-acre parcel (north of the JIV property), which is currently owned by the JIV "known as Daisy Drive", or (3) via a new roadway constructed from Melody Road south to the JIV property. Under the Daisy Drive access alternative, there are three potential build options which are described in more detail below. The third access alternative at Melody Road would connect off of the County of San Diego's property. This access alternative would still require improvements to SR-94 resulting in the need for an encroachment permit from Caltrans. In addition to the driveway access alternatives and the five intersection improvements a No Build alternative will be under consideration. Below is a breakdown of the proposed improvement alternatives.

Access Alternative 1: Reservation Road Access,
Access Alternative 2: Four-Acre Access, (Daisy Drive)
- Option 1: Full Disturbed Area
- Option 2: Reduced Disturbed Area
- Option 3: Minimum Disturbed Area

Access Alternative 3: Melody Road Access, and
Alternative 4: No Build Alternative.

The various options under Alternative 2 differ in the amount of additional right of way (ROW) needed to be incorporated into the project improvements. Each of the access alternatives are described in detail below in Section 1.2 *Alternatives*.

Figure 1-1 depicts the location of the project site in a regional context. **Figure 1-2** illustrates the location of the roadway improvements. **Appendix A** includes design plans for each of the proposed improvements along SR 94.

Alternatives

The JIV is proposing three build alternatives adjacent to their property along SR-94 to access the future gaming facility. In addition to the access road improvements, the JIV also proposes to improve five intersections along SR-94 to address anticipated traffic generated from their future gaming facility. The five intersection improvements will be a project feature of all the access road alternatives. The intersections to be improved include:

1. SR94/Jamacha Boulevard Intersection: Restripe the northbound left-turn lane to a northbound through shared left-turn lane and restripe the northbound through shared left-turn lane to a northbound right-turn lane (including required traffic signal modifications). The proposed improvements would affect Jamacha Boulevard, which is within the County.

2. SR94/Jamacha Road Intersection: Add a second eastbound right-turn lane and retaining wall (including required traffic signal modifications). The right-turn lane would extend beyond the existing Caltrans ROW. Modify northbound striping on Jamacha Road to have the left through-lane lead directly into the left-turn lanes.

3. SR94/Steele Canyon Road Intersection: Add a second eastbound and westbound through lane. Install traffic signal equipment, such as detection system, conduits and pullboxes. Two of the approaches are within the County ROW.

4. SR94/Lyons Valley Road Intersection: Install a traffic signal. Traffic signal equipment, such as detection system, conduits and pullboxes would have to be installed within the County's ROW.

5. SR94/Maxfield Road Intersection: Restripe the northbound approaches along SR94 to include an acceleration lane. This improvement will also include the widening of SR94 north of Maxfield Road necessary to accommodate additional acceleration lane.

Alternative 1: Reservation Road Access

Alternative 1 proposes improvements to SR-94 from approximately 1,200 feet north of Melody Road to approximately 1,800 feet south of Reservation Road, for a total length of approximately 0.9 miles. The alignment of SR-94 is realigned to provide flatter horizontal and vertical curvature, as well as pavement cross slope and superelevation meeting current design standards. Lanes and shoulders are widened where necessary to also meet current standards.

New traffic signals would be installed for Alternative 1 at the intersection of SR-94/Melody Road, and also at the intersection of SR-94/Reservation Road, which is the proposed JIV access location for Alternative 1. Exclusive left-turn lanes would be provided along SR-94 for the north to west move onto Melody Road, and the south to east move onto Peaceful Valley Ranch Road. Likewise, an exclusive left-turn lane would be provided for the north to west move onto Reservation Road. In addition, a second

southbound through lane would be provided along SR-94 between Melody Road and Reservation Road. Alternative 1 also widens Melody Road and Peaceful Valley Ranch Road to provide exclusive left-turn lanes onto SR-94 for overall improved intersection operation. The length of improvements along Melody Road and Peaceful Valley Ranch Road are approximately 700 feet and 500 feet, respectively. The intersection of SR-94/Reservation Road is also reconfigured with Alternative 1 to provide an intersection angle which meets current design standards. Retaining walls are proposed for Alternative 1 in order to minimize ROW requirements and environmental impacts. The five previously stated SR-94 intersection improvements apply to Alternative 1.

Alternative 2: Four-Acre Access (Daisy Drive)

Alternative 2 proposes improvements along SR-94 from an area north of Melody Road to an area south of the JIV property. Three options using the same entrance are addressed under Alternative 2. While maintaining the same entrance, each of these options contains separate ROW requirements. The JIV access driveway for Alternative 2 is located approximately 500 feet north of existing Reservation Road, at "Daisy Drive." Locating the access point at Daisy Drive decreases the intersection spacing to Melody Road, but shortens the project limits at the southern end. The Alternative 2 realignment of SR-94 maintains an alignment on the west side of existing SR-94, south of Daisy Drive, which results in one less horizontal curve along SR-94 within the project limits.

Alternative 2: Option 1 (Full Disturbed Area)

Option 1 proposes to improve SR-94 from approximately 1,200 feet north of Melody Road to approximately 1,400 feet south of existing Reservation Road, for a total length of approximately 0.8 miles. Similar to Alternative 1, SR-94 is realigned and widened as part of Option 1 to improve traffic operations. No design exceptions are needed for Option 1.

Proposed traffic signals and exclusive left-turn lanes for Alternative 2: Option 1 are the same as for Alternative 1, except the traffic signal for access to the JIV Gaming Project is provided at Daisy Drive instead of Reservation Road. In Addition, Option 1 would provide an additional northbound lane along SR-94 between Daisy Drive and Peaceful Valley Ranch Road to accommodate the expected dual left-turn lanes departing from the access driveway at Daisy Drive. Improvements to Melody Road and Peaceful Valley Ranch Road are the same for Alternatives 1 and 2: Option 1. Retaining walls associated with Alternative 2: Option 1 are reduced when compared to Alternative 1. The five previously stated SR-94 intersection improvements apply to Alternative 2: Option 1.

Alternative 2: Option 2 (Reduced Disturbed Area)

Option 2 proposes to improve SR-94 from about 1200 feet north of Melody Road to about 1400 feet south of existing Reservation Road, for a total length of approximately 0.8 miles. The project limits north and south along SR-94 are the same as stated for Alternative 2: Option 1. Alternative 2: Option 2 differs from Option 1 in that ROW impacts are reduced within private property and environmentally sensitive areas. The Option 2 centerline alignment for SR-94 is shifted to the west through the intersection with Melody Road with the use of a reduced radius, and a broken-back curve (two curves with a short tangent deflecting in the same direction) is introduced between Melody Road and the proposed access driveway at Daisy Drive. The introduction of a reduced radius and broken-back horizontal curvature helps facilitate the reduced ROW impact associated with Option 2.

Proposed traffic signals and left-turn lanes are the same as stated for Alternative 2: Option 1, with the exception that no exclusive left-turn lane is proposed on the departure from Peaceful Valley Ranch Road for Option 2. In addition, the alignment for Melody Road, as well as for Peaceful Valley Ranch Road, is shifted to the north with Option 2 to further reduce ROW impact to environmentally sensitive areas.

Alternative 2: Option 2 requires various retaining walls and fill walls to reduce the proposed footprint. The five previously discussed SR-94 intersection improvements apply to Alternative 2: Option 2.

Alternative 2: Option 3 (Minimum Disturbed Area)

Option 3 proposes to provide access to the JIV Gaming Project via Daisy Drive, the same as for Alternatives 2: Options 1 and 2. Alternative 2: Option 3, however, minimizes ROW impacts with the implementation of non-standard geometric elements requiring mandatory exceptions to Caltrans design standards. Reduced design speed from 55 mph to 45 mph, reduction in horizontal curvature, reduced shoulder width, reduced stopping sight distance along vertical curvature, increased maximum grade, and reduced superelevation rate are all incorporated to minimize impacts to ROW.

Improvements for Alternative 2: Option 3 begin approximately 800 feet north of Melody Road and continue to about 400 feet south of existing Reservation Road, for a total length of approximately 0.6 miles. Proposed traffic signals and exclusive left-turn lanes are the same for Options 2 and 3, except no left-turn is provided on the departure from Peaceful Valley Ranch Road. Lane widths are reduced along Melody Road in order to accommodate the roadway widening while minimizing ROW impacts. Unlike Alternative 2: Option2 which realigned Melody Road to the south, Alternative 2: Option 3 retains the existing southern edge of traveled way and widens Melody Road to the north. One fill-wall and three cut-walls are proposed along SR-94 for Option 3. No walls are proposed along Melody Road. The five previously discussed SR-94 intersection improvements apply to Alternative 2: Option 3.

Alternative 3: Melody Road Access

Alternative 3 provides access to the JIV Gaming Project via a proposed access driveway from Melody Road south to the JIV property. Therefore, no driveway improvements are proposed at either Reservation Road or Daisy Drive with this alternative. A wider footprint is necessary at the intersection of SR-94/Melody Road with this alternative in order to accommodate the necessary intersection improvements. In contrast to the other alternatives, Alternative 3 requires an additional northbound through lane north of Melody Road to accommodate a second exclusive left-turn lane proposed from Melody Road. A second exclusive left-turn lane is also required for the north to west move from SR-94 to Melody Road. A second through lane is also needed for westbound Melody Road leading to the proposed access driveway. The proposed centerline alignment for SR-94 for Alternative 3 is relatively the same as proposed for Alternative 2: Option 1. However, the extent of improvement along both SR-94 and Melody Road are different when compared to the other alternatives. The difference is related to the access driveway location. Alternative 3 improvements begin approximately 1300 feet north of Melody Road and continue to about 900 feet south of existing Reservation Road, for a total length of approximately 0.8 miles. The length of improvements along Melody Road is increased from about 750 feet to about 1300 feet with Alternative 3. Traffic signals are proposed at the intersection of SR-94/Melody Road, and also at the driveway access location along Melody Road. A driveway would continue from the new intersection at Melody Road and the driveway access and continue on private property south to the future gaming facility. This driveway would require a combination of cut/fill and retaining walls along its length. The five previously discussed SR-94 intersection improvements apply to Alternative 3.

Alternative 4: No Build Alternative

No roadway improvements would be constructed under the No Build Alternative.

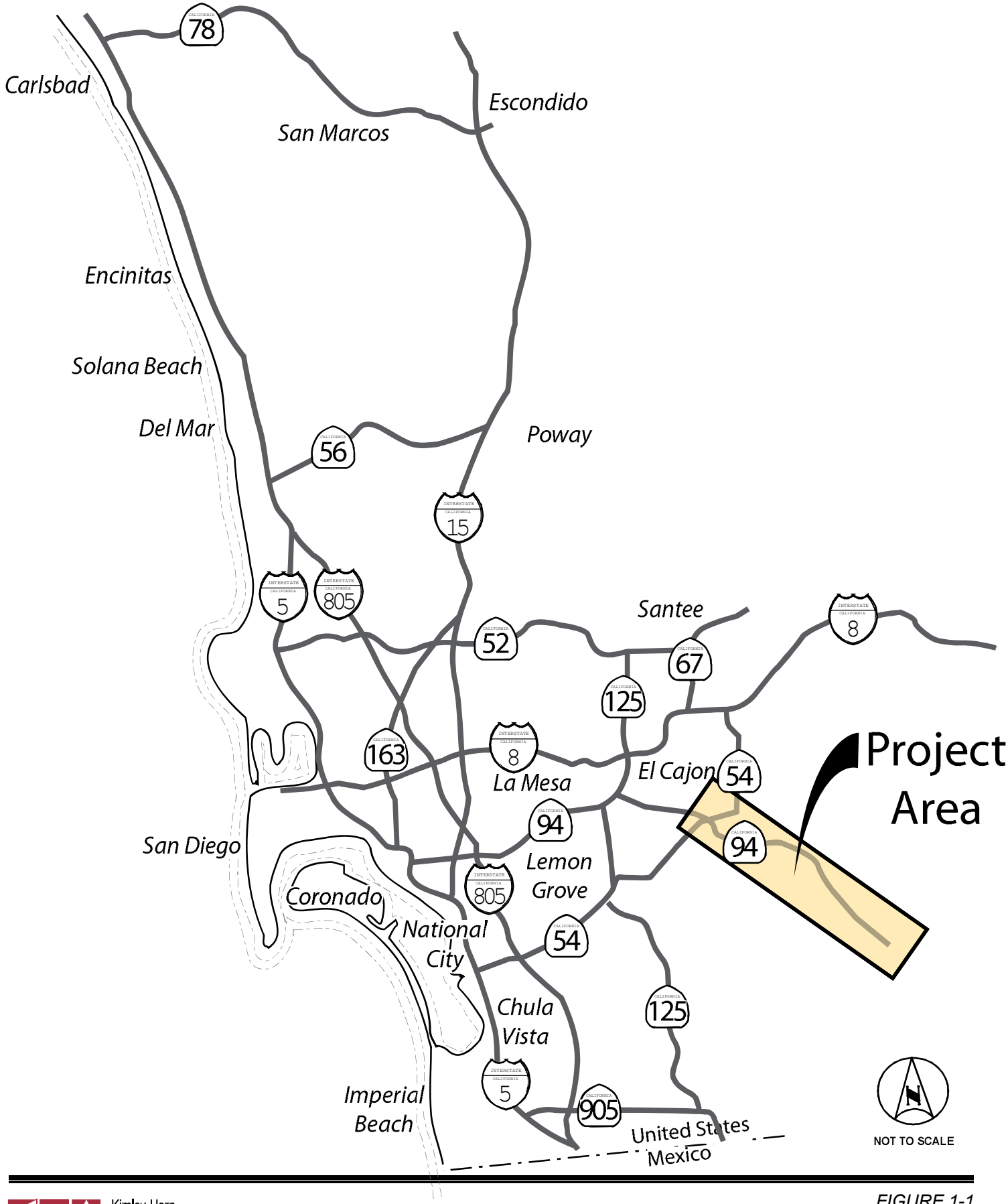

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FIGURE 1-1
Regional Vicinity Map

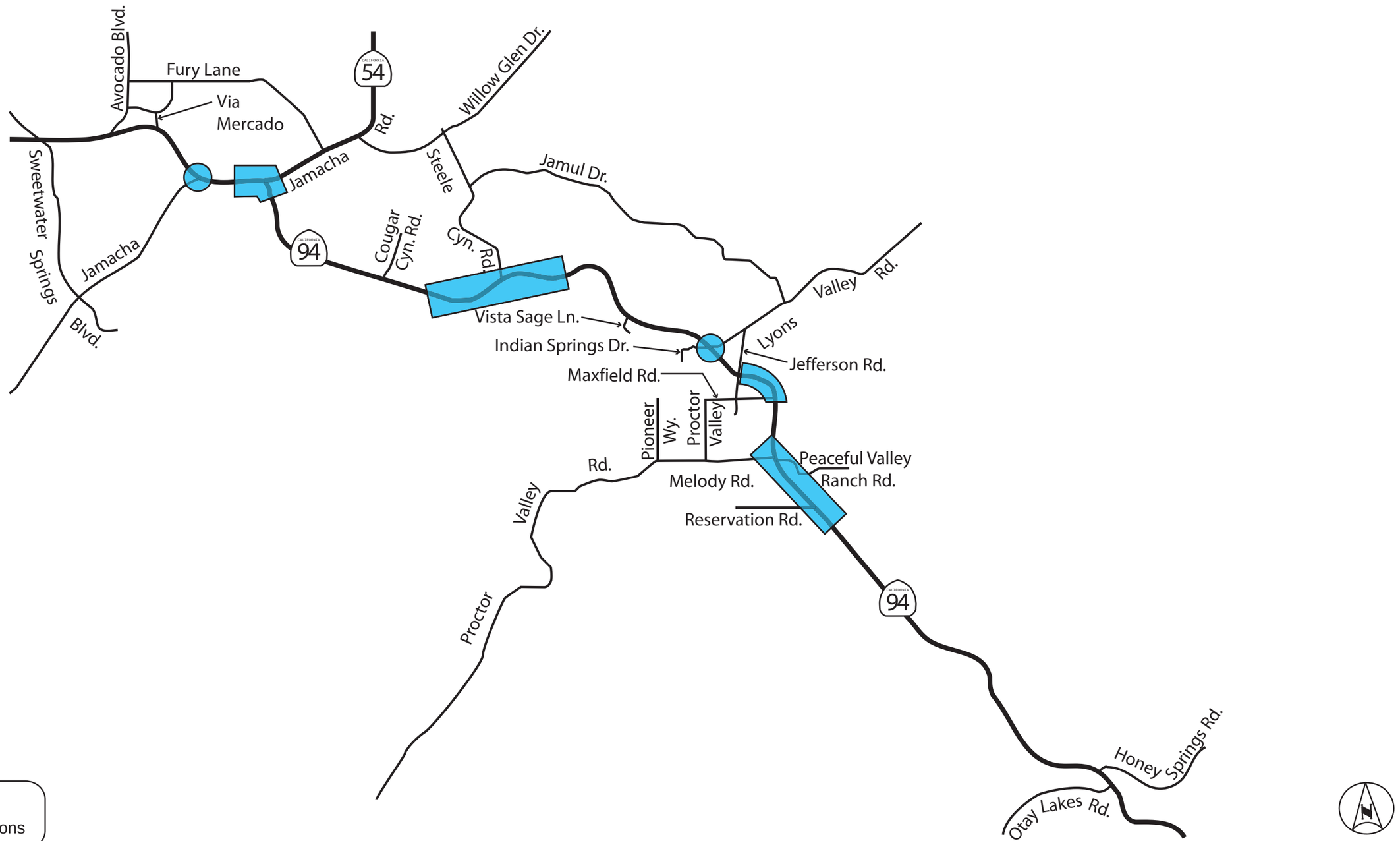

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FIGURE 1-2
Proposed Project Locations

2.0 METHODOLOGY

The following section describes the methodology used for the preparation of the traffic impact study for the Proposed Project.

Analysis Scenarios

The analysis scenarios to be evaluated were determined in coordination with Caltrans District 11 staff. A total of seven scenarios are analyzed within the traffic impact analysis for the Proposed Project. The scenarios are listed below:

- ***Existing Conditions***

  - Existing Baseline Conditions: Represents the traffic conditions of the existing street network with the use of traffic counts collected in the years 2009 through 2012.
  - Existing Baseline Plus Jamul Indian Village (JIV) Gaming Project Conditions: Represents the traffic conditions of the existing street network with the use of traffic counts collected in the years 2009 through 2012 and the addition of the JIV Gaming Project.
  - Existing Plus JIV Gaming Project Plus Proposed Project Conditions: Represents the existing traffic conditions with the addition of the proposed roadway changes to evaluate project level impacts. This scenario includes the traffic volumes generated by the JIV Gaming Project.

- ***Near Term Conditions (2015)***

  - Near Term No Project Conditions: Represents the traffic conditions of the street network assumed to be in place under the Near Term without project conditions. This scenario includes a projected traffic growth based on the addition of the JIV Gaming Project and other potential projects in the study area.
  - Near Term Plus Proposed Project Conditions: Represents the Near Term traffic conditions with the addition of the proposed roadway improvements and thus demonstrates cumulative impacts.

- ***Horizon Year Conditions (2035)***

  - Horizon Year No Project Conditions: Represents the traffic conditions of the street network to be in place under Horizon Year conditions, consistent with the Regional Transportation Plan, and is used to establish long-term, without project conditions for evaluating cumulative impacts and the degree to which the project would contribute to any such impacts. This scenario includes a projected traffic growth based on the addition of the JIV Gaming Project and other potential projects in the study area.
  - Horizon Year Plus Proposed Project Conditions: Represents the Horizon Year traffic conditions with the addition of the proposed roadway changes and thus demonstrates cumulative impacts.

Study Intersections

The study area includes all the intersection affected by the Proposed Project.

Table 2-1 lists all of the intersections included in the study area. As shown in Table 2-1, six study intersections are signalized and six study intersections are unsignalized. **Figure 2-1** displays the location of the study intersections.

TABLE 2-1
STUDY INTERSECTIONS

	Intersection	Traffic Control (a)
1	SR 94 and Via Mercado	Signal
2	SR 94 and Jamacha Blvd.	Signal
3	SR 94 and Jamacha Rd.	Signal
4	SR 94 and Cougar Canyon Rd.	Signal
5	SR 94 and Steele Canyon Rd.	Signal
6	SR 94 and Lyons Valley Rd.	TWSC
7	SR 94 and Jefferson Rd.	Signal
8	SR 94 and Maxfield Rd.	OWSC
9	SR 94 and Melody Rd.	TWSC
10	SR 94 and Reservation Rd.	OWSC
11	SR 94 and Honey Springs Rd.	OWSC
12	SR 94 and Otay Lakes Rd.	OWSC

Notes:
(a) Signal = Traffic signal; OWSC = One –Way Stopped Control; TWSC = Two-Way Stopped Control

Traffic Volumes

With the exception of the intersections of Honey Springs Road and SR 94, Melody Drive and S94, and Maxfield Road and SR 94, all of the existing peak-hour traffic volume counts for the intersections within Caltrans right-of-way were collected on May 20 and May 21, 2009. For the same intersections, the Friday existing afternoon peak-hour counts were collected on January 29, 2010. The Saturday existing peak-hour counts were collected on May 9 and May 16, 2009. For the intersection of Honey Springs Road and SR 94, peak-hour counts were collected on September 15, 16, and 17, 2011. For the intersection of Melody Drive and SR 94, peak-hour counts were collected on October 26, 28, and 29, 2011. For the intersections of Maxfield Road and SR 94, the existing peak-hour counts were collected on September 12, 13, and 14, 2012. An evaluation of historical counts along SR 94 between the year 2001 and 2011 during the Tribal EE process found that the 2009 and 2010 volumes were the best representation for baseline conditions within the study area. **Appendix B** includes the sources for all existing traffic count volumes used in the study.

Traffic volumes for the Near Term No Project Condition were estimated by adding the traffic from the pending JIV Gaming Project and other approved and pending cumulative projects to the existing traffic volumes. The traffic volumes for approved and pending cumulative projects were extracted from Appendix 10 of the *Jamul Indian Village Final Tribal Environmental Evaluation*, dated January 2013 and approved *Traffic Impact Analysis for the Peaceful Valley Ranch*, dated April 24, 2007. In addition, to account for other projects not yet identified by Caltrans or the County of San Diego which could be

constructed before the Proposed Project, a traffic volume growth rate was added to the existing traffic counts for a period of five years (2010 to 2015). The traffic volume growth rate varies by location and it is based on a liner extrapolation of traffic volumes between the Horizon Year 2035 volumes and Existing plus JIV Gaming Project and other approved/pending cumulative project volumes. It should be noted that some of the cumulative projects may not be built. As such, the volumes associated with the Near Term No Project Conditions would represent a conservative and worst-case scenario. A more detailed description of the cumulative projects to be included in the study is provided in Chapter 6.

The Horizon Year Average Daily Traffic (ADT) volumes on the roadway segments in the study area were derived by comparing the Series 11 and 12 Regional Transportation Forecast Models prepared by the San Diego Association of Governments (SANDAG). The Series 11 (2030 Horizon Year) traffic forecast model was used because it incorporates the land use changes approved under the County of San Diego's General Plan. SANDAG has recently approved a new Regional Model (Series 12) that represents future traffic volumes estimated for the Year 2035 based on the County of San Diego's General Plan which is twenty years beyond the implementation of the Proposed Project. **Table 2-2** presents the future ADT volumes for SR 94 within the study area forecasted by both the Series 11 and the Series 12 models. As shown in the table, most roadway ADT volumes were higher in the Series 11 model for the Year 2030 than the volumes forecasted by the Series 2012 model for the Year 2035. Only along SR 94 within proximity to Melody Road, were the ADT volumes for the Series 12 model higher than the Series 11 model. As a conservative measure, the highest ADT volume between the Series 11 and Series 12 models was used for the preparation of the traffic impact study for the Proposed Project. Copies of the forecast model plots showing the forecasted ADT volumes are included in **Appendix C.**

To estimate the Horizon Year turning movement volumes at the study intersections, the existing turning movements at each respective study intersection were extrapolated based on the projected ADT volumes along each segment. Each respective movement was derived using an iterative approach that balances the inflows and outflows for each approach. The input values include the existing turning movement volumes and future year peak-hour approach and departure volumes along each leg of the intersection. The future peak-hour approach volumes were estimated by applying the existing peak-hour factor (K-factor) and directional distributional percentage (D-factor) to the future ADT volumes along each approach. A more detailed description of the methodology used to forecast turning movement volumes is contained in National Cooperative Highway Research Program (NCHRP) 255 *Highway Traffic Data for Urbanized Area Project Planning and Design, Chapter 8*. An Excel model computes the forecast turning volumes from existing turning movement volumes and forecasted approach and departure volumes by the techniques described in NCHRP 255. As a conservative approach, if a turning movement volume produced by this model was less than the existing count for that movement, manual adjustments were made to assure that all forecast horizon year volumes would be equal to or greater than the existing turning movement counts. A copy of the NCHRP 255 Report and Excel calculation worksheets are included in **Appendix D**.

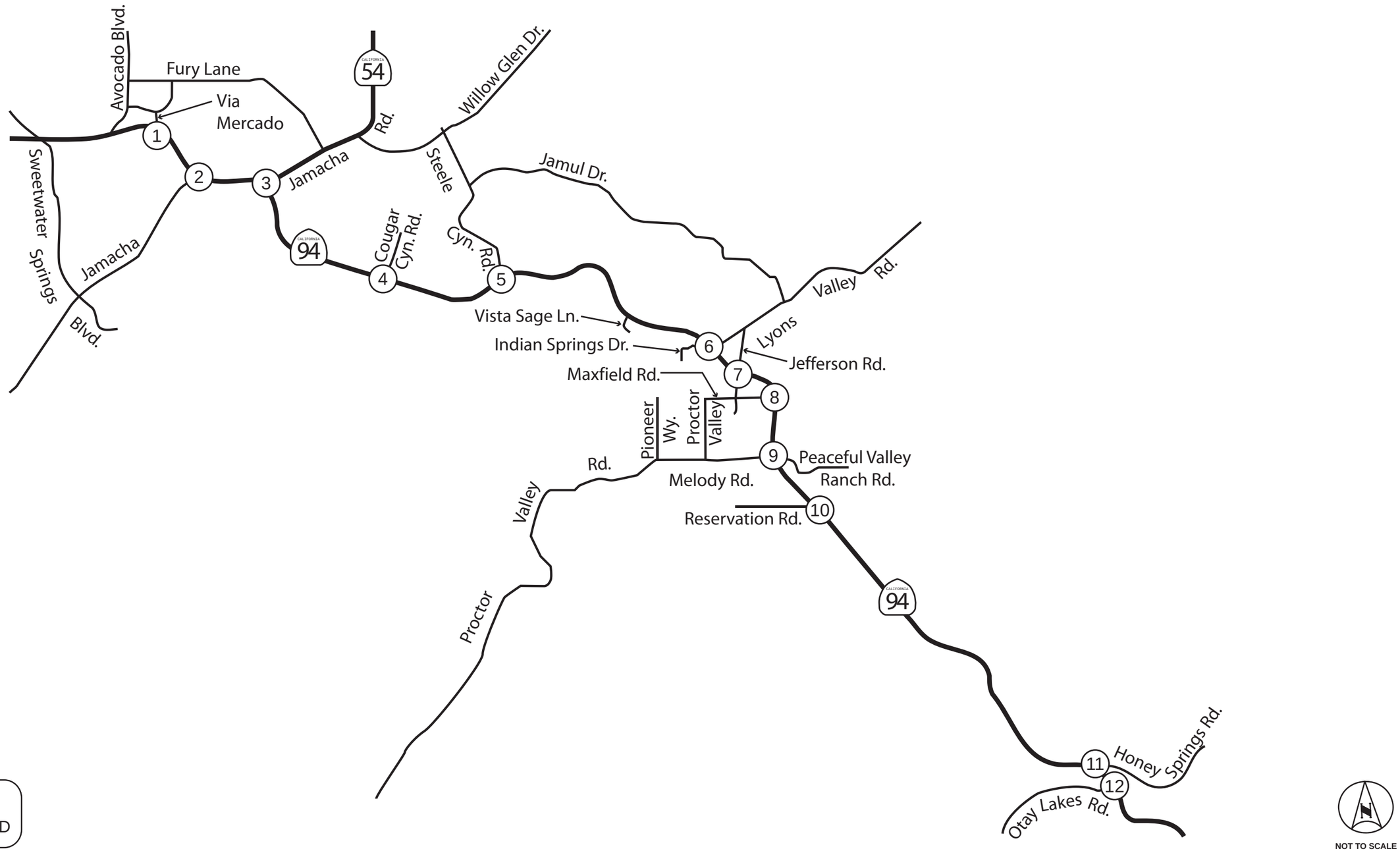

FIGURE 2-1
Study Intersections

TABLE 2-2:
COMPARISON BETWEEN SERIES 11 AND SERIES 12 FUTURE YEAR ADT VOLUMES

Roadway Segment	Series 11 ADT Volumes (Year 2030)	Series 12 ADT Volumes (Year 2035)
Sweetwater Springs Blvd.		
between Jamacha Blvd. and Austin Dr.	27,000	17,100
Jamacha Blvd.		
between SR 94 and Sweetwater Springs Blvd.	26,000	22,800
Jamacha Rd. (SR 54)		
between SR 94 and Fury Ln.	78,000	43,050
between Willow Glen Dr. and Brabham St.	34,000	20,500
Steele Canyon Rd.		
between SR 94 and Jamul Dr.	9,000	8,100
between Jamul Dr. and Willow Glen Dr.	24,000	24,400
Jamul Dr.		
between Steele Canyon Rd. and Lyons Valley Rd.	11,000	10,700
Willow Glen Dr.		
between Jamacha Rd. and Steele Canyon Rd.	26,000	25,000
between Steele Canyon Rd. and Hillsdale Rd.	18,400	11,200
Lyons Valley Rd.		
between SR 94 and Jefferson Rd.	8,300	2,700
between Jefferson Rd. and Jamul Dr.	12,000	7,800
between Jamul Dr. and Myrtle St.	13,000	13,300
Jefferson Rd.		
between SR 94 and Lyons Valley Rd.	11,000	7,700
Melody Rd.		
between SR 94 and Proctor Valley Rd.	5,000	1,900
Proctor Valley Rd.		
between Melody Rd. and Pioneer Wy.	14,000	11,400
Honey Springs Rd.		
between SR 94 and Mother Grundy Truck Trail	4,000	3,300
Otay Lakes Rd.		
between SR 94 and Otay Mountain Truck Trail	9,000	4,200
SR 94 (Campo Rd.)		
between Sweetwater Springs Blvd. and Via Mercado	66,000	53,900
between Via Mercado and Jamacha Blvd.	62,000	49,400
between Jamacha Blvd. and Jamacha Rd.	79,000	67,100
between Jamacha Rd. and Cougar Canyon Rd.	26,000	25,900
between Cougar Canyon Rd. and Steele Canyon Rd.	23,000	22,700
between Steele Canyon Rd. and Lyons Valley Rd.	27,000	24,200
between Lyons Valley Rd. and Jefferson Rd.	23,000	23,700
between Jefferson Rd. and Melody Rd.	17,000	14,100
between Melody Rd. and Panhandle Dwy.	13,000	13,100
between Panhandle Dwy. and Honey Springs Rd.	13,000	12,800
between Honey Springs Rd. and Otay Lakes Rd.	17,000	10,300
between Otay Lakes Rd. and Otay Truck Trail	17,000	10,100

Notes:
ADT = Average Daily Traffic
Volumes obtained from SANDAG's traffic forecast models Series 11 and Series 12 as noted.

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Analysis Process

The analysis process includes determining the operations at the study intersections for the weekday a.m. and p.m. peak periods, Friday p.m. peak-hours and Saturday p.m. peak-hours. The weekday a.m. peak period is defined as the morning peak-hour between 7:00 a.m. and 9:00 a.m., which represent the period were the majority of commuter traffic would occur. The weekday, Friday and Saturday p.m. peak period is defined as the afternoon peak-hour between 4:00 p.m. and 6:00 p.m. which represents the period were the majority of commuter traffic would occur. In addition, the operations along SR 94 were determined by using the *Highway Capacity Manual (HCM)* peak-hour arterial and two-lane highway analysis methodology.

Signalized and Unsignalized Intersections HCM Methodology

The 2000 *HCM* published by the Transportation Research Board establishes procedures to evaluate highway facilities and rate their ability to process traffic volumes. The terminology "level of service" is used to provide a qualitative evaluation based on certain quantitative calculations, which are related to empirical values.

Level of service (LOS) for signalized intersections is defined in terms of delay, which is a measure of driver discomfort, frustration, fuel consumption, and loss of travel time. Specifically, LOS criteria are stated in terms of the average control delay per vehicle for the peak 15-minute period within the hour analyzed. The average control delay includes initial deceleration delay, queue move-up time, and final acceleration time in addition to the stop delay. The LOS for unsignalized intersections is determined by the computed or measured control delay and is defined for each minor movement. At an all-way stop controlled intersection, the delay reported is the average control delay of the intersection. At a one-way or two-way stop controlled intersection, the delay reported represents the worst movement, which are typically the left-turns from the minor street approach.

The criteria for the various levels of service designations are given in **Table 2-3**.

Per Caltrans requirements, all signalized and unsignalized intersections are expected to operate at LOS C or better.

To analyze the operations of both signalized and unsignalized intersections, Synchro 8.0 (Trafficware) was used for the analysis. Synchro 8.0 uses the methodologies outlined in the *HCM*.

The following list contains the assumptions used for the intersection analyses:

- Peak-hour factor (PHF) = Existing peak-hour factors were used for the Existing and Near Term scenarios. Synchro's default value of 0.92 was used for the Horizon Year scenarios. The peak-hour factor represents the relationship between the peak 15-minute flow rate and the full hourly volume to estimate the most critical time period for evaluation.
- Percent of heavy vehicle (PHV) = Measured in field PHV was used at all locations with available data. For locations with no PHV data, a 2 percent default value was used.
- Signal Timing = All cycle lengths were optimized and account for the minimum pedestrian crossing times.

TABLE 2-3
LOS CRITERIA FOR INTERSECTIONS

LOS	Control Delay (sec/veh)		Description
	Signalized Intersections (a)	Unsignalized Intersections (b)	
A	≤10.0	≤10.0	Operations with very low delay and most vehicles do not stop.
B	>10.0 and ≤20.0	>10.0 and ≤15.0	Operations with good progression but with some restricted movement.
C	>20.0 and ≤35.0	>15.0 and ≤25.0	Operations where a significant number of vehicles are stopping with some backup and light congestion.
D	>35.0 and ≤55.0	>25.0 and ≤35.0	Operations where congestion is noticeable, longer delays occur, and many vehicles stop. The proportion of vehicles not stopping declines.
E	>55.0 and ≤80.0	>35.0 and ≤50.0	Operations where there is significant delay, extensive queuing, and poor progression.
F	>80.0	>50.0	Operations that are unacceptable to most drivers, when the arrival rates exceed the capacity of the intersection.

Notes:
(a) 2000 Highway Capacity Manual, Chapter 16, Page 2, Exhibit 16-2
(b) 2000 Highway Capacity Manual, Chapter 17, Page 2, Exhibit 17-2

Intersecting Lane Vehicle (ILV) Methodology

Per Caltrans District 11 requirements, intersection analysis must be performed at each Caltrans-owned signalized intersection affected by the Proposed Project using the intersecting lane vehicle (ILV) procedure, which is discussed in further detail in the Caltrans Highway Design Manual Topic 406, page 400-23. The ILV analysis is used to estimate the capacity of a signalized intersection when the phasing is relatively simple. The intersection is thought to be at capacity when the ILV is 1,500 vehicles per hour. **Table 2-4** describes the traffic flow conditions of ramp intersections at various levels of operations.

TABLE 2-4
ILV CRITERIA AT RAMP INTERSECTIONS

ILV/hr (a)	Result	Description
< 1200	Below Capacity	Stable flow with slight, but acceptable delay. Occasional signal loading may develop. Free mid-block operations.
1200 – 1500	Approaching Capacity	Unstable flow with considerable delays possible. Some vehicles occasionally wait two or more cycles to pass through the intersection. Continuous backup occurs on some approaches.
> 1500	Above Capacity	Stop-and-go operation with severe delay and heavy congestion (b). Traffic volume is limited by maximum discharge rates of each phase. Continuous backup in varying degrees occurs on all approaches. Where downstream capacity is restricted, mainline congestion can impede orderly discharge through the intersection.

Notes:
Based on the Caltrans Highway Design Manual, Table 406 "Traffic Flow Conditions at Intersections at Various Levels of Operation", page 400-23.
(a) = Intersecting Lane Vehicles/hour (ILV/hr)
(b) = The amount of congestion depends on how much the ILV/hr value exceeds 1500. Observed flow rates will normally not exceed 1500 ILV/hr, and the excess will be delayed in a queue.

HCM Peak-Hour Arterial Analysis

A peak-hour arterial analysis was conducted for segments of SR 94 between Via Mercado and Jefferson Road - Proctor Valley Road using the 2000 *HCM Chapter 15* procedures, as this segment functions as an urban arterial due to the number of signals along this corridor. Peak-hour arterial analysis estimates average travel speed on the given facility based on the operations of controlling intersections. This type of analysis provides a more accurate representation of street segment LOS than ADT-based evaluation because it considers peak-hour volumes and incorporates the capacity benefits of intersection turn lanes. Based on its speed, SR 94 is classified as a Class I arterial facility. The criteria for the various level of service designation for Class I arterials is given in **Table 2-5.**

TABLE 2-5
LOS CRITERIA FOR URBAN ARTERIALS CLASS I FACILITIES

LOS	Average Travel Speed (MPH) (a)	Description
A	>42.0	Free-flow operations, motorists can travel at desired speed and passing demand is well below capacity.
B	>34.0 and ≤42.0	Stable flow, with speeds generally higher than 50 miles per hour. The passing demand to maintain desired speeds becomes significant.
C	>27.0 and ≤34.0	Stable flow at slower speeds. Individuals become noticeably affected by interactions with others, and percent time-spent-following drastically increases.
D	>21.0 and ≤27.0	Unstable flow, with slower speeds and long platoons. Turning vehicles and roadside distractions cause major shock waves in the traffic stream.
E	>16.0 and ≤21.0	Operating conditions at or near capacity. Speeds are slow, and passing is virtually impossible. Platooning becomes intense.
F	< 16.0	Heavily congested flow.

Notes:
(a) 2000 Highway Capacity Manual, Chapter 15, Page 15-3, Exhibit 15-2

HCM Peak-Hour Two-Lane Highway Analysis

For the two-lane segment of SR 94 where the intersections are not signalized, the 2000 HCM Manual "two-lane highway" methodology was used.

According to the Caltrans SR 94 operations report, the highway is categorized as a Class I facility.

Level of service for Class I highways is based on a combination of two parameters: percent time spent following (PTSF) and average travel speed in miles/hour (MPH). The PTSF is the average percent of total travel time that vehicles must travel in platoons behind slower vehicles due to inability to pass on a two-lane highway. This parameter represents the freedom to maneuver and convenience of travel along a facility.

The criteria for the various level of service designations for Class I two-lane highway facilities are given in **Table 2-6**.

TABLE 2-6
LOS CRITERIA FOR TWO-LANE HIGHWAY CLASS I FACILITIES

LOS	Percent time spent following (PTSF) (a)	Average Travel Speed (MPH) (a)	Description
A	≤35.0	>55.0	Free-flow operations, motorists can travel at desired speed and passing demand is well below capacity.
B	>35.0 and ≤50.0	>50.0 and ≤55.0	Stable flow, with speeds generally higher than 50 miles per hour. The passing demand to maintain desired speeds becomes significant.
C	>50.0 and ≤65.0	>45.0 and ≤50.0	Stable flow at slower speeds. Individuals become noticeably affected by interactions with others, and percent time-spent-following drastically increases.
D	>65.0 and ≤80.0	>40.0 and ≤45.0	Unstable flow, with slower speeds and long platoons. Turning vehicles and roadside distractions cause major shock waves in the traffic stream.
E	≤80.0	<40.0	Operating conditions at or near capacity. Speeds are slow, and passing is virtually impossible. Platooning becomes intense.
F	N/A	N/A	Heavily congested flow.

Notes:
(a) 2000 Highway Capacity Manual, Chapter 12

The two-lane highway calculations were performed using the Highway Capacity Software (HCS) 2000 (Version HCS+5.5).

Significance Determination

The Caltrans *Guide for the Preparation of Traffic Impact Studies,* dated December 2002, was used to determine the Proposed Project impacts to facilities within Caltrans's jurisdiction. These guidelines state that Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" for all of its facilities. When an existing State Highway facility is operating at less than the appropriate target LOS, the existing measure of effectiveness (MOE) for that facility should be maintained. This means that, for facilities that operate at LOS D, E or F, a significant project impact would occur if a project causes a decrease in the MOE for that facility. **Table 2-7** shows the MOE that is used for each type of Caltrans facility. By way of example, if a signalized intersection were operating at a mid-range LOS D (45 seconds of delay per vehicle) and the project were to cause the delay to increase by any measure, the project would be deemed to cause a significant impact at that intersection. There is not a significant threshold established for the ILV evaluation.

TABLE 2-7
CALTRANS MEASURE OF EFFECTIVENESS BY FACILITY TYPE

Facility	Measurement of Effectiveness (MOE)
Signalized Intersection	Control delay per vehicle (sec/veh)
Unsignalized Intersection	Average control delay per vehicle (sec/veh)
Arterial Analysis	Average travel speeds (mile/hr)
Two-lane Highway	Percent time following and average travel speeds (mile/hr)

Notes:
Source: Guide for the Preparation of Traffic Impact Studies, dated December 2002. Appendix C.

Two classes of impacts are measured for significance: direct impacts and cumulative impacts. Direct traffic impacts are those projected to occur with the addition of the Proposed Project traffic to existing traffic volumes where Caltrans significance criteria (as applicable) are exceeded. Direct impacts are deemed to be mitigated when mitigation measures improve the intersection or roadway segment to an acceptable level of service or equal to or to a level that is better than pre-project conditions.

Cumulative traffic impacts are those projected to occur when project traffic is added to "future traffic," and where this resulting combined future traffic exceeds Caltrans significance criteria. Future traffic is based on additional proposed developments in the area (short-term cumulative) or when the affected community plan area reaches full planned build out (long-term cumulative). A project would be considered to have a cumulatively considerable impact when the addition of the project traffic to a future cumulative impact caused by other developments exceeds the Caltrans significance criteria. The project applicant would be responsible for mitigating its cumulatively considerable impact by providing a fair share contribution toward the implementation of mitigation measures needed to improve the intersection or roadway segment to an acceptable level of service or to a level that is equal to better than pre-project operations. A fair share contribution is based on the project's proportionate traffic contribution to the overall future traffic volumes at locations which exceed Caltrans significance criteria (as applicable).

3.0 EXISTING BASELINE CONDITIONS

This section summarizes the existing roadway circulation network, and existing traffic volumes within the study area.

Road Network

The following provides a description of the existing street system within the vicinity of the study area.

SR 94 begins near downtown San Diego as an eight-lane, access-controlled freeway. As it proceeds to the east, it narrows to a four-lane facility, with the freeway terminating at Avocado Boulevard. SR 94 then becomes a four-lane major roadway with signalized at-grade intersections between Avocado Boulevard and Jamacha Boulevard. In the relatively short section between Jamacha Boulevard and Jamacha Road, it is a six-lane road. South and east of Jamacha Road, it is a four-lane facility, which then transitions to a two-lane cross section. In the vicinity of the Proposed Project site, it is a two-lane, undivided, conventional highway that is also known as Campo Road. Bike lanes are currently not provided and curbside parking is prohibited along both sides of the roadway. Bus stops are provided intermittently along the roadway. SR 94 is part of the County of San Diego Bicycle Network System. SR 94 is approximately 26 feet wide with shoulders generally varying from 2 to 8 feet in the study area. The posted speed limit is 55 MPH. A two-way left-turn lane striping is provided along sections of the roadway where driveway access is denser. The segment between Cougar Canyon Road and Steele Canyon Road provides a two-way left-turn lane. SR 94 is classified as a prime arterial north of Melody Road and a major road south of Melody Road on the County of San Diego Circulation Element.

Jamacha Boulevard is constructed as a six-lane prime arterial south of SR 94. The posted speed limit along this corridor is 45 MPH. This roadway segment is built to its ultimate classification.

Jamacha Road is constructed as a six-lane prime arterial east of SR 94. The posted speed limit along this corridor is 45 MPH. This roadway segments is built to its ultimate classification.

Steele Canyon Road is currently constructed as a two lane undivided roadway, providing one travel lane in the north direction and one travel lane in the south direction. Steele Canyon Road is signalized at SR 94, Jamul Drive and Willow Glen Drive. Steele Canyon Road has a roadway width of 45 feet with no shoulders provided. The posted speed limit on Steele Canyon Road is 45 MPH. Steele Canyon Road is classified as a collector road in the County of San Diego Circulation Element. Between Jamul Drive and Heatherwood, a two-way left-turn lane is provided to facilitate access to adjacent properties along both sides of the road.

Lyons Valley Road is a two-lane undivided roadway. Bike lanes are provided and curbside parking is prohibited. Lyons Valley Road has a current roadway width of 35 feet with no shoulders provided. The speed limit is posted at 45 MPH.

Jefferson Road is a two-lane undivided roadway with a posted speed limit of 40 MPH. Currently, Jefferson Road has a roadway width of 30 feet with no shoulders provided. Jefferson Road is an unclassified roadway within the County of San Diego.

Melody Road is currently constructed as a two-lane undivided roadway providing one lane of travel per direction. No bike lanes or bus stops are provided and curbside parking is prohibited. Currently, Melody Road has a roadway width of 40 feet with no shoulders provided.

Figure 3-1 shows the existing geometrics for the intersections within the study area and **Figure 3-2** shows the existing number of lanes and functional classification for the roadway segments within the study area.

Traffic Volumes

With the exception of the intersections of Honey Springs Road and SR 94, Melody Drive and SR 94, and Maxfield Road and SR 94, all of the existing peak-hour traffic volume counts for the intersections within Caltrans right-of-way were collected on May 20 and May 21, 2009. For the same intersections, the Friday existing afternoon peak-hour counts were collected on January 29, 2010. The Saturday existing peak-hour counts were collected on May 9 and May 16, 2009. For the intersection of Honey Springs Road and SR 94, peak-hour counts were collected on September 15, 16, and 17, 2011. For the intersection of Melody Drive and SR 94, peak-hour counts were collected on October 26, 28, and 29, 2011. For the intersections of Maxfield Road and SR 94, the existing peak-hour counts were collected on September 12, 13, and 14, 2012. An evaluation of historical counts along SR 94 between the year 2001 and 2011 during the Tribal EE process found that the 2009 and 2010 volumes were the best representation for baseline conditions within the study area. **Appendix B** includes the sources for all existing traffic count volumes used in the study. **Appendix B** includes a copy of all the sources for all existing traffic counts volumes to be used in the study.

Figure 3-2 illustrates the existing peak-hour traffic volumes at the study intersections for a typical weekday. **Figure 3-3** illustrates existing traffic volumes at the study intersections for typical Friday and Saturday afternoon peak-hour periods.

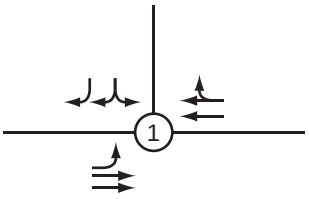
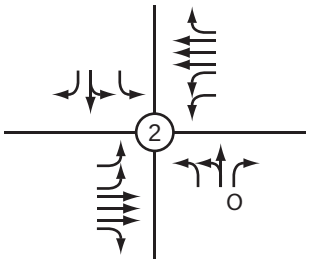
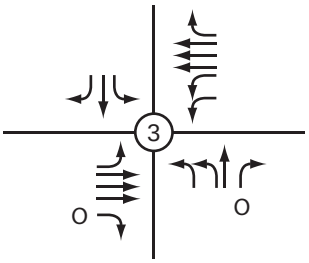
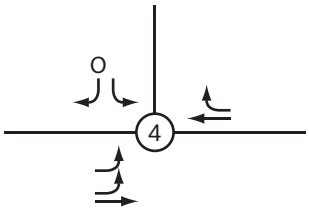
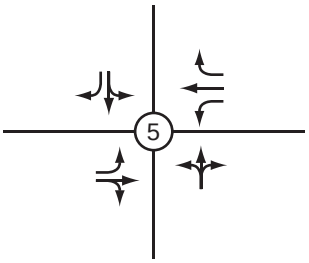
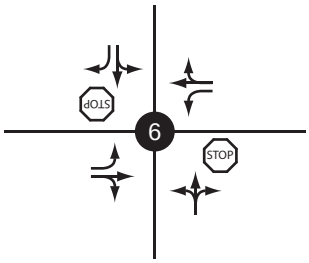
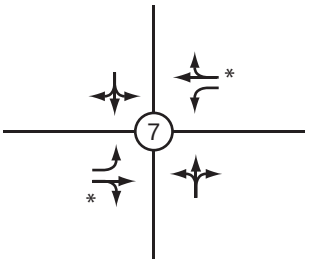
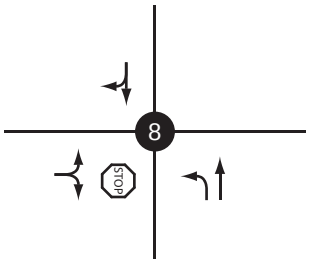
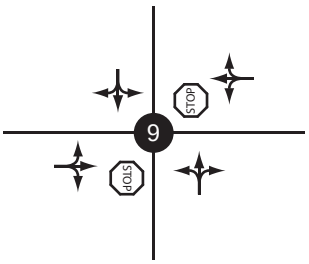
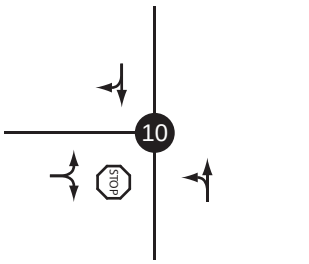
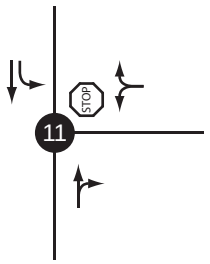
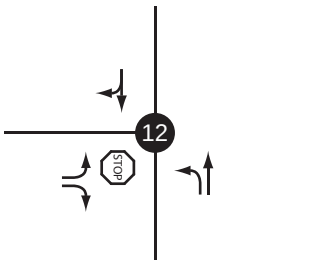
Intersection Analysis (HCM)

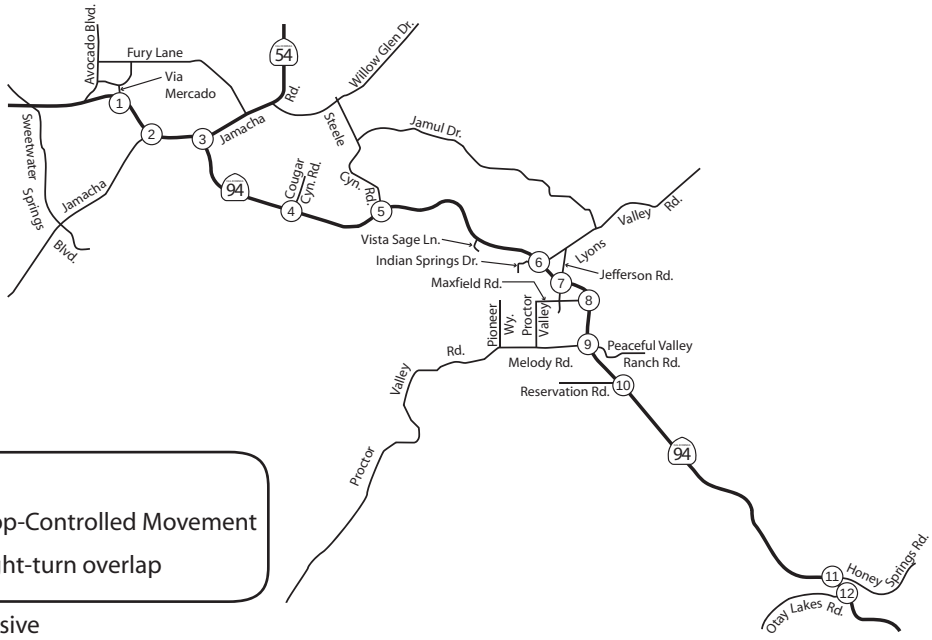
Tables 3-1 and 3-2 display the peak-hour LOS analysis results for the study intersections under Existing Conditions for all peak-hour periods analyzed. As shown in the tables, all intersections currently operate at LOS C or better during all peak periods analyzed, except for the following intersection:

- SR 94 (Campo Road) and Indian Spring Road/Lyons Valley Road (LOS F weekday a.m. and p.m. peak-hour, LOS F Friday p.m. peak-hour and LOS E Saturday p.m. peak-hour)

The SR 94 (Campo Road) and Lyons Valley Road intersection is currently a two-way stop controlled intersection. During the peak-hour operations, considerable delay is experienced by vehicles entering the intersection from Lyons Valley Road as the through traffic along SR 94 (Campo Road) does not provide sufficient vehicle gaps needed to enter the intersection.

Appendix E contains the intersections LOS calculation worksheets.

SR 94/ Via Mercado	SR 94/ Jamacha Blvd.	SR 94/ Jamacha Rd.	SR 94/ Cougar Canyon Rd.
			
SR 94/ Steele Canyon Rd.	**SR 94/ Lyons Valley Rd.**	**SR 94/ Jefferson Rd.**	**SR 94/ Maxfield Rd.**
			
SR 94/ Melody Rd.	**SR 94/ Reservation Rd.**	**SR 94/ Honey Springs Rd.**	**SR 94/ Otay Lakes Rd.**
			



Legend:

- (X) Signalized
- (X) Unsignalized
- STOP Stop-Controlled Movement
- o Right-turn overlap

*Right-turn functions as exclusive

NOT TO SCALE

Kimley-Horn and Associates, Inc.

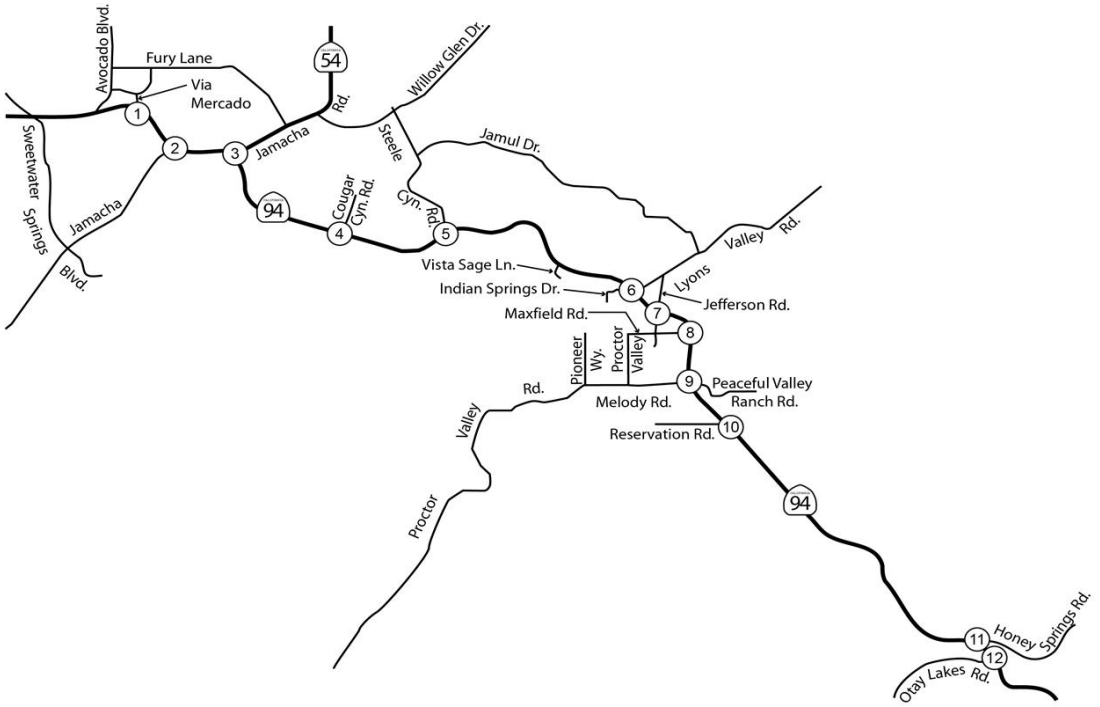
FIGURE 3-1

Existing Intersection Geometrics

1				2				3				4			
233 / 111 ⇖	94 / 212 ⇙	Via Mercado	⇗ 141 / 154 ⇧ 1928 / 1271 SR 94	0 / 3 ⇙ 3 / 3 ⇩ 3 / 6 ⇙	Jamacha Blvd.	⇗ 13 / 8 ⇦ 1770 / 1281 ⇖ 440 / 485 SR 94		36 / 59 ⇙ 9 / 15 ⇩ 5 / 27 ⇙	Dwy.	⇗ 10 / 21 ⇦ 1208 / 1146 ⇖ 93 / 94 Jamacha Rd.		356 / 138 ⇖	116 / 76 ⇙	Cougar Canyon Rd.	⇗ 277 / 45 ⇦ 738 / 413 SR 94
54 / 201 ⇗ 965 / 2056 ⇨				5 / 2 ⇗ 1003 / 2131 ⇨ 63 / 135 ⇙		⇗ ⇧ ⇗ 203 / 116 5 / 4 519 / 629		71 / 89 ⇗ 943 / 1895 ⇨ 518 / 783 ⇙	SR 94	⇗ ⇧ ⇗ 974 / 541 33 / 25 153 / 108		302 / 125 ⇗ 301 / 812 ⇨			

5				6				7				8			
245 / 96 ⇖	101 / 211 ⇙	Steele Canyon Rd.	⇗ 158 / 84 ⇧ 763 / 364 ⇖ 3 / 5 SR 94	353 / 162 ⇖ 2 / 1 ⇩ 3 / 3 ⇙	Lyons Valley Rd.	⇗ 1 / 5 ⇦ 598 / 264 ⇖ 7 / 2 SR 94		67 / 17 ⇖ 25 / 31 ⇩ 44 / 39 ⇙	Jefferson Rd.	⇗ 53 / 41 ⇦ 424 / 206 ⇖ 2 / 3 SR 94		10 / 52 ⇖ 180 / 458 ⇩	SR 94	Maxfield Rd.	
113 / 108 ⇗ 315 / 760 ⇨ 0 / 1 ⇙			⇗ ⇧ ⇗ 3 / 1 1 / 2 1 / 20	163 / 326 ⇗ 254 / 583 ⇨ 7 / 9 ⇙	Indian Springs Dr.	⇗ ⇧ ⇗ 11 / 6 1 / 2 3 / 6		14 / 17 ⇗ 194 / 413 ⇨ 35 / 114 ⇙	Proctor Valley Rd.	⇗ ⇧ ⇗ 117 / 52 33 / 41 5 / 15		6 / 33 ⇗ 4 / 31 ⇙		⇗ ⇧ 6 / 12 459 / 199	

9				10			11			12			
11 / 8 142 / 440 ⇩ 11 / 3 ⇙	SR 94	Melody Rd.	⇗ 1 / 4 Peaceful Valley Ranch Rd.	199 / 414 ⇩	SR 94 Reservation Rd.	⇧ 410 / 198	110 / 350 ⇩ 16 / 73 ⇙	SR 94	⇗ 67 / 35 ⇙ 26 / 13 Honey Springs Rd. ⇧ ⇗ 334 / 131 12 / 27	72 / 36 ⇖ 140 / 306 ⇩	SR 94	Otay Lakes Rd.	⇗ ⇧ 68 / 53 295 / 114
18 / 10 ⇗ 0 / 1 ⇨ 3 / 6 ⇙			⇗ ⇧ ⇗ 3 / 4 434 / 194 1 / 0							25 / 54 ⇗ 52 / 76 ⇙			



Legend

X / Y = AM / PM PEAK HOUR TURNING VOLUMES

NOT TO SCALE

Kimley-Horn and Associates, Inc.

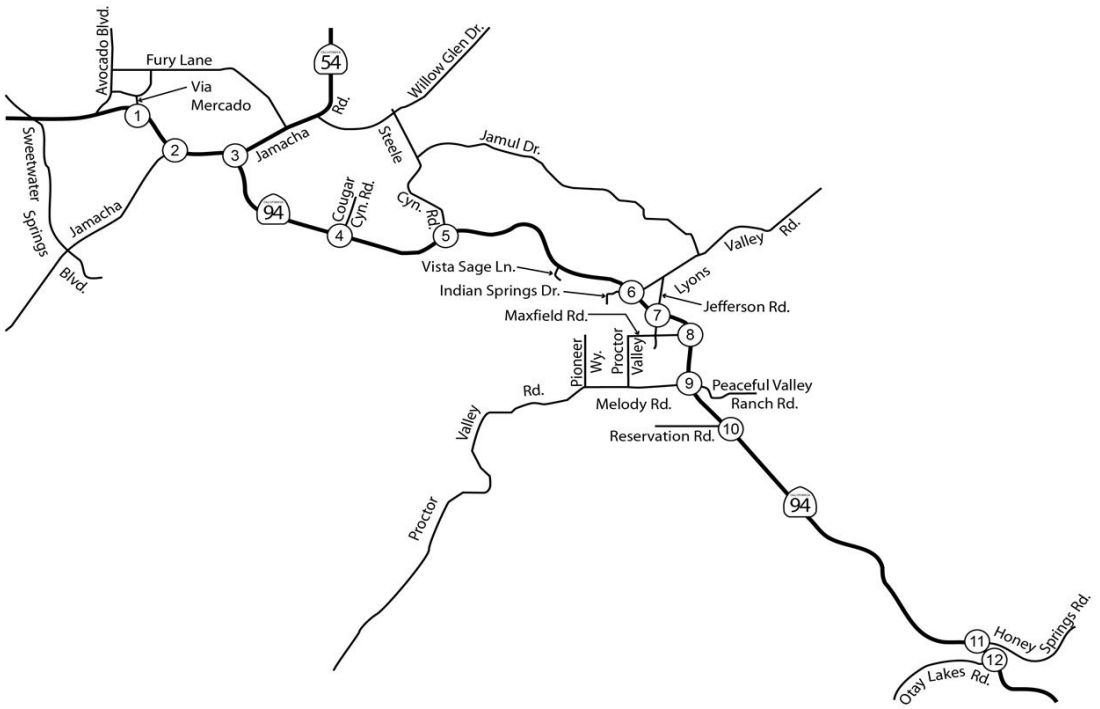
FIGURE 3-2

Existing Baseline Peak-Hour Traffic Volumes (Weekday)

1				2				3				4			
	157 / 123	205 / 169	Via Mercado		1 / 4	2 / 3	8 / 5	Jamacha Blvd.		79 / 62	32 / 19	29 / 19	Dwy.		109 / 5	67 / 1	Cougar Canyon Rd.	
	⇖	⇗			⇖	⇩	⇗			⇖	⇩	⇗			⇖	⇗		
			⇗ 183 / 164				⇗ 6 / 40				⇗ 25 / 15					⇗ 46 / 3		
			⇦ 1380 / 1233				⇦ 1444 / 1295				⇦ 1224 / 1087					⇦ 425 / 430		
			SR 94				⇖ 545 / 457 SR 94				⇖ 111 / 82 Jamacha Rd.		SR 94				SR 94	
164 / 96 ⇗				5 / 56 ⇗				113 / 87 ⇗				113 / 80 ⇗				84 / 4 ⇗			
1929 / 1555 ⇨				1976 / 1552 ⇨				2 / 9 ⇑				1738 / 1423 ⇨				861 / 500 ⇨			
				128 / 112 ⇙				698 / 526 ⇗				847 / 579 ⇙	SR 94	685 / 675 ⇗					
														26 / 32 ⇑					
														112 / 84 ⇗					

5				6				7				8			
	103 / 67	5 / 2	230 / 127 Steele Canyon Rd.		189 / 187	1 / 0	3 / 0 Lyons Valley Rd.		21 / 18	25 / 21	53 / 24 Jefferson Rd.		28 / 13	501 / 350	SR 94
	⇖	⇩	⇙		⇖	⇩	⇙		⇖	⇩	⇙		⇖	⇩	
			⇗ 106 / 92				⇗ 3 / 5				⇗ 26 / 19				
			⇦ 343 / 412				⇦ 284 / 320				⇦ 198 / 258				
			⇖ 5 / 2 SR 94				⇖ 3 / 4 SR 94				⇖ 3 / 2 SR 94		Maxfield Rd.		
106 / 57 ⇗				331 / 183 ⇗				27 / 17 ⇗				19 / 9 ⇗			
783 / 462 ⇨				647 / 406 ⇨				473 / 282 ⇨							
1 / 0 ⇙				14 / 7 ⇙	Indian Springs Dr.			121 / 89 ⇙	Proctor Valley Rd.			27 / 14 ⇙			
	⇗ 1 / 1	⇑	⇗		⇗ 6 / 6	⇑	⇗		⇗ 69 / 57	⇑	⇗				⇗ 4 / 6 ⇑
	⇑ 3 / 2		⇑		⇑ 1 / 0		⇑		⇑ 38 / 20		⇑				⇑ 204 / 162
	⇖ 18 / 7		⇗		⇖ 3 / 4		⇗		⇖ 22 / 10		⇗				

9				10				11				12			
	12 / 14	513 / 280	2 / 2 SR 94		0 / 2	499 / 289	SR 94		359 / 225	63 / 39	SR 94		50 / 33	372 / 196	SR 94
	⇖	⇩	⇙		⇖	⇩			⇩	⇙			⇖	⇩	
			⇗ 4 / 4								⇗ 27 / 37				
			⇖ 1 / 0								⇖ 14 / 15				
	Melody Rd.		Peaceful Valley Ranch Rd.		Reservation Rd.						Honey Springs Rd.		Otay Lakes Rd.		
11 / 9 ⇗												39 / 30 ⇗			
3 / 3 ⇙				0 / 4 ⇙								95 / 49 ⇙			
	⇗ 5 / 1	⇑			⇗ 0 / 1	⇑					⇑ 207 / 164				⇗ 42 / 39 ⇑
	⇑ 211 / 241				⇑ 186 / 218						⇑ 22 / 17				⇑ 104 / 134



Legend

X / Y = FRI / SAT PEAK HOUR TURNING VOLUMES

NOT TO SCALE

FIGURE 3-3

Existing Baseline Peak-Hour Traffic Volumes (Friday/Saturday)

Kimley-Horn and Associates, Inc.

TABLE 3-1:

EXISTING BASELINE

PEAK-HOUR INTERSECTION LOS (WEEKDAY)

	INTERSECTION	TRAFFIC CONTROL	PEAK HOUR	EXISTING BASELINE	
				DELAY (a)	LOS (b)
1	SR 94 (Campo Rd) & Via Mercado	Signal	AM	18.9	B
			PM	20.6	C
2	Jamacha Blvd. & SR 94 (Campo Rd)	Signal	AM	15.3	B
			PM	29.6	C
3	SR 94 (Campo Rd) & Jamacha Rd.	Signal	AM	23.8	C
			PM	21.2	C
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	Signal	AM	17.9	B
			PM	10.2	B
5	Steele Canyon Rd. & SR 94 (Campo Rd)	Signal	AM	28.8	C
			PM	24.7	C
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	Two-Way Stop	AM	589.6	**F**
			PM	73.6	**F**
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	Signal	AM	10.9	B
			PM	10.1	B
8	SR 94 (Campo Rd) & Maxfield Rd.	One-Way Stop	AM	12.3	B
			PM	14.8	B
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	Two-Way Stop	AM	14.5	B
			PM	14.4	B
10	SR 94 (Campo Rd) & Reservation Rd.	One-Way Stop	AM	Under this scenario, this intersection does not have conflicting movements.	
			PM		
11	SR 94 (Campo Rd) & Honey Springs Rd.	One-Way Stop	AM	12.0	B
			PM	11.0	B
12	SR 94 (Campo Rd) & Otay Lakes Rd.	One-Way Stop	AM	11.2	B
			PM	12.3	B

Notes:

Bold values indicate intersections operating at LOS D, E, or F.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

K:\SND_TPTO\095848001 - JIV Design\Reports\Traffic Report\TIA-CEQA\Excel\[848001IN02.xlsm]Existing

TABLE 3-2:

EXISTING BASELINE

PEAK-HOUR INTERSECTION LOS (FRIDAY/SATURDAY)

	INTERSECTION	TRAFFIC CONTROL	PEAK HOUR	EXISTING BASELINE	
				DELAY (a)	LOS (b)
1	SR 94 (Campo Rd) & Via Mercado	Signal	FRI PM	19.9	B
			SAT PM	13.8	B
2	Jamacha Blvd. & SR 94 (Campo Rd)	Signal	FRI PM	32.9	C
			SAT PM	15.8	B
3	SR 94 (Campo Rd) & Jamacha Rd.	Signal	FRI PM	24.5	C
			SAT PM	21.0	C
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	Signal	FRI PM	10.0	B
			SAT PM	13.5	B
5	Steele Canyon Rd. & SR 94 (Campo Rd)	Signal	FRI PM	27.3	C
			SAT PM	26.2	C
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	Two-Way Stop	FRI PM	125.3	**F**
			SAT PM	40.7	**E**
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	Signal	FRI PM	15.9	B
			SAT PM	13.8	B
8	SR 94 (Campo Rd) & Maxfield Rd.	One-Way Stop	FRI PM	14.2	B
			SAT PM	11.6	B
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	Two-Way Stop	FRI PM	16.6	C
			SAT PM	12.9	B
10	SR 94 (Campo Rd) & Reservation Rd.	One-Way Stop	FRI PM	Under this scenario, this intersection does not have conflicting movements.	
			SAT PM		
11	SR 94 (Campo Rd) & Honey Springs Rd.	One-Way Stop	FRI PM	12.0	B
			SAT PM	10.5	B
12	SR 94 (Campo Rd) & Otay Lakes Rd.	One-Way Stop	FRI PM	12.6	B
			SAT PM	10.6	B

Notes:

Bold values indicate intersections operating at LOS D, E, or F.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

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Intersection Analysis (ILV)

Tables 3-3 and 3-4 display the ILV analysis results for the Caltrans-owned signalized intersections under Existing Baseline Conditions for all peak-hours analyzed. As shown in the table, all intersections along SR 94 (Campo Road) would operate at below capacity during all peak periods, except for the following intersections, which operate at approaching capacity:

- SR 94 (Campo Road) & Via Mercado (weekday a.m. and p.m. peak-hours); and
- SR 94 (Campo Road) & Jamacha Boulevard (weekday p.m. peak-hour; Friday p.m. peak-hour).

Appendix F contains the ILV worksheets.

HCM Peak-Hour Arterial Analysis

Tables 3-5 and 3-6 display the peak-hour arterial analysis along SR 94 (Campo Road) between Via Mercado and Jefferson Road/Proctor Valley Road under Existing Baseline Conditions. As shown in the table, the roadway segments currently function at LOS A.

Appendix G contains the peak-hour arterial analysis worksheets.

HCM Peak-Hour Two-Lane Highway Analysis

Table 3-7 displays the peak-hour two-lane highway analysis along SR 94 (Campo Road) between Jefferson Road/Proctor Valley Road and Otay Lakes Road under Existing Baseline Conditions. The table shows the results of the weekday and weekend conditions. As shown in the tables, all roadway segments within the study area currently function at LOS D under the Existing Baseline Conditions.

Appendix H contains the two-way two-lane analysis worksheets.

TABLE 3-3:
EXISTING BASELINE
ILV ANALYSIS (WEEKDAY)

	INTERSECTION	PEAK HOUR	EXISTING BASELINE	
			ILV TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	AM	1253	Approaching Capacity
		PM	1240	Approaching Capacity
2	SR 94 (Campo Rd) & Jamacha Blvd.	AM	895	Below Capacity
		PM	1346	Approaching Capacity
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	997	Below Capacity
		PM	1009	Below Capacity
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	1094	Below Capacity
		PM	888	Below Capacity
5	SR 94 (Campo Rd) & Steele Canyon Rd.	AM	1126	Below Capacity
		PM	999	Below Capacity
7	SR 94 (Campo Rd) & Jefferson Rd	AM	646	Below Capacity
		PM	635	Below Capacity

Notes:
<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity
Bold values indicate intersections operating above capacity.

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TABLE 3-4:
EXISTING BASELINE
ILV ANALYSIS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	EXISTING BASELINE	
			ILV TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	FRI PM	1170	Below Capacity
		SAT PM	964	Below Capacity
2	SR 94 (Campo Rd) & Jamacha Blvd.	FRI PM	1365	Approaching Capacity
		SAT PM	1076	Below Capacity
3	SR 94 (Campo Rd) & Jamacha Rd.	FRI PM	1058	Below Capacity
		SAT PM	916	Below Capacity
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	FRI PM	928	Below Capacity
		SAT PM	505	Below Capacity
5	SR 94 (Campo Rd) & Steele Canyon Rd.	FRI PM	1036	Below Capacity
		SAT PM	608	Below Capacity
7	SR 94 (Campo Rd) & Jefferson Rd	FRI PM	726	Below Capacity
		SAT PM	460	Below Capacity

Notes:
<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity
Bold values indicate intersections operating above capacity.

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TABLE 3-5:
EXISTING BASELINE
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (WEEKDAY)

ROADWAY SEGMENT	DIRECTION	AM PEAK		PM PEAK	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Proctor Valley Rd	EB	48.9	A	45.4	A
	WB	41.7	B	42.3	A

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 3-6:
EXISTING BASELINE
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (FRIDAY/SATURDAY)

ROADWAY SEGMENT	DIRECTION	FRIDAY		SATURDAY	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Proctor Valley Rd	EB	43.9	A	45.2	A
	WB	42.4	A	42.2	A

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 3-7:

EXISTING BASELINE

TWO-WAY TWO-LANE HIGHWAY SEGMENT ANALYSIS

HIGHWAY SEGMENT	PEAK HOUR	EXISTING BASELINE		
		LOS (a)	Average Travel Speed (mph)	PTSF (b)
SR-94				
Proctor Valley Road to Melody Rd	Weekday AM	**D**	40.5	64.9%
	Weekday PM	**D**	40.5	64.8%
	Friday PM	**D**	40.2	68.7%
	Saturday PM	**D**	41.0	62.7%
Melody Road to Otay Lakes Rd	Weekday AM	**D**	44.4	63.4%
	Weekday PM	**D**	44.4	63.5%
	Friday PM	**D**	44.0	66.0%
	Saturday PM	**D**	45.0	61.1%

Notes:

Bold values indicate intersections operating at LOS D, E or F.

(a) LOS is based on Average Travel Speed and Percent Time Spent Following per Chapter 12 of the 2000 Highway Capacity Manual.

(b) PTSF = Percent Time Spent Following

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4.0 EXISTING BASELINE WITH JIV GAMING PROJECT TRAFFIC CONDITIONS

This section summarizes the results of the analysis for the existing roadway circulation network with the addition of the JIV Gaming Project traffic volumes.

Road Network

Existing Baseline with JIV Gaming Project Traffic Conditions was analyzed with existing roadway network as described in Chapter 3.

Traffic Volumes

Traffic volumes for this scenario include the existing baseline traffic volumes presented in Chapter 3 with the addition of the traffic associated with the JIV Gaming Project. The traffic volumes for the JIV Gaming project were extracted from *Appendix 10 of the Jamul Indian Village Final Tribal Environmental Evaluation,* dated January 2013. **Appendix I** include excerpts from the JIV Environmental Document showing the traffic volumes associated with the JIV Gaming Project.

Figure 4-1 illustrates the existing baseline plus JIV Gaming Project peak-hour traffic volumes at the study intersections for a typical weekday. **Figure 4-2** illustrates existing traffic volumes at the study intersections for typical Friday and Saturday peak-hour periods.

Intersection Analysis (HCM)

Tables 4-1 and 4-2 display the peak-hour LOS analysis results for the study intersections under Existing Baseline Conditions with JIV Gaming Project traffic for all peak-hour periods analyzed. As shown in the tables, several intersections are expected to operate at LOS D or worse for at least one peak-hour period:

- SR 94 (Campo Road) and Jamacha Boulevard (LOS D weekday p.m. peak-hour and Friday p.m. peak-hour);
- SR 94 (Campo Road) and Jamacha Road (LOS D Friday p.m. peak-hour);
- SR 94 (Campo Road) and Steele Canyon Road (LOS D weekday a.m. and p.m. peak-hours, LOS E Friday p.m. peak-hour, and LOS D Saturday p.m. peak-hour);
- SR 94 (Campo Road) and Lyons Valley Road/Indians Spring Drive (LOS F all peak-hour periods);
- SR 94 (Campo Road) and Maxfield Road (LOS E weekday p.m. peak-hour, LOS F Friday p.m. peak-hour, LOS D Saturday p.m. peak-hour);
- SR 94 (Campo Road) and Melody Road/Peaceful Valley Ranch Road (LOS D Weekday p.m. peak-hour, LOS F Friday p.m. peak-hour and LOS E Saturday p.m. peak-hour); and
- SR 94 (Campo Road) and Reservation Road (LOS E weekday a.m. peak-hour, LOS F weekday, Friday and Saturday p.m. peak-hours).

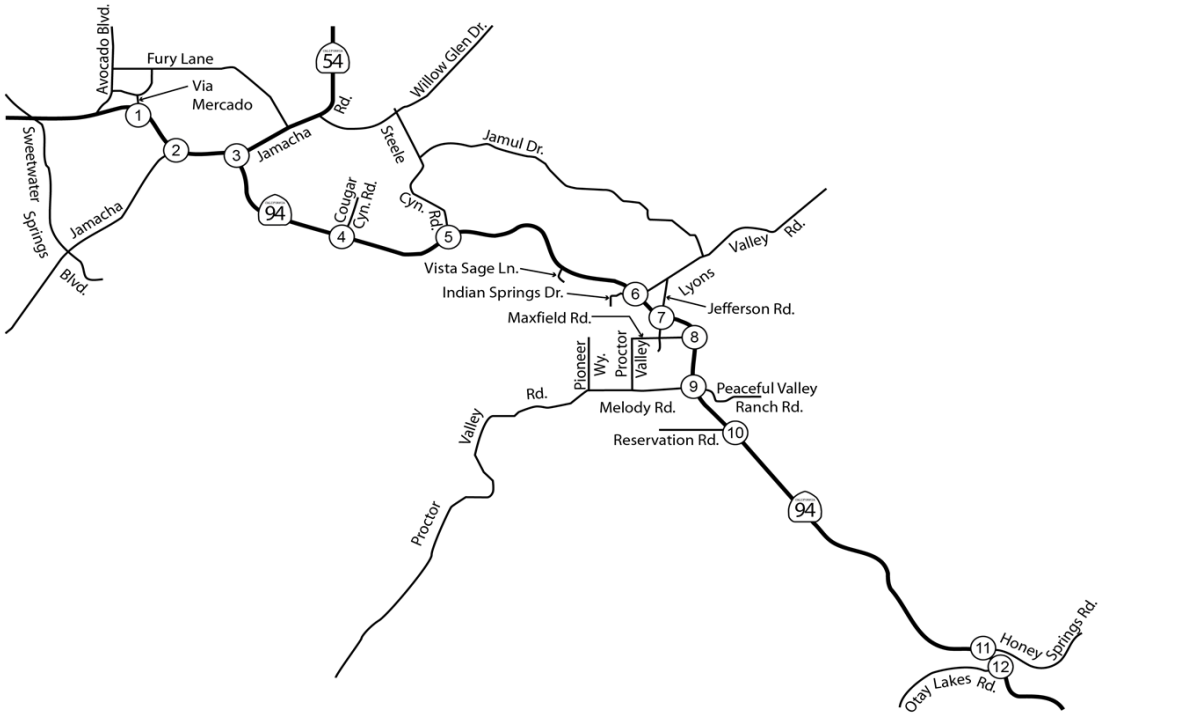
Appendix E contains the intersections LOS calculation worksheets.

SR 94 Improvement Project

1				2				3				4			
233 / 111	94 / 212	Via Mercado	141 / 154 2028 / 1535	0 / 3 3 / 3 3 / 6	Jamacha Blvd.	13 / 8 1870 / 1545 449 / 509		36 / 59 9 / 15 5 / 27	Dwy.	10 / 21 1208 / 1146 114 / 121		356 / 138	116 / 76	Cougar Canyon Rd.	277 / 45 856 / 724
SR 94			SR 94	SR 94		SR 94		SR 94		Jamacha Rd.		SR 94			SR 94
54 / 201 1200 / 2354				5 / 2 1238 / 2429 63 / 135		203 / 116 5 / 4 540 / 656		71 / 89 943 / 1895 774 / 1108	SR 94	1083 / 829 33 / 25 162 / 132		302 / 125 578 / 1164			

5				6				7				8			
245 / 96	130 / 248	Steele Canyon Rd.	171 / 117 881 / 675 3 / 5	353 / 162 2 / 1 7 / 8	Lyons Valley Rd.	3 / 10 729 / 608 7 / 2		67 / 17 25 / 31 69 / 71	Jefferson Rd.	64 / 69 556 / 555 2 / 3		10 / 52 516 / 884	SR 94		
SR 94				SR 94				SR 94				Maxfield Rd.			
113 / 108 592 / 1112 0 / 1			3 / 1 1 / 2 1 / 20	163 / 326 561 / 972 7 / 9	Indian Springs Dr.	11 / 6 1 / 2 3 / 6		14 / 17 505 / 807 35 / 114	Proctor Valley Rd.	117 / 52 33 / 41 5 / 15		6 / 33 4 / 31			6 / 12 602 / 576

9				10				11				12			
11 / 8 478 / 866	11 / 3	SR 94	1 / 4	344 / 437 199 / 414	SR 94			140 / 430 18 / 78	SR 94	71 / 40 26 / 13		101 / 111 142 / 311	SR 94		
Melody Rd.			Peaceful Valley Ranch Rd.	Reservation Rd.						Honey Springs Rd.		Otay Lakes Rd.			
18 / 10 0 / 1 11 / 17			7 / 13 577 / 571 1 / 0	147 / 387 32 / 85		76 / 96 410 / 198				405 / 222 12 / 27		92 / 139 52 / 76			68 / 53 299 / 119



Legend

X / Y = AM / PM PEAK HOUR TURNING VOLUMES

NOT TO SCALE

FIGURE 4-1

Existing Baseline with JIV Gaming Project Peak-Hour Traffic Volumes (Weekday)

SR 94 Improvement Project

| 1 | | |

Intersection Analysis (ILV)

Tables 4-3 and 4-4 display the ILV analysis results for the Caltrans-owned signalized intersections under Existing Baseline with JIV Gaming Project Traffic Conditions for all peak-hours analyzed. As shown in the table, all intersections along SR 94 (Campo Road) would operate at below capacity during all peak periods, except for the following intersections, which operate at approaching capacity:

- SR 94 (Campo Road) & Via Mercado (weekday a.m. and p.m. peak-hours, Friday p.m. peak-hour);
- SR 94 (Campo Road) & Jamacha Boulevard (weekday p.m. peak-hour; Saturday p.m. peak-hour);
- SR 94 (Campo Road) & Jamacha Road (weekday p.m. peak-hour and Friday p.m. peak-hour);
- SR 94 (Campo Road) & Cougar Canyon (weekday a.m. and p.m. peak-hours, Friday p.m. peak-hour);
- SR 94 (Campo Road) & Steele Canyon (weekday a.m. and p.m. peak-hours); and
- SR 94 (Campo Road) & Jefferson Road (Friday p.m. peak-hour)

In addition, the following two intersections have peak-hour periods were the intersection operates at above capacity levels:

- SR 94 (Campo Road) & Jamacha Boulevard (Friday p.m. peak-hour); and
- SR 94 (Campo Road) & Steele Canyon (Friday p.m. peak-hours).

Appendix F contains the ILV worksheets.

TABLE 4-1:
EXISTING BASELINE WITH JIV GAMING PROJECT
PEAK-HOUR INTERSECTION LOS (WEEKDAY)

	INTERSECTION	TRAFFIC CONTROL	PEAK HOUR	EXISTING WITH JIV GAMING PROJECT	
				DELAY (a)	LOS (b)
1	SR 94 (Campo Rd) & Via Mercado	Signal	AM	22.5	C
			PM	27.9	C
2	Jamacha Blvd. & SR 94 (Campo Rd)	Signal	AM	16.2	B
			PM	37.2	**D**
3	SR 94 (Campo Rd) & Jamacha Rd.	Signal	AM	25.0	C
			PM	30.9	C
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	Signal	AM	19.5	B
			PM	15.0	B
5	Steele Canyon Rd. & SR 94 (Campo Rd)	Signal	AM	37.9	**D**
			PM	42.0	**D**
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	Two-Way Stop	AM	ECL	**F**
			PM	659.0	**F**
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	Signal	AM	13.3	B
			PM	13.6	B
8	SR 94 (Campo Rd) & Maxfield Rd.	One-Way Stop	AM	19.5	C
			PM	45.3	**E**
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	Two-Way Stop	AM	24.1	C
			PM	34.6	**D**
10	SR 94 (Campo Rd) & Reservation Rd.	One-Way Stop	AM	45.4	**E**
			PM	645.3	**F**
11	SR 94 (Campo Rd) & Honey Springs Rd.	One-Way Stop	AM	13.1	B
			PM	12.3	B
12	SR 94 (Campo Rd) & Otay Lakes Rd.	One-Way Stop	AM	14.5	B
			PM	16.0	C

Notes:

Bold values indicate intersections operating at LOS D, E, or F.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

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TABLE 4-2:
EXISTING BASELINE WITH JIV GAMING PROJECT
PEAK-HOUR INTERSECTION LOS (FRIDAY/SATURDAY)

	INTERSECTION	TRAFFIC CONTROL	PEAK HOUR	EXISTING WITH JIV GAMING PROJECT	
				DELAY (a)	LOS (b)
1	SR 94 (Campo Rd) & Via Mercado	Signal	FRI PM	34.7	C
			SAT PM	18.0	B
2	Jamacha Blvd. & SR 94 (Campo Rd)	Signal	FRI PM	40.6	**D**
			SAT PM	20.0	C
3	SR 94 (Campo Rd) & Jamacha Rd.	Signal	FRI PM	54.0	**D**
			SAT PM	32.3	C
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	Signal	FRI PM	16.3	B
			SAT PM	20.4	C
5	Steele Canyon Rd. & SR 94 (Campo Rd)	Signal	FRI PM	56.7	**E**
			SAT PM	42.5	**D**
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	Two-Way Stop	FRI PM	ECL	**F**
			SAT PM	972.2	**F**
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	Signal	FRI PM	17.2	B
			SAT PM	21.9	C
8	SR 94 (Campo Rd) & Maxfield Rd.	One-Way Stop	FRI PM	58.9	**F**
			SAT PM	32.3	**D**
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	Two-Way Stop	FRI PM	77.8	**F**
			SAT PM	42.8	**E**
10	SR 94 (Campo Rd) & Reservation Rd.	One-Way Stop	FRI PM	ECL	**F**
			SAT PM	ECL	**F**
11	SR 94 (Campo Rd) & Honey Springs Rd.	One-Way Stop	FRI PM	14.2	B
			SAT PM	12.2	B
12	SR 94 (Campo Rd) & Otay Lakes Rd.	One-Way Stop	FRI PM	17.7	C
			SAT PM	14.2	B

Notes:

Bold values indicate intersections operating at LOS D, E, or F.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

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TABLE 4-3:

EXISTING BASELINE WITH JIV GAMING PROJECT

ILV ANALYSIS (WEEKDAY)

	INTERSECTION	PEAK HOUR	EXISTING PLUS JIV GAMING PROJECT	
			ILV/HR TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	AM	1303	Approaching Capacity
		PM	1389	Approaching Capacity
2	SR 94 (Campo Rd) & Jamacha Blvd.	AM	960	Below Capacity
		PM	1466	Approaching Capacity
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	1052	Below Capacity
		PM	1228	Approaching Capacity
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	1230	Approaching Capacity
		PM	1292	Approaching Capacity
5	SR 94 (Campo Rd) & Steele Canyon Rd.	AM	1244	Approaching Capacity
		PM	1389	Approaching Capacity
7	SR 94 (Campo Rd) & Jefferson Rd	AM	795	Below Capacity
		PM	1060	Below Capacity

Notes:

<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity

Bold values indicate intersections operating above capacity.

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TABLE 4-4:

EXISTING BASELINE WITH JIV GAMING PROJECT

ILV ANALYSIS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	EXISTING PLUS JIV GAMING PROJECT	
			ILV/HR TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	FRI PM	1362	Approaching Capacity
		SAT PM	1175	Below Capacity
2	SR 94 (Campo Rd) & Jamacha Blvd.	FRI PM	1517	**Above Capacity**
		SAT PM	1228	Approaching Capacity
3	SR 94 (Campo Rd) & Jamacha Rd.	FRI PM	1391	Approaching Capacity
		SAT PM	1162	Below Capacity
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	FRI PM	1354	Approaching Capacity
		SAT PM	934	Below Capacity
5	SR 94 (Campo Rd) & Steele Canyon Rd.	FRI PM	1517	**Above Capacity**
		SAT PM	1152	Below Capacity
7	SR 94 (Campo Rd) & Jefferson Rd	FRI PM	1212	Approaching Capacity
		SAT PM	1000	Below Capacity

Notes:

<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity

Bold values indicate intersections operating above capacity.

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HCM Peak-Hour Arterial Analysis

Tables 4-5 and 4-6 display the peak-hour arterial analysis along SR 94 (Campo Road) between Via Mercado and Jefferson Road/Proctor Valley Road under Existing Baseline with JIV Gaming Project Traffic Conditions. As shown in the table, the roadway segments would operate at LOS B or better with the addition of the JIV Gaming Project traffic during the peak-hours evaluated.

Appendix G contains the peak-hour arterial analysis worksheets.

HCM Peak-Hour Two-Lane Highway Analysis

Table 4-7 displays the peak-hour two-lane highway analysis along SR 94 (Campo Road) between Jefferson Road/Proctor Valley Road and Otay Lakes Road under Existing Baseline with JIV Gaming Project Traffic Conditions. The table shows the results of the weekday and weekend conditions. The segment between Proctor Valley Road and Reservation Road is expected to operate at LOS E during all peak-hour analyzed with the exception of the Wednesday a.m. peak-hour. During the Wednesday a.m peak-hour period, the segment of Melody Road to Reservation Road is expected to operate at LOS D. The segment between Reservation Road and Otay Lakes Road is expected to operate at LOS D during all peak-hour periods analyzed.

Appendix H contains the two-way two-lane analysis worksheets.

TABLE 4-5:
EXISTING BASELINE WITH JIV GAMING PROJECT
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (WEEKDAY)

ROADWAY SEGMENT	DIRECTION	AM PEAK		PM PEAK	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Proctor Valley Rd	EB	47.7	A	41.5	B
	WB	38.3	B	41.6	B

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 4-6:
EXISTING BASELINE WITH JIV GAMING PROJECT
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (FRIDAY/SATURDAY)

ROADWAY SEGMENT	DIRECTION	FRIDAY		SATURDAY	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Proctor Valley Rd	EB	37.9	B	43.7	A
	WB	39.4	B	38.8	B

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 4-7:

EXISTING BASELINE WITH JIV GAMING PROJECT

TWO-WAY TWO-LANE HIGHWAY SEGMENT ANALYSIS

HIGHWAY SEGMENT	PEAK HOUR	EXISTING BASELINE		
		LOS (a)	Average Travel Speed (mph)	PTSF (b)
SR-94				
Proctor Valley Road to Melody Rd	Weekday AM	**E**	37.2	78.5%
	Weekday PM	**E**	34.5	84.8%
	Friday PM	**E**	31.1	89.6%
	Saturday PM	**E**	32.6	87.7%
Melody Rd to Reservation Rd	Weekday AM	**D**	41.2	76.8%
	Weekday PM	**E**	38.1	84.1%
	Friday PM	**E**	34.1	89.5%
	Saturday PM	**E**	36.0	87.2%
Reservation Rd to Otay Lakes Rd	Weekday AM	**D**	43.7	67.0%
	Weekday PM	**D**	44.4	63.5%
	Friday PM	**D**	42.5	74.4%
	Saturday PM	**D**	43.2	69.4%

Notes:

Bold values indicate intersections operating at LOS D, E or F.

(a) LOS is based on Average Travel Speed and Percent Time Spent Following per Chapter 12 of the 2000 Highway Capacity Manual.

(b) PTSF = Percent Time Spent Following

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5.0 EXISTING WITH JIV GAMING PROJECT TRAFFIC WITH PROJECT CONDITIONS

This section summarizes the operations of the existing roadway circulation network with the addition of the Proposed Project roadway improvements. This scenario also includes the traffic from the JIV Gaming Project.

Road Network

The roadway network for this analysis includes the roadway improvements to be constructed by the Proposed Project as described in Chapter 1.

Traffic Volumes

Traffic volumes for this scenario are equal to the traffic volumes for the Existing Baseline with JIV Gaming Project Traffic conditions. It is assumed that with the exception of Alternative 3 project scenario, the Proposed Project will not change the traffic volumes and patterns along the study area. For Alternative 3 proposed improvements, however, the traffic volumes associated with the JIV Gaming facility will enter SR 94 (Campo Road) via Melody Road. For this reason, peak-hour volumes at the SR 94 (Campo Road)/Melody Road/Peaceful Valley Ranch Road and the SR 94 (Campo Road)/Reservation Road intersections were adjusted. The adjustment of traffic volumes was done so all traffic related to the JIV Gaming Project would turn to and from Melody Road instead of a driveway at Daisy Drive or Reservation Road.

Figure 5-1 illustrates the existing peak-hour traffic volumes at the study intersections for a typical weekday. **Figure 5-2** illustrates existing traffic volumes at the study intersections for a typical Friday and Saturday peak-hour periods. **Figure 5-3** illustrates the peak-hour traffic volume adjustment needed for the evaluation of the Alternative 3 project scenario, where the JIV Gaming Project related traffic uses Melody Road to access the SR 94.

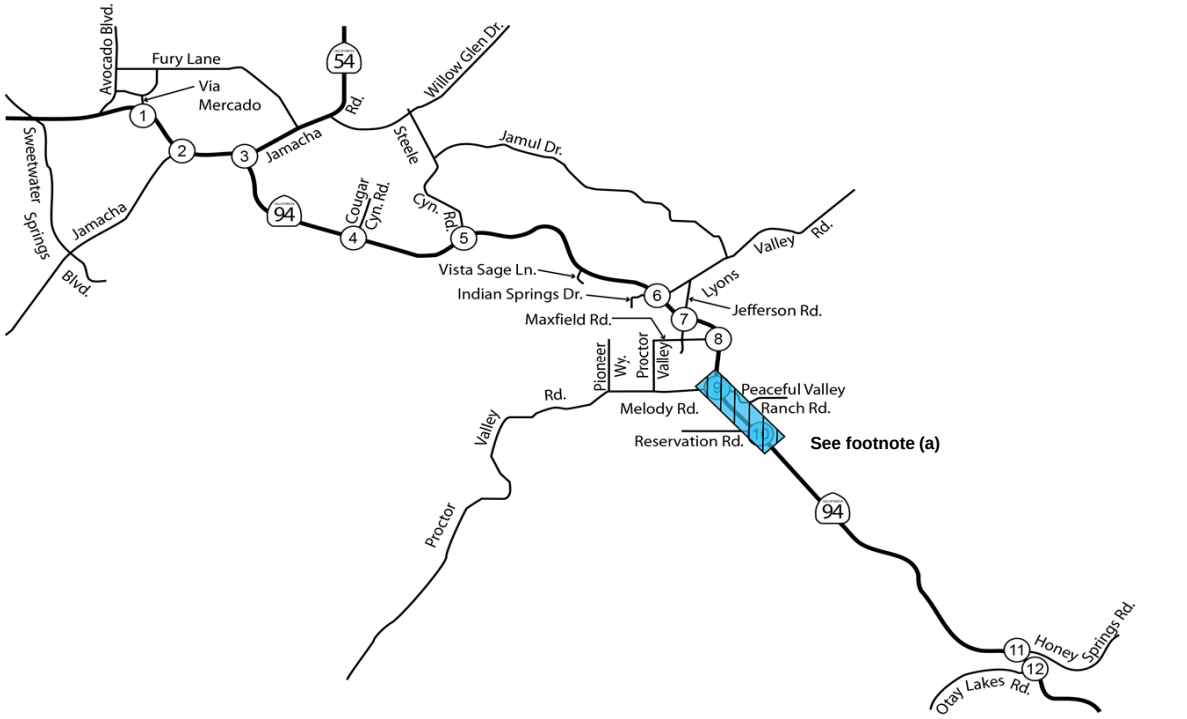
Intersection Analysis (HCM)

Tables 5-1 and 5-2 display the peak-hour LOS analysis results for the study intersections under Existing with JIV Gaming Project traffic with Project Alternatives 1-2 conditions for all peak-hour scenarios analyzed. As shown in the tables, with the implementation of the Proposed Project improvements, every intersection within the study area will operate at LOS C or better with the exception of SR 94 & Jamacha Road (LOS D) during the Friday PM peak hour period. All intersections were also found to operate at equal or less delay than the before project conditions except Jamacha Boulevard & SR 94 (LOS B) during the AM peak hour period.

Table 5-3 and 5-4 displays the peak-hour LOS analysis results for the study intersection under the Existing with JIV Gaming Project with Project Alternative 3 conditions for all peak-hour scenarios analysis. As with the Alternative 1-2 project conditions, with the implementation of the Proposed Project improvements, every intersection within the study area will operate at LOS C or better with the exception of SR 94 & Jamacha Road (LOS D) during the Friday PM peak hour period. All intersections were also found to operate at equal or less delay than the before project conditions except Jamacha Boulevard & SR 94 (LOS B) during the AM peak hour period.

Appendix E contains the intersections LOS calculation worksheets.

1 233 / 111 ⇖ 94 / 212 ⇗ **Via Mercado** ⇖ 141 / 154 ⇦ 2028 / 1535 **SR 94** 54 / 201 ⇙ 1200 / 2354 ⇨	**2** 0 / 3 ⇖ 3 / 3 ⇩ 3 / 6 ⇙ **Jamacha Blvd.** ⇖ 13 / 8 ⇦ 1870 / 1545 ⇙ 449 / 509 **SR 94** 5 / 2 ⇙ 1238 / 2429 ⇨ 63 / 135 ⇙ 203 / 116 ⇙ ⇧ ⇗ 5 / 4 540 / 656 ⇗	**3** 36 / 59 ⇖ 9 / 15 ⇩ 5 / 27 ⇙ **Dwy.** ⇗ 10 / 21 ⇦ 1208 / 1146 ⇙ 114 / 121 **Jamacha Rd.** **SR 94** 71 / 89 ⇙ 943 / 1895 ⇨ 774 / 1108 ⇙ 1083 / 829 ⇙ ⇧ ⇗ 33 / 25 162 / 132 ⇗	**4** 356 / 138 ⇖ 116 / 76 ⇙ **Cougar Canyon Rd.** ⇗ 277 / 45 ⇦ 856 / 724 **SR 94** 302 / 125 ⇙ 578 / 1164 ⇨
5 245 / 96 ⇖ 130 / 248 ⇙ **Steele Canyon Rd.** ⇖ 171 / 117 ⇦ 881 / 675 ⇙ 3 / 5 **SR 94** 113 / 108 ⇙ 592 / 1112 ⇨ 0 / 1 ⇙ ⇙ ⇧ ⇗ 3 / 1 1 / 2 1 / 20 ⇗	**6** 353 / 162 ⇖ 2 / 1 ⇩ 7 / 8 ⇙ **Lyons Valley Rd.** ⇗ 3 / 10 ⇦ 729 / 608 ⇙ 7 / 2 **SR 94** 163 / 326 ⇙ 561 / 972 ⇨ 7 / 9 ⇙ **Indian Springs Dr.** ⇙ ⇧ ⇗ 11 / 6 1 / 2 3 / 6 ⇗	**7** 67 / 17 ⇖ 25 / 31 ⇩ 69 / 71 ⇙ **Jefferson Rd.** ⇗ 64 / 69 ⇦ 556 / 555 ⇙ 2 / 3 **SR 94** 14 / 17 ⇙ 505 / 807 ⇨ 35 / 114 ⇙ **Proctor Valley Rd.** ⇙ ⇧ ⇗ 117 / 52 33 / 41 5 / 15 ⇗	**8** 10 / 52 ⇖ 516 / 884 ⇩ **SR 94** **Maxfield Rd.** 6 / 33 ⇙ 4 / 31 ⇙ ⇙ ⇧ 6 / 12 602 / 576 ⇗
9 11 / 8 ⇖ 478 / 866 ⇩ 11 / 3 ⇙ **SR 94** **Melody Rd.** ⇗ 1 / 4 **Peaceful Valley Ranch Rd.** 18 / 10 ⇙ 0 / 1 ⇨ 11 / 17 ⇙ ⇙ ⇧ ⇗ 7 / 13 577 / 571 1 / 0 ⇗	**10** 344 / 437 ⇖ 199 / 414 ⇩ **SR 94** **Reservation Rd or Daisy Dr** 147 / 387 ⇙ 32 / 85 ⇙ ⇙ ⇧ 76 / 96 410 / 198 ⇗	**11** 140 / 430 ⇩ 18 / 78 ⇙ **SR 94** ⇗ 71 / 40 ⇙ 26 / 13 **Honey Springs Rd.** ⇧ ⇗ 405 / 222 12 / 27 ⇗	**12** 101 / 111 ⇖ 142 / 311 ⇩ **SR 94** **Otay Lakes Rd.** 92 / 139 ⇙ 52 / 76 ⇙ ⇙ ⇧ 68 / 53 299 / 119 ⇗



Legend

X / Y = AM / PM PEAK HOUR TURNING VOLUMES

NOT TO SCALE

(a) Volumes for Alternative 1 and 2 would remain the same. Please refer to Figure 5-3 for Alternative 3 traffic volumes.

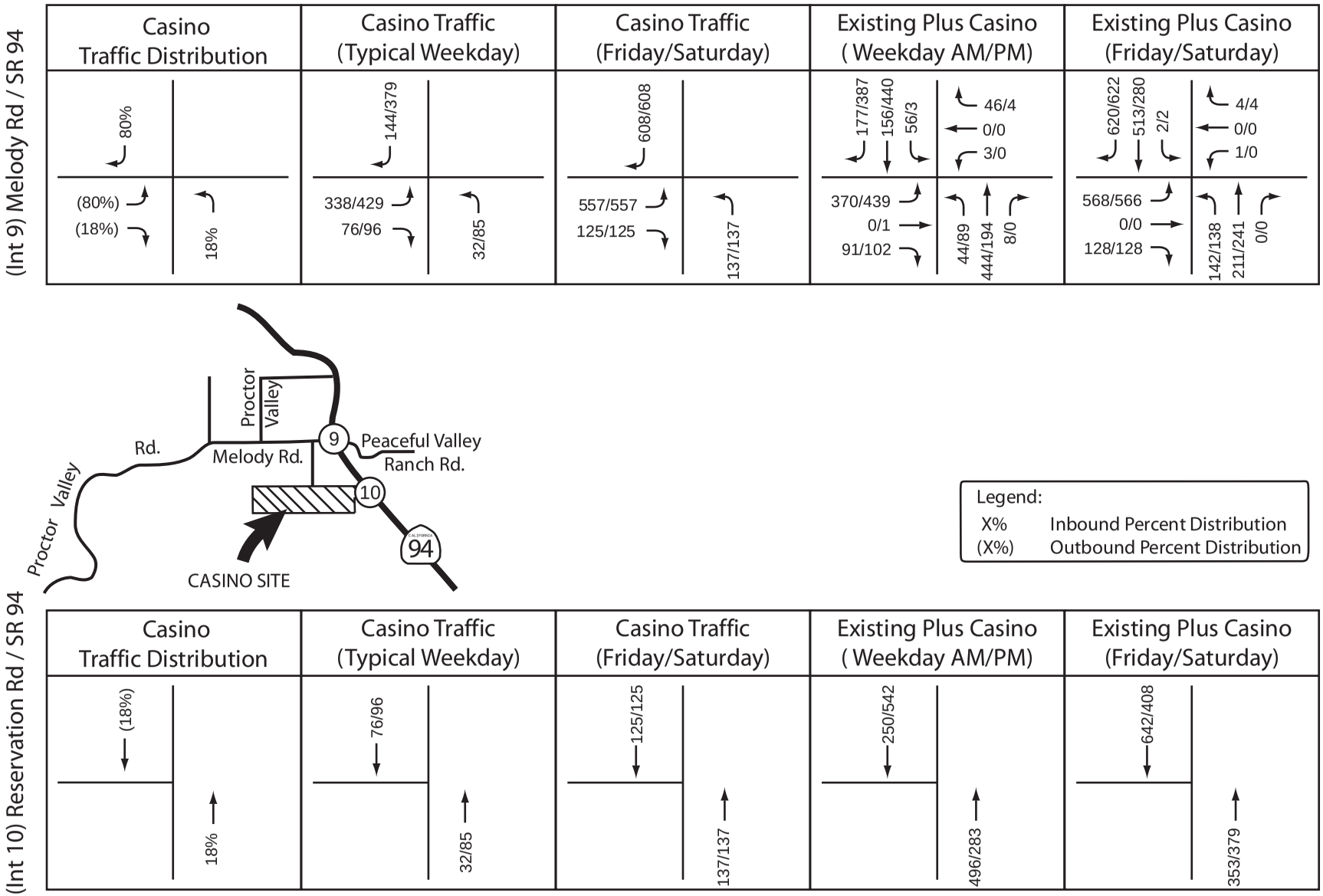
Kimley-Horn and Associates, Inc.

FIGURE 5-1

Existing with JIV Gaming Project with Project (Alt 1-2) Peak-Hour Traffic Volumes (Weekday)

SR 94 Improvement Project

| 1 | | |



Kimley-Horn and Associates, Inc.

FIGURE 5-3

Existing with JIV Gaming Project with Project (Alt 3) Peak-Hour Volume Adjustments

TABLE 5-1:
EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT (ALT 1-2)
PEAK-HOUR INTERSECTION LOS (WEEKDAY)

	INTERSECTION	PEAK HOUR	EXISTING WITH JIV GAMING PROJECT		EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT (ALT 1-2)			
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)	Δ (c)	SIGNIFICANT?
1	SR 94 (Campo Rd) & Via Mercado	AM	22.5	C	22.5	C	0.0	NO
		PM	27.9	C	27.9	C	0.0	NO
2	Jamacha Blvd. & SR 94 (Campo Rd)	AM	16.2	B	18.0	B	1.8	NO
		PM	37.2	**D**	28.9	C	-8.3	NO
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	25.0	C	24.7	C	-0.3	NO
		PM	30.9	C	28.5	C	-2.4	NO
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	19.5	B	19.5	B	0.0	NO
		PM	15.0	B	15.0	B	0.0	NO
5	Steele Canyon Rd. & SR 94 (Campo Rd)	AM	37.9	**D**	19.0	B	-18.9	NO
		PM	42.0	**D**	22.4	C	-19.6	NO
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	AM	ECL	**F**	12.0	B	-	NO
		PM	659.0	**F**	8.3	A	-650.7	NO
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	AM	13.3	B	13.3	B	0.0	NO
		PM	13.6	B	13.6	B	0.0	NO
8	SR 94 (Campo Rd) & Maxfield Rd.	AM	19.5	C	13.2	B	-6.3	NO
		PM	45.3	**E**	20.5	C	-24.8	NO
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	AM	24.1	C	4.8	A	-19.3	NO
		PM	34.6	C	6.2	A	-28.4	NO
10	SR 94 (Campo Rd) & Reservation Rd.	AM	45.4	**D**	4.8	A	-40.6	NO
		PM	645.3	**F**	7.0	A	-638.3	NO
11	SR 94 (Campo Rd) & Honey Springs Rd.	AM	13.1	B	13.1	B	0.0	NO
		PM	12.3	B	12.3	B	0.0	NO
12	SR 94 (Campo Rd) & Otay Lakes Rd.	AM	14.5	B	14.5	B	0.0	NO
		PM	16.0	C	16.0	C	0.0	NO

Notes:

Bold values indicate intersections operating at LOS D, E or F. **Bold and shaded** values indicate project significant impact.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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TABLE 5-2:
EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT (ALT 1-2)
PEAK-HOUR INTERSECTION LOS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	EXISTING WITH JIV GAMING PROJECT		EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT (ALT 1-2)			
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)	Δ (c)	SIGNIFICANT?
1	SR 94 (Campo Rd) & Via Mercado	FRI PM	34.7	C	34.7	C	0.0	NO
		SAT PM	18.0	B	18.0	B	0.0	NO
2	Jamacha Blvd. & SR 94 (Campo Rd)	FRI PM	40.6	**D**	28.9	C	-11.7	NO
		SAT PM	20.0	C	19.8	B	-0.2	NO
3	SR 94 (Campo Rd) & Jamacha Rd.	FRI PM	54.0	**D**	46.1	**D**	-7.9	NO
		SAT PM	32.3	C	31.2	C	-1.1	NO
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	FRI PM	16.3	B	16.3	B	0.0	NO
		SAT PM	20.4	C	20.4	C	0.0	NO
5	Steele Canyon Rd. & SR 94 (Campo Rd)	FRI PM	56.7	**E**	24.4	C	-32.3	NO
		SAT PM	42.5	**D**	22.9	C	-19.6	NO
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	FRI PM	ECL	**F**	10.1	B	-	NO
		SAT PM	972.2	**F**	8.2	A	-964.0	NO
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	FRI PM	17.2	B	17.2	B	0.0	NO
		SAT PM	21.9	C	21.9	C	0.0	NO
8	SR 94 (Campo Rd) & Maxfield Rd.	FRI PM	58.9	**F**	23.0	C	-35.9	NO
		SAT PM	32.3	**D**	17.9	C	-14.4	NO
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	FRI PM	77.8	**E**	6.8	A	-71.0	NO
		SAT PM	42.8	**D**	6.8	A	-36.0	NO
10	SR 94 (Campo Rd) & Reservation Rd.	FRI PM	ECL	**F**	9.0	A	-	NO
		SAT PM	ECL	**F**	7.7	A	-	NO
11	SR 94 (Campo Rd) & Honey Springs Rd.	FRI PM	14.2	B	14.2	B	0.0	NO
		SAT PM	12.2	B	12.2	B	0.0	NO
12	SR 94 (Campo Rd) & Otay Lakes Rd.	FRI PM	17.7	C	17.7	C	0.0	NO
		SAT PM	14.2	B	14.2	B	0.0	NO

Notes:

Bold values indicate intersections operating at LOS D, E or F. **Bold and shaded** values indicate project significant impact.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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TABLE 5-3:
EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT (ALT 3)
PEAK-HOUR INTERSECTION LOS (WEEKDAY)

	INTERSECTION	PEAK HOUR	EXISTING WITH JIV GAMING PROJECT		EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT (ALT 3)			
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)	Δ (c)	SIGNIFICANT?
1	SR 94 (Campo Rd) & Via Mercado	AM	22.5	C	22.5	C	0.0	NO
		PM	27.9	C	27.9	C	0.0	NO
2	Jamacha Blvd. & SR 94 (Campo Rd)	AM	16.2	B	18.0	B	1.8	NO
		PM	37.2	**D**	28.9	C	-8.3	NO
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	25.0	C	24.7	C	-0.3	NO
		PM	30.9	C	28.5	C	-2.4	NO
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	19.5	B	19.5	B	0.0	NO
		PM	15.0	B	15.0	B	0.0	NO
5	Steele Canyon Rd. & SR 94 (Campo Rd)	AM	37.9	**D**	19.0	B	-18.9	NO
		PM	42.0	**D**	22.4	C	-19.6	NO
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	AM	ECL	**F**	12.0	B	-	NO
		PM	659.0	**F**	8.3	A	-650.7	NO
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	AM	13.3	B	13.3	B	0.0	NO
		PM	13.6	B	13.6	B	0.0	NO
8	SR 94 (Campo Rd) & Maxfield Rd.	AM	19.5	C	13.2	B	-6.3	NO
		PM	45.3	**E**	20.5	C	-24.8	NO
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	AM	24.1	C	18.3	B	-5.8	NO
		PM	34.6	C	19.4	B	-15.2	NO
10	SR 94 (Campo Rd) & Reservation Rd.	AM	45.4	**E**	This intersection does not exist under this scenario.			
		PM	645.3	**F**				
11	SR 94 (Campo Rd) & Honey Springs Rd.	AM	13.1	B	13.1	B	0.0	NO
		PM	12.3	B	12.3	B	0.0	NO
12	SR 94 (Campo Rd) & Otay Lakes Rd.	AM	14.5	B	14.5	B	0.0	NO
		PM	16.0	C	16.0	C	0.0	NO

Notes:

Bold values indicate intersections operating at LOS D, E or F. **Bold and shaded** values indicate project significant impact.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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TABLE 5-4:
EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT (ALT 3)
PEAK-HOUR INTERSECTION LOS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	EXISTING WITH JIV GAMING PROJECT		EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT (ALT 3)			
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)	Δ (c)	SIGNIFICANT?
1	SR 94 (Campo Rd) & Via Mercado	FRI PM	34.7	C	34.7	C	0.0	NO
		SAT PM	18.0	B	18.0	B	0.0	NO
2	Jamacha Blvd. & SR 94 (Campo Rd)	FRI PM	40.6	**D**	28.9	C	-11.7	NO
		SAT PM	20.0	C	19.8	B	-0.2	NO
3	SR 94 (Campo Rd) & Jamacha Rd.	FRI PM	54.0	**D**	46.1	**D**	-7.9	NO
		SAT PM	32.3	C	31.2	C	-1.1	NO
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	FRI PM	16.3	B	16.3	B	0.0	NO
		SAT PM	20.4	C	20.4	C	0.0	NO
5	Steele Canyon Rd. & SR 94 (Campo Rd)	FRI PM	56.7	**E**	24.4	C	-32.3	NO
		SAT PM	42.5	**D**	22.9	C	-19.6	NO
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	FRI PM	ECL	**F**	10.1	B	-	NO
		SAT PM	972.2	**F**	8.2	A	-964.0	NO
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	FRI PM	17.2	B	17.2	B	0.0	NO
		SAT PM	21.9	C	21.9	C	0.0	NO
8	SR 94 (Campo Rd) & Maxfield Rd.	FRI PM	58.9	**F**	23.0	C	-35.9	NO
		SAT PM	32.3	**D**	17.9	C	-14.4	NO
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	FRI PM	77.8	**E**	26.3	C	-51.5	NO
		SAT PM	42.8	**D**	18.4	B	-24.4	NO
10	SR 94 (Campo Rd) & Reservation Rd.	FRI PM	ECL	**F**	This intersection does not exist under this scenario.			
		SAT PM	ECL	**F**				
11	SR 94 (Campo Rd) & Honey Springs Rd.	FRI PM	14.2	B	14.2	B	0.0	NO
		SAT PM	12.2	B	12.2	B	0.0	NO
12	SR 94 (Campo Rd) & Otay Lakes Rd.	FRI PM	17.7	C	17.7	C	0.0	NO
		SAT PM	14.2	B	14.2	B	0.0	NO

Notes:

Bold values indicate intersections operating at LOS D, E or F. **Bold and shaded** values indicate project significant impact.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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Intersection Analysis (ILV)

Tables 5-5 and 5-6 display the ILV analysis results for the Caltrans-owned signalized intersections under Existing Baseline with JIV Gaming Project Traffic and Proposed Project Conditions for all peak-hours analyzed. As shown in the table, all intersections along SR 94 (Campo Road) would operate at equal or better conditions than before project conditions.

HCM Peak-Hour Arterial Analysis

Tables 5-7 to 5-8 display the peak-hour arterial analysis along SR 94 (Campo Road) between Via Mercado and Jefferson Road/Proctor Valley Road under Existing Baseline with JIV Gaming Project Traffic and Proposed Project Conditions. As shown in the table, SR 94 between Via Mercado and Jefferson Road/Proctor Valley Road will continue to operate at LOS B or better after the construction of the proposed improvements.

Appendix G contains the peak-hour arterial analysis worksheets.

HCM Peak-Hour Two-Lane Highway Analysis

With the completion of the Proposed Project, new traffic signals will be installed at the following intersections:

- SR 94 (Campo Road) and Lyons Valley Road;
- SR 94 (Campo Road) and Melody Road; and
- SR 94 (Campo Road) and Reservation Road or Daisy Drive (Alternatives 1 and 2 only).

The installation of traffic signals at these locations will change the characteristics of the roadway operations between Proctor Valley Road and Otay Lakes Road making the HCM peak-hour two-lane highway analysis no longer applicable. With the installation of the traffic signals, this segment would operate as an arterial since traffic signals will be located within a 2 mile distance from each other. **Tables 5-9 and 5-10** show the results of the HCM Peak-Hour Arterial Analysis for the segment between Via Mercado and Melody Road. As shown in the Table, the results of the analysis show that the SR 94 will continue to operate at LOS B or better.

TABLE 5-5:
EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT
ILV ANALYSIS (WEEKDAY)

	INTERSECTION	PEAK HOUR	EXISTING PLUS JIV GAMING PROJECT		EXISTING PLUS JIV GAMING PROJECT PLUS PROPOSED PROJECT ALTERNATIVES 1 - 2		EXISTING PLUS JIV GAMING PROJECT PLUS PROPOSED PROJECT ALTERNATIVE 3	
			ILV/HR TOTAL	CAPACITY	ILV/HR TOTAL	CAPACITY	ILV/HR TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	AM	1303	Approaching Capacity	1303	Approaching Capacity	1303	Approaching Capacity
		PM	1389	Approaching Capacity	1389	Approaching Capacity	1389	Approaching Capacity
2	SR 94 (Campo Rd) & Jamacha Blvd.	AM	960	Below Capacity	850	Below Capacity	850	Below Capacity
		PM	1466	Approaching Capacity	1184	Below Capacity	1184	Below Capacity
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	1052	Below Capacity	1052	Below Capacity	1052	Below Capacity
		PM	1228	Approaching Capacity	1167	Below Capacity	1167	Below Capacity
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	1230	Approaching Capacity	1230	Approaching Capacity	1230	Approaching Capacity
		PM	1292	Approaching Capacity	1292	Approaching Capacity	1292	Approaching Capacity
5	SR 94 (Campo Rd) & Steele Canyon Rd.	AM	1244	Approaching Capacity	889	Below Capacity	889	Below Capacity
		PM	1389	Approaching Capacity	833	Below Capacity	833	Below Capacity
6	SR 94 (Campo Rd) & Lyons Valley Rd	AM	This intersection won't be signalized under this scenario		1248	Approaching Capacity	1248	Approaching Capacity
		PM			1145	Below Capacity	1145	Below Capacity
7	SR 94 (Campo Rd) & Jefferson Rd	AM	795	Below Capacity	795	Below Capacity	795	Below Capacity
		PM	1060	Below Capacity	1060	Below Capacity	1060	Below Capacity
9	SR 94 (Campo Rd) & Melody Rd	AM	This intersection won't be signalized under this scenario		628	Below Capacity	742	Below Capacity
		PM			915	Below Capacity	709	Below Capacity
10	SR 94 (Campo Rd) & Reservation Rd or Daisy Drive	AM	This intersection won't be signalized under this scenario		494	Below Capacity	This intersection won't be signalized under this scenario	
		PM			727	Below Capacity		

Notes:
<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity
Bold values indicate intersections operating above capacity.

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TABLE 5-6:
EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT
ILV ANALYSIS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	EXISTING PLUS JIV GAMING PROJECT		EXISTING PLUS JIV GAMING PROJECT PLUS PROPOSED PROJECT ALTERNATIVES 1 - 2		EXISTING PLUS JIV GAMING PROJECT PLUS PROPOSED PROJECT ALTERNATIVE 3	
			ILV/HR TOTAL	CAPACITY	ILV/HR TOTAL	CAPACITY	ILV/HR TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	AM	1362	Approaching Capacity	1362	Approaching Capacity	1362	Approaching Capacity
		PM	1175	Below Capacity	1175	Below Capacity	1175	Below Capacity
2	SR 94 (Campo Rd) & Jamacha Blvd.	AM	1517	**Above Capacity**	1191	Below Capacity	1191	Below Capacity
		PM	1228	Approaching Capacity	986	Below Capacity	986	Below Capacity
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	1391	Approaching Capacity	1304	Approaching Capacity	1304	Approaching Capacity
		PM	1162	Below Capacity	1162	Below Capacity	1162	Below Capacity
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	1354	Approaching Capacity	1354	Approaching Capacity	1354	Approaching Capacity
		PM	934	Below Capacity	934	Below Capacity	934	Below Capacity
5	SR 94 (Campo Rd) & Steele Canyon Rd.	AM	1517	**Above Capacity**	912	Below Capacity	912	Below Capacity
		PM	1152	Below Capacity	769	Below Capacity	769	Below Capacity
6	SR 94 (Campo Rd) & Lyons Valley Rd	AM	This intersection won't be signalized under this scenario		1367	Approaching Capacity	1367	Approaching Capacity
		PM			1255	Approaching Capacity	1255	Approaching Capacity
7	SR 94 (Campo Rd) & Jefferson Rd	AM	1212	Approaching Capacity	1212	Approaching Capacity	1212	Approaching Capacity
		PM	1000	Below Capacity	1000	Below Capacity	1000	Below Capacity
9	SR 94 (Campo Rd) & Melody Rd	AM	This intersection won't be signalized under this scenario		1088	Below Capacity	812	Below Capacity
		PM			887	Below Capacity	915	Below Capacity
10	SR 94 (Campo Rd) & Reservation Rd or Daisy Drive	AM	This intersection won't be signalized under this scenario		955	Below Capacity	This intersection won't be signalized under this scenario	
		PM			958	Below Capacity		

Notes:
<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity
Bold values indicate intersections operating above capacity.

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TABLE 5-7:
EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT (ALT 1-3)
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (WEEKDAY)

ROADWAY SEGMENT	DIRECTION	EXISTING PLUS JIV GAMING PROJECT		EXISTING PLUS JIV GAMING PROJECT PLUS PROPOSED PROJECT			
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)	Δ	SIGNIFICANT?
AM PEAK							
SR 94							
Via Mercado to Proctor Valley Rd	EB	47.7	A	46.2	A	-1.5	NO
	WB	38.3	B	40.0	B	1.7	NO
PM PEAK							
SR 94							
Via Mercado to Proctor Valley Rd	EB	41.5	B	42.6	A	1.1	NO
	WB	41.6	B	40.3	B	-1.3	NO

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 5-8:
EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT (ALT 1-3)
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (FRIDAY/SATURDAY)

ROADWAY SEGMENT	DIRECTION	EXISTING PLUS CJIV GAMING PROJECT		EXISTING PLUS JIV GAMING PROJECT PLUS PROPOSED PROJECT			
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)	Δ	SIGNIFICANT?
FRIDAY PM							
SR 94							
Via Mercado to Proctor Valley Rd	EB	39.2	B	41.8	B	2.6	NO
	WB	44.9	A	38.5	B	-6.4	NO
SATURDAY PM							
SR 94							
Via Mercado to Proctor Valley Rd	EB	44.8	A	43.7	A	-1.1	NO
	WB	44.0	A	39.7	B	-4.3	NO

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 5-9:
EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT (ALT 1-3)
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS TO MELODY RD (WEEKDAY)

ROADWAY SEGMENT	DIRECTION	AM PEAK		PM PEAK	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Reservation Rd	EB	46.2	A	42.5	A
	WB	40.3	B	40.9	B

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 5-10:
EXISTING WITH JIV GAMING PROJECT WITH PROPOSED PROJECT (ALT 1-3)
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS TO MELODY RD (FRIDAY/SATURDAY)

ROADWAY SEGMENT	DIRECTION	FRIDAY		SATURDAY	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Reservation Rd	EB	41.6	B	43.6	A
	WB	39.1	B	39.5	B

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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6.0 NEAR TERM (2015) NO PROJECT CONDITIONS

This section provides a description of Near Term (2015) conditions without the construction of the proposed roadway improvement by the Proposed Project.

Road Network

No roadway network changes are assumed to take place under the Near Term scenario. The same roadway network conditions as described in Chapter 3 are assumed for this scenario.

Cumulative Projects

There are fifteen potential cumulative projects that could add traffic to the study area intersections. Information for the JIV Gaming Project trip generation was extracted from the *Jamul Indian Village Final Tribal Environmental Evaluation,* dated January 2013. Information for the other cumulative projects was extracted from the approved *Traffic Impact Analysis for the Peaceful Valley Ranch (TM – 5341 RPL5),* dated April 12, 2007.

The fifteen identified projects are the following:

1. ***Jamul Indian Village Gaming Project*** proposes to construct a 203,000 square feet gaming facility on a 6.2 acre reservation held in trust by the United States for the benefit of the Jamul Indian Village. The external boundaries of the reservation lie within the Community of Jamul, County of San Diego. This project is estimated to generate 9,000 ADT with 420 inbound/179 outbound trips during the AM weekday peak-hour and 533 inbound/472 outbound trips during the weekday PM peak-hour.

2. ***TPM 20550 (Morgan Minor Subdivision)*** proposes to construct 2 single-family estate homes. The project site is proposed north of the Procter Valley Road/Poplar Meadow Lane intersection. The project was manually calculated using SANDAG's *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region* (April 2002) for estate homes. The project trips were calculated to generate 24 ADT with 1 inbound/1 outbound trip during the AM peak-hour and 1 inbound/1 outbound trip during the PM peak-hour.

3. ***TM 5154 RPL1 (Hendrix Subdivision)*** is located east of SR 94 (Campo Road) on Las Palmas Road. The project proposes to develop 5 single-family estate homes. The project trips were manually calculated using SANDAG's Trip Rates (April 2002) for estate homes. The project is calculated to generate 60 ADT with 2 inbound/3 outbound trips during the AM peak-hour and 4 inbound/2 outbound trips during the PM peak-hour.

4. ***TM 5213 RPL2 (Mintz Subdivision)*** is located north of Skyline Truck Trail and east of Hidden Trail drive. The project proposes to develop approximately 25 acres of land into 10 single-family estate homes. The project trips were manually calculated using SANDAG's Trip Rates (April 2002) for estate homes. The project is calculated to generate 120 ADT with 3 inbound/7 outbound trips during the AM peak-hour and 8 inbound/4 outbound trips during the PM peak-hour.

5. ***TM 5289 RPL2 (Jamul Highlands Subdivision)*** proposes to construct 25 single-family estate homes. The project site is proposed south of the Valley Road/Jamul Highlands Road intersection. The project trips were manually calculated using SANDAG's Trip Rates (April 2002) for estate

homes. The project is calculated to generate 300 ADT with 7 inbound/l9 outbound trips during the AM peak-hour and 21 inbound/9 outbound trips during the PM peak-hour.

6. ***TPM 20626*** proposes to construct 3 single-family estate homes. The project site is proposed on the west side of Procter Valley Road, just north of the Proctor Valley Road/Melody Road intersection. The project trips were manually calculated using SANDAG's Trip Rates (April 2002) for estate homes. The project is calculated to generate 36 ADT with 1 inbound/2 outbound trips during the AM peak-hour and 3 inbound/1 outbound trips during the PM peak-hour.

7. ***TPM 20628 RPLI (Yacoo Minor Subdivision)*** proposes to construct 4 single-family estate homes. The project site is proposed on Schlee Canyon Road north of Procter Valley Road. The project trips were manually calculated using SANDAG's Trip Rates (April 2002) for estate homes. The project is calculated to generate 48 ADT with 1 inbound/3 outbound trips during the AM peak-hour and 4 inbound/1 outbound trips during the PM peak-hour.

8. A Residential Development is located just east of the Proposed Project and south of Olive Vista Drive. The project proposes to develop 20 single-family estate homes. The project is calculated to generate 240 ADT with 6 inbound/13 outbound trips during the AM peak-hour and 17 inbound/7 outbound trips during the PM peak-hour.

9. ***TPM 20599 RPLI (Blanco Parcel Map)*** proposes to construct 4 single-family estate homes. The project site is proposed on the east side of SR 94, north of the Melody Road. The project trips were manually calculated using SANDAG's Trip Rates (April 2002) for estate homes. The project is calculated to generate 48 ADT with l inbound/3 outbound trips during the AM peak-hour and 4 inbound/1 outbound trips during the PM peak-hour.

10. ***TPM 20868 (Stein Barth Minor Subdivision)*** is located just north of the Proposed Project and south of Olive Vista Drive. The project proposes to develop 2 single-family estate homes. The project trips were manually calculated using SANDAG's Trip Rates (April 2002) for estate homes. The project is calculated to generate 24 ADT with 1 inbound/1 outbound trip during the AM peak-hour and 1 inbound/1 outbound trip during the PM peak-hour.

11. ***TPM 20594 (Pioneer Minor Subdivision)*** is located just west of the Proposed Project and north of Melody Lane. The project proposes to develop 3 single-family estate homes. The project trips were manually calculated using SANDAG's Trip Rates (April 2002) for estate homes. The project is calculated to generate 36 ADT with 1 inbound/2 outbound trips during the AM peak-hour and 3 inbound/1 outbound trips during the PM peak-hour.

12. ***Otay Ranch -Village 19*** is located south west of the Proposed Project and south of Melody Lane. The project proposes to develop 20 single-family estate homes. The project trips were manually calculated using SANDAG's Trip Rates (April 2002) for estate homes. The project is calculated to generate 240 ADT with 6 inbound/13 outbound trips during the AM peak-hour and 17 inbound/7 outbound trips during the PM peak-hour.

13. ***Jamul Estates II*** is located just north east of the Proposed Project. The maximum allowable developable lots are 68 single-family estate homes based on the current zoning. Therefore, the project trips were manually calculated using SANDAG's Trip Rates (April 2002) for estate homes. The project is calculated to generate 816 ADT with 20 inbound/46 outbound trips during the AM peak-hour and 57 inbound/24 outbound trips during the PM peak-hour.

14. ***Simpson Farms*** is generally located on the northeast comer of the SR 94 (Campo Road)/Jefferson Road intersection in the Jamul Community of San Diego County. The project proposes to develop 98 single-family estate homes and 115,000 square feet (sf) of commercial uses. The project trips were calculated to generate approximately 6,500 ADT with approximately 124 inbound/130 outbound trips during the AM peak-hour and 323 inbound/275 outbound trips during the PM peak-hour.

15. ***Peaceful Valley Ranch*** project proposes the subdivision of 181.31 acres for an estate residential development, 46 new estate residential lots, a 6.7 acres equestrian facility and a new joint-use fire and administration offices for the Rural Fire Protection District and the US Fish and Wildlife Services. The project is located east of SR 94 and will use the intersection of SR 94 and Melody Road as a single access point. The total project is calculated to generate approximately 750 ADT with 43 inbound/46 outbound trips during the AM peak hour and 56 inbound/46 outbound trips during the PM peak hour.

Appendix I contains the cumulative project trip distribution and assignment within the study area.

Figures 6-1 illustrate the cumulative traffic trip generation for the study area intersections within the study area.

Traffic Volumes

Traffic volumes for the Near Term (2015) No Project Conditions were estimated by adding the near-term cumulative project traffic to the Existing Baseline traffic volumes. In addition, to account for other projects not yet identified by Caltrans or the County of San Diego, a traffic volume growth rate was calculated for each movement and added to the existing traffic counts for a period of five years (2010 and 2015). The traffic volume growth rate varies by location and it is based on a liner extrapolation of traffic volumes between the Horizon Year 2035 volumes and Existing plus JIV Gaming Project and other approved/pending cumulative project volumes. **Figure 6-2** shows Near Term (2015) No Project peak-hour volumes for a typical weekday. **Figure 6-3** shows the Near Term (2015) No Project peak-hour volumes for a typical Friday and Saturday.

Intersection Analysis (HCM)

Tables 6-1 and 6-2 display the peak-hour LOS analysis results for the study intersections under Near Term (2015) No Project conditions. As shown in the tables, the following intersections would operate at LOS D, E or F for at least one peak period analyzed:

- SR 94 (Campo Road) & Via Mercado (LOS D weekday a.m. peak-hour, LOS F weekday p.m. peak-hour, and LOS E Friday p.m. peak-hour);
- SR 94 (Campo Road) & Jamacha Boulevard (LOS E weekday p.m. peak-hour, and LOS D Friday p.m. peak-hour);
- SR 94 (Campo Road) & Jamacha Road (LOS D weekday a.m. peak-hour, LOS F weekday p.m. peak-hour, E Friday p.m. peak-hour and D Saturday p.m. peak-hour);
- SR 94 (Campo Road) & Cougar Canyon Road (LOS D weekday p.m. peak-hour);
- SR 94 (Campo Road) & Steele Canyon Road (LOS D weekday a.m. peak-hour, LOS F weekday p.m. peak-hour, and LOS E Friday p.m. peak-hour);
- SR 94 (Campo Road) & Lyons Valley Road (LOS F all peak-hour periods analyzed);
- SR 94 (Campo Road) & Jefferson Road (LOS D a.m. peak-hour, LOS E p.m. peak-hour, LOS D Friday p.m. peak-hour);

- SR 94 (Campo Road) & Maxfield Road (LOS D a.m. peak-hour, LOS F weekday and Friday p.m. peak-hour, LOS E Saturday p.m. peak-hour);
- SR 94 (Campo Road) & Melody Road (LOS E a.m. peak-hour, LOS F p.m. peak-hour, LOS F p.m. peak-hour, and LOS E Saturday p.m. peak-hour);
- SR 94 (Campo Road) & Reservation Road (LOS F all peak-hour periods analyzed); and
- SR 94 (Campo Road) & Otay Lakes Road (LOS D Friday p.m. peak-hour).

Appendix E contains the intersection LOS calculation worksheets.

Intersection Analysis (ILV)

Tables 6-3 and 6-4 display the ILV analysis results for the Caltrans-owned signalized intersections under Near Term (2015) No Project conditions for all peak hours analyzed. As shown in the table, all intersections along SR 94 (Campo Road) would operate at below or approaching capacity during all peak periods, except for the following intersections, which operate at above capacity conditions:

- SR 94 (Campo Road) & Via Mercado (weekday a.m. and p.m. peak-hours, Friday p.m. peak-hour);
- SR 94 (Campo Road) & Jamacha Boulevard (weekday p.m. peak-hour and Friday p.m. peak-hour);
- SR 94 (Campo Road) & Jamacha Road (weekday p.m. peak-hour);
- SR 94 (Campo Road) & Cougar Canyon Road (weekday p.m. peak-hour);
- SR 94 (Campo Road) & Steele Canyon Road (weekday a.m. and p.m. peak-hours and Friday p.m. peak-hour); and
- SR 94 (Campo Road) & Jefferson Road (weekday p.m. peak-hours and Friday p.m. peak-hour).

Appendix F contains the ILV worksheets.

HCM Peak-Hour Arterial Analysis

Tables 6-5 and 6-6 display the peak-hour arterial analysis along SR 94 (Campo Road) between Via Mercado and Jefferson Road/Proctor Valley Road under the Near Term (2015) No Project Conditions. As shown in the table, the roadway segment would function at LOS C or better under the Near Term (2015) No Project conditions, except for the following segment:

- SR 94 (Campo Road) between Via Mercado and Proctor Valley Road (LOS D weekday p.m. peak-hour).

Appendix G contains the peak-hour arterial analysis worksheets.

HCM Peak-Hour Two-Lane Highway Analysis

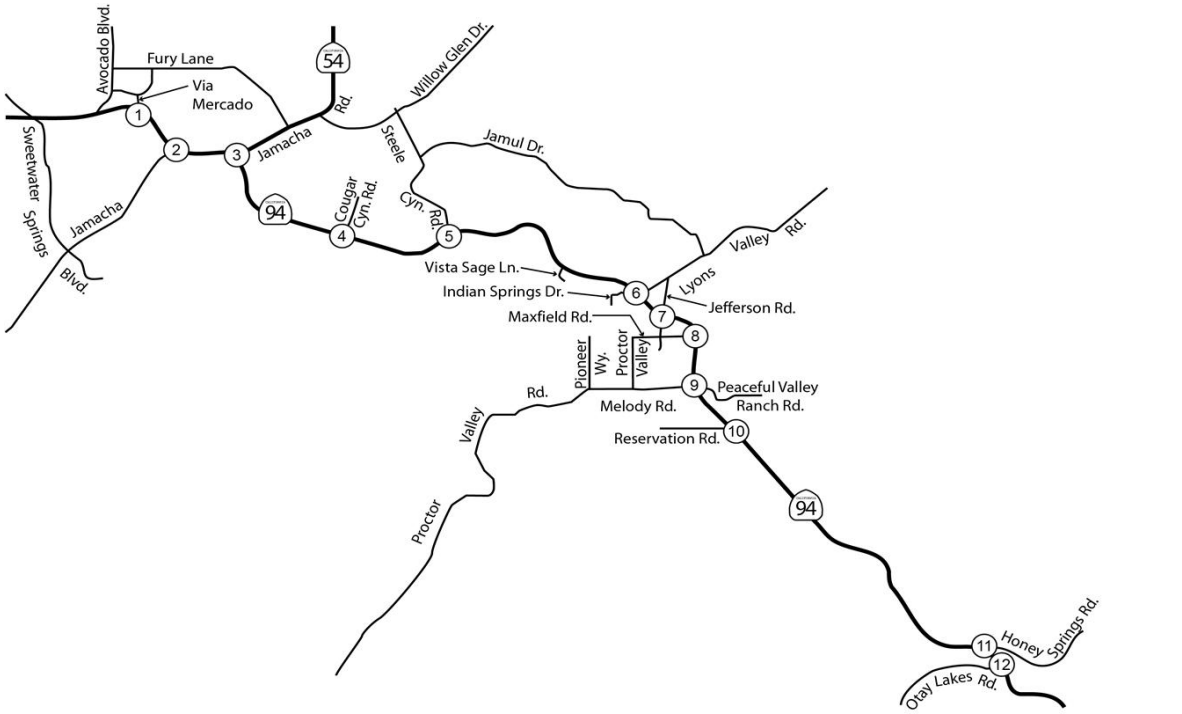
Table 6-7 displays the peak-hour two-lane highway analysis along SR 94 (Campo Road) between Jefferson Road/Proctor Valley Road and Otay Lakes Road under Near Term (2015) No Project Conditions. As shown in the table, all roadway segments within the study area would function at LOS D or E for all peak-hours analyzed..

Appendix H contains the two-way two-lane analysis worksheets.

1				2				3				4			
		Via Mercado				Jamacha Blvd.				Dwy.			0 / 10	0 / 20	Cougar Canyon Rd.
		⇦ 303 / 553				⇦ 303 / 553				⇨ 55 / 76			⇦	⇨	⇦ 8 / 3
		SR 94				⇨ 9 / 24				Jamacha Rd.					⇦ 363 / 640
408 / 672	⇨			408 / 672	⇨	SR 94		SR 94				5 / 0	⇨		SR 94
						⇨		⇦ 429 / 699	SR 94	⇦ 312 / 577	⇨ 51 / 74	483 / 775	⇨		
						21 / 27									

5				6				7				8			
5 / 3	49 / 77	Steele Canyon Rd.		27 / 24	4 / 5	Lyons Valley Rd.		104 / 220	1 / 1	35 / 37	Jefferson Rd.	21 / 25	348 / 430	41 / 53	SR 94
⇦	⇦	⇦ 35 / 66		⇦	⇦	⇦ 2 / 5		⇦	⇩	⇦	⇦ 16 / 38	⇦	⇩	⇦	⇦ 44 / 44
		⇧ 366 / 640				⇧ 367 / 682					⇧ 238 / 441				⇦ 2 / 2
		SR 94				SR 94					SR 94	Maxfield Rd.			
3 / 8	⇦			13 / 42	⇦			100 / 259	⇦		⇦ ⇧	13 / 23	⇦		⇦ ⇧ ⇦
480 / 787	⇨			506 / 815	⇨	Indian Springs Dr.		395 / 532	⇩						
								25 / 29	⇦	Proctor Valley Rd.	24 / 23	16 / 17	⇦		11 / 19
											1 / 0				148 / 389
															2 / 3

9				10				11			12				
21 / 25	348 / 430	41 / 53	SR 94	344 / 437	22 / 12	SR 94		52 / 92	2 / 5	SR 94		29 / 75	24 / 17	SR 94	
⇦	⇩	⇦		⇦	⇩			⇩	⇦		⇦ 4 / 5	⇦	⇩		
Melody Rd.			⇦ 44 / 44	Reservation Rd.							Honey Springs Rd.	Otay Lakes Rd.			
			⇦ 2 / 2												
			Peaceful Valley Ranch Rd.												
13 / 23	⇦		⇦ ⇧ ⇦	147 / 387	⇦		⇦ ⇧				⇧	67 / 85	⇦		⇧
16 / 17	⇦		11 / 19	32 / 85	⇦		76 / 96				85 / 116				18 / 30
			148 / 389				14 / 25								
			2 / 3												



Legend

X / Y = AM / PM PEAK HOUR TURNING VOLUMES

NOT TO SCALE

Kimley-Horn and Associates, Inc.

FIGURE 6-1

Cumulative Project Peak-Hour Traffic Assignment Volumes (Weekday)

SR 94 Improvement Project

Intersection	Approach	Left	Right	Total
1	Via Mercado	279 / 129	189 / 350	235 / 270
				2253 / 1840
	SR 94	59 / 244		1385 / 2753
2	Jamacha Blvd.	0 / 4	4 / 4	14 / 9
			4 / 7	2107 / 1850
				473 / 522
	SR 94	7 / 3		1427 / 2828
				92 / 192
		271 / 168	7 / 6	550 / 680
3	Dwy.	37 / 60	12 / 18	18 / 39
			10 / 44	1354 / 1261
				207 / 260
	SR 94	72 / 90		1033 / 2106
				954 / 1494
	Jamacha Rd.	1298 / 1127	42 / 29	298 / 268
4	Cougar Canyon Rd.	373 / 156	118 / 97	288 / 49
				1111 / 1061
	SR 94	324 / 133		790 / 1600
5	Steele Canyon Rd.	261 / 102	156 / 296	202 / 151
				1140 / 1011
				4 / 6
	SR 94	121 / 119		801 / 1559
				0 / 2
		4 / 2	2 / 3	2 / 23
6	Lyons Valley Rd.	384 / 188	3 / 2	7 / 18
			12 / 13	981 / 953
				9 / 3
	SR 94	178 / 372		765 / 1409
				8 / 10
	Indian Springs Dr.	12 / 7	2 / 3	5 / 9
7	Jefferson Rd.	173 / 240	94 / 93	72 / 80
			83 / 77	668 / 650
				12 / 29
	SR 94	116 / 279		592 / 951
				94 / 280
	Proctor Valley Rd.	270 / 126	101 / 100	22 / 77
8	SR 94	12 / 58	613 / 1051	
	Maxfield Rd.	7 / 40		5 / 32
		7 / 13	745 / 680	
9	SR 94	33 / 34	492 / 875	46 / 49
			53 / 57	3 / 3
	Melody Rd.	32 / 34		0 / 4
				23 / 24
	Peaceful Valley Ranch Rd.	16 / 24	587 / 586	8 / 4
10	SR 94	344 / 437	240 / 456	
	Reservation Rd.	147 / 387		32 / 85
		76 / 96	428 / 226	
11	SR 94	171 / 506	19 / 79	72 / 41
				60 / 34
	Honey Springs Rd.	479 / 258	24 / 61	
12	SR 94	119 / 120	202 / 412	
	Otay Lakes Rd.	98 / 152		75 / 112
		103 / 77	397 / 173	

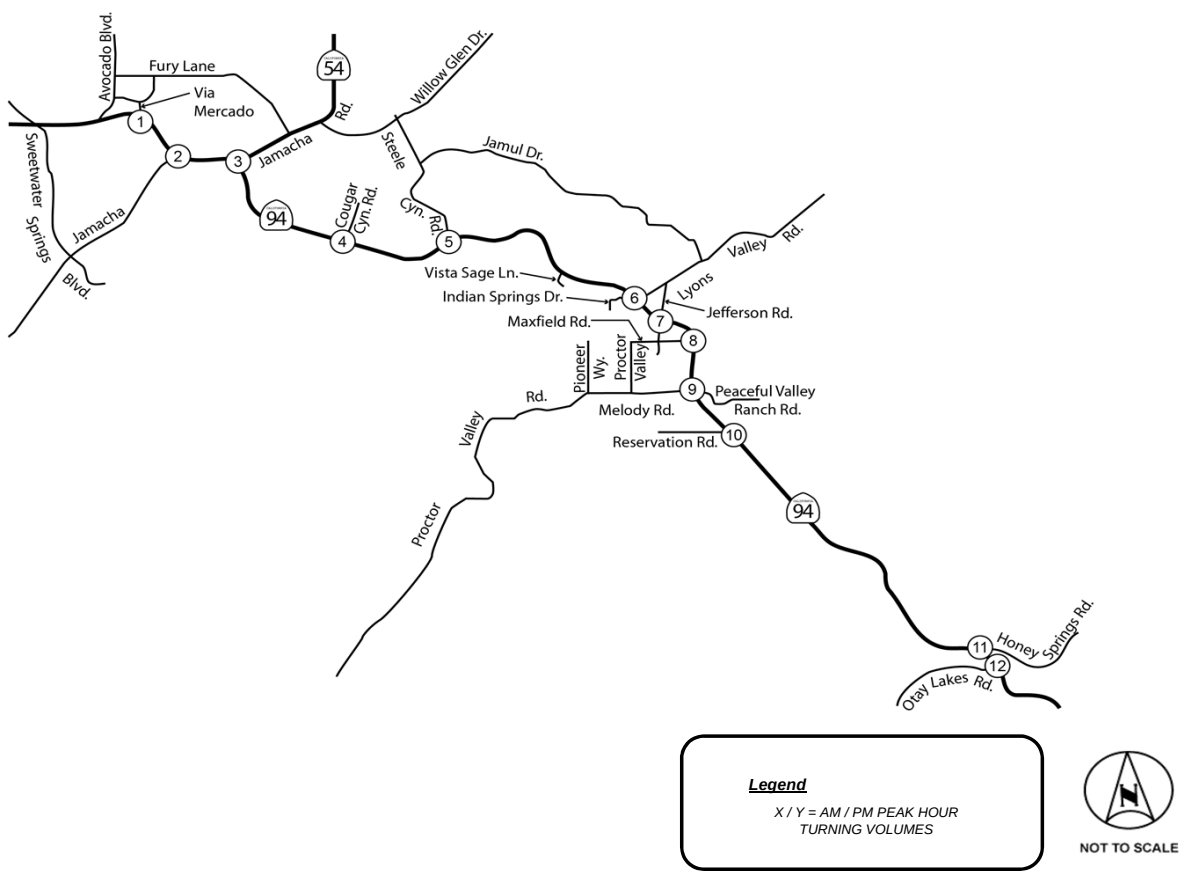


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FIGURE 6-2

Near Term (2015) No Project Peak-Hour Traffic Volumes (Weekday)

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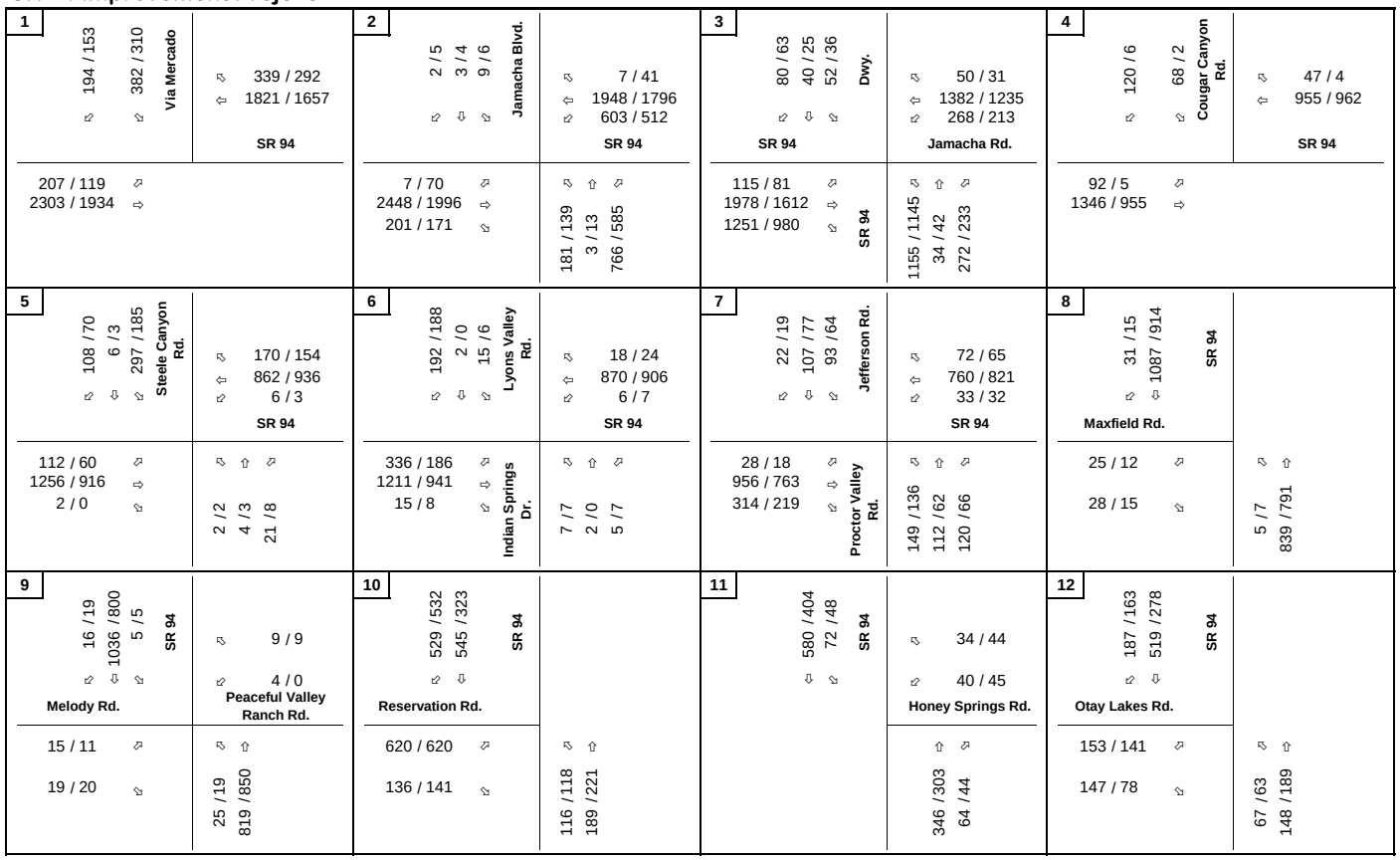
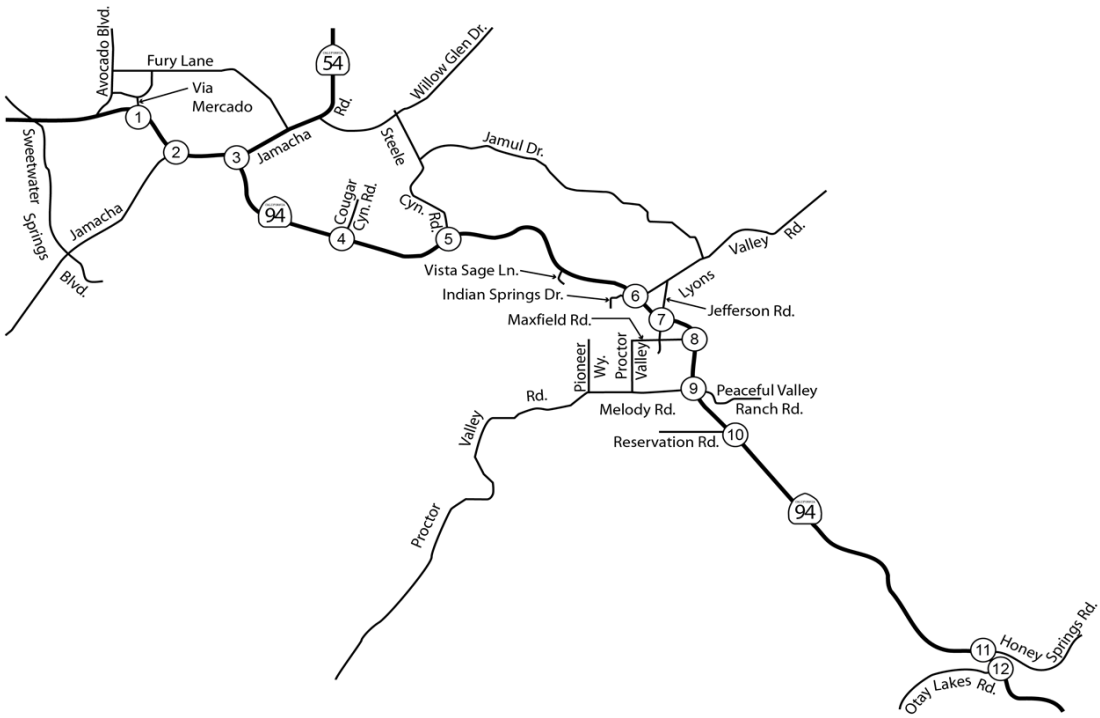
SR 94 Improvement Project





Legend

X / Y = FRI / SAT PEAK HOUR TURNING VOLUMES

NOT TO SCALE

Kimley-Horn and Associates, Inc.

FIGURE 6-3

Near Term (2015) No Project Peak-Hour Traffic Volumes (Friday/Saturday)

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TABLE 6-1:
NEAR TERM (2015) NO PROJECT
PEAK-HOUR INTERSECTION LOS (WEEKDAY)

	INTERSECTION	TRAFFIC CONTROL	PEAK HOUR	NEAR TERM NO BUILD	
				DELAY (a)	LOS (b)
1	SR 94 (Campo Rd) & Via Mercado	Signal	AM	44.2	**D**
			PM	91.7	**F**
2	Jamacha Blvd. & SR 94 (Campo Rd)	Signal	AM	18.8	B
			PM	57.1	**E**
3	SR 94 (Campo Rd) & Jamacha Rd.	Signal	AM	36.1	**D**
			PM	94.2	**F**
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	Signal	AM	34.7	C
			PM	45.6	**D**
5	Steele Canyon Rd. & SR 94 (Campo Rd)	Signal	AM	43.9	**D**
			PM	119.7	**F**
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	Two-Way Stop	AM	ECL	**F**
			PM	ECL	**F**
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	Signal	AM	53.2	**D**
			PM	61.1	**E**
8	SR 94 (Campo Rd) & Maxfield Rd.	One-Way Stop	AM	25.4	**D**
			PM	111.2	**F**
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	Two-Way Stop	AM	43.5	**E**
			PM	179.9	**F**
10	SR 94 (Campo Rd) & Reservation Rd.	One-Way Stop	AM	56.7	**F**
			PM	767.0	**F**
11	SR 94 (Campo Rd) & Honey Springs Rd.	One-Way Stop	AM	16.8	C
			PM	17.2	C
12	SR 94 (Campo Rd) & Otay Lakes Rd.	One-Way Stop	AM	20.0	C
			PM	23.8	C

Notes:

Bold values indicate intersections operating at LOS D, E, or F.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

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TABLE 6-2:

NEAR TERM (2015) NO PROJECT

PEAK-HOUR INTERSECTION LOS (FRIDAY/SATURDAY)

	INTERSECTION	TRAFFIC CONTROL	PEAK HOUR	NEAR TERM NO BUILD	
				DELAY (a)	LOS (b)
1	SR 94 (Campo Rd) & Via Mercado	Signal	FRI PM	65.2	**E**
			SAT PM	32.6	C
2	Jamacha Blvd. & SR 94 (Campo Rd)	Signal	FRI PM	52.4	**D**
			SAT PM	22.2	C
3	SR 94 (Campo Rd) & Jamacha Rd.	Signal	FRI PM	71.2	**E**
			SAT PM	41.5	**D**
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	Signal	FRI PM	19.9	B
			SAT PM	9.5	A
5	Steele Canyon Rd. & SR 94 (Campo Rd)	Signal	FRI PM	69.5	**E**
			SAT PM	29.9	C
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	Two-Way Stop	FRI PM	ECL	**F**
			SAT PM	1472.9	**F**
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	Signal	FRI PM	41.9	**D**
			SAT PM	23.7	C
8	SR 94 (Campo Rd) & Maxfield Rd.	One-Way Stop	FRI PM	96.0	**F**
			SAT PM	40.1	**E**
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	Two-Way Stop	FRI PM	109.1	**F**
			SAT PM	48.3	**E**
10	SR 94 (Campo Rd) & Reservation Rd.	One-Way Stop	FRI PM	ECL	**F**
			SAT PM	ECL	**F**
11	SR 94 (Campo Rd) & Honey Springs Rd.	One-Way Stop	FRI PM	22.8	C
			SAT PM	16.4	C
12	SR 94 (Campo Rd) & Otay Lakes Rd.	One-Way Stop	FRI PM	32.5	**D**
			SAT PM	18.2	C

Notes:

Bold values indicate intersections operating at LOS D, E, or F.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

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TABLE 6-3:
NEAR TERM (2015) NO PROJECT
ILV ANALYSIS (WEEKDAY)

	INTERSECTION	PEAK HOUR	NEAR TERM NO BUILD	
			ILV/HR TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	AM	1537	**Above Capacity**
		PM	1727	**Above Capacity**
2	SR 94 (Campo Rd) & Jamacha Blvd.	AM	1267	Approaching Capacity
		PM	1631	**Above Capacity**
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	1210	Approaching Capacity
		PM	1684	**Above Capacity**
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	1484	Approaching Capacity
		PM	1697	**Above Capacity**
5	SR 94 (Campo Rd) & Steele Canyon Rd.	AM	1530	**Above Capacity**
		PM	1891	**Above Capacity**
7	SR 94 (Campo Rd) & Jefferson Rd	AM	1249	Approaching Capacity
		PM	1670	**Above Capacity**

Notes:
<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity
Bold values indicate intersections operating above capacity.

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TABLE 6-4:
NEAR TERM (2015) NO BUILD
ILV ANALYSIS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	NEAR TERM NO BUILD	
			ILV TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	FRI PM	1669	**Above Capacity**
		SAT PM	1404	Approaching Capacity
2	SR 94 (Campo Rd) & Jamacha Blvd.	FRI PM	1592	**Above Capacity**
		SAT PM	1291	Approaching Capacity
3	SR 94 (Campo Rd) & Jamacha Rd.	FRI PM	1465	Approaching Capacity
		SAT PM	1281	Approaching Capacity
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	FRI PM	1420	Approaching Capacity
		SAT PM	968	Below Capacity
5	SR 94 (Campo Rd) & Steele Canyon Rd.	FRI PM	1591	**Above Capacity**
		SAT PM	1197	Below Capacity
7	SR 94 (Campo Rd) & Jefferson Rd	FRI PM	1684	**Above Capacity**
		SAT PM	1288	Approaching Capacity

Notes:
<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity
Bold values indicate intersections operating above capacity.

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TABLE 6-5:
NEAR TERM (2015) NO BUILD
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (WEEKDAY)

ROADWAY SEGMENT	DIRECTION	AM PEAK		PM PEAK	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Proctor Valley Rd	EB	45.2	A	24.6	**D**
	WB	35.5	B	33.8	C

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 6-6:
NEAR TERM (2015) NO BUILD
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (FRIDAY/SATURDAY)

ROADWAY SEGMENT	DIRECTION	FRIDAY		SATURDAY	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Proctor Valley Rd	EB	31.6	C	44.9	A
	WB	34.6	B	39.0	B

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 6-7:

NEAR TERM (2015) NO PROJECT

TWO-LANE HIGHWAY SEGMENT ANALYSIS

HIGHWAY SEGMENT	PEAK HOUR	NEAR TERM		
		LOS (a)	Average Travel Speed (mph)	PTSF (b)
SR-94				
Proctor Valley Road to Melody Rd	Weekday AM	**E**	35.9	81.9%
	Weekday PM	**E**	32.8	87.4%
	Friday PM	**E**	31.3	89.3%
	Saturday PM	**E**	33.2	86.8%
Melody Rd to Project Driveway	Weekday AM	**D**	41.3	76.6%
	Weekday PM	**E**	32.8	87.4%
	Friday PM	**E**	35.5	87.9%
	Saturday PM	**E**	37.2	85.5%
Project Driveway to Otay Lakes Rd	Weekday AM	**D**	43.1	69.7%
	Weekday PM	**D**	42.6	71.9%
	Friday PM	**D**	42.1	73.2%
	Saturday PM	**D**	43.2	69.3%

Notes:

Bold values indicate intersections operating at LOS D, E or F.

(a) LOS is based on Average Travel Speed and Percent Time Spent Following per Chapter 12 of the 2000 Highway Capacity Manual.

(b) PTSF = Percent Time Spent Following

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7.0 NEAR TERM (2015) WITH PROJECT CONDITIONS

This section summarizes the operations of the existing roadway circulation network with the addition of the Proposed Project.

Road Network

Near Term (2015) Plus Project scenario was analyzed with the proposed intersection traffic control, striping, and roadway facility modifications described in Chapter 1.

Traffic Volumes

Traffic volumes for this scenario are equal to the traffic volumes for the Near Term (2015) No Project conditions. It is assumed that with the exception of Alternative 3 project scenario, the Proposed Project will not change the traffic volumes and patterns along the study area. For Alternative 3 proposed improvements, however, the traffic volumes associated with the JIV Gaming Project will enter SR 94 (Campo Road) via Melody Road. For this reason, peak-hour volumes at the SR 94 (Campo Road)/ Melody Road/Peaceful Valley Ranch Road and the SR 94 (Campo Road)/Reservation Road intersections were adjusted. The adjustment of traffic volumes was done so all traffic related to the JIV Gaming Project would turn to and from Melody Road instead of a driveway at Daisy Drive or Reservation Road.

Figure 7-1 illustrates the Near Term (2015) peak-hour traffic volumes at the study intersections for a typical weekday. **Figure 7-2** illustrates the Near Term (2015) traffic volumes at the study intersections for typical Friday and Saturday peak-hour periods. **Figure 7-3** illustrates the peak-hour traffic volume adjustments needed for the evaluation of the Alternative 3 project scenario, where the JIV Gaming Project related traffic uses Melody Road to access the SR 94.

Intersection Analysis (HCM)

Tables 7-1 and 7-2 display the peak-hour LOS analysis results for the study intersections under the Near Term (2015) with Project Alternatives 1-2 conditions for all peak-hour scenarios analyzed. As shown in the tables, with the implementation of the Proposed Project improvements, all intersections will operate with equal or less delay than the before project conditions or will operate at an acceptable level of service.

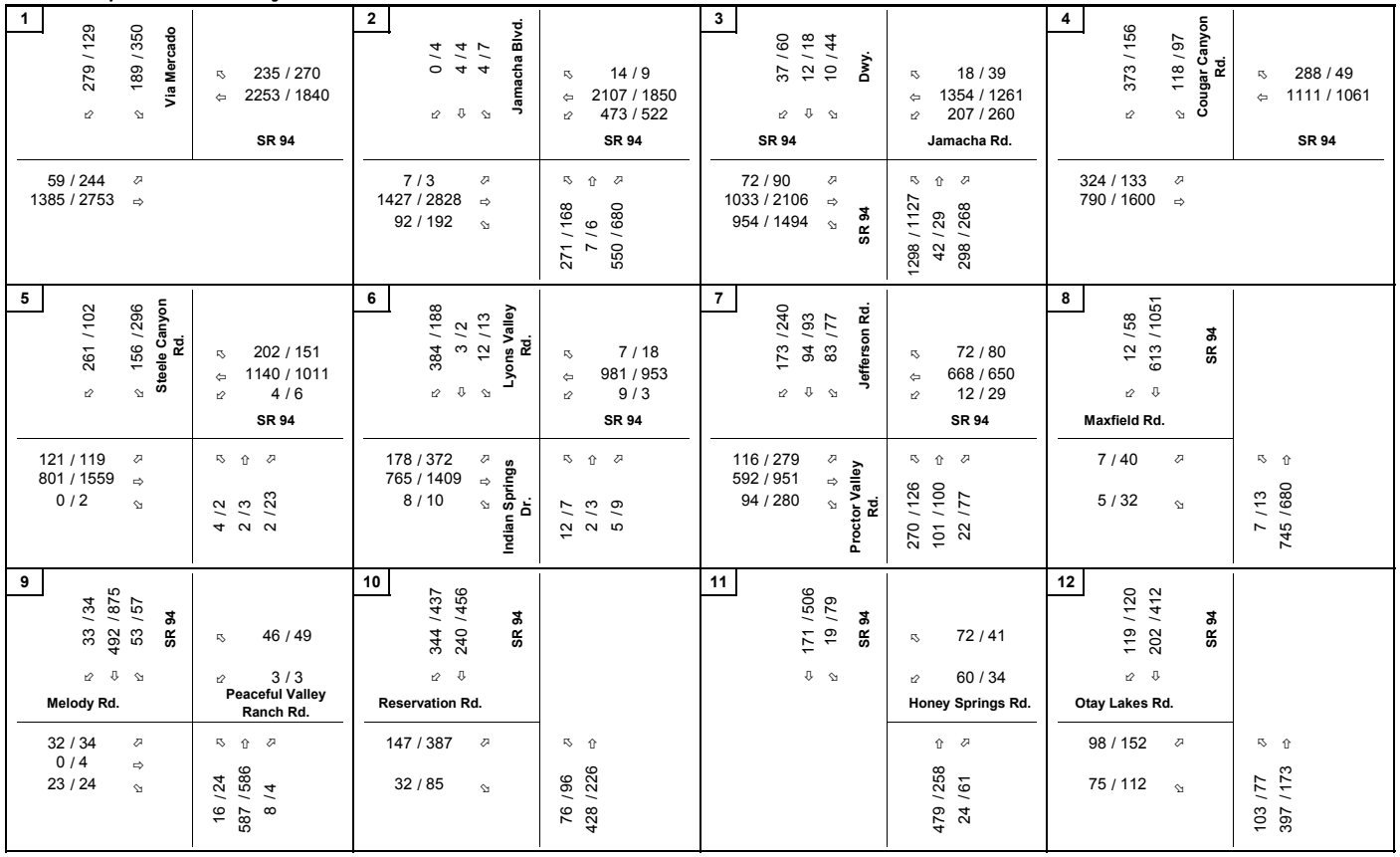
Tables 7-3 and 7-4 display the peak-hour LOS analysis results for the study intersections under the Near Term (2015) with Project Alternatives 3 conditions for all peak-hour scenarios analyzed. As shown in the tables, with the implementation of the Proposed Project improvements, all intersections will operate with equal or less delay than the before project conditions or will operate at an acceptable level of service.

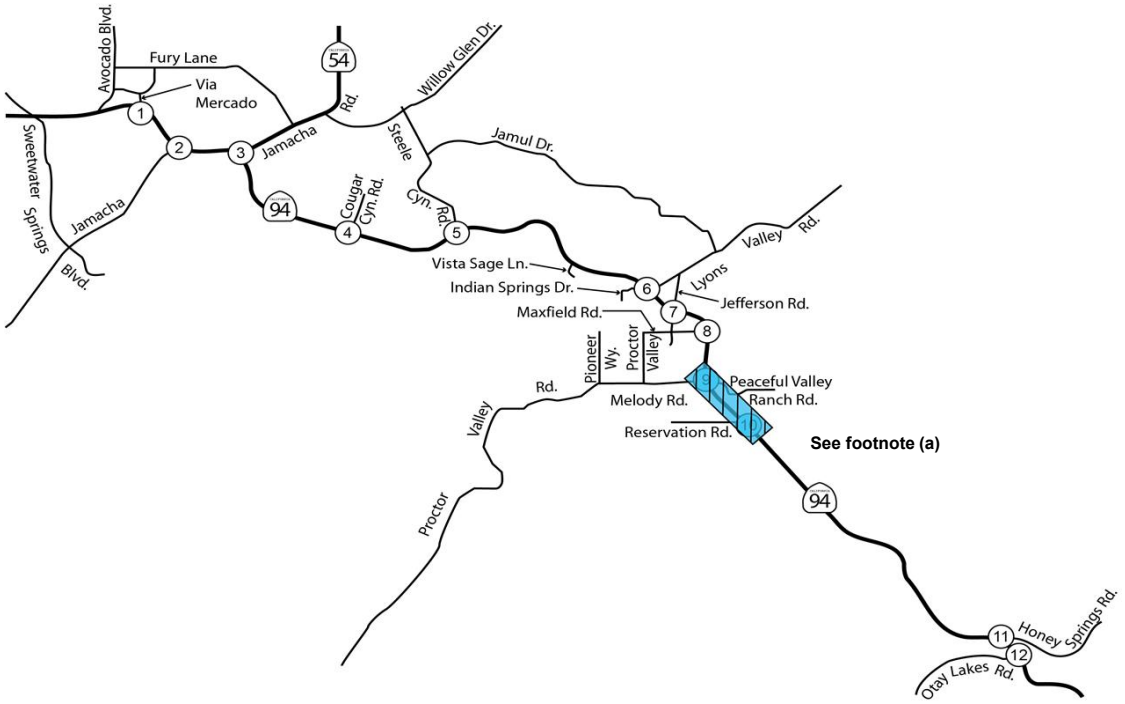
Intersection Analysis (ILV)

Tables 7-5 and 7-6 display the ILV analysis results for the Caltrans-owned signalized intersections under Near Term (2015) with Project conditions for all peak-hours analyzed. As shown in the table, all intersections along SR 94 (Campo Road) would have equal or better operations with the Proposed Project than before project conditions.

Appendix F contains the ILV worksheets.

SR 94 Improvement Project





Legend

X / Y = AM / PM PEAK HOUR TURNING VOLUMES

NOT TO SCALE

(a) Volumes for Alternative 1 and 2 would remain the same. Please refer to Figure 7-3 for Alternative 3 traffic volumes.

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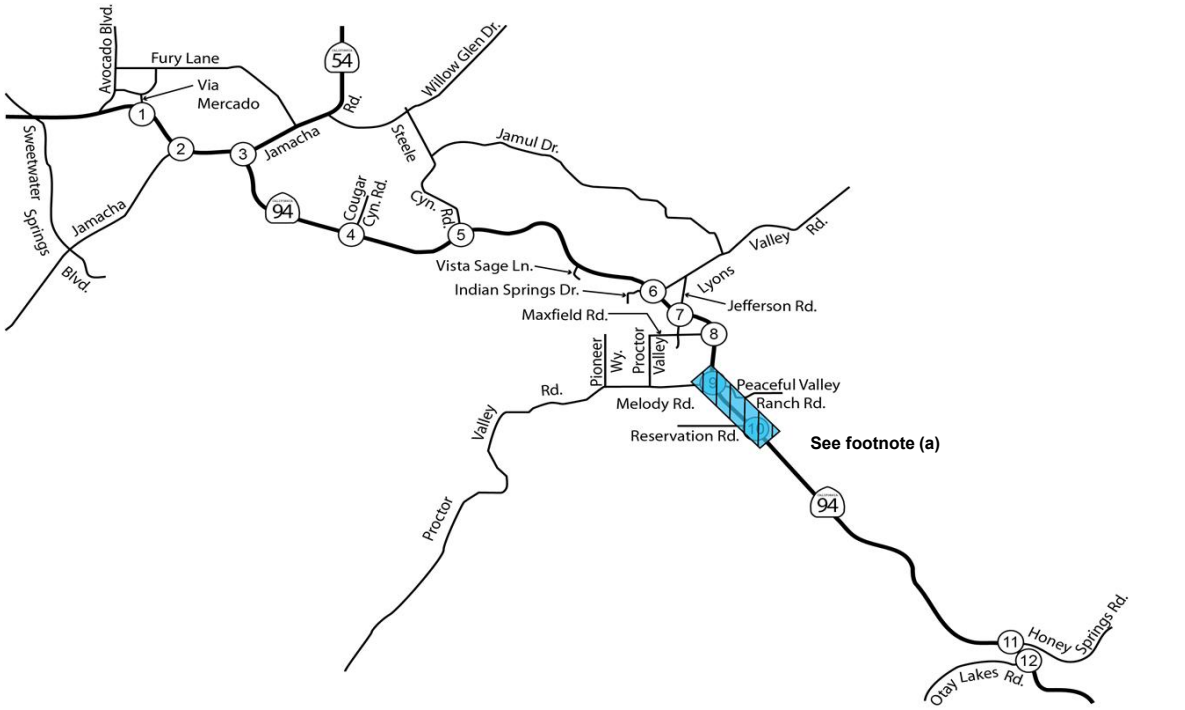
FIGURE 7-1

Near Term (2015) with Project (Alt 1-2) Peak-Hour Traffic Volumes (Weekday)

SR 94 Improvement Project

Intersection	Leg	Left	Right	Left	Right
1	Via Mercado	194 / 153	382 / 310	339 / 292	1821 / 1657
	SR 94	207 / 119	2303 / 1934		
2	Jamacha Blvd.	2 / 5	3 / 4	9 / 6	7 / 41
	SR 94	7 / 70	2448 / 1996	201 / 171	181 / 139
	SR 94	1948 / 1796	603 / 512	3 / 13	766 / 585
3	Dwy.	80 / 63	40 / 25	52 / 36	50 / 31
	SR 94	115 / 81	1978 / 1612	1251 / 980	1155 / 1145
	SR 94	1382 / 1235	268 / 213	34 / 42	272 / 233
4	Cougar Canyon Rd.	120 / 6	68 / 2	47 / 4	955 / 962
	SR 94	92 / 5	1346 / 955		
5	Steele Canyon Rd.	108 / 70	6 / 3	297 / 185	170 / 154
	SR 94	112 / 60	1256 / 916	2 / 0	862 / 936
	SR 94	2 / 2	4 / 3	21 / 8	6 / 3
6	Lyons Valley Rd.	192 / 188	2 / 0	15 / 6	18 / 24
	SR 94	336 / 186	1211 / 941	15 / 8	870 / 906
	SR 94	7 / 7	2 / 0	5 / 7	6 / 7
7	Jefferson Rd.	22 / 19	107 / 77	93 / 64	72 / 65
	SR 94	28 / 18	956 / 763	314 / 219	760 / 821
	SR 94	149 / 136	112 / 62	120 / 66	33 / 32
8	Maxfield Rd.	31 / 15	1087 / 914	25 / 12	28 / 15
	SR 94	5 / 7	839 / 791		
9	Melody Rd.	16 / 19	1036 / 800	5 / 5	9 / 9
	SR 94	15 / 11	19 / 20		4 / 0
	Peaceful Valley Ranch Rd.	25 / 19	819 / 850		
10	Reservation Rd.	529 / 532	545 / 323		
	SR 94	620 / 620	136 / 141		
	SR 94	116 / 118	189 / 221		
11	Honey Springs Rd.	580 / 404	72 / 48	34 / 44	40 / 45
	SR 94			346 / 303	64 / 44
12	Otay Lakes Rd.	187 / 163	519 / 278		
	SR 94	153 / 141	147 / 78		
	SR 94	67 / 63	148 / 189		



Legend

X / Y = FRI / SAT PEAK HOUR TURNING VOLUMES

NOT TO SCALE

(a) Volumes for Alternative 1 and 2 would remain the same. Please refer to Figure 7-3 for Alternative 3 traffic volumes.

Kimley-Horn and Associates, Inc.

FIGURE 7-2

Near Term (2015) with Project (Alt 1-2) Peak-Hour Traffic Volumes (Friday/Saturday)

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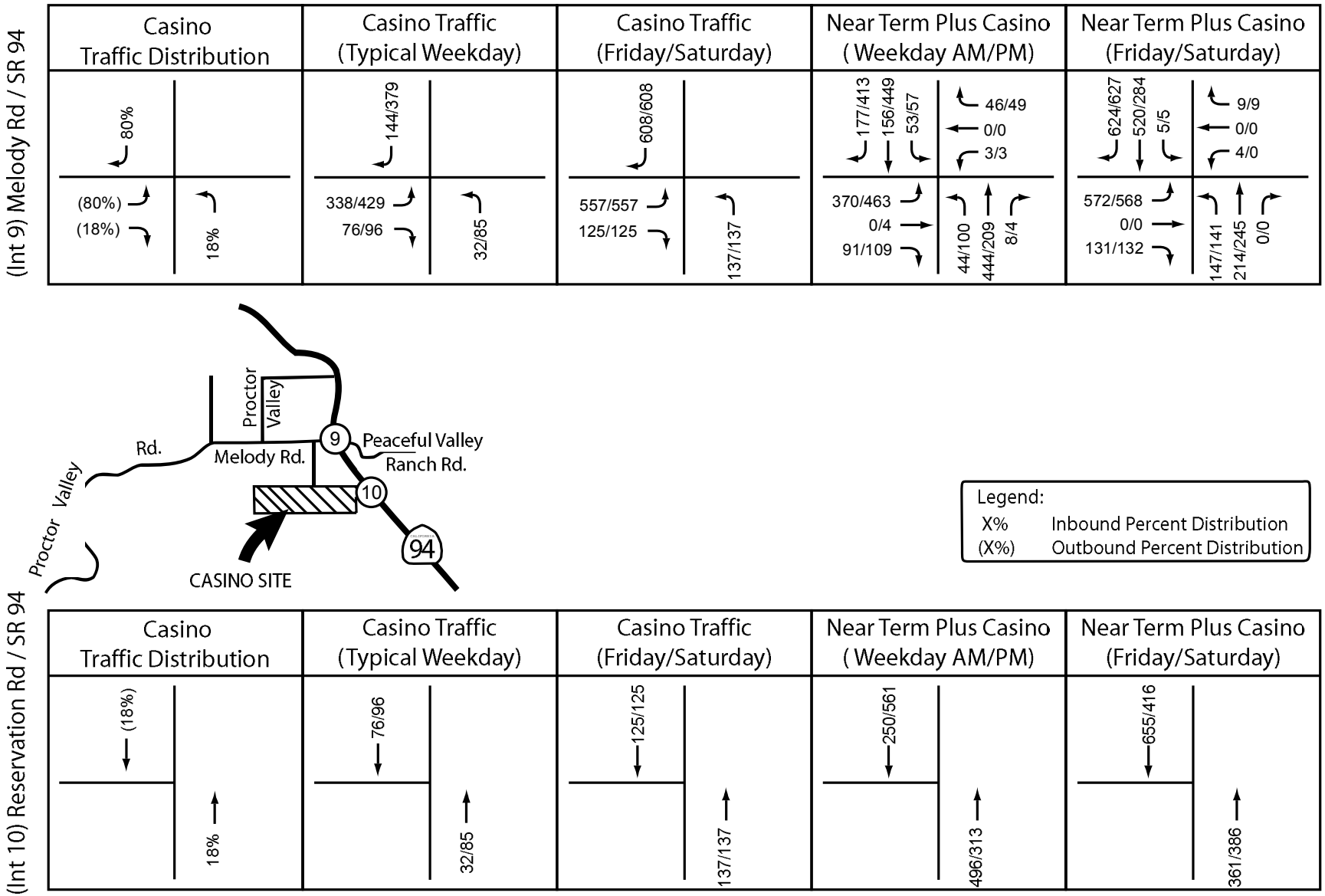

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FIGURE 7-3

Near Term (2015) with Project (Alt 3) Peak-Hour Volume Adjustments

TABLE 7-1:
NEAR TERM (2015) WITH PROPOSED PROJECT (ALT 1-2)
PEAK-HOUR INTERSECTION LOS (WEEKDAY)

	INTERSECTION	PEAK HOUR	NEAR TERM (2015) NO BUILD		NEAR TERM (2015) WITH PROPOSED PROJECT (ALT 1-2)			
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)	Δ (c)	SIGNIFICANT?
1	SR 94 (Campo Rd) & Via Mercado	AM	44.2	**D**	44.2	**D**	0.0	NO
		PM	91.7	**F**	91.7	**F**	0.0	NO
2	Jamacha Blvd. & SR 94 (Campo Rd)	AM	18.8	B	22.1	C	3.3	NO
		PM	57.1	**E**	50.9	**D**	-6.2	NO
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	36.1	**D**	35.1	**D**	-1.0	NO
		PM	94.2	**F**	66.4	**E**	-27.8	NO
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	34.7	C	34.7	C	0.0	NO
		PM	45.6	**D**	45.6	**D**	0.0	NO
5	Steele Canyon Rd. & SR 94 (Campo Rd)	AM	43.9	**D**	23.1	C	-20.8	NO
		PM	119.7	**F**	28.6	C	-91.1	NO
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	AM	ECL	**F**	27.2	C	-	NO
		PM	ECL	**F**	20.4	C	-	NO
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	AM	53.2	**D**	53.2	**D**	0.0	NO
		PM	61.1	**E**	61.1	**E**	0.0	NO
8	SR 94 (Campo Rd) & Maxfield Rd.	AM	25.4	**D**	14.7	B	-10.7	NO
		PM	111.2	**F**	27.0	**D**	-84.2	NO
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	AM	43.5	**D**	8.9	A	-34.6	NO
		PM	179.9	**F**	10.8	B	-169.1	NO
10	SR 94 (Campo Rd) & Reservation Rd.	AM	56.7	**E**	4.8	A	-51.9	NO
		PM	767.0	**F**	7.1	A	-759.9	NO
11	SR 94 (Campo Rd) & Honey Springs Rd.	AM	16.8	C	16.8	C	0.0	NO
		PM	17.2	C	17.2	C	0.0	NO
12	SR 94 (Campo Rd) & Otay Lakes Rd.	AM	20.0	C	20.0	C	0.0	NO
		PM	23.8	C	23.8	C	0.0	NO

Notes:

Bold values indicate intersections operating at LOS D, E or F. **Bold and shaded** values indicate project significant impact.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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TABLE 7-2:
NEAR TERM (2015) WITH PROJECT (ALT 1-2)
PEAK-HOUR INTERSECTION LOS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	NEAR TERM (2015) NO BUILD		NEAR TERM (2015) WITH PROJECT (ALT 1-2)			
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)	Δ (c)	SIGNIFICANT?
1	SR 94 (Campo Rd) & Via Mercado	FRI PM	65.2	**E**	65.2	**E**	0.0	NO
		SAT PM	32.6	C	32.6	C	0.0	NO
2	Jamacha Blvd. & SR 94 (Campo Rd)	FRI PM	52.4	**D**	40.3	**D**	-12.1	NO
		SAT PM	22.2	C	24.0	C	1.8	NO
3	SR 94 (Campo Rd) & Jamacha Rd.	FRI PM	71.2	**E**	60.4	**E**	-10.8	NO
		SAT PM	41.5	**D**	40.1	**D**	-1.4	NO
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	FRI PM	19.9	B	19.9	B	0.0	NO
		SAT PM	9.5	A	9.5	A	0.0	NO
5	Steele Canyon Rd. & SR 94 (Campo Rd)	FRI PM	69.5	**E**	26.9	C	-42.6	NO
		SAT PM	29.9	C	18.1	B	-11.8	NO
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	FRI PM	ECL	**F**	11.5	B	-	NO
		SAT PM	1472.9	**F**	8.8	A	-1464.1	NO
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	FRI PM	41.9	**D**	41.9	**D**	0.0	NO
		SAT PM	23.7	C	23.7	C	0.0	NO
8	SR 94 (Campo Rd) & Maxfield Rd.	FRI PM	96.0	**F**	26.2	**D**	-69.8	NO
		SAT PM	40.1	**E**	19.2	C	-20.9	NO
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	FRI PM	109.1	**F**	8.6	A	-100.5	NO
		SAT PM	48.3	**D**	8.3	A	-40.0	NO
10	SR 94 (Campo Rd) & Reservation Rd.	FRI PM	ECL	**F**	9.4	A	-	NO
		SAT PM	ECL	**F**	7.8	A	-	NO
11	SR 94 (Campo Rd) & Honey Springs Rd.	FRI PM	22.8	C	22.8	C	0.0	NO
		SAT PM	16.4	C	16.4	C	0.0	NO
12	SR 94 (Campo Rd) & Otay Lakes Rd.	FRI PM	32.5	**D**	32.5	**D**	0.0	NO
		SAT PM	18.2	C	18.2	C	0.0	NO

Notes:

Bold values indicate intersections operating at LOS D, E or F. **Bold and shaded** values indicate project significant impact.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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TABLE 7-3:
NEAR TERM (2015) WITH PROPOSED PROJECT (ALT 3)
PEAK-HOUR INTERSECTION LOS (WEEKDAY)

	INTERSECTION	PEAK HOUR	NEAR TERM (2015) NO BUILD		NEAR TERM (2015) WITH PROPOSED PROJECT (ALT 3)			
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)	Δ (c)	SIGNIFICANT?
1	SR 94 (Campo Rd) & Via Mercado	AM	44.2	**D**	44.2	**D**	0.0	NO
		PM	91.7	**F**	91.7	**F**	0.0	NO
2	Jamacha Blvd. & SR 94 (Campo Rd)	AM	18.8	B	22.1	C	3.3	NO
		PM	57.1	**E**	50.9	**D**	-6.2	NO
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	36.1	**D**	35.1	**D**	-1.0	NO
		PM	94.2	**F**	66.4	**E**	-27.8	NO
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	34.7	C	34.7	C	0.0	NO
		PM	45.6	**D**	45.6	**D**	0.0	NO
5	Steele Canyon Rd. & SR 94 (Campo Rd)	AM	43.9	**D**	23.1	C	-20.8	NO
		PM	119.7	**F**	28.6	C	-91.1	NO
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	AM	ECL	**F**	27.2	C	-	NO
		PM	ECL	**F**	20.4	C	-	NO
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	AM	53.2	**D**	53.2	**D**	0.0	NO
		PM	61.1	**E**	61.1	**E**	0.0	NO
8	SR 94 (Campo Rd) & Maxfield Rd.	AM	25.4	**D**	14.7	B	-10.7	NO
		PM	111.2	**F**	27.0	**D**	-84.2	NO
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	AM	43.5	**D**	18.1	B	-25.4	NO
		PM	179.9	**F**	20.6	C	-159.3	NO
10	SR 94 (Campo Rd) & Reservation Rd.	AM	56.7	**F**	This intersection does not exist under this scenario.			
		PM	767.0	**F**				
11	SR 94 (Campo Rd) & Honey Springs Rd.	AM	16.8	C	16.8	C	0.0	NO
		PM	17.2	C	17.2	C	0.0	NO
12	SR 94 (Campo Rd) & Otay Lakes Rd.	AM	20.0	C	20.0	C	0.0	NO
		PM	23.8	C	23.8	C	0.0	NO

Notes:

Bold values indicate intersections operating at LOS D, E or F. **Bold and shaded** values indicate project significant impact.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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TABLE 7-4:
NEAR TERM (2015) WITH PROJECT (ALT 3)
PEAK-HOUR INTERSECTION LOS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	NEAR TERM (2015) NO BUILD		NEAR TERM (2015) WITH PROJECT (ALT 3)			
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)	Δ (c)	SIGNIFICANT?
1	SR 94 (Campo Rd) & Via Mercado	FRI PM	65.2	**E**	65.2	**E**	0.0	NO
		SAT PM	32.6	C	32.6	C	0.0	NO
2	Jamacha Blvd. & SR 94 (Campo Rd)	FRI PM	52.4	**D**	40.3	**D**	-12.1	NO
		SAT PM	22.2	C	24.0	C	1.8	NO
3	SR 94 (Campo Rd) & Jamacha Rd.	FRI PM	71.2	**E**	60.4	**E**	-10.8	NO
		SAT PM	41.5	**D**	40.1	**D**	-1.4	NO
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	FRI PM	19.9	B	19.9	B	0.0	NO
		SAT PM	9.5	A	9.5	A	0.0	NO
5	Steele Canyon Rd. & SR 94 (Campo Rd)	FRI PM	69.5	**E**	26.9	C	-42.6	NO
		SAT PM	29.9	C	18.1	B	-11.8	NO
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	FRI PM	ECL	**F**	11.5	B	-	NO
		SAT PM	1472.9	**F**	8.8	A	-1464.1	NO
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	FRI PM	41.9	**D**	41.9	**D**	0.0	NO
		SAT PM	23.7	C	23.7	C	0.0	NO
8	SR 94 (Campo Rd) & Maxfield Rd.	FRI PM	96.0	**F**	26.2	**D**	-69.8	NO
		SAT PM	40.1	**E**	19.2	C	-20.9	NO
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	FRI PM	109.1	**F**	19.4	B	-89.7	NO
		SAT PM	48.3	**D**	16.2	B	-32.1	NO
10	SR 94 (Campo Rd) & Reservation Rd.	FRI PM	ECL	**F**	This intersection does not exist under this scenario.			
		SAT PM	ECL	**F**				
11	SR 94 (Campo Rd) & Honey Springs Rd.	FRI PM	22.8	C	22.8	C	0.0	NO
		SAT PM	16.4	C	16.4	C	0.0	NO
12	SR 94 (Campo Rd) & Otay Lakes Rd.	FRI PM	32.5	**D**	32.5	**D**	0.0	NO
		SAT PM	18.2	C	18.2	C	0.0	NO

Notes:

Bold values indicate intersections operating at LOS D, E or F. **Bold and shaded** values indicate project significant impact.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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TABLE 7-5:
NEAR TERM (2015) WITH PROPOSED PROJECT
ILV ANALYSIS (WEEKDAY)

	INTERSECTION	PEAK HOUR	NEAR TERM (2015) NO BUILD		NEAR TERM (2015) PLUS PROPOSED PROJECT ALTERNATIVES 1 - 2		NEAR TERM (2015) PLUS PROPOSED PROJECT ALTERNATIVE 3	
			ILV/HR TOTAL	CAPACITY	ILV/HR TOTAL	CAPACITY	ILV/HR TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	AM	1537	**Above Capacity**	1537	**Above Capacity**	1537	**Above Capacity**
		PM	1727	**Above Capacity**	1727	**Above Capacity**	1727	**Above Capacity**
2	SR 94 (Campo Rd) & Jamacha Blvd.	AM	1267	Approaching Capacity	999	Below Capacity	999	Below Capacity
		PM	1631	**Above Capacity**	1384	Approaching Capacity	1384	Approaching Capacity
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	1210	Approaching Capacity	1210	Approaching Capacity	1210	Approaching Capacity
		PM	1684	**Above Capacity**	1050	Below Capacity	1050	Below Capacity
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	1484	Approaching Capacity	1484	Approaching Capacity	1484	Approaching Capacity
		PM	1697	**Above Capacity**	1697	**Above Capacity**	1697	**Above Capacity**
5	SR 94 (Campo Rd) & Steele Canyon Rd.	AM	1530	**Above Capacity**	1061	Below Capacity	1061	Below Capacity
		PM	1891	**Above Capacity**	1167	Below Capacity	1167	Below Capacity
6	SR 94 (Campo Rd) & Lyons Valley Rd	AM	This intersection won't be signalized under this scenario		1550	**Above Capacity**	1550	**Above Capacity**
		PM			1610	**Above Capacity**	1610	**Above Capacity**
7	SR 94 (Campo Rd) & Jefferson Rd	AM	1249	Approaching Capacity	1249	Approaching Capacity	1249	Approaching Capacity
		PM	1670	**Above Capacity**	1670	**Above Capacity**	1670	**Above Capacity**
9	SR 94 (Campo Rd) & Melody Rd	AM	This intersection won't be signalized under this scenario		703	Below Capacity	739	Below Capacity
		PM			1028	Below Capacity	790	Below Capacity
10	SR 94 (Campo Rd) & Reservation Rd or Daisy Drive	AM	This intersection won't be signalized under this scenario		502	Below Capacity	This intersection won't be signalized under this scenario	
		PM			746	Below Capacity		

Notes:
<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity
Bold values indicate intersections operating above capacity.

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TABLE 7-6:

NEAR TERM (2015) WITH PROJECT

ILV ANALYSIS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	NEAR TERM (2015) NO BUILD		NEAR TERM (2015) PLUS PROJECT ALTERNATIVES 1 - 3		NEAR TERM (2015) PLUS PROJECT ALTERNATIVE 3	
			ILV/HR TOTAL	CAPACITY	ILV/HR TOTAL	CAPACITY	ILV/HR TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	AM	1669	**Above Capacity**	1669	**Above Capacity**	1669	**Above Capacity**
		PM	1404	Approaching Capacity	1404	Approaching Capacity	1404	Approaching Capacity
2	SR 94 (Campo Rd) & Jamacha Blvd.	AM	1592	**Above Capacity**	1308	Approaching Capacity	1308	Approaching Capacity
		PM	1291	Approaching Capacity	1079	Below Capacity	1079	Below Capacity
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	1465	Approaching Capacity	1451	Approaching Capacity	1451	Approaching Capacity
		PM	1281	Approaching Capacity	1281	Approaching Capacity	1281	Approaching Capacity
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	1420	Approaching Capacity	1420	Approaching Capacity	1420	Approaching Capacity
		PM	968	Below Capacity	968	Below Capacity	968	Below Capacity
5	SR 94 (Campo Rd) & Steele Canyon Rd.	AM	1591	**Above Capacity**	962	Below Capacity	962	Below Capacity
		PM	1197	Below Capacity	806	Below Capacity	806	Below Capacity
6	SR 94 (Campo Rd) & Lyons Valley Rd	AM	This intersection won't be signalized under this scenario		1424	Approaching Capacity	1424	Approaching Capacity
		PM			1311	Approaching Capacity	1311	Approaching Capacity
7	SR 94 (Campo Rd) & Jefferson Rd	AM	1684	**Above Capacity**	1684	**Above Capacity**	1684	**Above Capacity**
		PM	1288	Approaching Capacity	1288	Approaching Capacity	1288	Approaching Capacity
9	SR 94 (Campo Rd) & Melody Rd	AM	This intersection won't be signalized under this scenario		1111	Below Capacity	980	Below Capacity
		PM			900	Below Capacity	978	Below Capacity
10	SR 94 (Campo Rd) & Reservation Rd or Daisy Drive	AM	This intersection won't be signalized under this scenario		971	Below Capacity	This intersection won't be signalized under this scenario	
		PM			960	Below Capacity		

Notes:

<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity

Bold values indicate intersections operating above capacity.

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HCM Peak-Hour Arterial Analysis

Tables 7-7 to 7-8 display the peak-hour arterial analysis along SR 94 (Campo Road) between Via Mercado and Jefferson Road/Proctor Valley Road under Near Term (2015) with Project Conditions. As shown in the table, with the Proposed Project improvements, the analyzed roadway segment will operate at LOS C or better.

Appendix G contains the peak-hour arterial analysis worksheets.

HCM Peak-Hour Two-Lane Highway Analysis

With the completion of the project, new traffic signals will be installed at the following intersections:

- SR 94 (Campo Road) and Lyons Valley Road;
- SR 94 (Campo Road) and Melody Road; and
- SR 94 (Campo Road) and Reservation Road or Daisy Drive (Alternatives 1 and 2 only).

The installation of traffic signals at these locations will change the characteristics of the roadway operations between Proctor Valley Road and Otay Lakes Road making the HCM peak-hour two-lane highway analysis no longer applicable. With the installation of the traffic signals, this segment would operate as an arterial since traffic signals will be located within a 2 mile distance from each other. **Tables 7-9 and 7-10** show the results of the HCM Peak-Hour Arterial Analysis for the segment between Via Mercado and Melody Road. As shown in the Table, the results of the analysis show that SR 94 would operate at LOS C or better.

TABLE 7-7:
NEAR TERM (2015) WITH PROPOSED PROJECT (ALT 1-3)
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (WEEKDAY)

ROADWAY SEGMENT	DIRECTION	NEAR TERM NO BUILD		NEAR TERM WITH PROPOSED PROJECT (ALT. 1-3)			
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)	Δ	SIGNIFICANT?
AM PEAK							
SR 94							
Via Mercado to Proctor Valley Rd	EB	45.2	A	44.2	A	-1.0	NO
	WB	35.5	B	36.1	B	0.6	NO
PM PEAK							
SR 94							
Via Mercado to Proctor Valley Rd	EB	24.6	**D**	33.0	C	8.4	NO
	WB	33.8	C	34.3	B	0.5	NO

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 7-8:
NEAR TERM (2015) WITH PROPOSED PROJECT (ALT 1-3)
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (FRIDAY/SATURDAY)

ROADWAY SEGMENT	DIRECTION	NEAR TERM NO BUILD		NEAR TERM WITH PROPOSED			
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)	Δ	SIGNIFICANT?
FRIDAY PM							
SR 94							
Via Mercado to Proctor Valley Rd	EB	31.6	C	37.7	B	6.1	NO
	WB	34.6	B	34.7	B	0.1	NO
SATURDAY PM							
SR 94							
Via Mercado to Proctor Valley Rd	EB	44.9	A	44.1	A	-0.8	NO
	WB	39.0	B	38.6	B	-0.4	NO

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 7-9:
NEAR TERM (2015) WITH PROPOSED PROJECT (ALT 1-3)
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS TO MELODY RD (WEEKDAY)

ROADWAY SEGMENT	DIRECTION	AM PEAK		PM PEAK	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Reservation Rd	EB	44.4	A	34.1	B
	WB	34.1	B	33.1	C

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 7-10:
NEAR TERM (2015) WITH PROPOSED PROJECT (ALT 1-3)
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS TO MELODY RD (FRIDAY/SATURDAY)

ROADWAY SEGMENT	DIRECTION	FRIDAY		SATURDAY	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Reservation Rd	EB	37.3	B	44.5	A
	WB	34.1	B	38.8	B

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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8.0 HORIZON YEAR (2035) NO PROJECT CONDITIONS

This section provides a description of Horizon Year (2035) conditions without the Proposed Project.

Road Network

Per the County of San Diego's Mobility Element included in the approved General Plan, two roadway segment improvements were assumed to be completed under the Horizon Year (2035) conditions:

- Completion of Proctor Valley Road as a 2-lane light collector from Chula Vista city limits to SR 94; and
- Realignment of Otay Lakes Road with the intersection of Honey Springs Road to form a four-way intersection at SR 94.

Traffic Volumes

Chapter 2 provides a description of how the Horizon Year (2035) volumes were developed. **Figure 8-1** shows Horizon Year (2035) No Project peak-hour volumes for a typical weekday. **Figure 8-2** shows Horizon Year (2035) No Project volumes for typical Friday and Saturday afternoon peak-hours.

Intersection Analysis (HCM)

Tables 8-1 and 8-2 display the peak-hour LOS analysis results for the study intersections under Horizon Year (2035) No Project conditions. As shown in the table, the intersections would operate at LOS D or F during one or more peak-hours:

- SR 94 (Campo Road) & Via Mercado (LOS F all peak-hour periods analyzed);
- SR 94 (Campo Road) & Jamacha Boulevard (LOS F weekday and Friday p.m. peak-hour, and LOS D Saturday p.m. peak-hour);
- SR 94 (Campo Road) & Jamacha Road (LOS E weekday a.m. peak-hour, and LOS F weekday, Friday and Saturday p.m. peak-hours);
- SR 94 (Campo Road) & Cougar Canyon Road (LOS D weekday a.m. and p.m. peak-hours);
- SR 94 (Campo Road) & Steele Canyon Road (LOS D weekday a.m. peak-hour, and LOS F weekday and Friday p.m. peak-hours);
- SR 94 (Campo Road) & Lyons Valley Road (LOS F all peak-hour periods analyzed);
- SR 94 (Campo Road) & Jefferson Road (LOS F all peak-hour periods analyzed);
- SR 94 (Campo Road) & Maxfield Road (LOS D a.m. peak-hour period, and LOS F all other peak-hour periods analyzed);
- SR 94 (Campo Road) & Melody Road (LOS E weekday a.m. peak-hour, and LOS F weekday, Friday and Saturday p.m. peak-hours);
- SR 94 (Campo Road) & Reservation Road (LOS F all peak-hour periods analyzed); and
- SR 94 (Campo Road) & Otay Lakes Road (LOS D Friday peak-hour period)

Appendix E contains the intersection LOS calculation worksheets.

SR 94 Improvement Project

1

460 / 201	Via Mercado	565 / 902
	SR 94	611 / 732
		2313 / 1836
77 / 414		
1371 / 2776		

2

0 / 7 6 / 6 4 / 6	Jamacha Blvd.	
	SR 94	14 / 8 2214 / 1847 565 / 570
13 / 7 1431 / 2854 207 / 416		
		543 / 372 11 / 10 587 / 776

3

38 / 62 22 / 29 27 / 111	Dwy.	
SR 94		50 / 107 1937 / 1719 439 / 619
75 / 93 1392 / 2949 923 / 1466		
	SR 94	1320 / 1094 75 / 45 673 / 608

4

440 / 188	Cougar Canyon Rd.	122 / 101
	SR 94	299 / 50 1125 / 1024
390 / 163 750 / 1574		

5

303 / 114	Steele Canyon Rd.	177 / 327
	SR 94	234 / 154 1155 / 973 4 / 8
137 / 129 762 / 1532 0 / 1		
		5 / 2 2 / 3 2 / 31

6

399 / 195 7 / 6 32 / 30	Lyons Valley Rd.	
	SR 94	21 / 46 1020 / 910 13 / 7
185 / 386 724 / 1373 7 / 9		
	Indian Springs Dr.	12 / 6 2 / 3 12 / 17

7

180 / 249 365 / 337 97 / 78	Jefferson Rd.	
	SR 94	80 / 82 664 / 596 48 / 129
120 / 290 544 / 899 226 / 825		
	Proctor Valley Rd.	782 / 327 365 / 335 87 / 324

8

17 / 78 565 / 1070	SR 94	
Maxfield Rd.		
8 / 65 6 / 33		
		6 / 15 846 / 622

9

34 / 35 439 / 818 55 / 59	SR 94	
Melody Rd.		47 / 50 6 / 7
		Peaceful Valley Ranch Rd.
36 / 35 0 / 13 78 / 81		
		40 / 74 579 / 527 26 / 8

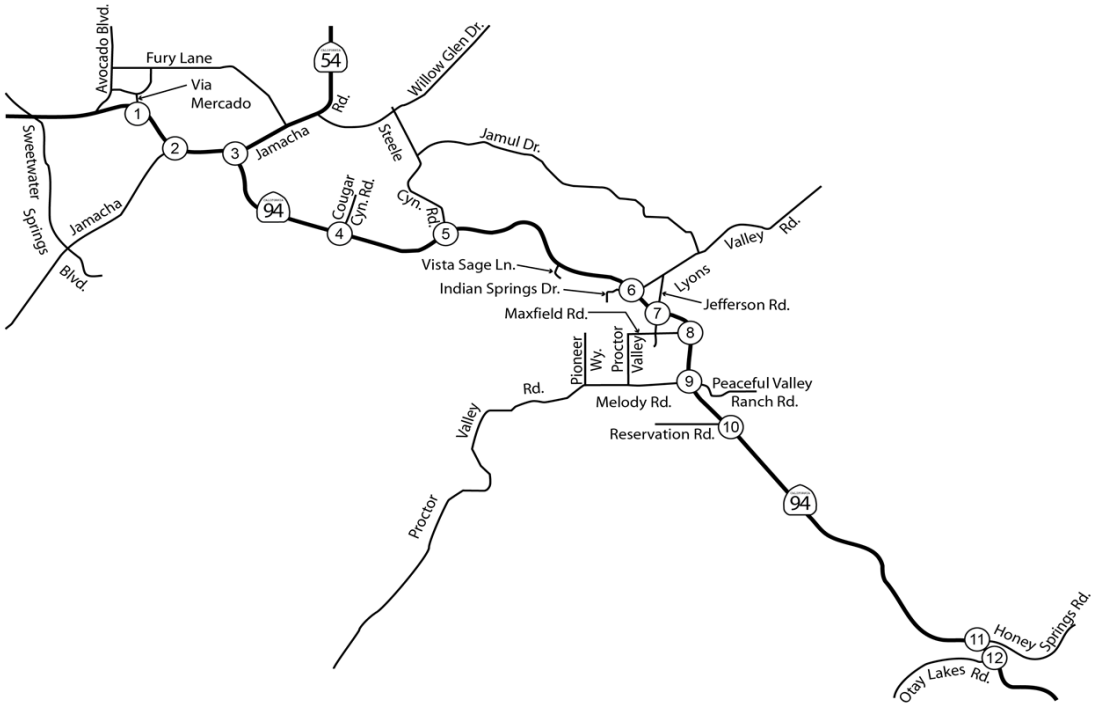
10

332 / 421 316 / 575	SR 94	
Reservation Rd.		
141 / 373 38 / 99		
		88 / 112 443 / 234

As part of the County of San Diego's General Plan, the intersection of Honey Springs Road will be realigned to form a four-way intersection with Otay Lakes Road and the intersection of SR-94

12

193 / 167 354 / 764 19 / 82	SR 94	
Otay Lakes Rd.		70 / 37 176 / 106 20 / 12
		Honey Springs Rd.
131 / 219 65 / 175 167 / 254		
		239 / 171 730 / 287 7 / 19



Legend

X / Y = AM / PM PEAK HOUR TURNING VOLUMES

NOT TO SCALE

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FIGURE 8-1

Horizon Year (2035) No Project Peak-Hour Traffic Volumes (Weekday)

SR 94 Improvement Project

1

304 / 241	911 / 730	Via Mercado
⇨	⇨	

⇨	804 / 674
⇦	1766 / 1553
	SR 94

334 / 186	⇨
2251 / 1897	⇨

2

3 / 8	5 / 7	9 / 6
⇨	⇩	⇨

Jamacha Blvd.

⇨	6 / 42
⇦	2085 / 1922
⇨	660 / 563
	SR 94

10 / 109	⇨
2690 / 2152	⇨
418 / 347	⇨

⇨	⇧	⇨
385 / 293	6 / 23	872 / 666

3

83 / 65	62 / 40	121 / 86
⇨	⇩	⇨

Dwy.

⇨	123 / 77
⇦	1854 / 1678
⇨	642 / 510
	Jamacha Rd.

119 / 84	⇨
2698 / 2179	⇨
1192 / 911	⇨
	SR 94

⇨	⇧	⇨
1074 / 1064	57 / 72	636 / 566

4

152 / 6	70 / 1	Cougar Canyon Rd.
⇨	⇨	

⇨	48 / 4
⇦	940 / 954
	SR 94

115 / 4	⇨
1429 / 951	⇨

5

123 / 78	7 / 3	360 / 222
⇨	⇩	⇨

Steele Canyon Rd.

⇨	200 / 181
⇦	816 / 904
⇨	9 / 3
	SR 94

130 / 67	⇨
1303 / 908	⇨
1 / 0	⇨

⇨	⇧	⇨
2 / 2	5 / 3	28 / 11

6

198 / 190	4 / 0	32 / 6
⇨	⇩	⇨

Lyons Valley Rd.

⇨	38 / 56
⇦	865 / 901
⇨	13 / 13
	SR 94

348 / 192	⇨
1400 / 1041	⇨
15 / 7	⇨

Indian Springs Dr.

⇨	⇧	⇨
6 / 6	3 / 0	10 / 14

7

22 / 19	351 / 245	95 / 64
⇨	⇩	⇨

Jefferson Rd.

⇨	72 / 66
⇦	661 / 724
⇨	122 / 122
	SR 94

28 / 18	⇨
884 / 683	⇨
890 / 609	⇨

Proctor Valley Rd.

⇨	⇧	⇨
387 / 371	331 / 186	411 / 233

8

40 / 19	1206 / 965	SR 94
⇨	⇩	

Maxfield Rd.

41 / 19	⇨
28 / 16	⇨

⇨	⇧
6 / 8	820 / 757

9

26 / 31	965 / 720	13 / 13
⇨	⇩	⇨

SR 94

Melody Rd.

⇨	22 / 24
⇨	16 / 6
	Peaceful Valley Ranch Rd.

26 / 17	⇨
91 / 95	⇨

⇨	⇧	⇨
114 / 103	721 / 752	8 / 8

10

510 / 512	680 / 422	SR 94
⇨	⇩	

Reservation Rd.

597 / 597	⇨
159 / 163	⇨

⇨	⇧
135 / 136	195 / 229

As part of the County of San Diego's General Plan, the intersection of Honey Springs Road will be realigned to form a four-way intersection with Otay Lakes Road and the intersection of SR-94

12

257 / 212	934 / 499	74 / 49
⇨	⇩	⇨

SR 94

Otay Lakes Rd.

⇨	28 / 39
⇦	104 / 122
⇨	12 / 14
	Honey Springs Rd.

206 / 185	⇨
168 / 113	⇨
303 / 163	⇨

⇨	⇧	⇨
142 / 134	262 / 336	19 / 13

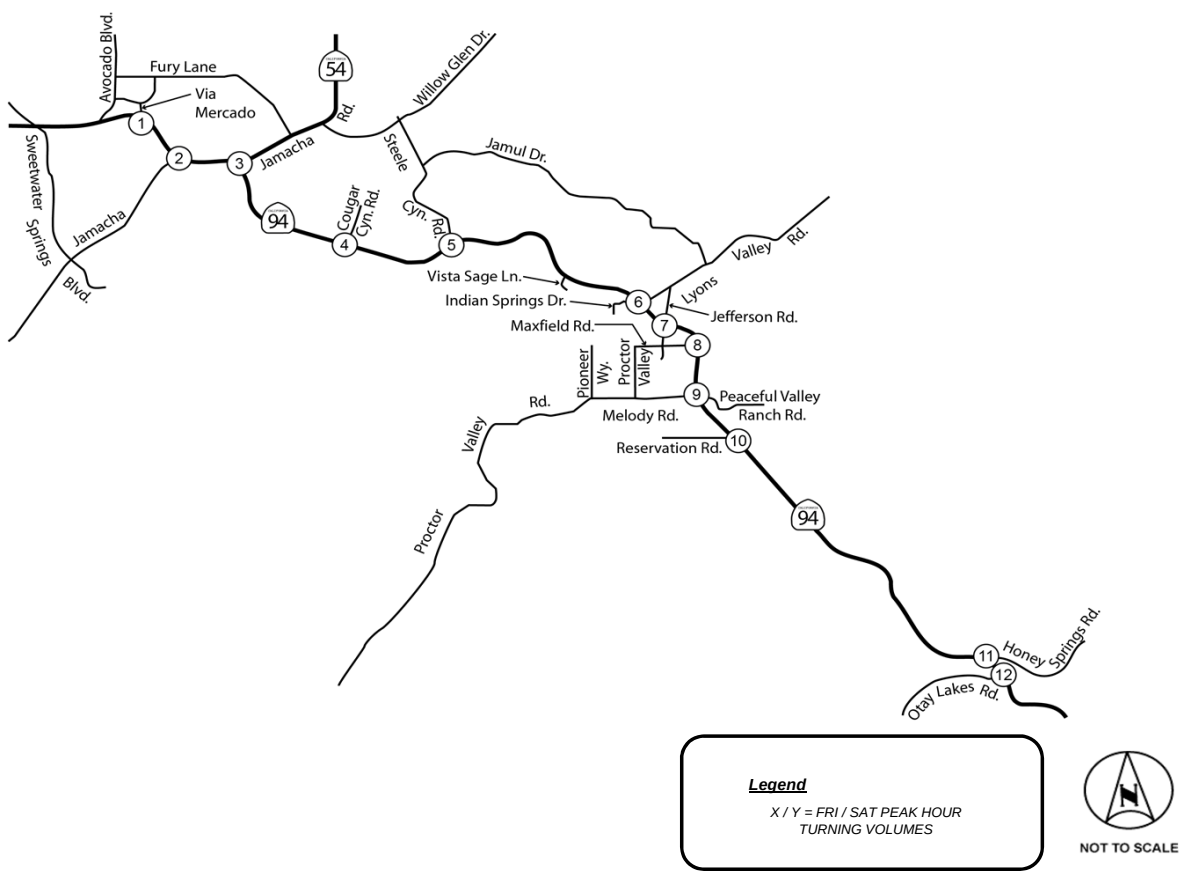

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FIGURE 8-2

Horizon Year (2035) No Project Peak-Hour Traffic Volumes (Friday/Saturday)

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TABLE 8-1:
HORIZON YEAR (2035) NO PROJECT
PEAK-HOUR INTERSECTION LOS (WEEKDAY)

	INTERSECTION	TRAFFIC CONTROL	PEAK HOUR	HORIZON YEAR NO BUILD	
				DELAY (a)	LOS (b)
1	SR 94 (Campo Rd) & Via Mercado	Signal	AM	178.7	**F**
			PM	312.4	**F**
2	Jamacha Blvd. & SR 94 (Campo Rd)	Signal	AM	29.6	C
			PM	84.5	**F**
3	SR 94 (Campo Rd) & Jamacha Rd.	Signal	AM	61.6	**E**
			PM	185.6	**F**
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	Signal	AM	41.5	**D**
			PM	43.4	**D**
5	Steele Canyon Rd. & SR 94 (Campo Rd)	Signal	AM	50.9	**D**
			PM	124.4	**F**
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	Two-Way Stop	AM	ECL	**F**
			PM	ECL	**F**
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	Signal	AM	388.9	**F**
			PM	321.6	**F**
8	SR 94 (Campo Rd) & Maxfield Rd.	One-Way Stop	AM	26.7	**D**
			PM	217.9	**F**
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	Two-Way Stop	AM	38.9	**E**
			PM	259.5	**F**
10	SR 94 (Campo Rd) & Reservation Rd.	One-Way Stop	AM	87.1	**F**
			PM	ECL	**F**
11	SR 94 (Campo Rd) & Honey Springs Rd.	One-Way Stop	As part of the County of San Diego's General Plan, the intersection of Honey Springs Road will be realigned to form a four-way intersection with Otay Lakes.		
12	SR 94 (Campo Rd) & Otay Lakes Rd.	Signal	AM	20.1	C
			PM	30.4	C

Notes:

Bold values indicate intersections operating at LOS D, E, or F.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

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TABLE 8-2:

HORIZON YEAR (2035) NO PROJECT

PEAK-HOUR INTERSECTION LOS (FRIDAY/SATURDAY)

	INTERSECTION	TRAFFIC CONTROL	PEAK HOUR	HORIZON YEAR NO BUILD	
				DELAY (a)	LOS (b)
1	SR 94 (Campo Rd) & Via Mercado	Signal	FRI PM	276.9	**F**
			SAT PM	146.5	**F**
2	Jamacha Blvd. & SR 94 (Campo Rd)	Signal	FRI PM	88.2	**F**
			SAT PM	36.6	**D**
3	SR 94 (Campo Rd) & Jamacha Rd.	Signal	FRI PM	160.3	**F**
			SAT PM	99.0	**F**
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	Signal	FRI PM	23.9	C
			SAT PM	9.5	A
5	Steele Canyon Rd. & SR 94 (Campo Rd)	Signal	FRI PM	90.9	**F**
			SAT PM	31.5	C
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	Two-Way Stop	FRI PM	ECL	**F**
			SAT PM	1499.5	**F**
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	Signal	FRI PM	307.0	**F**
			SAT PM	140.5	**F**
8	SR 94 (Campo Rd) & Maxfield Rd.	One-Way Stop	FRI PM	256.7	**F**
			SAT PM	52.7	**F**
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	Two-Way Stop	FRI PM	352.2	**F**
			SAT PM	62.7	**F**
10	SR 94 (Campo Rd) & Reservation Rd.	One-Way Stop	FRI PM	ECL	**F**
			SAT PM	ECL	**F**
11	SR 94 (Campo Rd) & Honey Springs Rd.	One-Way Stop	As part of the County of San Diego's General Plan, the intersection of Honey Springs Road will be realigned to form a four-way intersection with Otay Lakes.		
12	SR 94 (Campo Rd) & Otay Lakes Rd.	Signal	FRI PM	39.3	**D**
			SAT PM	17.5	B

Notes:

Bold values indicate intersections operating at LOS D, E, or F.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

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Intersection Analysis (ILV)

Tables 8-3 and 8-4 display the ILV analysis results for the Caltrans-owned signalized intersections under Horizon Year (2035) No Project conditions for all peak-hours analyzed. As shown in the table, all intersections along SR 94 (Campo Road) would operate at above capacity during one or more peak-hours.

Appendix F contains the ILV worksheets.

HCM Peak-Hour Arterial Analysis

Tables 8-5 and 8-6 display the peak-hour arterial analysis along SR 94 (Campo Road) between Via Mercado and Jefferson Road/Proctor Valley Road under the Horizon Year (2035) No Project conditions. As shown in the tables, the roadway segment will operate at LOS D or E during the following peak-hour periods:

- Eastbound direction (LOS E Weekday and Friday p.m. peak-hours); and
- Westbound direction (LOS D Weekday a.m. and Saturday p.m., and LOS E Weekday and Friday p.m. peak-hour)

Appendix G contains the peak-hour arterial analysis worksheets.

HCM Peak-Hour Two-Lane Highway Analysis

Table 8-7 displays the peak-hour two-lane highway analysis along SR 94 (Campo Road) between Jefferson Road/Proctor Valley Road and Otay Lakes Road under Horizon Year (2035) No Project Conditions. As shown in the table, all roadway segments within the study area would function at LOS D or E.

Appendix H contains the two-way two-lane analysis worksheets.

TABLE 8-3:
HORIZON YEAR (2035) NO BUILD
ILV ANALYSIS (WEEKDAY)

	INTERSECTION	PEAK HOUR	HORIZON YEAR	
			ILV TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	AM	2104	**Above Capacity**
		PM	2600	**Above Capacity**
2	SR 94 (Campo Rd) & Jamacha Blvd.	AM	1061	Below Capacity
		PM	1739	**Above Capacity**
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	1419	Approaching Capacity
		PM	1951	**Above Capacity**
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	1565	**Above Capacity**
		PM	1680	**Above Capacity**
5	SR 94 (Campo Rd) & Steele Canyon Rd.	AM	1604	**Above Capacity**
		PM	1904	**Above Capacity**
7	SR 94 (Campo Rd) & Jefferson Rd	AM	2098	**Above Capacity**
		PM	3678	**Above Capacity**

Notes:
<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity
Bold values indicate intersections operating above capacity.

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TABLE 8-4:
HORIZON YEAR (2035) NO BUILD
ILV ANALYSIS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	HORIZON YEAR	
			ILV TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	FRI PM	2540	**Above Capacity**
		SAT PM	2030	**Above Capacity**
2	SR 94 (Campo Rd) & Jamacha Blvd.	FRI PM	1781	**Above Capacity**
		SAT PM	1447	Approaching Capacity
3	SR 94 (Campo Rd) & Jamacha Rd.	FRI PM	2150	**Above Capacity**
		SAT PM	1600	**Above Capacity**
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	FRI PM	1523	**Above Capacity**
		SAT PM	960	Below Capacity
5	SR 94 (Campo Rd) & Steele Canyon Rd.	FRI PM	1715	**Above Capacity**
		SAT PM	1212	Approaching Capacity
7	SR 94 (Campo Rd) & Jefferson Rd	FRI PM	3025	**Above Capacity**
		SAT PM	2204	**Above Capacity**

Notes:
<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity
Bold values indicate intersections operating above capacity.

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TABLE 8-5:
HORIZON YEAR (2035) NO BUILD
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (WEEKDAY)

ROADWAY SEGMENT	DIRECTION	AM PEAK		PM PEAK	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Proctor Valley Rd	EB	33.8	C	16.6	**E**
	WB	24.8	**D**	17.8	**E**

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 8-6:
HORIZON YEAR (2035) NO PROJECT
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (FRIDAY/SATURDAY)

ROADWAY SEGMENT	DIRECTION	FRIDAY		SATURDAY	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Proctor Valley Rd	EB	19.3	**E**	33.7	C
	WB	16.4	**E**	21.3	**D**

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segmeBO or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 8-7:

HORIZON YEAR (2035) NO PROJECT

TWO-LANE HIGHWAY SEGMENT ANALYSIS

HIGHWAY SEGMENT	PEAK HOUR	HORIZON YEAR		
		LOS (a)	Average Travel Speed (mph)	PTSF (b)
SR-94				
Proctor Valley Road to Melody Rd	Weekday AM	**E**	35.4	83.0%
	Weekday PM	**E**	30.7	90.1%
	Friday PM	**E**	29.6	91.3%
	Saturday PM	**E**	32.5	87.8%
Melody Rd to Project Driveway	Weekday AM	**D**	40.8	77.9%
	Weekday PM	**E**	38.0	84.3%
	Friday PM	**E**	34.8	88.7%
	Saturday PM	**E**	36.7	86.3%
Project Driveway to Otay Lakes Rd	Weekday AM	**E**	38.7	82.3%
	Weekday PM	**E**	38.3	83.3%
	Friday PM	**E**	36.6	86.1%
	Saturday PM	**D**	40.1	79.0%

Notes:

Bold values indicate intersections operating at LOS D, E or F.

(a) LOS is based on Average Travel Speed and Percent Time Spent Following per Chapter 12 of the 2000 Highway Capacity Manual.

(b) PTSF = Percent Time Spent Following

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9.0 HORIZON YEAR (2035) WITH PROJECT CONDITIONS

This section summarizes the operations of Horizon Year (2035) conditions with the addition of the roadway improvement projects. This analysis evaluates whether the Proposed Project's contribution to any significant impacts would be cumulatively considerable.

Road Network

Horizon Year (2035) Plus Project scenario was analyzed with the proposed intersection traffic control, striping, and roadway facility modifications described in Chapter 1. In addition, per the County of San Diego's Mobility Element included in the approved General Plan, two roadway segment improvements were assumed to be completed under the Horizon Year (2035) with Project conditions:

- Completion of Proctor Valley Road as a 2-lane light collector from Chula Vista city limits to SR 94; and
- Realignment of Otay Lakes Road with the intersection of Honey Springs Road to form a four-way intersection at SR 94.

Traffic Volumes

The Proposed Project would not generate any additional traffic; therefore Horizon Year (2035) Plus Project volumes would be the same as Horizon Year (2035) No Project conditions (**Figures 8-1** and **8-2**).

Figure 9-1 illustrates the Horizon Year (2035) with Project peak-hour traffic volumes at the study intersections for a typical weekday. **Figure 9-2** illustrates the Horizon Year (2035) with Project traffic volumes at the study intersections for typical Friday and Saturday peak-hour periods. **Figure 9-3** illustrates the Horizon Year (2035) with project peak-hour traffic volume adjustments needed for the evaluation of the Alternative 3 project scenario, where the JIV Gaming Project related traffic uses Melody Road to access the SR 94.

Intersection Analysis (HCM)

Tables 9-1 and 9-2 display the peak-hour LOS analysis results for the study intersections under Horizon Year (2035) with Project Alternatives 1-2 conditions. **Tables 9-3 and 9-4** display the peak-hour LOS analysis results for the study intersections under the Horizon Year (2035) with Project Alternatives 3 conditions for all peak-hour scenarios analyzed. As shown in the table, all intersections would operate at equal or better LOS than before project conditions with the exception of the following intersection:

- SR 94 (Campo Road) & Jamacha Boulevard (LOS E weekday a.m. peak-hour, LOS F weekday p.m. peak-hour, and LOS D Saturday p.m. peak-hour)

By changing the existing lane configuration for the northbound movement, the proposed improvement at this intersection would increase the overall delay at this intersection and would make a cumulatively considerable contribution to a significant traffic impact that would require mitigation.

Appendix E contains the intersections LOS calculation worksheets.

Intersection Analysis (ILV)

Table 9-5 and 9-6 displays the ILV analysis results for the Caltrans-owned signalized intersections under the Horizon Year (2035) Plus Project conditions for all peak-hours analyzed. As shown in the table, all existing signalized intersections will operate at equal or better operations than the Horizon Year (2035) No Project scenario with the exception of SR 94 & Jamacha Boulevard during the AM peak-hour (Approaching Capacity). The new traffic signal at SR 94 (Campo Road) and Lyons Valley Road will operate at above capacity. The new traffic signals at Melody Road, Reservation Road and Otay Lakes Road will operate at below or approaching capacity conditions.

Appendix F contains the ILV worksheets.

SR 94 Improvement Project

1

460 / 201	565 / 902	Via Mercado
⇨	⇨	

⇨ 611 / 732	
⇦ 2313 / 1836	
SR 94	

77 / 414	⇨
1371 / 2776	⇨

2

0 / 7	6 / 6	4 / 6
⇨	⇩	⇨

Jamacha Blvd.

⇨ 14 / 8	
⇦ 2214 / 1847	
⇨ 565 / 570	
SR 94	

13 / 7	⇨
1431 / 2854	⇨
207 / 416	⇨

⇨	⇧	⇨
543 / 372	11 / 10	587 / 776

3

38 / 62	22 / 29	27 / 111
⇨	⇩	⇨

Dwy.

⇨ 50 / 107	
⇦ 1937 / 1719	
⇨ 439 / 619	
SR 94	Jamacha Rd.

75 / 93	⇨
1392 / 2949	⇨
923 / 1466	⇨
SR 94	

⇨	⇧	⇨
1320 / 1094	75 / 45	673 / 608

4

440 / 188	122 / 101	Cougar Canyon Rd.
⇨	⇨	

⇨ 299 / 50	
⇦ 1125 / 1024	
SR 94	

390 / 163	⇨
750 / 1574	⇨

5

303 / 114	177 / 327	Steele Canyon Rd.
⇨	⇨	

⇨ 234 / 154	
⇦ 1155 / 973	
⇨ 4 / 8	
SR 94	

137 / 129	⇨
762 / 1532	⇨
0 / 1	⇨

⇨	⇧	⇨
5 / 2	2 / 3	2 / 31

6

399 / 195	7 / 6	32 / 30
⇨	⇩	⇨

Lyons Valley Rd.

⇨ 21 / 46	
⇦ 1020 / 910	
⇨ 13 / 7	
SR 94	

185 / 386	⇨
724 / 1373	⇨
7 / 9	⇨
Indian Springs Dr.	

⇨	⇧	⇨
12 / 6	2 / 3	12 / 17

7

180 / 249	365 / 337	97 / 78
⇨	⇩	⇨

Jefferson Rd.

⇨ 80 / 82	
⇦ 664 / 596	
⇨ 48 / 129	
SR 94	

120 / 290	⇨
544 / 899	⇨
226 / 825	⇨
Proctor Valley Rd.	

⇨	⇧	⇨
782 / 327	365 / 335	87 / 324

8

17 / 78	565 / 1070	SR 94
⇨	⇩	
Maxfield Rd.		

8 / 65	⇨
6 / 33	⇨

⇨	⇧
6 / 15	846 / 622

9

34 / 35	439 / 818	55 / 59
⇨	⇩	⇨

SR 94

⇨ 47 / 50	
⇨ 6 / 7	
Melody Rd.	Peaceful Valley Ranch Rd.

36 / 35	⇨
0 / 13	⇨
78 / 81	⇨

⇨	⇧	⇨
40 / 74	579 / 527	26 / 8

10

332 / 421	316 / 575	SR 94
⇨	⇩	
Reservation Rd.		

141 / 373	⇨
38 / 99	⇨

⇨	⇧
88 / 112	443 / 234

As part of the County of San Diego's General Plan, the intersection of Honey Springs Road will be realigned to form a four-way intersection with Otay Lakes Road and the intersection of SR-94

12

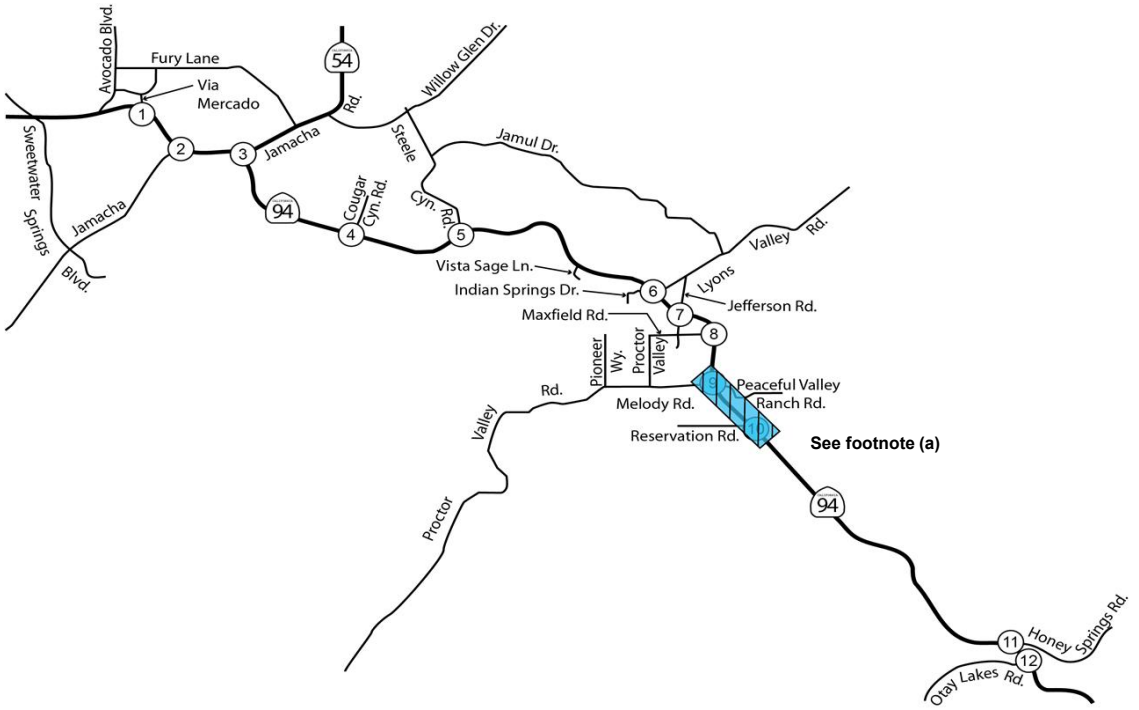
193 / 167	354 / 764	19 / 82
⇨	⇩	⇨

SR 94

⇨ 70 / 37	
⇦ 176 / 106	
⇨ 20 / 12	
Otay Lakes Rd.	Honey Springs Rd.

131 / 219	⇨
65 / 175	⇨
167 / 254	⇨

⇨	⇧	⇨
239 / 171	730 / 287	7 / 19



Legend

X / Y = AM / PM PEAK HOUR TURNING VOLUMES

NOT TO SCALE

(a) Volumes for Alternative 1 and 2 would remain the same. Please refer to Figure 9-3 for Alternative 3 traffic volumes.

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FIGURE 9-1

Horizon Year (2035) with Project (Alt 1-2) Peak-Hour Traffic Volumes (Weekday)

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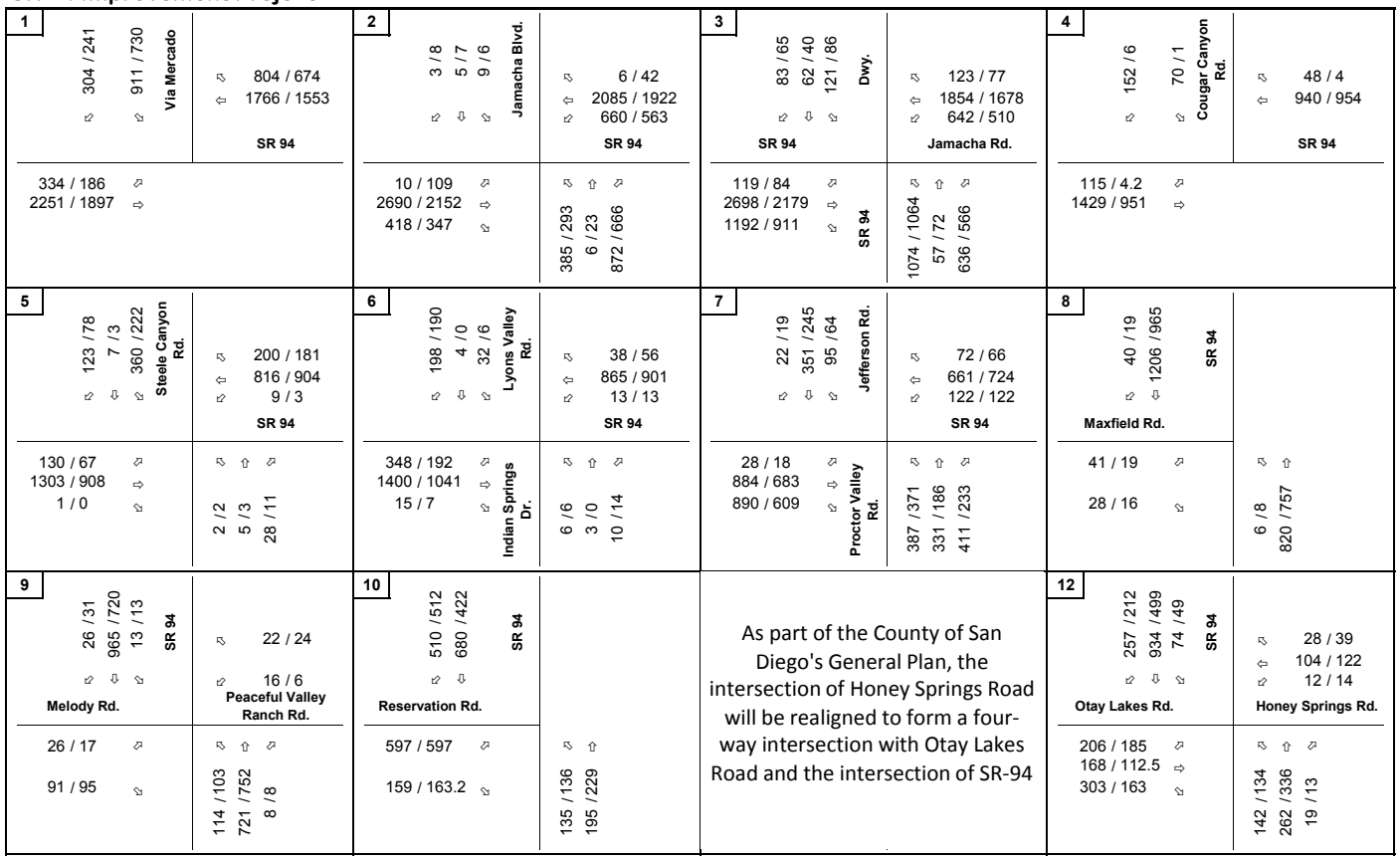
SR 94 Improvement Project



(a) Volumes for Alternative 1 and 2 would remain the same. Please refer to Figure 9-3 for Alternative 3 traffic volumes.

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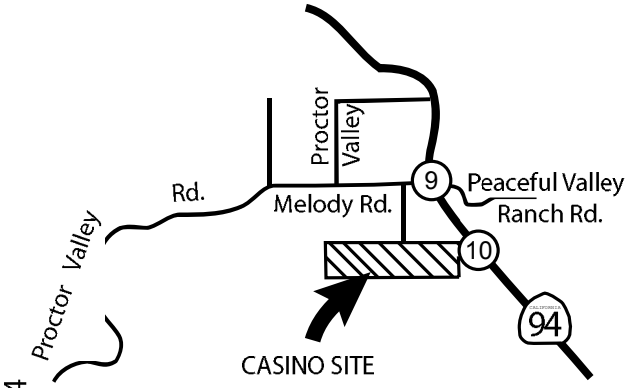
FIGURE 9-2

Horizon Year (2035) with Project (Alt 1-2) Peak-Hour Traffic Volumes (Friday/Saturday)

(Int 9) Melody Rd / SR 94

Casino Traffic Distribution	Casino Traffic (Typical Weekday)	Casino Traffic (Friday/Saturday)	Horizon Year Plus Casino (Weekday AM/PM)	Horizon Year Plus Casino (Friday/Saturday)
66% ↓ / ← 1%	279/354 ↓ / ← 4/5	459/459 ↓ / ← 7/7	313/389 ↓ 162/466 ↓ 55/59 ↱ / ← 4/5 / ↰ 2/2	485/490 ↓ 539/294 ↓ 13/13 ↱ / ← 7/7 / ↰ 10/0
(66%) ↱ (1%) → (21%) ↓ / ↰ 21%	119/313 ↱ 2/5 → 38/100 ↓ / ↰ 89/113	502/502 ↱ 8/8 → 160/160 ↓ / ↰ 146/146	155/348 ↱ 2/18 → 66/117 ↓ / ↰ 108/130 ↑ 461/216 ↱ 24/3	528/519 ↱ 8/8 → 174/178 ↓ / ↰ 169/158 ↑ 222/253 ↱ 0/0



Legend:
X% Inbound Percent Distribution
(X%) Outbound Percent Distribution

(Int 10) Reservation Rd / SR 94

Casino Traffic Distribution	Casino Traffic (Typical Weekday)	Casino Traffic (Friday/Saturday)	Horizon Year Plus Casino (Weekday AM/PM)	Horizon Year Plus Casino (Friday/Saturday)
(21%) ↓ / ↰ 21%	38/100 ↓ / ↰ 89/113	160/160 ↓ / ↰ 146/146	230/585 ↓ / ↰ 593/349	723/472 ↓ / ↰ 391/411

NOT TO SCALE

Kimley-Horn and Associates, Inc.

FIGURE 9-3

Horizon Year (2035) with Project (Alt 3) Peak-Hour Volume Adjustments

TABLE 9-1:
HORIZON YEAR (2035) WITH PROJECT (ALT 1-2)
PEAK-HOUR INTERSECTION LOS (WEEKDAY)

	INTERSECTION	PEAK HOUR	HORIZON YEAR (2035) NO BUILD		HORIZON YEAR (2035) WITH PROJECT (ALT 1-2)			
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)	Δ (c)	SIGNIFICANT?
1	SR 94 (Campo Rd) & Via Mercado	AM	178.7	**F**	178.7	**F**	0.0	NO
		PM	312.4	**F**	312.4	**F**	0.0	NO
2	Jamacha Blvd. & SR 94 (Campo Rd)	AM	29.6	C	56.7	**E**	27.1	**YES**
		PM	84.5	**F**	87.6	**F**	3.1	**YES**
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	61.6	**E**	60.5	**E**	-1.1	NO
		PM	185.6	**F**	155.0	**F**	-30.6	NO
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	41.5	**D**	41.5	**D**	0.0	NO
		PM	43.4	**D**	43.4	**D**	0.0	NO
5	Steele Canyon Rd. & SR 94 (Campo Rd)	AM	50.9	**D**	25.6	C	-25.3	NO
		PM	124.4	**F**	31.4	C	-93.0	NO
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	AM	ECL	**F**	37.2	**D**	-	NO
		PM	ECL	**F**	22.3	C	-	NO
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	AM	388.9	**F**	388.9	**F**	0.0	NO
		PM	321.6	**F**	321.6	**F**	0.0	NO
8	SR 94 (Campo Rd) & Maxfield Rd.	AM	26.7	**D**	15.0	C	-11.7	NO
		PM	217.9	**F**	31.9	**D**	-186.0	NO
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	AM	38.9	**D**	12.8	B	-26.1	NO
		PM	259.5	**F**	16.0	B	-243.5	NO
10	SR 94 (Campo Rd) & Reservation Rd.	AM	87.1	**F**	4.8	A	-82.3	NO
		PM	ECL	**F**	7.8	A	-	NO
11	SR 94 (Campo Rd) & Honey Springs Rd.	As part of the County of San Diego's General Plan, the intersection of Honey Springs Road will be realigned to form a four-way intersection with Otay Lakes.						
12	SR 94 (Campo Rd) & Otay Lakes Rd.	AM	20.1	C	20.1	C	0.0	NO
		PM	30.4	C	30.4	C	0.0	NO

Notes:

Bold values indicate intersections operating at LOS D, E or F. **Bold and shaded** values indicate project significant impact.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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TABLE 9-2:
HORIZON YEAR (2035) WITH PROJECT (ALT 1-2)
PEAK-HOUR INTERSECTION LOS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	HORIZON YEAR (2035) NO BUILD		HORIZON YEAR (2035) WITH PROJECT (ALT 1-2)			
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)	Δ (c)	SIGNIFICANT?
1	SR 94 (Campo Rd) & Via Mercado	FRI PM	276.9	**F**	276.9	**F**	0.0	NO
		SAT PM	146.5	**F**	146.5	**F**	0.0	NO
2	Jamacha Blvd. & SR 94 (Campo Rd)	FRI PM	88.2	**F**	85.7	**F**	-2.5	NO
		SAT PM	36.6	**D**	43.8	**D**	7.2	**YES**
3	SR 94 (Campo Rd) & Jamacha Rd.	FRI PM	160.3	**F**	143.4	**F**	-16.9	NO
		SAT PM	99.0	**F**	95.2	**F**	-3.8	NO
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	FRI PM	23.9	C	23.9	C	0.0	NO
		SAT PM	9.5	A	9.5	A	0.0	NO
5	Steele Canyon Rd. & SR 94 (Campo Rd)	FRI PM	90.9	**F**	31.2	C	-59.7	NO
		SAT PM	31.5	C	19.8	B	-11.7	NO
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	FRI PM	ECL	**F**	18.3	B	-	NO
		SAT PM	1499.5	**F**	8.7	A	-1490.8	NO
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	FRI PM	307.0	**F**	307.0	**F**	0.0	NO
		SAT PM	140.5	**F**	140.5	**F**	0.0	NO
8	SR 94 (Campo Rd) & Maxfield Rd.	FRI PM	256.7	**F**	33.8	**D**	-222.9	NO
		SAT PM	52.7	**F**	20.7	C	-32.0	NO
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	FRI PM	352.2	**F**	18.2	B	-334.0	NO
		SAT PM	62.7	**E**	12.1	B	-50.6	NO
10	SR 94 (Campo Rd) & Reservation Rd.	FRI PM	ECL	**F**	11.2	B	-	NO
		SAT PM	ECL	**F**	8.3	A	-	NO
11	SR 94 (Campo Rd) & Honey Springs Rd.	As part of the County of San Diego's General Plan, the intersection of Honey Springs Road will be realigned to form a four-way intersection with Otay Lakes.						
12	SR 94 (Campo Rd) & Otay Lakes Rd.	FRI PM	39.3	**D**	39.3	**D**	0.0	NO
		SAT PM	17.5	B	17.5	B	0.0	NO

Notes:

Bold values indicate intersections operating at LOS D, E or F. **Bold and shaded** values indicate project significant impact.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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TABLE 9-3:
HORIZON YEAR (2035) WITH PROJECT (ALT 3)
PEAK-HOUR INTERSECTION LOS (WEEKDAY)

	INTERSECTION	PEAK HOUR	HORIZON YEAR (2035) NO BUILD		HORIZON YEAR (2035) WITH PROJECT (ALT 3)			
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)	Δ (c)	SIGNIFICANT?
1	SR 94 (Campo Rd) & Via Mercado	AM	178.7	**F**	178.7	**F**	0.0	NO
		PM	312.4	**F**	312.4	**F**	0.0	NO
2	Jamacha Blvd. & SR 94 (Campo Rd)	AM	29.6	C	56.7	**E**	27.1	**YES**
		PM	84.5	**F**	87.6	**F**	3.1	**YES**
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	61.6	**E**	60.5	**E**	-1.1	NO
		PM	185.6	**F**	155.0	**F**	-30.6	NO
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	41.5	**D**	41.5	**D**	0.0	NO
		PM	43.4	**D**	43.4	**D**	0.0	NO
5	Steele Canyon Rd. & SR 94 (Campo Rd)	AM	50.9	**D**	25.6	C	-25.3	NO
		PM	124.4	**F**	31.4	C	-93.0	NO
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	AM	ECL	**F**	37.2	**D**	-	NO
		PM	ECL	**F**	22.3	C	-	NO
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	AM	388.9	**F**	388.9	**F**	0.0	NO
		PM	321.6	**F**	321.6	**F**	0.0	NO
8	SR 94 (Campo Rd) & Maxfield Rd.	AM	26.7	**D**	15.0	C	-11.7	NO
		PM	217.9	**F**	31.9	**D**	-186.0	NO
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	AM	38.9	**D**	16.1	B	-22.8	NO
		PM	259.5	**F**	20.9	C	-238.6	NO
10	SR 94 (Campo Rd) & Reservation Rd.	AM	87.1	**F**	This intersection does not exist under this scenario.			
		PM	ECL	**F**				
11	SR 94 (Campo Rd) & Honey Springs Rd.	As part of the County of San Diego's General Plan, the intersection of Honey Springs Road will be realigned to form a four-way intersection with Otay Lakes.						
12	SR 94 (Campo Rd) & Otay Lakes Rd.	AM	20.1	C	20.1	C	0.0	NO
		PM	30.4	C	30.4	C	0.0	NO

Notes:

Bold values indicate intersections operating at LOS D, E or F. **Bold and shaded** values indicate project significant impact.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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TABLE 9-4:

HORIZON YEAR (2035) WITH PROJECT (ALT 3)

PEAK-HOUR INTERSECTION LOS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	HORIZON YEAR (2035) NO BUILD		HORIZON YEAR (2035) WITH PROJECT (ALT 3)			
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)	Δ (c)	SIGNIFICANT?
1	SR 94 (Campo Rd) & Via Mercado	FRI PM	276.9	**F**	276.9	**F**	0.0	NO
		SAT PM	146.5	**F**	146.5	**F**	0.0	NO
2	Jamacha Blvd. & SR 94 (Campo Rd)	FRI PM	88.2	**F**	85.7	**F**	-2.5	NO
		SAT PM	36.6	**D**	43.8	**D**	7.2	**YES**
3	SR 94 (Campo Rd) & Jamacha Rd.	FRI PM	160.3	**F**	143.4	**F**	-16.9	NO
		SAT PM	99.0	**F**	95.2	**F**	-3.8	NO
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	FRI PM	23.9	C	23.9	C	0.0	NO
		SAT PM	9.5	A	9.5	A	0.0	NO
5	Steele Canyon Rd. & SR 94 (Campo Rd)	FRI PM	90.9	**F**	31.2	C	-59.7	NO
		SAT PM	31.5	C	19.8	B	-11.7	NO
6	Indian Springs Dr./Lyons Valley Rd. & SR 94 (Campo Rd)	FRI PM	ECL	**F**	18.3	B	-	NO
		SAT PM	1499.5	**F**	8.7	A	-1490.8	NO
7	Proctor Valley Rd./Jefferson Rd. & SR 94 (Campo Rd)	FRI PM	307.0	**F**	307.0	**F**	0.0	NO
		SAT PM	140.5	**F**	140.5	**F**	0.0	NO
8	SR 94 (Campo Rd) & Maxfield Rd.	FRI PM	256.7	**F**	33.8	**D**	-222.9	NO
		SAT PM	52.7	**F**	20.7	C	-32.0	NO
9	SR 94 (Campo Rd) & Melody Rd./Peaceful Valley Ranch Rd.	FRI PM	352.2	**F**	22.2	C	-330.0	NO
		SAT PM	62.7	**E**	30.8	C	-31.9	NO
10	SR 94 (Campo Rd) & Reservation Rd.	FRI PM	ECL	**F**	This intersection does not exist under this scenario.			
		SAT PM	ECL	**F**				
11	SR 94 (Campo Rd) & Honey Springs Rd.	As part of the County of San Diego's General Plan, the intersection of Honey Springs Road will be realigned to form a four-way intersection with Otay Lakes.						
12	SR 94 (Campo Rd) & Otay Lakes Rd.	FRI PM	39.3	**D**	39.3	**D**	0.0	NO
		SAT PM	17.5	B	17.5	B	0.0	NO

Notes:

Bold values indicate intersections operating at LOS D, E or F. **Bold and shaded** values indicate project significant impact.

ECL = Exceeds Calculable Limit. Reported when delay exceeds 1500 seconds.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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TABLE 9-5:

HORIZON YEAR (2035) WITH PROJECT

ILV ANALYSIS (WEEKDAY)

	INTERSECTION	PEAK HOUR	HORIZON YEAR (2035) NO BUILD		HORIZON YEAR (2035) PLUS PROJECT ALTERNATIVES 1 - 2		HORIZON YEAR (2035) PLUS PROJECT ALTERNATIVE 3	
			ILV/HR TOTAL	CAPACITY	ILV/HR TOTAL	CAPACITY	ILV/HR TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	AM	2104	**Above Capacity**	2104	**Above Capacity**	2104	**Above Capacity**
		PM	2600	**Above Capacity**	2600	**Above Capacity**	2600	**Above Capacity**
2	SR 94 (Campo Rd) & Jamacha Blvd.	AM	1061	Below Capacity	1304	Approaching Capacity	1304	Approaching Capacity
		PM	1739	**Above Capacity**	1626	**Above Capacity**	1626	**Above Capacity**
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	1419	Approaching Capacity	1419	Approaching Capacity	1419	Approaching Capacity
		PM	1951	**Above Capacity**	1951	**Above Capacity**	1951	**Above Capacity**
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	1565	**Above Capacity**	1565	**Above Capacity**	1565	**Above Capacity**
		PM	1680	**Above Capacity**	1680	**Above Capacity**	1680	**Above Capacity**
5	SR 94 (Campo Rd) & Steele Canyon Rd.	AM	1604	**Above Capacity**	1144	Below Capacity	1144	Below Capacity
		PM	1904	**Above Capacity**	1138	Below Capacity	1138	Below Capacity
6	SR 94 (Campo Rd) & Lyons Valley Rd	AM	This intersection won't be signalized under this scenario		1625	**Above Capacity**	1625	**Above Capacity**
		PM			1584	**Above Capacity**	1584	**Above Capacity**
7	SR 94 (Campo Rd) & Jefferson Rd	AM	3025	**Above Capacity**	3025	**Above Capacity**	3025	**Above Capacity**
		PM	2204	**Above Capacity**	2204	**Above Capacity**	2204	**Above Capacity**
9	SR 94 (Campo Rd) & Melody Rd	AM	This intersection won't be signalized under this scenario		774	Below Capacity	671	Below Capacity
		PM			1056	Below Capacity	762	Below Capacity
10	SR 94 (Campo Rd) & Reservation Rd or Daisy Drive	AM	This intersection won't be signalized under this scenario		514	Below Capacity	This intersection won't be signalized under this scenario	
		PM			874	Below Capacity		
12	SR 94 (Campo Rd) & Otay Lakes Rd	AM	This intersection won't be signalized under this scenario		1002	Below Capacity	1002	Below Capacity
		PM			1189	Below Capacity	1189	Below Capacity

Notes:

<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity

Bold values indicate intersections operating above capacity.

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TABLE 9-6:

HORIZON YEAR (2035) WITH PROJECT

ILV ANALYSIS (FRIDAY/SATURDAY)

	INTERSECTION	PEAK HOUR	HORIZON YEAR (2035) NO BUILD		HORIZON YEAR (2035) PLUS PROJECT ALTERNATIVES 1 - 2		HORIZON YEAR (2035) PLUS PROJECT ALTERNATIVE 3	
			ILV/HR TOTAL	CAPACITY	ILV/HR TOTAL	CAPACITY	ILV/HR TOTAL	CAPACITY
1	SR 94 (Campo Rd) & Via Mercado	AM	2540	**Above Capacity**	2540	**Above Capacity**	2540	**Above Capacity**
		PM	2030	**Above Capacity**	2030	**Above Capacity**	2030	**Above Capacity**
2	SR 94 (Campo Rd) & Jamacha Blvd.	AM	1781	**Above Capacity**	1550	**Above Capacity**	1550	**Above Capacity**
		PM	1447	Approaching Capacity	1327	Approaching Capacity	1327	Approaching Capacity
3	SR 94 (Campo Rd) & Jamacha Rd.	AM	2150	**Above Capacity**	2150	**Above Capacity**	2150	**Above Capacity**
		PM	1600	**Above Capacity**	1600	**Above Capacity**	1600	**Above Capacity**
4	SR 94 (Campo Rd) & Cougar Canyon Rd.	AM	1523	**Above Capacity**	1523	**Above Capacity**	1523	**Above Capacity**
		PM	960	Below Capacity	960	Below Capacity	960	Below Capacity
5	SR 94 (Campo Rd) & Steele Canyon Rd.	AM	1715	**Above Capacity**	1063	Below Capacity	1063	Below Capacity
		PM	1212	Approaching Capacity	851	Below Capacity	851	Below Capacity
6	SR 94 (Campo Rd) & Lyons Valley Rd	AM	This intersection won't be signalized under this scenario		1626	**Above Capacity**	1626	Above Capacity
		PM			1339	Approaching Capacity	1339	Approaching Capacity
7	SR 94 (Campo Rd) & Jefferson Rd	AM	3025	**Above Capacity**	3025	**Above Capacity**	3025	**Above Capacity**
		PM	2204	**Above Capacity**	2204	**Above Capacity**	2204	**Above Capacity**
9	SR 94 (Campo Rd) & Melody Rd	AM	This intersection won't be signalized under this scenario		1222	Approaching Capacity	873	Approaching Capacity
		PM			975	Below Capacity	860	Below Capacity
10	SR 94 (Campo Rd) & Reservation Rd or Daisy Drive	AM	This intersection won't be signalized under this scenario		1114	Below Capacity	This intersection won't be signalized under this scenario	
		PM			947	Below Capacity		
12	SR 94 (Campo Rd) & Otay Lakes Rd	AM	This intersection won't be signalized under this scenario		1379	Approaching Capacity	1379	Approaching Capacity
		PM			818	Below Capacity	818	Below Capacity

Notes:

<1200 = Below Capacity, 1201 - 1500 = Approaching Capacity, >1500 = Above Capacity

Bold values indicate intersections operating above capacity.

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HCM Peak-Hour Arterial Analysis

Tables 9-7 thru 9-8 display the peak-hour arterial analysis along SR 94 (Campo Road) between Via Mercado and Jefferson Road/Proctor Valley Road under Horizon Year (2035) with Project Conditions. As shown in the table, with the exception of the eastbound direction during the morning peak-hour period, SR 94 (Campo Road) will operate at better than before project conditions during all peak-hour periods analyzed. Although overall vehicular traffic speed would decrease during the morning peak-hour period in the eastbound direction, the corridor will operate at LOS C, which is an acceptable LOS for Caltrans.

Appendix G contains the peak-hour arterial analysis worksheets.

HCM Peak-Hour Two-Lane Highway Analysis

With the completion of the project, new traffic signals will be installed at the following intersections:

- SR 94 (Campo Road) and Lyons Valley Road;
- SR 94 (Campo Road) and Melody Road; and
- SR 94 (Campo Road) and Reservation Road or Daisy Drive (Alternatives 1 and 2 only).

The installation of traffic signals at these locations will change the characteristics of the roadway operations between Proctor Valley Road and Otay Lakes Road making the HCM peak-hour two-lane highway analysis no longer applicable. With the installation of the traffic signals, this segment would operate as an arterial since traffic signals will be located within a 2 mile distance from each other. **Tables 9-9 and 9-10** show the results of the HCM Peak-Hour Arterial Analysis for the segment between Via Mercado and Melody Road. As shown in the Table, the results of the analysis show that during the weekdays, the eastbound movement would operate at LOS D or better and operate at LOS E in the westbound direction. During the weekend p.m. peak hour periods, arterial speeds on Friday would operate at LOS E or better and LOS D or better on Saturday.

TABLE 9-7:
HORIZON YEAR (2035) WITH PROJECT (ALT 1-3)
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (WEEKDAY)

ROADWAY SEGMENT	DIRECTION	HORIZON YEAR NO BUILD		HORIZON YEAR WITH PROJECT (ALT 1-3)			
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)	Δ	SIGNIFICANT?
AM PEAK							
SR 94							
Via Mercado to Proctor Valley Rd	EB	33.8	C	33.5	C	-0.3	NO
	WB	24.8	**D**	25.2	**D**	0.4	NO
PM PEAK							
SR 94							
Via Mercado to Proctor Valley Rd	EB	16.6	**E**	21.8	**D**	5.2	NO
	WB	17.8	**E**	18.0	**E**	0.2	NO

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

TABLE 9-8:
HORIZON YEAR (2035) WITH PROJECT (ALT 1-3)
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS (FRIDAY/SATURDAY)

ROADWAY SEGMENT	DIRECTION	HORIZON YEAR NO BUILD		HORIZON YEAR WITH PROJECT (ALT 1-3)			
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)	Δ	SIGNIFICANT?
FRIDAY PM							
SR 94							
Via Mercado to Proctor Valley Rd	EB	19.3	**E**	23.1	**D**	3.8	NO
	WB	16.4	**E**	16.6	**E**	0.2	NO
SATURDAY PM							
SR 94							
Via Mercado to Proctor Valley Rd	EB	33.7	C	34.1	B	0.4	NO
	WB	21.3	**D**	21.7	**D**	0.4	NO

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 9-9:
HORIZON YEAR (2035) WITH PROJECT (ALT 1-3)
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS TO MELODY RD (WEEKDAY)

ROADWAY SEGMENT	DIRECTION	AM PEAK		PM PEAK	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Reservation Rd	EB	35.0	B	23.6	**D**
	WB	20.1	**E**	17.2	**E**

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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TABLE 9-10:
HORIZON YEAR (2035) WITH PROJECT (ALT 1-3)
PEAK-HOUR ARTERIAL SEGMENT ANALYSIS TO MELODY RD (FRIDAY/SATURDAY)

ROADWAY SEGMENT	DIRECTION	FRIDAY		SATURDAY	
		SPEED (a)	LOS (b)	SPEED (a)	LOS (b)
SR 94					
Via Mercado to Reservation Rd	EB	24.6	**D**	34.7	B
	WB	17.3	**E**	22.0	**D**

Notes:

(a) Speed is calculated as the roadway segment distance divided by the travel time in miles per hour (mph).

(b) The arterial LOS is based on average through-vehicle travel speed for the segment or for the entire street under consideration and is influenced both by the number of signals per mile and by the intersection control delay.

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Recommended Mitigation Measures

As shown in Tables 9-1 thru 9-4, the Proposed Project would make a cumulatively considerable contribution to a significant traffic impact at the intersection of SR 94 (Campo Road) and Jamacha Boulevard. To mitigate its cumulative traffic related impact, the project will make a monetary contribution toward the installation of an exclusive northbound left-turn lane and necessary roadway widening and signal modification.

Table 9-11 displays the mitigated peak-hour LOS summary at the intersection of SR 94 (Campo Road) and Jamacha Boulevard under the Horizon Year (2035) with Project Conditions. As shown in the Table, with the proposed improvements, the intersection would operate at better than before project conditions or at acceptable LOS.

Appendix E contains the intersection LOS worksheets.

TABLE 9-11:

HORIZON YEAR (2035) WITH PROJECT MITIGATION

PEAK-HOUR INTERSECTION LOS SUMMARY

	INTERSECTION	PEAK HOUR	HORIZON YEAR (2035) WITH PROJECT		HORIZON YEAR (2035) WITH PROJECT WITH MITIGATION	
			DELAY (a)	LOS (b)	DELAY (a)	LOS (b)
2	Jamacha Blvd. & SR 94 (Campo Rd)	AM	56.7	**E**	30.5	C
		PM	87.6	**F**	65.9	**E**
2	Jamacha Blvd. & SR 94 (Campo Rd)	FRI PM	85.7	**F**	63.0	**E**
		SAT PM	43.8	**D**	33.0	C

Notes:

Bold values indicate intersections operating at LOS D, E or F.

(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At a two-way stop-controlled intersection, delay refers to the worst movement.

(b) LOS calculations are based on the methodology outlined in the *2000 Highway Capacity Manual* and performed using Synchro 8.0

(c) Change in delay due to addition of project traffic

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10.0 OPERATION ANALYSIS

This section of the report provides additional operation analysis for the different project Alternatives along SR 94 (Campo Road) between the area west of Melody Road to just east of Reservation Road. This section includes a signal warrant evaluation and a queuing analysis.

Signal Warrant Analysis

The project includes the signalization of the following three intersections:

- SR 94 (Campo Road) & Lyon Valley Road (All Alternatives);
- SR 94 (Campo Road) & Melody Road (All Alternatives); and
- SR 94 (Campo Road) & Reservation Road (Alternatives 1 and 2 only)

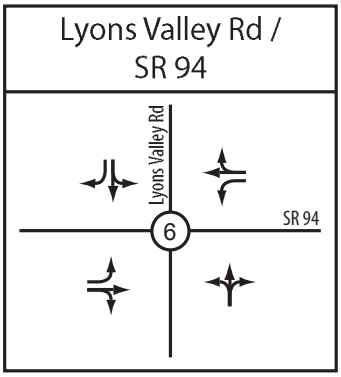
A signal warrant analysis was conducted using the Existing Baseline with JIV Gaming Project Traffic with Project peak-hour volumes. Peak-hour warrant guidelines can be found in the 2012 Edition of the California Manual on Uniform Traffic Control Devices (CA-MUTCD) under Section 4C.04, Warrant 3. For these intersections, SR 94 (Campo Road) is the major street and Melody Road and/or Reservation Road are the minor streets. As previously mentioned, SR 94 (Campo Road) has a posted speed limit of 55 miles per hour. Because the speed limit on the major street exceeds 40 miles per hour, Figure 4C-4 in the CA-MUTCD can be used to evaluate the signal warrant criteria.

In order for these intersections to warrant a traffic signal installation, a point representing the vehicles per hour on SR 94 (Campo Road) (total of both approaches) and the corresponding vehicles per hour on minor street approaches (one direction only) for one hour of a typical day must be plotted on the CA-MUTCD Figure 4C-4 graph and that point must be above the curve representing the 1 lane in each direction of traffic.

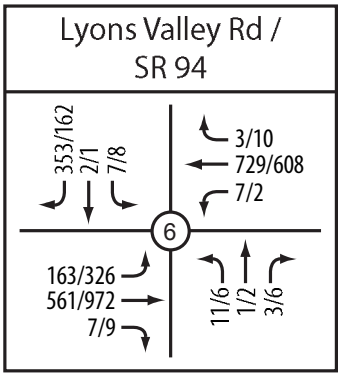
In **Figure 10-1**, the Existing Baseline with JIV Gaming Project Traffic with project peak-hours volumes were plotted on the CA-MUTCD Figure 4C-4 graph for the intersection of SR 94 (Campo Road) and Lyons Valley Road. The warrant analysis indicates that a traffic signal is warranted at this intersection during all the peak-hour periods analyzed.

In **Figure 10-2**, the Existing Baseline with JIV Gaming Project Traffic with project peak-hours volumes were plotted on the CA-MUTCD Figure 4C-4 graph for the intersection of SR 94 (Campo Road) and Melody Road. As shown in the figure, the warrant analysis indicates that a traffic signal is not warranted at this intersection during any of the peak-hour periods analyzed. As shown in **Figure 10-3**, when the Horizon Year (2035) with Project peak-hour volumes are plotted in the graph, the figure shows that a traffic signal will be warranted at this location.

In **Figure 10-4**, the Existing Baseline with JIV Gaming Project Traffic with project peak-hours volumes were plotted on the CA-MUTCD Figure 4C-4 graph for the intersection of SR 94 (Campo Road) and Reservation Road. As shown in the figure, the warrant analysis indicates that a traffic signal is warranted at this intersection during any of the peak-hour periods analyzed.



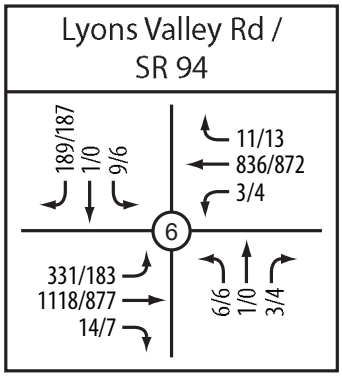
With Project Geometrics



Existing + Casino Weekday Peak-Hour Volumes (AM/PM)

Major Street: SR 94 (55 MPH)
Volume (both approaches): **1470 / 1927** VPH

Minor Street: Lyons Valley Rd
Volume (one approach): **362 / 171** VPH

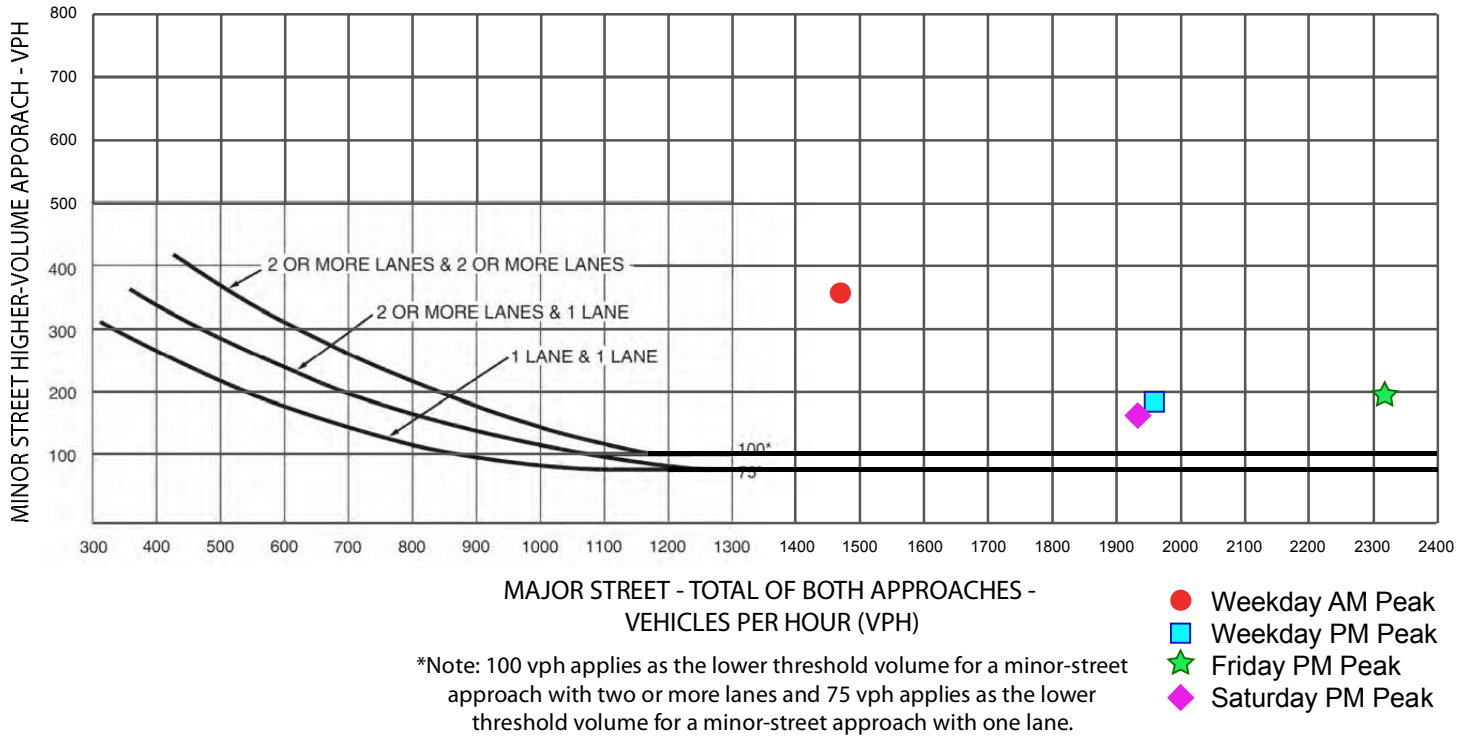


Existing + Casino Friday/Saturday Peak-Hour Volumes (Fri PM/Sat PM)

Major Street: SR 94 (55 MPH)
Volume (both approaches): **2313 / 1956** VPH

Minor Street: Lyons Valley Rd
Volume (one approach): **199 / 193** VPH

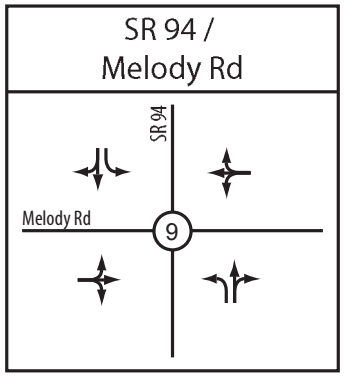
Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



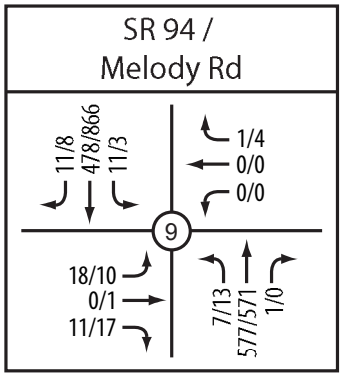
*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Kimley-Horn and Associates, Inc.

FIGURE 10-1
SR 94 (Campo Road) & Lyons Valley Road Traffic Signal Warrant



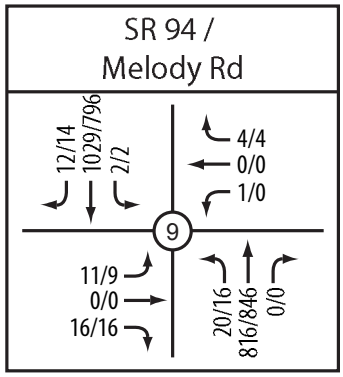
With Project Geometrics



Existing + Casino Weekday Peak-Hour Volumes (AM/PM)

Major Street: SR 94 (55 MPH)
Volume (both approaches): **1085 / 1461** VPH

Minor Street: Melody Rd
Volume (one approach): **29 / 28** VPH



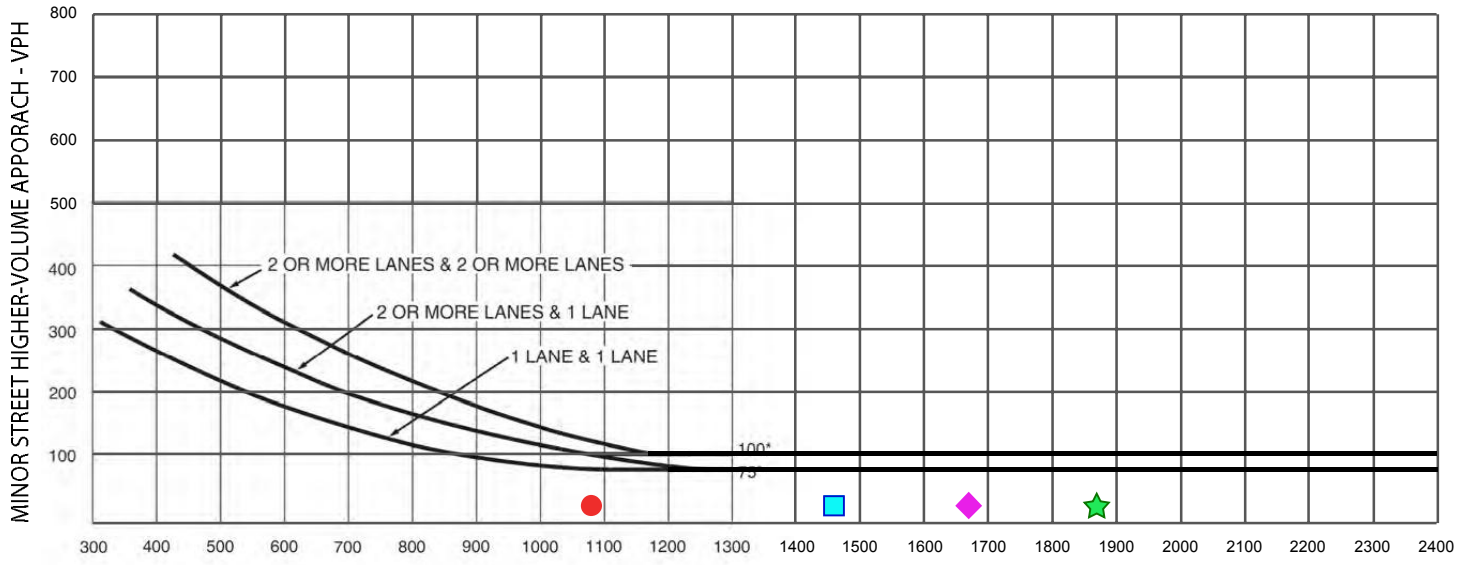
Existing + Casino Friday/Saturday Peak-Hour Volumes (Fri PM/Sat PM)

Major Street: SR 94 (55 MPH)
Volume (both approaches): **1877 / 1674** VPH

Minor Street: Melody Rd
Volume (one approach): **27/ 25** VPH

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

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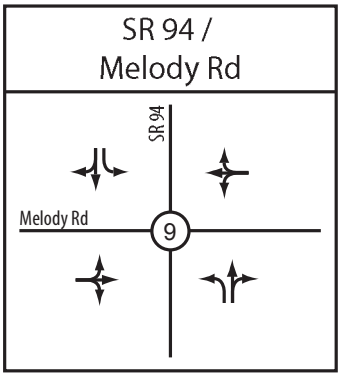
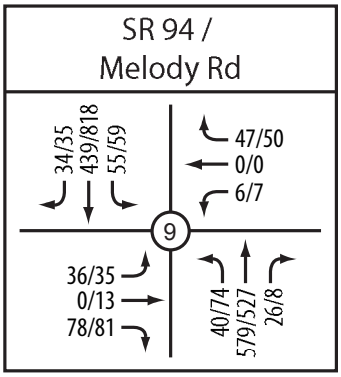
FIGURE 10-2

SR 94 (Campo Road) & Melody Road Traffic Signal Warrant



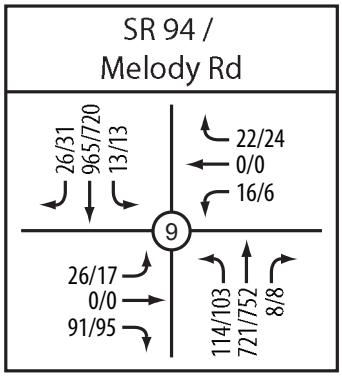
With Project Geometrics



Horizon Year (Year 2035) Weekday Peak-Hour Volumes (AM/PM)

Major Street: SR 94 (55 MPH)
Volume (both approaches): **1173 / 1521** VPH

Minor Street: Melody Rd
Volume (one approach): **114 / 129** VPH



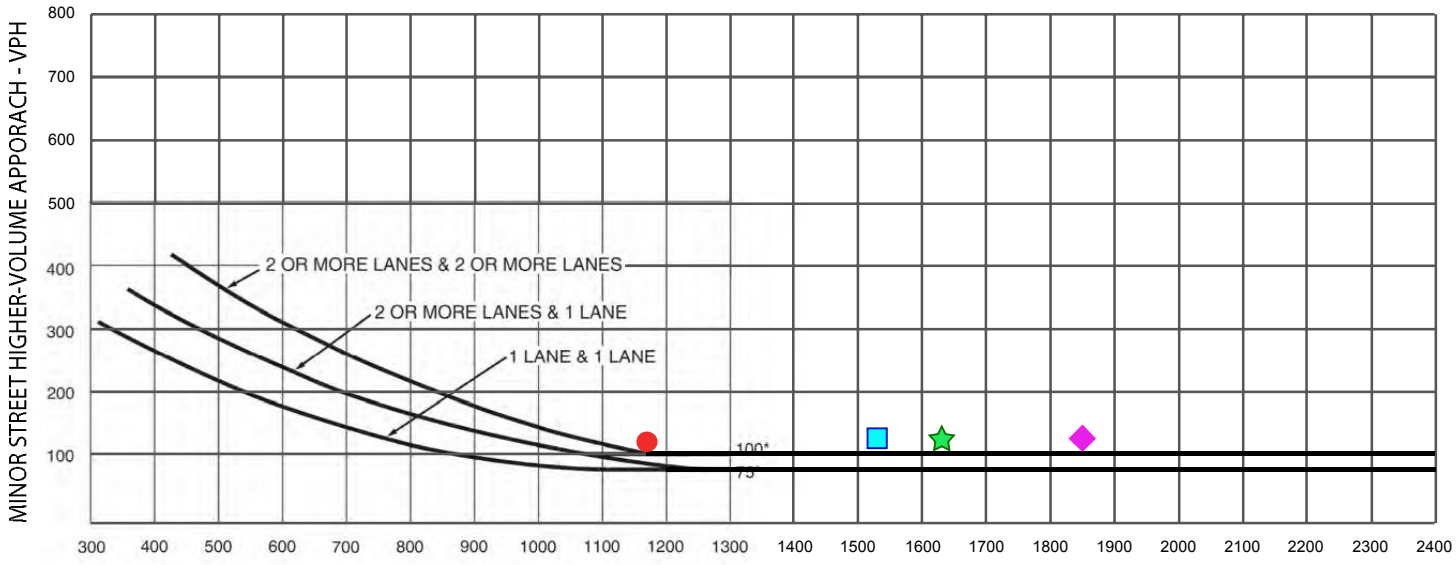
Horizon Year (Year 2035) Friday/Saturday Peak-Hour Volumes (Fri PM/Sat PM)

Major Street: SR 94 (55 MPH)
Volume (both approaches): **1847 / 1627** VPH

Minor Street: Melody Rd
Volume (one approach): **117/ 112** VPH

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

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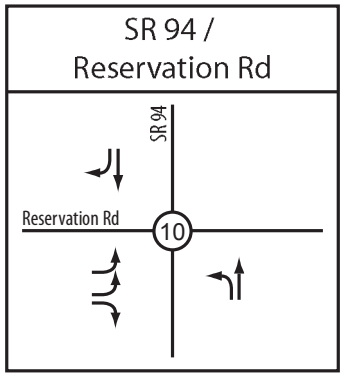
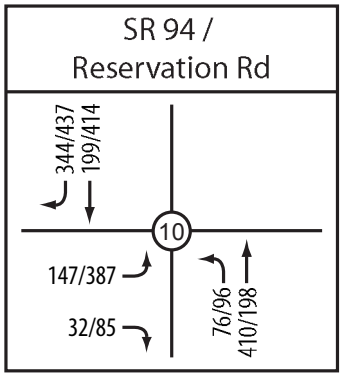
FIGURE 10-3

SR 94 (Campo Road) & Melody Road Traffic Signal Warrant



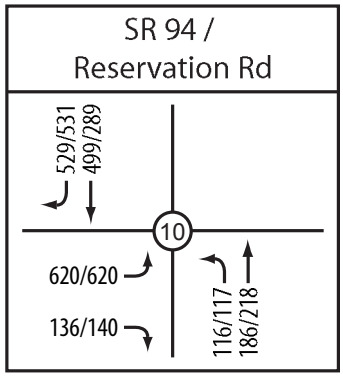
With Project Geometrics



Existing + Casino Weekday Peak-Hour Volumes (AM/PM)

Major Street: SR 94 (55 MPH)
Volume (both approaches): **1029 / 1145** VPH

Minor Street: Reservation Rd
Volume (one approach): **179 / 472** VPH



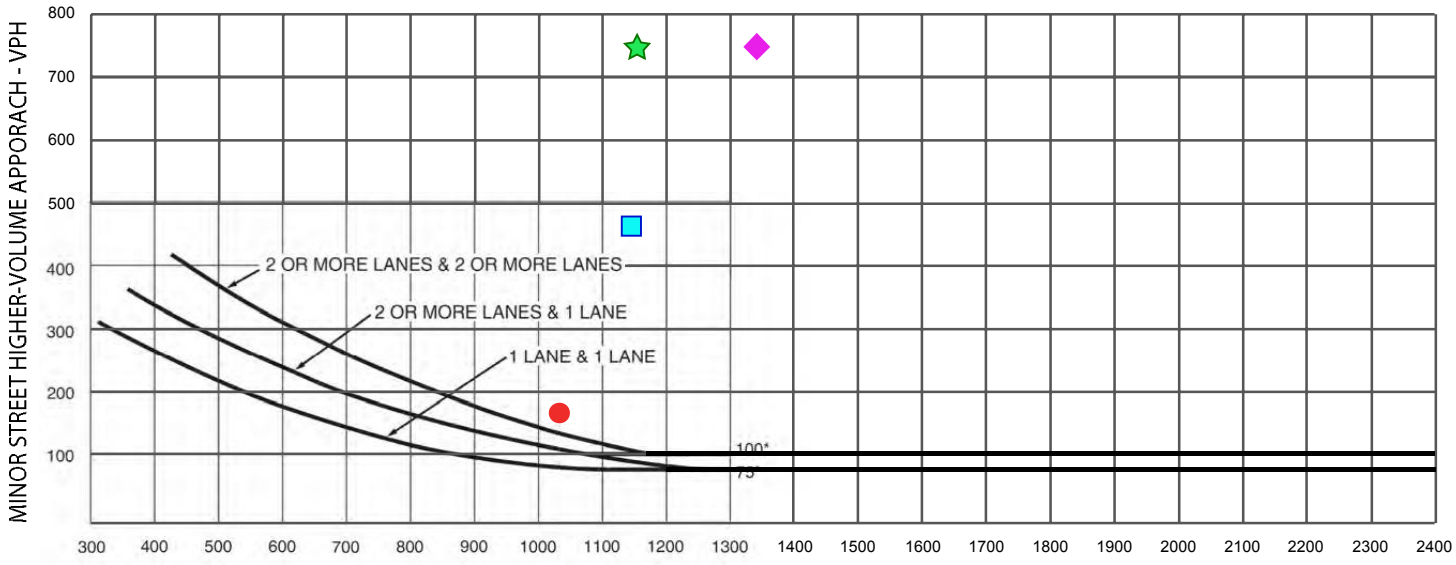
Existing + Casino Friday/Saturday Peak-Hour Volumes (Fri PM/Sat PM)

Major Street: SR 94 (55 MPH)
Volume (both approaches): **1330 / 1155** VPH

Minor Street: Reservation Rd
Volume (one approach): **756 / 760** VPH

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Queuing Analysis

A queuing analysis was conducted at the intersection of SR 94 (Campo Road) and Melody Road and SR 94 (Campo Road) and Reservation Road (or Daisy Drive). The purpose of this analysis was to document the differences between each of the Proposed Project Alternatives with respect to queuing. **Tables 10-1 10-2** display the estimated traffic queues at these intersections, using the Synchro 8.0 software package, for the 2035 Horizon Year with Project conditions. All queues are expressed as the 50th and 95th percentile queue. The 95th percentile queue is often used to determine the design length of turn pockets. The 95th percentile represents the queues that would be expected to be exceeded only 5 percent of the time.

As shown in the tables, it is expected that all anticipated queues will be accommodated with the proposed storage lengths.

Construction Traffic

As part of the Proposed Project, a Traffic Management Plan (TMP) will be prepared. This TMP will be prepared in conformance with the Department's District 11 Transportation Management Plan Guidelines, dated February 1, 2006 and Deputy Directives 60 and 64.

The goal of this TMP will be to identify a program for preventing traffic congestion and accidents during construction of the proposed improvements along State Route 94 (SR 94). The TMP program is based on the effective application of traditional traffic handling practices and an innovative combination of public and motorist, bicyclist, and pedestrian information, incident management, and strategies for construction, demand management, and alternative routes. It is anticipated that the following list of strategies will be included in the TMP document:

- Public Information
    - Public Awareness Campaign (PAC)
- Motorist Information Strategies
    - Portable Changeable Message Signs (PCMS)
    - Ground Mounted Signs
    - Caltrans Highway Information Network (CHIN)
    - SANDAG's 5-1-1 Traffic Service
- Incident Management
    - Construction Zone Enhanced Enforcement Program (COZEEP)
    - Traffic Management Team (TMT)
- Construction Strategies
    - Project Phasing
    - Lane Closure Charts
    - Lane Modifications
    - Off-peak/Night/Weekend Work
    - Speed Limit Reduction

TABLE 10-1:
HORIZON YEAR (2035) WITH PROJECT (ALT 1-3) QUEUING SUMMARY (WEEKDAY)

	INTERSECTION	DIR	YEAR 2035 WITH PROJECT CONDITIONS AVAILABLE STORAGE	AM PEAK QUEUE 50TH	AM PEAK QUEUE 95TH	PM PEAK QUEUE 50TH	PM PEAK QUEUE 95TH
ALTERNATIVE 1							
9	SR 94 & Melody Rd./Peaceful Valley Ranch Rd.	EBT	1000 ft	1 ft	31 ft	10 ft	42 ft
		WBT	325 ft		8 ft		9 ft
		NBL	540 ft	6 ft	30 ft	17 ft	**59 ft**
		NBT	> 750 ft	54 ft	**306 ft**	51 ft	**271 ft**
		SBL	450 ft	9 ft	38 ft	13 ft	41 ft
		SBT	650 ft	37 ft	**213 ft**	**265 ft**	**493 ft**
10	SR 94 & Reservation Rd.	EBL	300 ft	12 ft	31 ft	42 ft	71 ft
		EBR	300 ft		16 ft		25 ft
		NBL	550 ft	18 ft	**69 ft**	29 ft	**104 ft**
		NBT	> 750 ft	41 ft	91 ft	25 ft	65 ft
		SBT	> 750 ft	50 ft	105 ft	131 ft	**332 ft**
		SBR	> 750 ft		35 ft		46 ft
ALTERNATIVE 2							
9	SR 94 & Melody Rd./Peaceful Valley Ranch Rd.	EBT	1000 ft	1 ft	31 ft	10 ft	42 ft
		WBT	325 ft		8 ft		9 ft
		NBL	660 ft	6 ft	30 ft	17 ft	59 ft
		NBT	> 750 ft	54 ft	306 ft	51 ft	271 ft
		SBL	410 ft	9 ft	38 ft	13 ft	41 ft
		SBT	650 ft	37 ft	213 ft	265 ft	493 ft
10	SR 94 & Daisy Rd.	EBL	300 ft	12 ft	31 ft	42 ft	71 ft
		EBR	300 ft		16 ft		25 ft
		NBL	680 ft	18 ft	69 ft	29 ft	104 ft
		NBT	> 750 ft	41 ft	91 ft	25 ft	65 ft
		SBT	> 750 ft	50 ft	105 ft	131 ft	332 ft
		SBR	> 750 ft		35 ft		46 ft
ALTERNATIVE 3							
9	SR 94 & Melody Rd./Peaceful Valley Ranch Rd.	EBL	200 ft	22 ft	45 ft	54 ft	92 ft
		EBT	640 ft	1 ft	28 ft	5 ft	42 ft
		WBT	325 ft	2 ft	27 ft	2 ft	31 ft
		NBL	515 ft	17 ft	39 ft	22 ft	60 ft
		NBT	> 750 ft	138 ft	332 ft	58 ft	132 ft
		SBL	400 ft	17 ft	57 ft	20 ft	71 ft
		SBT	650 ft	37 ft	85 ft	148 ft	366 ft
		SBR	370 ft		47 ft		59 ft

Notes:
EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound; L = left turn; T = through movement; R = right turn
Bold values indicate queues that could be longer.
(a) Queues length were calculated using Synchro 8.0 software.

TABLE 10-2:
HORIZON YEAR (2035) WITH PROJECT (ALT 1-3) QUEUING SUMMARY (FRIDAY/SATURDAY)

INTERSECTION		DIR	YEAR 2035 WITH PROJECT CONDITIONS				
			AVAILABLE STORAGE	FRI PM PEAK		SAT PM PEAK	
				QUEUE 50TH	QUEUE 95TH	QUEUE 50TH	QUEUE 95TH
ALTERNATIVE 1							
9	SR 94 & Melody Rd./Peaceful Valley Ranch Rd.	EBT	1000 ft	2 ft	32 ft	1 ft	30 ft
		WBT	325 ft		2 ft		
		NBL	540 ft	26 ft	93 ft	23 ft	**82 ft**
		NBT	> 750 ft	75 ft	**391 ft**	79 ft	**408 ft**
		SBL	450 ft	3 ft	15 ft	3 ft	14 ft
		SBT	650 ft	329 ft	**565 ft**	**170 ft**	**402 ft**
10	SR 94 & Reservation Rd.	EBL	300 ft	74 ft	115 ft	74 ft	115 ft
		EBR	300 ft		30 ft		31 ft
		NBL	550 ft	41 ft	**131 ft**	41 ft	**132 ft**
		NBT	> 750 ft	28 ft	59 ft	33 ft	69 ft
		SBT	> 750 ft	247 ft	430 ft	379 ft	**593 ft**
		SBR	> 750 ft		53 ft		
ALTERNATIVE 2							
9	SR 94 & Melody Rd./Peaceful Valley Ranch Rd.	EBT	1000 ft	2 ft	32 ft	1 ft	30 ft
		WBT	325 ft		2 ft		
		NBL	660 ft	26 ft	93 ft	23 ft	82 ft
		NBT	> 750 ft	75 ft	391 ft	79 ft	408 ft
		SBL	410 ft	3 ft	15 ft	3 ft	14 ft
		SBT	650 ft	329 ft	565 ft	170 ft	402 ft
10	SR 94 & Daisy Rd.	EBL	300 ft	74 ft	115 ft	74 ft	115 ft
		EBR	300 ft		30 ft		31 ft
		NBL	680 ft	41 ft	131 ft	41 ft	132 ft
		NBT	> 750 ft	28 ft	59 ft	33 ft	69 ft
		SBT	> 750 ft	247 ft	430 ft	379 ft	593 ft
		SBR	> 750 ft		53 ft		
ALTERNATIVE 3							
9	SR 94 & Melody Rd./Peaceful Valley Ranch Rd.	EBL	200 ft	64 ft	140 ft	111 ft	161 ft
		EBT	640 ft	2 ft	44 ft	3 ft	50 ft
		WBT	325 ft	5 ft	30 ft	3 ft	23 ft
		NBL	515 ft	25 ft	83 ft	37 ft	89 ft
		NBT	> 750 ft	32 ft	133 ft	103 ft	176 ft
		SBL	400 ft	4 ft	20 ft	6 ft	22 ft
		SBT	650 ft	145 ft	436 ft	124 ft	233 ft
		SBR	370 ft		64 ft		75 ft

Notes:

EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound; L = left turn; T = through movement; R = right turn

Bold values indicate queues that could be longer.

(a) Queues length were calculated using Synchro 8.0 software.

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11.0 FINDINGS AND RECOMMENDATIONS

The results of the traffic study analysis have determined the traffic impacts from the proposed SR 94 Improvement Project. The following summarize the key findings and conclusions of the analysis. The Proposed Project is the construction of access road improvements on State Route 94 (SR-94) associated to the Jamul Indian Village (JIV) Gaming Project and five off-site mitigation measures per the certified *Jamul Indian Village Final Tribal EE*, dated January 2013.

Summary of Findings and Recommendations

The JIV is proposing three build alternatives adjacent to their property along SR-94 to access the future gaming facility. In addition to the access road improvements, the JIV also proposes to improve five intersections along SR-94 to address anticipated traffic generated from their future gaming facility. The five intersection improvements will be a project feature of all the access road alternatives. The intersections to be improved include:

6. SR94/Jamacha Boulevard Intersection: Restripe the northbound left-turn lane to a northbound through shared left-turn lane and restripe the northbound through shared left-turn lane to a northbound right-turn lane (including required traffic signal modifications). The proposed improvements would affect Jamacha Boulevard, which is within the County.

7. SR94/Jamacha Road Intersection: Add a second eastbound right-turn lane and retaining wall (including required traffic signal modifications). The right-turn lane would extend beyond the existing Caltrans ROW. Modify northbound striping on Jamacha Road to have the left through-lane lead directly into the left-turn lanes.

8. SR94/Steele Canyon Road Intersection: Add a second eastbound and westbound through lane. Install traffic signal equipment, such as detection system, conduits and pullboxes. Two of the approaches are within the County ROW.

9. SR94/Lyons Valley Road Intersection: Install a traffic signal. Traffic signal equipment, such as detection system, conduits and pullboxes would have to be installed within the County's ROW.

10. SR94/Maxfield Road Intersection: Restripe the northbound approaches along SR94 to include an acceleration lane. This improvement will also include the widening of SR94 north of Maxfield Road necessary to accommodate additional acceleration lane.

Alternative 1: Reservation Road Access

Alternative 1 proposes improvements to SR-94 from approximately 1,200 feet north of Melody Road to approximately 1,800 feet south of Reservation Road, for a total length of approximately 0.9 miles. The alignment of SR-94 is realigned to provide flatter horizontal and vertical curvature, as well as pavement cross slope and superelevation me K:\SND_TPTO\095848001 - JIV Design\Reports\Traffic Report\TIA-CEQA\PDFeting current design standards. Lanes and shoulders are widened where necessary to also meet current standards.

New traffic signals would be installed for Alternative 1 at the intersection of SR-94/Melody Road, and also at the intersection of SR-94/Reservation Road, which is the proposed JIV access location for Alternative 1. Exclusive left-turn lanes would be provided along SR-94 for the north to west move onto

Melody Road, and the south to east move onto Peaceful Valley Ranch Road. Likewise, an exclusive left-turn lane would be provided for the north to west move onto Reservation Road. In addition, a second southbound through lane would be provided along SR-94 between Melody Road and Reservation Road. Alternative 1 also widens Melody Road and Peaceful Valley Ranch Road to provide exclusive left-turn lanes onto SR-94 for overall improved intersection operation. The length of improvements along Melody Road and Peaceful Valley Ranch Road are approximately 700 feet and 500 feet, respectively. The intersection of SR-94/Reservation Road is also reconfigured with Alternative 1 to provide an intersection angle which meets current design standards. Retaining walls are proposed for Alternative 1 in order to minimize ROW requirements and environmental impacts. The five previously stated SR-94 intersection improvements apply to Alternative 1.

Alternative 2: Four-Acre Access (Daisy Drive)

Alternative 2 proposes improvements along SR-94 from an area north of Melody Road to an area south of the JIV property. Three options using the same entrance are addressed under Alternative 2. While maintaining the same entrance, each of these options contains separate ROW requirements. The JIV access driveway for Alternative 2 is located approximately 500 feet north of existing Reservation Road, at "Daisy Drive." Locating the access point at Daisy Drive decreases the intersection spacing to Melody Road, but shortens the project limits at the southern end. The Alternative 2 realignment of SR-94 maintains an alignment on the west side of existing SR-94, south of Daisy Drive, which results in one less horizontal curve along SR-94 within the project limits.

Alternative 2: Option 1 (Full Disturbed Area)

Option 1 proposes to improve SR-94 from approximately 1,200 feet north of Melody Road to approximately 1,400 feet south of existing Reservation Road, for a total length of approximately 0.8 miles. Similar to Alternative 1, SR-94 is realigned and widened as part of Option 1 to improve traffic operations. No design exceptions are needed for Option 1.

Proposed traffic signals and exclusive left-turn lanes for Alternative 2: Option 1 are the same as for Alternative 1, except the traffic signal for access to the JIV Gaming Project is provided at Daisy Drive instead of Reservation Road. In Addition, Option 1 would provide an additional northbound lane along SR-94 between Daisy Drive and Peaceful Valley Ranch Road to accommodate the expected dual left-turn lanes departing from the access driveway at Daisy Drive. Improvements to Melody Road and Peaceful Valley Ranch Road are the same for Alternatives 1 and 2: Option 1. Retaining walls associated with Alternative 2: Option 1 are reduced when compared to Alternative 1. The five previously stated SR-94 intersection improvements apply to Alternative 2: Option 1.

Alternative 2: Option 2 (Reduced Disturbed Area)

Option 2 proposes to improve SR-94 from about 1200 feet north of Melody Road to about 1400 feet south of existing Reservation Road, for a total length of approximately 0.8 miles. The project limits north and south along SR-94 are the same as stated for Alternative 2: Option 1. Alternative 2: Option 2 differs from Option 1 in that ROW impacts are reduced within private property and environmentally sensitive areas. The Option 2 centerline alignment for SR-94 is shifted to the west through the intersection with Melody Road with the use of a reduced radius, and a broken-back curve (two curves with a short tangent deflecting in the same direction) is introduced between Melody Road and the proposed access driveway at Daisy Drive. The introduction of a reduced radius and broken-back horizontal curvature helps facilitate the reduced ROW impact associated with Option 2.

Proposed traffic signals and left-turn lanes are the same as stated for Alternative 2: Option 1, with the exception that no exclusive left-turn lane is proposed on the departure from Peaceful Valley Ranch Road for Option 2. In addition, the alignment for Melody Road, as well as for Peaceful Valley Ranch Road, is shifted to the north with Option 2 to further reduce ROW impact to environmentally sensitive areas. Alternative 2: Option 2 requires various retaining walls and fill walls to reduce the proposed footprint. The five previously discussed SR-94 intersection improvements apply to Alternative 2: Option 2.

Alternative 2: Option 3 (Minimum Disturbed Area)

Option 3 proposes to provide access to the JIV Gaming Project via Daisy Drive, the same as for Alternatives 2: Options 1 and 2. Alternative 2: Option 3, however, minimizes ROW impacts with the implementation of non-standard geometric elements requiring mandatory exceptions to Caltrans design standards. Reduced design speed from 55 mph to 45 mph, reduction in horizontal curvature, reduced shoulder width, reduced stopping sight distance along vertical curvature, increased maximum grade, and reduced superelevation rate are all incorporated to minimize impacts to ROW.

Improvements for Alternative 2: Option 3 begin approximately 800 feet north of Melody Road and continue to about 400 feet south of existing Reservation Road, for a total length of approximately 0.6 miles. Proposed traffic signals and exclusive left-turn lanes are the same for Options 2 and 3, except no left-turn is provided on the departure from Peaceful Valley Ranch Road. Lane widths are reduced along Melody Road in order to accommodate the roadway widening while minimizing ROW impacts. Unlike Alternative 2: Option2 which realigned Melody Road to the south, Alternative 2: Option 3 retains the existing southern edge of traveled way and widens Melody Road to the north. One fill-wall and three cut-walls are proposed along SR-94 for Option 3. No walls are proposed along Melody Road. The five previously discussed SR-94 intersection improvements apply to Alternative 2: Option 3.

Alternative 3: Melody Road Access

Alternative 3 provides access to the JIV Gaming Project via a proposed access driveway from Melody Road south to the JIV property. Therefore, no driveway improvements are proposed at either Reservation Road or Daisy Drive with this alternative. A wider footprint is necessary at the intersection of SR-94/Melody Road with this alternative in order to accommodate the necessary intersection improvements. In contrast to the other alternatives, Alternative 3 requires an additional northbound through lane north of Melody Road to accommodate a second exclusive left-turn lane proposed from Melody Road. A second exclusive left-turn lane is also required for the north to west move from SR-94 to Melody Road. A second through lane is also needed for westbound Melody Road leading to the proposed access driveway.

The proposed centerline alignment for SR-94 for Alternative 3 is relatively the same as proposed for Alternative 2: Option 1. However, the extent of improvement along both SR-94 and Melody Road are different when compared to the other alternatives. The difference is related to the access driveway location. Alternative 3 improvements begin approximately 1300 feet north of Melody Road and continue to about 900 feet south of existing Reservation Road, for a total length of approximately 0.8 miles. The length of improvements along Melody Road is increased from about 750 feet to about 1300 feet with Alternative 3. Traffic signals are proposed at the intersection of SR-94/Melody Road, and also at the driveway access location along Melody Road. A driveway would continue from the new intersection at Melody Road and the driveway access and continue on private property south to the future gaming facility. This driveway would require a combination of cut/fill and retaining walls along its length. The five previously discussed SR-94 intersection improvements apply to Alternative 3.

Alternative 4: No Build Alternative

No roadway improvements would be constructed under the No Build Alternative.

The following list summarizes the results of the analyses and recommendations:

- The Proposed Project would not have a significant traffic related impact at the study intersections and roadway segments under the Existing and Near Term (2015) Conditions.

- Under the Horizon Year (2035) Conditions, the Proposed Project would have a cumulatively significant impact at the intersection of SR 94 and Jamacha Boulevard. To mitigate its cumulative traffic related impact, the project will make a monetary contribution toward the installation of an exclusive northbound left-turn lane and necessary roadway widening and signal modification.

APPENDICES

APPENDIX A

- Proposed Roadway Improvements

GENERAL NOTES

1. ALL STRIPING AND SIGNING SHALL CONFORM TO THE MOST RECENTLY ADOPTED EDITION OF THE FOLLOWING MANUALS:

DESCRIPTION	EDITION
STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (THE "GREENBOOK")	2012
CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CA MUTCD)	2012
SAN DIEGO COUNTY DESIGN STANDARDS	2012

2. ALL SIGNING AND STRIPING IS SUBJECT TO THE APPROVAL OF THE PROJECT ENGINEER PRIOR TO INSTALLATION AND/OR REMOVAL.
3. INSTALLATION OF ALL STRIPING, SIGNS, AND PAVEMENT MARKERS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
4. THE CONTRACTOR SHALL REMOVE ALL CONFLICTING STRIPING, PAVEMENT MARKINGS, AND LEGENDS BY SANDBLASTING AND/OR GRINDING WITH THE SEAL. ANY DEBRIS SHALL BE PROMPTLY REMOVED BY THE CONTRACTOR.
5. CONTRACTOR SHALL REPLACE ANY STRIPING, PAVEMENT MARKERS, OR LEGENDS OBLITERATED BY CONSTRUCTION.
6. CONTRACTOR SHALL REMOVE ALL REDUNDANT STRIPING.
7. SIGN POSTS SHALL BE INSTALLED WITH ALUMINUM ALLOY 6063–T6, CLEAR ANODIZED POST PER SAN DIEGO COUNTY DESIGN STANDARD DRAWING NO. DS–13C.
8. ALL RAISED MEDIAN NOSES SHALL BE PAINTED YELLOW.
9. ALL EXISTING SIGNS SHOWN ON THE STRIPING AND SIGNING PLANS SHALL REMAIN UNLESS OTHERWISE NOTED. NEW SIGNS SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR, EXCEPT FOR EXISTING SIGNS SPECIFICALLY INDICATED TO BE RELOCATED.
10. STRIPED CROSSWALKS SHALL HAVE AN INSIDE DIMENSION OF 10 FEET UNLESS INDICATED OTHERWISE.
11. ALL LIMIT LINES/STOP LINES, CROSSWALK LINES, PAVEMENT LEGENDS, AND ARROWS (EXCEPT WITHIN BIKE LANES) SHALL BE THERMOPLASTIC.
12. CONTRACTOR SHALL LAYOUT ALL INTERIM AND FINAL STRIPING, PAVEMENT MARKERS, AND SIGN PLACEMENT. LAYOUT SHALL BE INSPECTED BY THE ENGINEER PRIOR TO INSTALLATION.
13. THE CONTRACTOR SHALL NOTIFY THE COUNTY TRAFFIC ENGINEER A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO AND UPON COMPLETION OF STRIPING AND SIGNING TO SCHEDULE A FINAL INSPECTION.
14. ALL REFERENCES TO THE "COUNTY" SHALL EXPLICITLY REFER TO THE "COUNTY OF SAN DIEGO."
15. CONTRACTOR SHALL SUBMIT PRODUCT MANUALS AND SPECIFICATIONS FOR THERMOPLASTIC MATERIALS AT THE PRE–CONSTRUCTION MEETING FOR APPROVAL BY THE PROJECT ENGINEER.
16. CONTRACTOR SHALL REMOVE ALL CONFLICTING RAISED PAVEMENT MARKERS PRIOR TO STRIPING. PAVEMENT THAT IS DAMAGED DUE TO THE REMOVAL OF MARKERS SHALL BE IMMEDIATELY REPAIRED TO THE SATISFACTION OF THE PROJECT ENGINEER.
17. SURFACES WHICH ARE TO RECEIVE NEW STRIPING, PAVEMENT MARKINGS, AND PAVEMENT MARKERS SHALL BE CLEANED OF ALL DIRTY AND LOOSE MATERIALS PRIOR TO INSTALLATION.
18. ALL TRAFFIC STRIPES 6 INCHES OR LESS IN WIDTH SHALL BE INSTALLED WITH TWO COATS OF PAINT. THE FIRST COAT OF PAINT SHALL BE DRY BEFORE APPLICATION OF THE SECOND COAT PER THE LATEST STANDARD SPECIFICATION.
19. FOR ALL ROADWAY CENTERLINES REQUIRING DOUBLE YELLOW TRAFFIC STRIPING, THE CONTRACTOR SHALL CONCURRENTLY PAINT A 3–INCH WIDE BLACK STRIPE BETWEEN THE TWO 4–INCH WIDE YELLOW STRIPES.
20. ALL LIMIT LINES/STOP BARS SHALL BE LOCATED AT THE PROLONGATION OF THE CENTER DELTA OF THE CURB RETURN OR BEHIND THE PEDESTRIAN ACCESS RAMP, UNLESS OTHERWISE SPECIFIED. IF A STRIPED CROSSWALK EXISTS, THE LIMIT LINE/STOP BAR SHALL BE LOCATED 4 FEET IN ADVANCE OF THE CROSSWALK.
21. ALL STRIPING SHALL BEGIN AND TERMINATE AT QUARTER DELTA OF THE CURB, OR BACK OF THE LIMIT LINE/STOP BAR, UNLESS OTHERWISE SPECIFIED.
22. "STOP" PAVEMENT MARKINGS SHALL BE INSTALLED 8 FEET IN ADVANCE OF THE LIMIT LINE/STOP BAR, CONSISTENT WITH THE LATEST EDITION OF THE CALIFORNIA MUTCD.
23. CONTRACTOR SHALL INSTALL BLUE RETROFLECTIVE RAISED PAVEMENT MARKERS TO DESIGNATE THE LOCATION OF ALL FIRE HYDRANTS, CONSISTENT WITH THE LATEST EDITION OF THE CALIFORNIA MUTCD.
24. STANDARD STRIPING AND PAVEMENT MARKER DETAILS AND DIMENSIONS/SPACING FOR PAVEMENT MARKINGS SHALL CONFORM TO THE LATEST EDITIONS OF THE CALTRANS STANDARD PLANS AND CALIFORNIA MUTCD.
25. APPLICATION OF TRAFFIC STRIPES, PAVEMENT MARKINGS, AND PAVEMENT MARKERS SHALL CONFORM TO THE LATEST EDITION OF THE CALTRANS STANDARD SPECIFICATIONS.
26. ALL SIGNS PURCHASED AND INSTALLED BY THE CONTRACTOR SHALL CONFORM TO THE STANDARDS PROVIDED IN THE LATEST EDITION OF THE CALIFORNIA MUTCD, INCLUDING SIGN SIZE, SHAPE, COLOR, SYMBOLS, RETROREFLECTIVITY, VERTICAL AND LATERAL MOUNTING OFFSETS, ECT. ALL SIGN FACE REFLECTIVE SHEETS SHALL BE HIGH INTENSITY GRADE WITH A CLEAR PROTECTIVE OVERLAY FILM (I.E. ANTI–GRAFFITI COATING).
27. ALL PEDESTRIAN CROSSING SIGNS, PEDESTRIAN ADVANCED WARNING SIGNS, AND SUPPLEMENTAL PLAQUES SHALL BE FLUORESCENT GREEN IN COLOR.
28. CONTRACTOR IS RESPONSIBLE FOR REPAINTING ALL CURB MARKINGS WITHIN THE PROJECT LIMITS.

LEGEND

ITEM:	STANDARD DRWG NO.	EXISTING:	NEW / RELOCATED:
1. LANE WIDTH		(XX')	XX'
2. STREET NAME SIGN	DS–13A TO DS–13E	SNS	SNS
3. SIGN LOCATION (SINGLE POST)			
4. SIGN LOCATION (DOUBLE POST)			
5. SIGN LOCATION (MOUNTED ON LUMINAIRE OR SIGNAL POLE)			
6. BIKE LANE ARROW	CALTRANS A24A		
7. BIKE LANE SYMBOL WITH PERSON	CALTRANS A24C		
8. "AHEAD" PAVEMENT MARKING	CALTRANS A24D		
9. "BIKE" PAVEMENT MARKING	CALTRANS A24D		
10. "LANE" PAVEMENT MARKING	CALTRANS A24D		
11. "STOP" PAVEMENT MARKING	CALTRANS A24D		
12. TYPE I 10' THROUGH ARROW	CALTRANS A24A		
13. TYPE I 24' THROUGH ARROW	CALTRANS A24A		
14. TYPE II THROUGH–LEFT ARROW	CALTRANS A24B		
15. TYPE II THROUGH–RIGHT ARROW	CALTRANS A24B		
16. TYPE III LEFT–TURN ARROW	CALTRANS A24B		
17. TYPE III RIGHT–TURN ARROW	CALTRANS A24B		
18. TYPE VI ARROW	CALTRANS A24A		
19. TYPE VII THROUGH–LEFT ARROW	CALTRANS A24A		
20. TYPE IV LEFT–TURN ARROW	CALTRANS A24A		
21. TYPE IV RIGHT–TURN ARROW	CALTRANS A24A		
22. TYPE VII THROUGH–RIGHT ARROW	CALTRANS A24A		
23. LANE LINE PATTERN (DETAIL 12)	CALTRANS A20A		
24. TWO–DIRECTION NO–PASSING PATTERN (DETAIL 22)	CALTRANS A20A		
25. LEFT EDGELINE (DETAIL 25)	CALTRANS A20B		
26. RIGHT EDGELINE (DETAIL 27B)	CALTRANS A20B		
27. TWO–WAY LEFT TURN LANE (DETAIL 32)	CALTRANS A20B		
28. WHITE CHANNELIZING LINE (DETAIL 38)	CALTRANS A20D		
29. BIKE LANE LINE (DETAIL 39)	CALTRANS A20D		
30. BIKE INTERSECTION LINE (DETAIL 39A)	CALTRANS A20D		
31. LANE LINE EXTENSION THROUGH INTERSECTIONS (DETAIL 40)	CALTRANS A20D		

REGISTERED PROFESSIONAL ENGINEER — LEONARDO PRESELEMINARY NOT FOR CONSTRUCTION — STATE OF CALIFORNIA

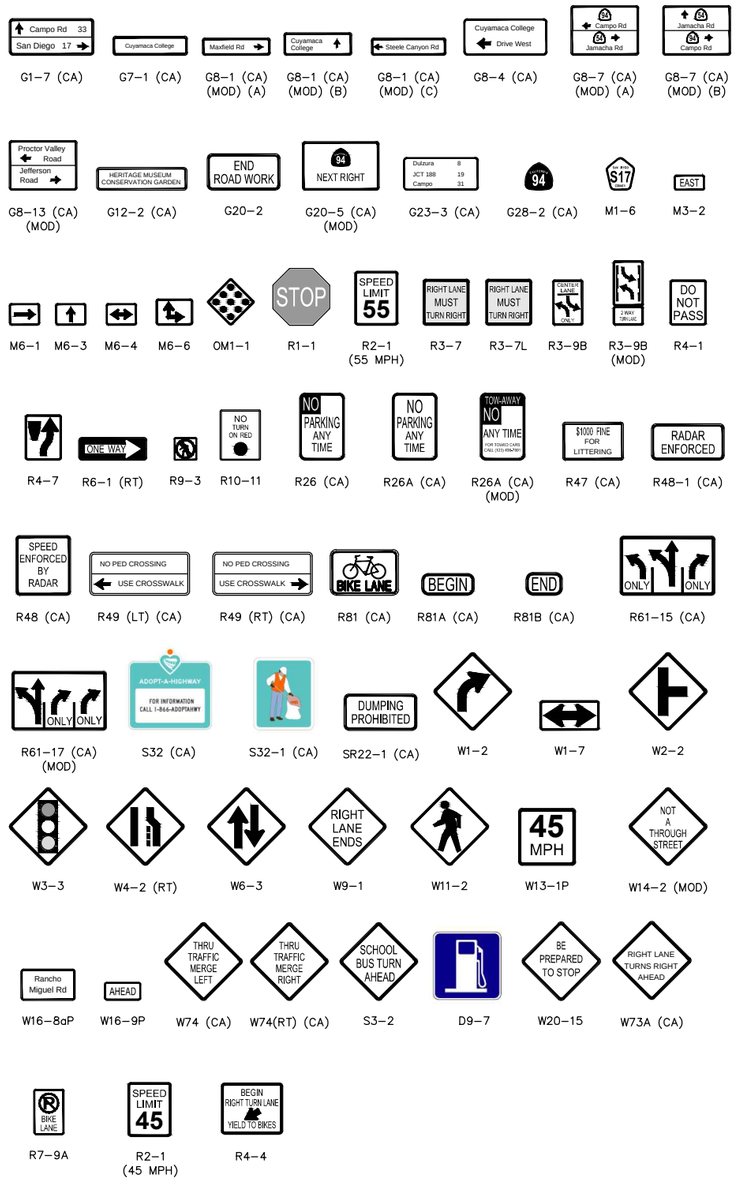
PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY–HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619–234–9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE

65% SUBMITTAL - NOT FOR CONSTRUCTION

SIGN LEGEND:



G1–7 (CA) · G7–1 (CA) · G8–1 (CA) (MOD) (A) · G8–1 (CA) (MOD) (B) · G8–1 (CA) (MOD) (C) · G8–4 (CA) · G8–7 (CA) (MOD) (A) · G8–7 (CA) (MOD) (B)

G8–13 (CA) (MOD) · G12–2 (CA) · G20–2 · G20–5 (CA) (MOD) · G23–3 (CA) · G28–2 (CA) · M1–6 · M3–2

M6–1 · M6–3 · M6–4 · M6–6 · OM1–1 · R1–1 · R2–1 (55 MPH) · R3–7 · R3–7L · R3–9B · R3–9B (MOD) · R4–1

R4–7 · R6–1 (RT) · R9–3 · R10–11 · R26 (CA) · R26A (CA) · R26A (CA) (MOD) · R47 (CA) · R48–1 (CA)

R48 (CA) · R49 (LT) (CA) · R49 (RT) (CA) · R81 (CA) · R81A (CA) · R81B (CA) · R61–15 (CA)

R61–17 (CA) (MOD) · S32 (CA) · S32–1 (CA) · SR22–1 (CA) · W1–2 · W1–7 · W2–2

W3–3 · W4–2 (RT) · W6–3 · W9–1 · W11–2 · W13–1P · W14–2 (MOD)

W16–8aP · W16–9P · W74 (CA) · W74(RT) (CA) · S3–2 · D9–7 · W20–15 · W73A (CA)

R7–9A · R2–1 (45 MPH) · R4–4

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COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123–1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619–234–9411
WWW.KIMLEY–HORN.COM

REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1850018 N. 6345504 E.
CONST. COMPL. _____
FIELD REVISIONS _____

CAMPO RD (SR94) IMPROVEMENTS AT JAMACHA BLVD & JAMACHA RD

SIGNING AND PAVEMENT MARKING NOTES

SCALE: HOR. N/A VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 13 OF 32 SHEETS

-1 0 1 2 3 4 5 6 7 8 9 10

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES

PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY-HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619-234-9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE

65% SUBMITTAL - NOT FOR CONSTRUCTION

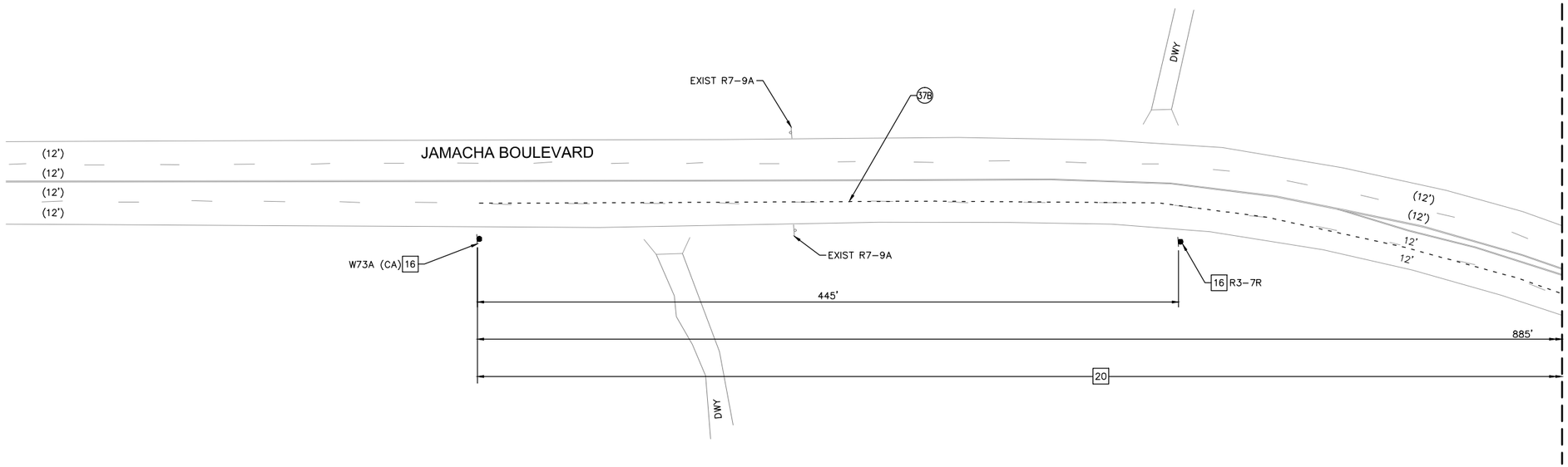
STRIPING LEGEND

(12) 4" WHITE LANE LINE, STD. PLAN A20A, DETAIL 12

(29) 4" YELLOW MEDIAN ISLAND LINE, STD. PLAN A20B, DETAIL 29

(37B) 8" WHITE LANE DROP AT INTERSECTIONS, STD. PLAN A20C, DETAIL 37B

(38) 8" WHITE, STD. PLAN A20D, DETAIL 38



SIGNING AND MARKING NOTES

7 TYPE IV(R) ARROW, STD. PLAN A24A

11 TYPE VII(L) ARROW, STD. PLAN A24A

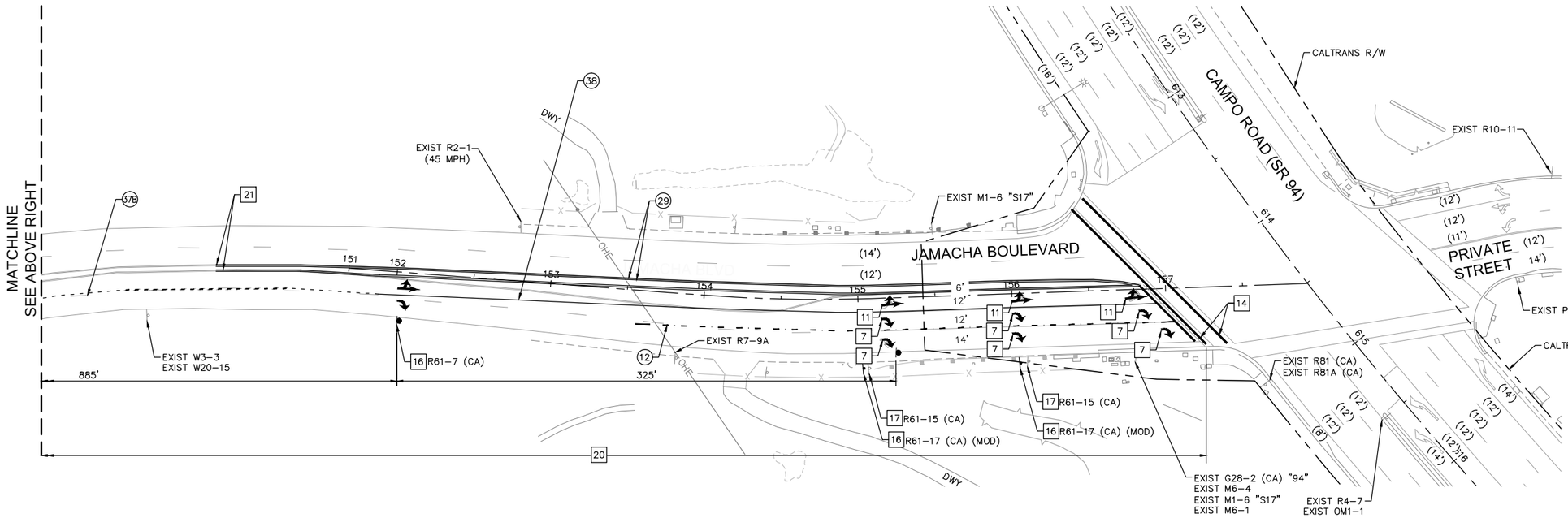
14 12" WHITE LIMIT LINE, STD. PLAN A24E

16 FURNISH AND INSTALL NEW SIGN.

17 REMOVE AND SALVAGE EXISTING SIGN.

20 REMOVE CONFLICTING STRIPING

21 MATCH EXISTING STRIPING



COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619-234-9411
WWW.KIMLEY-HORN.COM

REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1850018 N. 6345504 E.
CONST. COMPL. _____
FIELD REVISIONS _____

CAMPO RD (SR94) IMPROVEMENTS AT JAMACHA BLVD & JAMACHA RD

SIGNING AND PAVEMENT MARKING PLAN

SCALE: HOR. 1" = 40' VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 14 OF 32 SHEETS

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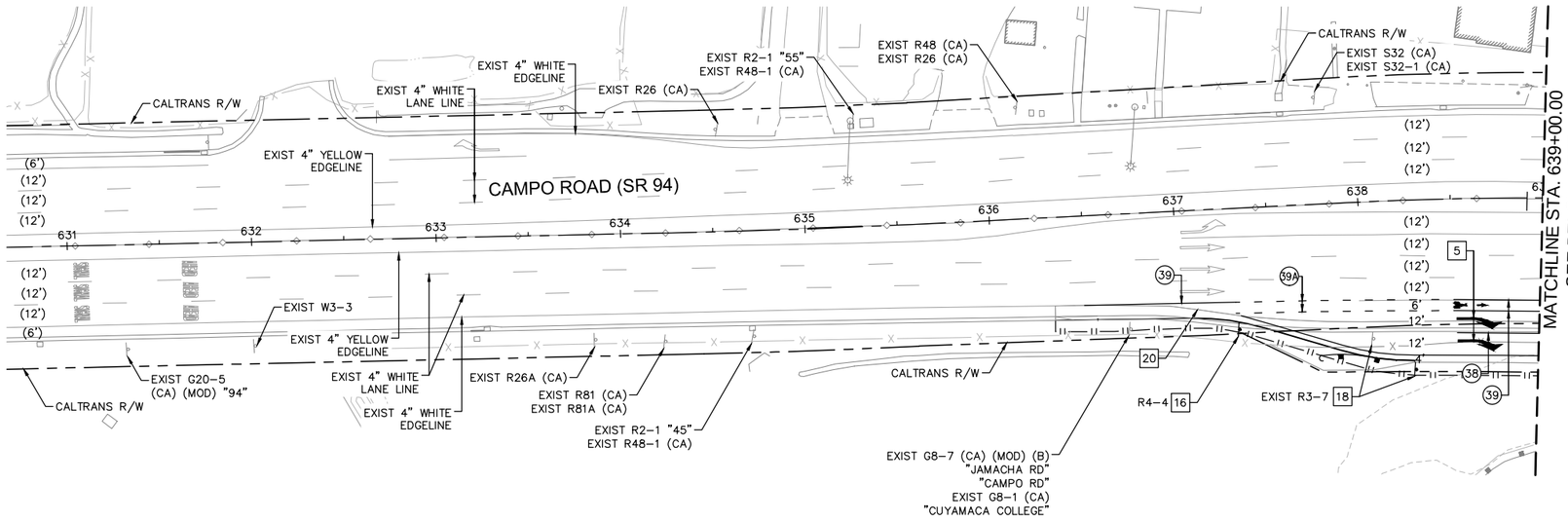
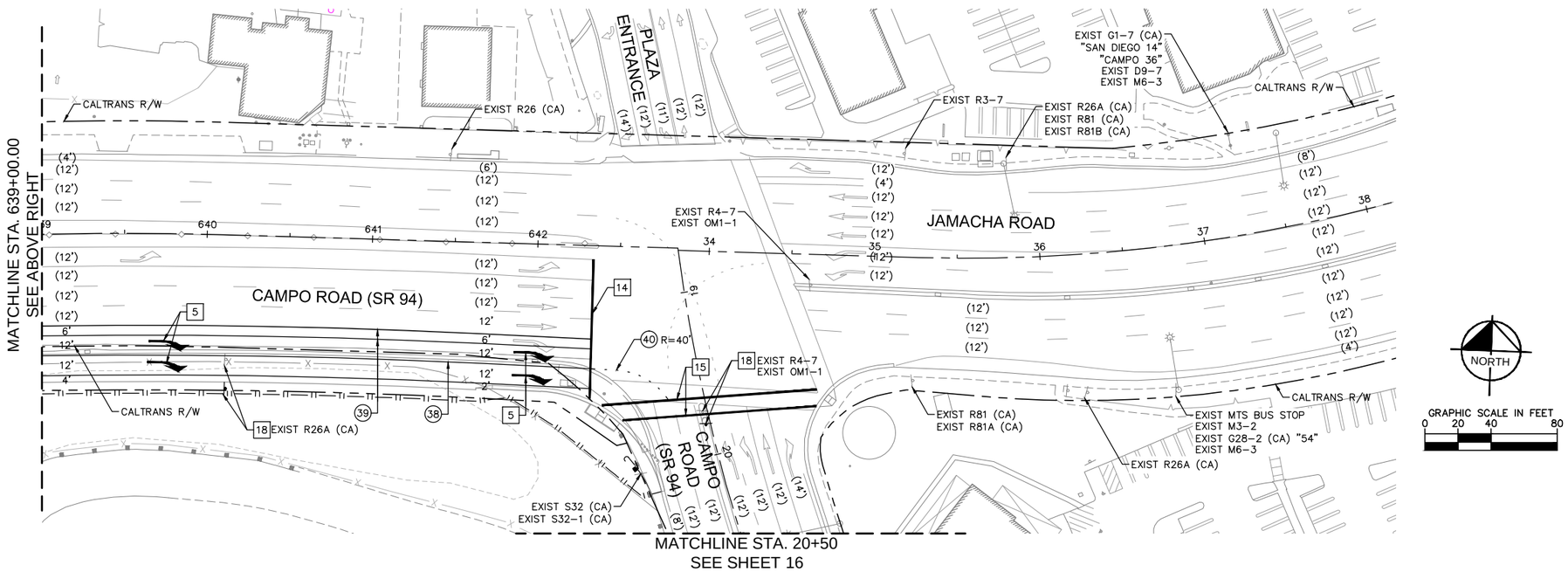
FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES




MATCHLINE STA. 639+00.00
SEE ABOVE RIGHT
CALTRANS R/W
EXIST R26 (CA)
PLAZA ENTRANCE (12') (11') (12') (12') (14')
EXIST G1-7 (CA)
"SAN DIEGO 14"
"CAMPO 36"
EXIST D9-7
EXIST M6-3
EXIST R3-7
EXIST R26A (CA)
EXIST R81 (CA)
EXIST R81B (CA)
CALTRANS R/W
(4')
(12')
(12')
(12')
639
640
641
642
(6')
(12')
(12')
(12')
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(12')
(12')
(12

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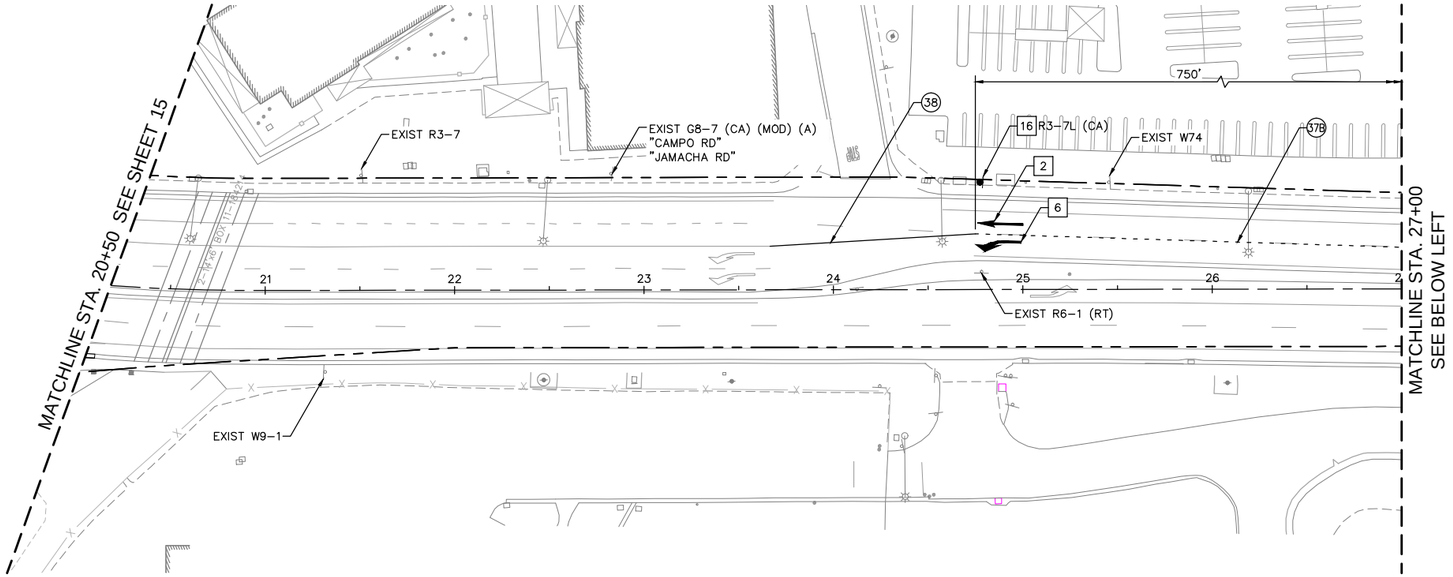
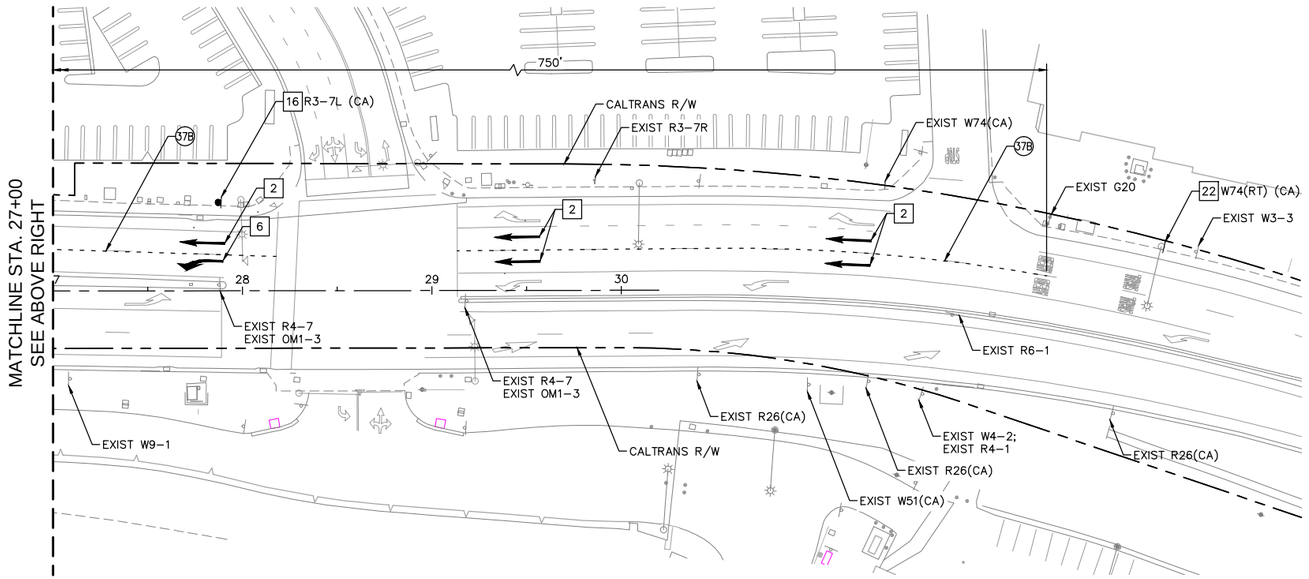
FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES





STRIPING LEGEND

37B 8" WHITE LANE DROP AT INTERSECTIONS, STD. PLAN A20C, DETAIL 37B

38 8" WHITE, STD. PLAN A20D, DETAIL 38

SIGNING AND MARKING NOTES

2 TYPE I 24' ARROW, STD. PLAN A24A

6 TYPE III(L) ARROW, STD. PLAN A24B

16 FURNISH AND INSTALL NEW SIGN

22 FURNISH AND INSTALL NEW SIGN ON EXISTING POLE

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY-HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619-234-9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE

65% SUBMITTAL - NOT FOR CONSTRUCTION

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COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619-234-9411
WWW.KIMLEY-HORN.COM

REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1850018 N. 6345504 E.
CONST. COMPL. _____
FIELD REVISIONS _____

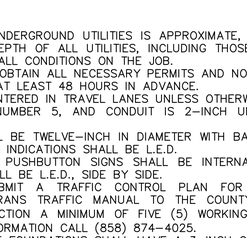
CAMPO RD (SR94) IMPROVEMENTS AT JAMACHA BLVD & JAMACHA RD

SIGNING AND PAVEMENT MARKING PLAN

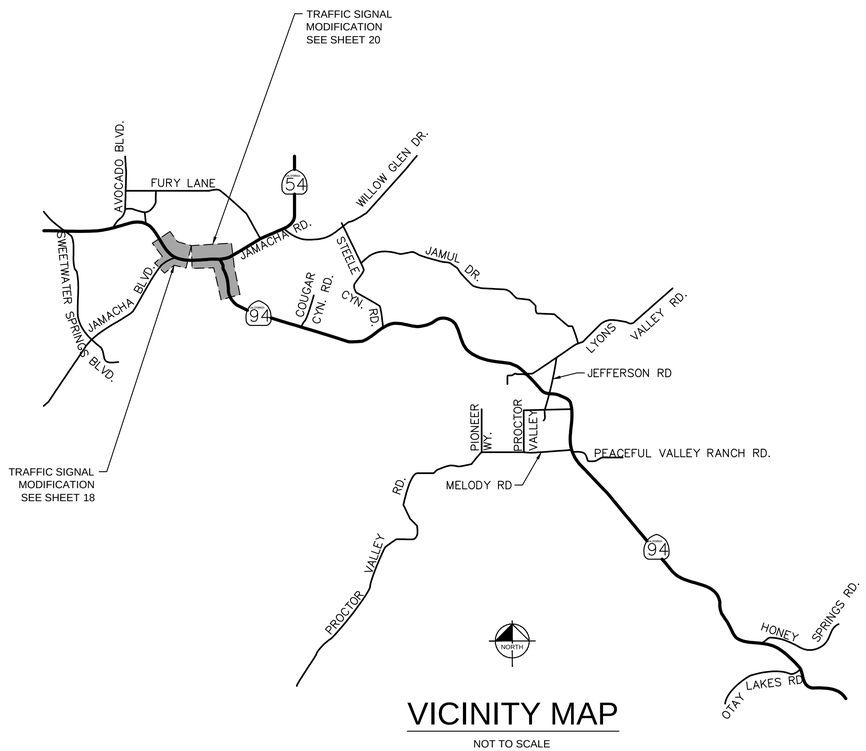
SCALE: HOR. 1" = 40' VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 16 OF 32 SHEETS

GENERAL NOTES

1. THE LOCATION OF ALL UNDERGROUND UTILITIES IS APPROXIMATE, THE CONTRACTOR SHALL DETERMINE THE DEPTH OF ALL UTILITIES, INCLUDING THOSE NOT SHOWN ON THE PLANS, AND VERIFY ALL CONDITIONS ON THE JOB.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND NOTIFY ALL UTILITIES AND AGENCIES AT LEAST 48 HOURS IN ADVANCE.
3. ALL LOOPS SHALL BE CENTERED IN TRAVEL LANES UNLESS OTHERWISE NOTED.
4. ALL PULL BOXES ARE NUMBER 5, AND CONDUIT IS 2–INCH UNLESS OTHERWISE NOTED.
5. ALL SIGNAL HEADS SHALL BE TWELVE–INCH IN DIAMETER WITH BACK PLATES. ALL RED, YELLOW, AND GREEN INDICATIONS SHALL BE L.E.D.
6. PEDESTRIAN HEADS AND PUSHBUTTON SIGNS SHALL BE INTERNATIONAL SYMBOLS. PEDESTRIAN SIGNALS SHALL BE L.E.D., SIDE BY SIDE.
7. CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN FOR TRAFFIC SIGNAL INSTALLATION PER CALTRANS TRAFFIC MANUAL TO THE COUNTY OF SAN DIEGO TRAFFIC ENGINEERING SECTION A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO CONSTRUCTION. FOR INFORMATION CALL (858) 874–4025.
8. ALL TRAFFIC SIGNAL POLE FOUNDATIONS SHALL HAVE A 3–INCH CONDUIT INSTALLED TO THE ADJACENT PULL BOX.
9. THE CONTRACTOR IS RESPONSIBLE FOR THE LAYOUT AND INSTALLATION OF LOOP DETECTORS, TRAFFIC STRIPING, PAVEMENT MARKING, PARKING REMOVAL, AND TRAFFIC SIGNING, AS SHOWN ON THE PLAN:
   a) THE CONTRACTOR SHALL OBTAIN THE APPROVAL OF THE COUNTY TRAFFIC ENGINEERING SECTION FOR THE LOOP LOCATIONS, STRIPING, PAVEMENT, MARKINGS, PARKING REMOVAL, AND SIGN LOCATIONS PRIOR TO PAINTING AND INSTALLATION. CONTRACTOR SHALL USE LEAD–FREE PAINT FOR ALL STRIPING AND PAVEMENT MARKINGS.
   b) THE CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL OF ALL CONFLICTING STRIPING AND PAVEMENT MARKINGS AND SANDBLASTING/GRINDING AND SAND SEALING.
10. CONTRACTOR SHALL NOT ERECT ANY SIGNAL STANDARDS MORE THAN THREE WEEKS PRIOR TO SCHEDULED TRAFFIC SIGNAL TURN ON.
11. FLASHING SIGNAL OPERATION SHALL BE RED ON ALL PHASES. PEDESTRIAN SIGNALS SHALL BE BLACK DURING FLASHING OPERATION.
12. ALL TRAFFIC SIGNAL IMPROVEMENTS SHALL BE INSTALLED IN COORDINATION WITH THE SIGNING AND STRIPING CONTRACTOR.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MONUMENTATION AND/OR BENCHMARKS WHICH WILL BE DISTURBED OR DESTROYED BY CONSTRUCTION. SUCH POINTS SHALL BE REFERENCED AND REPLACED BY APPROPRIATE MONUMENTATION BY A LICENSED LAND SURVEYOR OR A REGISTERED CIVIL ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING. A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILED BY THE LICENSED SURVEYOR OR REGISTERED CIVIL ENGINEER AS REQUIRED BY THE LAND SURVEYOR'S ACT.
14. RAISED PAVEMENT MARKERS SHALL BE PLACED ON ALL NEW CENTERLINES AND LANE LINE STRIPING PER CALTRANS STANDARD PLANS.
15. CONTRACTOR SHALL REPLACE ALL STRIPING, PAVEMENT MARKERS, AND LEGENDS OBLITERATED BY THIS PROJECT.
16. CONTRACTOR SHALL REMOVE/TRIM VEGETATION PER ENGINEER.
17. ALL CONDUIT PLACED IN STREET SHALL HAVE A MINIMUM OF 24" COVER (R.S.D.) G–34.



POLE PLACEMENT DETAIL
N.T.S



VICINITY MAP
NOT TO SCALE

LEGEND

ITEM:	STANDARD DWG. NO.:	EXISTING:	NEW / RELOCATED:
1. SAFETY LIGHTING/LUMINAIRE, LPS 180 WATT EQUIVALENT	PER PLAN		
2. TRAFFIC SIGNAL STANDARD, MAST ARM, SNS, SIGN, VIDEO DETECTOR, VEHICLE INDICATIONS, EVP, PEDESTRIAN INDICATION, AND LUMINAIRE	PER PLAN		
3. EMERGENCY VEHICLE PREEMPTION (EVPE)	PER PLAN		
4. STREET NAME SIGNS (SNS)	SAN DIEGO COUNTY STD. DWG. NO. DS–13D & DS–13E		
5. PEDESTRIAN INDICATION	PER PLAN		
6. 170E CONTROLLER CABINET	CALTRANS & SAN DIEGO COUNTY SPECS.		
7. SERVICE POINT	PER PLAN		
9. ADVANCED VEHICLE DETECTION ZONE (LOOPS)	PER PLAN		
10. VIDEO DETECTION ZONE	PER PLAN		
11. CONDUIT	PER PLAN		
17. SIGN ON TRAFFIC SIGNAL EQUIPMENT	PER PLAN		
18. PULL BOX	PER PLAN		
19. VIDEO DETECTOR CAMERA	PER PLAN		
20. THROUGH VEHICLE INDICATION			
21. PROTECTED VEHICLE INDICATION			

PRELIMINARY NOT FOR CONSTRUCTION
REGISTERED PROFESSIONAL ENGINEER — LEONARDO ESPELETA — No. 53121 — STATE OF CALIFORNIA

PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY–HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619–234–9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE

65% SUBMITTAL - NOT FOR CONSTRUCTION

K:\SND_TPTO\095848001 – JIV Design\Design\PS&E Off–site\Plan Sheets\Jamacha Blvd & Jamacha Rd\848001–TS–00.dwg Tuesday, May 27 2014 10:58am othman.elmezain

COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619–234–9411
WWW.KIMLEY–HORN.COM

REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1850018 N. 6345504 E.
CONST. COMPL. _____
FIELD REVISIONS _____

CAMPO RD (SR94) IMPROVEMENTS AT JAMACHA BLVD & JAMACHA RD

TRAFFIC SIGNAL NOTES

SCALE: HOR. N/A VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 17 OF 32 SHEETS

TRAFFIC SIGNAL NOTES

9 REMOVE AND SALVAGE EXISTING SIGN ON TRAFFIC SIGNAL MAST ARM. FURNISH AND INSTALL NEW SIGN ON TRAFFIC SIGNAL MAST ARM.

SIGNAL NO. P14.336

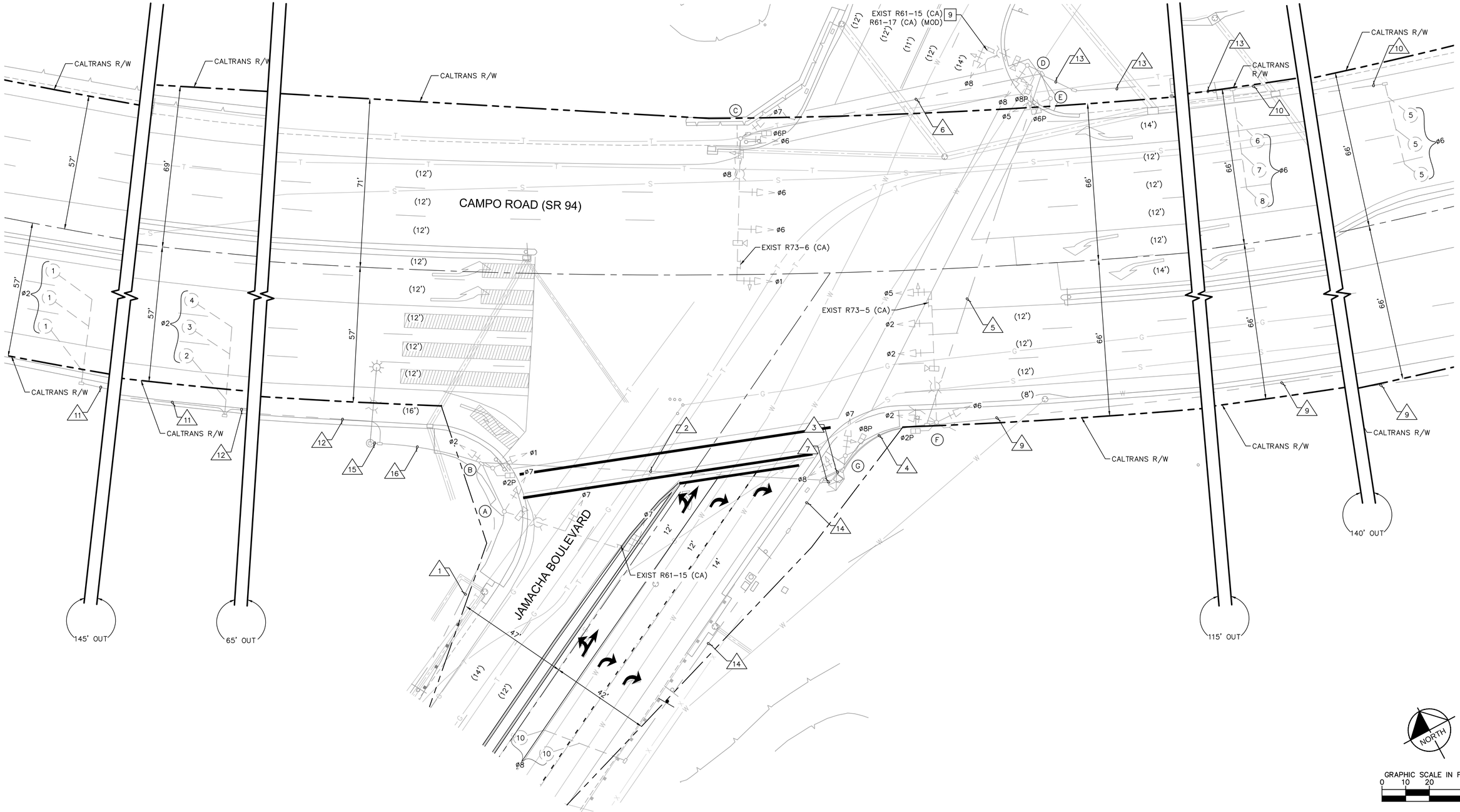
FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES

PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY-HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619-234-9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE

REGISTERED PROFESSIONAL ENGINEER — LEONARDO E. ESPELET — No. 74532 — CIVIL — STATE OF CALIFORNIA — PRELIMINARY NOT FOR CONSTRUCTION



65% SUBMITTAL - NOT FOR CONSTRUCTION

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COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
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REVISIONS	BY	APPROVED	DATE

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1850018 N. 6345504 E.
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FIELD REVISIONS _____

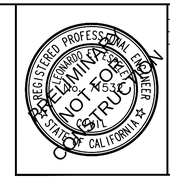
CAMPO RD (SR94) IMPROVEMENTS AT JAMACHA BLVD

TRAFFIC SIGNAL MODIFICATION PLAN

SCALE: HOR. 1" = 20' VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 18 OF 32 SHEETS

-1 0 1 2 3 4 5 6 7 8 9 10

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES



PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY–HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619–234–9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE

65% SUBMITTAL - NOT FOR CONSTRUCTION

CONDUCTOR SCHEDULE

AWG SIZE	ø	CIRCUIT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CONDUCTORS 3 / 12 CONDUCTORS		POLE – (A)	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
		POLE – (B)	– –	– 1	– –	– –	– –	– –	– 1	– –	– –	– –	– –	– –	– –	– –	– –	– –
		POLE – (C)	– –	– –	1 –	1 –	1 –	1 –	1 –	– –	– –	– –	– –	– –	– –	– –	– –	– –
		POLE – (D)	– –	– –	1 1	1 1	1 1	– –	1 1	– –	– –	– –	– –	– –	– –	– –	– –	– –
		POLE – (E)	– –	– –	1 1	1 1	1 1	– –	1 1	– –	– –	– –	– –	– –	– –	– –	– –	– –
		POLE – (F)	– –	– –	1 2	1 2	– –	– –	1 2	– –	– –	– –	– –	– –	– –	– –	– –	– –
		POLE – (G)	– –	– –	1 1	– –	– –	– –	1 1	– –	– –	– –	– –	– –	– –	– –	– –	– –
			– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
			– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
			– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
TOTAL CABLES–3 CONDUCT./12 CONDUCT.			– –	1 2	5 7	4 6	3 1	1 2	6 9	– –	– –	– –	– –	– –	– –	– –	– –	– –
#14	PEU		3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
#10	LIGHTING		4	2	2	2	2	2	–	–	–	–	–	–	–	–	2	2
#6	SIGNAL SERVICE		2	2	–	–	–	–	2	–	–	–	–	–	–	–	–	–
TYPE "B" DLC	ø2	DLC	–	2	–	–	–	–	4	–	–	–	1	4	–	–	–	4
	ø4	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	ø6	DLC	–	–	4	4	4	–	4	–	–	1	–	–	4	–	–	–
	ø8	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–
INTERCONNECT CABLE – SIC			–	1	1	1	–	–	2	–	1	–	1	1	–	–	–	1
VIDEO DETECTION CABLE			–	1	3	3	2	1	4	–	–	–	–	–	–	–	–	–
EMERGENCY VEHICLE PREEMPTION			–	–	4	4	2	–	4	–	–	–	–	–	–	–	–	–
CONDUIT SIZE			2"	3"	2–4"	2–3"	4"	2"	3–4"	N/A	2"	2"	2"	2"	2"	2"	2"	2"

ALL CONDUCTORS AND CONDUIT ARE EXISTING

TO BE COMPLETED FOR NEXT SUBMITTAL

SIGN LEGEND:



R61–15 (CA)
48" X 30"



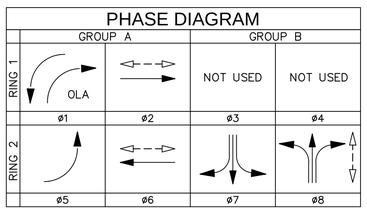
R61–17 (CA) (MOD)
48" X 30"

POLE SCHEDULE

POLE DATA No.	TYPE	Ht.	SIGNAL M.A.	LUMINAIRE M.A.	LUMINAIRE LPS	VEH SIG MTG MAST	VEH SIG MTG POLE	PED SIG MTG	PPB ø	PPB QUAD	POLE LOC. A	POLE LOC. B	POLE LOC. C	REMARKS
(A)	29–5–80	30'	55'	15'	180W	1–MAS–4B 1–MAT	SV–1–T	–	–	–	EX.	EX.	EX.	EX. R61–15 (CA), EX. R10–11a
(B)	1–A	10'	–	–	–	–	TV–2–T	SP–1–T	2	S	EX.	EX.	EX.	
(C)	61–5–80	30'	60'	15'	180W	3–MAS	SV–3–TC	SP–1–T	6	N	EX.	EX.	EX.	EX. R73–6 (CA)
(D)	17–3–80	30'	20'	12'	180W	1–MAS–4B	SV–1–T	SP–1–T	6	S	EX.	EX.	EX.	**R61–17 (CA) (MOD)**
(E)	1–A	10'	–	–	–	–	TV–1–T	SP–1–T	8	W	EX.	EX.	EX.	
(F)	60–5–80	30'	55'	15'	180W	2–MAS 1–MAT	SV–1–T SV–1–T	SP–1–T	–	–	EX.	EX.	EX.	EX. R73–5 (CA)
(G)	1–A	10'	–	–	–	–	TV–2–T	SP–1–T	–	S / E	EX.	EX.	EX.	EX. ø7 INDICATION TO REMAIN

BOLD = NEW

PHASE DIAGRAM



COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY:
Mohamad Fakhrriddine, County Engineer DATE _____

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619–234–9411
WWW.KIMLEY–HORN.COM

REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1850018 N. 6345504 E.
CONST. COMPL. _____
FIELD REVISIONS _____

CAMPO RD (SR94) IMPROVEMENTS AT JAMACHA BLVD

TRAFFIC SIGNAL SCHEDULE AND DETAILS

SCALE: HOR. N/A VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 19 OF 32 SHEETS

K:\SND_TPTO\095848001 – JIV Design\Design\PS&E Off–site\Plan Sheets\Jamacha Blvd & Jamacha Rd\848001–TS–01A.dwg Tuesday, May. 27 2014 10:58am othman.elmezain

TRAFFIC SIGNAL NOTES

1. INSTALL MODEL 332 ALUMINUM CABINET AND FOUNDATION. FURNISH AND INSTALL TYPE 170E CONTROLLER.
4. FURNISH AND INSTALL OPTICOM 722 EMERGENCY VEHICLE PREEMPTION (EVP) DETECTOR ON TOP OF SIGNAL MAST ARM AS SHOWN.
9. REMOVE AND SALVAGE EXISTING SIGN ON TRAFFIC SIGNAL MAST ARM. FURNISH AND INSTALL NEW SIGN ON TRAFFIC SIGNAL MAST ARM.
12. ALIGN EXISTING PEDESTRIAN SIGNAL HEAD FOR NEW INTERSECTION ALIGNMENT.
13. ALIGN EXISTING TRAFFIC SIGNAL HEAD FOR NEW INTERSECTION ALIGNMENT.
14. PROGRAM EXISTING VIDEO DETECTION CAMERA ON TRAFFIC SIGNAL MAST ARM FOR NEW LANE CONFIGURATION.
15. FURNISH AND INSTALL NEW VIDEO DETECTION CAMERA ON TRAFFIC SIGNAL MAST ARM AS SHOWN.
16. INSTALL RELOCATED SIGN ON TRAFFIC SIGNAL MAST ARM AS SHOWN.
17. INSTALL RELOCATED STREET NAME SIGN PER COUNTY OF SAN DIEGO STANDARD DRAWINGS DS-13D, DS-13E, AND DS-13F DATED 10/15/12.
20. REMOVE AND RELOCATE EXISTING 332 CONTROLLER CABINET, TRAFFIC SIGNAL CONTROLLER, AND ALL APPURTENANCES TO NEW LOCATION.
21. REMOVE AND SALVAGE EXISTING VIDEO CAMERA.

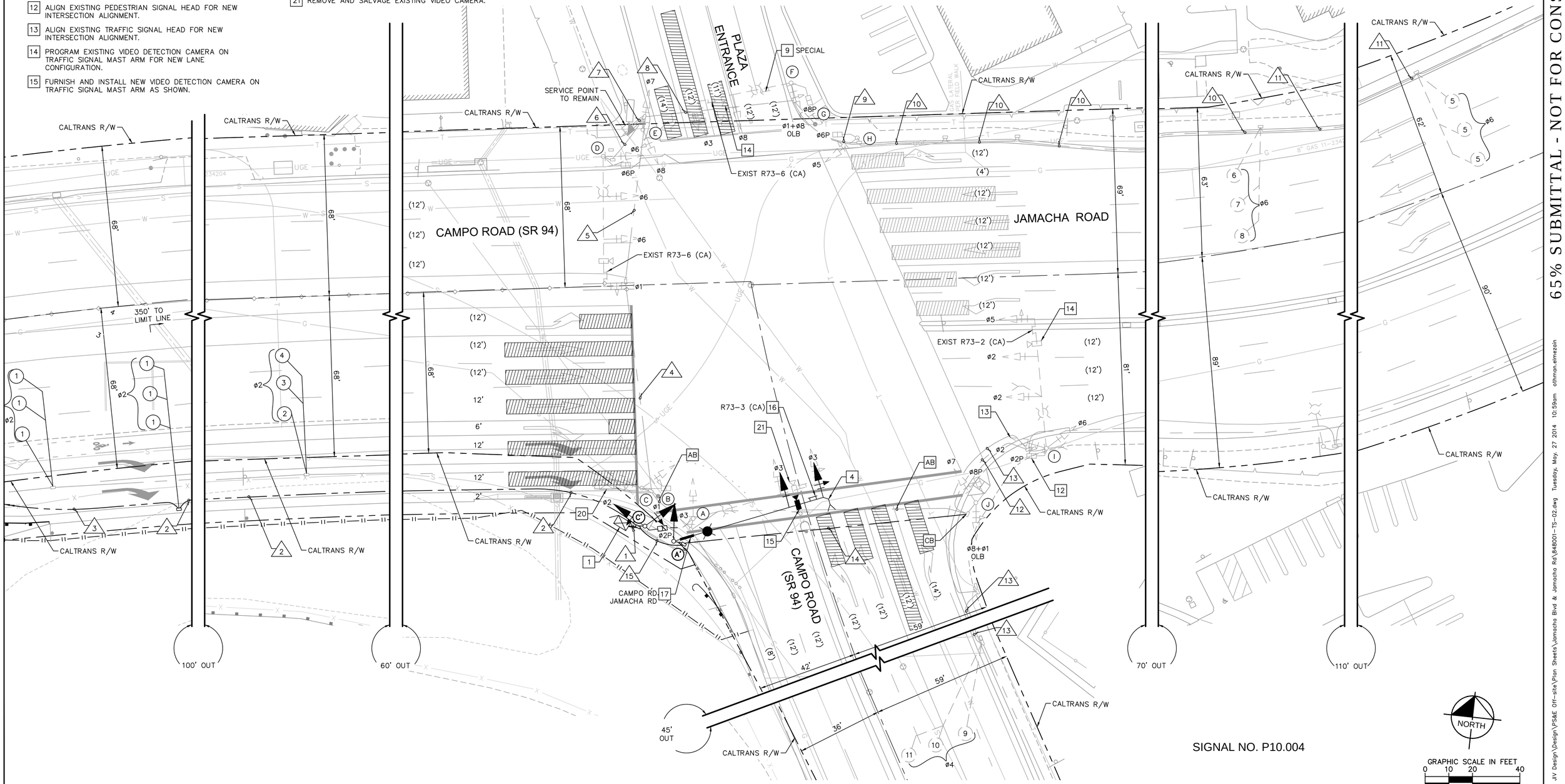
FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES

PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY-HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619-234-9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE

REGISTERED PROFESSIONAL ENGINEER — LEONARDO L. ESPELET — NO. 53[illegible] — CIVIL — STATE OF CALIFORNIA — PRELIMINARY NOT FOR CONSTRUCTION



SIGNAL NO. P10.004

65% SUBMITTAL - NOT FOR CONSTRUCTION

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COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619-234-9411
WWW.KIMLEY-HORN.COM

REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1850018 N. 6345504 E.
CONST. COMPL. _____
FIELD REVISIONS _____

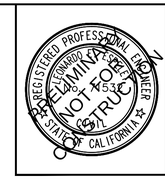
CAMPO RD (SR94) IMPROVEMENTS AT JAMACHA RD

TRAFFIC SIGNAL MODIFICATION PLAN

SCALE: HOR. 1" = 20' VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 20 OF 32 SHEETS

-1 0 1 2 3 4 5 6 7 8 9 10

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES



PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY–HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619–234–9411

12/31/2015
REGISTERED CIVIL ENGINEER — DATE

65% SUBMITTAL - NOT FOR CONSTRUCTION

CONDUCTOR SCHEDULE

AWG SIZE	ø	CIRCUIT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CONDUCTORS 3 / 12 CONDUCTORS		POLE – A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – B	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – C	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – D	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – E	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – F	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – G	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL CABLES–3 CONDUCT./12 CONDUCT.			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
#14	PEU		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
#10	LIGHTING		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
#6	SIGNAL SERVICE		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TYPE "B" DLC	ø2	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	ø4	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	ø6	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	ø8	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
INTERCONNECT CABLE – SIC			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
VIDEO DETECTION CABLE			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EMERGENCY VEHICLE PREEMPTION			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONDUIT SIZE			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

TO BE COMPLETED FOR NEXT SUBMITTAL

SIGN LEGEND:



R73–2 (CA)
36" X 36"

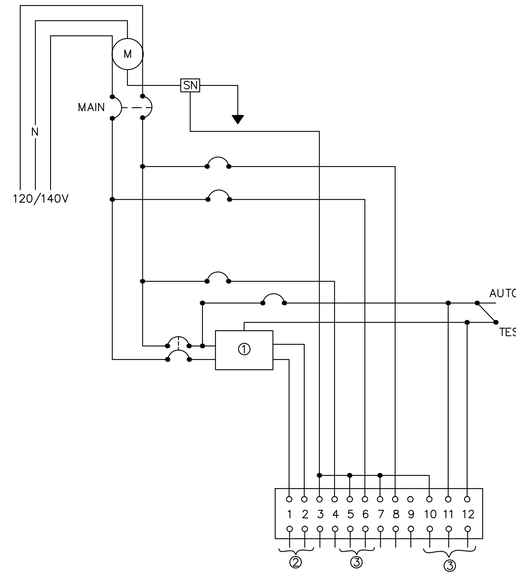


R73–3 (CA)
36" X 36"



R73–6 (CA)
36" X 36"

WIRING DIAGRAM:



WIRING DIAGRAM:
MAIN 2P – 100 AMP
A – SP–15 AMP SPARE
B – SP–50 AMP
C – SP–15 AMP SPARE
D – SP–15 AMP
E } – SP–30AMP
F }

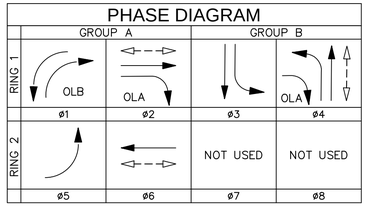
NOTES:
① – CONTACTOR
② – LIGHTING
③ – SIGNAL
④ – PEU

POLE SCHEDULE

POLE DATA No.	TYPE	Ht.	SIGNAL M.A.	LUMINAIRE M.A.	LUMINAIRE LPS	VEH SIG MTG MAST	VEH SIG MTG POLE	PED SIG MTG	PPB ø	PPB QUAD	POLE LOC. A	POLE LOC. B	POLE LOC. C	REMARKS
A	29–5–80	30'	55'	15'	180W	1–MAS 1–MAT	SV–1–T	–	–	–	EX.	EX.	EX.	REMOVE AND SALVAGE EX. POLE, RELOCATE SIGNS AND EQUIPMENT TO LOCATION A'
A'	**61–5–100**	**30'**	**65'**	**15'**	**180W**	**1–MAS 1–MAT**	**SV–1–T**	**–**	**2**	**N**	**XX'**	**XX'**	**XX'**	**REUSE SIGNS AND EQUIPMENT FROM LOCATION A**
B	PPB	5'	–	–	–	–	–	–	2	N	EX.	EX.	EX.	REMOVE AND SALVAGE EX. POLE
C	1–A	10'	–	–	–	–	TV–2–T	SP–1–T	2	N	EX.	EX.	EX.	RELOCATE POLE AND EQUIPMENT TO LOCATION C'
C'	**1–A**	**10'**	**–**	**–**	**–**	**–**	**TV–2–T**	**SP–1–T**	**–**	**–**	**XX'**	**XX'**	**XX'**	**REUSE POLE AND EQUIPMENT FROM LOCATION C**
D	29–5–80	30'	55'	15'	180W	2–MAS 1–MAT	SV–1–T	SP–1–T	–	–	EX.	EX.	EX.	EX. R73–6 (CA)
E	1–A	10'	–	–	–	–	TV–2–T	–	6 / 6	S / S	EX.	EX.	EX.	2 EX. PPB
F	26–4–80	30'	40'	15'	180W	1–MAS 1–MAT	SV–1–T	SP–1–T	–	–	EX.	EX.	EX.	EX R73–6 (CA) **SPECIAL**
G	PPB	5'	–	–	–	–	–	–	6	S	EX.	EX.	EX.	
H	1–A	10'	–	–	–	–	TV–1–T	SP–1–T	8 / 8	W / W	EX.	EX.	EX.	1 EX. PPB 1 EX. HORSE PUSH BUTTON
I	29–5–80	30'	55'	15'	180W	2–MAS 1–MAT	SV–1–T SV–1–T	SP–1–T	–	–	EX.	EX.	EX.	EX. R73–2
J	1–A	10'	–	–	–	–	TV–2–T	SP–1–T	2 / 8	N / E	EX.	EX.	EX.	2 EX. PPB 2 EX. HORSE PUSH BUTTONS

BOLD=NEW

PHASE DIAGRAM



COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619–234–9411
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COORDINATE INDEX
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CAMPO RD (SR94) IMPROVEMENTS AT JAMACHA RD

TRAFFIC SIGNAL SCHEDULE AND DETAILS

SCALE: HOR. N/A VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 21 OF 32 SHEETS

K:\SND_TPTO\958348001 – JV Design\Design\PS&E Off-site\Plan Sheets\Jamacha Rd\848001-TS-02A.dwg Tuesday, May 27 2014 10:59am othman.elmezain

GENERAL NOTES

1. ALL STRIPING AND SIGNING SHALL CONFORM TO THE MOST RECENTLY ADOPTED EDITION OF THE FOLLOWING MANUALS:

DESCRIPTION	EDITION
STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (THE "GREENBOOK")	2012
CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CA MUTCD)	2012
SAN DIEGO COUNTY DESIGN STANDARDS	2012

2. ALL SIGNING AND STRIPING IS SUBJECT TO THE APPROVAL OF THE PROJECT ENGINEER PRIOR TO INSTALLATION AND/OR REMOVAL.
3. INSTALLATION OF ALL STRIPING, SIGNS, AND PAVEMENT MARKERS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
4. THE CONTRACTOR SHALL REMOVE ALL CONFLICTING STRIPING, PAVEMENT MARKINGS, AND LEGENDS BY SANDBLASTING AND/OR GRINDING WITH THE SEAL. ANY DEBRIS SHALL BE PROMPTLY REMOVED BY THE CONTRACTOR.
5. CONTRACTOR SHALL REPLACE ANY STRIPING, PAVEMENT MARKERS, OR LEGENDS OBLITERATED BY CONSTRUCTION.
6. CONTRACTOR SHALL REMOVE ALL REDUNDANT STRIPING.
7. SIGN POSTS SHALL BE INSTALLED WITH ALUMINUM ALLOY 6063–T6, CLEAR ANODIZED POST PER SAN DIEGO COUNTY DESIGN STANDARD DRAWING NO. DS–13C.
8. ALL RAISED MEDIAN NOSES SHALL BE PAINTED YELLOW.
9. ALL EXISTING SIGNS SHOWN ON THE STRIPING AND SIGNING PLANS SHALL REMAIN UNLESS OTHERWISE NOTED. NEW SIGNS SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR, EXCEPT FOR EXISTING SIGNS SPECIFICALLY INDICATED TO BE RELOCATED.
10. STRIPED CROSSWALKS SHALL HAVE AN INSIDE DIMENSION OF 10 FEET UNLESS INDICATED OTHERWISE.
11. ALL LIMIT LINES/STOP LINES, CROSSWALK LINES, PAVEMENT LEGENDS, AND ARROWS (EXCEPT WITHIN BIKE LANES) SHALL BE THERMOPLASTIC.
12. CONTRACTOR SHALL LAYOUT ALL INTERIM AND FINAL STRIPING, PAVEMENT MARKERS, AND SIGN PLACEMENT. LAYOUT SHALL BE INSPECTED BY THE ENGINEER PRIOR TO INSTALLATION.
13. THE CONTRACTOR SHALL NOTIFY THE COUNTY TRAFFIC ENGINEER A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO AND UPON COMPLETION OF STRIPING AND SIGNING TO SCHEDULE A FINAL INSPECTION.
14. ALL REFERENCES TO THE "COUNTY" SHALL EXPLICITLY REFER TO THE "COUNTY OF SAN DIEGO."
15. CONTRACTOR SHALL SUBMIT PRODUCT MANUALS AND SPECIFICATIONS FOR THERMOPLASTIC MATERIALS AT THE PRE–CONSTRUCTION MEETING FOR APPROVAL BY THE PROJECT ENGINEER.
16. CONTRACTOR SHALL REMOVE ALL CONFLICTING RAISED PAVEMENT MARKERS PRIOR TO STRIPING. PAVEMENT THAT IS DAMAGED DUE TO THE REMOVAL OF MARKERS SHALL BE IMMEDIATELY REPAIRED TO THE SATISFACTION OF THE PROJECT ENGINEER.
17. SURFACES WHICH ARE TO RECEIVE NEW STRIPING, PAVEMENT MARKINGS, AND PAVEMENT MARKERS SHALL BE CLEANED OF ALL DIRTY AND LOOSE MATERIALS PRIOR TO INSTALLATION.
18. ALL TRAFFIC STRIPES 6 INCHES OR LESS IN WIDTH SHALL BE INSTALLED WITH TWO COATS OF PAINT. THE FIRST COAT OF PAINT SHALL BE DRY BEFORE APPLICATION OF THE SECOND COAT PER THE LATEST STANDARD SPECIFICATION.
19. FOR ALL ROADWAY CENTERLINES REQUIRING DOUBLE YELLOW TRAFFIC STRIPING, THE CONTRACTOR SHALL CONCURRENTLY PAINT A 3–INCH WIDE BLACK STRIPE BETWEEN THE TWO 4–INCH WIDE YELLOW STRIPES.
20. ALL LIMIT LINES/STOP BARS SHALL BE LOCATED AT THE PROLONGATION OF THE CENTER DELTA OF THE CURB RETURN OR BEHIND THE PEDESTRIAN ACCESS RAMP, UNLESS OTHERWISE SPECIFIED. IF A STRIPED CROSSWALK EXISTS, THE LIMIT LINE/STOP BAR SHALL BE LOCATED 4 FEET IN ADVANCE OF THE CROSSWALK.
21. ALL STRIPING SHALL BEGIN AND TERMINATE AT QUARTER DELTA OF THE CURB, OR BACK OF THE LIMIT LINE/STOP BAR, UNLESS OTHERWISE SPECIFIED.
22. "STOP" PAVEMENT MARKINGS SHALL BE INSTALLED 8 FEET IN ADVANCE OF THE LIMIT LINE/STOP BAR, CONSISTENT WITH THE LATEST EDITION OF THE CALIFORNIA MUTCD.
23. CONTRACTOR SHALL INSTALL BLUE RETROFLECTIVE RAISED PAVEMENT MARKERS TO DESIGNATE THE LOCATION OF ALL FIRE HYDRANTS, CONSISTENT WITH THE LATEST EDITION OF THE CALIFORNIA MUTCD.
24. STANDARD STRIPING AND PAVEMENT MARKER DETAILS AND DIMENSIONS/SPACING FOR PAVEMENT MARKINGS SHALL CONFORM TO THE LATEST EDITIONS OF THE CALTRANS STANDARD PLANS AND CALIFORNIA MUTCD.
25. APPLICATION OF TRAFFIC STRIPES, PAVEMENT MARKINGS, AND PAVEMENT MARKERS SHALL CONFORM TO THE LATEST EDITION OF THE CALTRANS STANDARD SPECIFICATIONS.
26. ALL SIGNS PURCHASED AND INSTALLED BY THE CONTRACTOR SHALL CONFORM TO THE STANDARDS PROVIDED IN THE LATEST EDITION OF THE CALIFORNIA MUTCD, INCLUDING SIGN SIZE, SHAPE, COLOR, SYMBOLS, RETROREFLECTIVITY, VERTICAL AND LATERAL MOUNTING OFFSETS, ECT. ALL SIGN FACE REFLECTIVE SHEETS SHALL BE HIGH INTENSITY GRADE WITH A CLEAR PROTECTIVE OVERLAY FILM (I.E. ANTI–GRAFFITI COATING).
27. ALL PEDESTRIAN CROSSING SIGNS, PEDESTRIAN ADVANCED WARNING SIGNS, AND SUPPLEMENTAL PLAQUES SHALL BE FLUORESCENT GREEN IN COLOR.
28. CONTRACTOR IS RESPONSIBLE FOR REPAINTING ALL CURB MARKINGS WITHIN THE PROJECT LIMITS.

LEGEND

ITEM:	STANDARD DRWG NO.	EXISTING:	NEW / RELOCATED:
1. LANE WIDTH		(XX')	XX'
2. STREET NAME SIGN	DS–13A TO DS–13E	SNS	SNS
3. SIGN LOCATION (SINGLE POST)			
4. SIGN LOCATION (DOUBLE POST)			
5. SIGN LOCATION (MOUNTED ON LUMINAIRE OR SIGNAL POLE)			
6. BIKE LANE ARROW	CALTRANS A24A		
7. BIKE LANE SYMBOL WITH PERSON	CALTRANS A24C		
8. "AHEAD" PAVEMENT MARKING	CALTRANS A24D	AHEAD	AHEAD
9. "BIKE" PAVEMENT MARKING	CALTRANS A24D	BIKE	BIKE
10. "LANE" PAVEMENT MARKING	CALTRANS A24D	LANE	LANE
11. "STOP" PAVEMENT MARKING	CALTRANS A24D	STOP	STOP
12. TYPE I 10' THROUGH ARROW	CALTRANS A24A		
13. TYPE I 24' THROUGH ARROW	CALTRANS A24A		
14. TYPE II THROUGH–LEFT ARROW	CALTRANS A24B		
15. TYPE II THROUGH–RIGHT ARROW	CALTRANS A24B		
16. TYPE III LEFT–TURN ARROW	CALTRANS A24B		
17. TYPE III RIGHT–TURN ARROW	CALTRANS A24B		
18. TYPE VI ARROW	CALTRANS A24A		
19. TYPE VII THROUGH–LEFT ARROW	CALTRANS A24A		
20. TYPE IV LEFT–TURN ARROW	CALTRANS A24A		
21. TYPE IV RIGHT–TURN ARROW	CALTRANS A24A		
22. TYPE VII THROUGH–RIGHT ARROW	CALTRANS A24A		
23. LANE LINE PATTERN (DETAIL 12)	CALTRANS A20A		
24. TWO–DIRECTION NO–PASSING PATTERN (DETAIL 22)	CALTRANS A20A		
25. LEFT EDGELINE (DETAIL 25)	CALTRANS A20B		
26. RIGHT EDGELINE (DETAIL 27B)	CALTRANS A20B		
27. TWO–WAY LEFT TURN LANE (DETAIL 32)	CALTRANS A20B		
28. WHITE CHANNELIZING LINE (DETAIL 38)	CALTRANS A20D		
29. BIKE LANE LINE (DETAIL 39)	CALTRANS A20D		
30. BIKE INTERSECTION LINE (DETAIL 39A)	CALTRANS A20D		
31. LANE LINE EXTENSION THROUGH INTERSECTIONS (DETAIL 40)	CALTRANS A20D		

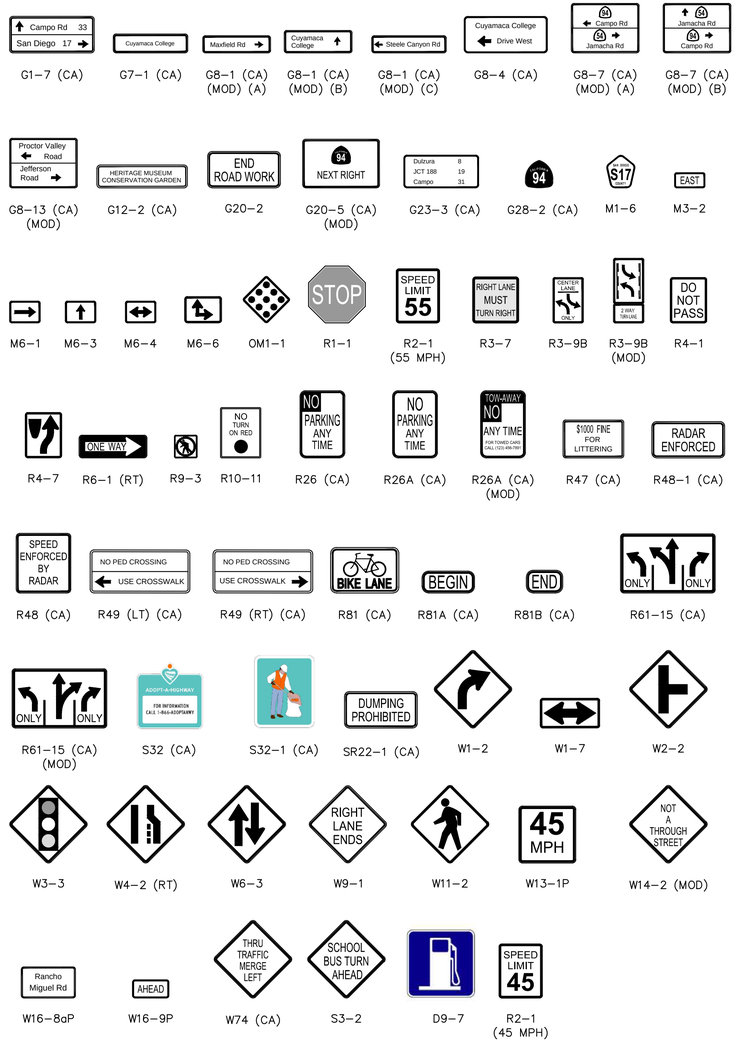
REGISTERED PROFESSIONAL ENGINEER — LEONARDO PRESTIPINO — No. 15311 — STATE OF CALIFORNIA — PRELIMINARY — NOT FOR CONSTRUCTION

PLANS	BY	DATE
DESIGNED		04/2014
CHECKED		

KIMLEY–HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619–234–9411

REGISTERED CIVIL ENGINEER _____ DATE _____

SIGN LEGEND:



65% SUBMITTAL - NOT FOR CONSTRUCTION

K:\SND_PTD\095848001 – JV Design\Design\PS&E Off–site\Plan Sheets\Lyons Valley Rd & Maxfield\848001–SM–00.dwg Tuesday, May. 27 2014 12:27pm othman.elmezain

COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123–1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619–234–9411
WWW.KIMLEY–HORN.COM

REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1842715 N. 6367329 E.
CONST. COMPL. _____
FIELD REVISIONS _____

CAMPO RD (SR94) IMPROVEMENTS AT LYONS VALLEY RD & MAXFIELD RD

SIGNING AND PAVEMENT MARKING NOTES

SCALE: HOR. N/A VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 20 OF 38 SHEETS

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES

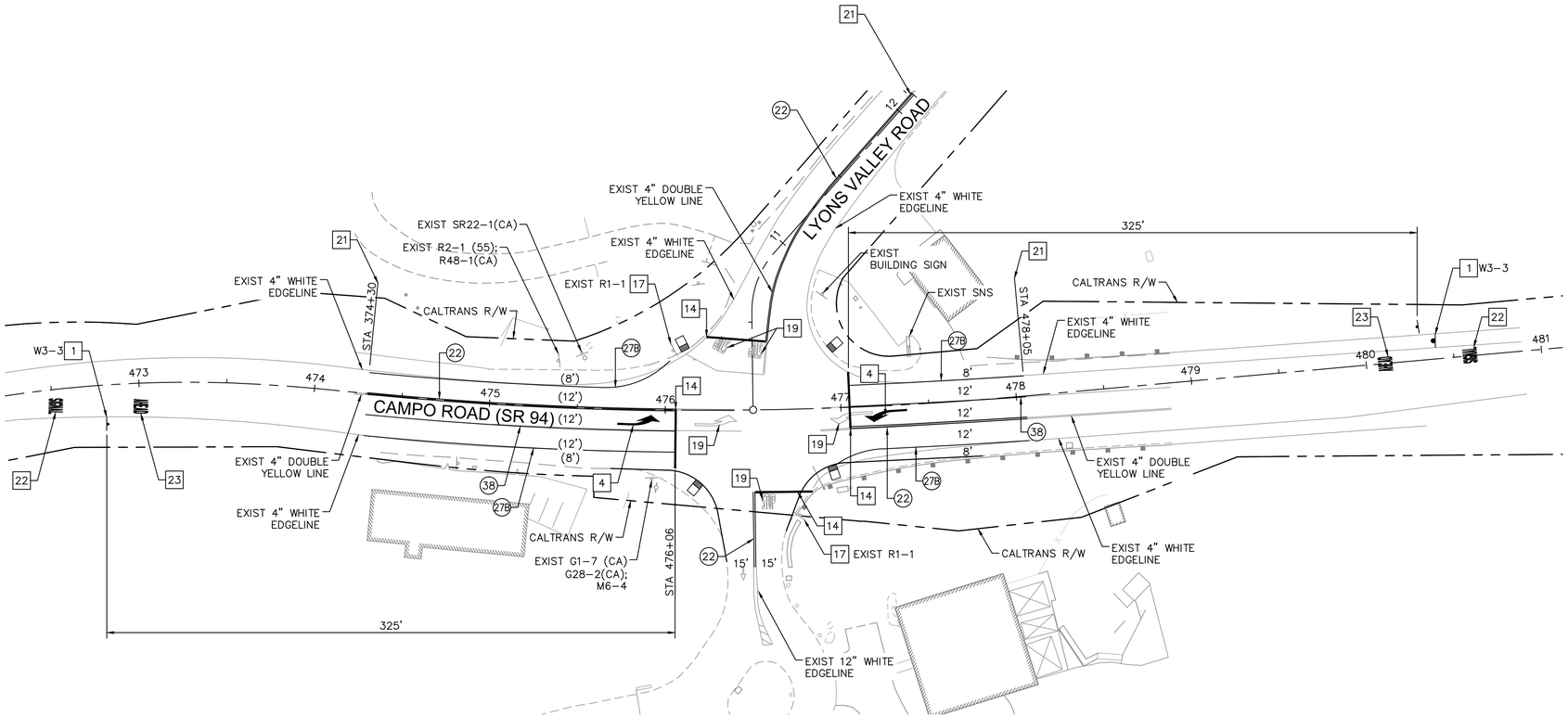
PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY-HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619-234-9411

REGISTERED CIVIL ENGINEER 12/31/2015 DATE

STRIPING LEGEND

- (22) 4" DOUBLE YELLOW LINE, STD. PLAN A20A, DETAIL 22
- (27B) 4" WHITE EDGELINE, STD. PLAN A20B, DETAIL 27B
- (38) 8" WHITE, STD. PLAN A20D, DETAIL 38



SIGNING AND MARKING NOTES

- 1 TYPE I 10' ARROW, STD. PLAN A24A
- 4 TYPE II(L) ARROW, STD. PLAN A24B
- 14 12" WHITE LIMIT LINE, STD. PLAN A24E
- 17 REMOVE AND SALVAGE EXISTING SIGN
- 19 REMOVE EXISTING PAVEMENT MARKING
- 21 MATCH EXISTING STRIPING
- 22 "SIGNAL" LEGEND, STD. PLAN A24D
- 23 "AHEAD" LEGEND, STD. PLAN A24D

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

65% SUBMITTAL - NOT FOR CONSTRUCTION

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COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

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_____ DATE _____
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REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1842715 N. 6367329 E.
CONST. COMPL. _____
FIELD REVISIONS _____

CAMPO RD (SR94) IMPROVEMENTS
AT LYONS VALLEY RD & MAXFIELD RD
SIGNING AND PAVEMENT MARKING PLAN

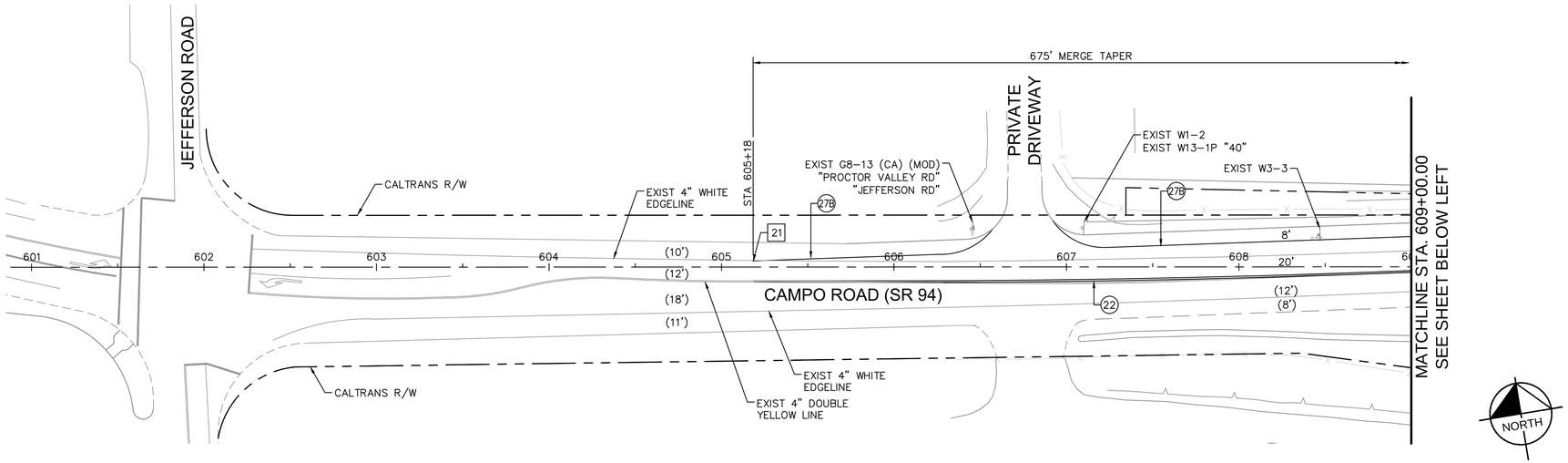
SCALE: HOR. 1" = 40' VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 24 OF 38 SHEETS

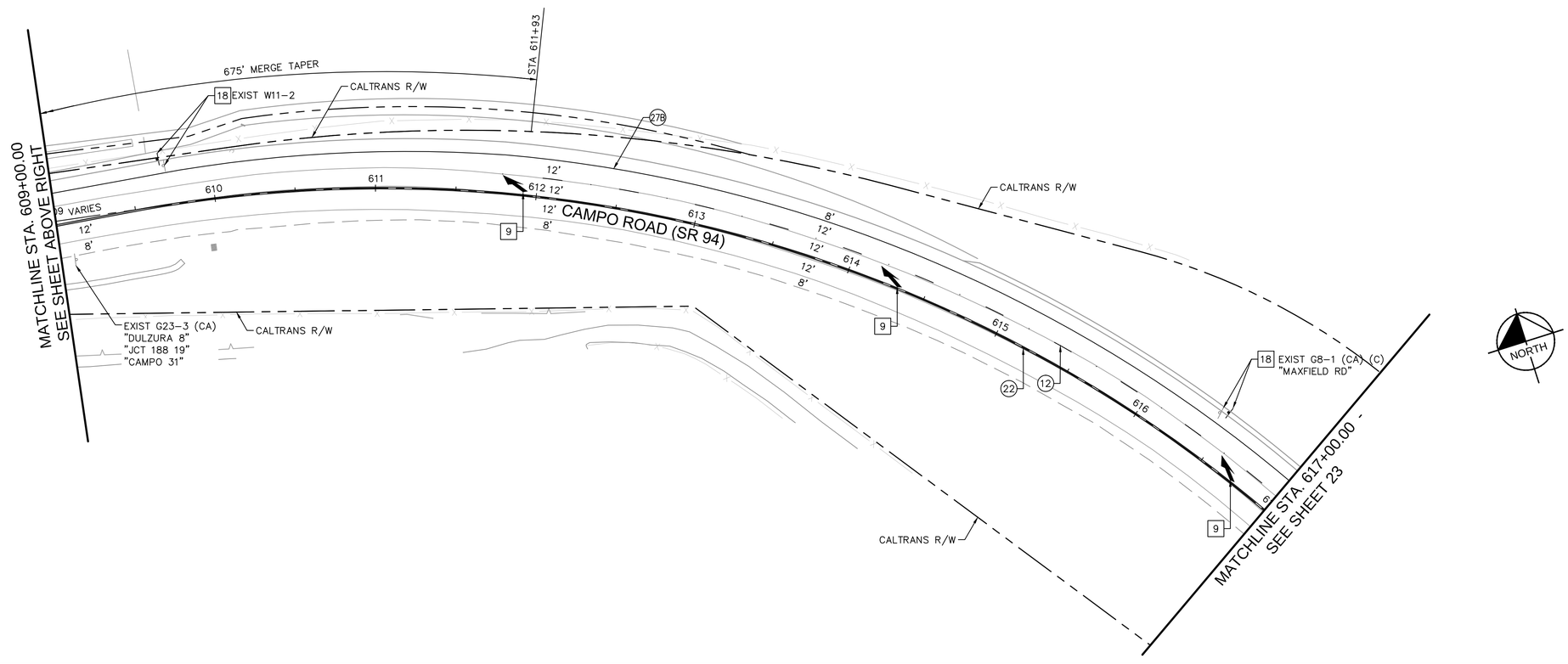
FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES

PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY-HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619-234-9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE





STRIPING LEGEND

- (12) 4" WHITE LANE LINE, STD. PLAN A20A, DETAIL 12
- (22) 4" DOUBLE YELLOW LINE, STD. PLAN A20A, DETAIL 22
- (27B) 4" WHITE EDGELINE, STD. PLAN A20B, DETAIL 27B

SIGNING AND MARKING NOTES

- 9 TYPE VI ARROW, STD.PLAN A24A
- 18 RELOCATE EXISTING SIGN(S) TO NEW LOCATION
- 21 MATCH EXISTING STRIPING

GRAPHIC SCALE IN FEET
0 20 40 80

65% SUBMITTAL - NOT FOR CONSTRUCTION

COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619-234-9411
WWW.KIMLEY-HORN.COM

REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1842715 N. 6367329 E.
CONST. COMPL. _____
FIELD REVISIONS _____

CAMPO RD (SR94) IMPROVEMENTS AT LYONS VALLEY RD & MAXFIELD RD
SIGNING AND PAVEMENT MARKING PLAN

SCALE: HOR. 1" = 40' VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 22 OF 38 SHEETS

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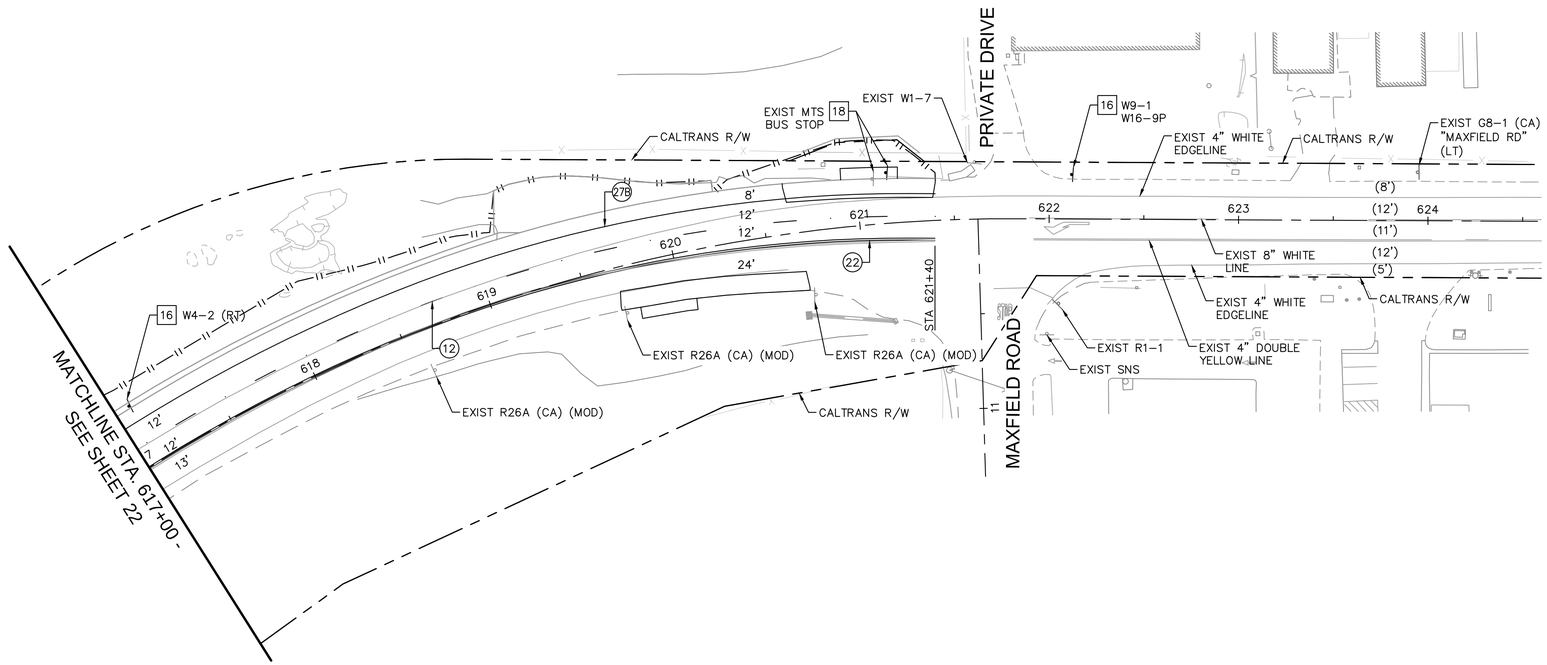
FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES



STRIPING LEGEND

(12) 4" WHITE LANE LINE, STD. PLAN A20A, DETAIL 12

(22) 4" DOUBLE YELLOW LINE, STD. PLAN A20A, DETAIL 22

(27B) 4" WHITE EDGELINE, STD. PLAN A20B, DETAIL 27B

SIGNING AND MARKING NOTES

16 FURNISH AND INSTALL NEW SIGN

18 RELOCATE EXISTING SIGN(S) TO NEW LOCATION

GRAPHIC SCALE IN FEET
0 20 40 80

NORTH

PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY-HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619-234-9411

REGISTERED CIVIL ENGINEER — DATE 12/31/2015

PRELIMINARY NOT FOR CONSTRUCTION

65% SUBMITTAL - NOT FOR CONSTRUCTION

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COUNTY OF SAN DIEGO
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5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

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_____ DATE _____

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REVISIONS	BY	APPROVED	DATE

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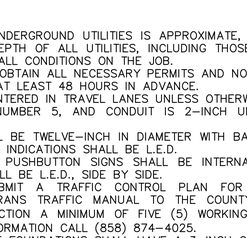
CAMPO RD (SR94) IMPROVEMENTS AT LYONS VALLEY RD & MAXFIELD RD

SIGNING AND PAVEMENT MARKING PLAN

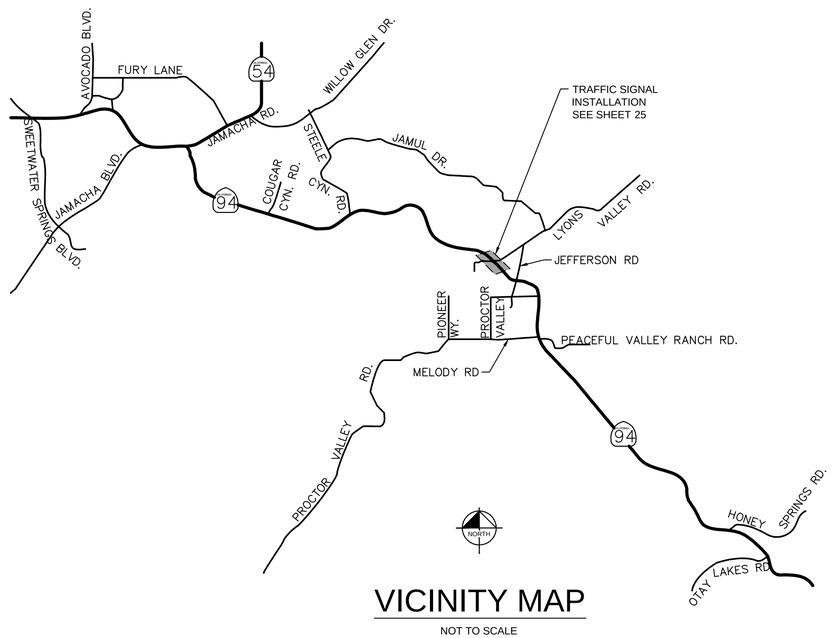
SCALE: HOR. 1" = 40' VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 23 OF 38 SHEETS

GENERAL NOTES

1. THE LOCATION OF ALL UNDERGROUND UTILITIES IS APPROXIMATE, THE CONTRACTOR SHALL DETERMINE THE DEPTH OF ALL UTILITIES, INCLUDING THOSE NOT SHOWN ON THE PLANS, AND VERIFY ALL CONDITIONS ON THE JOB.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND NOTIFY ALL UTILITIES AND AGENCIES AT LEAST 48 HOURS IN ADVANCE.
3. ALL LOOPS SHALL BE CENTERED IN TRAVEL LANES UNLESS OTHERWISE NOTED.
4. ALL PULL BOXES ARE NUMBER 5, AND CONDUIT IS 2–INCH UNLESS OTHERWISE NOTED.
5. ALL SIGNAL HEADS SHALL BE TWELVE–INCH IN DIAMETER WITH BACK PLATES. ALL RED, YELLOW, AND GREEN INDICATIONS SHALL BE L.E.D.
6. PEDESTRIAN HEADS AND PUSHBUTTON SIGNS SHALL BE INTERNATIONAL SYMBOLS. PEDESTRIAN SIGNALS SHALL BE L.E.D., SIDE BY SIDE.
7. CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN FOR TRAFFIC SIGNAL INSTALLATION PER CALTRANS TRAFFIC MANUAL TO THE COUNTY OF SAN DIEGO TRAFFIC ENGINEERING SECTION A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO CONSTRUCTION. FOR INFORMATION CALL (858) 874–4025.
8. ALL TRAFFIC SIGNAL POLE FOUNDATIONS SHALL HAVE A 3–INCH CONDUIT INSTALLED TO THE ADJACENT PULL BOX.
9. THE CONTRACTOR IS RESPONSIBLE FOR THE LAYOUT AND INSTALLATION OF LOOP DETECTORS, TRAFFIC STRIPING, PAVEMENT MARKING, PARKING REMOVAL, AND TRAFFIC SIGNING, AS SHOWN ON THE PLAN:
   a) THE CONTRACTOR SHALL OBTAIN THE APPROVAL OF THE COUNTY TRAFFIC ENGINEERING SECTION FOR THE LOOP LOCATIONS, STRIPING, PAVEMENT, MARKINGS, PARKING REMOVAL, AND SIGN LOCATIONS PRIOR TO PAINTING AND INSTALLATION. CONTRACTOR SHALL USE LEAD–FREE PAINT FOR ALL STRIPING AND PAVEMENT MARKINGS.
   b) THE CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL OF ALL CONFLICTING STRIPING AND PAVEMENT MARKINGS AND SANDBLASTING/GRINDING AND SAND SEALING.
10. CONTRACTOR SHALL NOT ERECT ANY SIGNAL STANDARDS MORE THAN THREE WEEKS PRIOR TO SCHEDULED TRAFFIC SIGNAL TURN ON.
11. FLASHING SIGNAL OPERATION SHALL BE RED ON ALL PHASES. PEDESTRIAN SIGNALS SHALL BE BLACK DURING FLASHING OPERATION.
12. ALL TRAFFIC SIGNAL IMPROVEMENTS SHALL BE INSTALLED IN COORDINATION WITH THE SIGNING AND STRIPING CONTRACTOR.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MONUMENTATION AND/OR BENCHMARKS WHICH WILL BE DISTURBED OR DESTROYED BY CONSTRUCTION. SUCH POINTS SHALL BE REFERENCED AND REPLACED BY APPROPRIATE MONUMENTATION BY A LICENSED LAND SURVEYOR OR A REGISTERED CIVIL ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING. A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILED BY THE LICENSED SURVEYOR OR REGISTERED CIVIL ENGINEER AS REQUIRED BY THE LAND SURVEYOR'S ACT.
14. RAISED PAVEMENT MARKERS SHALL BE PLACED ON ALL NEW CENTERLINES AND LANE LINE STRIPING PER CALTRANS STANDARD PLANS.
15. CONTRACTOR SHALL REPLACE ALL STRIPING, PAVEMENT MARKERS, AND LEGENDS OBLITERATED BY THIS PROJECT.
16. CONTRACTOR SHALL REMOVE/TRIM VEGETATION PER ENGINEER.
17. ALL CONDUIT PLACED IN STREET SHALL HAVE A MINIMUM OF 24" COVER (R.S.D.) G–34.



POLE PLACEMENT DETAIL
N.T.S



VICINITY MAP
NOT TO SCALE

LEGEND

ITEM:	STANDARD DWG. NO.:	EXISTING:	NEW / RELOCATED:
1. SAFETY LIGHTING/LUMINAIRE, LPS 180 WATT EQUIVALENT	PER PLAN		
2. TRAFFIC SIGNAL STANDARD, MAST ARM, SNS, SIGN, VIDEO DETECTOR, VEHICLE INDICATIONS, EVP, PEDESTRIAN INDICATION, AND LUMINAIRE	PER PLAN		
3. EMERGENCY VEHICLE PREEMPTION (EVPE)	PER PLAN		
4. STREET NAME SIGNS (SNS)	SAN DIEGO COUNTY STD. DWG. NO. DS–13D & DS–13E		
5. PEDESTRIAN INDICATION	PER PLAN		
6. 170E CONTROLLER CABINET	CALTRANS & SAN DIEGO COUNTY SPECS.		
7. SERVICE POINT	PER PLAN		
9. ADVANCED VEHICLE DETECTION ZONE (LOOPS)	PER PLAN		
10. VIDEO DETECTION ZONE	PER PLAN		
11. CONDUIT	PER PLAN		
17. SIGN ON TRAFFIC SIGNAL EQUIPMENT	PER PLAN		
18. PULL BOX	PER PLAN		
19. VIDEO DETECTOR CAMERA	PER PLAN		
20. THROUGH VEHICLE INDICATION			
21. PROTECTED VEHICLE INDICATION			

PRELIMINARY NOT FOR CONSTRUCTION
REGISTERED PROFESSIONAL ENGINEER — LEONARDO ESPELETA — No. 53121 — STATE OF CALIFORNIA

PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY–HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619–234–9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE

65% SUBMITTAL - NOT FOR CONSTRUCTION

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COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619–234–9411
WWW.KIMLEY–HORN.COM

REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1842715 N. 6367329 E.
CONST. COMPL. _____
FIELD REVISIONS _____

CAMPO RD (SR94) IMPROVEMENTS AT LYONS VALLEY RD

TRAFFIC SIGNAL NOTES

SCALE: HOR. N/A VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 24 OF 38 SHEETS

TRAFFIC SIGNAL NOTES

1. FURNISH AND INSTALL MODEL 332 ALUMINUM CABINET AND FOUNDATION. FURNISH AND INSTALL TYPE 170E ATC CONTROLLER.
2. FURNISH AND INSTALL VIDEO DETECTION CAMERA ON LUMINAIRE MAST ARM AS SHOWN.
3. FURNISH AND INSTALL VIDEO DETECTION CAMERA ON TRAFFIC SIGNAL MAST ARM AS SHOWN.
4. FURNISH AND INSTALL OPTICOM 722 EMERGENCY VEHICLE PREEMPTION (EVP) DETECTOR ON TOP OF SIGNAL MAST ARM AS SHOWN.
5. FURNISH AND INSTALL 120V TYPE III–BF SERVICE EQUIPMENT ENCLOSURE.
6. FURNISH AND INSTALL SIGN ON MAST ARM.
8. FURNISH AND INSTALL TRAFFIC SIGNAL STREET NAME SIGN PER COUNTY OF SAN DIEGO STANDARD DRAWINGS DS–13D,DS–13E, AND DS–13F DATED 10/15/12.

-1 0 1 2 3 4 5 6 7 8 9 10

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES



GRAPHIC SCALE IN FEET
0 10 20 40

NORTH

PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY–HORN AND ASSOCIATES
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619–234–9411

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CAMPO RD (SR94) IMPROVEMENTS AT LYONS VALLEY RD

TRAFFIC SIGNAL INSTALLATION PLAN

SCALE: HOR. 1" = 20' VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 25 OF 38 SHEETS

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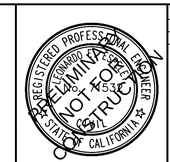
FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES



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CONDUCTOR SCHEDULE

AWG SIZE	ø	CIRCUIT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CONDUCTORS 3 / 12 CONDUCTORS		POLE – (A)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – (B)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – (C)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – (D)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – (E)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – (F)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – (G)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL CABLES–3 CONDUCT./12 CONDUCT.			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
#14	PEU		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
#10	LIGHTING		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
#6	SIGNAL SERVICE		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TYPE "B" DLC	ø2	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	ø4	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	ø6	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	ø8	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
INTERCONNECT CABLE – SIC			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
VIDEO DETECTION CABLE			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EMERGENCY VEHICLE PREEMPTION			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONDUIT SIZE			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

TO BE COMPLETED FOR 100% SUBMITTAL

SIGN LEGEND:

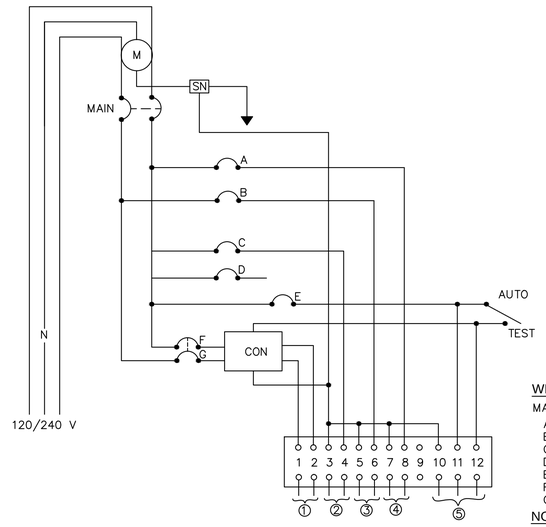


R73–3 (CA)
36" X 36"



R10–12
30" X 36"

WIRING DIAGRAM:



WIRING DIAGRAM:
MAIN 2P – 100 AMP
A – 1P–15 AMP
B – 1P–15 AMP
C – 1P–50 AMP
D – 1P–15 AMP SPARE
E – 1P–15 AMP
F, G – 2P–30 AMP

NOTES:
① – LIGHTING
② – SIGNAL
③ – TDC
④ – FB
⑤ – PEU

CON=CONTACTOR

POLE SCHEDULE

POLE DATA No.	TYPE	Ht.	SIGNAL M.A.	LUMINAIRE M.A.	LUMINAIRE LPS	VEH SIG MTG MAST	VEH SIG MTG POLE	PED SIG MTG	PPB ø	PPB QUAD	POLE LOC. A	POLE LOC. B	POLE LOC. C	REMARKS
(A)	26–4–100	30'	40'	12'	180W	1–MAS 1–MAT	SV–2–T	SP–2–T	6 4	N E	XX'	XX'	XX'	INSTALL R73–3 (CA)
(B)	23–4–100	30'	35'	12'	180W	1–MAT	SV–2–T	SP–2–T	6 8	N E	XX'	XX'	XX'	INSTALL R10–12
(C)	18–4–100	30'	30'	12'	180W	1–MAS 1–MAT	SV–2–T	SP–2–T	8 2	W S	XX'	XX'	XX'	
(D)	18–4–100	30'	25'	12'	180W	1–MAT	SV–2–T	SP–2–T	2 4	N W	XX'	XX'	XX'	

PROPOSED PHASE DIAGRAM

	GROUP A		GROUP B	
RING 1	ø1	ø2	ø3	ø4
			NOT USED	
RING 2	ø5	ø6	ø7	ø8
			NOT USED	

COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619–234–9411
WWW.KIMLEY–HORN.COM

	REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1842715 N. 6367329 E.
CONST. COMPL. _____
FIELD REVISIONS _____

CAMPO RD (SR94) IMPROVEMENTS AT LYONS VALLEY RD

TRAFFIC SIGNAL SCHEDULE AND DETAILS

SCALE: HOR. N/A VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 26 OF 38 SHEETS

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GENERAL NOTES

1. ALL STRIPING AND SIGNING SHALL CONFORM TO THE MOST RECENTLY ADOPTED EDITION OF THE FOLLOWING MANUALS:

DESCRIPTION	EDITION
STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (THE "GREENBOOK")	2012
CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CA MUTCD)	2012
SAN DIEGO COUNTY DESIGN STANDARDS	2012

2. ALL SIGNING AND STRIPING IS SUBJECT TO THE APPROVAL OF THE PROJECT ENGINEER PRIOR TO INSTALLATION AND/OR REMOVAL.
3. INSTALLATION OF ALL STRIPING, SIGNS, AND PAVEMENT MARKERS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
4. THE CONTRACTOR SHALL REMOVE ALL CONFLICTING STRIPING, PAVEMENT MARKINGS, AND LEGENDS BY SANDBLASTING AND/OR GRINDING WITH THE SEAL. ANY DEBRIS SHALL BE PROMPTLY REMOVED BY THE CONTRACTOR.
5. CONTRACTOR SHALL REPLACE ANY STRIPING, PAVEMENT MARKERS, OR LEGENDS OBLITERATED BY CONSTRUCTION.
6. CONTRACTOR SHALL REMOVE ALL REDUNDANT STRIPING.
7. SIGN POSTS SHALL BE INSTALLED WITH ALUMINUM ALLOY 6063–T6, CLEAR ANODIZED POST PER SAN DIEGO COUNTY DESIGN STANDARD DRAWING NO. DS–13C.
8. ALL RAISED MEDIAN NOSES SHALL BE PAINTED YELLOW.
9. ALL EXISTING SIGNS SHOWN ON THE STRIPING AND SIGNING PLANS SHALL REMAIN UNLESS OTHERWISE NOTED. NEW SIGNS SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR, EXCEPT FOR EXISTING SIGNS SPECIFICALLY INDICATED TO BE RELOCATED.
10. STRIPED CROSSWALKS SHALL HAVE AN INSIDE DIMENSION OF 10 FEET UNLESS INDICATED OTHERWISE.
11. ALL LIMIT LINES/STOP LINES, CROSSWALK LINES, PAVEMENT LEGENDS, AND ARROWS (EXCEPT WITHIN BIKE LANES) SHALL BE THERMOPLASTIC.
12. CONTRACTOR SHALL LAYOUT ALL INTERIM AND FINAL STRIPING, PAVEMENT MARKERS, AND SIGN PLACEMENT. LAYOUT SHALL BE INSPECTED BY THE ENGINEER PRIOR TO INSTALLATION.
13. THE CONTRACTOR SHALL NOTIFY THE COUNTY TRAFFIC ENGINEER AT A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO AND UPON COMPLETION OF STRIPING AND SIGNING TO SCHEDULE A FINAL INSPECTION.
14. ALL REFERENCES TO THE "COUNTY" SHALL EXPLICITLY REFER TO THE "COUNTY OF SAN DIEGO."
15. CONTRACTOR SHALL SUBMIT PRODUCT MANUALS AND SPECIFICATIONS FOR THERMOPLASTIC MATERIALS AT THE PRE–CONSTRUCTION MEETING FOR APPROVAL BY THE PROJECT ENGINEER.
16. CONTRACTOR SHALL REMOVE ALL CONFLICTING RAISED PAVEMENT MARKERS PRIOR TO STRIPING. PAVEMENT THAT IS DAMAGED DUE TO THE REMOVAL OF MARKERS SHALL BE IMMEDIATELY REPAIRED TO THE SATISFACTION OF THE PROJECT ENGINEER.
17. SURFACES WHICH ARE TO RECEIVE NEW STRIPING, PAVEMENT MARKINGS, AND PAVEMENT MARKERS SHALL BE CLEANED OF ALL DIRTY AND LOOSE MATERIALS PRIOR TO INSTALLATION.
18. ALL TRAFFIC STRIPES 6 INCHES OR LESS IN WIDTH SHALL BE INSTALLED WITH TWO COATS OF PAINT. THE FIRST COAT OF PAINT SHALL BE DRY BEFORE APPLICATION OF THE SECOND COAT PER THE LATEST STANDARD SPECIFICATION.
19. FOR ALL ROADWAY CENTERLINES REQUIRING DOUBLE YELLOW TRAFFIC STRIPING, THE CONTRACTOR SHALL CONCURRENTLY PAINT A 3–INCH WIDE BLACK STRIPE BETWEEN THE TWO 4–INCH WIDE YELLOW STRIPES.
20. ALL LIMIT LINES/STOP BARS SHALL BE LOCATED AT THE PROLONGATION OF THE CENTER DELTA OF THE CURB RETURN OR BEHIND THE PEDESTRIAN ACCESS RAMP, UNLESS OTHERWISE SPECIFIED. IF A STRIPED CROSSWALK EXISTS, THE LIMIT LINE/STOP BAR SHALL BE LOCATED 4 FEET IN ADVANCE OF THE CROSSWALK.
21. ALL STRIPING SHALL BEGIN AND TERMINATE AT QUARTER DELTA OF THE CURB, OR BACK OF THE LIMIT LINE/STOP BAR, UNLESS OTHERWISE SPECIFIED.
22. "STOP" PAVEMENT MARKINGS SHALL BE INSTALLED 8 FEET IN ADVANCE OF THE LIMIT LINE/STOP BAR, CONSISTENT WITH THE LATEST EDITION OF THE CALIFORNIA MUTCD.
23. CONTRACTOR SHALL INSTALL BLUE RETROFLECTIVE RAISED PAVEMENT MARKERS TO DESIGNATE THE LOCATION OF ALL FIRE HYDRANTS, CONSISTENT WITH THE LATEST EDITION OF THE CALIFORNIA MUTCD.
24. STANDARD STRIPING AND PAVEMENT MARKER DETAILS AND DIMENSIONS/SPACING FOR PAVEMENT MARKINGS SHALL CONFORM TO THE LATEST EDITIONS OF THE CALTRANS STANDARD PLANS AND CALIFORNIA MUTCD.
25. APPLICATION OF TRAFFIC STRIPES, PAVEMENT MARKINGS, AND PAVEMENT MARKERS SHALL CONFORM TO THE LATEST EDITION OF THE CALTRANS STANDARD SPECIFICATIONS.
26. ALL SIGNS PURCHASED AND INSTALLED BY THE CONTRACTOR SHALL CONFORM TO THE STANDARDS PROVIDED IN THE LATEST EDITION OF THE CALIFORNIA MUTCD, INCLUDING SIGN SIZE, SHAPE, COLOR, SYMBOLS, RETROREFLECTIVITY, VERTICAL AND LATERAL MOUNTING OFFSETS, ECT. ALL SIGN FACE REFLECTIVE SHEETS SHALL BE HIGH INTENSITY GRADE WITH A CLEAR PROTECTIVE OVERLAY FILM (I.E. ANTI–GRAFFITI COATING).
27. ALL PEDESTRIAN CROSSING SIGNS, PEDESTRIAN ADVANCED WARNING SIGNS, AND SUPPLEMENTAL PLAQUES SHALL BE FLUORESCENT GREEN IN COLOR.
28. CONTRACTOR IS RESPONSIBLE FOR REPAINTING ALL CURB MARKINGS WITHIN THE PROJECT LIMITS.

LEGEND

ITEM:	STANDARD DRWG NO.	EXISTING:	NEW / RELOCATED:
1. LANE WIDTH		(XX')	XX'
2. STREET NAME SIGN	DS–13A TO DS–13E	SNS	SNS
3. SIGN LOCATION (SINGLE POST)			
4. SIGN LOCATION (DOUBLE POST)			
5. SIGN LOCATION (MOUNTED ON LUMINAIRE OR SIGNAL POLE)			
6. BIKE LANE ARROW	CALTRANS A24A		
7. BIKE LANE SYMBOL WITH PERSON	CALTRANS A24C		
8. "AHEAD" PAVEMENT MARKING	CALTRANS A24D		
9. "BIKE" PAVEMENT MARKING	CALTRANS A24D		
10. "LANE" PAVEMENT MARKING	CALTRANS A24D		
11. "STOP" PAVEMENT MARKING	CALTRANS A24D		
12. TYPE I 10' THROUGH ARROW	CALTRANS A24A		
13. TYPE I 24' THROUGH ARROW	CALTRANS A24A		
14. TYPE II THROUGH–LEFT ARROW	CALTRANS A24B		
15. TYPE II THROUGH–RIGHT ARROW	CALTRANS A24B		
16. TYPE III LEFT–TURN ARROW	CALTRANS A24B		
17. TYPE III RIGHT–TURN ARROW	CALTRANS A24B		
18. TYPE VI ARROW	CALTRANS A24A		
19. TYPE VII THROUGH–LEFT ARROW	CALTRANS A24A		
20. TYPE IV LEFT–TURN ARROW	CALTRANS A24A		
21. TYPE IV RIGHT–TURN ARROW	CALTRANS A24A		
22. TYPE VII THROUGH–RIGHT ARROW	CALTRANS A24A		
23. LANE LINE PATTERN (DETAIL 12)	CALTRANS A20A		
24. TWO–DIRECTION NO–PASSING PATTERN (DETAIL 22)	CALTRANS A20A		
25. LEFT EDGELINE (DETAIL 25)	CALTRANS A20B		
26. RIGHT EDGELINE (DETAIL 27B)	CALTRANS A20B		
27. TWO–WAY LEFT TURN LANE (DETAIL 32)	CALTRANS A20B		
28. WHITE CHANNELIZING LINE (DETAIL 38)	CALTRANS A20D		
29. BIKE LANE LINE (DETAIL 39)	CALTRANS A20D		
30. BIKE INTERSECTION LINE (DETAIL 39A)	CALTRANS A20D		
31. LANE LINE EXTENSION THROUGH INTERSECTIONS (DETAIL 40)	CALTRANS A20D		

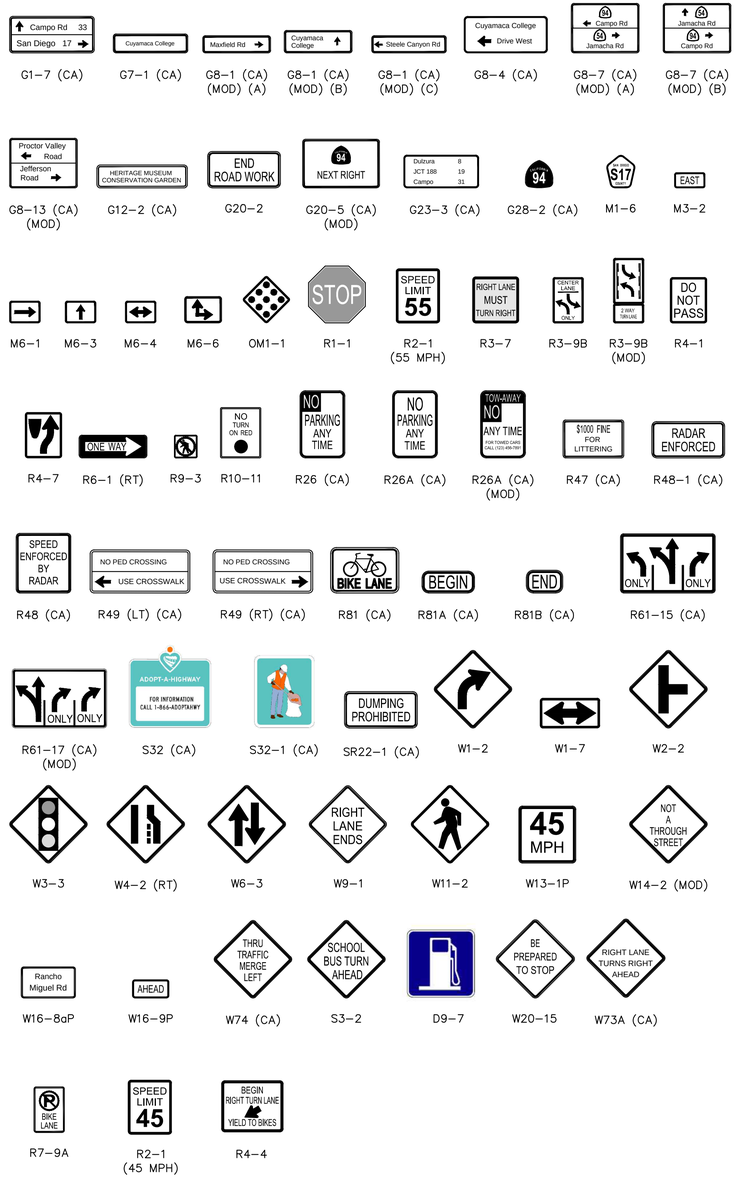
REGISTERED PROFESSIONAL ENGINEER LEONARDO PRESCOTT 15311 STATE OF CALIFORNIA
PRELIMINARY NOT FOR CONSTRUCTION

KIMLEY–HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619–234–9411

REGISTERED CIVIL ENGINEER _____ DATE _____

PLANS	BY	DATE
DESIGNED		04/2014
CHECKED	X. XXXXX	

SIGN LEGEND:



G1–7 (CA) · G7–1 (CA) · G8–1 (CA) (MOD) (A) · G8–1 (CA) (MOD) (B) · G8–1 (CA) (MOD) (C) · G8–4 (CA) · G8–7 (CA) (MOD) (A) · G8–7 (CA) (MOD) (B)

G8–13 (CA) (MOD) · G12–2 (CA) · G20–2 · G20–5 (CA) (MOD) · G23–3 (CA) · G28–2 (CA) · M1–6 · M3–2

M6–1 · M6–3 · M6–4 · M6–6 · OM1–1 · R1–1 · R2–1 (55 MPH) · R3–7 · R3–9B · R3–9B (MOD) · R4–1

R4–7 · R6–1 (RT) · R9–3 · R10–11 · R26 (CA) · R26A (CA) · R26A (CA) (MOD) · R47 (CA) · R48–1 (CA)

R48 (CA) · R49 (LT) (CA) · R49 (RT) (CA) · R81 (CA) · R81A (CA) · R81B (CA) · R61–15 (CA)

R61–17 (CA) (MOD) · S32 (CA) · S32–1 (CA) · SR22–1 (CA) · W1–2 · W1–7 · W2–2

W3–3 · W4–2 (RT) · W6–3 · W9–1 · W11–2 · W13–1P · W14–2 (MOD)

W16–8aP · W16–9P · W74 (CA) · S3–2 · D9–7 · W20–15 · W73A (CA)

R7–9A · R2–1 (45 MPH) · R4–4

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COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619–234–9411
WWW.KIMLEY–HORN.COM

REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1844571 N. 6358118 E.
CONST. COMPL. _____
FIELD REVISIONS _____

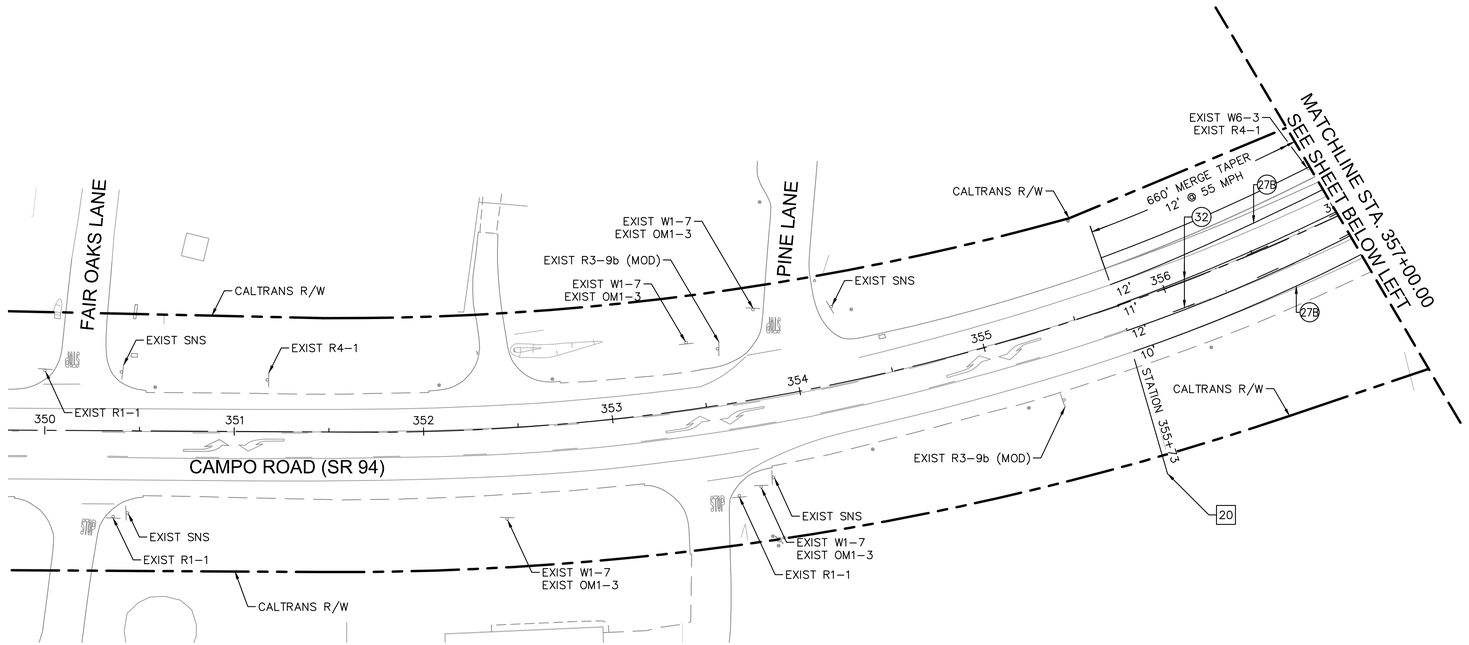
CAMPO RD (SR94) IMPROVEMENTS AT STEELE CANYON RD

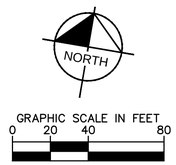
SIGNING AND PAVEMENT MARKING NOTES

SCALE: HOR. N/A VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 22 OF 33 SHEETS

-1 0 1 2 3 4 5 6 7 8 9 10

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES



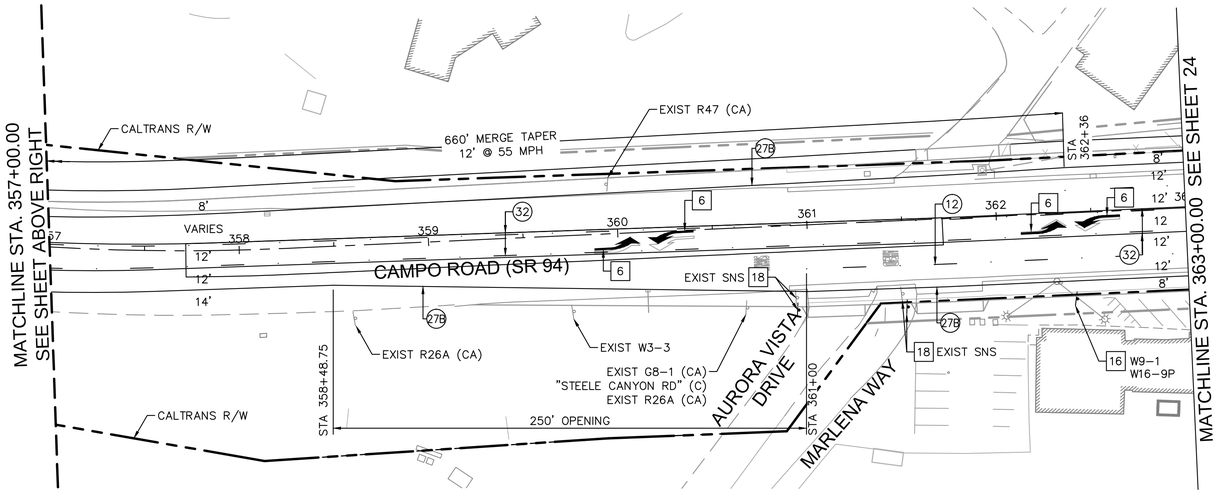


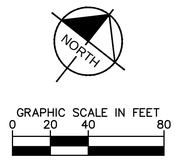
STRIPING LEGEND

(12) 4" WHITE LANE LINE, STD. PLAN A20A, DETAIL 12

(27B) 4" WHITE EDGELINE, STD. PLAN A20B, DETAIL 27B

(32) TWO-WAY LEFT TURN LANE, STD. PLAN A20B, DETAIL 32





SIGNING AND MARKING NOTES

6 TYPE III(L) ARROW, STD. PLAN A24B

16 FURNISH AND INSTALL NEW SIGN.

18 RELOCATE EXISTING SIGN(S) TO NEW LOCATION.

PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY-HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619-234-9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE

NOT FOR CONSTRUCTION

65% SUBMITTAL - NOT FOR CONSTRUCTION

COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619-234-9411
WWW.KIMLEY-HORN.COM

REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1844571 N. 6358118 E.
CONST. COMPL. _____
FIELD REVISIONS _____

CAMPO RD (SR94) IMPROVEMENTS AT STEELE CANYON RD

SIGNING AND PAVEMENT MARKING PLAN

SCALE: HOR. 1" = 40' VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 23 OF 33 SHEETS

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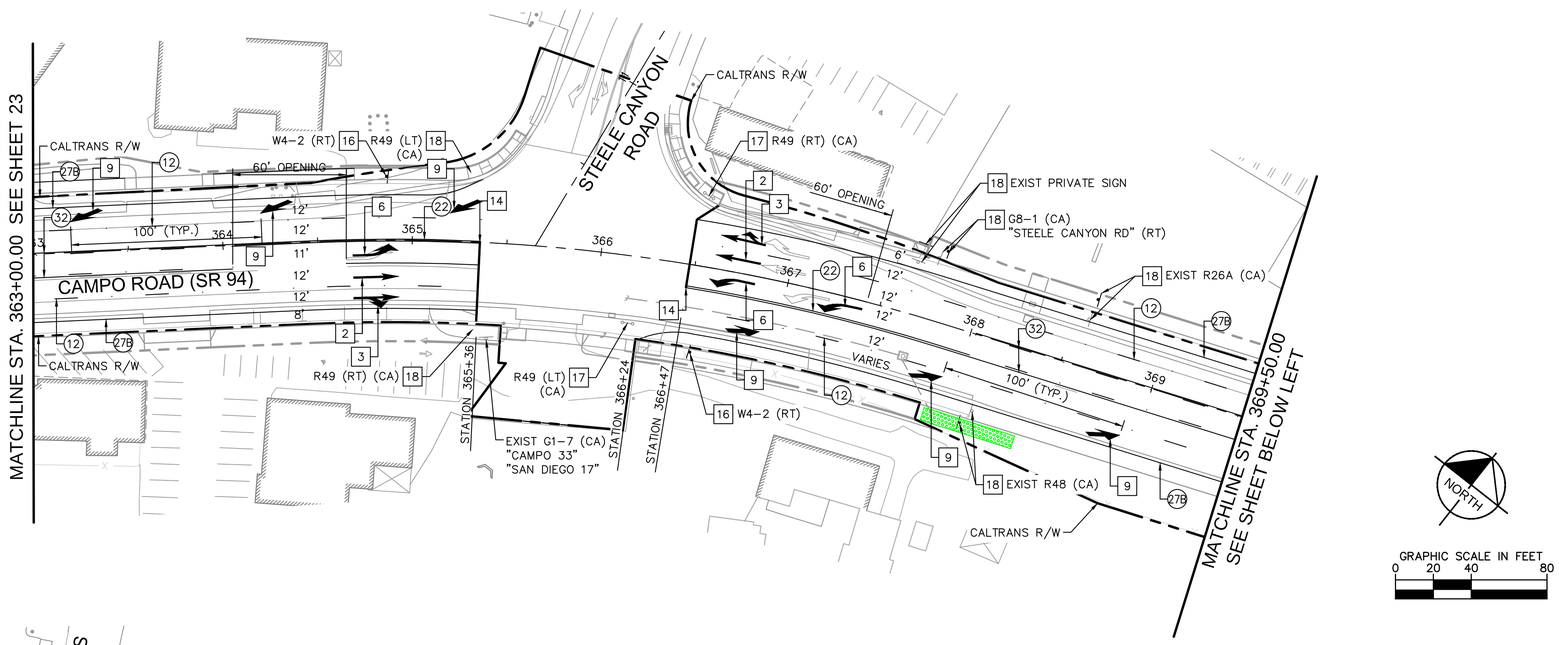
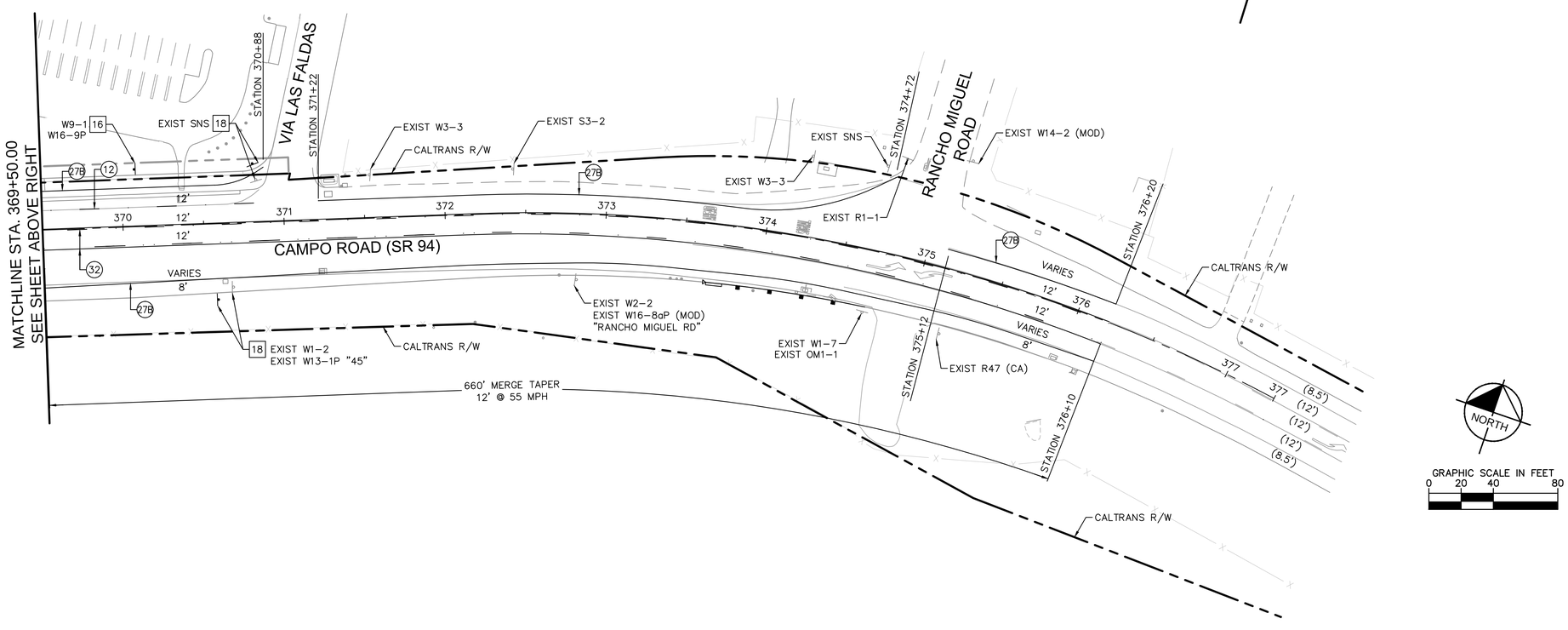
FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES

PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY-HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619-234-9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE





STRIPING LEGEND

- (12) 4" WHITE LANE LINE, STD. PLAN A20A, DETAIL 12
- (22) 4" DOUBLE YELLOW LINE, STD. PLAN A20A, DETAIL 22
- (27B) 4" WHITE EDGELINE, STD. PLAN A20B, DETAIL 27B
- (32) TWO-WAY LEFT TURN LANE, STD. PLAN A20B, DETAIL 32

SIGNING AND MARKING NOTES

- 2 TYPE I 24' ARROW, STD. PLAN A24A
- 3 TYPE II(R) ARROW, STD. PLAN A24B
- 6 TYPE III(L) ARROW, STD. PLAN A24B
- 9 TYPE VI ARROW, STD.PLAN A24A
- 14 12" WHITE LIMIT LINE, STD. PLAN A24E
- 16 FURNISH AND INSTALL NEW SIGN.
- 17 REMOVE AND SALVAGE EXISTING SIGN.
- 18 RELOCATE EXISTING SIGN(S) TO NEW LOCATION.

65% SUBMITTAL - NOT FOR CONSTRUCTION

COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619-234-9411
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REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1844571 N. 6358118 E.
CONST. COMPL. _____
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CAMPO RD (SR94) IMPROVEMENTS AT STEELE CANYON RD
SIGNING AND PAVEMENT MARKING PLAN

SCALE: HOR. 1" = 40' VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 24 OF 33 SHEETS

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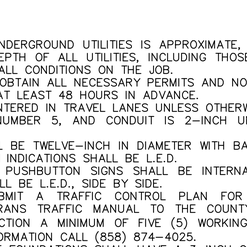
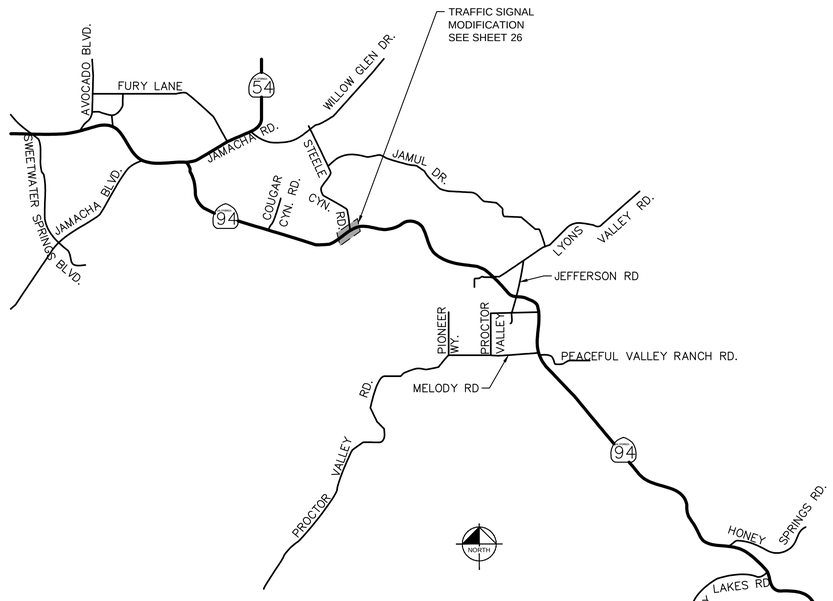
GENERAL NOTES

1. THE LOCATION OF ALL UNDERGROUND UTILITIES IS APPROXIMATE, THE CONTRACTOR SHALL DETERMINE THE DEPTH OF ALL UTILITIES, INCLUDING THOSE NOT SHOWN ON THE PLANS, AND VERIFY ALL CONDITIONS ON THE JOB.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND NOTIFY ALL UTILITIES AND AGENCIES AT LEAST 48 HOURS IN ADVANCE.
3. ALL LOOPS SHALL BE CENTERED IN TRAVEL LANES UNLESS OTHERWISE NOTED.
4. ALL PULL BOXES ARE NUMBER 5, AND CONDUIT IS 2–INCH UNLESS OTHERWISE NOTED.
5. ALL SIGNAL HEADS SHALL BE TWELVE–INCH IN DIAMETER WITH BACK PLATES. ALL RED, YELLOW, AND GREEN INDICATIONS SHALL BE L.E.D.
6. PEDESTRIAN HEADS AND PUSHBUTTON SIGNS SHALL BE INTERNATIONAL SYMBOLS. PEDESTRIAN SIGNALS SHALL BE L.E.D., SIDE BY SIDE.
7. CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN FOR TRAFFIC SIGNAL INSTALLATION PER CALTRANS TRAFFIC MANUAL TO THE COUNTY OF SAN DIEGO TRAFFIC ENGINEERING SECTION A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO CONSTRUCTION. FOR INFORMATION CALL (858) 874–4025.
8. ALL TRAFFIC SIGNAL POLE FOUNDATIONS SHALL HAVE A 3–INCH CONDUIT INSTALLED TO THE ADJACENT PULL BOX.
9. THE CONTRACTOR IS RESPONSIBLE FOR THE LAYOUT AND INSTALLATION OF LOOP DETECTORS, TRAFFIC STRIPING, PAVEMENT MARKING, PARKING REMOVAL, AND TRAFFIC SIGNING, AS SHOWN ON THE PLAN:
   a) THE CONTRACTOR SHALL OBTAIN THE APPROVAL OF THE COUNTY TRAFFIC ENGINEERING SECTION FOR THE LOOP LOCATIONS, STRIPING, PAVEMENT, MARKINGS, PARKING REMOVAL, AND SIGN LOCATIONS PRIOR TO PAINTING AND INSTALLATION. CONTRACTOR SHALL USE LEAD–FREE PAINT FOR ALL STRIPING AND PAVEMENT MARKINGS.
   b) THE CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL OF ALL CONFLICTING STRIPING AND PAVEMENT MARKINGS AND SANDBLASTING/GRINDING AND SAND SEALING.
10. CONTRACTOR SHALL NOT ERECT ANY SIGNAL STANDARDS MORE THAN THREE WEEKS PRIOR TO SCHEDULED TRAFFIC SIGNAL TURN ON.
11. FLASHING SIGNAL OPERATION SHALL BE RED ON ALL PHASES. PEDESTRIAN SIGNALS SHALL BE BLACK DURING FLASHING OPERATION.
12. ALL TRAFFIC SIGNAL IMPROVEMENTS SHALL BE INSTALLED IN COORDINATION WITH THE SIGNING AND STRIPING CONTRACTOR.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MONUMENTATION AND/OR BENCHMARKS WHICH WILL BE DISTURBED OR DESTROYED BY CONSTRUCTION. SUCH POINTS SHALL BE REFERENCED AND REPLACED BY APPROPRIATE MONUMENTATION BY A LICENSED LAND SURVEYOR OR A REGISTERED CIVIL ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING. A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILED BY THE LICENSED SURVEYOR OR REGISTERED CIVIL ENGINEER AS REQUIRED BY THE LAND SURVEYOR'S ACT.
14. RAISED PAVEMENT MARKERS SHALL BE PLACED ON ALL NEW CENTERLINES AND LANE LINE STRIPING PER CALTRANS STANDARD PLANS.
15. CONTRACTOR SHALL REPLACE ALL STRIPING, PAVEMENT MARKERS, AND LEGENDS OBLITERATED BY THIS PROJECT.
16. CONTRACTOR SHALL REMOVE/TRIM VEGETATION PER ENGINEER.
17. ALL CONDUIT PLACED IN STREET SHALL HAVE A MINIMUM OF 24" COVER (R.S.D.) G–34.



POLE PLACEMENT DETAIL
N.T.S



VICINITY MAP
NOT TO SCALE

LEGEND

ITEM:	STANDARD DWG. NO.:	EXISTING:	NEW / RELOCATED:
1. SAFETY LIGHTING/LUMINAIRE, LPS 180 WATT EQUIVALENT	PER PLAN		
2. TRAFFIC SIGNAL STANDARD, MAST ARM, SNS, SIGN, VIDEO DETECTOR, VEHICLE INDICATIONS, EVP, PEDESTRIAN INDICATION, AND LUMINAIRE	PER PLAN		
3. EMERGENCY VEHICLE PREEMPTION (EVPE)	PER PLAN		
4. STREET NAME SIGNS (SNS)	SAN DIEGO COUNTY STD. DWG. NO. DS–13D & DS–13E		
5. PEDESTRIAN INDICATION	PER PLAN		
6. 170E CONTROLLER CABINET	CALTRANS & SAN DIEGO COUNTY SPECS.		
7. SERVICE POINT	PER PLAN		
9. ADVANCED VEHICLE DETECTION ZONE (LOOPS)	PER PLAN		
10. VIDEO DETECTION ZONE	PER PLAN		
11. CONDUIT	PER PLAN		
17. SIGN ON TRAFFIC SIGNAL EQUIPMENT	PER PLAN		
18. PULL BOX	PER PLAN		
19. VIDEO DETECTOR CAMERA	PER PLAN		
20. THROUGH VEHICLE INDICATION			
21. PROTECTED VEHICLE INDICATION			

PRELIMINARY NOT FOR CONSTRUCTION
REGISTERED PROFESSIONAL ENGINEER — LEONARDO ESPELETA — No. 53121 — STATE OF CALIFORNIA

PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY–HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619–234–9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE

65% SUBMITTAL - NOT FOR CONSTRUCTION

K:\SND_TPTO\095848001 – JV Design\Design\PS&E Off-site\Plan Sheets\Steele Canyon Rd\848001-TS-00.dwg Tuesday, May. 27 2014 11:26am othman.elmezain

COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
_____ DATE _____
APPROVED BY: _____ DATE _____
Mohamad Fakhrriddine, County Engineer

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
PHONE: 619–234–9411
WWW.KIMLEY–HORN.COM

REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1844571 N. 6358118 E.
CONST. COMPL. _____
FIELD REVISIONS _____

CAMPO RD (SR94) IMPROVEMENTS AT STEELE CANYON RD

TRAFFIC SIGNAL NOTES

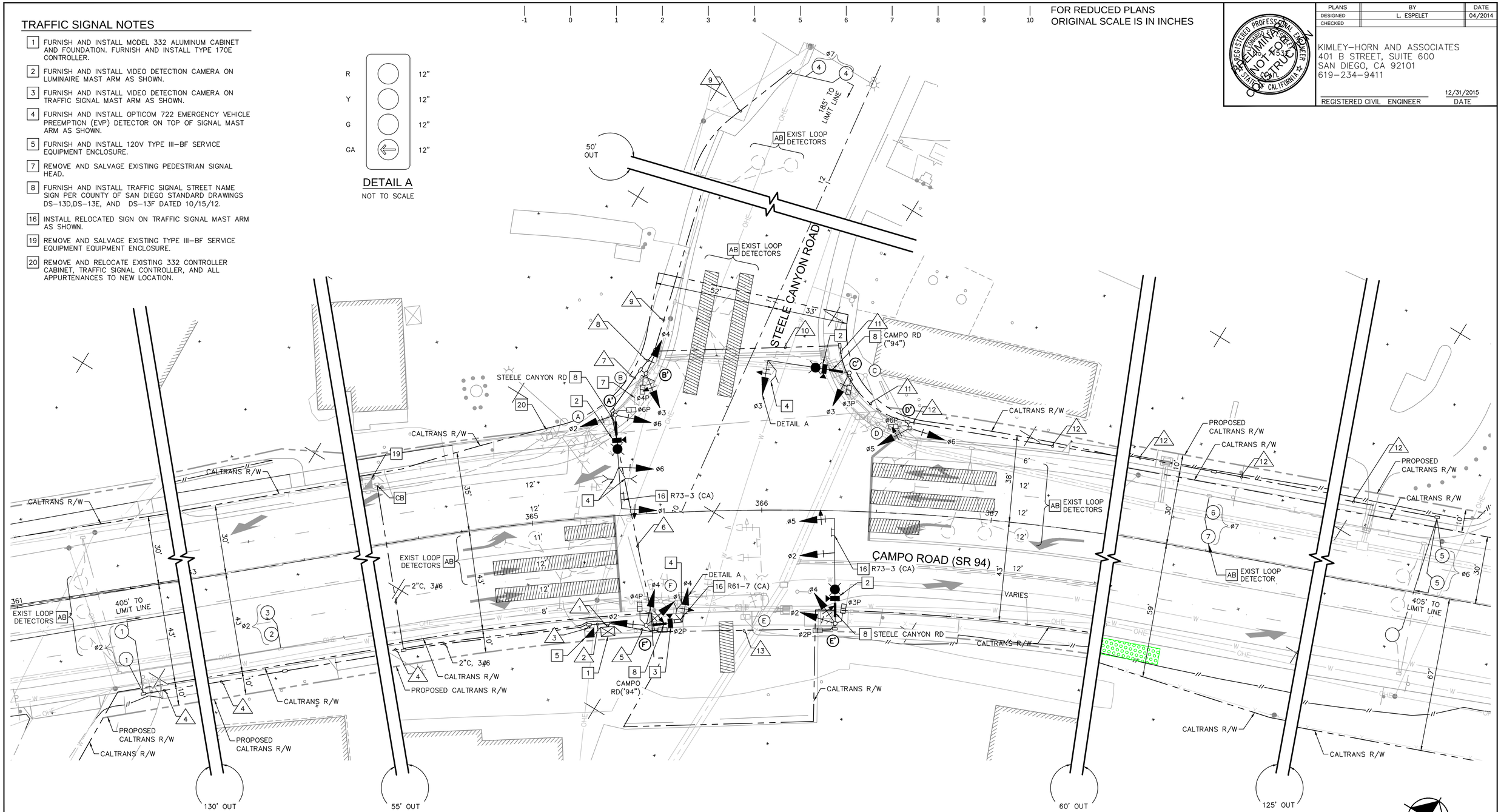
SCALE: HOR. N/A VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 25 OF 33 SHEETS

TRAFFIC SIGNAL NOTES

1. FURNISH AND INSTALL MODEL 332 ALUMINUM CABINET AND FOUNDATION. FURNISH AND INSTALL TYPE 170E CONTROLLER.
2. FURNISH AND INSTALL VIDEO DETECTION CAMERA ON LUMINAIRE MAST ARM AS SHOWN.
3. FURNISH AND INSTALL VIDEO DETECTION CAMERA ON TRAFFIC SIGNAL MAST ARM AS SHOWN.
4. FURNISH AND INSTALL OPTICOM 722 EMERGENCY VEHICLE PREEMPTION (EVP) DETECTOR ON TOP OF SIGNAL MAST ARM AS SHOWN.
5. FURNISH AND INSTALL 120V TYPE III-BF SERVICE EQUIPMENT ENCLOSURE.
7. REMOVE AND SALVAGE EXISTING PEDESTRIAN SIGNAL HEAD.
8. FURNISH AND INSTALL TRAFFIC SIGNAL STREET NAME SIGN PER COUNTY OF SAN DIEGO STANDARD DRAWINGS DS-13D,DS-13E, AND DS-13F DATED 10/15/12.
16. INSTALL RELOCATED SIGN ON TRAFFIC SIGNAL MAST ARM AS SHOWN.
19. REMOVE AND SALVAGE EXISTING TYPE III-BF SERVICE EQUIPMENT EQUIPMENT ENCLOSURE.
20. REMOVE AND RELOCATE EXISTING 332 CONTROLLER CABINET, TRAFFIC SIGNAL CONTROLLER, AND ALL APPURTENANCES TO NEW LOCATION.

DETAIL A
NOT TO SCALE

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES



PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

KIMLEY-HORN AND ASSOCIATES
401 B STREET, SUITE 600
SAN DIEGO, CA 92101
619-234-9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE

65% SUBMITTAL - NOT FOR CONSTRUCTION

COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
5500 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295

RECOMMENDED BY: _____ DATE _____
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Mohamad Fakhrriddine, County Engineer

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401 B STREET, SUITE 600, SAN DIEGO, CA 92101
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REVISIONS	BY	APPROVED	DATE

COORDINATE INDEX
1844571 N. 6358118 E.
CONST. COMPL. _____
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CAMPO RD (SR94) IMPROVEMENTS AT STEELE CANYON RD

TRAFFIC SIGNAL MODIFICATION PLAN

SCALE: HOR. 1" = 20' VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 26 OF 33 SHEETS

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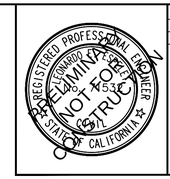
-1 0 1 2 3 4 5 6 7 8 9 10

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES



PLANS	BY	DATE
DESIGNED	L. ESPELET	04/2014
CHECKED		

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SAN DIEGO, CA 92101
619-234-9411

REGISTERED CIVIL ENGINEER — 12/31/2015 DATE

65% SUBMITTAL - NOT FOR CONSTRUCTION

CONDUCTOR SCHEDULE

AWG SIZE	ø	CIRCUIT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CONDUCTORS 3 / 12 CONDUCTORS		POLE – (A)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – (B)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – (C)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – (D)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – (E)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – (F)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		POLE – (G)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOTAL CABLES–3 CONDUCT./12 CONDUCT.			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
#14	PEU		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
#10	LIGHTING		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
#6	SIGNAL SERVICE		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TYPE "B" DLC	ø2	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	ø4	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	ø6	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	ø8	DLC	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
INTERCONNECT CABLE – SIC			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
VIDEO DETECTION CABLE			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EMERGENCY VEHICLE PREEMPTION			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CONDUIT SIZE			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

TO BE COMPLETED FOR 100% SUBMITTAL

SIGN LEGEND:

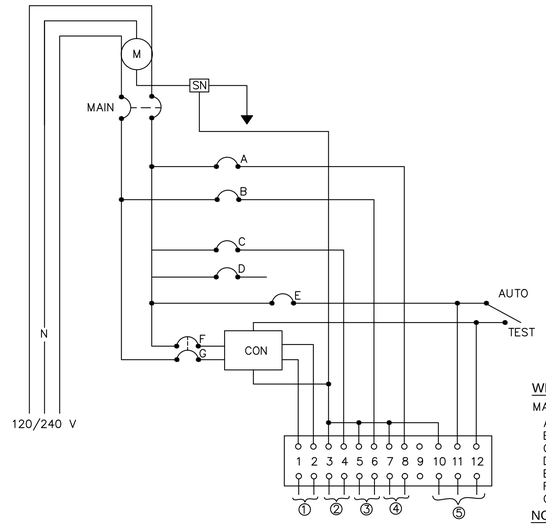


R73–3 (CA)
36" X 36"



R61–7 (CA)
36" X 30"

WIRING DIAGRAM:

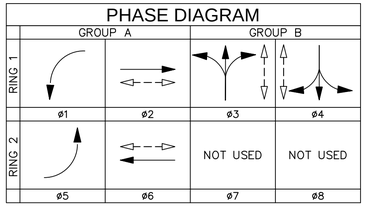


WIRING DIAGRAM:
MAIN 2P – 100 AMP
A – 1P–15 AMP
B – 1P–15 AMP
C – 1P–50 AMP
D – 1P–15 AMP SPARE
E – 1P–15 AMP
F, G – 2P–30 AMP

NOTES:
① – LIGHTING
② – SIGNAL
③ – TDC
④ – FB
⑤ – PEU

CON=CONTACTOR

PHASE DIAGRAM



POLE SCHEDULE

POLE DATA No.	TYPE	Ht.	SIGNAL M.A.	LUMINAIRE M.A.	LUMINAIRE LPS	VEH SIG MTG MAST	VEH SIG MTG POLE	PED SIG MTG	PPB ø	PPB QUAD	POLE LOC. A	POLE LOC. B	POLE LOC. C	REMARKS
(A)	26–4–80	30'	40'	12'	180W	1–MAS 1–MAT	SV–2–T SV–1–T	SP–1–T	4	E ←	EX.	EX.	EX.	REMOVE AND SALVAGE EX. POLE, RELOCATE EX. SIGNS AND EQUIPMENT TO LOCATION A'
(A')	**26–4–100**	**30'**	**40'**	**12'**	**180W**	**1–MAS 1–MAT**	**SV–2–T SV–1–T**	**SP–1–T**	**4**	**W →**	**XX'**	**XX'**	**XX'**	**REUSE EX. SIGNS AND EQUIPMENT FROM LOCATION A**
(B)	1–A	10'	–	–	–	–	TV–1–T	SP–1–T	6	S →	EX.	EX.	EX.	REMOVE AND SALVAGE EX. PED HEAD
(B')	**1–A**	**10'**	**–**	**–**	**–**	**–**	**TV–1–T**	**SP–1–T**	6	**S →**	**XX'**	**XX'**	**XX'**	**REUSE EX. EQUIPMENT FROM LOCATION C**
(C)	26–3–80	30'	40'	10'	180W	1–MAS–4B	SV–1–T	–	–	–	EX.	EX.	EX.	REMOVE AND SALVAGE EX. POLE, RELOCATE EX. EQUIPMENT TO LOCATION C'
(C')	**24–3–100**	**30'**	**35'**	**12'**	**180W**	**1–MAS–4B**	**SV–1–T**	**SP–1–T**	**6**	**S ←**	**XX'**	**XX'**	**XX'**	**REUSE EX. EQUIPMENT FROM LOCATION C**
(D)	1–A	10'	–	–	–	–	TV–2–T	SP–1–T	6	S ←	EX.	EX.	EX.	RELOCATE POLE AND EQUIPMENT TO LOCATION D'
(D')	**1–A**	**10'**	**–**	**–**	**–**	**–**	**TV–2–T**	**SP–2–T**	**3**	**W →**	**XX'**	**XX'**	**XX'**	**REUSE POLE AND EQUIPMENT FROM LOCATION D**
(E)	24–4–80	30'	35'	*	180W	1–MAS 1–MAT	SV–2–TD	SP–1–T	2	N →	EX.	EX.	EX.	REMOVE AND SALVAGE EX. POLE AND SNS, RELOCATE EX. EQUIPMENT TO LOCATION E'
(E')	**26–4–100**	**30'**	**45'**	**12'**	**180W**	**1–MAS 1–MAT**	**SV–2–T**	**SP–2–T**	**2 / 3**	**N → / W ←**	**XX'**	**XX'**	**XX'**	**REUSE EX. EQUIPMENT FROM LOCATION E**
(F)	18–3–80	30'	20'	–	–	1–MAS–4B	SV–3–TC	SP–2–T	2 / 4	N ← / E →	EX.	EX.	EX.	REMOVE AND SALVAGE EX. POLE AND SNS, REUSE EX. EQUIPMENT AT LOCATION F'
(F')	**17–3–100**	**30'**	**15'**	**–**	**–**	**1–MAS**	**SV–3–T**	**SP–1–T**	**2**	**N ←**	**XX'**	**XX'**	**XX'**	**REUSE EX. EQUIPMENT FROM LOCATION F**

BOLD=NEW
* LUMINAIRE NOT STANDARD LENGTH

COUNTY OF SAN DIEGO
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CAMPO RD (SR94) IMPROVEMENTS AT STEELE CANYON RD

TRAFFIC SIGNAL SCHEDULE AND DETAILS

SCALE: HOR. N/A VERT. N/A
W.A. XXXX R.S. XXXX
SP
SHEET 27 OF 33 SHEETS

K:\SND_TPTO\095848001 – JV Design\Design\PS&E Off-site\Plan Sheets\Steele Canyon Rd\848001-TS-03A.dwg Tuesday, May. 27 2014 11:28am othman.elmezain

APPENDIX B

- Existing Traffic Counts Data

San Diego County Road Segments

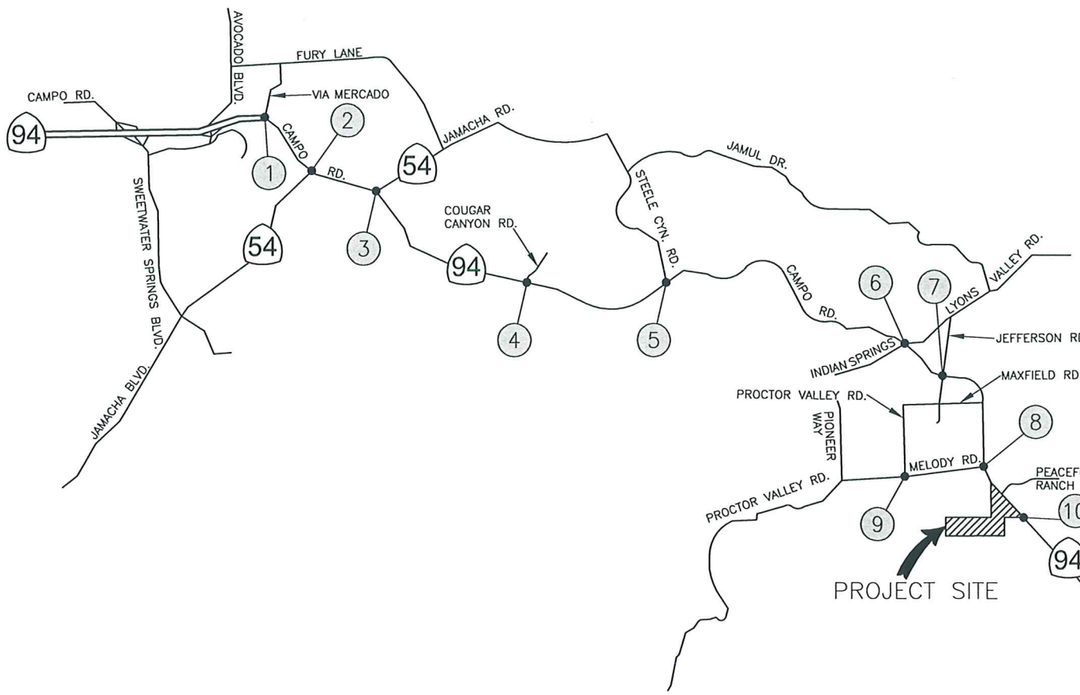
As shown in Table 9, all of the road segments under San Diego County jurisdiction operate at LOS C or better, thereby conforming to the County's LOS D standard.

Table 9
Roadway Segment Level of Service Summary
Existing Conditions

Roadway Segment	Lanes/ Classification	Roadway Capacity[1]	Daily Traffic Volume[2]	V/C[3] Ratio	LOS[4]
Jamacha Blvd. – SR 94 to Sweetwater Springs Boulevard	4 Lanes/ Major Road	37,000 VPD[5]	17,000 VPD	0.46	B
Jamacha Rd. – SR 94 to Fury Lane	6 Lanes/ Prime Arterial	57,000 VPD	35,500 VPD	0.62	B
Steele Canyon Rd. – SR 94 to Jamul Dr.	2 Lanes/Rural Light Collector	16,200 VPD	5,930 VPD	0.37	C
Lyons Valley Rd. – SR 94 to Jefferson Rd.	2 Lanes/ Rural Light Collector	16,200 VPD	6,720 VPD	0.41	C
Melody Rd – SR 94 to Proctor Valley Rd.	2 Lanes/Rural Light Collector	16,200 VPD	275 VPD	0.02	A
Proctor Valley Rd. – SR 94 to Melody Rd.	2 Lanes/Rural Light Collector	16,200 VPD	1,710 VPD	0.11	A
Proctor Valley Rd. – Melody Rd to Pioneer Way	2 Lanes/Rural Light Collector	16,200 VPD	1,630 VPD	0.10	A

Notes:
1 Reference: *Public Road Standards* (County of San Diego, Department of Public Works, Adopted July 14, 1999).
2 Counts conducted Tuesday, May 19, 2009.
3 Volume/capacity.
4 Level of service.
5 Vehicles per day.

Dist	Route	CO		Postmile	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
11	94	SD	R	13.333	AVOCADO BLVD	5,000	59,000	57,000	3,700	44,000	42,500
11	94	SD		14.33	JAMACHA BLVD	3,700	44,000	42,500	5,400	64,000	62,000
11	94	SD		14.86	JCT. RTE. 54 NORTH	5,400	64,000	62,000	1,400	16,800	16,400
11	94	SD		17.352	STEEL CANYON RD	1,300	15,300	14,900	1,450	17,500	17,000
11	94	SD		19.4	LYONS VALLEY RD	1,450	17,500	17,000	950	10,800	10,600
11	94	SD		24.554	HONEY SPRINGS RD	700	7,700	7,500	570	6,400	6,300
11	94	SD		24.731	OTAY LAKES	570	6,400	6,300	570	6,600	6,500
11	94	SD		28.3	DULZURA POST OFFICE	570	6,600	6,500	620	6,300	6,200
11	94	SD		29.872	MARRON VALLEY	620	6,300	6,200	610	6,400	6,100
11	94	SD		38.97	JCT. RTE. 188 SOUTH	540	5,700	5,400	200	1,900	1,850
11	94	SD		41.393	POTRERO VALLEY RD	200	1,900	1,850	120	1,300	1,250
11	94	SD		52.15	BUCKMAN SPRINGS RD	170	1,800	1,750	200	1,850	1,750
11	94	SD		61.701	LIVE OAKS SPRS RD	60	500	450	60	500	450
11	94	SD		64.229	WEST JUNCTION OLD HWY 80	70	600	560	150	1,300	1,250
11	94	SD		64.817	JEWEL VALLEY/ RIBBONWOOD	150	1,300	1,250	120	1,200	1,050
11	94	SD		65.375	JCT. RTE. 8	120	1,200	1,050			
8	95	RIV		0	HOBSON WAY				350	3,400	3,200
8	95	RIV		3.52	SIXTH AVE	330	3,150	2,800	290	2,400	2,150
8	95	RIV		10.54	PALO VERDE DAM RD	230	2,050	1,800	260	2,100	1,800
8	95	RIV		36.197	RIVERSIDE/S BERN CO LINE	260	2,000	1,750			
8	95	SBD		0	RIVERSIDE/S BERN CO LINE				220	1,700	1,450
8	95	SBD		9.684	JCT. RTE. 62	220	1,700	1,450	350	3,250	2,700
8	95	SBD		37.3	HAVASU LAKE RD	320	3,250	2,700	520	6,000	5,100
8	95	SBD		57.275	EAST JCT. RTE. 40	550	6,300	5,400	550	6,300	5,400
8	95	SBD	R	57.244	WEST JCT. RTE. 40	550	6,300	5,400	330	3,850	3,000
8	95	SBD		63.944	ARROWHEAD JUNCTION	330	3,850	3,000	460	4,200	3,300
8	95	SBD		80.453	NEVADA STATE LINE	460	4,200	3,300			
1	96	HUM		0	WILLOW CREEK, JCT. RTE. 299				290	3,150	2,900
1	96	HUM		0.1	STANDARD OIL LANE	290	3,150	2,900	200	2,050	1,900
1	96	HUM		3.59	WILLOW CREEK, NORTH	200	2,050	1,900	190	2,050	1,900
1	96	HUM		10.95	SOUTH LIMITS HOOPA	380	4,100	3,700	350	3,900	3,500
1	96	HUM		12.83	NORTH LIMITS HOOPA	240	2,650	2,400	200	2,500	2,150
1	96	HUM		23.086	WEITCHPEC, JCT. RTE. 169	70	750	690	50	520	450
1	96	HUM		37.87	EYESEE RD	110	1,100	900	120	1,200	900
1	96	HUM		38.5	ORLEANS, NORTH	110	1,200	900	110	1,200	900
1	96	HUM	R	38.773	KLAMATH RIVER, NORTH	90	560	520	100	570	520
1	96	HUM	R	44.979	HUMBOLDT/SISKIYOU CO LINE	80	490	420			
2	96	SIS	R	0	HUMBOLDT/SISKIYOU CO LINE				70	490	410

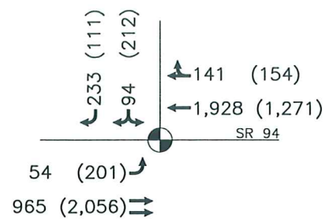


NOT TO SCALE

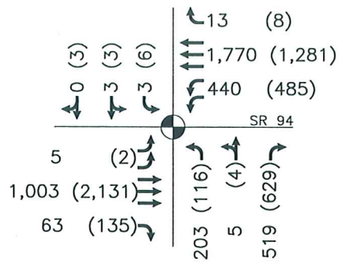
LEGEND

- TURN LANE
- XX (XX) AM (PM) PEAK HOUR TRAFFIC VOLUME
- STOP SIGN
- TRAFFIC SIGNAL

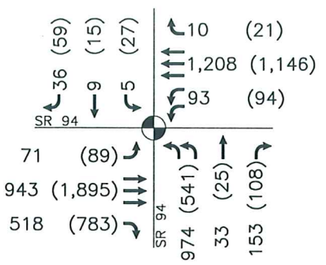
1 SR 94/CAMPO RD. & VIA MERCADO



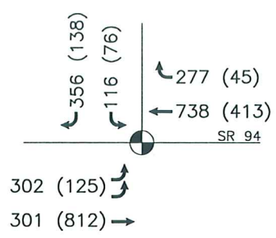
2 SR 94/CAMPO RD. & JAMACHA BLVD/SR 54



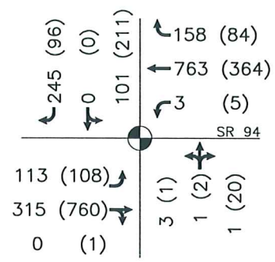
3 SR 94/CAMPO RD. & JAMACHA RD/SR 54



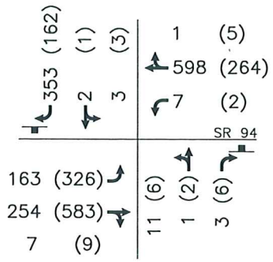
4 SR 94/CAMPO RD. & COUGAR CANYON RD.



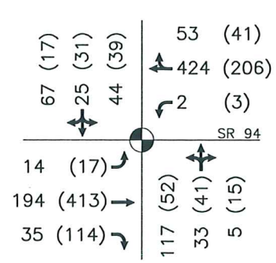
5 SR 94/CAMPO RD. & STEELE CANYON RD.



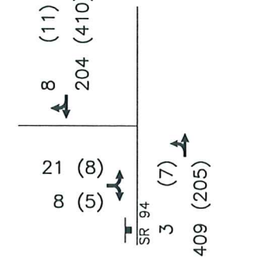
6 SR 94/CAMPO RD. & LYONS VALLEY RD.



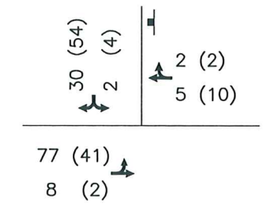
7 SR 94/CAMPO RD. & JEFFERSON RD./PROCTOR VALLEY RD.



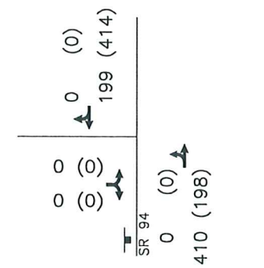
8 SR 94/CAMPO RD. & MELODY RD.



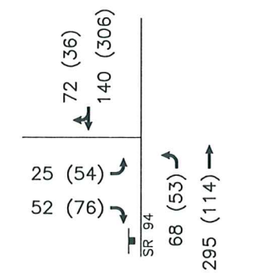
9 PROCTOR VALLEY RD. & MELODY RD.



10 SR 94/CAMPO RD. & PANHANDLE DRIVEWAY



11 SR 94/CAMPO RD. & OTAY LAKES RD.



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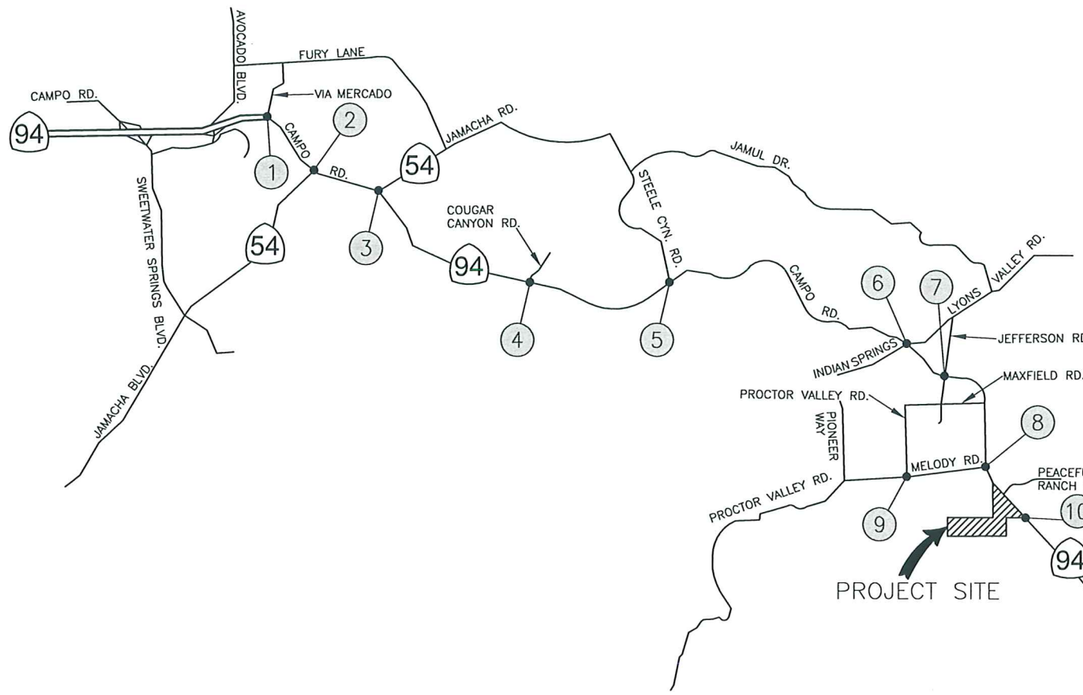
PEAK HOUR TRAFFIC VOLUMES - WEEKDAY AM & PM
EXISTING CONDITIONS

FIGURE 2

N:\2009\20902 Jamul Alternatives Analysis and Traffic Study\Working\CADD\TRAFFIC EXHIBIT.dwg Jul 02, 2010-09:59 am

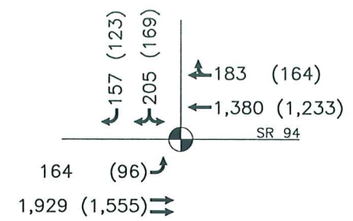


NOT TO SCALE

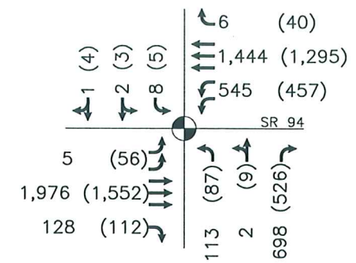
LEGEND

- TURN LANE
- XX (XX) FRIDAY (SATURDAY) PEAK HOUR TRAFFIC VOLUME
- STOP SIGN
- TRAFFIC SIGNAL

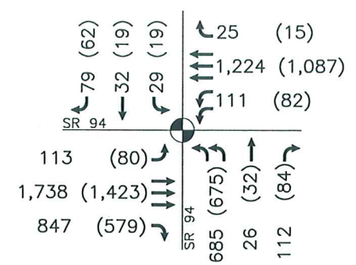
1 SR 94/CAMPO RD. & VIA MERCADO



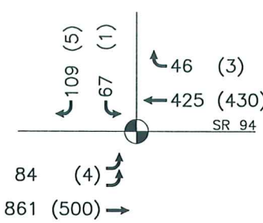
2 SR 94/CAMPO RD. & JAMACHA BLVD/SR 54



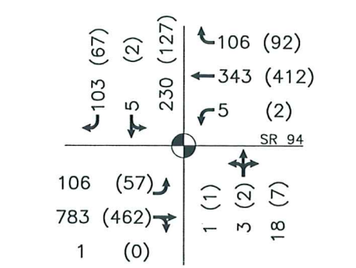
3 SR 94/CAMPO RD. & JAMACHA RD/SR 54



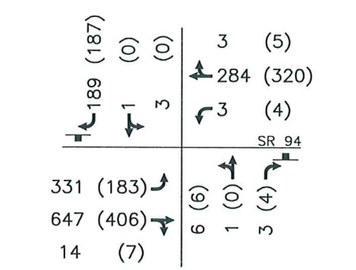
4 SR 94/CAMPO RD. & COUGAR CANYON RD.



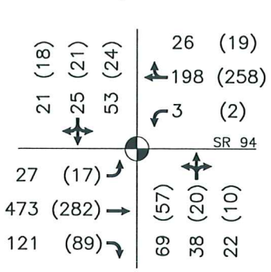
5 SR 94/CAMPO RD. & STEELE CANYON RD.



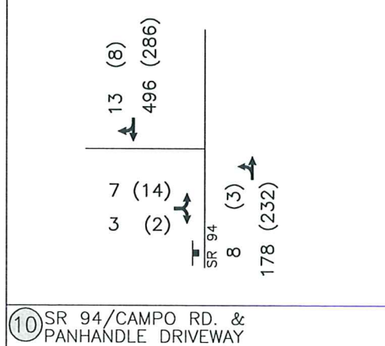
6 SR 94/CAMPO RD. & LYONS VALLEY RD.



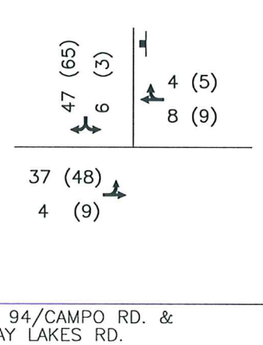
7 SR 94/CAMPO RD. & JEFFERSON RD./PROCTOR VALLEY RD.



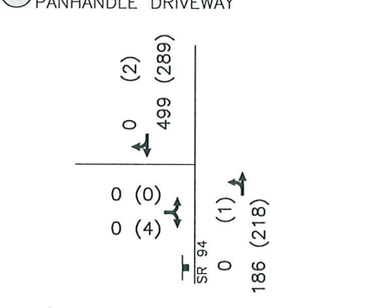
8 SR 94/CAMPO RD. & MELODY RD.



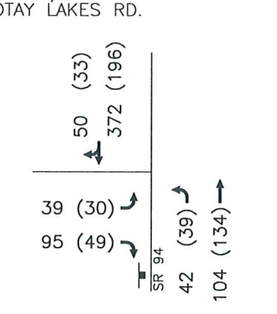
9 PROCTOR VALLEY RD. & MELODY RD.



10 SR 94/CAMPO RD. & PANHANDLE DRIVEWAY



11 SR 94/CAMPO RD. & OTAY LAKES RD.



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PEAK HOUR TRAFFIC VOLUMES - FRIDAY PM & SATURDAY PM
EXISTING CONDITIONS

FIGURE 3

N:\2009\20902 Jamul Alternatives Analysis and Traffic Study\Working\CADD\TRAFFIC EXHIBIT.dwg Jul 02, 2010--09:59 am

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA11_4249_001

Day: THURSDAY

City: City of Jamul

Date: 9/15/2011

AM

NS/EW Streets:	State Route 94 (Campo Rd)			State Route 94 (Campo Rd)			Honey Springs Rd			Honey Springs Rd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1	1	0	0	0	0	0	1	0	
7:00 AM		98	4	3	25					2		13	145
7:15 AM		73	3	8	23					13		13	133
7:30 AM		83	3	3	37					8		23	157
7:45 AM		80	2	2	25					3		18	130
8:00 AM		48	2	6	26					3		15	100
8:15 AM		53	5	5	28					6		12	109
8:30 AM		46	1	7	28					2		17	101
8:45 AM		57	2	6	20					1		12	98
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	538	22	40	212	0	0	0	0	38	0	123	973
APPROACH %'s :	0.00%	96.07%	3.93%	15.87%	84.13%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	23.60%	0.00%	76.40%	
PEAK HR START TIME :	700 AM												TOTAL
PEAK HR VOL :	0	334	12	16	110	0	0	0	0	26	0	67	565
PEAK HR FACTOR :		0.848			0.788			0.000			0.750		0.900

CONTROL : 1-Way Stop (WB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA11_4249_001

Day: THURSDAY

City: City of Jamul

Date: 9/15/2011

PM

NS/EW Streets:	State Route 94 (Campo Rd)			State Route 94 (Campo Rd)			Honey Springs Rd			Honey Springs Rd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1	1	0	0	0	0	0	1	0	
4:00 PM		41	5	14	77					2		5	144
4:15 PM		37	4	18	92					2		7	160
4:30 PM		33	7	21	82					3		8	154
4:45 PM		28	8	23	94					3		10	166
5:00 PM		33	8	11	82					5		10	149
5:15 PM		29	4	17	86					2		8	146
5:30 PM		27	6	20	88					0		5	146
5:45 PM		24	11	15	82					6		5	143
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	252	53	139	683	0	0	0	0	23	0	58	1208
APPROACH %'s :	0.00%	82.62%	17.38%	16.91%	83.09%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	28.40%	0.00%	71.60%	
PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	0	131	27	73	350	0	0	0	0	13	0	35	629
PEAK HR FACTOR :		0.963			0.904			0.000			0.800		0.947

CONTROL : 1-Way Stop (WB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA11_4249_001

Day: FRIDAY

City: City of Jamul

Date: 9/16/2011

PM

NS/EW Streets:	State Route 94 (Campo Rd)			State Route 94 (Campo Rd)			Honey Springs Rd			Honey Springs Rd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1	1	0	0	0	0	0	1	0	
4:00 PM		67	9	17	88					3		8	192
4:15 PM		48	3	13	81					3		10	158
4:30 PM		56	3	17	90					4		7	177
4:45 PM		36	7	16	100					4		2	165
5:00 PM		29	2	16	71					1		10	129
5:15 PM		32	6	14	115					3		6	176
5:30 PM		27	4	17	95					3		9	155
5:45 PM		35	3	14	105					3		4	164

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	330	37	124	745	0	0	0	0	24	0	56	1316
APPROACH %'s :	0.00%	89.92%	10.08%	14.27%	85.73%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	30.00%	0.00%	70.00%	

PEAK HR START TIME :	400 PM												TOTAL
PEAK HR VOL :	0	207	22	63	359	0	0	0	0	14	0	27	692
PEAK HR FACTOR :		0.753			0.909			0.000			0.788		0.901

CONTROL : 1-Way Stop (WB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA11_4249_001

Day: SATURDAY

City: City of Jamul

Date: 9/17/2011

PM

NS/EW Streets:	State Route 94 (Campo Rd)			State Route 94 (Campo Rd)			Honey Springs Rd			Honey Springs Rd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1	1	0	0	0	0	0	1	0	
4:00 PM		48	3	7	55					7		4	124
4:15 PM		41	3	11	68					3		13	139
4:30 PM		40	2	11	53					3		7	116
4:45 PM		35	9	10	49					2		13	118
5:00 PM		36	3	13	44					3		9	108
5:15 PM		34	4	6	61					1		6	112
5:30 PM		45	3	15	51					1		3	118
5:45 PM		37	8	13	64					3		4	129
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	316	35	86	445	0	0	0	0	23	0	59	964
APPROACH %'s :	0.00%	90.03%	9.97%	16.20%	83.80%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	28.05%	0.00%	71.95%	
PEAK HR START TIME :	400 PM												TOTAL
PEAK HR VOL :	0	164	17	39	225	0	0	0	0	15	0	37	497
PEAK HR FACTOR :		0.887			0.835			0.000			0.813		0.894

CONTROL : 1-Way Stop (WB)

ITM Peak Hour Summary

Prepared by:

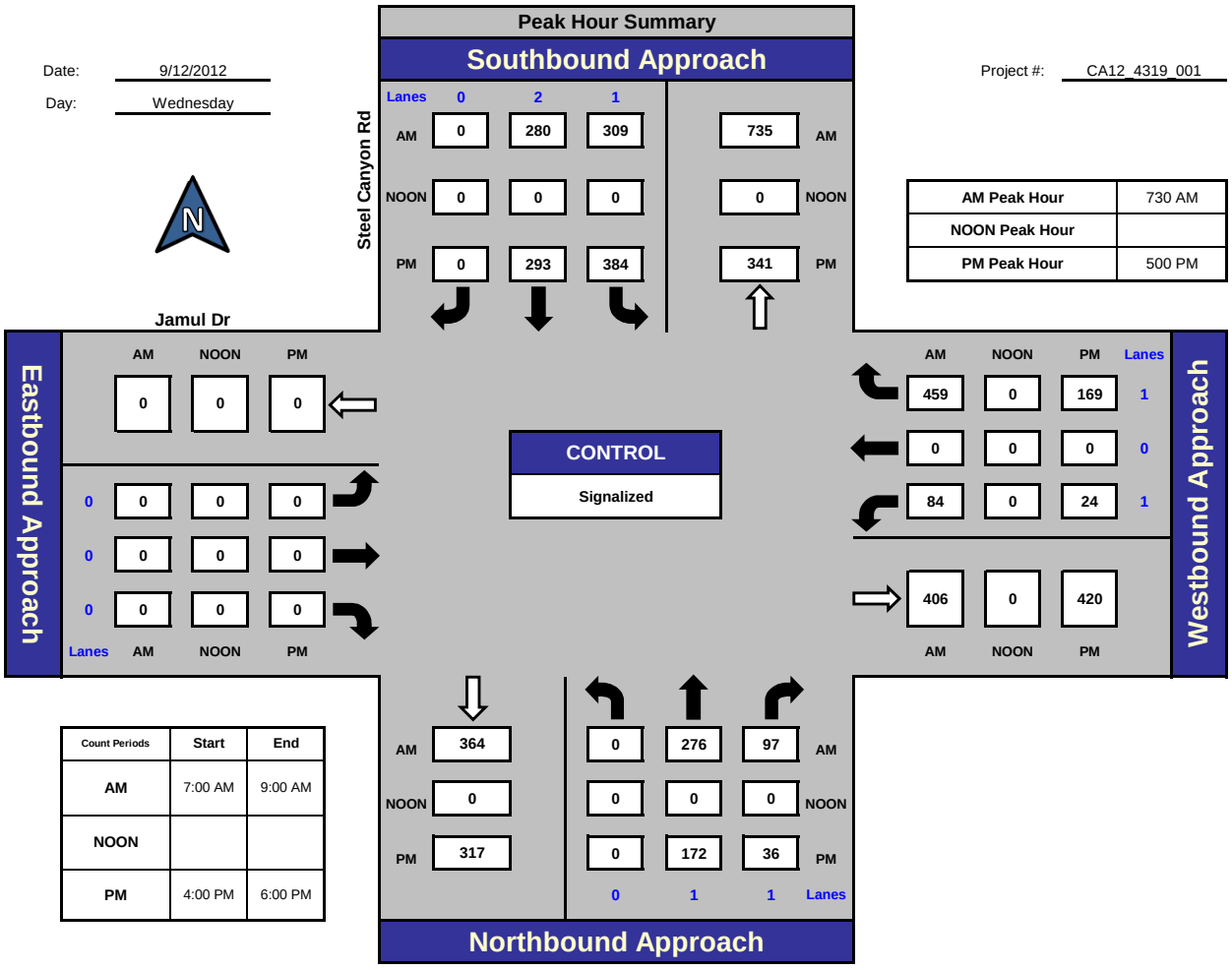
National Data & Surveying Services

Steel Canyon Rd and Jamul Dr , City of Jamul

Date: 9/12/2012

Day: Wednesday

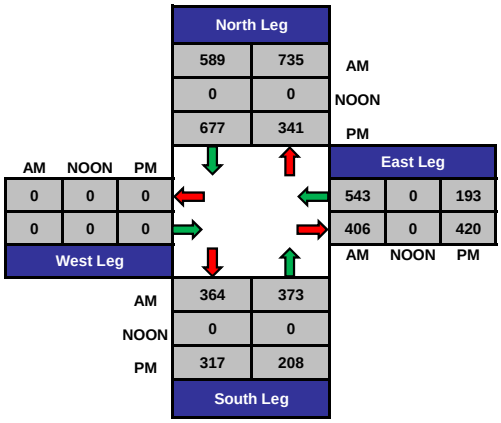
Project #: CA12_4319_001



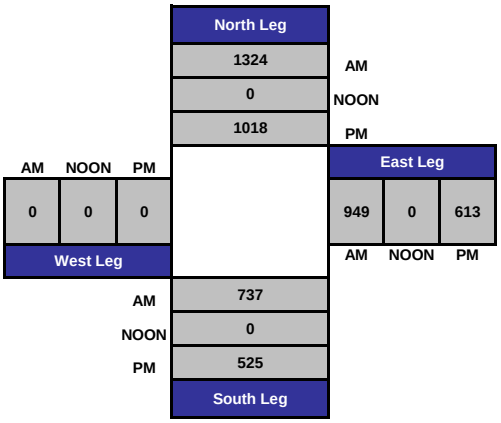
AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	500 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

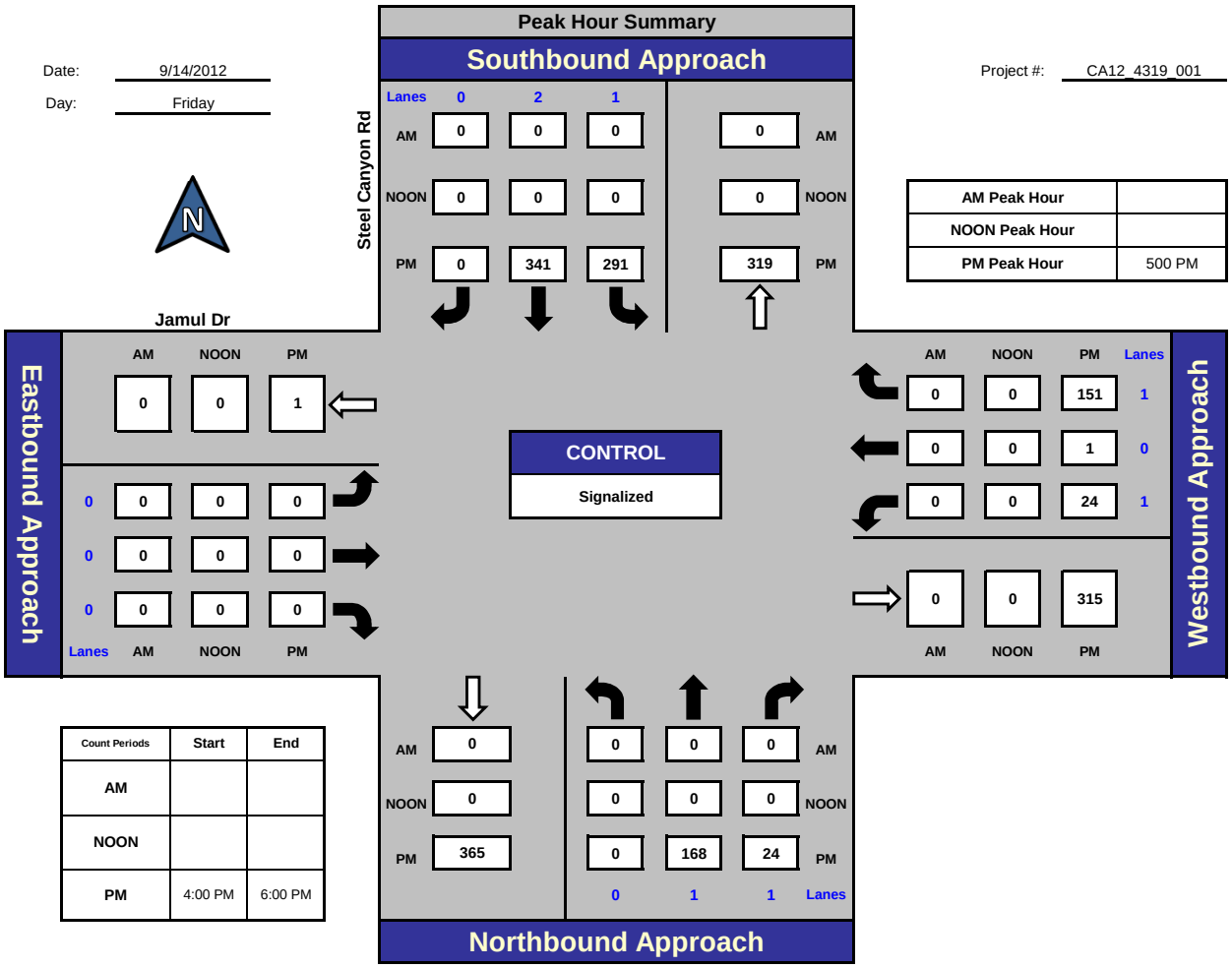
National Data & Surveying Services

Steel Canyon Rd and Jamul Dr , City of Jamul

Date: 9/14/2012

Day: Friday

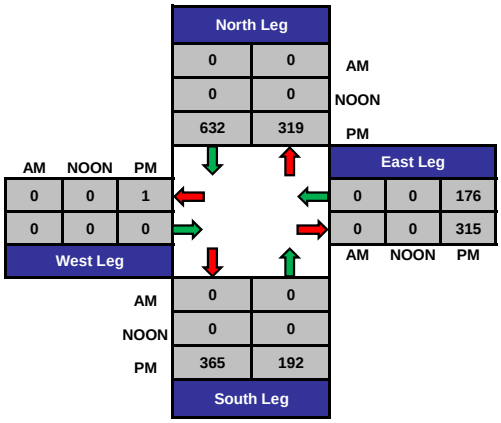
Project #: CA12_4319_001



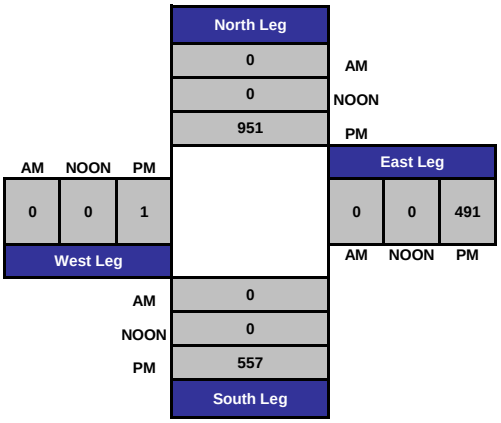
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	500 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

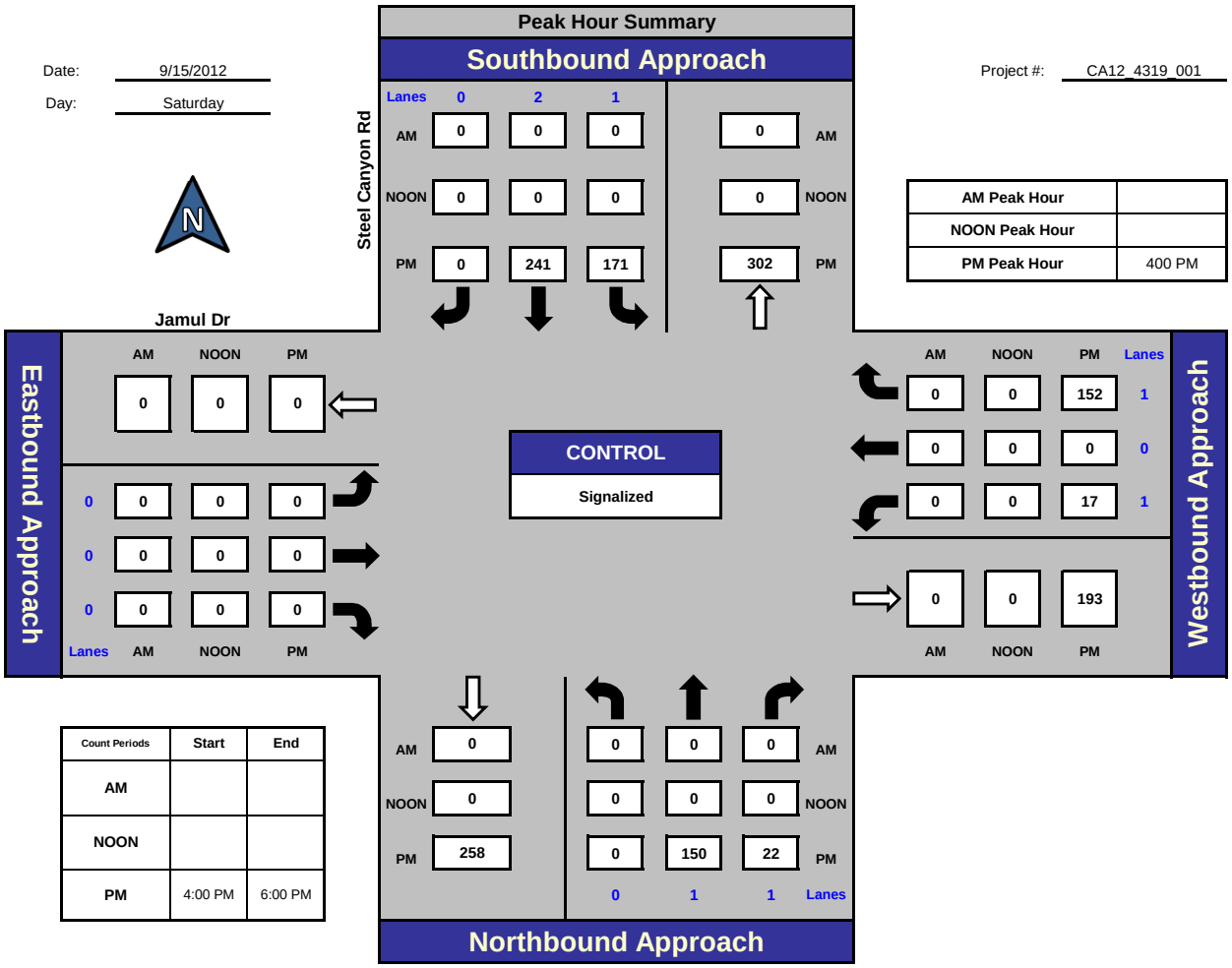
National Data & Surveying Services

Steel Canyon Rd and Jamul Dr , City of Jamul

Date: 9/15/2012

Day: Saturday

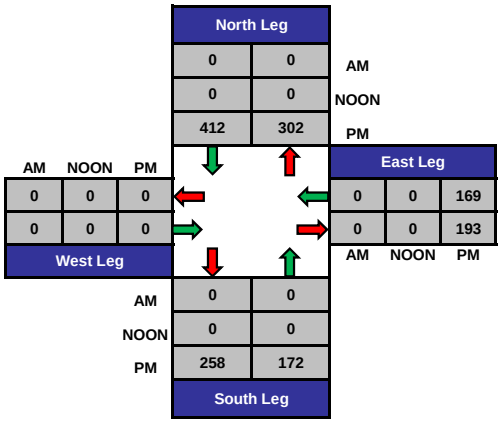
Project #: CA12_4319_001



AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	400 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



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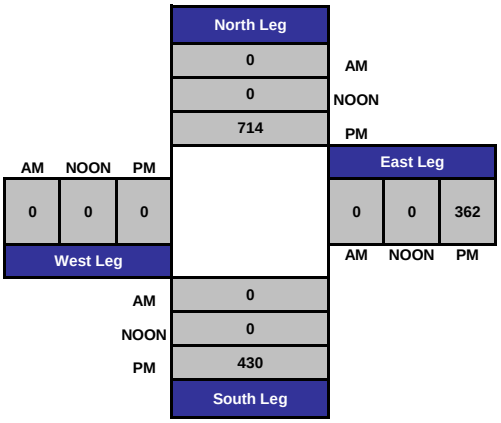


ITM Peak Hour Summary

Prepared by:

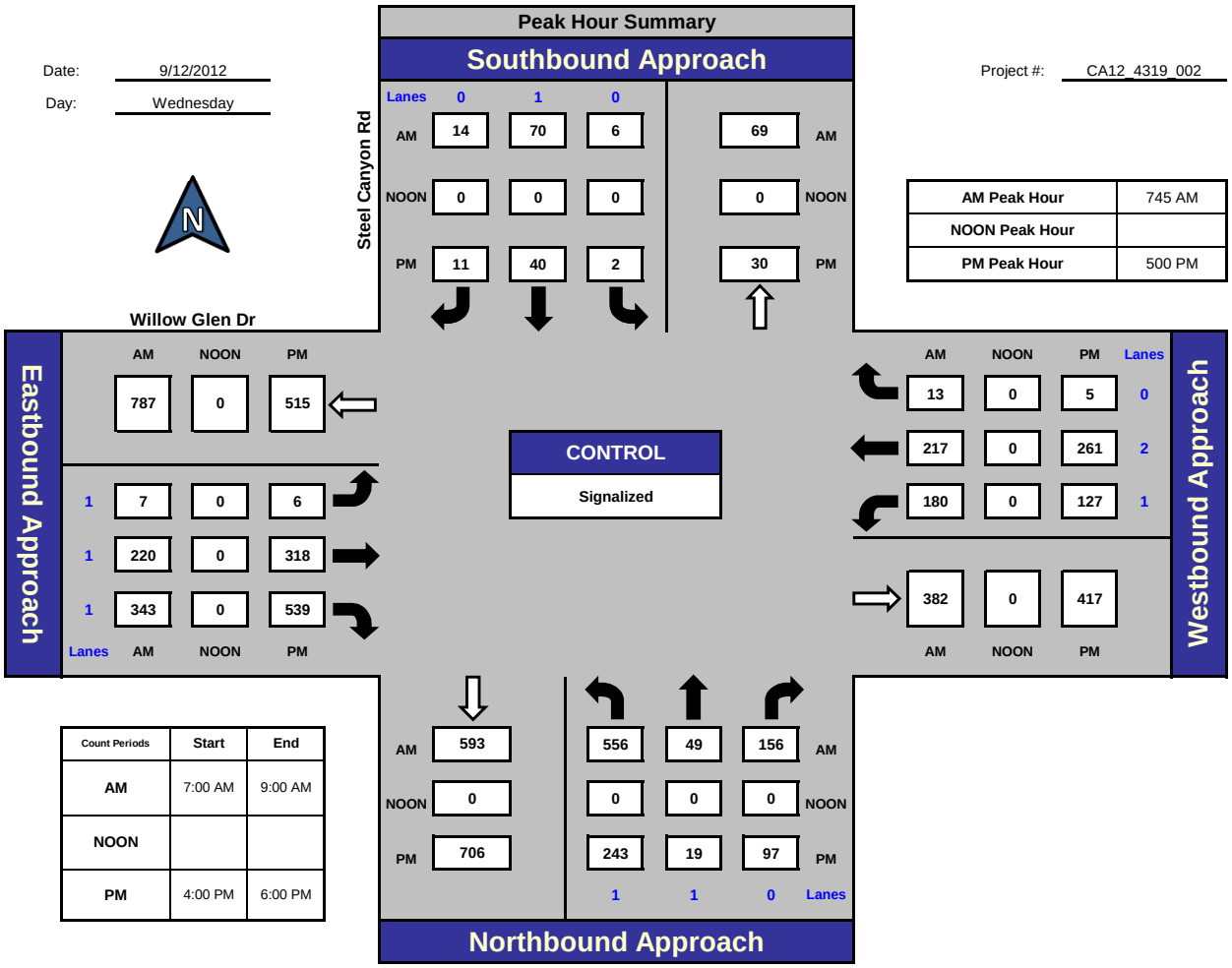
National Data & Surveying Services

Steel Canyon Rd and Willow Glen Dr , City of Jamul

Date: 9/12/2012

Day: Wednesday

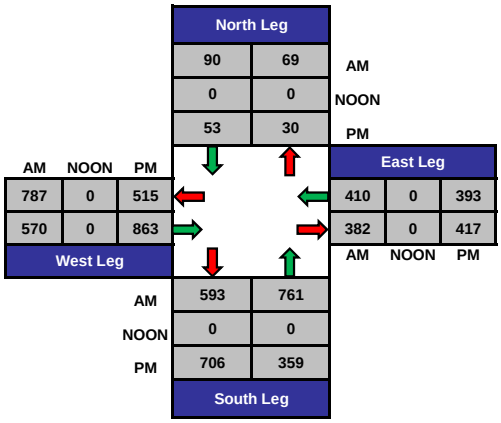
Project #: CA12_4319_002



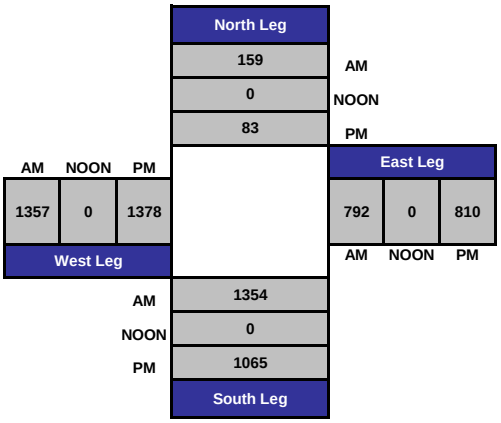
AM Peak Hour	745 AM
NOON Peak Hour	
PM Peak Hour	500 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

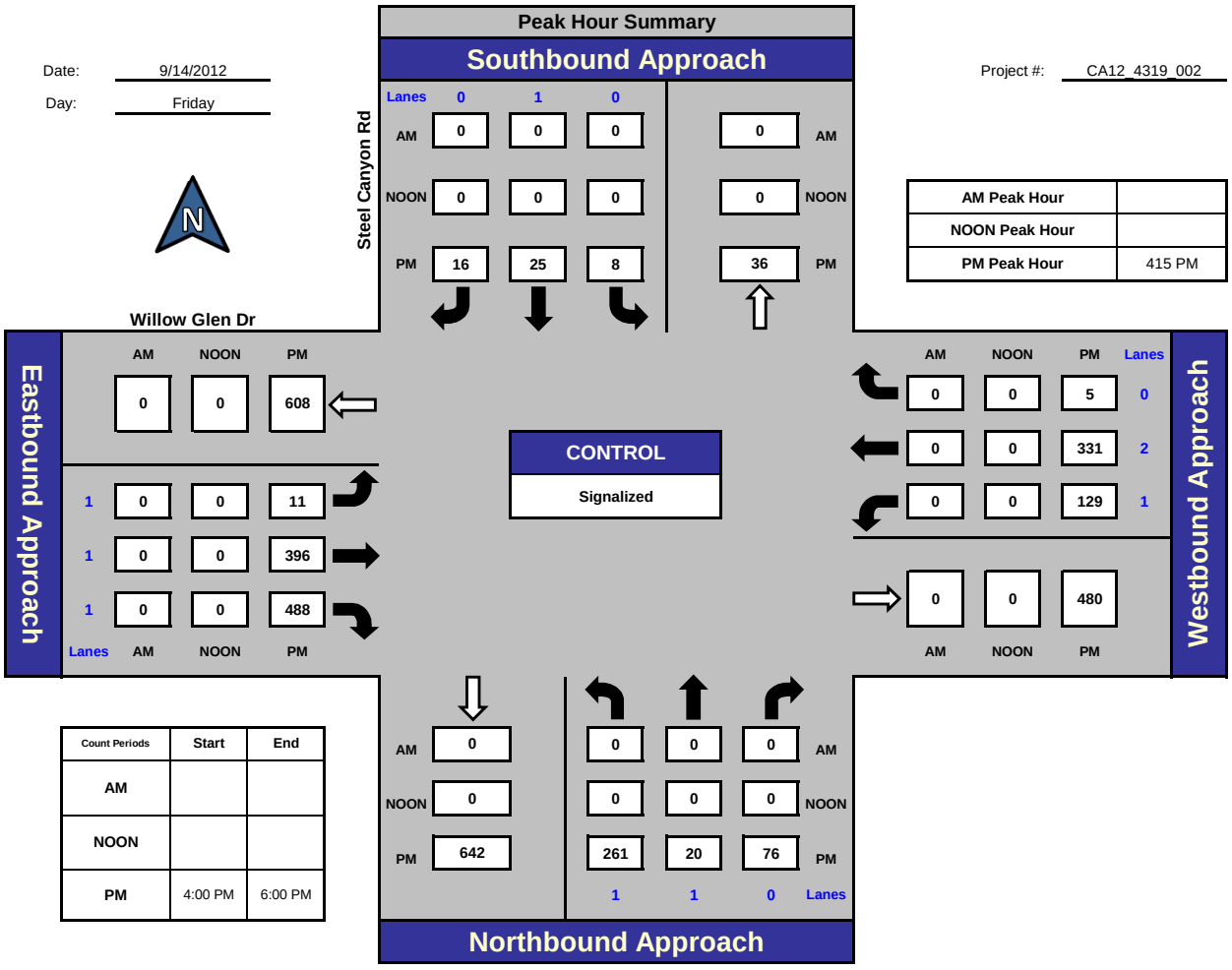
National Data & Surveying Services

Steel Canyon Rd and Willow Glen Dr , City of Jamul

Date: 9/14/2012

Day: Friday

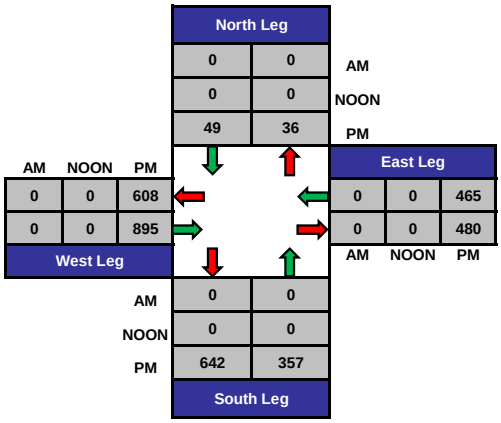
Project #: CA12_4319_002



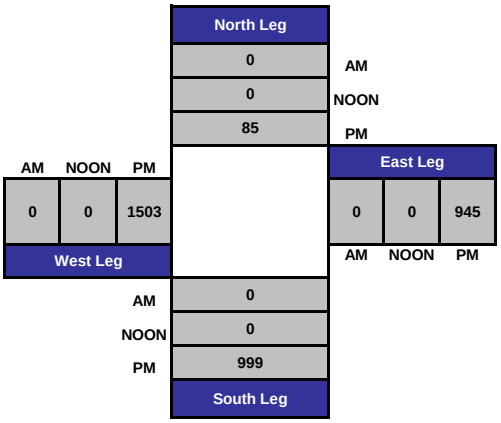
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	415 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

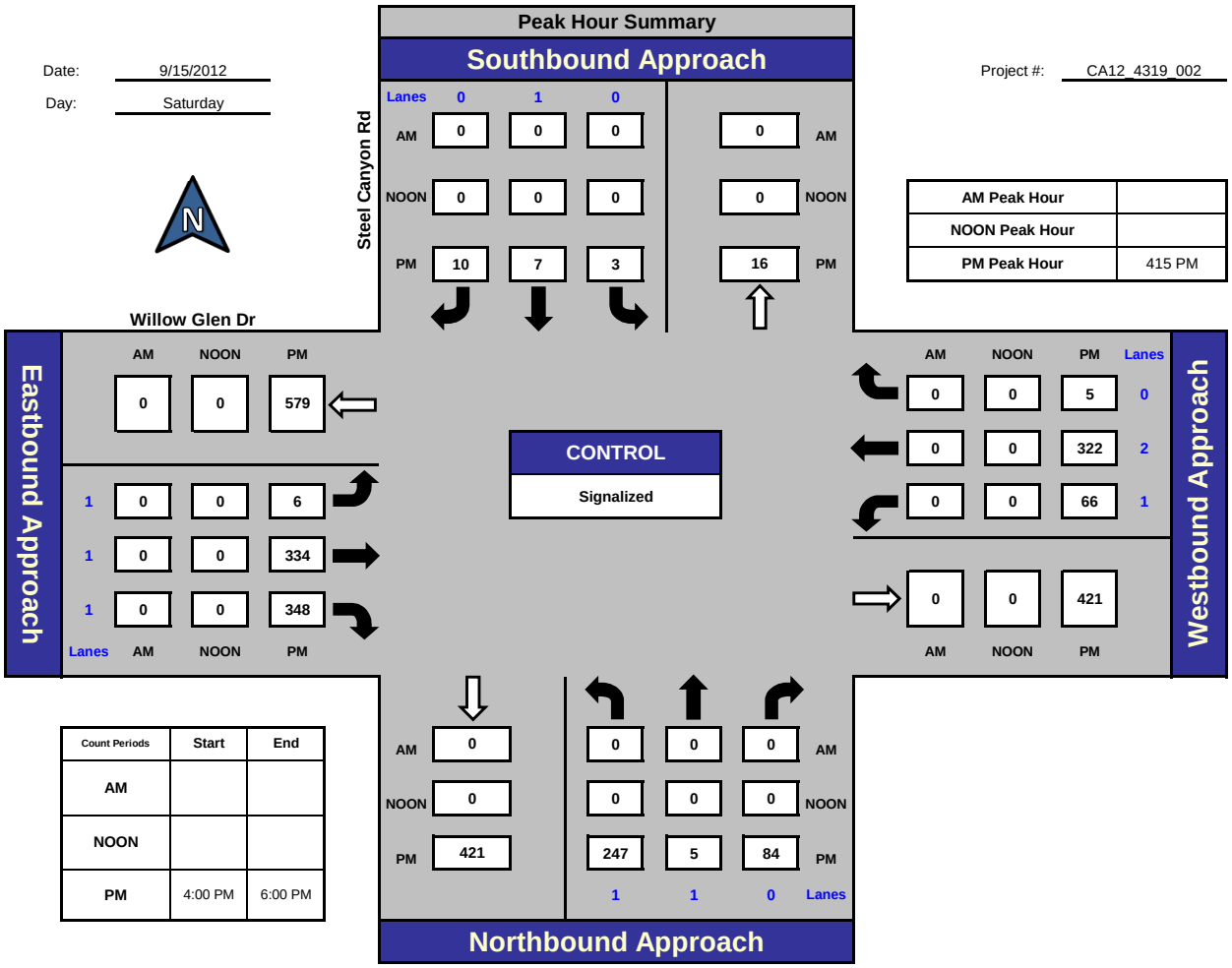
National Data & Surveying Services

Steel Canyon Rd and Willow Glen Dr , City of Jamul

Date: 9/15/2012

Day: Saturday

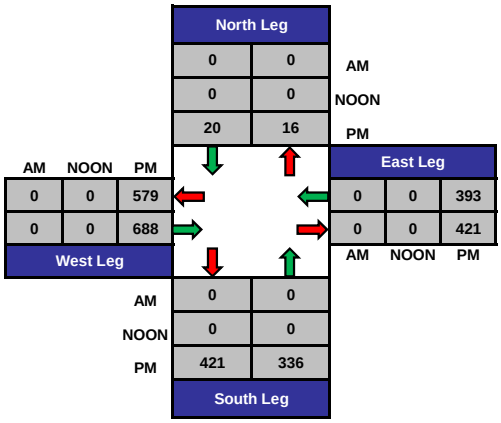
Project #: CA12_4319_002



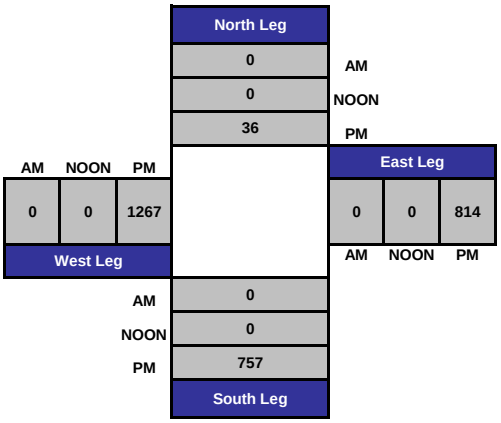
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	415 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

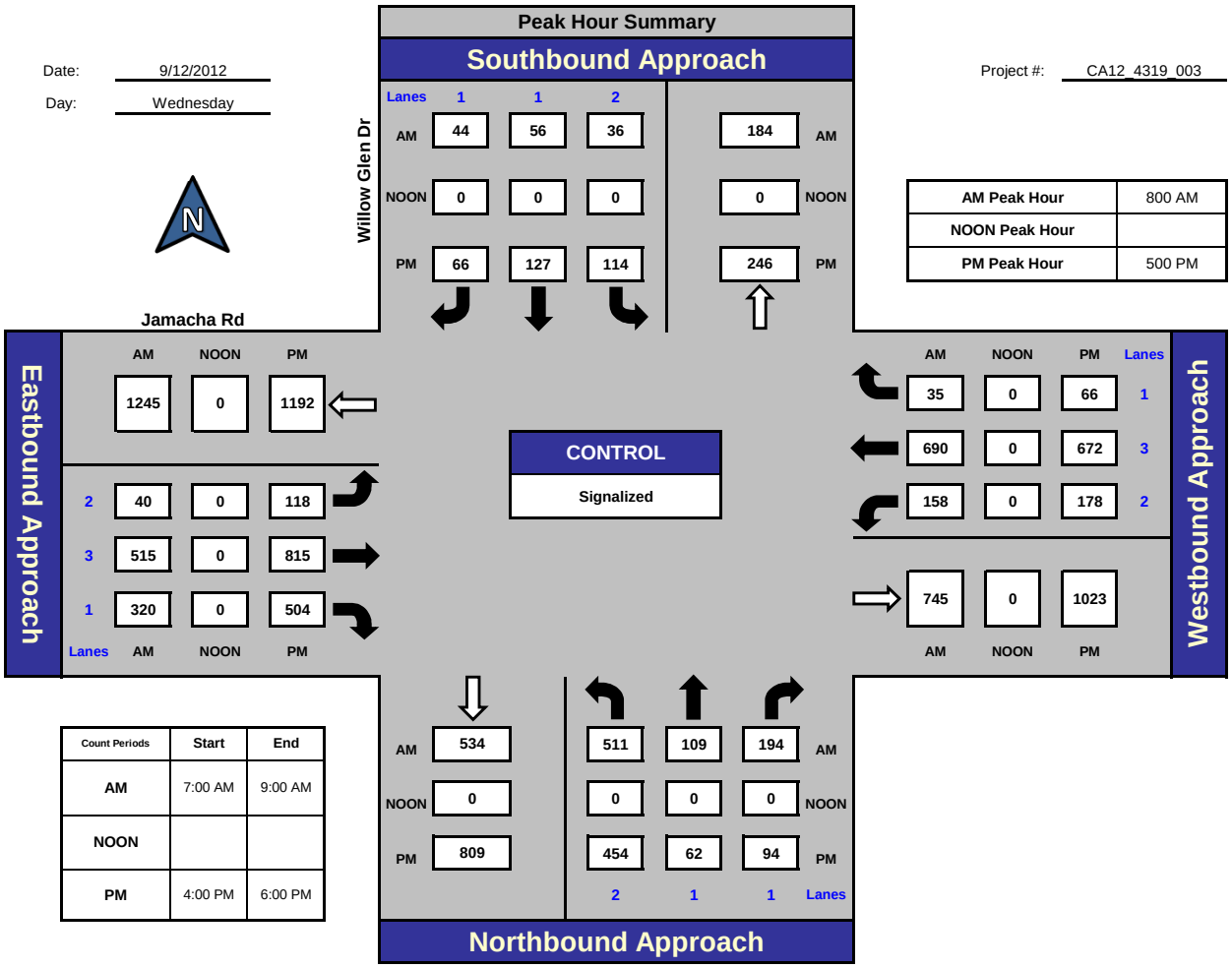
Willow Glen Dr and Jamacha Rd , City of Jamul

Date: 9/12/2012

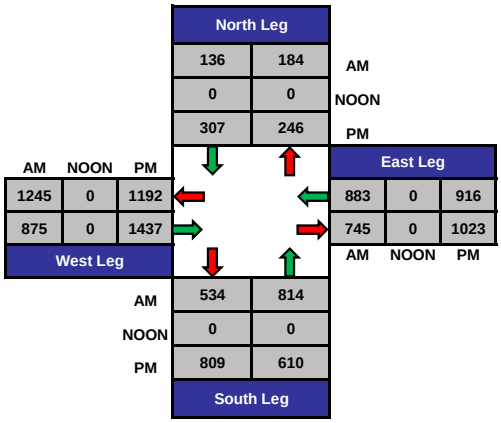
Day: Wednesday

Project #: CA12_4319_003

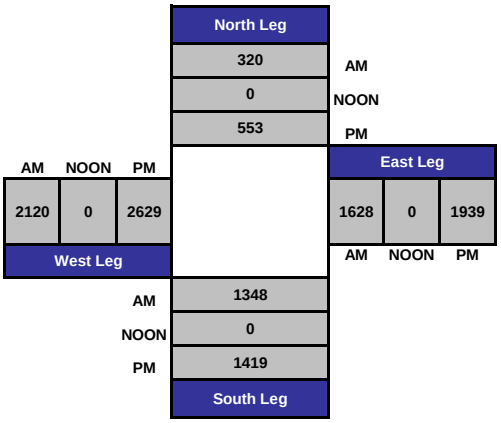
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	500 PM



Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

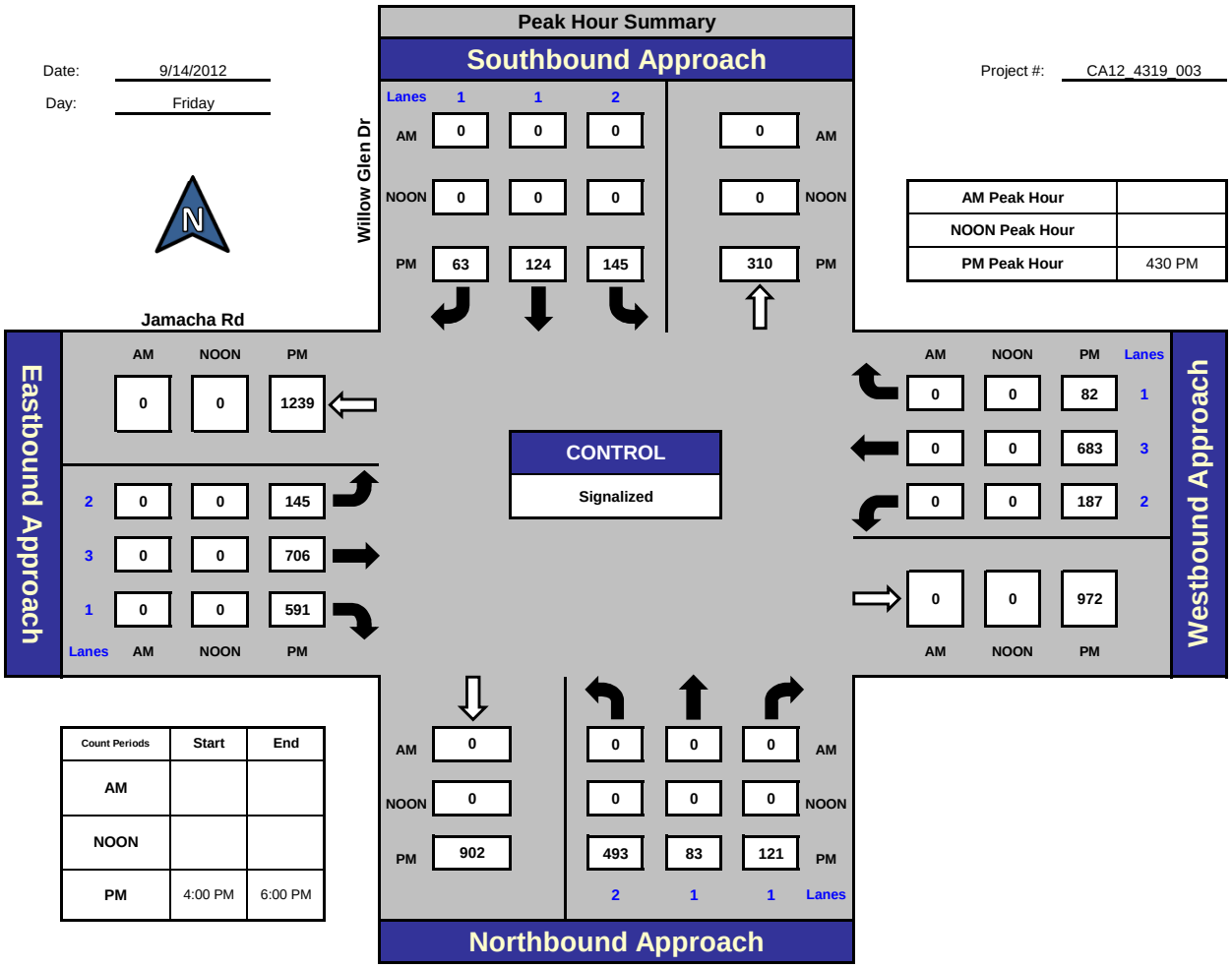
National Data & Surveying Services

Willow Glen Dr and Jamacha Rd , City of Jamul

Date: 9/14/2012

Day: Friday

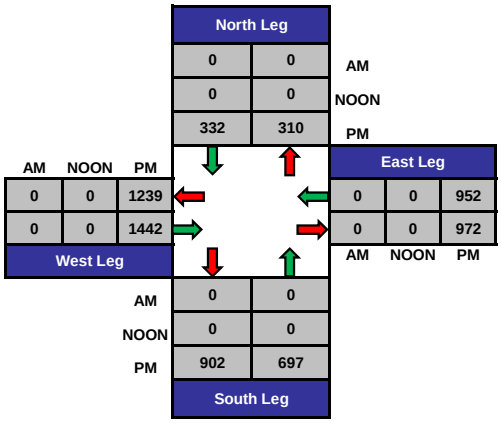
Project #: CA12_4319_003



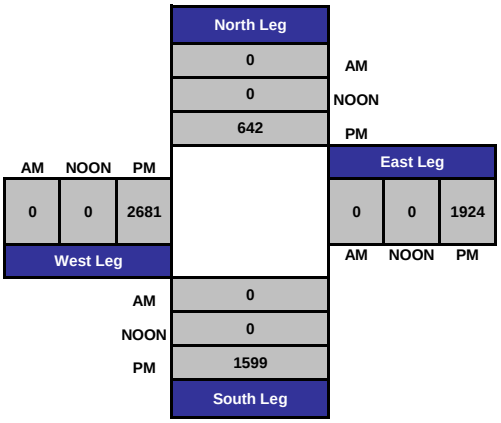
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

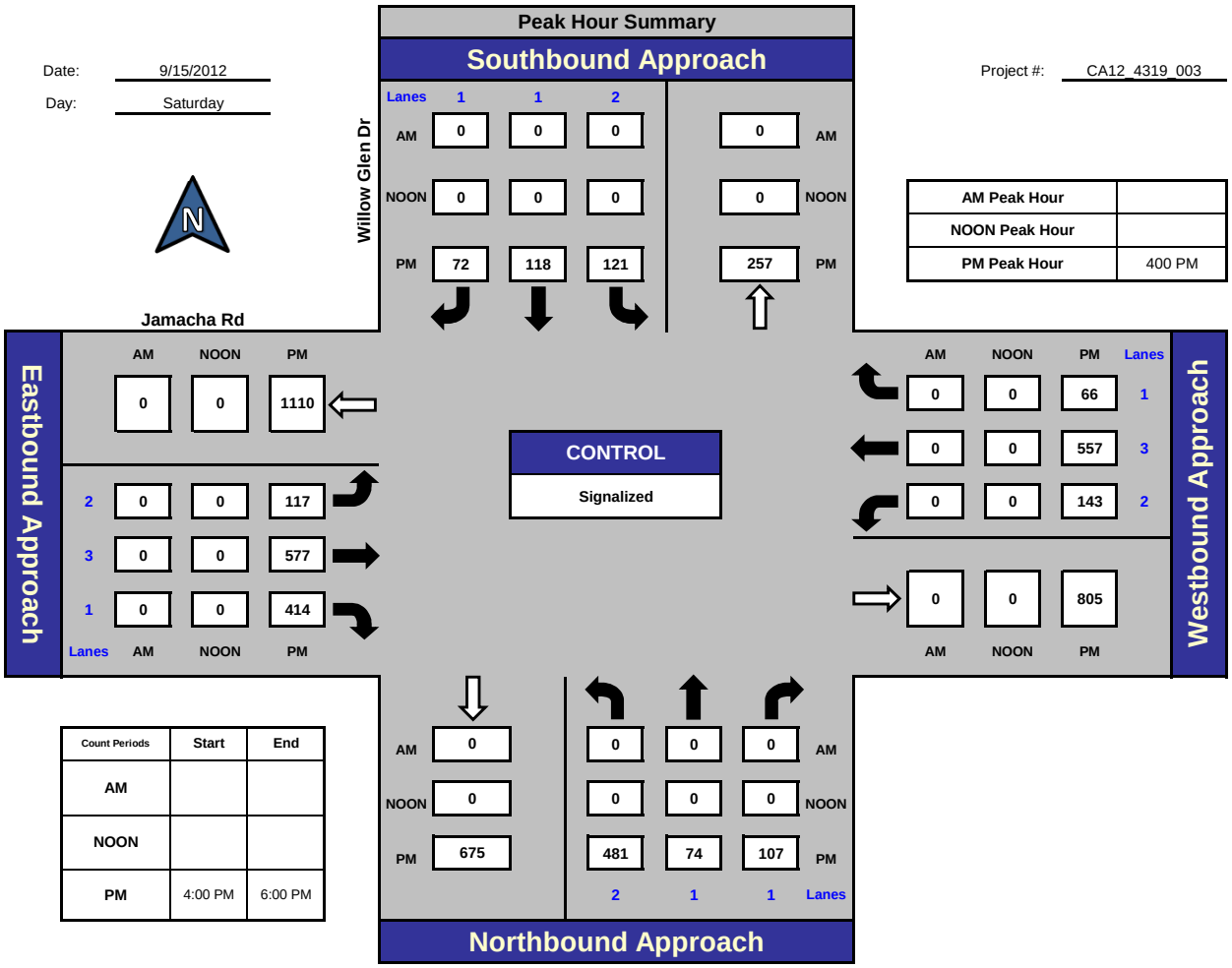
National Data & Surveying Services

Willow Glen Dr and Jamacha Rd , City of Jamul

Date: 9/15/2012

Day: Saturday

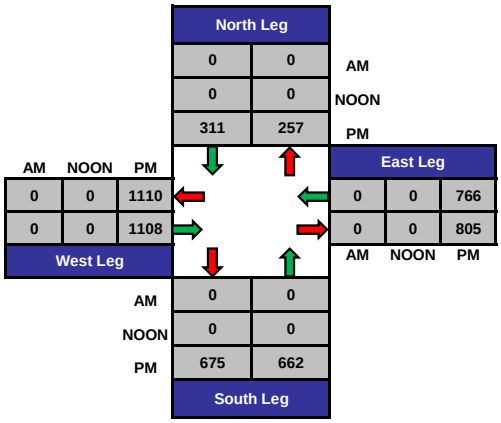
Project #: CA12_4319_003



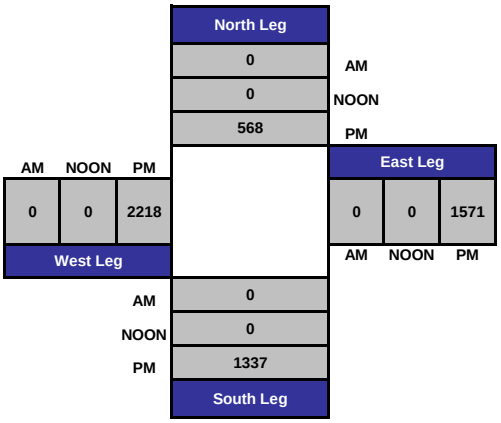
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	400 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

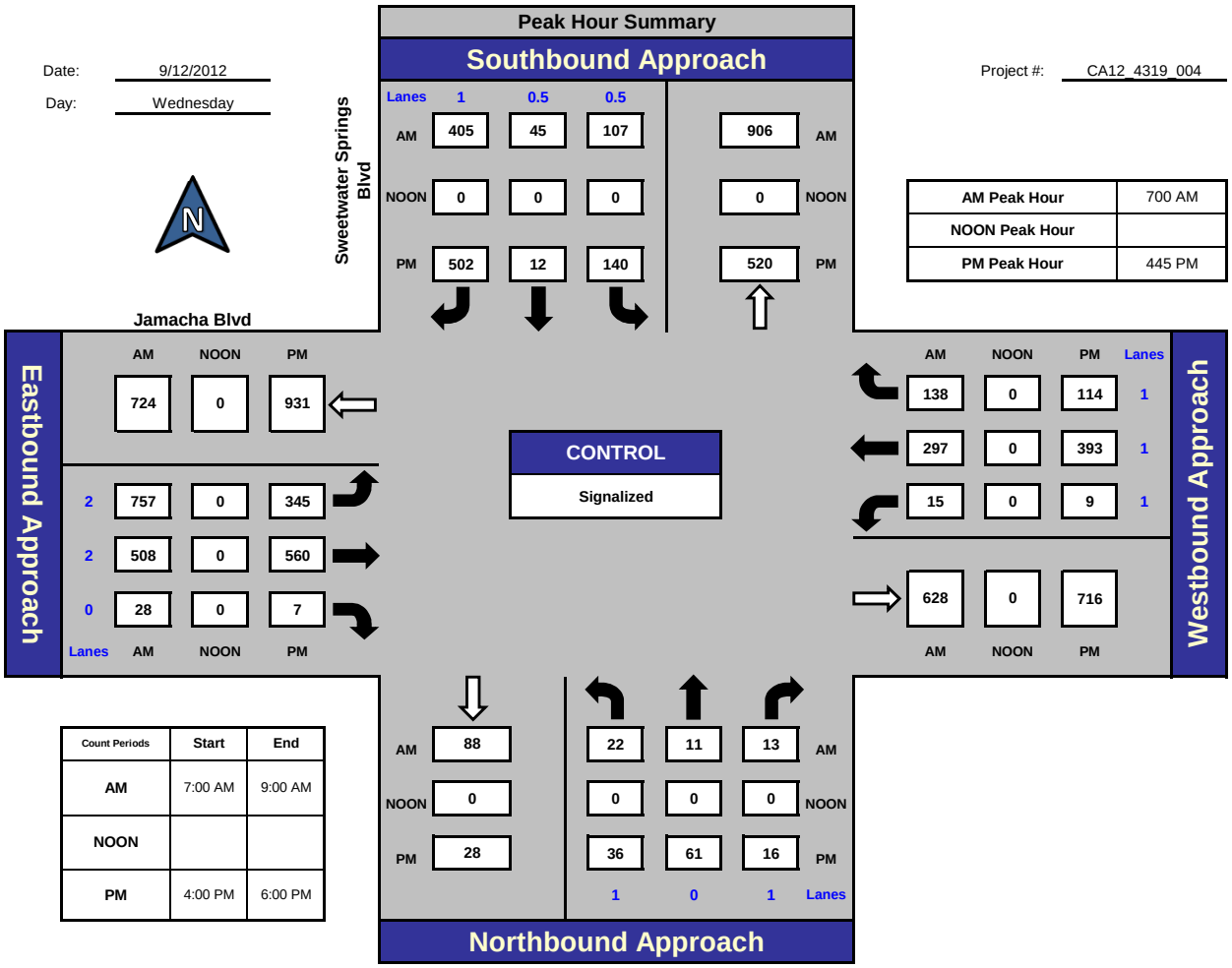
National Data & Surveying Services

Sweetwater Springs Blvd and Jamacha Blvd , City of Jamul

Date: 9/12/2012

Day: Wednesday

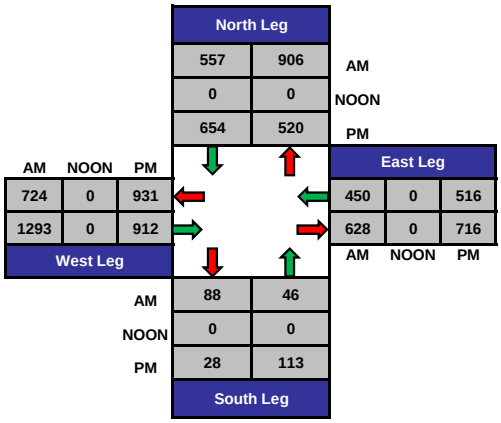
Project #: CA12_4319_004



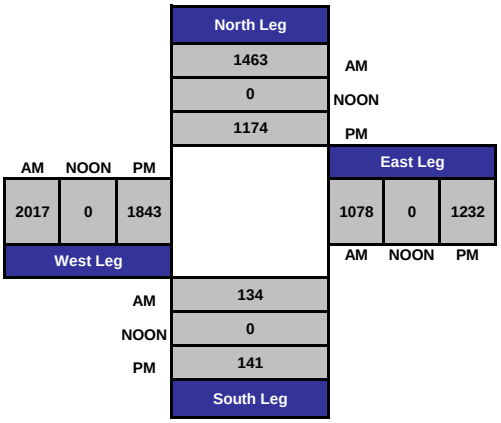
AM Peak Hour	700 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

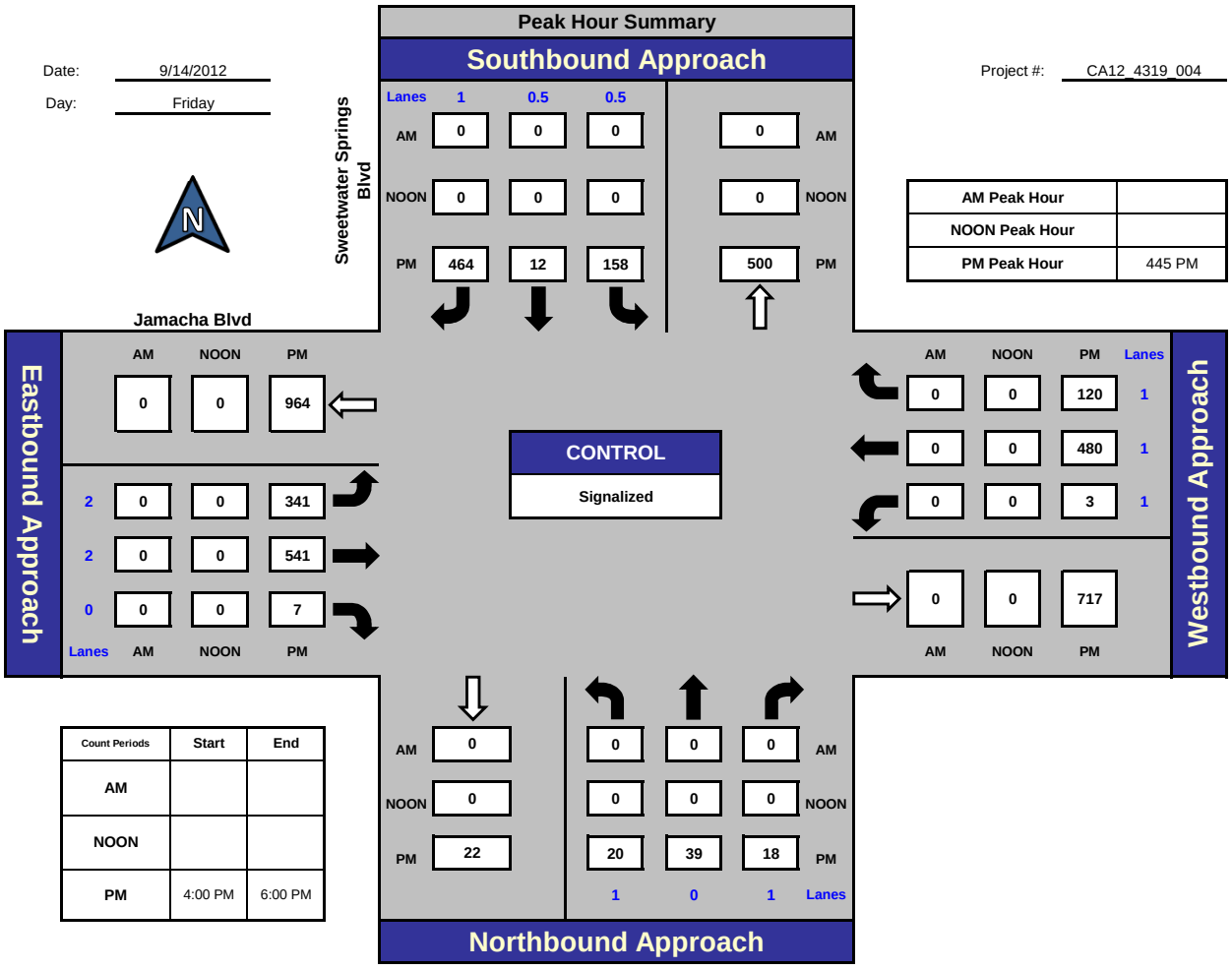
National Data & Surveying Services

Sweetwater Springs Blvd and Jamacha Blvd , City of Jamul

Date: 9/14/2012

Day: Friday

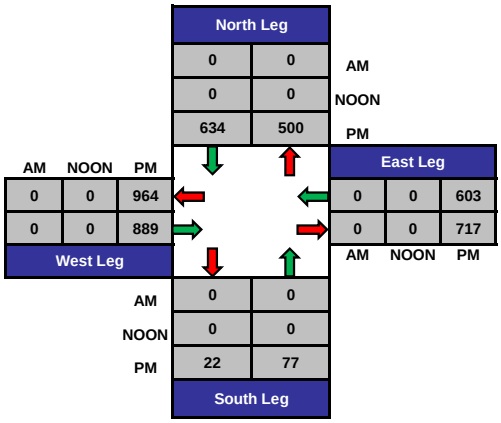
Project #: CA12_4319_004



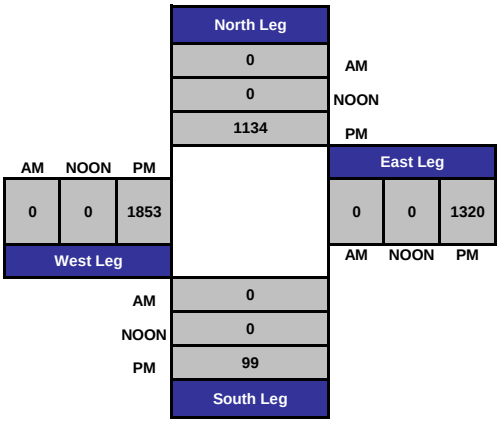
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

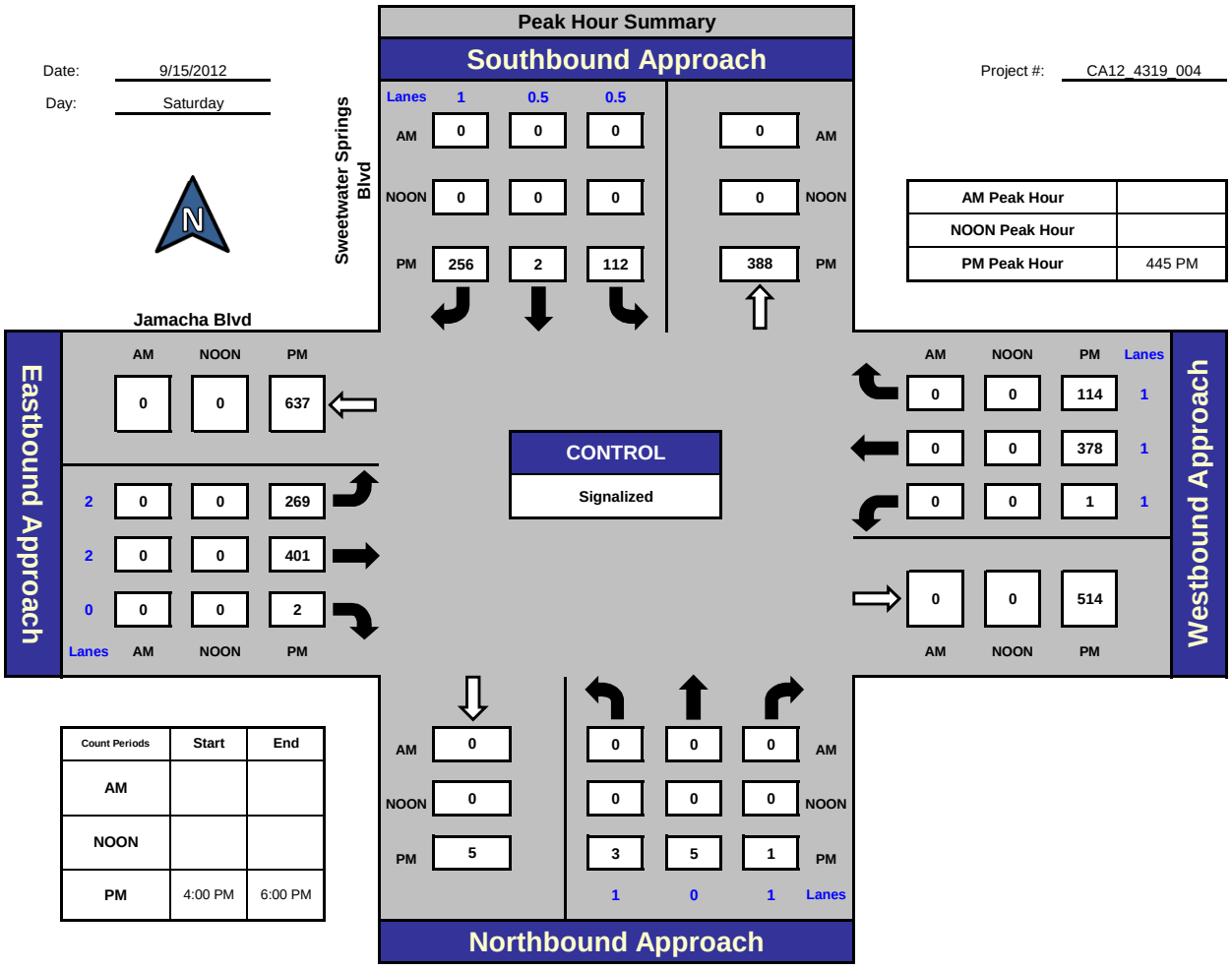
National Data & Surveying Services

Sweetwater Springs Blvd and Jamacha Blvd , City of Jamul

Date: 9/15/2012

Day: Saturday

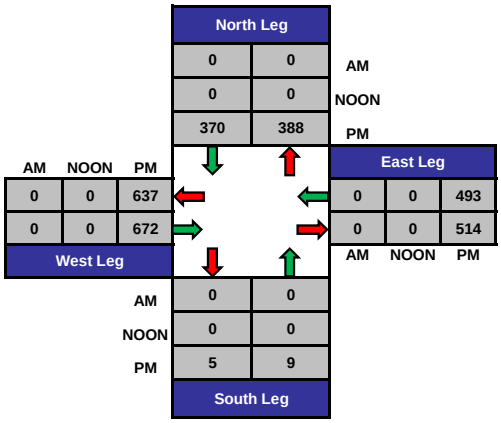
Project #: CA12_4319_004



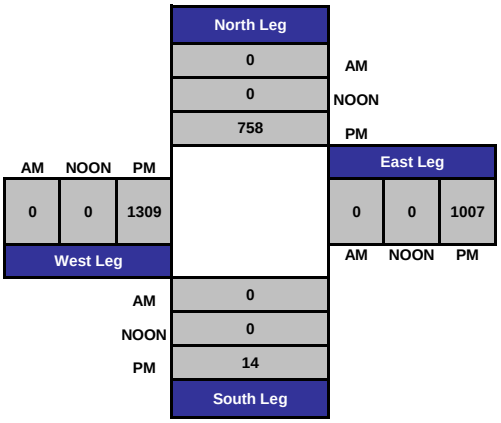
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

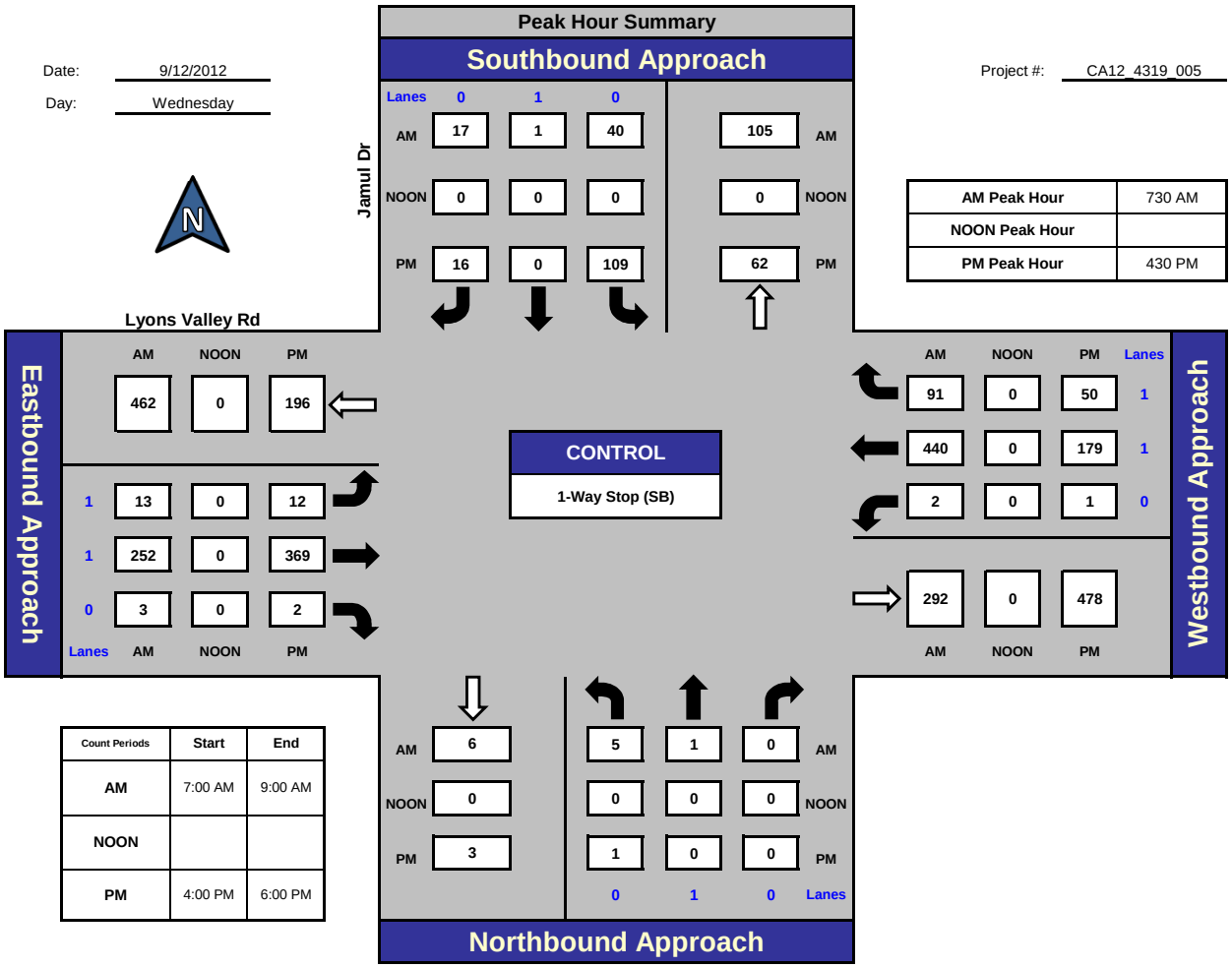
Jamul Dr and Lyons Valley Rd , City of Jamul

Date: 9/12/2012

Day: Wednesday

Project #: CA12_4319_005

AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	430 PM



Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs

North Leg		
58	105	AM
0	0	NOON
125	62	PM

West Leg			East Leg		
AM	NOON	PM			
462	0	196	533	0	230
268	0	383	292	0	478
			AM	NOON	PM

South Leg	
6	6
0	0
3	1

Total Volume Per Leg

North Leg	
163	AM
0	NOON
187	PM

West Leg			East Leg		
AM	NOON	PM			
730	0	579	825	0	708
			AM	NOON	PM

South Leg	
AM	12
NOON	0
PM	4

ITM Peak Hour Summary

Prepared by:

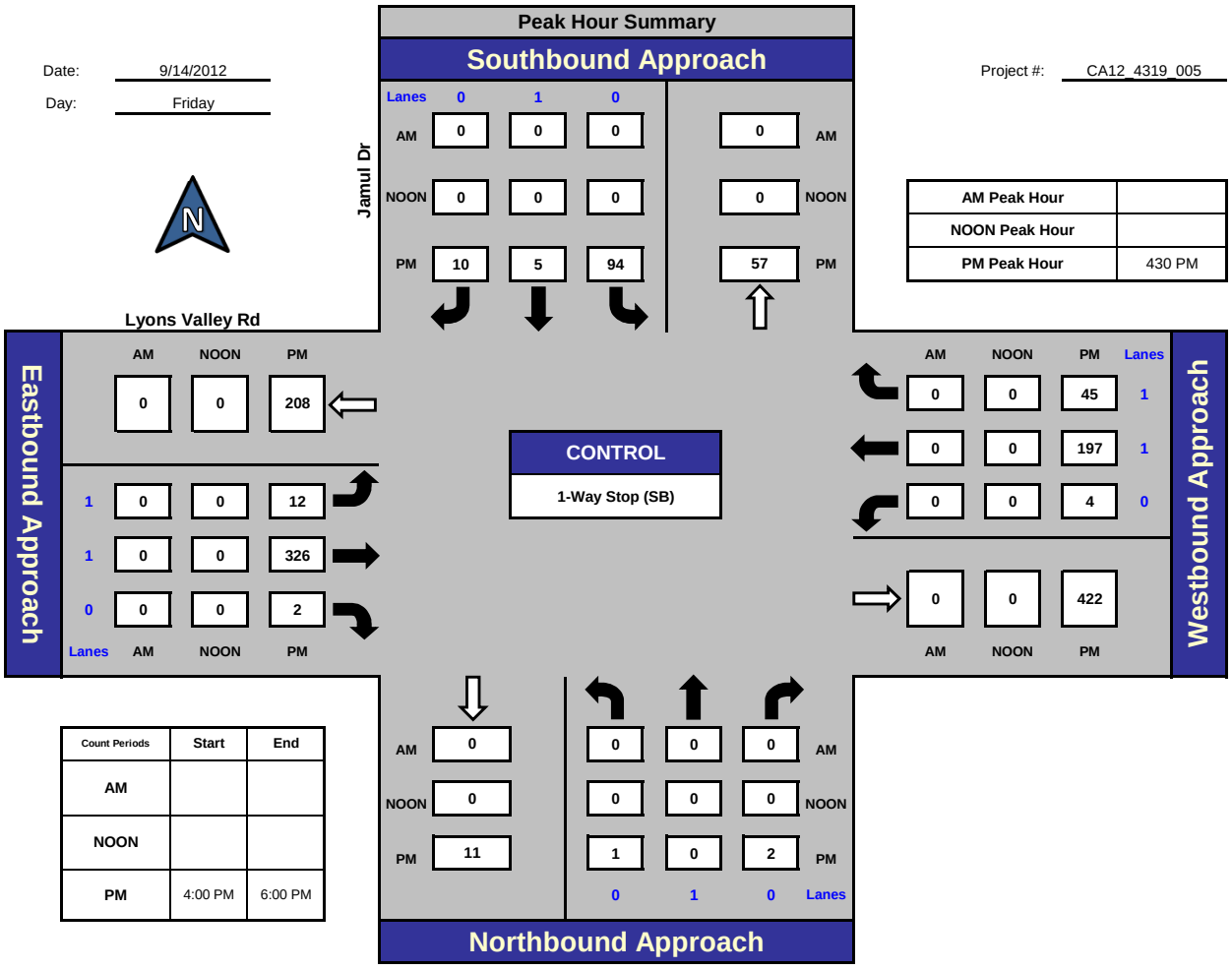
National Data & Surveying Services

Jamul Dr and Lyons Valley Rd , City of Jamul

Date: 9/14/2012

Day: Friday

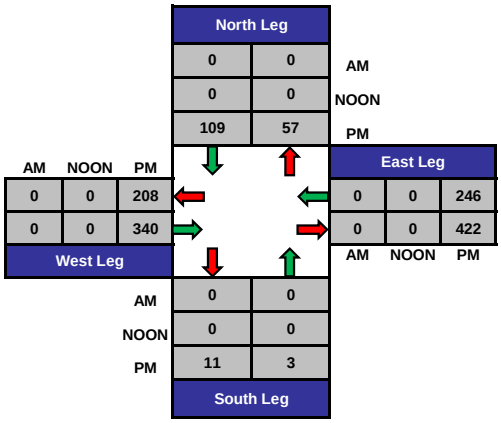
Project #: CA12_4319_005



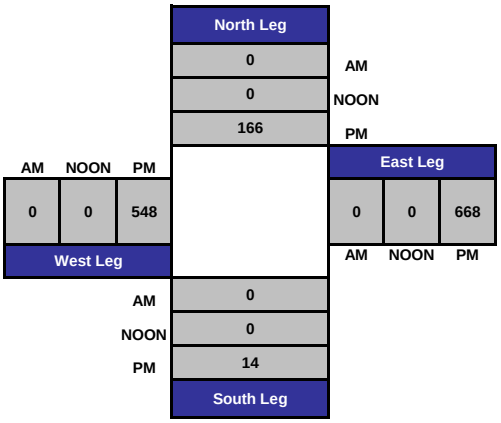
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

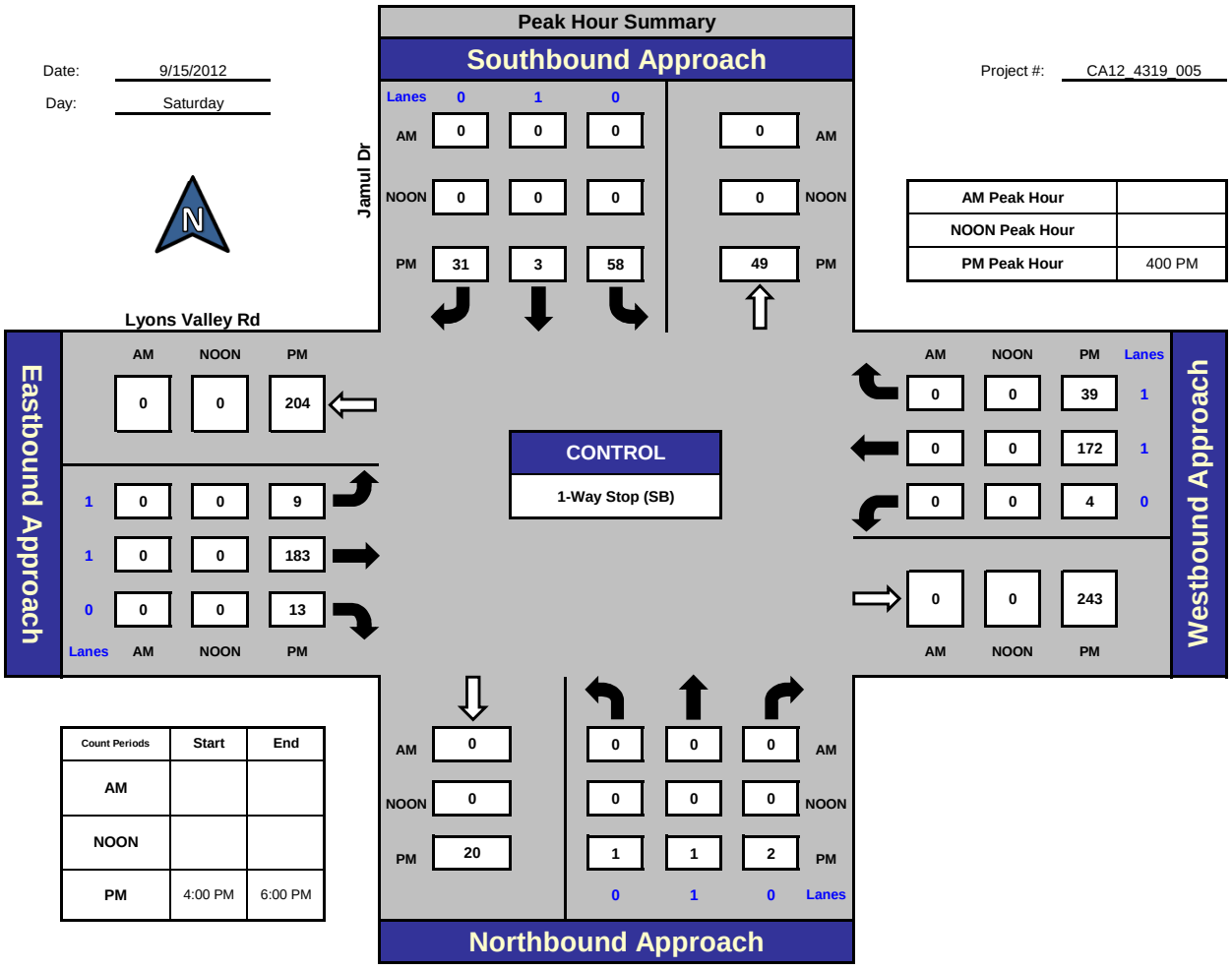
National Data & Surveying Services

Jamul Dr and Lyons Valley Rd , City of Jamul

Date: 9/15/2012

Day: Saturday

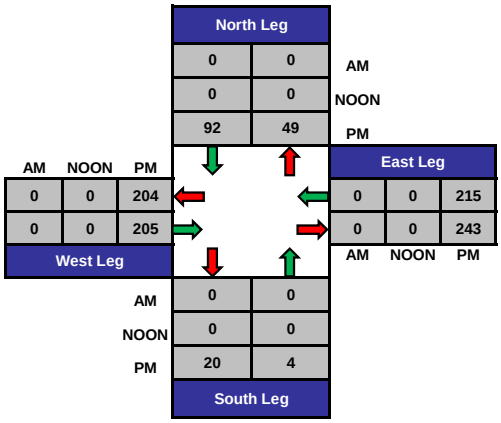
Project #: CA12_4319_005



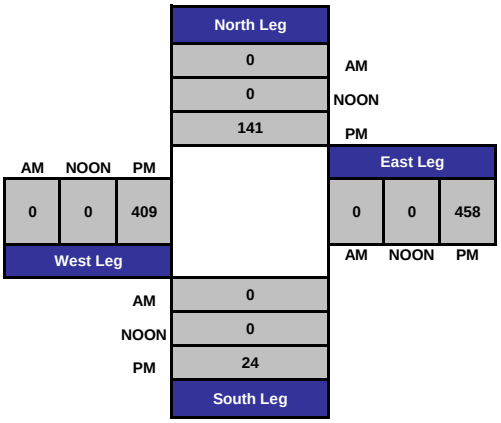
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	400 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

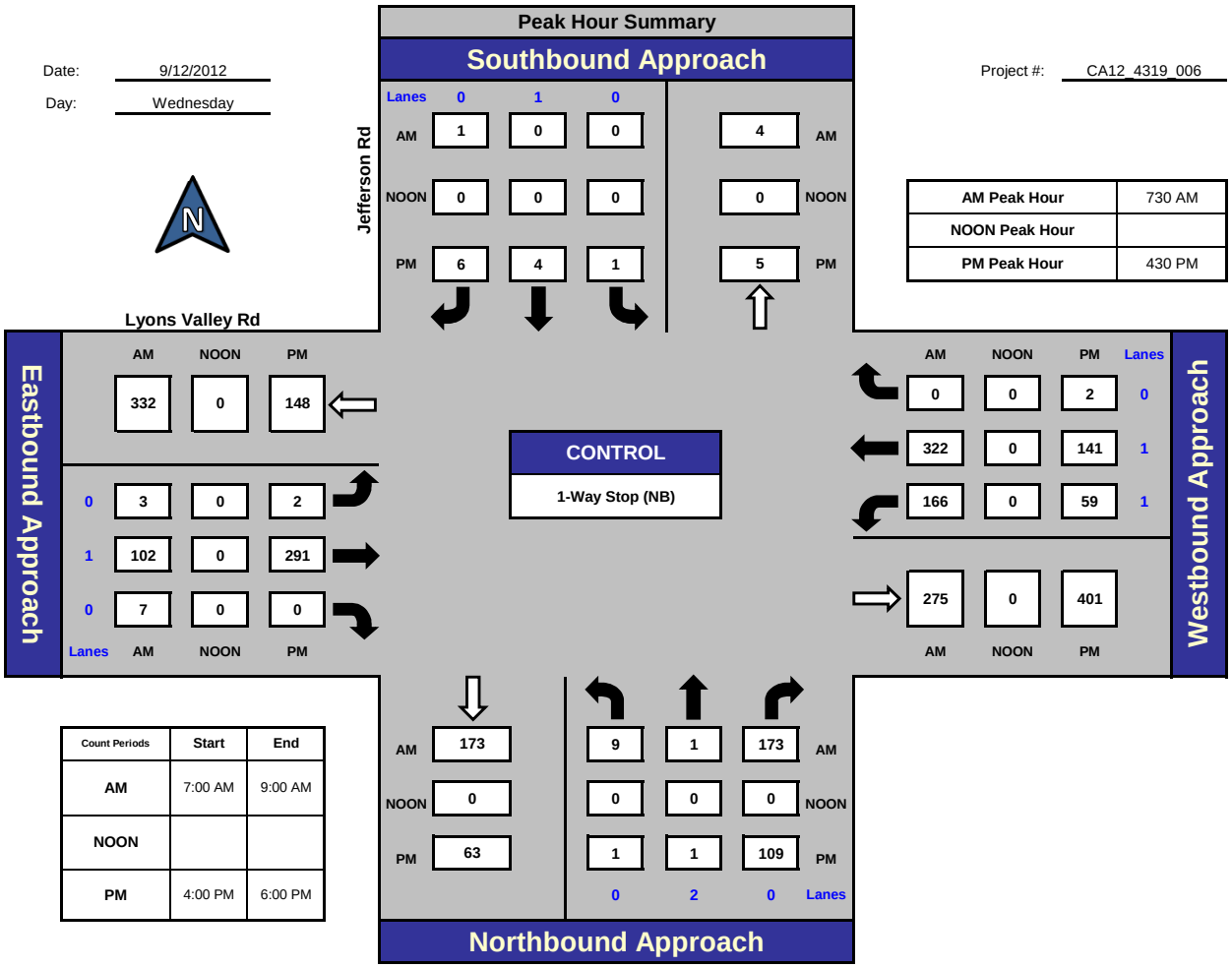
National Data & Surveying Services

Jefferson Rd and Lyons Valley Rd , City of Jamul

Date: 9/12/2012

Day: Wednesday

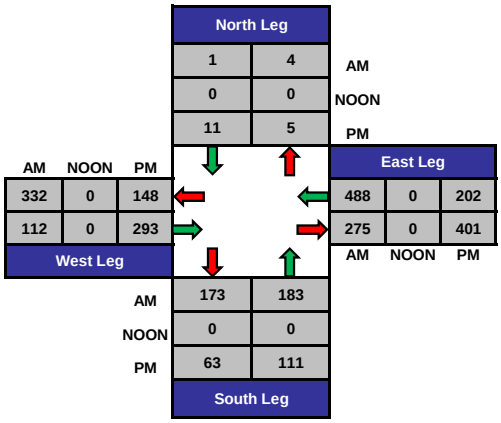
Project #: CA12_4319_006



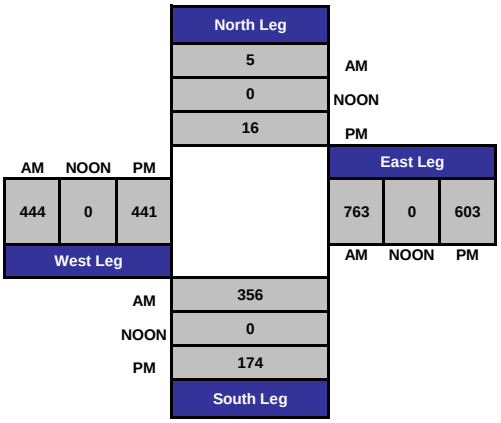
AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

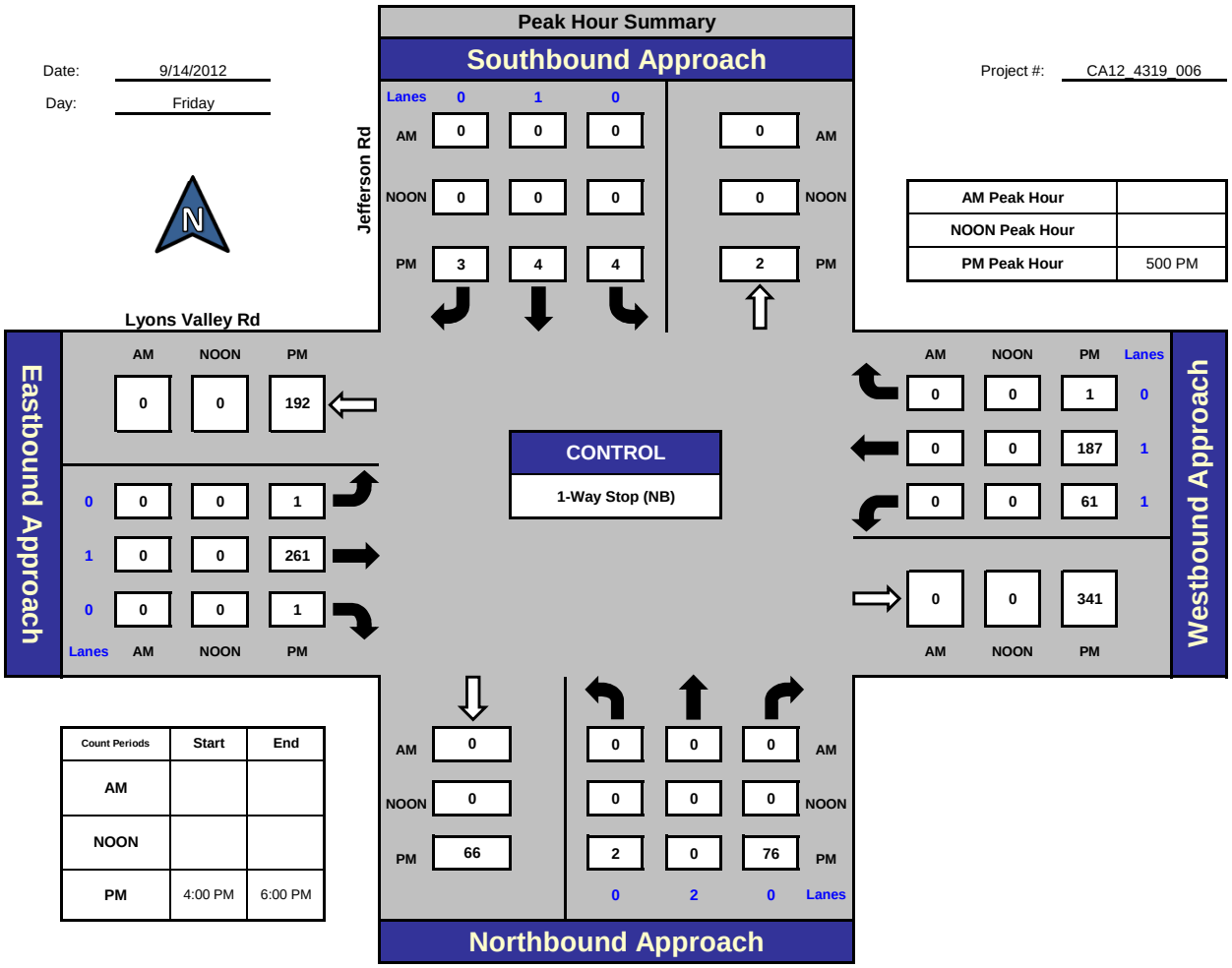
National Data & Surveying Services

Jefferson Rd and Lyons Valley Rd , City of Jamul

Date: 9/14/2012

Day: Friday

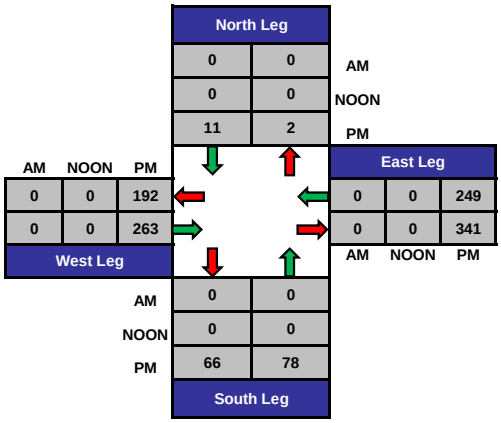
Project #: CA12_4319_006



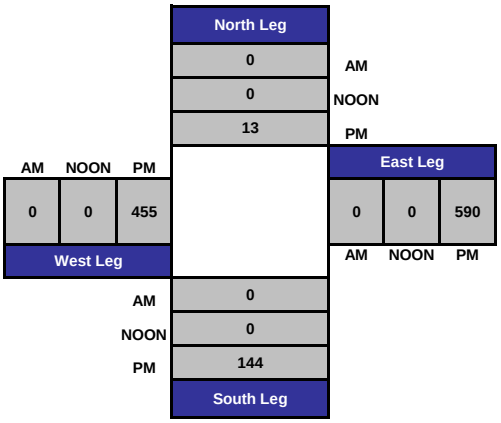
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	500 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

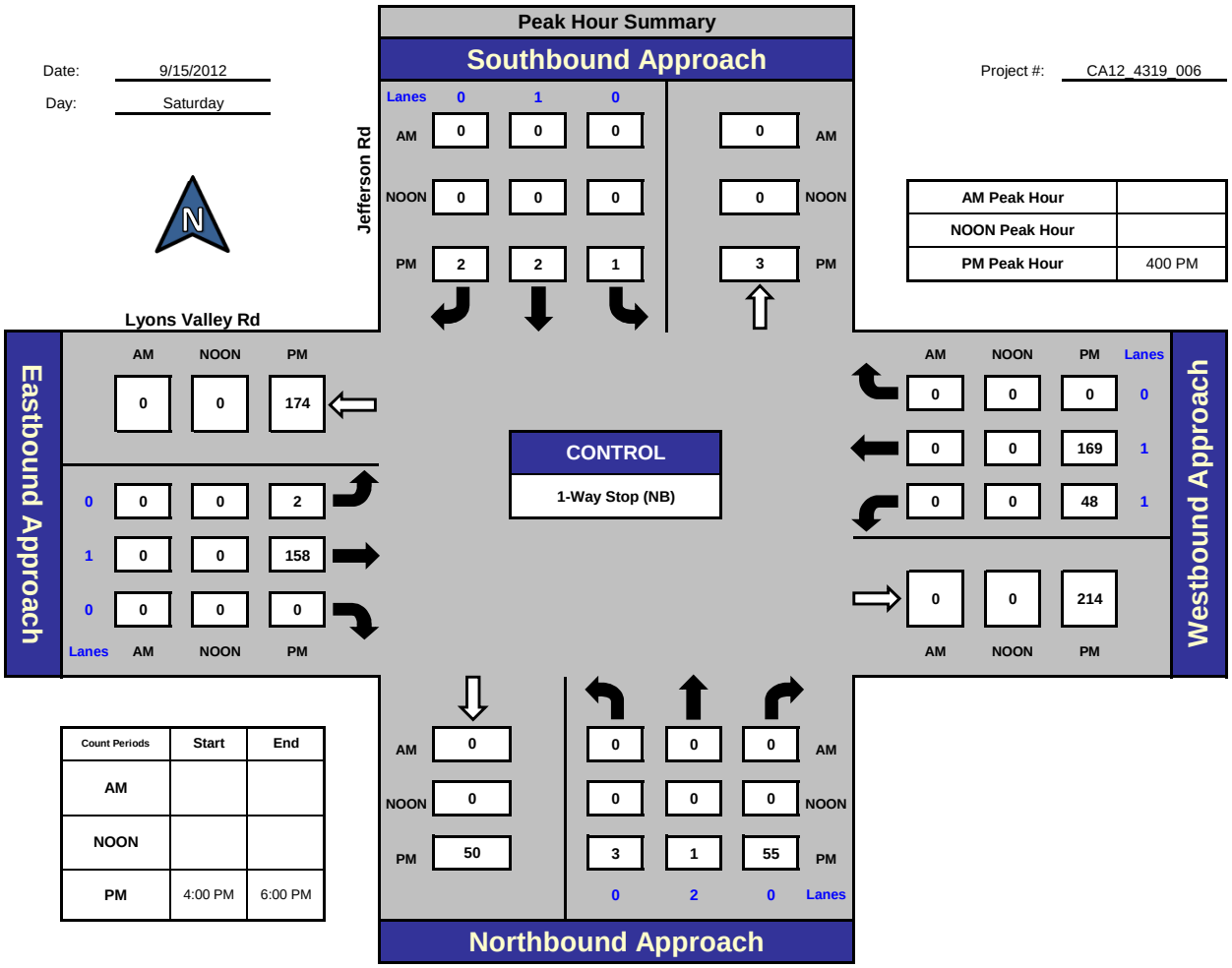
National Data & Surveying Services

Jefferson Rd and Lyons Valley Rd , City of Jamul

Date: 9/15/2012

Day: Saturday

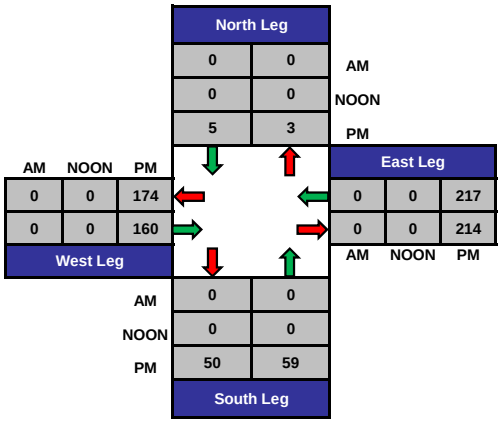
Project #: CA12_4319_006



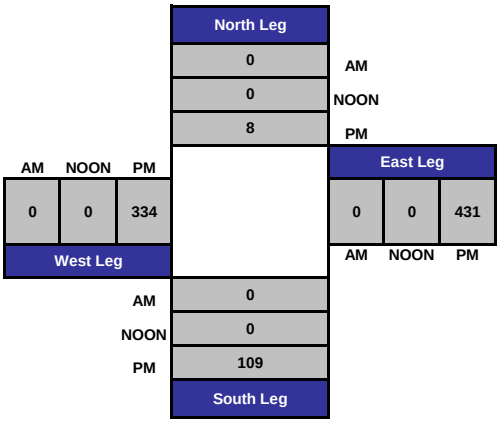
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	400 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

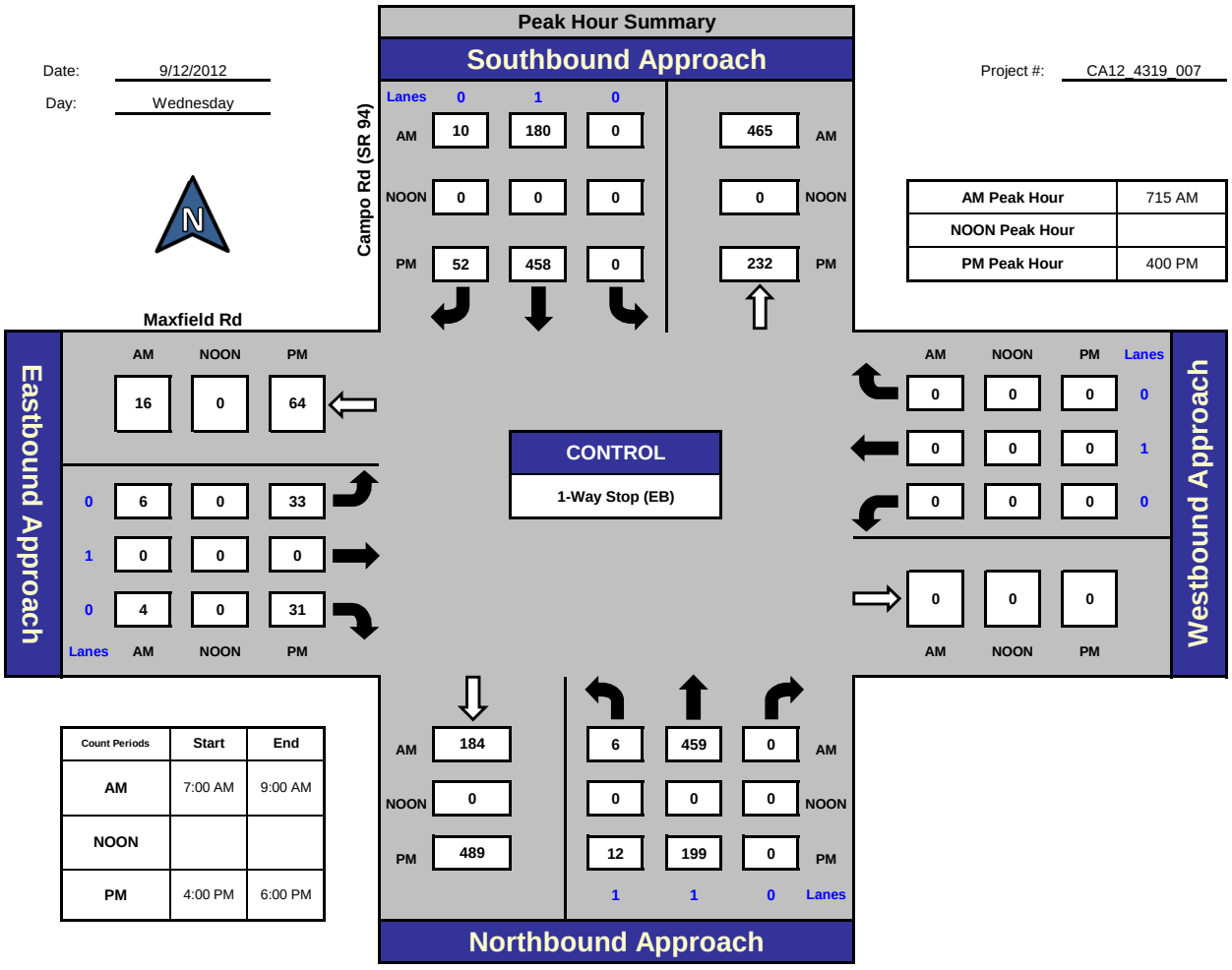
Campo Rd (SR 94) and Maxfield Rd , City of Jamul

Date: 9/12/2012

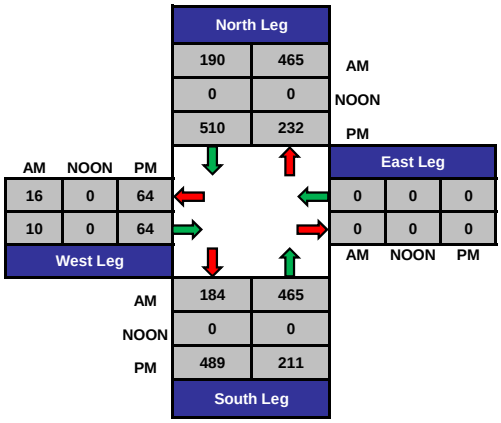
Day: Wednesday

Project #: CA12_4319_007

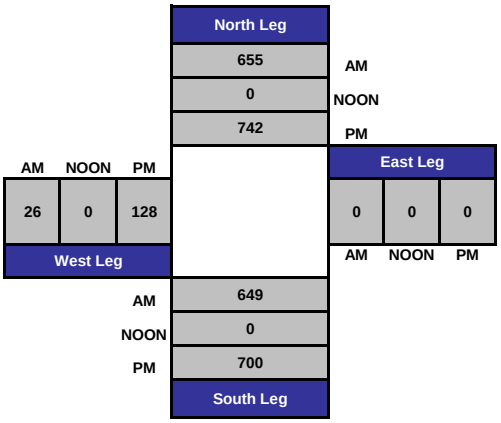
AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	400 PM



Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

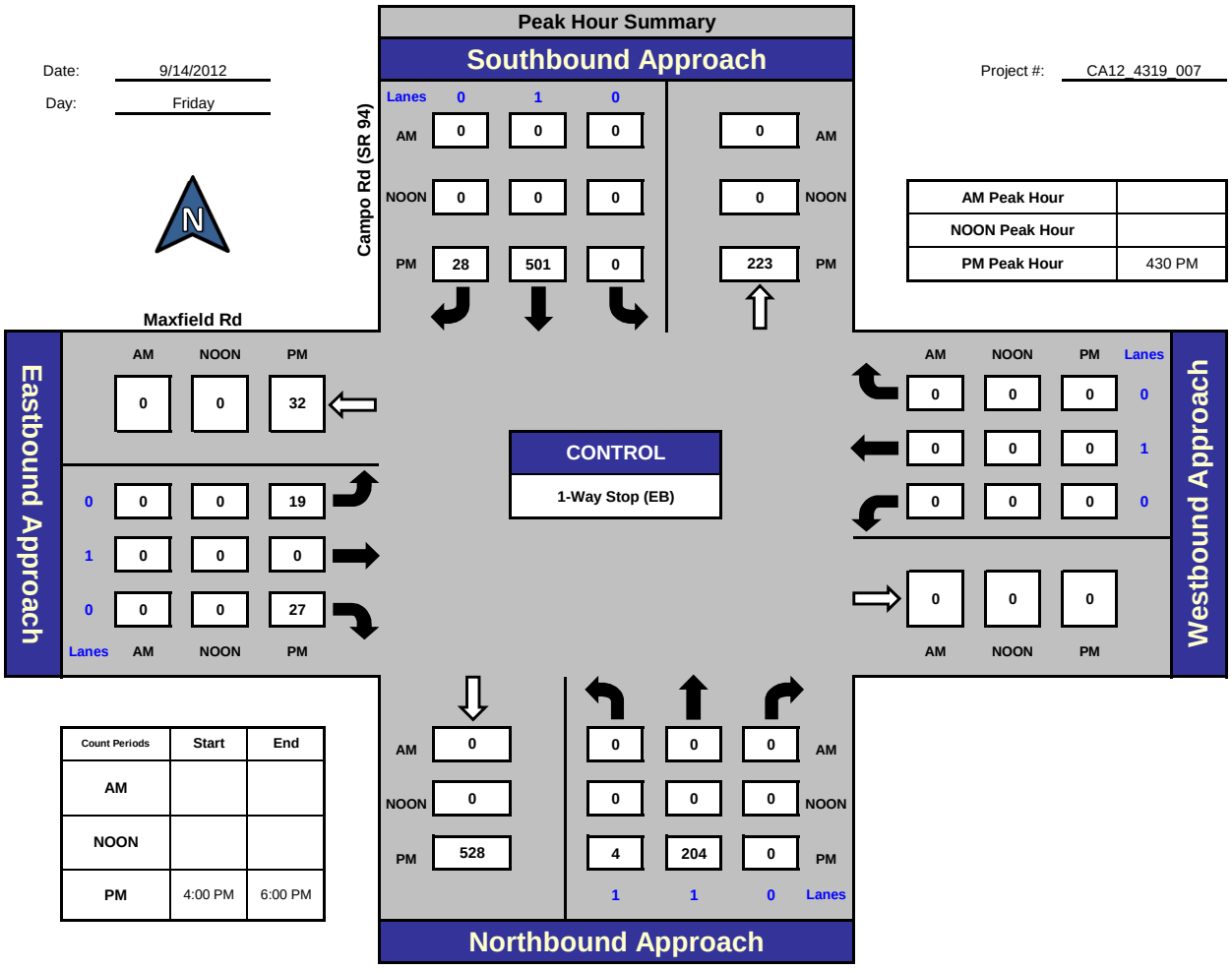
National Data & Surveying Services

Campo Rd (SR 94) and Maxfield Rd , City of Jamul

Date: 9/14/2012

Day: Friday

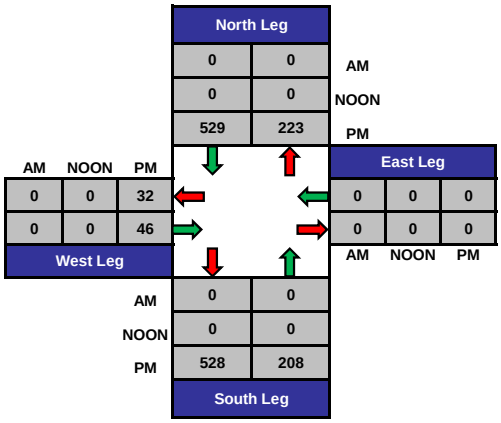
Project #: CA12_4319_007



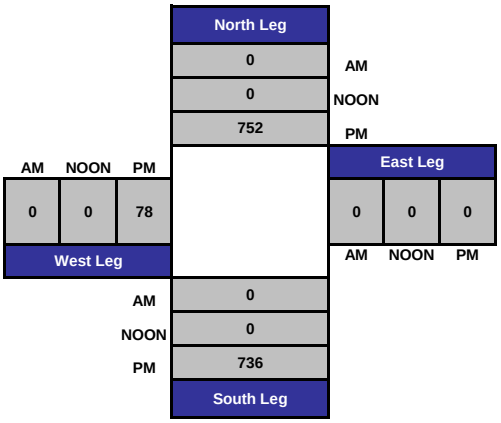
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

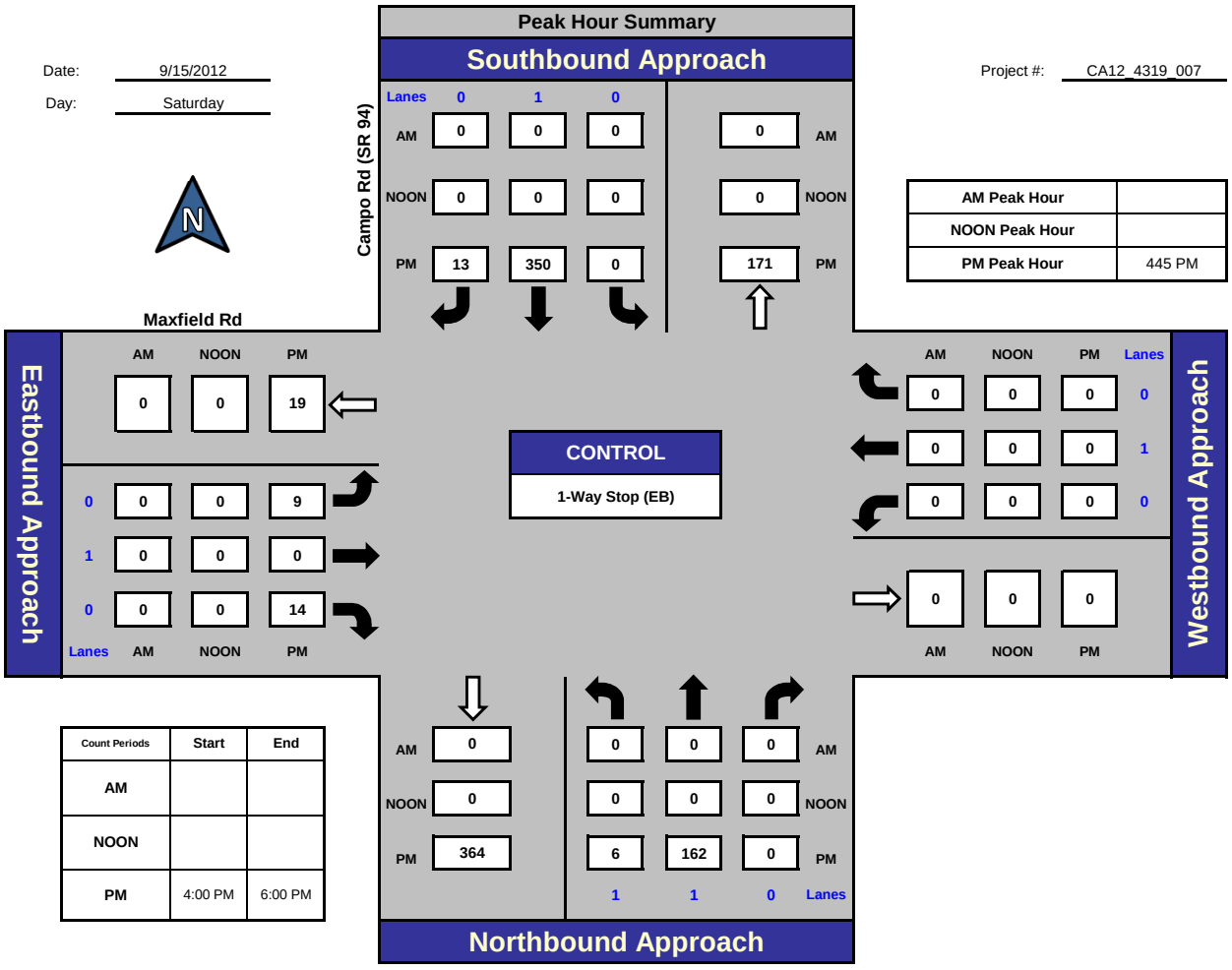
National Data & Surveying Services

Campo Rd (SR 94) and Maxfield Rd , City of Jamul

Date: 9/15/2012

Day: Saturday

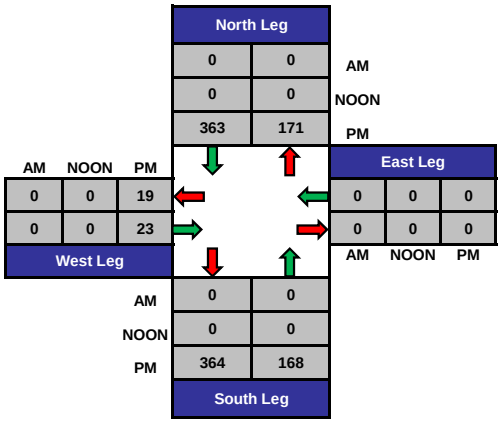
Project #: CA12_4319_007



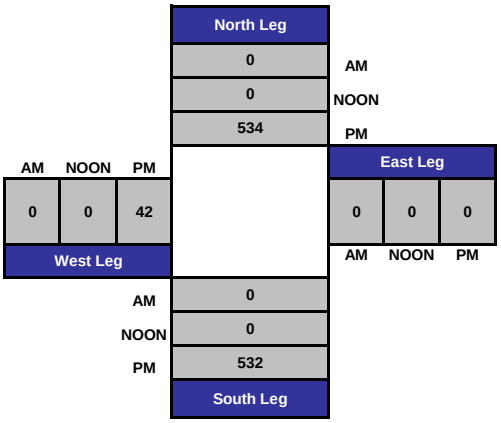
AM Peak Hour	
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM		
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



Prepared by NDS/ATD

VOLUME

Steel Canyon Rd between Jamul Dr & Willow Glen Dr

Day: Wednesday
Date: 9/12/2012

City: Jamul
Project #: CA12_4320_001

DAILY TOTALS	NB	SB	EB	WB	Total
	6,888	7,140	0	0	14,028

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	11		13				24		12:00	95		91				186	
00:15	6		11				17		12:15	97		83				180	
00:30	6		9				15		12:30	90		88				178	
00:45	1	24	8	41			9	65	12:45	110	392	109	371			219	763
01:00	3		6				9		13:00	95		92				187	
01:15	2		9				11		13:15	86		103				189	
01:30	0		5				5		13:30	83		101				184	
01:45	5	10	5	25			10	35	13:45	110	374	86	382			196	756
02:00	2		8				10		14:00	122		94				216	
02:15	1		4				5		14:15	163		126				289	
02:30	3		3				6		14:30	92		100				192	
02:45	3	9	2	17			5	26	14:45	109	486	113	433			222	919
03:00	3		1				4		15:00	138		123				261	
03:15	7		5				12		15:15	118		137				255	
03:30	5		6				11		15:30	112		143				255	
03:45	4	19	1	13			5	32	15:45	83	451	144	547			227	998
04:00	6		2				8		16:00	92		165				257	
04:15	5		2				7		16:15	83		122				205	
04:30	11		5				16		16:30	86		138				224	
04:45	18	40	8	17			26	57	16:45	89	350	154	579			243	929
05:00	21		10				31		17:00	86		162				248	
05:15	19		11				30		17:15	104		147				251	
05:30	38		7				45		17:30	82		168				250	
05:45	56	134	16	44			72	178	17:45	91	363	224	701			315	1064
06:00	68		18				86		18:00	110		171				281	
06:15	89		34				123		18:15	84		144				228	
06:30	106		84				190		18:30	78		141				219	
06:45	161	424	192	328			353	752	18:45	139	411	139	595			278	1006
07:00	198		131				329		19:00	103		135				238	
07:15	203		128				331		19:15	85		105				190	
07:30	214		149				363		19:30	78		84				162	
07:45	229	844	178	586			407	1430	19:45	82	348	88	412			170	760
08:00	202		97				299		20:00	113		57				170	
08:15	141		78				219		20:15	72		93				165	
08:30	155		98				253		20:30	56		93				149	
08:45	121	619	95	368			216	987	20:45	36	277	62	305			98	582
09:00	97		71				168		21:00	31		61				92	
09:15	99		69				168		21:15	28		60				88	
09:30	88		47				135		21:30	31		53				84	
09:45	77	361	58	245			135	606	21:45	30	120	57	231			87	351
10:00	83		67				150		22:00	25		51				76	
10:15	88		58				146		22:15	26		47				73	
10:30	83		86				169		22:30	14		32				46	
10:45	78	332	80	291			158	623	22:45	25	90	29	159			54	249
11:00	75		90				165		23:00	14		24				38	
11:15	86		106				192		23:15	14		23				37	
11:30	95		79				174		23:30	11		17				28	
11:45	106	362	85	360			191	722	23:45	9	48	26	90			35	138
TOTALS		3178		2335				5513	TOTALS		3710		4805				8515
SPLIT %		57.6%		42.4%				39.3%	SPLIT %		43.6%		56.4%				60.7%

DAILY TOTALS	NB	SB	EB	WB	Total
	6,888	7,140	0	0	14,028

AM Peak Hour	07:15	06:45			07:00	PM Peak Hour	14:15	17:15			17:15
AM Pk Volume	848	600			1430	PM Pk Volume	502	710			1097
Pk Hr Factor	0.926	0.781			0.878	Pk Hr Factor	0.770	0.792			0.871
7 - 9 Volume	1463	954	0	0	2417	4 - 6 Volume	713	1280	0	0	1993
7 - 9 Peak Hour	07:15	07:00			07:00	4 - 6 Peak Hour	16:30	17:00			17:00
7 - 9 Pk Volume	848	586	0	0	1430	4 - 6 Pk Volume	365	701	0	0	1064
Pk Hr Factor	0.926	0.823	0.000	0.000	0.878	Pk Hr Factor	0.877	0.782	0.000	0.000	0.844

Prepared by NDS/ATD

VOLUME

Willow Glen Dr between Jamacha Rd & Steele Canyon Rd

Day: Tuesday
Date: 9/25/2012

City: Jamul
Project #: CA12_4320_002

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	9,465	10,521	19,986

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00			25		37		62		12:00			119		174		293	
00:15			17		69		86		12:15			127		157		284	
00:30			21		38		59		12:30			147		151		298	
00:45			19	82	65	209	84	291	12:45			126	519	157	639	283	1158
01:00			16		35		51		13:00			171		166		337	
01:15			17		33		50		13:15			165		132		297	
01:30			9		35		44		13:30			189		129		318	
01:45			7	49	31	134	38	183	13:45			161	686	164	591	325	1277
02:00			12		34		46		14:00			156		190		346	
02:15			11		28		39		14:15			153		171		324	
02:30			15		29		44		14:30			165		148		313	
02:45			8	46	26	117	34	163	14:45			165	639	123	632	288	1271
03:00			5		24		29		15:00			173		174		347	
03:15			8		44		52		15:15			159		164		323	
03:30			4		22		26		15:30			194		160		354	
03:45			4	21	32	122	36	143	15:45			208	734	115	613	323	1347
04:00			4		28		32		16:00			200		144		344	
04:15			12		33		45		16:15			192		183		375	
04:30			9		41		50		16:30			207		143		350	
04:45			20	45	33	135	53	180	16:45			185	784	131	601	316	1385
05:00			19		41		60		17:00			191		131		322	
05:15			14		44		58		17:15			192		145		337	
05:30			27		56		83		17:30			197		128		325	
05:45			32	92	88	229	120	321	17:45			211	791	115	519	326	1310
06:00			46		76		122		18:00			190		120		310	
06:15			52		130		182		18:15			178		124		302	
06:30			80		163		243		18:30			144		123		267	
06:45			138	316	200	569	338	885	18:45			167	679	120	487	287	1166
07:00			145		259		404		19:00			149		88		237	
07:15			114		267		381		19:15			129		84		213	
07:30			152		226		378		19:30			116		81		197	
07:45			163	574	249	1001	412	1575	19:45			96	490	80	333	176	823
08:00			166		268		434		20:00			109		93		202	
08:15			104		203		307		20:15			91		92		183	
08:30			115		210		325		20:30			83		54		137	
08:45			160	545	208	889	368	1434	20:45			73	356	52	291	125	647
09:00			110		176		286		21:00			90		62		152	
09:15			120		133		253		21:15			75		52		127	
09:30			122		112		234		21:30			66		68		134	
09:45			98	450	146	567	244	1017	21:45			68	299	39	221	107	520
10:00			105		120		225		22:00			63		62		125	
10:15			96		145		241		22:15			56		81		137	
10:30			105		160		265		22:30			54		76		130	
10:45			102	408	144	569	246	977	22:45			41	214	65	284	106	498
11:00			106		125		231		23:00			48		54		102	
11:15			151		154		305		23:15			46		55		101	
11:30			107		127		234		23:30			29		40		69	
11:45			134	498	161	567	295	1065	23:45			25	148	53	202	78	350
TOTALS				3126		5108		8234	TOTALS				6339		5413		11752
SPLIT %				38.0%		62.0%		41.2%	SPLIT %				53.9%		46.1%		58.8%

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	9,465	10,521	19,986

AM Peak Hour			07:15	07:15	07:15	PM Peak Hour			15:45	13:45	15:30
AM Pk Volume			595	1010	1605	PM Pk Volume			807	673	1396
Pk Hr Factor			0.896	0.942	0.925	Pk Hr Factor			0.970	0.886	0.931
7 - 9 Volume	0	0	1119	1890	3009	4 - 6 Volume	0	0	1575	1120	2695
7 - 9 Peak Hour			07:15	07:15	07:15	4 - 6 Peak Hour			17:00	16:00	16:00
7 - 9 Pk Volume	0	0	595	1010	1605	4 - 6 Pk Volume	0	0	791	601	1385
Pk Hr Factor	0.000	0.000	0.896	0.942	0.925	Pk Hr Factor	0.000	0.000	0.937	0.821	0.923

Prepared by NDS/ATD

VOLUME

Willow Glen Dr E/o Steel Canyon Rd

Day: Wednesday
Date: 9/12/2012

City: Jamul
Project #: CA12_4320_003

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	6,109	6,128	12,237

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00			29		19		48		12:00			84		71		155	
00:15			39		15		54		12:15			73		79		152	
00:30			31		14		45		12:30			99		76		175	
00:45			40	139	9	57	49	196	12:45			74	330	92	318	166	648
01:00			17		10		27		13:00			76		89		165	
01:15			29		12		41		13:15			86		93		179	
01:30			20		4		24		13:30			83		94		177	
01:45			29	95	4	30	33	125	13:45			83	328	95	371	178	699
02:00			13		14		27		14:00			99		108		207	
02:15			23		11		34		14:15			79		140		219	
02:30			23		12		35		14:30			85		86		171	
02:45			22	81	2	39	24	120	14:45			84	347	118	452	202	799
03:00			9		8		17		15:00			99		144		243	
03:15			23		5		28		15:15			122		111		233	
03:30			16		6		22		15:30			103		113		216	
03:45			13	61	3	22	16	83	15:45			90	414	108	476	198	890
04:00			13		5		18		16:00			105		109		214	
04:15			20		6		26		16:15			115		114		229	
04:30			26		4		30		16:30			116		99		215	
04:45			15	74	11	26	26	100	16:45			112	448	104	426	216	874
05:00			17		16		33		17:00			108		115		223	
05:15			27		12		39		17:15			106		130		236	
05:30			23		11		34		17:30			104		107		211	
05:45			25	92	33	72	58	164	17:45			94	412	101	453	195	865
06:00			29		34		63		18:00			80		121		201	
06:15			48		33		81		18:15			86		110		196	
06:30			78		41		119		18:30			77		115		192	
06:45			125	280	48	156	173	436	18:45			79	322	92	438	171	760
07:00			100		95		195		19:00			83		104		187	
07:15			103		88		191		19:15			60		102		162	
07:30			71		89		160		19:30			81		103		184	
07:45			83	357	101	373	184	730	19:45			86	310	84	393	170	703
08:00			84		99		183		20:00			50		82		132	
08:15			83		84		167		20:15			51		68		119	
08:30			81		77		158		20:30			54		72		126	
08:45			101	349	107	367	208	716	20:45			57	212	53	275	110	487
09:00			74		65		139		21:00			53		52		105	
09:15			78		86		164		21:15			69		51		120	
09:30			54		83		137		21:30			51		56		107	
09:45			69	275	88	322	157	597	21:45			56	229	47	206	103	435
10:00			60		85		145		22:00			81		36		117	
10:15			62		80		142		22:15			81		50		131	
10:30			46		74		120		22:30			50		42		92	
10:45			63	231	75	314	138	545	22:45			70	282	33	161	103	443
11:00			61		98		159		23:00			40		29		69	
11:15			63		73		136		23:15			53		33		86	
11:30			77		69		146		23:30			39		16		55	
11:45			61	262	56	296	117	558	23:45			47	179	7	85	54	264
TOTALS				2296		2074		4370	TOTALS				3813		4054		7867
SPLIT %				52.5%		47.5%		35.7%	SPLIT %				48.5%		51.5%		64.3%

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	6,109	6,128	12,237

AM Peak Hour			06:30	07:15	07:00	PM Peak Hour		16:15	14:15	14:45
AM Pk Volume			406	377	730	PM Pk Volume		451	488	894
Pk Hr Factor			0.812	0.933	0.936	Pk Hr Factor		0.972	0.847	0.920
7 - 9 Volume	0	0	706	740	1446	4 - 6 Volume	0	860	879	1739
7 - 9 Peak Hour			07:00	07:15	07:00	4 - 6 Peak Hour		16:15	16:45	16:30
7 - 9 Pk Volume	0	0	357	377	730	4 - 6 PK Volume	0	451	456	890
Pk Hr Factor	0.000	0.000	0.867	0.933	0.936	Pk Hr Factor	0.000	0.972	0.877	0.943

Prepared by NDS/ATD

VOLUME

Jamul Dr between Steele Canyon Rd & Lyons Valley Rd

Day: Wednesday
Date: 9/12/2012

City: Jamul
Project #: CA12_4320_004

DAILY TOTALS	NB	SB	EB	WB	Total
	1,226	1,207	0	0	2,433

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00	4		1						5		12:00	9		18						27	
00:15	0		2						2		12:15	13		13						26	
00:30	0		0						0		12:30	21		13						34	
00:45	1	5	0	3					1	8	12:45	14	57	18	62					32	119
01:00	1		0						1		13:00	26		14						40	
01:15	0		0						0		13:15	22		17						39	
01:30	1		0						1		13:30	12		12						24	
01:45	3	5	0						3	5	13:45	17	77	10	53					27	130
02:00	2		1						3		14:00	35		13						48	
02:15	0		0						0		14:15	28		24						52	
02:30	3		0						3		14:30	22		13						35	
02:45	0	5	1	2					1	7	14:45	28	113	17	67					45	180
03:00	0		0						0		15:00	21		20						41	
03:15	1		0						1		15:15	28		28						56	
03:30	1		2						3		15:30	25		19						44	
03:45	2	4	0	2					2	6	15:45	34	108	20	87					54	195
04:00	0		0						0		16:00	24		14						38	
04:15	1		0						1		16:15	30		17						47	
04:30	0		3						3		16:30	35		23						58	
04:45	1	2	3	6					4	8	16:45	34	123	11	65					45	188
05:00	0		3						3		17:00	33		21						54	
05:15	2		4						6		17:15	31		21						52	
05:30	0		6						6		17:30	31		20						51	
05:45	1	3	4	17					5	20	17:45	24	119	9	71					33	190
06:00	0		10						10		18:00	32		13						45	
06:15	6		11						17		18:15	25		22						47	
06:30	4		19						23		18:30	22		21						43	
06:45	11	21	45	85					56	106	18:45	25	104	13	69					38	173
07:00	20		58						78		19:00	17		13						30	
07:15	14		68						82		19:15	13		17						30	
07:30	12		37						49		19:30	25		8						33	
07:45	4	50	35	198					39	248	19:45	23	78	7	45					30	123
08:00	13		30						43		20:00	22		8						30	
08:15	11		22						33		20:15	13		12						25	
08:30	7		37						44		20:30	21		7						28	
08:45	21	52	29	118					50	170	20:45	10	66	3	30					13	96
09:00	10		28						38		21:00	19		12						31	
09:15	8		11						19		21:15	13		3						16	
09:30	8		14						22		21:30	11		4						15	
09:45	8	34	17	70					25	104	21:45	17	60	2	21					19	81
10:00	19		11						30		22:00	4		2						6	
10:15	15		25						40		22:15	4		3						7	
10:30	10		20						30		22:30	6		0						6	
10:45	11	55	13	69					24	124	22:45	3	17	8	13					11	30
11:00	13		10						23		23:00	1		2						3	
11:15	13		6						19		23:15	4		0						4	
11:30	15		20						35		23:30	4		1						5	
11:45	12	53	14	50					26	103	23:45	6	15	1	4					7	19
TOTALS		289		620						909	TOTALS		937		587						1524
SPLIT %		31.8%		68.2%						37.4%	SPLIT %		61.5%		38.5%						62.6%

DAILY TOTALS	NB	SB	EB	WB	Total
	1,226	1,207	0	0	2,433

AM Peak Hour	06:45	06:45			06:45	PM Peak Hour	16:30	15:00			16:30
AM Pk Volume	57	208			265	PM Pk Volume	133	87			209
Pk Hr Factor	0.713	0.765			0.808	Pk Hr Factor	0.950	0.777			0.901
7 - 9 Volume	102	316	0	0	418	4 - 6 Volume	242	136	0	0	378
7 - 9 Peak Hour	08:00	07:00			07:00	4 - 6 Peak Hour	16:30	16:30			16:30
7 - 9 Pk Volume	52	198	0	0	248	4 - 6 Pk Volume	133	76	0	0	209
Pk Hr Factor	0.619	0.728	0.000	0.000	0.756	Pk Hr Factor	0.950	0.826	0.000	0.000	0.901

Prepared by NDS/ATD

VOLUME

Sweetwater Springs Blvd just N/o Jamacha Blvd

Day: Wednesday
Date: 9/12/2012

City: Jamul
Project #: CA12_4320_005

DAILY TOTALS	NB	SB	EB	WB	Total
	7,490	7,993	0	0	15,483

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00	8		15						23		12:00	88		109						197	
00:15	7		16						23		12:15	98		107						205	
00:30	8		10						18		12:30	75		87						162	
00:45	7	30	14	55					21	85	12:45	86	347	96	399					182	746
01:00	8		5						13		13:00	83		81						164	
01:15	7		7						14		13:15	100		126						226	
01:30	9		10						19		13:30	134		99						233	
01:45	5	29	7	29					12	58	13:45	130	447	102	408					232	855
02:00	5		9						14		14:00	158		142						300	
02:15	12		7						19		14:15	150		217						367	
02:30	7		11						18		14:30	128		193						321	
02:45	10	34	10	37					20	71	14:45	141	577	127	679					268	1256
03:00	9		8						17		15:00	170		223						393	
03:15	13		6						19		15:15	130		193						323	
03:30	5		6						11		15:30	112		140						252	
03:45	6	33	14	34					20	67	15:45	115	527	189	745					304	1272
04:00	11		4						15		16:00	117		151						268	
04:15	11		6						17		16:15	100		165						265	
04:30	16		6						22		16:30	120		174						294	
04:45	15	53	5	21					20	74	16:45	131	468	167	657					298	1125
05:00	27		12						39		17:00	140		155						295	
05:15	37		20						57		17:15	129		185						314	
05:30	66		29						95		17:30	124		182						306	
05:45	60	190	33	94					93	284	17:45	116	509	168	690					284	1199
06:00	69		24						93		18:00	107		159						266	
06:15	105		58						163		18:15	112		140						252	
06:30	137		75						212		18:30	98		129						227	
06:45	248	559	124	281					372	840	18:45	109	426	132	560					241	986
07:00	205		176						381		19:00	87		118						205	
07:15	163		106						269		19:15	87		137						224	
07:30	246		103						349		19:30	83		123						206	
07:45	270	884	183	568					453	1452	19:45	66	323	98	476					164	799
08:00	130		200						330		20:00	61		100						161	
08:15	121		96						217		20:15	58		91						149	
08:30	112		82						194		20:30	51		71						122	
08:45	123	486	77	455					200	941	20:45	49	219	68	330					117	549
09:00	85		73						158		21:00	48		66						114	
09:15	79		75						154		21:15	49		69						118	
09:30	90		53						143		21:30	34		59						93	
09:45	92	346	69	270					161	616	21:45	26	157	63	257					89	414
10:00	89		72						161		22:00	29		59						88	
10:15	71		82						153		22:15	22		60						82	
10:30	81		65						146		22:30	25		39						64	
10:45	95	336	75	294					170	630	22:45	29	105	36	194					65	299
11:00	82		78						160		23:00	25		33						58	
11:15	66		92						158		23:15	23		31						54	
11:30	93		86						179		23:30	8		23						31	
11:45	91	332	68	324					159	656	23:45	17	73	49	136					66	209
TOTALS		3312		2462						5774	TOTALS		4178		5531						9709
SPLIT %		57.4%		42.6%						37.3%	SPLIT %		43.0%		57.0%						62.7%

DAILY TOTALS	NB	SB	EB	WB	Total
	7,490	7,993	0	0	15,483

AM Peak Hour	07:00	07:15			07:00	PM Peak Hour	14:15	14:15			14:15
AM Pk Volume	884	592			1452	PM Pk Volume	589	760			1349
Pk Hr Factor	0.819	0.740			0.801	Pk Hr Factor	0.866	0.852			0.858
7 - 9 Volume	1370	1023	0	0	2393	4 - 6 Volume	977	1347	0	0	2324
7 - 9 Peak Hour	07:00	07:15			07:00	4 - 6 Peak Hour	16:45	17:00			16:45
7 - 9 Pk Volume	884	592	0	0	1452	4 - 6 Pk Volume	524	690	0	0	1213
Pk Hr Factor	0.819	0.740	0.000	0.000	0.801	Pk Hr Factor	0.936	0.932	0.000	0.000	0.966

Prepared by NDS/ATD

VOLUME

Lyons Valley Rd E/o Jamul Dr

Day: Wednesday
Date: 9/12/2012

City: Jamul
Project #: CA12_4320_006

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	4,221	4,272	8,493

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00			18		2		20		12:00			36		54		90	
00:15			4		3		7		12:15			38		49		87	
00:30			3		0		3		12:30			63		49		112	
00:45			8	33	2	7	10	40	12:45			51	188	58	210	109	398
01:00			4		3		7		13:00			79		51		130	
01:15			3		1		4		13:15			54		38		92	
01:30			2		0		2		13:30			52		42		94	
01:45			3	12	1	5	4	17	13:45			65	250	44	175	109	425
02:00			5		3		8		14:00			58		62		120	
02:15			3		2		5		14:15			74		70		144	
02:30			2		1		3		14:30			94		65		159	
02:45			4	14	1	7	5	21	14:45			148	374	99	296	247	670
03:00			3		3		6		15:00			103		120		223	
03:15			3		5		8		15:15			74		88		162	
03:30			3		6		9		15:30			87		62		149	
03:45			3	12	4	18	7	30	15:45			97	361	60	330	157	691
04:00			0		8		8		16:00			101		57		158	
04:15			2		8		10		16:15			109		62		171	
04:30			2		20		22		16:30			103		61		164	
04:45			2	6	13	49	15	55	16:45			90	403	63	243	153	646
05:00			2		23		25		17:00			112		57		169	
05:15			8		42		50		17:15			106		59		165	
05:30			4		51		55		17:30			98		60		158	
05:45			7	21	50	166	57	187	17:45			94	410	35	211	129	621
06:00			8		56		64		18:00			93		50		143	
06:15			9		92		101		18:15			88		61		149	
06:30			15		121		136		18:30			83		58		141	
06:45			23	55	152	421	175	476	18:45			83	347	42	211	125	558
07:00			29		131		160		19:00			69		40		109	
07:15			37		119		156		19:15			84		31		115	
07:30			55		113		168		19:30			83		28		111	
07:45			77	198	113	476	190	674	19:45			86	322	31	130	117	452
08:00			84		121		205		20:00			70		16		86	
08:15			67		126		193		20:15			55		20		75	
08:30			52		123		175		20:30			63		16		79	
08:45			51	254	94	464	145	718	20:45			41	229	21	73	62	302
09:00			37		69		106		21:00			49		5		54	
09:15			32		61		93		21:15			55		17		72	
09:30			28		55		83		21:30			30		13		43	
09:45			32	129	63	248	95	377	21:45			40	174	8	43	48	217
10:00			32		61		93		22:00			29		8		37	
10:15			40		76		116		22:15			16		5		21	
10:30			29		54		83		22:30			21		7		28	
10:45			33	134	50	241	83	375	22:45			10	76	4	24	14	100
11:00			37		50		87		23:00			13		4		17	
11:15			32		56		88		23:15			14		3		17	
11:30			42		57		99		23:30			10		2		12	
11:45			58	169	51	214	109	383	23:45			13	50	1	10	14	60
TOTALS				1037		2316		3353	TOTALS				3184		1956		5140
SPLIT %				30.9%		69.1%		39.5%	SPLIT %				61.9%		38.1%		60.5%

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	4,221	4,272	8,493

AM Peak Hour			07:30	06:30	07:45	PM Peak Hour		14:15	14:30	14:30
AM Pk Volume			283	523	763	PM Pk Volume		419	372	791
Pk Hr Factor			0.842	0.860	0.930	Pk Hr Factor		0.708	0.775	0.801
7 - 9 Volume	0	0	452	940	1392	4 - 6 Volume	0	813	454	1267
7 - 9 Peak Hour			07:30	07:45	07:45	4 - 6 Peak Hour		16:15	16:00	16:15
7 - 9 Pk Volume	0	0	283	483	763	4 - 6 Pk Volume	0	414	243	657
Pk Hr Factor	0.000	0.000	0.842	0.958	0.930	Pk Hr Factor	0.000	0.924	0.964	0.961

Prepared by NDS/ATD

VOLUME

Maxfield Rd just W/o Campo Rd (SR-94)

Day: Tuesday
Date: 9/25/2012

City: Jamul
Project #: CA12_4320_007

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	169	181	350

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00					0		0		0		12:00					5		4		9	
00:15					0		0		0		12:15					2		2		4	
00:30					0		0		0		12:30					3		6		9	
00:45					0		0		0		12:45					5	15	9	21	14	36
01:00					0		0		0		13:00					6		7		13	
01:15					0		0		0		13:15					3		2		5	
01:30					0		0		0		13:30					4		3		7	
01:45					0		0		0		13:45					5	18	1	13	6	31
02:00					0		0		0		14:00					4		3		7	
02:15					0		0		0		14:15					3		3		6	
02:30					0		0		0		14:30					3		6		9	
02:45					0		1	1	1	1	14:45					2	12	4	16	6	28
03:00					0		0		0		15:00					3		6		9	
03:15					0		0		0		15:15					5		4		9	
03:30					0		0		0		15:30					5		4		9	
03:45					0		0		0		15:45					7	20	3	17	10	37
04:00					0		0		0		16:00					7		10		17	
04:15					0		0		0		16:15					3		3		6	
04:30					0		0		0		16:30					6		7		13	
04:45					0		0		0		16:45					7	23	8	28	15	51
05:00					0		0		0		17:00					4		6		10	
05:15					0		0		0		17:15					5		4		9	
05:30					0		0		0		17:30					0		4		4	
05:45					0		1	1	1	1	17:45					3	12	1	15	4	27
06:00					1		0		1		18:00					1		1		2	
06:15					0		0		0		18:15					1		4		5	
06:30					0		1		1		18:30					1		0		1	
06:45					1	2	0	1	1	3	18:45					1	4	2	7	3	11
07:00					1		0		1		19:00					1		2		3	
07:15					2		2		4		19:15					1		3		4	
07:30					3		1		4		19:30					0		0		0	
07:45					3	9	1	4	4	13	19:45					2	4	2	7	4	11
08:00					5		0		5		20:00					1		0		1	
08:15					5		5		10		20:15					1		1		2	
08:30					1		2		3		20:30					1		1		2	
08:45					5	16	2	9	7	25	20:45					0	3	1	3	1	6
09:00					2		2		4		21:00					1		1		2	
09:15					2		2		4		21:15					0		1		1	
09:30					7		1		8		21:30					0		0		0	
09:45					4	15	1	6	5	21	21:45					0	1	1	3	1	4
10:00					3		3		6		22:00					0		0		0	
10:15					2		8		10		22:15					1		0		1	
10:30					1		2		3		22:30					0		1		1	
10:45					2	8	2	15	4	23	22:45					1	2	0	1	1	3
11:00					0		7		7		23:00					0		0		0	
11:15					0		4		4		23:15					0		0		0	
11:30					2		0		2		23:30					0		0		0	
11:45					2	4	2	13	4	17	23:45					1	1	0		1	1
TOTALS						54		50		104	TOTALS						115		131		246
SPLIT %						51.9%		48.1%		29.7%	SPLIT %						46.7%		53.3%		70.3%

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	169	181	350

AM Peak Hour			07:30	10:15	09:30	PM Peak Hour			15:15	16:00	16:00
AM Pk Volume			16	19	29	PM Pk Volume			24	28	51
Pk Hr Factor			0.800	0.594	0.725	Pk Hr Factor			0.857	0.700	0.750
7 - 9 Volume	0	0	25	13	38	4 - 6 Volume	0	0	35	43	78
7 - 9 Peak Hour			07:30	08:00	08:00	4 - 6 Peak Hour			16:00	16:00	16:00
7 - 9 Pk Volume	0	0	16	9	25	4 - 6 Pk Volume	0	0	23	28	51
Pk Hr Factor	0.000	0.000	0.800	0.450	0.625	Pk Hr Factor	0.000	0.000	0.821	0.700	0.750

Prepared by NDS/ATD

VOLUME

Jamacha Rd N/o Willow Glen Dr

Day: Wednesday
Date: 9/12/2012

City: Jamul
Project #: CA12_4320_008

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	11,896	11,625	23,521

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00			44		21		65		12:00			146		125		271	
00:15			30		24		54		12:15			163		145		308	
00:30			22		21		43		12:30			167		120		287	
00:45			19	115	16	82	35	197	12:45			188	664	150	540	338	1204
01:00			17		14		31		13:00			172		152		324	
01:15			18		22		40		13:15			160		157		317	
01:30			9		8		17		13:30			166		181		347	
01:45			8	52	10	54	18	106	13:45			210	708	200	690	410	1398
02:00			10		19		29		14:00			196		180		376	
02:15			11		17		28		14:15			229		206		435	
02:30			15		15		30		14:30			202		159		361	
02:45			12	48	4	55	16	103	14:45			226	853	194	739	420	1592
03:00			6		7		13		15:00			270		207		477	
03:15			7		9		16		15:15			244		190		434	
03:30			12		12		24		15:30			226		215		441	
03:45			3	28	3	31	6	59	15:45			231	971	236	848	467	1819
04:00			12		5		17		16:00			249		242		491	
04:15			8		9		17		16:15			283		202		485	
04:30			6		10		16		16:30			231		225		456	
04:45			14	40	17	41	31	81	16:45			253	1016	228	897	481	1913
05:00			18		18		36		17:00			271		228		499	
05:15			17		24		41		17:15			255		235		490	
05:30			24		29		53		17:30			241		211		452	
05:45			43	102	53	124	96	226	17:45			253	1020	235	909	488	1929
06:00			54		67		121		18:00			239		215		454	
06:15			43		81		124		18:15			193		218		411	
06:30			108		129		237		18:30			203		186		389	
06:45			131	336	209	486	340	822	18:45			184	819	146	765	330	1584
07:00			179		188		367		19:00			191		179		370	
07:15			167		203		370		19:15			175		157		332	
07:30			171		202		373		19:30			206		161		367	
07:45			154	671	245	838	399	1509	19:45			167	739	151	648	318	1387
08:00			186		177		363		20:00			153		146		299	
08:15			132		171		303		20:15			127		132		259	
08:30			172		214		386		20:30			118		129		247	
08:45			142	632	215	777	357	1409	20:45			114	512	96	503	210	1015
09:00			121		163		284		21:00			124		110		234	
09:15			128		196		324		21:15			122		98		220	
09:30			139		175		314		21:30			88		104		192	
09:45			134	522	178	712	312	1234	21:45			92	426	86	398	178	824
10:00			153		150		303		22:00			83		62		145	
10:15			118		132		250		22:15			71		84		155	
10:30			120		140		260		22:30			63		58		121	
10:45			147	538	135	557	282	1095	22:45			65	282	42	246	107	528
11:00			138		156		294		23:00			61		54		115	
11:15			162		144		306		23:15			49		44		93	
11:30			153		124		277		23:30			46		26		72	
11:45			157	610	109	533	266	1143	23:45			36	192	28	152	64	344
TOTALS				3694		4290		7984	TOTALS				8202		7335		15537
SPLIT %				46.3%		53.7%		33.9%	SPLIT %				52.8%		47.2%		66.1%

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	11,896	11,625	23,521

AM Peak Hour			07:15	07:00	07:00	PM Peak Hour		16:15	16:30	17:00
AM Pk Volume			678	838	1509	PM Pk Volume		1038	916	1929
Pk Hr Factor			0.911	0.855	0.945	Pk Hr Factor		0.917	0.974	0.966
7 - 9 Volume	0	0	1303	1615	2918	4 - 6 Volume	0	2036	1806	3842
7 - 9 Peak Hour			07:15	07:00	07:00	4 - 6 Peak Hour		16:15	16:30	17:00
7 - 9 Pk Volume	0	0	678	838	1509	4 - 6 PK Volume	0	1038	916	1929
Pk Hr Factor	0.000	0.000	0.911	0.855	0.945	Pk Hr Factor	0.000	0.917	0.974	0.966

Prepared by National Data & Surveying Services

CLASSIFICATION

SR-94 (Campo Rd) btwn Cougar Canyon Rd & Jamacha Rd

Day: Wednesday
Date: 10/17/2012

City: Jamul
Project #: CA12_4374_001

Summary

Time	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	Total
00:00 AM	0	44	11	0	4	0	0	0	2	0	0	0	0	61
01:00	0	34	9	0	2	0	0	0	0	0	0	0	0	45
02:00	0	22	5	0	0	0	0	0	0	0	0	0	0	27
03:00	0	38	9	0	1	0	0	0	1	0	0	0	0	49
04:00	0	79	31	0	10	0	0	0	0	0	0	0	0	120
05:00	0	328	110	0	26	0	0	0	3	0	3	0	0	470
06:00	0	743	202	1	83	0	0	0	10	0	5	0	0	1044
07:00	2	922	186	10	74	2	0	2	20	0	1	0	0	1219
08:00	7	1505	269	27	77	1	0	2	55	0	0	0	0	1943
09:00	1	836	192	4	70	0	0	0	20	1	5	0	0	1129
10:00	1	656	167	1	69	0	0	0	21	0	2	0	0	917
11:00	0	619	162	4	65	1	0	0	15	0	5	0	0	871
12:00 PM	1	728	154	7	62	0	0	0	15	0	1	0	0	968
13:00	0	923	173	2	69	1	0	0	16	0	2	0	0	1186
14:00	0	1075	290	12	101	0	0	0	24	1	4	0	0	1507
15:00	2	1078	311	13	128	0	0	3	28	0	5	0	0	1568
16:00	0	1042	286	10	114	0	0	0	24	0	1	0	0	1477
17:00	1	1198	280	7	98	0	0	0	18	0	0	0	0	1602
18:00	1	894	219	3	57	0	0	0	17	0	0	0	0	1191
19:00	0	567	148	1	50	0	0	0	13	0	0	0	0	779
20:00	0	436	121	0	33	0	0	0	4	0	0	0	0	594
21:00	0	320	79	0	25	0	0	0	6	0	0	0	0	430
22:00	0	196	42	2	10	0	0	0	1	0	0	0	0	251
23:00	0	125	33	0	5	0	0	0	4	0	0	0	0	167
Totals	16	14408	3489	104	1233	5		7	317	2	34			19615
% of Totals	0%	73%	18%	1%	6%	0%		0%	2%	0%	0%			100%

AM Volumes	11	5826	1353	47	481	4	0	4	147	1	21	0	0	7895
% AM	0%	30%	7%	0%	2%	0%		0%	1%	0%	0%			40%
AM Peak Hour	08:00	08:00	08:00	08:00	06:00	07:00		07:00	08:00	09:00	06:00			08:00
Volume	7	1505	269	27	83	2		2	55	1	5			1943
PM Volumes	5	8582	2136	57	752	1	0	3	170	1	13	0	0	11720
% PM	0%	44%	11%	0%	4%	0%		0%	1%	0%	0%			60%
PM Peak Hour	15:00	17:00	15:00	15:00	15:00	13:00		15:00	15:00	14:00	15:00			17:00
Volume	2	1198	311	13	128	1		3	28	1	5			1602

Directional Peak Periods All Classes	AM 7-9		NOON 12-2		PM 4-6		Off Peak Volumes	
	Volume	%	Volume	%	Volume	%	Volume	%
	3162	16%	2154	11%	3079	16%	11220	57%

Classification Definitions

1 Motorcycles
2 Passenger Cars
3 2-Axle, 4-Tire Single Units
4 Buses
5 2-Axle, 6-Tire Single Units
6 3-Axle Single Units
7 > =4-Axle Single Units
8 <=4-Axle Single Trailers
9 5-Axle Single Trailers
10 >=6-Axle Single Trailers
11 <=5-Axle Multi-Trailers
12 6-Axle Multi-Trailers
13 >=7-Axle Multi-Trailers

SPEED

SR-94 (Campo Rd) btwn Cougar Canyon Rd & Jamacha Rd

Day: Wednesday
Date: 10/17/2012

City: Jamul
Project #: CA12_4374_001

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	0	0	1	10	19	15	8	7	1	0	61
01:00	0	0	0	0	1	4	7	12	16	3	2	0	0	45
02:00	0	0	0	0	0	1	2	4	14	4	1	1	0	27
03:00	0	0	0	0	1	1	2	9	25	8	3	0	0	49
04:00	0	0	0	0	2	6	8	32	45	21	6	0	0	120
05:00	0	0	0	1	3	13	61	197	147	43	4	1	0	470
06:00	0	1	1	8	23	114	324	402	135	31	4	1	0	1044
07:00	23	14	6	17	41	106	331	415	223	40	3	0	0	1219
08:00	82	41	46	100	193	312	500	475	153	37	4	0	0	1943
09:00	11	5	9	23	54	146	323	365	167	23	2	1	0	1129
10:00	0	0	1	6	12	92	285	309	158	51	3	0	0	917
11:00	0	0	2	8	16	117	294	261	121	44	8	0	0	871
12:00 PM	1	1	2	5	34	104	313	312	168	22	5	1	0	968
13:00	0	0	1	10	46	203	389	328	155	43	10	1	0	1186
14:00	1	1	7	19	80	215	471	391	212	86	23	1	0	1507
15:00	15	18	23	29	102	250	402	400	224	86	15	4	0	1568
16:00	0	2	4	23	45	175	442	431	247	84	19	4	1	1477
17:00	0	0	5	18	70	231	471	456	234	96	16	5	0	1602
18:00	0	0	2	8	43	155	326	364	194	74	23	2	0	1191
19:00	1	0	3	0	18	92	220	230	137	62	13	3	0	779
20:00	0	0	0	0	10	43	115	186	146	62	25	7	0	594
21:00	0	0	0	0	3	17	87	117	119	59	21	6	1	430
22:00	0	0	0	0	3	9	34	62	81	43	14	3	2	251
23:00	0	0	0	0	3	8	13	41	50	39	11	2	0	167
Totals	134	83	112	275	803	2415	5430	5818	3186	1069	242	44	4	19615
% of Totals	1%	0%	1%	1%	4%	12%	28%	30%	16%	5%	1%	0%	0%	100%

AM Volumes	116	61	65	163	346	913	2147	2500	1219	313	47	5	0	7895
% AM	1%	0%	0%	1%	2%	5%	11%	13%	6%	2%	0%	0%		40%
AM Peak Hour	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	07:00	10:00	11:00			08:00
Volume	82	41	46	100	193	312	500	475	223	51	8	1		1943
PM Volumes	18	22	47	112	457	1502	3283	3318	1967	756	195	39	4	11720
% PM	0%	0%	0%	1%	2%	8%	17%	17%	10%	4%	1%	0%	0%	60%
PM Peak Hour	15:00	15:00	15:00	15:00	15:00	15:00	14:00	17:00	16:00	17:00	20:00	20:00	22:00	17:00
Volume	15	18	23	29	102	250	471	456	247	96	25	7	2	1602

Directional Peak Periods All Speeds	AM 7-9		NOON 12-2		PM 4-6		Off Peak Volumes	
	Volume	%	Volume	%	Volume	%	Volume	%
	3162 ⟷	16%	2154 ⟷	11%	3079 ⟷	16%	11220 ⟷	57%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
SR-94 (Campo Rd)	Summary	38	45	45	53	57	19615

Prepared by National Data & Surveying Services

CLASSIFICATION

SR-94 (Campo Rd) btwn Steele Canyon Rd & Lorrel Pl

Day: Wednesday
Date: 10/17/2012

City: Jamul
Project #: CA12_4374_002e

East Bound

Time	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	Total
00:00 AM	0	40	14	0	2	0	0	0	2	0	0	0	0	58
01:00	0	20	3	0	1	0	0	0	0	0	0	0	0	24
02:00	0	12	3	0	0	0	0	0	0	0	0	0	0	15
03:00	0	13	6	0	0	0	0	0	0	0	0	0	0	19
04:00	0	12	3	0	2	0	0	0	0	0	0	0	0	17
05:00	0	29	17	1	5	0	0	0	1	0	3	0	0	56
06:00	0	94	49	1	21	1	0	1	3	0	0	0	0	170
07:00	0	179	65	3	22	0	0	0	9	0	1	0	0	279
08:00	0	236	76	1	26	0	0	0	7	0	0	0	0	346
09:00	4	201	87	2	37	0	0	0	1	0	0	0	0	332
10:00	1	194	75	0	20	0	0	0	2	0	1	0	0	293
11:00	0	235	88	0	28	0	0	0	6	0	5	0	0	362
12:00 PM	0	253	84	4	37	0	0	0	7	0	1	0	0	386
13:00	0	298	102	1	29	0	0	0	7	0	1	0	0	438
14:00	0	465	115	2	38	0	0	0	8	0	0	0	0	628
15:00	1	533	193	1	56	0	0	0	5	0	3	0	0	792
16:00	0	608	179	4	50	1	0	0	7	0	2	0	0	851
17:00	1	659	157	3	50	0	0	0	4	0	0	0	0	874
18:00	0	562	141	1	47	0	0	1	3	0	0	0	0	755
19:00	1	405	98	0	28	0	0	0	9	0	0	0	0	541
20:00	0	318	69	0	22	0	0	0	2	0	0	0	0	411
21:00	0	255	45	0	19	0	0	0	4	0	0	0	0	323
22:00	1	132	23	2	12	0	0	0	0	0	0	0	0	170
23:00	0	107	17	0	2	0	0	0	2	0	0	0	0	128
Totals	9	5860	1709	26	554	2		2	89		17			8268
% of Totals	0%	71%	21%	0%	7%	0%		0%	1%		0%			100%

AM Volumes	5	1265	486	8	164	1	0	1	31	0	10	0	0	1971
% AM	0%	15%	6%	0%	2%	0%		0%	0%		0%			24%
AM Peak Hour	09:00	08:00	11:00	07:00	09:00	06:00		06:00	07:00		11:00			11:00
Volume	4	236	88	3	37	1		1	9		5			362
PM Volumes	4	4595	1223	18	390	1	0	1	58	0	7	0	0	6297
% PM	0%	56%	15%	0%	5%	0%		0%	1%		0%			76%
PM Peak Hour	15:00	17:00	15:00	12:00	15:00	16:00		18:00	19:00		15:00			17:00
Volume	1	659	193	4	56	1		1	9		3			874

Directional Peak Periods All Classes	AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
	Volume	⟷	%	Volume	⟷	%	Volume	⟷	%	Volume	⟷	%
	625		8%	824		10%	1725		21%	5094		62%

Classification Definitions

1 Motorcycles
2 Passenger Cars
3 2-Axle, 4-Tire Single Units
4 Buses
5 2-Axle, 6-Tire Single Units
6 3-Axle Single Units
7 > =4-Axle Single Units
8 <=4-Axle Single Trailers
9 5-Axle Single Trailers
10 >=6-Axle Single Trailers
11 <=5-Axle Multi-Trailers
12 6-Axle Multi-Trailers
13 >=7-Axle Multi-Trailers

SPEED

SR-94 (Campo Rd) btwn Steele Canyon Rd & Lorrel Pl

Day: Wednesday
Date: 10/17/2012

City: Jamul
Project #: CA12_4374_002w

West Bound

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	0	0	2	7	7	8	2	5	0	0	31
01:00	0	0	0	0	0	0	0	6	9	1	3	0	0	19
02:00	0	0	0	0	0	0	3	3	3	2	0	0	0	11
03:00	0	0	0	0	0	1	2	4	17	10	1	0	0	35
04:00	0	0	0	0	1	2	5	22	41	27	4	0	0	102
05:00	0	0	0	1	7	20	43	161	171	43	2	0	0	448
06:00	7	5	8	14	41	99	247	312	118	16	0	0	0	867
07:00	4	11	14	15	32	78	265	341	124	9	0	0	0	893
08:00	30	37	77	46	58	109	191	229	76	6	1	0	0	860
09:00	1	0	3	3	22	50	170	234	69	6	1	0	0	559
10:00	0	0	4	8	30	70	173	185	59	11	0	0	0	540
11:00	0	0	1	3	15	59	137	194	56	5	0	0	0	470
12:00 PM	1	0	0	10	28	56	147	177	62	10	0	0	0	491
13:00	0	0	2	11	30	47	105	153	78	14	1	0	0	441
14:00	8	8	18	17	36	61	134	126	53	10	0	0	0	471
15:00	0	1	3	10	34	49	126	175	81	9	0	0	0	488
16:00	0	2	7	12	16	36	105	169	67	5	1	0	0	420
17:00	0	3	5	12	25	59	119	151	42	6	1	0	0	423
18:00	0	0	1	11	27	42	144	112	32	1	0	0	0	370
19:00	0	0	0	2	8	36	67	68	21	11	0	0	0	213
20:00	0	0	0	2	17	14	39	49	21	6	1	0	0	149
21:00	0	0	0	3	3	11	29	52	18	6	1	0	0	123
22:00	0	0	0	2	2	4	15	23	21	5	0	0	0	72
23:00	0	0	0	0	2	2	7	15	14	5	0	0	0	45
Totals	51	67	143	182	434	907	2280	2968	1261	226	22			8541
% of Totals	1%	1%	2%	2%	5%	11%	27%	35%	15%	3%	0%			100%

AM Volumes	42	53	107	90	206	490	1243	1698	751	138	17	0	0	4835
% AM	0%	1%	1%	1%	2%	6%	15%	20%	9%	2%	0%			57%
AM Peak Hour	08:00	08:00	08:00	08:00	08:00	08:00	07:00	07:00	05:00	05:00				07:00
Volume	30	37	77	46	58	109	265	341	171	43	5			893
PM Volumes	9	14	36	92	228	417	1037	1270	510	88	5	0	0	3706
% PM	0%	0%	0%	1%	3%	5%	12%	15%	6%	1%	0%			43%
PM Peak Hour	14:00	14:00	14:00	14:00	14:00	14:00	12:00	12:00	15:00	13:00	13:00			12:00
Volume	8	8	18	17	36	61	147	177	81	14	1			491

Directional Peak Periods	AM 7-9		NOON 12-2		PM 4-6		Off Peak Volumes	
All Speeds	Volume	%	Volume	%	Volume	%	Volume	%
	1753 ⟷	21%	932 ⟷	11%	843 ⟷	10%	5013 ⟷	59%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
SR-94 (Campo Rd)	East Bound	38	45	45	51	54	8268
SR-94 (Campo Rd)	West Bound	37	45	44	51	54	8541

Prepared by National Data & Surveying Services

CLASSIFICATION

SR-94 (Campo Rd) btwn Maxfield Rd & Melody Rd

Day: Wednesday
Date: 10/17/2012

City: Jamul
Project #: CA12_4374_003s

South Bound

Time	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	Total
00:00 AM	1	24	9	0	2	0	0	1	2	0	0	0	0	39
01:00	0	13	1	0	1	0	0	0	0	0	0	0	0	15
02:00	0	9	1	0	0	0	0	0	0	0	0	0	0	10
03:00	0	9	2	0	0	0	0	0	0	0	0	0	0	11
04:00	0	9	3	0	1	0	0	0	0	0	0	0	0	13
05:00	0	18	8	1	2	0	0	1	1	0	2	0	0	33
06:00	1	53	23	2	12	3	0	2	3	0	0	0	0	99
07:00	3	76	23	2	9	0	0	1	3	1	1	0	0	119
08:00	5	123	35	3	13	0	0	3	1	0	0	0	0	183
09:00	0	96	44	1	16	0	0	0	2	0	0	0	0	159
10:00	0	87	33	0	10	1	0	0	1	0	1	0	0	133
11:00	0	94	27	0	14	1	0	2	1	0	5	0	0	144
12:00 PM	4	107	33	1	12	0	0	3	3	0	1	0	0	164
13:00	0	145	41	1	10	2	0	4	1	0	1	0	0	205
14:00	2	182	38	1	9	0	0	0	9	0	0	0	0	241
15:00	0	282	90	3	29	0	0	0	6	0	3	0	0	413
16:00	4	335	75	3	20	1	0	2	4	0	2	0	0	446
17:00	3	331	76	3	11	0	0	1	1	0	0	0	0	426
18:00	2	255	57	1	17	2	0	1	5	0	0	0	0	340
19:00	1	190	41	0	9	2	0	4	5	0	0	0	0	252
20:00	1	119	29	0	9	2	0	1	2	0	0	0	0	163
21:00	3	116	13	0	5	0	0	2	3	0	0	0	0	142
22:00	0	61	9	1	2	0	0	1	0	0	0	0	0	74
23:00	0	45	9	0	1	0	0	0	1	0	0	0	0	56
Totals	30	2779	720	23	214	14		29	54	1	16			3880
% of Totals	1%	72%	19%	1%	6%	0%		1%	1%	0%	0%			100%

AM Volumes	10	611	209	9	80	5	0	10	14	1	9	0	0	958
% AM	0%	16%	5%	0%	2%	0%		0%	0%	0%	0%			25%
AM Peak Hour	08:00	08:00	09:00	08:00	09:00	06:00		08:00	06:00	07:00	11:00			08:00
Volume	5	123	44	3	16	3		3	3	1	5			183
PM Volumes	20	2168	511	14	134	9	0	19	40	0	7	0	0	2922
% PM	1%	56%	13%	0%	3%	0%		0%	1%		0%			75%
PM Peak Hour	12:00	16:00	15:00	15:00	15:00	13:00		13:00	14:00		15:00			16:00
Volume	4	335	90	3	29	2		4	9		3			446

Directional Peak Periods All Classes	AM 7-9		NOON 12-2		PM 4-6		Off Peak Volumes	
	Volume	%	Volume	%	Volume	%	Volume	%
	302	8%	369	10%	872	22%	2337	60%

Classification Definitions

1 Motorcycles
2 Passenger Cars
3 2-Axle, 4-Tire Single Units
4 Buses
5 2-Axle, 6-Tire Single Units
6 3-Axle Single Units
7 > =4-Axle Single Units
8 <=4-Axle Single Trailers
9 5-Axle Single Trailers
10 >=6-Axle Single Trailers
11 <=5-Axle Multi-Trailers
12 6-Axle Multi-Trailers
13 >=7-Axle Multi-Trailers

SPEED

SR-94 (Campo Rd) btwn Maxfield Rd & Melody Rd

Day: Wednesday
Date: 10/17/2012

City: Jamul
Project #: CA12_4374_003s

South Bound

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	0	0	1	3	2	11	7	7	6	2	39
01:00	0	0	0	0	0	0	0	2	8	3	1	0	1	15
02:00	0	0	0	0	0	1	0	2	2	3	2	0	0	10
03:00	0	0	0	1	0	0	0	1	1	4	2	1	1	11
04:00	0	0	0	0	0	0	1	0	4	3	1	2	2	13
05:00	0	0	0	0	2	1	0	5	8	8	7	1	1	33
06:00	0	0	1	1	2	0	3	23	37	23	6	1	2	99
07:00	0	0	1	0	0	0	3	30	43	35	6	0	1	119
08:00	1	0	0	4	0	3	16	65	57	28	9	0	0	183
09:00	0	0	2	1	0	2	9	46	65	24	7	2	1	159
10:00	0	0	0	0	3	1	4	47	53	21	3	1	0	133
11:00	1	0	0	1	2	9	17	41	49	19	5	0	0	144
12:00 PM	0	1	1	2	2	6	15	53	58	21	4	1	0	164
13:00	0	0	0	1	0	5	24	54	78	34	8	1	0	205
14:00	0	0	0	0	0	4	16	77	95	40	8	1	0	241
15:00	0	0	0	0	1	5	41	126	174	58	6	2	0	413
16:00	0	0	0	0	0	4	49	198	145	46	4	0	0	446
17:00	0	0	0	1	4	2	29	122	174	77	17	0	0	426
18:00	0	0	0	0	0	3	29	90	155	53	10	0	0	340
19:00	0	0	0	0	0	9	21	78	96	30	18	0	0	252
20:00	0	0	0	0	1	5	20	55	45	28	6	3	0	163
21:00	0	0	0	0	0	1	8	37	59	26	10	1	0	142
22:00	0	0	0	0	0	1	4	9	26	21	9	4	0	74
23:00	0	0	0	0	0	0	1	9	18	16	9	2	1	56
Totals	2	1	5	12	17	63	313	1172	1461	628	165	29	12	3880
% of Totals	0%	0%	0%	0%	0%	2%	8%	30%	38%	16%	4%	1%	0%	100%

AM Volumes	2	0	4	8	9	18	56	264	338	178	56	14	11	958
% AM	0%		0%	0%	0%	0%	1%	7%	9%	5%	1%	0%	0%	25%
AM Peak Hour	08:00		09:00	08:00	10:00	11:00	11:00	08:00	09:00	07:00	08:00			08:00
Volume	1		2	4	3	9	17	65	65	35	9	6	2	183
PM Volumes	0	1	1	4	8	45	257	908	1123	450	109	15	1	2922
% PM		0%	0%	0%	0%	1%	7%	23%	29%	12%	3%	0%	0%	75%
PM Peak Hour		12:00	12:00	12:00	17:00	19:00	16:00	16:00	15:00	17:00	19:00	22:00	23:00	16:00
Volume		1	1	2	4	9	49	198	174	77	18	4	1	446

Directional Peak Periods All Speeds	AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
	Volume		%	Volume		%	Volume		%	Volume		%
	302	⟷	8%	369	⟷	10%	872	⟷	22%	2337	⟷	60%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
SR-94 (Campo Rd)	North Bound	47	54	53	60	65	3946
SR-94 (Campo Rd)	South Bound	46	51	51	57	60	3880

Prepared by National Data & Surveying Services

CLASSIFICATION

SR-94 (Campo Rd) btwn Rancho Jamul Dr & Melody Rd

Day: Wednesday
Date: 10/17/2012

City: Jamul
Project #: CA12_4374_004s

South Bound

Time	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	Total
00:00 AM	0	21	9	0	2	0	0	0	2	0	0	0	0	34
01:00	0	13	2	0	1	0	0	0	1	0	0	0	0	17
02:00	0	9	1	0	0	0	0	0	0	0	0	0	0	10
03:00	0	9	2	0	0	0	0	0	0	0	0	0	0	11
04:00	0	10	3	0	2	0	0	0	0	0	0	0	0	15
05:00	0	17	7	1	1	0	0	1	1	0	3	0	0	31
06:00	1	47	23	2	13	2	0	1	2	0	0	0	0	91
07:00	0	72	26	2	15	1	0	1	4	1	1	0	0	123
08:00	5	113	26	1	15	0	0	2	4	0	0	0	0	166
09:00	0	85	36	1	19	1	0	1	2	0	0	0	0	145
10:00	0	77	33	0	12	2	0	0	3	0	1	0	0	128
11:00	1	84	28	0	13	3	0	3	0	0	5	0	0	137
12:00 PM	4	94	32	1	12	0	0	3	4	0	1	0	0	151
13:00	0	128	41	1	12	1	0	1	5	0	1	0	0	190
14:00	2	166	49	0	10	0	0	4	6	0	0	0	0	237
15:00	0	267	90	3	34	0	0	1	4	0	3	0	0	402
16:00	6	304	79	2	22	2	0	3	5	0	2	0	0	425
17:00	2	297	89	3	15	0	0	0	2	0	0	0	0	408
18:00	3	244	59	2	17	1	0	1	4	0	0	0	0	331
19:00	0	174	48	0	12	0	0	3	5	0	0	0	0	242
20:00	1	106	27	0	11	0	0	2	1	0	0	0	0	148
21:00	1	106	16	0	6	0	0	3	3	0	0	0	0	135
22:00	0	54	7	1	2	0	0	0	1	0	0	0	0	65
23:00	0	43	6	0	4	0	0	0	2	0	0	0	0	55
Totals	26	2540	739	20	250	13		30	61	1	17			3697
% of Totals	1%	69%	20%	1%	7%	0%		1%	2%	0%	0%			100%

AM Volumes	7	557	196	7	93	9	0	9	19	1	10	0	0	908
% AM	0%	15%	5%	0%	3%	0%		0%	1%	0%	0%			25%
AM Peak Hour	08:00	08:00	09:00	06:00	09:00	11:00		11:00	07:00	07:00	11:00			08:00
Volume	5	113	36	2	19	3		3	4	1	5			166
PM Volumes	19	1983	543	13	157	4	0	21	42	0	7	0	0	2789
% PM	1%	54%	15%	0%	4%	0%		1%	1%		0%			75%
PM Peak Hour	16:00	16:00	15:00	15:00	15:00	16:00		14:00	14:00		15:00			16:00
Volume	6	304	90	3	34	2		4	6		3			425

Directional Peak Periods	AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
All Classes	Volume	⟷	%	Volume	⟷	%	Volume	⟷	%	Volume	⟷	%
	289		8%	341		9%	833		23%	2234		60%

Classification Definitions

1 Motorcycles
2 Passenger Cars
3 2-Axle, 4-Tire Single Units
4 Buses
5 2-Axle, 6-Tire Single Units
6 3-Axle Single Units
7 > =4-Axle Single Units
8 <=4-Axle Single Trailers
9 5-Axle Single Trailers
10 >=6-Axle Single Trailers
11 <=5-Axle Multi-Trailers
12 6-Axle Multi-Trailers
13 >=7-Axle Multi-Trailers

SPEED

SR-94 (Campo Rd) btwn Rancho Jamul Dr & Melody Rd

Day: Wednesday
Date: 10/17/2012

City: Jamul
Project #: CA12_4374_004

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	0	0	0	0	4	12	11	15	4	3	49
01:00	0	0	0	0	0	1	4	8	5	10	4	1	0	33
02:00	0	0	0	0	0	1	0	3	4	7	3	1	2	21
03:00	0	0	0	0	0	0	2	1	2	12	7	1	1	26
04:00	0	0	0	0	0	0	2	4	10	24	17	6	0	63
05:00	0	0	0	0	1	0	2	21	64	100	61	20	2	271
06:00	0	0	0	0	3	8	41	89	233	123	28	9	1	535
07:00	0	0	0	0	2	23	24	87	226	139	33	9	0	543
08:00	0	0	0	1	0	4	24	85	210	142	40	1	0	507
09:00	0	0	0	0	0	8	22	93	144	81	25	5	3	381
10:00	0	0	0	0	8	12	23	85	128	70	24	5	0	355
11:00	0	0	0	0	1	10	21	91	113	99	25	1	0	361
12:00 PM	0	0	0	1	4	13	35	85	119	69	19	3	1	349
13:00	0	0	0	0	5	6	26	85	164	81	31	4	0	402
14:00	0	0	0	0	3	7	31	124	177	76	18	6	0	442
15:00	0	0	0	0	1	9	39	118	267	117	27	5	1	584
16:00	0	0	0	0	1	3	35	170	256	135	17	2	0	619
17:00	0	0	0	0	0	3	17	133	237	141	32	6	1	570
18:00	0	0	0	0	3	5	31	111	192	105	16	0	0	463
19:00	0	0	0	0	0	6	20	77	126	62	23	4	0	318
20:00	0	0	0	0	2	6	25	46	87	39	12	1	0	218
21:00	0	0	0	0	0	1	6	44	77	51	15	2	1	197
22:00	0	0	0	0	0	1	3	16	23	35	16	5	0	99
23:00	0	0	0	0	2	4	3	8	22	21	17	4	0	81
Totals				2	36	131	436	1588	2898	1750	525	105	16	7487
% of Totals				0%	0%	2%	6%	21%	39%	23%	7%	1%	0%	100%

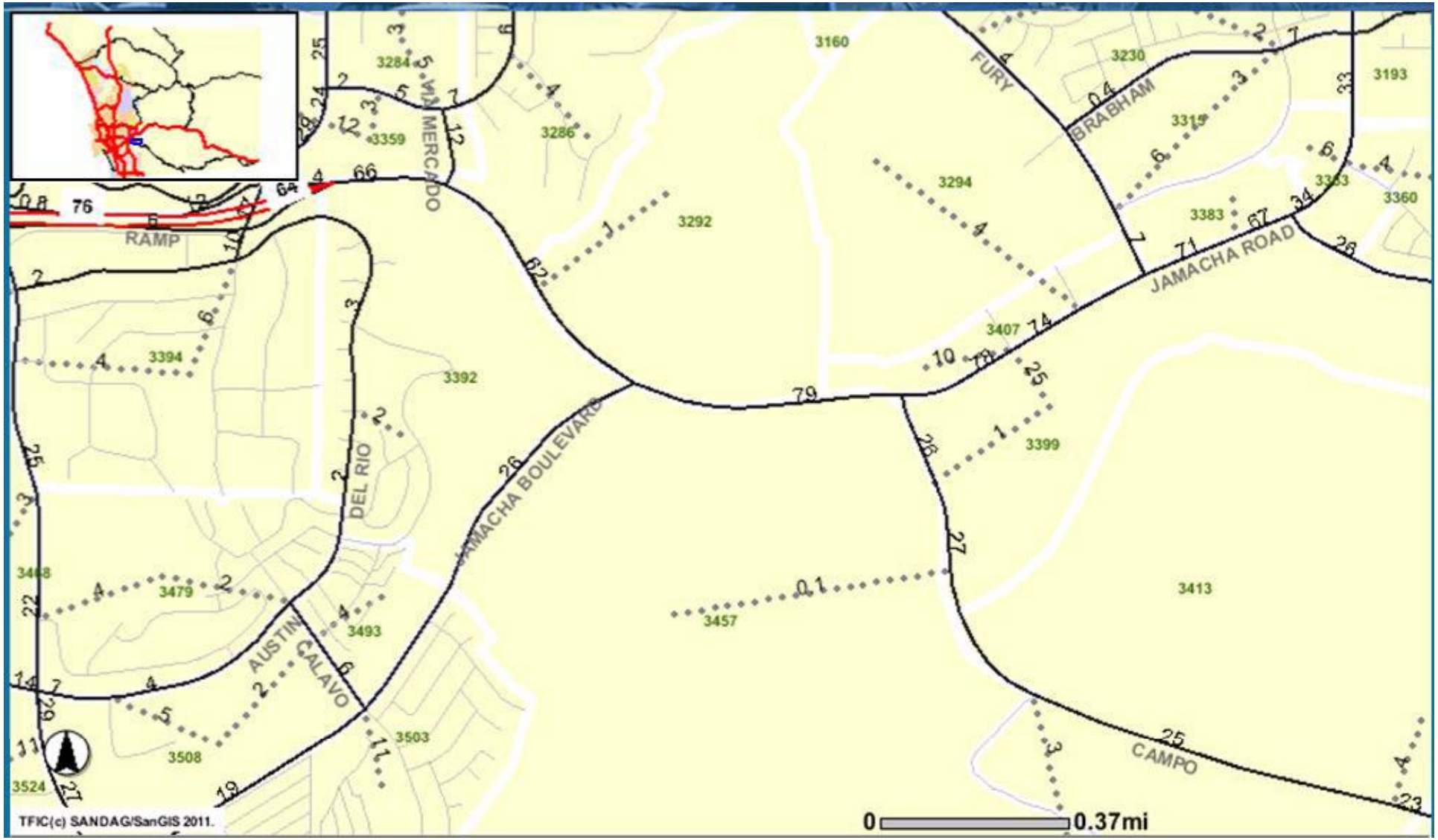
AM Volumes	0	0	0	1	15	67	165	571	1151	818	282	63	12	3145
% AM				0%	0%	1%	2%	8%	15%	11%	4%	1%	0%	42%
AM Peak Hour				08:00	10:00	07:00	06:00	09:00	06:00	08:00	05:00	05:00		07:00
Volume				1	8	23	41	93	233	142	61	20	3	543
PM Volumes	0	0	0	1	21	64	271	1017	1747	932	243	42	4	4342
% PM				0%	0%	1%	4%	14%	23%	12%	3%	1%	0%	58%
PM Peak Hour				12:00	13:00	12:00	15:00	16:00	15:00	17:00	17:00	14:00	12:00	16:00
Volume				1	5	13	39	170	267	141	32	6	1	619

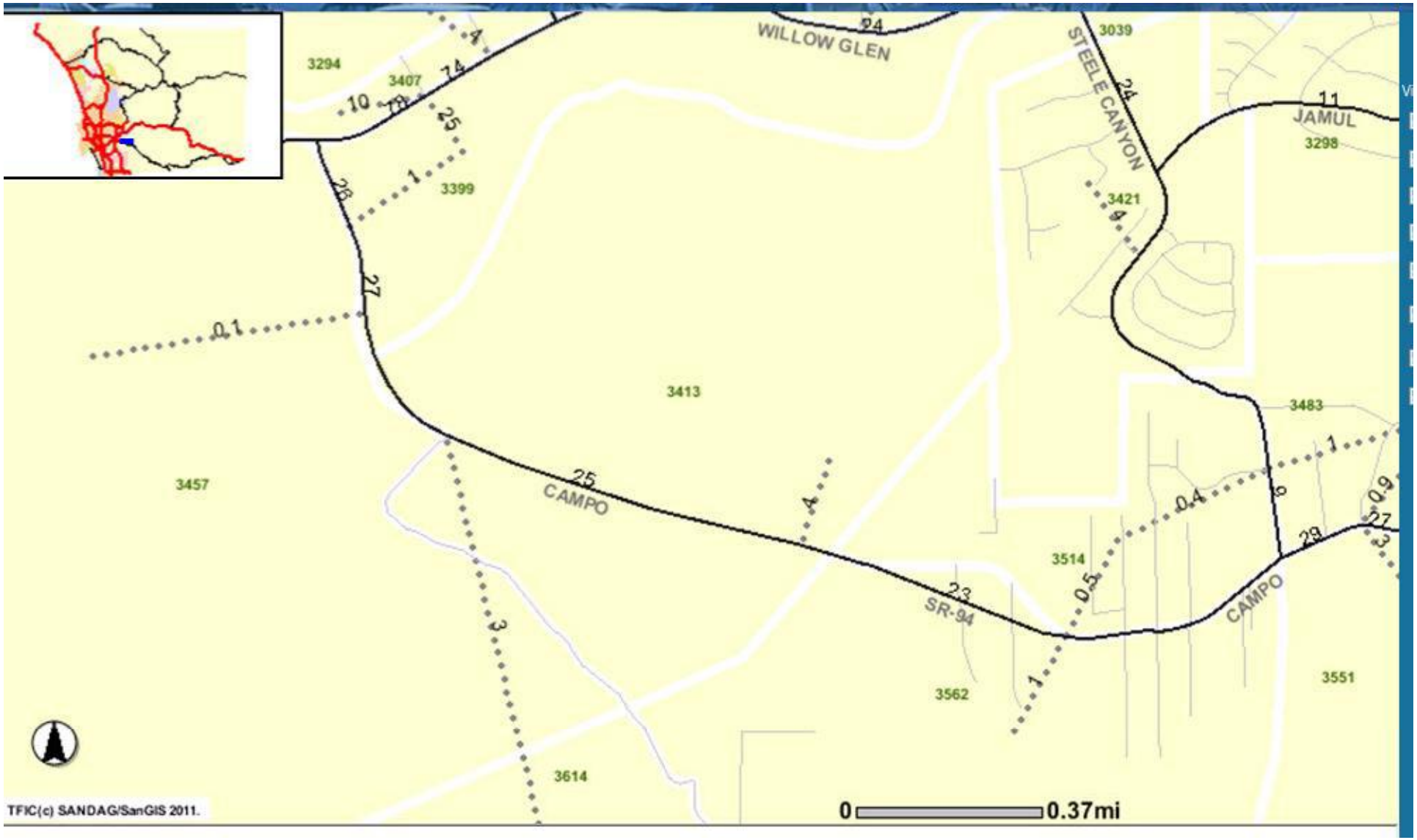
Directional Peak Periods All Speeds	AM 7-9		NOON 12-2		PM 4-6		Off Peak Volumes	
	Volume	%	Volume	%	Volume	%	Volume	%
	1050 ⟷	14%	751 ⟷	10%	1189 ⟷	16%	4497 ⟷	60%

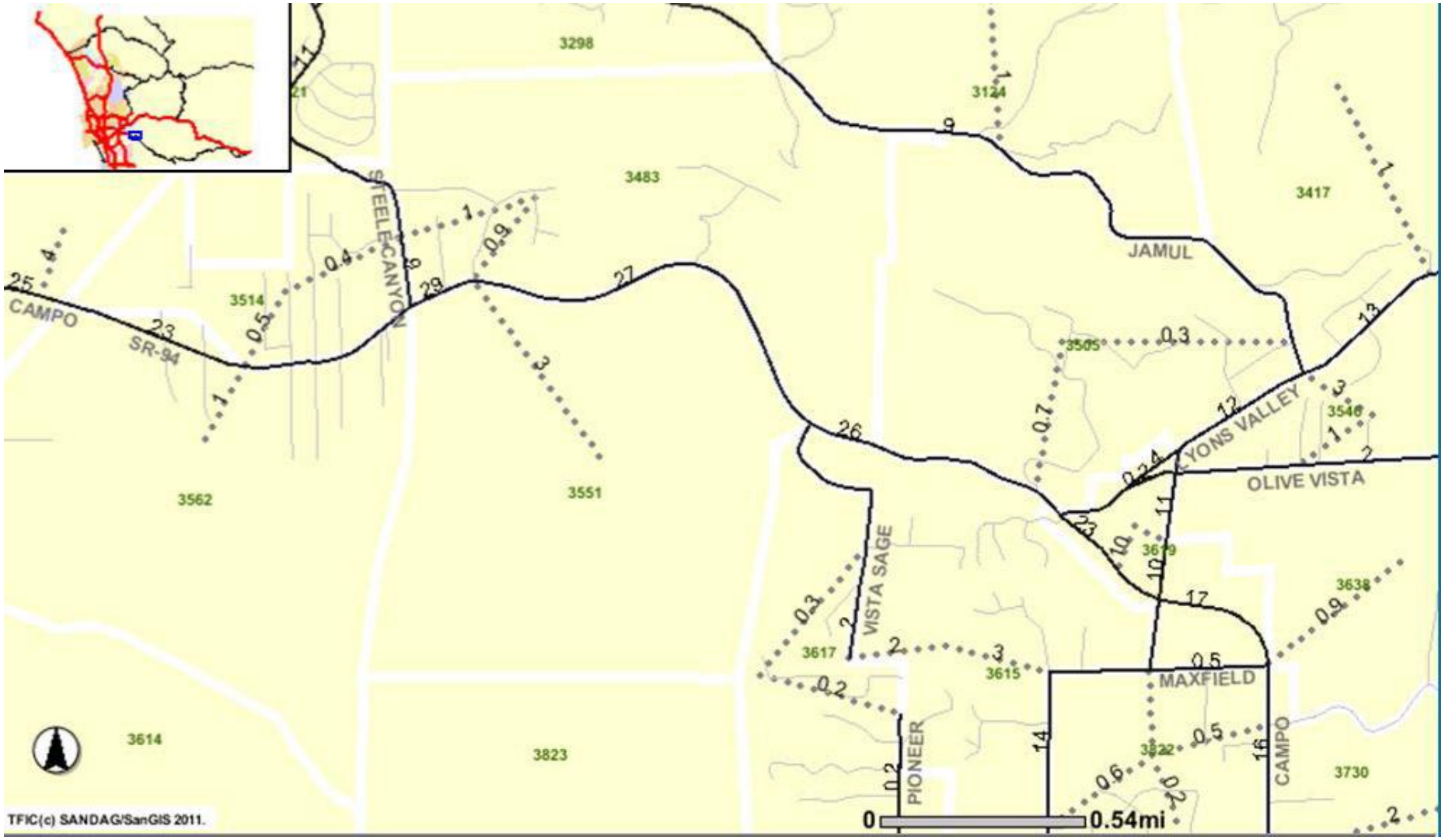
Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
SR-94 (Campo Rd)	Summary	47	53	53	59	63	7487

APPENDIX C

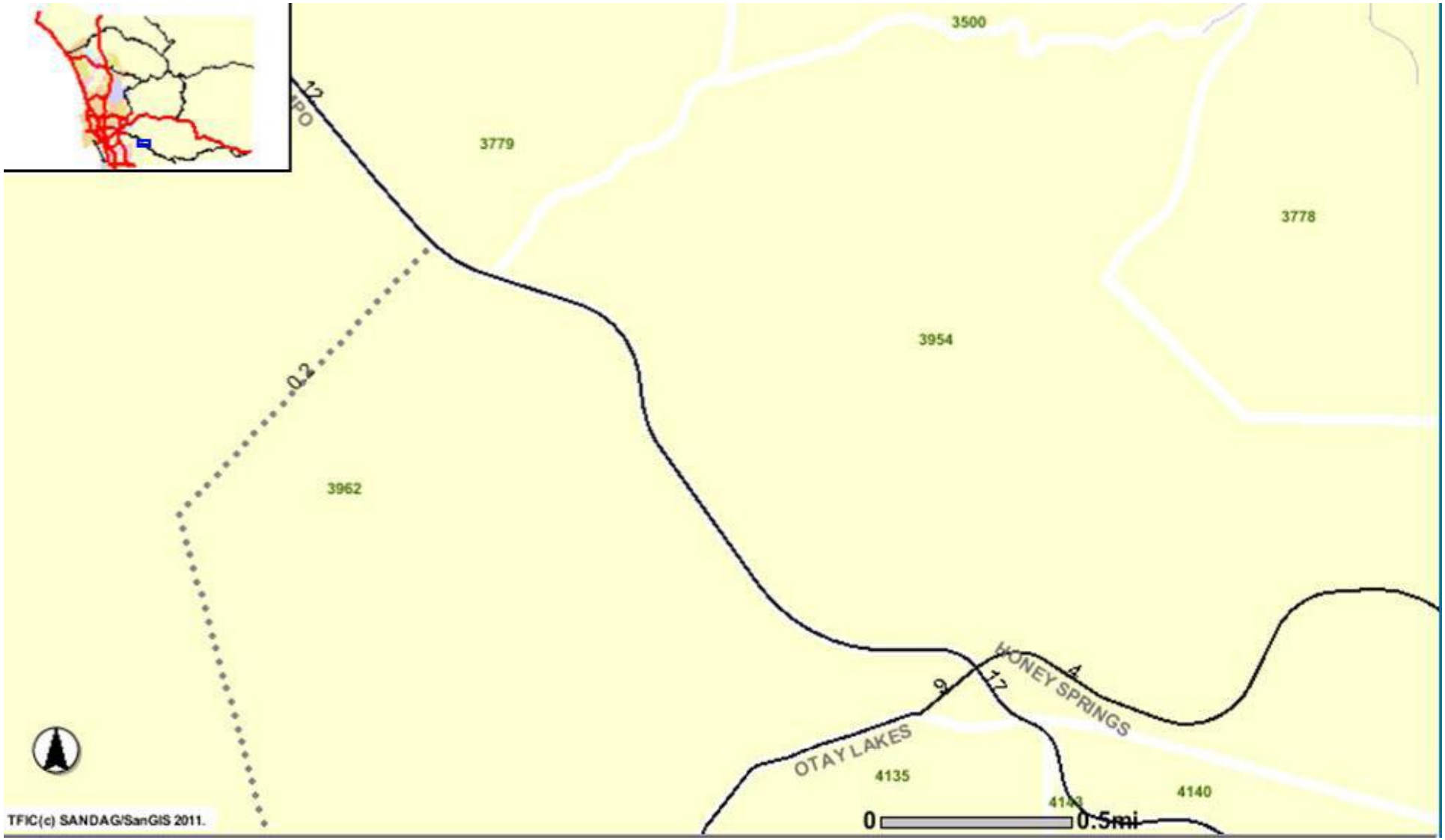
- Series 11 and Series 12 Future Year Volumes Forecast

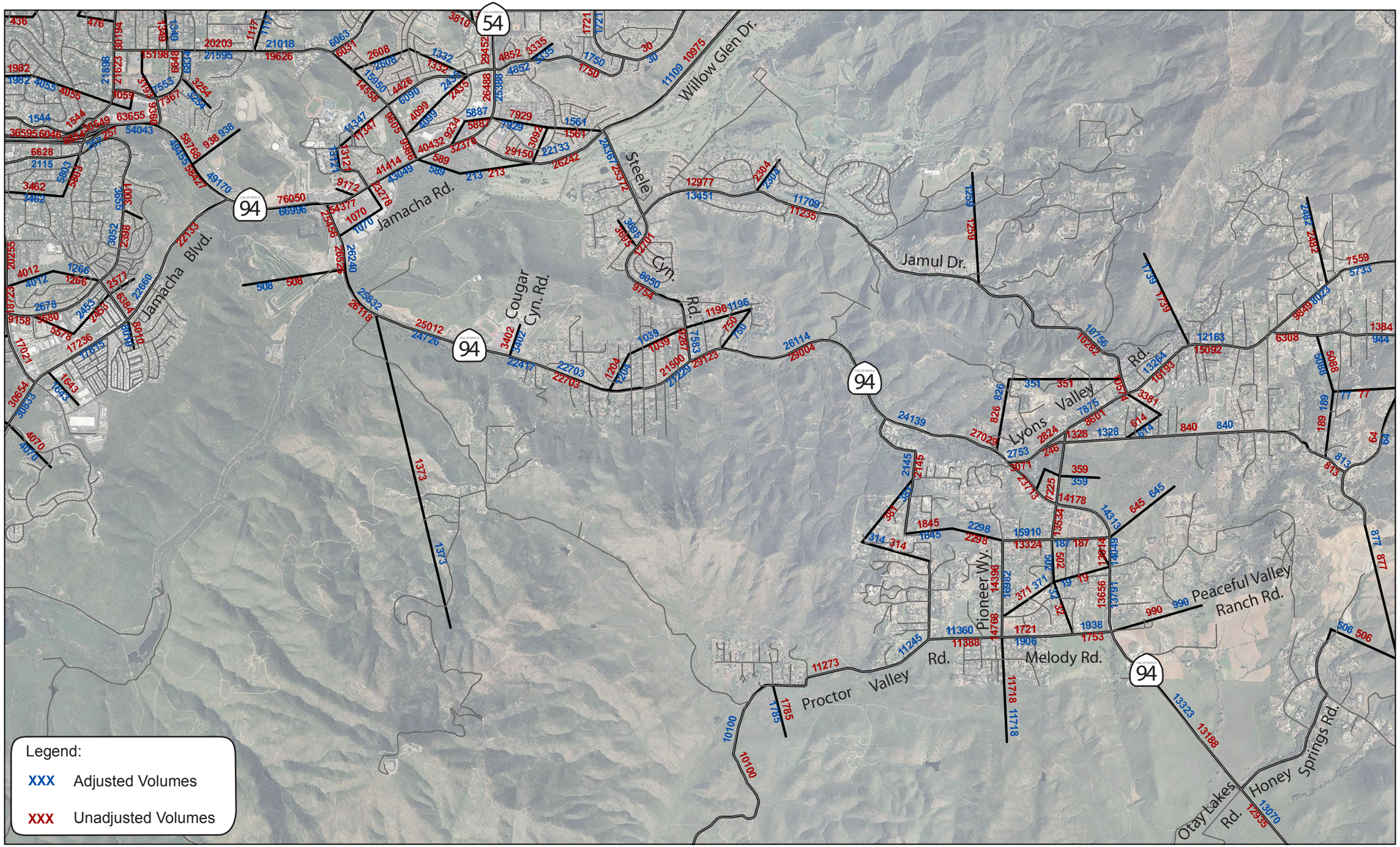

RAMP
VIA MERCADO
FURY
BRABHAM
JAMACHA ROAD
JAMACHA BOULEVARD
DEL RIO
AUSTIN
CALAVO
CAMPO
3160
3230
3193
3284
3359
3286
3315
3294
3292
3383
3360
3407
3394
3392
3399
3413
3457
3468
3479
3493
3503
3508
3524
TFIC(c) SANDAG/SanGIS 2011.
0
0.37mi


WILLOW GLEN
STEELE CANYON
JAMUL
CAMPO
SR-94
CAMPO
3294
3407
3399
3039
3298
3421
3413
3483
3457
3514
3562
3551
3614
TFIC(c) SANDAG/SanGIS 2011.
0
0.37mi


3298
3124
3483
3417
JAMUL
STEELE CANYON
CAMPO
SR-94
3514
3505
LYONS VALLEY
3546
OLIVE VISTA
3562
3551
VISTA SAGE
3617
3615
MAXFIELD
3614
3823
PIONEER
CAMPO
3730
TFIC(c) SANDAG/SanGIS 2011.
0
0.54mi


VISTA SAG
PIONEER
PROCTOR VALLEY
MAXFIELD
CAMPO
MELODY
OLIVE VISTA
LYONS VALLEY
SC 760
RANCHO JAMUL
3505
3546
3526
3638
3615
3617
3822
3730
3779
3823
3919
3962
TFIC(c) SANDAG/SanGIS 2011.
0
0.54mi


3500
3779
3778
3954
3962
0.2
12
PO
9
17
4
HONEY SPRINGS
OTAY LAKES
4135
4140
0
0.5mi
TFIC(c) SANDAG/SanGIS 2011.


Jamacha Blvd.
Jamacha Rd.
Cougar Cyn. Rd.
Steele Cyn. Rd.
Willow Glen Dr.
Jamul Dr.
Lyons Valley Rd.
Pioneer Wy.
Melody Rd.
Proctor Valley Rd.
Peaceful Valley Ranch Rd.
Otay Lakes Rd.
Honey Springs Rd.
54
94
Legend:
XXX Adjusted Volumes
XXX Unadjusted Volumes

APPENDIX D

- NCHRP 255 Methodology and Forecast Worksheets

CHAPTER EIGHT
TURNING MOVEMENT PROCEDURES

GENERAL

Turning movement data are often required for the planning and design of highway intersections and interchanges. Computerized traffic assignments rarely provide turning movement forecasts that can be directly used for these purposes, resulting in a need for significant refinement. Often the system-level forecasts do not provide any turning movement data. Therefore, procedures are presented that enable the analyst to develop these data from various sources and for various uses. These procedures can be used independently or to supplement the link refinement and detailing procedures documented in Chapters 4 through 7.

The appropriate procedure to use is dependent on several factors, including the availability or suitability of the following:

1. Future year turning volume forecasts.
2. Directional or nondirectional volume forecasts. Directional turning volumes are specific to each direction of travel. Nondirectional turning volumes represent two-way volumes passing between adjacent links. Figure A-58 illustrates these differences using a common four-way intersection.
3. Actual base year turning movement counts.
4. Base year turning movement assignments.
5. Desired time period (e.g., peak hour, 24-hour).
6. Number of intersection approaches.

In some cases the analyst must combine two or more procedures in order to arrive at a reasonable turning movement estimate.

Three sets of procedures are presented in this chapter. They are the following:

1. Factoring Procedures--includes use of either Ratio Method or Difference Method.
2. Iterative Procedures--includes separate Directional and Nondirectional Volume Methods.
3. "T" Intersection Procedures--includes separate Directional and Nondirectional Turning Movement Methods.

The primary feature of the factoring procedures is their computational simplicity. By the same token, their simplicity means that several potentially key factors have not been considered. The procedures also require actual base year turning movement counts as well as a base year turning movement assignment, thus limiting their applicability.

The iterative procedures are significantly different, depending on whether directional or nondirectional turning volumes are used as input. The directional volume method adjusts future year turning movements to match as closely as possible a predetermined estimate of turning percentages. It can be applied whether or not base year turning movements are known. The method can become time-consuming if a significant number of iteration calculations are required. The nondirectional volume method requires considerably more judgment on the part of the analyst. Typically these turns are derived only from a knowledge of nondirectional approach link volumes and an estimate of the total turn percentage at the intersection. Therefore, the task is to produce turning movements that appear to be reasonable based on the given approach volumes and the distribution of adjacent land uses. The results are not intended to be used for design purposes.

The "T" intersection procedures were developed to address the uniqueness of an intersection having only three approaches. A unique solution can be obtained for nondirectional turning volumes

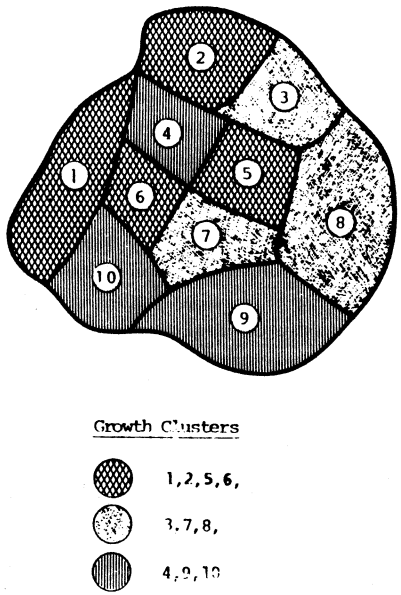


Figure A-57. Zones clustered by growth.

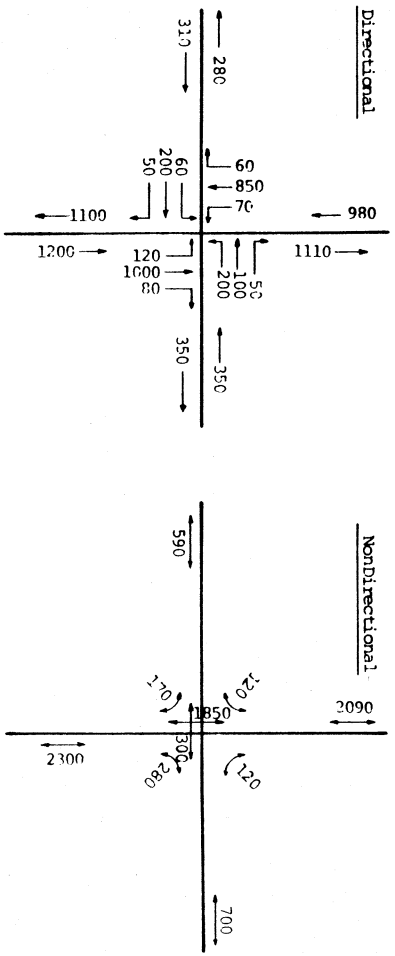


Figure A-58. Directional and nondirectional turning volumes.

if the approach volumes are known. Directional turning volumes can also be directly computed if the directional approach volumes and one turning movement are known. Otherwise, reasonable estimates of directional turning volumes can be made from nondirectional volumes using some basic relationships characteristic of a "T" intersection.

These procedures are described in the following sections of this chapter.

FACTORING PROCEDURES

Future year turning movement forecasts are frequently based on the relationships between base year assignments and actual base year counts. The assumption used is that the discrepancy between a base year count and a base year assignment is likely to be of the same magnitude in the future year. Given this assumption, the future year turning movements can be modified by comparing the relative ratios or differences between base year link or turning volumes. The procedures are equally valid for producing directional or nondirectional turning movements.

Input Data Requirements

The following directional or nondirectional data are required for both the ratio or difference procedures:

1. Future year turning movement forecast.
2. Base year turning movement assignment.
3. Base year turning movement counts.

The first two data items are obtained from computer assignments, while the actual base year data (item 3) must be obtained from existing counting programs or from field studies.

Directions for Use

Similar computations are performed for the ratio and difference methods, as follows.

Ratio Method

Each turning movement in the future year assignment is factored by the ratio of the base year actual traffic count to the base year assignment.

$$V_{ri} = F_i * (B_{ci}/B_{ai}) \qquad \text{(A-27)}$$

where:

V_{ri} = ratio adjusted future year volume turning movement i;
F_i = future year forecasted volume for turning movement i;
B_{ci} = base year traffic count for turning movement i; and
B_{ai} = base year assigned volume for turning movement i.

Each turning volume is adjusted separately and then summed to produce an adjusted total approach volume.

For example, the numbered intersection as shown in Figure A-59 is provided.

Assume the following data for turning movement 3:

F_3 = 500

B_{c3} = 200

B_{a3} = 260

Then:

V_{r3} = 500* (200/260) = 385

Similar calculations would be performed for the other 11 turning movements.

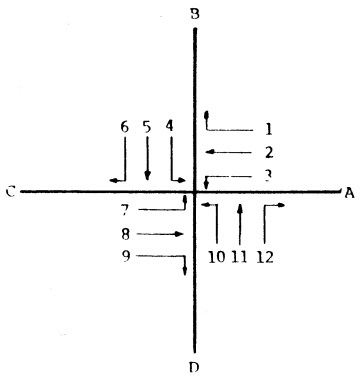


Figure A-59. Example intersection turning movements.

Difference Method

Each turning movement in the future year assignment is factored by the difference between the base year actual traffic count and the base year assignment.

$$V_{di} = F_i + (B_{ci} + B_{ai}) \quad \text{(A-28)}$$

Where:

V_{di} = difference adjusted future year volume for turning movement i;

F_i = future year forecasted volume for turning movement i;

B_{ci} = base year traffic count for turning movement i; and

B_{ai} = base year assigned volume fo turning movement i.

Each turning volume is adjusted separately and then summed to produce an adjusted total approach volume.

Using the same example from above, the following calculations would occur for turning movement 3 (see Fig. A-59):

V_{d3} = 500 + (200-260) = 440

Similar calculations would be performed for the other 11 turning movements.

Both the ratio and the difference methods must be carefully applied to avoid extreme values. In the ratio method, if the base year count is significantly higher or lower than the base year assignment, the adjusted future year volume may be unrealistically high or low. Similarly, in the difference method, extreme discrepancies during the base year can significantly alter the future year volume. Negative values can also occur, which is a disadvantage of the difference method.

Combined Method

The two methods can be combined using a procedure similar to that developed for link volumes by the New York State Department of Transportation (77). The results of the ratio and difference methods are simply averaged to produce the final future adjusted turning volume.

$$(V_{ri} + V_{di}) /2 = V_{fi} \quad \text{(A-29)}$$

where:

V_{ri} = ratio adjusted future year volume for turning movement i;

V_{di} = difference adjusted future year volume for turning movement i; and

V_{fi} = final averaged future year volume for turning movement i.

Using the results from the ratio and difference adjustments, the final averaged future year volume for turning movement 3 would be:

V_{fi} = (385 + 440) /2 = 413

This averaging method tends to reduce the extremes experienced by the individual methods. Judgment must still be used, however, to assess whether the resulting turning volumes are realistic. In particular, this method may produce revised future year approach volumes that are significantly different from the future year volumes previously forecast. If desired, the turning movements can be further adjusted using the iterative method described in the next section. The iterative method is most useful when the analyst wishes to retain a specified future year link volume on each intersection approach.

Special Consideration—Lack of Base Year Turning Volumes

The base year volumes B_{ci} and B_{ai} should preferably represent the same turning movement i as that represented by the future volume F_i. Therefore, F_i would be adjusted based on the relative ratio between the actual and assigned base year volume for the specific turning movement i. If base year turning volumes are not available, however, approach link volumes may be substituted for B_{ci} and B_{ai} in the ratio method only. This substitution will result in each turning movement on an approach being adjusted by the same ratio. Obviously, this technique will not produce an adjustment that is as specific as that derived by comparing individual base year turning movements. However, it will account for major deviations between the actual and assigned volumes.

For example, on approach B to the intersection shown in Figure A-59, assume the following information:

Base year actual approach volume (link) = 500

Base year assigned approach volume (link) = 700

The future year forecasted volumes (F_i) for turning movements 4, 5, and 6 on approach B would then be adjusted as follows:

$$V_{ri} = F_i * (500/700) = F_i * 0.71 \text{ for } i = 4, 5, 6$$

The adjustment would be different for each intersection approach.

Note that the difference method cannot be used with base year link volumes because the total difference between actual and assigned link volumes cannot be added (or subtracted) to each individual turning movement.

ITERATIVE PROCEDURES

This section contains procedures for producing either directional or non-directional turning volumes using an iterative approach. Iteration involves applying a technique repeatedly until the results converge to an acceptable result. Both procedures derive future year turning movements from prespecified link volumes and an initial estimate of turning percentages. Iteration is required to balance the volume of traffic entering and leaving the intersection. Therefore, the number of iterations necessary to produce an acceptable set of turning volumes is dependent on the ability of the analyst to make reasonable a priori estimates of turning percentages. These estimates can be made by analyzing base year counts at the same intersection, by reviewing turning movements at similar intersections, or by examining adjacent land use intensity and distribution.

Directional Volume Method

Starting with user-estimated turning percentages, the directional volume method proceeds through an iterative computational technique to produce a final set of future year turning volumes. The computations involve alternately balancing the rows (inflows) and the columns (outflows) of a turning movement matrix until an acceptable convergence is obtained. Future year link volumes are fixed using this method and the turning movements are adjusted to match.

This procedure is most applicable in cases where the future year turning volume forecasts are not expected to be radically different from either the base year conditions or from the initial user-supplied estimates of turning percentages. If large differences occur, several iterations may be required to reach convergence to the prespecified future year link volumes. Normally, however, six to ten iterations requiring one or two person-hours should suffice.

Basis for Development

The directional volume method is based on a basic iteration technique developed by Furness (30) and modified for intersection flows by Mekky (64). A similar but more complex formulation developed by Bacharach (7) involves input-output changes using a biproportional matrix method.

Apart from these iterative techniques, there also exists a noniterative method for generating intersection directional turning movements. This method, developed by Norman et al. (43, 73), may be substituted for the iterative approach in cases where the analyst has good initial estimates of the future year turning movements. However, the mathematical complexity of the formulation, plus the probability that negative numbers may result, indicates that the iterative method described in this chapter will produce the most consistent results in a reasonable time frame.

Input Data Requirements

The following input data are required:

- Future year directional link volumes.
- Either: Base year actual or assigned directional turning movements.
  Initial estimate of future year directional turning percentages.

The future year link volumes are obtained directly from the computer forecasts or from the results of a link refinement or detailing procedure (see Chapters 4 through 7). The base year data would preferably be actual turning movement counts, but turning data from a base year assignment could also be used. In lieu of base year data, the analyst must make an initial estimate of future year turning percentages based on an examination of adjacent land uses or the turning movements at similar intersections.

Directions for Use

The directional volume method consists of five steps, as diagrammed in Figure A-60. The following notations are used in the calculations:

- n = number of links emanating from the intersection;
- O_{ib} = base year (b) inflow to the intersection on link i (i=1...R);
- O_{if} = future year (f) inflow to the intersection on link i (i=1...n);
- D_{jb} = base year (b) outflow from the intersection on link j (j=1...n);
- D_{jf} = future year (f) outflow from the intersection on link j (j=1...n);
- T_{ijb} = base year (b) traffic flow entering through link i and leaving through link j;
- T_{ijf} = future year (f) traffic flow entering through link i and leaving through link j;
- P_{ijf} = future year (f) estimated percentage (expressed in decimal form) of traffic flow from link i to link j (use in place of T_{ijb}); and
- * = represents adjusted values in each iteration.

These notations can be illustrated using the example intersection diagrammed in Figure A-61. In this case, the number of links is 4 (n=4). The base year and future year inflows O_{ib} and O_{if} are shown for each link, as are the corresponding outflows D_{jb} and D_{jf}. The base year and future year turning movements T_{ijb} and T_{ijf} are diagrammed for each of the 12 movements.

If the base year turns T_{ijb} were not known, estimated future year turn percentages (P_{ijf}) could be substituted, as illustrated for link 1. The P_{ijf} must total to 1.00 (or 100%) for each approach. Therefore, $P_{12f} + P_{13f} + P_{14f} = 1.00$ and so forth for each approach link.

The computational steps are described below, followed by an example.

Step 1--Construct Initial Turning Movement Matrix. The first step involves constructing an initial matrix of turning movements to be used in the iterations. The construction varies depending on whether or not base year turning volumes are available. In these and subsequent matrices, the diagonal elements (i=j) will always be equal to zero unless U-turns are permitted.

Step 1A--Base Year Turning Volumes Known. First construct a turning movement matrix of base year turning volumes (T_{ijb}). Next, insert the row and column totals. The row totals should represent inflows (O_{ib}) and the column totals should represent outflows (O_{jb}). This is shown below.

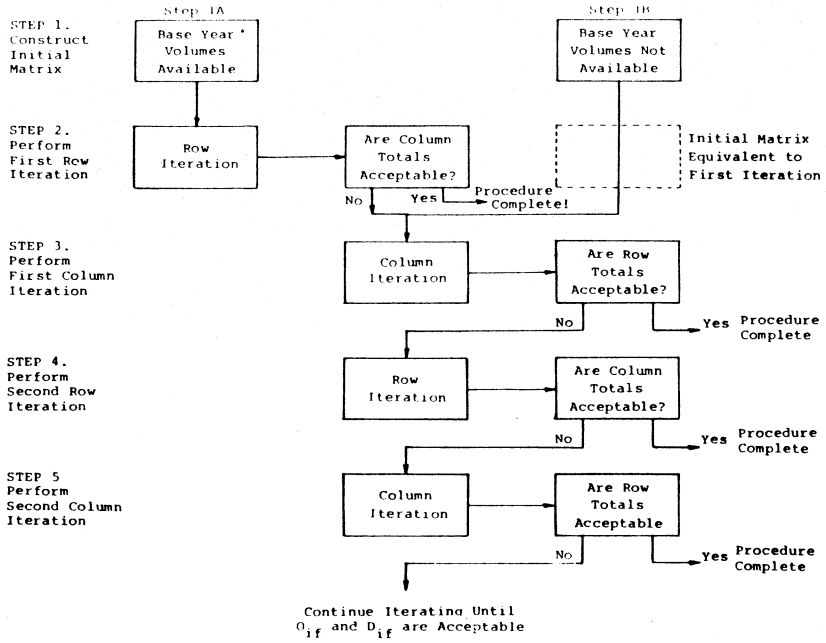


Figure A-60. Iterative procedure to compute directional turning volumes.

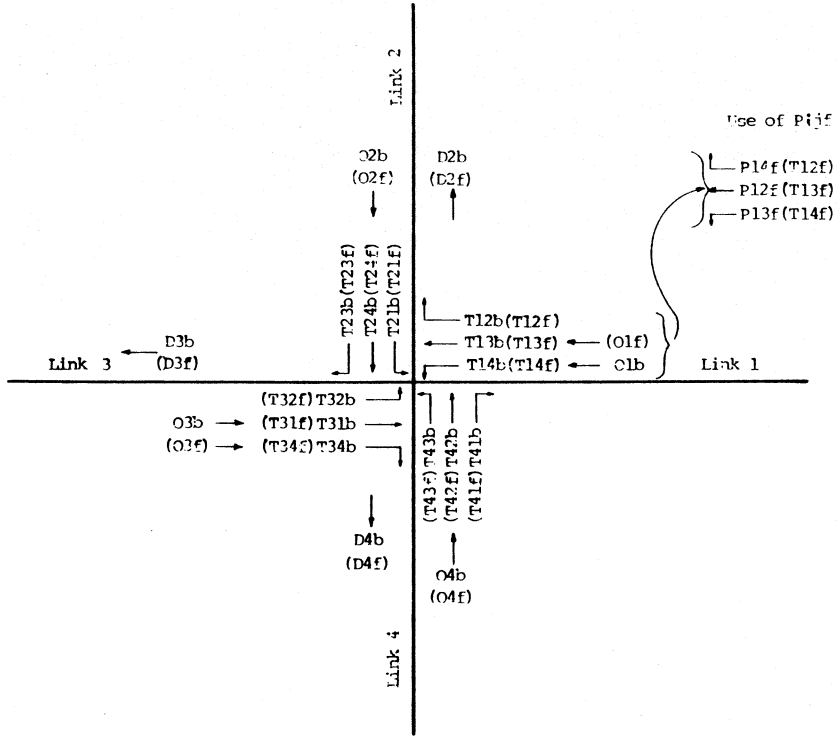
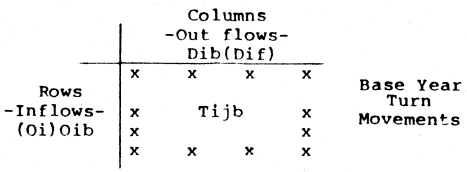


Figure A-61. Intersection notation used for directional iterative procedure.



The sum of the T_{ijb} across each row and down each column should be equal to the O_{ib} and D_{jb} respectively.

Finally, display the future year link volume inflows (O_{if}) and outflows (D_{jf}) in parentheses adjacent to the corresponding base year link volumes. Proceed to Step 2.

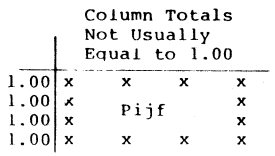
If base year turning volumes are not known, omit this step and proceed to Step 1B.

Step 1B--Base Year Turning Volumes Not Known. Construct an initial future year turning movement matrix using estimated turn percentages. The row totals should represent the future year assigned inflows (O_{if}). The column totals should represent outflows (D_{jf}). The individual turning movements (i.e., cells of the matrix) are calculated as follows:

$$T_{ijf}^* = O_{if} * P_{ijf} \qquad \text{(A-30)}$$

Note that the P_{ijf} are applied to the inflows (O_{if}), not to the outflows (D_{jf}). This computation is repeated for each cell of the matrix.

To aid in this computation, it is often helpful to construct a separate matrix of estimated turning percentages, as shown below. Matrix multiplication can then be performed.

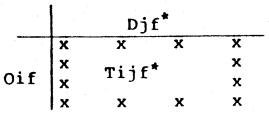


The row totals must equal 1.00. Except by coincidence, the column totals of P_{ijf} will not equal 1.00.

At this point the inflows (O_{if}) are equal to the desired future year assigned link volumes. The adjusted outflows (D_{jf}^*), on the other hand, must be calculated as the sum of all traffic volumes (T_{ijf}^*) for the appropriate column (j). For instance, for link 2, D_{jf}^* would equal the sum of all traffic turning onto Link 2 (e.g., $T_{12f}^* + T_{32f}^* + T_{42f}^* = D_{2f}^*$ for a four-legged intersection with no U-turns).

$$D_{jf}^* = \sum_{i=1}^{N} T_{ijf}^* \qquad \text{(A-31)}$$

Except in rare cases, this value of D_{jf}^* will not equal the desired future year outflow D_{jf}. Therefore, iterations will be required to enable the D_{jf}^* to converge onto the desired D_{jf} value. If the difference between these values is acceptable to the analyst, the procedure is complete. Typically, a difference of ± 10 percent is considered to be acceptable. The matrix at this stage is shown below.



Step 1B actually represents the first row iteration of the procedure, although derived in a slightly different fashion from the case where base year volumes are known. Therefore, if further iterations are required, the analyst should now skip to Step 3. These relationships are shown in Figure A-60.

Step 2--Perform the First Row Iteration. Perform this step only after Step 1A. In the matrix replace the base year inflows (O_{ib}) with the future year inflows (O_{if}). Then adjust each individual turning movement according to the following:

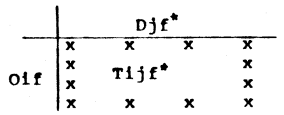
$$T_{ijf}^* = (O_{if}/O_{ib}) \times T_{ijb} \qquad \text{(A-32)}$$

where T_{ijf}^* is the adjusted future volume for this iteration.

Construct a new matrix consisting of the T_{ijf}^* and O_{if}. Now calculate the new D_{jf}^* by summing the T_{ijf}^* in each column j.

$$D_{jf}^* = \sum_{i=1}^{N} T_{ijf}^* \qquad \text{(A-33)}$$

The matrix at this stage is shown below.



The D_{jf}^* should be compared with the desired D_{jf} from Step 1A. If the difference between these values is acceptable to the analyst, then the procedure is complete. Typically, a difference of ± 10 percent is considered to be acceptable. If a larger discrepancy is apparent, then a further iteration(s) is required.

Step 3--Perform the First Column Iteration. This step is performed on the adjusted turning movement matrix from Steps 2 or 1B. Replace the outflows (D_{jf}^*) with the original D_{jf}. Adjust

each individual movement according to the following:

$$T_{ijf}*NEW = (D_{jf}/D_{jf}*)\, T_{ijf}*OLD \qquad (A\text{-}34)$$

where:

$T_{ijf}*OLD$ = $T_{ijf}*$ value in the matrix developed in Steps 2 or 1B; and

$T_{ijf}*NEW$ = Adjusted T_{ijf} after column iteration.

In subsequent iterations, $T_{ijf}*NEW$ becomes $T_{ijf}*OLD$ and so forth.

Construct a new matrix consisting of the $T_{ijf}*NEW$ and D_{jf}. Calculate the adjusted $O_{if}*$ by summing the $T_{ijf}*NEW$ in each row.

$$O_{if}* = \sum_{j=1}^{N} T_{ijf}*NEW \qquad (A\text{-}35)$$

The $O_{if}*$ should be compared with the original O_{if}. If the difference between these values is acceptable to the analyst, the procedure is complete. Typically, a value of $\pm$ 10 percent is considered to be acceptable. If a larger discrepancy is apparent, continue with a further iteration(s).

Step 4--Repeat Row Iteration. If needed, repeat the Step 2 procedure for row iterations. Calculate new values for $T_{ijf}*NEW$ and $D_{jf}*$. Compare $D_{jf}*$ with D_{jf}.

Step 5--Repeat Column Iteration. If needed after Step 4, repeat the Step 3 column iteration procedure. Calculate new values for $T_{ijf}*NEW$ and $O_{if}*$. Compare $O_{if}*$ with O_{if}.

The row and column iterations should be continued until acceptable values of $O_{if}*$ and $D_{jf}*$ are obtained. The $T_{ijf}*$ values in the final iteration matrix will represent the final adjusted directional turning and through movements. The $T_{ijf}*$ should be closely reviewed for reasonableness before using them in subsequent planning and design studies.

Example

Step 1A A four-link intersection has base year turning movements and future year link volumes as illustrated in Figure A-62 and displayed in matrix form in Figure A-63. For this example, Step 1B is not used, and the analysis moves to Step 2.

Step 2: First Row Iteration (Fig. A-64)

Step 3: First Column Iteration (Fig. A-65)

In this example, the differences in row totals are within 5 percent after the second iteration. If this difference is acceptable, select the $T_{ijf}*NEW$ from Step 3 as the final turning movement matrix, and subsequent iterations will not be required.

For comparison, after six iterations, the results in Figure A-66 could be obtained. Therefore, the additional iterations have reduced the differences further still.

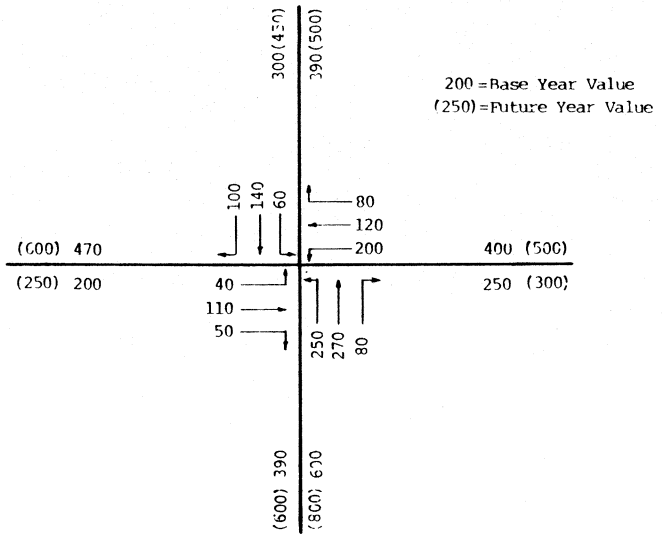


Figure A-62. Example of directional intersection volumes.

		(300) 250	(500) 390	(600) 470	(600) 390	(D_{jf}) D_{jb}	Out-flows
(500)	400	0	80	120	200		
(450)	300	60	0	100	140	T_{ijb}	
(250)	200	110	40	0	50		
(800)	600	80	270	250	0		
(O_{if})	O_{ib}						

Inflows

Figure A-63. Intersection volumes displayed in matrix format.

O_{if}	D_{jf}^*: 335	510	633	522	$D_{jf}^* = \sum_{i=1}^{4} T_{ijf}^*$
500	0	100	150	250	$T_{ijf}^* = \frac{O_{if}}{O_{ib}} \times T_{ijf}$
450	90	0	150	210	
250	138	50	0	62	
800	107	360	333	0	

Compare	D_{jf}^*	≈	D_{jf}	Δ
j = 1	335		300	+12 %
j = 2	510		500	+ 2 %
j = 3	633		600	+ 6 %
j = 4	522		600	- 13%
Total	2000		2000	✓

Figure A-64. First row iteration.

O_{if}^*	D_{jf}: 300	500	600	600
527	0	98	142	287
464	81	0	142	241
244	123	49	0	72
765	96	353	316	0

$T_{ijf}^{*NEW} = \frac{D_{if}}{D_{jf}^*} \times T_{ijf}^{*OLD}$

Compare	O_{if}^*	≈	O_{if}	Δ
i = 1	527		500	+5%
i = 2	464		450	+3%
i = 3	244		250	-2%
i = 4	765		800	-4%
	2000		2000	✓

Figure A-65. First column iteration.

O_{if}^*	D_{jf}: 300	500	600	600
502	0	89	132	281
453	76	0	135	242
250	124	49	0	77
795	100	362	333	0

$T_{ijf}^{*NEW} = \frac{D_{if}}{D_{jf}^*} \times T_{ijf}^{*OLD}$

Compare	O_{if}^*	≈	O_{if}	Δ
i = 1	502		500	0%
i = 2	453		450	+1%
i = 3	250		250	0%
i = 4	795		800	-1%
	2000		2000	✓

Figure A-66. Intersection volumes after 6 iterations.

Nondirectional Volume Method

The nondirectional volume method produces two-way turning volumes at an intersection given two-way link volumes and an estimate of the total vehicle turning percentage. The basic assumption used is that the volume of traffic on a given approach of an intersection is a surrogate for land-use attractions and production downstream. Turning movements at an intersection should therefore be some function of the attractions and productions each direction of travel offers.

The method provides a five-step sequence and may have to be performed iteratively to achieve a balanced distribution of turns and through movements. The number of iterations required will vary between intersections, depending on the number of intersection approaches and the volume of turns. Usually three to four iterations requiring one to three person-hours will be sufficient.

Basis for Development

This nondirectional volume method is adapted from an unpublished technique developed by Marshment at the Middle Rio Grande Council of Governments (63). It originally evolved through combining empirical analyses of actual intersection operations with local knowledge of characteristics specific to the intersection being studied. As such, there is no theoretical basis for the method, and there is no uniqiue solution. Rather the method produces a reasonable turning movement scenario using the assumptions described above.

Because of its sketch-planning nature, the method relies heavily on the judgment of the analyst to select reasonable total turn percentages and to make manual adjustments to the volumes after completion of the basic computations. However, its straightforward formulation provides a logical tool with which to analyze basic intersection turning movements in situations where only link volumes are known.

Input Data Requirements

Nondirectional link volumes (i.e., total both directions) on each approach are required input data for this method. The nondirectional link volumes are obtained directly from the computer assignment or from the results of link refinement or detailing procedures described in Chapters 4 through 7.

Directions for Use

The five-step methodology is described below, along with an illustrative example.

Step 1--Estimate Total Turning Percentage. The first step is to estimate the percentage of total inflowing traffic which turns (either right or left). The turning percentage value must normally be estimated based on the unique characteristics of the intersection and comparable intersections from other parts of the urban area. If the actual signal green time given to individual turning movements is known at the subject intersection, these values can be used instead of the estimated percentage for the entire intersection.

This turning movement percentage is estimated relative to the sum of only inflowing (i.e., one direction) volume. The inflowing volume equals one-half of the total nondirectional volume. Therefore, a turn percentage relative to the total non-directional volume would need to be doubled.

For example, Figure A-67 depicts a four-way intersection with nondirectional link volumes.

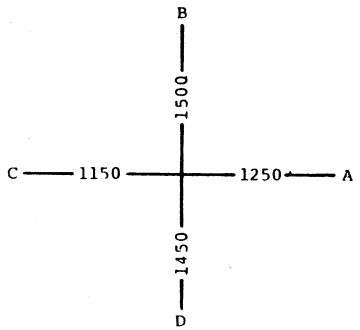


Figure A-67. Example of nondirectional intersection volumes.

The sum of the nondirectional link volumes is 1,250 + 1,500 + 1,150 + 1,450 = 5,350. Therefore, the total inflowing (equals outflowing) volume is 5,350/2 = 2,675. It is assumed on the basis of conditions at similar intersections that the total turn percentage would not exceed 20 percent of the inflowing traffic, or 0.20 * 2,675 = 535 turning vehicles. This value of 535 would equal the sum of all inflowing left turn and right turn volumes (V_{turns}). Because the 2,675 total represents the total inflowing volume, Eq. A-36 can be used to calculate total through volume ($V_{through}$):

$$V_{Turns} + V_{Through} = 2,675 \quad \text{(A-36)}$$

Substituting for the turning volume yields:

$V_{Through}$ = 2,675 - 535 = 2,140 (sum of all approaches)

$V_{Through}$ can be checked for reasonableness against volumes on similar approaches with known directional link volumes.

Step 2--Calculate the Relative Weight of Each Intersection Approach. This step is best accomplished graphically. Draw a generalized schematic of the intersection. Sum all the nondirectional volumes on all the intersection approaches. Express the volume on a particular approach as a proportion of total volume. The proportions (or relative weights) on all approaches must sum to 1.00 (100%).

Using the example in Figure A-67, the relative weights for approaches A through D would be as follows:

Total Nondirectional Volumes = 5,350 (from Step 1)

Approach A: 1,250/5,350 = 0.23
Approach B: 1,500/5,350 = 0.28
Approach C: 1,150/5,350 = 0.22
Approach D: 1,450/5,350 = 0.27
1.00

Step 3--Perform Initial Allocation of Turns. This step involves allocating the volume on each approach to the other intersection approaches. Multiply the total volume on an approach by the relative weights, as computed in Step 2 for the remaining approaches which involve turns. Straight-through volumes are not allocated at this time. This calculation should be performed for each intersection approach to produce turns to the other approaches. For this methodology, U-turns are assumed to be negligible and are not included. Continuing with the example, the following calculations would be made:

From Approach	To Approach	
A	B	1,250 * 0.28 = 350
	D	1,250 * 0.27 = 338
B	A	1,500 * 0.23 = 345
	C	1,500 * 0.22 = 330
C	B	1,150 * 0.28 = 310
	D	1,150 * 0.27 = 310
D	A	1,450 * 0.23 = 334
	C	1,450 * 0.22 = 319

At this point there will be two sets of two-way turn volumes for each interchange opportunity (e.g. A to B; B to A). To avoid double-counting, each pair of turn volumes for each potential turn should be averaged to produce one nondirectional turn volume for each potential interchange. These values will be further refined in subsequent steps. Figure A-68 shows this averaging calculation.

Step 4--Adjust Turning Volumes Based on Total Turning Percentage. The total volume of turns generated in Step 3 will typically exceed the likely volume of turns at the intersection. To adjust the Step 3 estimates, a turning percentage adjustment needs to be imposed. The adjustment involves the following computations:

(a) Write down the total inflowing volume (Step 1).

(b) Write down the total turn percentage (Step 1).

(c) Compute total expected volume of turns as (a) * (b).

(d) Sum the turning volumes calculated during Step 3.

(e) Adjust the individual turns from Step 3 using either a difference or a ratio method. For the difference method, subtract (d) from (c) to determine the total turn volume discrepancy. Divide this difference by the number of turning movements (e.g., for a four approach intersection there are four turning movements) and add/subtract to/from the turning movements. For the ratio method, divide (c) by (d) and multiply this value times each of the turning movements. Both of these methods produce satisfactory results in most cases; however, the difference method may result in negative numbers if the total estimated intersection turning percentage (Step 1) is too low.

At the end of this step, the total volume of turns at the intersection will be equal to the expected volume total from Step 1.

Using the example:

(a) Total inflowing volume = 2,675

(b) Total turn percentage = 20% (0.20)

(c) Total expected volume of turns = 2,675 * 0.20 = 535

(d) Sum of turns from Step 3 = 348 + 320 + 315 + 336 = 1,319

(e) Adjustment:

Difference Method: 535 - 1,319 = -784 - 84/4 = 196 to be subtracted from each turning volumes

Ratio Method: 35/1,319 = 0.41 to be multiplied by each turning volumes

Since no negative numbers would result in this example, the difference method is selected. The result is shown in Figure A-69.

Step 5--Balance the Approach Volumes and Adjusted Turn Volumes. Typically the preceding steps will yield a turning movement estimate that conforms to the estimated turning percentage established in Step 1. However, it is possible, even likely, that the method will not yield an intersection scenario that accounts for all traffic traversing the intersection. To test for this situation, take each approach of the intersection and do the following:

(a) Write down the total approach volume

(b) Subtract the turns made to/from that approach from cross streets

(c) Add the turns made to/from the approach on the opposite side of the intersection.

This computation should be performed independently for each intersection approach. If the intersection clears all traffic, the total volume on the opposing approach of the intersection should equal the volume estimated from the above test. If these volumes do not correspond, an adjustment needs to be made to out-of-balance numbers to bring the analysis into equilibrium, and thus to account for all of the intersection volume. The adjustment technique is not routine, but needs to be tailored to the specific results of the test.

In this example, the following calculations are performed for approach A:

Approach A: (a) 1,250

(b) 1,250 - 152 - 140 = 958

(c) 958 + 124 + 119 = 1,201 (compared with Approach C volume = 1,150)

Similar calculations are performed for the other approaches with the results shown in Figure A-70. It can be seen that the calculations yielded fairly close in agreement in this case. Comparing opposite approaches, Approaches A and C are under/overestimated by 51 respectively, while B and D are under/overestimated by 33 respectively.

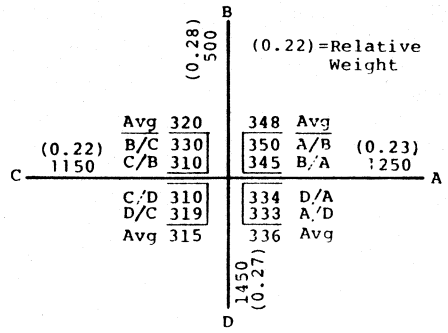


Figure A-68. Averaging of nondirectional turning volumes.

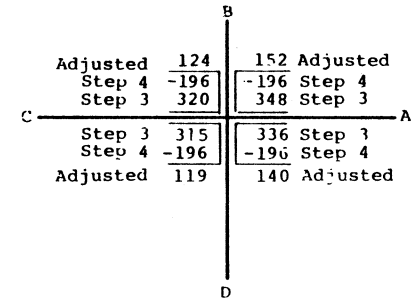


Figure A-69. Adjusted nondirectional turning volumes.

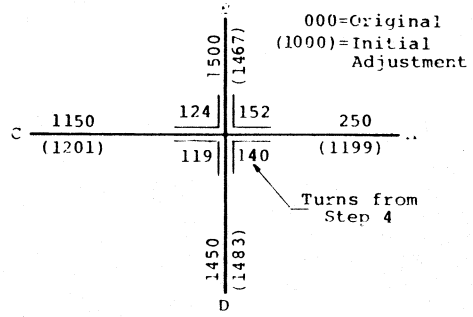


Figure A-70. Results of test for intersection volume clearance.

Two situations are normally encountered in this analysis:

1. The opposite intersection approaches show a greater difference in adjusted volume (Step 5) than was evident in the original volumes (Step 2).

2. The two opposing intersection approaches have adjusted volumes (Step 5) that are closer to each other than was evident in the original volumes (Step 2).

In the first situation, iterating the entire procedure from Step 2 using the new approach volumes will narrow the volume differences between two opposing intersection approaches. The nature of the procedure tends to reduce differences. Thus, when working with intersections with dramatically different volumes on each approach, the procedure will reduce the differences on opposing approaches, and if subjected to enough iterations, will ultimately yield the average of the two volumes on each opposing approach.

The second situation, in which the difference in volume on opposing approaches needs to be increased, is more complicated. The volumes in this example typify this discrepancy, as shown below:

	Original Volume Difference (Step 2)	Adjusted Volume Difference (Step 5)	Conclusion
Approaches A/C	1,250-1,150 = 100	1,201-1,199 = 2	Increase Difference
Approaches B/D	1,500-1,450 = 50	1,483-1,467 = 16	Increase Difference

This difference needs to be apportioned between the two approach volumes, keeping the turning volumes constant. The following computations will provide an adjustment on the first iteration which will increase the difference between the opposing volumes.

(a) Sum the volumes on the two opposing approaches using the original volumes input at the outset of the analysis (Step 2).

(b) Determine the proportion of this volume (a) represented by each of the two opposing approaches. This must sum to 1.00 (100%).

(c) Determine the approach volume difference between the adjusted (Step 5) and the original estimates. This absolute difference should be the same on each side of the intersection, although the sign will change.

(d) Multiply the proportions (b) by the volume difference (c). Add/subtract this number to/from the calculated volumes as appropriate.

The above adjustments should be applied to each intersection approach in order to ensure that the approach volumes are in scale relative to the completed turning volumes. Note that unless the proportions determined from (b) are split 50%-50%, then (d) will result in a change in the sum of the opposing approach volumes (a) and also of the total intersection volume.

These calculations are shown below for the example:

	Approaches A/C	Approaches B/D
(a)	1,250 + 1,150 = 2,400	1,500 + 1,450 = 2,950
(b)	A: 1,250/2,400 = 0.52	B: 1,500/2,950 = 0.51
	C: 1,150/2,400 = 0.48	D: 1,450/2,950 = 0.49
(c)	A: 1,250 - 1,199 = +51	B: 1,500 - 1,467 = +33
or	C: 1,150 - 1,201 = -51	or D: 1,450 - 1,483 = -33
(d)	A: 0.52 * 51 = 27 (Add)	B: 0.51 * 33 = 17 (Add)
	C: 0.48 * 51 = 24 (Subtract)	D: 0.49 * 33 = 14 (Subtract)

The final nondirectional intersection volumes are shown in Figure A-71.

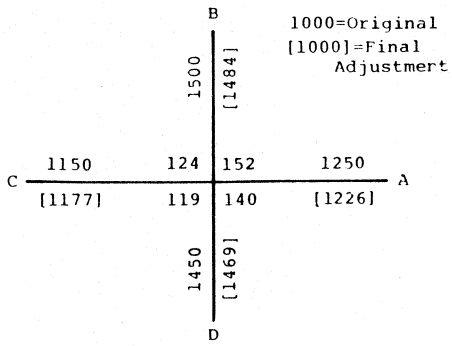


Figure A-71. Final nondirectional intersection volumes.

As a check, the total adjusted intersection volume is calculated to be 1,226 + 1,484 + 1,177 + 1,469 = 5,356, which is slightly higher than the original total of 5,350. This difference is not significant; however, in other examples additional manual link and/or turn adjustments may be required to ensure that the total intersection volume remains within a range acceptable to the analyst.

Special Situations

This method is intended for sketch planning purposes to determine the approximate nondirectional movements at an intersection. The method can also be applied with care to directional volumes, although the added complexity of this situation often leads to a time-consuming process. Therefore, directional volumes are better estimated using the preceeding iterative method.

Several applications of the method require special attention. At an intersection with five or more approaches, the approaches may have to be broken down into two or three partial intersections and then remerged to manually combine the results. This involves considerable judgment. Another difficult situation occurs when one of the intersection approaches is a one-way street. In such a situation two-way trip interchanges cannot occur. To treat this problem, the intersection must be broken into a set of one-way streets. One street would carry the flow into the intersection, and all of the other approaches would carry flow away from the intersection. At this point, the method proceeds as usual from Step 1 for each "set" of one-way streets. After all movements have been accounted for, the results should be merged and adjusted to ensure that all traffic can clear the intersection (Step 5).

A very common difficulty encountered with this method occurs where the intersection approaches carry radically different volumes. For example, a residential collector carrying a volume of 6,000 may cross a large principal arterial carrying 35,000 or more. Since the method tends to reduce the differences between link volumes on adjacent approaches the analyst in this situation will frequently be confronted with the need to increase the differences in volumes.

The method can be made to work with different turning movement percentages for different approach directions. An analyst familiar with local conditions can invoke this feature with good results. When signal green times for particular turning movements are available, these should be used instead of a total percentage for all turns (Step 1). In such cases, Step 4 can be modified to adjust each turning movement independently using the difference or ratio method. These results are then merged to produce a total intersection flow diagram for input to Step 5.

"T" INTERSECTION PROCEDURES

The turning movements on a three-legged, or "T" intersection can often be determined using simpler procedures. A unique solution can be obtained for nondirectional turning movements. Directional turning volumes can be directly computed from directional link volumes if only one intersection movement is available. Basic mathematical relationships among the link volumes can aid in estimating one of the turning movements for input to these computations.

Nondirectional Turning Movement Method

Nondirectional turn volumes can be easily computed if nondirectional link volumes on the three approaches are known. Note that directional link volumes must be summed together prior to application of the procedure.

Basis for Development

The nondirectional method is mathematically based on algebraic relationships. The two unknown turning volumes can be directly obtained from two independent equations. Therefore the solution is unique.

Input Data Requirements

Input data required for this method are nondirectional link volumes for each of the three approaches. These volumes can be obtained directly from the computer assignment or from the results of the refinement or detailing procedures presented in Chapters 4 through 7.

Directions for Use

Referring to Figure A-72 for notations, the following equations are used:

$$X = (A - B + C)/2 \qquad \text{(A-37)}$$

$$Y = (C - A + B)/2 \qquad \text{(A-38)}$$

Where A, B and C are link volumes and X and Y are the desired turning movements:

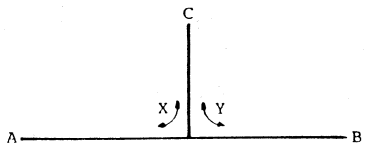


Figure A-72. "T" intersection with nondirectional turning movements.

For example, given the following link volumes:

A = 10,000

B = 12,000

C = 4,000

Then:

X = (10,000 - 12,000 + 4,000)/2 = 1,000

Y = (4,000 - 10,000 + 12,000)/2 = 3,000

As a check, the sum of X+Y must equal link volume C. Therefore, 1,000 + 3,000 = 4,000 = C (Check). Care must be taken to denote the movements as shown above. Otherwise, Eqs. A-37 and A-38 would require adjustment.

Directional Turning Movement Method

Directional volumes at "T" intersections cannot be uniquely determined from directional link volumes alone. However, knowledge of one directional volume will produce a unique solution for all other directional volumes.

Basis for Development

Because a "T" intersection has only six directional movements involved, simple mathematics can be used to derive equations to aid in the solution. A total of five independent equations are available to solve for six unknown volumes. Therefore, one movement must be known or estimated before the other five movements can be calculated. Some basic mathematical relationships can also be made among the six directional link volumes. These relationships can assist in estimating one of the turning volumes, from which the others can be directly computed as discussed above.

Input Data Requirements

Six directional link volumes are required for input to this method. In addition, one of the six turning volumes must be known or estimated.

The link volumes can be obtained from a directional computer assignment or from the results of a refinement or detailing procedure described in Chapters 4 through 7. The procedures in Chapter 10 can be used to derive directional link volumes from nondirectional link volumes. The one turning volume can be estimated from base year counts, turning volumes at similar intersections, or from known relationships among the link volumes. This latter source is described below.

Directions for Use

If one turning volume or one through movement is known or can be estimated, the analyst can calculate the remaining volumes. Five independent equations can be constructed. Figure A-73 shows a typical situation with unknown volumes A, B, C, D and E, while F is assumed to be known (F = 100), as are the link volumes 1 through 6. The following equations are possible:

$$E = \text{Volume } 4 - F \text{ where F is known} \qquad \text{(A-39)}$$

$$A = \text{Volume } 5 - E \qquad \text{(A-40)}$$

$$B = \text{Volume } 2 - A \qquad \text{(A-41)}$$

C = Volume 3 - B (A-42)

D = Volume 6 - C (A-43)

Substituting for the link volumes and for F, the volumes A through E are calculated sequentially as follows:

E = 400 - (100) = 300

Then:

A = 1000 - (300) = 700

B = 800 - (700) = 100

C = 300 - (100) = 200

D = 1200 - (200) = 1000

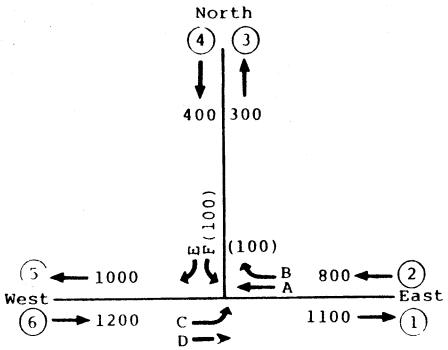


Figure A-73. "T" intersection with directional turning movements.

Other similar computations with different number pairs would produce the same unique results.

In most cases, the analyst will know or be able to estimate one of these directional movements. Straight-through movements are usually quite apparent from the directional link volumes. In the example in Figure A-73, the through volumes A and D would be expected to represent a high proportion of their respective approach volumes given the continuity of directional link volumes on both sides of the intersection (e.g., the link volumes on the west and east approaches are similar), and given the relatively small link volumes on the north approach. In cases where the cross street link volumes (e.g., on north approach) are high relative to the main street link volumes (e.g., on west and east approaches), then lower through volumes (e.g., movements A and D) would be expected. Once these relationships are established, one of the directional volumes can usually be estimated.

Another technique is to first compute the nondirectional turning volumes using the method described previously. Using Figure A-73, the nondirectional turning volumes will equal the sum of directional volumes (C + E) and (B + F). The task is then to determine each of these directional volumes, plus the through volumes A and D given the nondirectional turning volumes and the directional link volumes, which are known.

Some basic relationships can be established using the directional link volumes. For instance, as shown in Figure A-73, if link volume (1) is greater than (6), turning movement F must be greater than C. Similarly, if (5) is greater than (2), E must be greater than B. Finally, if (3) is greater than (4), (B + C) must be greater than (E + F). Because the link volumes 1 through 6 are known, the magnitudes of these inequalities are also known. The converse of these relationships is also true. Given this knowledge, the analyst can usually estimate at least a range for each of the turning volumes. Once a single turning volume is estimated within a tolerable range, the remaining directional volumes can then be computed directly as described previously.

Some of the above relationships can also be developed for four or five-legged intersections where specified movements (e.g., left turns) are prohibited. However, the added complexity of multi-leg intersections usually prevents the analyst from constructing meaningful mathematical relationships within a reasonable timeframe.

APPENDIX E

- Synchro Analysis Worksheets



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	54	965	1928	141	94	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.99		0.93	0.85
Flt Protected	0.95	1.00	1.00		0.97	1.00
Satd. Flow (prot)	1770	3539	3503		1692	1504
Flt Permitted	0.95	1.00	1.00		0.97	1.00
Satd. Flow (perm)	1770	3539	3503		1692	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	1049	2096	153	102	253
RTOR Reduction (vph)	0	0	5	0	33	70
Lane Group Flow (vph)	59	1049	2244	0	150	102
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	3.1	64.7	57.6		12.0	12.0
Effective Green, g (s)	3.1	64.7	57.6		12.0	12.0
Actuated g/C Ratio	0.04	0.76	0.68		0.14	0.14
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	64	2703	2382		239	213
v/s Ratio Prot	c0.03	0.30	c0.64		c0.09	
v/s Ratio Perm						0.07
v/c Ratio	0.92	0.39	0.94		0.63	0.48
Uniform Delay, d1	40.7	3.4	12.1		34.2	33.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	84.8	0.1	8.4		5.0	1.7
Delay (s)	125.5	3.4	20.4		39.3	35.1
Level of Service	F	A	C		D	D
Approach Delay (s)		9.9	20.4		37.3	
Approach LOS		A	C		D	

Intersection Summary				
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	84.7	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	74.4%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1003	63	440	1770	13	203	5	519	3	3	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1689	1583	1681	1770	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1689	1583	1681	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	1090	68	478	1924	14	221	5	564	3	3	0
RTOR Reduction (vph)	0	0	41	0	0	6	0	0	237	0	0	0
Lane Group Flow (vph)	5	1090	27	478	1924	8	113	113	327	3	3	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	0.9	27.9	27.9	15.8	42.8	42.8	10.3	10.3	26.1	0.9	0.9	
Effective Green, g (s)	0.9	27.9	27.9	15.8	42.8	42.8	10.3	10.3	26.1	0.9	0.9	
Actuated g/C Ratio	0.01	0.39	0.39	0.22	0.60	0.60	0.15	0.15	0.37	0.01	0.01	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	43	2001	622	765	3069	955	244	245	672	21	22	
v/s Ratio Prot	0.00	0.21		c0.14	c0.38		0.07	0.07	c0.11	c0.00	0.00	
v/s Ratio Perm			0.02			0.01			0.10			
v/c Ratio	0.12	0.54	0.04	0.62	0.63	0.01	0.46	0.46	0.49	0.14	0.14	
Uniform Delay, d1	34.6	16.6	13.3	24.9	9.0	5.6	27.8	27.8	17.2	34.6	34.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	0.3	0.0	1.6	0.4	0.0	1.4	1.4	0.6	3.1	2.8	
Delay (s)	35.8	16.9	13.3	26.5	9.4	5.6	29.2	29.1	17.8	37.7	37.4	
Level of Service	D	B	B	C	A	A	C	C	B	D	D	
Approach Delay (s)		16.8			12.7			21.0			37.6	
Approach LOS		B			B			C			D	

Intersection Summary				
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	70.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	64.8%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	943	518	93	1208	10	974	33	153	5	9	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	77	1025	563	101	1313	11	1059	36	166	5	10	39
RTOR Reduction (vph)	0	0	173	0	0	7	0	0	95	0	0	37
Lane Group Flow (vph)	77	1025	390	101	1313	4	1059	36	71	5	10	2
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	4.0	24.5	53.2	4.0	24.5	24.5	28.7	28.7	32.7	3.6	3.6	3.6
Effective Green, g (s)	4.0	24.5	53.2	4.0	24.5	24.5	28.7	28.7	32.7	3.6	3.6	3.6
Actuated g/C Ratio	0.05	0.32	0.69	0.05	0.32	0.32	0.37	0.37	0.43	0.05	0.05	0.05
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	92	1622	1096	178	1622	504	1282	696	756	82	87	74
v/s Ratio Prot	c0.04	0.20	0.13	0.03	c0.26		c0.31	0.02	0.00	0.00	c0.01	
v/s Ratio Perm			0.11			0.00			0.04			0.00
v/c Ratio	0.84	0.63	0.36	0.57	0.81	0.01	0.83	0.05	0.09	0.06	0.11	0.02
Uniform Delay, d1	36.1	22.3	4.8	35.6	24.0	17.8	21.8	15.4	13.2	35.0	35.1	34.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	45.2	0.8	0.2	4.1	3.1	0.0	4.5	0.0	0.1	0.3	0.6	0.1
Delay (s)	81.3	23.1	5.0	39.7	27.1	17.9	26.3	15.4	13.2	35.3	35.7	35.1
Level of Service	F	C	A	D	C	B	C	B	B	D	D	D
Approach Delay (s)		19.7			27.9			24.3			35.2	
Approach LOS		B			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	76.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	71.7%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	302	301	738	277	116	356
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	328	327	802	301	126	387
RTOR Reduction (vph)	0	0	0	151	0	77
Lane Group Flow (vph)	328	327	802	151	126	310
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	7.1	39.6	28.5	28.5	9.4	16.5
Effective Green, g (s)	7.1	39.6	28.5	28.5	9.4	16.5
Actuated g/C Ratio	0.12	0.69	0.50	0.50	0.16	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	427	1294	931	791	291	569
v/s Ratio Prot	c0.10	0.18	c0.43		0.07	c0.07
v/s Ratio Perm				0.10		0.13
v/c Ratio	0.77	0.25	0.86	0.19	0.43	0.54
Uniform Delay, d1	24.2	3.2	12.5	7.9	21.4	17.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.1	0.1	8.2	0.1	1.0	1.1
Delay (s)	32.2	3.3	20.8	8.0	22.4	18.1
Level of Service	C	A	C	A	C	B
Approach Delay (s)		17.8	17.3		19.2	
Approach LOS		B	B		B	

Intersection Summary				
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	67.6%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	113	315	0	3	763	158	3	1	1	101	0	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97			0.95	1.00
Satd. Flow (prot)	1770	1863		1770	1863	1583		1760			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97			0.95	1.00
Satd. Flow (perm)	1770	1863		1770	1863	1583		1760			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	342	0	3	829	172	3	1	1	110	0	266
RTOR Reduction (vph)	0	0	0	0	0	52	0	1	0	0	0	231
Lane Group Flow (vph)	123	342	0	3	829	120	0	4	0	0	110	35
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	5.0	44.6		0.7	40.3	40.3		5.8			10.0	10.0
Effective Green, g (s)	5.0	44.6		0.7	40.3	40.3		5.8			10.0	10.0
Actuated g/C Ratio	0.06	0.58		0.01	0.52	0.52		0.08			0.13	0.13
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	114	1077		16	973	827		132			229	205
v/s Ratio Prot	c0.07	0.18		0.00	c0.45			c0.00			c0.06	
v/s Ratio Perm						0.08						0.02
v/c Ratio	1.08	0.32		0.19	0.85	0.15		0.03			0.48	0.17
Uniform Delay, d1	36.0	8.4		37.9	15.8	9.5		33.0			31.1	29.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	107.1	0.2		5.6	7.3	0.1		0.1			1.6	0.4
Delay (s)	143.2	8.6		43.5	23.1	9.6		33.1			32.7	30.2
Level of Service	F	A		D	C	A		C			C	C
Approach Delay (s)		44.2			20.9			33.1			31.0	
Approach LOS		D			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	28.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	77.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	68.7%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	163	254	7	7	598	1	11	1	3	3	2	353
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	177	276	8	8	650	1	12	1	3	3	2	384
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	651			284			1684	1301	280	1300	1304	651
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	651			284			1684	1301	280	1300	1304	651
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			99			0	99	100	97	98	18
cM capacity (veh/h)	935			1279			11	130	759	116	129	469

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	177	284	8	651	16	5	384
Volume Left	177	0	8	0	12	3	0
Volume Right	0	8	0	1	3	0	384
cSH	935	1700	1279	1700	15	121	469
Volume to Capacity	0.19	0.17	0.01	0.38	1.06	0.04	0.82
Queue Length 95th (ft)	17	0	0	0	63	3	195
Control Delay (s)	9.7	0.0	7.8	0.0	589.6	36.1	38.9
Lane LOS	A		A		F	E	E
Approach Delay (s)	3.7		0.1		589.6	38.9	
Approach LOS					F	E	

Intersection Summary			
Average Delay	17.4		
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	194	35	2	424	53	117	33	5	44	25	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96			0.98	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1788			1711	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.77			0.86	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1424			1491	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	211	38	2	461	58	127	36	5	48	27	73
RTOR Reduction (vph)	0	0	24	0	0	36	0	2	0	0	53	0
Lane Group Flow (vph)	15	211	14	2	461	22	0	166	0	0	95	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	0.5	13.1	13.1	0.5	13.1	13.1		9.7			9.7	
Effective Green, g (s)	0.5	13.1	13.1	0.5	13.1	13.1		9.7			9.7	
Actuated g/C Ratio	0.01	0.37	0.37	0.01	0.37	0.37		0.27			0.27	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	25	691	587	25	691	587		391			409	
v/s Ratio Prot	c0.01	0.11		0.00	c0.25							
v/s Ratio Perm			0.01			0.01		c0.12			0.06	
v/c Ratio	0.60	0.31	0.02	0.08	0.67	0.04		0.42			0.23	
Uniform Delay, d1	17.3	7.9	7.0	17.2	9.3	7.1		10.5			9.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	33.2	0.3	0.0	1.4	2.4	0.0		0.7			0.3	
Delay (s)	50.5	8.1	7.1	18.5	11.7	7.1		11.3			10.2	
Level of Service	D	A	A	B	B	A		B			B	
Approach Delay (s)		10.4			11.2			11.3			10.2	
Approach LOS		B			B			B			B	

Intersection Summary				
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	35.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	44.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	4	6	459	180	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	4	7	499	196	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	713	201	207			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	713	201	207			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	100			
cM capacity (veh/h)	396	840	1365			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	11	7	499	207
Volume Left	7	7	0	0
Volume Right	4	0	0	11
cSH	503	1365	1700	1700
Volume to Capacity	0.02	0.00	0.29	0.12
Queue Length 95th (ft)	2	0	0	0
Control Delay (s)	12.3	7.7	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	12.3	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

9: SR 94 (Campo Rd) & Melody Rd./Peacefull Valley Ranch Rd.

Timing Plan: AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	0	3	0	0	1	3	434	1	11	142	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	0	3	0	0	1	3	472	1	12	154	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	664	664	160	666	669	472	166			473		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	664	664	160	666	669	472	166			473		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	100	100	100	100	100			99		
cM capacity (veh/h)	370	376	885	368	374	592	1412			1089		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	23	1	476	178
Volume Left	20	0	3	12
Volume Right	3	1	1	12
cSH	403	592	1412	1089
Volume to Capacity	0.06	0.00	0.00	0.01
Queue Length 95th (ft)	4	0	0	1
Control Delay (s)	14.5	11.1	0.1	0.7
Lane LOS	B	B	A	A
Approach Delay (s)	14.5	11.1	0.1	0.7
Approach LOS	B	B		

Intersection Summary				
Average Delay		0.7		
Intersection Capacity Utilization		38.2%	ICU Level of Service	A
Analysis Period (min)		15		

10: SR 94 (Campo Rd) & Reservation Rd.

Timing Plan: AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	410	199	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	446	216	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	662	216	216			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	662	216	216			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	427	824	1353			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	446	216
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1353	1700
Volume to Capacity	0.00	0.00	0.13
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		24.9%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	26	67	334	12	16	110
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	73	363	13	17	120
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	524	370			376	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	524	370			376	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	89			99	
cM capacity (veh/h)	506	676			1182	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	101	376	17	120
Volume Left	28	0	17	0
Volume Right	73	13	0	0
cSH	618	1700	1182	1700
Volume to Capacity	0.16	0.22	0.01	0.07
Queue Length 95th (ft)	15	0	1	0
Control Delay (s)	12.0	0.0	8.1	0.0
Lane LOS	B		A	
Approach Delay (s)	12.0	0.0	1.0	
Approach LOS	B			

Intersection Summary				
Average Delay			2.2	
Intersection Capacity Utilization			30.5%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	25	52	68	295	140	72
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	57	74	321	152	78
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	660	191	230			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	660	191	230			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	93	94			
cM capacity (veh/h)	404	850	1337			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	84	74	321	230
Volume Left	27	74	0	0
Volume Right	57	0	0	78
cSH	1246	1337	1700	1700
Volume to Capacity	0.07	0.06	0.19	0.14
Queue Length 95th (ft)	5	4	0	0
Control Delay (s)	11.2	7.8	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	11.2	1.5		0.0
Approach LOS	B			

Intersection Summary				
Average Delay			2.1	
Intersection Capacity Utilization			28.9%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	164	1929	1380	183	205	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.98		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3477		1761	1504
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3477		1761	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	2097	1500	199	223	171
RTOR Reduction (vph)	0	0	13	0	4	125
Lane Group Flow (vph)	178	2097	1686	0	236	29
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	9.0	50.5	37.5		13.6	13.6
Effective Green, g (s)	9.0	50.5	37.5		13.6	13.6
Actuated g/C Ratio	0.12	0.70	0.52		0.19	0.19
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	220	2478	1808		332	283
v/s Ratio Prot	0.10	c0.59	c0.48		c0.13	
v/s Ratio Perm						0.02
v/c Ratio	0.81	0.85	0.93		0.71	0.10
Uniform Delay, d1	30.7	7.9	16.1		27.4	24.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	19.3	2.9	9.3		7.0	0.2
Delay (s)	50.0	10.8	25.4		34.4	24.4
Level of Service	D	B	C		C	C
Approach Delay (s)		13.9	25.4		30.5	
Approach LOS		B	C		C	

Intersection Summary				
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	72.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	77.6%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1976	128	545	1444	6	113	2	698	8	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1688	1583	1681	1713	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1688	1583	1681	1713	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	2148	139	592	1570	7	123	2	759	9	2	1
RTOR Reduction (vph)	0	0	70	0	0	2	0	0	126	0	0	0
Lane Group Flow (vph)	5	2148	69	592	1570	5	63	62	633	5	6	1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.1	66.8	66.8	38.2	103.9	103.9	10.2	10.2	48.4	2.5	2.5	2.5
Effective Green, g (s)	1.1	66.8	66.8	38.2	103.9	103.9	10.2	10.2	48.4	2.5	2.5	2.5
Actuated g/C Ratio	0.01	0.50	0.50	0.29	0.78	0.78	0.08	0.08	0.36	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	28	2540	790	980	3951	1230	128	128	620	31	32	29
v/s Ratio Prot	0.00	c0.42		0.17	0.31		0.04	0.04	c0.29	0.00	c0.00	
v/s Ratio Perm			0.04			0.00			0.11			0.00
v/c Ratio	0.18	0.85	0.09	0.60	0.40	0.00	0.49	0.48	1.02	0.16	0.19	0.03
Uniform Delay, d1	65.9	29.0	17.5	41.2	4.8	3.3	59.3	59.2	42.6	64.6	64.6	64.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	2.8	0.0	1.1	0.1	0.0	3.0	2.9	41.7	2.4	2.8	0.5
Delay (s)	68.9	31.8	17.6	42.3	4.9	3.3	62.2	62.1	84.3	67.0	67.4	64.9
Level of Service	E	C	B	D	A	A	E	E	F	E	E	E
Approach Delay (s)		31.0			15.1			81.2			67.0	
Approach LOS		C			B			F			E	

Intersection Summary				
HCM 2000 Control Delay	32.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.94			
Actuated Cycle Length (s)	133.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	94.7%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	113	1738	847	111	1224	25	685	26	112	29	32	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	1889	921	121	1330	27	745	28	122	32	35	86
RTOR Reduction (vph)	0	0	221	0	0	17	0	0	85	0	0	80
Lane Group Flow (vph)	123	1889	700	121	1330	10	745	28	37	32	35	6
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	8.0	34.2	54.3	4.0	30.2	30.2	20.1	20.1	24.1	5.8	5.8	5.8
Effective Green, g (s)	8.0	34.2	54.3	4.0	30.2	30.2	20.1	20.1	24.1	5.8	5.8	5.8
Actuated g/C Ratio	0.10	0.43	0.68	0.05	0.38	0.38	0.25	0.25	0.30	0.07	0.07	0.07
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	176	2171	1073	171	1917	596	861	467	555	128	134	114
v/s Ratio Prot	c0.07	c0.37	0.16	0.04	0.26		c0.22	0.02	0.00	0.02	c0.02	
v/s Ratio Perm			0.28			0.01			0.02			0.00
v/c Ratio	0.70	0.87	0.65	0.71	0.69	0.02	0.87	0.06	0.07	0.25	0.26	0.05
Uniform Delay, d1	34.9	20.9	7.5	37.5	21.0	15.6	28.7	22.8	20.0	35.1	35.1	34.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.5	4.1	1.4	12.6	1.1	0.0	9.1	0.1	0.1	1.0	1.0	0.2
Delay (s)	46.4	25.0	8.9	50.0	22.2	15.7	37.8	22.9	20.0	36.1	36.2	34.8
Level of Service	D	C	A	D	C	B	D	C	C	D	D	C
Approach Delay (s)		20.9			24.3			34.9			35.4	
Approach LOS		C			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	80.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	73.1%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	84	861	425	46	67	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	936	462	50	73	118
RTOR Reduction (vph)	0	0	0	27	0	87
Lane Group Flow (vph)	91	936	462	23	73	31
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	3.8	28.1	20.3	20.3	7.6	11.4
Effective Green, g (s)	3.8	28.1	20.3	20.3	7.6	11.4
Actuated g/C Ratio	0.09	0.64	0.46	0.46	0.17	0.26
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	298	1197	865	735	307	557
v/s Ratio Prot	0.03	c0.50	0.25		c0.04	0.00
v/s Ratio Perm				0.01		0.01
v/c Ratio	0.31	0.78	0.53	0.03	0.24	0.06
Uniform Delay, d1	18.7	5.6	8.3	6.4	15.6	12.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	3.4	0.6	0.0	0.4	0.0
Delay (s)	19.3	9.0	9.0	6.4	16.0	12.2
Level of Service	B	A	A	A	B	B
Approach Delay (s)		9.9	8.7		13.6	
Approach LOS		A	A		B	

Intersection Summary				
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	43.7	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	55.7%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	106	783	1	5	343	106	1	3	18	230	5	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	1862		1770	1863	1583		1650			1776	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (perm)	1770	1862		1770	1863	1583		1650			1776	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	115	851	1	5	373	115	1	3	20	250	5	112
RTOR Reduction (vph)	0	0	0	0	0	68	0	18	0	0	0	90
Lane Group Flow (vph)	115	852	0	5	373	47	0	6	0	0	255	22
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	8.2	38.2		0.7	30.7	30.7		6.1			14.6	14.6
Effective Green, g (s)	8.2	38.2		0.7	30.7	30.7		6.1			14.6	14.6
Actuated g/C Ratio	0.11	0.51		0.01	0.41	0.41		0.08			0.19	0.19
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	191	940		16	756	642		133			342	305
v/s Ratio Prot	c0.06	c0.46		0.00	0.20			c0.00			c0.14	
v/s Ratio Perm						0.03						0.01
v/c Ratio	0.60	0.91		0.31	0.49	0.07		0.04			0.75	0.07
Uniform Delay, d1	32.1	17.1		37.2	16.7	13.7		32.1			28.7	25.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	5.3	12.1		10.9	0.5	0.0		0.1			8.6	0.1
Delay (s)	37.4	29.2		48.1	17.2	13.8		32.2			37.3	25.1
Level of Service	D	C		D	B	B		C			D	C
Approach Delay (s)		30.1			16.7			32.2			33.6	
Approach LOS		C			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	75.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	74.3%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	331	647	14	3	284	3	6	1	3	3	1	189
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	360	703	15	3	309	3	7	1	3	3	1	205
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	312			718			1952	1749	711	1743	1755	310
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	312			718			1952	1749	711	1743	1755	310
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	71			100			75	98	99	94	98	72
cM capacity (veh/h)	1248			883			27	61	433	51	60	730

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	360	718	3	312	11	4	205
Volume Left	360	0	3	0	7	3	0
Volume Right	0	15	0	3	3	0	205
cSH	1248	1700	883	1700	40	53	730
Volume to Capacity	0.29	0.42	0.00	0.18	0.27	0.08	0.28
Queue Length 95th (ft)	30	0	0	0	22	6	29
Control Delay (s)	9.0	0.0	9.1	0.0	125.3	78.3	11.9
Lane LOS	A		A		F	F	B
Approach Delay (s)	3.0		0.1		125.3	13.2	
Approach LOS					F	B	

Intersection Summary				
Average Delay	4.6			
Intersection Capacity Utilization	54.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	473	121	3	198	26	69	38	22	53	25	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.97	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1772			1762	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.78			0.78	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1417			1420	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	514	132	3	215	28	75	41	24	58	27	23
RTOR Reduction (vph)	0	0	65	0	0	17	0	17	0	0	17	0
Lane Group Flow (vph)	29	514	67	3	215	11	0	123	0	0	91	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	0.5	14.1	14.1	0.5	14.1	14.1		8.4			8.4	
Effective Green, g (s)	0.5	14.1	14.1	0.5	14.1	14.1		8.4			8.4	
Actuated g/C Ratio	0.01	0.40	0.40	0.01	0.40	0.40		0.24			0.24	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	25	750	637	25	750	637		340			340	
v/s Ratio Prot	c0.02	c0.28		0.00	0.12							
v/s Ratio Perm			0.04			0.01		c0.09			0.06	
v/c Ratio	1.16	0.69	0.11	0.12	0.29	0.02		0.36			0.27	
Uniform Delay, d1	17.2	8.6	6.5	17.0	7.1	6.3		11.1			10.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	233.2	2.6	0.1	2.1	0.2	0.0		0.7			0.4	
Delay (s)	250.4	11.2	6.6	19.2	7.3	6.3		11.7			11.2	
Level of Service	F	B	A	B	A	A		B			B	
Approach Delay (s)		20.6			7.3			11.7			11.2	
Approach LOS		C			A			B			B	

Intersection Summary				
HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.58			
Actuated Cycle Length (s)	35.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	40.4%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	19	27	4	204	501	28
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	29	4	222	545	30
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	790	560	575			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	790	560	575			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	94	100			
cM capacity (veh/h)	357	528	998			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	50	4	222	575
Volume Left	21	4	0	0
Volume Right	29	0	0	30
cSH	441	998	1700	1700
Volume to Capacity	0.11	0.00	0.13	0.34
Queue Length 95th (ft)	10	0	0	0
Control Delay (s)	14.2	8.6	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.2	0.2		0.0
Approach LOS	B			

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	38.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	0	3	1	0	4	5	211	0	2	513	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	0	3	1	0	4	5	229	0	2	558	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	813	809	564	812	815	229	571			229		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	813	809	564	812	815	229	571			229		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	99	100	100	99	99			100		
cM capacity (veh/h)	294	312	525	294	310	810	1002			1339		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	15	5	235	573
Volume Left	12	1	5	2
Volume Right	3	4	0	13
cSH	324	600	1002	1339
Volume to Capacity	0.05	0.01	0.01	0.00
Queue Length 95th (ft)	4	1	0	0
Control Delay (s)	16.6	11.1	0.3	0.0
Lane LOS	C	B	A	A
Approach Delay (s)	16.6	11.1	0.3	0.0
Approach LOS	C	B		

Intersection Summary				
Average Delay		0.5		
Intersection Capacity Utilization		38.7%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	186	499	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	202	542	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	745	542	542			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	745	542	542			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	382	540	1026			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	202	542
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1026	1700
Volume to Capacity	0.00	0.00	0.32
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		29.6%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	14	27	207	22	63	359
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	29	225	24	68	390
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	764	237			249	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	764	237			249	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	96			95	
cM capacity (veh/h)	352	802			1317	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	45	249	68	390
Volume Left	15	0	68	0
Volume Right	29	24	0	0
cSH	559	1700	1317	1700
Volume to Capacity	0.08	0.15	0.05	0.23
Queue Length 95th (ft)	6	0	4	0
Control Delay (s)	12.0	0.0	7.9	0.0
Lane LOS	B		A	
Approach Delay (s)	12.0	0.0	1.2	
Approach LOS	B			

Intersection Summary				
Average Delay			1.4	
Intersection Capacity Utilization			29.1%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	39	95	42	104	372	50
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	103	46	113	404	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	636	432	459			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	636	432	459			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	83	96			
cM capacity (veh/h)	424	624	1102			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	146	46	113	459
Volume Left	42	46	0	0
Volume Right	103	0	0	54
cSH	880	1102	1700	1700
Volume to Capacity	0.17	0.04	0.07	0.27
Queue Length 95th (ft)	15	3	0	0
Control Delay (s)	12.6	8.4	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	12.6	2.4		0.0
Approach LOS	B			

Intersection Summary				
Average Delay			2.9	
Intersection Capacity Utilization			39.3%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	201	2056	1271	154	212	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.98		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3482		1765	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3482		1765	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	218	2235	1382	167	230	121
RTOR Reduction (vph)	0	0	12	0	2	88
Lane Group Flow (vph)	218	2235	1537	0	240	21
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	10.8	49.5	34.7		13.6	13.6
Effective Green, g (s)	10.8	49.5	34.7		13.6	13.6
Actuated g/C Ratio	0.15	0.70	0.49		0.19	0.19
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	268	2463	1699		337	287
v/s Ratio Prot	0.12	c0.63	0.44		c0.14	
v/s Ratio Perm						0.01
v/c Ratio	0.81	0.91	0.90		0.71	0.07
Uniform Delay, d1	29.2	8.9	16.7		26.9	23.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	17.0	5.3	7.2		6.9	0.1
Delay (s)	46.1	14.2	23.9		33.8	23.7
Level of Service	D	B	C		C	C
Approach Delay (s)		17.1	23.9		30.7	
Approach LOS		B	C		C	

Intersection Summary				
HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	71.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	77.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	2131	135	485	1281	8	116	4	629	6	3	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.98	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1690	1583	1681	1735	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.98	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1690	1583	1681	1735	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	2316	147	527	1392	9	126	4	684	7	3	3
RTOR Reduction (vph)	0	0	66	0	0	2	0	0	157	0	0	0
Lane Group Flow (vph)	2	2316	81	527	1392	7	66	64	527	5	5	3
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.1	62.0	62.0	24.2	85.1	85.1	8.1	8.1	32.3	2.4	2.4	2.4
Effective Green, g (s)	1.1	62.0	62.0	24.2	85.1	85.1	8.1	8.1	32.3	2.4	2.4	2.4
Actuated g/C Ratio	0.01	0.55	0.55	0.21	0.76	0.76	0.07	0.07	0.29	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	33	2797	870	737	3839	1195	120	121	509	35	36	33
v/s Ratio Prot	0.00	c0.46		0.15	0.27		0.04	0.04	c0.22	c0.00	0.00	
v/s Ratio Perm			0.05			0.00			0.11			0.00
v/c Ratio	0.06	0.83	0.09	0.72	0.36	0.01	0.55	0.53	1.04	0.14	0.14	0.09
Uniform Delay, d1	55.3	20.9	12.0	41.1	4.7	3.4	50.5	50.5	40.2	54.1	54.1	54.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	2.1	0.0	3.3	0.1	0.0	5.4	4.1	49.3	1.9	1.8	1.2
Delay (s)	56.1	23.1	12.1	44.4	4.7	3.4	55.9	54.6	89.5	56.0	55.9	55.3
Level of Service	E	C	B	D	A	A	E	D	F	E	E	E
Approach Delay (s)		22.5			15.5			84.1			55.8	
Approach LOS		C			B			F			E	

Intersection Summary				
HCM 2000 Control Delay	29.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	112.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	93.5%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	1895	783	94	1146	21	541	25	108	27	15	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	2060	851	102	1246	23	588	27	117	29	16	64
RTOR Reduction (vph)	0	0	252	0	0	13	0	0	88	0	0	60
Lane Group Flow (vph)	97	2060	599	102	1246	10	588	27	29	29	16	4
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	6.8	38.5	54.6	4.0	35.7	35.7	16.1	16.1	20.1	5.6	5.6	5.6
Effective Green, g (s)	6.8	38.5	54.6	4.0	35.7	35.7	16.1	16.1	20.1	5.6	5.6	5.6
Actuated g/C Ratio	0.08	0.48	0.68	0.05	0.45	0.45	0.20	0.20	0.25	0.07	0.07	0.07
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	150	2441	1077	171	2263	704	689	373	475	123	130	110
v/s Ratio Prot	c0.05	c0.41	0.11	0.03	0.25		c0.17	0.01	0.00	c0.02	0.01	
v/s Ratio Perm			0.27			0.01			0.02			0.00
v/c Ratio	0.65	0.84	0.56	0.60	0.55	0.01	0.85	0.07	0.06	0.24	0.12	0.04
Uniform Delay, d1	35.5	18.2	6.6	37.3	16.4	12.4	30.9	26.0	22.9	35.3	35.0	34.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.2	2.9	0.6	5.5	0.3	0.0	10.0	0.1	0.1	1.0	0.4	0.2
Delay (s)	44.8	21.1	7.2	42.8	16.6	12.4	40.9	26.1	22.9	36.3	35.4	34.9
Level of Service	D	C	A	D	B	B	D	C	C	D	D	C
Approach Delay (s)		17.9			18.5			37.5			35.4	
Approach LOS		B			B			D			D	

Intersection Summary				
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	80.2	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	72.0%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	125	812	413	45	76	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	883	449	49	83	150
RTOR Reduction (vph)	0	0	0	28	0	108
Lane Group Flow (vph)	136	883	449	21	83	42
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	3.8	25.9	18.1	18.1	7.8	11.6
Effective Green, g (s)	3.8	25.9	18.1	18.1	7.8	11.6
Actuated g/C Ratio	0.09	0.62	0.43	0.43	0.19	0.28
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	312	1157	808	687	331	592
v/s Ratio Prot	0.04	c0.47	0.24		c0.05	0.01
v/s Ratio Perm				0.01		0.02
v/c Ratio	0.44	0.76	0.56	0.03	0.25	0.07
Uniform Delay, d1	17.9	5.7	8.8	6.8	14.5	11.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	3.0	0.8	0.0	0.4	0.1
Delay (s)	18.9	8.7	9.6	6.8	14.9	11.1
Level of Service	B	A	A	A	B	B
Approach Delay (s)		10.1	9.4		12.5	
Approach LOS		B	A		B	

Intersection Summary				
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	41.7	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	53.6%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	760	1	5	364	84	1	2	20	211	0	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.88			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	1862		1770	1863	1583		1638			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (perm)	1770	1862		1770	1863	1583		1638			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	826	1	5	396	91	1	2	22	229	0	104
RTOR Reduction (vph)	0	0	0	0	0	53	0	20	0	0	0	85
Lane Group Flow (vph)	117	827	0	5	396	38	0	5	0	0	229	19
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	8.2	38.4		0.7	30.9	30.9		6.1			13.7	13.7
Effective Green, g (s)	8.2	38.4		0.7	30.9	30.9		6.1			13.7	13.7
Actuated g/C Ratio	0.11	0.51		0.01	0.41	0.41		0.08			0.18	0.18
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	193	954		16	768	653		133			323	289
v/s Ratio Prot	c0.07	c0.44		0.00	0.21			c0.00			c0.13	
v/s Ratio Perm						0.02						0.01
v/c Ratio	0.61	0.87		0.31	0.52	0.06		0.04			0.71	0.07
Uniform Delay, d1	31.8	16.0		36.9	16.4	13.2		31.7			28.7	25.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	5.3	8.4		10.9	0.6	0.0		0.1			7.0	0.1
Delay (s)	37.1	24.4		47.7	17.0	13.3		31.8			35.7	25.4
Level of Service	D	C		D	B	B		C			D	C
Approach Delay (s)		26.0			16.6			31.8			32.5	
Approach LOS		C			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	74.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	71.8%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	326	583	9	2	264	5	6	2	6	3	1	162
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	354	634	10	2	287	5	7	2	7	3	1	176
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	292			643			1815	1644	639	1644	1646	290
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	292			643			1815	1644	639	1644	1646	290
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	72			100			82	97	99	95	98	77
cM capacity (veh/h)	1269			941			36	72	476	60	71	749

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	354	643	2	292	15	4	176
Volume Left	354	0	2	0	7	3	0
Volume Right	0	10	0	5	7	0	176
cSH	1269	1700	941	1700	67	63	749
Volume to Capacity	0.28	0.38	0.00	0.17	0.23	0.07	0.23
Queue Length 95th (ft)	29	0	0	0	20	5	23
Control Delay (s)	8.9	0.0	8.8	0.0	73.6	66.8	11.3
Lane LOS	A		A		F	F	B
Approach Delay (s)	3.2		0.1		73.6	12.6	
Approach LOS					F	B	

Intersection Summary				
Average Delay	4.4			
Intersection Capacity Utilization	50.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	413	114	3	206	41	52	41	15	39	31	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.98	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1786			1775	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.81			0.82	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1484			1495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	449	124	3	224	45	57	45	16	42	34	18
RTOR Reduction (vph)	0	0	68	0	0	28	0	12	0	0	14	0
Lane Group Flow (vph)	18	449	56	3	224	17	0	106	0	0	80	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	0.5	12.2	12.2	0.5	12.2	12.2		7.9			7.9	
Effective Green, g (s)	0.5	12.2	12.2	0.5	12.2	12.2		7.9			7.9	
Actuated g/C Ratio	0.02	0.37	0.37	0.02	0.37	0.37		0.24			0.24	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	27	697	592	27	697	592		359			362	
v/s Ratio Prot	c0.01	c0.24		0.00	0.12							
v/s Ratio Perm			0.04			0.01		c0.07			0.05	
v/c Ratio	0.67	0.64	0.09	0.11	0.32	0.03		0.29			0.22	
Uniform Delay, d1	16.0	8.4	6.6	15.8	7.3	6.5		10.1			9.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	48.1	2.0	0.1	1.8	0.3	0.0		0.5			0.3	
Delay (s)	64.0	10.5	6.7	17.7	7.5	6.5		10.5			10.2	
Level of Service	E	B	A	B	A	A		B			B	
Approach Delay (s)		11.3			7.5			10.5			10.2	
Approach LOS		B			A			B			B	

Intersection Summary				
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.51			
Actuated Cycle Length (s)	32.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	36.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	33	31	12	199	458	52
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	34	13	216	498	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	768	526	554			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	768	526	554			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	94	99			
cM capacity (veh/h)	365	552	1016			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	70	13	216	554
Volume Left	36	13	0	0
Volume Right	34	0	0	57
cSH	436	1016	1700	1700
Volume to Capacity	0.16	0.01	0.13	0.33
Queue Length 95th (ft)	14	1	0	0
Control Delay (s)	14.8	8.6	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.8	0.5		0.0
Approach LOS	B			

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	37.7%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	1	6	0	0	4	4	194	0	3	440	8
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	1	7	0	0	4	4	211	0	3	478	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	713	709	483	716	713	211	487			211		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	713	709	483	716	713	211	487			211		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	99	100	100	99	100			100		
cM capacity (veh/h)	343	357	584	339	355	829	1076			1360		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	18	4	215	490
Volume Left	11	0	4	3
Volume Right	7	4	0	9
cSH	403	829	1076	1360
Volume to Capacity	0.05	0.01	0.00	0.00
Queue Length 95th (ft)	4	0	0	0
Control Delay (s)	14.4	9.4	0.2	0.1
Lane LOS	B	A	A	A
Approach Delay (s)	14.4	9.4	0.2	0.1
Approach LOS	B	A		

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	39.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	198	414	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	215	450	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	665	450	450			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	665	450	450			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	425	609	1110			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	215	450
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1110	1700
Volume to Capacity	0.00	0.00	0.26
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	25.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	13	35	131	27	73	350
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	38	142	29	79	380
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	696	157			172	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	696	157			172	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	96			94	
cM capacity (veh/h)	385	888			1405	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	52	172	79	380
Volume Left	14	0	79	0
Volume Right	38	29	0	0
cSH	656	1700	1405	1700
Volume to Capacity	0.08	0.10	0.06	0.22
Queue Length 95th (ft)	6	0	4	0
Control Delay (s)	11.0	0.0	7.7	0.0
Lane LOS	B		A	
Approach Delay (s)	11.0	0.0	1.3	
Approach LOS	B			

Intersection Summary				
Average Delay			1.7	
Intersection Capacity Utilization			28.4%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	54	76	53	114	306	36
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	83	58	124	333	39
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	591	352	372			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	591	352	372			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	88	95			
cM capacity (veh/h)	447	691	1187			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	141	58	124	372
Volume Left	59	58	0	0
Volume Right	83	0	0	39
cSH	1075	1187	1700	1700
Volume to Capacity	0.13	0.05	0.07	0.22
Queue Length 95th (ft)	11	4	0	0
Control Delay (s)	12.3	8.2	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	12.3	2.6		0.0
Approach LOS	B			

Intersection Summary				
Average Delay			3.2	
Intersection Capacity Utilization			35.0%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	96	1555	1233	164	169	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.98		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3477		1762	1504
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3477		1762	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	1690	1340	178	184	134
RTOR Reduction (vph)	0	0	16	0	5	96
Lane Group Flow (vph)	104	1690	1502	0	192	25
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	4.0	35.1	27.1		11.1	11.1
Effective Green, g (s)	4.0	35.1	27.1		11.1	11.1
Actuated g/C Ratio	0.07	0.65	0.50		0.20	0.20
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	130	2291	1738		360	308
v/s Ratio Prot	0.06	c0.48	c0.43		c0.11	
v/s Ratio Perm						0.02
v/c Ratio	0.80	0.74	0.86		0.53	0.08
Uniform Delay, d1	24.7	6.4	11.9		19.2	17.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	28.6	1.3	4.7		1.5	0.1
Delay (s)	53.3	7.7	16.7		20.8	17.5
Level of Service	D	A	B		C	B
Approach Delay (s)		10.4	16.7		19.5	
Approach LOS		B	B		B	

Intersection Summary				
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	54.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	66.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	1552	112	457	1295	40	87	9	526	5	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.99	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1701	1583	1681	1748	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.99	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1701	1583	1681	1748	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	1687	122	497	1408	43	95	10	572	5	3	4
RTOR Reduction (vph)	0	0	69	0	0	18	0	0	278	0	0	0
Lane Group Flow (vph)	61	1687	53	497	1408	25	52	53	294	4	4	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	4.0	28.8	28.8	14.2	39.0	39.0	6.0	6.0	20.2	1.0	1.0	1.0
Effective Green, g (s)	4.0	28.8	28.8	14.2	39.0	39.0	6.0	6.0	20.2	1.0	1.0	1.0
Actuated g/C Ratio	0.06	0.44	0.44	0.22	0.59	0.59	0.09	0.09	0.31	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	208	2218	690	738	3004	935	152	154	580	25	26	23
v/s Ratio Prot	0.02	c0.33		c0.14	0.28		0.03	0.03	c0.11	0.00	0.00	
v/s Ratio Perm			0.03			0.02			0.08			c0.00
v/c Ratio	0.29	0.76	0.08	0.67	0.47	0.03	0.34	0.34	0.51	0.16	0.15	0.17
Uniform Delay, d1	29.6	15.7	10.8	23.8	7.6	5.6	28.1	28.2	18.8	32.1	32.1	32.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	1.6	0.0	2.4	0.1	0.0	1.3	1.3	0.7	3.0	2.7	3.6
Delay (s)	30.4	17.3	10.9	26.2	7.8	5.6	29.5	29.5	19.5	35.1	34.8	35.7
Level of Service	C	B	B	C	A	A	C	C	B	D	C	D
Approach Delay (s)		17.3			12.4			21.1			35.2	
Approach LOS		B			B			C			D	

Intersection Summary				
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	75.9%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	1423	579	82	1087	15	675	32	84	19	19	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	1547	629	89	1182	16	734	35	91	21	21	67
RTOR Reduction (vph)	0	0	220	0	0	10	0	0	63	0	0	62
Lane Group Flow (vph)	87	1547	409	89	1182	6	734	35	28	21	21	5
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	4.5	26.5	44.5	3.0	25.0	25.0	18.0	18.0	21.0	5.0	5.0	5.0
Effective Green, g (s)	4.5	26.5	44.5	3.0	25.0	25.0	18.0	18.0	21.0	5.0	5.0	5.0
Actuated g/C Ratio	0.07	0.39	0.65	0.04	0.36	0.36	0.26	0.26	0.31	0.07	0.07	0.07
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	116	1967	1028	150	1855	577	902	489	577	129	135	115
v/s Ratio Prot	c0.05	c0.30	0.10	0.03	0.23		c0.21	0.02	0.00	c0.01	0.01	
v/s Ratio Perm			0.15			0.00			0.02			0.00
v/c Ratio	0.75	0.79	0.40	0.59	0.64	0.01	0.81	0.07	0.05	0.16	0.16	0.04
Uniform Delay, d1	31.4	18.5	5.7	32.2	18.0	13.9	23.7	19.0	16.7	29.8	29.8	29.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	23.5	3.3	0.3	6.2	0.7	0.0	5.7	0.1	0.0	0.6	0.5	0.2
Delay (s)	54.9	21.8	5.9	38.3	18.7	13.9	29.4	19.0	16.8	30.4	30.3	29.7
Level of Service	D	C	A	D	B	B	C	B	B	C	C	C
Approach Delay (s)		18.6			20.0			27.6			29.9	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	68.5	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	66.8%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	500	430	3	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	543	467	3	1	5
RTOR Reduction (vph)	0	0	0	2	0	3
Lane Group Flow (vph)	4	543	467	1	1	2
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	0.7	20.3	15.6	15.6	16.3	17.0
Effective Green, g (s)	0.7	20.3	15.6	15.6	16.3	17.0
Actuated g/C Ratio	0.02	0.46	0.35	0.35	0.37	0.38
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	53	847	651	553	646	745
v/s Ratio Prot	0.00	c0.29	0.25		0.00	c0.00
v/s Ratio Perm				0.00		0.00
v/c Ratio	0.08	0.64	0.72	0.00	0.00	0.00
Uniform Delay, d1	21.6	9.3	12.6	9.4	9.0	8.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	1.7	3.8	0.0	0.0	0.0
Delay (s)	22.2	11.0	16.4	9.4	9.0	8.5
Level of Service	C	B	B	A	A	A
Approach Delay (s)		11.1	16.3		8.6	
Approach LOS		B	B		A	

Intersection Summary				
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.40			
Actuated Cycle Length (s)	44.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	36.3%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	462	0	2	412	92	1	2	7	127	2	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	1863		1770	1863	1583		1672			1775	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (perm)	1770	1863		1770	1863	1583		1672			1775	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	502	0	2	448	100	1	2	8	138	2	73
RTOR Reduction (vph)	0	0	0	0	0	67	0	6	0	0	0	64
Lane Group Flow (vph)	62	502	0	2	448	33	0	5	0	0	140	9
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	2.9	24.4		0.7	22.2	22.2		17.1			8.5	8.5
Effective Green, g (s)	2.9	24.4		0.7	22.2	22.2		17.1			8.5	8.5
Actuated g/C Ratio	0.04	0.37		0.01	0.33	0.33		0.26			0.13	0.13
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	76	681		18	620	526		428			226	201
v/s Ratio Prot	c0.04	c0.27		0.00	0.24			c0.00			c0.08	
v/s Ratio Perm						0.02						0.01
v/c Ratio	0.82	0.74		0.11	0.72	0.06		0.01			0.62	0.05
Uniform Delay, d1	31.6	18.4		32.7	19.5	15.2		18.5			27.6	25.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	46.7	4.2		2.7	4.2	0.1		0.1			5.0	0.1
Delay (s)	78.3	22.5		35.4	23.7	15.2		18.5			32.6	25.6
Level of Service	E	C		D	C	B		B			C	C
Approach Delay (s)		28.7			22.2			18.5			30.2	
Approach LOS		C			C			B			C	

Intersection Summary				
HCM 2000 Control Delay	26.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.50			
Actuated Cycle Length (s)	66.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	51.5%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	183	406	7	4	320	5	6	0	4	0	0	187
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	199	441	8	4	348	5	7	0	4	0	0	203
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	353			449			1403	1205	445	1203	1206	351
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	353			449			1403	1205	445	1203	1206	351
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	83			100			91	100	99	100	100	71
cM capacity (veh/h)	1205			1111			72	153	613	139	153	693

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	199	449	4	353	11	0	203
Volume Left	199	0	4	0	7	0	0
Volume Right	0	8	0	5	4	0	203
cSH	1205	1700	1111	1700	112	1700	693
Volume to Capacity	0.17	0.26	0.00	0.21	0.10	0.00	0.29
Queue Length 95th (ft)	15	0	0	0	8	0	31
Control Delay (s)	8.6	0.0	8.3	0.0	40.7	0.0	12.3
Lane LOS	A		A		E	A	B
Approach Delay (s)	2.6		0.1		40.7	12.3	
Approach LOS					E	B	

Intersection Summary				
Average Delay	3.8			
Intersection Capacity Utilization	42.1%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	282	89	2	258	19	57	20	10	24	21	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.98	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1776			1757	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.82			0.91	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1511			1623	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	307	97	2	280	21	62	22	11	26	23	20
RTOR Reduction (vph)	0	0	70	0	0	15	0	6	0	0	12	0
Lane Group Flow (vph)	18	307	27	2	280	6	0	89	0	0	57	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	0.6	11.3	11.3	0.6	11.3	11.3		16.7			16.7	
Effective Green, g (s)	0.6	11.3	11.3	0.6	11.3	11.3		16.7			16.7	
Actuated g/C Ratio	0.01	0.28	0.28	0.01	0.28	0.28		0.41			0.41	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	26	518	440	26	518	440		621			667	
v/s Ratio Prot	c0.01	c0.16		0.00	0.15							
v/s Ratio Perm			0.02			0.00		c0.06			0.04	
v/c Ratio	0.69	0.59	0.06	0.08	0.54	0.01		0.14			0.09	
Uniform Delay, d1	19.9	12.7	10.8	19.7	12.4	10.6		7.5			7.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	57.6	1.8	0.1	1.3	1.2	0.0		0.5			0.3	
Delay (s)	77.5	14.5	10.8	21.0	13.6	10.6		8.0			7.5	
Level of Service	E	B	B	C	B	B		A			A	
Approach Delay (s)		16.3			13.4			8.0			7.5	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.33			
Actuated Cycle Length (s)	40.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	29.6%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	9	14	6	162	350	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	15	7	176	380	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	577	388	395			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	577	388	395			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	99			
cM capacity (veh/h)	476	661	1164			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	25	7	176	395
Volume Left	10	7	0	0
Volume Right	15	0	0	14
cSH	574	1164	1700	1700
Volume to Capacity	0.04	0.01	0.10	0.23
Queue Length 95th (ft)	3	0	0	0
Control Delay (s)	11.6	8.1	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	11.6	0.3		0.0
Approach LOS	B			

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	29.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	0	3	0	0	4	1	241	0	2	280	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	0	3	0	0	4	1	262	0	2	304	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	585	580	312	584	588	262	320			262		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	585	580	312	584	588	262	320			262		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	100	100	100	99	100			100		
cM capacity (veh/h)	419	424	728	421	420	777	1240			1302		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	13	4	263	322
Volume Left	10	0	1	2
Volume Right	3	4	0	15
cSH	469	777	1240	1302
Volume to Capacity	0.03	0.01	0.00	0.00
Queue Length 95th (ft)	2	0	0	0
Control Delay (s)	12.9	9.7	0.0	0.1
Lane LOS	B	A	A	A
Approach Delay (s)	12.9	9.7	0.0	0.1
Approach LOS	B	A		

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	31.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	4	1	218	289	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	4	1	237	314	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	554	315	316			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	554	315	316			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	493	725	1244			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	4	238	316
Volume Left	0	1	0
Volume Right	4	0	2
cSH	725	1244	1700
Volume to Capacity	0.01	0.00	0.19
Queue Length 95th (ft)	0	0	0
Control Delay (s)	10.0	0.0	0.0
Lane LOS	A	A	
Approach Delay (s)	10.0	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay	0.1			
Intersection Capacity Utilization	25.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	15	37	164	17	39	225
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	40	178	18	42	245
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	517	188			197	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	517	188			197	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	95			97	
cM capacity (veh/h)	503	855			1376	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	57	197	42	245
Volume Left	16	0	42	0
Volume Right	40	18	0	0
cSH	711	1700	1376	1700
Volume to Capacity	0.08	0.12	0.03	0.14
Queue Length 95th (ft)	6	0	2	0
Control Delay (s)	10.5	0.0	7.7	0.0
Lane LOS	B		A	
Approach Delay (s)	10.5	0.0	1.1	
Approach LOS	B			

Intersection Summary				
Average Delay			1.7	
Intersection Capacity Utilization			26.3%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	30	49	39	134	196	33
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	53	42	146	213	36
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	461	231	249			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	461	231	249			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	93	97			
cM capacity (veh/h)	540	808	1317			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	86	42	146	249
Volume Left	33	42	0	0
Volume Right	53	0	0	36
cSH	1303	1317	1700	1700
Volume to Capacity	0.07	0.03	0.09	0.15
Queue Length 95th (ft)	5	2	0	0
Control Delay (s)	10.6	7.8	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	10.6	1.8		0.0
Approach LOS	B			

Intersection Summary				
Average Delay			2.4	
Intersection Capacity Utilization			29.0%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	54	1200	2028	141	94	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.99		0.93	0.85
Flt Protected	0.95	1.00	1.00		0.97	1.00
Satd. Flow (prot)	1770	3539	3505		1692	1504
Flt Permitted	0.95	1.00	1.00		0.97	1.00
Satd. Flow (perm)	1770	3539	3505		1692	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	1304	2204	153	102	253
RTOR Reduction (vph)	0	0	5	0	33	69
Lane Group Flow (vph)	59	1304	2352	0	150	103
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	3.1	65.4	58.3		12.1	12.1
Effective Green, g (s)	3.1	65.4	58.3		12.1	12.1
Actuated g/C Ratio	0.04	0.76	0.68		0.14	0.14
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	64	2707	2389		239	212
v/s Ratio Prot	c0.03	0.37	c0.67		c0.09	
v/s Ratio Perm						0.07
v/c Ratio	0.92	0.48	0.98		0.63	0.49
Uniform Delay, d1	41.1	3.7	13.2		34.6	33.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	84.8	0.1	14.8		5.0	1.8
Delay (s)	125.9	3.9	28.0		39.6	35.6
Level of Service	F	A	C		D	D
Approach Delay (s)		9.2	28.0		37.7	
Approach LOS		A	C		D	

Intersection Summary				
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	85.5	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	77.2%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1238	63	449	1870	13	203	5	540	3	3	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1689	1583	1681	1770	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1689	1583	1681	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	1346	68	488	2033	14	221	5	587	3	3	0
RTOR Reduction (vph)	0	0	40	0	0	5	0	0	218	0	0	0
Lane Group Flow (vph)	5	1346	28	488	2033	9	113	113	369	3	3	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	0.9	30.6	30.6	15.8	45.5	45.5	10.3	10.3	26.1	0.9	0.9	
Effective Green, g (s)	0.9	30.6	30.6	15.8	45.5	45.5	10.3	10.3	26.1	0.9	0.9	
Actuated g/C Ratio	0.01	0.42	0.42	0.21	0.62	0.62	0.14	0.14	0.35	0.01	0.01	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	41	2114	658	736	3143	978	235	236	647	20	21	
v/s Ratio Prot	0.00	0.26		c0.14	c0.40		0.07	0.07	c0.12	c0.00	0.00	
v/s Ratio Perm			0.02			0.01			0.11			
v/c Ratio	0.12	0.64	0.04	0.66	0.65	0.01	0.48	0.48	0.57	0.15	0.14	
Uniform Delay, d1	36.0	17.1	12.8	26.5	8.9	5.4	29.2	29.2	19.2	36.0	36.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.3	0.6	0.0	2.3	0.5	0.0	1.6	1.5	1.2	3.5	3.1	
Delay (s)	37.3	17.7	12.8	28.7	9.4	5.4	30.7	30.7	20.4	39.4	39.1	
Level of Service	D	B	B	C	A	A	C	C	C	D	D	
Approach Delay (s)		17.6			13.1			23.3			39.3	
Approach LOS		B			B			C			D	

Intersection Summary				
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	70.7%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	943	774	114	1208	10	1083	33	162	5	9	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	77	1025	841	124	1313	11	1177	36	176	5	10	39
RTOR Reduction (vph)	0	0	261	0	0	8	0	0	97	0	0	37
Lane Group Flow (vph)	77	1025	580	124	1313	3	1177	36	79	5	10	2
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	4.0	23.1	53.2	5.0	24.1	24.1	30.1	30.1	35.1	3.6	3.6	3.6
Effective Green, g (s)	4.0	23.1	53.2	5.0	24.1	24.1	30.1	30.1	35.1	3.6	3.6	3.6
Actuated g/C Ratio	0.05	0.30	0.68	0.06	0.31	0.31	0.39	0.39	0.45	0.05	0.05	0.05
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	91	1509	1082	220	1575	490	1328	720	795	81	86	73
v/s Ratio Prot	c0.04	0.20	0.21	0.04	c0.26		c0.34	0.02	0.01	0.00	c0.01	
v/s Ratio Perm			0.16			0.00			0.04			0.00
v/c Ratio	0.85	0.68	0.54	0.56	0.83	0.01	0.89	0.05	0.10	0.06	0.12	0.02
Uniform Delay, d1	36.6	24.1	6.1	35.3	25.0	18.6	22.3	14.9	12.3	35.5	35.6	35.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	47.9	1.2	0.5	3.3	4.0	0.0	7.5	0.0	0.1	0.3	0.6	0.1
Delay (s)	84.5	25.3	6.7	38.6	28.9	18.6	29.7	14.9	12.3	35.8	36.2	35.6
Level of Service	F	C	A	D	C	B	C	B	B	D	D	D
Approach Delay (s)		19.6			29.7			27.1			35.7	
Approach LOS		B			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	77.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	74.8%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	302	578	856	277	116	356
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	328	628	930	301	126	387
RTOR Reduction (vph)	0	0	0	132	0	86
Lane Group Flow (vph)	328	628	930	169	126	301
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	8.2	51.6	39.4	39.4	10.4	18.6
Effective Green, g (s)	8.2	51.6	39.4	39.4	10.4	18.6
Actuated g/C Ratio	0.12	0.74	0.56	0.56	0.15	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	402	1373	1048	891	262	511
v/s Ratio Prot	c0.10	0.34	c0.50		0.07	c0.07
v/s Ratio Perm				0.11		0.12
v/c Ratio	0.82	0.46	0.89	0.19	0.48	0.59
Uniform Delay, d1	30.2	3.6	13.4	7.5	27.3	22.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.1	0.2	9.2	0.1	1.4	1.7
Delay (s)	42.2	3.9	22.6	7.6	28.7	24.1
Level of Service	D	A	C	A	C	C
Approach Delay (s)		17.0	18.9		25.2	
Approach LOS		B	B		C	

Intersection Summary				
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	73.8%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	113	592	0	3	881	171	3	1	1	130	0	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97			0.95	1.00
Satd. Flow (prot)	1770	1863		1770	1863	1583		1760			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97			0.95	1.00
Satd. Flow (perm)	1770	1863		1770	1863	1583		1760			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	643	0	3	958	186	3	1	1	141	0	266
RTOR Reduction (vph)	0	0	0	0	0	53	0	1	0	0	0	227
Lane Group Flow (vph)	123	643	0	3	958	133	0	4	0	0	141	39
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	5.0	44.6		0.7	40.3	40.3		5.8			11.5	11.5
Effective Green, g (s)	5.0	44.6		0.7	40.3	40.3		5.8			11.5	11.5
Actuated g/C Ratio	0.06	0.57		0.01	0.51	0.51		0.07			0.15	0.15
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	112	1057		15	955	811		129			258	231
v/s Ratio Prot	c0.07	0.35		0.00	c0.51			c0.00			c0.08	
v/s Ratio Perm						0.08						0.02
v/c Ratio	1.10	0.61		0.20	1.00	0.16		0.03			0.55	0.17
Uniform Delay, d1	36.8	11.2		38.7	19.1	10.2		33.8			31.1	29.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	113.9	1.0		6.5	29.9	0.1		0.1			2.4	0.3
Delay (s)	150.7	12.2		45.2	49.0	10.3		33.9			33.5	29.7
Level of Service	F	B		D	D	B		C			C	C
Approach Delay (s)		34.5			42.7			33.9			31.0	
Approach LOS		C			D			C			C	

Intersection Summary				
HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	78.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	74.9%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	163	561	7	7	729	3	11	1	3	7	2	353
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	177	610	8	8	792	3	12	1	3	8	2	384
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	796			617			2160	1779	614	1777	1781	794
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	796			617			2160	1779	614	1777	1781	794
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	79			99			0	98	99	85	97	1
cM capacity (veh/h)	826			963			0	64	492	52	64	388

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	177	617	8	796	16	10	384
Volume Left	177	0	8	0	12	8	0
Volume Right	0	8	0	3	3	0	384
cSH	826	1700	963	1700	0	54	388
Volume to Capacity	0.21	0.36	0.01	0.47	38.45	0.18	0.99
Queue Length 95th (ft)	20	0	1	0	Err	15	293
Control Delay (s)	10.5	0.0	8.8	0.0	Err	85.0	76.1
Lane LOS	B		A		F	F	F
Approach Delay (s)	2.4		0.1		Err	76.3	
Approach LOS					F	F	

Intersection Summary				
Average Delay	97.1			
Intersection Capacity Utilization	73.7%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	505	35	2	556	64	117	33	5	69	25	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00			0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96			0.98	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1788			1721	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.73			0.84	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1351			1472	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	549	38	2	604	70	127	36	5	75	27	73
RTOR Reduction (vph)	0	0	22	0	0	40	0	2	0	0	43	0
Lane Group Flow (vph)	15	549	16	2	604	30	0	166	0	0	132	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	0.5	17.8	17.8	0.5	17.8	17.8		10.9			10.9	
Effective Green, g (s)	0.5	17.8	17.8	0.5	17.8	17.8		10.9			10.9	
Actuated g/C Ratio	0.01	0.43	0.43	0.01	0.43	0.43		0.26			0.26	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	21	804	683	21	804	683		357			389	
v/s Ratio Prot	c0.01	0.29		0.00	c0.32							
v/s Ratio Perm			0.01			0.02		c0.12			0.09	
v/c Ratio	0.71	0.68	0.02	0.10	0.75	0.04		0.46			0.34	
Uniform Delay, d1	20.3	9.4	6.7	20.1	9.8	6.8		12.7			12.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	75.0	2.4	0.0	2.0	4.0	0.0		1.0			0.5	
Delay (s)	95.3	11.8	6.7	22.1	13.8	6.8		13.7			12.8	
Level of Service	F	B	A	C	B	A		B			B	
Approach Delay (s)		13.6			13.1			13.7			12.8	
Approach LOS		B			B			B			B	

Intersection Summary				
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	41.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	50.3%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	4	6	602	516	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	4	7	654	561	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1234	566	572			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1234	566	572			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	194	523	1001			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	11	7	654	572
Volume Left	7	7	0	0
Volume Right	4	0	0	11
cSH	259	1001	1700	1700
Volume to Capacity	0.04	0.01	0.38	0.34
Queue Length 95th (ft)	3	0	0	0
Control Delay (s)	19.5	8.6	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	19.5	0.1		0.0
Approach LOS	C			

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	41.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	0	11	0	0	1	7	577	1	11	478	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	0	12	0	0	1	8	627	1	12	520	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1193	1193	526	1204	1198	628	532			628		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1193	1193	526	1204	1198	628	532			628		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	100	98	100	100	100	99			99		
cM capacity (veh/h)	161	183	552	155	182	483	1036			954		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	32	1	636	543
Volume Left	20	0	8	12
Volume Right	12	1	1	12
cSH	220	483	1036	954
Volume to Capacity	0.14	0.00	0.01	0.01
Queue Length 95th (ft)	12	0	1	1
Control Delay (s)	24.1	12.5	0.2	0.4
Lane LOS	C	B	A	A
Approach Delay (s)	24.1	12.5	0.2	0.4
Approach LOS	C	B		

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	48.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	147	32	76	410	199	344
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	160	35	83	446	216	374
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1014	403	590			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1014	403	590			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	34	95	92			
cM capacity (veh/h)	242	647	985			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	195	528	590
Volume Left	160	83	0
Volume Right	35	0	374
cSH	273	985	1700
Volume to Capacity	0.71	0.08	0.35
Queue Length 95th (ft)	124	7	0
Control Delay (s)	45.4	2.3	0.0
Lane LOS	E	A	
Approach Delay (s)	45.4	2.3	0.0
Approach LOS	E		

Intersection Summary				
Average Delay	7.6			
Intersection Capacity Utilization	77.5%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	26	71	405	12	18	140
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	77	440	13	20	152
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	638	447			453	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	638	447			453	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	87			98	
cM capacity (veh/h)	433	612			1107	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	105	453	20	152
Volume Left	28	0	20	0
Volume Right	77	13	0	0
cSH	551	1700	1107	1700
Volume to Capacity	0.19	0.27	0.02	0.09
Queue Length 95th (ft)	18	0	1	0
Control Delay (s)	13.1	0.0	8.3	0.0
Lane LOS	B		A	
Approach Delay (s)	13.1	0.0	0.9	
Approach LOS	B			

Intersection Summary				
Average Delay		2.1		
Intersection Capacity Utilization		34.5%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	92	52	68	299	142	101
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	100	57	74	325	154	110
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	682	209	264			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	682	209	264			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	74	93	94			
cM capacity (veh/h)	392	831	1300			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	157	74	325	264
Volume Left	100	74	0	0
Volume Right	57	0	0	110
cSH	613	1300	1700	1700
Volume to Capacity	0.26	0.06	0.19	0.16
Queue Length 95th (ft)	25	5	0	0
Control Delay (s)	14.5	7.9	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.5	1.5		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		3.5		
Intersection Capacity Utilization		32.5%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	164	2290	1803	183	205	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.99		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3490		1761	1504
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3490		1761	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	2489	1960	199	223	171
RTOR Reduction (vph)	0	0	8	0	3	128
Lane Group Flow (vph)	178	2489	2151	0	237	26
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	9.0	66.0	53.0		14.8	14.8
Effective Green, g (s)	9.0	66.0	53.0		14.8	14.8
Actuated g/C Ratio	0.10	0.74	0.60		0.17	0.17
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	179	2630	2082		293	250
v/s Ratio Prot	0.10	c0.70	c0.62		c0.13	
v/s Ratio Perm						0.02
v/c Ratio	0.99	0.95	1.03		0.81	0.10
Uniform Delay, d1	39.9	9.9	17.9		35.6	31.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	65.3	8.2	28.8		15.0	0.2
Delay (s)	105.2	18.0	46.7		50.6	31.6
Level of Service	F	B	D		D	C
Approach Delay (s)		23.8	46.7		43.2	
Approach LOS		C	D		D	

Intersection Summary				
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	89.3%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	2337	128	583	1867	6	113	2	730	8	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1688	1583	1681	1713	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1688	1583	1681	1713	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	2540	139	634	2029	7	123	2	793	9	2	1
RTOR Reduction (vph)	0	0	66	0	0	2	0	0	125	0	0	0
Lane Group Flow (vph)	5	2540	73	634	2029	5	63	62	668	5	6	1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.1	70.5	70.5	35.1	104.5	104.5	10.2	10.2	45.3	2.5	2.5	2.5
Effective Green, g (s)	1.1	70.5	70.5	35.1	104.5	104.5	10.2	10.2	45.3	2.5	2.5	2.5
Actuated g/C Ratio	0.01	0.52	0.52	0.26	0.78	0.78	0.08	0.08	0.34	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	28	2669	830	897	3956	1231	127	128	581	31	31	29
v/s Ratio Prot	0.00	c0.50		0.18	0.40		0.04	0.04	c0.30	0.00	c0.00	
v/s Ratio Perm			0.05			0.00			0.12			0.00
v/c Ratio	0.18	0.95	0.09	0.71	0.51	0.00	0.50	0.48	1.15	0.16	0.19	0.03
Uniform Delay, d1	66.2	30.3	15.9	44.9	5.5	3.3	59.6	59.5	44.5	64.9	64.9	64.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	8.7	0.0	2.6	0.1	0.0	3.0	2.9	85.9	2.4	3.0	0.5
Delay (s)	69.2	39.0	15.9	47.5	5.6	3.3	62.6	62.4	130.4	67.3	67.9	65.2
Level of Service	E	D	B	D	A	A	E	E	F	E	E	E
Approach Delay (s)		37.9			15.6			121.1			67.5	
Approach LOS		D			B			F			E	

Intersection Summary				
HCM 2000 Control Delay	40.6	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.05			
Actuated Cycle Length (s)	134.3	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	103.7%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	113	1738	1240	143	1224	25	1146	26	150	29	32	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	1889	1348	155	1330	27	1246	28	163	32	35	86
RTOR Reduction (vph)	0	0	110	0	0	18	0	0	87	0	0	81
Lane Group Flow (vph)	123	1889	1238	155	1330	9	1246	28	76	32	35	5
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	13.1	52.0	110.0	8.0	46.9	46.9	58.0	58.0	66.0	8.1	8.1	8.1
Effective Green, g (s)	13.1	52.0	110.0	8.0	46.9	46.9	58.0	58.0	66.0	8.1	8.1	8.1
Actuated g/C Ratio	0.09	0.37	0.77	0.06	0.33	0.33	0.41	0.41	0.46	0.06	0.06	0.06
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	163	1860	1225	193	1678	522	1401	760	779	100	106	90
v/s Ratio Prot	c0.07	c0.37	c0.41	0.05	0.26		0.36	0.02	0.01	0.02	c0.02	
v/s Ratio Perm			0.37			0.01			0.04			0.00
v/c Ratio	0.75	1.02	1.01	0.80	0.79	0.02	0.89	0.04	0.10	0.32	0.33	0.05
Uniform Delay, d1	62.9	45.0	16.0	66.3	43.2	32.1	39.1	25.3	21.3	64.4	64.4	63.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	17.8	24.8	28.4	20.9	2.7	0.0	7.3	0.0	0.1	1.9	1.8	0.3
Delay (s)	80.8	69.9	44.5	87.2	45.8	32.1	46.3	25.3	21.4	66.2	66.2	63.6
Level of Service	F	E	D	F	D	C	D	C	C	E	E	E
Approach Delay (s)		60.1			49.8			43.1			64.8	
Approach LOS		E			D			D			E	

Intersection Summary				
HCM 2000 Control Delay	54.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.96			
Actuated Cycle Length (s)	142.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	94.2%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	84	1287	924	46	67	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	1399	1004	50	73	118
RTOR Reduction (vph)	0	0	0	14	0	101
Lane Group Flow (vph)	91	1399	1004	36	73	17
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	4.0	73.3	65.3	65.3	9.1	13.1
Effective Green, g (s)	4.0	73.3	65.3	65.3	9.1	13.1
Actuated g/C Ratio	0.04	0.81	0.72	0.72	0.10	0.14
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	151	1510	1345	1143	178	299
v/s Ratio Prot	0.03	c0.75	0.54		c0.04	0.00
v/s Ratio Perm				0.02		0.01
v/c Ratio	0.60	0.93	0.75	0.03	0.41	0.06
Uniform Delay, d1	42.4	6.5	7.6	3.6	38.1	33.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.6	10.0	2.3	0.0	1.5	0.1
Delay (s)	49.0	16.5	9.9	3.6	39.7	33.4
Level of Service	D	B	A	A	D	C
Approach Delay (s)		18.5	9.6		35.8	
Approach LOS		B	A		D	

Intersection Summary				
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	78.1%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	106	1209	1	5	842	159	1	3	18	275	5	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	1863		1770	1863	1583		1650			1775	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (perm)	1770	1863		1770	1863	1583		1650			1775	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	115	1314	1	5	915	173	1	3	20	299	5	112
RTOR Reduction (vph)	0	0	0	0	0	37	0	19	0	0	0	80
Lane Group Flow (vph)	115	1315	0	5	915	136	0	5	0	0	304	32
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	10.0	93.1		0.8	83.9	83.9		6.4			21.0	21.0
Effective Green, g (s)	10.0	93.1		0.8	83.9	83.9		6.4			21.0	21.0
Actuated g/C Ratio	0.07	0.68		0.01	0.61	0.61		0.05			0.15	0.15
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	128	1263		10	1138	967		76			271	242
v/s Ratio Prot	c0.06	c0.71		0.00	0.49			c0.00			c0.17	
v/s Ratio Perm						0.09						0.02
v/c Ratio	0.90	1.04		0.50	0.80	0.14		0.06			1.12	0.13
Uniform Delay, d1	63.1	22.1		68.1	20.4	11.4		62.6			58.2	50.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	49.3	36.7		34.4	4.2	0.1		0.4			91.5	0.2
Delay (s)	112.5	58.8		102.4	24.6	11.4		62.9			149.6	50.5
Level of Service	F	E		F	C	B		E			F	D
Approach Delay (s)		63.1			22.9			62.9			122.9	
Approach LOS		E			C			E			F	

Intersection Summary				
HCM 2000 Control Delay	56.7	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.01			
Actuated Cycle Length (s)	137.3	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	99.2%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	331	1118	14	3	836	11	6	1	3	9	1	189
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	360	1215	15	3	909	12	7	1	3	10	1	205
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	921			1230			3064	2870	1223	2860	2871	915
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	921			1230			3064	2870	1223	2860	2871	915
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	51			99			0	87	99	0	87	38
cM capacity (veh/h)	742			566			2	8	219	6	8	331

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	360	1230	3	921	11	11	205
Volume Left	360	0	3	0	7	10	0
Volume Right	0	15	0	12	3	0	205
cSH	742	1700	566	1700	3	6	331
Volume to Capacity	0.49	0.72	0.01	0.54	4.22	1.79	0.62
Queue Length 95th (ft)	67	0	0	0	Err	59	98
Control Delay (s)	14.3	0.0	11.4	0.0	Err	1489.0	32.2
Lane LOS	B		B		F	F	D
Approach Delay (s)	3.2		0.0		Err	105.4	
Approach LOS					F	F	

Intersection Summary				
Average Delay	49.9			
Intersection Capacity Utilization	78.8%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	950	121	3	757	71	69	38	22	92	25	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.97	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1772			1765	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.79			0.73	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1434			1331	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	1033	132	3	823	77	75	41	24	100	27	23
RTOR Reduction (vph)	0	0	26	0	0	30	0	10	0	0	8	0
Lane Group Flow (vph)	29	1033	106	3	823	47	0	130	0	0	142	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.3	40.8	40.8	0.6	40.1	40.1		12.0			12.0	
Effective Green, g (s)	1.3	40.8	40.8	0.6	40.1	40.1		12.0			12.0	
Actuated g/C Ratio	0.02	0.62	0.62	0.01	0.61	0.61		0.18			0.18	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	35	1162	987	16	1142	970		263			244	
v/s Ratio Prot	c0.02	c0.55		0.00	0.44							
v/s Ratio Perm			0.07			0.03		0.09			c0.11	
v/c Ratio	0.83	0.89	0.11	0.19	0.72	0.05		0.50			0.58	
Uniform Delay, d1	31.9	10.4	5.0	32.2	8.8	5.0		24.0			24.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	84.5	8.6	0.0	5.6	2.3	0.0		1.5			3.5	
Delay (s)	116.4	18.9	5.0	37.8	11.0	5.1		25.4			27.9	
Level of Service	F	B	A	D	B	A		C			C	
Approach Delay (s)		19.8			10.6			25.4			27.9	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	65.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	67.0%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	19	27	4	809	1017	28
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	29	4	879	1105	30
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2009	1121	1136			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2009	1121	1136			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	68	88	99			
cM capacity (veh/h)	65	251	615			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	50	4	879	1136
Volume Left	21	4	0	0
Volume Right	29	0	0	30
cSH	114	615	1700	1700
Volume to Capacity	0.44	0.01	0.52	0.67
Queue Length 95th (ft)	47	1	0	0
Control Delay (s)	58.9	10.9	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	58.9	0.1		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	0	16	1	0	4	20	816	0	2	1029	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	0	17	1	0	4	22	887	0	2	1118	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2064	2060	1125	2077	2066	887	1132			887		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2064	2060	1125	2077	2066	887	1132			887		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	69	100	93	97	100	99	96			100		
cM capacity (veh/h)	39	53	250	36	52	343	617			763		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	29	5	909	1134
Volume Left	12	1	22	2
Volume Right	17	4	0	13
cSH	77	126	617	763
Volume to Capacity	0.38	0.04	0.04	0.00
Queue Length 95th (ft)	37	3	3	0
Control Delay (s)	77.8	35.0	1.1	0.1
Lane LOS	F	D	A	A
Approach Delay (s)	77.8	35.0	1.1	0.1
Approach LOS	F	D		

Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	68.2%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	620	136	116	186	499	529
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	674	148	126	202	542	575
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1284	830	1117			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1284	830	1117			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	60	80			
cM capacity (veh/h)	145	370	625			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	822	328	1117
Volume Left	674	126	0
Volume Right	148	0	575
cSH	163	625	1700
Volume to Capacity	5.04	0.20	0.66
Queue Length 95th (ft)	Err	19	0
Control Delay (s)	Err	6.4	0.0
Lane LOS	F	A	
Approach Delay (s)	Err	6.4	0.0
Approach LOS	F		

Intersection Summary				
Average Delay	3624.7			
Intersection Capacity Utilization	127.5%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	14	33	317	22	71	487
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	36	345	24	77	529
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1040	357			368	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1040	357			368	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	95			94	
cM capacity (veh/h)	238	688			1190	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	51	368	77	529
Volume Left	15	0	77	0
Volume Right	36	24	0	0
cSH	440	1700	1190	1700
Volume to Capacity	0.12	0.22	0.06	0.31
Queue Length 95th (ft)	10	0	5	0
Control Delay (s)	14.2	0.0	8.2	0.0
Lane LOS	B		A	
Approach Delay (s)	14.2	0.0	1.0	
Approach LOS	B			

Intersection Summary				
Average Delay			1.3	
Intersection Capacity Utilization			35.6%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	142	95	42	110	380	171
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	154	103	46	120	413	186
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	717	506	599			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	717	506	599			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	59	82	95			
cM capacity (veh/h)	378	566	978			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	258	46	120	599
Volume Left	154	46	0	0
Volume Right	103	0	0	186
cSH	631	978	1700	1700
Volume to Capacity	0.41	0.05	0.07	0.35
Queue Length 95th (ft)	50	4	0	0
Control Delay (s)	17.7	8.9	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	17.7	2.4		0.0
Approach LOS	C			

Intersection Summary				
Average Delay			4.9	
Intersection Capacity Utilization			49.4%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	201	2354	1535	154	212	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.99		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3491		1765	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3491		1765	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	218	2559	1668	167	230	121
RTOR Reduction (vph)	0	0	8	0	2	91
Lane Group Flow (vph)	218	2559	1827	0	240	18
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	12.0	66.0	50.0		14.9	14.9
Effective Green, g (s)	12.0	66.0	50.0		14.9	14.9
Actuated g/C Ratio	0.13	0.74	0.56		0.17	0.17
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	238	2627	1963		295	252
v/s Ratio Prot	0.12	c0.72	0.52		c0.14	
v/s Ratio Perm						0.01
v/c Ratio	0.92	0.97	0.93		0.81	0.07
Uniform Delay, d1	38.0	10.7	17.9		35.6	31.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	36.1	12.1	8.6		15.5	0.1
Delay (s)	74.1	22.7	26.4		51.1	31.3
Level of Service	E	C	C		D	C
Approach Delay (s)		26.7	26.4		45.0	
Approach LOS		C	C		D	

Intersection Summary				
HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	88.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	85.7%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	2429	135	509	1545	8	116	4	656	6	3	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.98	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1690	1583	1681	1735	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.98	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1690	1583	1681	1735	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	2640	147	553	1679	9	126	4	713	7	3	3
RTOR Reduction (vph)	0	0	67	0	0	2	0	0	128	0	0	0
Lane Group Flow (vph)	2	2640	80	553	1679	7	66	64	585	5	5	3
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.1	73.6	73.6	32.1	104.6	104.6	10.4	10.4	42.5	2.5	2.5	2.5
Effective Green, g (s)	1.1	73.6	73.6	32.1	104.6	104.6	10.4	10.4	42.5	2.5	2.5	2.5
Actuated g/C Ratio	0.01	0.55	0.55	0.24	0.78	0.78	0.08	0.08	0.32	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	28	2780	865	818	3951	1230	129	130	546	31	32	29
v/s Ratio Prot	0.00	c0.52		0.16	0.33		0.04	0.04	c0.26	c0.00	0.00	
v/s Ratio Perm			0.05			0.00			0.11			0.00
v/c Ratio	0.07	0.95	0.09	0.68	0.42	0.01	0.51	0.49	1.07	0.16	0.16	0.10
Uniform Delay, d1	66.2	28.8	14.6	46.5	5.0	3.4	59.7	59.6	46.0	65.0	65.0	64.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	8.1	0.0	2.2	0.1	0.0	3.4	2.9	59.1	2.4	2.3	1.6
Delay (s)	67.3	36.9	14.6	48.8	5.1	3.4	63.1	62.5	105.1	67.5	67.3	66.5
Level of Service	E	D	B	D	A	A	E	E	F	E	E	E
Approach Delay (s)		35.7			15.8			98.6			67.2	
Approach LOS		D			B			F			E	

Intersection Summary				
HCM 2000 Control Delay	37.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.01			
Actuated Cycle Length (s)	134.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	100.9%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	1895	1108	121	1146	21	829	25	132	27	15	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	2060	1204	132	1246	23	901	27	143	29	16	64
RTOR Reduction (vph)	0	0	219	0	0	14	0	0	96	0	0	60
Lane Group Flow (vph)	97	2060	985	132	1246	9	901	27	47	29	16	4
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	7.0	39.0	65.1	4.0	36.0	36.0	26.1	26.1	30.1	5.8	5.8	5.8
Effective Green, g (s)	7.0	39.0	65.1	4.0	36.0	36.0	26.1	26.1	30.1	5.8	5.8	5.8
Actuated g/C Ratio	0.08	0.43	0.72	0.04	0.40	0.40	0.29	0.29	0.33	0.06	0.06	0.06
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	136	2181	1133	151	2013	626	985	534	593	112	118	101
v/s Ratio Prot	c0.05	c0.41	0.25	0.04	0.25		c0.26	0.01	0.00	c0.02	0.01	
v/s Ratio Perm			0.37			0.01			0.03			0.00
v/c Ratio	0.71	0.94	0.87	0.87	0.62	0.01	0.91	0.05	0.08	0.26	0.14	0.04
Uniform Delay, d1	41.0	24.9	9.7	43.2	22.0	16.7	31.3	23.4	20.9	40.5	40.2	39.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.2	9.3	7.3	38.9	0.6	0.0	12.6	0.0	0.1	1.2	0.5	0.2
Delay (s)	57.2	34.2	17.0	82.1	22.5	16.7	43.9	23.5	20.9	41.7	40.7	40.1
Level of Service	E	C	B	F	C	B	D	C	C	D	D	D
Approach Delay (s)		28.7			28.1			40.4			40.6	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	30.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	85.4%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	125	1164	724	45	76	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	1265	787	49	83	150
RTOR Reduction (vph)	0	0	0	19	0	116
Lane Group Flow (vph)	136	1265	787	30	83	34
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	7.1	54.0	42.9	42.9	9.1	16.2
Effective Green, g (s)	7.1	54.0	42.9	42.9	9.1	16.2
Actuated g/C Ratio	0.10	0.76	0.60	0.60	0.13	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	342	1414	1124	955	226	449
v/s Ratio Prot	0.04	c0.68	0.42		c0.05	0.01
v/s Ratio Perm				0.02		0.01
v/c Ratio	0.40	0.89	0.70	0.03	0.37	0.08
Uniform Delay, d1	30.0	6.4	9.7	5.7	28.4	21.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	7.7	2.0	0.0	1.0	0.1
Delay (s)	30.8	14.1	11.7	5.7	29.4	21.6
Level of Service	C	B	B	A	C	C
Approach Delay (s)		15.7	11.3		24.4	
Approach LOS		B	B		C	

Intersection Summary				
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	71.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	72.1%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	1112	1	5	675	117	1	2	20	248	0	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.88			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	1863		1770	1863	1583		1638			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (perm)	1770	1863		1770	1863	1583		1638			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	1209	1	5	734	127	1	2	22	270	0	104
RTOR Reduction (vph)	0	0	0	0	0	43	0	21	0	0	0	86
Lane Group Flow (vph)	117	1210	0	5	734	84	0	4	0	0	270	18
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	12.6	85.1		0.7	73.2	73.2		6.3			19.0	19.0
Effective Green, g (s)	12.6	85.1		0.7	73.2	73.2		6.3			19.0	19.0
Actuated g/C Ratio	0.10	0.67		0.01	0.58	0.58		0.05			0.15	0.15
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	175	1247		9	1072	911		81			264	236
v/s Ratio Prot	c0.07	c0.65		0.00	0.39			c0.00			c0.15	
v/s Ratio Perm						0.05						0.01
v/c Ratio	0.67	0.97		0.56	0.68	0.09		0.05			1.02	0.08
Uniform Delay, d1	55.2	19.8		63.0	18.9	12.1		57.6			54.0	46.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	9.3	18.7		58.1	1.8	0.0		0.3			61.4	0.1
Delay (s)	64.5	38.5		121.2	20.7	12.1		57.8			115.4	46.6
Level of Service	E	D		F	C	B		E			F	D
Approach Delay (s)		40.8			20.0			57.8			96.3	
Approach LOS		D			C			E			F	

Intersection Summary				
HCM 2000 Control Delay	42.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.93			
Actuated Cycle Length (s)	127.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	92.3%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	326	972	9	2	608	10	6	2	6	8	1	162
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	354	1057	10	2	661	11	7	2	7	9	1	176
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	672			1066			2612	2446	1061	2443	2446	666
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	672			1066			2612	2446	1061	2443	2446	666
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	61			100			2	89	98	35	94	62
cM capacity (veh/h)	919			653			7	19	272	13	19	459

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	354	1066	2	672	15	10	176
Volume Left	354	0	2	0	7	9	0
Volume Right	0	10	0	11	7	0	176
cSH	919	1700	653	1700	14	14	459
Volume to Capacity	0.39	0.63	0.00	0.40	1.11	0.70	0.38
Queue Length 95th (ft)	46	0	0	0	62	42	44
Control Delay (s)	11.4	0.0	10.5	0.0	659.0	492.5	17.6
Lane LOS	B		B		F	F	C
Approach Delay (s)	2.8		0.0		659.0	42.6	
Approach LOS					F	E	

Intersection Summary				
Average Delay	9.6			
Intersection Capacity Utilization	71.2%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	807	114	3	555	69	52	41	15	71	31	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.97	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1786			1775	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.84			0.81	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1535			1472	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	877	124	3	603	75	57	45	16	77	34	18
RTOR Reduction (vph)	0	0	36	0	0	32	0	10	0	0	10	0
Lane Group Flow (vph)	18	877	88	3	603	43	0	108	0	0	119	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	0.6	28.9	28.9	0.6	28.9	28.9		9.4			9.4	
Effective Green, g (s)	0.6	28.9	28.9	0.6	28.9	28.9		9.4			9.4	
Actuated g/C Ratio	0.01	0.57	0.57	0.01	0.57	0.57		0.18			0.18	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	20	1057	898	20	1057	898		283			271	
v/s Ratio Prot	c0.01	c0.47		0.00	0.32							
v/s Ratio Perm			0.06			0.03		0.07			c0.08	
v/c Ratio	0.90	0.83	0.10	0.15	0.57	0.05		0.38			0.44	
Uniform Delay, d1	25.1	9.0	5.0	24.9	7.0	4.9		18.2			18.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	153.9	5.5	0.0	3.5	0.7	0.0		0.9			1.1	
Delay (s)	179.0	14.5	5.1	28.4	7.8	4.9		19.1			19.6	
Level of Service	F	B	A	C	A	A		B			B	
Approach Delay (s)		16.3			7.6			19.1			19.6	
Approach LOS		B			A			B			B	

Intersection Summary				
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	50.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	58.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	33	31	12	576	884	52
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	34	13	626	961	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1641	989	1017			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1641	989	1017			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	67	89	98			
cM capacity (veh/h)	108	299	682			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	70	13	626	1017
Volume Left	36	13	0	0
Volume Right	34	0	0	57
cSH	156	682	1700	1700
Volume to Capacity	0.44	0.02	0.37	0.60
Queue Length 95th (ft)	51	1	0	0
Control Delay (s)	45.3	10.4	0.0	0.0
Lane LOS	E	B		
Approach Delay (s)	45.3	0.2		0.0
Approach LOS	E			

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	1	17	0	0	4	13	571	0	3	866	8
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	1	18	0	0	4	14	621	0	3	941	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1605	1601	946	1620	1605	621	950			621		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1605	1601	946	1620	1605	621	950			621		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	87	99	94	100	100	99	98			100		
cM capacity (veh/h)	83	103	317	76	103	488	723			960		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	30	4	635	953
Volume Left	11	0	14	3
Volume Right	18	4	0	9
cSH	152	488	723	960
Volume to Capacity	0.20	0.01	0.02	0.00
Queue Length 95th (ft)	18	1	1	0
Control Delay (s)	34.6	12.5	0.5	0.1
Lane LOS	D	B	A	A
Approach Delay (s)	34.6	12.5	0.5	0.1
Approach LOS	D	B		

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	62.5%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	387	85	96	198	414	437
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	421	92	104	215	450	475
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1111	688	925			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1111	688	925			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	79	86			
cM capacity (veh/h)	199	447	739			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	513	320	925
Volume Left	421	104	0
Volume Right	92	0	475
cSH	221	739	1700
Volume to Capacity	2.33	0.14	0.54
Queue Length 95th (ft)	1031	12	0
Control Delay (s)	645.3	4.6	0.0
Lane LOS	F	A	
Approach Delay (s)	645.3	4.6	0.0
Approach LOS	F		

Intersection Summary				
Average Delay	189.2			
Intersection Capacity Utilization	100.9%	ICU Level of Service	G	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	13	40	222	27	78	430
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	43	241	29	85	467
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	893	256			271	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	893	256			271	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	94			93	
cM capacity (veh/h)	292	783			1293	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	58	271	85	467
Volume Left	14	0	85	0
Volume Right	43	29	0	0
cSH	554	1700	1293	1700
Volume to Capacity	0.10	0.16	0.07	0.27
Queue Length 95th (ft)	9	0	5	0
Control Delay (s)	12.3	0.0	8.0	0.0
Lane LOS	B		A	
Approach Delay (s)	12.3	0.0	1.2	
Approach LOS	B			

Intersection Summary				
Average Delay			1.6	
Intersection Capacity Utilization			32.6%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	139	76	53	119	311	111
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	151	83	58	129	338	121
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	643	398	459			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	643	398	459			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	64	87	95			
cM capacity (veh/h)	415	651	1102			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	234	58	129	459
Volume Left	151	58	0	0
Volume Right	83	0	0	121
cSH	642	1102	1700	1700
Volume to Capacity	0.36	0.05	0.08	0.27
Queue Length 95th (ft)	42	4	0	0
Control Delay (s)	16.0	8.4	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	16.0	2.6		0.0
Approach LOS	C			

Intersection Summary				
Average Delay			4.8	
Intersection Capacity Utilization			44.2%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	96	1916	1656	164	169	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.99		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3491		1762	1504
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3491		1762	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	2083	1800	178	184	134
RTOR Reduction (vph)	0	0	9	0	3	100
Lane Group Flow (vph)	104	2083	1969	0	194	21
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	5.0	55.0	46.0		12.9	12.9
Effective Green, g (s)	5.0	55.0	46.0		12.9	12.9
Actuated g/C Ratio	0.07	0.72	0.61		0.17	0.17
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	116	2564	2115		299	255
v/s Ratio Prot	0.06	c0.59	c0.56		c0.11	
v/s Ratio Perm						0.01
v/c Ratio	0.90	0.81	0.93		0.65	0.08
Uniform Delay, d1	35.2	7.0	13.5		29.4	26.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	52.2	2.1	8.1		4.8	0.1
Delay (s)	87.4	9.1	21.6		34.2	26.7
Level of Service	F	A	C		C	C
Approach Delay (s)		12.8	21.6		31.3	
Approach LOS		B	C		C	

Intersection Summary				
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	75.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	78.2%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	1913	112	495	1718	40	87	9	558	5	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.99	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1701	1583	1681	1748	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.99	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1701	1583	1681	1748	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	2079	122	538	1867	43	95	10	607	5	3	4
RTOR Reduction (vph)	0	0	59	0	0	15	0	0	202	0	0	0
Lane Group Flow (vph)	61	2079	63	538	1867	28	52	53	405	4	4	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	5.6	45.6	45.6	17.8	57.8	57.8	6.7	6.7	24.5	2.2	2.2	2.2
Effective Green, g (s)	5.6	45.6	45.6	17.8	57.8	57.8	6.7	6.7	24.5	2.2	2.2	2.2
Actuated g/C Ratio	0.06	0.52	0.52	0.20	0.65	0.65	0.08	0.08	0.28	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	217	2626	817	692	3328	1036	127	129	510	41	43	39
v/s Ratio Prot	0.02	c0.41		0.16	0.37		0.03	0.03	c0.16	0.00	0.00	
v/s Ratio Perm			0.04			0.02			0.10			c0.00
v/c Ratio	0.28	0.79	0.08	0.78	0.56	0.03	0.41	0.41	0.79	0.10	0.09	0.10
Uniform Delay, d1	39.4	17.5	10.8	33.4	8.3	5.4	38.9	38.9	29.6	42.1	42.1	42.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	1.7	0.0	5.5	0.2	0.0	2.1	2.1	8.4	1.0	0.9	1.2
Delay (s)	40.1	19.2	10.8	38.9	8.5	5.4	41.1	41.0	37.9	43.1	43.0	43.2
Level of Service	D	B	B	D	A	A	D	D	D	D	D	D
Approach Delay (s)		19.3			15.2			38.4			43.1	
Approach LOS		B			B			D			D	

Intersection Summary				
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	84.8%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	1423	972	114	1087	15	1136	32	122	19	19	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	1547	1057	124	1182	16	1235	35	133	21	21	67
RTOR Reduction (vph)	0	0	208	0	0	11	0	0	76	0	0	63
Lane Group Flow (vph)	87	1547	849	124	1182	5	1235	35	57	21	21	4
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	5.5	30.0	64.1	5.0	29.5	29.5	34.1	34.1	39.1	5.4	5.4	5.4
Effective Green, g (s)	5.5	30.0	64.1	5.0	29.5	29.5	34.1	34.1	39.1	5.4	5.4	5.4
Actuated g/C Ratio	0.06	0.33	0.71	0.06	0.33	0.33	0.38	0.38	0.43	0.06	0.06	0.06
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	107	1685	1121	189	1657	516	1293	701	753	105	111	94
v/s Ratio Prot	c0.05	c0.30	0.29	0.04	0.23		c0.36	0.02	0.00	c0.01	0.01	
v/s Ratio Perm			0.25			0.00			0.03			0.00
v/c Ratio	0.81	0.92	0.76	0.66	0.71	0.01	0.96	0.05	0.08	0.20	0.19	0.04
Uniform Delay, d1	42.0	29.1	8.3	41.9	26.8	20.6	27.5	17.9	15.1	40.5	40.5	40.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.7	9.5	3.0	7.9	1.5	0.0	15.4	0.0	0.0	0.9	0.8	0.2
Delay (s)	77.7	38.6	11.3	49.9	28.3	20.6	42.9	17.9	15.1	41.4	41.3	40.3
Level of Service	E	D	B	D	C	C	D	B	B	D	D	D
Approach Delay (s)		29.1			30.2			39.6			40.7	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	32.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	90.5	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	79.9%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	926	929	3	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	1007	1010	3	1	5
RTOR Reduction (vph)	0	0	0	1	0	4
Lane Group Flow (vph)	4	1007	1010	2	1	1
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	0.7	45.6	40.9	40.9	16.4	17.1
Effective Green, g (s)	0.7	45.6	40.9	40.9	16.4	17.1
Actuated g/C Ratio	0.01	0.65	0.58	0.58	0.23	0.24
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	34	1213	1088	924	414	477
v/s Ratio Prot	0.00	c0.54	c0.54		0.00	c0.00
v/s Ratio Perm				0.00		0.00
v/c Ratio	0.12	0.83	0.93	0.00	0.00	0.00
Uniform Delay, d1	34.3	9.3	13.2	6.1	20.5	20.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	5.0	13.2	0.0	0.0	0.0
Delay (s)	35.9	14.2	26.5	6.1	20.5	20.0
Level of Service	D	B	C	A	C	C
Approach Delay (s)		14.3	26.4		20.1	
Approach LOS		B	C		C	

Intersection Summary				
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	58.9%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	888	0	2	911	145	1	2	7	172	2	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	1863		1770	1863	1583		1672			1775	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (perm)	1770	1863		1770	1863	1583		1672			1775	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	965	0	2	990	158	1	2	8	187	2	73
RTOR Reduction (vph)	0	0	0	0	0	40	0	7	0	0	0	63
Lane Group Flow (vph)	62	965	0	2	990	118	0	4	0	0	189	10
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	4.0	64.4		0.8	61.2	61.2		16.0			14.7	14.7
Effective Green, g (s)	4.0	64.4		0.8	61.2	61.2		16.0			14.7	14.7
Actuated g/C Ratio	0.04	0.58		0.01	0.55	0.55		0.14			0.13	0.13
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	63	1072		12	1018	865		239			233	207
v/s Ratio Prot	c0.04	c0.52		0.00	c0.53			c0.00			c0.11	
v/s Ratio Perm						0.07						0.01
v/c Ratio	0.98	0.90		0.17	0.97	0.14		0.02			0.81	0.05
Uniform Delay, d1	53.9	20.9		55.2	24.5	12.4		41.2			47.3	42.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	107.2	10.3		6.5	21.6	0.1		0.1			18.9	0.1
Delay (s)	161.1	31.3		61.7	46.2	12.5		41.3			66.1	42.6
Level of Service	F	C		E	D	B		D			E	D
Approach Delay (s)		39.1			41.6			41.3			59.6	
Approach LOS		D			D			D			E	

Intersection Summary				
HCM 2000 Control Delay	42.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	111.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	70.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	183	877	7	4	872	13	6	0	4	6	0	187
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	199	953	8	4	948	14	7	0	4	7	0	203
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	962			961			2515	2326	957	2319	2322	955
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	962			961			2515	2326	957	2319	2322	955
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	72			99			0	100	99	68	100	35
cM capacity (veh/h)	715			716			5	27	312	20	27	313

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	199	961	4	962	11	7	203
Volume Left	199	0	4	0	7	7	0
Volume Right	0	8	0	14	4	0	203
cSH	715	1700	716	1700	9	20	313
Volume to Capacity	0.28	0.57	0.01	0.57	1.26	0.32	0.65
Queue Length 95th (ft)	28	0	0	0	54	23	106
Control Delay (s)	12.0	0.0	10.1	0.0	972.2	250.6	35.4
Lane LOS	B		B		F	F	E
Approach Delay (s)	2.1		0.0		972.2	42.1	
Approach LOS					F	E	

Intersection Summary				
Average Delay	9.3			
Intersection Capacity Utilization	72.7%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	759	89	2	817	64	57	20	10	63	21	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.97	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1776			1763	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.78			0.79	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1431			1441	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	825	97	2	888	70	62	22	11	68	23	20
RTOR Reduction (vph)	0	0	37	0	0	33	0	7	0	0	11	0
Lane Group Flow (vph)	18	825	60	2	888	37	0	88	0	0	100	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	0.7	32.3	32.3	0.7	32.3	32.3		16.3			16.3	
Effective Green, g (s)	0.7	32.3	32.3	0.7	32.3	32.3		16.3			16.3	
Actuated g/C Ratio	0.01	0.53	0.53	0.01	0.53	0.53		0.27			0.27	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	20	981	834	20	981	834		380			383	
v/s Ratio Prot	c0.01	0.44		0.00	c0.48							
v/s Ratio Perm			0.04			0.02		0.06			c0.07	
v/c Ratio	0.90	0.84	0.07	0.10	0.91	0.04		0.23			0.26	
Uniform Delay, d1	30.3	12.3	7.1	30.0	13.1	7.0		17.6			17.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	153.9	6.6	0.0	2.2	11.6	0.0		1.4			1.7	
Delay (s)	184.2	18.9	7.2	32.2	24.7	7.0		19.0			19.4	
Level of Service	F	B	A	C	C	A		B			B	
Approach Delay (s)		20.9			23.4			19.0			19.4	
Approach LOS		C			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	61.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	56.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	9	14	6	767	866	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	15	7	834	941	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1795	948	955			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1795	948	955			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	95	99			
cM capacity (veh/h)	88	316	720			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	25	7	834	955
Volume Left	10	7	0	0
Volume Right	15	0	0	14
cSH	156	720	1700	1700
Volume to Capacity	0.16	0.01	0.49	0.56
Queue Length 95th (ft)	14	1	0	0
Control Delay (s)	32.3	10.0	0.0	0.0
Lane LOS	D	B		
Approach Delay (s)	32.3	0.1		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	0	16	0	0	4	16	846	0	2	796	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	0	17	0	0	4	17	920	0	2	865	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1836	1832	873	1849	1839	920	880			920		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1836	1832	873	1849	1839	920	880			920		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	100	95	100	100	99	98			100		
cM capacity (veh/h)	56	74	350	53	74	328	768			742		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	27	4	937	883
Volume Left	10	0	17	2
Volume Right	17	4	0	15
cSH	122	328	768	742
Volume to Capacity	0.22	0.01	0.02	0.00
Queue Length 95th (ft)	20	1	2	0
Control Delay (s)	42.8	16.1	0.7	0.1
Lane LOS	E	C	A	A
Approach Delay (s)	42.8	16.1	0.7	0.1
Approach LOS	E	C		

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	71.3%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	620	140	117	218	289	531
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	674	152	127	237	314	577
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1094	603	891			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1094	603	891			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	70	83			
cM capacity (veh/h)	197	499	761			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	826	364	891
Volume Left	674	127	0
Volume Right	152	0	577
cSH	222	761	1700
Volume to Capacity	3.72	0.17	0.52
Queue Length 95th (ft)	Err	15	0
Control Delay (s)	Err	5.1	0.0
Lane LOS	F	A	
Approach Delay (s)	Err	5.1	0.0
Approach LOS	F		

Intersection Summary				
Average Delay	3969.2			
Intersection Capacity Utilization	118.6%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	15	43	274	17	47	353
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	47	298	18	51	384
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	793	307			316	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	793	307			316	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	94			96	
cM capacity (veh/h)	343	733			1244	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	63	316	51	384
Volume Left	16	0	51	0
Volume Right	47	18	0	0
cSH	566	1700	1244	1700
Volume to Capacity	0.11	0.19	0.04	0.23
Queue Length 95th (ft)	9	0	3	0
Control Delay (s)	12.2	0.0	8.0	0.0
Lane LOS	B		A	
Approach Delay (s)	12.2	0.0	0.9	
Approach LOS	B			

Intersection Summary				
Average Delay			1.4	
Intersection Capacity Utilization			32.3%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	133	49	39	140	204	154
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	145	53	42	152	222	167
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	542	305	389			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	542	305	389			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	70	93	96			
cM capacity (veh/h)	483	734	1169			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	198	42	152	389
Volume Left	145	42	0	0
Volume Right	53	0	0	167
cSH	661	1169	1700	1700
Volume to Capacity	0.30	0.04	0.09	0.23
Queue Length 95th (ft)	31	3	0	0
Control Delay (s)	14.2	8.2	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.2	1.8		0.0
Approach LOS	B			

Intersection Summary				
Average Delay			4.0	
Intersection Capacity Utilization			40.8%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	54	1200	2028	141	94	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.99		0.93	0.85
Flt Protected	0.95	1.00	1.00		0.97	1.00
Satd. Flow (prot)	1770	3539	3505		1692	1504
Flt Permitted	0.95	1.00	1.00		0.97	1.00
Satd. Flow (perm)	1770	3539	3505		1692	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	1304	2204	153	102	253
RTOR Reduction (vph)	0	0	5	0	33	69
Lane Group Flow (vph)	59	1304	2352	0	150	103
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	3.1	65.4	58.3		12.1	12.1
Effective Green, g (s)	3.1	65.4	58.3		12.1	12.1
Actuated g/C Ratio	0.04	0.76	0.68		0.14	0.14
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	64	2707	2389		239	212
v/s Ratio Prot	c0.03	0.37	c0.67		c0.09	
v/s Ratio Perm						0.07
v/c Ratio	0.92	0.48	0.98		0.63	0.49
Uniform Delay, d1	41.1	3.7	13.2		34.6	33.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	84.8	0.1	14.8		5.0	1.8
Delay (s)	125.9	3.9	28.0		39.6	35.6
Level of Service	F	A	C		D	D
Approach Delay (s)		9.2	28.0		37.7	
Approach LOS		A	C		D	

Intersection Summary				
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	85.5	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	77.2%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1238	63	449	1870	13	203	5	540	3	3	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00		1.00	0.88	0.95	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583		1776	2787	1681	1770	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583		1776	2787	1681	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	1346	68	488	2033	14	221	5	587	3	3	0
RTOR Reduction (vph)	0	0	41	0	0	6	0	0	361	0	0	0
Lane Group Flow (vph)	5	1346	27	488	2033	8	0	226	226	3	3	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.0	31.3	31.3	16.0	46.3	46.3		14.3	30.3	1.0	1.0	
Effective Green, g (s)	1.0	31.3	31.3	16.0	46.3	46.3		14.3	30.3	1.0	1.0	
Actuated g/C Ratio	0.01	0.40	0.40	0.20	0.59	0.59		0.18	0.39	0.01	0.01	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	43	2024	630	698	2995	932		323	1216	21	22	
v/s Ratio Prot	0.00	0.26		c0.14	c0.40			c0.13	0.04	c0.00	0.00	
v/s Ratio Perm			0.02			0.01			0.04			
v/c Ratio	0.12	0.67	0.04	0.70	0.68	0.01		0.70	0.19	0.14	0.14	
Uniform Delay, d1	38.4	19.4	14.5	29.1	11.1	6.7		30.1	16.0	38.4	38.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	0.8	0.0	3.1	0.6	0.0		6.5	0.1	3.1	2.8	
Delay (s)	39.6	20.2	14.5	32.1	11.7	6.7		36.6	16.1	41.5	41.2	
Level of Service	D	C	B	C	B	A		D	B	D	D	
Approach Delay (s)		20.0			15.6			21.8			41.3	
Approach LOS		B			B			C			D	

Intersection Summary				
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	78.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	67.6%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	943	774	114	1208	10	1083	33	162	5	9	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	77	1025	841	124	1313	11	1177	36	176	5	10	39
RTOR Reduction (vph)	0	0	266	0	0	8	0	0	97	0	0	37
Lane Group Flow (vph)	77	1025	575	124	1313	3	1177	36	79	5	10	2
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	4.0	23.1	53.2	5.0	24.1	24.1	30.1	30.1	35.1	3.6	3.6	3.6
Effective Green, g (s)	4.0	23.1	53.2	5.0	24.1	24.1	30.1	30.1	35.1	3.6	3.6	3.6
Actuated g/C Ratio	0.05	0.30	0.68	0.06	0.31	0.31	0.39	0.39	0.45	0.05	0.05	0.05
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	91	1509	1905	220	1575	490	1328	720	795	81	86	73
v/s Ratio Prot	c0.04	0.20	0.12	0.04	c0.26		c0.34	0.02	0.01	0.00	c0.01	
v/s Ratio Perm			0.09			0.00			0.04			0.00
v/c Ratio	0.85	0.68	0.30	0.56	0.83	0.01	0.89	0.05	0.10	0.06	0.12	0.02
Uniform Delay, d1	36.6	24.1	4.9	35.3	25.0	18.6	22.3	14.9	12.3	35.5	35.6	35.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	47.9	1.2	0.1	3.3	4.0	0.0	7.5	0.0	0.1	0.3	0.6	0.1
Delay (s)	84.5	25.3	5.0	38.6	28.9	18.6	29.7	14.9	12.3	35.8	36.2	35.6
Level of Service	F	C	A	D	C	B	C	B	B	D	D	D
Approach Delay (s)		18.9			29.7			27.1			35.7	
Approach LOS		B			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	77.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	74.8%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	302	578	856	277	116	356
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	328	628	930	301	126	387
RTOR Reduction (vph)	0	0	0	132	0	86
Lane Group Flow (vph)	328	628	930	169	126	301
Turn Type	Prot	NA	NA	Perm	Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	8.2	51.6	39.4	39.4	10.4	18.6
Effective Green, g (s)	8.2	51.6	39.4	39.4	10.4	18.6
Actuated g/C Ratio	0.12	0.74	0.56	0.56	0.15	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	402	1373	1048	891	262	511
v/s Ratio Prot	c0.10	0.34	c0.50		0.07	c0.07
v/s Ratio Perm				0.11		0.12
v/c Ratio	0.82	0.46	0.89	0.19	0.48	0.59
Uniform Delay, d1	30.2	3.6	13.4	7.5	27.3	22.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.1	0.2	9.2	0.1	1.4	1.7
Delay (s)	42.2	3.9	22.6	7.6	28.7	24.1
Level of Service	D	A	C	A	C	C
Approach Delay (s)		17.0	18.9		25.2	
Approach LOS		B	B		C	

Intersection Summary				
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	73.8%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	113	592	0	3	881	171	3	1	1	130	0	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97			0.95	1.00
Satd. Flow (prot)	1770	3539		1770	3539	1583		1760			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97			0.95	1.00
Satd. Flow (perm)	1770	3539		1770	3539	1583		1760			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	643	0	3	958	186	3	1	1	141	0	266
RTOR Reduction (vph)	0	0	0	0	0	63	0	1	0	0	0	222
Lane Group Flow (vph)	123	643	0	3	958	123	0	4	0	0	141	44
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	5.1	32.5		0.6	28.0	28.0		5.9			10.9	10.9
Effective Green, g (s)	5.1	32.5		0.6	28.0	28.0		5.9			10.9	10.9
Actuated g/C Ratio	0.08	0.49		0.01	0.42	0.42		0.09			0.17	0.17
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	136	1745		16	1503	672		157			292	261
v/s Ratio Prot	c0.07	0.18		0.00	c0.27			c0.00			c0.08	
v/s Ratio Perm						0.08						0.03
v/c Ratio	0.90	0.37		0.19	0.64	0.18		0.03			0.48	0.17
Uniform Delay, d1	30.2	10.3		32.4	14.9	11.8		27.4			24.9	23.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	49.1	0.1		5.6	0.9	0.1		0.1			1.3	0.3
Delay (s)	79.3	10.5		38.0	15.8	12.0		27.4			26.2	23.9
Level of Service	E	B		D	B	B		C			C	C
Approach Delay (s)		21.5			15.3			27.4			24.7	
Approach LOS		C			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	65.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	52.9%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	163	561	7	7	729	3	11	1	3	7	2	353
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.96	1.00
Satd. Flow (prot)	1770	1859		1770	1862			1750			1791	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.86			0.86	1.00
Satd. Flow (perm)	1770	1859		1770	1862			1563			1611	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	610	8	8	792	3	12	1	3	8	2	384
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	182
Lane Group Flow (vph)	177	618	0	8	795	0	0	14	0	0	10	202
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	8.2	40.5		0.7	33.0			12.0			12.0	12.0
Effective Green, g (s)	8.2	40.5		0.7	33.0			12.0			12.0	12.0
Actuated g/C Ratio	0.13	0.62		0.01	0.51			0.18			0.18	0.18
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	222	1154		19	942			287			296	291
v/s Ratio Prot	c0.10	0.33		0.00	c0.43							
v/s Ratio Perm								0.01			0.01	c0.13
v/c Ratio	0.80	0.54		0.42	0.84			0.05			0.03	0.69
Uniform Delay, d1	27.7	7.0		32.0	13.9			21.9			21.8	24.9
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	17.8	0.5		14.4	7.0			0.1			0.0	7.0
Delay (s)	45.5	7.5		46.4	20.9			22.0			21.9	31.9
Level of Service	D	A		D	C			C			C	C
Approach Delay (s)		15.9			21.1			22.0			31.6	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	65.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	73.7%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	505	35	2	556	64	117	33	5	69	25	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00			0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96			0.98	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1788			1721	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.73			0.84	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1351			1472	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	549	38	2	604	70	127	36	5	75	27	73
RTOR Reduction (vph)	0	0	22	0	0	40	0	2	0	0	43	0
Lane Group Flow (vph)	15	549	16	2	604	30	0	166	0	0	132	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	0.5	17.8	17.8	0.5	17.8	17.8		10.9			10.9	
Effective Green, g (s)	0.5	17.8	17.8	0.5	17.8	17.8		10.9			10.9	
Actuated g/C Ratio	0.01	0.43	0.43	0.01	0.43	0.43		0.26			0.26	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	21	804	683	21	804	683		357			389	
v/s Ratio Prot	c0.01	0.29		0.00	c0.32							
v/s Ratio Perm			0.01			0.02		c0.12			0.09	
v/c Ratio	0.71	0.68	0.02	0.10	0.75	0.04		0.46			0.34	
Uniform Delay, d1	20.3	9.4	6.7	20.1	9.8	6.8		12.7			12.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	75.0	2.4	0.0	2.0	4.0	0.0		1.0			0.5	
Delay (s)	95.3	11.8	6.7	22.1	13.8	6.8		13.7			12.8	
Level of Service	F	B	A	C	B	A		B			B	
Approach Delay (s)		13.6			13.1			13.7			12.8	
Approach LOS		B			B			B			B	

Intersection Summary				
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	41.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	50.3%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	4	6	602	516	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	4	7	654	561	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1234	566	572			
vC1, stage 1 conf vol	566					
vC2, stage 2 conf vol	667					
vCu, unblocked vol	1234	566	572			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	410	523	1001			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	11	7	654	572
Volume Left	7	7	0	0
Volume Right	4	0	0	11
cSH	449	1001	1700	1700
Volume to Capacity	0.02	0.01	0.38	0.34
Queue Length 95th (ft)	2	0	0	0
Control Delay (s)	13.2	8.6	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.2	0.1		0.0
Approach LOS	B			

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	41.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	0	11	0	0	1	7	577	1	11	478	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.86		1.00	1.00		1.00	1.00	
Flt Protected		0.97			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1715			1611		1770	1862		1770	1856	
Flt Permitted		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1768			1611		1770	1862		1770	1856	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	0	12	0	0	1	8	627	1	12	520	12
RTOR Reduction (vph)	0	31	0	0	1	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	1	0	0	0	0	8	628	0	12	531	0
Turn Type	Perm	NA			NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		1.7			1.7		0.6	27.4		0.6	27.4	
Effective Green, g (s)		1.7			1.7		0.6	27.4		0.6	27.4	
Actuated g/C Ratio		0.04			0.04		0.01	0.66		0.01	0.66	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		72			65		25	1223		25	1219	
v/s Ratio Prot					0.00		0.00	c0.34		c0.01	0.29	
v/s Ratio Perm		c0.00										
v/c Ratio		0.02			0.00		0.32	0.51		0.48	0.44	
Uniform Delay, d1		19.2			19.2		20.3	3.7		20.4	3.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.0		7.3	0.4		13.8	0.3	
Delay (s)		19.3			19.2		27.6	4.1		34.2	3.7	
Level of Service		B			B		C	A		C	A	
Approach Delay (s)		19.3			19.2			4.4			4.4	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM 2000 Control Delay	4.8	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.48			
Actuated Cycle Length (s)	41.7	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	45.4%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	147	32	76	410	199	344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	35	83	446	216	374
RTOR Reduction (vph)	0	29	0	0	0	210
Lane Group Flow (vph)	160	6	83	446	216	164
Turn Type	Perm	Perm	Prot	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	5.6	5.6	2.3	21.8	15.5	15.5
Effective Green, g (s)	5.6	5.6	2.3	21.8	15.5	15.5
Actuated g/C Ratio	0.16	0.16	0.06	0.62	0.44	0.44
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	543	250	115	1147	815	693
v/s Ratio Prot			c0.05	c0.24	0.12	
v/s Ratio Perm	c0.05	0.00				0.10
v/c Ratio	0.29	0.02	0.72	0.39	0.27	0.24
Uniform Delay, d1	13.2	12.6	16.2	3.4	6.3	6.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.0	19.9	0.2	0.2	0.2
Delay (s)	13.5	12.6	36.1	3.7	6.5	6.4
Level of Service	B	B	D	A	A	A
Approach Delay (s)	13.3			8.8	6.4	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	35.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	26	71	405	12	18	140
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	77	440	13	20	152
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	638	447			453	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	638	447			453	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	87			98	
cM capacity (veh/h)	433	612			1107	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	105	453	20	152
Volume Left	28	0	20	0
Volume Right	77	13	0	0
cSH	551	1700	1107	1700
Volume to Capacity	0.19	0.27	0.02	0.09
Queue Length 95th (ft)	18	0	1	0
Control Delay (s)	13.1	0.0	8.3	0.0
Lane LOS	B		A	
Approach Delay (s)	13.1	0.0	0.9	
Approach LOS	B			

Intersection Summary				
Average Delay		2.1		
Intersection Capacity Utilization		34.5%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	92	52	68	299	142	101
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	100	57	74	325	154	110
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	682	209	264			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	682	209	264			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	74	93	94			
cM capacity (veh/h)	392	831	1300			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	157	74	325	264
Volume Left	100	74	0	0
Volume Right	57	0	0	110
cSH	613	1300	1700	1700
Volume to Capacity	0.26	0.06	0.19	0.16
Queue Length 95th (ft)	25	5	0	0
Control Delay (s)	14.5	7.9	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.5	1.5		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		3.5		
Intersection Capacity Utilization		32.5%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	111	45	405	22	11	13	757	525	28	15	304	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1799	1583	1770	1863	1583	3433	3513		1770	1863	1583
Flt Permitted		0.97	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1799	1583	1770	1863	1583	3433	3513		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	121	49	440	24	12	14	823	571	30	16	330	152
RTOR Reduction (vph)	0	0	256	0	0	13	0	3	0	0	0	107
Lane Group Flow (vph)	0	170	184	24	12	1	823	598	0	16	330	45
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	5	8	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		10.9	27.2	2.6	2.6	4.0	16.3	34.0		1.4	19.1	19.1
Effective Green, g (s)		10.9	27.2	2.6	2.6	4.0	16.3	34.0		1.4	19.1	19.1
Actuated g/C Ratio		0.17	0.42	0.04	0.04	0.06	0.25	0.52		0.02	0.29	0.29
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		302	663	70	74	195	862	1840		38	548	465
v/s Ratio Prot		c0.09	0.07	c0.01	0.01	0.00	c0.24	0.17		0.01	c0.18	
v/s Ratio Perm			0.05			0.00						0.03
v/c Ratio		0.56	0.28	0.34	0.16	0.00	0.95	0.32		0.42	0.60	0.10
Uniform Delay, d1		24.8	12.4	30.3	30.1	28.6	23.9	8.9		31.3	19.6	16.6
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		2.4	0.2	2.9	1.0	0.0	20.3	0.5		7.4	4.8	0.4
Delay (s)		27.2	12.6	33.2	31.1	28.6	44.2	9.3		38.7	24.5	17.0
Level of Service		C	B	C	C	C	D	A		D	C	B
Approach Delay (s)		16.7			31.4			29.5			22.7	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	64.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	62.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	522	328	179	707	35	515	109	203	36	56	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	567	357	195	768	38	560	118	221	39	61	48
RTOR Reduction (vph)	0	0	223	0	0	27	0	0	131	0	0	34
Lane Group Flow (vph)	43	567	134	195	768	11	560	118	90	39	61	14
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	1.5	15.2	23.2	4.0	17.7	17.7	8.0	25.0	25.0	1.5	18.5	18.5
Effective Green, g (s)	1.5	15.2	23.2	4.0	17.7	17.7	8.0	25.0	25.0	1.5	18.5	18.5
Actuated g/C Ratio	0.02	0.25	0.38	0.06	0.29	0.29	0.13	0.41	0.41	0.02	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	83	1252	697	222	1458	454	445	754	641	83	558	474
v/s Ratio Prot	0.01	0.11	0.02	c0.06	c0.15		c0.16	c0.06		0.01	0.03	
v/s Ratio Perm			0.06			0.01			0.06			0.01
v/c Ratio	0.52	0.45	0.19	0.88	0.53	0.02	1.26	0.16	0.14	0.47	0.11	0.03
Uniform Delay, d1	29.7	19.7	12.9	28.6	18.5	15.8	26.9	11.7	11.6	29.7	15.6	15.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.4	0.3	0.1	30.0	0.3	0.0	133.5	0.4	0.5	4.2	0.4	0.1
Delay (s)	35.1	20.0	13.1	58.6	18.8	15.8	160.3	12.1	12.0	33.9	16.0	15.4
Level of Service	D	B	B	E	B	B	F	B	B	C	B	B
Approach Delay (s)		18.1			26.5			104.4			20.5	
Approach LOS		B			C			F			C	

Intersection Summary				
HCM 2000 Control Delay	46.7	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	61.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	48.4%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	220	372	193	217	13	569	49	161	6	70	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.88			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3509		1770	1648			1818	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3509		1770	1648			1818	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	239	404	210	236	14	618	53	175	7	76	15
RTOR Reduction (vph)	0	0	106	0	3	0	0	75	0	0	5	0
Lane Group Flow (vph)	8	239	298	210	247	0	618	153	0	0	93	0
Turn Type	Prot	NA	pm+ov	Prot	NA		Split	NA		Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)	0.7	25.2	91.8	20.4	44.9		66.6	66.6			12.1	
Effective Green, g (s)	0.7	25.2	91.8	20.4	44.9		66.6	66.6			12.1	
Actuated g/C Ratio	0.00	0.18	0.65	0.15	0.32		0.47	0.47			0.09	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	8	334	1080	257	1122		840	782			156	
v/s Ratio Prot	0.00	c0.13	0.13	c0.12	0.07		c0.35	0.09			c0.05	
v/s Ratio Perm			0.06									
v/c Ratio	1.00	0.72	0.28	0.82	0.22		0.74	0.20			0.60	
Uniform Delay, d1	69.8	54.2	10.2	58.1	34.9		29.7	21.3			61.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	318.2	7.1	0.1	17.9	0.1		5.7	0.6			6.1	
Delay (s)	388.0	61.3	10.4	76.0	35.0		35.4	21.9			67.8	
Level of Service	F	E	B	E	C		D	C			E	
Approach Delay (s)		33.7			53.7			31.8			67.8	
Approach LOS		C			D			C			E	

Intersection Summary				
HCM 2000 Control Delay	39.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	140.3	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	70.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	84	464	289	97	322	309
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	504	314	105	350	336
RTOR Reduction (vph)	0	417	0	69	0	0
Lane Group Flow (vph)	91	87	314	36	350	336
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	9.2	9.2	18.4	18.4	13.8	36.2
Effective Green, g (s)	9.2	9.2	18.4	18.4	13.8	36.2
Actuated g/C Ratio	0.17	0.17	0.34	0.34	0.26	0.68
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	304	272	641	545	457	1262
v/s Ratio Prot	0.05		c0.17		c0.20	0.18
v/s Ratio Perm		c0.05		0.02		
v/c Ratio	0.30	0.32	0.49	0.07	0.77	0.27
Uniform Delay, d1	19.3	19.4	13.8	11.7	18.3	3.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.7	2.7	0.2	7.5	0.5
Delay (s)	19.8	20.0	16.5	12.0	25.8	3.9
Level of Service	B	C	B	B	C	A
Approach Delay (s)	20.0		15.3			15.1
Approach LOS	C		B			B

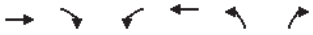
Intersection Summary				
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.54			
Actuated Cycle Length (s)	53.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	50.6%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	18	259	457	91	40	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	282	497	99	43	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	497				817	497
vC1, stage 1 conf vol					497	
vC2, stage 2 conf vol					321	
vCu, unblocked vol	497				817	497
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	98				92	94
cM capacity (veh/h)	1067				536	573

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	20	282	497	99	76
Volume Left	20	0	0	0	43
Volume Right	0	0	0	99	33
cSH	1067	1700	1700	1700	552
Volume to Capacity	0.02	0.17	0.29	0.06	0.14
Queue Length 95th (ft)	1	0	0	0	12
Control Delay (s)	8.4	0.0	0.0	0.0	12.6
Lane LOS	A				B
Approach Delay (s)	0.5		0.0		12.6
Approach LOS					B

Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	34.8%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	104	7	191	326	9	184
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	113	8	208	354	10	200
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			121		886	117
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			121		886	117
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			86		96	79
cM capacity (veh/h)			1467		270	935

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	121	208	354	210
Volume Left	0	208	0	10
Volume Right	8	0	0	200
cSH	1700	1467	1700	839
Volume to Capacity	0.07	0.14	0.21	0.25
Queue Length 95th (ft)	0	12	0	25
Control Delay (s)	0.0	7.9	0.0	10.7
Lane LOS		A		B
Approach Delay (s)	0.0	2.9		10.7
Approach LOS				B

Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	35.8%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Yield	Stop		Yield	
Volume (vph)	77	16	9	2	2	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	84	17	10	2	2	33

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	101	12	35
Volume Left (vph)	84	0	2
Volume Right (vph)	0	2	33
Hadj (s)	0.20	-0.08	-0.52
Departure Headway (s)	4.2	4.0	3.6
Degree Utilization, x	0.12	0.01	0.04
Capacity (veh/h)	849	885	951
Control Delay (s)	7.7	7.0	6.8
Approach Delay (s)	7.7	7.0	6.8
Approach LOS	A	A	A

Intersection Summary			
Delay		7.4	
Level of Service		A	
Intersection Capacity Utilization		21.8%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	737	3	2	1126	7	7
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	801	3	2	1224	8	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			804		2031	803
vC1, stage 1 conf vol					803	
vC2, stage 2 conf vol					1228	
vCu, unblocked vol			804		2031	803
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	98
cM capacity (veh/h)			820		234	384

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	804	1226	15
Volume Left	0	2	8
Volume Right	3	0	8
cSH	1700	820	291
Volume to Capacity	0.47	0.00	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.0	0.1	18.1
Lane LOS		A	C
Approach Delay (s)	0.0	0.1	18.1
Approach LOS			C

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		70.8%	ICU Level of Service C
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	164	2290	1803	183	205	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.99		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3490		1761	1504
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3490		1761	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	2489	1960	199	223	171
RTOR Reduction (vph)	0	0	8	0	3	128
Lane Group Flow (vph)	178	2489	2151	0	237	26
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	9.0	66.0	53.0		14.8	14.8
Effective Green, g (s)	9.0	66.0	53.0		14.8	14.8
Actuated g/C Ratio	0.10	0.74	0.60		0.17	0.17
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	179	2630	2082		293	250
v/s Ratio Prot	0.10	c0.70	c0.62		c0.13	
v/s Ratio Perm						0.02
v/c Ratio	0.99	0.95	1.03		0.81	0.10
Uniform Delay, d1	39.9	9.9	17.9		35.6	31.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	65.3	8.2	28.8		15.0	0.2
Delay (s)	105.2	18.0	46.7		50.6	31.6
Level of Service	F	B	D		D	C
Approach Delay (s)		23.8	46.7		43.2	
Approach LOS		C	D		D	

Intersection Summary				
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	89.3%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	2337	128	583	1867	6	113	2	730	8	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583		1775	2787	1681	1713	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583		1775	2787	1681	1713	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	2540	139	634	2029	7	123	2	793	9	2	1
RTOR Reduction (vph)	0	0	65	0	0	2	0	0	224	0	0	0
Lane Group Flow (vph)	5	2540	74	634	2029	5	0	125	569	5	6	1
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.1	70.9	70.9	30.0	99.8	99.8		13.4	43.4	2.4	2.4	2.4
Effective Green, g (s)	1.1	70.9	70.9	30.0	99.8	99.8		13.4	43.4	2.4	2.4	2.4
Actuated g/C Ratio	0.01	0.53	0.53	0.23	0.75	0.75		0.10	0.33	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	28	2716	845	776	3824	1190		179	995	30	30	28
v/s Ratio Prot	0.00	c0.50		c0.18	0.40			c0.07	c0.13	0.00	c0.00	
v/s Ratio Perm			0.05			0.00			0.07			0.00
v/c Ratio	0.18	0.94	0.09	0.82	0.53	0.00		0.70	0.57	0.17	0.20	0.04
Uniform Delay, d1	65.4	28.8	15.1	48.7	6.8	4.1		57.7	37.0	64.2	64.2	64.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	6.9	0.0	6.7	0.1	0.0		11.3	0.8	2.6	3.3	0.5
Delay (s)	68.4	35.6	15.1	55.4	6.9	4.1		69.0	37.8	66.8	67.5	64.5
Level of Service	E	D	B	E	A	A		E	D	E	E	E
Approach Delay (s)		34.6			18.4			42.0			66.9	
Approach LOS		C			B			D			E	

Intersection Summary				
HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	132.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	84.8%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	113	1738	1240	143	1224	25	1146	26	150	29	32	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	1889	1348	155	1330	27	1246	28	163	32	35	86
RTOR Reduction (vph)	0	0	193	0	0	18	0	0	87	0	0	81
Lane Group Flow (vph)	123	1889	1155	155	1330	9	1246	28	76	32	35	5
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	13.1	52.0	110.0	8.0	46.9	46.9	58.0	58.0	66.0	8.1	8.1	8.1
Effective Green, g (s)	13.1	52.0	110.0	8.0	46.9	46.9	58.0	58.0	66.0	8.1	8.1	8.1
Actuated g/C Ratio	0.09	0.37	0.77	0.06	0.33	0.33	0.41	0.41	0.46	0.06	0.06	0.06
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	163	1860	2157	193	1678	522	1401	760	779	100	106	90
v/s Ratio Prot	c0.07	c0.37	0.22	0.05	0.26		c0.36	0.02	0.01	0.02	c0.02	
v/s Ratio Perm			0.20			0.01			0.04			0.00
v/c Ratio	0.75	1.02	0.54	0.80	0.79	0.02	0.89	0.04	0.10	0.32	0.33	0.05
Uniform Delay, d1	62.9	45.0	6.2	66.3	43.2	32.1	39.1	25.3	21.3	64.4	64.4	63.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	17.8	24.8	0.3	20.9	2.7	0.0	7.3	0.0	0.1	1.9	1.8	0.3
Delay (s)	80.8	69.9	6.5	87.2	45.8	32.1	46.3	25.3	21.4	66.2	66.2	63.6
Level of Service	F	E	A	F	D	C	D	C	C	E	E	E
Approach Delay (s)		44.8			49.8			43.1			64.8	
Approach LOS		D			D			D			E	

Intersection Summary				
HCM 2000 Control Delay	46.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	142.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	87.0%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	84	1287	924	46	67	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	1399	1004	50	73	118
RTOR Reduction (vph)	0	0	0	14	0	101
Lane Group Flow (vph)	91	1399	1004	36	73	17
Turn Type	Prot	NA	NA	Perm	Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	4.0	73.3	65.3	65.3	9.1	13.1
Effective Green, g (s)	4.0	73.3	65.3	65.3	9.1	13.1
Actuated g/C Ratio	0.04	0.81	0.72	0.72	0.10	0.14
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	151	1510	1345	1143	178	299
v/s Ratio Prot	0.03	c0.75	0.54		c0.04	0.00
v/s Ratio Perm				0.02		0.01
v/c Ratio	0.60	0.93	0.75	0.03	0.41	0.06
Uniform Delay, d1	42.4	6.5	7.6	3.6	38.1	33.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.6	10.0	2.3	0.0	1.5	0.1
Delay (s)	49.0	16.5	9.9	3.6	39.7	33.4
Level of Service	D	B	A	A	D	C
Approach Delay (s)		18.5	9.6		35.8	
Approach LOS		B	A		D	

Intersection Summary				
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	78.1%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	106	1209	1	5	842	159	1	3	18	275	5	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.95	1.00
Satd. Flow (prot)	1770	3539		1770	3455			1650			1775	1583
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.95	1.00
Satd. Flow (perm)	1770	3539		1770	3455			1650			1775	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	115	1314	1	5	915	173	1	3	20	299	5	112
RTOR Reduction (vph)	0	0	0	0	15	0	0	19	0	0	0	73
Lane Group Flow (vph)	115	1315	0	5	1073	0	0	5	0	0	304	39
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												4
Actuated Green, G (s)	10.1	47.1		0.7	37.7			6.1			21.2	21.2
Effective Green, g (s)	10.1	47.1		0.7	37.7			6.1			21.2	21.2
Actuated g/C Ratio	0.11	0.52		0.01	0.41			0.07			0.23	0.23
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	196	1829		13	1429			110			413	368
v/s Ratio Prot	c0.06	c0.37		0.00	0.31			c0.00			c0.17	
v/s Ratio Perm												0.02
v/c Ratio	0.59	0.72		0.38	0.75			0.05			0.74	0.11
Uniform Delay, d1	38.5	16.9		45.0	22.7			39.8			32.4	27.5
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	4.4	1.4		17.9	2.3			0.2			6.7	0.1
Delay (s)	42.9	18.3		62.9	25.0			40.0			39.1	27.6
Level of Service	D	B		E	C			D			D	C
Approach Delay (s)		20.3			25.2			40.0			36.0	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.68			
Actuated Cycle Length (s)	91.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	68.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	331	1118	14	3	836	11	6	1	3	9	1	189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00			0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.96	1.00
Satd. Flow (prot)	1770	1859		1770	1859			1739			1782	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.85			0.78	1.00
Satd. Flow (perm)	1770	1859		1770	1859			1517			1459	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	360	1215	15	3	909	12	7	1	3	10	1	205
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	0	187
Lane Group Flow (vph)	360	1230	0	3	921	0	0	8	0	0	11	18
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	18.0	64.6		0.8	47.4			7.5			7.5	7.5
Effective Green, g (s)	18.0	64.6		0.8	47.4			7.5			7.5	7.5
Actuated g/C Ratio	0.21	0.76		0.01	0.56			0.09			0.09	0.09
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	375	1414		16	1037			134			128	139
v/s Ratio Prot	c0.20	c0.66		0.00	0.50							
v/s Ratio Perm								0.01			0.01	c0.01
v/c Ratio	0.96	0.87		0.19	0.89			0.06			0.09	0.13
Uniform Delay, d1	33.1	7.2		41.7	16.4			35.5			35.6	35.7
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	35.6	6.0		5.6	9.4			0.2			0.3	0.4
Delay (s)	68.7	13.2		47.4	25.8			35.7			35.8	36.1
Level of Service	E	B		D	C			D			D	D
Approach Delay (s)		25.7			25.8			35.7			36.1	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.85			
Actuated Cycle Length (s)	84.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	78.8%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	950	121	3	757	71	69	38	22	92	25	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.97	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1772			1765	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.79			0.73	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1434			1331	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	1033	132	3	823	77	75	41	24	100	27	23
RTOR Reduction (vph)	0	0	26	0	0	30	0	10	0	0	8	0
Lane Group Flow (vph)	29	1033	106	3	823	47	0	130	0	0	142	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.3	40.8	40.8	0.6	40.1	40.1		12.0			12.0	
Effective Green, g (s)	1.3	40.8	40.8	0.6	40.1	40.1		12.0			12.0	
Actuated g/C Ratio	0.02	0.62	0.62	0.01	0.61	0.61		0.18			0.18	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	35	1162	987	16	1142	970		263			244	
v/s Ratio Prot	c0.02	c0.55		0.00	0.44							
v/s Ratio Perm			0.07			0.03		0.09			c0.11	
v/c Ratio	0.83	0.89	0.11	0.19	0.72	0.05		0.50			0.58	
Uniform Delay, d1	31.9	10.4	5.0	32.2	8.8	5.0		24.0			24.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	84.5	8.6	0.0	5.6	2.3	0.0		1.5			3.5	
Delay (s)	116.4	18.9	5.0	37.8	11.0	5.1		25.4			27.9	
Level of Service	F	B	A	D	B	A		C			C	
Approach Delay (s)		19.8			10.6			25.4			27.9	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	65.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	67.0%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	19	27	4	809	1017	28
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	29	4	879	1105	30
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2009	1121	1136			
vC1, stage 1 conf vol	1121					
vC2, stage 2 conf vol	888					
vCu, unblocked vol	2009	1121	1136			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	88	99			
cM capacity (veh/h)	247	251	615			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	50	4	879	1136
Volume Left	21	4	0	0
Volume Right	29	0	0	30
cSH	249	615	1700	1700
Volume to Capacity	0.20	0.01	0.52	0.67
Queue Length 95th (ft)	18	1	0	0
Control Delay (s)	23.0	10.9	0.0	0.0
Lane LOS	C	B		
Approach Delay (s)	23.0	0.1		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	0	16	1	0	4	20	816	0	2	1029	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.89		1.00	1.00		1.00	1.00	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1681			1645		1770	1863		1770	1860	
Flt Permitted		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1715			1662		1770	1863		1770	1860	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	0	17	1	0	4	22	887	0	2	1118	13
RTOR Reduction (vph)	0	28	0	0	5	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	0	0	22	887	0	2	1131	0
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)		2.0			2.0		1.5	61.9		0.8	61.2	
Effective Green, g (s)		2.0			2.0		1.5	61.9		0.8	61.2	
Actuated g/C Ratio		0.03			0.03		0.02	0.81		0.01	0.80	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		44			43		34	1503		18	1484	
v/s Ratio Prot							c0.01	0.48		0.00	c0.61	
v/s Ratio Perm		c0.00			0.00							
v/c Ratio		0.02			0.00		0.65	0.59		0.11	0.76	
Uniform Delay, d1		36.4			36.4		37.3	2.7		37.6	4.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.0		35.3	0.6		2.7	2.4	
Delay (s)		36.5			36.4		72.6	3.4		40.3	6.4	
Level of Service		D			D		E	A		D	A	
Approach Delay (s)		36.5			36.4			5.0			6.4	
Approach LOS		D			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	6.3	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	76.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	64.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	620	136	116	186	499	529
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	674	148	126	202	542	575
RTOR Reduction (vph)	0	105	0	0	0	356
Lane Group Flow (vph)	674	43	126	202	542	219
Turn Type	Perm	Perm	Prot	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	14.0	14.0	4.1	26.6	18.5	18.5
Effective Green, g (s)	14.0	14.0	4.1	26.6	18.5	18.5
Actuated g/C Ratio	0.29	0.29	0.08	0.55	0.38	0.38
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	988	456	149	1019	709	602
v/s Ratio Prot			c0.07	0.11	c0.29	
v/s Ratio Perm	c0.20	0.03				0.14
v/c Ratio	0.68	0.09	0.85	0.20	0.76	0.36
Uniform Delay, d1	15.3	12.7	21.9	5.6	13.1	10.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.1	33.3	0.1	4.9	0.4
Delay (s)	17.3	12.7	55.2	5.7	18.1	11.2
Level of Service	B	B	E	A	B	B
Approach Delay (s)	16.5			24.7	14.5	
Approach LOS	B			C	B	

Intersection Summary				
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	48.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	60.4%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	14	33	317	22	71	487
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	36	345	24	77	529
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1040	357			368	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1040	357			368	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	95			94	
cM capacity (veh/h)	238	688			1190	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	51	368	77	529
Volume Left	15	0	77	0
Volume Right	36	24	0	0
cSH	440	1700	1190	1700
Volume to Capacity	0.12	0.22	0.06	0.31
Queue Length 95th (ft)	10	0	5	0
Control Delay (s)	14.2	0.0	8.2	0.0
Lane LOS	B		A	
Approach Delay (s)	14.2	0.0	1.0	
Approach LOS	B			

Intersection Summary				
Average Delay			1.3	
Intersection Capacity Utilization			35.6%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	142	95	42	110	380	171
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	154	103	46	120	413	186
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	717	506	599			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	717	506	599			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	59	82	95			
cM capacity (veh/h)	378	566	978			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	258	46	120	599
Volume Left	154	46	0	0
Volume Right	103	0	0	186
cSH	631	978	1700	1700
Volume to Capacity	0.41	0.05	0.07	0.35
Queue Length 95th (ft)	50	4	0	0
Control Delay (s)	17.7	8.9	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	17.7	2.4		0.0
Approach LOS	C			

Intersection Summary				
Average Delay			4.9	
Intersection Capacity Utilization			49.4%	ICU Level of Service A
Analysis Period (min)			15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	164	12	464	20	39	18	341	567	7	3	510	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1780	1583	1770	1863	1583	3433	3532		1770	1863	1583
Flt Permitted		0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1780	1583	1770	1863	1583	3433	3532		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	13	504	22	42	20	371	616	8	3	554	139
RTOR Reduction (vph)	0	0	302	0	0	18	0	1	0	0	0	85
Lane Group Flow (vph)	0	191	202	22	42	2	371	623	0	3	554	54
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	5	8	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		11.8	21.0	4.3	4.3	5.7	9.2	34.0		1.4	26.2	26.2
Effective Green, g (s)		11.8	21.0	4.3	4.3	5.7	9.2	34.0		1.4	26.2	26.2
Actuated g/C Ratio		0.17	0.31	0.06	0.06	0.08	0.14	0.50		0.02	0.39	0.39
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		311	492	112	118	227	467	1779		36	723	614
v/s Ratio Prot		c0.11	0.06	0.01	c0.02	0.00	c0.11	0.18		0.00	c0.30	
v/s Ratio Perm			0.07			0.00						0.03
v/c Ratio		0.61	0.41	0.20	0.36	0.01	0.79	0.35		0.08	0.77	0.09
Uniform Delay, d1		25.7	18.4	30.0	30.3	28.3	28.2	10.1		32.4	18.0	13.1
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		3.6	0.6	0.9	1.8	0.0	9.0	0.5		1.0	7.6	0.3
Delay (s)		29.3	18.9	30.8	32.1	28.3	37.3	10.6		33.4	25.6	13.4
Level of Service		C	B	C	C	C	D	B		C	C	B
Approach Delay (s)		21.8			30.9			20.6			23.2	
Approach LOS		C			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	67.5	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	68.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	145	736	604	219	709	82	508	83	159	145	124	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	800	657	238	771	89	552	90	173	158	135	68
RTOR Reduction (vph)	0	0	282	0	0	67	0	0	115	0	0	49
Lane Group Flow (vph)	158	800	375	238	771	22	552	90	58	158	135	19
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	4.0	14.8	22.8	4.0	14.8	14.8	8.0	20.1	20.1	4.7	16.8	16.8
Effective Green, g (s)	4.0	14.8	22.8	4.0	14.8	14.8	8.0	20.1	20.1	4.7	16.8	16.8
Actuated g/C Ratio	0.07	0.25	0.38	0.07	0.25	0.25	0.13	0.34	0.34	0.08	0.28	0.28
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	230	1262	711	230	1262	393	460	628	533	270	525	446
v/s Ratio Prot	0.05	c0.16	0.07	c0.07	0.15		c0.16	c0.05		0.05	c0.07	
v/s Ratio Perm			0.17			0.01			0.04			0.01
v/c Ratio	0.69	0.63	0.53	1.03	0.61	0.06	1.20	0.14	0.11	0.59	0.26	0.04
Uniform Delay, d1	27.2	20.0	14.2	27.8	19.8	17.1	25.8	13.8	13.6	26.5	16.6	15.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.2	1.1	0.7	68.7	0.9	0.1	109.3	0.5	0.4	3.2	1.2	0.2
Delay (s)	35.4	21.0	14.9	96.5	20.7	17.1	135.1	14.2	14.0	29.7	17.8	15.7
Level of Service	D	C	B	F	C	B	F	B	B	C	B	B
Approach Delay (s)		20.0			36.9			96.1			22.6	
Approach LOS		B			D			F			C	

Intersection Summary				
HCM 2000 Control Delay	40.9	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.58			
Actuated Cycle Length (s)	59.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	60.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	396	533	148	331	5	314	20	99	8	25	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.88			0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	3532		1770	1631			1767	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (perm)	1770	1863	1583	1770	3532		1770	1631			1767	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	430	579	161	360	5	341	22	108	9	27	17
RTOR Reduction (vph)	0	0	165	0	1	0	0	66	0	0	12	0
Lane Group Flow (vph)	12	430	414	161	364	0	341	64	0	0	41	0
Turn Type	Prot	NA	pm+ov	Prot	NA		Split	NA		Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)	1.7	35.5	82.0	16.0	49.8		46.5	46.5			6.9	
Effective Green, g (s)	1.7	35.5	82.0	16.0	49.8		46.5	46.5			6.9	
Actuated g/C Ratio	0.01	0.29	0.68	0.13	0.41		0.38	0.38			0.06	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	24	547	1126	234	1454		680	627			100	
v/s Ratio Prot	0.01	c0.23	0.14	c0.09	0.10		c0.19	0.04			c0.02	
v/s Ratio Perm			0.12									
v/c Ratio	0.50	0.79	0.37	0.69	0.25		0.50	0.10			0.41	
Uniform Delay, d1	59.2	39.2	8.3	50.1	23.3		28.4	23.8			55.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	15.4	7.3	0.2	8.1	0.1		2.6	0.3			2.7	
Delay (s)	74.6	46.5	8.5	58.2	23.4		31.0	24.1			57.7	
Level of Service	E	D	A	E	C		C	C			E	
Approach Delay (s)		25.3			34.1			29.1			57.7	
Approach LOS		C			C			C			E	

Intersection Summary				
HCM 2000 Control Delay	29.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	120.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	63.1%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	24	174	221	24	310	386
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	189	240	26	337	420
RTOR Reduction (vph)	0	168	0	16	0	0
Lane Group Flow (vph)	26	21	240	10	337	420
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	5.6	5.6	18.9	18.9	13.5	36.4
Effective Green, g (s)	5.6	5.6	18.9	18.9	13.5	36.4
Actuated g/C Ratio	0.11	0.11	0.38	0.38	0.27	0.73
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	198	177	704	598	477	1356
v/s Ratio Prot	c0.01		0.13		c0.19	c0.23
v/s Ratio Perm		0.01		0.01		
v/c Ratio	0.13	0.12	0.34	0.02	0.71	0.31
Uniform Delay, d1	20.0	20.0	11.1	9.7	16.5	2.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.3	1.3	0.1	4.7	0.6
Delay (s)	20.3	20.3	12.4	9.8	21.2	3.0
Level of Service	C	C	B	A	C	A
Approach Delay (s)	20.3		12.2			11.1
Approach LOS	C		B			B

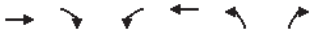
Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	35	356	223	45	94	29
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	387	242	49	102	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	242				705	242
vC1, stage 1 conf vol					242	
vC2, stage 2 conf vol					463	
vCu, unblocked vol	242				705	242
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	97				82	96
cM capacity (veh/h)	1324				565	796

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	38	387	242	49	134
Volume Left	38	0	0	0	102
Volume Right	0	0	0	49	32
cSH	1324	1700	1700	1700	606
Volume to Capacity	0.03	0.23	0.14	0.03	0.22
Queue Length 95th (ft)	2	0	0	0	21
Control Delay (s)	7.8	0.0	0.0	0.0	12.6
Lane LOS	A				B
Approach Delay (s)	0.7		0.0		12.6
Approach LOS					B

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	32.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	269	1	100	193	2	121
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	292	1	109	210	2	132
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			293		720	293
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			293		720	293
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		99	82
cM capacity (veh/h)			1268		361	746

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	293	109	210	134
Volume Left	0	109	0	2
Volume Right	1	0	0	132
cSH	1700	1268	1700	734
Volume to Capacity	0.17	0.09	0.12	0.18
Queue Length 95th (ft)	0	7	0	17
Control Delay (s)	0.0	8.1	0.0	11.0
Lane LOS		A		B
Approach Delay (s)	0.0	2.8		11.0
Approach LOS				B

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	37.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Yield	Stop		Yield	
Volume (vph)	37	17	23	4	6	47
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	18	25	4	7	51

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	59	29	58
Volume Left (vph)	40	0	7
Volume Right (vph)	0	4	51
Hadj (s)	0.17	-0.05	-0.48
Departure Headway (s)	4.2	4.0	3.6
Degree Utilization, x	0.07	0.03	0.06
Capacity (veh/h)	837	877	961
Control Delay (s)	7.5	7.2	6.8
Approach Delay (s)	7.5	7.2	6.8
Approach LOS	A	A	A

Intersection Summary			
Delay		7.2	
Level of Service		A	
Intersection Capacity Utilization		19.6%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1547	14	2	995	4	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1682	15	2	1082	4	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1697		2775	1689
vC1, stage 1 conf vol					1689	
vC2, stage 2 conf vol					1086	
vCu, unblocked vol			1697		2775	1689
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	97
cM capacity (veh/h)			375		142	116

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1697	1084	8
Volume Left	0	2	4
Volume Right	15	0	3
cSH	1700	375	129
Volume to Capacity	1.00	0.01	0.06
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.0	0.3	34.6
Lane LOS		A	D
Approach Delay (s)	0.0	0.3	34.6
Approach LOS			D

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		92.3%	ICU Level of Service F
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	201	2354	1535	154	212	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.99		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3491		1765	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3491		1765	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	218	2559	1668	167	230	121
RTOR Reduction (vph)	0	0	8	0	2	91
Lane Group Flow (vph)	218	2559	1827	0	240	18
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	12.0	66.0	50.0		14.9	14.9
Effective Green, g (s)	12.0	66.0	50.0		14.9	14.9
Actuated g/C Ratio	0.13	0.74	0.56		0.17	0.17
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	238	2627	1963		295	252
v/s Ratio Prot	0.12	c0.72	0.52		c0.14	
v/s Ratio Perm						0.01
v/c Ratio	0.92	0.97	0.93		0.81	0.07
Uniform Delay, d1	38.0	10.7	17.9		35.6	31.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	36.1	12.1	8.6		15.5	0.1
Delay (s)	74.1	22.7	26.4		51.1	31.3
Level of Service	E	C	C		D	C
Approach Delay (s)		26.7	26.4		45.0	
Approach LOS		C	C		D	

Intersection Summary				
HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	88.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	85.7%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	2429	135	509	1545	8	116	4	656	6	3	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	0.98	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583		1777	2787	1681	1735	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	0.98	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583		1777	2787	1681	1735	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	2640	147	553	1679	9	126	4	713	7	3	3
RTOR Reduction (vph)	0	0	65	0	0	2	0	0	229	0	0	0
Lane Group Flow (vph)	2	2640	82	553	1679	7	0	130	484	5	5	3
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.1	74.0	74.0	26.7	99.6	99.6		13.6	40.3	2.4	2.4	2.4
Effective Green, g (s)	1.1	74.0	74.0	26.7	99.6	99.6		13.6	40.3	2.4	2.4	2.4
Actuated g/C Ratio	0.01	0.56	0.56	0.20	0.75	0.75		0.10	0.30	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	28	2835	882	690	3816	1188		182	930	30	31	28
v/s Ratio Prot	0.00	c0.52		c0.16	0.33			c0.07	c0.10	c0.00	0.00	
v/s Ratio Perm			0.05			0.00			0.07			0.00
v/c Ratio	0.07	0.93	0.09	0.80	0.44	0.01		0.71	0.52	0.17	0.16	0.11
Uniform Delay, d1	65.3	27.0	13.7	50.5	6.2	4.1		57.7	38.2	64.2	64.2	64.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	6.3	0.0	6.7	0.1	0.0		12.5	0.5	2.6	2.4	1.7
Delay (s)	66.4	33.3	13.7	57.1	6.2	4.1		70.2	38.7	66.8	66.6	65.8
Level of Service	E	C	B	E	A	A		E	D	E	E	E
Approach Delay (s)		32.3			18.8			43.6			66.5	
Approach LOS		C			B			D			E	

Intersection Summary				
HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.86			
Actuated Cycle Length (s)	132.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	84.8%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	1895	1108	121	1146	21	829	25	132	27	15	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	2060	1204	132	1246	23	901	27	143	29	16	64
RTOR Reduction (vph)	0	0	342	0	0	14	0	0	96	0	0	60
Lane Group Flow (vph)	97	2060	862	132	1246	9	901	27	47	29	16	4
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	7.0	39.0	65.1	4.0	36.0	36.0	26.1	26.1	30.1	5.8	5.8	5.8
Effective Green, g (s)	7.0	39.0	65.1	4.0	36.0	36.0	26.1	26.1	30.1	5.8	5.8	5.8
Actuated g/C Ratio	0.08	0.43	0.72	0.04	0.40	0.40	0.29	0.29	0.33	0.06	0.06	0.06
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	136	2181	1995	151	2013	626	985	534	593	112	118	101
v/s Ratio Prot	c0.05	c0.41	0.12	0.04	0.25		c0.26	0.01	0.00	c0.02	0.01	
v/s Ratio Perm			0.19			0.01			0.03			0.00
v/c Ratio	0.71	0.94	0.43	0.87	0.62	0.01	0.91	0.05	0.08	0.26	0.14	0.04
Uniform Delay, d1	41.0	24.9	5.3	43.2	22.0	16.7	31.3	23.4	20.9	40.5	40.2	39.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.2	9.3	0.2	38.9	0.6	0.0	12.6	0.0	0.1	1.2	0.5	0.2
Delay (s)	57.2	34.2	5.5	82.1	22.5	16.7	43.9	23.5	20.9	41.7	40.7	40.1
Level of Service	E	C	A	F	C	B	D	C	C	D	D	D
Approach Delay (s)		24.6			28.1			40.4			40.6	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	28.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	80.4%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	125	1164	724	45	76	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	1265	787	49	83	150
RTOR Reduction (vph)	0	0	0	19	0	116
Lane Group Flow (vph)	136	1265	787	30	83	34
Turn Type	Prot	NA	NA	Perm	Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	7.1	54.0	42.9	42.9	9.1	16.2
Effective Green, g (s)	7.1	54.0	42.9	42.9	9.1	16.2
Actuated g/C Ratio	0.10	0.76	0.60	0.60	0.13	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	342	1414	1124	955	226	449
v/s Ratio Prot	0.04	c0.68	0.42		c0.05	0.01
v/s Ratio Perm				0.02		0.01
v/c Ratio	0.40	0.89	0.70	0.03	0.37	0.08
Uniform Delay, d1	30.0	6.4	9.7	5.7	28.4	21.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	7.7	2.0	0.0	1.0	0.1
Delay (s)	30.8	14.1	11.7	5.7	29.4	21.6
Level of Service	C	B	B	A	C	C
Approach Delay (s)		15.7	11.3		24.4	
Approach LOS		B	B		C	

Intersection Summary				
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	71.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	72.1%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	1112	1	5	675	117	1	2	20	248	0	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.88			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.95	1.00
Satd. Flow (prot)	1770	3539		1770	3461			1638			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.95	1.00
Satd. Flow (perm)	1770	3539		1770	3461			1638			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	1209	1	5	734	127	1	2	22	270	0	104
RTOR Reduction (vph)	0	0	0	0	13	0	0	20	0	0	0	77
Lane Group Flow (vph)	117	1210	0	5	848	0	0	5	0	0	270	27
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												4
Actuated Green, G (s)	10.7	39.1		0.7	29.1			6.1			19.2	19.2
Effective Green, g (s)	10.7	39.1		0.7	29.1			6.1			19.2	19.2
Actuated g/C Ratio	0.13	0.48		0.01	0.36			0.08			0.24	0.24
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	233	1706		15	1241			123			419	374
v/s Ratio Prot	c0.07	c0.34		0.00	0.24			c0.00			c0.15	
v/s Ratio Perm												0.02
v/c Ratio	0.50	0.71		0.33	0.68			0.04			0.64	0.07
Uniform Delay, d1	32.7	16.5		40.0	22.1			34.8			27.9	24.0
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	1.7	1.4		12.7	1.6			0.1			3.4	0.1
Delay (s)	34.4	17.9		52.6	23.7			34.9			31.3	24.1
Level of Service	C	B		D	C			C			C	C
Approach Delay (s)		19.4			23.8			34.9			29.3	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	81.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	64.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	326	972	9	2	608	10	6	2	6	8	1	162
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00			0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1770	1860		1770	1858			1715			1783	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.89			0.79	1.00
Satd. Flow (perm)	1770	1860		1770	1858			1554			1465	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	354	1057	10	2	661	11	7	2	7	9	1	176
RTOR Reduction (vph)	0	0	0	0	1	0	0	6	0	0	0	157
Lane Group Flow (vph)	354	1067	0	2	671	0	0	10	0	0	10	19
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	17.0	47.6		0.7	31.3			7.1			7.1	7.1
Effective Green, g (s)	17.0	47.6		0.7	31.3			7.1			7.1	7.1
Actuated g/C Ratio	0.25	0.71		0.01	0.46			0.11			0.11	0.11
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	446	1313		18	862			163			154	166
v/s Ratio Prot	c0.20	c0.57		0.00	0.36							
v/s Ratio Perm								0.01			0.01	c0.01
v/c Ratio	0.79	0.81		0.11	0.78			0.06			0.06	0.11
Uniform Delay, d1	23.6	6.8		33.0	15.1			27.1			27.2	27.3
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	9.4	3.9		2.7	4.5			0.2			0.2	0.3
Delay (s)	33.0	10.8		35.8	19.6			27.3			27.3	27.6
Level of Service	C	B		D	B			C			C	C
Approach Delay (s)		16.3			19.7			27.3			27.6	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	67.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	71.2%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	807	114	3	555	69	52	41	15	71	31	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.97	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1786			1775	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.84			0.81	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1535			1472	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	877	124	3	603	75	57	45	16	77	34	18
RTOR Reduction (vph)	0	0	36	0	0	32	0	10	0	0	10	0
Lane Group Flow (vph)	18	877	88	3	603	43	0	108	0	0	119	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	0.6	28.9	28.9	0.6	28.9	28.9		9.4			9.4	
Effective Green, g (s)	0.6	28.9	28.9	0.6	28.9	28.9		9.4			9.4	
Actuated g/C Ratio	0.01	0.57	0.57	0.01	0.57	0.57		0.18			0.18	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	20	1057	898	20	1057	898		283			271	
v/s Ratio Prot	c0.01	c0.47		0.00	0.32							
v/s Ratio Perm			0.06			0.03		0.07			c0.08	
v/c Ratio	0.90	0.83	0.10	0.15	0.57	0.05		0.38			0.44	
Uniform Delay, d1	25.1	9.0	5.0	24.9	7.0	4.9		18.2			18.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	153.9	5.5	0.0	3.5	0.7	0.0		0.9			1.1	
Delay (s)	179.0	14.5	5.1	28.4	7.8	4.9		19.1			19.6	
Level of Service	F	B	A	C	A	A		B			B	
Approach Delay (s)		16.3			7.6			19.1			19.6	
Approach LOS		B			A			B			B	

Intersection Summary				
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	50.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	58.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	33	31	12	576	884	52
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	34	13	626	961	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1641	989	1017			
vC1, stage 1 conf vol	989					
vC2, stage 2 conf vol	652					
vCu, unblocked vol	1641	989	1017			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	89	98			
cM capacity (veh/h)	303	299	682			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	70	13	626	1017
Volume Left	36	13	0	0
Volume Right	34	0	0	57
cSH	301	682	1700	1700
Volume to Capacity	0.23	0.02	0.37	0.60
Queue Length 95th (ft)	22	1	0	0
Control Delay (s)	20.5	10.4	0.0	0.0
Lane LOS	C	B		
Approach Delay (s)	20.5	0.2		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	1	17	0	0	4	13	571	0	3	866	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.86		1.00	1.00		1.00	1.00	
Flt Protected		0.98			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1681			1611		1770	1863		1770	1860	
Flt Permitted		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1712			1611		1770	1863		1770	1860	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	1	18	0	0	4	14	621	0	3	941	9
RTOR Reduction (vph)	0	17	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	13	0	0	0	0	14	621	0	3	950	0
Turn Type	Perm	NA			NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		2.2			2.2		0.6	40.3		0.6	40.3	
Effective Green, g (s)		2.2			2.2		0.6	40.3		0.6	40.3	
Actuated g/C Ratio		0.04			0.04		0.01	0.73		0.01	0.73	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		68			64		19	1362		19	1360	
v/s Ratio Prot					0.00		c0.01	0.33		0.00	c0.51	
v/s Ratio Perm		c0.01										
v/c Ratio		0.19			0.00		0.74	0.46		0.16	0.70	
Uniform Delay, d1		25.6			25.4		27.2	3.0		27.0	4.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.3			0.0		88.4	0.2		3.9	1.6	
Delay (s)		26.9			25.4		115.6	3.2		30.9	5.6	
Level of Service		C			C		F	A		C	A	
Approach Delay (s)		26.9			25.4			5.7			5.7	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	6.2	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.67			
Actuated Cycle Length (s)	55.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	61.0%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	387	85	96	198	414	437
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	421	92	104	215	450	475
RTOR Reduction (vph)	0	68	0	0	0	299
Lane Group Flow (vph)	421	24	104	215	450	176
Turn Type	Perm	Perm	Prot	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	10.4	10.4	3.0	22.0	15.0	15.0
Effective Green, g (s)	10.4	10.4	3.0	22.0	15.0	15.0
Actuated g/C Ratio	0.26	0.26	0.07	0.54	0.37	0.37
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	883	407	131	1014	691	587
v/s Ratio Prot			c0.06	0.12	c0.24	
v/s Ratio Perm	c0.12	0.01				0.11
v/c Ratio	0.48	0.06	0.79	0.21	0.65	0.30
Uniform Delay, d1	12.7	11.3	18.4	4.7	10.5	9.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	27.2	0.1	2.2	0.3
Delay (s)	13.1	11.4	45.6	4.8	12.7	9.3
Level of Service	B	B	D	A	B	A
Approach Delay (s)	12.8			18.1	11.0	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	40.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	13	40	222	27	78	430
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	43	241	29	85	467
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	893	256			271	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	893	256			271	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	94			93	
cM capacity (veh/h)	292	783			1293	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	58	271	85	467
Volume Left	14	0	85	0
Volume Right	43	29	0	0
cSH	554	1700	1293	1700
Volume to Capacity	0.10	0.16	0.07	0.27
Queue Length 95th (ft)	9	0	5	0
Control Delay (s)	12.3	0.0	8.0	0.0
Lane LOS	B		A	
Approach Delay (s)	12.3	0.0	1.2	
Approach LOS	B			

Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	32.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	139	76	53	119	311	111
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	151	83	58	129	338	121
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	643	398	459			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	643	398	459			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	64	87	95			
cM capacity (veh/h)	415	651	1102			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	234	58	129	459
Volume Left	151	58	0	0
Volume Right	83	0	0	121
cSH	642	1102	1700	1700
Volume to Capacity	0.36	0.05	0.08	0.27
Queue Length 95th (ft)	42	4	0	0
Control Delay (s)	16.0	8.4	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	16.0	2.6		0.0
Approach LOS	C			

Intersection Summary				
Average Delay	4.8			
Intersection Capacity Utilization	44.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	145	12	502	36	61	16	345	581	7	9	412	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1780	1583	1770	1863	1583	3433	3533		1770	1863	1583
Flt Permitted		0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1780	1583	1770	1863	1583	3433	3533		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	13	546	39	66	17	375	632	8	10	448	129
RTOR Reduction (vph)	0	0	320	0	0	15	0	1	0	0	0	84
Lane Group Flow (vph)	0	171	226	39	66	2	375	639	0	10	448	45
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	5	8	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		8.9	18.5	6.0	6.0	7.4	9.6	30.1		1.4	21.9	21.9
Effective Green, g (s)		8.9	18.5	6.0	6.0	7.4	9.6	30.1		1.4	21.9	21.9
Actuated g/C Ratio		0.14	0.30	0.10	0.10	0.12	0.15	0.48		0.02	0.35	0.35
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		253	469	170	179	289	528	1704		39	653	555
v/s Ratio Prot		c0.10	0.07	0.02	c0.04	0.00	c0.11	0.18		0.01	c0.24	
v/s Ratio Perm			0.07			0.00						0.03
v/c Ratio		0.68	0.48	0.23	0.37	0.01	0.71	0.37		0.26	0.69	0.08
Uniform Delay, d1		25.4	18.0	26.1	26.4	24.3	25.1	10.2		30.0	17.3	13.5
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		7.0	0.8	0.7	1.3	0.0	4.5	0.6		3.5	5.8	0.3
Delay (s)		32.3	18.8	26.8	27.7	24.3	29.6	10.8		33.5	23.1	13.8
Level of Service		C	B	C	C	C	C	B		C	C	B
Approach Delay (s)		22.0			26.9			17.8			21.2	
Approach LOS		C			C			B			C	

Intersection Summary				
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	62.4	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	66.1%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	118	834	515	205	693	66	463	62	118	114	127	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	128	907	560	223	753	72	503	67	128	124	138	72
RTOR Reduction (vph)	0	0	272	0	0	52	0	0	84	0	0	52
Lane Group Flow (vph)	128	907	288	223	753	20	503	67	44	124	138	20
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	3.2	16.2	24.2	4.0	17.0	17.0	8.0	20.9	20.9	4.0	16.9	16.9
Effective Green, g (s)	3.2	16.2	24.2	4.0	17.0	17.0	8.0	20.9	20.9	4.0	16.9	16.9
Actuated g/C Ratio	0.05	0.27	0.40	0.07	0.28	0.28	0.13	0.34	0.34	0.07	0.28	0.28
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	179	1348	730	224	1414	440	449	637	541	224	515	437
v/s Ratio Prot	0.04	c0.18	0.05	c0.06	0.15		c0.15	c0.04		0.04	c0.07	
v/s Ratio Perm			0.13			0.01			0.03			0.01
v/c Ratio	0.72	0.67	0.39	1.00	0.53	0.05	1.12	0.11	0.08	0.55	0.27	0.05
Uniform Delay, d1	28.5	20.1	13.2	28.5	18.7	16.1	26.6	13.7	13.6	27.7	17.3	16.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.7	1.3	0.4	58.5	0.4	0.0	79.5	0.3	0.3	2.9	1.3	0.2
Delay (s)	41.2	21.4	13.6	87.1	19.1	16.2	106.1	14.0	13.9	30.6	18.5	16.4
Level of Service	D	C	B	F	B	B	F	B	B	C	B	B
Approach Delay (s)		20.2			33.3			80.3			22.6	
Approach LOS		C			C			F			C	

Intersection Summary				
HCM 2000 Control Delay	35.6	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.57			
Actuated Cycle Length (s)	61.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	55.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	318	576	143	261	5	276	19	111	2	40	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.87			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3530		1770	1625			1807	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3530		1770	1625			1807	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	346	626	155	284	5	300	21	121	2	43	12
RTOR Reduction (vph)	0	0	153	0	1	0	0	71	0	0	7	0
Lane Group Flow (vph)	7	346	473	155	288	0	300	71	0	0	50	0
Turn Type	Prot	NA	pm+ov	Prot	NA		Split	NA		Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)	0.7	30.3	79.7	15.6	45.2		49.4	49.4			7.3	
Effective Green, g (s)	0.7	30.3	79.7	15.6	45.2		49.4	49.4			7.3	
Actuated g/C Ratio	0.01	0.26	0.67	0.13	0.38		0.42	0.42			0.06	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	10	475	1117	232	1345		737	676			111	
v/s Ratio Prot	0.00	c0.19	c0.18	c0.09	0.08		0.17	0.04			c0.03	
v/s Ratio Perm			0.12									
v/c Ratio	0.70	0.73	0.42	0.67	0.21		0.41	0.11			0.45	
Uniform Delay, d1	58.8	40.4	8.9	49.0	24.7		24.3	21.1			53.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	117.6	5.5	0.3	7.1	0.1		1.7	0.3			2.9	
Delay (s)	176.5	45.9	9.2	56.1	24.8		26.0	21.4			56.7	
Level of Service	F	D	A	E	C		C	C			E	
Approach Delay (s)		23.4			35.7			24.5			56.7	
Approach LOS		C			D			C			E	

Intersection Summary				
HCM 2000 Control Delay	27.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	118.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	56.9%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	24	183	205	36	400	330
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	199	223	39	435	359
RTOR Reduction (vph)	0	172	0	26	0	0
Lane Group Flow (vph)	26	27	223	13	435	359
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	7.0	7.0	16.4	16.4	15.7	36.1
Effective Green, g (s)	7.0	7.0	16.4	16.4	15.7	36.1
Actuated g/C Ratio	0.14	0.14	0.32	0.32	0.31	0.71
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	242	216	597	508	543	1316
v/s Ratio Prot	0.01		c0.12		c0.25	0.19
v/s Ratio Perm		c0.02		0.01		
v/c Ratio	0.11	0.13	0.37	0.02	0.80	0.27
Uniform Delay, d1	19.3	19.4	13.4	11.9	16.3	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.3	1.8	0.1	8.3	0.5
Delay (s)	19.5	19.6	15.2	12.0	24.6	3.2
Level of Service	B	B	B	B	C	A
Approach Delay (s)	19.6		14.7			14.9
Approach LOS	B		B			B

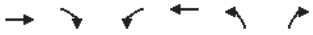
Intersection Summary				
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.50			
Actuated Cycle Length (s)	51.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	46.3%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	26	388	200	50	109	32
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	422	217	54	118	35
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	217				696	217
vC1, stage 1 conf vol					217	
vC2, stage 2 conf vol					478	
vCu, unblocked vol	217				696	217
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	98				79	96
cM capacity (veh/h)	1352				566	822

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	28	422	217	54	153
Volume Left	28	0	0	0	118
Volume Right	0	0	0	54	35
cSH	1352	1700	1700	1700	609
Volume to Capacity	0.02	0.25	0.13	0.03	0.25
Queue Length 95th (ft)	2	0	0	0	25
Control Delay (s)	7.7	0.0	0.0	0.0	12.9
Lane LOS	A				B
Approach Delay (s)	0.5		0.0		12.9
Approach LOS					B

Intersection Summary				
Average Delay	2.5			
Intersection Capacity Utilization	35.1%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	296	0	91	146	1	137
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	322	0	99	159	1	149
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			322		678	322
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			322		678	322
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		100	79
cM capacity (veh/h)			1238		384	719

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	322	99	159	150
Volume Left	0	99	0	1
Volume Right	0	0	0	149
cSH	1700	1238	1700	715
Volume to Capacity	0.19	0.08	0.09	0.21
Queue Length 95th (ft)	0	7	0	20
Control Delay (s)	0.0	8.2	0.0	11.4
Lane LOS		A		B
Approach Delay (s)	0.0	3.1		11.4
Approach LOS				B

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	39.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Yield	Stop		Yield	
Volume (vph)	41	13	19	2	4	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	14	21	2	4	59

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	59	23	63
Volume Left (vph)	45	0	4
Volume Right (vph)	0	2	59
Hadj (s)	0.19	-0.02	-0.51
Departure Headway (s)	4.2	4.1	3.6
Degree Utilization, x	0.07	0.03	0.06
Capacity (veh/h)	833	867	975
Control Delay (s)	7.5	7.2	6.8
Approach Delay (s)	7.5	7.2	6.8
Approach LOS	A	A	A

Intersection Summary			
Delay		7.2	
Level of Service		A	
Intersection Capacity Utilization		19.8%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1341	18	3	818	10	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1458	20	3	889	11	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1477		2363	1467
vC1, stage 1 conf vol					1467	
vC2, stage 2 conf vol					896	
vCu, unblocked vol			1477		2363	1467
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		94	97
cM capacity (veh/h)			456		183	157

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1477	892	15
Volume Left	0	3	11
Volume Right	20	0	4
cSH	1700	456	175
Volume to Capacity	0.87	0.01	0.09
Queue Length 95th (ft)	0	1	7
Control Delay (s)	0.0	0.2	27.5
Lane LOS		A	D
Approach Delay (s)	0.0	0.2	27.5
Approach LOS			D

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		81.7%	ICU Level of Service D
Analysis Period (min)		15	

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	24.7	120.3	1.46	43.7	A
Jamacha Blvd.	I	55	38.0	34.9	72.9	0.52	25.7	D
SR 94	I	55	38.1	1.0	39.1	0.58	53.6	A
Cougar Canyon Rd.	I	55	78.0	17.8	95.8	1.19	44.8	A
Steele Canyon Rd.	I	55	81.2	17.2	98.4	1.24	45.4	A
Indian Springs Dr.	I	55	121.9	12.0	133.9	1.86	50.0	A
Proctor Valley Rd.	I	55	29.0	15.9	44.9	0.33	26.7	D
Melody Rd.	I	55	56.4	6.6	63.0	0.86	49.2	A
Reservation Rd.	I	55	28.5	17.2	45.7	0.33	25.8	D
Total	I		566.7	147.3	714.0	8.38	42.2	A

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Reservation Rd.	I	55	261.8	5.9	267.7	4.00	53.8	A
Peacefull Valley Ran	I	55	28.5	3.7	32.2	0.33	36.6	B
Jefferson Rd.	I	55	56.4	8.9	65.3	0.86	47.5	A
Lyons Valley Rd.	I	55	29.0	27.4	56.4	0.33	21.2	D
Steele Canyon Rd.	I	55	121.9	27.2	149.1	1.86	44.9	A
Cougar Canyon Rd.	I	55	81.2	13.9	95.1	1.24	47.0	A
Jamacha Rd.	I	55	78.0	44.3	122.3	1.19	35.1	B
Jamacha Blvd.	I	55	38.1	5.8	43.9	0.58	47.7	A
Via Mercado	I	55	38.0	28.3	66.3	0.52	28.3	C
Total	I		732.9	165.4	898.3	10.92	43.7	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	96	1916	1656	164	169	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.99		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3491		1762	1504
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3491		1762	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	2083	1800	178	184	134
RTOR Reduction (vph)	0	0	9	0	3	100
Lane Group Flow (vph)	104	2083	1969	0	194	21
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	5.0	55.0	46.0		12.9	12.9
Effective Green, g (s)	5.0	55.0	46.0		12.9	12.9
Actuated g/C Ratio	0.07	0.72	0.61		0.17	0.17
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	116	2564	2115		299	255
v/s Ratio Prot	0.06	c0.59	c0.56		c0.11	
v/s Ratio Perm						0.01
v/c Ratio	0.90	0.81	0.93		0.65	0.08
Uniform Delay, d1	35.2	7.0	13.5		29.4	26.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	52.2	2.1	8.1		4.8	0.1
Delay (s)	87.4	9.1	21.6		34.2	26.7
Level of Service	F	A	C		C	C
Approach Delay (s)		12.8	21.6		31.3	
Approach LOS		B	C		C	

Intersection Summary				
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	75.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	78.2%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	1913	112	495	1718	40	87	9	558	5	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00	0.95	0.99	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583		1782	2787	1681	1748	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00	0.95	0.99	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583		1782	2787	1681	1748	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	2079	122	538	1867	43	95	10	607	5	3	4
RTOR Reduction (vph)	0	0	61	0	0	15	0	0	345	0	0	0
Lane Group Flow (vph)	61	2079	61	538	1867	28	0	105	262	4	4	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	5.7	45.7	45.7	18.2	58.2	58.2		8.8	27.0	2.2	2.2	2.2
Effective Green, g (s)	5.7	45.7	45.7	18.2	58.2	58.2		8.8	27.0	2.2	2.2	2.2
Actuated g/C Ratio	0.06	0.50	0.50	0.20	0.64	0.64		0.10	0.30	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	215	2556	795	687	3255	1013		172	950	40	42	38
v/s Ratio Prot	0.02	c0.41		c0.16	0.37			c0.06	0.06	0.00	0.00	
v/s Ratio Perm			0.04			0.02			0.04			c0.00
v/c Ratio	0.28	0.81	0.08	0.78	0.57	0.03		0.61	0.28	0.10	0.10	0.11
Uniform Delay, d1	40.7	19.0	11.7	34.5	9.3	6.0		39.4	24.5	43.4	43.4	43.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	2.1	0.0	5.8	0.2	0.0		6.3	0.2	1.1	1.0	1.2
Delay (s)	41.4	21.1	11.7	40.3	9.5	6.0		45.7	24.6	44.5	44.4	44.6
Level of Service	D	C	B	D	A	A		D	C	D	D	D
Approach Delay (s)		21.1			16.2			27.7			44.5	
Approach LOS		C			B			C			D	

Intersection Summary				
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	73.0%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	1423	972	114	1087	15	1136	32	122	19	19	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	1547	1057	124	1182	16	1235	35	133	21	21	67
RTOR Reduction (vph)	0	0	308	0	0	11	0	0	76	0	0	63
Lane Group Flow (vph)	87	1547	749	124	1182	5	1235	35	57	21	21	4
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	5.5	30.0	64.1	5.0	29.5	29.5	34.1	34.1	39.1	5.4	5.4	5.4
Effective Green, g (s)	5.5	30.0	64.1	5.0	29.5	29.5	34.1	34.1	39.1	5.4	5.4	5.4
Actuated g/C Ratio	0.06	0.33	0.71	0.06	0.33	0.33	0.38	0.38	0.43	0.06	0.06	0.06
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	107	1685	1973	189	1657	516	1293	701	753	105	111	94
v/s Ratio Prot	c0.05	c0.30	0.14	0.04	0.23		c0.36	0.02	0.00	c0.01	0.01	
v/s Ratio Perm			0.13			0.00			0.03			0.00
v/c Ratio	0.81	0.92	0.38	0.66	0.71	0.01	0.96	0.05	0.08	0.20	0.19	0.04
Uniform Delay, d1	42.0	29.1	5.3	41.9	26.8	20.6	27.5	17.9	15.1	40.5	40.5	40.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.7	9.5	0.1	7.9	1.5	0.0	15.4	0.0	0.0	0.9	0.8	0.2
Delay (s)	77.7	38.6	5.4	49.9	28.3	20.6	42.9	17.9	15.1	41.4	41.3	40.3
Level of Service	E	D	A	D	C	C	D	B	B	D	D	D
Approach Delay (s)		26.8			30.2			39.6			40.7	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	31.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	90.5	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	79.9%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	926	929	3	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	1007	1010	3	1	5
RTOR Reduction (vph)	0	0	0	1	0	4
Lane Group Flow (vph)	4	1007	1010	2	1	1
Turn Type	Prot	NA	NA	Perm	Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	0.7	45.6	40.9	40.9	16.4	17.1
Effective Green, g (s)	0.7	45.6	40.9	40.9	16.4	17.1
Actuated g/C Ratio	0.01	0.65	0.58	0.58	0.23	0.24
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	34	1213	1088	924	414	477
v/s Ratio Prot	0.00	c0.54	c0.54		0.00	c0.00
v/s Ratio Perm				0.00		0.00
v/c Ratio	0.12	0.83	0.93	0.00	0.00	0.00
Uniform Delay, d1	34.3	9.3	13.2	6.1	20.5	20.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	5.0	13.2	0.0	0.0	0.0
Delay (s)	35.9	14.2	26.5	6.1	20.5	20.0
Level of Service	D	B	C	A	C	C
Approach Delay (s)		14.3	26.4		20.1	
Approach LOS		B	C		C	

Intersection Summary				
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	58.9%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	888	0	2	911	145	1	2	7	172	2	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	3539		1770	3539	1583		1672			1775	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (perm)	1770	3539		1770	3539	1583		1672			1775	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	965	0	2	990	158	1	2	8	187	2	73
RTOR Reduction (vph)	0	0	0	0	0	53	0	6	0	0	0	61
Lane Group Flow (vph)	62	965	0	2	990	105	0	5	0	0	189	12
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	4.1	36.5		0.7	33.1	33.1		16.2			13.3	13.3
Effective Green, g (s)	4.1	36.5		0.7	33.1	33.1		16.2			13.3	13.3
Actuated g/C Ratio	0.05	0.44		0.01	0.40	0.40		0.20			0.16	0.16
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	87	1561		14	1416	633		327			285	254
v/s Ratio Prot	c0.04	c0.27		0.00	c0.28			c0.00			c0.11	
v/s Ratio Perm						0.07						0.01
v/c Ratio	0.71	0.62		0.14	0.70	0.17		0.01			0.66	0.05
Uniform Delay, d1	38.7	17.7		40.7	20.7	15.9		26.8			32.6	29.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	24.0	0.7		4.7	1.5	0.1		0.1			5.7	0.1
Delay (s)	62.7	18.5		45.4	22.2	16.1		26.9			38.3	29.4
Level of Service	E	B		D	C	B		C			D	C
Approach Delay (s)		21.2			21.4			26.9			35.8	
Approach LOS		C			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.51			
Actuated Cycle Length (s)	82.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	54.8%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	183	877	7	4	872	13	6	0	4	6	0	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00			0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.95	1.00
Satd. Flow (prot)	1770	1860		1770	1859			1717			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.85			0.75	1.00
Satd. Flow (perm)	1770	1860		1770	1859			1499			1398	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	199	953	8	4	948	14	7	0	4	7	0	203
RTOR Reduction (vph)	0	0	0	0	0	0	0	10	0	0	0	184
Lane Group Flow (vph)	199	961	0	4	962	0	0	1	0	0	7	19
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	11.1	58.4		0.7	48.0			7.3			7.3	7.3
Effective Green, g (s)	11.1	58.4		0.7	48.0			7.3			7.3	7.3
Actuated g/C Ratio	0.14	0.74		0.01	0.61			0.09			0.09	0.09
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	250	1385		15	1138			139			130	147
v/s Ratio Prot	c0.11	0.52		0.00	c0.52							
v/s Ratio Perm								0.00			0.01	c0.01
v/c Ratio	0.80	0.69		0.27	0.85			0.01			0.05	0.13
Uniform Delay, d1	32.6	5.3		38.6	12.2			32.3			32.4	32.6
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	15.9	1.5		9.3	5.9			0.0			0.2	0.4
Delay (s)	48.5	6.8		47.9	18.1			32.3			32.6	33.0
Level of Service	D	A		D	B			C			C	C
Approach Delay (s)		14.0			18.2			32.3			33.0	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	78.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	72.7%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	759	89	2	817	64	57	20	10	63	21	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.97	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1776			1763	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.78			0.79	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1431			1441	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	825	97	2	888	70	62	22	11	68	23	20
RTOR Reduction (vph)	0	0	37	0	0	33	0	7	0	0	11	0
Lane Group Flow (vph)	18	825	60	2	888	37	0	88	0	0	100	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	0.7	32.3	32.3	0.7	32.3	32.3		16.3			16.3	
Effective Green, g (s)	0.7	32.3	32.3	0.7	32.3	32.3		16.3			16.3	
Actuated g/C Ratio	0.01	0.53	0.53	0.01	0.53	0.53		0.27			0.27	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	20	981	834	20	981	834		380			383	
v/s Ratio Prot	c0.01	0.44		0.00	c0.48							
v/s Ratio Perm			0.04			0.02		0.06			c0.07	
v/c Ratio	0.90	0.84	0.07	0.10	0.91	0.04		0.23			0.26	
Uniform Delay, d1	30.3	12.3	7.1	30.0	13.1	7.0		17.6			17.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	153.9	6.6	0.0	2.2	11.6	0.0		1.4			1.7	
Delay (s)	184.2	18.9	7.2	32.2	24.7	7.0		19.0			19.4	
Level of Service	F	B	A	C	C	A		B			B	
Approach Delay (s)		20.9			23.4			19.0			19.4	
Approach LOS		C			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	61.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	56.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	9	14	6	767	866	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	15	7	834	941	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1795	948	955			
vC1, stage 1 conf vol	948					
vC2, stage 2 conf vol	847					
vCu, unblocked vol	1795	948	955			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	95	99			
cM capacity (veh/h)	285	316	720			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	25	7	834	955
Volume Left	10	7	0	0
Volume Right	15	0	0	14
cSH	303	720	1700	1700
Volume to Capacity	0.08	0.01	0.49	0.56
Queue Length 95th (ft)	7	1	0	0
Control Delay (s)	17.9	10.0	0.0	0.0
Lane LOS	C	B		
Approach Delay (s)	17.9	0.1		0.0
Approach LOS	C			

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		56.4%	ICU Level of Service B
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	0	16	0	0	4	16	846	0	2	796	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.86		1.00	1.00		1.00	1.00	
Flt Protected		0.98			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1673			1611		1770	1863		1770	1858	
Flt Permitted		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1704			1611		1770	1863		1770	1858	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	0	17	0	0	4	17	920	0	2	865	15
RTOR Reduction (vph)	0	26	0	0	4	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	1	0	0	0	0	17	920	0	2	879	0
Turn Type	Perm	NA			NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		1.7			1.7		0.6	37.6		0.6	37.6	
Effective Green, g (s)		1.7			1.7		0.6	37.6		0.6	37.6	
Actuated g/C Ratio		0.03			0.03		0.01	0.72		0.01	0.72	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		55			52		20	1349		20	1346	
v/s Ratio Prot					0.00		c0.01	c0.49		0.00	0.47	
v/s Ratio Perm		c0.00										
v/c Ratio		0.02			0.00		0.85	0.68		0.10	0.65	
Uniform Delay, d1		24.3			24.3		25.6	3.9		25.4	3.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.0		129.8	1.4		2.2	1.2	
Delay (s)		24.4			24.3		155.4	5.3		27.6	4.9	
Level of Service		C			C		F	A		C	A	
Approach Delay (s)		24.4			24.3			8.1			4.9	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	51.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	59.3%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	620	140	117	218	289	531
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	674	152	127	237	314	577
RTOR Reduction (vph)	0	104	0	0	0	403
Lane Group Flow (vph)	674	48	127	237	314	174
Turn Type	Perm	Perm	Prot	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	13.2	13.2	4.1	20.8	12.7	12.7
Effective Green, g (s)	13.2	13.2	4.1	20.8	12.7	12.7
Actuated g/C Ratio	0.31	0.31	0.10	0.50	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1078	497	172	922	563	478
v/s Ratio Prot			c0.07	0.13	c0.17	
v/s Ratio Perm	c0.20	0.03				0.11
v/c Ratio	0.63	0.10	0.74	0.26	0.56	0.37
Uniform Delay, d1	12.3	10.2	18.4	6.1	12.3	11.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.1	15.2	0.1	1.2	0.5
Delay (s)	13.4	10.3	33.6	6.3	13.5	12.0
Level of Service	B	B	C	A	B	B
Approach Delay (s)	12.8			15.8	12.5	
Approach LOS	B			B	B	

Intersection Summary				
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	42.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	49.4%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	15	43	274	17	47	353
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	47	298	18	51	384
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	793	307			316	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	793	307			316	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	94			96	
cM capacity (veh/h)	343	733			1244	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	63	316	51	384
Volume Left	16	0	51	0
Volume Right	47	18	0	0
cSH	566	1700	1244	1700
Volume to Capacity	0.11	0.19	0.04	0.23
Queue Length 95th (ft)	9	0	3	0
Control Delay (s)	12.2	0.0	8.0	0.0
Lane LOS	B		A	
Approach Delay (s)	12.2	0.0	0.9	
Approach LOS	B			

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	32.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	133	49	39	140	204	154
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	145	53	42	152	222	167
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	542	305	389			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	542	305	389			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	70	93	96			
cM capacity (veh/h)	483	734	1169			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	198	42	152	389
Volume Left	145	42	0	0
Volume Right	53	0	0	167
cSH	661	1169	1700	1700
Volume to Capacity	0.30	0.04	0.09	0.23
Queue Length 95th (ft)	31	3	0	0
Control Delay (s)	14.2	8.2	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.2	1.8		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		4.0		
Intersection Capacity Utilization		40.8%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	118	2	256	3	5	1	269	427	2	1	408	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1775	1583	1770	1863	1583	3433	3537		1770	1863	1583
Flt Permitted		0.95	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1775	1583	1770	1863	1583	3433	3537		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	128	2	278	3	5	1	292	464	2	1	443	133
RTOR Reduction (vph)	0	0	206	0	0	1	0	0	0	0	0	75
Lane Group Flow (vph)	0	130	72	3	5	0	292	466	0	1	443	58
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	5	8	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		7.3	14.5	1.0	1.0	1.6	7.2	30.8		0.6	24.2	24.2
Effective Green, g (s)		7.3	14.5	1.0	1.0	1.6	7.2	30.8		0.6	24.2	24.2
Actuated g/C Ratio		0.13	0.26	0.02	0.02	0.03	0.13	0.55		0.01	0.43	0.43
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		232	412	31	33	159	443	1955		19	809	687
v/s Ratio Prot		c0.07	0.02	0.00	c0.00	0.00	c0.09	0.13		0.00	c0.24	
v/s Ratio Perm			0.02			0.00						0.04
v/c Ratio		0.56	0.18	0.10	0.15	0.00	0.66	0.24		0.05	0.55	0.08
Uniform Delay, d1		22.7	16.0	26.9	26.9	26.3	23.1	6.4		27.3	11.7	9.2
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		3.1	0.2	1.4	2.1	0.0	3.5	0.3		1.2	2.7	0.2
Delay (s)		25.8	16.2	28.3	29.1	26.3	26.6	6.7		28.4	14.3	9.5
Level of Service		C	B	C	C	C	C	A		C	B	A
Approach Delay (s)		19.2			28.5			14.4			13.3	
Approach LOS		B			C			B			B	

Intersection Summary						
HCM 2000 Control Delay		15.2	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio		0.56				
Actuated Cycle Length (s)		55.7	Sum of lost time (s)		16.0	
Intersection Capacity Utilization		52.5%	ICU Level of Service		A	
Analysis Period (min)		15				
c Critical Lane Group						

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	117	607	427	175	583	66	496	74	145	121	118	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	660	464	190	634	72	539	80	158	132	128	78
RTOR Reduction (vph)	0	0	289	0	0	53	0	0	102	0	0	56
Lane Group Flow (vph)	127	660	175	190	634	19	539	80	56	132	128	22
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	3.1	14.4	22.4	4.0	15.3	15.3	8.0	21.0	21.0	3.9	16.9	16.9
Effective Green, g (s)	3.1	14.4	22.4	4.0	15.3	15.3	8.0	21.0	21.0	3.9	16.9	16.9
Actuated g/C Ratio	0.05	0.24	0.38	0.07	0.26	0.26	0.13	0.35	0.35	0.07	0.28	0.28
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	179	1234	704	231	1311	408	463	659	560	225	530	451
v/s Ratio Prot	0.04	c0.13	0.03	c0.06	0.12		c0.16	0.04		0.04	c0.07	
v/s Ratio Perm			0.08			0.01			0.04			0.01
v/c Ratio	0.71	0.53	0.25	0.82	0.48	0.05	1.16	0.12	0.10	0.59	0.24	0.05
Uniform Delay, d1	27.7	19.5	12.7	27.3	18.7	16.5	25.6	12.9	12.8	26.9	16.3	15.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.1	0.4	0.2	20.5	0.3	0.0	95.2	0.4	0.4	3.9	1.1	0.2
Delay (s)	39.8	20.0	12.9	47.8	18.9	16.6	120.9	13.3	13.2	30.8	17.4	15.6
Level of Service	D	B	B	D	B	B	F	B	B	C	B	B
Approach Delay (s)		19.4			24.9			87.9			22.2	
Approach LOS		B			C			F			C	

Intersection Summary				
HCM 2000 Control Delay	37.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	59.3	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	47.6%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	334	393	85	322	5	300	5	107	3	7	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.86			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	3532		1770	1595			1725	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (perm)	1770	1863	1583	1770	3532		1770	1595			1725	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	363	427	92	350	5	326	5	116	3	8	11
RTOR Reduction (vph)	0	0	117	0	1	0	0	63	0	0	11	0
Lane Group Flow (vph)	7	363	310	92	354	0	326	58	0	0	11	0
Turn Type	Prot	NA	pm+ov	Prot	NA		Split	NA		Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)	0.6	26.7	71.5	8.5	34.6		44.8	44.8			2.5	
Effective Green, g (s)	0.6	26.7	71.5	8.5	34.6		44.8	44.8			2.5	
Actuated g/C Ratio	0.01	0.27	0.73	0.09	0.35		0.45	0.45			0.03	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	10	504	1213	152	1240		805	725			43	
v/s Ratio Prot	0.00	c0.19	0.12	c0.05	0.10		c0.18	0.04			c0.01	
v/s Ratio Perm			0.08									
v/c Ratio	0.70	0.72	0.26	0.61	0.29		0.40	0.08			0.26	
Uniform Delay, d1	48.9	32.5	4.5	43.4	23.0		17.9	15.2			47.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	117.6	5.0	0.1	6.7	0.1		1.5	0.2			3.2	
Delay (s)	166.5	37.5	4.7	50.0	23.2		19.5	15.4			50.3	
Level of Service	F	D	A	D	C		B	B			D	
Approach Delay (s)		21.1			28.7			18.4			50.3	
Approach LOS		C			C			B			D	

Intersection Summary				
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.52			
Actuated Cycle Length (s)	98.5	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	55.6%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	17	175	203	22	190	286
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	190	221	24	207	311
RTOR Reduction (vph)	0	165	0	14	0	0
Lane Group Flow (vph)	18	25	221	10	207	311
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	5.4	5.4	17.2	17.2	6.0	27.2
Effective Green, g (s)	5.4	5.4	17.2	17.2	6.0	27.2
Actuated g/C Ratio	0.13	0.13	0.42	0.42	0.15	0.67
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	235	210	789	670	261	1248
v/s Ratio Prot	0.01		0.12		c0.12	c0.17
v/s Ratio Perm		c0.02		0.01		
v/c Ratio	0.08	0.12	0.28	0.02	0.79	0.25
Uniform Delay, d1	15.4	15.5	7.7	6.8	16.7	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.3	0.9	0.0	15.1	0.5
Delay (s)	15.6	15.8	8.5	6.8	31.8	3.1
Level of Service	B	B	A	A	C	A
Approach Delay (s)	15.7		8.4			14.6
Approach LOS	B		A			B

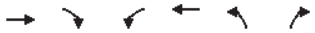
Intersection Summary				
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.36			
Actuated Cycle Length (s)	40.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	34.5%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	32	213	198	39	58	50
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	232	215	42	63	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	215				516	215
vC1, stage 1 conf vol					215	
vC2, stage 2 conf vol					301	
vCu, unblocked vol	215				516	215
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	97				90	93
cM capacity (veh/h)	1355				663	825

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	35	232	215	42	117
Volume Left	35	0	0	0	63
Volume Right	0	0	0	42	54
cSH	1355	1700	1700	1700	729
Volume to Capacity	0.03	0.14	0.13	0.02	0.16
Queue Length 95th (ft)	2	0	0	0	14
Control Delay (s)	7.7	0.0	0.0	0.0	10.9
Lane LOS	A				B
Approach Delay (s)	1.0		0.0		10.9
Approach LOS					B

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	166	0	87	175	3	100
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	180	0	95	190	3	109
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			180		560	180
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			180		560	180
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		99	87
cM capacity (veh/h)			1395		456	862

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	180	95	190	112
Volume Left	0	95	0	3
Volume Right	0	0	0	109
cSH	1700	1395	1700	841
Volume to Capacity	0.11	0.07	0.11	0.13
Queue Length 95th (ft)	0	5	0	11
Control Delay (s)	0.0	7.8	0.0	9.9
Lane LOS		A		A
Approach Delay (s)	0.0	2.6		9.9
Approach LOS				A

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	29.9%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Yield	Stop		Yield	
Volume (vph)	48	22	24	5	3	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	24	26	5	3	71

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	76	32	74
Volume Left (vph)	52	0	3
Volume Right (vph)	0	5	71
Hadj (s)	0.17	-0.07	-0.53
Departure Headway (s)	4.2	4.1	3.6
Degree Utilization, x	0.09	0.04	0.07
Capacity (veh/h)	828	865	961
Control Delay (s)	7.7	7.2	6.9
Approach Delay (s)	7.7	7.2	6.9
Approach LOS	A	A	A

Intersection Summary			
Delay	7.3		
Level of Service	A		
Intersection Capacity Utilization	21.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1119	13	1	1010	2	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1216	14	1	1098	2	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1230		2323	1223
vC1, stage 1 conf vol					1223	
vC2, stage 2 conf vol					1100	
vCu, unblocked vol			1230		2323	1223
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	98
cM capacity (veh/h)			566		206	219

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1230	1099	7
Volume Left	0	1	2
Volume Right	14	0	4
cSH	1700	566	214
Volume to Capacity	0.72	0.00	0.03
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.1	22.3
Lane LOS		A	C
Approach Delay (s)	0.0	0.1	22.3
Approach LOS			C

Intersection Summary				
Average Delay		0.1		
Intersection Capacity Utilization		69.7%	ICU Level of Service	C
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	155	2	66	2	4	47	108	461	24	55	162	313
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		0.97	1.00		1.00	1.00	1.00
Frt	1.00	0.85			0.88		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1591			1635		3433	1849		1770	1863	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1591			1635		3433	1849		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	2	72	2	4	51	117	501	26	60	176	340
RTOR Reduction (vph)	0	63	0	0	48	0	0	2	0	0	0	186
Lane Group Flow (vph)	168	11	0	0	9	0	117	525	0	60	176	154
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	6.7	6.7			3.3		3.2	25.4		1.9	24.1	24.1
Effective Green, g (s)	6.7	6.7			3.3		3.2	25.4		1.9	24.1	24.1
Actuated g/C Ratio	0.13	0.13			0.06		0.06	0.48		0.04	0.45	0.45
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	431	199			101		206	881		63	842	715
v/s Ratio Prot	c0.05	0.01			c0.01		c0.03	c0.28		0.03	0.09	
v/s Ratio Perm												0.10
v/c Ratio	0.39	0.06			0.09		0.57	0.60		0.95	0.21	0.22
Uniform Delay, d1	21.4	20.5			23.6		24.4	10.2		25.7	8.8	8.9
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1			0.4		3.6	1.1		96.0	0.1	0.2
Delay (s)	22.0	20.6			24.0		27.9	11.3		121.6	9.0	9.0
Level of Service	C	C			C		C	B		F	A	A
Approach Delay (s)		21.6			24.0			14.3			20.7	
Approach LOS		C			C			B			C	

Intersection Summary					
HCM 2000 Control Delay		18.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio		0.53			
Actuated Cycle Length (s)		53.3	Sum of lost time (s)	16.0	
Intersection Capacity Utilization		50.1%	ICU Level of Service	A	
Analysis Period (min)		15			
c Critical Lane Group					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	593	230	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	645	250	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	895	250	250			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	895	250	250			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	311	789	1316			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	0	645	250	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1316	1700	1700
Volume to Capacity	0.00	0.00	0.15	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS	A			
Approach Delay (s)	0.0	0.0	0.0	
Approach LOS	A			

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		34.5%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	528	8	174	10	7	22	169	222	0	13	539	485
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		0.97	1.00		1.00	1.00	1.00
Frt	1.00	0.86			0.92		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1596			1701		3433	1863		1770	1863	1583
Flt Permitted	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1596			1701		3433	1863		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	574	9	189	11	8	24	184	241	0	14	586	527
RTOR Reduction (vph)	0	145	0	0	23	0	0	0	0	0	0	296
Lane Group Flow (vph)	574	53	0	0	20	0	184	241	0	14	586	231
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	16.9	16.9			3.8		4.2	35.5		0.6	31.9	31.9
Effective Green, g (s)	16.9	16.9			3.8		4.2	35.5		0.6	31.9	31.9
Actuated g/C Ratio	0.23	0.23			0.05		0.06	0.49		0.01	0.44	0.44
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	796	370			88		198	908		14	816	693
v/s Ratio Prot	c0.17	0.03			c0.01		c0.05	c0.13		0.01	c0.31	
v/s Ratio Perm												0.15
v/c Ratio	0.72	0.14			0.23		0.93	0.27		1.00	0.72	0.33
Uniform Delay, d1	25.8	22.2			33.1		34.2	11.0		36.1	16.8	13.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.2	0.2			1.3		43.8	0.2		240.5	3.0	0.3
Delay (s)	29.0	22.4			34.4		78.0	11.1		276.6	19.8	13.7
Level of Service	C	C			C		E	B		F	B	B
Approach Delay (s)		27.3			34.4			40.1			20.2	
Approach LOS		C			C			D			C	

Intersection Summary					
HCM 2000 Control Delay		26.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio		0.67			
Actuated Cycle Length (s)		72.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization		64.9%	ICU Level of Service	C	
Analysis Period (min)		15			
c Critical Lane Group					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	291	723	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	316	786	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1102	786	786			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1102	786	786			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	234	392	833			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	316	786
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	833	1700
Volume to Capacity	0.00	0.00	0.46
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		41.4%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	348	18	117	2	5	50	130	216	3	59	466	389
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		0.97	1.00		1.00	1.00	1.00
Frt	1.00	0.87			0.88		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1621			1637		3433	1859		1770	1863	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1621			1637		3433	1859		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	378	20	127	2	5	54	141	235	3	64	507	423
RTOR Reduction (vph)	0	101	0	0	51	0	0	1	0	0	0	252
Lane Group Flow (vph)	378	46	0	0	10	0	141	237	0	64	507	171
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	12.7	12.7			3.6		4.4	26.3		3.1	25.0	25.0
Effective Green, g (s)	12.7	12.7			3.6		4.4	26.3		3.1	25.0	25.0
Actuated g/C Ratio	0.21	0.21			0.06		0.07	0.43		0.05	0.41	0.41
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	706	333			95		244	792		88	754	641
v/s Ratio Prot	c0.11	0.03			c0.01		c0.04	0.13		0.04	c0.27	
v/s Ratio Perm												0.11
v/c Ratio	0.54	0.14			0.11		0.58	0.30		0.73	0.67	0.27
Uniform Delay, d1	21.9	20.0			27.5		27.8	11.6		28.9	15.0	12.2
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	0.2			0.5		3.3	0.2		25.6	2.4	0.2
Delay (s)	22.7	20.2			28.0		31.0	11.9		54.5	17.4	12.5
Level of Service	C	C			C		C	B		D	B	B
Approach Delay (s)		22.0			28.0			19.0			17.7	
Approach LOS		C			C			B			B	

Intersection Summary					
HCM 2000 Control Delay		19.4	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.58			
Actuated Cycle Length (s)		61.7	Sum of lost time (s)		16.0
Intersection Capacity Utilization		54.8%	ICU Level of Service		A
Analysis Period (min)		15			
c Critical Lane Group					



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	349	585	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	379	636	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1015	636	636			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1015	636	636			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	264	478	948			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	379	636
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	948	1700
Volume to Capacity	0.00	0.00	0.37
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay		0.0		
Intersection Capacity Utilization		34.1%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	519	8	178	0	7	24	158	253	0	13	294	490
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		0.97	1.00		1.00	1.00	1.00
Frt	1.00	0.86			0.90		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1596			1670		3433	1863		1770	1863	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1596			1670		3433	1863		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	564	9	193	0	8	26	172	275	0	14	320	533
RTOR Reduction (vph)	0	142	0	0	25	0	0	0	0	0	0	350
Lane Group Flow (vph)	564	60	0	0	9	0	172	275	0	14	320	183
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	15.0	15.0			2.2		4.2	23.2		0.6	19.6	19.6
Effective Green, g (s)	15.0	15.0			2.2		4.2	23.2		0.6	19.6	19.6
Actuated g/C Ratio	0.26	0.26			0.04		0.07	0.41		0.01	0.34	0.34
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	903	420			64		252	758		18	640	544
v/s Ratio Prot	c0.16	0.04			c0.01		c0.05	c0.15		0.01	c0.17	
v/s Ratio Perm												0.12
v/c Ratio	0.62	0.14			0.14		0.68	0.36		0.78	0.50	0.34
Uniform Delay, d1	18.5	16.1			26.5		25.7	11.8		28.1	14.8	13.9
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.4	0.2			1.0		7.4	0.3		107.6	0.6	0.4
Delay (s)	19.9	16.2			27.5		33.2	12.1		135.7	15.4	14.2
Level of Service	B	B			C		C	B		F	B	B
Approach Delay (s)		18.9			27.5			20.2			16.6	
Approach LOS		B			C			C			B	

Intersection Summary					
HCM 2000 Control Delay		18.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio		0.52			
Actuated Cycle Length (s)		57.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization		51.5%	ICU Level of Service	A	
Analysis Period (min)		15			
c Critical Lane Group					



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	411	472	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	447	513	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	960	513	513			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	960	513	513			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	285	561	1052			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	447	513
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1052	1700
Volume to Capacity	0.00	0.00	0.30
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		28.2%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	59	1385	2253	235	189	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.99		0.97	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3489		1732	1504
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3489		1732	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	1505	2449	255	205	303
RTOR Reduction (vph)	0	0	6	0	8	53
Lane Group Flow (vph)	64	1505	2699	0	258	189
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	5.0	114.0	105.0		18.0	18.0
Effective Green, g (s)	5.0	114.0	105.0		18.0	18.0
Actuated g/C Ratio	0.04	0.81	0.75		0.13	0.13
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	63	2881	2616		222	193
v/s Ratio Prot	c0.04	0.43	c0.77		c0.15	
v/s Ratio Perm						0.13
v/c Ratio	1.02	0.52	1.03		1.16	0.98
Uniform Delay, d1	67.5	4.2	17.5		61.0	60.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	117.9	0.2	26.3		111.4	57.9
Delay (s)	185.4	4.4	43.8		172.4	118.7
Level of Service	F	A	D		F	F
Approach Delay (s)		11.8	43.8		146.8	
Approach LOS		B	D		F	

Intersection Summary				
HCM 2000 Control Delay	44.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.05			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	92.6%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	1427	92	473	2107	14	271	7	550	4	4	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1690	1583	1681	1770	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1690	1583	1681	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	1551	100	514	2290	15	295	8	598	4	4	0
RTOR Reduction (vph)	0	0	56	0	0	5	0	0	207	0	0	0
Lane Group Flow (vph)	8	1551	44	514	2290	10	150	153	391	4	4	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.0	37.6	37.6	19.0	55.6	55.6	12.3	12.3	31.3	1.0	1.0	
Effective Green, g (s)	1.0	37.6	37.6	19.0	55.6	55.6	12.3	12.3	31.3	1.0	1.0	
Actuated g/C Ratio	0.01	0.44	0.44	0.22	0.65	0.65	0.14	0.14	0.36	0.01	0.01	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	39	2225	692	759	3291	1024	240	241	650	19	20	
v/s Ratio Prot	0.00	0.30		c0.15	c0.45		0.09	0.09	c0.13	c0.00	0.00	
v/s Ratio Perm			0.03			0.01			0.11			
v/c Ratio	0.21	0.70	0.06	0.68	0.70	0.01	0.62	0.63	0.60	0.21	0.20	
Uniform Delay, d1	42.1	19.5	14.0	30.6	9.7	5.4	34.6	34.7	22.2	42.1	42.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.6	1.0	0.0	2.4	0.7	0.0	5.0	5.4	1.6	5.5	4.9	
Delay (s)	44.7	20.5	14.0	33.0	10.4	5.4	39.6	40.1	23.8	47.5	46.9	
Level of Service	D	C	B	C	B	A	D	D	C	D	D	
Approach Delay (s)		20.2			14.5			29.2			47.2	
Approach LOS		C			B			C			D	

Intersection Summary					
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.72				
Actuated Cycle Length (s)	85.9	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	75.0%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	72	1033	954	207	1354	18	1298	42	298	10	12	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	1123	1037	225	1472	20	1411	46	324	11	13	40
RTOR Reduction (vph)	0	0	201	0	0	14	0	0	155	0	0	38
Lane Group Flow (vph)	78	1123	836	225	1472	6	1411	46	169	11	13	2
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	6.0	31.3	78.4	9.8	35.1	35.1	47.1	47.1	56.9	5.2	5.2	5.2
Effective Green, g (s)	6.0	31.3	78.4	9.8	35.1	35.1	47.1	47.1	56.9	5.2	5.2	5.2
Actuated g/C Ratio	0.05	0.29	0.72	0.09	0.32	0.32	0.43	0.43	0.52	0.05	0.05	0.05
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	97	1454	1134	307	1631	507	1478	802	881	84	88	75
v/s Ratio Prot	0.04	0.22	0.32	c0.07	c0.29		c0.41	0.02	0.02	0.01	c0.01	
v/s Ratio Perm			0.21			0.00			0.09			0.00
v/c Ratio	0.80	0.77	0.74	0.73	0.90	0.01	0.95	0.06	0.19	0.13	0.15	0.03
Uniform Delay, d1	51.1	35.8	9.3	48.5	35.5	25.3	30.1	18.2	14.0	49.9	50.0	49.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	36.6	2.6	2.5	8.7	7.4	0.0	14.0	0.0	0.1	0.7	0.8	0.1
Delay (s)	87.7	38.4	11.9	57.3	42.9	25.3	44.1	18.2	14.1	50.6	50.8	49.8
Level of Service	F	D	B	E	D	C	D	B	B	D	D	D
Approach Delay (s)		27.8			44.5			38.0			50.2	
Approach LOS		C			D			D			D	

Intersection Summary					
HCM 2000 Control Delay	36.1	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.89				
Actuated Cycle Length (s)	109.4	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	83.8%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	324	790	1111	288	118	373
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	352	859	1208	313	128	405
RTOR Reduction (vph)	0	0	0	111	0	63
Lane Group Flow (vph)	352	859	1208	202	128	342
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	10.0	76.1	62.1	62.1	12.0	22.0
Effective Green, g (s)	10.0	76.1	62.1	62.1	12.0	22.0
Actuated g/C Ratio	0.10	0.79	0.65	0.65	0.12	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	357	1475	1203	1022	221	428
v/s Ratio Prot	0.10	0.46	c0.65		0.07	c0.08
v/s Ratio Perm				0.13		0.13
v/c Ratio	0.99	0.58	1.00	0.20	0.58	0.80
Uniform Delay, d1	43.0	3.9	17.0	6.9	39.7	35.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	43.5	0.6	27.0	0.1	3.7	10.0
Delay (s)	86.5	4.5	44.0	7.0	43.3	45.0
Level of Service	F	A	D	A	D	D
Approach Delay (s)		28.3	36.3		44.6	
Approach LOS		C	D		D	

Intersection Summary				
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	96.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	88.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	121	801	0	4	1140	202	4	2	2	156	0	261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.95	1.00
Satd. Flow (prot)	1770	1863		1770	1863	1583		1756			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.98			0.95	1.00
Satd. Flow (perm)	1770	1863		1770	1863	1583		1756			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	132	871	0	4	1239	220	4	2	2	170	0	284
RTOR Reduction (vph)	0	0	0	0	0	32	0	2	0	0	0	240
Lane Group Flow (vph)	132	871	0	4	1239	188	0	6	0	0	170	44
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	11.0	104.4		0.8	94.2	94.2		6.1			15.8	15.8
Effective Green, g (s)	11.0	104.4		0.8	94.2	94.2		6.1			15.8	15.8
Actuated g/C Ratio	0.08	0.73		0.01	0.66	0.66		0.04			0.11	0.11
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	136	1359		9	1226	1042		74			195	174
v/s Ratio Prot	c0.07	0.47		0.00	c0.67			c0.00			c0.10	
v/s Ratio Perm						0.12						0.03
v/c Ratio	0.97	0.64		0.44	1.01	0.18		0.08			0.87	0.25
Uniform Delay, d1	65.9	9.8		70.9	24.4	9.5		65.8			62.7	58.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	67.9	1.0		31.3	28.3	0.1		0.5			32.0	0.8
Delay (s)	133.7	10.9		102.2	52.8	9.6		66.3			94.6	59.0
Level of Service	F	B		F	D	A		E			F	E
Approach Delay (s)		27.0			46.4			66.3			72.3	
Approach LOS		C			D			E			E	

Intersection Summary				
HCM 2000 Control Delay	43.9	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.94			
Actuated Cycle Length (s)	143.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	92.0%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	178	765	8	9	981	7	12	2	5	12	3	384
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	193	832	9	10	1066	8	13	2	5	13	3	417
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1074			840			2728	2316	836	2315	2317	1070
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1074			840			2728	2316	836	2315	2317	1070
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	70			99			0	92	99	30	88	0
cM capacity (veh/h)	649			795			0	26	367	19	26	269

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	193	840	10	1074	21	16	417
Volume Left	193	0	10	0	13	13	0
Volume Right	0	9	0	8	5	0	417
cSH	649	1700	795	1700	0	20	269
Volume to Capacity	0.30	0.49	0.01	0.63	Err	0.82	1.55
Queue Length 95th (ft)	31	0	1	0	Err	56	622
Control Delay (s)	12.9	0.0	9.6	0.0	Err	407.4	300.8
Lane LOS	B		A		F	F	F
Approach Delay (s)	2.4		0.1		Err	304.8	
Approach LOS					F	F	

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	89.2%	ICU Level of Service		E
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	592	94	12	668	72	270	101	22	83	94	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1787			1718	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.51			0.84	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		952			1456	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	643	102	13	726	78	293	110	24	90	102	188
RTOR Reduction (vph)	0	0	27	0	0	38	0	2	0	0	33	0
Lane Group Flow (vph)	126	643	75	13	726	40	0	425	0	0	347	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	8.0	51.8	51.8	1.6	45.4	45.4		47.0			47.0	
Effective Green, g (s)	8.0	51.8	51.8	1.6	45.4	45.4		47.0			47.0	
Actuated g/C Ratio	0.07	0.46	0.46	0.01	0.40	0.40		0.42			0.42	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	125	858	729	25	752	639		398			608	
v/s Ratio Prot	c0.07	0.35		0.01	c0.39							
v/s Ratio Perm			0.05			0.03		c0.45			0.24	
v/c Ratio	1.01	0.75	0.10	0.52	0.97	0.06		1.07			0.57	
Uniform Delay, d1	52.2	25.0	17.1	55.0	32.7	20.5		32.7			25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	82.6	3.6	0.1	18.1	24.4	0.0		64.5			1.3	
Delay (s)	134.8	28.6	17.2	73.2	57.1	20.5		97.2			26.3	
Level of Service	F	C	B	E	E	C		F			C	
Approach Delay (s)		42.6			53.9			97.2			26.3	
Approach LOS		D			D			F			C	

Intersection Summary					
HCM 2000 Control Delay	53.2	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	1.02				
Actuated Cycle Length (s)	112.4	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	96.7%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	7	5	7	745	613	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	5	8	810	666	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1498	673	679			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1498	673	679			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	99	99			
cM capacity (veh/h)	134	455	913			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	13	8	810	679
Volume Left	8	8	0	0
Volume Right	5	0	0	13
cSH	189	913	1700	1700
Volume to Capacity	0.07	0.01	0.48	0.40
Queue Length 95th (ft)	5	1	0	0
Control Delay (s)	25.4	9.0	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	25.4	0.1		0.0
Approach LOS	D			

Intersection Summary				
Average Delay			0.3	
Intersection Capacity Utilization			49.2%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	32	0	23	3	0	46	16	587	8	53	492	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	25	3	0	50	17	638	9	58	535	36
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1395	1349	553	1370	1363	642	571			647		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1395	1349	553	1370	1363	642	571			647		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	65	100	95	97	100	89	98			94		
cM capacity (veh/h)	100	139	533	111	136	474	1002			939		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	60	53	664	628
Volume Left	35	3	17	58
Volume Right	25	50	9	36
cSH	151	395	1002	939
Volume to Capacity	0.40	0.13	0.02	0.06
Queue Length 95th (ft)	43	12	1	5
Control Delay (s)	43.5	15.5	0.5	1.6
Lane LOS	E	C	A	A
Approach Delay (s)	43.5	15.5	0.5	1.6
Approach LOS	E	C		

Intersection Summary				
Average Delay			3.4	
Intersection Capacity Utilization			70.3%	ICU Level of Service C
Analysis Period (min)			15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	147	32	76	428	240	344
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	160	35	83	465	261	374
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1078	448	635			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1078	448	635			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	28	94	91			
cM capacity (veh/h)	221	611	948			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	195	548	635
Volume Left	160	83	0
Volume Right	35	0	374
cSH	249	948	1700
Volume to Capacity	0.78	0.09	0.37
Queue Length 95th (ft)	144	7	0
Control Delay (s)	56.7	2.3	0.0
Lane LOS	F	A	
Approach Delay (s)	56.7	2.3	0.0
Approach LOS	F		

Intersection Summary				
Average Delay	8.9			
Intersection Capacity Utilization	80.5%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	60	72	479	24	19	171
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	78	521	26	21	186
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	761	534			547	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	761	534			547	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	82	86			98	
cM capacity (veh/h)	366	546			1023	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	143	547	21	186
Volume Left	65	0	21	0
Volume Right	78	26	0	0
cSH	446	1700	1023	1700
Volume to Capacity	0.32	0.32	0.02	0.11
Queue Length 95th (ft)	34	0	2	0
Control Delay (s)	16.8	0.0	8.6	0.0
Lane LOS	C		A	
Approach Delay (s)	16.8	0.0	0.9	
Approach LOS	C			

Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	41.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	98	75	103	397	202	119
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	107	82	112	432	220	129
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	940	284	349			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	940	284	349			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	60	89	91			
cM capacity (veh/h)	266	755	1210			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	188	112	432	349
Volume Left	107	112	0	0
Volume Right	82	0	0	129
cSH	469	1210	1700	1700
Volume to Capacity	0.40	0.09	0.25	0.21
Queue Length 95th (ft)	48	8	0	0
Control Delay (s)	20.0	8.3	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	20.0	1.7		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		4.3		
Intersection Capacity Utilization		39.0%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	207	2303	1821	339	382	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.98		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3456		1765	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3456		1765	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	225	2503	1979	368	415	211
RTOR Reduction (vph)	0	0	13	0	2	134
Lane Group Flow (vph)	225	2503	2334	0	434	56
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	12.0	91.0	75.0		21.0	21.0
Effective Green, g (s)	12.0	91.0	75.0		21.0	21.0
Actuated g/C Ratio	0.10	0.76	0.62		0.18	0.18
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	177	2683	2160		308	263
v/s Ratio Prot	c0.13	0.71	c0.68		c0.25	
v/s Ratio Perm						0.04
v/c Ratio	1.27	0.93	1.08		1.41	0.21
Uniform Delay, d1	54.0	12.0	22.5		49.5	42.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	158.7	6.8	45.3		202.9	0.4
Delay (s)	212.7	18.7	67.8		252.4	42.8
Level of Service	F	B	E		F	D
Approach Delay (s)		34.7	67.8		188.8	
Approach LOS		C	E		F	

Intersection Summary				
HCM 2000 Control Delay	65.2	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.17			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	107.7%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	2448	201	603	1948	7	181	3	766	9	3	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1688	1583	1681	1720	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1688	1583	1681	1720	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2661	218	655	2117	8	197	3	833	10	3	2
RTOR Reduction (vph)	0	0	110	0	0	2	0	0	122	0	0	0
Lane Group Flow (vph)	8	2661	108	655	2117	6	100	100	711	6	7	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.2	67.6	67.6	38.1	104.5	104.5	12.6	12.6	50.7	2.6	2.6	2.6
Effective Green, g (s)	1.2	67.6	67.6	38.1	104.5	104.5	12.6	12.6	50.7	2.6	2.6	2.6
Actuated g/C Ratio	0.01	0.49	0.49	0.28	0.76	0.76	0.09	0.09	0.37	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	30	2510	781	955	3881	1208	154	155	632	31	32	30
v/s Ratio Prot	0.00	c0.52		0.19	0.42		0.06	0.06	c0.31	0.00	c0.00	
v/s Ratio Perm			0.07			0.00			0.14			0.00
v/c Ratio	0.27	1.06	0.14	0.69	0.55	0.01	0.65	0.65	1.12	0.19	0.22	0.07
Uniform Delay, d1	67.4	34.7	18.8	44.1	6.6	3.8	60.0	60.0	43.1	66.1	66.1	66.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.7	36.5	0.1	2.1	0.2	0.0	9.1	8.9	75.3	3.0	3.4	0.9
Delay (s)	72.1	71.1	18.9	46.1	6.7	3.9	69.1	68.9	118.4	69.2	69.6	66.9
Level of Service	E	E	B	D	A	A	E	E	F	E	E	E
Approach Delay (s)		67.2			16.0			108.8			69.1	
Approach LOS		E			B			F			E	

Intersection Summary				
HCM 2000 Control Delay	52.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.11			
Actuated Cycle Length (s)	136.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	108.1%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	115	1978	1251	268	1382	50	1155	34	272	52	40	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	2150	1360	291	1502	54	1255	37	296	57	43	87
RTOR Reduction (vph)	0	0	99	0	0	33	0	0	72	0	0	81
Lane Group Flow (vph)	125	2150	1261	291	1502	21	1255	37	224	57	43	6
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	13.2	58.1	107.1	11.0	55.9	55.9	49.0	49.0	60.0	10.0	10.0	10.0
Effective Green, g (s)	13.2	58.1	107.1	11.0	55.9	55.9	49.0	49.0	60.0	10.0	10.0	10.0
Actuated g/C Ratio	0.09	0.40	0.74	0.08	0.39	0.39	0.34	0.34	0.42	0.07	0.07	0.07
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	162	2050	1176	262	1972	614	1167	633	703	122	129	109
v/s Ratio Prot	0.07	0.42	c0.36	c0.08	0.30		c0.37	0.02	0.02	c0.03	0.02	
v/s Ratio Perm			0.43			0.01			0.12			0.00
v/c Ratio	0.77	1.05	1.07	1.11	0.76	0.03	1.08	0.06	0.32	0.47	0.33	0.06
Uniform Delay, d1	64.0	43.0	18.5	66.5	38.3	27.4	47.5	32.0	28.3	64.5	63.9	62.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.0	34.1	47.8	88.6	1.8	0.0	49.1	0.0	0.3	2.8	1.5	0.2
Delay (s)	84.0	77.1	66.3	155.1	40.1	27.4	96.7	32.1	28.6	67.3	65.4	62.9
Level of Service	F	E	E	F	D	C	F	C	C	E	E	E
Approach Delay (s)		73.3			57.9			82.5			64.8	
Approach LOS		E			E			F			E	

Intersection Summary				
HCM 2000 Control Delay	71.2	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.03			
Actuated Cycle Length (s)	144.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	98.4%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	92	1346	955	47	68	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	100	1463	1038	51	74	130
RTOR Reduction (vph)	0	0	0	14	0	110
Lane Group Flow (vph)	100	1463	1038	37	74	20
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	5.0	76.1	67.1	67.1	9.2	14.2
Effective Green, g (s)	5.0	76.1	67.1	67.1	9.2	14.2
Actuated g/C Ratio	0.05	0.82	0.72	0.72	0.10	0.15
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	183	1519	1339	1138	174	308
v/s Ratio Prot	0.03	c0.79	0.56		c0.04	0.00
v/s Ratio Perm				0.02		0.01
v/c Ratio	0.55	0.96	0.78	0.03	0.43	0.06
Uniform Delay, d1	43.0	7.4	8.3	3.8	39.6	33.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3	15.1	2.9	0.0	1.7	0.1
Delay (s)	46.4	22.5	11.2	3.8	41.2	33.9
Level of Service	D	C	B	A	D	C
Approach Delay (s)		24.1	10.8		36.6	
Approach LOS		C	B		D	

Intersection Summary				
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.95			
Actuated Cycle Length (s)	93.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	81.3%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	112	1256	2	6	862	170	2	4	21	297	6	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	1862		1770	1863	1583		1658			1776	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (perm)	1770	1862		1770	1863	1583		1658			1776	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	122	1365	2	7	937	185	2	4	23	323	7	117
RTOR Reduction (vph)	0	0	0	0	0	39	0	22	0	0	0	79
Lane Group Flow (vph)	122	1367	0	7	937	146	0	7	0	0	330	38
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	11.0	91.7		0.8	81.5	81.5		6.6			24.0	24.0
Effective Green, g (s)	11.0	91.7		0.8	81.5	81.5		6.6			24.0	24.0
Actuated g/C Ratio	0.08	0.66		0.01	0.59	0.59		0.05			0.17	0.17
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	139	1227		10	1091	927		78			306	273
v/s Ratio Prot	c0.07	c0.73		0.00	0.50			c0.00			c0.19	
v/s Ratio Perm						0.09						0.02
v/c Ratio	0.88	1.11		0.70	0.86	0.16		0.09			1.08	0.14
Uniform Delay, d1	63.4	23.7		69.0	24.0	13.1		63.4			57.5	48.8
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	41.8	63.0		117.6	6.9	0.1		0.5			73.9	0.2
Delay (s)	105.2	86.7		186.6	30.9	13.2		63.9			131.5	49.0
Level of Service	F	F		F	C	B		E			F	D
Approach Delay (s)		88.2			29.0			63.9			109.9	
Approach LOS		F			C			E			F	

Intersection Summary				
HCM 2000 Control Delay	69.5	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.06			
Actuated Cycle Length (s)	139.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	103.0%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	336	1211	15	6	870	18	7	2	5	15	2	192
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	365	1316	16	7	946	20	8	2	5	16	2	209
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	965			1333			3223	3033	1324	3022	3032	955
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	965			1333			3223	3033	1324	3022	3032	955
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	49			99			0	65	97	0	65	33
cM capacity (veh/h)	713			518			1	6	191	3	6	313

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	365	1333	7	965	15	18	209
Volume Left	365	0	7	0	8	16	0
Volume Right	0	16	0	20	5	0	209
cSH	713	1700	518	1700	2	4	313
Volume to Capacity	0.51	0.78	0.01	0.57	9.30	5.01	0.67
Queue Length 95th (ft)	74	0	1	0	Err	Err	112
Control Delay (s)	15.2	0.0	12.0	0.0	Err	Err	36.7
Lane LOS	C		B		F	F	E
Approach Delay (s)	3.3		0.1		Err	847.1	
Approach LOS					F	F	

Intersection Summary				
Average Delay	120.3			
Intersection Capacity Utilization	85.0%	ICU Level of Service		E
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	956	314	33	760	72	149	112	120	93	107	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.96			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.98	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1750			1800	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.73			0.66	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1309			1218	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	1039	341	36	826	78	162	122	130	101	116	24
RTOR Reduction (vph)	0	0	35	0	0	34	0	16	0	0	4	0
Lane Group Flow (vph)	30	1039	306	36	826	44	0	398	0	0	237	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	2.3	55.1	55.1	2.3	55.1	55.1		29.0			29.0	
Effective Green, g (s)	2.3	55.1	55.1	2.3	55.1	55.1		29.0			29.0	
Actuated g/C Ratio	0.02	0.56	0.56	0.02	0.56	0.56		0.29			0.29	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	41	1043	886	41	1043	886		385			358	
v/s Ratio Prot	0.02	c0.56		c0.02	0.44							
v/s Ratio Perm			0.19			0.03		c0.30			0.19	
v/c Ratio	0.73	1.00	0.35	0.88	0.79	0.05		1.03			0.66	
Uniform Delay, d1	47.7	21.5	11.8	47.9	17.1	9.8		34.7			30.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	49.4	26.7	0.2	92.9	4.2	0.0		54.7			4.5	
Delay (s)	97.2	48.3	12.0	140.9	21.3	9.8		89.4			34.9	
Level of Service	F	D	B	F	C	A		F			C	
Approach Delay (s)		40.6			24.9			89.4			34.9	
Approach LOS		D			C			F			C	

Intersection Summary				
HCM 2000 Control Delay	41.9	HCM 2000 Level of Service		D
HCM 2000 Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	98.4	Sum of lost time (s)		12.0
Intersection Capacity Utilization	83.9%	ICU Level of Service		E
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	25	28	5	839	1087	31
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	30	5	912	1182	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2121	1198	1215			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2121	1198	1215			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	50	87	99			
cM capacity (veh/h)	55	226	574			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	58	5	912	1215
Volume Left	27	5	0	0
Volume Right	30	0	0	34
cSH	91	574	1700	1700
Volume to Capacity	0.63	0.01	0.54	0.71
Queue Length 95th (ft)	75	1	0	0
Control Delay (s)	96.0	11.3	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	96.0	0.1		0.0
Approach LOS	F			

Intersection Summary				
Average Delay			2.6	
Intersection Capacity Utilization			69.1%	ICU Level of Service C
Analysis Period (min)			15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	0	19	4	0	9	25	819	0	5	1036	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	0	21	4	0	10	27	890	0	5	1126	17
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2100	2090	1135	2111	2099	890	1143			890		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2100	2090	1135	2111	2099	890	1143			890		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	54	100	92	87	100	97	96			99		
cM capacity (veh/h)	35	50	246	33	49	342	611			761		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	37	14	917	1149
Volume Left	16	4	27	5
Volume Right	21	10	0	17
cSH	68	88	611	761
Volume to Capacity	0.55	0.16	0.04	0.01
Queue Length 95th (ft)	57	14	3	1
Control Delay (s)	109.1	53.9	1.3	0.3
Lane LOS	F	F	A	A
Approach Delay (s)	109.1	53.9	1.3	0.3
Approach LOS	F	F		

Intersection Summary				
Average Delay			3.0	
Intersection Capacity Utilization			70.8%	ICU Level of Service C
Analysis Period (min)			15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	620	136	116	189	545	529
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	674	148	126	205	592	575
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1338	880	1167			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1338	880	1167			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	57	79			
cM capacity (veh/h)	133	346	598			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	822	332	1167
Volume Left	674	126	0
Volume Right	148	0	575
cSH	150	598	1700
Volume to Capacity	5.48	0.21	0.69
Queue Length 95th (ft)	Err	20	0
Control Delay (s)	Err	6.7	0.0
Lane LOS	F	A	
Approach Delay (s)	Err	6.7	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	3541.6		
Intersection Capacity Utilization	130.0%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	40	34	346	64	72	580
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	37	376	70	78	630
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1198	411			446	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1198	411			446	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	77	94			93	
cM capacity (veh/h)	191	641			1115	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	80	446	78	630
Volume Left	43	0	78	0
Volume Right	37	70	0	0
cSH	282	1700	1115	1700
Volume to Capacity	0.29	0.26	0.07	0.37
Queue Length 95th (ft)	29	0	6	0
Control Delay (s)	22.8	0.0	8.5	0.0
Lane LOS	C		A	
Approach Delay (s)	22.8	0.0	0.9	
Approach LOS	C			

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	153	147	67	148	519	187
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	166	160	73	161	564	203
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	972	666	767			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	972	666	767			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	35	65	91			
cM capacity (veh/h)	256	460	846			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	326	73	161	767
Volume Left	166	73	0	0
Volume Right	160	0	0	203
cSH	443	846	1700	1700
Volume to Capacity	0.74	0.09	0.09	0.45
Queue Length 95th (ft)	148	7	0	0
Control Delay (s)	32.5	9.7	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	32.5	3.0		0.0
Approach LOS	D			

Intersection Summary				
Average Delay		8.5		
Intersection Capacity Utilization		60.9%	ICU Level of Service	B
Analysis Period (min)		15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	244	2753	1840	270	350	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.98		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3471		1768	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3471		1768	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	265	2992	2000	293	380	140
RTOR Reduction (vph)	0	0	9	0	1	101
Lane Group Flow (vph)	265	2992	2284	0	393	25
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	19.0	98.0	75.0		24.0	24.0
Effective Green, g (s)	19.0	98.0	75.0		24.0	24.0
Actuated g/C Ratio	0.15	0.75	0.58		0.18	0.18
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	258	2667	2002		326	277
v/s Ratio Prot	0.15	c0.85	0.66		c0.22	
v/s Ratio Perm						0.02
v/c Ratio	1.03	1.12	1.14		1.21	0.09
Uniform Delay, d1	55.5	16.0	27.5		53.0	43.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	63.2	60.5	70.0		118.1	0.1
Delay (s)	118.7	76.5	97.5		171.1	44.1
Level of Service	F	E	F		F	D
Approach Delay (s)		79.9	97.5		140.3	
Approach LOS		E	F		F	

Intersection Summary				
HCM 2000 Control Delay	91.7	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.18			
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	105.0%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	2828	192	522	1850	9	168	6	680	7	4	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.98	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1691	1583	1681	1741	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.98	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1691	1583	1681	1741	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	3074	209	567	2011	10	183	7	739	8	4	4
RTOR Reduction (vph)	0	0	89	0	0	2	0	0	124	0	0	0
Lane Group Flow (vph)	3	3074	120	567	2011	8	95	95	615	6	6	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.1	76.5	76.5	29.1	104.5	104.5	12.3	12.3	41.4	2.5	2.5	2.5
Effective Green, g (s)	1.1	76.5	76.5	29.1	104.5	104.5	12.3	12.3	41.4	2.5	2.5	2.5
Actuated g/C Ratio	0.01	0.56	0.56	0.21	0.77	0.77	0.09	0.09	0.30	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	27	2851	887	732	3895	1212	151	152	526	30	31	29
v/s Ratio Prot	0.00	c0.60		0.17	0.40		0.06	0.06	c0.25	c0.00	0.00	
v/s Ratio Perm			0.08			0.00			0.14			0.00
v/c Ratio	0.11	1.08	0.14	0.77	0.52	0.01	0.63	0.62	1.17	0.20	0.19	0.14
Uniform Delay, d1	67.2	30.0	14.2	50.6	6.2	3.7	59.9	59.8	47.5	66.0	66.0	65.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	42.4	0.1	5.1	0.1	0.0	8.0	7.8	95.1	3.3	3.0	2.2
Delay (s)	69.0	72.4	14.3	55.7	6.3	3.8	67.8	67.6	142.6	69.2	69.0	68.1
Level of Service	E	E	B	E	A	A	E	E	F	E	E	E
Approach Delay (s)		68.7			17.1			127.3			68.9	
Approach LOS		E			B			F			E	

Intersection Summary				
HCM 2000 Control Delay	57.1	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.13			
Actuated Cycle Length (s)	136.4	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	110.1%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	2106	1494	260	1261	39	1127	29	268	44	18	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	2289	1624	283	1371	42	1225	32	291	48	20	65
RTOR Reduction (vph)	0	0	139	0	0	26	0	0	89	0	0	61
Lane Group Flow (vph)	98	2289	1485	283	1371	16	1225	32	202	48	20	4
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	10.4	51.1	99.2	9.0	49.7	49.7	48.1	48.1	57.1	7.7	7.7	7.7
Effective Green, g (s)	10.4	51.1	99.2	9.0	49.7	49.7	48.1	48.1	57.1	7.7	7.7	7.7
Actuated g/C Ratio	0.08	0.39	0.75	0.07	0.38	0.38	0.36	0.36	0.43	0.06	0.06	0.06
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	139	1970	1190	234	1916	596	1251	679	733	103	108	92
v/s Ratio Prot	0.06	0.45	c0.45	c0.08	0.27		0.36	0.02	0.02	c0.03	0.01	
v/s Ratio Perm			0.48			0.01			0.11			0.00
v/c Ratio	0.71	1.16	1.25	1.21	0.72	0.03	0.98	0.05	0.28	0.47	0.19	0.04
Uniform Delay, d1	59.3	40.4	16.4	61.5	35.1	25.9	41.4	27.1	24.1	60.1	59.1	58.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.0	78.9	118.9	127.2	1.3	0.0	20.3	0.0	0.2	3.3	0.8	0.2
Delay (s)	74.3	119.3	135.2	188.6	36.4	25.9	61.7	27.1	24.3	63.4	59.9	58.8
Level of Service	E	F	F	F	D	C	E	C	C	E	E	E
Approach Delay (s)		124.7			61.5			54.0			60.6	
Approach LOS		F			E			D			E	

Intersection Summary				
HCM 2000 Control Delay	94.2	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.19			
Actuated Cycle Length (s)	131.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	113.3%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	133	1600	1061	49	97	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	1739	1153	53	105	170
RTOR Reduction (vph)	0	0	0	12	0	123
Lane Group Flow (vph)	145	1739	1153	41	105	47
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	8.9	126.1	113.2	113.2	13.3	22.2
Effective Green, g (s)	8.9	126.1	113.2	113.2	13.3	22.2
Actuated g/C Ratio	0.06	0.86	0.77	0.77	0.09	0.15
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	207	1593	1430	1215	159	281
v/s Ratio Prot	0.04	c0.93	0.62		c0.06	0.01
v/s Ratio Perm				0.03		0.02
v/c Ratio	0.70	1.09	0.81	0.03	0.66	0.17
Uniform Delay, d1	67.9	10.7	10.4	4.1	64.9	54.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.2	51.9	3.4	0.0	9.8	0.3
Delay (s)	78.2	62.6	13.8	4.1	74.7	54.8
Level of Service	E	E	B	A	E	D
Approach Delay (s)		63.8	13.4		62.4	
Approach LOS		E	B		E	

Intersection Summary				
HCM 2000 Control Delay	45.6	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.08			
Actuated Cycle Length (s)	147.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	96.3%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	119	1559	2	6	1011	151	2	3	23	296	0	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	1862		1770	1863	1583		1648			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (perm)	1770	1862		1770	1863	1583		1648			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	129	1695	2	7	1099	164	2	3	25	322	0	111
RTOR Reduction (vph)	0	0	0	0	0	37	0	24	0	0	0	82
Lane Group Flow (vph)	129	1697	0	7	1099	127	0	6	0	0	322	29
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	13.3	99.8		0.8	87.3	87.3		6.5			20.0	20.0
Effective Green, g (s)	13.3	99.8		0.8	87.3	87.3		6.5			20.0	20.0
Actuated g/C Ratio	0.09	0.70		0.01	0.61	0.61		0.05			0.14	0.14
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	164	1298		9	1136	965		74			247	221
v/s Ratio Prot	c0.07	c0.91		0.00	0.59			c0.00			c0.18	
v/s Ratio Perm						0.08						0.02
v/c Ratio	0.79	1.31		0.78	0.97	0.13		0.08			1.30	0.13
Uniform Delay, d1	63.5	21.6		71.1	26.5	11.8		65.4			61.5	53.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	21.5	144.0		167.2	19.1	0.1		0.5			162.9	0.3
Delay (s)	85.1	165.6		238.2	45.7	11.9		65.9			224.4	54.2
Level of Service	F	F		F	D	B		E			F	D
Approach Delay (s)		160.0			42.4			65.9			180.8	
Approach LOS		F			D			E			F	

Intersection Summary				
HCM 2000 Control Delay	119.7	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.25			
Actuated Cycle Length (s)	143.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	118.6%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	372	1409	10	3	953	18	7	3	9	13	2	188
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	404	1532	11	3	1036	20	8	3	10	14	2	204
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1055			1542			3593	3408	1537	3404	3403	1046
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1055			1542			3593	3408	1537	3404	3403	1046
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	39			99			0	0	93	0	23	26
cM capacity (veh/h)	660			430			0	3	143	0	3	278

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	404	1542	3	1055	21	16	204
Volume Left	404	0	3	0	8	14	0
Volume Right	0	11	0	20	10	0	204
cSH	660	1700	430	1700	0	0	278
Volume to Capacity	0.61	0.91	0.01	0.62	47.39	Err	0.74
Queue Length 95th (ft)	105	0	1	0	Err	Err	133
Control Delay (s)	18.7	0.0	13.4	0.0	Err	Err	47.0
Lane LOS	C		B		F	F	E
Approach Delay (s)	3.9		0.0		Err	Err	
Approach LOS					F	F	

Intersection Summary					
Average Delay	Err				
Intersection Capacity Utilization	95.5%	ICU Level of Service		F	
Analysis Period (min)	15				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	279	951	280	29	650	80	126	100	77	77	93	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1762			1700	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.52			0.84	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		929			1449	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	303	1034	304	32	707	87	137	109	84	84	101	261
RTOR Reduction (vph)	0	0	24	0	0	45	0	9	0	0	39	0
Lane Group Flow (vph)	303	1034	280	32	707	42	0	321	0	0	407	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	23.0	72.0	72.0	3.2	52.2	52.2		42.0			42.0	
Effective Green, g (s)	23.0	72.0	72.0	3.2	52.2	52.2		42.0			42.0	
Actuated g/C Ratio	0.18	0.56	0.56	0.02	0.40	0.40		0.33			0.33	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	315	1038	882	43	752	639		301			471	
v/s Ratio Prot	c0.17	c0.56		0.02	0.38							
v/s Ratio Perm			0.18			0.03		c0.35			0.28	
v/c Ratio	0.96	1.00	0.32	0.74	0.94	0.07		1.06			0.86	
Uniform Delay, d1	52.7	28.5	15.4	62.6	37.0	23.6		43.6			40.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	40.3	26.8	0.2	50.5	19.7	0.0		70.1			15.1	
Delay (s)	93.0	55.3	15.6	113.1	56.7	23.6		113.7			56.0	
Level of Service	F	E	B	F	E	C		F			E	
Approach Delay (s)		54.9			55.4			113.7			56.0	
Approach LOS		D			E			F			E	

Intersection Summary					
HCM 2000 Control Delay	61.1	HCM 2000 Level of Service		E	
HCM 2000 Volume to Capacity ratio	1.03				
Actuated Cycle Length (s)	129.2	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	96.7%	ICU Level of Service		F	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	40	32	13	680	1051	58
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	35	14	739	1142	63
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1941	1174	1205			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1941	1174	1205			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	38	85	98			
cM capacity (veh/h)	70	234	579			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	78	14	739	1205
Volume Left	43	14	0	0
Volume Right	35	0	0	63
cSH	102	579	1700	1700
Volume to Capacity	0.77	0.02	0.43	0.71
Queue Length 95th (ft)	104	2	0	0
Control Delay (s)	111.2	11.4	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	111.2	0.2		0.0
Approach LOS	F			

Intersection Summary				
Average Delay	4.4			
Intersection Capacity Utilization	69.7%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	34	4	24	3	0	49	24	586	4	57	875	34
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	4	26	3	0	53	26	637	4	62	951	37
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1838	1787	970	1813	1803	639	988			641		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1838	1787	970	1813	1803	639	988			641		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	22	94	92	93	100	89	96			93		
cM capacity (veh/h)	48	73	307	49	71	476	699			943		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	67	57	667	1050
Volume Left	37	3	26	62
Volume Right	26	53	4	37
cSH	73	316	699	943
Volume to Capacity	0.92	0.18	0.04	0.07
Queue Length 95th (ft)	117	16	3	5
Control Delay (s)	179.9	18.8	1.0	1.9
Lane LOS	F	C	A	A
Approach Delay (s)	179.9	18.8	1.0	1.9
Approach LOS	F	C		

Intersection Summary				
Average Delay	8.6			
Intersection Capacity Utilization	87.3%	ICU Level of Service	E	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	387	85	96	226	456	437
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	421	92	104	246	496	475
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1188	733	971			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1188	733	971			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	78	85			
cM capacity (veh/h)	177	421	710			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	513	350	971
Volume Left	421	104	0
Volume Right	92	0	475
cSH	198	710	1700
Volume to Capacity	2.59	0.15	0.57
Queue Length 95th (ft)	1094	13	0
Control Delay (s)	767.0	4.6	0.0
Lane LOS	F	A	
Approach Delay (s)	767.0	4.6	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	215.5		
Intersection Capacity Utilization	104.6%	ICU Level of Service	G
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	34	41	258	61	79	506
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	45	280	66	86	550
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1035	314			347	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1035	314			347	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	94			93	
cM capacity (veh/h)	239	727			1212	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	82	347	86	550
Volume Left	37	0	86	0
Volume Right	45	66	0	0
cSH	377	1700	1212	1700
Volume to Capacity	0.22	0.20	0.07	0.32
Queue Length 95th (ft)	20	0	6	0
Control Delay (s)	17.2	0.0	8.2	0.0
Lane LOS	C		A	
Approach Delay (s)	17.2	0.0	1.1	
Approach LOS	C			

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	152	112	77	173	412	120
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	165	122	84	188	448	130
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	868	513	578			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	868	513	578			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	44	78	92			
cM capacity (veh/h)	296	561	995			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	287	84	188	578
Volume Left	165	84	0	0
Volume Right	122	0	0	130
cSH	513	995	1700	1700
Volume to Capacity	0.56	0.08	0.11	0.34
Queue Length 95th (ft)	85	7	0	0
Control Delay (s)	23.8	8.9	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	23.8	2.8		0.0
Approach LOS	C			

Intersection Summary			
Average Delay		6.7	
Intersection Capacity Utilization		51.7%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	119	1934	1657	292	310	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.98		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3460		1765	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3460		1765	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	129	2102	1801	317	337	166
RTOR Reduction (vph)	0	0	16	0	2	116
Lane Group Flow (vph)	129	2102	2102	0	352	33
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	7.0	66.0	55.0		16.0	16.0
Effective Green, g (s)	7.0	66.0	55.0		16.0	16.0
Actuated g/C Ratio	0.08	0.73	0.61		0.18	0.18
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	137	2595	2114		313	267
v/s Ratio Prot	0.07	c0.59	c0.61		c0.20	
v/s Ratio Perm						0.02
v/c Ratio	0.94	0.81	0.99		1.13	0.12
Uniform Delay, d1	41.3	7.9	17.3		37.0	31.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	59.0	2.0	18.1		89.2	0.2
Delay (s)	100.3	9.9	35.5		126.2	31.3
Level of Service	F	A	D		F	C
Approach Delay (s)		15.1	35.5		98.1	
Approach LOS		B	D		F	

Intersection Summary				
HCM 2000 Control Delay	32.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	1.02			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	92.0%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	1996	171	512	1796	41	139	13	585	6	4	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.98	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1699	1583	1681	1741	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.98	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1699	1583	1681	1741	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	2170	186	557	1952	45	151	14	636	7	4	5
RTOR Reduction (vph)	0	0	92	0	0	16	0	0	194	0	0	0
Lane Group Flow (vph)	76	2170	94	557	1952	29	82	83	442	5	6	5
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	6.0	45.6	45.6	18.3	57.9	57.9	8.1	8.1	26.4	2.3	2.3	2.3
Effective Green, g (s)	6.0	45.6	45.6	18.3	57.9	57.9	8.1	8.1	26.4	2.3	2.3	2.3
Actuated g/C Ratio	0.07	0.50	0.50	0.20	0.64	0.64	0.09	0.09	0.29	0.03	0.03	0.03
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	228	2567	799	695	3260	1015	150	152	532	42	44	40
v/s Ratio Prot	0.02	c0.43		0.16	0.38		0.05	0.05	c0.17	0.00	c0.00	
v/s Ratio Perm			0.06			0.02			0.11			0.00
v/c Ratio	0.33	0.85	0.12	0.80	0.60	0.03	0.55	0.55	0.83	0.12	0.14	0.12
Uniform Delay, d1	40.2	19.3	11.8	34.3	9.4	5.9	39.3	39.3	29.9	43.0	43.0	43.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	2.7	0.1	6.6	0.3	0.0	4.0	4.0	10.6	1.3	1.4	1.4
Delay (s)	41.1	22.0	11.8	40.9	9.7	5.9	43.4	43.3	40.5	44.3	44.4	44.4
Level of Service	D	C	B	D	A	A	D	D	D	D	D	D
Approach Delay (s)		21.9			16.5			41.1			44.4	
Approach LOS		C			B			D			D	

Intersection Summary				
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.86			
Actuated Cycle Length (s)	90.3	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	88.1%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	81	1612	980	213	1235	31	1145	42	233	36	25	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	88	1752	1065	232	1342	34	1245	46	253	39	27	68
RTOR Reduction (vph)	0	0	140	0	0	22	0	0	107	0	0	64
Lane Group Flow (vph)	88	1752	925	232	1342	12	1245	46	146	39	27	4
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	8.7	44.1	89.2	9.0	44.4	44.4	45.1	45.1	54.1	6.9	6.9	6.9
Effective Green, g (s)	8.7	44.1	89.2	9.0	44.4	44.4	45.1	45.1	54.1	6.9	6.9	6.9
Actuated g/C Ratio	0.07	0.36	0.74	0.07	0.37	0.37	0.37	0.37	0.45	0.06	0.06	0.06
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	127	1851	1166	255	1864	580	1278	693	759	100	106	90
v/s Ratio Prot	0.05	c0.34	0.30	c0.07	0.26		c0.36	0.02	0.01	c0.02	0.01	
v/s Ratio Perm			0.29			0.01			0.08			0.00
v/c Ratio	0.69	0.95	0.79	0.91	0.72	0.02	0.97	0.07	0.19	0.39	0.25	0.04
Uniform Delay, d1	54.9	37.4	10.1	55.6	33.0	24.5	37.4	24.5	20.3	55.1	54.6	54.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.1	10.8	3.8	33.0	1.4	0.0	19.1	0.0	0.1	2.5	1.3	0.2
Delay (s)	70.0	48.1	13.9	88.6	34.4	24.5	56.5	24.5	20.4	57.6	55.9	54.2
Level of Service	E	D	B	F	C	C	E	C	C	E	E	D
Approach Delay (s)		36.2			42.0			49.7			55.5	
Approach LOS		D			D			D			E	

Intersection Summary				
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	121.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	86.6%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	5	955	962	4	2	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	1038	1046	4	2	7
RTOR Reduction (vph)	0	0	0	1	0	6
Lane Group Flow (vph)	5	1038	1046	3	2	1
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	0.6	41.0	36.4	36.4	5.9	6.5
Effective Green, g (s)	0.6	41.0	36.4	36.4	5.9	6.5
Actuated g/C Ratio	0.01	0.75	0.66	0.66	0.11	0.12
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	37	1391	1235	1049	190	302
v/s Ratio Prot	0.00	c0.56	c0.56		c0.00	0.00
v/s Ratio Perm				0.00		0.00
v/c Ratio	0.14	0.75	0.85	0.00	0.01	0.00
Uniform Delay, d1	26.9	4.0	7.1	3.1	21.9	21.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	2.2	5.6	0.0	0.0	0.0
Delay (s)	28.6	6.2	12.7	3.1	21.9	21.3
Level of Service	C	A	B	A	C	C
Approach Delay (s)		6.3	12.6		21.5	
Approach LOS		A	B		C	

Intersection Summary				
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	54.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	60.6%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	916	0	3	936	154	2	3	8	185	3	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1770	1863		1770	1863	1583		1689			1775	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (perm)	1770	1863		1770	1863	1583		1689			1775	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	996	0	3	1017	167	2	3	9	201	3	76
RTOR Reduction (vph)	0	0	0	0	0	36	0	8	0	0	0	65
Lane Group Flow (vph)	65	996	0	3	1017	131	0	6	0	0	204	11
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	4.0	64.5		0.8	61.3	61.3		6.1			14.8	14.8
Effective Green, g (s)	4.0	64.5		0.8	61.3	61.3		6.1			14.8	14.8
Actuated g/C Ratio	0.04	0.63		0.01	0.60	0.60		0.06			0.14	0.14
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	69	1175		13	1117	949		100			257	229
v/s Ratio Prot	c0.04	c0.53		0.00	c0.55			c0.00			c0.11	
v/s Ratio Perm						0.08						0.01
v/c Ratio	0.94	0.85		0.23	0.91	0.14		0.06			0.79	0.05
Uniform Delay, d1	49.0	15.0		50.4	18.0	8.9		45.3			42.2	37.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	87.8	5.8		8.9	11.0	0.1		0.2			15.4	0.1
Delay (s)	136.8	20.8		59.3	29.0	9.0		45.6			57.6	37.7
Level of Service	F	C		E	C	A		D			E	D
Approach Delay (s)		27.9			26.3			45.6			52.2	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	29.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	102.2	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	73.6%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	186	941	8	7	906	24	7	0	7	6	0	188
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	202	1023	9	8	985	26	8	0	8	7	0	204
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1011			1032			2636	2458	1027	2448	2449	998
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1011			1032			2636	2458	1027	2448	2449	998
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	71			99			0	100	97	59	100	31
cM capacity (veh/h)	686			674			4	21	285	16	22	296

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	202	1032	8	1011	15	7	204
Volume Left	202	0	8	0	8	7	0
Volume Right	0	9	0	26	8	0	204
cSH	686	1700	674	1700	7	16	296
Volume to Capacity	0.29	0.61	0.01	0.59	2.09	0.41	0.69
Queue Length 95th (ft)	31	0	1	0	73	27	118
Control Delay (s)	12.4	0.0	10.4	0.0	1472.9	343.7	40.4
Lane LOS	B		B		F	F	E
Approach Delay (s)	2.0		0.1		1472.9	49.8	
Approach LOS					F	E	

Intersection Summary					
Average Delay	14.3				
Intersection Capacity Utilization	76.6%	ICU Level of Service		D	
Analysis Period (min)	15				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	763	219	32	821	65	136	62	66	64	77	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.98	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1754			1797	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.74			0.79	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1336			1446	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	829	238	35	892	71	148	67	72	70	84	21
RTOR Reduction (vph)	0	0	44	0	0	33	0	16	0	0	6	0
Lane Group Flow (vph)	20	829	194	35	892	38	0	271	0	0	169	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.3	34.3	34.3	1.3	34.3	34.3		16.8			16.8	
Effective Green, g (s)	1.3	34.3	34.3	1.3	34.3	34.3		16.8			16.8	
Actuated g/C Ratio	0.02	0.53	0.53	0.02	0.53	0.53		0.26			0.26	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	35	992	843	35	992	843		348			377	
v/s Ratio Prot	0.01	0.45		c0.02	c0.48							
v/s Ratio Perm			0.12			0.02		c0.20			0.12	
v/c Ratio	0.57	0.84	0.23	1.00	0.90	0.04		0.78			0.45	
Uniform Delay, d1	31.3	12.7	8.0	31.6	13.5	7.2		22.1			19.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	20.6	6.2	0.1	152.1	10.8	0.0		10.8			0.9	
Delay (s)	51.8	18.9	8.2	183.7	24.3	7.2		32.9			20.8	
Level of Service	D	B	A	F	C	A		C			C	
Approach Delay (s)		17.1			28.7			32.9			20.8	
Approach LOS		B			C			C			C	

Intersection Summary					
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.86				
Actuated Cycle Length (s)	64.4	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	71.2%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	12	15	7	791	914	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	16	8	860	993	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1877	1002	1010			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1877	1002	1010			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	83	94	99			
cM capacity (veh/h)	78	294	686			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	29	8	860	1010
Volume Left	13	8	0	0
Volume Right	16	0	0	16
cSH	132	686	1700	1700
Volume to Capacity	0.22	0.01	0.51	0.59
Queue Length 95th (ft)	20	1	0	0
Control Delay (s)	40.1	10.3	0.0	0.0
Lane LOS	E	B		
Approach Delay (s)	40.1	0.1		0.0
Approach LOS	E			

Intersection Summary				
Average Delay			0.7	
Intersection Capacity Utilization			59.0%	ICU Level of Service
Analysis Period (min)			15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	0	20	0	0	9	19	850	0	5	800	19
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	0	22	0	0	10	21	924	0	5	870	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1866	1856	880	1878	1866	924	890			924		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1866	1856	880	1878	1866	924	890			924		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	77	100	94	100	100	97	97			99		
cM capacity (veh/h)	52	71	346	50	70	327	761			739		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	34	10	945	896
Volume Left	12	0	21	5
Volume Right	22	10	0	21
cSH	116	327	761	739
Volume to Capacity	0.29	0.03	0.03	0.01
Queue Length 95th (ft)	28	2	2	1
Control Delay (s)	48.3	16.4	0.8	0.2
Lane LOS	E	C	A	A
Approach Delay (s)	48.3	16.4	0.8	0.2
Approach LOS	E	C		

Intersection Summary				
Average Delay			1.4	
Intersection Capacity Utilization			72.9%	ICU Level of Service
Analysis Period (min)			15	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	620	141	118	221	323	532
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	674	153	128	240	351	578
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1137	640	929			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1137	640	929			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	68	83			
cM capacity (veh/h)	184	475	736			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	827	368	929
Volume Left	674	128	0
Volume Right	153	0	578
cSH	208	736	1700
Volume to Capacity	3.98	0.17	0.55
Queue Length 95th (ft)	Err	16	0
Control Delay (s)	Err	5.2	0.0
Lane LOS	F	A	
Approach Delay (s)	Err	5.2	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	3893.1		
Intersection Capacity Utilization	120.7%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	45	44	303	44	48	404
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	48	329	48	52	439
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	897	353			377	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	897	353			377	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	93			96	
cM capacity (veh/h)	297	690			1181	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	97	377	52	439
Volume Left	49	0	52	0
Volume Right	48	48	0	0
cSH	413	1700	1181	1700
Volume to Capacity	0.23	0.22	0.04	0.26
Queue Length 95th (ft)	22	0	3	0
Control Delay (s)	16.4	0.0	8.2	0.0
Lane LOS	C		A	
Approach Delay (s)	16.4	0.0	0.9	
Approach LOS	C			

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	141	78	63	189	278	163
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	153	85	68	205	302	177
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	733	391	479			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	733	391	479			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	58	87	94			
cM capacity (veh/h)	363	658	1083			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	238	68	205	479
Volume Left	153	68	0	0
Volume Right	85	0	0	177
cSH	564	1083	1700	1700
Volume to Capacity	0.42	0.06	0.12	0.28
Queue Length 95th (ft)	52	5	0	0
Control Delay (s)	18.2	8.5	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	18.2	2.1		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		4.9		
Intersection Capacity Utilization		45.9%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	59	1385	2253	235	189	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.99		0.97	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3489		1732	1504
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3489		1732	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	1505	2449	255	205	303
RTOR Reduction (vph)	0	0	6	0	8	53
Lane Group Flow (vph)	64	1505	2699	0	258	189
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	5.0	114.0	105.0		18.0	18.0
Effective Green, g (s)	5.0	114.0	105.0		18.0	18.0
Actuated g/C Ratio	0.04	0.81	0.75		0.13	0.13
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	63	2881	2616		222	193
v/s Ratio Prot	c0.04	0.43	c0.77		c0.15	
v/s Ratio Perm						0.13
v/c Ratio	1.02	0.52	1.03		1.16	0.98
Uniform Delay, d1	67.5	4.2	17.5		61.0	60.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	117.9	0.2	26.3		111.4	57.9
Delay (s)	185.4	4.4	43.8		172.4	118.7
Level of Service	F	A	D		F	F
Approach Delay (s)		11.8	43.8		146.8	
Approach LOS		B	D		F	

Intersection Summary				
HCM 2000 Control Delay	44.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.05			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	92.6%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	1427	92	473	2107	14	271	7	550	4	4	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00		1.00	0.88	0.95	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583		1776	2787	1681	1770	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583		1776	2787	1681	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	1551	100	514	2290	15	295	8	598	4	4	0
RTOR Reduction (vph)	0	0	59	0	0	6	0	0	346	0	0	0
Lane Group Flow (vph)	8	1551	41	514	2290	9	0	303	252	4	4	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.0	37.3	37.3	19.3	55.6	55.6		16.2	35.5	1.1	1.1	
Effective Green, g (s)	1.0	37.3	37.3	19.3	55.6	55.6		16.2	35.5	1.1	1.1	
Actuated g/C Ratio	0.01	0.41	0.41	0.21	0.62	0.62		0.18	0.39	0.01	0.01	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	38	2109	656	737	3144	979		320	1224	20	21	
v/s Ratio Prot	0.00	0.30		c0.15	c0.45			c0.17	0.04	c0.00	0.00	
v/s Ratio Perm			0.03			0.01			0.05			
v/c Ratio	0.21	0.74	0.06	0.70	0.73	0.01		0.95	0.21	0.20	0.19	
Uniform Delay, d1	44.1	22.1	15.8	32.6	11.9	6.6		36.4	17.9	44.0	44.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.8	1.4	0.0	2.9	0.9	0.0		36.1	0.1	4.9	4.4	
Delay (s)	46.8	23.5	15.8	35.5	12.8	6.6		72.5	18.0	48.8	48.3	
Level of Service	D	C	B	D	B	A		E	B	D	D	
Approach Delay (s)		23.2			16.9			36.3			48.6	
Approach LOS		C			B			D			D	

Intersection Summary					
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.78				
Actuated Cycle Length (s)	89.9	Sum of lost time (s)	16.0		
Intersection Capacity Utilization	76.1%	ICU Level of Service	D		
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	72	1033	954	207	1354	18	1298	42	298	10	12	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	1123	1037	225	1472	20	1411	46	324	11	13	40
RTOR Reduction (vph)	0	0	294	0	0	14	0	0	155	0	0	38
Lane Group Flow (vph)	78	1123	743	225	1472	6	1411	46	169	11	13	2
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	6.0	31.3	78.4	9.8	35.1	35.1	47.1	47.1	56.9	5.2	5.2	5.2
Effective Green, g (s)	6.0	31.3	78.4	9.8	35.1	35.1	47.1	47.1	56.9	5.2	5.2	5.2
Actuated g/C Ratio	0.05	0.29	0.72	0.09	0.32	0.32	0.43	0.43	0.52	0.05	0.05	0.05
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	97	1454	1997	307	1631	507	1478	802	881	84	88	75
v/s Ratio Prot	0.04	0.22	0.16	c0.07	c0.29		c0.41	0.02	0.02	0.01	c0.01	
v/s Ratio Perm			0.11			0.00			0.09			0.00
v/c Ratio	0.80	0.77	0.37	0.73	0.90	0.01	0.95	0.06	0.19	0.13	0.15	0.03
Uniform Delay, d1	51.1	35.8	6.0	48.5	35.5	25.3	30.1	18.2	14.0	49.9	50.0	49.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	36.6	2.6	0.1	8.7	7.4	0.0	14.0	0.0	0.1	0.7	0.8	0.1
Delay (s)	87.7	38.4	6.1	57.3	42.9	25.3	44.1	18.2	14.1	50.6	50.8	49.8
Level of Service	F	D	A	E	D	C	D	B	B	D	D	D
Approach Delay (s)		25.2			44.5			38.0			50.2	
Approach LOS		C			D			D			D	

Intersection Summary					
HCM 2000 Control Delay	35.1	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.89				
Actuated Cycle Length (s)	109.4	Sum of lost time (s)	16.0		
Intersection Capacity Utilization	83.8%	ICU Level of Service	E		
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	324	790	1111	288	118	373
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	352	859	1208	313	128	405
RTOR Reduction (vph)	0	0	0	111	0	63
Lane Group Flow (vph)	352	859	1208	202	128	342
Turn Type	Prot	NA	NA	Perm	Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	10.0	76.1	62.1	62.1	12.0	22.0
Effective Green, g (s)	10.0	76.1	62.1	62.1	12.0	22.0
Actuated g/C Ratio	0.10	0.79	0.65	0.65	0.12	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	357	1475	1203	1022	221	428
v/s Ratio Prot	0.10	0.46	c0.65		0.07	c0.08
v/s Ratio Perm				0.13		0.13
v/c Ratio	0.99	0.58	1.00	0.20	0.58	0.80
Uniform Delay, d1	43.0	3.9	17.0	6.9	39.7	35.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	43.5	0.6	27.0	0.1	3.7	10.0
Delay (s)	86.5	4.5	44.0	7.0	43.3	45.0
Level of Service	F	A	D	A	D	D
Approach Delay (s)		28.3	36.3		44.6	
Approach LOS		C	D		D	

Intersection Summary				
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	96.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	88.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	121	801	0	4	1140	202	4	2	2	156	0	261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1770	3539		1770	3459			1756			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (perm)	1770	3539		1770	3459			1756			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	132	871	0	4	1239	220	4	2	2	170	0	284
RTOR Reduction (vph)	0	0	0	0	12	0	0	2	0	0	0	229
Lane Group Flow (vph)	132	871	0	4	1447	0	0	6	0	0	170	55
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												4
Actuated Green, G (s)	11.2	62.7		0.7	52.2			6.1			15.2	15.2
Effective Green, g (s)	11.2	62.7		0.7	52.2			6.1			15.2	15.2
Actuated g/C Ratio	0.11	0.62		0.01	0.52			0.06			0.15	0.15
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	196	2203		12	1793			106			267	238
v/s Ratio Prot	c0.07	0.25		0.00	c0.42			c0.00			c0.10	
v/s Ratio Perm												0.03
v/c Ratio	0.67	0.40		0.33	0.81			0.06			0.64	0.23
Uniform Delay, d1	43.0	9.5		49.8	20.1			44.6			40.2	37.6
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	8.8	0.1		15.7	2.8			0.2			4.9	0.5
Delay (s)	51.8	9.6		65.4	22.9			44.8			45.1	38.1
Level of Service	D	A		E	C			D			D	D
Approach Delay (s)		15.2			23.0			44.8			40.7	
Approach LOS		B			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	100.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	69.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	178	765	8	9	981	7	12	2	5	12	3	384
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.96	1.00
Satd. Flow (prot)	1770	1860		1770	1861			1743			1790	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.87			0.85	1.00
Satd. Flow (perm)	1770	1860		1770	1861			1575			1583	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	193	832	9	10	1066	8	13	2	5	13	3	417
RTOR Reduction (vph)	0	0	0	0	0	0	0	4	0	0	0	164
Lane Group Flow (vph)	193	841	0	10	1074	0	0	16	0	0	16	253
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	10.0	64.4		0.8	55.2			15.6			15.6	15.6
Effective Green, g (s)	10.0	64.4		0.8	55.2			15.6			15.6	15.6
Actuated g/C Ratio	0.11	0.69		0.01	0.59			0.17			0.17	0.17
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	190	1290		15	1106			264			266	266
v/s Ratio Prot	c0.11	0.45		0.01	c0.58							
v/s Ratio Perm								0.01			0.01	c0.16
v/c Ratio	1.02	0.65		0.67	0.97			0.06			0.06	0.95
Uniform Delay, d1	41.4	7.9		45.9	18.0			32.4			32.4	38.2
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	69.5	1.2		75.9	20.2			0.1			0.1	41.9
Delay (s)	110.9	9.1		121.7	38.3			32.5			32.5	80.1
Level of Service	F	A		F	D			C			C	F
Approach Delay (s)		28.1			39.0			32.5			78.3	
Approach LOS		C			D			C			E	

Intersection Summary				
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.97			
Actuated Cycle Length (s)	92.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	89.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	592	94	12	668	72	270	101	22	83	94	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.99			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1787			1718	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.51			0.84	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		952			1456	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	643	102	13	726	78	293	110	24	90	102	188
RTOR Reduction (vph)	0	0	27	0	0	38	0	2	0	0	33	0
Lane Group Flow (vph)	126	643	75	13	726	40	0	425	0	0	347	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	8.0	51.8	51.8	1.6	45.4	45.4		47.0			47.0	
Effective Green, g (s)	8.0	51.8	51.8	1.6	45.4	45.4		47.0			47.0	
Actuated g/C Ratio	0.07	0.46	0.46	0.01	0.40	0.40		0.42			0.42	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	125	858	729	25	752	639		398			608	
v/s Ratio Prot	c0.07	0.35		0.01	c0.39							
v/s Ratio Perm			0.05			0.03		c0.45			0.24	
v/c Ratio	1.01	0.75	0.10	0.52	0.97	0.06		1.07			0.57	
Uniform Delay, d1	52.2	25.0	17.1	55.0	32.7	20.5		32.7			25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	82.6	3.6	0.1	18.1	24.4	0.0		64.5			1.3	
Delay (s)	134.8	28.6	17.2	73.2	57.1	20.5		97.2			26.3	
Level of Service	F	C	B	E	E	C		F			C	
Approach Delay (s)		42.6			53.9			97.2			26.3	
Approach LOS		D			D			F			C	

Intersection Summary				
HCM 2000 Control Delay	53.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.02			
Actuated Cycle Length (s)	112.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	96.7%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	7	5	7	745	613	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	5	8	810	666	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1498	673	679			
vC1, stage 1 conf vol	673					
vC2, stage 2 conf vol	825					
vCu, unblocked vol	1498	673	679			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	343	455	913			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	13	8	810	679
Volume Left	8	8	0	0
Volume Right	5	0	0	13
cSH	382	913	1700	1700
Volume to Capacity	0.03	0.01	0.48	0.40
Queue Length 95th (ft)	3	1	0	0
Control Delay (s)	14.7	9.0	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.7	0.1		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		49.2%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	0	23	3	0	46	16	587	8	53	492	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.94			0.87		1.00	1.00		1.00	0.99	
Flt Protected		0.97			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1708			1621		1770	1859		1770	1845	
Flt Permitted		1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1758			1584		1770	1859		1770	1845	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	0	25	3	0	50	17	638	9	58	535	36
RTOR Reduction (vph)	0	57	0	0	50	0	0	1	0	0	3	0
Lane Group Flow (vph)	0	3	0	0	3	0	17	646	0	58	568	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		2.2			2.2		0.7	24.8		1.5	25.6	
Effective Green, g (s)		2.2			2.2		0.7	24.8		1.5	25.6	
Actuated g/C Ratio		0.05			0.05		0.02	0.61		0.04	0.63	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		95			86		30	1138		65	1166	
v/s Ratio Prot							0.01	c0.35		c0.03	0.31	
v/s Ratio Perm		c0.00			0.00							
v/c Ratio		0.03			0.03		0.57	0.57		0.89	0.49	
Uniform Delay, d1		18.1			18.1		19.7	4.7		19.4	4.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.2		22.3	0.7		74.5	0.3	
Delay (s)		18.3			18.3		42.0	5.3		93.9	4.3	
Level of Service		B			B		D	A		F	A	
Approach Delay (s)		18.3			18.3			6.3			12.5	
Approach LOS		B			B			A			B	

Intersection Summary					
HCM 2000 Control Delay		10.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio		0.54			
Actuated Cycle Length (s)		40.5	Sum of lost time (s)	12.0	
Intersection Capacity Utilization		54.6%	ICU Level of Service	A	
Analysis Period (min)		15			
c Critical Lane Group					



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	147	32	76	428	240	344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	35	83	465	261	374
RTOR Reduction (vph)	0	30	0	0	0	203
Lane Group Flow (vph)	160	5	83	465	261	171
Turn Type	Perm	Perm	Prot	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	5.6	5.6	2.2	22.8	16.6	16.6
Effective Green, g (s)	5.6	5.6	2.2	22.8	16.6	16.6
Actuated g/C Ratio	0.15	0.15	0.06	0.63	0.46	0.46
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	528	243	106	1166	849	721
v/s Ratio Prot			c0.05	c0.25	0.14	
v/s Ratio Perm	c0.05	0.00				0.11
v/c Ratio	0.30	0.02	0.78	0.40	0.31	0.24
Uniform Delay, d1	13.7	13.1	16.9	3.4	6.3	6.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.0	30.5	0.2	0.2	0.2
Delay (s)	14.0	13.1	47.3	3.6	6.5	6.2
Level of Service	B	B	D	A	A	A
Approach Delay (s)	13.8			10.2	6.3	
Approach LOS	B			B	A	

Intersection Summary				
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	36.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	60	72	479	24	19	171
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	78	521	26	21	186
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	761	534			547	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	761	534			547	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	82	86			98	
cM capacity (veh/h)	366	546			1023	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	143	547	21	186
Volume Left	65	0	21	0
Volume Right	78	26	0	0
cSH	446	1700	1023	1700
Volume to Capacity	0.32	0.32	0.02	0.11
Queue Length 95th (ft)	34	0	2	0
Control Delay (s)	16.8	0.0	8.6	0.0
Lane LOS	C		A	
Approach Delay (s)	16.8	0.0	0.9	
Approach LOS	C			

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	98	75	103	397	202	119
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	107	82	112	432	220	129
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	940	284	349			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	940	284	349			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	60	89	91			
cM capacity (veh/h)	266	755	1210			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	188	112	432	349
Volume Left	107	112	0	0
Volume Right	82	0	0	129
cSH	469	1210	1700	1700
Volume to Capacity	0.40	0.09	0.25	0.21
Queue Length 95th (ft)	48	8	0	0
Control Delay (s)	20.0	8.3	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	20.0	1.7		0.0
Approach LOS	C			

Intersection Summary				
Average Delay			4.3	
Intersection Capacity Utilization			39.0%	ICU Level of Service A
Analysis Period (min)			15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	113	46	735	47	12	14	963	642	53	16	537	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1799	1583	1770	1863	1583	3433	3498		1770	1863	1583
Flt Permitted		0.97	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1799	1583	1770	1863	1583	3433	3498		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	50	799	51	13	15	1047	698	58	17	584	154
RTOR Reduction (vph)	0	0	147	0	0	14	0	4	0	0	0	82
Lane Group Flow (vph)	0	173	652	51	13	1	1047	752	0	17	584	72
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	5	8	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		14.3	49.5	7.3	7.3	10.2	35.2	71.3		2.9	39.0	39.0
Effective Green, g (s)		14.3	49.5	7.3	7.3	10.2	35.2	71.3		2.9	39.0	39.0
Actuated g/C Ratio		0.13	0.44	0.07	0.07	0.09	0.31	0.64		0.03	0.35	0.35
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		230	700	115	121	201	1080	2230		45	649	552
v/s Ratio Prot		0.10	c0.29	c0.03	0.01	0.00	c0.30	0.21		0.01	c0.31	
v/s Ratio Perm			0.12			0.00						0.05
v/c Ratio		0.75	0.93	0.44	0.11	0.01	0.97	0.34		0.38	0.90	0.13
Uniform Delay, d1		47.0	29.6	50.3	49.2	46.2	37.8	9.3		53.6	34.5	24.8
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		13.0	19.2	2.7	0.4	0.0	20.1	0.4		5.2	17.8	0.5
Delay (s)		60.0	48.8	53.0	49.6	46.2	57.9	9.8		58.8	52.4	25.3
Level of Service		E	D	D	D	D	E	A		E	D	C
Approach Delay (s)		50.8			51.2			37.7			47.0	
Approach LOS		D			D			D			D	

Intersection Summary					
HCM 2000 Control Delay		43.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio		0.89			
Actuated Cycle Length (s)		111.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization		87.1%	ICU Level of Service	E	
Analysis Period (min)		15			
c Critical Lane Group					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	638	377	240	838	36	596	111	256	37	57	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	693	410	261	911	39	648	121	278	40	62	70
RTOR Reduction (vph)	0	0	240	0	0	28	0	0	158	0	0	51
Lane Group Flow (vph)	68	693	170	261	911	11	648	121	120	40	62	19
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	2.3	15.9	27.9	5.0	18.6	18.6	12.0	28.9	28.9	1.6	18.5	18.5
Effective Green, g (s)	2.3	15.9	27.9	5.0	18.6	18.6	12.0	28.9	28.9	1.6	18.5	18.5
Actuated g/C Ratio	0.03	0.24	0.41	0.07	0.28	0.28	0.18	0.43	0.43	0.02	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	117	1199	749	254	1403	436	611	798	678	81	511	434
v/s Ratio Prot	0.02	0.14	0.04	c0.08	c0.18		c0.19	0.06		0.01	0.03	
v/s Ratio Perm			0.07			0.01			c0.08			0.01
v/c Ratio	0.58	0.58	0.23	1.03	0.65	0.02	1.06	0.15	0.18	0.49	0.12	0.04
Uniform Delay, d1	32.1	22.8	12.8	31.2	21.5	17.8	27.7	11.8	11.9	32.5	18.4	18.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.2	0.7	0.2	63.8	1.0	0.0	53.5	0.4	0.6	4.7	0.5	0.2
Delay (s)	39.2	23.5	12.9	95.0	22.6	17.8	81.2	12.2	12.5	37.2	18.8	18.1
Level of Service	D	C	B	F	C	B	F	B	B	D	B	B
Approach Delay (s)		20.7			38.0			55.0			22.8	
Approach LOS		C			D			D			C	

Intersection Summary					
HCM 2000 Control Delay	36.6	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.63				
Actuated Cycle Length (s)	67.4	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	53.2%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	223	452	269	220	14	661	51	230	7	72	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.88			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3508		1770	1634			1816	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3508		1770	1634			1816	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	242	491	292	239	15	718	55	250	8	78	16
RTOR Reduction (vph)	0	0	158	0	4	0	0	152	0	0	7	0
Lane Group Flow (vph)	9	242	333	292	250	0	718	153	0	0	95	0
Turn Type	Prot	NA	pm+ov	Prot	NA		Split	NA		Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)	0.7	18.2	55.5	15.1	32.6		37.3	37.3			8.6	
Effective Green, g (s)	0.7	18.2	55.5	15.1	32.6		37.3	37.3			8.6	
Actuated g/C Ratio	0.01	0.19	0.58	0.16	0.34		0.39	0.39			0.09	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	13	356	989	280	1201		693	640			164	
v/s Ratio Prot	0.01	c0.13	0.13	c0.17	0.07		c0.41	0.09			c0.05	
v/s Ratio Perm			0.08									
v/c Ratio	0.69	0.68	0.34	1.04	0.21		1.04	0.24			0.58	
Uniform Delay, d1	47.1	35.8	10.3	40.1	22.2		29.0	19.4			41.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	96.3	5.1	0.2	65.4	0.1		43.9	0.9			4.9	
Delay (s)	143.4	40.9	10.5	105.5	22.2		72.8	20.3			46.4	
Level of Service	F	D	B	F	C		E	C			D	
Approach Delay (s)		22.0			66.7			57.1			46.4	
Approach LOS		C			E			E			D	

Intersection Summary					
HCM 2000 Control Delay	48.1	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.90				
Actuated Cycle Length (s)	95.2	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	79.9%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	168	674	318	204	569	338
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	183	733	346	222	618	367
RTOR Reduction (vph)	0	603	0	161	0	0
Lane Group Flow (vph)	183	130	346	61	618	367
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	12.8	12.8	19.8	19.8	27.3	51.1
Effective Green, g (s)	12.8	12.8	19.8	19.8	27.3	51.1
Actuated g/C Ratio	0.18	0.18	0.28	0.28	0.38	0.71
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	315	281	513	435	672	1324
v/s Ratio Prot	c0.10		c0.19		c0.35	0.20
v/s Ratio Perm		0.08		0.04		
v/c Ratio	0.58	0.46	0.67	0.14	0.92	0.28
Uniform Delay, d1	27.1	26.5	23.2	19.6	21.3	3.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.7	1.2	6.9	0.7	17.6	0.5
Delay (s)	29.8	27.7	30.1	20.3	38.9	4.3
Level of Service	C	C	C	C	D	A
Approach Delay (s)	28.1		26.3			26.0
Approach LOS	C		C			C

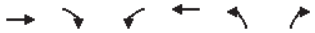
Intersection Summary				
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	71.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	92	323	536	131	54	117
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	100	351	583	142	59	127
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	583				1134	583
vC1, stage 1 conf vol					583	
vC2, stage 2 conf vol					551	
vCu, unblocked vol	583				1134	583
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	90				86	75
cM capacity (veh/h)	992				415	512

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	100	351	583	142	186
Volume Left	100	0	0	0	59
Volume Right	0	0	0	142	127
cSH	992	1700	1700	1700	477
Volume to Capacity	0.10	0.21	0.34	0.08	0.39
Queue Length 95th (ft)	8	0	0	0	46
Control Delay (s)	9.0	0.0	0.0	0.0	17.3
Lane LOS	A				C
Approach Delay (s)	2.0		0.0		17.3
Approach LOS					C

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	119	25	372	357	51	324
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	129	27	404	388	55	352
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			157		1340	143
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			157		1340	143
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			72		54	61
cM capacity (veh/h)			1423		121	905

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	157	404	388	408
Volume Left	0	404	0	55
Volume Right	27	0	0	352
cSH	1700	1423	1700	480
Volume to Capacity	0.09	0.28	0.23	0.85
Queue Length 95th (ft)	0	29	0	216
Control Delay (s)	0.0	8.5	0.0	42.0
Lane LOS		A		E
Approach Delay (s)	0.0	4.4		42.0
Approach LOS				E

Intersection Summary				
Average Delay	15.2			
Intersection Capacity Utilization	61.2%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Yield	Stop		Yield	
Volume (vph)	237	38	38	8	7	70
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	258	41	41	9	8	76

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	299	50	84
Volume Left (vph)	258	0	8
Volume Right (vph)	0	9	76
Hadj (s)	0.21	-0.07	-0.49
Departure Headway (s)	4.4	4.3	4.2
Degree Utilization, x	0.36	0.06	0.10
Capacity (veh/h)	812	791	791
Control Delay (s)	9.8	7.6	7.7
Approach Delay (s)	9.8	7.6	7.7
Approach LOS	A	A	A

Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	967	10	6	1409	21	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1051	11	7	1532	23	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1062		2601	1057
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1062		2601	1057
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		16	92
cM capacity (veh/h)			656		27	274

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1062	1538	45
Volume Left	0	7	23
Volume Right	11	0	22
cSH	1700	656	48
Volume to Capacity	0.62	0.01	0.92
Queue Length 95th (ft)	0	1	97
Control Delay (s)	0.0	1.1	239.5
Lane LOS		A	F
Approach Delay (s)	0.0	1.1	239.5
Approach LOS			F

Intersection Summary				
Average Delay		4.7		
Intersection Capacity Utilization		88.9%	ICU Level of Service	E
Analysis Period (min)		15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	207	2303	1821	339	382	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.98		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3456		1765	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3456		1765	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	225	2503	1979	368	415	211
RTOR Reduction (vph)	0	0	13	0	2	134
Lane Group Flow (vph)	225	2503	2334	0	434	56
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	12.0	91.0	75.0		21.0	21.0
Effective Green, g (s)	12.0	91.0	75.0		21.0	21.0
Actuated g/C Ratio	0.10	0.76	0.62		0.18	0.18
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	177	2683	2160		308	263
v/s Ratio Prot	c0.13	0.71	c0.68		c0.25	
v/s Ratio Perm						0.04
v/c Ratio	1.27	0.93	1.08		1.41	0.21
Uniform Delay, d1	54.0	12.0	22.5		49.5	42.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	158.7	6.8	45.3		202.9	0.4
Delay (s)	212.7	18.7	67.8		252.4	42.8
Level of Service	F	B	E		F	D
Approach Delay (s)		34.7	67.8		188.8	
Approach LOS		C	E		F	

Intersection Summary				
HCM 2000 Control Delay	65.2	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.17			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	107.7%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	2448	201	603	1948	7	181	3	766	9	3	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583		1775	2787	1681	1720	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583		1775	2787	1681	1720	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2661	218	655	2117	8	197	3	833	10	3	2
RTOR Reduction (vph)	0	0	108	0	0	2	0	0	220	0	0	0
Lane Group Flow (vph)	8	2661	110	655	2117	6	0	200	613	6	7	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.2	67.7	67.7	31.6	98.1	98.1		16.1	47.7	2.5	2.5	2.5
Effective Green, g (s)	1.2	67.7	67.7	31.6	98.1	98.1		16.1	47.7	2.5	2.5	2.5
Actuated g/C Ratio	0.01	0.51	0.51	0.24	0.73	0.73		0.12	0.36	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	30	2570	800	810	3725	1159		213	1076	31	32	29
v/s Ratio Prot	0.00	c0.52		c0.19	0.42			c0.11	c0.13	0.00	c0.00	
v/s Ratio Perm			0.07			0.00			0.09			0.00
v/c Ratio	0.27	1.04	0.14	0.81	0.57	0.01		0.94	0.57	0.19	0.22	0.07
Uniform Delay, d1	65.9	33.1	17.6	48.3	8.2	4.8		58.4	34.8	64.7	64.7	64.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.7	27.7	0.1	6.0	0.2	0.0		44.2	0.7	3.0	3.4	1.0
Delay (s)	70.6	60.8	17.7	54.3	8.4	4.8		102.6	35.6	67.7	68.2	65.6
Level of Service	E	E	B	D	A	A		F	D	E	E	E
Approach Delay (s)		57.6			19.2			48.5			67.7	
Approach LOS		E			B			D			E	

Intersection Summary				
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.95			
Actuated Cycle Length (s)	133.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	91.4%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	115	1978	1251	268	1382	50	1155	34	272	52	40	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	2150	1360	291	1502	54	1255	37	296	57	43	87
RTOR Reduction (vph)	0	0	175	0	0	33	0	0	72	0	0	81
Lane Group Flow (vph)	125	2150	1185	291	1502	21	1255	37	224	57	43	6
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	13.2	58.1	107.1	11.0	55.9	55.9	49.0	49.0	60.0	10.0	10.0	10.0
Effective Green, g (s)	13.2	58.1	107.1	11.0	55.9	55.9	49.0	49.0	60.0	10.0	10.0	10.0
Actuated g/C Ratio	0.09	0.40	0.74	0.08	0.39	0.39	0.34	0.34	0.42	0.07	0.07	0.07
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	162	2050	2071	262	1972	614	1167	633	703	122	129	109
v/s Ratio Prot	0.07	c0.42	0.19	c0.08	0.30		c0.37	0.02	0.02	c0.03	0.02	
v/s Ratio Perm			0.23			0.01			0.12			0.00
v/c Ratio	0.77	1.05	0.57	1.11	0.76	0.03	1.08	0.06	0.32	0.47	0.33	0.06
Uniform Delay, d1	64.0	43.0	8.3	66.5	38.3	27.4	47.5	32.0	28.3	64.5	63.9	62.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.0	34.1	0.4	88.6	1.8	0.0	49.1	0.0	0.3	2.8	1.5	0.2
Delay (s)	84.0	77.1	8.7	155.1	40.1	27.4	96.7	32.1	28.6	67.3	65.4	62.9
Level of Service	F	E	A	F	D	C	F	C	C	E	E	E
Approach Delay (s)		51.7			57.9			82.5			64.8	
Approach LOS		D			E			F			E	

Intersection Summary				
HCM 2000 Control Delay	60.4	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.02			
Actuated Cycle Length (s)	144.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	95.5%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	92	1346	955	47	68	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	100	1463	1038	51	74	130
RTOR Reduction (vph)	0	0	0	14	0	110
Lane Group Flow (vph)	100	1463	1038	37	74	20
Turn Type	Prot	NA	NA	Perm	Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	5.0	76.1	67.1	67.1	9.2	14.2
Effective Green, g (s)	5.0	76.1	67.1	67.1	9.2	14.2
Actuated g/C Ratio	0.05	0.82	0.72	0.72	0.10	0.15
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	183	1519	1339	1138	174	308
v/s Ratio Prot	0.03	c0.79	0.56		c0.04	0.00
v/s Ratio Perm				0.02		0.01
v/c Ratio	0.55	0.96	0.78	0.03	0.43	0.06
Uniform Delay, d1	43.0	7.4	8.3	3.8	39.6	33.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3	15.1	2.9	0.0	1.7	0.1
Delay (s)	46.4	22.5	11.2	3.8	41.2	33.9
Level of Service	D	C	B	A	D	C
Approach Delay (s)		24.1	10.8		36.6	
Approach LOS		C	B		D	

Intersection Summary				
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.95			
Actuated Cycle Length (s)	93.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	81.3%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	112	1256	2	6	862	170	2	4	21	297	6	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.95	1.00
Satd. Flow (prot)	1770	3538		1770	3452			1658			1776	1583
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.95	1.00
Satd. Flow (perm)	1770	3538		1770	3452			1658			1776	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	122	1365	2	7	937	185	2	4	23	323	7	117
RTOR Reduction (vph)	0	0	0	0	14	0	0	22	0	0	0	72
Lane Group Flow (vph)	122	1367	0	7	1108	0	0	7	0	0	330	45
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												4
Actuated Green, G (s)	11.1	51.4		0.7	41.0			6.3			24.2	24.2
Effective Green, g (s)	11.1	51.4		0.7	41.0			6.3			24.2	24.2
Actuated g/C Ratio	0.11	0.52		0.01	0.42			0.06			0.25	0.25
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	199	1844		12	1435			105			435	388
v/s Ratio Prot	c0.07	c0.39		0.00	0.32			c0.00			c0.19	
v/s Ratio Perm												0.03
v/c Ratio	0.61	0.74		0.58	0.77			0.07			0.76	0.12
Uniform Delay, d1	41.7	18.4		48.8	24.8			43.4			34.5	28.9
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	5.5	1.6		56.2	2.6			0.3			7.4	0.1
Delay (s)	47.2	20.1		105.0	27.4			43.7			41.9	29.0
Level of Service	D	C		F	C			D			D	C
Approach Delay (s)		22.3			27.9			43.7			38.5	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	71.6%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	336	1211	15	6	870	18	7	2	5	15	2	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00			0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.96	1.00
Satd. Flow (prot)	1770	1859		1770	1857			1733			1783	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.86			0.76	1.00
Satd. Flow (perm)	1770	1859		1770	1857			1531			1422	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	365	1316	16	7	946	20	8	2	5	16	2	209
RTOR Reduction (vph)	0	0	0	0	1	0	0	5	0	0	0	192
Lane Group Flow (vph)	365	1332	0	7	965	0	0	10	0	0	18	17
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	20.0	74.6		0.8	55.4			7.8			7.8	7.8
Effective Green, g (s)	20.0	74.6		0.8	55.4			7.8			7.8	7.8
Actuated g/C Ratio	0.21	0.78		0.01	0.58			0.08			0.08	0.08
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	371	1456		14	1080			125			116	129
v/s Ratio Prot	c0.21	c0.72		0.00	0.52							
v/s Ratio Perm								0.01			c0.01	0.01
v/c Ratio	0.98	0.91		0.50	0.89			0.08			0.16	0.13
Uniform Delay, d1	37.4	7.9		47.0	17.3			40.4			40.6	40.6
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	42.1	9.2		25.4	9.6			0.3			0.6	0.5
Delay (s)	79.5	17.0		72.4	26.9			40.7			41.3	41.0
Level of Service	E	B		E	C			D			D	D
Approach Delay (s)		30.5			27.3			40.7			41.0	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	95.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	85.0%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	956	314	33	760	72	149	112	120	93	107	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.96			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.98	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1750			1800	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.73			0.66	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1309			1218	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	1039	341	36	826	78	162	122	130	101	116	24
RTOR Reduction (vph)	0	0	35	0	0	34	0	16	0	0	4	0
Lane Group Flow (vph)	30	1039	306	36	826	44	0	398	0	0	237	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	2.3	55.1	55.1	2.3	55.1	55.1		29.0			29.0	
Effective Green, g (s)	2.3	55.1	55.1	2.3	55.1	55.1		29.0			29.0	
Actuated g/C Ratio	0.02	0.56	0.56	0.02	0.56	0.56		0.29			0.29	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	41	1043	886	41	1043	886		385			358	
v/s Ratio Prot	0.02	c0.56		c0.02	0.44							
v/s Ratio Perm			0.19			0.03		c0.30			0.19	
v/c Ratio	0.73	1.00	0.35	0.88	0.79	0.05		1.03			0.66	
Uniform Delay, d1	47.7	21.5	11.8	47.9	17.1	9.8		34.7			30.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	49.4	26.7	0.2	92.9	4.2	0.0		54.7			4.5	
Delay (s)	97.2	48.3	12.0	140.9	21.3	9.8		89.4			34.9	
Level of Service	F	D	B	F	C	A		F			C	
Approach Delay (s)		40.6			24.9			89.4			34.9	
Approach LOS		D			C			F			C	

Intersection Summary				
HCM 2000 Control Delay	41.9	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	98.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	83.9%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	25	28	5	839	1087	31
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	30	5	912	1182	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2121	1198	1215			
vC1, stage 1 conf vol	1198					
vC2, stage 2 conf vol	923					
vCu, unblocked vol	2121	1198	1215			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	87	99			
cM capacity (veh/h)	228	226	574			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	58	5	912	1215
Volume Left	27	5	0	0
Volume Right	30	0	0	34
cSH	227	574	1700	1700
Volume to Capacity	0.25	0.01	0.54	0.71
Queue Length 95th (ft)	24	1	0	0
Control Delay (s)	26.2	11.3	0.0	0.0
Lane LOS	D	B		
Approach Delay (s)	26.2	0.1		0.0
Approach LOS	D			

Intersection Summary				
Average Delay			0.7	
Intersection Capacity Utilization			69.1%	ICU Level of Service
Analysis Period (min)			15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	0	19	4	0	9	25	819	0	5	1036	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.90		1.00	1.00		1.00	1.00	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1684			1659		1770	1863		1770	1859	
Flt Permitted		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1720			1683		1770	1863		1770	1859	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	0	21	4	0	10	27	890	0	5	1126	17
RTOR Reduction (vph)	0	36	0	0	14	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	1	0	0	0	0	27	890	0	5	1142	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		1.0			1.0		0.7	27.3		0.7	27.3	
Effective Green, g (s)		1.0			1.0		0.7	27.3		0.7	27.3	
Actuated g/C Ratio		0.02			0.02		0.02	0.67		0.02	0.67	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		41			41		30	1240		30	1237	
v/s Ratio Prot							c0.02	0.48		0.00	c0.61	
v/s Ratio Perm		c0.00			0.00							
v/c Ratio		0.02			0.01		0.90	0.72		0.17	0.92	
Uniform Delay, d1		19.5			19.5		20.1	4.4		19.9	5.9	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.1		122.1	2.0		2.6	11.5	
Delay (s)		19.7			19.6		142.2	6.4		22.5	17.4	
Level of Service		B			B		F	A		C	B	
Approach Delay (s)		19.7			19.6			10.4			17.4	
Approach LOS		B			B			B			B	

Intersection Summary						
HCM 2000 Control Delay		14.4	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio		0.89				
Actuated Cycle Length (s)		41.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization		65.5%	ICU Level of Service		C	
Analysis Period (min)		15				
c Critical Lane Group						



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	620	136	116	189	545	529
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	674	148	126	205	592	575
RTOR Reduction (vph)	0	104	0	0	0	373
Lane Group Flow (vph)	674	44	126	205	592	202
Turn Type	Perm	Perm	Prot	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	13.7	13.7	4.0	24.1	16.1	16.1
Effective Green, g (s)	13.7	13.7	4.0	24.1	16.1	16.1
Actuated g/C Ratio	0.30	0.30	0.09	0.53	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1026	473	154	980	654	556
v/s Ratio Prot			c0.07	0.11	c0.32	
v/s Ratio Perm	c0.20	0.03				0.13
v/c Ratio	0.66	0.09	0.82	0.21	0.91	0.36
Uniform Delay, d1	14.0	11.6	20.5	5.8	14.1	11.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	0.1	27.4	0.1	16.0	0.4
Delay (s)	15.5	11.7	48.0	5.9	30.2	11.4
Level of Service	B	B	D	A	C	B
Approach Delay (s)	14.8			21.9	20.9	
Approach LOS	B			C	C	

Intersection Summary				
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	45.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	62.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	40	34	346	64	72	580
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	37	376	70	78	630
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1198	411			446	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1198	411			446	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	77	94			93	
cM capacity (veh/h)	191	641			1115	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	80	446	78	630
Volume Left	43	0	78	0
Volume Right	37	70	0	0
cSH	282	1700	1115	1700
Volume to Capacity	0.29	0.26	0.07	0.37
Queue Length 95th (ft)	29	0	6	0
Control Delay (s)	22.8	0.0	8.5	0.0
Lane LOS	C		A	
Approach Delay (s)	22.8	0.0	0.9	
Approach LOS	C			

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	153	147	67	148	519	187
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	166	160	73	161	564	203
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	972	666	767			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	972	666	767			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	35	65	91			
cM capacity (veh/h)	256	460	846			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	326	73	161	767
Volume Left	166	73	0	0
Volume Right	160	0	0	203
cSH	443	846	1700	1700
Volume to Capacity	0.74	0.09	0.09	0.45
Queue Length 95th (ft)	148	7	0	0
Control Delay (s)	32.5	9.7	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	32.5	3.0		0.0
Approach LOS	D			

Intersection Summary				
Average Delay			8.5	
Intersection Capacity Utilization			60.9%	ICU Level of Service
Analysis Period (min)			15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	166	13	892	73	40	19	470	703	14	4	846	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1780	1583	1770	1863	1583	3433	3529		1770	1863	1583
Flt Permitted		0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1780	1583	1770	1863	1583	3433	3529		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	180	14	970	79	43	21	511	764	15	4	920	141
RTOR Reduction (vph)	0	0	73	0	0	19	0	1	0	0	0	57
Lane Group Flow (vph)	0	194	897	79	43	2	511	778	0	4	920	84
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	5	8	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		16.0	61.0	11.7	11.7	14.1	45.0	101.3		2.4	58.7	58.7
Effective Green, g (s)		16.0	61.0	11.7	11.7	14.1	45.0	101.3		2.4	58.7	58.7
Actuated g/C Ratio		0.11	0.41	0.08	0.08	0.10	0.31	0.69		0.02	0.40	0.40
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		193	655	140	147	194	1048	2425		28	741	630
v/s Ratio Prot		0.11	c0.42	c0.04	0.02	0.00	0.15	0.22		0.00	c0.49	
v/s Ratio Perm			0.15			0.00						0.05
v/c Ratio		1.01	1.37	0.56	0.29	0.01	0.49	0.32		0.14	1.24	0.13
Uniform Delay, d1		65.7	43.2	65.4	63.9	60.3	41.8	9.2		71.5	44.4	28.2
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		66.1	176.1	5.1	1.1	0.0	0.4	0.4		2.3	120.0	0.4
Delay (s)		131.8	219.3	70.5	65.1	60.4	42.1	9.6		73.8	164.4	28.6
Level of Service		F	F	E	E	E	D	A		E	F	C
Approach Delay (s)		204.7			67.4			22.5			146.1	
Approach LOS		F			E			C			F	

Intersection Summary						
HCM 2000 Control Delay		118.1	HCM 2000 Level of Service		F	
HCM 2000 Volume to Capacity ratio		1.24				
Actuated Cycle Length (s)		147.4	Sum of lost time (s)		16.0	
Intersection Capacity Utilization		113.8%	ICU Level of Service		H	
Analysis Period (min)		15				
c Critical Lane Group						



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	206	868	706	222	850	84	588	85	161	147	126	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	224	943	767	241	924	91	639	92	175	160	137	127
RTOR Reduction (vph)	0	0	260	0	0	69	0	0	108	0	0	93
Lane Group Flow (vph)	224	943	507	241	924	22	639	92	67	160	137	34
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	4.0	15.8	27.8	4.0	15.8	15.8	12.0	25.0	25.0	4.8	17.8	17.8
Effective Green, g (s)	4.0	15.8	27.8	4.0	15.8	15.8	12.0	25.0	25.0	4.8	17.8	17.8
Actuated g/C Ratio	0.06	0.24	0.42	0.06	0.24	0.24	0.18	0.38	0.38	0.07	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	209	1224	767	209	1224	381	627	709	603	251	505	429
v/s Ratio Prot	0.07	c0.19	0.12	c0.07	0.18		c0.19	0.05		0.05	c0.07	
v/s Ratio Perm			0.20			0.01			0.04			0.02
v/c Ratio	1.07	0.77	0.66	1.15	0.75	0.06	1.02	0.13	0.11	0.64	0.27	0.08
Uniform Delay, d1	30.8	23.2	15.1	30.8	23.1	19.2	26.8	13.2	13.1	29.6	18.8	17.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	82.6	3.1	2.1	109.7	2.7	0.1	40.8	0.4	0.4	5.2	1.3	0.4
Delay (s)	113.4	26.3	17.3	140.5	25.8	19.2	67.6	13.6	13.5	34.8	20.1	18.2
Level of Service	F	C	B	F	C	B	E	B	B	C	C	B
Approach Delay (s)		32.8			47.3			51.7			25.1	
Approach LOS		C			D			D			C	

Intersection Summary					
HCM 2000 Control Delay	39.9	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.68				
Actuated Cycle Length (s)	65.6	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	66.7%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	416	581	197	342	6	342	21	132	9	27	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.87			0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	3529		1770	1622			1768	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (perm)	1770	1863	1583	1770	3529		1770	1622			1768	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	452	632	214	372	7	372	23	143	10	29	18
RTOR Reduction (vph)	0	0	257	0	1	0	0	103	0	0	17	0
Lane Group Flow (vph)	13	452	375	214	378	0	372	63	0	0	40	0
Turn Type	Prot	NA	pm+ov	Prot	NA		Split	NA		Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)	0.7	25.5	47.8	12.0	36.8		22.3	22.3			4.7	
Effective Green, g (s)	0.7	25.5	47.8	12.0	36.8		22.3	22.3			4.7	
Actuated g/C Ratio	0.01	0.32	0.59	0.15	0.46		0.28	0.28			0.06	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	15	590	1018	263	1613		490	449			103	
v/s Ratio Prot	0.01	c0.24	0.10	c0.12	0.11		c0.21	0.04			c0.02	
v/s Ratio Perm			0.13									
v/c Ratio	0.87	0.77	0.37	0.81	0.23		0.76	0.14			0.39	
Uniform Delay, d1	39.9	24.8	8.5	33.2	13.3		26.6	21.9			36.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	162.9	5.9	0.2	17.3	0.1		10.6	0.6			2.4	
Delay (s)	202.8	30.7	8.7	50.4	13.4		37.2	22.5			38.9	
Level of Service	F	C	A	D	B		D	C			D	
Approach Delay (s)		20.1			26.7			32.7			38.9	
Approach LOS		C			C			C			D	

Intersection Summary					
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.74				
Actuated Cycle Length (s)	80.5	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	68.4%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	106	251	224	80	499	391
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	115	273	243	87	542	425
RTOR Reduction (vph)	0	231	0	62	0	0
Lane Group Flow (vph)	115	42	243	25	542	425
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	9.0	9.0	16.6	16.6	20.5	41.1
Effective Green, g (s)	9.0	9.0	16.6	16.6	20.5	41.1
Actuated g/C Ratio	0.15	0.15	0.29	0.29	0.35	0.71
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	274	245	532	452	624	1317
v/s Ratio Prot	c0.06		c0.13		c0.31	0.23
v/s Ratio Perm		0.03		0.02		
v/c Ratio	0.42	0.17	0.46	0.05	0.87	0.32
Uniform Delay, d1	22.2	21.3	17.0	15.1	17.5	3.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.3	2.8	0.2	12.3	0.6
Delay (s)	23.2	21.7	19.9	15.3	29.8	3.9
Level of Service	C	C	B	B	C	A
Approach Delay (s)	22.1		18.7			18.4
Approach LOS	C		B			B

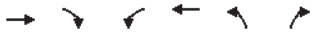
Intersection Summary				
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	58.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	55.3%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	69	367	228	65	147	63
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	399	248	71	160	68
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	248				797	248
vC1, stage 1 conf vol					248	
vC2, stage 2 conf vol					549	
vCu, unblocked vol	248				797	248
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	94				68	91
cM capacity (veh/h)	1318				507	791

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	75	399	248	71	228
Volume Left	75	0	0	0	160
Volume Right	0	0	0	71	68
cSH	1318	1700	1700	1700	568
Volume to Capacity	0.06	0.23	0.15	0.04	0.40
Queue Length 95th (ft)	5	0	0	0	48
Control Delay (s)	7.9	0.0	0.0	0.0	15.5
Lane LOS	A				C
Approach Delay (s)	1.2		0.0		15.5
Approach LOS					C

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	271	4	144	196	7	172
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	295	4	157	213	8	187
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			299		823	297
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			299		823	297
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			88		97	75
cM capacity (veh/h)			1262		301	743

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	299	157	213	195
Volume Left	0	157	0	8
Volume Right	4	0	0	187
cSH	1700	1262	1700	702
Volume to Capacity	0.18	0.12	0.13	0.28
Queue Length 95th (ft)	0	11	0	28
Control Delay (s)	0.0	8.3	0.0	12.1
Lane LOS		A		B
Approach Delay (s)	0.0	3.5		12.1
Approach LOS				B

Intersection Summary				
Average Delay	4.2			
Intersection Capacity Utilization	43.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Yield	Stop		Yield	
Volume (vph)	148	18	24	17	12	138
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	161	20	26	18	13	150

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	180	45	163
Volume Left (vph)	161	0	13
Volume Right (vph)	0	18	150
Hadj (s)	0.21	-0.21	-0.50
Departure Headway (s)	4.5	4.2	3.9
Degree Utilization, x	0.23	0.05	0.18
Capacity (veh/h)	772	798	869
Control Delay (s)	8.8	7.5	7.8
Approach Delay (s)	8.8	7.5	7.8
Approach LOS	A	A	A

Intersection Summary			
Delay	8.2		
Level of Service	A		
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1605	42	12	1016	11	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1745	46	13	1104	12	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1790		2898	1767
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1790		2898	1767
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		29	86
cM capacity (veh/h)			345		17	104

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1790	1117	26
Volume Left	0	13	12
Volume Right	46	0	14
cSH	1700	345	31
Volume to Capacity	1.05	0.04	0.84
Queue Length 95th (ft)	0	3	71
Control Delay (s)	0.0	1.9	299.9
Lane LOS		A	F
Approach Delay (s)	0.0	1.9	299.9
Approach LOS			F

Intersection Summary			
Average Delay			3.4
Intersection Capacity Utilization			97.0%
Analysis Period (min)			15

ICU Level of Service	F

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	20.2	115.8	1.46	45.4	A
Jamacha Blvd.	I	55	38.0	61.6	99.6	0.52	18.8	E
SR 94	I	55	38.1	3.1	41.2	0.58	50.9	A
Cougar Canyon Rd.	I	55	78.0	25.9	103.9	1.19	41.3	B
Steele Canyon Rd.	I	55	81.2	19.4	100.6	1.24	44.4	A
Indian Springs Dr.	I	55	124.6	16.7	141.3	1.90	48.5	A
Proctor Valley Rd.	I	55	29.0	45.9	74.9	0.33	16.0	F
Melody Rd.	I	55	56.9	11.9	68.8	0.87	45.5	A
Reservation Rd.	I	55	28.5	37.9	66.4	0.33	17.7	E
Total	I		569.9	242.6	812.5	8.43	37.4	B

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Reservation Rd.	I	55	261.8	7.1	268.9	4.00	53.5	A
Peacefull Valley Ran	I	55	28.5	9.4	37.9	0.33	31.1	C
Jefferson Rd.	I	55	56.9	23.5	80.4	0.87	38.9	B
Lyons Valley Rd.	I	55	29.0	33.8	62.8	0.33	19.1	E
Steele Canyon Rd.	I	55	124.6	30.4	155.0	1.90	44.2	A
Cougar Canyon Rd.	I	55	81.2	14.1	95.3	1.24	46.9	A
Jamacha Rd.	I	55	78.0	93.7	171.7	1.19	25.0	D
Jamacha Blvd.	I	55	38.1	7.6	45.7	0.58	45.8	A
Via Mercado	I	55	38.0	68.6	106.6	0.52	17.6	E
Total	I		736.1	288.2	1024.3	10.97	38.5	B



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	244	2753	1840	270	350	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.98		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3471		1768	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3471		1768	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	265	2992	2000	293	380	140
RTOR Reduction (vph)	0	0	9	0	1	101
Lane Group Flow (vph)	265	2992	2284	0	393	25
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	19.0	98.0	75.0		24.0	24.0
Effective Green, g (s)	19.0	98.0	75.0		24.0	24.0
Actuated g/C Ratio	0.15	0.75	0.58		0.18	0.18
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	258	2667	2002		326	277
v/s Ratio Prot	0.15	c0.85	0.66		c0.22	
v/s Ratio Perm						0.02
v/c Ratio	1.03	1.12	1.14		1.21	0.09
Uniform Delay, d1	55.5	16.0	27.5		53.0	43.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	63.2	60.5	70.0		118.1	0.1
Delay (s)	118.7	76.5	97.5		171.1	44.1
Level of Service	F	E	F		F	D
Approach Delay (s)		79.9	97.5		140.3	
Approach LOS		E	F		F	

Intersection Summary				
HCM 2000 Control Delay	91.7	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.18			
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	105.0%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	2828	192	522	1850	9	168	6	680	7	4	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	0.98	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583		1777	2787	1681	1741	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	0.98	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583		1777	2787	1681	1741	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	3074	209	567	2011	10	183	7	739	8	4	4
RTOR Reduction (vph)	0	0	91	0	0	3	0	0	216	0	0	0
Lane Group Flow (vph)	3	3074	118	567	2011	7	0	190	523	6	6	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.1	76.5	76.5	27.0	102.4	102.4		16.0	43.0	2.6	2.6	2.6
Effective Green, g (s)	1.1	76.5	76.5	27.0	102.4	102.4		16.0	43.0	2.6	2.6	2.6
Actuated g/C Ratio	0.01	0.55	0.55	0.20	0.74	0.74		0.12	0.31	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	27	2816	876	671	3770	1173		205	948	31	32	29
v/s Ratio Prot	0.00	c0.60		c0.17	0.40			c0.11	c0.11	c0.00	0.00	
v/s Ratio Perm			0.07			0.00			0.08			0.00
v/c Ratio	0.11	1.09	0.14	0.85	0.53	0.01		0.93	0.55	0.19	0.19	0.14
Uniform Delay, d1	68.0	30.8	14.9	53.5	7.6	4.6		60.5	39.5	66.7	66.7	66.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	47.8	0.1	9.6	0.1	0.0		42.4	0.7	3.0	2.8	2.2
Delay (s)	69.8	78.6	14.9	63.1	7.8	4.6		102.9	40.2	69.8	69.5	68.8
Level of Service	E	E	B	E	A	A		F	D	E	E	E
Approach Delay (s)		74.5			19.9			53.0			69.4	
Approach LOS		E			B			D			E	

Intersection Summary				
HCM 2000 Control Delay	50.9	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	138.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	95.8%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	2106	1494	260	1261	39	1127	29	268	44	18	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	2289	1624	283	1371	42	1225	32	291	48	20	65
RTOR Reduction (vph)	0	0	244	0	0	26	0	0	89	0	0	61
Lane Group Flow (vph)	98	2289	1380	283	1371	16	1225	32	202	48	20	4
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	10.4	51.1	99.2	9.0	49.7	49.7	48.1	48.1	57.1	7.7	7.7	7.7
Effective Green, g (s)	10.4	51.1	99.2	9.0	49.7	49.7	48.1	48.1	57.1	7.7	7.7	7.7
Actuated g/C Ratio	0.08	0.39	0.75	0.07	0.38	0.38	0.36	0.36	0.43	0.06	0.06	0.06
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	139	1970	2096	234	1916	596	1251	679	733	103	108	92
v/s Ratio Prot	0.06	c0.45	0.24	c0.08	0.27		c0.36	0.02	0.02	c0.03	0.01	
v/s Ratio Perm			0.26			0.01			0.11			0.00
v/c Ratio	0.71	1.16	0.66	1.21	0.72	0.03	0.98	0.05	0.28	0.47	0.19	0.04
Uniform Delay, d1	59.3	40.4	8.0	61.5	35.1	25.9	41.4	27.1	24.1	60.1	59.1	58.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.0	78.9	0.8	127.2	1.3	0.0	20.3	0.0	0.2	3.3	0.8	0.2
Delay (s)	74.3	119.3	8.8	188.6	36.4	25.9	61.7	27.1	24.3	63.4	59.9	58.8
Level of Service	E	F	A	F	D	C	E	C	C	E	E	E
Approach Delay (s)		73.5			61.5			54.0			60.6	
Approach LOS		E			E			D			E	

Intersection Summary				
HCM 2000 Control Delay	66.4	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.04			
Actuated Cycle Length (s)	131.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	96.9%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	133	1600	1061	49	97	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	1739	1153	53	105	170
RTOR Reduction (vph)	0	0	0	12	0	123
Lane Group Flow (vph)	145	1739	1153	41	105	47
Turn Type	Prot	NA	NA	Perm	Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	8.9	126.1	113.2	113.2	13.3	22.2
Effective Green, g (s)	8.9	126.1	113.2	113.2	13.3	22.2
Actuated g/C Ratio	0.06	0.86	0.77	0.77	0.09	0.15
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	207	1593	1430	1215	159	281
v/s Ratio Prot	0.04	c0.93	0.62		c0.06	0.01
v/s Ratio Perm				0.03		0.02
v/c Ratio	0.70	1.09	0.81	0.03	0.66	0.17
Uniform Delay, d1	67.9	10.7	10.4	4.1	64.9	54.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.2	51.9	3.4	0.0	9.8	0.3
Delay (s)	78.2	62.6	13.8	4.1	74.7	54.8
Level of Service	E	E	B	A	E	D
Approach Delay (s)		63.8	13.4		62.4	
Approach LOS		E	B		E	

Intersection Summary				
HCM 2000 Control Delay	45.6	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.08			
Actuated Cycle Length (s)	147.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	96.3%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	119	1559	2	6	1011	151	2	3	23	296	0	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.95	1.00
Satd. Flow (prot)	1770	3539		1770	3470			1648			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.95	1.00
Satd. Flow (perm)	1770	3539		1770	3470			1648			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	129	1695	2	7	1099	164	2	3	25	322	0	111
RTOR Reduction (vph)	0	0	0	0	10	0	0	23	0	0	0	76
Lane Group Flow (vph)	129	1697	0	7	1253	0	0	7	0	0	322	35
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												4
Actuated Green, G (s)	12.5	60.9		0.6	49.0			6.4			20.5	20.5
Effective Green, g (s)	12.5	60.9		0.6	49.0			6.4			20.5	20.5
Actuated g/C Ratio	0.12	0.58		0.01	0.47			0.06			0.20	0.20
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	211	2064		10	1628			101			347	310
v/s Ratio Prot	c0.07	c0.48		0.00	0.36			c0.00			c0.18	
v/s Ratio Perm												0.02
v/c Ratio	0.61	0.82		0.70	0.77			0.06			0.93	0.11
Uniform Delay, d1	43.6	17.4		51.8	23.0			46.2			41.2	34.5
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	5.2	2.8		117.6	2.3			0.3			30.2	0.2
Delay (s)	48.8	20.2		169.4	25.3			46.5			71.4	34.6
Level of Service	D	C		F	C			D			E	C
Approach Delay (s)		22.2			26.1			46.5			62.0	
Approach LOS		C			C			D			E	

Intersection Summary				
HCM 2000 Control Delay	28.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	104.4	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	79.6%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	372	1409	10	3	953	18	7	3	9	13	2	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00			0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1770	1861		1770	1857			1710			1785	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.89			0.76	1.00
Satd. Flow (perm)	1770	1861		1770	1857			1555			1410	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	404	1532	11	3	1036	20	8	3	10	14	2	204
RTOR Reduction (vph)	0	0	0	0	0	0	0	9	0	0	0	192
Lane Group Flow (vph)	404	1543	0	3	1056	0	0	12	0	0	16	12
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	34.7	123.0		0.8	89.1			8.4			8.4	8.4
Effective Green, g (s)	34.7	123.0		0.8	89.1			8.4			8.4	8.4
Actuated g/C Ratio	0.24	0.85		0.01	0.62			0.06			0.06	0.06
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	425	1587		9	1147			90			82	92
v/s Ratio Prot	c0.23	c0.83		0.00	0.57							
v/s Ratio Perm								0.01			c0.01	0.01
v/c Ratio	0.95	0.97		0.33	0.92			0.13			0.20	0.13
Uniform Delay, d1	53.9	9.1		71.4	24.4			64.4			64.7	64.4
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	31.2	16.4		20.6	11.9			0.6			1.2	0.6
Delay (s)	85.1	25.5		92.0	36.3			65.1			65.8	65.1
Level of Service	F	C		F	D			E			E	E
Approach Delay (s)		37.9			36.4			65.1			65.1	
Approach LOS		D			D			E			E	

Intersection Summary				
HCM 2000 Control Delay	39.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.93			
Actuated Cycle Length (s)	144.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	95.5%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

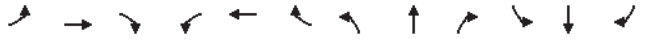
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	279	951	280	29	650	80	126	100	77	77	93	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1762			1700	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.52			0.84	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		929			1449	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	303	1034	304	32	707	87	137	109	84	84	101	261
RTOR Reduction (vph)	0	0	24	0	0	45	0	9	0	0	39	0
Lane Group Flow (vph)	303	1034	280	32	707	42	0	321	0	0	407	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	23.0	72.0	72.0	3.2	52.2	52.2		42.0			42.0	
Effective Green, g (s)	23.0	72.0	72.0	3.2	52.2	52.2		42.0			42.0	
Actuated g/C Ratio	0.18	0.56	0.56	0.02	0.40	0.40		0.33			0.33	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	315	1038	882	43	752	639		301			471	
v/s Ratio Prot	c0.17	c0.56		0.02	0.38							
v/s Ratio Perm			0.18			0.03		c0.35			0.28	
v/c Ratio	0.96	1.00	0.32	0.74	0.94	0.07		1.06			0.86	
Uniform Delay, d1	52.7	28.5	15.4	62.6	37.0	23.6		43.6			40.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	40.3	26.8	0.2	50.5	19.7	0.0		70.1			15.1	
Delay (s)	93.0	55.3	15.6	113.1	56.7	23.6		113.7			56.0	
Level of Service	F	E	B	F	E	C		F			E	
Approach Delay (s)		54.9			55.4			113.7			56.0	
Approach LOS		D			E			F			E	

Intersection Summary				
HCM 2000 Control Delay	61.1	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.03			
Actuated Cycle Length (s)	129.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	96.7%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	40	32	13	680	1051	58
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	35	14	739	1142	63
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1941	1174	1205			
vC1, stage 1 conf vol	1174					
vC2, stage 2 conf vol	767					
vCu, unblocked vol	1941	1174	1205			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	82	85	98			
cM capacity (veh/h)	247	234	579			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	78	14	739	1205
Volume Left	43	14	0	0
Volume Right	35	0	0	63
cSH	241	579	1700	1700
Volume to Capacity	0.32	0.02	0.43	0.71
Queue Length 95th (ft)	34	2	0	0
Control Delay (s)	27.0	11.4	0.0	0.0
Lane LOS	D	B		
Approach Delay (s)	27.0	0.2		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	4	24	3	0	49	24	586	4	57	875	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.87		1.00	1.00		1.00	0.99	
Flt Protected		0.97			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1718			1620		1770	1861		1770	1852	
Flt Permitted		1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1765			1584		1770	1861		1770	1852	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	4	26	3	0	53	26	637	4	62	951	37
RTOR Reduction (vph)	0	24	0	0	52	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	43	0	0	4	0	26	641	0	62	986	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		2.8			2.8		0.7	24.9		1.4	25.6	
Effective Green, g (s)		2.8			2.8		0.7	24.9		1.4	25.6	
Actuated g/C Ratio		0.07			0.07		0.02	0.61		0.03	0.62	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		120			107		30	1127		60	1153	
v/s Ratio Prot							0.01	0.34		c0.04	c0.53	
v/s Ratio Perm		c0.02			0.00							
v/c Ratio		0.36			0.04		0.87	0.57		1.03	0.86	
Uniform Delay, d1		18.3			17.9		20.2	4.9		19.9	6.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.8			0.1		108.1	0.7		125.8	6.4	
Delay (s)		20.1			18.0		128.2	5.5		145.7	12.7	
Level of Service		C			B		F	A		F	B	
Approach Delay (s)		20.1			18.0			10.3			20.5	
Approach LOS		C			B			B			C	

Intersection Summary				
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	41.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	387	85	96	226	456	437
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	421	92	104	246	496	475
RTOR Reduction (vph)	0	69	0	0	0	294
Lane Group Flow (vph)	421	23	104	246	496	181
Turn Type	Perm	Perm	Prot	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	10.4	10.4	3.0	22.6	15.6	15.6
Effective Green, g (s)	10.4	10.4	3.0	22.6	15.6	15.6
Actuated g/C Ratio	0.25	0.25	0.07	0.55	0.38	0.38
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	870	401	129	1026	708	602
v/s Ratio Prot			c0.06	0.13	c0.27	
v/s Ratio Perm	c0.12	0.01				0.11
v/c Ratio	0.48	0.06	0.81	0.24	0.70	0.30
Uniform Delay, d1	13.0	11.6	18.7	4.8	10.7	8.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	29.5	0.1	3.1	0.3
Delay (s)	13.4	11.7	48.2	4.9	13.9	9.2
Level of Service	B	B	D	A	B	A
Approach Delay (s)	13.1			17.8	11.6	
Approach LOS	B			B	B	

Intersection Summary				
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	41.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	50.4%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	34	41	258	61	79	506
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	45	280	66	86	550
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1035	314			347	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1035	314			347	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	94			93	
cM capacity (veh/h)	239	727			1212	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	82	347	86	550
Volume Left	37	0	86	0
Volume Right	45	66	0	0
cSH	377	1700	1212	1700
Volume to Capacity	0.22	0.20	0.07	0.32
Queue Length 95th (ft)	20	0	6	0
Control Delay (s)	17.2	0.0	8.2	0.0
Lane LOS	C		A	
Approach Delay (s)	17.2	0.0	1.1	
Approach LOS	C			

Intersection Summary				
Average Delay		2.0		
Intersection Capacity Utilization		37.7%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	152	112	77	173	412	120
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	165	122	84	188	448	130
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	868	513	578			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	868	513	578			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	44	78	92			
cM capacity (veh/h)	296	561	995			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	287	84	188	578
Volume Left	165	84	0	0
Volume Right	122	0	0	130
cSH	513	995	1700	1700
Volume to Capacity	0.56	0.08	0.11	0.34
Queue Length 95th (ft)	85	7	0	0
Control Delay (s)	23.8	8.9	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	23.8	2.8		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		6.7		
Intersection Capacity Utilization		51.7%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	147	13	851	96	62	17	457	688	14	10	645	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1781	1583	1770	1863	1583	3433	3529		1770	1863	1583
Flt Permitted		0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1781	1583	1770	1863	1583	3433	3529		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	14	925	104	67	18	497	748	15	11	701	132
RTOR Reduction (vph)	0	0	67	0	0	16	0	1	0	0	0	62
Lane Group Flow (vph)	0	174	858	104	67	2	497	762	0	11	701	70
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	5	8	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		15.9	67.9	13.2	13.2	15.6	52.0	101.3		2.4	51.7	51.7
Effective Green, g (s)		15.9	67.9	13.2	13.2	15.6	52.0	101.3		2.4	51.7	51.7
Actuated g/C Ratio		0.11	0.46	0.09	0.09	0.10	0.35	0.68		0.02	0.35	0.35
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		190	722	157	165	208	1199	2402		28	647	550
v/s Ratio Prot		0.10	c0.41	c0.06	0.04	0.00	0.14	0.22		0.01	c0.38	
v/s Ratio Perm			0.13			0.00						0.04
v/c Ratio		0.92	1.19	0.66	0.41	0.01	0.41	0.32		0.39	1.08	0.13
Uniform Delay, d1		65.8	40.5	65.6	64.1	59.7	36.8	9.7		72.5	48.6	33.1
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		41.9	98.1	10.0	1.6	0.0	0.2	0.3		8.9	60.1	0.5
Delay (s)		107.7	138.5	75.7	65.7	59.7	37.1	10.0		81.3	108.7	33.6
Level of Service		F	F	E	E	E	D	B		F	F	C
Approach Delay (s)		133.7			70.6			20.7			96.6	
Approach LOS		F			E			C			F	

Intersection Summary				
HCM 2000 Control Delay	79.0	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.09			
Actuated Cycle Length (s)	148.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	102.0%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	158	984	594	309	843	67	519	63	238	116	129	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	172	1070	646	336	916	73	564	68	259	126	140	122
RTOR Reduction (vph)	0	0	250	0	0	55	0	0	146	0	0	89
Lane Group Flow (vph)	172	1070	396	336	916	18	564	68	113	126	140	33
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.0	16.0	27.0	5.0	16.0	16.0	11.0	24.8	24.8	4.0	17.8	17.8
Effective Green, g (s)	5.0	16.0	27.0	5.0	16.0	16.0	11.0	24.8	24.8	4.0	17.8	17.8
Actuated g/C Ratio	0.08	0.24	0.41	0.08	0.24	0.24	0.17	0.38	0.38	0.06	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	260	1236	745	260	1236	384	573	702	596	208	503	428
v/s Ratio Prot	0.05	c0.21	0.09	c0.10	0.18		c0.16	0.04		0.04	c0.08	
v/s Ratio Perm			0.16			0.01			0.07			0.02
v/c Ratio	0.66	0.87	0.53	1.29	0.74	0.05	0.98	0.10	0.19	0.61	0.28	0.08
Uniform Delay, d1	29.6	23.9	14.6	30.4	23.0	19.1	27.3	13.3	13.8	30.1	18.9	17.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.2	6.6	0.7	157.2	2.4	0.0	33.3	0.3	0.7	4.9	1.4	0.4
Delay (s)	35.8	30.4	15.4	187.6	25.4	19.1	60.6	13.5	14.5	35.0	20.3	18.2
Level of Service	D	C	B	F	C	B	E	B	B	D	C	B
Approach Delay (s)		25.8			66.2			43.6			24.4	
Approach LOS		C			E			D			C	

Intersection Summary				
HCM 2000 Control Delay	41.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	65.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	62.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	326	703	234	266	6	397	20	208	3	42	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.86			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3527		1770	1608			1806	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3527		1770	1608			1806	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	354	764	254	289	7	432	22	226	3	46	13
RTOR Reduction (vph)	0	0	233	0	2	0	0	157	0	0	12	0
Lane Group Flow (vph)	8	354	531	254	294	0	432	91	0	0	50	0
Turn Type	Prot	NA	pm+ov	Prot	NA		Split	NA		Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)	0.7	21.4	46.6	13.9	34.6		25.2	25.2			6.4	
Effective Green, g (s)	0.7	21.4	46.6	13.9	34.6		25.2	25.2			6.4	
Actuated g/C Ratio	0.01	0.26	0.56	0.17	0.42		0.30	0.30			0.08	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	14	480	966	296	1472		538	488			139	
v/s Ratio Prot	0.00	c0.19	0.17	c0.14	0.08		c0.24	0.06			c0.03	
v/s Ratio Perm			0.17									
v/c Ratio	0.57	0.74	0.55	0.86	0.20		0.80	0.19			0.36	
Uniform Delay, d1	41.0	28.2	11.5	33.5	15.4		26.6	21.3			36.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	46.0	5.8	0.7	21.0	0.1		12.0	0.8			1.6	
Delay (s)	86.9	34.0	12.2	54.6	15.4		38.6	22.1			37.9	
Level of Service	F	C	B	D	B		D	C			D	
Approach Delay (s)		19.6			33.5			32.6			37.9	
Approach LOS		B			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	82.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	69.8%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	89	372	249	94	691	377
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	404	271	102	751	410
RTOR Reduction (vph)	0	350	0	78	0	0
Lane Group Flow (vph)	97	54	271	24	751	410
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	9.8	9.8	17.7	17.7	34.4	56.1
Effective Green, g (s)	9.8	9.8	17.7	17.7	34.4	56.1
Actuated g/C Ratio	0.13	0.13	0.24	0.24	0.47	0.76
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	234	209	446	379	823	1414
v/s Ratio Prot	c0.05		c0.15		c0.42	0.22
v/s Ratio Perm		0.03		0.02		
v/c Ratio	0.41	0.26	0.61	0.06	0.91	0.29
Uniform Delay, d1	29.4	28.8	25.0	21.7	18.4	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.7	6.0	0.3	14.3	0.5
Delay (s)	30.6	29.4	31.1	22.0	32.7	3.3
Level of Service	C	C	C	C	C	A
Approach Delay (s)	29.7		28.6			22.3
Approach LOS	C		C			C

Intersection Summary				
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	73.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	66.3%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	183	550	329	70	156	164
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	199	598	358	76	170	178
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	358				1353	358
vC1, stage 1 conf vol					358	
vC2, stage 2 conf vol					996	
vCu, unblocked vol	358				1353	358
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	83				40	74
cM capacity (veh/h)	1201				282	687

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	199	598	358	76	348
Volume Left	199	0	0	0	170
Volume Right	0	0	0	76	178
cSH	1201	1700	1700	1700	404
Volume to Capacity	0.17	0.35	0.21	0.04	0.86
Queue Length 95th (ft)	15	0	0	0	211
Control Delay (s)	8.6	0.0	0.0	0.0	49.2
Lane LOS	A				E
Approach Delay (s)	2.1		0.0		49.2
Approach LOS					E

Intersection Summary				
Average Delay	11.9			
Intersection Capacity Utilization	56.2%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	342	0	320	172	9	410
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	372	0	348	187	10	446
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			372		1254	372
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			372		1254	372
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			71		93	34
cM capacity (veh/h)			1187		134	674

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	372	348	187	455
Volume Left	0	348	0	10
Volume Right	0	0	0	446
cSH	1700	1187	1700	620
Volume to Capacity	0.22	0.29	0.11	0.73
Queue Length 95th (ft)	0	31	0	158
Control Delay (s)	0.0	9.3	0.0	25.1
Lane LOS		A		D
Approach Delay (s)	0.0	6.0		25.1
Approach LOS				D

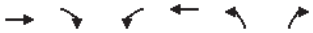
Intersection Summary				
Average Delay	10.8			
Intersection Capacity Utilization	71.6%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Yield	Stop		Yield	
Volume (vph)	134	43	55	13	7	139
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	146	47	60	14	8	151

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	192	74	159
Volume Left (vph)	146	0	8
Volume Right (vph)	0	14	151
Hadj (s)	0.19	-0.08	-0.53
Departure Headway (s)	4.5	4.4	4.0
Degree Utilization, x	0.24	0.09	0.18
Capacity (veh/h)	772	775	848
Control Delay (s)	8.9	7.8	7.8
Approach Delay (s)	8.9	7.8	7.8
Approach LOS	A	A	A

Intersection Summary			
Delay		8.3	
Level of Service		A	
Intersection Capacity Utilization		32.0%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1959	45	17	1264	22	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2129	49	18	1374	24	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			2178		3565	2154
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			2178		3565	2154
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		0	66
cM capacity (veh/h)			244		6	60

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	2178	1392	45
Volume Left	0	18	24
Volume Right	49	0	21
cSH	1700	244	10
Volume to Capacity	1.28	0.08	4.40
Queue Length 95th (ft)	0	6	Err
Control Delay (s)	0.0	8.5	Err
Lane LOS		A	F
Approach Delay (s)	0.0	8.5	Err
Approach LOS			F

Intersection Summary			
Average Delay		126.5	
Intersection Capacity Utilization		115.8%	ICU Level of Service H
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	119	1934	1657	292	310	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.98		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3460		1765	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3460		1765	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	129	2102	1801	317	337	166
RTOR Reduction (vph)	0	0	16	0	2	116
Lane Group Flow (vph)	129	2102	2102	0	352	33
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	7.0	66.0	55.0		16.0	16.0
Effective Green, g (s)	7.0	66.0	55.0		16.0	16.0
Actuated g/C Ratio	0.08	0.73	0.61		0.18	0.18
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	137	2595	2114		313	267
v/s Ratio Prot	0.07	c0.59	c0.61		c0.20	
v/s Ratio Perm						0.02
v/c Ratio	0.94	0.81	0.99		1.13	0.12
Uniform Delay, d1	41.3	7.9	17.3		37.0	31.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	59.0	2.0	18.1		89.2	0.2
Delay (s)	100.3	9.9	35.5		126.2	31.3
Level of Service	F	A	D		F	C
Approach Delay (s)		15.1	35.5		98.1	
Approach LOS		B	D		F	

Intersection Summary				
HCM 2000 Control Delay	32.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	1.02			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	92.0%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	1996	171	512	1796	41	139	13	585	6	4	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00	0.95	0.98	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583		1781	2787	1681	1741	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00	0.95	0.98	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583		1781	2787	1681	1741	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	2170	186	557	1952	45	151	14	636	7	4	5
RTOR Reduction (vph)	0	0	97	0	0	18	0	0	324	0	0	0
Lane Group Flow (vph)	76	2170	89	557	1952	27	0	165	312	5	6	5
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	6.2	45.2	45.2	18.1	57.1	57.1		12.9	31.0	2.4	2.4	2.4
Effective Green, g (s)	6.2	45.2	45.2	18.1	57.1	57.1		12.9	31.0	2.4	2.4	2.4
Actuated g/C Ratio	0.07	0.48	0.48	0.19	0.60	0.60		0.14	0.33	0.03	0.03	0.03
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	224	2429	756	656	3069	955		242	1031	42	44	40
v/s Ratio Prot	0.02	c0.43		c0.16	0.38			c0.09	0.06	0.00	c0.00	
v/s Ratio Perm			0.06			0.02			0.05			0.00
v/c Ratio	0.34	0.89	0.12	0.85	0.64	0.03		0.68	0.30	0.12	0.14	0.12
Uniform Delay, d1	42.2	22.5	13.7	36.9	12.1	7.6		38.9	23.7	45.1	45.1	45.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	4.7	0.1	10.0	0.4	0.0		7.7	0.2	1.3	1.4	1.4
Delay (s)	43.1	27.2	13.7	46.9	12.5	7.6		46.6	23.9	46.3	46.5	46.5
Level of Service	D	C	B	D	B	A		D	C	D	D	D
Approach Delay (s)		26.6			19.9			28.6			46.4	
Approach LOS		C			B			C			D	

Intersection Summary				
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	94.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	78.2%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	81	1612	980	213	1235	31	1145	42	233	36	25	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	88	1752	1065	232	1342	34	1245	46	253	39	27	68
RTOR Reduction (vph)	0	0	247	0	0	22	0	0	107	0	0	64
Lane Group Flow (vph)	88	1752	818	232	1342	12	1245	46	146	39	27	4
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	8.7	44.1	89.2	9.0	44.4	44.4	45.1	45.1	54.1	6.9	6.9	6.9
Effective Green, g (s)	8.7	44.1	89.2	9.0	44.4	44.4	45.1	45.1	54.1	6.9	6.9	6.9
Actuated g/C Ratio	0.07	0.36	0.74	0.07	0.37	0.37	0.37	0.37	0.45	0.06	0.06	0.06
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	127	1851	2052	255	1864	580	1278	693	759	100	106	90
v/s Ratio Prot	0.05	c0.34	0.15	c0.07	0.26		c0.36	0.02	0.01	c0.02	0.01	
v/s Ratio Perm			0.15			0.01			0.08			0.00
v/c Ratio	0.69	0.95	0.40	0.91	0.72	0.02	0.97	0.07	0.19	0.39	0.25	0.04
Uniform Delay, d1	54.9	37.4	5.9	55.6	33.0	24.5	37.4	24.5	20.3	55.1	54.6	54.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.1	10.8	0.1	33.0	1.4	0.0	19.1	0.0	0.1	2.5	1.3	0.2
Delay (s)	70.0	48.1	6.1	88.6	34.4	24.5	56.5	24.5	20.4	57.6	55.9	54.2
Level of Service	E	D	A	F	C	C	E	C	C	E	E	D
Approach Delay (s)		33.4			42.0			49.7			55.5	
Approach LOS		C			D			D			E	

Intersection Summary				
HCM 2000 Control Delay	40.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	121.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	86.6%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	5	955	962	4	2	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	1038	1046	4	2	7
RTOR Reduction (vph)	0	0	0	1	0	6
Lane Group Flow (vph)	5	1038	1046	3	2	1
Turn Type	Prot	NA	NA	Perm	Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	0.6	41.0	36.4	36.4	5.9	6.5
Effective Green, g (s)	0.6	41.0	36.4	36.4	5.9	6.5
Actuated g/C Ratio	0.01	0.75	0.66	0.66	0.11	0.12
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	37	1391	1235	1049	190	302
v/s Ratio Prot	0.00	c0.56	c0.56		c0.00	0.00
v/s Ratio Perm				0.00		0.00
v/c Ratio	0.14	0.75	0.85	0.00	0.01	0.00
Uniform Delay, d1	26.9	4.0	7.1	3.1	21.9	21.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	2.2	5.6	0.0	0.0	0.0
Delay (s)	28.6	6.2	12.7	3.1	21.9	21.3
Level of Service	C	A	B	A	C	C
Approach Delay (s)		6.3	12.6		21.5	
Approach LOS		A	B		C	

Intersection Summary				
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	54.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	60.6%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	916	0	3	936	154	2	3	8	185	3	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3539		1770	3464			1689			1775	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (perm)	1770	3539		1770	3464			1689			1775	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	996	0	3	1017	167	2	3	9	201	3	76
RTOR Reduction (vph)	0	0	0	0	13	0	0	8	0	0	0	62
Lane Group Flow (vph)	65	996	0	3	1171	0	0	6	0	0	204	14
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												4
Actuated Green, G (s)	4.1	38.7		0.7	35.3			6.1			13.7	13.7
Effective Green, g (s)	4.1	38.7		0.7	35.3			6.1			13.7	13.7
Actuated g/C Ratio	0.05	0.51		0.01	0.47			0.08			0.18	0.18
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	96	1821		16	1626			137			323	288
v/s Ratio Prot	c0.04	c0.28		0.00	c0.34			c0.00			c0.11	
v/s Ratio Perm												0.01
v/c Ratio	0.68	0.55		0.19	0.72			0.04			0.63	0.05
Uniform Delay, d1	34.9	12.3		37.0	16.0			31.9			28.4	25.4
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	17.3	0.3		5.6	1.6			0.1			4.0	0.1
Delay (s)	52.2	12.7		42.6	17.6			32.0			32.4	25.4
Level of Service	D	B		D	B			C			C	C
Approach Delay (s)		15.1			17.6			32.0			30.5	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	75.2	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	61.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	186	941	8	7	906	24	7	0	7	6	0	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1770	1860		1770	1856			1695			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.87			0.75	1.00
Satd. Flow (perm)	1770	1860		1770	1856			1514			1392	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	202	1023	9	8	985	26	8	0	8	7	0	204
RTOR Reduction (vph)	0	0	0	0	1	0	0	15	0	0	0	186
Lane Group Flow (vph)	202	1032	0	8	1010	0	0	1	0	0	7	18
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	11.0	62.0		0.7	51.7			7.4			7.4	7.4
Effective Green, g (s)	11.0	62.0		0.7	51.7			7.4			7.4	7.4
Actuated g/C Ratio	0.13	0.76		0.01	0.63			0.09			0.09	0.09
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	237	1404		15	1168			136			125	142
v/s Ratio Prot	c0.11	0.55		0.00	c0.54							
v/s Ratio Perm								0.00			0.01	c0.01
v/c Ratio	0.85	0.73		0.53	0.86			0.01			0.06	0.13
Uniform Delay, d1	34.8	5.5		40.5	12.4			34.0			34.2	34.4
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	24.4	2.0		31.9	6.9			0.0			0.2	0.4
Delay (s)	59.1	7.6		72.4	19.2			34.0			34.3	34.8
Level of Service	E	A		E	B			C			C	C
Approach Delay (s)		16.0			19.7			34.0			34.8	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	76.6%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	763	219	32	821	65	136	62	66	64	77	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.98	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1754			1797	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.74			0.79	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1336			1446	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	829	238	35	892	71	148	67	72	70	84	21
RTOR Reduction (vph)	0	0	44	0	0	33	0	16	0	0	6	0
Lane Group Flow (vph)	20	829	194	35	892	38	0	271	0	0	169	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.3	34.3	34.3	1.3	34.3	34.3		16.8			16.8	
Effective Green, g (s)	1.3	34.3	34.3	1.3	34.3	34.3		16.8			16.8	
Actuated g/C Ratio	0.02	0.53	0.53	0.02	0.53	0.53		0.26			0.26	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	35	992	843	35	992	843		348			377	
v/s Ratio Prot	0.01	0.45		c0.02	c0.48							
v/s Ratio Perm			0.12			0.02		c0.20			0.12	
v/c Ratio	0.57	0.84	0.23	1.00	0.90	0.04		0.78			0.45	
Uniform Delay, d1	31.3	12.7	8.0	31.6	13.5	7.2		22.1			19.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	20.6	6.2	0.1	152.1	10.8	0.0		10.8			0.9	
Delay (s)	51.8	18.9	8.2	183.7	24.3	7.2		32.9			20.8	
Level of Service	D	B	A	F	C	A		C			C	
Approach Delay (s)		17.1			28.7			32.9			20.8	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.86			
Actuated Cycle Length (s)	64.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	71.2%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	12	15	7	791	914	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	16	8	860	993	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1877	1002	1010			
vC1, stage 1 conf vol	1002					
vC2, stage 2 conf vol	875					
vCu, unblocked vol	1877	1002	1010			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	94	99			
cM capacity (veh/h)	270	294	686			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	29	8	860	1010
Volume Left	13	8	0	0
Volume Right	16	0	0	16
cSH	283	686	1700	1700
Volume to Capacity	0.10	0.01	0.51	0.59
Queue Length 95th (ft)	9	1	0	0
Control Delay (s)	19.2	10.3	0.0	0.0
Lane LOS	C	B		
Approach Delay (s)	19.2	0.1		0.0
Approach LOS	C			

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	59.0%	ICU Level of Service		B
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	0	20	0	0	9	19	850	0	5	800	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.91			0.86		1.00	1.00		1.00	1.00	
Flt Protected		0.98			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1671			1611		1770	1863		1770	1856	
Flt Permitted		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1700			1611		1770	1863		1770	1856	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	0	22	0	0	10	21	924	0	5	870	21
RTOR Reduction (vph)	0	33	0	0	10	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	1	0	0	0	0	21	924	0	5	890	0
Turn Type	Perm	NA			NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		1.0			1.0		0.7	27.7		0.7	27.7	
Effective Green, g (s)		1.0			1.0		0.7	27.7		0.7	27.7	
Actuated g/C Ratio		0.02			0.02		0.02	0.67		0.02	0.67	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		41			38		29	1246		29	1241	
v/s Ratio Prot					0.00		c0.01	c0.50		0.00	0.48	
v/s Ratio Perm		c0.00										
v/c Ratio		0.02			0.01		0.72	0.74		0.17	0.72	
Uniform Delay, d1		19.7			19.7		20.3	4.5		20.1	4.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.1		61.8	2.4		2.8	2.0	
Delay (s)		19.9			19.8		82.0	6.9		22.9	6.4	
Level of Service		B			B		F	A		C	A	
Approach Delay (s)		19.9			19.8			8.6			6.5	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	41.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	59.9%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	620	141	118	221	323	532
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	674	153	128	240	351	578
RTOR Reduction (vph)	0	105	0	0	0	398
Lane Group Flow (vph)	674	48	128	240	351	180
Turn Type	Perm	Perm	Prot	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	13.2	13.2	4.1	21.3	13.2	13.2
Effective Green, g (s)	13.2	13.2	4.1	21.3	13.2	13.2
Actuated g/C Ratio	0.31	0.31	0.10	0.50	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1066	491	170	933	578	491
v/s Ratio Prot			c0.07	0.13	c0.19	
v/s Ratio Perm	c0.20	0.03				0.11
v/c Ratio	0.63	0.10	0.75	0.26	0.61	0.37
Uniform Delay, d1	12.6	10.4	18.7	6.1	12.4	11.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.1	17.1	0.1	1.8	0.5
Delay (s)	13.8	10.5	35.8	6.2	14.3	11.9
Level of Service	B	B	D	A	B	B
Approach Delay (s)	13.2			16.5	12.8	
Approach LOS	B			B	B	

Intersection Summary				
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	42.5	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	51.2%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	45	44	303	44	48	404
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	48	329	48	52	439
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	897	353			377	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	897	353			377	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	93			96	
cM capacity (veh/h)	297	690			1181	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	97	377	52	439
Volume Left	49	0	52	0
Volume Right	48	48	0	0
cSH	413	1700	1181	1700
Volume to Capacity	0.23	0.22	0.04	0.26
Queue Length 95th (ft)	22	0	3	0
Control Delay (s)	16.4	0.0	8.2	0.0
Lane LOS	C		A	
Approach Delay (s)	16.4	0.0	0.9	
Approach LOS	C			

Intersection Summary				
Average Delay		2.1		
Intersection Capacity Utilization		37.1%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	141	78	63	189	278	163
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	153	85	68	205	302	177
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		2				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	733	391	479			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	733	391	479			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	58	87	94			
cM capacity (veh/h)	363	658	1083			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	238	68	205	479
Volume Left	153	68	0	0
Volume Right	85	0	0	177
cSH	564	1083	1700	1700
Volume to Capacity	0.42	0.06	0.12	0.28
Queue Length 95th (ft)	52	5	0	0
Control Delay (s)	18.2	8.5	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	18.2	2.1		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		4.9		
Intersection Capacity Utilization		45.9%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	3	519	10	6	2	372	526	4	2	698	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1776	1583	1770	1863	1583	3433	3536		1770	1863	1583
Flt Permitted		0.95	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1776	1583	1770	1863	1583	3433	3536		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	3	564	11	7	2	404	572	4	2	759	135
RTOR Reduction (vph)	0	0	281	0	0	2	0	0	0	0	0	68
Lane Group Flow (vph)	0	133	283	11	7	0	404	576	0	2	759	67
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	5	8	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		8.7	19.0	2.3	2.3	3.0	10.3	46.0		0.7	36.4	36.4
Effective Green, g (s)		8.7	19.0	2.3	2.3	3.0	10.3	46.0		0.7	36.4	36.4
Actuated g/C Ratio		0.12	0.26	0.03	0.03	0.04	0.14	0.62		0.01	0.49	0.49
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		209	408	55	58	150	479	2207		16	920	781
v/s Ratio Prot		0.07	c0.10	c0.01	0.00	0.00	c0.12	0.16		0.00	c0.41	
v/s Ratio Perm			0.08			0.00						0.04
v/c Ratio		0.64	0.69	0.20	0.12	0.00	0.84	0.26		0.12	0.82	0.09
Uniform Delay, d1		31.0	24.7	34.8	34.7	33.9	30.9	6.2		36.2	15.9	9.9
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		6.2	5.1	1.8	0.9	0.0	12.8	0.3		3.5	8.3	0.2
Delay (s)		37.2	29.8	36.6	35.7	33.9	43.7	6.5		39.7	24.3	10.1
Level of Service		D	C	D	D	C	D	A		D	C	B
Approach Delay (s)		31.2			36.0			21.8			22.2	
Approach LOS		C			D			C			C	

Intersection Summary				
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	73.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	82.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	166	715	502	177	695	67	571	75	147	123	120	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	180	777	546	192	755	73	621	82	160	134	130	137
RTOR Reduction (vph)	0	0	291	0	0	55	0	0	104	0	0	98
Lane Group Flow (vph)	180	777	255	192	755	18	621	82	56	134	130	39
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	4.0	14.7	22.7	4.0	14.7	14.7	8.0	20.9	20.9	3.9	16.8	16.8
Effective Green, g (s)	4.0	14.7	22.7	4.0	14.7	14.7	8.0	20.9	20.9	3.9	16.8	16.8
Actuated g/C Ratio	0.07	0.25	0.38	0.07	0.25	0.25	0.13	0.35	0.35	0.07	0.28	0.28
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	230	1256	710	230	1256	391	461	654	556	225	526	446
v/s Ratio Prot	0.05	c0.15	0.05	c0.06	0.15		c0.18	0.04		0.04	c0.07	
v/s Ratio Perm			0.11			0.01			0.04			0.02
v/c Ratio	0.78	0.62	0.36	0.83	0.60	0.05	1.35	0.13	0.10	0.60	0.25	0.09
Uniform Delay, d1	27.3	19.9	13.2	27.4	19.8	17.1	25.8	13.1	13.0	27.0	16.5	15.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.8	0.9	0.3	22.2	0.8	0.0	170.1	0.4	0.4	4.2	1.1	0.4
Delay (s)	43.1	20.8	13.5	49.6	20.6	17.1	195.8	13.5	13.3	31.2	17.6	16.1
Level of Service	D	C	B	D	C	B	F	B	B	C	B	B
Approach Delay (s)		20.8			25.8			144.7			21.6	
Approach LOS		C			C			F			C	

Intersection Summary				
HCM 2000 Control Delay	50.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	59.5	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	52.4%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	348	428	116	340	6	321	6	142	4	8	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.86			0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	3529		1770	1595			1728	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (perm)	1770	1863	1583	1770	3529		1770	1595			1728	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	378	465	126	370	7	349	7	154	4	9	12
RTOR Reduction (vph)	0	0	178	0	1	0	0	106	0	0	12	0
Lane Group Flow (vph)	8	378	287	126	376	0	349	55	0	0	13	0
Turn Type	Prot	NA	pm+ov	Prot	NA		Split	NA		Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)	0.7	19.4	39.6	6.1	24.8		20.2	20.2			2.5	
Effective Green, g (s)	0.7	19.4	39.6	6.1	24.8		20.2	20.2			2.5	
Actuated g/C Ratio	0.01	0.30	0.62	0.10	0.39		0.31	0.31			0.04	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	19	562	1075	168	1363		556	501			67	
v/s Ratio Prot	0.00	c0.20	0.08	c0.07	0.11		c0.20	0.03			c0.01	
v/s Ratio Perm			0.10									
v/c Ratio	0.42	0.67	0.27	0.75	0.28		0.63	0.11			0.20	
Uniform Delay, d1	31.5	19.6	5.6	28.3	13.5		18.8	15.6			29.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	14.4	3.2	0.1	17.0	0.1		5.3	0.4			1.5	
Delay (s)	45.9	22.8	5.8	45.3	13.6		24.1	16.1			31.4	
Level of Service	D	C	A	D	B		C	B			C	
Approach Delay (s)		13.7			21.6			21.6			31.4	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	64.2	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	59.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	79	254	205	69	305	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	276	223	75	332	315
RTOR Reduction (vph)	0	233	0	49	0	0
Lane Group Flow (vph)	86	43	223	26	332	315
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	8.2	8.2	18.4	18.4	13.7	36.1
Effective Green, g (s)	8.2	8.2	18.4	18.4	13.7	36.1
Actuated g/C Ratio	0.16	0.16	0.35	0.35	0.26	0.69
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	277	248	655	556	463	1285
v/s Ratio Prot	c0.05		c0.12		c0.19	0.17
v/s Ratio Perm		0.03		0.02		
v/c Ratio	0.31	0.17	0.34	0.05	0.72	0.25
Uniform Delay, d1	19.5	19.1	12.5	11.2	17.5	3.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.3	1.4	0.2	5.2	0.5
Delay (s)	20.2	19.5	13.9	11.3	22.8	3.5
Level of Service	C	B	B	B	C	A
Approach Delay (s)	19.6		13.2			13.4
Approach LOS	B		B			B

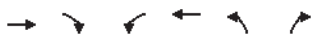
Intersection Summary				
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.46			
Actuated Cycle Length (s)	52.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	42.1%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	53	220	201	64	88	92
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	58	239	218	70	96	100
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	218				573	218
vC1, stage 1 conf vol					218	
vC2, stage 2 conf vol					354	
vCu, unblocked vol	218				573	218
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	96				85	88
cM capacity (veh/h)	1351				623	821

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	58	239	218	70	196
Volume Left	58	0	0	0	96
Volume Right	0	0	0	70	100
cSH	1351	1700	1700	1700	711
Volume to Capacity	0.04	0.14	0.13	0.04	0.28
Queue Length 95th (ft)	3	0	0	0	28
Control Delay (s)	7.8	0.0	0.0	0.0	12.0
Lane LOS	A				B
Approach Delay (s)	1.5		0.0		12.0
Approach LOS					B

Intersection Summary				
Average Delay	3.6			
Intersection Capacity Utilization	34.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	168	0	124	178	10	134
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	183	0	135	193	11	146
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			183		646	183
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			183		646	183
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			90		97	83
cM capacity (veh/h)			1392		394	860

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	183	135	193	157
Volume Left	0	135	0	11
Volume Right	0	0	0	146
cSH	1700	1392	1700	795
Volume to Capacity	0.11	0.10	0.11	0.20
Queue Length 95th (ft)	0	8	0	18
Control Delay (s)	0.0	7.9	0.0	10.6
Lane LOS		A		B
Approach Delay (s)	0.0	3.2		10.6
Approach LOS				B

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	34.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Yield	Stop		Yield	
Volume (vph)	193	23	25	19	11	187
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	210	25	27	21	12	203

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	235	48	215
Volume Left (vph)	210	0	12
Volume Right (vph)	0	21	203
Hadj (s)	0.21	-0.23	-0.52
Departure Headway (s)	4.6	4.4	4.1
Degree Utilization, x	0.30	0.06	0.24
Capacity (veh/h)	737	755	836
Control Delay (s)	9.6	7.7	8.3
Approach Delay (s)	9.6	7.7	8.3
Approach LOS	A	A	A

Intersection Summary			
Delay		8.9	
Level of Service		A	
Intersection Capacity Utilization		37.4%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1147	42	5	1036	5	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1247	46	5	1126	5	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1292		2407	1270
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1292		2407	1270
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		85	91
cM capacity (veh/h)			536		36	205

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1292	1132	24
Volume Left	0	5	5
Volume Right	46	0	18
cSH	1700	536	99
Volume to Capacity	0.76	0.01	0.24
Queue Length 95th (ft)	0	1	22
Control Delay (s)	0.0	0.4	52.4
Lane LOS		A	F
Approach Delay (s)	0.0	0.4	52.4
Approach LOS			F

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		72.9%	ICU Level of Service C
Analysis Period (min)		15	

9: SR 94 & Melody Rd./Peacefull Valley Ranch Rd.

Timing Plan: AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	370	0	91	3	0	46	44	444	8	53	156	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		0.97	1.00		0.95	0.91	0.95
Frt	1.00	0.85			0.87		1.00	1.00		1.00	0.98	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1583			1621		3433	1858		1681	1665	1504
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	0.99	1.00
Satd. Flow (perm)	3433	1583			1621		3433	1858		1681	1650	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	402	0	99	3	0	50	48	483	9	58	170	192
RTOR Reduction (vph)	0	77	0	0	50	0	0	1	0	0	4	106
Lane Group Flow (vph)	402	22	0	0	3	0	48	491	0	52	193	65
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	11.2	11.2			2.8		1.3	18.5		2.0	21.2	19.2
Effective Green, g (s)	11.2	11.2			2.8		1.3	18.5		2.0	21.2	19.2
Actuated g/C Ratio	0.22	0.22			0.06		0.03	0.37		0.04	0.42	0.38
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	761	351			89		88	680		66	693	571
v/s Ratio Prot	c0.12	0.01			c0.00		0.01	c0.26		c0.03	0.01	
v/s Ratio Perm											0.11	0.04
v/c Ratio	0.53	0.06			0.03		0.55	0.72		0.79	0.28	0.11
Uniform Delay, d1	17.3	15.5			22.6		24.3	13.8		24.0	9.6	10.1
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1			0.2		6.7	3.8		44.9	0.2	0.1
Delay (s)	18.0	15.6			22.7		31.1	17.6		69.0	9.8	10.2
Level of Service	B	B			C		C	B		E	A	B
Approach Delay (s)		17.5			22.7			18.8			17.3	
Approach LOS		B			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	50.5	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	53.4%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

10: SR 94 & Reservation Rd.

Timing Plan: AM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	496	250	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	539	272	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	811	272	272			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	811	272	272			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	349	767	1292			

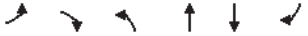
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	539	272
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1292	1700
Volume to Capacity	0.00	0.00	0.16
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary					
Average Delay	0.0				
Intersection Capacity Utilization	29.4%	ICU Level of Service	A		
Analysis Period (min)	15				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	572	0	131	4	0	9	147	214	0	5	520	624
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		0.97	1.00		1.00	1.00	1.00
Frt	1.00	0.85			0.90		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1583			1659		3433	1863		1770	1863	1583
Flt Permitted	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1583			1659		3433	1863		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	622	0	142	4	0	10	160	233	0	5	565	678
RTOR Reduction (vph)	0	105	0	0	14	0	0	0	0	0	0	435
Lane Group Flow (vph)	622	37	0	0	0	0	160	233	0	5	565	243
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	14.1	14.1			0.9		4.0	22.9		0.7	19.6	19.6
Effective Green, g (s)	14.1	14.1			0.9		4.0	22.9		0.7	19.6	19.6
Actuated g/C Ratio	0.26	0.26			0.02		0.07	0.42		0.01	0.36	0.36
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	886	408			27		251	781		22	668	568
v/s Ratio Prot	c0.18	0.02			c0.00		c0.05	c0.13		0.00	c0.30	
v/s Ratio Perm												0.15
v/c Ratio	0.70	0.09			0.01		0.64	0.30		0.23	0.85	0.43
Uniform Delay, d1	18.3	15.4			26.4		24.6	10.5		26.7	16.1	13.3
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.5	0.1			0.1		5.2	0.2		5.2	9.7	0.5
Delay (s)	20.9	15.5			26.5		29.8	10.7		31.9	25.8	13.8
Level of Service	C	B			C		C	B		C	C	B
Approach Delay (s)		19.9			26.5			18.5			19.3	
Approach LOS		B			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	54.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	64.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	361	655	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	392	712	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1104	712	712			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1104	712	712			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	233	432	888			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	392	712
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	888	1700
Volume to Capacity	0.00	0.00	0.42
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary					
Average Delay	0.0				
Intersection Capacity Utilization	37.8%	ICU Level of Service	A		
Analysis Period (min)	15				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	463	4	109	3	0	49	100	209	4	57	449	413
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		0.97	1.00		0.95	0.91	0.95
Frt	1.00	0.85			0.87		1.00	1.00		1.00	0.99	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1592			1620		3433	1858		1681	1673	1504
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1592			1620		3433	1858		1681	1670	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	503	4	118	3	0	53	109	227	4	62	488	449
RTOR Reduction (vph)	0	89	0	0	53	0	0	1	0	0	3	267
Lane Group Flow (vph)	503	33	0	0	3	0	109	230	0	56	536	137
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	12.7	12.7			2.8		3.0	18.7		2.1	19.9	17.8
Effective Green, g (s)	12.7	12.7			2.8		3.0	18.7		2.1	19.9	17.8
Actuated g/C Ratio	0.24	0.24			0.05		0.06	0.36		0.04	0.38	0.34
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	833	386			86		196	664		67	635	511
v/s Ratio Prot	c0.15	0.02			c0.00		0.03	0.12		0.03	c0.03	
v/s Ratio Perm											c0.29	0.09
v/c Ratio	0.60	0.08			0.03		0.56	0.35		0.84	0.84	0.27
Uniform Delay, d1	17.6	15.3			23.5		24.0	12.3		24.9	14.8	12.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.2	0.1			0.2		3.4	0.3		56.4	10.0	0.3
Delay (s)	18.8	15.4			23.6		27.4	12.6		81.4	24.8	12.8
Level of Service	B	B			C		C	B		F	C	B
Approach Delay (s)		18.1			23.6			17.4			23.1	
Approach LOS		B			C			B			C	

Intersection Summary				
HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.68			
Actuated Cycle Length (s)	52.3	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	65.6%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	313	561	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	340	610	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	950	610	610			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	950	610	610			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	289	495	969			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	340	610
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	969	1700
Volume to Capacity	0.00	0.00	0.36
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	32.9%	ICU Level of Service	A	
Analysis Period (min)	15			

9: SR 94 & Melody Rd./Peacefull Valley Ranch Rd.

Timing Plan: PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	568	0	132	0	0	9	141	245	0	5	284	627
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		0.97	1.00		1.00	1.00	1.00
Frt	1.00	0.85			0.86		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1583			1611		3433	1863		1770	1863	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1583			1611		3433	1863		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	617	0	143	0	0	10	153	266	0	5	309	682
RTOR Reduction (vph)	0	105	0	0	10	0	0	0	0	0	0	459
Lane Group Flow (vph)	617	38	0	0	0	0	153	266	0	5	309	223
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	13.9	13.9			0.9		4.1	20.5		0.6	17.0	17.0
Effective Green, g (s)	13.9	13.9			0.9		4.1	20.5		0.6	17.0	17.0
Actuated g/C Ratio	0.27	0.27			0.02		0.08	0.39		0.01	0.33	0.33
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	919	423			27		271	735		20	610	518
v/s Ratio Prot	c0.18	0.02			c0.00		c0.04	c0.14		0.00	c0.17	
v/s Ratio Perm												0.14
v/c Ratio	0.67	0.09			0.01		0.56	0.36		0.25	0.51	0.43
Uniform Delay, d1	17.0	14.3			25.1		23.0	11.1		25.4	14.1	13.7
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.9	0.1			0.1		2.7	0.3		6.5	0.7	0.6
Delay (s)	18.9	14.4			25.2		25.7	11.4		31.9	14.7	14.2
Level of Service	B	B			C		C	B		C	B	B
Approach Delay (s)		18.0			25.2			16.6			14.5	
Approach LOS		B			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.54			
Actuated Cycle Length (s)	51.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	56.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

10: SR 94 & Reservation Rd.

Timing Plan: PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	386	416	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	420	452	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	872	452	452			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	872	452	452			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	321	607	1108			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	420	452
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1108	1700
Volume to Capacity	0.00	0.00	0.27
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	25.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	77	1371	2313	611	565	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.97		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3428		1760	1504
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3428		1760	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	1490	2514	664	614	500
RTOR Reduction (vph)	0	0	17	0	2	47
Lane Group Flow (vph)	84	1490	3161	0	662	403
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	5.0	97.0	88.0		35.0	35.0
Effective Green, g (s)	5.0	97.0	88.0		35.0	35.0
Actuated g/C Ratio	0.04	0.69	0.63		0.25	0.25
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	63	2452	2154		440	376
v/s Ratio Prot	c0.05	0.42	c0.92		c0.38	
v/s Ratio Perm						0.27
v/c Ratio	1.33	0.61	1.47		1.50	1.07
Uniform Delay, d1	67.5	11.4	26.0		52.5	52.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	225.9	0.4	212.9		238.4	66.6
Delay (s)	293.4	11.8	238.9		290.9	119.1
Level of Service	F	B	F		F	F
Approach Delay (s)		26.9	238.9		221.5	
Approach LOS		C	F		F	

Intersection Summary				
HCM 2000 Control Delay	178.7	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.47			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	130.8%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	1431	207	565	2214	14	543	11	587	4	6	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1689	1583	1681	1770	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1689	1583	1681	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	1555	225	614	2407	15	590	12	638	4	7	0
RTOR Reduction (vph)	0	0	133	0	0	6	0	0	151	0	0	0
Lane Group Flow (vph)	14	1555	92	614	2407	9	301	301	487	4	7	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	2.3	45.7	45.7	24.8	68.2	68.2	23.3	23.3	48.1	2.4	2.4	
Effective Green, g (s)	2.3	45.7	45.7	24.8	68.2	68.2	23.3	23.3	48.1	2.4	2.4	
Actuated g/C Ratio	0.02	0.41	0.41	0.22	0.61	0.61	0.21	0.21	0.43	0.02	0.02	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	70	2071	644	758	3090	962	349	350	735	35	37	
v/s Ratio Prot	0.00	0.31		c0.18	c0.47		c0.18	0.18	c0.15	0.00	c0.00	
v/s Ratio Perm			0.06			0.01			0.16			
v/c Ratio	0.20	0.75	0.14	0.81	0.78	0.01	0.86	0.86	0.66	0.11	0.19	
Uniform Delay, d1	54.0	28.4	20.9	41.5	16.4	8.7	42.9	42.9	25.6	53.9	53.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	1.6	0.1	6.5	1.3	0.0	19.2	18.5	2.3	1.5	2.5	
Delay (s)	55.5	30.0	21.0	48.0	17.7	8.7	62.1	61.4	27.8	55.3	56.4	
Level of Service	E	C	C	D	B	A	E	E	C	E	E	
Approach Delay (s)		29.0			23.8			44.3			56.0	
Approach LOS		C			C			D			E	

Intersection Summary				
HCM 2000 Control Delay	29.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	112.2	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	78.1%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	1392	923	439	1937	50	1320	75	673	27	22	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	1513	1003	477	2105	54	1435	82	732	29	24	41
RTOR Reduction (vph)	0	0	126	0	0	31	0	0	98	0	0	39
Lane Group Flow (vph)	82	1513	877	477	2105	23	1435	82	634	29	24	2
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	5.0	45.1	99.2	19.0	59.1	59.1	54.1	54.1	73.1	6.6	6.6	6.6
Effective Green, g (s)	5.0	45.1	99.2	19.0	59.1	59.1	54.1	54.1	73.1	6.6	6.6	6.6
Actuated g/C Ratio	0.04	0.32	0.70	0.13	0.42	0.42	0.38	0.38	0.52	0.05	0.05	0.05
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	62	1628	1115	463	2134	664	1319	715	866	82	87	74
v/s Ratio Prot	0.05	0.30	0.30	c0.14	c0.41		c0.42	0.04	0.10	c0.02	0.01	
v/s Ratio Perm			0.25			0.01			0.30			0.00
v/c Ratio	1.32	0.93	0.79	1.03	0.99	0.03	1.09	0.11	0.73	0.35	0.28	0.03
Uniform Delay, d1	67.9	46.3	13.8	60.9	40.5	24.0	43.4	27.9	26.3	65.0	64.8	64.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	222.7	9.7	3.7	49.8	16.2	0.0	52.3	0.1	3.2	2.6	1.7	0.1
Delay (s)	290.6	56.0	17.5	110.7	56.7	24.1	95.7	28.0	29.5	67.7	66.5	64.2
Level of Service	F	E	B	F	E	C	F	C	C	E	E	E
Approach Delay (s)		48.6			65.8			71.7			65.8	
Approach LOS		D			E			E			E	

Intersection Summary				
HCM 2000 Control Delay	61.6	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.02			
Actuated Cycle Length (s)	140.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	95.9%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	390	750	1125	299	122	440
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	424	815	1223	325	133	478
RTOR Reduction (vph)	0	0	0	112	0	66
Lane Group Flow (vph)	424	815	1223	213	133	412
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	15.0	96.1	77.1	77.1	13.3	28.3
Effective Green, g (s)	15.0	96.1	77.1	77.1	13.3	28.3
Actuated g/C Ratio	0.13	0.82	0.66	0.66	0.11	0.24
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	438	1524	1223	1039	200	435
v/s Ratio Prot	0.12	0.44	c0.66		0.08	c0.12
v/s Ratio Perm				0.13		0.14
v/c Ratio	0.97	0.53	1.00	0.21	0.67	0.95
Uniform Delay, d1	51.0	3.4	20.2	8.0	49.9	43.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	34.4	0.4	25.7	0.1	8.1	29.8
Delay (s)	85.3	3.8	45.9	8.1	58.0	73.6
Level of Service	F	A	D	A	E	E
Approach Delay (s)		31.7	38.0		70.2	
Approach LOS		C	D		E	

Intersection Summary				
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.02			
Actuated Cycle Length (s)	117.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	93.1%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	137	762	0	4	1155	234	5	2	2	177	0	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97			0.95	1.00
Satd. Flow (prot)	1770	1863		1770	1863	1583		1758			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97			0.95	1.00
Satd. Flow (perm)	1770	1863		1770	1863	1583		1758			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	149	828	0	4	1255	254	5	2	2	192	0	329
RTOR Reduction (vph)	0	0	0	0	0	33	0	2	0	0	0	236
Lane Group Flow (vph)	149	828	0	4	1255	221	0	7	0	0	192	93
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	11.0	104.4		0.8	94.2	94.2		6.2			16.0	16.0
Effective Green, g (s)	11.0	104.4		0.8	94.2	94.2		6.2			16.0	16.0
Actuated g/C Ratio	0.08	0.73		0.01	0.66	0.66		0.04			0.11	0.11
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	135	1356		9	1223	1039		76			197	176
v/s Ratio Prot	c0.08	0.44		0.00	c0.67			c0.00			c0.11	
v/s Ratio Perm						0.14						0.06
v/c Ratio	1.10	0.61		0.44	1.03	0.21		0.09			0.97	0.53
Uniform Delay, d1	66.2	9.5		71.1	24.6	9.8		65.9			63.5	60.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	108.0	0.8		31.3	32.6	0.1		0.5			56.3	2.8
Delay (s)	174.2	10.4		102.4	57.2	9.9		66.4			119.8	63.0
Level of Service	F	B		F	E	A		E			F	E
Approach Delay (s)		35.4			49.4			66.4			83.9	
Approach LOS		D			D			E			F	

Intersection Summary				
HCM 2000 Control Delay	50.9	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.98			
Actuated Cycle Length (s)	143.4	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	94.1%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	185	724	7	13	1020	21	12	2	12	32	7	399
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	201	787	8	14	1109	23	13	2	13	35	8	434
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1132			795			2767	2353	791	2352	2345	1120
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1132			795			2767	2353	791	2352	2345	1120
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	67			98			0	91	97	0	68	0
cM capacity (veh/h)	617			827			0	24	390	17	24	251

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	201	795	14	1132	28	42	434
Volume Left	201	0	14	0	13	35	0
Volume Right	0	8	0	23	13	0	434
cSH	617	1700	827	1700	0	18	251
Volume to Capacity	0.33	0.47	0.02	0.67	Err	2.41	1.73
Queue Length 95th (ft)	35	0	1	0	Err	146	713
Control Delay (s)	13.6	0.0	9.4	0.0	Err	1092.9	377.4
Lane LOS	B		A		F	F	F
Approach Delay (s)	2.8		0.1		Err	441.1	
Approach LOS					F	F	

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	93.0%	ICU Level of Service	F	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	544	226	48	664	80	782	365	87	97	365	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.99			0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1788			1779	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.43			0.73	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		794			1303	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	591	246	52	722	87	850	397	95	105	397	196
RTOR Reduction (vph)	0	0	29	0	0	32	0	2	0	0	10	0
Lane Group Flow (vph)	130	591	217	52	722	55	0	1340	0	0	688	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	7.0	38.2	38.2	5.6	36.8	36.8		95.0			95.0	
Effective Green, g (s)	7.0	38.2	38.2	5.6	36.8	36.8		95.0			95.0	
Actuated g/C Ratio	0.05	0.25	0.25	0.04	0.24	0.24		0.63			0.63	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	82	471	400	65	454	386		500			820	
v/s Ratio Prot	c0.07	0.32		0.03	c0.39							
v/s Ratio Perm			0.14			0.03		c1.69			0.53	
v/c Ratio	1.59	1.25	0.54	0.80	1.59	0.14		2.68			0.84	
Uniform Delay, d1	71.9	56.3	48.7	72.0	57.0	44.6		27.9			21.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	313.4	131.1	1.5	48.8	275.9	0.2		761.8			7.6	
Delay (s)	385.3	187.4	50.2	120.9	332.9	44.8		789.7			29.5	
Level of Service	F	F	D	F	F	D		F			C	
Approach Delay (s)		179.1			291.0			789.7			29.5	
Approach LOS		F			F			F			C	

Intersection Summary				
HCM 2000 Control Delay	388.9	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	2.33			
Actuated Cycle Length (s)	150.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	158.3%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	8	6	6	846	565	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	7	7	920	614	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1556	623	633			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1556	623	633			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	99	99			
cM capacity (veh/h)	123	486	950			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	15	7	920	633
Volume Left	9	7	0	0
Volume Right	7	0	0	18
cSH	181	950	1700	1700
Volume to Capacity	0.08	0.01	0.54	0.37
Queue Length 95th (ft)	7	1	0	0
Control Delay (s)	26.7	8.8	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	26.7	0.1		0.0
Approach LOS	D			

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	54.5%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	36	0	78	6	0	47	40	579	26	55	439	34
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	0	85	7	0	51	43	629	28	60	477	37
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1397	1360	496	1430	1364	643	514			658		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1397	1360	496	1430	1364	643	514			658		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	60	100	85	93	100	89	96			94		
cM capacity (veh/h)	97	133	574	88	132	473	1051			930		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	124	58	701	574
Volume Left	39	7	43	60
Volume Right	85	51	28	37
cSH	225	317	1051	930
Volume to Capacity	0.55	0.18	0.04	0.06
Queue Length 95th (ft)	74	16	3	5
Control Delay (s)	38.9	18.9	1.1	1.7
Lane LOS	E	C	A	A
Approach Delay (s)	38.9	18.9	1.1	1.7
Approach LOS	E	C		

Intersection Summary				
Average Delay	5.2			
Intersection Capacity Utilization	62.6%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	141	38	88	443	316	332
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	153	41	96	482	343	361
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1197	524	704			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1197	524	704			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	16	93	89			
cM capacity (veh/h)	183	553	893			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	195	577	704
Volume Left	153	96	0
Volume Right	41	0	361
cSH	214	893	1700
Volume to Capacity	0.91	0.11	0.41
Queue Length 95th (ft)	186	9	0
Control Delay (s)	87.1	2.8	0.0
Lane LOS	F	A	
Approach Delay (s)	87.1	2.8	0.0
Approach LOS	F		

Intersection Summary				
Average Delay	12.6			
Intersection Capacity Utilization	85.3%	ICU Level of Service	E	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	196	74	731	72	19	211
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	213	80	795	78	21	229
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			966			
pX, platoon unblocked	0.65	0.65			0.65	
vC, conflicting volume	1104	834			873	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	888	470			530	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	79			97	
cM capacity (veh/h)	197	384			671	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	293	873	21	229
Volume Left	213	0	21	0
Volume Right	80	78	0	0
cSH	227	1700	671	1700
Volume to Capacity	1.29	0.51	0.03	0.13
Queue Length 95th (ft)	386	0	2	0
Control Delay (s)	202.7	0.0	10.5	0.0
Lane LOS	F		B	
Approach Delay (s)	202.7	0.0	0.9	
Approach LOS	F			

Intersection Summary				
Average Delay			42.2	
Intersection Capacity Utilization			64.9%	ICU Level of Service C
Analysis Period (min)			15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	131	65	167	20	176	70	239	730	7	19	354	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1783		1770	1860		1770	1863	1583
Flt Permitted	0.44	1.00	1.00	0.71	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	817	1863	1583	1324	1783		1770	1860		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	142	71	182	22	191	76	260	793	8	21	385	210
RTOR Reduction (vph)	0	0	140	0	25	0	0	0	0	0	0	137
Lane Group Flow (vph)	142	71	42	22	242	0	260	801	0	21	385	73
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	12.7	12.7	12.7	12.7	12.7		11.1	29.4		0.7	19.0	19.0
Effective Green, g (s)	12.7	12.7	12.7	12.7	12.7		11.1	29.4		0.7	19.0	19.0
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.23		0.20	0.54		0.01	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	189	431	366	306	413		358	997		22	645	548
v/s Ratio Prot		0.04			0.14		c0.15	c0.43		0.01	0.21	
v/s Ratio Perm	c0.17		0.03	0.02								0.05
v/c Ratio	0.75	0.16	0.12	0.07	0.59		0.73	0.80		0.95	0.60	0.13
Uniform Delay, d1	19.6	16.8	16.6	16.4	18.7		20.4	10.3		27.0	14.7	12.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.4	0.2	0.1	0.1	2.1		7.2	4.7		169.9	1.5	0.1
Delay (s)	35.0	17.0	16.8	16.5	20.8		27.6	15.1		196.9	16.2	12.4
Level of Service	D	B	B	B	C		C	B		F	B	B
Approach Delay (s)		23.4			20.5			18.2			21.1	
Approach LOS		C			C			B			C	

Intersection Summary					
HCM 2000 Control Delay		20.1	HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.81			
Actuated Cycle Length (s)		54.8	Sum of lost time (s)		12.0
Intersection Capacity Utilization		76.3%	ICU Level of Service		D
Analysis Period (min)		15			
c Critical Lane Group					



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	334	2251	1766	804	911	304
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3373		1768	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3373		1768	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	363	2447	1920	874	990	330
RTOR Reduction (vph)	0	0	37	0	1	85
Lane Group Flow (vph)	363	2447	2757	0	1022	212
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	17.0	84.0	63.0		48.0	48.0
Effective Green, g (s)	17.0	84.0	63.0		48.0	48.0
Actuated g/C Ratio	0.12	0.60	0.45		0.34	0.34
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	214	2123	1517		606	515
v/s Ratio Prot	c0.21	0.69	c0.82		c0.58	
v/s Ratio Perm						0.14
v/c Ratio	1.70	1.15	1.82		1.69	0.41
Uniform Delay, d1	61.5	28.0	38.5		46.0	35.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	332.6	74.6	370.3		316.3	0.5
Delay (s)	394.1	102.6	408.8		362.3	35.7
Level of Service	F	F	F		F	D
Approach Delay (s)		140.2	408.8		288.8	
Approach LOS		F	F		F	

Intersection Summary				
HCM 2000 Control Delay	276.9	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.75			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	159.7%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	2690	418	660	2085	6	385	6	872	9	5	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.98	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1688	1583	1681	1737	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.98	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1688	1583	1681	1737	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	2924	454	717	2266	7	418	7	948	10	5	3
RTOR Reduction (vph)	0	0	217	0	0	2	0	0	119	0	0	0
Lane Group Flow (vph)	11	2924	237	717	2266	5	213	212	829	7	8	3
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	2.5	66.6	66.6	38.1	102.2	102.2	16.0	16.0	54.1	2.7	2.7	2.7
Effective Green, g (s)	2.5	66.6	66.6	38.1	102.2	102.2	16.0	16.0	54.1	2.7	2.7	2.7
Actuated g/C Ratio	0.02	0.48	0.48	0.27	0.73	0.73	0.11	0.11	0.39	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	61	2429	756	938	3728	1160	192	193	659	32	33	30
v/s Ratio Prot	0.00	c0.57		0.21	0.45		0.13	0.13	c0.34	0.00	c0.00	
v/s Ratio Perm			0.15			0.00			0.18			0.00
v/c Ratio	0.18	1.20	0.31	0.76	0.61	0.00	1.11	1.10	1.26	0.22	0.24	0.10
Uniform Delay, d1	67.4	36.4	22.4	46.5	9.0	5.0	61.7	61.7	42.7	67.3	67.3	67.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	95.9	0.2	3.8	0.3	0.0	97.3	93.6	128.3	3.4	3.8	1.5
Delay (s)	68.9	132.3	22.6	50.3	9.2	5.0	159.0	155.3	171.0	70.7	71.1	68.6
Level of Service	E	F	C	D	A	A	F	F	F	E	E	E
Approach Delay (s)		117.4			19.1			166.7			70.6	
Approach LOS		F			B			F			E	

Intersection Summary				
HCM 2000 Control Delay	88.2	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.25			
Actuated Cycle Length (s)	139.4	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	119.3%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	119	2698	1192	642	1854	123	1074	57	636	121	62	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	129	2933	1296	698	2015	134	1167	62	691	132	67	90
RTOR Reduction (vph)	0	0	81	0	0	32	0	0	27	0	0	81
Lane Group Flow (vph)	129	2933	1215	698	2015	102	1167	62	664	132	67	9
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	15.2	69.1	96.1	22.0	75.9	75.9	27.0	27.0	49.0	14.5	14.5	14.5
Effective Green, g (s)	15.2	69.1	96.1	22.0	75.9	75.9	27.0	27.0	49.0	14.5	14.5	14.5
Actuated g/C Ratio	0.10	0.47	0.65	0.15	0.51	0.51	0.18	0.18	0.33	0.10	0.10	0.10
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	181	2364	1023	508	2597	808	623	338	564	172	181	154
v/s Ratio Prot	0.07	c0.58	0.22	c0.20	0.40		c0.34	0.03	0.17	c0.07	0.04	
v/s Ratio Perm			0.55			0.06			0.25			0.01
v/c Ratio	0.71	1.24	1.19	1.37	0.78	0.13	1.87	0.18	1.18	0.77	0.37	0.06
Uniform Delay, d1	64.6	39.8	26.2	63.3	29.5	19.0	60.8	51.5	49.8	65.4	62.8	60.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.5	112.1	94.5	180.4	1.5	0.1	399.0	0.3	96.8	18.3	1.3	0.2
Delay (s)	77.1	151.9	120.7	243.7	31.0	19.1	459.8	51.7	146.6	83.7	64.1	61.0
Level of Service	E	F	F	F	C	B	F	D	F	F	E	E
Approach Delay (s)		140.4			82.6			333.9			72.1	
Approach LOS		F			F			F			E	

Intersection Summary				
HCM 2000 Control Delay	160.3	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.34			
Actuated Cycle Length (s)	148.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	117.8%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	115	1429	940	48	70	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	1553	1022	52	76	165
RTOR Reduction (vph)	0	0	0	13	0	139
Lane Group Flow (vph)	125	1553	1022	39	76	26
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	8.6	106.1	93.5	93.5	10.7	19.3
Effective Green, g (s)	8.6	106.1	93.5	93.5	10.7	19.3
Actuated g/C Ratio	0.07	0.85	0.75	0.75	0.09	0.15
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	236	1583	1395	1185	151	295
v/s Ratio Prot	0.04	c0.83	0.55		c0.04	0.01
v/s Ratio Perm				0.02		0.01
v/c Ratio	0.53	0.98	0.73	0.03	0.50	0.09
Uniform Delay, d1	56.1	8.4	8.7	4.0	54.5	45.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1	18.2	2.0	0.0	2.6	0.1
Delay (s)	58.3	26.6	10.7	4.0	57.1	45.3
Level of Service	E	C	B	A	E	D
Approach Delay (s)		29.0	10.4		49.0	
Approach LOS		C	B		D	

Intersection Summary				
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.97			
Actuated Cycle Length (s)	124.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	85.8%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	130	1303	1	9	816	200	2	5	28	360	7	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	1863		1770	1863	1583		1654			1776	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (perm)	1770	1863		1770	1863	1583		1654			1776	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	1416	1	10	887	217	2	5	30	391	8	134
RTOR Reduction (vph)	0	0	0	0	0	42	0	29	0	0	0	77
Lane Group Flow (vph)	141	1417	0	10	887	175	0	8	0	0	399	57
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	12.0	88.7		0.8	77.5	77.5		6.7			27.0	27.0
Effective Green, g (s)	12.0	88.7		0.8	77.5	77.5		6.7			27.0	27.0
Actuated g/C Ratio	0.09	0.64		0.01	0.56	0.56		0.05			0.19	0.19
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	152	1187		10	1037	881		79			344	307
v/s Ratio Prot	c0.08	c0.76		0.01	0.48			c0.01			c0.22	
v/s Ratio Perm						0.11						0.04
v/c Ratio	0.93	1.19		1.00	0.86	0.20		0.11			1.16	0.19
Uniform Delay, d1	63.2	25.2		69.2	26.1	15.4		63.4			56.1	46.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	51.4	95.7		284.6	7.0	0.1		0.6			99.4	0.3
Delay (s)	114.5	121.0		353.8	33.1	15.5		64.0			155.5	47.2
Level of Service	F	F		F	C	B		E			F	D
Approach Delay (s)		120.4			32.6			64.0			128.3	
Approach LOS		F			C			E			F	

Intersection Summary				
HCM 2000 Control Delay	90.9	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.14			
Actuated Cycle Length (s)	139.2	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	109.0%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	348	1400	15	13	865	38	6	3	10	32	4	198
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	378	1522	16	14	940	41	7	3	11	35	4	215
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	982			1538			3472	3296	1530	3280	3284	961
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	982			1538			3472	3296	1530	3280	3284	961
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	46			97			0	16	92	0	0	31
cM capacity (veh/h)	703			432			0	4	144	1	4	311

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	378	1538	14	982	21	39	215
Volume Left	378	0	14	0	7	35	0
Volume Right	0	16	0	41	11	0	215
cSH	703	1700	432	1700	0	1	311
Volume to Capacity	0.54	0.90	0.03	0.58	Err	41.02	0.69
Queue Length 95th (ft)	81	0	3	0	Err	Err	120
Control Delay (s)	15.9	0.0	13.6	0.0	Err	Err	39.0
Lane LOS	C		B		F	F	E
Approach Delay (s)	3.1		0.2		Err	1571.3	
Approach LOS					F	F	

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	94.4%	ICU Level of Service	F	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	884	890	122	661	72	387	331	411	95	351	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.95			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1741			1832	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.64			0.67	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1137			1233	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	961	967	133	718	78	421	360	447	103	382	24
RTOR Reduction (vph)	0	0	77	0	0	30	0	15	0	0	1	0
Lane Group Flow (vph)	30	961	890	133	718	48	0	1213	0	0	508	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	3.2	45.8	45.8	6.0	48.6	48.6		77.0			77.0	
Effective Green, g (s)	3.2	45.8	45.8	6.0	48.6	48.6		77.0			77.0	
Actuated g/C Ratio	0.02	0.33	0.33	0.04	0.35	0.35		0.55			0.55	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	40	606	514	75	643	546		621			674	
v/s Ratio Prot	0.02	0.52		c0.08	c0.39							
v/s Ratio Perm			c0.56			0.03		c1.07			0.41	
v/c Ratio	0.75	1.59	1.73	1.77	1.12	0.09		1.95			0.75	
Uniform Delay, d1	68.4	47.5	47.5	67.4	46.1	31.1		31.9			24.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	55.2	271.4	337.3	396.3	72.0	0.1		434.9			4.8	
Delay (s)	123.6	318.9	384.8	463.7	118.1	31.2		466.8			29.3	
Level of Service	F	F	F	F	F	C		F			C	
Approach Delay (s)		348.5			160.3			466.8			29.3	
Approach LOS		F			F			F			C	

Intersection Summary				
HCM 2000 Control Delay	307.0	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.85			
Actuated Cycle Length (s)	140.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	155.6%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	41	28	6	820	1206	40
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	30	7	891	1311	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2237	1333	1354			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2237	1333	1354			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	3	84	99			
cM capacity (veh/h)	46	188	508			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	75	7	891	1354
Volume Left	45	7	0	0
Volume Right	30	0	0	43
cSH	66	508	1700	1700
Volume to Capacity	1.13	0.01	0.52	0.80
Queue Length 95th (ft)	147	1	0	0
Control Delay (s)	256.7	12.2	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	256.7	0.1		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	8.3		
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	0	91	16	0	22	114	721	8	13	965	26
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	0	99	17	0	24	124	784	9	14	1049	28
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2151	2132	1063	2226	2141	788	1077			792		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2151	2132	1063	2226	2141	788	1077			792		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	64	0	100	94	81			98		
cM capacity (veh/h)	28	39	271	16	39	391	647			828		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	127	41	916	1091
Volume Left	28	17	124	14
Volume Right	99	24	9	28
cSH	91	37	647	828
Volume to Capacity	1.39	1.12	0.19	0.02
Queue Length 95th (ft)	237	105	18	1
Control Delay (s)	312.7	352.2	5.3	0.6
Lane LOS	F	F	A	A
Approach Delay (s)	312.7	352.2	5.3	0.6
Approach LOS	F	F		

Intersection Summary				
Average Delay	27.5			
Intersection Capacity Utilization	115.5%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	597	159	135	195	680	510
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	649	173	147	212	739	554
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1522	1016	1293			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1522	1016	1293			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	40	73			
cM capacity (veh/h)	95	289	536			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	822	359	1293
Volume Left	649	147	0
Volume Right	173	0	554
cSH	110	536	1700
Volume to Capacity	7.46	0.27	0.76
Queue Length 95th (ft)	Err	28	0
Control Delay (s)	Err	8.5	0.0
Lane LOS	F	A	
Approach Delay (s)	Err	8.5	0.0
Approach LOS	F		

Intersection Summary				
Average Delay	3322.5			
Intersection Capacity Utilization	137.4%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	116	34	451	187	74	880
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	126	37	490	203	80	957
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			966			
pX, platoon unblocked	0.84	0.84			0.84	
vC, conflicting volume	1709	592			693	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1748	425			545	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	93			91	
cM capacity (veh/h)	72	532			865	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	163	693	80	957
Volume Left	126	0	80	0
Volume Right	37	203	0	0
cSH	90	1700	865	1700
Volume to Capacity	1.81	0.41	0.09	0.56
Queue Length 95th (ft)	340	0	8	0
Control Delay (s)	483.5	0.0	9.6	0.0
Lane LOS	F		A	
Approach Delay (s)	483.5	0.0	0.7	
Approach LOS	F			

Intersection Summary				
Average Delay			42.0	
Intersection Capacity Utilization			61.5%	ICU Level of Service B
Analysis Period (min)			15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	206	168	303	12	104	28	142	262	19	74	934	257
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1804		1770	1844		1770	1863	1583
Flt Permitted	0.57	1.00	1.00	0.48	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1069	1863	1583	887	1804		1770	1844		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	224	183	329	13	113	30	154	285	21	80	1015	279
RTOR Reduction (vph)	0	0	208	0	11	0	0	3	0	0	0	117
Lane Group Flow (vph)	224	183	121	13	132	0	154	303	0	80	1015	162
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	16.1	16.1	16.1	16.1	16.1		9.0	53.3		6.8	51.1	51.1
Effective Green, g (s)	16.1	16.1	16.1	16.1	16.1		9.0	53.3		6.8	51.1	51.1
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.10	0.60		0.08	0.58	0.58
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	195	340	288	161	329		180	1114		136	1079	917
v/s Ratio Prot		0.10			0.07		c0.09	0.16		0.05	c0.54	
v/s Ratio Perm	c0.21		0.08	0.01								0.10
v/c Ratio	1.15	0.54	0.42	0.08	0.40		0.86	0.27		0.59	0.94	0.18
Uniform Delay, d1	36.0	32.7	31.9	29.9	31.8		39.0	8.3		39.3	17.1	8.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	110.2	1.6	1.0	0.2	0.8		30.6	0.1		6.4	15.2	0.1
Delay (s)	146.3	34.3	32.9	30.1	32.6		69.6	8.4		45.7	32.4	8.8
Level of Service	F	C	C	C	C		E	A		D	C	A
Approach Delay (s)		67.8			32.4			28.9			28.4	
Approach LOS		E			C			C			C	

Intersection Summary					
HCM 2000 Control Delay		39.3	HCM 2000 Level of Service		D
HCM 2000 Volume to Capacity ratio		0.97			
Actuated Cycle Length (s)		88.2	Sum of lost time (s)		12.0
Intersection Capacity Utilization		88.9%	ICU Level of Service		E
Analysis Period (min)		15			
c Critical Lane Group					



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	414	2776	1836	732	902	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3388		1770	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3388		1770	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	450	3017	1996	796	980	218
RTOR Reduction (vph)	0	0	28	0	1	53
Lane Group Flow (vph)	450	3017	2764	0	1001	143
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	21.0	93.0	68.0		49.0	49.0
Effective Green, g (s)	21.0	93.0	68.0		49.0	49.0
Actuated g/C Ratio	0.14	0.62	0.45		0.33	0.33
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	247	2194	1535		578	491
v/s Ratio Prot	c0.25	0.85	c0.82		c0.57	
v/s Ratio Perm						0.10
v/c Ratio	1.82	1.38	1.80		1.73	0.29
Uniform Delay, d1	64.5	28.5	41.0		50.5	37.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	385.3	171.8	362.8		336.8	0.3
Delay (s)	449.8	200.3	403.8		387.3	37.9
Level of Service	F	F	F		F	D
Approach Delay (s)		232.7	403.8		330.1	
Approach LOS		F	F		F	

Intersection Summary				
HCM 2000 Control Delay	312.4	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.78			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	161.1%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	2854	416	570	1847	8	372	10	776	6	6	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.99	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1690	1583	1681	1759	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.99	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1690	1583	1681	1759	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	3102	452	620	2008	9	404	11	843	7	7	8
RTOR Reduction (vph)	0	0	201	0	0	2	0	0	124	0	0	0
Lane Group Flow (vph)	8	3102	251	620	2008	7	206	209	719	6	8	8
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.3	73.4	73.4	32.0	104.1	104.1	16.0	16.0	48.0	4.0	4.0	4.0
Effective Green, g (s)	1.3	73.4	73.4	32.0	104.1	104.1	16.0	16.0	48.0	4.0	4.0	4.0
Actuated g/C Ratio	0.01	0.52	0.52	0.23	0.74	0.74	0.11	0.11	0.34	0.03	0.03	0.03
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	31	2639	821	776	3743	1165	190	191	582	47	49	44
v/s Ratio Prot	0.00	c0.61		0.18	0.39		0.12	0.12	c0.28	0.00	0.00	
v/s Ratio Perm			0.16			0.00			0.17			c0.01
v/c Ratio	0.26	1.18	0.31	0.80	0.54	0.01	1.08	1.09	1.24	0.13	0.16	0.18
Uniform Delay, d1	69.6	34.0	19.4	51.7	8.1	4.9	62.7	62.7	46.7	67.0	67.1	67.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.4	83.3	0.2	5.8	0.1	0.0	89.5	92.5	120.6	1.2	1.6	2.0
Delay (s)	74.0	117.3	19.6	57.4	8.3	4.9	152.2	155.2	167.3	68.2	68.6	69.1
Level of Service	E	F	B	E	A	A	F	F	F	E	E	E
Approach Delay (s)		104.8			19.8			162.8			68.7	
Approach LOS		F			B			F			E	

Intersection Summary				
HCM 2000 Control Delay	84.5	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.21			
Actuated Cycle Length (s)	141.4	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	116.5%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	2949	1466	619	1719	107	1094	45	608	111	29	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	3205	1593	673	1868	116	1189	49	661	121	32	67
RTOR Reduction (vph)	0	0	127	0	0	33	0	0	31	0	0	61
Lane Group Flow (vph)	101	3205	1466	673	1868	83	1189	49	630	121	32	6
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	12.7	67.0	99.0	19.0	73.3	73.3	32.0	32.0	51.0	14.0	14.0	14.0
Effective Green, g (s)	12.7	67.0	99.0	19.0	73.3	73.3	32.0	32.0	51.0	14.0	14.0	14.0
Actuated g/C Ratio	0.09	0.45	0.67	0.13	0.50	0.50	0.22	0.22	0.34	0.09	0.09	0.09
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	151	2301	1058	440	2518	784	742	402	588	167	176	149
v/s Ratio Prot	0.06	c0.63	0.30	c0.20	0.37		c0.35	0.03	0.14	c0.07	0.02	
v/s Ratio Perm			0.63			0.05			0.26			0.00
v/c Ratio	0.67	1.39	1.39	1.53	0.74	0.11	1.60	0.12	1.07	0.72	0.18	0.04
Uniform Delay, d1	65.6	40.5	24.5	64.5	29.8	19.9	58.0	46.7	48.5	65.1	61.7	60.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.7	179.5	179.4	249.6	1.2	0.1	277.4	0.1	57.5	14.4	0.5	0.1
Delay (s)	76.3	220.0	203.9	314.1	31.0	20.0	335.4	46.8	106.0	79.6	62.2	61.0
Level of Service	E	F	F	F	C	B	F	D	F	E	E	E
Approach Delay (s)		211.8			102.2			248.1			71.4	
Approach LOS		F			F			F			E	

Intersection Summary				
HCM 2000 Control Delay	185.6	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.39			
Actuated Cycle Length (s)	148.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	122.5%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	163	1574	1024	50	101	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	1711	1113	54	110	204
RTOR Reduction (vph)	0	0	0	13	0	129
Lane Group Flow (vph)	177	1711	1113	41	110	75
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	9.9	126.0	112.1	112.1	13.5	23.4
Effective Green, g (s)	9.9	126.0	112.1	112.1	13.5	23.4
Actuated g/C Ratio	0.07	0.85	0.76	0.76	0.09	0.16
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	230	1591	1415	1203	162	294
v/s Ratio Prot	0.05	c0.92	0.60		c0.06	0.02
v/s Ratio Perm				0.03		0.03
v/c Ratio	0.77	1.08	0.79	0.03	0.68	0.26
Uniform Delay, d1	67.7	10.8	10.6	4.4	64.9	54.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	14.3	45.9	3.0	0.0	10.8	0.5
Delay (s)	82.0	56.6	13.5	4.4	75.7	54.9
Level of Service	F	E	B	A	E	D
Approach Delay (s)		59.0	13.1		62.2	
Approach LOS		E	B		E	

Intersection Summary				
HCM 2000 Control Delay	43.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.07			
Actuated Cycle Length (s)	147.5	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	95.1%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	129	1532	1	8	973	154	2	3	31	327	0	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.88			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	1863		1770	1863	1583		1639			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (perm)	1770	1863		1770	1863	1583		1639			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	1665	1	9	1058	167	2	3	34	355	0	124
RTOR Reduction (vph)	0	0	0	0	0	40	0	32	0	0	0	80
Lane Group Flow (vph)	140	1666	0	9	1058	127	0	7	0	0	355	44
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	14.2	96.6		0.8	83.2	83.2		6.7			23.0	23.0
Effective Green, g (s)	14.2	96.6		0.8	83.2	83.2		6.7			23.0	23.0
Actuated g/C Ratio	0.10	0.68		0.01	0.58	0.58		0.05			0.16	0.16
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	175	1257		9	1083	920		76			284	254
v/s Ratio Prot	c0.08	c0.89		0.01	0.57			c0.00			c0.20	
v/s Ratio Perm						0.08						0.03
v/c Ratio	0.80	1.33		1.00	0.98	0.14		0.09			1.25	0.17
Uniform Delay, d1	63.1	23.2		71.1	29.0	13.6		65.3			60.0	51.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	22.4	152.0		300.0	21.7	0.1		0.5			138.3	0.3
Delay (s)	85.5	175.3		371.1	50.7	13.7		65.8			198.3	52.2
Level of Service	F	F		F	D	B		E			F	D
Approach Delay (s)		168.3			48.0			65.8			160.5	
Approach LOS		F			D			E			F	

Intersection Summary				
HCM 2000 Control Delay	124.4	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.25			
Actuated Cycle Length (s)	143.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	118.8%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	386	1373	9	7	910	46	6	3	17	30	6	195
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	420	1492	10	8	989	50	7	3	18	33	7	212
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1039			1502			3556	3391	1497	3381	3371	1014
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1039			1502			3556	3391	1497	3381	3371	1014
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	37			98			0	0	88	0	0	27
cM capacity (veh/h)	669			446			0	3	151	0	3	290

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	420	1502	8	1039	28	39	212
Volume Left	420	0	8	0	7	33	0
Volume Right	0	10	0	50	18	0	212
cSH	669	1700	446	1700	0	0	290
Volume to Capacity	0.63	0.88	0.02	0.61	Err	Err	0.73
Queue Length 95th (ft)	110	0	1	0	Err	Err	132
Control Delay (s)	19.0	0.0	13.2	0.0	Err	Err	45.1
Lane LOS	C		B		F	F	E
Approach Delay (s)	4.1		0.1		Err	Err	
Approach LOS					F	F	

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	93.1%	ICU Level of Service	F	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	290	899	825	129	596	82	327	335	324	78	337	249
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.96			0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1751			1758	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.54			0.79	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		968			1391	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	315	977	897	140	648	89	355	364	352	85	366	271
RTOR Reduction (vph)	0	0	66	0	0	48	0	12	0	0	15	0
Lane Group Flow (vph)	315	977	831	140	648	41	0	1059	0	0	707	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	15.0	47.0	47.0	7.0	39.0	39.0		84.0			84.0	
Effective Green, g (s)	15.0	47.0	47.0	7.0	39.0	39.0		84.0			84.0	
Actuated g/C Ratio	0.10	0.31	0.31	0.05	0.26	0.26		0.56			0.56	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	177	583	496	82	484	411		542			778	
v/s Ratio Prot	c0.18	0.52		0.08	0.35							
v/s Ratio Perm			c0.52			0.03		c1.09			0.51	
v/c Ratio	1.78	1.68	1.68	1.71	1.34	0.10		1.95			0.91	
Uniform Delay, d1	67.5	51.5	51.5	71.5	55.5	42.2		33.0			29.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	372.7	311.6	312.8	364.6	166.0	0.1		436.0			14.4	
Delay (s)	440.2	363.1	364.3	436.1	221.5	42.3		469.0			44.0	
Level of Service	F	F	F	F	F	D		F			D	
Approach Delay (s)		374.7			237.5			469.0			44.0	
Approach LOS		F			F			F			D	

Intersection Summary				
HCM 2000 Control Delay	321.6	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.89			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	160.6%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	65	33	15	622	1070	78
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	71	36	16	676	1163	85
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1914	1205	1248			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1914	1205	1248			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	2	84	97			
cM capacity (veh/h)	72	224	558			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	107	16	676	1248
Volume Left	71	16	0	0
Volume Right	36	0	0	85
cSH	94	558	1700	1700
Volume to Capacity	1.14	0.03	0.40	0.73
Queue Length 95th (ft)	179	2	0	0
Control Delay (s)	217.9	11.6	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	217.9	0.3		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	11.4		
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	13	81	7	0	50	74	527	8	59	818	35
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	14	88	8	0	54	80	573	9	64	889	38
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1829	1779	908	1870	1793	577	927			582		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1829	1779	908	1870	1793	577	927			582		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	17	79	74	75	100	89	89			94		
cM capacity (veh/h)	46	69	334	30	67	516	737			993		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	140	62	662	991
Volume Left	38	8	80	64
Volume Right	88	54	9	38
cSH	108	172	737	993
Volume to Capacity	1.30	0.36	0.11	0.06
Queue Length 95th (ft)	238	38	9	5
Control Delay (s)	259.5	37.1	2.8	1.8
Lane LOS	F	E	A	A
Approach Delay (s)	259.5	37.1	2.8	1.8
Approach LOS	F	E		

Intersection Summary				
Average Delay	22.8			
Intersection Capacity Utilization	77.2%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	373	99	112	234	575	421
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	405	108	122	254	625	458
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1352	854	1083			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1352	854	1083			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	70	81			
cM capacity (veh/h)	134	359	644			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	513	376	1083
Volume Left	405	122	0
Volume Right	108	0	458
cSH	155	644	1700
Volume to Capacity	3.32	0.19	0.64
Queue Length 95th (ft)	Err	17	0
Control Delay (s)	Err	5.6	0.0
Lane LOS	F	A	
Approach Delay (s)	Err	5.6	0.0
Approach LOS	F		

Intersection Summary				
Average Delay	2602.8			
Intersection Capacity Utilization	111.2%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	118	42	314	194	82	775
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	128	46	341	211	89	842
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			966			
pX, platoon unblocked	0.85	0.85			0.85	
vC, conflicting volume	1467	447			552	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1462	260			385	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	93			91	
cM capacity (veh/h)	110	661			998	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	174	552	89	842
Volume Left	128	0	89	0
Volume Right	46	211	0	0
cSH	141	1700	998	1700
Volume to Capacity	1.24	0.32	0.09	0.50
Queue Length 95th (ft)	261	0	7	0
Control Delay (s)	214.9	0.0	9.0	0.0
Lane LOS	F		A	
Approach Delay (s)	214.9	0.0	0.9	
Approach LOS	F			

Intersection Summary				
Average Delay		23.0		
Intersection Capacity Utilization		56.6%	ICU Level of Service	B
Analysis Period (min)		15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	219	175	254	12	106	37	171	287	19	82	764	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1791		1770	1845		1770	1863	1583
Flt Permitted	0.62	1.00	1.00	0.54	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1146	1863	1583	1014	1791		1770	1845		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	238	190	276	13	115	40	186	312	21	89	830	182
RTOR Reduction (vph)	0	0	213	0	18	0	0	3	0	0	0	94
Lane Group Flow (vph)	238	190	63	13	137	0	186	330	0	89	830	88
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	15.7	15.7	15.7	15.7	15.7		8.0	34.7		6.7	33.4	33.4
Effective Green, g (s)	15.7	15.7	15.7	15.7	15.7		8.0	34.7		6.7	33.4	33.4
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.23		0.12	0.50		0.10	0.48	0.48
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	260	423	359	230	406		204	926		171	900	765
v/s Ratio Prot		0.10			0.08		c0.11	0.18		0.05	c0.45	
v/s Ratio Perm	c0.21		0.04	0.01								0.06
v/c Ratio	0.92	0.45	0.17	0.06	0.34		0.91	0.36		0.52	0.92	0.11
Uniform Delay, d1	26.1	23.0	21.5	20.9	22.3		30.2	10.4		29.7	16.6	9.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	33.9	0.8	0.2	0.1	0.5		39.2	0.2		2.8	14.6	0.1
Delay (s)	60.0	23.7	21.7	21.0	22.8		69.5	10.7		32.5	31.2	9.8
Level of Service	E	C	C	C	C		E	B		C	C	A
Approach Delay (s)		35.2			22.7			31.7			27.8	
Approach LOS		D			C			C			C	

Intersection Summary						
HCM 2000 Control Delay		30.4	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio		0.92				
Actuated Cycle Length (s)		69.1	Sum of lost time (s)		12.0	
Intersection Capacity Utilization		83.0%	ICU Level of Service		E	
Analysis Period (min)		15				
c Critical Lane Group						



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	186	1897	1553	674	730	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3378		1768	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3378		1768	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	202	2062	1688	733	793	262
RTOR Reduction (vph)	0	0	33	0	1	79
Lane Group Flow (vph)	202	2062	2388	0	818	157
Turn Type	Prot	NA	NA		NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	12.0	94.0	78.0		48.0	48.0
Effective Green, g (s)	12.0	94.0	78.0		48.0	48.0
Actuated g/C Ratio	0.08	0.63	0.52		0.32	0.32
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	141	2217	1756		565	481
v/s Ratio Prot	c0.11	0.58	c0.71		c0.46	
v/s Ratio Perm						0.10
v/c Ratio	1.43	0.93	1.36		1.45	0.33
Uniform Delay, d1	69.0	25.1	36.0		51.0	38.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	230.4	7.7	165.8		211.6	0.4
Delay (s)	299.4	32.8	201.8		262.6	39.1
Level of Service	F	C	F		F	D
Approach Delay (s)		56.6	201.8		212.6	
Approach LOS		E	F		F	

Intersection Summary				
HCM 2000 Control Delay	146.5	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.40			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	130.1%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	109	2152	347	563	1922	42	293	23	666	6	7	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.99	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1681	1697	1583	1681	1760	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00	0.95	0.99	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1681	1697	1583	1681	1760	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	118	2339	377	612	2089	46	318	25	724	7	8	9
RTOR Reduction (vph)	0	0	194	0	0	16	0	0	133	0	0	0
Lane Group Flow (vph)	118	2339	183	612	2089	30	172	171	591	6	9	9
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	9.7	62.1	62.1	30.1	82.5	82.5	15.6	15.6	45.7	4.0	4.0	4.0
Effective Green, g (s)	9.7	62.1	62.1	30.1	82.5	82.5	15.6	15.6	45.7	4.0	4.0	4.0
Actuated g/C Ratio	0.08	0.49	0.49	0.24	0.65	0.65	0.12	0.12	0.36	0.03	0.03	0.03
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	260	2470	769	808	3282	1021	205	207	615	52	55	49
v/s Ratio Prot	0.03	c0.46		0.18	0.41		0.10	0.10	c0.23	0.00	0.01	
v/s Ratio Perm			0.12			0.02			0.15			c0.01
v/c Ratio	0.45	0.95	0.24	0.76	0.64	0.03	0.84	0.83	0.96	0.12	0.16	0.18
Uniform Delay, d1	56.5	31.3	19.1	45.5	13.6	8.2	54.9	54.8	40.2	60.2	60.3	60.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	8.6	0.2	4.1	0.4	0.0	24.8	22.8	26.7	1.0	1.4	1.8
Delay (s)	57.8	39.9	19.3	49.5	14.0	8.2	79.7	77.6	66.9	61.2	61.7	62.1
Level of Service	E	D	B	D	B	A	E	E	E	E	E	E
Approach Delay (s)		37.9			21.9			70.7			61.7	
Approach LOS		D			C			E			E	

Intersection Summary				
HCM 2000 Control Delay	36.6	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.96			
Actuated Cycle Length (s)	127.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	96.2%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	84	2179	911	510	1678	77	1064	72	566	86	40	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	2368	990	554	1824	84	1157	78	615	93	43	71
RTOR Reduction (vph)	0	0	107	0	0	31	0	0	44	0	0	65
Lane Group Flow (vph)	91	2368	883	554	1824	53	1157	78	571	93	43	6
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	12.3	67.1	97.1	21.0	75.8	75.8	30.0	30.0	51.0	12.6	12.6	12.6
Effective Green, g (s)	12.3	67.1	97.1	21.0	75.8	75.8	30.0	30.0	51.0	12.6	12.6	12.6
Actuated g/C Ratio	0.08	0.46	0.66	0.14	0.52	0.52	0.20	0.20	0.35	0.09	0.09	0.09
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	148	2325	1047	491	2627	817	702	380	593	152	160	135
v/s Ratio Prot	0.05	c0.47	0.17	c0.16	0.36		c0.34	0.04	c0.14	c0.05	0.02	
v/s Ratio Perm			0.39			0.03			0.22			0.00
v/c Ratio	0.61	1.02	0.84	1.13	0.69	0.06	1.65	0.21	0.96	0.61	0.27	0.05
Uniform Delay, d1	64.9	39.8	19.0	62.8	26.7	17.7	58.3	48.5	46.9	64.7	62.7	61.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.4	23.5	6.3	80.8	0.8	0.0	298.0	0.3	27.6	7.1	0.9	0.1
Delay (s)	72.3	63.3	25.3	143.6	27.5	17.8	356.4	48.7	74.5	71.8	63.6	61.7
Level of Service	E	E	C	F	C	B	F	D	E	E	E	E
Approach Delay (s)		52.6			53.3			249.7			66.6	
Approach LOS		D			D			F			E	

Intersection Summary				
HCM 2000 Control Delay	99.0	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.14			
Actuated Cycle Length (s)	146.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	103.7%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	951	954	4	1	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	1034	1037	4	1	7
RTOR Reduction (vph)	0	0	0	1	0	6
Lane Group Flow (vph)	4	1034	1037	3	1	1
Turn Type	Prot	NA	NA	Perm	NA	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	0.6	39.9	35.3	35.3	5.8	6.4
Effective Green, g (s)	0.6	39.9	35.3	35.3	5.8	6.4
Actuated g/C Ratio	0.01	0.74	0.66	0.66	0.11	0.12
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	38	1384	1224	1040	191	306
v/s Ratio Prot	0.00	c0.56	c0.56		c0.00	0.00
v/s Ratio Perm				0.00		0.00
v/c Ratio	0.11	0.75	0.85	0.00	0.01	0.00
Uniform Delay, d1	26.3	4.0	7.1	3.2	21.4	20.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	2.2	5.6	0.0	0.0	0.0
Delay (s)	27.5	6.2	12.7	3.2	21.4	20.8
Level of Service	C	A	B	A	C	C
Approach Delay (s)		6.3	12.7		20.9	
Approach LOS		A	B		C	

Intersection Summary				
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	53.7	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	60.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	67	908	0	3	904	181	2	3	11	222	3	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1770	1863		1770	1863	1583		1675			1775	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (perm)	1770	1863		1770	1863	1583		1675			1775	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	987	0	3	983	197	2	3	12	241	3	85
RTOR Reduction (vph)	0	0	0	0	0	37	0	11	0	0	0	72
Lane Group Flow (vph)	73	987	0	3	983	160	0	6	0	0	244	13
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	5.0	64.4		0.8	60.2	60.2		6.1			16.0	16.0
Effective Green, g (s)	5.0	64.4		0.8	60.2	60.2		6.1			16.0	16.0
Actuated g/C Ratio	0.05	0.62		0.01	0.58	0.58		0.06			0.15	0.15
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	85	1161		13	1085	922		98			274	245
v/s Ratio Prot	c0.04	0.53		0.00	c0.53			c0.00			c0.14	
v/s Ratio Perm						0.10						0.01
v/c Ratio	0.86	0.85		0.23	0.91	0.17		0.06			0.89	0.05
Uniform Delay, d1	48.8	15.6		50.9	19.0	10.0		45.9			42.8	37.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	53.3	6.1		8.9	10.7	0.1		0.2			28.1	0.1
Delay (s)	102.1	21.7		59.9	29.8	10.1		46.1			70.8	37.3
Level of Service	F	C		E	C	B		D			E	D
Approach Delay (s)		27.2			26.6			46.1			62.2	
Approach LOS		C			C			D			E	

Intersection Summary				
HCM 2000 Control Delay	31.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	103.3	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	80.4%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	192	1041	7	13	901	56	6	0	14	6	0	190
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	209	1132	8	14	979	61	7	0	15	7	0	207
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1040			1139			2767	2621	1135	2602	2595	1010
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1040			1139			2767	2621	1135	2602	2595	1010
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	69			98			0	100	94	43	100	29
cM capacity (veh/h)	668			613			3	16	246	11	17	291

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	209	1139	14	1040	22	7	207
Volume Left	209	0	14	0	7	7	0
Volume Right	0	8	0	61	15	0	207
cSH	668	1700	613	1700	9	11	291
Volume to Capacity	0.31	0.67	0.02	0.61	2.47	0.57	0.71
Queue Length 95th (ft)	33	0	2	0	94	32	124
Control Delay (s)	12.8	0.0	11.0	0.0	1499.5	519.8	42.6
Lane LOS	B		B		F	F	E
Approach Delay (s)	2.0		0.1		1499.5	57.2	
Approach LOS					F	F	

Intersection Summary				
Average Delay	18.1			
Intersection Capacity Utilization	78.2%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	683	609	122	724	66	371	186	233	64	245	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.96			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1748			1830	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.64			0.78	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1140			1444	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	742	662	133	787	72	403	202	253	70	266	21
RTOR Reduction (vph)	0	0	86	0	0	31	0	14	0	0	2	0
Lane Group Flow (vph)	20	742	576	133	787	41	0	844	0	0	355	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.6	38.4	38.4	6.0	42.8	42.8		56.0			56.0	
Effective Green, g (s)	1.6	38.4	38.4	6.0	42.8	42.8		56.0			56.0	
Actuated g/C Ratio	0.01	0.34	0.34	0.05	0.38	0.38		0.50			0.50	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	25	636	540	94	709	602		567			719	
v/s Ratio Prot	0.01	0.40		c0.08	c0.42							
v/s Ratio Perm			0.36			0.03		c0.74			0.25	
v/c Ratio	0.80	1.17	1.07	1.41	1.11	0.07		1.49			0.49	
Uniform Delay, d1	55.2	37.0	37.0	53.2	34.8	22.1		28.2			18.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	95.2	91.3	58.0	237.9	68.1	0.0		229.1			0.5	
Delay (s)	150.4	128.3	95.0	291.1	102.9	22.2		257.3			19.3	
Level of Service	F	F	F	F	F	C		F			B	
Approach Delay (s)		113.1			122.3			257.3			19.3	
Approach LOS		F			F			F			B	

Intersection Summary				
HCM 2000 Control Delay	140.5	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.36			
Actuated Cycle Length (s)	112.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	118.2%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	19	16	8	757	965	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	17	9	823	1049	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1899	1059	1070			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1899	1059	1070			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	72	94	99			
cM capacity (veh/h)	75	273	652			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	38	9	823	1070
Volume Left	21	9	0	0
Volume Right	17	0	0	21
cSH	112	652	1700	1700
Volume to Capacity	0.34	0.01	0.48	0.63
Queue Length 95th (ft)	34	1	0	0
Control Delay (s)	52.7	10.6	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	52.7	0.1		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	17	0	95	6	0	24	103	752	8	13	720	31
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	0	103	7	0	26	112	817	9	14	783	34
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1899	1878	799	1977	1890	822	816			826		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1899	1878	799	1977	1890	822	816			826		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	57	100	73	78	100	93	86			98		
cM capacity (veh/h)	43	60	385	30	59	374	811			805		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	122	33	938	830
Volume Left	18	7	112	14
Volume Right	103	26	9	34
cSH	175	113	811	805
Volume to Capacity	0.70	0.29	0.14	0.02
Queue Length 95th (ft)	105	27	12	1
Control Delay (s)	62.7	49.1	3.6	0.5
Lane LOS	F	E	A	A
Approach Delay (s)	62.7	49.1	3.6	0.5
Approach LOS	F	E		

Intersection Summary				
Average Delay	6.8			
Intersection Capacity Utilization	104.7%	ICU Level of Service	G	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	597	163	136	229	422	512
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	649	177	148	249	459	557
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1282	737	1015			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1282	737	1015			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	58	78			
cM capacity (veh/h)	143	418	683			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	826	397	1015
Volume Left	649	148	0
Volume Right	177	0	557
cSH	167	683	1700
Volume to Capacity	4.96	0.22	0.60
Queue Length 95th (ft)	Err	20	0
Control Delay (s)	Err	6.2	0.0
Lane LOS	F	A	
Approach Delay (s)	Err	6.2	0.0
Approach LOS	F		

Intersection Summary				
Average Delay	3691.8			
Intersection Capacity Utilization	126.2%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	135	45	409	125	49	578
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	147	49	445	136	53	628
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			966			
pX, platoon unblocked	0.88	0.88			0.88	
vC, conflicting volume	1247	512			580	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1212	375			452	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	12	92			95	
cM capacity (veh/h)	167	589			973	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	196	580	53	628
Volume Left	147	0	53	0
Volume Right	49	136	0	0
cSH	203	1700	973	1700
Volume to Capacity	0.96	0.34	0.05	0.37
Queue Length 95th (ft)	203	0	4	0
Control Delay (s)	102.3	0.0	8.9	0.0
Lane LOS	F		A	
Approach Delay (s)	102.3	0.0	0.7	
Approach LOS	F			

Intersection Summary				
Average Delay		14.1		
Intersection Capacity Utilization		52.7%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	185	113	163	14	122	39	134	336	13	49	499	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1796		1770	1852		1770	1863	1583
Flt Permitted	0.64	1.00	1.00	0.68	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1189	1863	1583	1263	1796		1770	1852		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	201	123	177	15	133	42	146	365	14	53	542	230
RTOR Reduction (vph)	0	0	132	0	19	0	0	2	0	0	0	134
Lane Group Flow (vph)	201	123	45	15	156	0	146	377	0	53	542	96
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	13.3	13.3	13.3	13.3	13.3		5.1	23.7		3.1	21.7	21.7
Effective Green, g (s)	13.3	13.3	13.3	13.3	13.3		5.1	23.7		3.1	21.7	21.7
Actuated g/C Ratio	0.26	0.26	0.26	0.26	0.26		0.10	0.45		0.06	0.42	0.42
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	303	475	404	322	458		173	842		105	775	659
v/s Ratio Prot		0.07			0.09		c0.08	0.20		0.03	c0.29	
v/s Ratio Perm	c0.17		0.03	0.01								0.06
v/c Ratio	0.66	0.26	0.11	0.05	0.34		0.84	0.45		0.50	0.70	0.15
Uniform Delay, d1	17.4	15.5	14.9	14.6	15.8		23.1	9.7		23.8	12.5	9.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.4	0.3	0.1	0.1	0.4		29.5	0.4		3.8	2.8	0.1
Delay (s)	22.8	15.8	15.0	14.7	16.3		52.6	10.1		27.5	15.3	9.5
Level of Service	C	B	B	B	B		D	B		C	B	A
Approach Delay (s)		18.3			16.1			21.9			14.5	
Approach LOS		B			B			C			B	

Intersection Summary					
HCM 2000 Control Delay		17.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio		0.69			
Actuated Cycle Length (s)		52.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization		66.1%	ICU Level of Service	C	
Analysis Period (min)		15			
c Critical Lane Group					



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	77	1371	2313	611	565	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.97		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3428		1760	1504
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3428		1760	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	1490	2514	664	614	500
RTOR Reduction (vph)	0	0	17	0	2	47
Lane Group Flow (vph)	84	1490	3161	0	662	403
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	5.0	97.0	88.0		35.0	35.0
Effective Green, g (s)	5.0	97.0	88.0		35.0	35.0
Actuated g/C Ratio	0.04	0.69	0.63		0.25	0.25
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	63	2452	2154		440	376
v/s Ratio Prot	c0.05	0.42	c0.92		c0.38	
v/s Ratio Perm						0.27
v/c Ratio	1.33	0.61	1.47		1.50	1.07
Uniform Delay, d1	67.5	11.4	26.0		52.5	52.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	225.9	0.4	212.9		238.4	66.6
Delay (s)	293.4	11.8	238.9		290.9	119.1
Level of Service	F	B	F		F	F
Approach Delay (s)		26.9	238.9		221.5	
Approach LOS		C	F		F	

Intersection Summary				
HCM 2000 Control Delay	178.7	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.47			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	130.8%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	1431	207	565	2214	14	543	11	587	4	6	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00		1.00	0.88	0.95	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	1.00	
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583		1776	2787	1681	1770	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	1.00	
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583		1776	2787	1681	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	1555	225	614	2407	15	590	12	638	4	7	0
RTOR Reduction (vph)	0	0	133	0	0	6	0	0	265	0	0	0
Lane Group Flow (vph)	14	1555	92	614	2407	9	0	602	373	4	7	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	2.3	45.7	45.7	24.8	68.2	68.2		23.3	48.1	2.4	2.4	
Effective Green, g (s)	2.3	45.7	45.7	24.8	68.2	68.2		23.3	48.1	2.4	2.4	
Actuated g/C Ratio	0.02	0.41	0.41	0.22	0.61	0.61		0.21	0.43	0.02	0.02	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	70	2071	644	758	3090	962		368	1294	35	37	
v/s Ratio Prot	0.00	0.31		c0.18	c0.47			c0.34	0.06	0.00	c0.00	
v/s Ratio Perm			0.06			0.01			0.07			
v/c Ratio	0.20	0.75	0.14	0.81	0.78	0.01		1.64	0.29	0.11	0.19	
Uniform Delay, d1	54.0	28.4	20.9	41.5	16.4	8.7		44.5	20.9	53.9	53.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	1.6	0.1	6.5	1.3	0.0		298.2	0.1	1.5	2.5	
Delay (s)	55.5	30.0	21.0	48.0	17.7	8.7		342.7	21.0	55.3	56.4	
Level of Service	E	C	C	D	B	A		F	C	E	E	
Approach Delay (s)		29.0			23.8			177.2			56.0	
Approach LOS		C			C			F			E	

Intersection Summary				
HCM 2000 Control Delay	56.7	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	112.2	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	93.4%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	1392	923	439	1937	50	1320	75	673	27	22	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	1513	1003	477	2105	54	1435	82	732	29	24	41
RTOR Reduction (vph)	0	0	221	0	0	31	0	0	98	0	0	39
Lane Group Flow (vph)	82	1513	782	477	2105	23	1435	82	634	29	24	2
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	5.0	45.1	99.2	19.0	59.1	59.1	54.1	54.1	73.1	6.6	6.6	6.6
Effective Green, g (s)	5.0	45.1	99.2	19.0	59.1	59.1	54.1	54.1	73.1	6.6	6.6	6.6
Actuated g/C Ratio	0.04	0.32	0.70	0.13	0.42	0.42	0.38	0.38	0.52	0.05	0.05	0.05
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	62	1628	1963	463	2134	664	1319	715	866	82	87	74
v/s Ratio Prot	0.05	0.30	0.15	c0.14	c0.41		c0.42	0.04	0.10	c0.02	0.01	
v/s Ratio Perm			0.13			0.01			0.30			0.00
v/c Ratio	1.32	0.93	0.40	1.03	0.99	0.03	1.09	0.11	0.73	0.35	0.28	0.03
Uniform Delay, d1	67.9	46.3	8.5	60.9	40.5	24.0	43.4	27.9	26.3	65.0	64.8	64.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	222.7	9.7	0.1	49.8	16.2	0.0	52.3	0.1	3.2	2.6	1.7	0.1
Delay (s)	290.6	56.0	8.7	110.7	56.7	24.1	95.7	28.0	29.5	67.7	66.5	64.2
Level of Service	F	E	A	F	E	C	F	C	C	E	E	E
Approach Delay (s)		45.1			65.8			71.7			65.8	
Approach LOS		D			E			E			E	

Intersection Summary				
HCM 2000 Control Delay	60.5	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.02			
Actuated Cycle Length (s)	140.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	95.9%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	390	750	1125	299	122	440
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	424	815	1223	325	133	478
RTOR Reduction (vph)	0	0	0	112	0	66
Lane Group Flow (vph)	424	815	1223	213	133	412
Turn Type	Prot	NA	NA	Perm	Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	15.0	96.1	77.1	77.1	13.3	28.3
Effective Green, g (s)	15.0	96.1	77.1	77.1	13.3	28.3
Actuated g/C Ratio	0.13	0.82	0.66	0.66	0.11	0.24
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	438	1524	1223	1039	200	435
v/s Ratio Prot	0.12	0.44	c0.66		0.08	c0.12
v/s Ratio Perm				0.13		0.14
v/c Ratio	0.97	0.53	1.00	0.21	0.67	0.95
Uniform Delay, d1	51.0	3.4	20.2	8.0	49.9	43.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	34.4	0.4	25.7	0.1	8.1	29.8
Delay (s)	85.3	3.8	45.9	8.1	58.0	73.6
Level of Service	F	A	D	A	E	E
Approach Delay (s)		31.7	38.0		70.2	
Approach LOS		C	D		E	

Intersection Summary				
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.02			
Actuated Cycle Length (s)	117.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	93.1%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	137	762	0	4	1155	234	5	2	2	177	0	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.95	1.00
Satd. Flow (prot)	1770	3539		1770	3450			1758			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.97			0.95	1.00
Satd. Flow (perm)	1770	3539		1770	3450			1758			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	149	828	0	4	1255	254	5	2	2	192	0	329
RTOR Reduction (vph)	0	0	0	0	15	0	0	2	0	0	0	204
Lane Group Flow (vph)	149	828	0	4	1494	0	0	7	0	0	192	125
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												4
Actuated Green, G (s)	9.1	60.6		0.7	52.2			6.0			14.2	14.2
Effective Green, g (s)	9.1	60.6		0.7	52.2			6.0			14.2	14.2
Actuated g/C Ratio	0.09	0.62		0.01	0.54			0.06			0.15	0.15
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	165	2199		12	1847			108			257	230
v/s Ratio Prot	c0.08	0.23		0.00	c0.43			c0.00			c0.11	
v/s Ratio Perm												0.08
v/c Ratio	0.90	0.38		0.33	0.81			0.07			0.75	0.54
Uniform Delay, d1	43.8	9.1		48.2	18.6			43.1			39.9	38.6
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	43.0	0.1		15.7	2.7			0.3			11.2	2.6
Delay (s)	86.8	9.2		63.8	21.3			43.4			51.2	41.2
Level of Service	F	A		E	C			D			D	D
Approach Delay (s)		21.0			21.4			43.4			44.9	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	97.5	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	72.7%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	185	724	7	13	1020	21	12	2	12	32	7	399
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00			0.94			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1770	1860		1770	1857			1706			1790	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.89			0.78	1.00
Satd. Flow (perm)	1770	1860		1770	1857			1554			1461	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	201	787	8	14	1109	23	13	2	13	35	8	434
RTOR Reduction (vph)	0	0	0	0	1	0	0	11	0	0	0	172
Lane Group Flow (vph)	201	795	0	14	1131	0	0	17	0	0	43	262
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	5.1	64.9		1.4	61.2			13.3			13.3	13.3
Effective Green, g (s)	5.1	64.9		1.4	61.2			13.3			13.3	13.3
Actuated g/C Ratio	0.06	0.71		0.02	0.67			0.15			0.15	0.15
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	98	1317		27	1240			225			212	229
v/s Ratio Prot	c0.11	c0.43		0.01	c0.61							
v/s Ratio Perm								0.01			0.03	c0.17
v/c Ratio	2.05	0.60		0.52	0.91			0.08			0.20	1.14
Uniform Delay, d1	43.2	6.8		44.8	12.9			33.8			34.5	39.1
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	506.4	0.8		15.8	10.3			0.1			0.5	104.1
Delay (s)	549.7	7.6		60.6	23.2			34.0			35.0	143.3
Level of Service	F	A		E	C			C			C	F
Approach Delay (s)		117.0			23.6			34.0			133.5	
Approach LOS		F			C			C			F	

Intersection Summary				
HCM 2000 Control Delay	78.7	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.98			
Actuated Cycle Length (s)	91.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	93.0%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	544	226	48	664	80	782	365	87	97	365	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.99			0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1788			1779	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.43			0.73	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		794			1303	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	591	246	52	722	87	850	397	95	105	397	196
RTOR Reduction (vph)	0	0	29	0	0	32	0	2	0	0	10	0
Lane Group Flow (vph)	130	591	217	52	722	55	0	1340	0	0	688	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	7.0	38.2	38.2	5.6	36.8	36.8		95.0			95.0	
Effective Green, g (s)	7.0	38.2	38.2	5.6	36.8	36.8		95.0			95.0	
Actuated g/C Ratio	0.05	0.25	0.25	0.04	0.24	0.24		0.63			0.63	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	82	471	400	65	454	386		500			820	
v/s Ratio Prot	c0.07	0.32		0.03	c0.39							
v/s Ratio Perm			0.14			0.03		c1.69			0.53	
v/c Ratio	1.59	1.25	0.54	0.80	1.59	0.14		2.68			0.84	
Uniform Delay, d1	71.9	56.3	48.7	72.0	57.0	44.6		27.9			21.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	313.4	131.1	1.5	48.8	275.9	0.2		761.8			7.6	
Delay (s)	385.3	187.4	50.2	120.9	332.9	44.8		789.7			29.5	
Level of Service	F	F	D	F	F	D		F			C	
Approach Delay (s)		179.1			291.0			789.7			29.5	
Approach LOS		F			F			F			C	

Intersection Summary				
HCM 2000 Control Delay	388.9	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	2.33			
Actuated Cycle Length (s)	150.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	158.3%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	8	6	6	846	565	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	7	7	920	614	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1556	623	633			
vC1, stage 1 conf vol	623					
vC2, stage 2 conf vol	933					
vCu, unblocked vol	1556	623	633			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	323	486	950			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	15	7	920	633
Volume Left	9	7	0	0
Volume Right	7	0	0	18
cSH	377	950	1700	1700
Volume to Capacity	0.04	0.01	0.54	0.37
Queue Length 95th (ft)	3	1	0	0
Control Delay (s)	15.0	8.8	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	15.0	0.1		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	0	78	6	0	47	40	579	26	55	439	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.91			0.88		1.00	0.99		1.00	0.99	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1664			1632		1770	1851		1770	1843	
Flt Permitted		0.87			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1475			1590		1770	1851		1770	1843	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	0	85	7	0	51	43	629	28	60	477	37
RTOR Reduction (vph)	0	102	0	0	52	0	0	2	0	0	4	0
Lane Group Flow (vph)	0	22	0	0	6	0	43	655	0	60	510	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		4.2			4.2		1.4	22.3		1.4	22.3	
Effective Green, g (s)		4.2			4.2		1.4	22.3		1.4	22.3	
Actuated g/C Ratio		0.11			0.11		0.04	0.56		0.04	0.56	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		155			167		62	1034		62	1030	
v/s Ratio Prot							0.02	c0.35		c0.03	0.28	
v/s Ratio Perm		c0.01			0.00							
v/c Ratio		0.14			0.04		0.69	0.63		0.97	0.50	
Uniform Delay, d1		16.2			16.0		19.0	6.0		19.2	5.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.1		28.5	1.3		101.8	0.4	
Delay (s)		16.6			16.1		47.6	7.3		121.0	5.7	
Level of Service		B			B		D	A		F	A	
Approach Delay (s)		16.6			16.1			9.8			17.8	
Approach LOS		B			B			A			B	

Intersection Summary				
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.58			
Actuated Cycle Length (s)	39.9	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	58.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	141	38	88	443	316	332
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	153	41	96	482	343	361
RTOR Reduction (vph)	0	35	0	0	0	192
Lane Group Flow (vph)	153	6	96	482	343	169
Turn Type	Perm	Perm	Prot	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	5.6	5.6	2.2	23.7	17.5	17.5
Effective Green, g (s)	5.6	5.6	2.2	23.7	17.5	17.5
Actuated g/C Ratio	0.15	0.15	0.06	0.64	0.47	0.47
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	515	237	104	1183	874	742
v/s Ratio Prot			c0.05	c0.26	0.18	
v/s Ratio Perm	c0.04	0.00				0.11
v/c Ratio	0.30	0.03	0.92	0.41	0.39	0.23
Uniform Delay, d1	14.1	13.5	17.5	3.3	6.4	5.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.0	63.7	0.2	0.3	0.2
Delay (s)	14.4	13.6	81.2	3.6	6.7	6.0
Level of Service	B	B	F	A	A	A
Approach Delay (s)	14.2			16.5	6.4	
Approach LOS	B			B	A	

Intersection Summary				
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.47			
Actuated Cycle Length (s)	37.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	35.5%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	196	74	731	72	19	211
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	213	80	795	78	21	229
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			966			
pX, platoon unblocked	0.65	0.65			0.65	
vC, conflicting volume	1104	834			873	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	888	469			529	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	79			97	
cM capacity (veh/h)	197	384			671	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	293	873	21	229
Volume Left	213	0	21	0
Volume Right	80	78	0	0
cSH	227	1700	671	1700
Volume to Capacity	1.29	0.51	0.03	0.13
Queue Length 95th (ft)	386	0	2	0
Control Delay (s)	202.8	0.0	10.5	0.0
Lane LOS	F		B	
Approach Delay (s)	202.8	0.0	0.9	
Approach LOS	F			

Intersection Summary				
Average Delay		42.2		
Intersection Capacity Utilization		64.9%	ICU Level of Service	C
Analysis Period (min)		15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	131	65	167	20	176	70	239	730	7	19	354	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1783		1770	1860		1770	1863	1583
Flt Permitted	0.44	1.00	1.00	0.71	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	817	1863	1583	1324	1783		1770	1860		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	142	71	182	22	191	76	260	793	8	21	385	210
RTOR Reduction (vph)	0	0	140	0	25	0	0	0	0	0	0	137
Lane Group Flow (vph)	142	71	42	22	242	0	260	801	0	21	385	73
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	12.7	12.7	12.7	12.7	12.7		11.1	29.4		0.7	19.0	19.0
Effective Green, g (s)	12.7	12.7	12.7	12.7	12.7		11.1	29.4		0.7	19.0	19.0
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.23		0.20	0.54		0.01	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	189	431	366	306	413		358	997		22	645	548
v/s Ratio Prot		0.04			0.14		c0.15	c0.43		0.01	0.21	
v/s Ratio Perm	c0.17		0.03	0.02								0.05
v/c Ratio	0.75	0.16	0.12	0.07	0.59		0.73	0.80		0.95	0.60	0.13
Uniform Delay, d1	19.6	16.8	16.6	16.4	18.7		20.4	10.3		27.0	14.7	12.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.4	0.2	0.1	0.1	2.1		7.2	4.7		169.9	1.5	0.1
Delay (s)	35.0	17.0	16.8	16.5	20.8		27.6	15.1		196.9	16.2	12.4
Level of Service	D	B	B	B	C		C	B		F	B	B
Approach Delay (s)		23.4			20.5			18.2			21.1	
Approach LOS		C			C			B			C	

Intersection Summary					
HCM 2000 Control Delay		20.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio		0.81			
Actuated Cycle Length (s)		54.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization		76.3%	ICU Level of Service	D	
Analysis Period (min)		15			
c Critical Lane Group					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	47	2051	147	12	14	1786	1108	150	16	1468	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected		0.97	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1799	1583	1770	1863	1583	3433	3476		1770	1863	1583
Flt Permitted		0.97	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1799	1583	1770	1863	1583	3433	3476		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	51	2229	160	13	15	1941	1204	163	17	1596	160
RTOR Reduction (vph)	0	0	21	0	0	13	0	7	0	0	0	61
Lane Group Flow (vph)	0	177	2208	160	13	2	1941	1360	0	17	1596	99
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	5	8	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		16.0	65.0	15.5	15.5	18.5	49.0	100.6		3.0	54.6	54.6
Effective Green, g (s)		16.0	65.0	15.5	15.5	18.5	49.0	100.6		3.0	54.6	54.6
Actuated g/C Ratio		0.11	0.43	0.10	0.10	0.12	0.32	0.67		0.02	0.36	0.36
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		190	680	181	191	235	1113	2314		35	673	572
v/s Ratio Prot		0.10	c1.05	c0.09	0.01	0.00	0.57	0.39		0.01	c0.86	
v/s Ratio Perm			0.34			0.00						0.06
v/c Ratio		0.93	3.25	0.88	0.07	0.01	1.74	0.59		0.49	2.37	0.17
Uniform Delay, d1		67.0	43.0	66.9	61.3	58.2	51.0	13.9		73.3	48.2	32.9
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		46.0	1015.3	36.2	0.2	0.0	338.5	1.1		10.2	621.8	0.7
Delay (s)		113.0	1058.4	103.1	61.4	58.3	389.6	15.0		83.5	670.0	33.5
Level of Service		F	F	F	E	E	F	B		F	F	C
Approach Delay (s)		988.8			96.6			234.8			606.9	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM 2000 Control Delay	553.7	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	2.62			
Actuated Cycle Length (s)	151.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	222.4%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	154	932	572	248	1224	37	917	114	265	38	59	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	167	1013	622	270	1330	40	997	124	288	41	64	157
RTOR Reduction (vph)	0	0	272	0	0	30	0	0	117	0	0	123
Lane Group Flow (vph)	167	1013	350	270	1330	10	997	124	171	41	64	34
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.0	21.0	48.0	8.0	24.0	24.0	27.0	44.2	44.2	2.4	19.6	19.6
Effective Green, g (s)	5.0	21.0	48.0	8.0	24.0	24.0	27.0	44.2	44.2	2.4	19.6	19.6
Actuated g/C Ratio	0.05	0.23	0.52	0.09	0.26	0.26	0.29	0.48	0.48	0.03	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	187	1165	898	299	1332	414	1011	898	763	89	398	338
v/s Ratio Prot	0.05	0.20	0.11	c0.08	c0.26		c0.29	0.07		0.01	0.03	
v/s Ratio Perm			0.11			0.01			c0.11			0.02
v/c Ratio	0.89	0.87	0.39	0.90	1.00	0.03	0.99	0.14	0.22	0.46	0.16	0.10
Uniform Delay, d1	43.0	34.0	13.0	41.4	33.8	25.1	32.1	13.1	13.7	44.0	29.3	28.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	37.3	7.1	0.3	28.5	24.1	0.0	24.7	0.3	0.7	3.7	0.9	0.6
Delay (s)	80.3	41.1	13.3	69.9	57.9	25.1	56.8	13.5	14.4	47.7	30.2	29.5
Level of Service	F	D	B	E	E	C	E	B	B	D	C	C
Approach Delay (s)		35.2			59.1			44.3			32.5	
Approach LOS		D			E			D			C	

Intersection Summary				
HCM 2000 Control Delay	45.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	91.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	70.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	231	537	414	228	14	826	58	369	6	80	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.87			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3509		1770	1621			1820	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3509		1770	1621			1820	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	251	584	450	248	15	898	63	401	7	87	16
RTOR Reduction (vph)	0	0	75	0	3	0	0	153	0	0	5	0
Lane Group Flow (vph)	8	251	509	450	260	0	898	311	0	0	105	0
Turn Type	Prot	NA	pm+ov	Prot	NA		Split	NA		Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)	0.8	20.3	88.3	33.0	52.5		68.0	68.0			13.1	
Effective Green, g (s)	0.8	20.3	88.3	33.0	52.5		68.0	68.0			13.1	
Actuated g/C Ratio	0.01	0.13	0.59	0.22	0.35		0.45	0.45			0.09	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	9	251	971	388	1224		800	732			158	
v/s Ratio Prot	0.00	c0.13	0.24	c0.25	0.07		c0.51	0.19			c0.06	
v/s Ratio Perm			0.08									
v/c Ratio	0.89	1.00	0.52	1.16	0.21		1.12	0.43			0.67	
Uniform Delay, d1	74.8	65.0	18.5	58.7	34.4		41.2	27.9			66.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	230.5	56.8	0.5	96.9	0.1		71.1	1.8			10.2	
Delay (s)	305.2	121.9	19.0	155.6	34.5		112.3	29.7			76.7	
Level of Service	F	F	B	F	C		F	C			E	
Approach Delay (s)		52.4			110.9			84.2			76.7	
Approach LOS		D			F			F			E	

Intersection Summary				
HCM 2000 Control Delay	81.4	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.07			
Actuated Cycle Length (s)	150.4	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	97.5%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	502	1278	329	632	1268	349
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	546	1389	358	687	1378	379
RTOR Reduction (vph)	0	623	0	320	0	0
Lane Group Flow (vph)	546	766	358	367	1378	379
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	38.0	38.0	25.0	25.0	75.0	104.0
Effective Green, g (s)	38.0	38.0	25.0	25.0	75.0	104.0
Actuated g/C Ratio	0.25	0.25	0.17	0.17	0.50	0.69
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	448	401	310	263	885	1291
v/s Ratio Prot	0.31		0.19		c0.78	0.20
v/s Ratio Perm		c0.48		c0.23		
v/c Ratio	1.22	1.91	1.15	1.40	1.56	0.29
Uniform Delay, d1	56.0	56.0	62.5	62.5	37.5	8.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	117.2	419.1	99.9	199.5	256.2	0.6
Delay (s)	173.2	475.1	162.4	262.0	293.7	9.4
Level of Service	F	F	F	F	F	A
Approach Delay (s)	389.9		227.9			232.4
Approach LOS	F		F			F

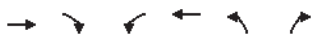
Intersection Summary				
HCM 2000 Control Delay	295.8	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.62			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	125.4%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	152	335	561	290	106	177
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	165	364	610	315	115	192
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	610				1304	610
vC1, stage 1 conf vol					610	
vC2, stage 2 conf vol					695	
vCu, unblocked vol	610				1304	610
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	83				67	61
cM capacity (veh/h)	969				347	495

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	165	364	610	315	308
Volume Left	165	0	0	0	115
Volume Right	0	0	0	315	192
cSH	969	1700	1700	1700	426
Volume to Capacity	0.17	0.21	0.36	0.19	0.72
Queue Length 95th (ft)	15	0	0	0	141
Control Delay (s)	9.5	0.0	0.0	0.0	32.4
Lane LOS	A				D
Approach Delay (s)	3.0		0.0		32.4
Approach LOS					D

Intersection Summary				
Average Delay	6.5			
Intersection Capacity Utilization	64.7%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	123	96	636	370	217	458
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	134	104	691	402	236	498
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			238		1971	186
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			238		1971	186
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			48		0	42
cM capacity (veh/h)			1329		33	856

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	238	691	402	734
Volume Left	0	691	0	236
Volume Right	104	0	0	498
cSH	1700	1329	1700	95
Volume to Capacity	0.14	0.52	0.24	7.74
Queue Length 95th (ft)	0	78	0	Err
Control Delay (s)	0.0	10.6	0.0	Err
Lane LOS		B		F
Approach Delay (s)	0.0	6.7		Err
Approach LOS				F

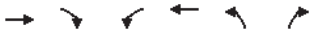
Intersection Summary				
Average Delay	3555.8			
Intersection Capacity Utilization	97.8%	ICU Level of Service	F	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Yield	Stop		Yield	
Volume (vph)	875	80	56	28	25	230
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	951	87	61	30	27	250

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	1038	91	277
Volume Left (vph)	951	0	27
Volume Right (vph)	0	30	250
Hadj (s)	0.22	-0.17	-0.49
Departure Headway (s)	5.1	5.5	5.5
Degree Utilization, x	1.0	0.14	0.42
Capacity (veh/h)	704	627	650
Control Delay (s)	232.6	9.4	12.3
Approach Delay (s)	232.6	9.4	12.3
Approach LOS	F	A	B

Intersection Summary			
Delay		174.7	
Level of Service		F	
Intersection Capacity Utilization		81.6%	ICU Level of Service D
Analysis Period (min)		15	



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	934	36	18	1434	75	69
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1015	39	20	1559	82	75
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1054		2633	1035
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1054		2633	1035
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		0	73
cM capacity (veh/h)			660		25	282

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1054	1578	157
Volume Left	0	20	82
Volume Right	39	0	75
cSH	1700	660	45
Volume to Capacity	0.62	0.03	3.49
Queue Length 95th (ft)	0	2	Err
Control Delay (s)	0.0	3.9	Err
Lane LOS		A	F
Approach Delay (s)	0.0	3.9	Err
Approach LOS			F

Intersection Summary			
Average Delay		563.3	
Intersection Capacity Utilization		104.9%	ICU Level of Service G
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	334	2251	1766	804	911	304
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3373		1768	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3373		1768	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	363	2447	1920	874	990	330
RTOR Reduction (vph)	0	0	37	0	1	85
Lane Group Flow (vph)	363	2447	2757	0	1022	212
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	17.0	84.0	63.0		48.0	48.0
Effective Green, g (s)	17.0	84.0	63.0		48.0	48.0
Actuated g/C Ratio	0.12	0.60	0.45		0.34	0.34
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	214	2123	1517		606	515
v/s Ratio Prot	c0.21	0.69	c0.82		c0.58	
v/s Ratio Perm						0.14
v/c Ratio	1.70	1.15	1.82		1.69	0.41
Uniform Delay, d1	61.5	28.0	38.5		46.0	35.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	332.6	74.6	370.3		316.3	0.5
Delay (s)	394.1	102.6	408.8		362.3	35.7
Level of Service	F	F	F		F	D
Approach Delay (s)		140.2	408.8		288.8	
Approach LOS		F	F		F	

Intersection Summary				
HCM 2000 Control Delay	276.9	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.75			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	159.7%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	2690	418	660	2085	6	385	6	872	9	5	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	0.98	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583		1775	2787	1681	1737	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	0.98	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583		1775	2787	1681	1737	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	2924	454	717	2266	7	418	7	948	10	5	3
RTOR Reduction (vph)	0	0	210	0	0	2	0	0	215	0	0	0
Lane Group Flow (vph)	11	2924	244	717	2266	5	0	425	733	7	8	3
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	2.4	66.8	66.8	33.9	98.3	98.3		16.1	50.0	2.6	2.6	2.6
Effective Green, g (s)	2.4	66.8	66.8	33.9	98.3	98.3		16.1	50.0	2.6	2.6	2.6
Actuated g/C Ratio	0.02	0.49	0.49	0.25	0.73	0.73		0.12	0.37	0.02	0.02	0.02
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	60	2508	780	859	3691	1149		211	1111	32	33	30
v/s Ratio Prot	0.00	c0.57		c0.21	0.45			c0.24	c0.17	0.00	c0.00	
v/s Ratio Perm			0.15			0.00			0.10			0.00
v/c Ratio	0.18	1.17	0.31	0.83	0.61	0.00		2.01	0.66	0.22	0.24	0.10
Uniform Delay, d1	65.5	34.3	20.5	48.1	9.2	5.1		59.7	35.6	65.4	65.4	65.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	79.4	0.2	7.0	0.3	0.0		472.8	1.4	3.4	3.8	1.5
Delay (s)	67.0	113.7	20.8	55.1	9.5	5.1		532.4	37.0	68.8	69.2	66.7
Level of Service	E	F	C	E	A	A		F	D	E	E	E
Approach Delay (s)		101.1			20.4			190.4			68.7	
Approach LOS		F			C			F			E	

Intersection Summary				
HCM 2000 Control Delay	85.7	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.17			
Actuated Cycle Length (s)	135.4	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	109.1%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	119	2698	1192	642	1854	123	1074	57	636	121	62	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	129	2933	1296	698	2015	134	1167	62	691	132	67	90
RTOR Reduction (vph)	0	0	101	0	0	32	0	0	24	0	0	82
Lane Group Flow (vph)	129	2933	1195	698	2015	102	1167	62	667	132	67	8
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	15.2	69.0	99.0	22.0	75.8	75.8	30.0	30.0	52.0	12.8	12.8	12.8
Effective Green, g (s)	15.2	69.0	99.0	22.0	75.8	75.8	30.0	30.0	52.0	12.8	12.8	12.8
Actuated g/C Ratio	0.10	0.46	0.66	0.15	0.51	0.51	0.20	0.20	0.35	0.09	0.09	0.09
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	179	2342	1841	504	2573	801	687	373	591	151	159	135
v/s Ratio Prot	0.07	c0.58	0.13	c0.20	0.40		c0.34	0.03	0.17	c0.07	0.04	
v/s Ratio Perm			0.30			0.06			0.26			0.00
v/c Ratio	0.72	1.25	0.65	1.38	0.78	0.13	1.70	0.17	1.13	0.87	0.42	0.06
Uniform Delay, d1	65.2	40.4	15.1	63.9	30.3	19.5	59.9	49.6	48.9	67.7	65.0	63.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.3	117.3	0.8	185.2	1.6	0.1	320.7	0.2	78.1	38.9	1.8	0.2
Delay (s)	78.6	157.7	15.9	249.1	31.9	19.6	380.6	49.8	127.0	106.6	66.8	63.1
Level of Service	E	F	B	F	C	B	F	D	F	F	E	E
Approach Delay (s)		113.2			84.6			278.6			83.8	
Approach LOS		F			F			F			F	

Intersection Summary				
HCM 2000 Control Delay	137.4	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.34			
Actuated Cycle Length (s)	149.8	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	117.8%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	115	1429	940	48	70	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	1553	1022	52	76	165
RTOR Reduction (vph)	0	0	0	13	0	139
Lane Group Flow (vph)	125	1553	1022	39	76	26
Turn Type	Prot	NA	NA	Perm	Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	8.6	106.1	93.5	93.5	10.7	19.3
Effective Green, g (s)	8.6	106.1	93.5	93.5	10.7	19.3
Actuated g/C Ratio	0.07	0.85	0.75	0.75	0.09	0.15
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	236	1583	1395	1185	151	295
v/s Ratio Prot	0.04	c0.83	0.55		c0.04	0.01
v/s Ratio Perm				0.02		0.01
v/c Ratio	0.53	0.98	0.73	0.03	0.50	0.09
Uniform Delay, d1	56.1	8.4	8.7	4.0	54.5	45.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1	18.2	2.0	0.0	2.6	0.1
Delay (s)	58.3	26.6	10.7	4.0	57.1	45.3
Level of Service	E	C	B	A	E	D
Approach Delay (s)		29.0	10.4		49.0	
Approach LOS		C	B		D	

Intersection Summary				
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.97			
Actuated Cycle Length (s)	124.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	85.8%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	130	1303	1	9	816	200	2	5	28	360	7	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.95	1.00
Satd. Flow (prot)	1770	3539		1770	3435			1654			1776	1583
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.95	1.00
Satd. Flow (perm)	1770	3539		1770	3435			1654			1776	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	1416	1	10	887	217	2	5	30	391	8	134
RTOR Reduction (vph)	0	0	0	0	18	0	0	28	0	0	0	70
Lane Group Flow (vph)	141	1417	0	10	1086	0	0	9	0	0	399	64
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												4
Actuated Green, G (s)	12.1	54.4		0.7	43.0			6.5			27.3	27.3
Effective Green, g (s)	12.1	54.4		0.7	43.0			6.5			27.3	27.3
Actuated g/C Ratio	0.12	0.52		0.01	0.41			0.06			0.26	0.26
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	204	1835		11	1408			102			462	411
v/s Ratio Prot	c0.08	c0.40		0.01	0.32			c0.01			c0.22	
v/s Ratio Perm												0.04
v/c Ratio	0.69	0.77		0.91	0.77			0.09			0.86	0.16
Uniform Delay, d1	44.6	20.3		52.1	26.7			46.4			37.0	29.9
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	9.7	2.1		217.6	2.7			0.4			15.3	0.2
Delay (s)	54.3	22.4		269.6	29.4			46.8			52.3	30.1
Level of Service	D	C		F	C			D			D	C
Approach Delay (s)		25.2			31.6			46.8			46.7	
Approach LOS		C			C			D			D	

Intersection Summary				
HCM 2000 Control Delay	31.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	104.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	76.4%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	348	1400	15	13	865	38	6	3	10	32	4	198
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.93			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1770	1860		1770	1851			1703			1783	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.91			0.73	1.00
Satd. Flow (perm)	1770	1860		1770	1851			1570			1365	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	378	1522	16	14	940	41	7	3	11	35	4	215
RTOR Reduction (vph)	0	0	0	0	1	0	0	10	0	0	0	200
Lane Group Flow (vph)	378	1538	0	14	980	0	0	11	0	0	39	15
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	32.5	118.3		1.5	87.3			9.6			9.6	9.6
Effective Green, g (s)	32.5	118.3		1.5	87.3			9.6			9.6	9.6
Actuated g/C Ratio	0.23	0.84		0.01	0.62			0.07			0.07	0.07
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	406	1556		18	1142			106			92	107
v/s Ratio Prot	c0.21	c0.83		0.01	0.53							
v/s Ratio Perm								0.01			c0.03	0.01
v/c Ratio	0.93	0.99		0.78	0.86			0.10			0.42	0.14
Uniform Delay, d1	53.4	10.9		69.8	22.0			61.9			63.2	62.0
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	28.0	19.8		107.6	6.6			0.4			3.1	0.6
Delay (s)	81.3	30.7		177.4	28.6			62.3			66.4	62.6
Level of Service	F	C		F	C			E			E	E
Approach Delay (s)		40.7			30.7			62.3			63.2	
Approach LOS		D			C			E			E	

Intersection Summary				
HCM 2000 Control Delay	39.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.96			
Actuated Cycle Length (s)	141.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	94.4%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	884	890	122	661	72	387	331	411	95	351	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.95			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1741			1832	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.64			0.67	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1137			1233	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	961	967	133	718	78	421	360	447	103	382	24
RTOR Reduction (vph)	0	0	77	0	0	30	0	15	0	0	1	0
Lane Group Flow (vph)	30	961	890	133	718	48	0	1213	0	0	508	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	3.2	45.8	45.8	6.0	48.6	48.6		77.0			77.0	
Effective Green, g (s)	3.2	45.8	45.8	6.0	48.6	48.6		77.0			77.0	
Actuated g/C Ratio	0.02	0.33	0.33	0.04	0.35	0.35		0.55			0.55	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	40	606	514	75	643	546		621			674	
v/s Ratio Prot	0.02	0.52		c0.08	c0.39							
v/s Ratio Perm			c0.56			0.03		c1.07			0.41	
v/c Ratio	0.75	1.59	1.73	1.77	1.12	0.09		1.95			0.75	
Uniform Delay, d1	68.4	47.5	47.5	67.4	46.1	31.1		31.9			24.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	55.2	271.4	337.3	396.3	72.0	0.1		434.9			4.8	
Delay (s)	123.6	318.9	384.8	463.7	118.1	31.2		466.8			29.3	
Level of Service	F	F	F	F	F	C		F			C	
Approach Delay (s)		348.5			160.3			466.8			29.3	
Approach LOS		F			F			F			C	

Intersection Summary				
HCM 2000 Control Delay	307.0	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.85			
Actuated Cycle Length (s)	140.8	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	155.6%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	41	28	6	820	1206	40
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	30	7	891	1311	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2237	1333	1354			
vC1, stage 1 conf vol	1333					
vC2, stage 2 conf vol	904					
vCu, unblocked vol	2237	1333	1354			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	78	84	99			
cM capacity (veh/h)	206	188	508			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	75	7	891	1354
Volume Left	45	7	0	0
Volume Right	30	0	0	43
cSH	198	508	1700	1700
Volume to Capacity	0.38	0.01	0.52	0.80
Queue Length 95th (ft)	41	1	0	0
Control Delay (s)	33.8	12.2	0.0	0.0
Lane LOS	D	B		
Approach Delay (s)	33.8	0.1		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	0	91	16	0	22	114	721	8	13	965	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.89			0.92		1.00	1.00		1.00	1.00	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1649			1681		1770	1860		1770	1855	
Flt Permitted		0.91			0.88		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1520			1506		1770	1860		1770	1855	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	0	99	17	0	24	124	784	9	14	1049	28
RTOR Reduction (vph)	0	100	0	0	36	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	27	0	0	5	0	124	793	0	14	1076	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		5.5			5.5		4.0	25.7		0.8	22.5	
Effective Green, g (s)		5.5			5.5		4.0	25.7		0.8	22.5	
Actuated g/C Ratio		0.12			0.12		0.09	0.58		0.02	0.51	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		190			188		160	1086		32	948	
v/s Ratio Prot							c0.07	c0.43		0.01	c0.58	
v/s Ratio Perm		c0.02			0.00							
v/c Ratio		0.14			0.03		0.78	0.73		0.44	1.13	
Uniform Delay, d1		17.2			16.9		19.6	6.6		21.4	10.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.1		20.6	2.5		9.3	73.7	
Delay (s)		17.5			17.0		40.1	9.1		30.7	84.4	
Level of Service		B			B		D	A		C	F	
Approach Delay (s)		17.5			17.0			13.3			83.8	
Approach LOS		B			B			B			F	

Intersection Summary				
HCM 2000 Control Delay	48.9	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	44.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	76.4%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	597	159	135	195	680	510
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	649	173	147	212	739	554
RTOR Reduction (vph)	0	122	0	0	0	358
Lane Group Flow (vph)	649	51	147	212	739	196
Turn Type	Perm	Perm	Prot	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	13.5	13.5	4.0	24.1	16.1	16.1
Effective Green, g (s)	13.5	13.5	4.0	24.1	16.1	16.1
Actuated g/C Ratio	0.30	0.30	0.09	0.53	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1016	468	155	984	657	558
v/s Ratio Prot			c0.08	0.11	c0.40	
v/s Ratio Perm	c0.19	0.03				0.12
v/c Ratio	0.64	0.11	0.95	0.22	1.12	0.35
Uniform Delay, d1	13.9	11.7	20.7	5.7	14.8	10.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.1	56.3	0.1	74.7	0.4
Delay (s)	15.3	11.8	77.0	5.8	89.5	11.3
Level of Service	B	B	E	A	F	B
Approach Delay (s)	14.5			35.0	56.0	
Approach LOS	B			C	E	

Intersection Summary				
HCM 2000 Control Delay	39.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.91			
Actuated Cycle Length (s)	45.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	70.3%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	116	34	451	187	74	880
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	126	37	490	203	80	957
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			966			
pX, platoon unblocked	0.83	0.83			0.83	
vC, conflicting volume	1709	592			693	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1752	407			529	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	93			91	
cM capacity (veh/h)	71	535			862	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	163	693	80	957
Volume Left	126	0	80	0
Volume Right	37	203	0	0
cSH	88	1700	862	1700
Volume to Capacity	1.85	0.41	0.09	0.56
Queue Length 95th (ft)	345	0	8	0
Control Delay (s)	502.6	0.0	9.6	0.0
Lane LOS	F		A	
Approach Delay (s)	502.6	0.0	0.7	
Approach LOS	F			

Intersection Summary				
Average Delay			43.7	
Intersection Capacity Utilization			61.5%	ICU Level of Service B
Analysis Period (min)			15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	206	168	303	12	104	28	142	262	19	74	934	257
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1804		1770	1844		1770	1863	1583
Flt Permitted	0.57	1.00	1.00	0.48	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1069	1863	1583	887	1804		1770	1844		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	224	183	329	13	113	30	154	285	21	80	1015	279
RTOR Reduction (vph)	0	0	208	0	11	0	0	3	0	0	0	117
Lane Group Flow (vph)	224	183	121	13	132	0	154	303	0	80	1015	162
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	16.1	16.1	16.1	16.1	16.1		9.0	53.3		6.8	51.1	51.1
Effective Green, g (s)	16.1	16.1	16.1	16.1	16.1		9.0	53.3		6.8	51.1	51.1
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.10	0.60		0.08	0.58	0.58
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	195	340	288	161	329		180	1114		136	1079	917
v/s Ratio Prot		0.10			0.07		c0.09	0.16		0.05	c0.54	
v/s Ratio Perm	c0.21		0.08	0.01								0.10
v/c Ratio	1.15	0.54	0.42	0.08	0.40		0.86	0.27		0.59	0.94	0.18
Uniform Delay, d1	36.0	32.7	31.9	29.9	31.8		39.0	8.3		39.3	17.1	8.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	110.2	1.6	1.0	0.2	0.8		30.6	0.1		6.4	15.2	0.1
Delay (s)	146.3	34.3	32.9	30.1	32.6		69.6	8.4		45.7	32.4	8.8
Level of Service	F	C	C	C	C		E	A		D	C	A
Approach Delay (s)		67.8			32.4			28.9			28.4	
Approach LOS		E			C			C			C	

Intersection Summary						
HCM 2000 Control Delay		39.3	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio		0.97				
Actuated Cycle Length (s)		88.2	Sum of lost time (s)		12.0	
Intersection Capacity Utilization		88.9%	ICU Level of Service		E	
Analysis Period (min)		15				
c Critical Lane Group						

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	172	13	2176	229	41	19	856	1108	32	3	1851	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1780	1583	1770	1863	1583	3433	3524		1770	1863	1583
Flt Permitted		0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1780	1583	1770	1863	1583	3433	3524		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	14	2365	249	45	21	930	1204	35	3	2012	146
RTOR Reduction (vph)	0	0	21	0	0	18	0	1	0	0	0	59
Lane Group Flow (vph)	0	201	2344	249	45	3	930	1238	0	3	2012	87
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	5	8	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		16.0	62.0	16.0	16.0	18.4	46.0	101.2		2.4	57.6	57.6
Effective Green, g (s)		16.0	62.0	16.0	16.0	18.4	46.0	101.2		2.4	57.6	57.6
Actuated g/C Ratio		0.11	0.41	0.11	0.11	0.12	0.30	0.67		0.02	0.38	0.38
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		187	647	186	196	233	1041	2352		28	707	601
v/s Ratio Prot		0.11	c1.10	c0.14	0.02	0.00	0.27	0.35		0.00	c1.08	
v/s Ratio Perm			0.38			0.00						0.06
v/c Ratio		1.07	3.62	1.34	0.23	0.01	0.89	0.53		0.11	2.85	0.14
Uniform Delay, d1		67.8	44.8	67.8	62.2	58.6	50.5	12.9		73.5	47.0	30.8
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		87.1	1183.9	184.1	0.6	0.0	9.9	0.8		1.7	834.5	0.5
Delay (s)		154.9	1228.7	251.9	62.8	58.6	60.4	13.8		75.2	881.5	31.3
Level of Service		F	F	F	E	E	E	B		E	F	C
Approach Delay (s)		1144.6			212.0			33.7			823.0	
Approach LOS		F			F			C			F	

Intersection Summary				
HCM 2000 Control Delay	673.3	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	3.02			
Actuated Cycle Length (s)	151.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	254.8%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	388	1261	1009	228	1272	86	827	87	165	152	130	278
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	422	1371	1097	248	1383	93	899	95	179	165	141	302
RTOR Reduction (vph)	0	0	132	0	0	69	0	0	115	0	0	129
Lane Group Flow (vph)	422	1371	965	248	1383	24	899	95	64	165	141	173
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	11.0	27.0	50.0	7.0	23.0	23.0	23.0	32.2	32.2	7.8	17.0	17.0
Effective Green, g (s)	11.0	27.0	50.0	7.0	23.0	23.0	23.0	32.2	32.2	7.8	17.0	17.0
Actuated g/C Ratio	0.12	0.30	0.56	0.08	0.26	0.26	0.26	0.36	0.36	0.09	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	419	1525	949	267	1299	404	877	666	566	297	351	299
v/s Ratio Prot	c0.12	0.27	c0.26	0.07	0.27		c0.26	0.05		0.05	0.08	
v/s Ratio Perm			0.35			0.02			0.04			c0.11
v/c Ratio	1.01	0.90	1.02	0.93	1.06	0.06	1.03	0.14	0.11	0.56	0.40	0.58
Uniform Delay, d1	39.5	30.2	20.0	41.3	33.5	25.3	33.5	19.6	19.3	39.4	32.0	33.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	45.8	7.4	33.4	36.1	44.1	0.1	36.9	0.4	0.4	2.2	3.4	7.9
Delay (s)	85.3	37.6	53.4	77.3	77.6	25.4	70.4	20.0	19.7	41.7	35.4	41.2
Level of Service	F	D	D	E	E	C	E	C	B	D	D	D
Approach Delay (s)		50.6			74.8			58.6			40.0	
Approach LOS		D			E			E			D	

Intersection Summary				
HCM 2000 Control Delay	57.6	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	85.8%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	476	724	341	375	9	424	22	231	11	33	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.86			0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	3527		1770	1608			1778	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (perm)	1770	1863	1583	1770	3527		1770	1608			1778	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	517	787	371	408	10	461	24	251	12	36	18
RTOR Reduction (vph)	0	0	165	0	2	0	0	180	0	0	12	0
Lane Group Flow (vph)	13	517	622	371	417	0	461	95	0	0	54	0
Turn Type	Prot	NA	pm+ov	Prot	NA		Split	NA		Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)	1.5	34.5	66.6	24.1	57.1		32.1	32.1			7.5	
Effective Green, g (s)	1.5	34.5	66.6	24.1	57.1		32.1	32.1			7.5	
Actuated g/C Ratio	0.01	0.30	0.58	0.21	0.50		0.28	0.28			0.07	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	23	562	978	373	1763		497	451			116	
v/s Ratio Prot	0.01	c0.28	0.18	c0.21	0.12		c0.26	0.06			c0.03	
v/s Ratio Perm			0.21									
v/c Ratio	0.57	0.92	0.64	0.99	0.24		0.93	0.21			0.46	
Uniform Delay, d1	56.0	38.5	15.8	45.0	16.2		39.9	31.4			51.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	28.1	20.2	1.4	44.9	0.1		25.9	1.1			2.9	
Delay (s)	84.1	58.7	17.1	89.9	16.3		65.8	32.4			54.3	
Level of Service	F	E	B	F	B		E	C			D	
Approach Delay (s)		34.1			50.9			53.3			54.3	
Approach LOS		C			D			D			D	

Intersection Summary				
HCM 2000 Control Delay	44.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.90			
Actuated Cycle Length (s)	114.2	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	84.1%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	350	482	229	248	1066	403
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	380	524	249	270	1159	438
RTOR Reduction (vph)	0	390	0	239	0	0
Lane Group Flow (vph)	380	134	249	31	1159	438
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	28.0	28.0	16.0	16.0	84.0	104.0
Effective Green, g (s)	28.0	28.0	16.0	16.0	84.0	104.0
Actuated g/C Ratio	0.20	0.20	0.11	0.11	0.60	0.74
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	354	316	212	180	1062	1383
v/s Ratio Prot	c0.21		c0.13		c0.65	0.24
v/s Ratio Perm		0.08		0.02		
v/c Ratio	1.07	0.42	1.17	0.17	1.09	0.32
Uniform Delay, d1	56.0	48.9	62.0	56.0	28.0	6.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	68.8	0.9	116.9	2.1	56.0	0.6
Delay (s)	124.8	49.9	178.9	58.1	84.0	6.7
Level of Service	F	D	F	E	F	A
Approach Delay (s)	81.3		116.0			62.8
Approach LOS	F		F			E

Intersection Summary				
HCM 2000 Control Delay	77.5	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.10			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	100.5%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	168	398	243	124	303	162
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	183	433	264	135	329	176
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	264				1062	264
vC1, stage 1 conf vol					264	
vC2, stage 2 conf vol					798	
vCu, unblocked vol	264				1062	264
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	86				9	77
cM capacity (veh/h)	1300				362	775

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	183	433	264	135	505
Volume Left	183	0	0	0	329
Volume Right	0	0	0	135	176
cSH	1300	1700	1700	1700	444
Volume to Capacity	0.14	0.25	0.16	0.08	1.14
Queue Length 95th (ft)	12	0	0	0	453
Control Delay (s)	8.2	0.0	0.0	0.0	115.8
Lane LOS	A				F
Approach Delay (s)	2.4		0.0		115.8
Approach LOS					F

Intersection Summary				
Average Delay	39.5			
Intersection Capacity Utilization	58.8%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	277	11	275	202	22	322
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	301	12	299	220	24	350
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			313		1124	307
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			313		1124	307
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			76		86	52
cM capacity (veh/h)			1247		173	733

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	313	299	220	374
Volume Left	0	299	0	24
Volume Right	12	0	0	350
cSH	1700	1247	1700	607
Volume to Capacity	0.18	0.24	0.13	0.62
Queue Length 95th (ft)	0	23	0	105
Control Delay (s)	0.0	8.8	0.0	20.0
Lane LOS		A		C
Approach Delay (s)	0.0	5.1		20.0
Approach LOS				C

Intersection Summary				
Average Delay	8.4			
Intersection Capacity Utilization	61.6%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Yield	Stop		Yield	
Volume (vph)	479	81	99	54	29	409
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	521	88	108	59	32	445

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	609	166	476
Volume Left (vph)	521	0	32
Volume Right (vph)	0	59	445
Hadj (s)	0.21	-0.18	-0.51
Departure Headway (s)	5.9	6.3	5.7
Degree Utilization, x	1.00	0.29	0.75
Capacity (veh/h)	605	550	628
Control Delay (s)	60.4	11.9	23.6
Approach Delay (s)	60.4	11.9	23.6
Approach LOS	F	B	C

Intersection Summary			
Delay		40.0	
Level of Service		E	
Intersection Capacity Utilization		76.2%	ICU Level of Service D
Analysis Period (min)		15	



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1688	124	41	973	32	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1835	135	45	1058	35	47
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1970		3049	1902
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1970		3049	1902
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			85		0	46
cM capacity (veh/h)			294		12	86

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1970	1102	82
Volume Left	0	45	35
Volume Right	135	0	47
cSH	1700	294	23
Volume to Capacity	1.16	0.15	3.48
Queue Length 95th (ft)	0	13	Err
Control Delay (s)	0.0	8.3	Err
Lane LOS		A	F
Approach Delay (s)	0.0	8.3	Err
Approach LOS			F

Intersection Summary			
Average Delay		261.4	
Intersection Capacity Utilization		107.4%	ICU Level of Service G
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	414	2776	1836	732	902	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3388		1770	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3388		1770	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	450	3017	1996	796	980	218
RTOR Reduction (vph)	0	0	28	0	1	53
Lane Group Flow (vph)	450	3017	2764	0	1001	143
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	21.0	93.0	68.0		49.0	49.0
Effective Green, g (s)	21.0	93.0	68.0		49.0	49.0
Actuated g/C Ratio	0.14	0.62	0.45		0.33	0.33
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	247	2194	1535		578	491
v/s Ratio Prot	c0.25	0.85	c0.82		c0.57	
v/s Ratio Perm						0.10
v/c Ratio	1.82	1.38	1.80		1.73	0.29
Uniform Delay, d1	64.5	28.5	41.0		50.5	37.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	385.3	171.8	362.8		336.8	0.3
Delay (s)	449.8	200.3	403.8		387.3	37.9
Level of Service	F	F	F		F	D
Approach Delay (s)		232.7	403.8		330.1	
Approach LOS		F	F		F	

Intersection Summary				
HCM 2000 Control Delay	312.4	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.78			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	161.1%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	2854	416	570	1847	8	372	10	776	6	6	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	0.99	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583		1776	2787	1681	1759	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00	0.95	0.99	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583		1776	2787	1681	1759	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	3102	452	620	2008	9	404	11	843	7	7	8
RTOR Reduction (vph)	0	0	197	0	0	2	0	0	221	0	0	0
Lane Group Flow (vph)	8	3102	255	620	2008	7	0	415	622	6	8	8
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	1.2	73.5	73.5	29.5	101.8	101.8		16.1	45.6	3.9	3.9	3.9
Effective Green, g (s)	1.2	73.5	73.5	29.5	101.8	101.8		16.1	45.6	3.9	3.9	3.9
Actuated g/C Ratio	0.01	0.53	0.53	0.21	0.73	0.73		0.12	0.33	0.03	0.03	0.03
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	29	2688	837	728	3724	1159		205	994	47	49	44
v/s Ratio Prot	0.00	c0.61		c0.18	0.39			c0.23	c0.13	0.00	0.00	
v/s Ratio Perm			0.16			0.00			0.09			c0.01
v/c Ratio	0.28	1.15	0.30	0.85	0.54	0.01		2.02	0.63	0.13	0.16	0.18
Uniform Delay, d1	68.5	32.8	18.4	52.6	8.2	5.0		61.5	39.5	65.9	66.0	66.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	74.0	0.2	9.4	0.2	0.0		477.7	1.2	1.2	1.6	2.0
Delay (s)	73.6	106.8	18.6	62.1	8.4	5.0		539.2	40.7	67.1	67.5	68.0
Level of Service	E	F	B	E	A	A		F	D	E	E	E
Approach Delay (s)		95.5			21.0			205.2			67.6	
Approach LOS		F			C			F			E	

Intersection Summary				
HCM 2000 Control Delay	87.6	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.17			
Actuated Cycle Length (s)	139.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	109.2%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	2949	1466	619	1719	107	1094	45	608	111	29	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	3205	1593	673	1868	116	1189	49	661	121	32	67
RTOR Reduction (vph)	0	0	224	0	0	33	0	0	31	0	0	61
Lane Group Flow (vph)	101	3205	1369	673	1868	83	1189	49	630	121	32	6
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	12.7	67.0	99.0	19.0	73.3	73.3	32.0	32.0	51.0	14.0	14.0	14.0
Effective Green, g (s)	12.7	67.0	99.0	19.0	73.3	73.3	32.0	32.0	51.0	14.0	14.0	14.0
Actuated g/C Ratio	0.09	0.45	0.67	0.13	0.50	0.50	0.22	0.22	0.34	0.09	0.09	0.09
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	151	2301	1864	440	2518	784	742	402	588	167	176	149
v/s Ratio Prot	0.06	c0.63	0.16	c0.20	0.37		c0.35	0.03	0.14	c0.07	0.02	
v/s Ratio Perm			0.33			0.05			0.26			0.00
v/c Ratio	0.67	1.39	0.73	1.53	0.74	0.11	1.60	0.12	1.07	0.72	0.18	0.04
Uniform Delay, d1	65.6	40.5	15.9	64.5	29.8	19.9	58.0	46.7	48.5	65.1	61.7	60.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.7	179.5	1.5	249.6	1.2	0.1	277.4	0.1	57.5	14.4	0.5	0.1
Delay (s)	76.3	220.0	17.5	314.1	31.0	20.0	335.4	46.8	106.0	79.6	62.2	61.0
Level of Service	E	F	B	F	C	B	F	D	F	E	E	E
Approach Delay (s)		151.2			102.2			248.1			71.4	
Approach LOS		F			F			F			E	

Intersection Summary				
HCM 2000 Control Delay	155.0	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.39			
Actuated Cycle Length (s)	148.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	122.5%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	163	1574	1024	50	101	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	1711	1113	54	110	204
RTOR Reduction (vph)	0	0	0	13	0	129
Lane Group Flow (vph)	177	1711	1113	41	110	75
Turn Type	Prot	NA	NA	Perm	Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	9.9	126.0	112.1	112.1	13.5	23.4
Effective Green, g (s)	9.9	126.0	112.1	112.1	13.5	23.4
Actuated g/C Ratio	0.07	0.85	0.76	0.76	0.09	0.16
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	230	1591	1415	1203	162	294
v/s Ratio Prot	0.05	c0.92	0.60		c0.06	0.02
v/s Ratio Perm				0.03		0.03
v/c Ratio	0.77	1.08	0.79	0.03	0.68	0.26
Uniform Delay, d1	67.7	10.8	10.6	4.4	64.9	54.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	14.3	45.9	3.0	0.0	10.8	0.5
Delay (s)	82.0	56.6	13.5	4.4	75.7	54.9
Level of Service	F	E	B	A	E	D
Approach Delay (s)		59.0	13.1		62.2	
Approach LOS		E	B		E	

Intersection Summary				
HCM 2000 Control Delay	43.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.07			
Actuated Cycle Length (s)	147.5	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	95.1%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	129	1532	1	8	973	154	2	3	31	327	0	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.88			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.95	1.00
Satd. Flow (prot)	1770	3539		1770	3467			1639			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.95	1.00
Satd. Flow (perm)	1770	3539		1770	3467			1639			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	1665	1	9	1058	167	2	3	34	355	0	124
RTOR Reduction (vph)	0	0	0	0	10	0	0	32	0	0	0	76
Lane Group Flow (vph)	140	1666	0	9	1215	0	0	7	0	0	355	48
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												4
Actuated Green, G (s)	12.9	60.6		0.6	48.3			6.5			21.5	21.5
Effective Green, g (s)	12.9	60.6		0.6	48.3			6.5			21.5	21.5
Actuated g/C Ratio	0.12	0.58		0.01	0.46			0.06			0.20	0.20
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	217	2038		10	1591			101			361	323
v/s Ratio Prot	c0.08	c0.47		0.01	0.35			c0.00			c0.20	
v/s Ratio Perm												0.03
v/c Ratio	0.65	0.82		0.90	0.76			0.07			0.98	0.15
Uniform Delay, d1	44.0	17.9		52.3	23.7			46.5			41.7	34.3
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	6.4	2.7		226.0	2.2			0.3			42.6	0.2
Delay (s)	50.4	20.5		278.2	25.9			46.8			84.3	34.6
Level of Service	D	C		F	C			D			F	C
Approach Delay (s)		22.9			27.8			46.8			71.4	
Approach LOS		C			C			D			E	

Intersection Summary				
HCM 2000 Control Delay	31.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	105.2	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	80.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	386	1373	9	7	910	46	6	3	17	30	6	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	1861		1770	1849			1680			1789	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.93			0.84	1.00
Satd. Flow (perm)	1770	1861		1770	1849			1578			1561	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	420	1492	10	8	989	50	7	3	18	33	7	212
RTOR Reduction (vph)	0	0	0	0	1	0	0	17	0	0	0	198
Lane Group Flow (vph)	420	1502	0	8	1038	0	0	11	0	0	40	14
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	21.0	118.2		0.7	97.9			9.5			9.5	9.5
Effective Green, g (s)	21.0	118.2		0.7	97.9			9.5			9.5	9.5
Actuated g/C Ratio	0.15	0.84		0.00	0.70			0.07			0.07	0.07
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	264	1566		8	1289			106			105	107
v/s Ratio Prot	c0.24	c0.81		0.00	0.56							
v/s Ratio Perm								0.01			c0.03	0.01
v/c Ratio	1.59	0.96		1.00	0.81			0.11			0.38	0.13
Uniform Delay, d1	59.7	9.1		69.9	14.7			61.5			62.6	61.6
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	283.1	14.0		318.2	3.8			0.4			2.3	0.6
Delay (s)	342.8	23.2		388.0	18.4			61.9			64.9	62.2
Level of Service	F	C		F	B			E			E	E
Approach Delay (s)		93.0			21.3			61.9			62.6	
Approach LOS		F			C			E			E	

Intersection Summary				
HCM 2000 Control Delay	67.3	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.04			
Actuated Cycle Length (s)	140.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	93.1%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	290	899	825	129	596	82	327	335	324	78	337	249
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.96			0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1751			1758	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.54			0.79	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		968			1391	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	315	977	897	140	648	89	355	364	352	85	366	271
RTOR Reduction (vph)	0	0	66	0	0	48	0	12	0	0	15	0
Lane Group Flow (vph)	315	977	831	140	648	41	0	1059	0	0	707	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	15.0	47.0	47.0	7.0	39.0	39.0		84.0			84.0	
Effective Green, g (s)	15.0	47.0	47.0	7.0	39.0	39.0		84.0			84.0	
Actuated g/C Ratio	0.10	0.31	0.31	0.05	0.26	0.26		0.56			0.56	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	177	583	496	82	484	411		542			778	
v/s Ratio Prot	c0.18	0.52		0.08	0.35							
v/s Ratio Perm			c0.52			0.03		c1.09			0.51	
v/c Ratio	1.78	1.68	1.68	1.71	1.34	0.10		1.95			0.91	
Uniform Delay, d1	67.5	51.5	51.5	71.5	55.5	42.2		33.0			29.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	372.7	311.6	312.8	364.6	166.0	0.1		436.0			14.4	
Delay (s)	440.2	363.1	364.3	436.1	221.5	42.3		469.0			44.0	
Level of Service	F	F	F	F	F	D		F			D	
Approach Delay (s)		374.7			237.5			469.0			44.0	
Approach LOS		F			F			F			D	

Intersection Summary				
HCM 2000 Control Delay	321.6	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.89			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	160.6%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	65	33	15	622	1070	78
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	71	36	16	676	1163	85
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1914	1205	1248			
vC1, stage 1 conf vol	1205					
vC2, stage 2 conf vol	709					
vCu, unblocked vol	1914	1205	1248			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	71	84	97			
cM capacity (veh/h)	245	224	558			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	107	16	676	1248
Volume Left	71	16	0	0
Volume Right	36	0	0	85
cSH	238	558	1700	1700
Volume to Capacity	0.45	0.03	0.40	0.73
Queue Length 95th (ft)	54	2	0	0
Control Delay (s)	31.9	11.6	0.0	0.0
Lane LOS	D	B		
Approach Delay (s)	31.9	0.3		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	13	81	7	0	50	74	527	8	59	818	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.88		1.00	1.00		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1682			1633		1770	1858		1770	1851	
Flt Permitted		0.89			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1512			1584		1770	1858		1770	1851	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	14	88	8	0	54	80	573	9	64	889	38
RTOR Reduction (vph)	0	76	0	0	53	0	0	1	0	0	2	0
Lane Group Flow (vph)	0	64	0	0	9	0	80	581	0	64	925	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		5.9			5.9		2.3	22.3		1.5	21.5	
Effective Green, g (s)		5.9			5.9		2.3	22.3		1.5	21.5	
Actuated g/C Ratio		0.14			0.14		0.06	0.53		0.04	0.52	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		213			224		97	993		63	954	
v/s Ratio Prot							c0.05	0.31		0.04	c0.50	
v/s Ratio Perm		c0.04			0.01							
v/c Ratio		0.30			0.04		0.82	0.59		1.02	0.97	
Uniform Delay, d1		16.1			15.5		19.5	6.6		20.1	9.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			0.1		40.9	0.9		117.9	21.7	
Delay (s)		16.9			15.5		60.4	7.5		138.0	31.4	
Level of Service		B			B		E	A		F	C	
Approach Delay (s)		16.9			15.5			13.9			38.3	
Approach LOS		B			B			B			D	

Intersection Summary				
HCM 2000 Control Delay	27.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	41.7	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	73.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	373	99	112	234	575	421
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3433	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3433	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	405	108	122	254	625	458
RTOR Reduction (vph)	0	82	0	0	0	272
Lane Group Flow (vph)	405	26	122	254	625	186
Turn Type	Perm	Perm	Prot	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	10.2	10.2	3.1	24.4	17.3	17.3
Effective Green, g (s)	10.2	10.2	3.1	24.4	17.3	17.3
Actuated g/C Ratio	0.24	0.24	0.07	0.57	0.41	0.41
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	821	379	128	1067	756	642
v/s Ratio Prot			c0.07	0.14	c0.34	
v/s Ratio Perm	c0.12	0.02				0.12
v/c Ratio	0.49	0.07	0.95	0.24	0.83	0.29
Uniform Delay, d1	14.0	12.5	19.7	4.5	11.3	8.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.1	64.7	0.1	7.4	0.3
Delay (s)	14.4	12.6	84.4	4.6	18.7	8.8
Level of Service	B	B	F	A	B	A
Approach Delay (s)	14.1			30.5	14.5	
Approach LOS	B			C	B	

Intersection Summary				
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	42.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	57.1%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	118	42	314	194	82	775
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	128	46	341	211	89	842
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			966			
pX, platoon unblocked	0.83	0.83			0.83	
vC, conflicting volume	1467	447			552	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1461	225			353	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	93			91	
cM capacity (veh/h)	107	673			996	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	174	552	89	842
Volume Left	128	0	89	0
Volume Right	46	211	0	0
cSH	137	1700	996	1700
Volume to Capacity	1.27	0.32	0.09	0.50
Queue Length 95th (ft)	267	0	7	0
Control Delay (s)	227.8	0.0	9.0	0.0
Lane LOS	F		A	
Approach Delay (s)	227.8	0.0	0.9	
Approach LOS	F			

Intersection Summary				
Average Delay		24.4		
Intersection Capacity Utilization		56.6%	ICU Level of Service	B
Analysis Period (min)		15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	219	175	254	12	106	37	171	287	19	82	764	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1791		1770	1845		1770	1863	1583
Flt Permitted	0.62	1.00	1.00	0.54	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1146	1863	1583	1014	1791		1770	1845		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	238	190	276	13	115	40	186	312	21	89	830	182
RTOR Reduction (vph)	0	0	213	0	18	0	0	3	0	0	0	94
Lane Group Flow (vph)	238	190	63	13	137	0	186	330	0	89	830	88
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	15.7	15.7	15.7	15.7	15.7		8.0	34.7		6.7	33.4	33.4
Effective Green, g (s)	15.7	15.7	15.7	15.7	15.7		8.0	34.7		6.7	33.4	33.4
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.23		0.12	0.50		0.10	0.48	0.48
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	260	423	359	230	406		204	926		171	900	765
v/s Ratio Prot		0.10			0.08		c0.11	0.18		0.05	c0.45	
v/s Ratio Perm	c0.21		0.04	0.01								0.06
v/c Ratio	0.92	0.45	0.17	0.06	0.34		0.91	0.36		0.52	0.92	0.11
Uniform Delay, d1	26.1	23.0	21.5	20.9	22.3		30.2	10.4		29.7	16.6	9.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	33.9	0.8	0.2	0.1	0.5		39.2	0.2		2.8	14.6	0.1
Delay (s)	60.0	23.7	21.7	21.0	22.8		69.5	10.7		32.5	31.2	9.8
Level of Service	E	C	C	C	C		E	B		C	C	A
Approach Delay (s)		35.2			22.7			31.7			27.8	
Approach LOS		D			C			C			C	

Intersection Summary					
HCM 2000 Control Delay		30.4	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio		0.92			
Actuated Cycle Length (s)		69.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization		83.0%	ICU Level of Service	E	
Analysis Period (min)		15			
c Critical Lane Group					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	152	13	2244	335	64	17	901	1115	42	9	1576	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1781	1583	1770	1863	1583	3433	3520		1770	1863	1583
Flt Permitted		0.96	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1781	1583	1770	1863	1583	3433	3520		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	165	14	2439	364	70	18	979	1212	46	10	1713	136
RTOR Reduction (vph)	0	0	21	0	0	15	0	2	0	0	0	62
Lane Group Flow (vph)	0	179	2418	364	70	3	979	1256	0	10	1713	74
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	5	8	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		16.0	64.0	19.0	19.0	21.4	48.0	98.2		2.4	52.6	52.6
Effective Green, g (s)		16.0	64.0	19.0	19.0	21.4	48.0	98.2		2.4	52.6	52.6
Actuated g/C Ratio		0.11	0.42	0.13	0.13	0.14	0.32	0.65		0.02	0.35	0.35
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		187	668	221	233	265	1086	2280		28	646	549
v/s Ratio Prot		0.10	c1.15	c0.21	0.04	0.00	0.29	0.36		0.01	c0.92	
v/s Ratio Perm			0.38			0.00						0.05
v/c Ratio		0.96	3.62	1.65	0.30	0.01	0.90	0.55		0.36	2.65	0.13
Uniform Delay, d1		67.5	43.8	66.3	60.3	56.0	49.5	14.6		73.8	49.5	33.9
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		52.9	1182.7	310.6	0.7	0.0	10.3	1.0		7.7	747.7	0.5
Delay (s)		120.3	1226.5	376.9	61.0	56.0	59.9	15.6		81.5	797.2	34.4
Level of Service		F	F	F	E	E	E	B		F	F	C
Approach Delay (s)		1150.9			315.2			35.0			737.6	
Approach LOS		F			F			C			F	

Intersection Summary					
HCM 2000 Control Delay	642.6	HCM 2000 Level of Service		F	
HCM 2000 Volume to Capacity ratio	2.97				
Actuated Cycle Length (s)	151.6	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	250.5%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	317	1384	909	320	1246	69	741	65	246	120	133	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	345	1504	988	348	1354	75	805	71	267	130	145	321
RTOR Reduction (vph)	0	0	126	0	0	54	0	0	152	0	0	141
Lane Group Flow (vph)	345	1504	862	348	1354	21	805	71	115	130	145	180
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.0	26.0	49.0	8.0	25.0	25.0	23.0	33.1	33.1	6.9	17.0	17.0
Effective Green, g (s)	9.0	26.0	49.0	8.0	25.0	25.0	23.0	33.1	33.1	6.9	17.0	17.0
Actuated g/C Ratio	0.10	0.29	0.54	0.09	0.28	0.28	0.26	0.37	0.37	0.08	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	343	1469	932	305	1412	439	877	685	582	263	351	299
v/s Ratio Prot	0.10	c0.30	c0.24	c0.10	0.27		0.23	0.04		0.04	0.08	
v/s Ratio Perm			0.31			0.01			0.07			c0.11
v/c Ratio	1.01	1.02	0.93	1.14	0.96	0.05	0.92	0.10	0.20	0.49	0.41	0.60
Uniform Delay, d1	40.5	32.0	18.8	41.0	32.0	23.8	32.6	18.7	19.4	39.9	32.1	33.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	50.1	29.7	14.5	95.3	15.1	0.0	14.2	0.3	0.8	1.5	3.6	8.7
Delay (s)	90.6	61.7	33.4	136.3	47.1	23.8	46.8	19.0	20.2	41.3	35.7	42.1
Level of Service	F	E	C	F	D	C	D	B	C	D	D	D
Approach Delay (s)		55.4			63.6			38.8			40.4	
Approach LOS		E			E			D			D	

Intersection Summary					
HCM 2000 Control Delay	53.3	HCM 2000 Level of Service		D	
HCM 2000 Volume to Capacity ratio	0.94				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	82.4%	ICU Level of Service		E	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	354	807	327	282	7	411	20	258	2	48	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.86			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3526		1770	1604			1811	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3526		1770	1604			1811	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	385	877	355	307	8	447	22	280	2	52	13
RTOR Reduction (vph)	0	0	215	0	2	0	0	203	0	0	11	0
Lane Group Flow (vph)	7	385	662	355	313	0	447	99	0	0	56	0
Turn Type	Prot	NA	pm+ov	Prot	NA		Split	NA		Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)	0.8	21.4	44.5	17.1	37.7		23.1	23.1			6.7	
Effective Green, g (s)	0.8	21.4	44.5	17.1	37.7		23.1	23.1			6.7	
Actuated g/C Ratio	0.01	0.25	0.53	0.20	0.45		0.27	0.27			0.08	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	16	472	910	359	1576		485	439			143	
v/s Ratio Prot	0.00	c0.21	0.20	c0.20	0.09		c0.25	0.06			c0.03	
v/s Ratio Perm			0.22									
v/c Ratio	0.44	0.82	0.73	0.99	0.20		0.92	0.22			0.39	
Uniform Delay, d1	41.5	29.6	15.3	33.5	14.1		29.7	23.7			36.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	18.0	10.4	2.9	44.0	0.1		25.4	1.2			1.8	
Delay (s)	59.5	40.0	18.2	77.5	14.2		55.1	24.9			38.6	
Level of Service	E	D	B	E	B		E	C			D	
Approach Delay (s)		25.0			47.8			42.9			38.6	
Approach LOS		C			D			D			D	

Intersection Summary				
HCM 2000 Control Delay	35.8	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.85			
Actuated Cycle Length (s)	84.3	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	81.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	347	508	257	324	1351	390
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	377	552	279	352	1468	424
RTOR Reduction (vph)	0	414	0	235	0	0
Lane Group Flow (vph)	377	138	279	117	1468	424
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	24.0	24.0	20.0	20.0	84.0	108.0
Effective Green, g (s)	24.0	24.0	20.0	20.0	84.0	108.0
Actuated g/C Ratio	0.17	0.17	0.14	0.14	0.60	0.77
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	303	271	266	226	1062	1437
v/s Ratio Prot	c0.21		c0.15		c0.83	0.23
v/s Ratio Perm		0.09		0.07		
v/c Ratio	1.24	0.51	1.05	0.52	1.38	0.30
Uniform Delay, d1	58.0	52.6	60.0	55.5	28.0	4.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	134.6	1.5	68.6	8.3	178.0	0.5
Delay (s)	192.6	54.1	128.6	63.8	206.0	5.3
Level of Service	F	D	F	E	F	A
Approach Delay (s)	110.3		92.4		161.0	
Approach LOS	F		F		F	

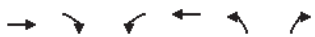
Intersection Summary				
HCM 2000 Control Delay	134.8	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.30			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	117.6%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	189	570	340	149	340	189
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	205	620	370	162	370	205
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	370				1400	370
vC1, stage 1 conf vol					370	
vC2, stage 2 conf vol					1030	
vCu, unblocked vol	370				1400	370
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	83				0	70
cM capacity (veh/h)	1189				269	676

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	205	620	370	162	575
Volume Left	205	0	0	0	370
Volume Right	0	0	0	162	205
cSH	1189	1700	1700	1700	343
Volume to Capacity	0.17	0.36	0.22	0.10	1.68
Queue Length 95th (ft)	16	0	0	0	878
Control Delay (s)	8.7	0.0	0.0	0.0	343.7
Lane LOS	A				F
Approach Delay (s)	2.2		0.0		343.7
Approach LOS					F

Intersection Summary			
Average Delay	103.3		
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	355	0	331	178	38	425
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	386	0	360	193	41	462
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			386		1299	386
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			386		1299	386
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			69		67	30
cM capacity (veh/h)			1173		124	662

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	386	360	193	503
Volume Left	0	360	0	41
Volume Right	0	0	0	462
cSH	1700	1173	1700	488
Volume to Capacity	0.23	0.31	0.11	1.03
Queue Length 95th (ft)	0	33	0	369
Control Delay (s)	0.0	9.4	0.0	78.7
Lane LOS		A		F
Approach Delay (s)	0.0	6.1		78.7
Approach LOS				F

Intersection Summary			
Average Delay	29.8		
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Yield	Stop		Yield	
Volume (vph)	502	97	104	54	16	476
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	546	105	113	59	17	517

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	651	172	535
Volume Left (vph)	546	0	17
Volume Right (vph)	0	59	517
Hadj (s)	0.20	-0.17	-0.54
Departure Headway (s)	6.1	6.4	5.6
Degree Utilization, x	1.0	0.31	0.83
Capacity (veh/h)	581	532	634
Control Delay (s)	92.4	12.3	30.3
Approach Delay (s)	92.4	12.3	30.3
Approach LOS	F	B	D

Intersection Summary			
Delay		57.8	
Level of Service		F	
Intersection Capacity Utilization		82.0%	ICU Level of Service E
Analysis Period (min)		15	



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2455	149	69	1532	70	78
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2668	162	75	1665	76	85
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			2830		4565	2749
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			2830		4565	2749
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			44		0	0
cM capacity (veh/h)			134		1	26

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	2830	1740	161
Volume Left	0	75	76
Volume Right	162	0	85
cSH	1700	134	1
Volume to Capacity	1.66	0.56	131.11
Queue Length 95th (ft)	0	69	Err
Control Delay (s)	0.0	61.2	Err
Lane LOS		F	F
Approach Delay (s)	0.0	61.2	Err
Approach LOS			F

Intersection Summary			
Average Delay		362.5	
Intersection Capacity Utilization		153.6%	ICU Level of Service H
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	186	1897	1553	674	730	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	0.95
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3378		1768	1504
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3378		1768	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	202	2062	1688	733	793	262
RTOR Reduction (vph)	0	0	33	0	1	79
Lane Group Flow (vph)	202	2062	2388	0	818	157
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	12.0	94.0	78.0		48.0	48.0
Effective Green, g (s)	12.0	94.0	78.0		48.0	48.0
Actuated g/C Ratio	0.08	0.63	0.52		0.32	0.32
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	141	2217	1756		565	481
v/s Ratio Prot	c0.11	0.58	c0.71		c0.46	
v/s Ratio Perm						0.10
v/c Ratio	1.43	0.93	1.36		1.45	0.33
Uniform Delay, d1	69.0	25.1	36.0		51.0	38.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	230.4	7.7	165.8		211.6	0.4
Delay (s)	299.4	32.8	201.8		262.6	39.1
Level of Service	F	C	F		F	D
Approach Delay (s)		56.6	201.8		212.6	
Approach LOS		E	F		F	

Intersection Summary				
HCM 2000 Control Delay	146.5	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.40			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	130.1%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	109	2152	347	563	1922	42	293	23	666	6	7	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00	0.95	0.99	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583		1780	2787	1681	1760	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00	0.95	0.99	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583		1780	2787	1681	1760	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	118	2339	377	612	2089	46	318	25	724	7	8	9
RTOR Reduction (vph)	0	0	190	0	0	17	0	0	239	0	0	0
Lane Group Flow (vph)	118	2339	187	612	2089	29	0	343	485	6	9	9
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2		1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	9.7	62.3	62.3	27.4	80.0	80.0		16.1	43.5	3.9	3.9	3.9
Effective Green, g (s)	9.7	62.3	62.3	27.4	80.0	80.0		16.1	43.5	3.9	3.9	3.9
Actuated g/C Ratio	0.08	0.50	0.50	0.22	0.64	0.64		0.13	0.35	0.03	0.03	0.03
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	264	2520	784	748	3236	1007		227	1053	52	54	49
v/s Ratio Prot	0.03	c0.46		c0.18	0.41			c0.19	0.10	0.00	0.01	
v/s Ratio Perm			0.12			0.02			0.07			c0.01
v/c Ratio	0.45	0.93	0.24	0.82	0.65	0.03		1.51	0.46	0.12	0.17	0.18
Uniform Delay, d1	55.4	29.6	18.1	46.8	14.1	8.5		54.8	32.0	59.2	59.3	59.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	6.7	0.2	6.9	0.4	0.0		251.4	0.3	1.0	1.5	1.8
Delay (s)	56.6	36.3	18.3	53.7	14.5	8.5		306.2	32.3	60.2	60.8	61.2
Level of Service	E	D	B	D	B	A		F	C	E	E	E
Approach Delay (s)		34.7			23.2			120.3			60.8	
Approach LOS		C			C			F			E	

Intersection Summary				
HCM 2000 Control Delay	43.8	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.96			
Actuated Cycle Length (s)	125.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	91.7%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	84	2179	911	510	1678	77	1064	72	566	86	40	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.91	0.88	0.97	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	2787	3433	5085	1583	3433	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	2368	990	554	1824	84	1157	78	615	93	43	71
RTOR Reduction (vph)	0	0	160	0	0	32	0	0	33	0	0	65
Lane Group Flow (vph)	91	2368	830	554	1824	52	1157	78	582	93	43	6
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	5	2	8	1	6		8	8	1	4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	12.3	67.0	99.0	21.0	75.7	75.7	32.0	32.0	53.0	12.0	12.0	12.0
Effective Green, g (s)	12.3	67.0	99.0	21.0	75.7	75.7	32.0	32.0	53.0	12.0	12.0	12.0
Actuated g/C Ratio	0.08	0.45	0.67	0.14	0.51	0.51	0.22	0.22	0.36	0.08	0.08	0.08
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	147	2301	1864	487	2600	809	742	402	609	143	151	128
v/s Ratio Prot	0.05	c0.47	0.10	c0.16	0.36		c0.34	0.04	0.14	c0.05	0.02	
v/s Ratio Perm			0.20			0.03			0.23			0.00
v/c Ratio	0.62	1.03	0.45	1.14	0.70	0.06	1.56	0.19	0.96	0.65	0.28	0.04
Uniform Delay, d1	65.6	40.5	11.6	63.5	27.5	18.3	58.0	47.5	46.3	66.0	64.0	62.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.5	26.7	0.2	84.3	0.9	0.0	258.3	0.2	25.5	10.1	1.0	0.1
Delay (s)	73.1	67.2	11.7	147.8	28.4	18.3	316.3	47.7	71.9	76.1	65.0	62.9
Level of Service	E	E	B	F	C	B	F	D	E	E	E	E
Approach Delay (s)		51.4			54.9			223.7			69.2	
Approach LOS		D			D			F			E	

Intersection Summary				
HCM 2000 Control Delay	93.0	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.14			
Actuated Cycle Length (s)	148.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	103.7%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	951	954	4	1	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	1863	1863	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	1863	1863	1583	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	1034	1037	4	1	7
RTOR Reduction (vph)	0	0	0	1	0	6
Lane Group Flow (vph)	4	1034	1037	3	1	1
Turn Type	Prot	NA	NA	Perm	Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases				6		4
Actuated Green, G (s)	0.6	39.9	35.3	35.3	5.8	6.4
Effective Green, g (s)	0.6	39.9	35.3	35.3	5.8	6.4
Actuated g/C Ratio	0.01	0.74	0.66	0.66	0.11	0.12
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	38	1384	1224	1040	191	306
v/s Ratio Prot	0.00	c0.56	c0.56		c0.00	0.00
v/s Ratio Perm				0.00		0.00
v/c Ratio	0.11	0.75	0.85	0.00	0.01	0.00
Uniform Delay, d1	26.3	4.0	7.1	3.2	21.4	20.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	2.2	5.6	0.0	0.0	0.0
Delay (s)	27.5	6.2	12.7	3.2	21.4	20.8
Level of Service	C	A	B	A	C	C
Approach Delay (s)		6.3	12.7		20.9	
Approach LOS		A	B		C	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	53.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	67	908	0	3	904	181	2	3	11	222	3	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3539		1770	3451			1675			1775	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (perm)	1770	3539		1770	3451			1675			1775	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	987	0	3	983	197	2	3	12	241	3	85
RTOR Reduction (vph)	0	0	0	0	17	0	0	11	0	0	0	68
Lane Group Flow (vph)	73	987	0	3	1163	0	0	6	0	0	244	17
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												4
Actuated Green, G (s)	5.1	40.2		0.7	35.8			6.1			15.7	15.7
Effective Green, g (s)	5.1	40.2		0.7	35.8			6.1			15.7	15.7
Actuated g/C Ratio	0.06	0.51		0.01	0.45			0.08			0.20	0.20
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	114	1807		15	1569			129			354	315
v/s Ratio Prot	c0.04	0.28		0.00	c0.34			c0.00			c0.14	
v/s Ratio Perm												0.01
v/c Ratio	0.64	0.55		0.20	0.74			0.05			0.69	0.05
Uniform Delay, d1	35.9	13.1		38.7	17.6			33.6			29.2	25.5
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	11.6	0.3		6.5	1.9			0.1			5.5	0.1
Delay (s)	47.5	13.4		45.2	19.6			33.8			34.7	25.6
Level of Service	D	B		D	B			C			C	C
Approach Delay (s)		15.8			19.6			33.8			32.4	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	78.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	63.6%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	192	1041	7	13	901	56	6	0	14	6	0	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.95	1.00
Satd. Flow (prot)	1770	1861		1770	1846			1665			1770	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.91			0.74	1.00
Satd. Flow (perm)	1770	1861		1770	1846			1547			1384	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	209	1132	8	14	979	61	7	0	15	7	0	207
RTOR Reduction (vph)	0	0	0	0	2	0	0	20	0	0	0	189
Lane Group Flow (vph)	209	1140	0	14	1038	0	0	2	0	0	7	18
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		6
Actuated Green, G (s)	10.0	62.9		0.7	53.6			7.4			7.4	7.4
Effective Green, g (s)	10.0	62.9		0.7	53.6			7.4			7.4	7.4
Actuated g/C Ratio	0.12	0.76		0.01	0.65			0.09			0.09	0.09
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	213	1410		14	1192			137			123	141
v/s Ratio Prot	c0.12	0.61		0.01	c0.56							
v/s Ratio Perm								0.00			0.01	c0.01
v/c Ratio	0.98	0.81		1.00	0.87			0.01			0.06	0.13
Uniform Delay, d1	36.4	6.3		41.1	11.9			34.5			34.6	34.8
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	56.0	3.5		240.5	7.2			0.0			0.2	0.4
Delay (s)	92.4	9.8		281.7	19.1			34.5			34.8	35.3
Level of Service	F	A		F	B			C			C	D
Approach Delay (s)		22.6			22.6			34.5			35.2	
Approach LOS		C			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	83.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	78.2%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	683	609	122	724	66	371	186	233	64	245	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.96			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1748			1830	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.64			0.78	
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1140			1444	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	742	662	133	787	72	403	202	253	70	266	21
RTOR Reduction (vph)	0	0	86	0	0	31	0	14	0	0	2	0
Lane Group Flow (vph)	20	742	576	133	787	41	0	844	0	0	355	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.6	38.4	38.4	6.0	42.8	42.8		56.0			56.0	
Effective Green, g (s)	1.6	38.4	38.4	6.0	42.8	42.8		56.0			56.0	
Actuated g/C Ratio	0.01	0.34	0.34	0.05	0.38	0.38		0.50			0.50	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	25	636	540	94	709	602		567			719	
v/s Ratio Prot	0.01	0.40		c0.08	c0.42							
v/s Ratio Perm			0.36			0.03		c0.74			0.25	
v/c Ratio	0.80	1.17	1.07	1.41	1.11	0.07		1.49			0.49	
Uniform Delay, d1	55.2	37.0	37.0	53.2	34.8	22.1		28.2			18.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	95.2	91.3	58.0	237.9	68.1	0.0		229.1			0.5	
Delay (s)	150.4	128.3	95.0	291.1	102.9	22.2		257.3			19.3	
Level of Service	F	F	F	F	F	C		F			B	
Approach Delay (s)		113.1			122.3			257.3			19.3	
Approach LOS		F			F			F			B	

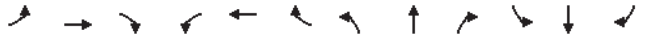
Intersection Summary				
HCM 2000 Control Delay	140.5	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.36			
Actuated Cycle Length (s)	112.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	118.2%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	19	16	8	757	965	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	17	9	823	1049	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1899	1059	1070			
vC1, stage 1 conf vol	1059					
vC2, stage 2 conf vol	840					
vCu, unblocked vol	1899	1059	1070			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	94	99			
cM capacity (veh/h)	264	273	652			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	38	9	823	1070
Volume Left	21	9	0	0
Volume Right	17	0	0	21
cSH	268	652	1700	1700
Volume to Capacity	0.14	0.01	0.48	0.63
Queue Length 95th (ft)	12	1	0	0
Control Delay (s)	20.7	10.6	0.0	0.0
Lane LOS	C	B		
Approach Delay (s)	20.7	0.1		0.0
Approach LOS	C			

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	61.9%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	0	95	6	0	24	103	752	8	13	720	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.89			0.89		1.00	1.00		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1637			1647		1770	1860		1770	1851	
Flt Permitted		0.94			0.95		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1551			1582		1770	1860		1770	1851	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	0	103	7	0	26	112	817	9	14	783	34
RTOR Reduction (vph)	0	103	0	0	30	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	18	0	0	3	0	112	826	0	14	815	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		4.0			4.0		3.2	25.5		0.7	23.0	
Effective Green, g (s)		4.0			4.0		3.2	25.5		0.7	23.0	
Actuated g/C Ratio		0.09			0.09		0.08	0.60		0.02	0.55	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		147			149		134	1123		29	1008	
v/s Ratio Prot							c0.06	c0.44		0.01	0.44	
v/s Ratio Perm		c0.01			0.00							
v/c Ratio		0.12			0.02		0.84	0.74		0.48	0.81	
Uniform Delay, d1		17.5			17.3		19.2	5.9		20.6	7.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.1		34.1	2.5		12.1	4.8	
Delay (s)		17.9			17.4		53.3	8.5		32.7	12.7	
Level of Service		B			B		D	A		C	B	
Approach Delay (s)		17.9			17.4			13.8			13.0	
Approach LOS		B			B			B			B	

Intersection Summary				
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	42.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	63.9%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	597	163	136	229	422	512
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.93	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	3433	1583	1770	1863	1725	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	3433	1583	1770	1863	1725	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	649	177	148	249	459	557
RTOR Reduction (vph)	0	125	0	0	89	0
Lane Group Flow (vph)	649	52	148	249	927	0
Turn Type	Perm	Perm	Prot	NA	NA	
Protected Phases			5	2	6	
Permitted Phases	4	4				
Actuated Green, G (s)	13.5	13.5	4.0	24.1	16.1	
Effective Green, g (s)	13.5	13.5	4.0	24.1	16.1	
Actuated g/C Ratio	0.30	0.30	0.09	0.53	0.35	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1016	468	155	984	609	
v/s Ratio Prot			c0.08	0.13	c0.54	
v/s Ratio Perm	c0.19	0.03				
v/c Ratio	0.64	0.11	0.95	0.25	1.52	
Uniform Delay, d1	13.9	11.7	20.7	5.9	14.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.3	0.1	58.4	0.1	243.6	
Delay (s)	15.3	11.8	79.1	6.0	258.3	
Level of Service	B	B	E	A	F	
Approach Delay (s)	14.5			33.2	258.3	
Approach LOS	B			C	F	

Intersection Summary				
HCM 2000 Control Delay	128.5	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.10			
Actuated Cycle Length (s)	45.6	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	88.1%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	135	45	409	125	49	578
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	147	49	445	136	53	628
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			966			
pX, platoon unblocked	0.84	0.84			0.84	
vC, conflicting volume	1247	512			580	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1200	326			407	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	10	92			95	
cM capacity (veh/h)	163	602			969	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	196	580	53	628
Volume Left	147	0	53	0
Volume Right	49	136	0	0
cSH	199	1700	969	1700
Volume to Capacity	0.98	0.34	0.05	0.37
Queue Length 95th (ft)	209	0	4	0
Control Delay (s)	109.0	0.0	8.9	0.0
Lane LOS	F		A	
Approach Delay (s)	109.0	0.0	0.7	
Approach LOS	F			

Intersection Summary				
Average Delay			15.0	
Intersection Capacity Utilization			52.7%	ICU Level of Service A
Analysis Period (min)			15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	185	113	163	14	122	39	134	336	13	49	499	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1796		1770	1852		1770	1863	1583
Flt Permitted	0.64	1.00	1.00	0.68	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1189	1863	1583	1263	1796		1770	1852		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	201	123	177	15	133	42	146	365	14	53	542	230
RTOR Reduction (vph)	0	0	132	0	19	0	0	2	0	0	0	134
Lane Group Flow (vph)	201	123	45	15	156	0	146	377	0	53	542	96
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	13.3	13.3	13.3	13.3	13.3		5.1	23.7		3.1	21.7	21.7
Effective Green, g (s)	13.3	13.3	13.3	13.3	13.3		5.1	23.7		3.1	21.7	21.7
Actuated g/C Ratio	0.26	0.26	0.26	0.26	0.26		0.10	0.45		0.06	0.42	0.42
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	303	475	404	322	458		173	842		105	775	659
v/s Ratio Prot		0.07			0.09		c0.08	0.20		0.03	c0.29	
v/s Ratio Perm	c0.17		0.03	0.01								0.06
v/c Ratio	0.66	0.26	0.11	0.05	0.34		0.84	0.45		0.50	0.70	0.15
Uniform Delay, d1	17.4	15.5	14.9	14.6	15.8		23.1	9.7		23.8	12.5	9.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.4	0.3	0.1	0.1	0.4		29.5	0.4		3.8	2.8	0.1
Delay (s)	22.8	15.8	15.0	14.7	16.3		52.6	10.1		27.5	15.3	9.5
Level of Service	C	B	B	B	B		D	B		C	B	A
Approach Delay (s)		18.3			16.1			21.9			14.5	
Approach LOS		B			B			C			B	

Intersection Summary						
HCM 2000 Control Delay		17.5	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio		0.69				
Actuated Cycle Length (s)		52.1	Sum of lost time (s)		12.0	
Intersection Capacity Utilization		66.1%	ICU Level of Service		C	
Analysis Period (min)		15				
c Critical Lane Group						



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	124	2	1307	29	5	1	681	821	7	1	1565	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1775	1583	1770	1863	1583	3433	3534		1770	1863	1583
Flt Permitted		0.95	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1775	1583	1770	1863	1583	3433	3534		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	135	2	1421	32	5	1	740	892	8	1	1701	139
RTOR Reduction (vph)	0	0	96	0	0	1	0	0	0	0	0	47
Lane Group Flow (vph)	0	137	1325	32	5	0	740	900	0	1	1701	92
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA		Prot	NA	Perm
Protected Phases	4	4	5	8	8	1	5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)		14.2	48.3	5.3	5.3	6.1	34.1	104.9		0.8	71.6	71.6
Effective Green, g (s)		14.2	48.3	5.3	5.3	6.1	34.1	104.9		0.8	71.6	71.6
Actuated g/C Ratio		0.10	0.34	0.04	0.04	0.04	0.24	0.74		0.01	0.51	0.51
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		178	541	66	69	113	829	2625		10	944	802
v/s Ratio Prot		0.08	c0.59	c0.02	0.00	0.00	0.22	0.25		0.00	c0.91	
v/s Ratio Perm			0.25			0.00						0.06
v/c Ratio		0.77	2.45	0.48	0.07	0.00	0.89	0.34		0.10	1.80	0.11
Uniform Delay, d1		61.9	46.4	66.6	65.6	64.6	51.8	6.3		69.8	34.8	18.2
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		18.0	657.7	5.5	0.4	0.0	11.9	0.4		4.4	365.1	0.3
Delay (s)		79.9	704.1	72.1	66.0	64.6	63.7	6.6		74.2	399.9	18.5
Level of Service		E	F	E	E	E	E	A		E	F	B
Approach Delay (s)		649.2			71.1			32.4			370.9	
Approach LOS		F			E			C			F	

Intersection Summary				
HCM 2000 Control Delay	344.7	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.99			
Actuated Cycle Length (s)	141.2	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	176.6%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	310	1038	726	182	1031	69	794	78	150	127	124	286
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	1863	1583	3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	337	1128	789	198	1121	75	863	85	163	138	135	311
RTOR Reduction (vph)	0	0	177	0	0	58	0	0	100	0	0	139
Lane Group Flow (vph)	337	1128	612	198	1121	17	863	85	63	138	135	172
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	8.0	20.0	41.0	6.0	18.0	18.0	21.0	31.1	31.1	6.9	17.0	17.0
Effective Green, g (s)	8.0	20.0	41.0	6.0	18.0	18.0	21.0	31.1	31.1	6.9	17.0	17.0
Actuated g/C Ratio	0.10	0.25	0.51	0.08	0.22	0.22	0.26	0.39	0.39	0.09	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	343	1271	890	257	1144	356	901	724	615	296	395	336
v/s Ratio Prot	c0.10	c0.22	0.18	0.06	0.22		c0.25	0.05		0.04	0.07	
v/s Ratio Perm			0.21			0.01			0.04			c0.11
v/c Ratio	0.98	0.89	0.69	0.77	0.98	0.05	0.96	0.12	0.10	0.47	0.34	0.51
Uniform Delay, d1	35.9	28.9	14.7	36.3	30.8	24.3	29.1	15.7	15.6	34.8	26.7	27.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	43.6	7.8	2.2	13.3	21.6	0.1	20.2	0.3	0.3	1.2	2.3	5.5
Delay (s)	79.5	36.7	16.9	49.6	52.4	24.3	49.3	16.0	15.9	36.0	29.1	33.3
Level of Service	E	D	B	D	D	C	D	B	B	D	C	C
Approach Delay (s)		36.2			50.5			41.8			32.9	
Approach LOS		D			D			D			C	

Intersection Summary				
HCM 2000 Control Delay	40.7	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	71.3%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	390	531	209	392	6	381	6	247	4	11	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85			0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	3531		1770	1590			1743	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.99	
Satd. Flow (perm)	1770	1863	1583	1770	3531		1770	1590			1743	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	424	577	227	426	7	414	7	268	4	12	12
RTOR Reduction (vph)	0	0	227	0	1	0	0	188	0	0	12	0
Lane Group Flow (vph)	7	424	350	227	432	0	414	87	0	0	16	0
Turn Type	Prot	NA	pm+ov	Prot	NA		Split	NA		Split	NA	
Protected Phases	7	4	2	3	8		2	2		6	6	
Permitted Phases			4									
Actuated Green, G (s)	0.7	24.2	47.5	12.1	35.6		23.3	23.3			2.7	
Effective Green, g (s)	0.7	24.2	47.5	12.1	35.6		23.3	23.3			2.7	
Actuated g/C Ratio	0.01	0.31	0.61	0.15	0.45		0.30	0.30			0.03	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	15	575	1041	273	1605		526	473			60	
v/s Ratio Prot	0.00	c0.23	0.10	c0.13	0.12		c0.23	0.05			c0.01	
v/s Ratio Perm			0.12									
v/c Ratio	0.47	0.74	0.34	0.83	0.27		0.79	0.18			0.27	
Uniform Delay, d1	38.6	24.2	7.6	32.1	13.3		25.2	20.4			36.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	21.2	4.9	0.2	19.0	0.1		11.3	0.9			2.5	
Delay (s)	59.8	29.1	7.8	51.1	13.4		36.5	21.3			39.3	
Level of Service	E	C	A	D	B		D	C			D	
Approach Delay (s)		17.1			26.3			30.5			39.3	
Approach LOS		B			C			C			D	

Intersection Summary				
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	78.3	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	69.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	263	490	211	210	650	298
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1583	1863	1583	1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	286	533	229	228	707	324
RTOR Reduction (vph)	0	426	0	177	0	0
Lane Group Flow (vph)	286	107	229	51	707	324
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	14.8	14.8	16.5	16.5	30.6	51.1
Effective Green, g (s)	14.8	14.8	16.5	16.5	30.6	51.1
Actuated g/C Ratio	0.20	0.20	0.22	0.22	0.41	0.69
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	354	317	415	353	732	1288
v/s Ratio Prot	c0.16		c0.12		c0.40	0.17
v/s Ratio Perm		0.07		0.03		
v/c Ratio	0.81	0.34	0.55	0.14	0.97	0.25
Uniform Delay, d1	28.2	25.3	25.4	23.0	21.1	4.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.7	0.6	5.2	0.9	24.9	0.5
Delay (s)	40.9	26.0	30.6	23.9	46.0	4.7
Level of Service	D	C	C	C	D	A
Approach Delay (s)	31.2		27.3			33.0
Approach LOS	C		C			C

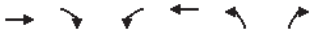
Intersection Summary			
HCM 2000 Control Delay	31.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	73.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	113	240	207	139	177	215
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	123	261	225	151	192	234
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	225				732	225
vC1, stage 1 conf vol					225	
vC2, stage 2 conf vol					507	
vCu, unblocked vol	225				732	225
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	91				63	71
cM capacity (veh/h)	1344				515	814

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	123	261	225	151	426
Volume Left	123	0	0	0	192
Volume Right	0	0	0	151	234
cSH	1344	1700	1700	1700	645
Volume to Capacity	0.09	0.15	0.13	0.09	0.66
Queue Length 95th (ft)	8	0	0	0	124
Control Delay (s)	7.9	0.0	0.0	0.0	20.8
Lane LOS	A				C
Approach Delay (s)	2.5		0.0		20.8
Approach LOS					C

Intersection Summary				
Average Delay	8.3			
Intersection Capacity Utilization	50.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	171	0	235	183	28	234
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	186	0	255	199	30	254
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			186		896	186
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			186		896	186
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			82		88	70
cM capacity (veh/h)			1389		254	856

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	186	255	199	285
Volume Left	0	255	0	30
Volume Right	0	0	0	254
cSH	1700	1389	1700	683
Volume to Capacity	0.11	0.18	0.12	0.42
Queue Length 95th (ft)	0	17	0	52
Control Delay (s)	0.0	8.2	0.0	14.0
Lane LOS		A		B
Approach Delay (s)	0.0	4.6		14.0
Approach LOS				B

Intersection Summary				
Average Delay	6.6			
Intersection Capacity Utilization	48.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Yield	Stop		Yield	
Volume (vph)	626	86	100	61	34	553
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	680	93	109	66	37	601

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	774	175	638
Volume Left (vph)	680	0	37
Volume Right (vph)	0	66	601
Hadj (s)	0.21	-0.19	-0.52
Departure Headway (s)	6.5	6.8	5.7
Degree Utilization, x	1.0	0.33	1.0
Capacity (veh/h)	568	525	638
Control Delay (s)	208.9	13.2	59.8
Approach Delay (s)	208.9	13.2	59.8
Approach LOS	F	B	F

Intersection Summary			
Delay	127.4		
Level of Service	F		
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1140	127	17	1006	13	53
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1239	138	18	1093	14	58
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1377		2439	1308
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1377		2439	1308
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		58	70
cM capacity (veh/h)			498		33	195

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1377	1112	72
Volume Left	0	18	14
Volume Right	138	0	58
cSH	1700	498	100
Volume to Capacity	0.81	0.04	0.72
Queue Length 95th (ft)	0	3	93
Control Delay (s)	0.0	1.5	102.9
Lane LOS		A	F
Approach Delay (s)	0.0	1.5	102.9
Approach LOS			F

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	155	2	66	2	4	47	108	461	24	55	162	313
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		0.97	1.00		1.00	1.00	1.00
Frt	1.00	0.85			0.88		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1591			1635		3433	1849		1770	1863	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1591			1635		3433	1849		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	2	72	2	4	51	117	501	26	60	176	340
RTOR Reduction (vph)	0	63	0	0	47	0	0	2	0	0	0	203
Lane Group Flow (vph)	168	11	0	0	10	0	117	525	0	60	176	137
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	6.3	6.3			3.4		3.2	20.6		2.1	19.5	19.5
Effective Green, g (s)	6.3	6.3			3.4		3.2	20.6		2.1	19.5	19.5
Actuated g/C Ratio	0.13	0.13			0.07		0.07	0.43		0.04	0.40	0.40
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	446	207			114		226	786		76	750	637
v/s Ratio Prot	c0.05	0.01			c0.01		c0.03	c0.28		0.03	0.09	
v/s Ratio Perm												0.09
v/c Ratio	0.38	0.05			0.08		0.52	0.67		0.79	0.23	0.22
Uniform Delay, d1	19.3	18.4			21.0		21.9	11.2		22.9	9.5	9.4
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.5	0.1			0.3		2.0	2.2		40.6	0.2	0.2
Delay (s)	19.8	18.6			21.4		23.9	13.3		63.5	9.7	9.6
Level of Service	B	B			C		C	B		E	A	A
Approach Delay (s)		19.4			21.4			15.2			15.3	
Approach LOS		B			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	48.4	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	50.1%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	593	230	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	645	250	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	895	250	250			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	895	250	250			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	311	789	1316			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	645	250
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1316	1700
Volume to Capacity	0.00	0.00	0.15
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	528	8	174	10	7	22	169	222	0	13	539	485
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		0.97	1.00		1.00	1.00	1.00
Frt	1.00	0.86			0.92		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1596			1701		3433	1863		1770	1863	1583
Flt Permitted	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1596			1701		3433	1863		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	574	9	189	11	8	24	184	241	0	14	586	527
RTOR Reduction (vph)	0	143	0	0	23	0	0	0	0	0	0	340
Lane Group Flow (vph)	574	55	0	0	20	0	184	241	0	14	586	187
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	13.5	13.5			2.5		4.1	23.2		0.7	19.8	19.8
Effective Green, g (s)	13.5	13.5			2.5		4.1	23.2		0.7	19.8	19.8
Actuated g/C Ratio	0.24	0.24			0.04		0.07	0.42		0.01	0.35	0.35
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	829	385			76		251	773		22	659	560
v/s Ratio Prot	c0.17	0.03			c0.01		c0.05	c0.13		0.01	c0.31	
v/s Ratio Perm												0.12
v/c Ratio	0.69	0.14			0.26		0.73	0.31		0.64	0.89	0.33
Uniform Delay, d1	19.3	16.7			25.8		25.4	11.0		27.5	17.0	13.2
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.5	0.2			1.9		10.5	0.2		47.5	13.9	0.4
Delay (s)	21.8	16.8			27.7		35.9	11.2		75.0	30.9	13.6
Level of Service	C	B			C		D	B		E	C	B
Approach Delay (s)		20.5			27.7			21.9			23.3	
Approach LOS		C			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	55.9	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	64.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	391	723	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	425	786	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1211	786	786			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1211	786	786			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	201	392	833			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	425	786
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	833	1700
Volume to Capacity	0.00	0.00	0.46
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	348	18	117	2	5	50	130	216	3	59	466	389
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		0.97	1.00		1.00	1.00	1.00
Frt	1.00	0.87			0.88		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1621			1637		3433	1859		1770	1863	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1621			1637		3433	1859		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	378	20	127	2	5	54	141	235	3	64	507	423
RTOR Reduction (vph)	0	100	0	0	50	0	0	1	0	0	0	274
Lane Group Flow (vph)	378	47	0	0	11	0	141	237	0	64	507	149
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	11.2	11.2			3.6		3.0	19.2		2.1	18.3	18.3
Effective Green, g (s)	11.2	11.2			3.6		3.0	19.2		2.1	18.3	18.3
Actuated g/C Ratio	0.21	0.21			0.07		0.06	0.37		0.04	0.35	0.35
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	737	348			113		197	685		71	654	556
v/s Ratio Prot	c0.11	0.03			c0.01		c0.04	0.13		0.04	c0.27	
v/s Ratio Perm												0.09
v/c Ratio	0.51	0.14			0.09		0.72	0.35		0.90	0.78	0.27
Uniform Delay, d1	18.0	16.5			22.7		24.1	11.9		24.9	15.1	12.1
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	0.2			0.4		11.7	0.3		73.4	5.7	0.3
Delay (s)	18.6	16.7			23.1		35.8	12.2		98.3	20.8	12.4
Level of Service	B	B			C		D	B		F	C	B
Approach Delay (s)		18.1			23.1			21.0			22.2	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	52.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	54.8%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	349	585	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	379	636	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1015	636	636			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1015	636	636			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	264	478	948			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	379	636
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	948	1700
Volume to Capacity	0.00	0.00	0.37
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	519	8	178	0	7	24	158	253	0	13	294	490
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		0.97	1.00		1.00	1.00	1.00
Frt	1.00	0.86			0.90		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1596			1670		3433	1863		1770	1863	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1596			1670		3433	1863		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	564	9	193	0	8	26	172	275	0	14	320	533
RTOR Reduction (vph)	0	148	0	0	20	0	0	0	0	0	0	408
Lane Group Flow (vph)	564	54	0	0	14	0	172	275	0	14	320	125
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	16.0	16.0			16.0		4.0	16.0		4.0	16.0	16.0
Effective Green, g (s)	16.0	16.0			16.0		4.0	16.0		4.0	16.0	16.0
Actuated g/C Ratio	0.24	0.24			0.24		0.06	0.24		0.06	0.24	0.24
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Grp Cap (vph)	807	375			392		201	438		104	438	372
v/s Ratio Prot	c0.16	0.03			c0.01		c0.05	0.15		0.01	c0.17	
v/s Ratio Perm												0.08
v/c Ratio	0.70	0.15			0.04		0.86	0.63		0.13	0.73	0.34
Uniform Delay, d1	23.8	20.6			20.1		31.7	23.3		30.4	24.0	21.6
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.0	0.8			0.2		34.6	6.7		2.7	10.3	2.4
Delay (s)	28.8	21.4			20.2		66.4	30.0		33.0	34.3	24.0
Level of Service	C	C			C		E	C		C	C	C
Approach Delay (s)		26.8			20.2			44.0			28.0	
Approach LOS		C			C			D			C	

Intersection Summary				
HCM 2000 Control Delay	30.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.52			
Actuated Cycle Length (s)	68.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	51.5%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	411	472	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	447	513	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	960	513	513			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	960	513	513			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	285	561	1052			

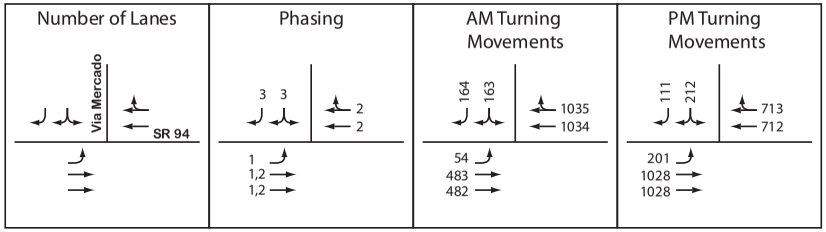
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	447	513
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1052	1700
Volume to Capacity	0.00	0.00	0.30
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

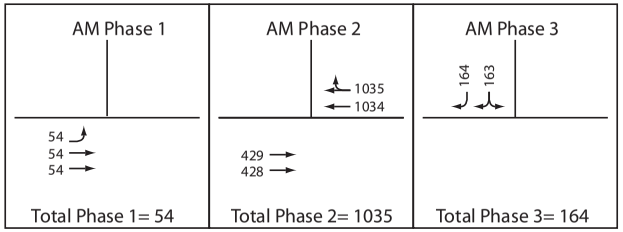
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

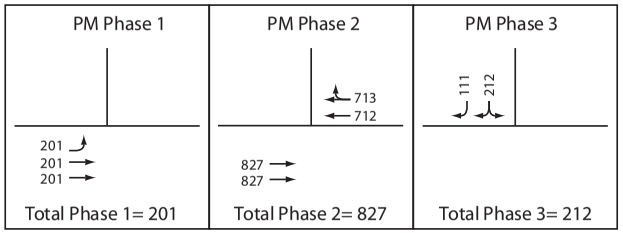
APPENDIX F

- ILV Analysis Worksheets

Intersection Name: SR 94 & Via Mercado
Date: August 27, 2013
Scenario: Existing Baseline Weekday



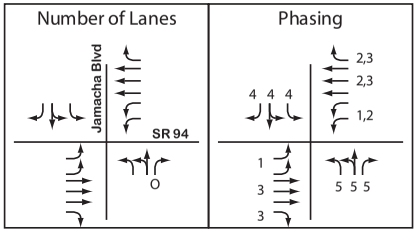


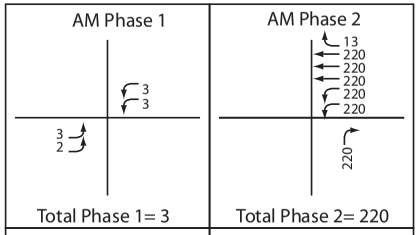


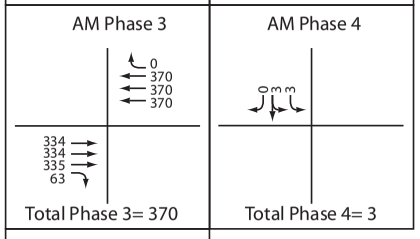
AM TOTAL= 1253 AM LOS= Approaching Capacity

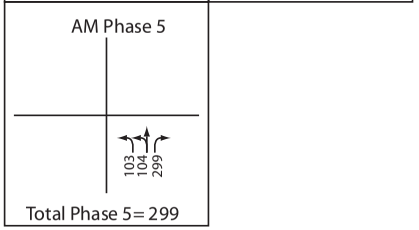
PM TOTAL= 1240 PM LOS= Approaching Capacity

Intersection Name: SR 94 & Jamacha Blvd
Date: August 27, 2013
Scenario: Existing Baseline Weekday





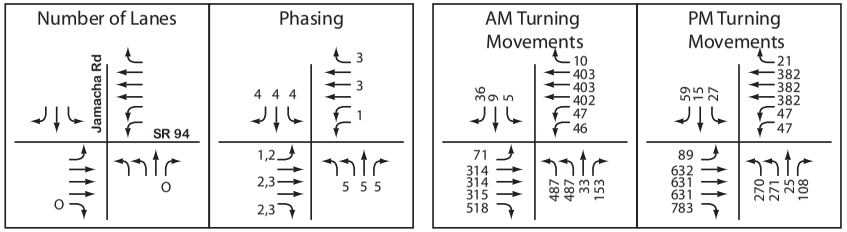


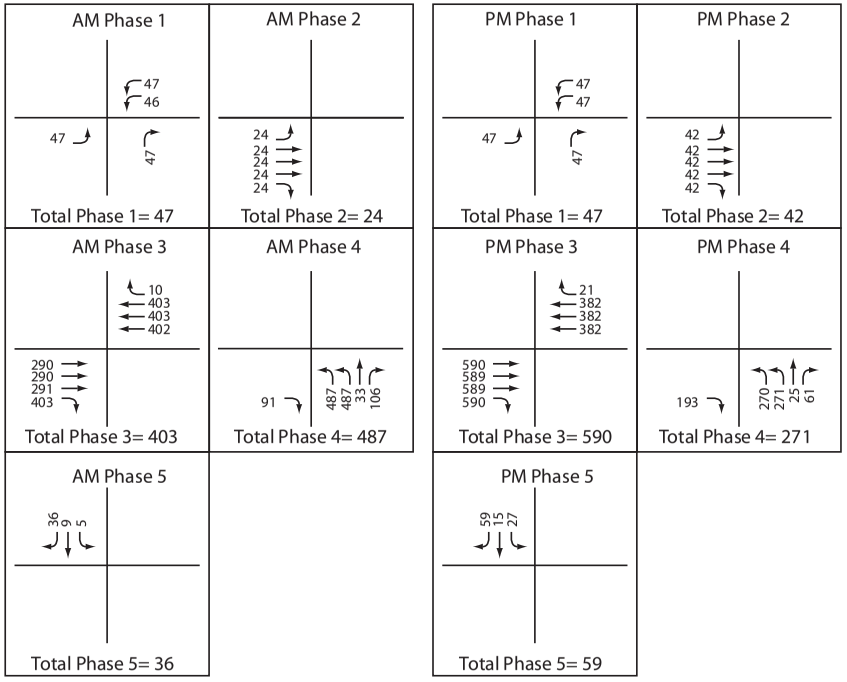


AM TOTAL= 895
AM LOS= Below Capacity

PM TOTAL= 1346
PM LOS= Approaching Capacity

Intersection Name: SR 94 & Jamacha Rd
Date: August 27, 2013
Scenario: Existing Baseline Weekday

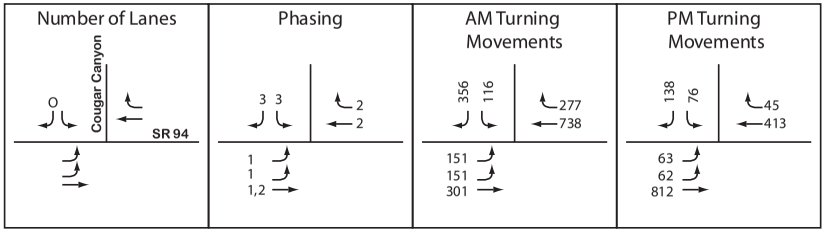


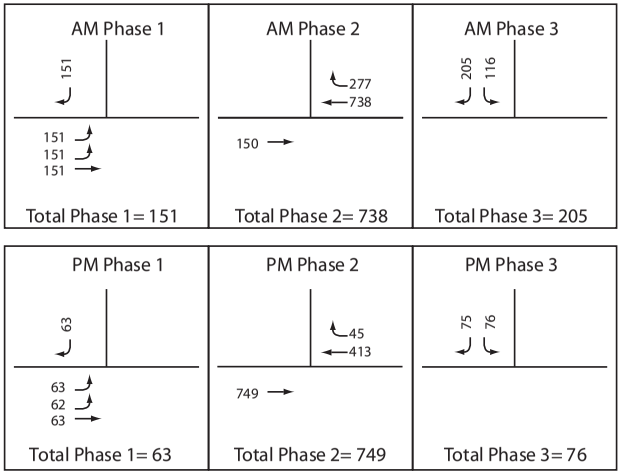


AM TOTAL= 997
AM LOS= Below Capacity

PM TOTAL= 1009
PM LOS= Below Capacity

Intersection Name: SR 94 & Cougar Canyon Rd
Date: August 27, 2013
Scenario: Existing Baseline Weekday

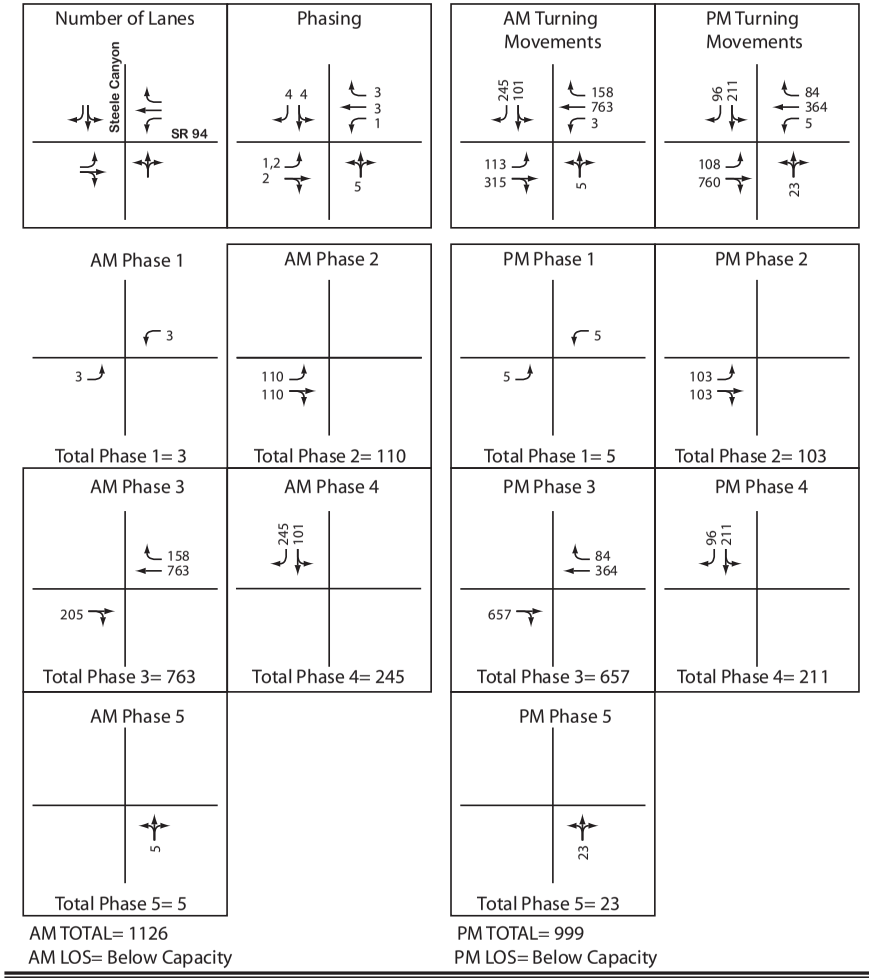




AM TOTAL= 1094
AM LOS= Below Capacity

PM TOTAL= 888
PM LOS= Below Capacity

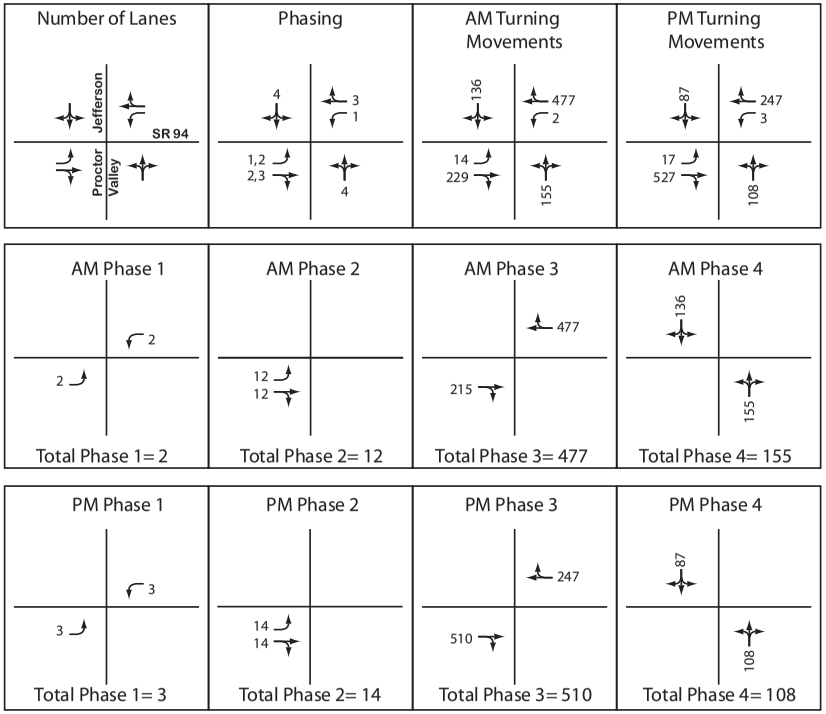
Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Existing Baseline Weekday



AM TOTAL= 1126
AM LOS= Below Capacity

PM TOTAL= 999
PM LOS= Below Capacity

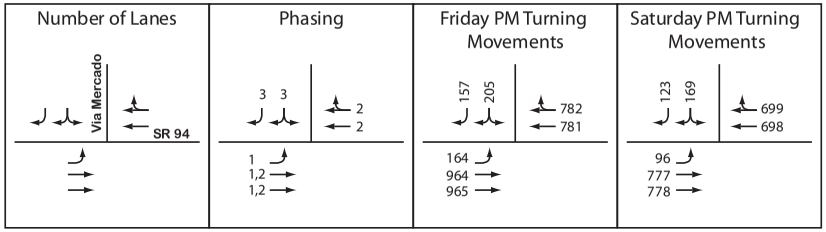
Intersection Name: SR 94 & Proctor Valley Rd/Jefferson Rd
Date: August 27, 2013
Scenario: Existing Baseline Weekday

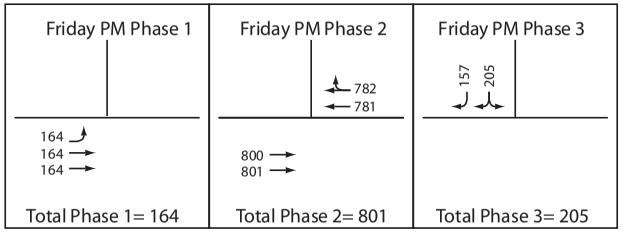


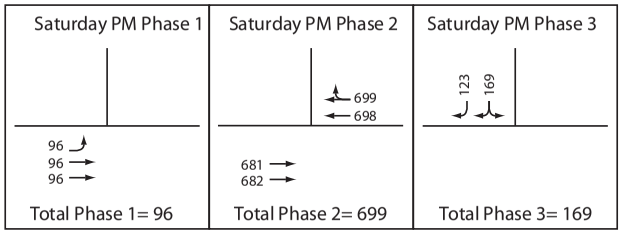
AM TOTAL= 646
AM LOS= Below Capacity

PM TOTAL= 635
PM LOS= Below Capacity

Intersection Name: SR 94 & Via Mercado
Date: August 27, 2013
Scenario: Existing Baseline Friday/Saturday







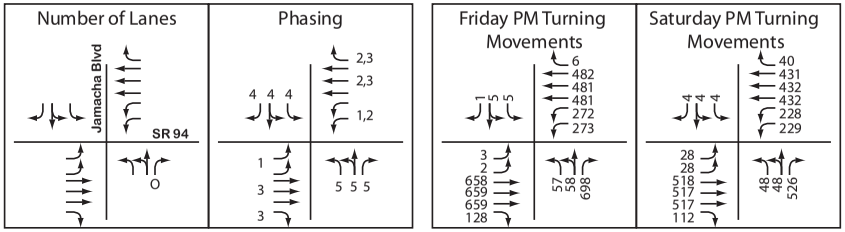
Friday PM TOTAL= 1170

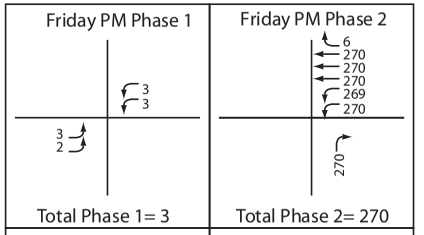
Friday PM LOS= Below Capacity

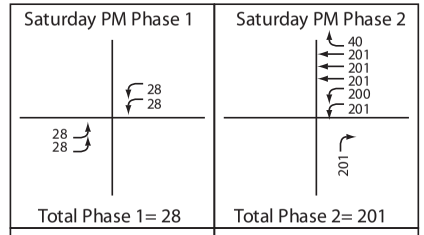
Saturday PM TOTAL= 964

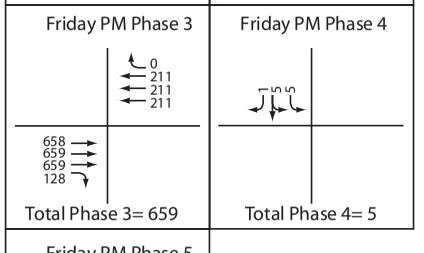
Saturday PM LOS= Below Capacity

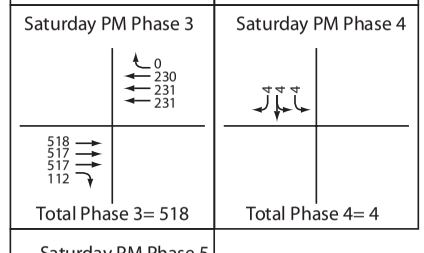
Intersection Name: SR 94 & Jamacha Blvd
Date: August 27, 2013
Scenario: Existing Baseline Friday/Saturday

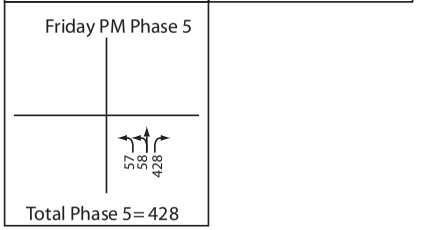


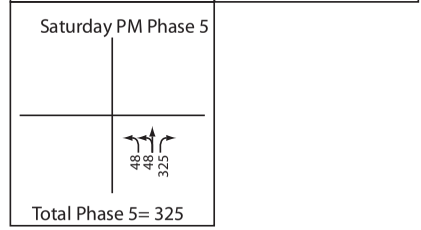








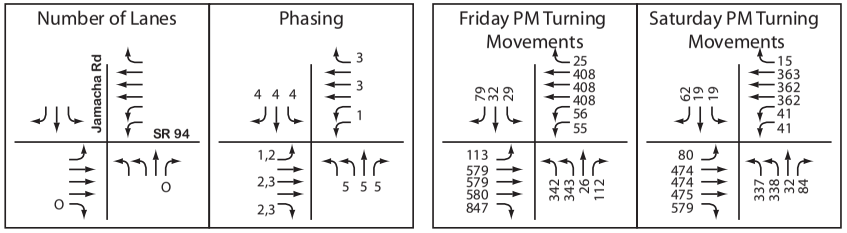


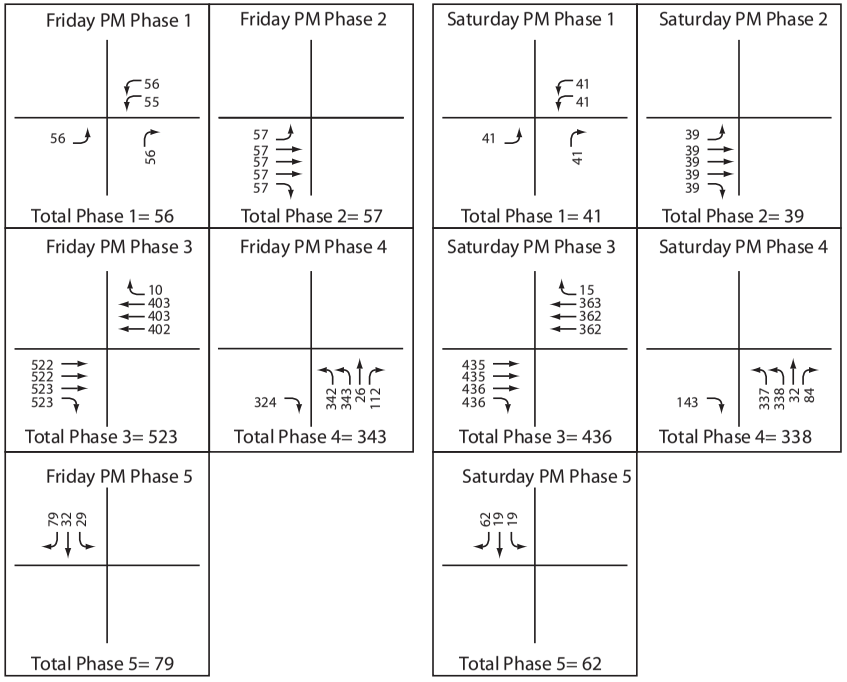


Friday PM TOTAL= 1365
Friday PM LOS= Approaching Capacity

Saturday PM TOTAL= 1076
Saturday PM LOS= Below Capacity

Intersection Name: SR 94 & Jamacha Rd
Date: August 27, 2013
Scenario: Existing Baseline Friday/Saturday

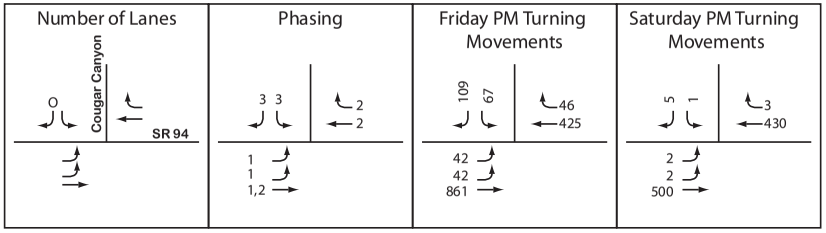


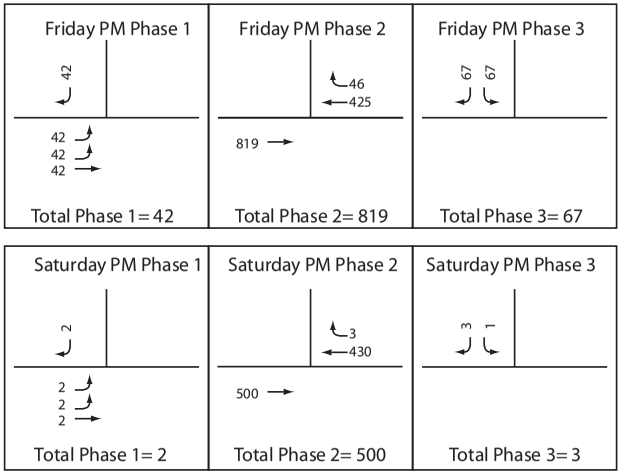


Friday PM TOTAL= 1058
Friday PM LOS= Below Capacity

Saturday PM TOTAL= 916
Saturday PM LOS= Below Capacity

Intersection Name: SR 94 & Cougar Canyon Rd
Date: August 27, 2013
Scenario: Existing Baseline Friday/Saturday

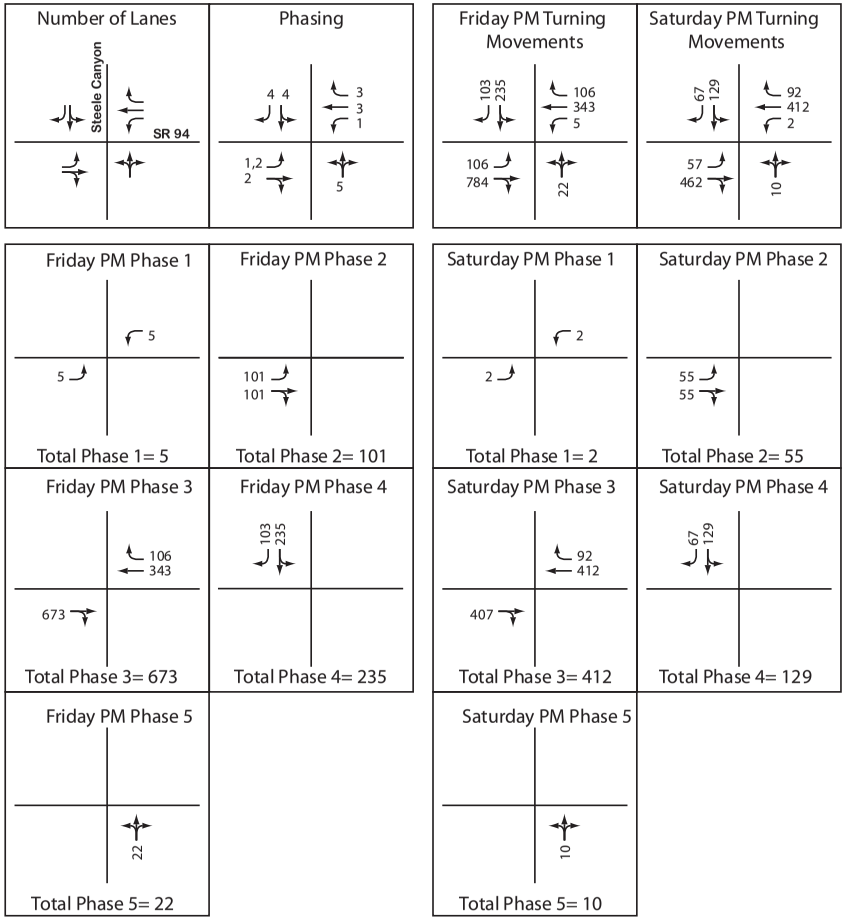




Friday PM TOTAL= 928
Friday PM LOS= Below Capacity

Saturday PM TOTAL= 505
Saturday PM LOS= Below Capacity

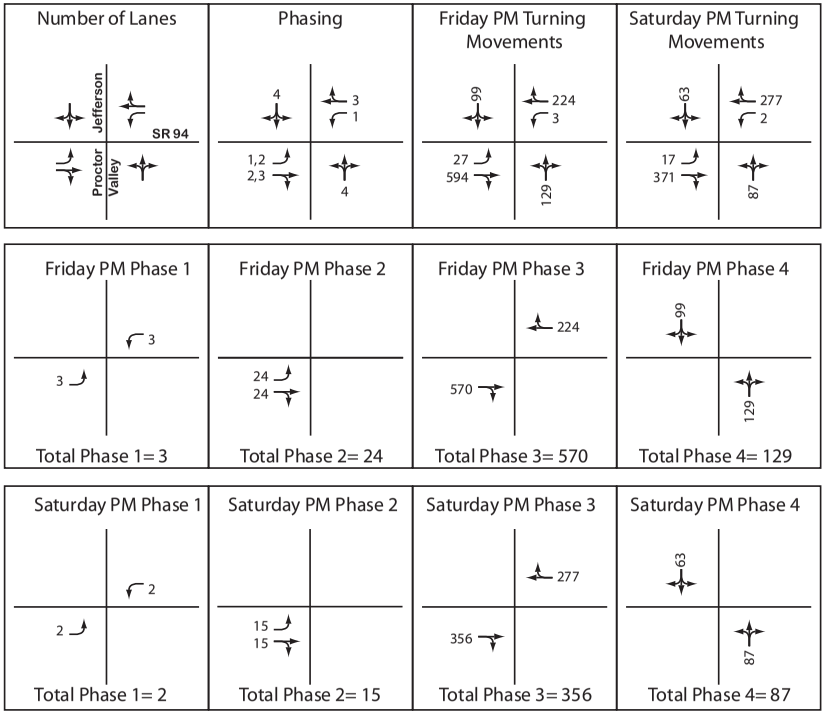
Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Existing Baseline Friday/Saturday



Friday PM TOTAL= 1036
Friday PM LOS= Below Capacity

Saturday PM TOTAL= 608
Saturday PM LOS= Below Capacity

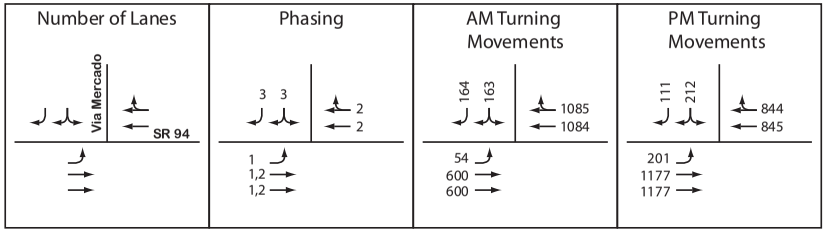
Intersection Name: SR 94 & Proctor Valley Rd/Jefferson Rd
Date: August 27, 2013
Scenario: Existing Baseline Weekend

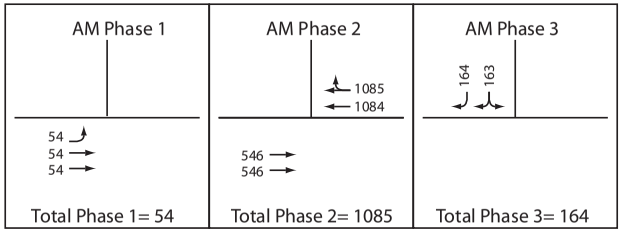


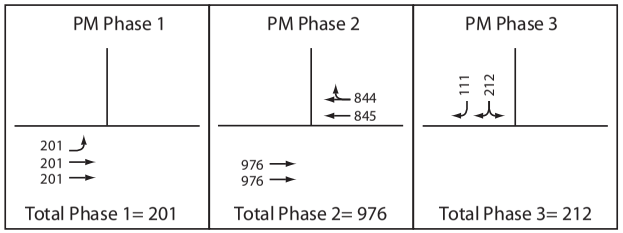
Friday PM TOTAL= 726
Friday PM LOS= Below Capacity

Saturday PM TOTAL= 460
Saturday PM LOS= Below Capacity

Intersection Name: SR 94 & Via Mercado
Date: August 27, 2013
Scenario: Existing Plus Casino Weekday







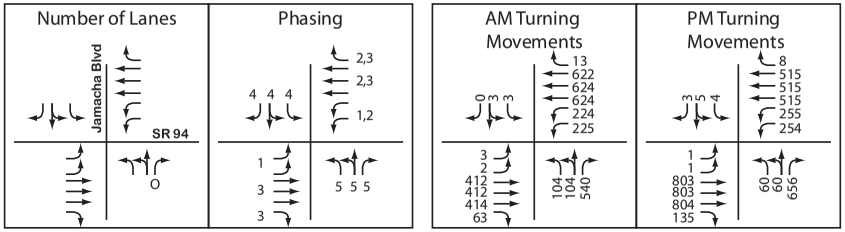
AM TOTAL= 1303

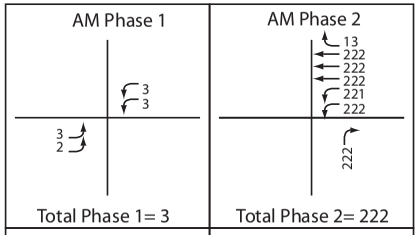
AM LOS= Approaching Capacity

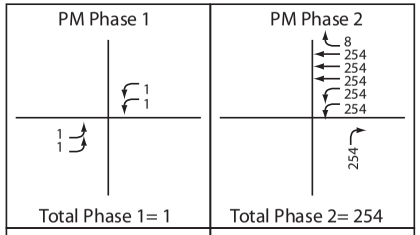
PM TOTAL= 1389

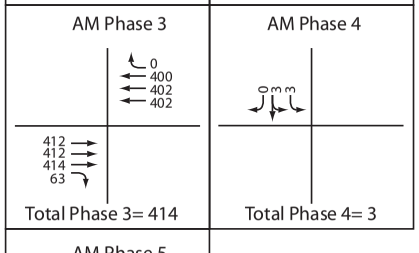
PM LOS= Approaching Capacity

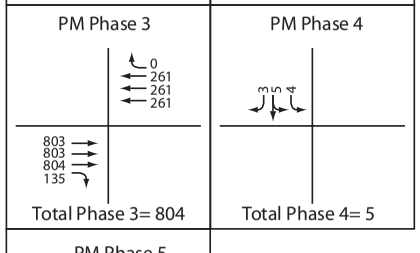
Intersection Name: SR 94 & Jamacha Blvd
Date: August 27, 2013
Scenario: Existing Plus Casino Weekday

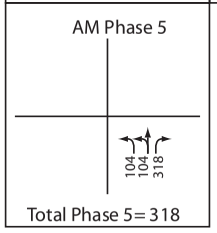


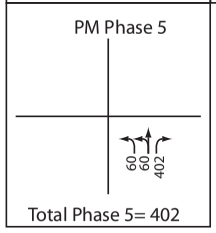








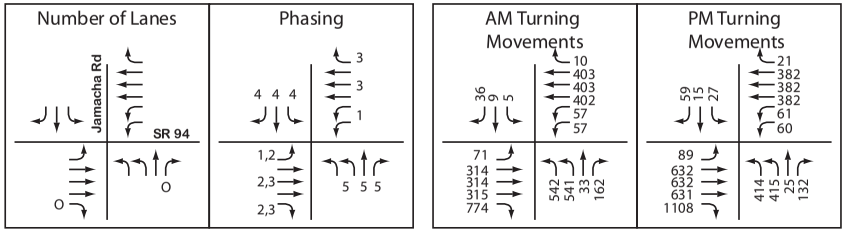


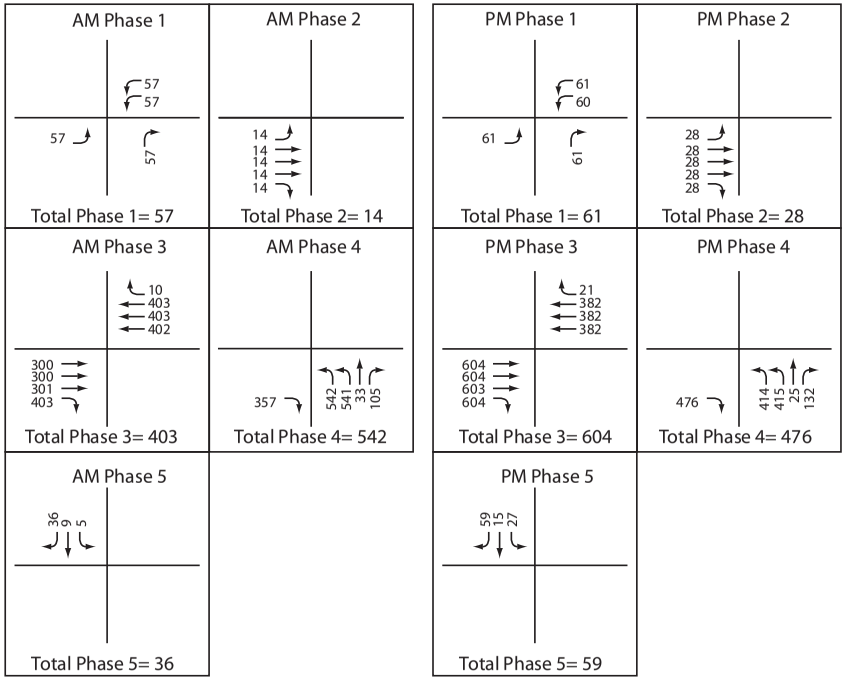


AM TOTAL= 960
AM LOS= Below Capacity

PM TOTAL= 1466
PM LOS= Approaching Capacity

Intersection Name: SR 94 & Jamacha Rd
Date: August 27, 2013
Scenario: Existing Plus Casino Weekday

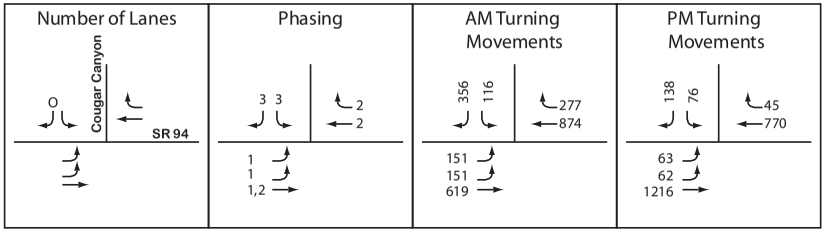


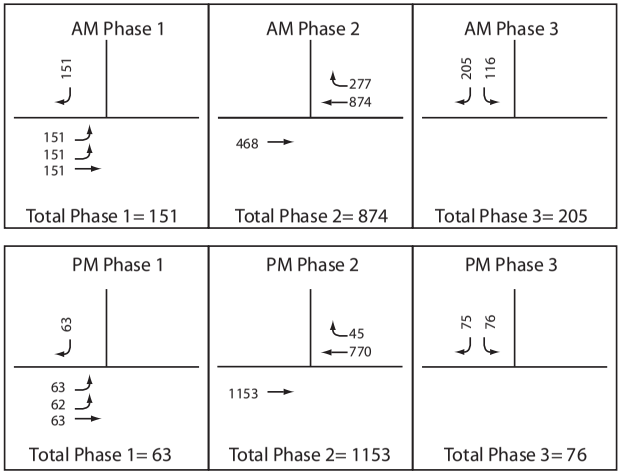


AM TOTAL= 1052
AM LOS= Below Capacity

PM TOTAL= 1228
PM LOS= Approaching Capacity

Intersection Name: SR 94 & Cougar Canyon Rd
Date: August 27, 2013
Scenario: Existing Plus Casino Weekday

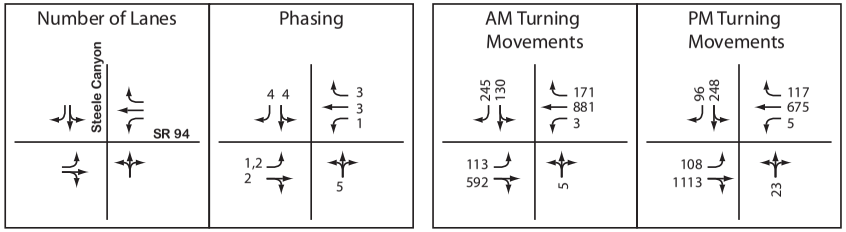


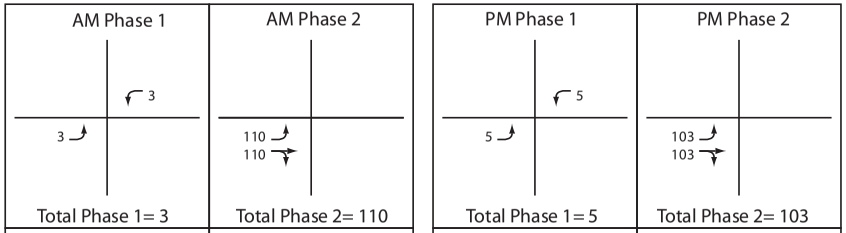


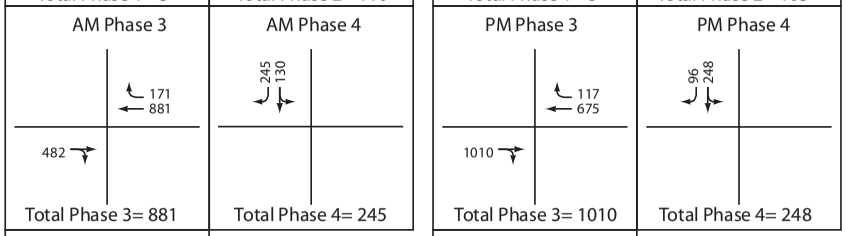
AM TOTAL= 1230
AM LOS= Approaching Capacity

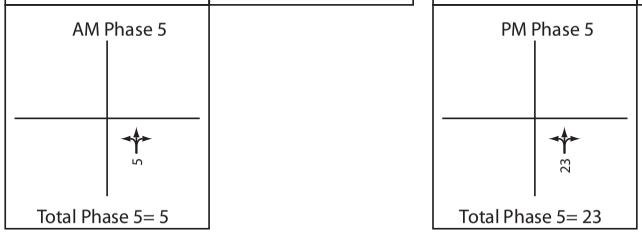
PM TOTAL= 1292
PM LOS= Approaching Capacity

Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Existing Plus Casino Weekday





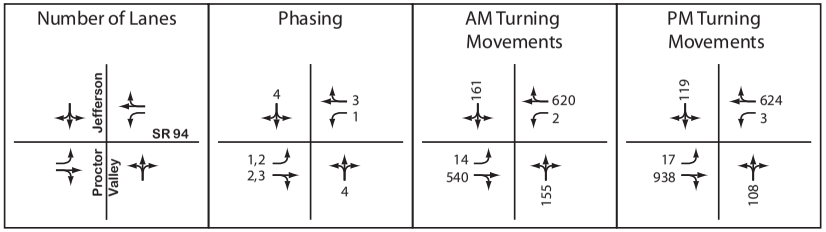


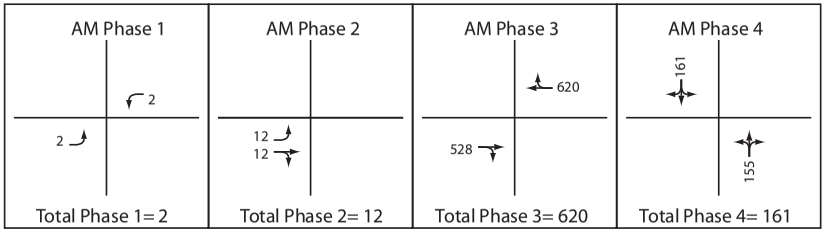


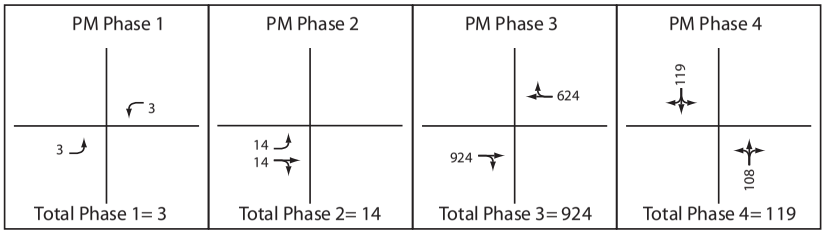
AM TOTAL= 1244
AM LOS= Approaching Capacity

PM TOTAL= 1389
PM LOS= Approaching Capacity

Intersection Name: SR 94 & Proctor Valley Rd/Jefferson Rd
Date: August 27, 2013
Scenario: Existing Plus Casino Weekday



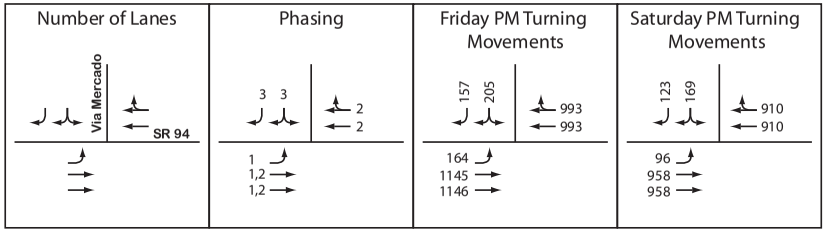


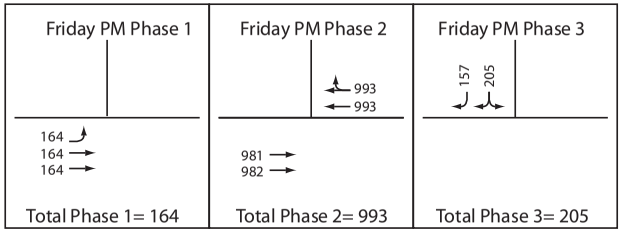


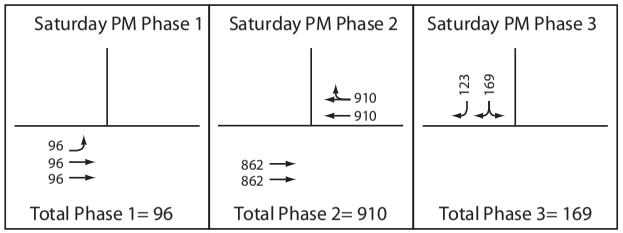
AM TOTAL= 795
AM LOS= Below Capacity

PM TOTAL= 1060
PM LOS= Below Capacity

Intersection Name: SR 94 & Via Mercado
Date: August 27, 2013
Scenario: Existing Plus Casino Friday/Saturday







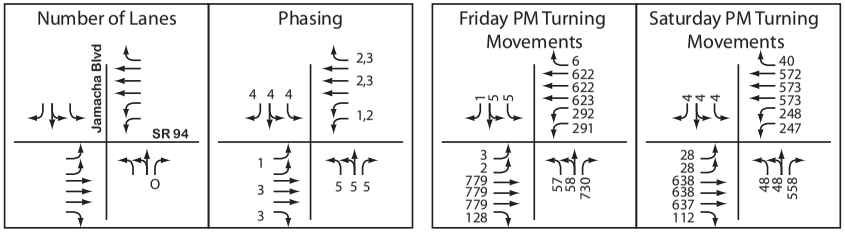
Friday PM TOTAL= 1362

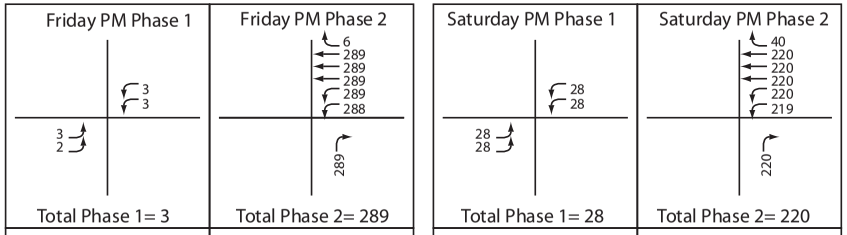
Friday PM LOS= Approaching Capacity

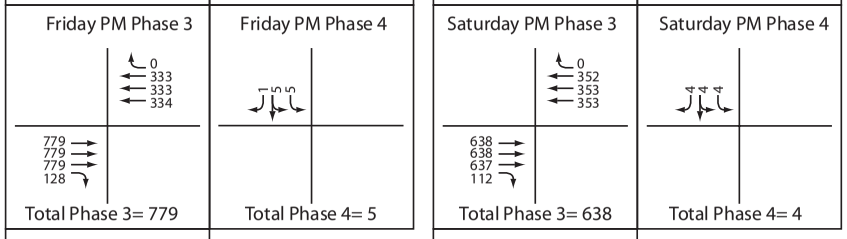
Saturday PM TOTAL= 1175

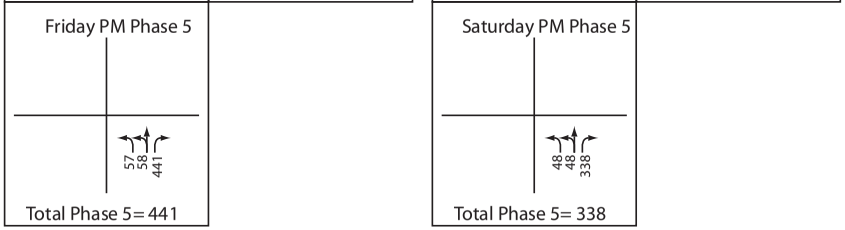
Saturday PM LOS= Below Capacity

Intersection Name: SR 94 & Jamacha Blvd
Date: August 27, 2013
Scenario: Existing Plus Casino Friday/Saturday









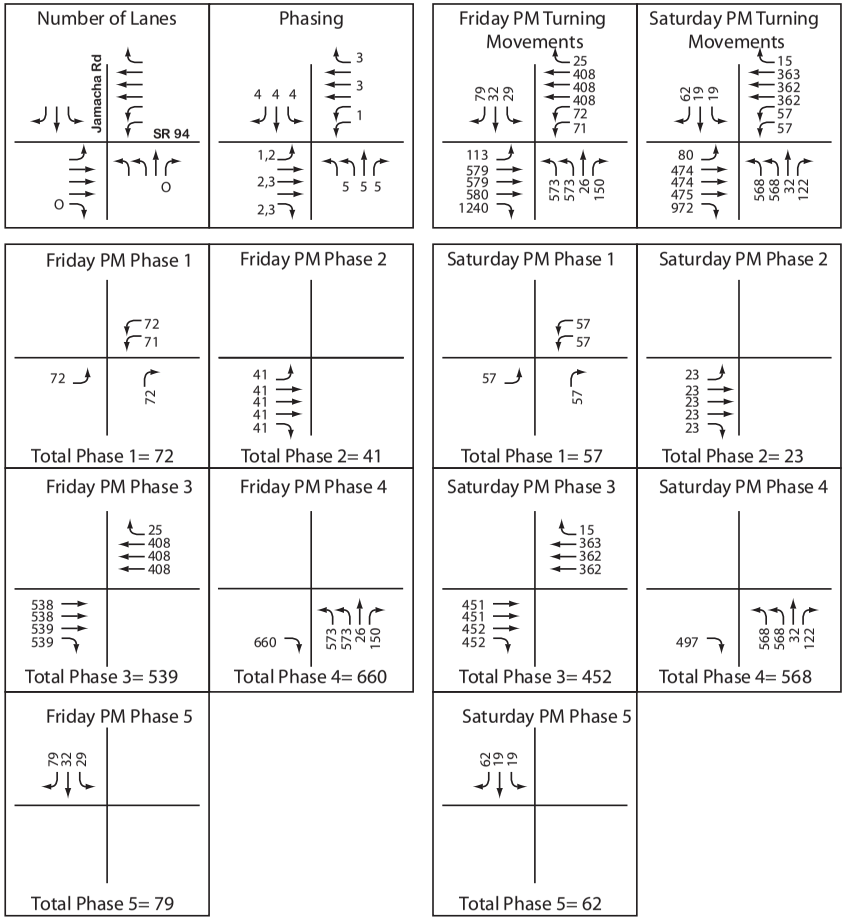
Friday PM TOTAL= 1517

Friday PM LOS= Above Capacity

Saturday PM TOTAL= 1228

Saturday PM LOS= Approaching Capacity

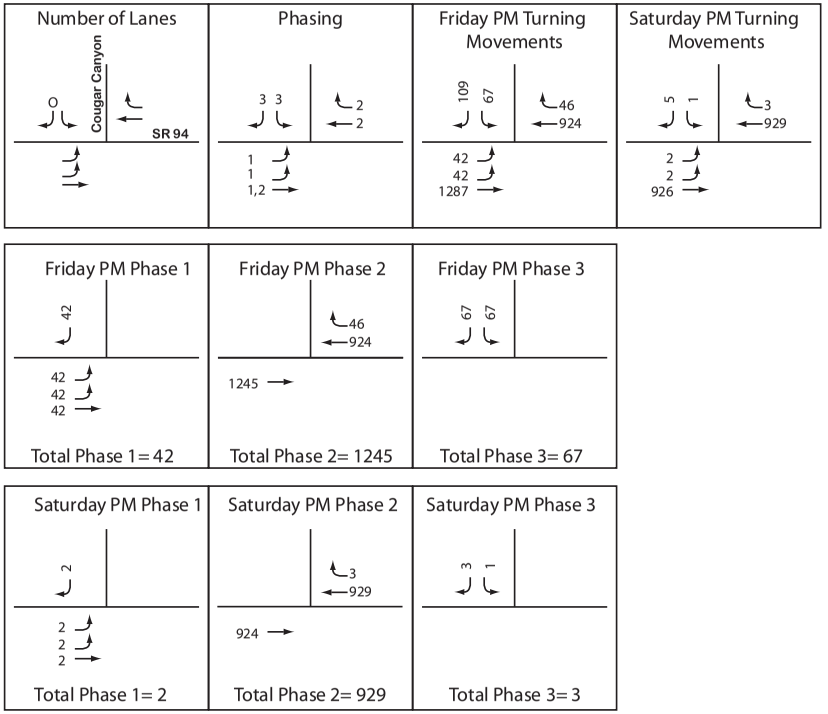
Intersection Name: SR 94 & Jamacha Rd
Date: August 27, 2013
Scenario: Existing Plus Casino Friday/Saturday



Friday PM TOTAL= 1391
Friday PM LOS= Approaching Capacity

Saturday PM TOTAL= 1162
Saturday PM LOS= Below Capacity

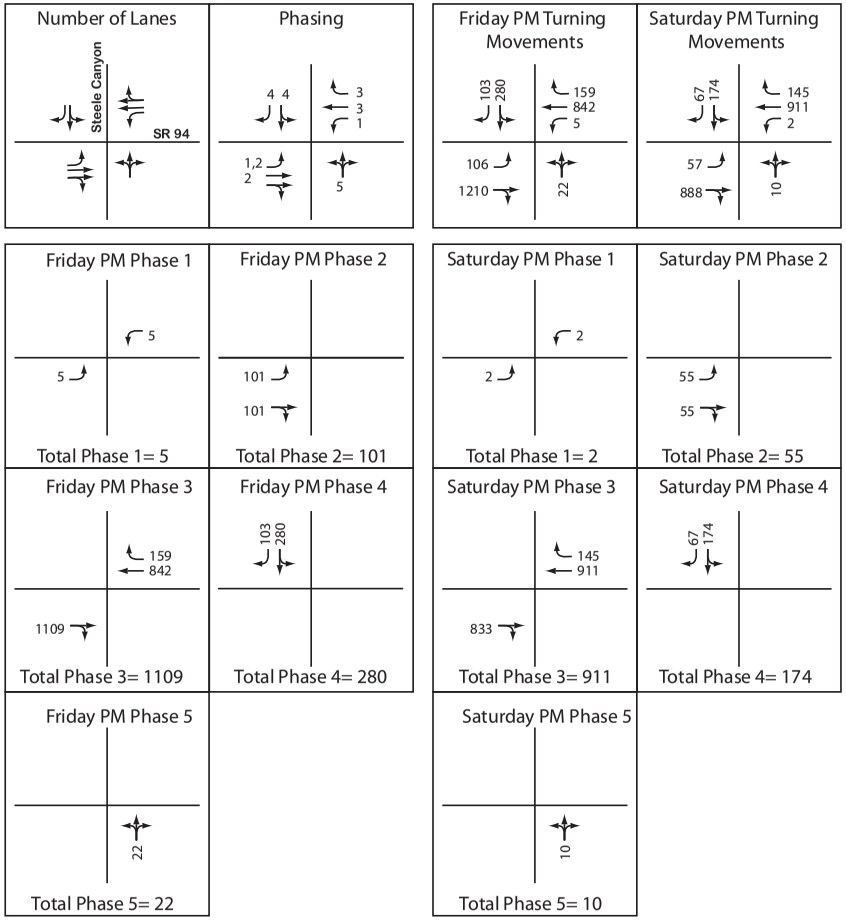
Intersection Name: SR 94 & Cougar Canyon Rd
Date: August 27, 2013
Scenario: Existing Plus Casino Friday/Saturday



Friday PM TOTAL= 1354
Friday PM LOS= Approaching Capacity

Saturday PM TOTAL= 934
Saturday PM LOS= Below Capacity

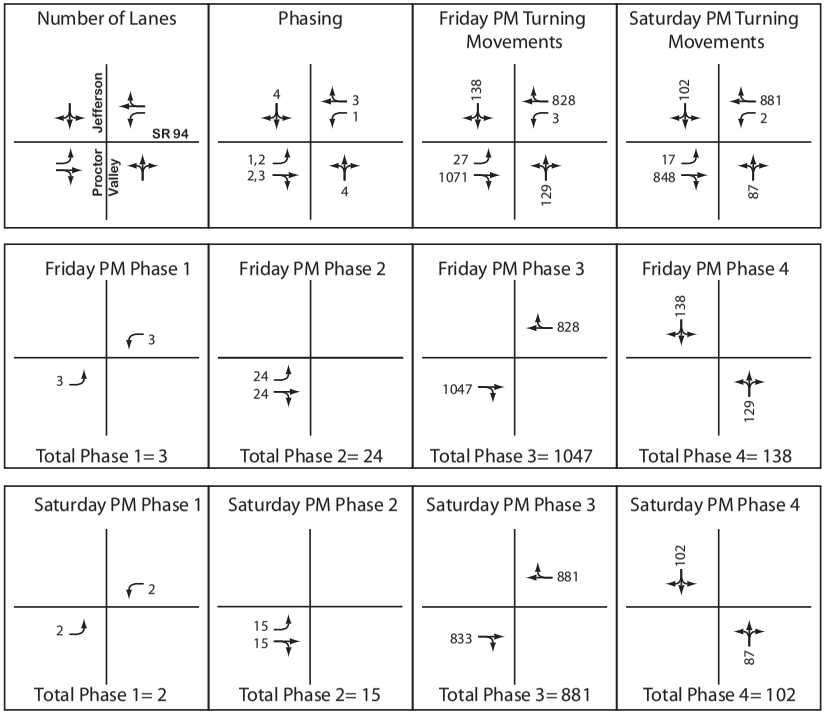
Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Existing with Casino Friday/Saturday



Friday PM TOTAL= 1,517
Friday PM LOS= Above Capacity

Saturday PM TOTAL= 1,152
Saturday PM LOS= Below Capacity

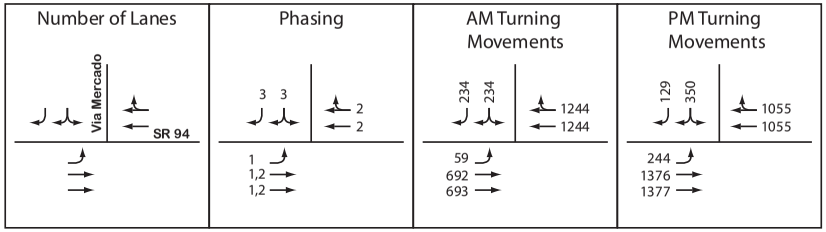
Intersection Name: SR 94 & Proctor Valley Rd/Jefferson Rd
Date: August 27, 2013
Scenario: Existing Plus Casino Weekend

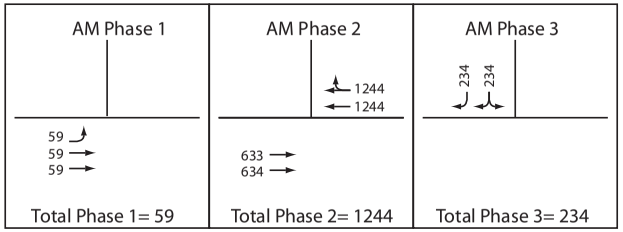


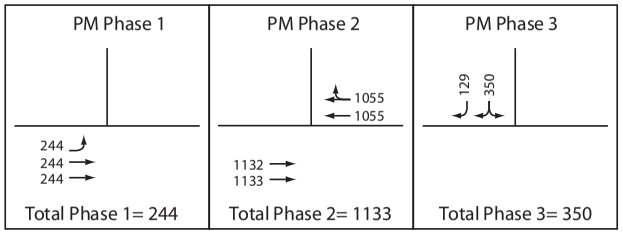
Friday PM TOTAL= 1212
Friday PM LOS= Approaching Capacity

Saturday PM TOTAL= 1000
Saturday PM LOS= Below Capacity

Intersection Name: SR 94 & Via Mercado
Date: August 27, 2013
Scenario: Near Term No Build Weekday - Proposed Project







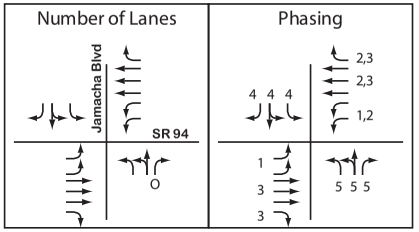
AM TOTAL= 1537

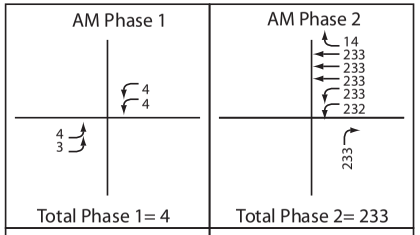
AM LOS= Above Capacity

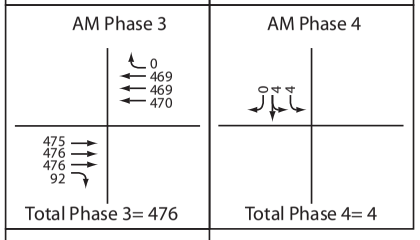
PM TOTAL= 1727

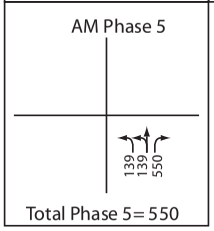
PM LOS= Above Capacity

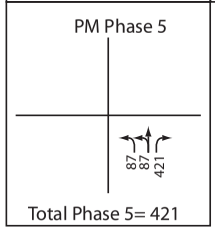
Intersection Name: SR 94 & Jamacha Blvd
Date: August 27, 2013
Scenario: Near Term No Build Weekday







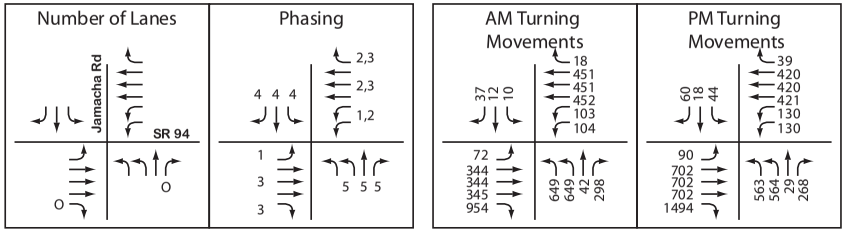


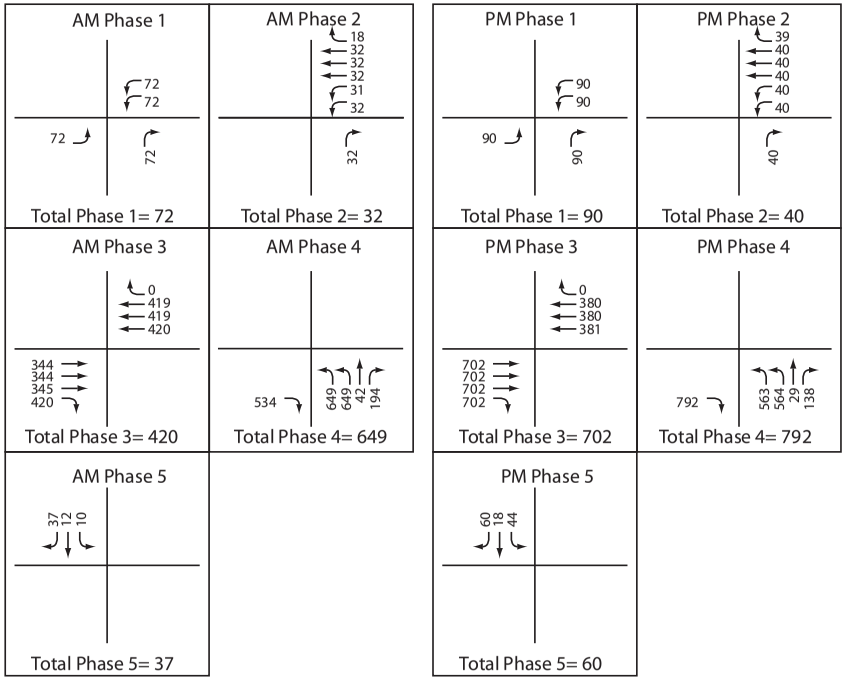


AM TOTAL= 1267
AM LOS= Approaching Capacity

PM TOTAL= 1631
PM LOS= Above Capacity

Intersection Name: SR 94 & Jamacha Rd
Date: August 27, 2013
Scenario: Near Term No Build Weekday

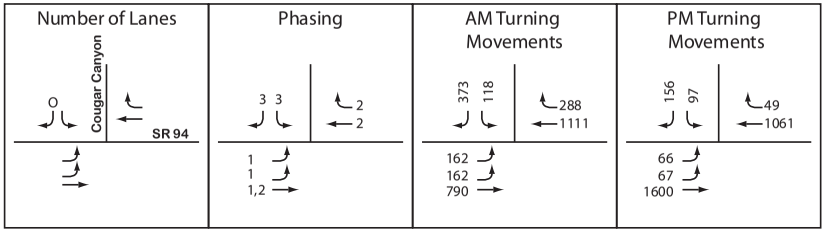


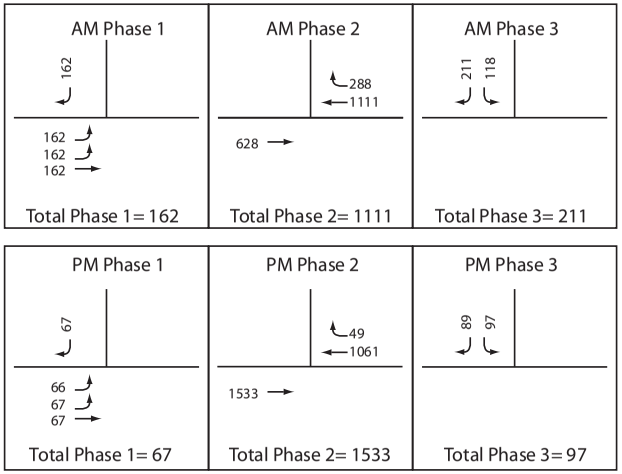


AM TOTAL= 1210
AM LOS= Approaching Capacity

PM TOTAL= 1684
PM LOS= Above Capacity

Intersection Name: SR 94 & Cougar Canyon Rd
Date: August 27, 2013
Scenario: Near Term No Build Weekday

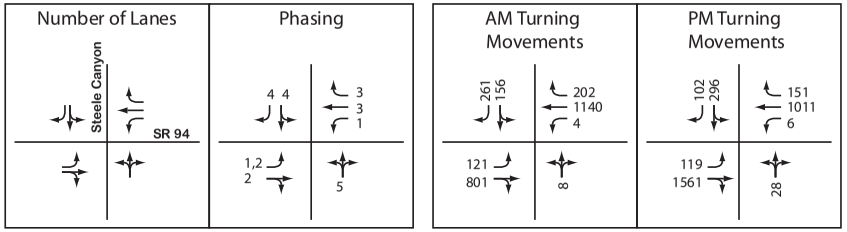


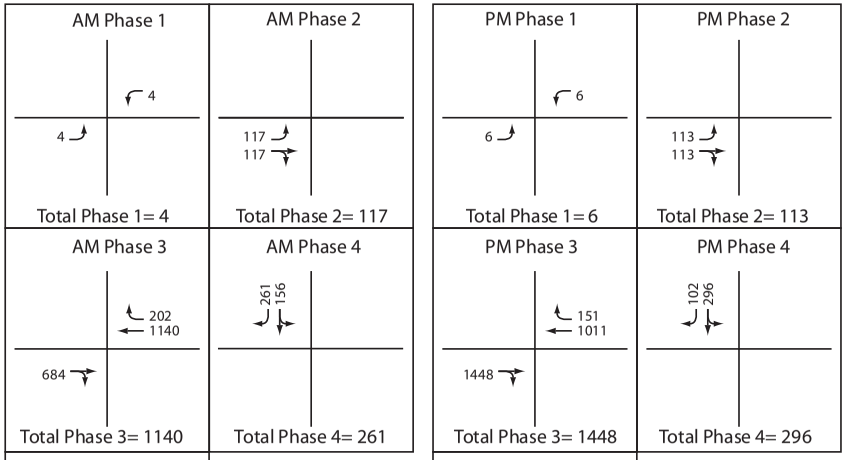


AM TOTAL= 1484
AM LOS= Approaching Capacity

PM TOTAL= 1697
PM LOS= Above Capacity

Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Near Term No Build Weekday

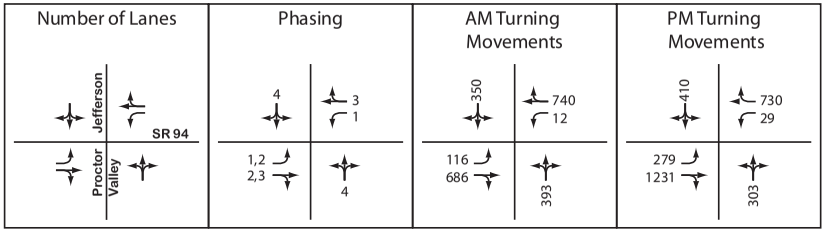


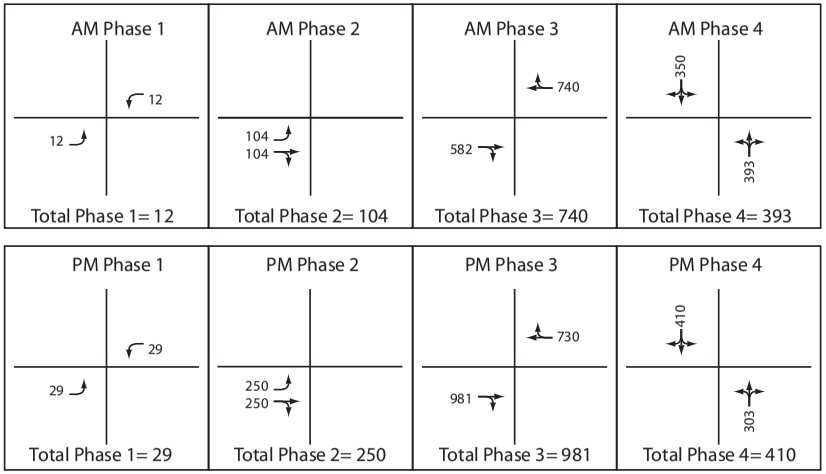


AM TOTAL= 1530
AM LOS= Above Capacity

PM TOTAL= 1891
PM LOS= Above Capacity

Intersection Name: SR 94 & Proctor Valley Rd/Jefferson Rd
Date: August 27, 2013
Scenario: Near Term No Build Weekday

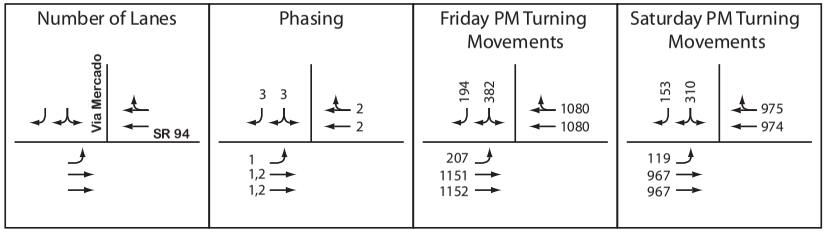


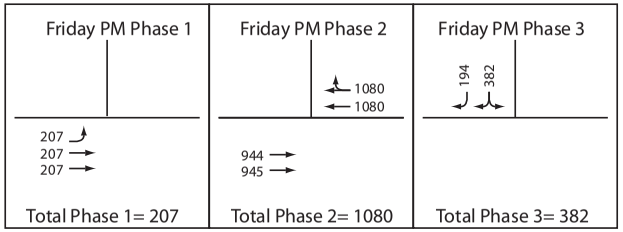


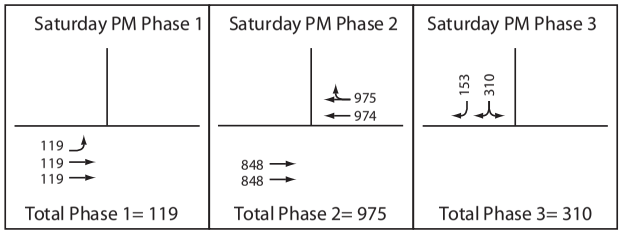
AM TOTAL= 1249
AM LOS= Approaching Capacity

PM TOTAL= 1670
PM LOS= Above Capacity

Intersection Name: SR 94 & Via Mercado
Date: August 27, 2013
Scenario: Near Term No Build Friday/Saturday







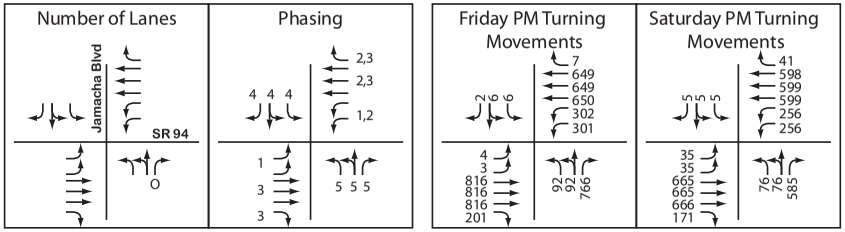
Friday PM TOTAL= 1669

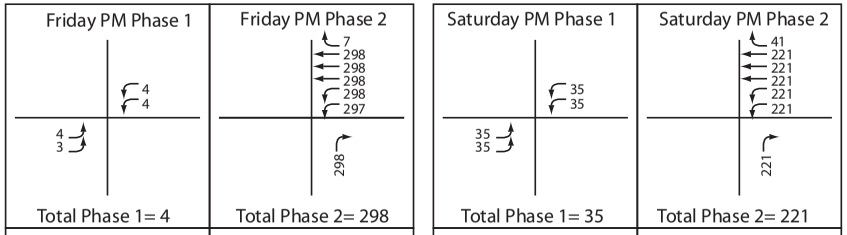
Friday PM LOS= Above Capacity

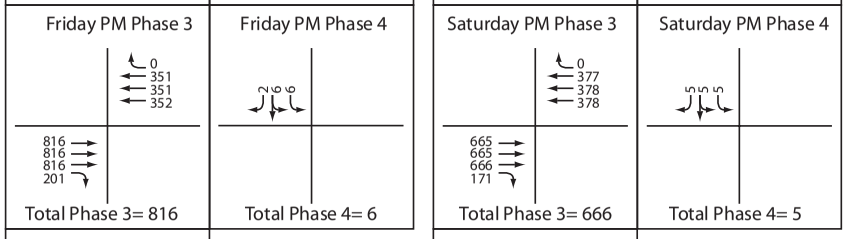
Saturday PM TOTAL= 1404

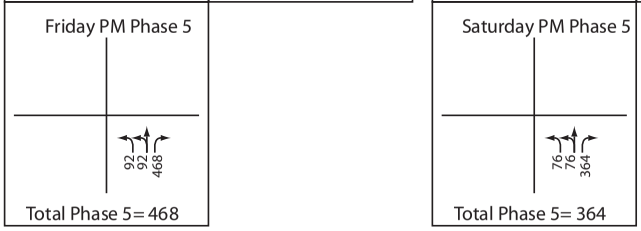
Saturday PM LOS= Approaching Capacity

Intersection Name: SR 94 & Jamacha Blvd
Date: August 27, 2013
Scenario: Near Term No Build Friday/Saturday





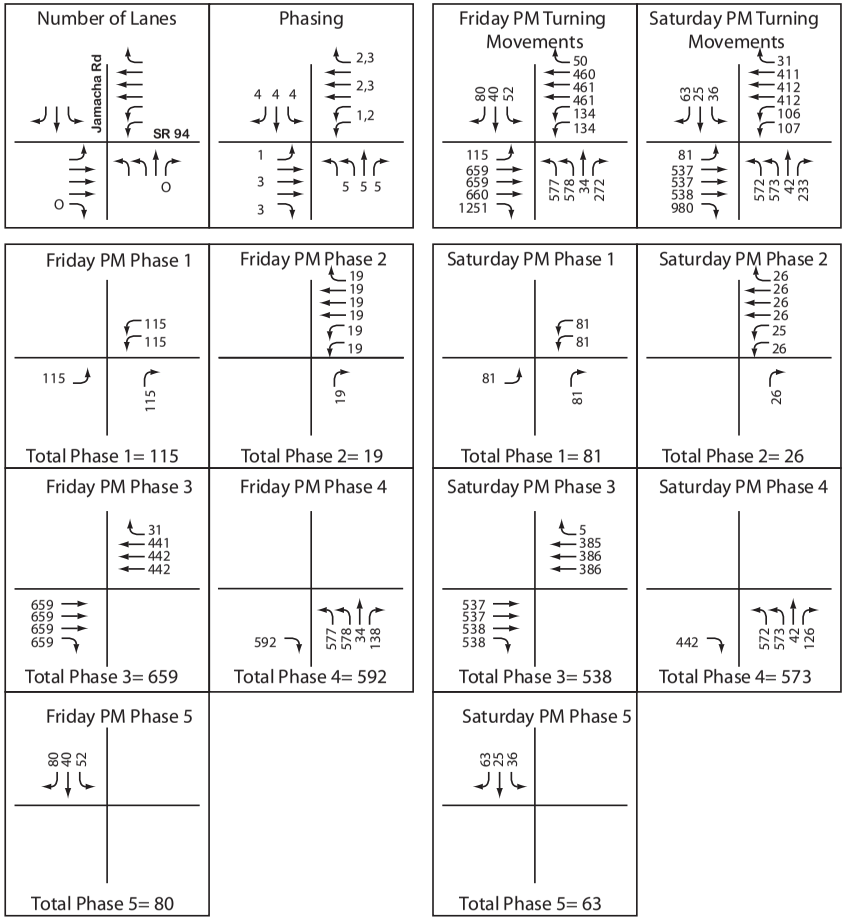




Friday PM TOTAL= 1592
Friday PM LOS= Above Capacity

Saturday PM TOTAL= 1291
Saturday PM LOS= Approaching Capacity

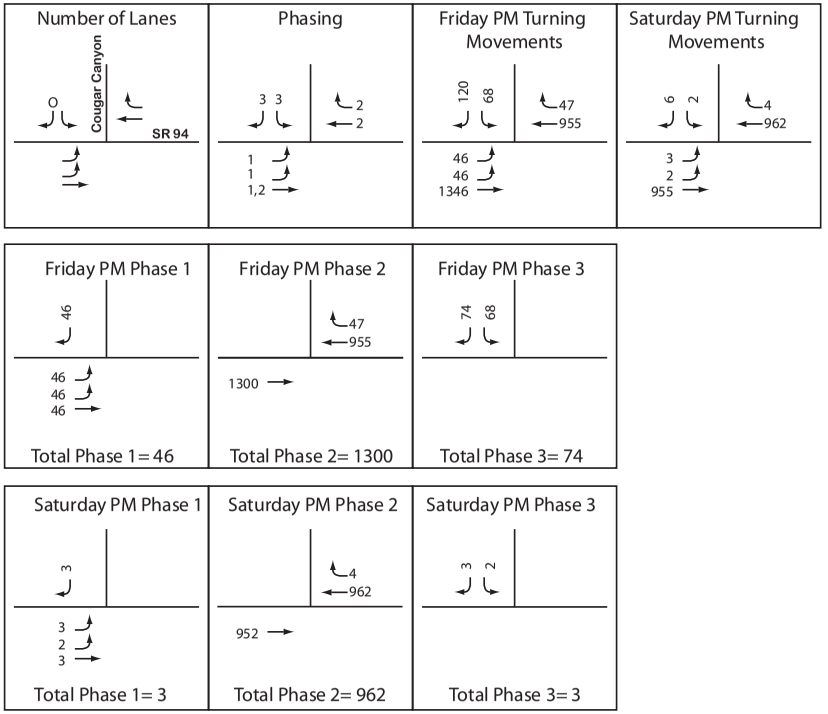
Intersection Name: SR 94 & Jamacha Rd
Date: August 27, 2013
Scenario: Near Term No Build Friday/Saturday



Friday PM TOTAL= 1465
Friday PM LOS= Above Capacity

Saturday PM TOTAL= 1281
Saturday PM LOS= Approaching Capacity

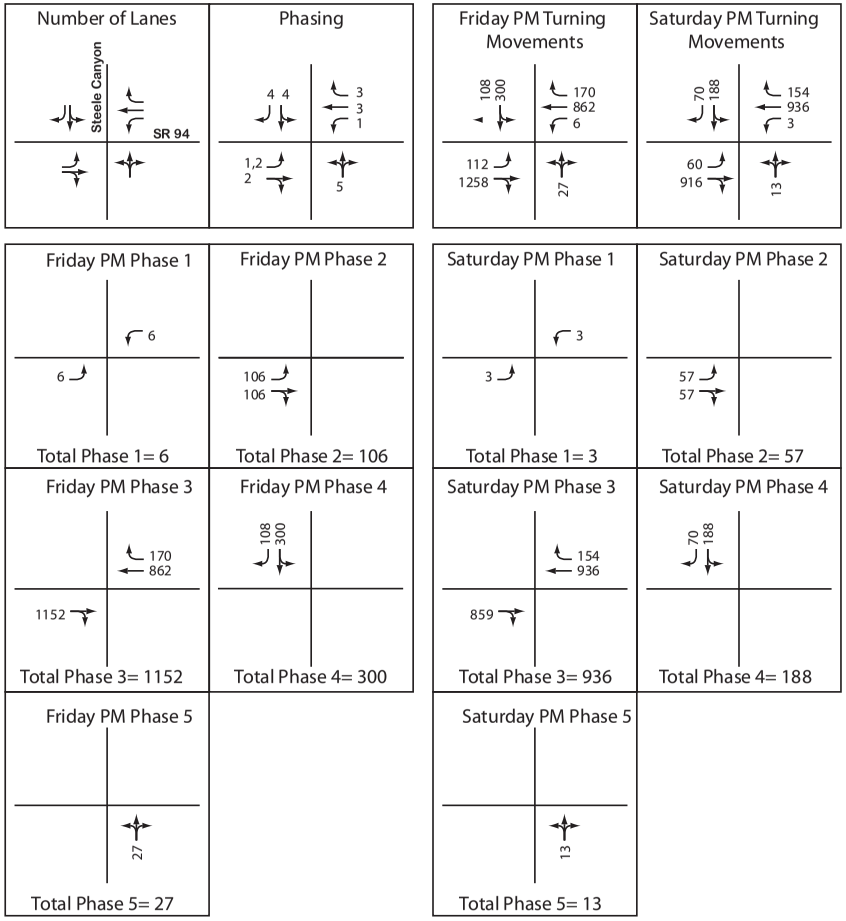
Intersection Name: SR 94 & Cougar Canyon Rd
Date: August 27, 2013
Scenario: Near Term No Build Friday/Saturday



Friday PM TOTAL= 1420
Friday PM LOS= Approaching Capacity

Saturday PM TOTAL= 968
Saturday PM LOS= Below Capacity

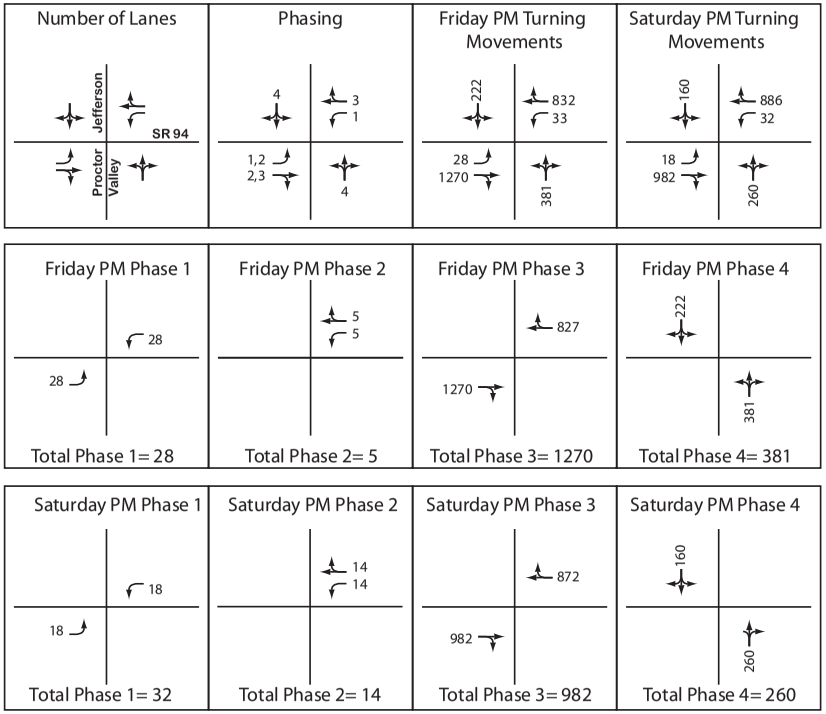
Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Near Term No Build Friday/Saturday



Friday PM TOTAL= 1591
Friday PM LOS= Above Capacity

Saturday PM TOTAL= 1197
Saturday PM LOS= Below Capacity

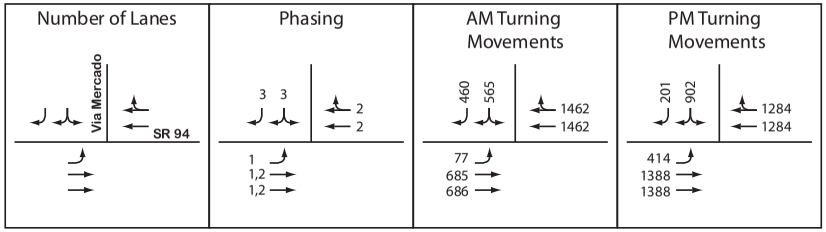
Intersection Name: SR 94 & Proctor Valley Rd/Jefferson Rd
Date: August 27, 2013
Scenario: Near Term No Build Friday/Saturday

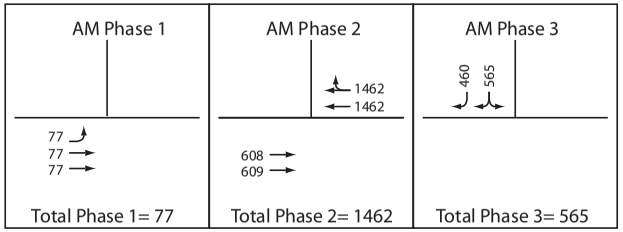


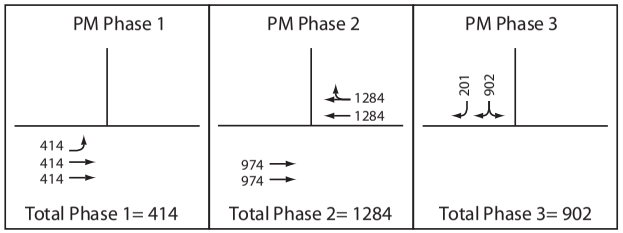
Friday PM TOTAL= 1684
Friday PM LOS= Above Capacity

Saturday PM TOTAL= 1288
Saturday PM LOS= Approaching Capacity

Intersection Name: SR 94 & Via Mercado
Date: August 27, 2013
Scenario: Horizon Year No Build Weekday







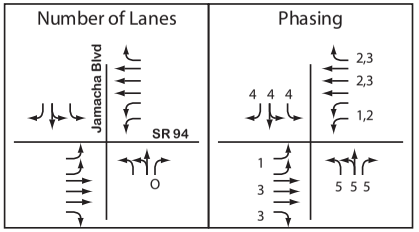
AM TOTAL= 2104

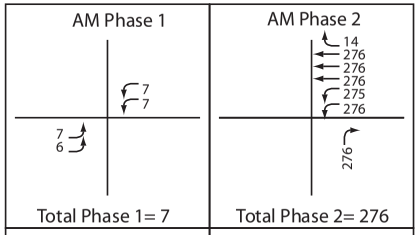
AM LOS= Above Capacity

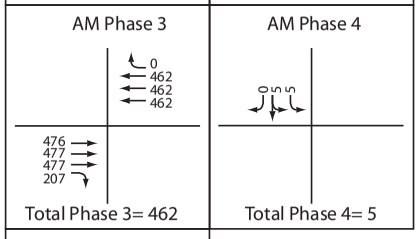
PM TOTAL= 2600

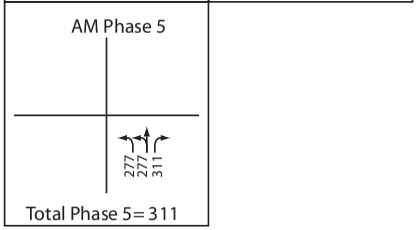
PM LOS= Above Capacity

Intersection Name: SR 94 & Jamacha Blvd
Date: August 27, 2013
Scenario: Horizon Year No Build Weekday





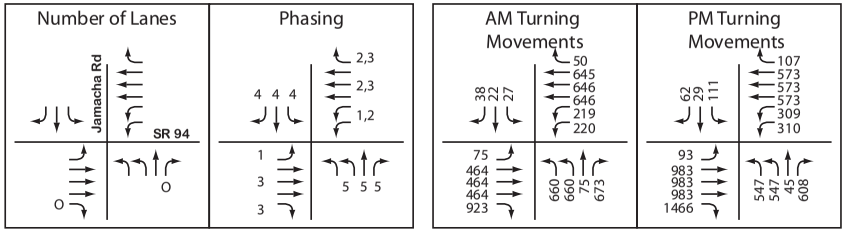


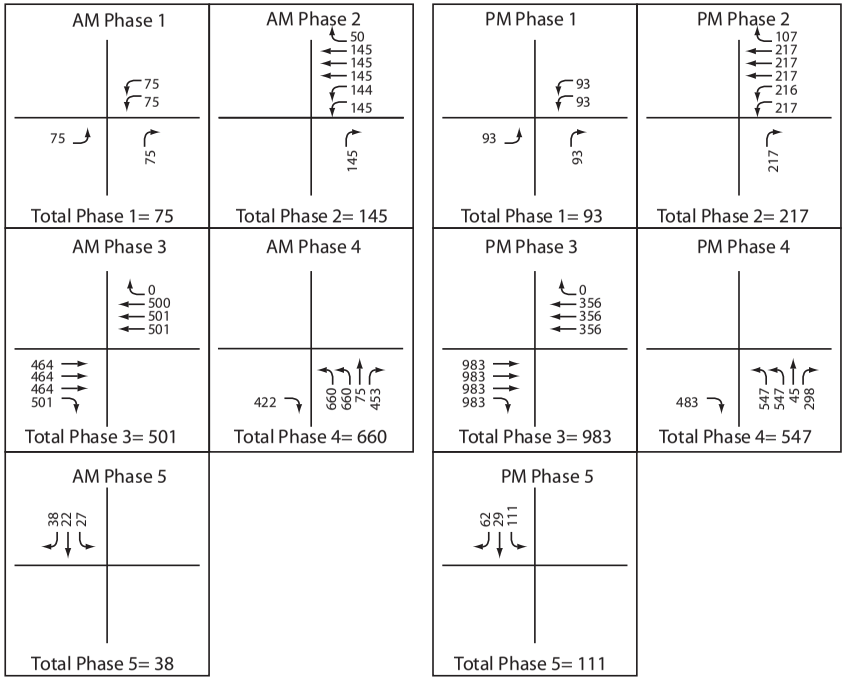


AM TOTAL= 1061
AM LOS= Below Capacity

PM TOTAL= 1739
PM LOS= Above Capacity

Intersection Name: SR 94 & Jamacha Rd
Date: August 27, 2013
Scenario: Horizon Year No Build Weekday

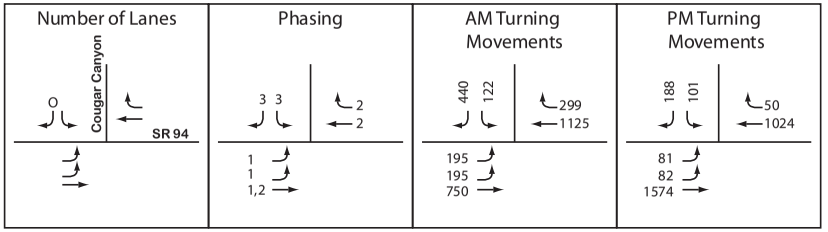


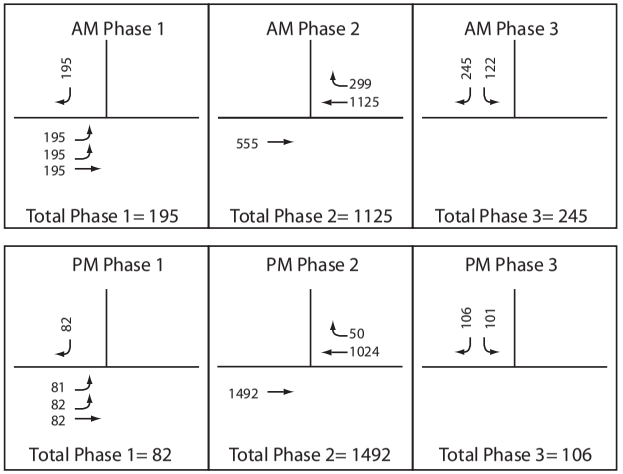


AM TOTAL= 1419
AM LOS= Approaching Capacity

PM TOTAL= 1951
PM LOS= Above Capacity

Intersection Name: SR 94 & Cougar Canyon Rd
Date: August 27, 2013
Scenario: Horizon Year No Build Weekday

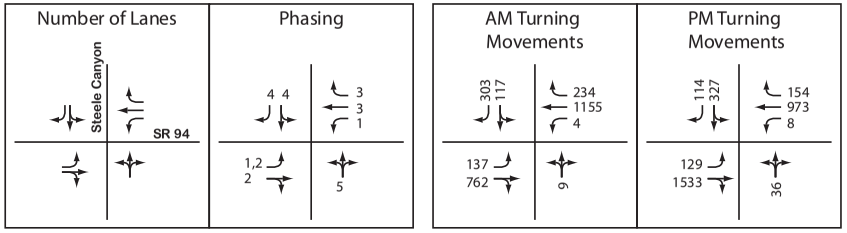


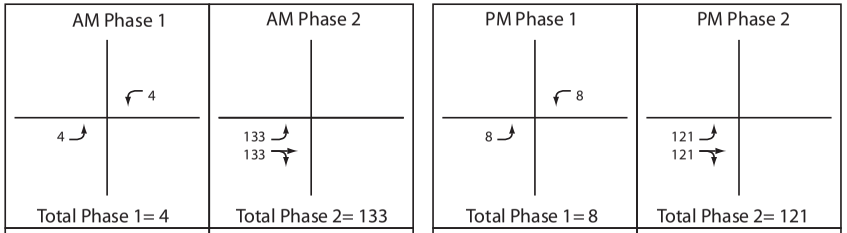


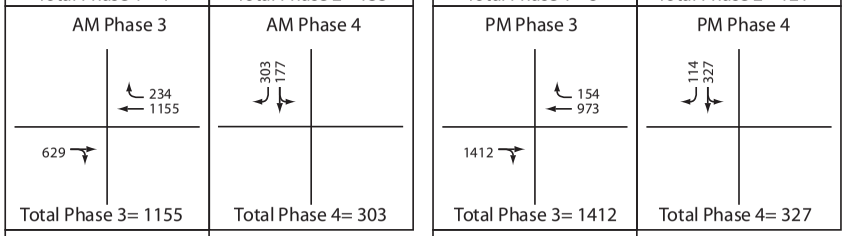
AM TOTAL= 1565
AM LOS= Above Capacity

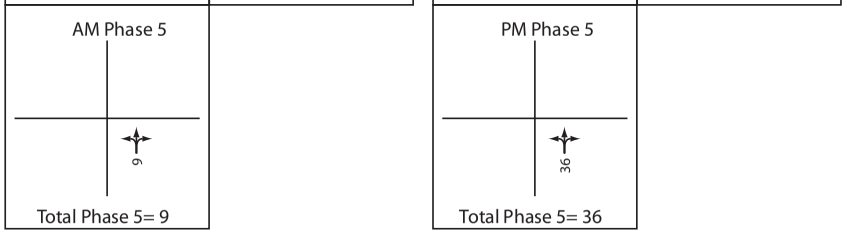
PM TOTAL= 1680
PM LOS= Above Capacity

Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Horizon Year No Build Weekday





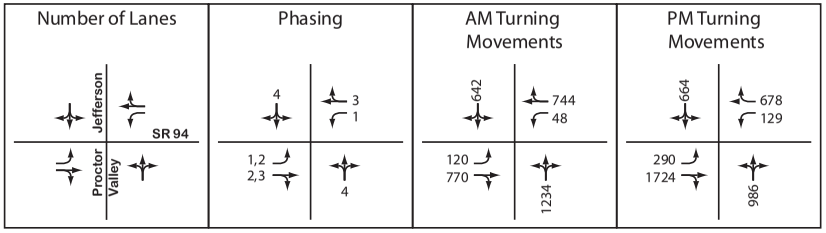


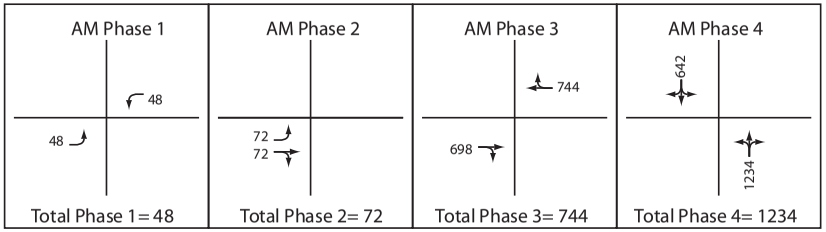


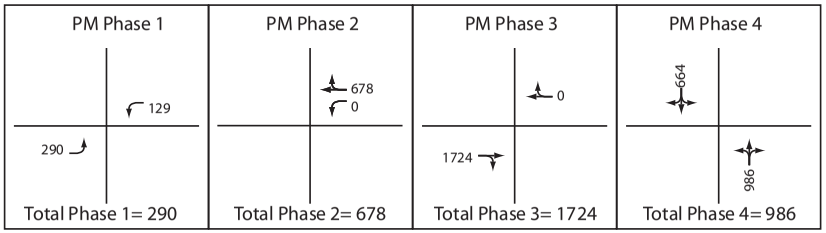
AM TOTAL= 1604
AM LOS= Above Capacity

PM TOTAL= 1904
PM LOS= Above Capacity

Intersection Name: SR 94 & Proctor Valley Rd/Jefferson Rd
Date: August 27, 2013
Scenario: Horizon Year No Build Weekday



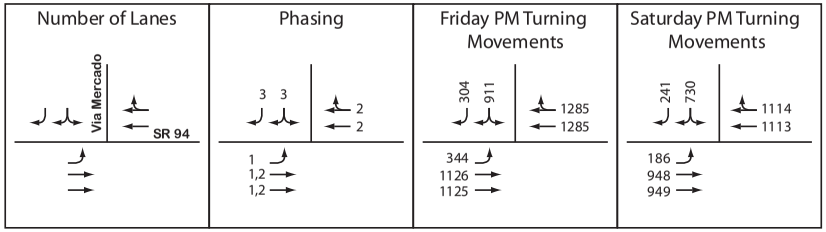


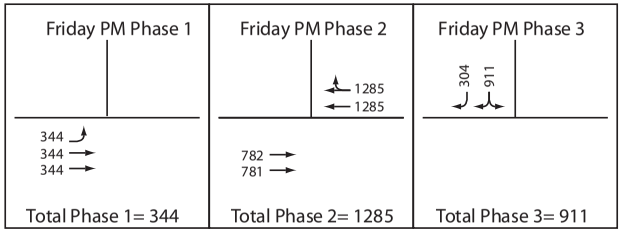


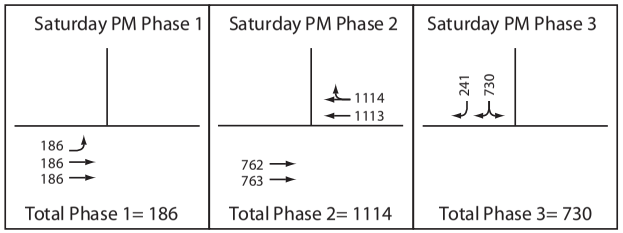
AM TOTAL= 2098
AM LOS= Above Capacity

PM TOTAL= 3678
PM LOS= Above Capacity

Intersection Name: SR 94 & Via Mercado
Date: August 27, 2013
Scenario: Horizon Year No Build Friday/Saturday







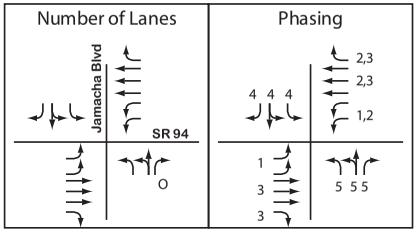
Friday PM TOTAL= 2540

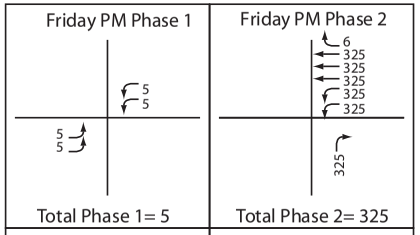
Friday PM LOS= Above Capacity

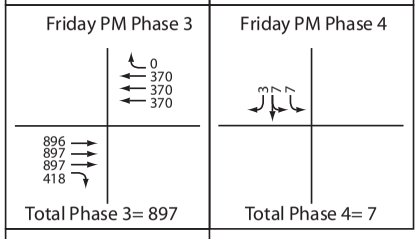
Saturday PM TOTAL= 2030

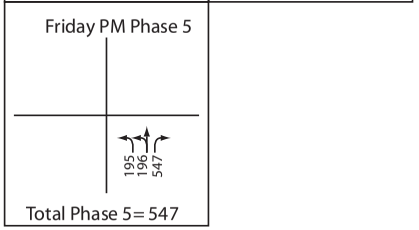
Saturday PM LOS= Above Capacity

Intersection Name: SR 94 & Jamacha Blvd
Date: August 27, 2013
Scenario: Horizon Year No Build Friday/Saturday









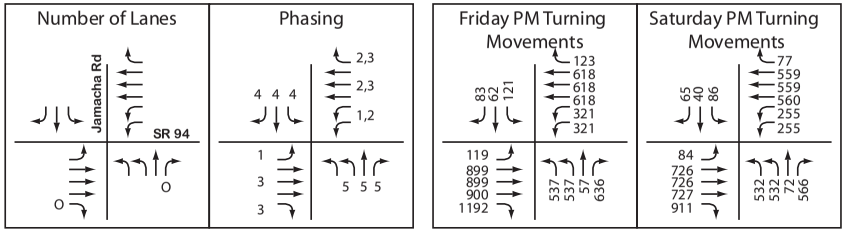
Friday PM TOTAL= 1781

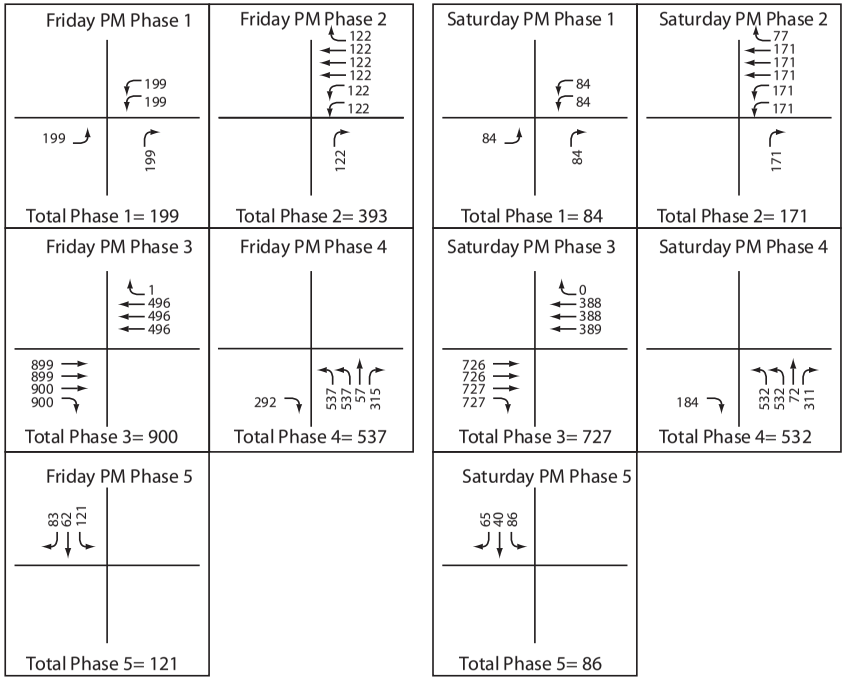
Friday PM LOS= Above Capacity

Saturday PM TOTAL= 1447

Saturday PM LOS= Approaching Capacity

Intersection Name: SR 94 & Jamacha Rd
Date: August 27, 2013
Scenario: Horizon Year No Build Friday/Saturday

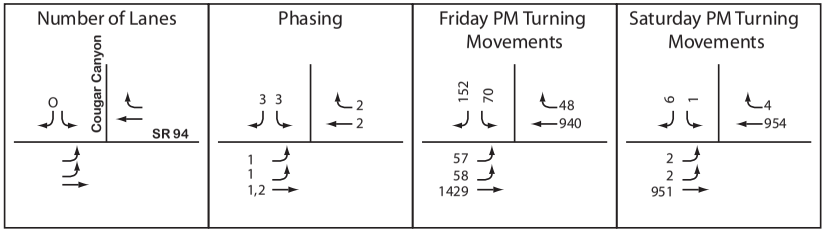


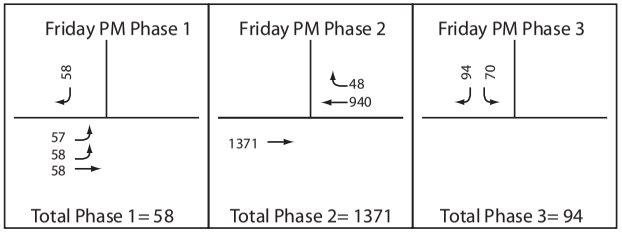


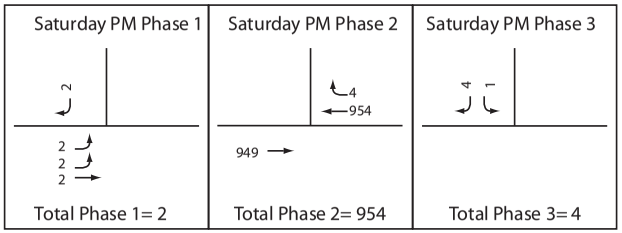
Friday PM TOTAL= 2150
Friday PM LOS= Above Capacity

Saturday PM TOTAL= 1600
Saturday PM LOS= Above Capacity

Intersection Name: SR 94 & Cougar Canyon Rd
Date: August 27, 2013
Scenario: Horizon Year No Buid Friday/Saturday



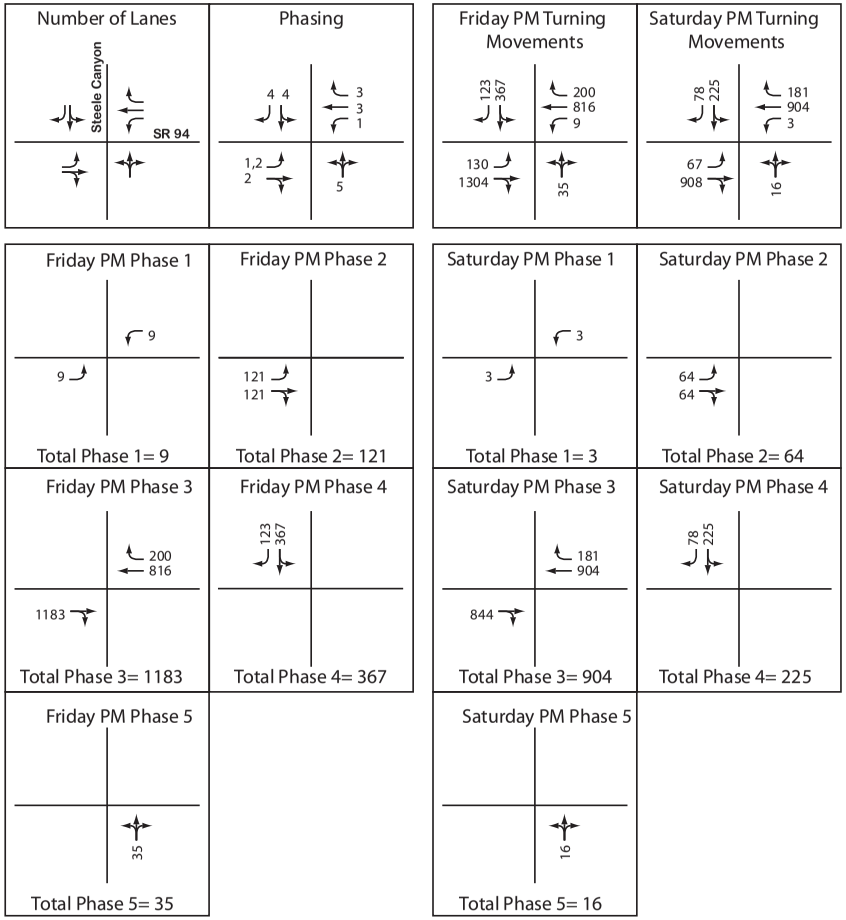




Friday PM TOTAL= 1523
Friday PM LOS= Above Capacity

Saturday PM TOTAL= 960
Saturday PM LOS= Below Capacity

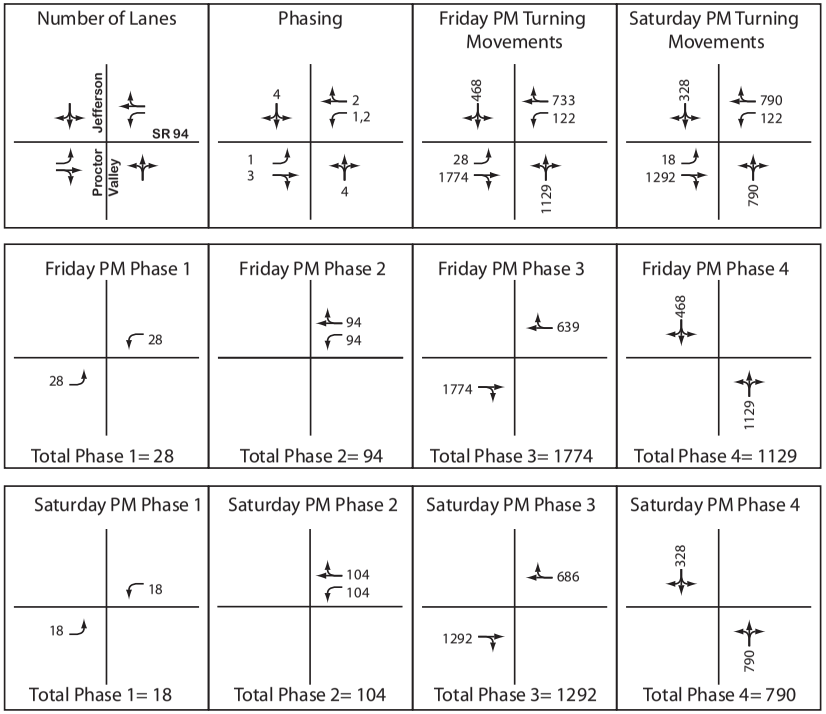
Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Horizon Year No Build Friday/Saturday



Friday PM TOTAL= 1715
Friday PM LOS= Above Capacity

Saturday PM TOTAL= 1212
Saturday PM LOS= Approaching Capacity

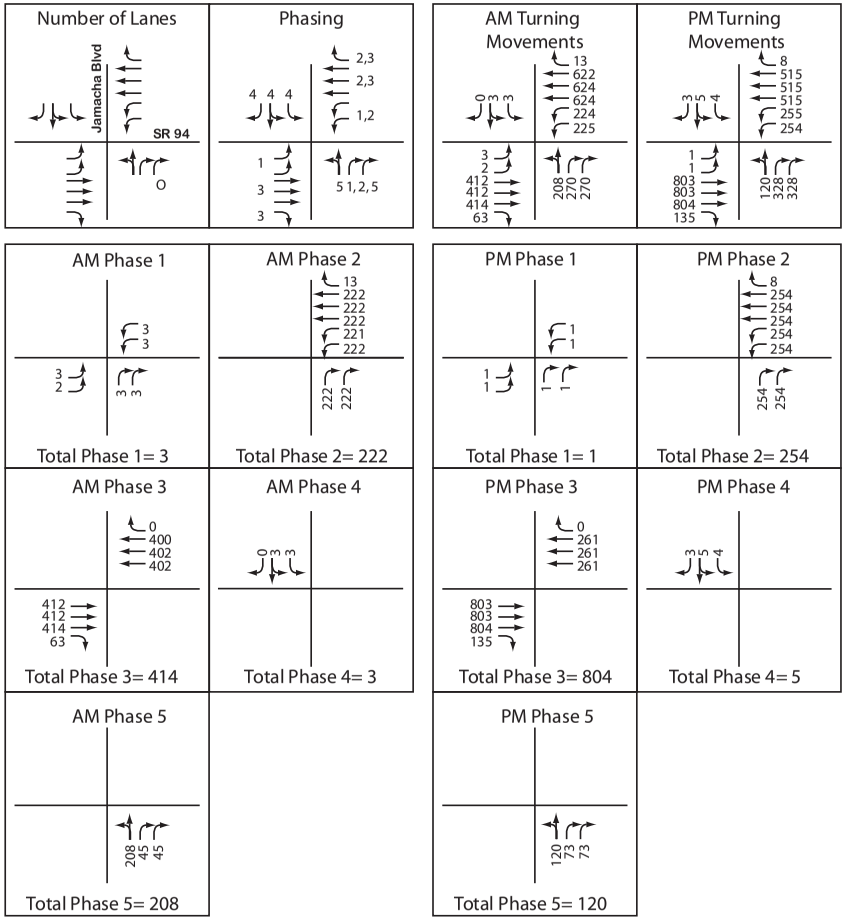
Intersection Name: SR 94 & Proctor Valley Rd/Jefferson Rd
Date: August 27, 2013
Scenario: Horizon Year No Build Friday/Saturday



Friday PM TOTAL= 3025
Friday PM LOS= Above Capacity

Saturday PM TOTAL= 2204
Saturday PM LOS= Above Capacity

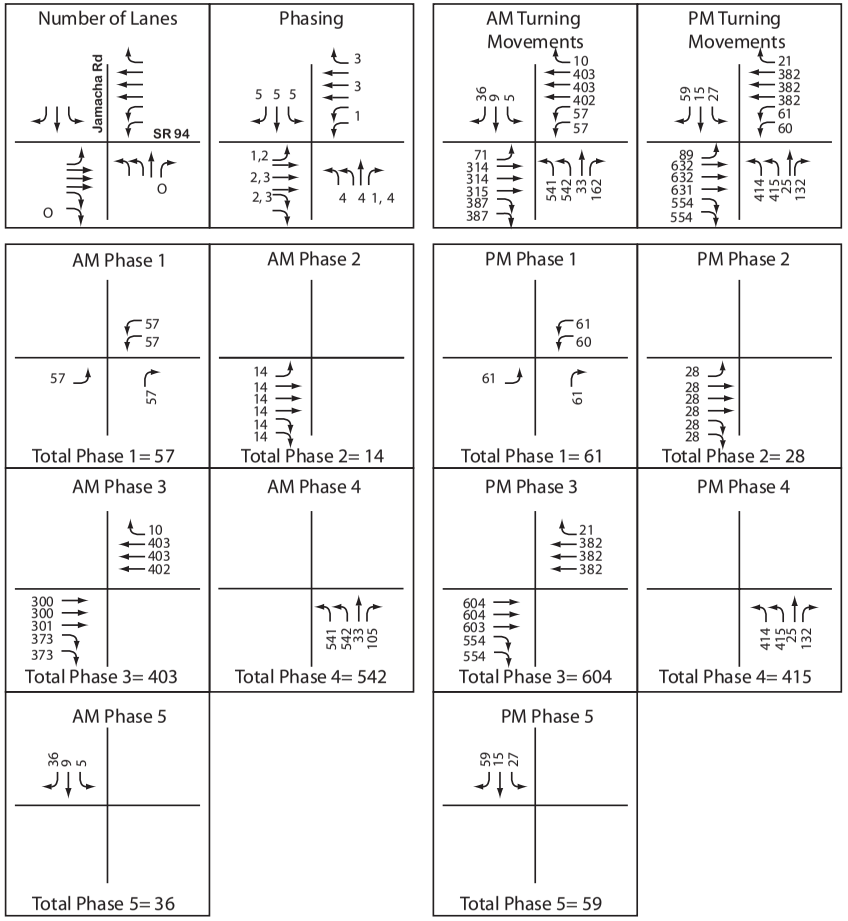
Intersection Name: SR 94 & Jamacha Blvd
Date: April 16, 2014
Scenario: Existing with Casino Weekday with Project



AM TOTAL= 850
AM LOS= Below Capacity

PM TOTAL= 1184
PM LOS= Below Capacity

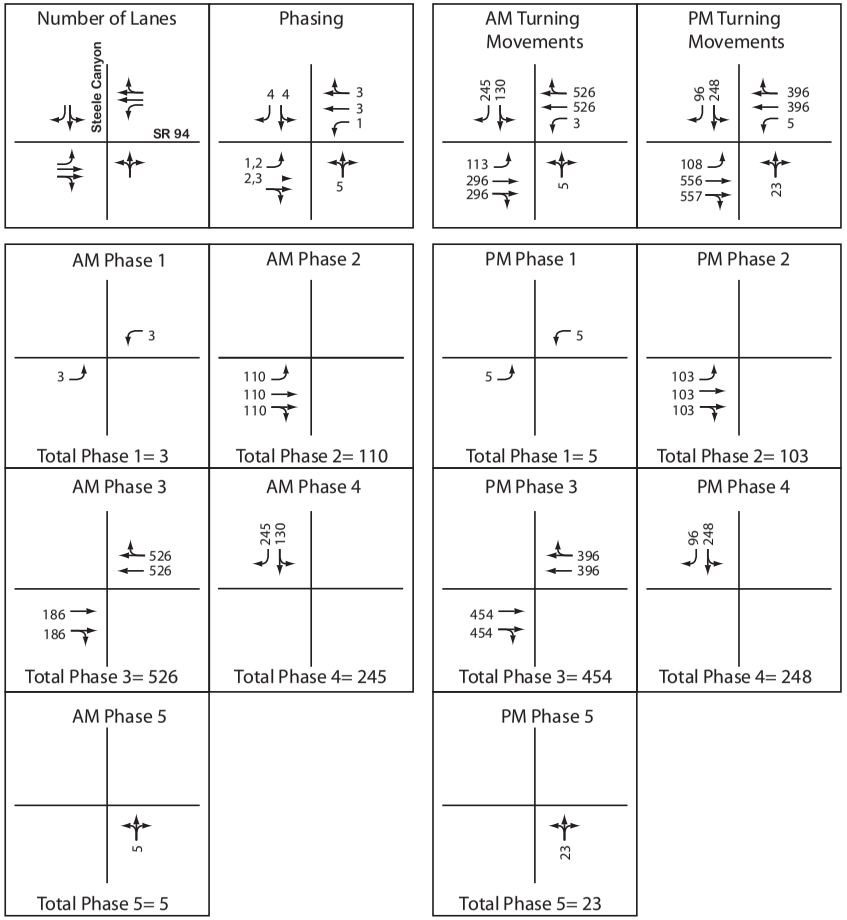
Intersection Name: SR 94 & Jamacha Rd
Date: April 16, 2014
Scenario: Existing with Casino Weekday with Project



AM TOTAL= 1052
AM LOS= Below Capacity

PM TOTAL= 1167
PM LOS= Below Capacity

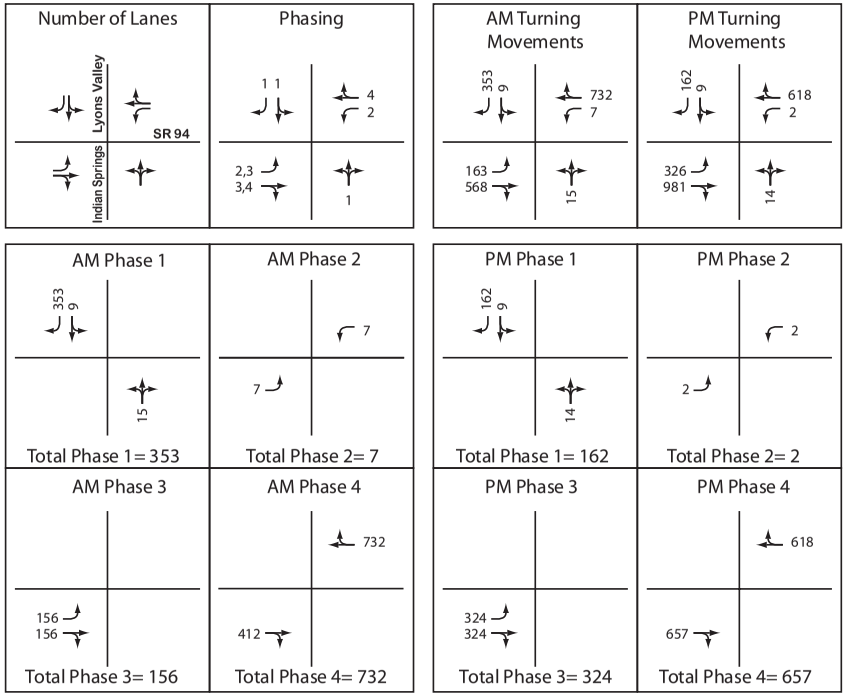
Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Existing with Casino Weekday with Project



AM TOTAL= 889
AM LOS= Below Capacity

PM TOTAL= 833
PM LOS= Below Capacity

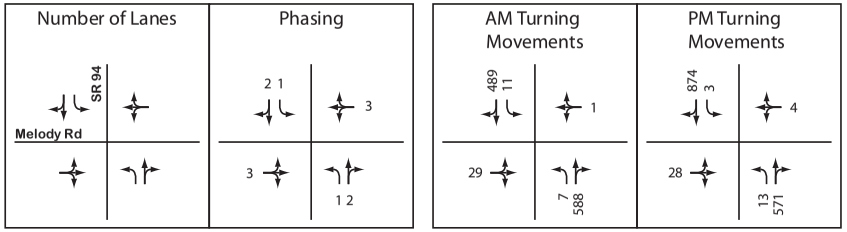
Intersection Name: SR 94 & Lyons Valley Rd/Indian Springs Dr
Date: August 30, 2013
Scenario: Existing Weekday with Project Alternatives 1-2

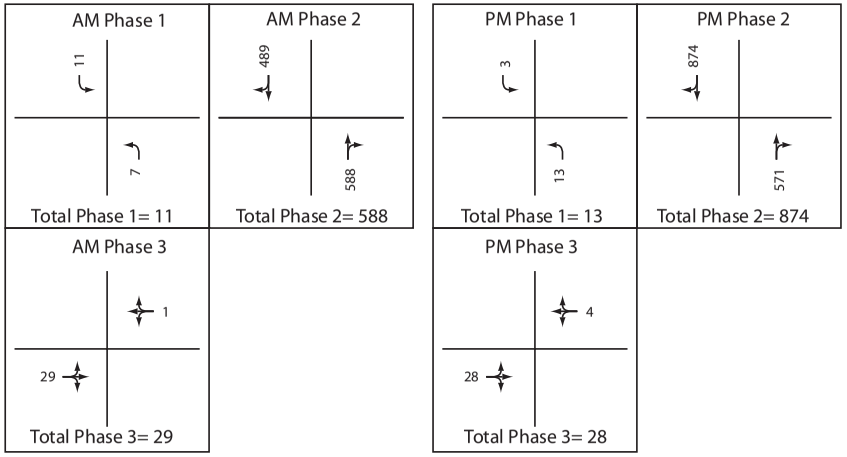


AM TOTAL= 1,248
AM LOS= Approaching Capacity

PM TOTAL= 1,145
PM LOS= Below Capacity

Intersection Name: SR 94 & Melody Rd
Date: September 3, 2013
Scenario: Existing Weekday with Project Alternatives 1-2

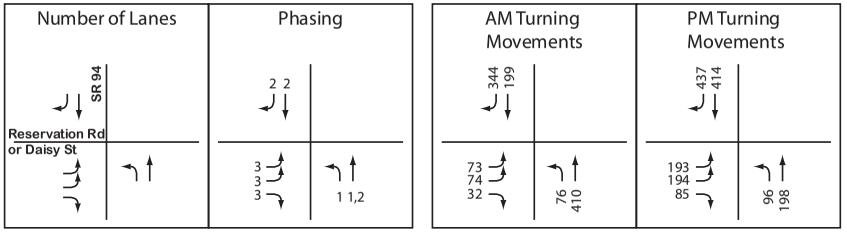


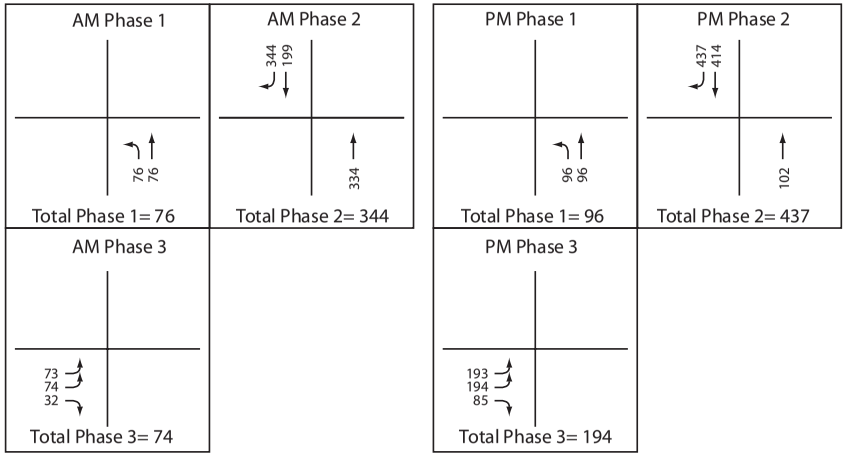


AM TOTAL = 628
AM LOS = Below Capacity

PM TOTAL = 915
PM LOS= Below Capacity

Intersection Name: SR 94 & Resevation Rd
Date: September 3, 2013
Scenario: Existing Weekday with Project Alternatives 1-2

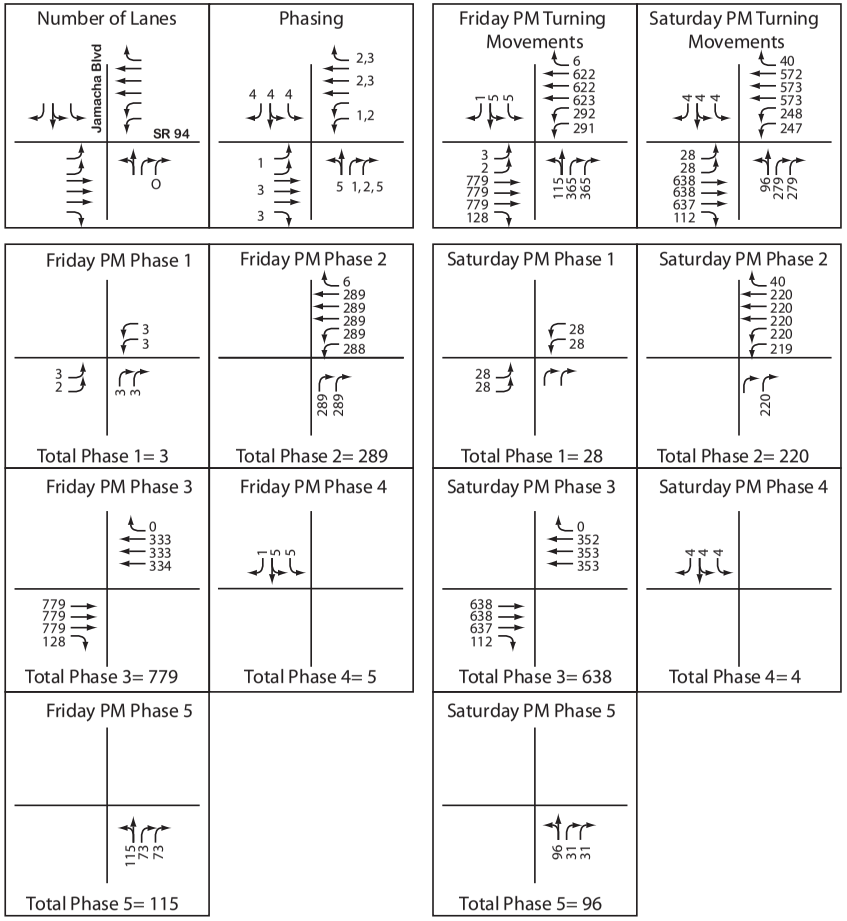




AM TOTAL = 494
AM LOS = Below Capacity

PM TOTAL = 727
PM LOS= Below Capacity

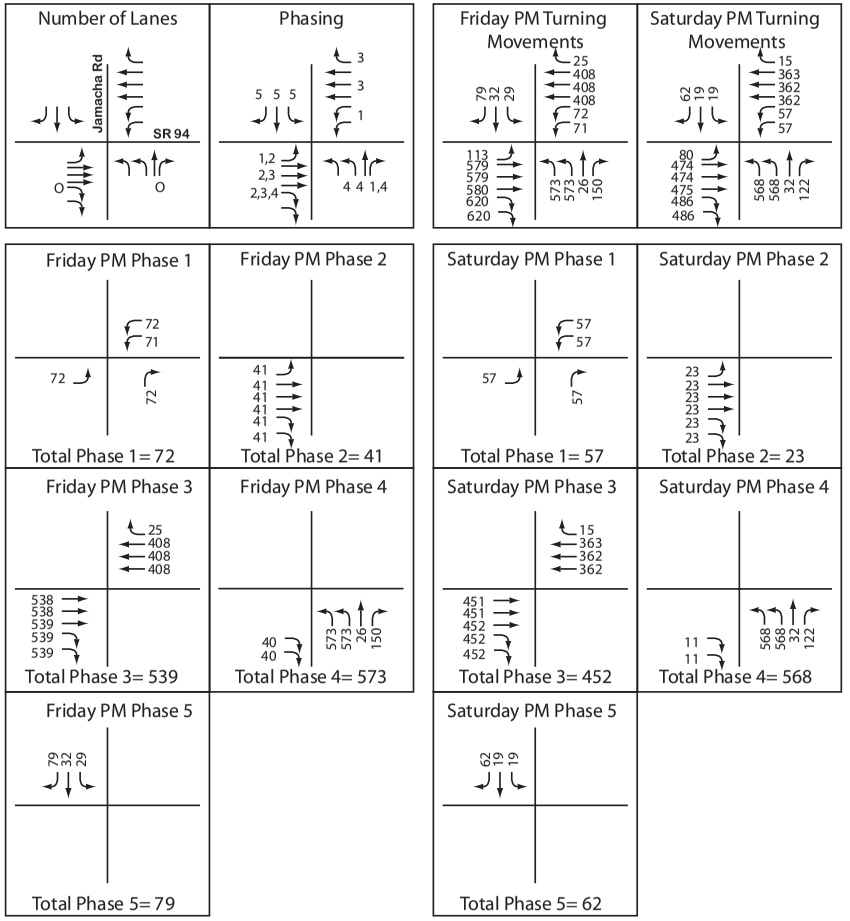
Intersection Name: SR 94 & Jamacha Blvd
Date: April 16, 2014
Scenario: Existing with Casino Friday/Saturday with Project



Friday PM TOTAL= 1191
Friday PM LOS= Below Capacity

Saturday PM TOTAL= 986
Saturday PM LOS= Below Capacity

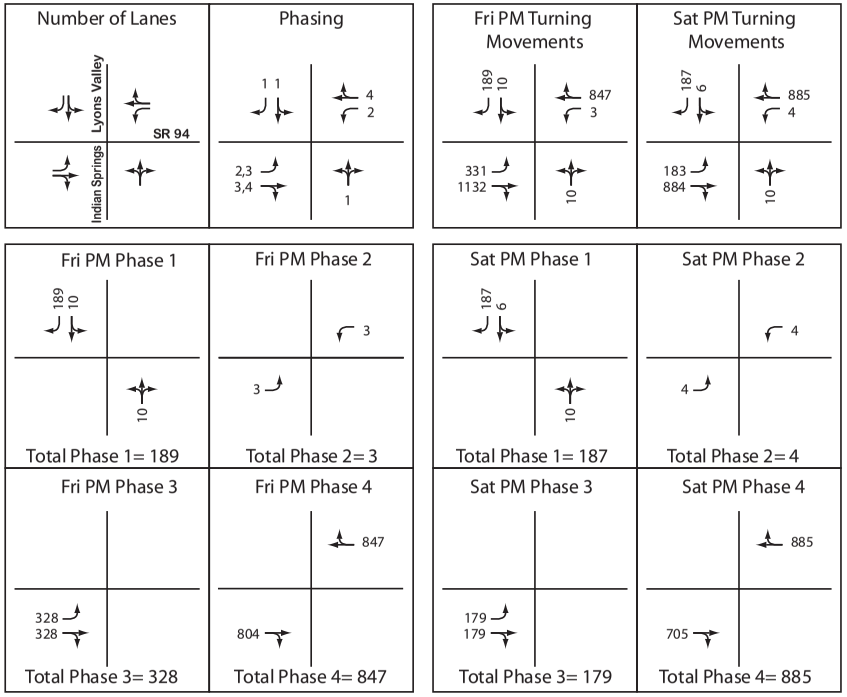
Intersection Name: SR 94 & Jamacha Rd
Date: April 16, 2014
Scenario: Existing with Casino Friday/Saturday with Project



Friday PM TOTAL= 1304
Friday PM LOS= Approaching Capacity

Saturday PM TOTAL= 1162
Saturday PM LOS= Below Capacity

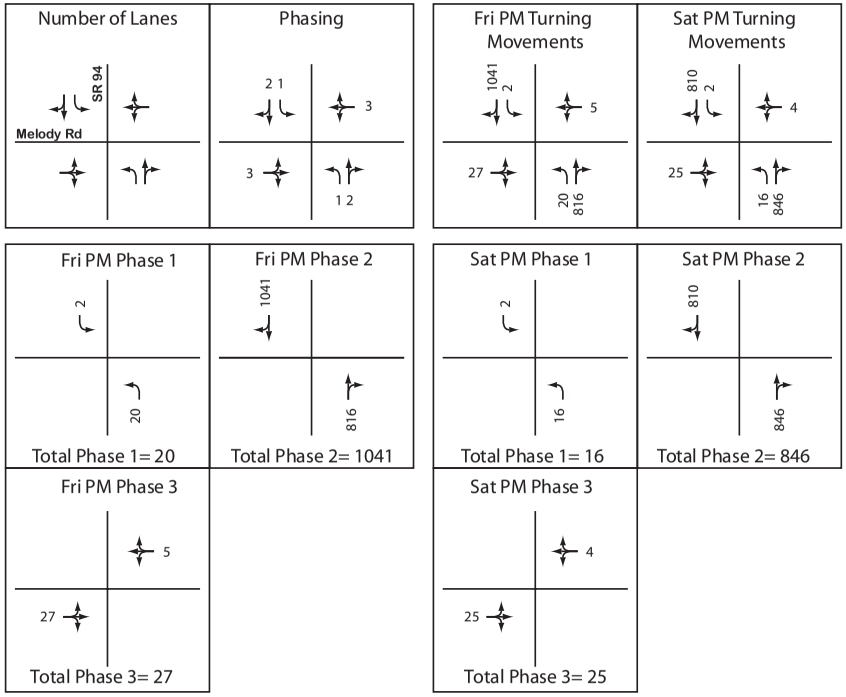
Intersection Name: SR 94 & Lyons Valley Rd/Indian Springs Dr
Date: September 3, 2013
Scenario: Existing Friday/Saturday with Project Alternatives 1-2



Fri PM TOTAL= 1,367
Fri PM LOS= Approaching Capacity

Sat PM TOTAL= 1,255
Sat PM LOS= Below Capacity

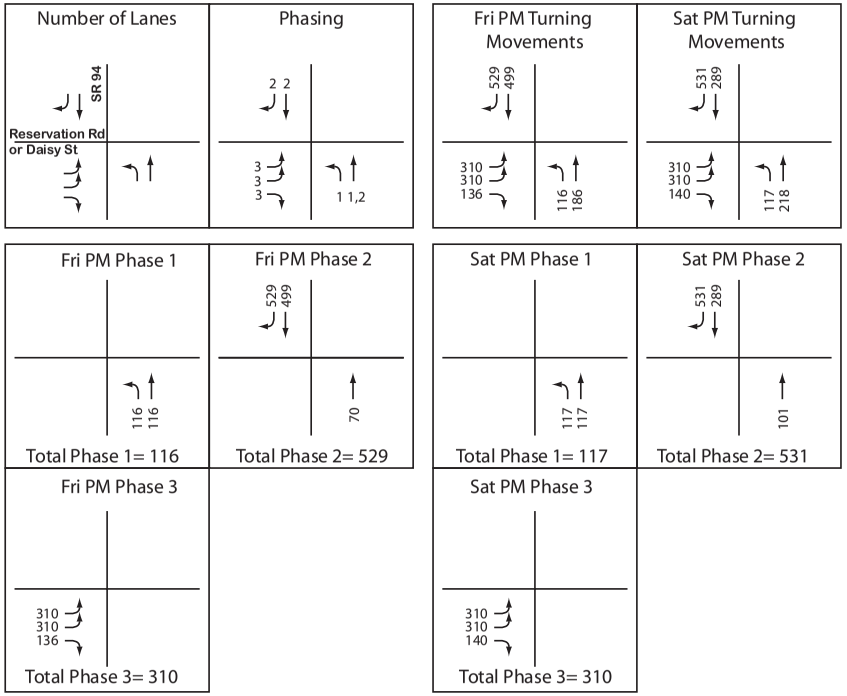
Intersection Name: SR 94 & Melody Rd
Date: September 3, 2013
Scenario: Existing Friday/Saturday with Project Alternatives 1-2



Fri PM TOTAL = 1,088
Fri PM LOS = Below Capacity

Sat PM TOTAL = 887
Sat PM LOS= Below Capacity

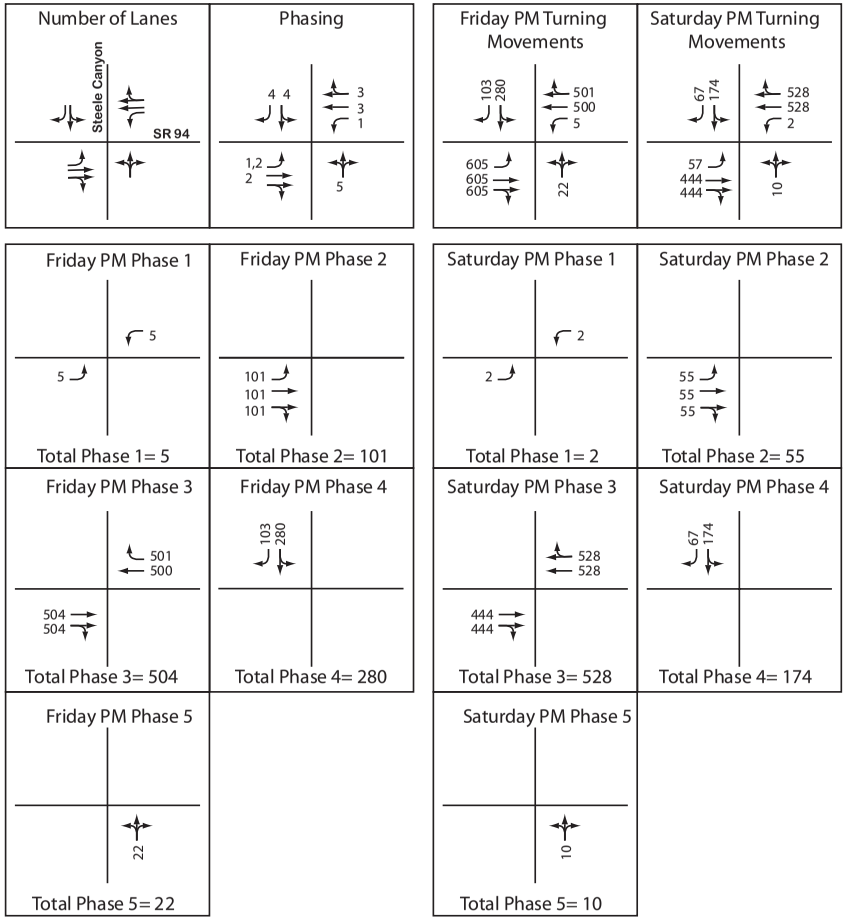
Intersection Name: SR 94 & Resevation Rd
Date: September 3, 2013
Scenario: Existing Friday/Saturday with Project Alternatives 1-2



Fri PM TOTAL = 955
Fri PM LOS = Below Capacity

Sat PM TOTAL = 958
Sat PM LOS= Below Capacity

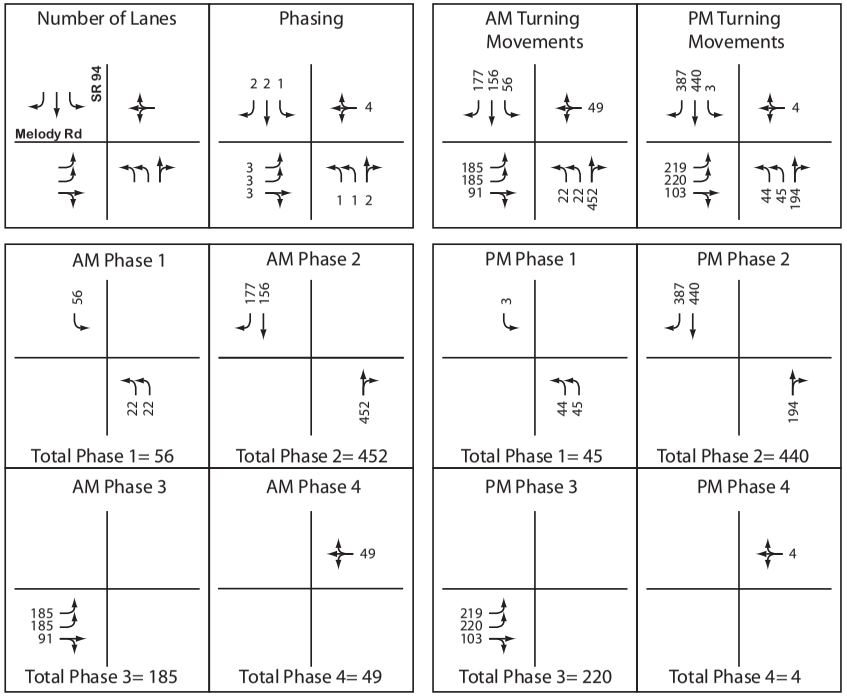
Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Existing with Casino Friday/Saturday Plus Project



Friday PM TOTAL= 912
Friday PM LOS= Below Capacity

Saturday PM TOTAL= 769
Saturday PM LOS= Below Capacity

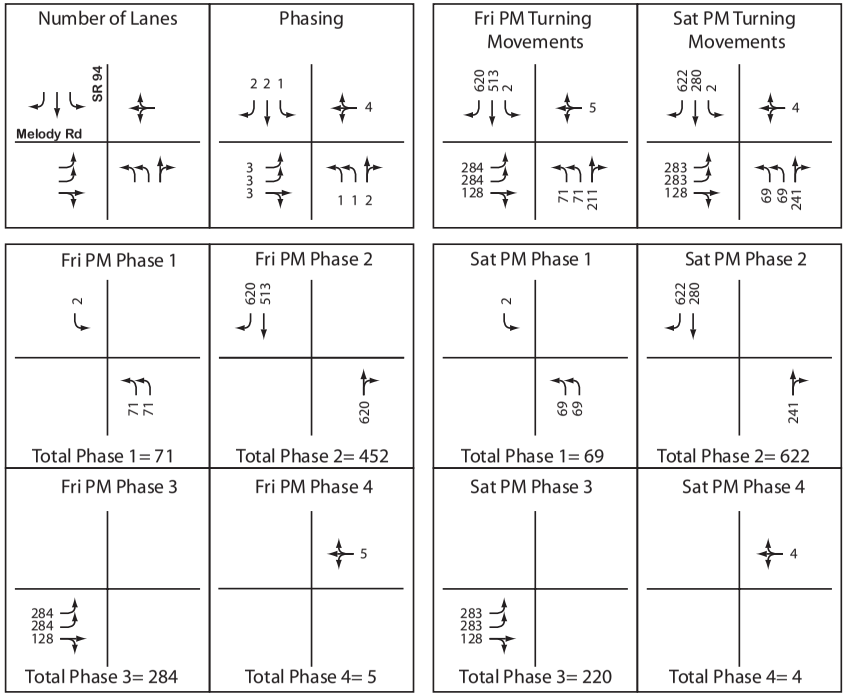
Intersection Name: SR 94 & Melody Rd
Date: September 3, 2013
Scenario: Existing Weekday with Project Alternative 3



AM TOTAL = 742
AM LOS = Below Capacity

PM TOTAL = 709
PM LOS= Below Capacity

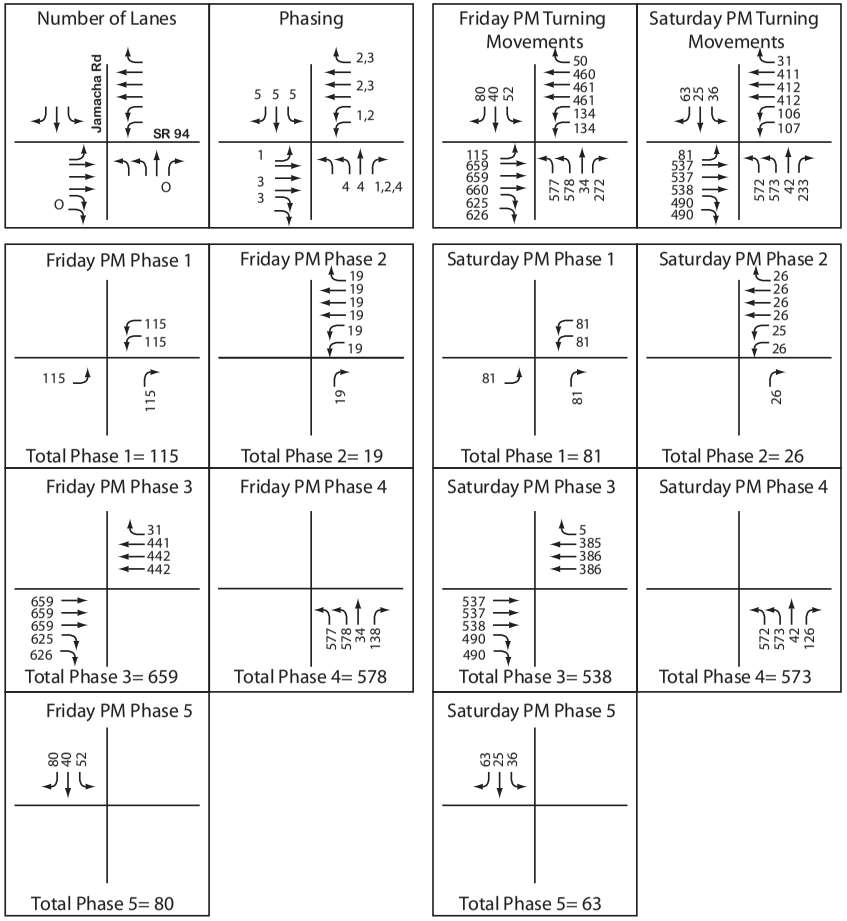
Intersection Name: SR 94 & Melody Rd
Date: September 3, 2013
Scenario: Existing Friday/Saturday with Project Alternative 3



Fri PM TOTAL = 812
Fri PM LOS = Below Capacity

Sat PM TOTAL = 915
Sat PM LOS= Below Capacity

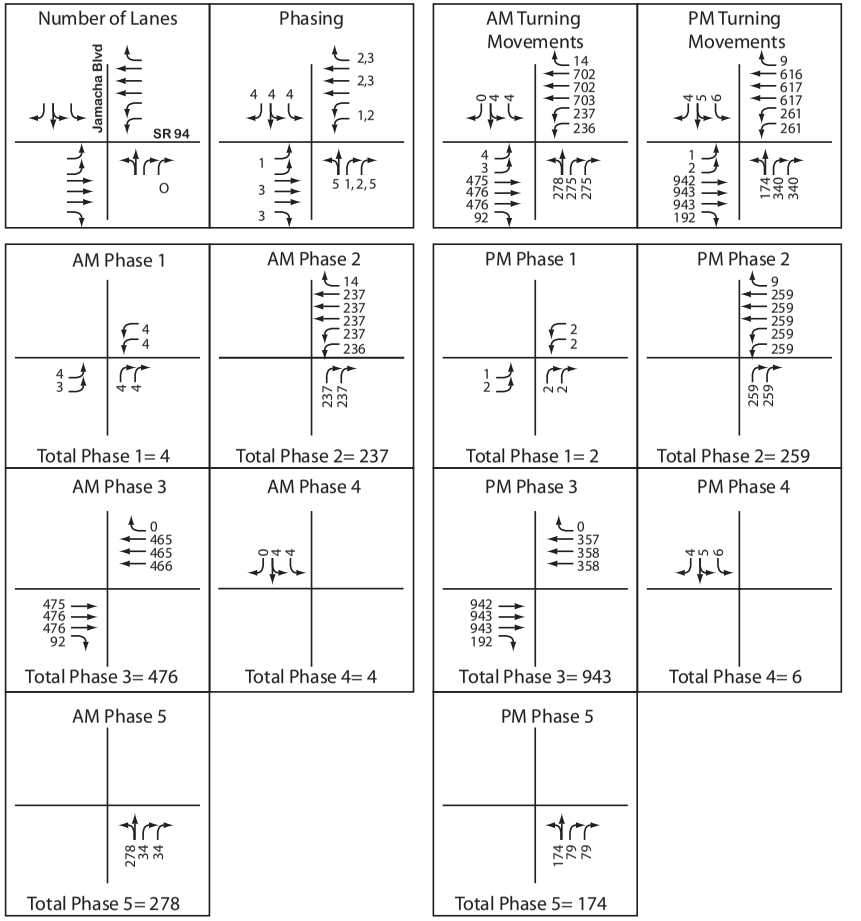
Intersection Name: SR 94 & Jamacha Rd
Date: April 16, 2014
Scenario: Near Term (Year 2015) with Casino Friday/Saturday with Project



Friday PM TOTAL= 1451
Friday PM LOS= Approaching Capacity

Saturday PM TOTAL= 1281
Saturday PM LOS= Approaching Capacity

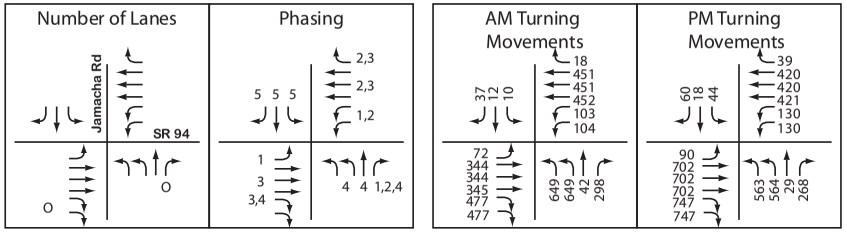
Intersection Name: SR 94 & Jamacha Blvd
Date: April 16, 2014
Scenario: Near Term (Year 2015) with Casino Weekday with Project

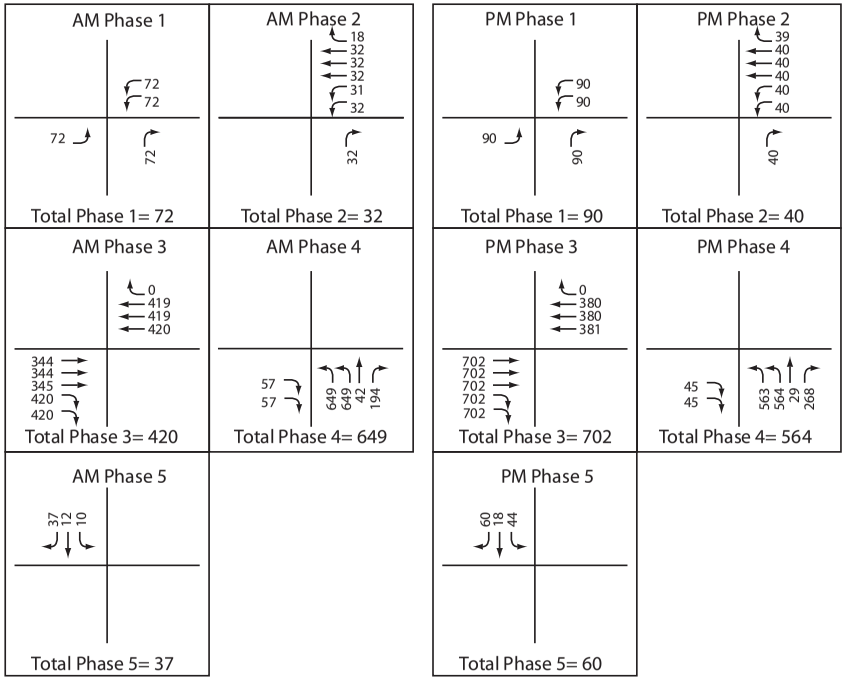


AM TOTAL= 999
AM LOS= Below Capacity

PM TOTAL= 1,384
PM LOS= Approaching Capacity

Intersection Name: SR 94 & Jamacha Rd
Date: April 16, 2014
Scenario: Near Term (Year 2015) with Casino Weekday with Project

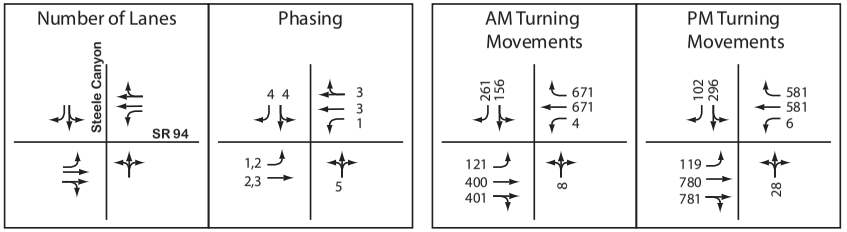


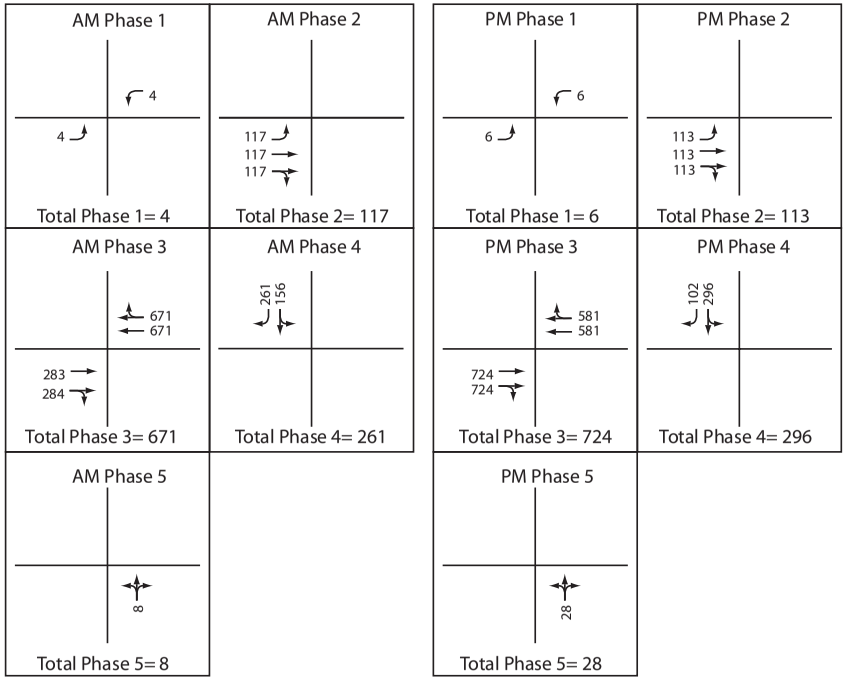


AM TOTAL= 1210
AM LOS= Approaching Capacity

PM TOTAL= 1050
PM LOS= Below Capacity

Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Near Term (No Build) No Build Weekday with Project

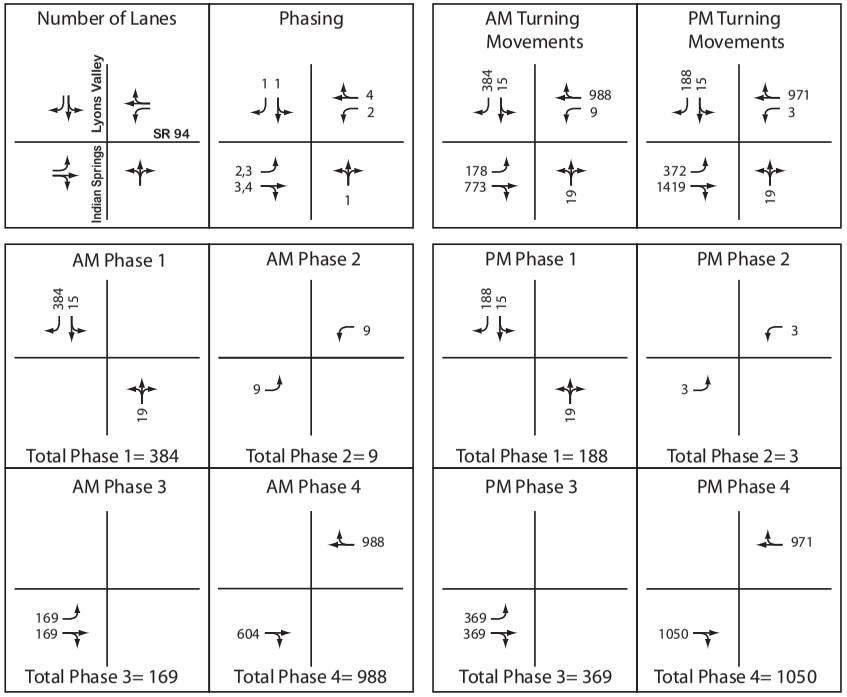




AM TOTAL= 1061
AM LOS= Above Capacity

PM TOTAL= 1167
PM LOS= Above Capacity

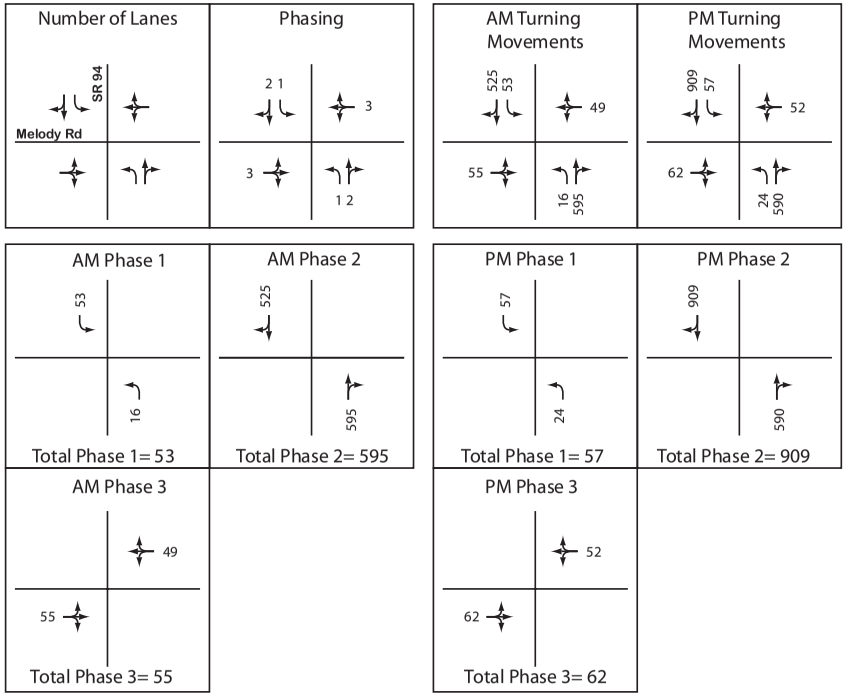
Intersection Name: SR 94 & Lyons Valley Rd/Indian Springs Dr
Date: August 30, 2013
Scenario: Near-Term (Year 2015) Weekday with Project Alternatives 1-2



AM TOTAL = 1,550
AM LOS = Above Capacity

PM TOTAL = 1,610
PM LOS= Above Capacity

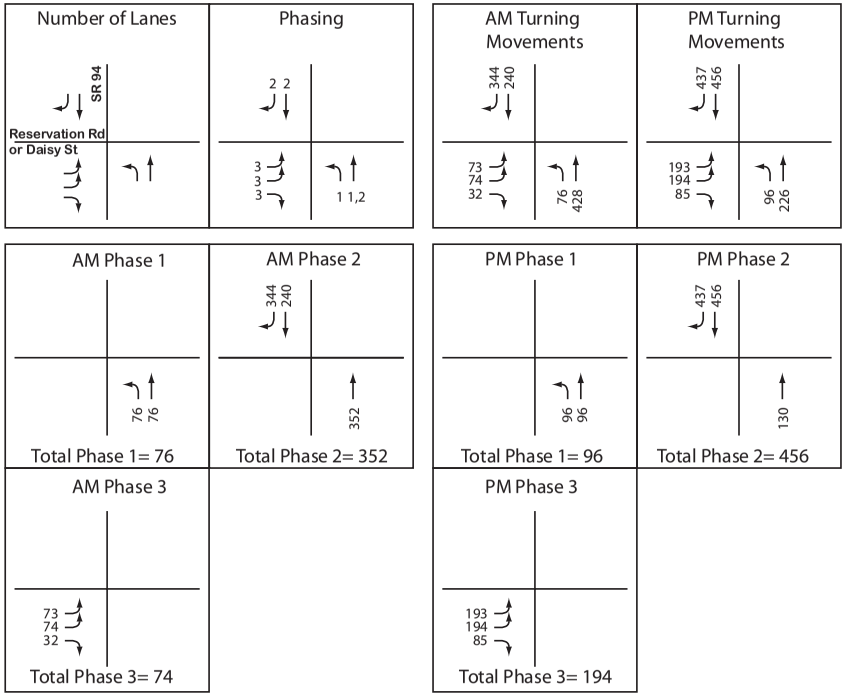
Intersection Name: SR 94 & Melody Rd
Date: September 3, 2013
Scenario: Near Term (Year 2015) Weekday with Project Alternatives 1-2



AM TOTAL = 703
AM LOS = Below Capacity

PM TOTAL = 1,028
PM LOS= Below Capacity

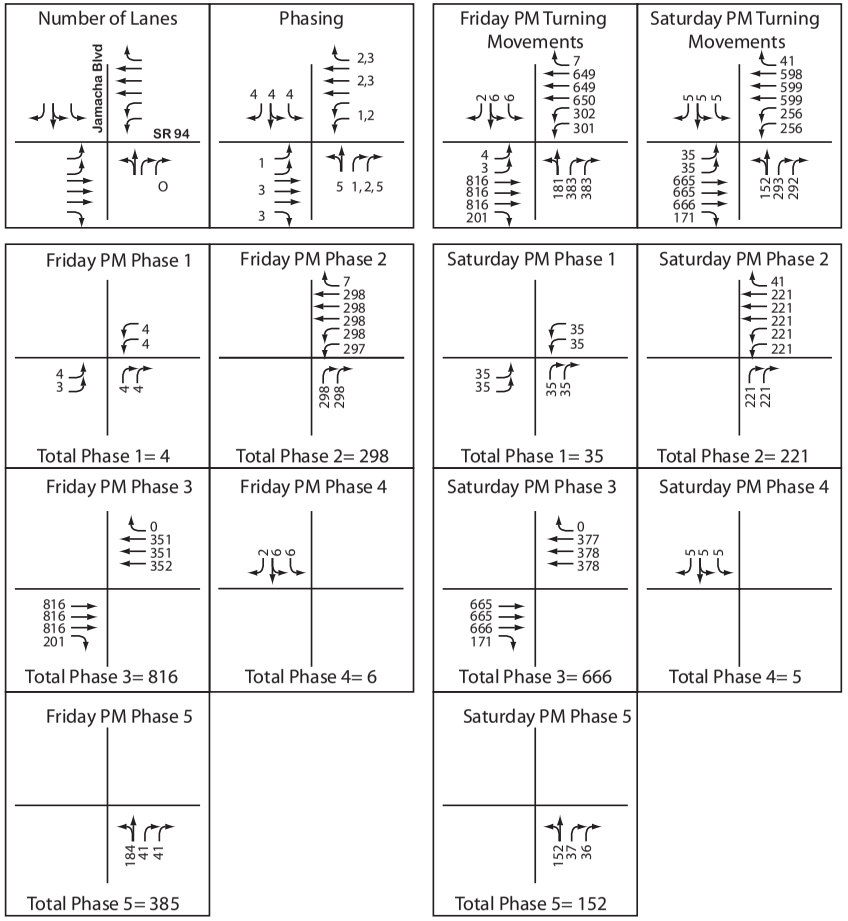
Intersection Name: SR 94 & Resevation Rd
Date: September 3, 2013
Scenario: Near Term (Year 2015) Weekday with Project Alternatives 1-2



AM TOTAL = 502
AM LOS = Below Capacity

PM TOTAL = 746
PM LOS= Below Capacity

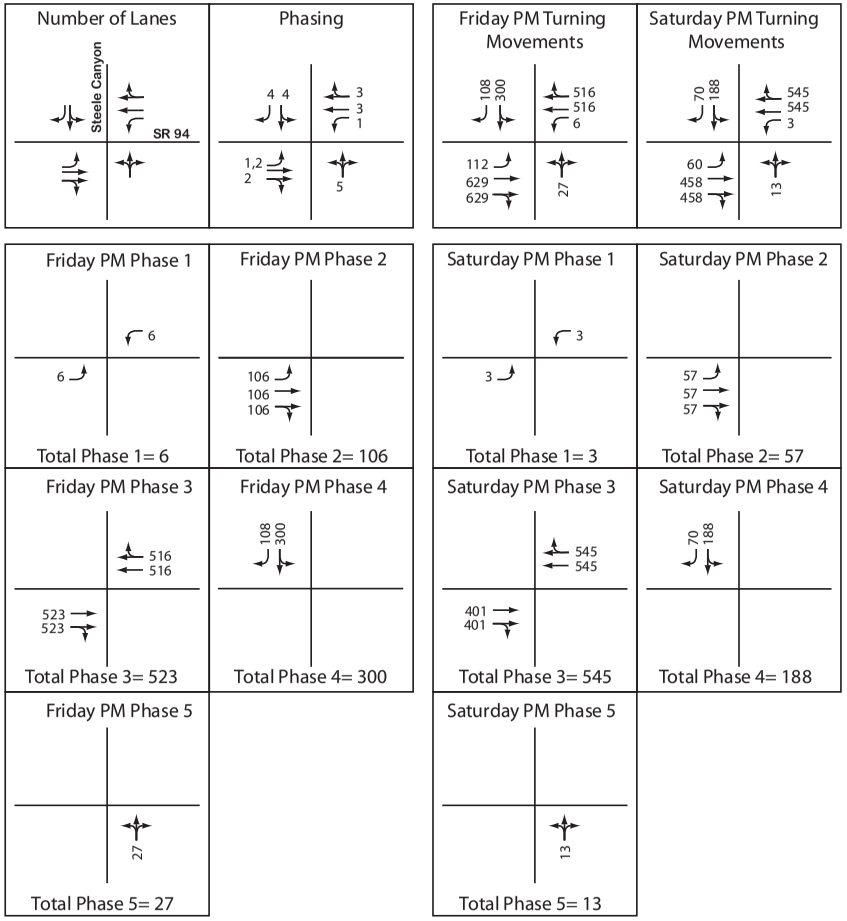
Intersection Name: SR 94 & Jamacha Blvd
Date: April 16, 2014
Scenario: Near Term (Year 2015) with Casino Friday/Saturday with Project



Friday PM TOTAL= 1308
Friday PM LOS= Approaching Capacity

Saturday PM TOTAL= 1079
Saturday PM LOS= Below Capacity

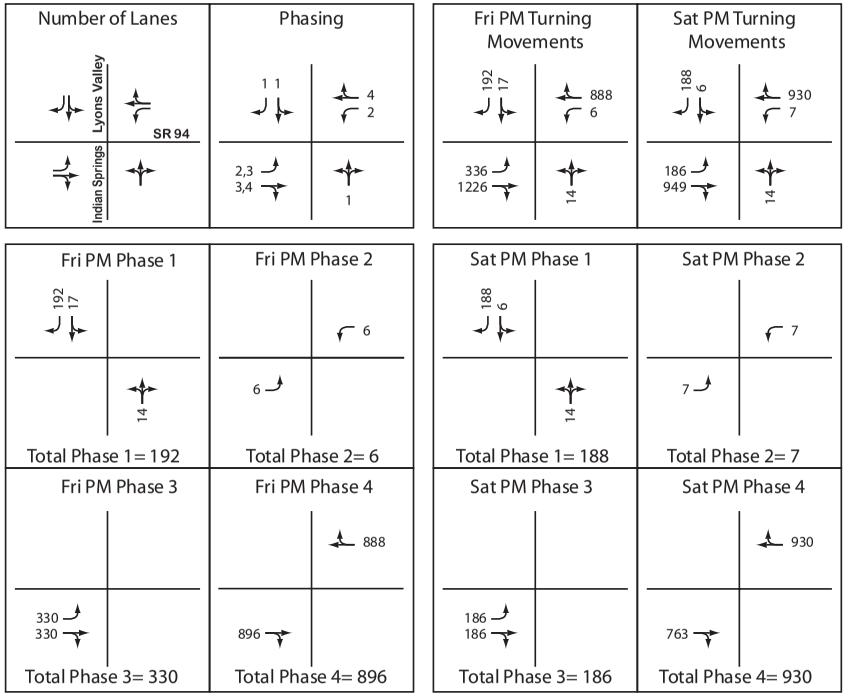
Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Near Term (Year 2015) No Build Friday/Saturday with Project



Friday PM TOTAL= 962
Friday PM LOS= Below Capacity

Saturday PM TOTAL= 806
Saturday PM LOS= Below Capacity

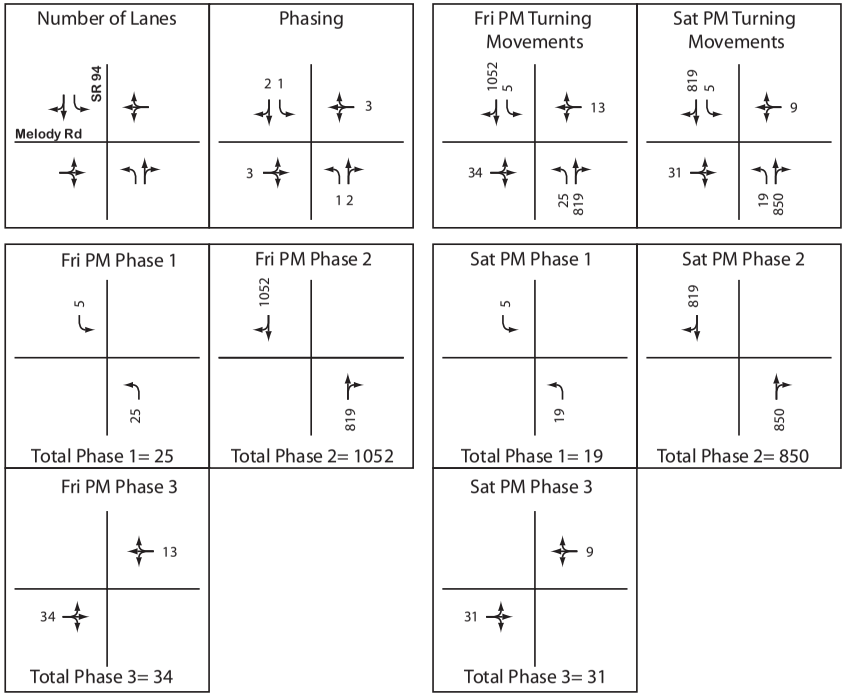
Intersection Name: SR 94 & Lyons Valley Rd/Indian Springs Dr
Date: September 3, 2013
Scenario: Near Term (Year 2015) Friday/Saturday with Project Alternatives 1-2



Fri PM TOTAL= 1,424
Fri PM LOS= Approaching Capacity

Sat PM TOTAL= 1,311
Sat PM LOS= Approaching Capacity

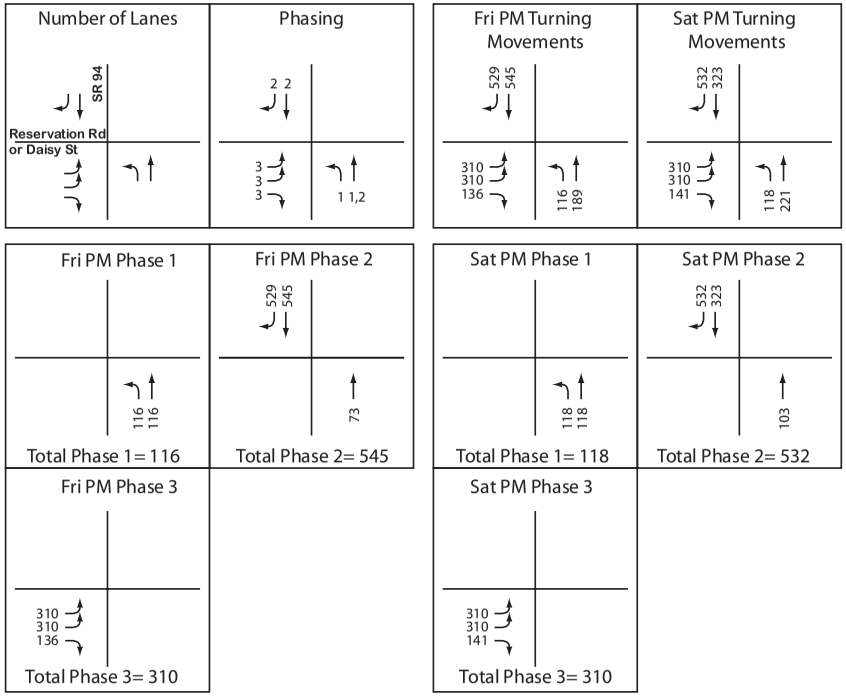
Intersection Name: SR 94 & Melody Rd
Date: September 3, 2013
Scenario: Near Term (Year 2015) Friday/Saturday with Project Alternatives 1-2



Fri PM TOTAL = 1,111
Fri PM LOS = Below Capacity

Sat PM TOTAL = 900
Sat PM LOS= Below Capacity

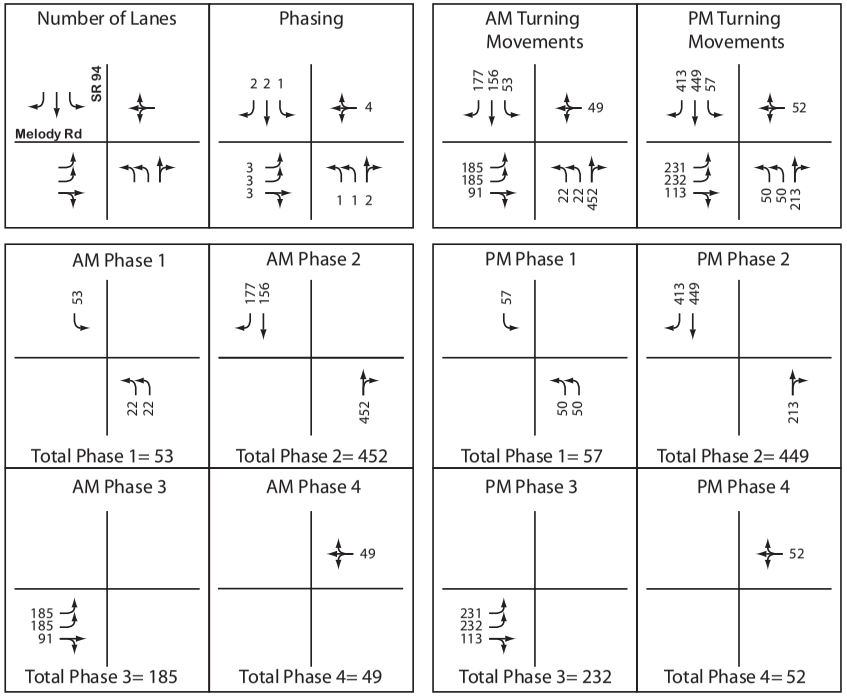
Intersection Name: SR 94 & Resevation Rd
Date: September 3, 2013
Scenario: Near Term (Year 2015) Friday/Saturday with Project Alternatives 1-2



Fri PM TOTAL = 971
Fri PM LOS = Below Capacity

Sat PM TOTAL = 960
Sat PM LOS= Below Capacity

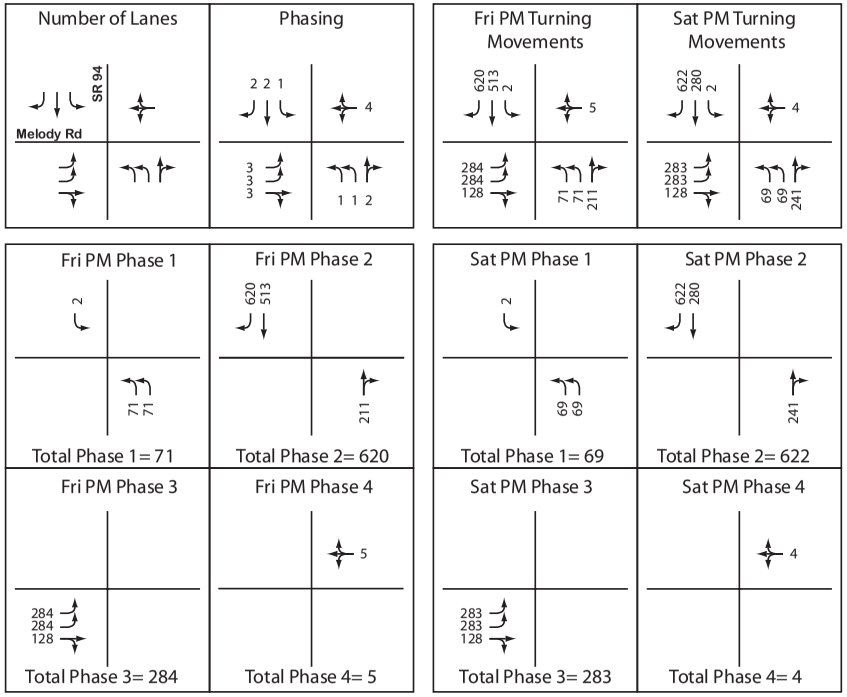
Intersection Name: SR 94 & Melody Rd
Date: September 3, 2013
Scenario: Near Term (Year 2015) Weekday with Project Alternative 3



AM TOTAL = 739
AM LOS = Below Capacity

PM TOTAL = 790
PM LOS= Below Capacity

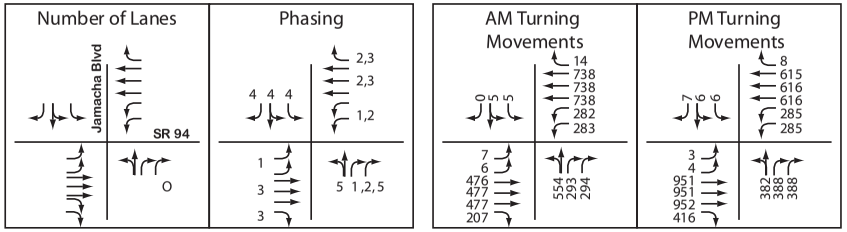
Intersection Name: SR 94 & Melody Rd
Date: September 3, 2013
Scenario: Near Term (Year 2015) Friday/Saturday with Project Alternative 3

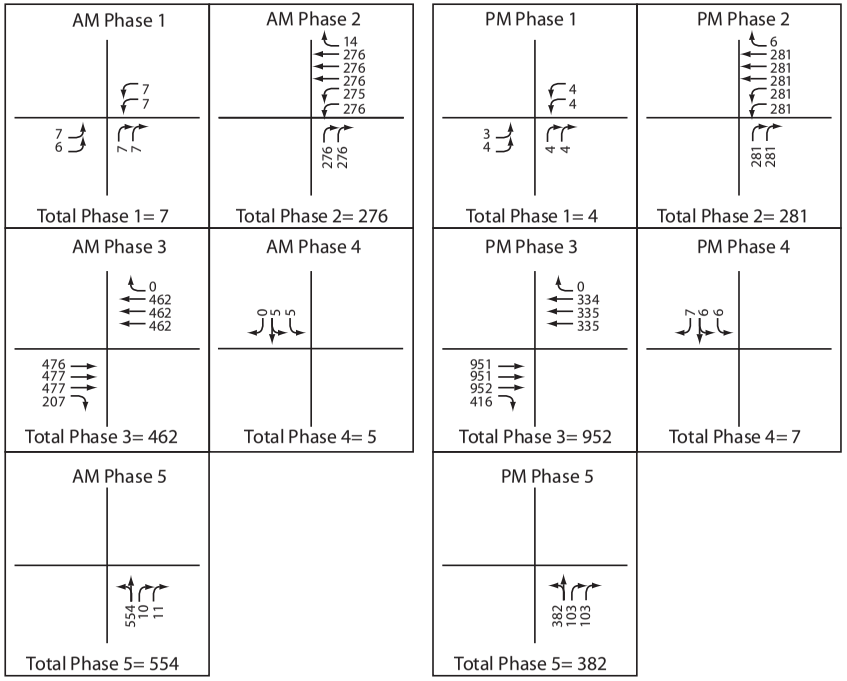


Fri PM TOTAL = 980
Fri PM LOS = Below Capacity

Sat PM TOTAL = 978
Sat PM LOS= Below Capacity

Intersection Name: SR 94 & Jamacha Blvd
Date: April 16, 2014
Scenario: Horizon Year (Year 2035) with Casino Weekday with Project

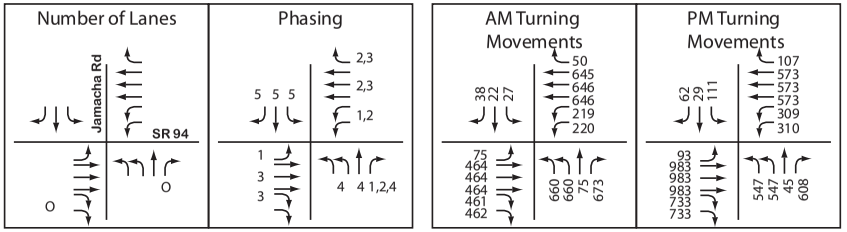


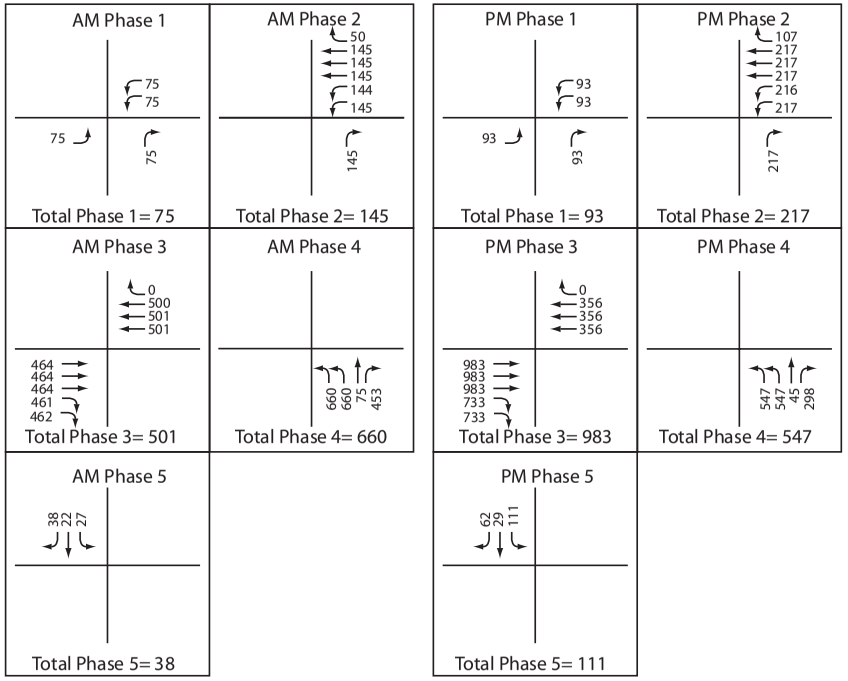


AM TOTAL= 1304
AM LOS= Approaching Capacity

PM TOTAL= 1626
PM LOS= Above Capacity

Intersection Name: SR 94 & Jamacha Rd
Date: April 16, 1014
Scenario: Horizon Year (Year 2035) with Casino Weekday with Project

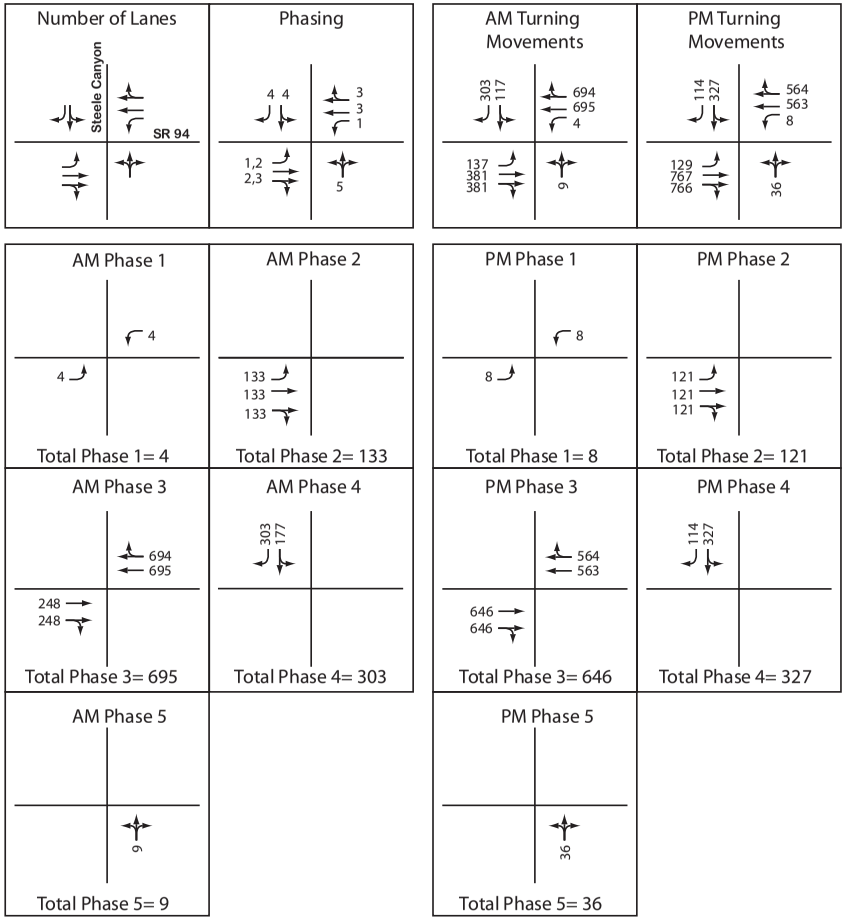




AM TOTAL= 1419
AM LOS= Approaching Capacity

PM TOTAL= 1951
PM LOS= Above Capacity

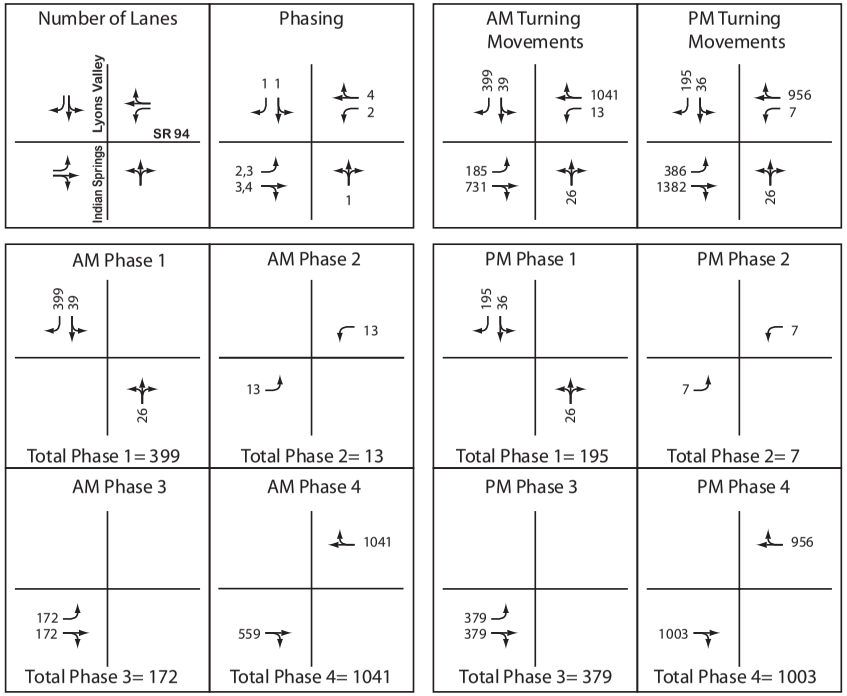
Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Horizon Year (Year 2035) No Build Weekday with Project



AM TOTAL= 1144
AM LOS= Below Capacity

PM TOTAL= 1138
PM LOS= Below Capacity

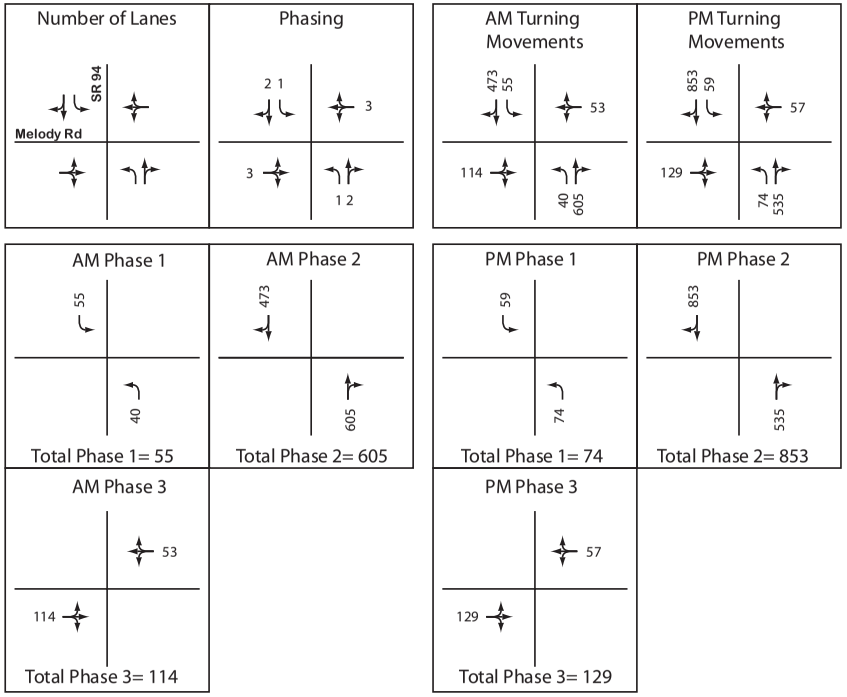
Intersection Name: SR 94 & Lyons Valley Rd/Indian Springs Dr
Date: August 30, 2013
Scenario: Horizon Year (Year 2035) Weekday with Project Alternatives 1-2



AM TOTAL = 1,625
AM LOS = Above Capacity

PM TOTAL = 1,584
PM LOS= Above Capacity

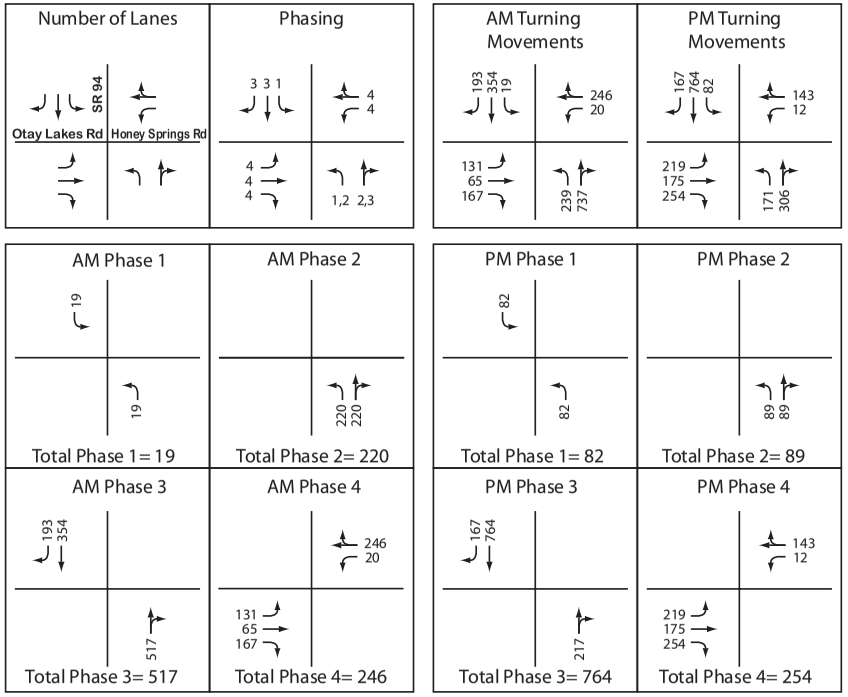
Intersection Name: SR 94 & Melody Rd
Date: September 3, 2013
Scenario: Horizon Year (Year 2035) Weekday with Project Alternatives 1-2



AM TOTAL = 774
AM LOS = Below Capacity

PM TOTAL = 1,056
PM LOS= Below Capacity

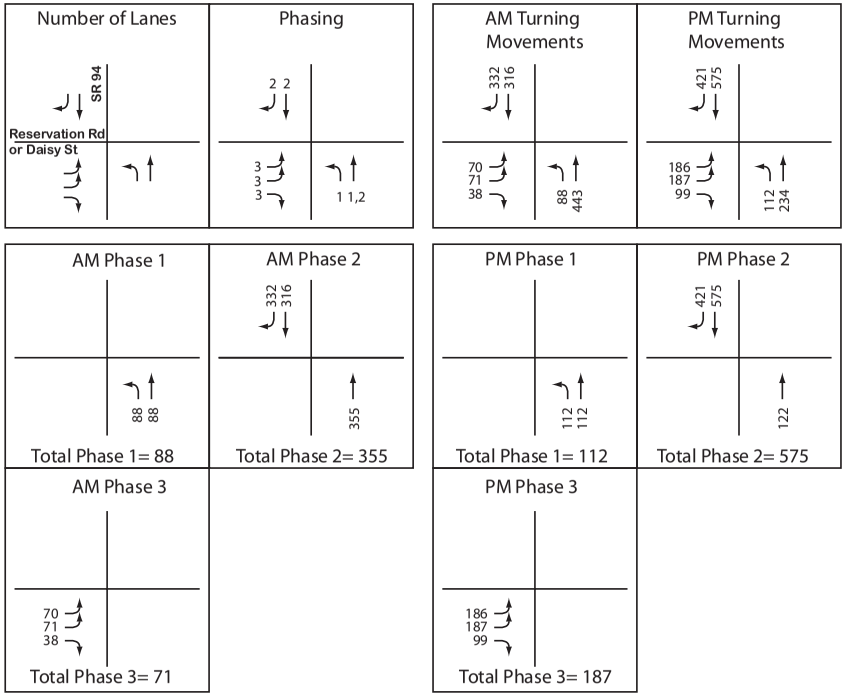
Intersection Name: SR 94 & Otay Lakes Rd/Honey Springs Rd
Date: September 3, 2013
Scenario: Horizon Year (Year 2035) Weekday with Project Alternatives 1-2



AM TOTAL = 1,002
AM LOS = Below Capacity

PM TOTAL = 1,189
PM LOS= Below Capacity

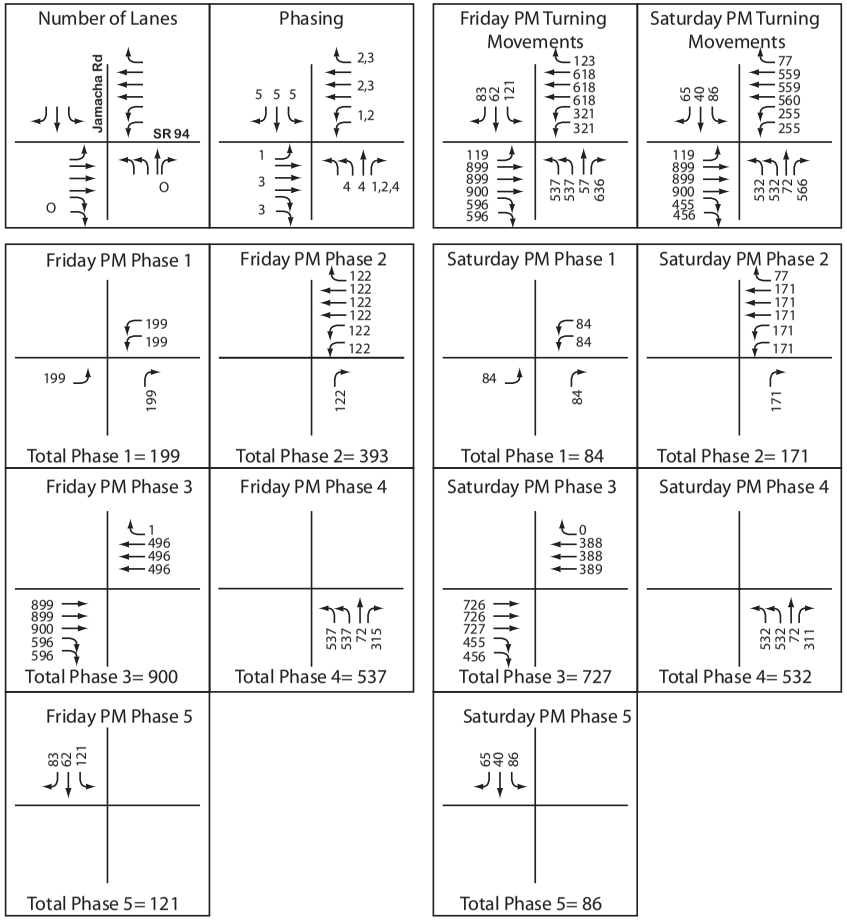
Intersection Name: SR 94 & Resevation Rd
Date: September 3, 2013
Scenario: Horizon Year (Year 2035) Weekday with Project Alternatives 1-2



AM TOTAL = 514
AM LOS = Below Capacity

PM TOTAL = 874
PM LOS= Below Capacity

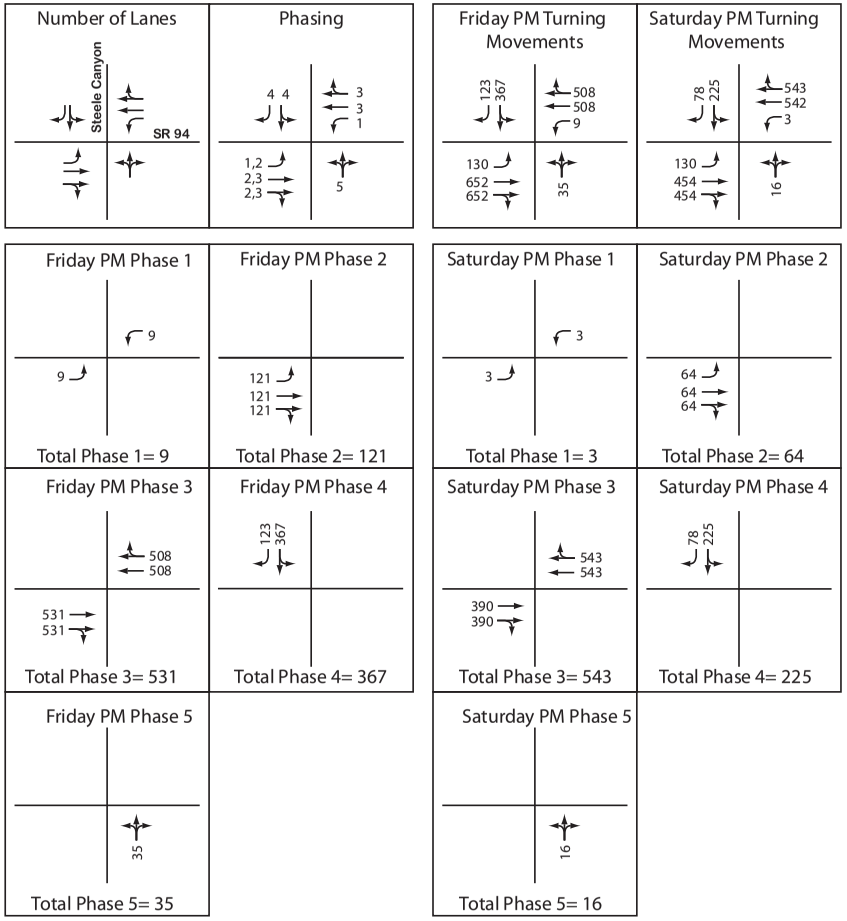
Intersection Name: SR 94 & Jamacha Rd
Date: April 16, 2014
Scenario: Horizon Year (Year 2035) with Casino Friday/Saturday with Project



Friday PM TOTAL= 2150
Friday PM LOS= Above Capacity

Saturday PM TOTAL= 1600
Saturday PM LOS= Above Capacity

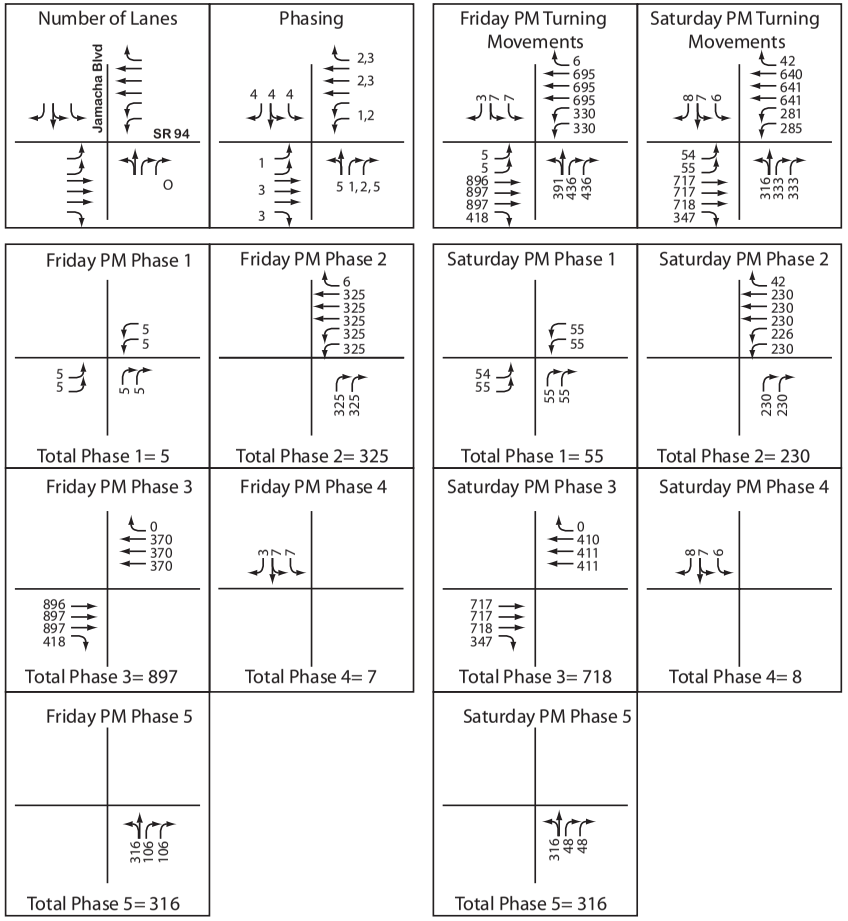
Intersection Name: SR 94 & Steele Canyon Rd
Date: August 27, 2013
Scenario: Horizon Year (Year 2035) No Build Friday/Saturday with Project



Friday PM TOTAL= 1063
Friday PM LOS= Below Capacity

Saturday PM TOTAL= 851
Saturday PM LOS= Approaching Capacity

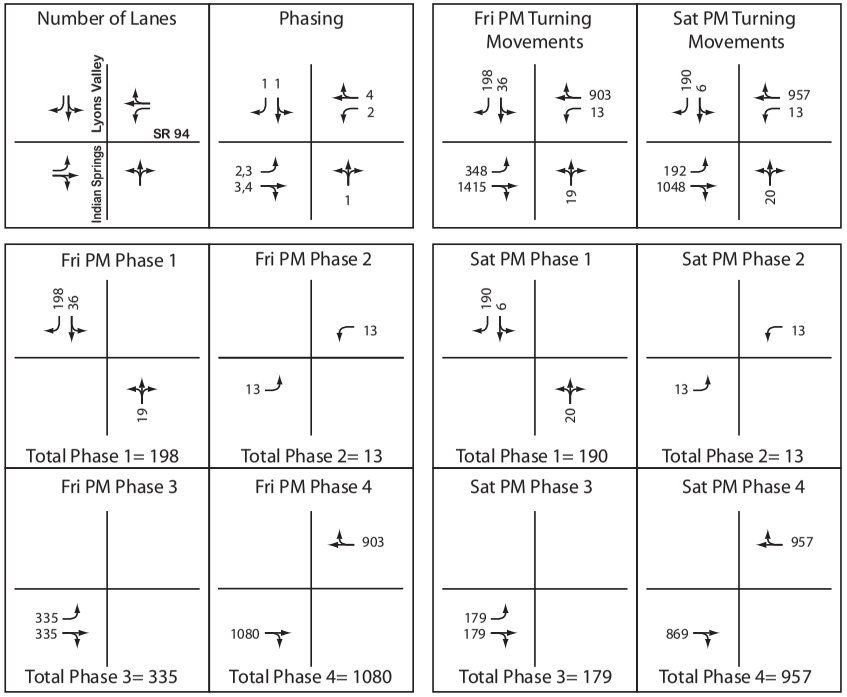
Intersection Name: SR 94 & Jamacha Blvd
Date: April 16, 2014
Scenario: Horizon Year (Year 2035) with Casino Friday/Saturday with Project



Friday PM TOTAL= 1550
Friday PM LOS= Above Capacity

Saturday PM TOTAL= 1327
Saturday PM LOS= Approaching Capacity

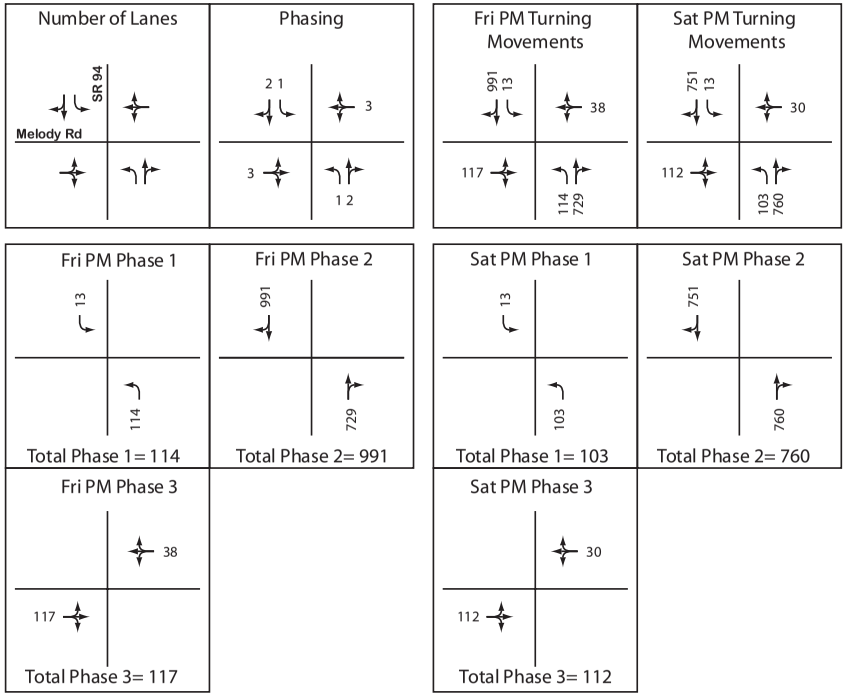
Intersection Name: SR 94 & Lyons Valley Rd/Indian Springs Dr
Date: September 3, 2013
Scenario: Horizon Year (Year 2035) Friday/Saturday with Project Alternatives 1-2



Fri PM TOTAL= 1,626
Fri PM LOS= Above Capacity

Sat PM TOTAL= 1,339
Sat PM LOS= Above Capacity

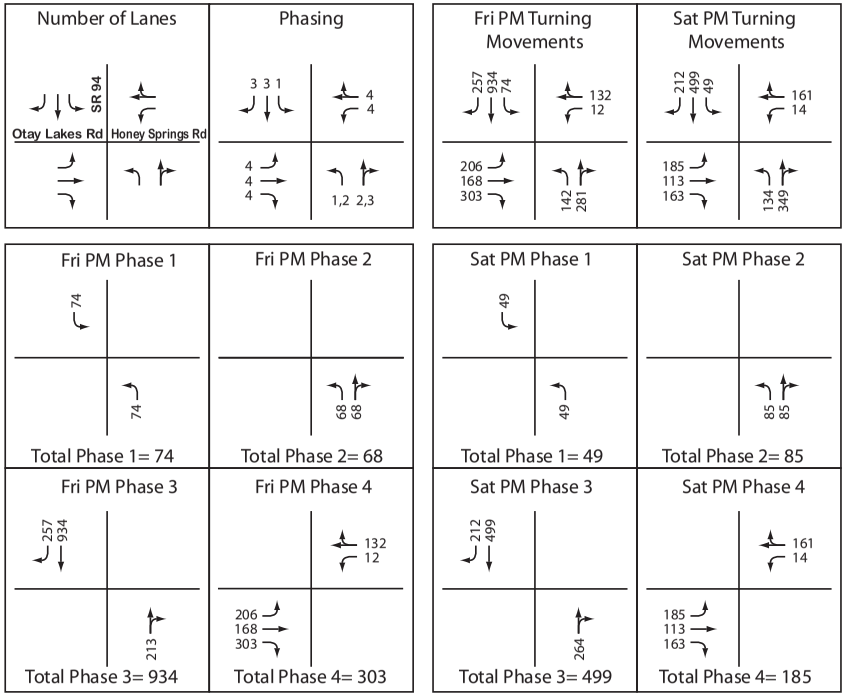
Intersection Name: SR 94 & Melody Rd
Date: September 3, 2013
Scenario: Horizon Year (Year 2035) Friday/Saturday with Project Alternatives 1-2



Fri PM TOTAL = 1,222
Fri PM LOS = Approaching Capacity

Sat PM TOTAL = 975
Sat PM LOS= Below Capacity

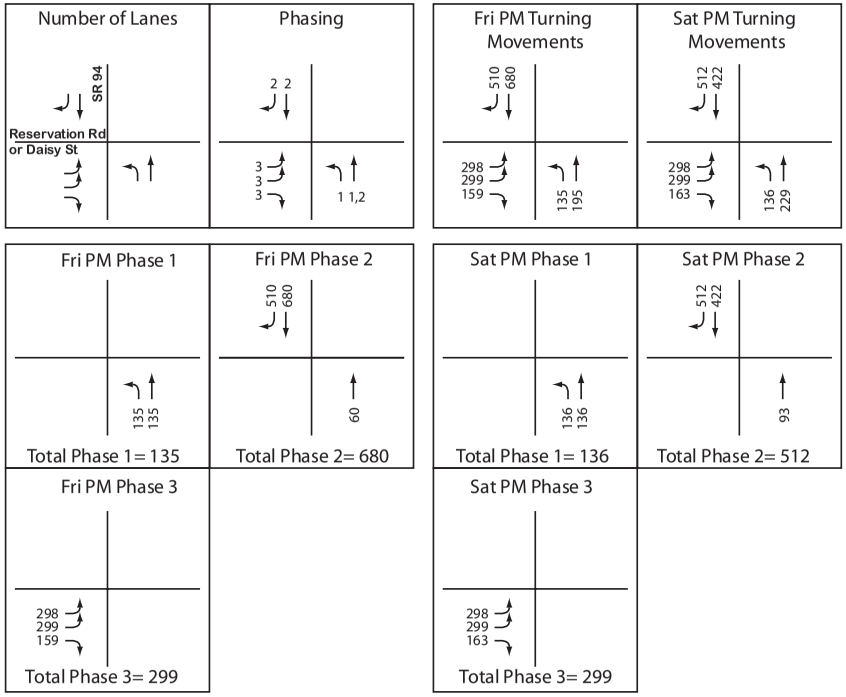
Intersection Name: SR 94 & Otay Lakes Rd/Honey Springs Rd
Date: September 3, 2013
Scenario: Horizon Year (Year 2035) Friday/Saturday with Project Alternatives 1-2



Friday PM TOTAL = 1,379
Friday PM LOS = Approaching Capacity

Saturday PM TOTAL = 818
Saturday PM LOS= Below Capacity

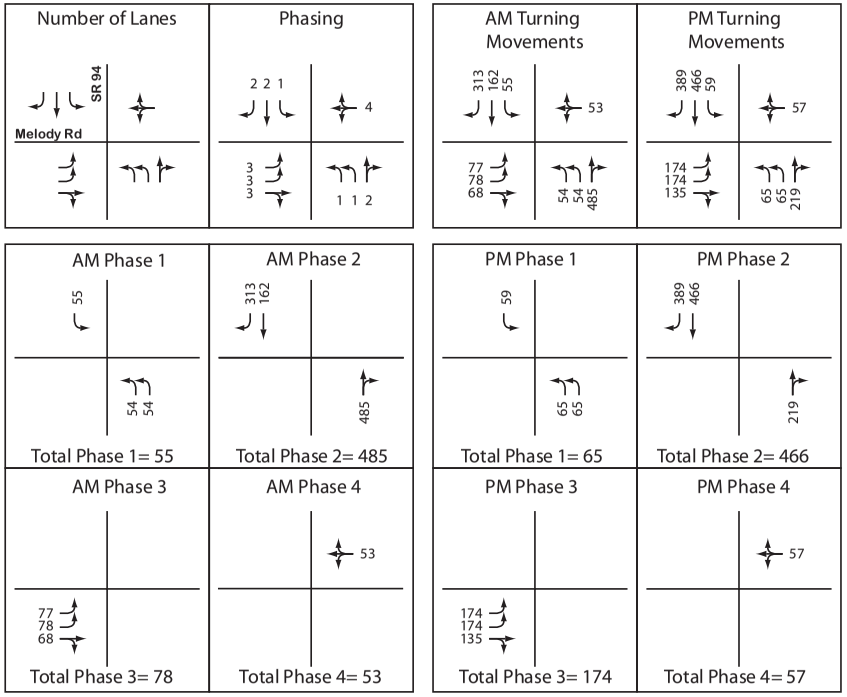
Intersection Name: SR 94 & Resevation Rd
Date: September 3, 2013
Scenario: Horizon Year (Year 2035) Friday/Saturday with Project Alternatives 1-2



Fri PM TOTAL = 1,114
Fri PM LOS = Below Capacity

Sat PM TOTAL = 947
Sat PM LOS= Below Capacity

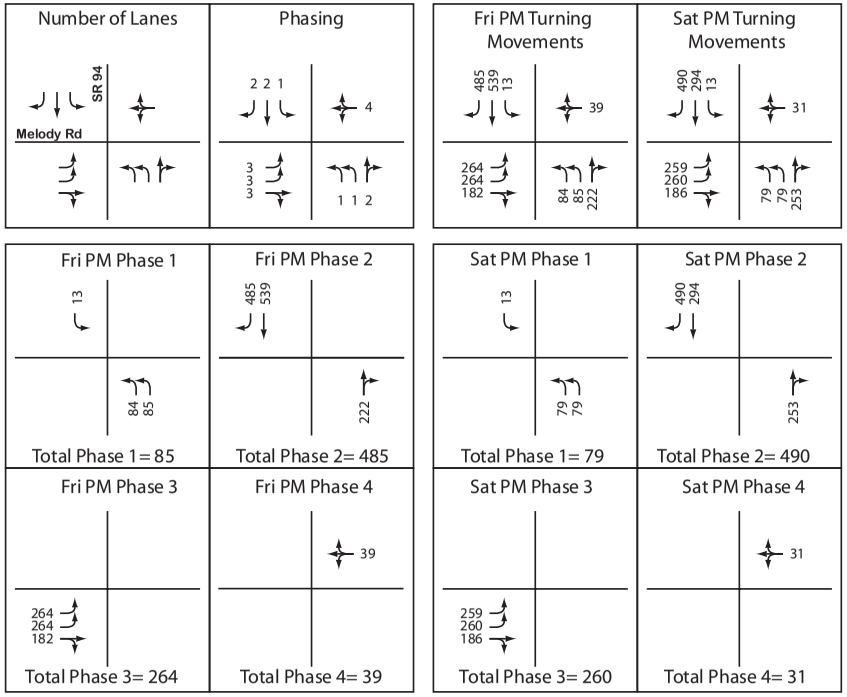
Intersection Name: SR 94 & Melody Rd
Date: September 3, 2013
Scenario: Horizon Year (Year 2035) Weekday with Project Alternative 3



AM TOTAL = 671
AM LOS = Below Capacity

PM TOTAL = 762
PM LOS= Below Capacity

Intersection Name: SR 94 & Melody Rd
Date: September 3, 2013
Scenario: Horizon Year (Year 2035) Friday/Saturday with Project Alternative 3



Fri PM TOTAL = 873
Fri PM LOS = Below Capacity

Sat PM TOTAL = 860
Sat PM LOS= Below Capacity

APPENDIX G

- Peak-Hour Arterial Analysis Worksheets

Arterial Level of Service: EB SR 94 (Campo Rd)

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	4.2	99.8	1.46	52.7	A
Jamacha Blvd.	I	55	38.0	18.8	56.8	0.52	33.0	C
SR 94 (Campo Rd)	I	55	38.1	1.3	39.4	0.58	53.2	A
Cougar Canyon Rd.	I	55	78.0	4.2	82.2	1.19	52.2	A
Steele Canyon Rd.	I	55	81.2	9.4	90.6	1.24	49.3	A
Proctor Valley Rd.	I	55	143.1	9.0	152.1	2.19	51.7	A
Total	I		474.0	46.9	520.9	7.18	49.6	A

Arterial Level of Service: WB SR 94 (Campo Rd)

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Jefferson Rd.	I	55	339.9	13.5	353.4	5.19	52.9	A
Steele Canyon Rd.	I	55	143.1	31.4	174.5	2.19	45.1	A
Cougar Canyon Rd.	I	55	81.2	25.4	106.6	1.24	41.9	B
Jamacha Rd.	I	55	78.0	28.0	106.0	1.19	40.5	B
Jamacha Blvd.	I	55	38.1	8.5	46.6	0.58	45.0	A
Via Mercado	I	55	38.0	22.2	60.2	0.52	31.1	C
Total	I		718.3	129.0	847.3	10.91	46.4	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	13.0	108.6	1.46	48.4	A
Jamacha Blvd.	I	55	38.0	33.1	71.1	0.52	26.4	D
SR 94	I	55	38.1	4.3	42.4	0.58	49.4	A
Cougar Canyon Rd.	I	55	78.0	12.2	90.2	1.19	47.5	A
Steele Canyon Rd.	I	55	81.2	28.0	109.2	1.24	40.9	B
Proctor Valley Rd.	I	55	143.3	13.0	156.3	2.19	50.4	A
Total	I		474.2	103.6	577.8	7.19	44.8	A

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Jefferson Rd.	I	55	339.9	7.8	347.7	5.19	53.8	A
Steele Canyon Rd.	I	55	143.3	22.0	165.3	2.19	47.7	A
Cougar Canyon Rd.	I	55	81.2	11.3	92.5	1.24	48.3	A
Jamacha Rd.	I	55	78.0	40.6	118.6	1.19	36.2	B
Jamacha Blvd.	I	55	38.1	4.7	42.8	0.58	49.0	A
Via Mercado	I	55	38.0	28.0	66.0	0.52	28.4	C
Total	I		718.5	114.4	832.9	10.92	47.2	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	16.8	112.4	1.46	46.8	A
Jamacha Blvd.	I	55	38.0	24.5	62.5	0.52	30.0	C
SR 94	I	55	38.1	2.8	40.9	0.58	51.2	A
Cougar Canyon Rd.	I	55	78.0	11.9	89.9	1.19	47.7	A
Steele Canyon Rd.	I	55	81.2	24.9	106.1	1.24	42.1	A
Proctor Valley Rd.	I	55	143.9	11.3	155.2	2.20	51.0	A
Total	I		474.8	92.2	567.0	7.19	45.7	A

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Jefferson Rd.	I	55	340.4	7.9	348.3	5.20	53.7	A
Steele Canyon Rd.	I	55	143.9	22.2	166.1	2.20	47.6	A
Cougar Canyon Rd.	I	55	81.2	12.2	93.4	1.24	47.8	A
Jamacha Rd.	I	55	78.0	43.1	121.1	1.19	35.4	B
Jamacha Blvd.	I	55	38.1	4.8	42.9	0.58	48.8	A
Via Mercado	I	55	38.0	26.4	64.4	0.52	29.1	C
Total	I		719.6	116.6	836.2	10.93	47.1	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	9.6	105.2	1.46	50.0	A
Jamacha Blvd.	I	55	38.0	19.2	57.2	0.52	32.8	C
SR 94	I	55	38.1	1.7	39.8	0.58	52.6	A
Cougar Canyon Rd.	I	55	78.0	15.6	93.6	1.19	45.8	A
Steele Canyon Rd.	I	55	81.2	24.9	106.1	1.24	42.1	A
Proctor Valley Rd.	I	55	143.6	15.1	158.7	2.19	49.8	A
Total	I		474.5	86.1	560.6	7.19	46.2	A

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Jefferson Rd.	I	55	340.1	14.2	354.3	5.20	52.8	A
Steele Canyon Rd.	I	55	143.6	31.3	174.9	2.19	45.1	A
Cougar Canyon Rd.	I	55	81.2	16.9	98.1	1.24	45.5	A
Jamacha Rd.	I	55	78.0	32.0	110.0	1.19	39.0	B
Jamacha Blvd.	I	55	38.1	8.6	46.7	0.58	44.9	A
Via Mercado	I	55	38.0	19.9	57.9	0.52	32.4	C
Total	I		719.0	122.9	841.9	10.92	46.7	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	4.8	100.4	1.46	52.4	A
Jamacha Blvd.	I	55	38.0	18.8	56.8	0.52	33.0	C
SR 94	I	55	38.1	2.4	40.5	0.58	51.7	A
Cougar Canyon Rd.	I	55	78.0	5.3	83.3	1.19	51.5	A
Steele Canyon Rd.	I	55	81.2	13.9	95.1	1.24	47.0	A
Proctor Valley Rd.	I	55	144.4	12.7	157.1	2.21	50.6	A
Total	I		475.3	57.9	533.2	7.20	48.6	A

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Jefferson Rd.	I	55	339.8	14.3	354.1	5.19	52.8	A
Steele Canyon Rd.	I	55	144.4	64.8	209.2	2.21	38.0	B
Cougar Canyon Rd.	I	55	81.2	26.6	107.8	1.24	41.4	B
Jamacha Rd.	I	55	78.0	30.8	108.8	1.19	39.4	B
Jamacha Blvd.	I	55	38.1	8.6	46.7	0.58	44.9	A
Via Mercado	I	55	38.0	28.4	66.4	0.52	28.2	C
Total	I		719.5	173.5	893.0	10.93	44.1	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	20.3	115.9	1.46	45.4	A
Jamacha Blvd.	I	55	38.0	39.8	77.8	0.52	24.1	D
SR 94	I	55	38.1	34.8	72.9	0.58	28.7	C
Cougar Canyon Rd.	I	55	78.0	20.2	98.2	1.19	43.7	A
Steele Canyon Rd.	I	55	81.2	50.5	131.7	1.24	33.9	C
Proctor Valley Rd.	I	55	142.2	18.8	161.0	2.17	48.6	A
Total	I		473.1	184.4	657.5	7.17	39.2	B

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Jefferson Rd.	I	55	339.9	13.1	353.0	5.19	53.0	A
Steele Canyon Rd.	I	55	142.2	28.5	170.7	2.17	45.8	A
Cougar Canyon Rd.	I	55	81.2	12.5	93.7	1.24	47.7	A
Jamacha Rd.	I	55	78.0	48.4	126.4	1.19	33.9	C
Jamacha Blvd.	I	55	38.1	5.6	43.7	0.58	47.9	A
Via Mercado	I	55	38.0	48.4	86.4	0.52	21.7	D
Total	I		717.4	156.5	873.9	10.90	44.9	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	24.7	120.3	1.46	43.7	A
Jamacha Blvd.	I	55	38.0	37.7	75.7	0.52	24.8	D
SR 94	I	55	38.1	12.2	50.3	0.58	41.7	B
Cougar Canyon Rd.	I	55	78.0	17.8	95.8	1.19	44.8	A
Steele Canyon Rd.	I	55	81.2	34.0	115.2	1.24	38.8	B
Proctor Valley Rd.	I	55	143.7	15.9	159.6	2.19	49.5	A
Total	I		474.6	142.3	616.9	7.19	42.0	B

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Jefferson Rd.	I	55	339.6	8.9	348.5	5.19	53.6	A
Steele Canyon Rd.	I	55	143.7	24.4	168.1	2.19	47.0	A
Cougar Canyon Rd.	I	55	81.2	13.9	95.1	1.24	47.0	A
Jamacha Rd.	I	55	78.0	44.3	122.3	1.19	35.1	B
Jamacha Blvd.	I	55	38.1	4.9	43.0	0.58	48.7	A
Via Mercado	I	55	38.0	28.3	66.3	0.52	28.3	C
Total	I		718.6	124.7	843.3	10.92	46.6	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	11.0	106.6	1.46	49.3	A
Jamacha Blvd.	I	55	38.0	20.2	58.2	0.52	32.2	C
SR 94	I	55	38.1	6.5	44.6	0.58	47.0	A
Cougar Canyon Rd.	I	55	78.0	17.9	95.9	1.19	44.7	A
Steele Canyon Rd.	I	55	81.2	30.4	111.6	1.24	40.0	B
Proctor Valley Rd.	I	55	144.6	18.0	162.6	2.21	48.9	A
Total	I		475.5	104.0	579.5	7.20	44.8	A

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Jefferson Rd.	I	55	340.0	21.9	361.9	5.19	51.7	A
Steele Canyon Rd.	I	55	144.6	54.2	198.8	2.21	40.0	B
Cougar Canyon Rd.	I	55	81.2	22.7	103.9	1.24	43.0	A
Jamacha Rd.	I	55	78.0	41.7	119.7	1.19	35.8	B
Jamacha Blvd.	I	55	38.1	10.0	48.1	0.58	43.6	A
Via Mercado	I	55	38.0	24.2	62.2	0.52	30.1	C
Total	I		719.9	174.7	894.6	10.94	44.0	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	4.8	100.4	1.46	52.4	A
Jamacha Blvd.	I	55	38.0	21.1	59.1	0.52	31.7	C
SR 94	I	55	38.1	0.7	38.8	0.58	54.0	A
Cougar Canyon Rd.	I	55	78.0	5.3	83.3	1.19	51.5	A
Steele Canyon Rd.	I	55	81.2	10.4	91.6	1.24	48.8	A
Indian Springs Dr.	I	55	122.6	9.1	131.7	1.87	51.2	A
Proctor Valley Rd.	I	55	29.0	12.7	41.7	0.33	28.7	C
Melody Rd.	I	55	56.6	3.7	60.3	0.87	51.7	A
Reservation Rd.	I	55	28.5	9.0	37.5	0.33	31.4	C
Total	I		567.6	76.8	644.4	8.39	46.9	A

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Reservation Rd.	I	55	261.8	5.4	267.2	4.00	53.9	A
Peacefull Valley Ran	I	55	28.5	4.1	32.6	0.33	36.1	B
Jefferson Rd.	I	55	56.6	14.3	70.9	0.87	43.9	A
Lyons Valley Rd.	I	55	29.0	31.1	60.1	0.33	19.9	E
Steele Canyon Rd.	I	55	122.6	19.0	141.6	1.87	47.6	A
Cougar Canyon Rd.	I	55	81.2	26.6	107.8	1.24	41.4	B
Jamacha Rd.	I	55	78.0	30.8	108.8	1.19	39.4	B
Jamacha Blvd.	I	55	38.1	10.3	48.4	0.58	43.3	A
Via Mercado	I	55	38.0	28.4	66.4	0.52	28.2	C
Total	I		733.8	170.0	903.8	10.93	43.5	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	20.3	115.9	1.46	45.4	A
Jamacha Blvd.	I	55	38.0	37.2	75.2	0.52	24.9	D
SR 94	I	55	38.1	2.0	40.1	0.58	52.3	A
Cougar Canyon Rd.	I	55	78.0	20.2	98.2	1.19	43.7	A
Steele Canyon Rd.	I	55	81.2	17.7	98.9	1.24	45.2	A
Indian Springs Dr.	I	55	120.4	14.2	134.6	1.84	49.2	A
Proctor Valley Rd.	I	55	29.0	18.8	47.8	0.33	25.1	D
Melody Rd.	I	55	56.7	8.1	64.8	0.87	48.1	A
Reservation Rd.	I	55	28.5	22.6	51.1	0.33	23.0	D
Total	I		565.5	161.1	726.6	8.36	41.4	B

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Reservation Rd.	I	55	261.8	6.6	268.4	4.00	53.6	A
Peacefull Valley Ran	I	55	28.5	3.9	32.4	0.33	36.3	B
Jefferson Rd.	I	55	56.7	13.1	69.8	0.87	44.7	A
Lyons Valley Rd.	I	55	29.0	33.7	62.7	0.33	19.1	E
Steele Canyon Rd.	I	55	120.4	27.8	148.2	1.84	44.7	A
Cougar Canyon Rd.	I	55	81.2	12.5	93.7	1.24	47.7	A
Jamacha Rd.	I	55	78.0	48.4	126.4	1.19	33.9	C
Jamacha Blvd.	I	55	38.1	6.6	44.7	0.58	46.9	A
Via Mercado	I	55	38.0	48.4	86.4	0.52	21.7	D
Total	I		731.7	201.0	932.7	10.90	42.1	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	24.7	120.3	1.46	43.7	A
Jamacha Blvd.	I	55	38.0	34.9	72.9	0.52	25.7	D
SR 94	I	55	38.1	1.0	39.1	0.58	53.6	A
Cougar Canyon Rd.	I	55	78.0	17.8	95.8	1.19	44.8	A
Steele Canyon Rd.	I	55	81.2	17.2	98.4	1.24	45.4	A
Indian Springs Dr.	I	55	121.9	12.0	133.9	1.86	50.0	A
Proctor Valley Rd.	I	55	29.0	15.9	44.9	0.33	26.7	D
Melody Rd.	I	55	56.4	6.6	63.0	0.86	49.2	A
Reservation Rd.	I	55	28.5	17.2	45.7	0.33	25.8	D
Total	I		566.7	147.3	714.0	8.38	42.2	A

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Reservation Rd.	I	55	261.8	5.9	267.7	4.00	53.8	A
Peacefull Valley Ran	I	55	28.5	3.7	32.2	0.33	36.6	B
Jefferson Rd.	I	55	56.4	8.9	65.3	0.86	47.5	A
Lyons Valley Rd.	I	55	29.0	27.4	56.4	0.33	21.2	D
Steele Canyon Rd.	I	55	121.9	27.2	149.1	1.86	44.9	A
Cougar Canyon Rd.	I	55	81.2	13.9	95.1	1.24	47.0	A
Jamacha Rd.	I	55	78.0	44.3	122.3	1.19	35.1	B
Jamacha Blvd.	I	55	38.1	5.8	43.9	0.58	47.7	A
Via Mercado	I	55	38.0	28.3	66.3	0.52	28.3	C
Total	I		732.9	165.4	898.3	10.92	43.7	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	11.0	106.6	1.46	49.3	A
Jamacha Blvd.	I	55	38.0	22.3	60.3	0.52	31.1	C
SR 94	I	55	38.1	0.8	38.9	0.58	53.9	A
Cougar Canyon Rd.	I	55	78.0	17.9	95.9	1.19	44.7	A
Steele Canyon Rd.	I	55	81.2	18.3	99.5	1.24	44.9	A
Indian Springs Dr.	I	55	122.8	8.1	130.9	1.88	51.6	A
Proctor Valley Rd.	I	55	29.0	18.0	47.0	0.33	25.5	D
Melody Rd.	I	55	56.8	4.8	61.6	0.87	50.7	A
Reservation Rd.	I	55	28.5	17.2	45.7	0.33	25.8	D
Total	I		568.0	118.4	686.4	8.40	44.1	A

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Reservation Rd.	I	55	261.8	7.5	269.3	4.00	53.5	A
Peacefull Valley Ran	I	55	28.5	5.3	33.8	0.33	34.8	B
Jefferson Rd.	I	55	56.8	21.9	78.7	0.87	39.7	B
Lyons Valley Rd.	I	55	29.0	24.0	53.0	0.33	22.6	D
Steele Canyon Rd.	I	55	122.8	25.5	148.3	1.88	45.5	A
Cougar Canyon Rd.	I	55	81.2	22.7	103.9	1.24	43.0	A
Jamacha Rd.	I	55	78.0	41.7	119.7	1.19	35.8	B
Jamacha Blvd.	I	55	38.1	11.3	49.4	0.58	42.4	A
Via Mercado	I	55	38.0	24.2	62.2	0.52	30.1	C
Total	I		734.2	184.1	918.3	10.94	42.9	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	4.9	100.5	1.46	52.3	A
Jamacha Blvd.	I	55	38.0	22.5	60.5	0.52	31.0	C
SR 94	I	55	38.1	5.9	44.0	0.58	47.6	A
Cougar Canyon Rd.	I	55	78.0	6.2	84.2	1.19	50.9	A
Steele Canyon Rd.	I	55	81.2	11.5	92.7	1.24	48.2	A
Proctor Valley Rd.	I	55	143.5	30.6	174.1	2.19	45.3	A
Total	I		474.4	81.6	556.0	7.19	46.5	A

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Jefferson Rd.	I	55	340.1	67.0	407.1	5.20	45.9	A
Steele Canyon Rd.	I	55	143.5	56.7	200.2	2.19	39.4	B
Cougar Canyon Rd.	I	55	81.2	45.9	127.1	1.24	35.1	B
Jamacha Rd.	I	55	78.0	44.4	122.4	1.19	35.0	B
Jamacha Blvd.	I	55	38.1	9.4	47.5	0.58	44.1	A
Via Mercado	I	55	38.0	44.3	82.3	0.52	22.8	D
Total	I		718.9	267.7	986.6	10.92	39.9	B

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	20.2	115.8	1.46	45.4	A
Jamacha Blvd.	I	55	38.0	72.3	110.3	0.52	17.0	E
SR 94	I	55	38.1	55.6	93.7	0.58	22.4	D
Cougar Canyon Rd.	I	55	78.0	25.9	103.9	1.19	41.3	B
Steele Canyon Rd.	I	55	81.2	75.8	157.0	1.24	28.5	C
Proctor Valley Rd.	I	55	146.4	45.9	192.3	2.24	41.9	B
Total	I		477.3	295.7	773.0	7.23	33.7	C

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Jefferson Rd.	I	55	340.1	23.5	363.6	5.20	51.4	A
Steele Canyon Rd.	I	55	146.4	35.4	181.8	2.24	44.3	A
Cougar Canyon Rd.	I	55	81.2	14.1	95.3	1.24	46.9	A
Jamacha Rd.	I	55	78.0	93.7	171.7	1.19	25.0	D
Jamacha Blvd.	I	55	38.1	6.6	44.7	0.58	46.9	A
Via Mercado	I	55	38.0	68.6	106.6	0.52	17.6	E
Total	I		721.8	241.9	963.7	10.97	41.0	B

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	79.0	174.6	1.46	30.1	C
Jamacha Blvd.	I	55	38.0	71.3	109.3	0.52	17.1	E
SR 94	I	55	38.1	114.8	152.9	0.58	13.7	F
Cougar Canyon Rd.	I	55	78.0	65.7	143.7	1.19	29.8	C
Steele Canyon Rd.	I	55	81.2	153.3	234.5	1.24	19.1	E
Proctor Valley Rd.	I	55	144.8	54.2	199.0	2.21	40.0	B
Total	I		475.7	538.3	1014.0	7.21	25.6	D

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Jefferson Rd.	I	55	339.3	60.3	399.6	5.18	46.7	A
Steele Canyon Rd.	I	55	144.8	50.8	195.6	2.21	40.7	B
Cougar Canyon Rd.	I	55	81.2	16.7	97.9	1.24	45.6	A
Jamacha Rd.	I	55	78.0	61.0	139.0	1.19	30.8	C
Jamacha Blvd.	I	55	38.1	6.2	44.3	0.58	47.3	A
Via Mercado	I	55	38.0	97.1	135.1	0.52	13.9	F
Total	I		719.4	292.1	1011.5	10.93	38.9	B

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	11.2	106.8	1.46	49.2	A
Jamacha Blvd.	I	55	38.0	23.0	61.0	0.52	30.7	C
SR 94	I	55	38.1	8.4	46.5	0.58	45.1	A
Cougar Canyon Rd.	I	55	78.0	8.6	86.6	1.19	49.5	A
Steele Canyon Rd.	I	55	81.2	21.6	102.8	1.24	43.5	A
Proctor Valley Rd.	I	55	147.3	19.3	166.6	2.25	48.6	A
Total	I		478.2	92.1	570.3	7.25	45.7	A

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Jefferson Rd.	I	55	339.9	23.6	363.5	5.19	51.4	A
Steele Canyon Rd.	I	55	147.3	35.5	182.8	2.25	44.3	A
Cougar Canyon Rd.	I	55	81.2	11.8	93.0	1.24	48.0	A
Jamacha Rd.	I	55	78.0	56.2	134.2	1.19	32.0	C
Jamacha Blvd.	I	55	38.1	11.5	49.6	0.58	42.2	A
Via Mercado	I	55	38.0	36.3	74.3	0.52	25.2	D
Total	I		722.5	174.9	897.4	10.98	44.0	A

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	4.9	100.5	1.46	52.3	A
Jamacha Blvd.	I	55	38.0	24.9	62.9	0.52	29.8	C
SR 94	I	55	38.1	0.8	38.9	0.58	53.9	A
Cougar Canyon Rd.	I	55	78.0	6.2	84.2	1.19	50.9	A
Steele Canyon Rd.	I	55	81.2	9.0	90.2	1.24	49.5	A
Indian Springs Dr.	I	55	121.7	9.8	131.5	1.86	50.9	A
Proctor Valley Rd.	I	55	29.0	30.6	59.6	0.33	20.1	E
Melody Rd.	I	55	56.9	6.5	63.4	0.87	49.4	A
Reservation Rd.	I	55	28.5	9.0	37.5	0.33	31.4	C
Total	I		567.0	101.7	668.7	8.39	45.1	A

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Reservation Rd.	I	55	261.8	5.4	267.2	4.00	53.9	A
Peacefull Valley Ran	I	55	28.5	9.5	38.0	0.33	31.0	C
Jefferson Rd.	I	55	56.9	67.0	123.9	0.87	25.3	D
Lyons Valley Rd.	I	55	29.0	46.5	75.5	0.33	15.9	F
Steele Canyon Rd.	I	55	121.7	25.3	147.0	1.86	45.5	A
Cougar Canyon Rd.	I	55	81.2	45.9	127.1	1.24	35.1	B
Jamacha Rd.	I	55	78.0	44.4	122.4	1.19	35.0	B
Jamacha Blvd.	I	55	38.1	10.9	49.0	0.58	42.8	A
Via Mercado	I	55	38.0	44.3	82.3	0.52	22.8	D
Total	I		733.2	299.2	1032.4	10.92	38.1	B

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	20.2	115.8	1.46	45.4	A
Jamacha Blvd.	I	55	38.0	61.6	99.6	0.52	18.8	E
SR 94	I	55	38.1	3.1	41.2	0.58	50.9	A
Cougar Canyon Rd.	I	55	78.0	25.9	103.9	1.19	41.3	B
Steele Canyon Rd.	I	55	81.2	19.4	100.6	1.24	44.4	A
Indian Springs Dr.	I	55	124.6	16.7	141.3	1.90	48.5	A
Proctor Valley Rd.	I	55	29.0	45.9	74.9	0.33	16.0	F
Melody Rd.	I	55	56.9	11.9	68.8	0.87	45.5	A
Reservation Rd.	I	55	28.5	37.9	66.4	0.33	17.7	E
Total	I		569.9	242.6	812.5	8.43	37.4	B

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Reservation Rd.	I	55	261.8	7.1	268.9	4.00	53.5	A
Peacefull Valley Ran	I	55	28.5	9.4	37.9	0.33	31.1	C
Jefferson Rd.	I	55	56.9	23.5	80.4	0.87	38.9	B
Lyons Valley Rd.	I	55	29.0	33.8	62.8	0.33	19.1	E
Steele Canyon Rd.	I	55	124.6	30.4	155.0	1.90	44.2	A
Cougar Canyon Rd.	I	55	81.2	14.1	95.3	1.24	46.9	A
Jamacha Rd.	I	55	78.0	93.7	171.7	1.19	25.0	D
Jamacha Blvd.	I	55	38.1	7.6	45.7	0.58	45.8	A
Via Mercado	I	55	38.0	68.6	106.6	0.52	17.6	E
Total	I		736.1	288.2	1024.3	10.97	38.5	B

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	79.0	174.6	1.46	30.1	C
Jamacha Blvd.	I	55	38.0	78.0	116.0	0.52	16.2	E
SR 94	I	55	38.1	3.1	41.2	0.58	50.9	A
Cougar Canyon Rd.	I	55	78.0	65.7	143.7	1.19	29.8	C
Steele Canyon Rd.	I	55	81.2	18.9	100.1	1.24	44.6	A
Indian Springs Dr.	I	55	123.0	22.5	145.5	1.88	46.5	A
Proctor Valley Rd.	I	55	29.0	54.2	83.2	0.33	14.4	F
Melody Rd.	I	55	56.1	13.9	70.0	0.86	44.1	A
Reservation Rd.	I	55	28.5	19.2	47.7	0.33	24.7	D
Total	I		567.5	354.5	922.0	8.39	32.8	C

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Reservation Rd.	I	55	261.8	6.1	267.9	4.00	53.7	A
Peacefull Valley Ran	I	55	28.5	10.8	39.3	0.33	30.0	C
Jefferson Rd.	I	55	56.1	60.3	116.4	0.86	26.5	D
Lyons Valley Rd.	I	55	29.0	41.0	70.0	0.33	17.1	E
Steele Canyon Rd.	I	55	123.0	27.7	150.7	1.88	44.9	A
Cougar Canyon Rd.	I	55	81.2	16.7	97.9	1.24	45.6	A
Jamacha Rd.	I	55	78.0	61.0	139.0	1.19	30.8	C
Jamacha Blvd.	I	55	38.1	7.1	45.2	0.58	46.4	A
Via Mercado	I	55	38.0	97.1	135.1	0.52	13.9	F
Total	I		733.7	327.8	1061.5	10.93	37.1	B

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	11.2	106.8	1.46	49.2	A
Jamacha Blvd.	I	55	38.0	27.8	65.8	0.52	28.5	C
SR 94	I	55	38.1	1.1	39.2	0.58	53.4	A
Cougar Canyon Rd.	I	55	78.0	8.6	86.6	1.19	49.5	A
Steele Canyon Rd.	I	55	81.2	12.5	93.7	1.24	47.7	A
Indian Springs Dr.	I	55	125.5	9.2	134.7	1.92	51.3	A
Proctor Valley Rd.	I	55	29.0	19.3	48.3	0.33	24.8	D
Melody Rd.	I	55	56.7	9.4	66.1	0.87	47.2	A
Reservation Rd.	I	55	28.5	18.3	46.8	0.33	25.2	D
Total	I		570.6	117.4	688.0	8.44	44.2	A

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Reservation Rd.	I	55	261.8	7.5	269.3	4.00	53.5	A
Peacefull Valley Ran	I	55	28.5	9.7	38.2	0.33	30.8	C
Jefferson Rd.	I	55	56.7	23.6	80.3	0.87	38.8	B
Lyons Valley Rd.	I	55	29.0	25.2	54.2	0.33	22.1	D
Steele Canyon Rd.	I	55	125.5	20.3	145.8	1.92	47.4	A
Cougar Canyon Rd.	I	55	81.2	11.8	93.0	1.24	48.0	A
Jamacha Rd.	I	55	78.0	56.2	134.2	1.19	32.0	C
Jamacha Blvd.	I	55	38.1	13.7	51.8	0.58	40.4	B
Via Mercado	I	55	38.0	36.3	74.3	0.52	25.2	D
Total	I		736.8	204.3	941.1	10.98	42.0	B

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	12.7	108.3	1.46	48.6	A
Jamacha Blvd.	I	55	38.0	31.2	69.2	0.52	27.1	C
SR 94	I	55	38.1	10.3	48.4	0.58	43.3	A
Cougar Canyon Rd.	I	55	78.0	5.2	83.2	1.19	51.5	A
Steele Canyon Rd.	I	55	81.2	11.0	92.2	1.24	48.5	A
Proctor Valley Rd.	I	55	142.6	172.6	315.2	2.18	24.9	D
Otay Lakes Rd.	I	55	314.2	23.9	338.1	4.80	51.1	A
Total	I		787.7	266.9	1054.6	11.97	40.9	B

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
	I	55	32.4	17.3	49.7	0.39	28.6	C
Jefferson Rd.	I	55	314.2	323.0	637.2	4.80	27.1	C
Steele Canyon Rd.	I	55	142.6	61.5	204.1	2.18	38.4	B
Cougar Canyon Rd.	I	55	81.2	47.2	128.4	1.24	34.8	B
Jamacha Rd.	I	55	78.0	90.9	168.9	1.19	25.4	D
Jamacha Blvd.	I	55	38.1	17.0	55.1	0.58	38.0	B
Via Mercado	I	55	38.0	235.9	273.9	0.52	6.8	F
Total	I		724.5	792.8	1517.3	10.91	25.9	D

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	102.5	198.1	1.46	26.5	D
Jamacha Blvd.	I	55	38.0	129.5	167.5	0.52	11.2	F
SR 94	I	55	38.1	106.0	144.1	0.58	14.5	F
Cougar Canyon Rd.	I	55	78.0	29.0	107.0	1.19	40.1	B
Steele Canyon Rd.	I	55	81.2	108.8	190.0	1.24	23.5	D
Proctor Valley Rd.	I	55	142.7	313.4	456.1	2.18	17.2	E
Otay Lakes Rd.	I	55	314.4	36.3	350.7	4.80	49.3	A
Total	I		788.0	825.5	1613.5	11.98	26.7	D

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
	I	55	32.4	9.2	41.6	0.39	34.2	B
Jefferson Rd.	I	55	314.4	112.2	426.6	4.80	40.5	B
Steele Canyon Rd.	I	55	142.7	38.0	180.7	2.18	43.4	A
Cougar Canyon Rd.	I	55	81.2	13.3	94.5	1.24	47.3	A
Jamacha Rd.	I	55	78.0	430.8	508.8	1.19	8.4	F
Jamacha Blvd.	I	55	38.1	9.1	47.2	0.58	44.4	A
Via Mercado	I	55	38.0	387.3	425.3	0.52	4.4	F
Total	I		724.8	999.9	1724.7	10.91	22.8	D

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	198.7	294.3	1.46	17.9	E
Jamacha Blvd.	I	55	38.0	120.2	158.2	0.52	11.8	F
SR 94	I	55	38.1	177.7	215.8	0.58	9.7	F
Cougar Canyon Rd.	I	55	78.0	59.5	137.5	1.19	31.2	C
Steele Canyon Rd.	I	55	81.2	162.0	243.2	1.24	18.4	E
Proctor Valley Rd.	I	55	142.9	344.4	487.3	2.18	16.1	E
Otay Lakes Rd.	I	55	314.6	37.2	351.8	4.81	49.2	A
Total	I		788.4	1099.7	1888.1	11.98	22.9	D

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
	I	55	32.4	12.3	44.7	0.39	31.8	C
Jefferson Rd.	I	55	314.6	208.3	522.9	4.81	33.1	C
Steele Canyon Rd.	I	55	142.9	56.1	199.0	2.18	39.5	B
Cougar Canyon Rd.	I	55	81.2	16.2	97.4	1.24	45.9	A
Jamacha Rd.	I	55	78.0	314.2	392.2	1.19	10.9	F
Jamacha Blvd.	I	55	38.1	7.8	45.9	0.58	45.6	A
Via Mercado	I	55	38.0	383.6	421.6	0.52	4.4	F
Total	I		725.2	998.5	1723.7	10.92	22.8	D

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	34.0	129.6	1.46	40.6	B
Jamacha Blvd.	I	55	38.0	39.0	77.0	0.52	24.3	D
SR 94	I	55	38.1	16.6	54.7	0.58	38.3	B
Cougar Canyon Rd.	I	55	78.0	8.7	86.7	1.19	49.5	A
Steele Canyon Rd.	I	55	81.2	22.0	103.2	1.24	43.3	A
Proctor Valley Rd.	I	55	142.6	146.5	289.1	2.18	27.1	C
Otay Lakes Rd.	I	55	314.4	20.0	334.4	4.80	51.7	A
Total	I		787.9	286.8	1074.7	11.98	40.1	B

Arterial Level of Service: WB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
	I	55	32.4	12.7	45.1	0.39	31.5	C
Jefferson Rd.	I	55	314.4	92.7	407.1	4.80	42.5	A
Steele Canyon Rd.	I	55	142.6	35.9	178.5	2.18	44.0	A
Cougar Canyon Rd.	I	55	81.2	11.7	92.9	1.24	48.1	A
Jamacha Rd.	I	55	78.0	333.6	411.6	1.19	10.4	F
Jamacha Blvd.	I	55	38.1	14.9	53.0	0.58	39.5	B
Via Mercado	I	55	38.0	192.9	230.9	0.52	8.1	F
Total	I		724.7	694.4	1419.1	10.91	27.7	C

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	12.7	108.3	1.46	48.6	A
Jamacha Blvd.	I	55	38.0	31.2	69.2	0.52	27.1	C
SR 94	I	55	38.1	1.8	39.9	0.58	52.5	A
Cougar Canyon Rd.	I	55	78.0	5.2	83.2	1.19	51.5	A
Steele Canyon Rd.	I	55	81.2	8.5	89.7	1.24	49.8	A
Indian Springs Dr.	I	55	120.8	8.0	128.8	1.85	51.6	A
Proctor Valley Rd.	I	55	29.0	172.6	201.6	0.33	5.9	F
Melody Rd.	I	55	56.8	9.2	66.0	0.87	47.3	A
Reservation Rd.	I	55	28.5	9.2	37.7	0.33	31.2	C
Otay Lakes Rd.	I	55	236.0	23.9	259.9	3.60	49.9	A
Total	I		802.0	282.3	1084.3	11.97	39.8	B

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
	I	55	32.4	17.3	49.7	0.39	28.6	C
Reservation Rd.	I	55	236.0	5.3	241.3	3.60	53.8	A
Peacefull Valley Ran	I	55	28.5	12.7	41.2	0.33	28.6	C
Jefferson Rd.	I	55	56.8	323.0	379.8	0.87	8.2	F
Lyons Valley Rd.	I	55	29.0	27.9	56.9	0.33	21.1	D
Steele Canyon Rd.	I	55	120.8	23.5	144.3	1.85	46.0	A
Cougar Canyon Rd.	I	55	81.2	47.2	128.4	1.24	34.8	B
Jamacha Rd.	I	55	78.0	90.9	168.9	1.19	25.4	D
Jamacha Blvd.	I	55	38.1	17.0	55.1	0.58	38.0	B
Via Mercado	I	55	38.0	235.9	273.9	0.52	6.8	F
Total	I		738.8	800.7	1539.5	10.91	25.5	D

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	102.5	198.1	1.46	26.5	D
Jamacha Blvd.	I	55	38.0	111.0	149.0	0.52	12.6	F
SR 94	I	55	38.1	7.7	45.8	0.58	45.7	A
Cougar Canyon Rd.	I	55	78.0	29.0	107.0	1.19	40.1	B
Steele Canyon Rd.	I	55	81.2	21.5	102.7	1.24	43.5	A
Indian Springs Dr.	I	55	120.9	28.3	149.2	1.85	44.6	A
Proctor Valley Rd.	I	55	29.0	313.4	342.4	0.33	3.5	F
Melody Rd.	I	55	57.0	124.5	181.5	0.87	17.3	E
Reservation Rd.	I	55	28.5	96.7	125.2	0.33	9.4	F
Otay Lakes Rd.	I	55	236.0	36.3	272.3	3.60	47.7	A
Total	I		802.3	870.9	1673.2	11.98	25.8	D

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
	I	55	32.4	9.2	41.6	0.39	34.2	B
Reservation Rd.	I	55	236.0	7.1	243.1	3.60	53.4	A
Peacefull Valley Ran	I	55	28.5	13.8	42.3	0.33	27.8	C
Jefferson Rd.	I	55	57.0	112.2	169.2	0.87	18.5	E
Lyons Valley Rd.	I	55	29.0	32.8	61.8	0.33	19.4	E
Steele Canyon Rd.	I	55	120.9	32.1	153.0	1.85	43.4	A
Cougar Canyon Rd.	I	55	81.2	13.3	94.5	1.24	47.3	A
Jamacha Rd.	I	55	78.0	356.1	434.1	1.19	9.9	F
Jamacha Blvd.	I	55	38.1	9.3	47.4	0.58	44.2	A
Via Mercado	I	55	38.0	387.3	425.3	0.52	4.4	F
Total	I		739.1	973.2	1712.3	10.91	22.9	D

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	198.7	294.3	1.46	17.9	E
Jamacha Blvd.	I	55	38.0	109.2	147.2	0.52	12.7	F
SR 94	I	55	38.1	7.2	45.3	0.58	46.3	A
Cougar Canyon Rd.	I	55	78.0	59.5	137.5	1.19	31.2	C
Steele Canyon Rd.	I	55	81.2	19.3	100.5	1.24	44.5	A
Indian Springs Dr.	I	55	121.1	21.2	142.3	1.85	46.8	A
Proctor Valley Rd.	I	55	29.0	344.4	373.4	0.33	3.2	F
Melody Rd.	I	55	57.2	31.7	88.9	0.87	35.4	B
Reservation Rd.	I	55	28.5	26.0	54.5	0.33	21.6	D
Otay Lakes Rd.	I	55	236.0	37.2	273.2	3.60	47.5	A
Total	I		802.7	854.4	1657.1	11.98	26.0	D

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
	I	55	32.4	12.3	44.7	0.39	31.8	C
Reservation Rd.	I	55	236.0	5.9	241.9	3.60	53.6	A
Peacefull Valley Ran	I	55	28.5	12.4	40.9	0.33	28.8	C
Jefferson Rd.	I	55	57.2	208.3	265.5	0.87	11.9	F
Lyons Valley Rd.	I	55	29.0	22.2	51.2	0.33	23.4	D
Steele Canyon Rd.	I	55	121.1	28.1	149.2	1.85	44.6	A
Cougar Canyon Rd.	I	55	81.2	16.2	97.4	1.24	45.9	A
Jamacha Rd.	I	55	78.0	314.2	392.2	1.19	10.9	F
Jamacha Blvd.	I	55	38.1	7.9	46.0	0.58	45.5	A
Via Mercado	I	55	38.0	383.6	421.6	0.52	4.4	F
Total	I		739.5	1011.1	1750.6	10.92	22.5	D

Arterial Level of Service: EB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Via Mercado	I	55	95.6	34.0	129.6	1.46	40.6	B
Jamacha Blvd.	I	55	38.0	36.4	74.4	0.52	25.2	D
SR 94	I	55	38.1	3.7	41.8	0.58	50.1	A
Cougar Canyon Rd.	I	55	78.0	8.7	86.7	1.19	49.5	A
Steele Canyon Rd.	I	55	81.2	13.0	94.2	1.24	47.4	A
Indian Springs Dr.	I	55	120.8	11.6	132.4	1.85	50.2	A
Proctor Valley Rd.	I	55	29.0	146.5	175.5	0.33	6.8	F
Melody Rd.	I	55	57.0	21.7	78.7	0.87	39.9	B
Reservation Rd.	I	55	28.5	233.9	262.4	0.33	4.5	F
Otay Lakes Rd.	I	55	236.0	20.0	256.0	3.60	50.7	A
Total	I		802.2	529.5	1331.7	11.98	32.4	C

Arterial Level of Service: NB SR 94

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
	I	55	32.4	12.7	45.1	0.39	31.5	C
Reservation Rd.	I	55	236.0	7.3	243.3	3.60	53.3	A
Peacefull Valley Ran	I	55	28.5	12.9	41.4	0.33	28.4	C
Jefferson Rd.	I	55	57.0	92.7	149.7	0.87	21.0	E
Lyons Valley Rd.	I	55	29.0	24.9	53.9	0.33	22.2	D
Steele Canyon Rd.	I	55	120.8	22.1	142.9	1.85	46.5	A
Cougar Canyon Rd.	I	55	81.2	11.7	92.9	1.24	48.1	A
Jamacha Rd.	I	55	78.0	296.1	374.1	1.19	11.5	F
Jamacha Blvd.	I	55	38.1	15.2	53.3	0.58	39.3	B
Via Mercado	I	55	38.0	192.9	230.9	0.52	8.1	F
Total	I		739.0	688.5	1427.5	10.91	27.5	C

APPENDIX H

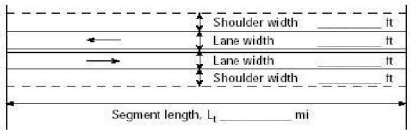
- Two-Way Two-Lane Highway Analysis Worksheets

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday AM	Analysis Year	Existing (2009) Baseline

Project Description: Jamul Indian Village

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	722 veh/h
Directional split	66 / 34
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.986
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	796
v_p * highest directional split proportion[2] (pc/h)	525

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	3.0
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	40.5

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	790
v_p * highest directional split proportion[2] (pc/h)	521
Base percent time-spent-following, $BPTSF(\%)=100(1-e^{-0.000879v_p})$	50.1
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	14.8
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	64.9

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.25
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	177
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	550
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	4.4

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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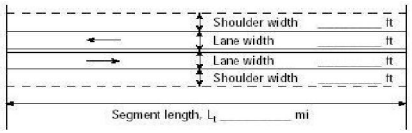
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday PM	Analysis Year	Existing (2009) Baseline

Project Description: Jamul Indian Village

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	717 veh/h
Directional split	65 / 35
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.986
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	790
v_p * highest directional split proportion[2] (pc/h)	514

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	3.0
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	40.5

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	785
v_p * highest directional split proportion[2] (pc/h)	510
Base percent time-spent-following, $BPTSF(\%)=100(1-e^{-0.000879v_p})$	49.8
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	15.0
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	64.8

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.25
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	175
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	645
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	4.3

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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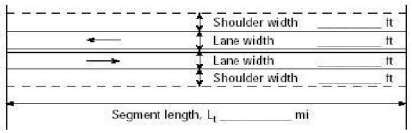
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Friday PM	Analysis Year	Existing (2009) Baseline

Project Description: Jamul Indian Village

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	775 veh/h
Directional split	79 / 21
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.986
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	854
v_p * highest directional split proportion[2] (pc/h)	675

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	2.9
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	40.2

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	848
v_p * highest directional split proportion[2] (pc/h)	670
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	52.5
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	16.2
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	68.7

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.27
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	190
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	697
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	4.7

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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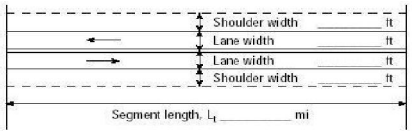
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Saturday PM	Analysis Year	Existing (2009) Baseline

Project Description: Jamul Indian Village

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	595 veh/h
Directional split	53 / 47
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.986
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	656
v_p * highest directional split proportion[2] (pc/h)	348

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	3.6
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	41.0

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	651
v_p * highest directional split proportion[2] (pc/h)	345
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	43.6
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	19.2
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	62.7

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.20
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	146
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	535
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	3.6

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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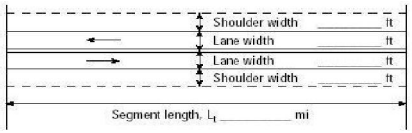
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday AM	Analysis Year	Existing (2009) Baseline

Project Description: Jamul Indian Village

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	609 veh/h
Directional split	67 / 33
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ mi	1

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	764
v_p * highest directional split proportion[2] (pc/h)	512

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	mi/h	Base free-flow speed, $BFFS_{FM}$	55.0 mi/h
Observed volume, V_f	veh/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 mi/h
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	mi/h	Adj. for access points, f_A (Exhibit 20-6)	0.3 mi/h
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	3.2
Average travel speed, ATS (mi/h) ATS=FFS-0.00776v_p-f_{np}	44.4

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	732
v_p * highest directional split proportion[2] (pc/h)	490
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	47.5
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	16.7
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	64.1

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.24
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)= 0.25L_t(V/PHF)	50
Peak-hour vehicle-miles of travel, VMT_{60}(veh- mi)=V*L_t	183
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	1.1

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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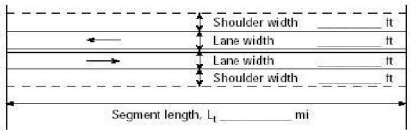
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday PM	Analysis Year	Existing (2009) Baseline

Project Description: Jamul Indian Village

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	644 veh/h
Directional split	69 / 31
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ mi	1

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	808
v_p * highest directional split proportion[2] (pc/h)	558

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	mi/h	Base free-flow speed, $BFFS_{FM}$	55.0 mi/h
Observed volume, V_f	veh/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 mi/h
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	mi/h	Adj. for access points, f_A (Exhibit 20-6)	0.3 mi/h
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	3.0
Average travel speed, ATS (mi/h) ATS=FFS-0.00776v_p-f_{np}	44.2

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	774
v_p * highest directional split proportion[2] (pc/h)	534
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	49.4
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	15.4
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	64.8

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.25
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)= 0.25L_t(V/PHF)	53
Peak-hour vehicle-miles of travel, VMT_{60}(veh- mi)=V*L_t	193
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	1.2

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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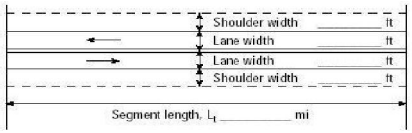
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Friday PM	Analysis Year	Existing (2009) Baseline

Project Description: Jamul Indian Village

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	733 veh/h
Directional split	71 / 29
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	1

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	920
v_p * highest directional split proportion[2] (pc/h)	553

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.3 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	2.8
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	43.6

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	881
v_p * highest directional split proportion[2] (pc/h)	526
Base percent time-spent-following, $BPTSF(\%)=100(1-e^{-0.000879v_p})$	53.9
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	14.0
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	67.9

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.29
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	60
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	220
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	1.4

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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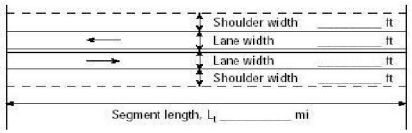
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Saturday PM	Analysis Year	Existing (2009) Baseline

Project Description: Jamul Indian Village

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	525 veh/h
Directional split	54 / 46
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	1

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	659
v_p * highest directional split proportion[2] (pc/h)	356

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.3 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	3.6
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	44.7

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	631
v_p * highest directional split proportion[2] (pc/h)	341
Base percent time-spent-following, $BPTSF(\%)=100(1-e^{-0.000879v_p})$	42.6
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	19.7
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	62.3

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.21
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	43
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	158
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	1.0

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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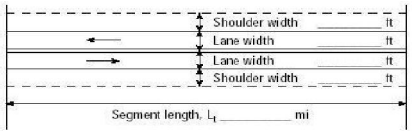
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday AM	Analysis Year	Existing (2009) Baseline

Project Description: Jamul Indian Village

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	609 veh/h
Directional split	67 / 33
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ mi	2

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	764
v_p * highest directional split proportion[2] (pc/h)	512

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	mi/h	Base free-flow speed, $BFFS_{FM}$	55.0 mi/h
Observed volume, V_f	veh/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 mi/h
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	mi/h	Adj. for access points, f_A (Exhibit 20-6)	0.5 mi/h
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	2.8
Average travel speed, ATS (mi/h) ATS=FFS-0.00776v_p-f_{np}	44.4

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	732
v_p * highest directional split proportion[2] (pc/h)	490
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	47.5
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	16.0
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	63.4

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.24
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)= 0.25L_t(V/PHF)	629
Peak-hour vehicle-miles of travel, VMT_{60}(veh- mi)=V*L_t	2314
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	14.2

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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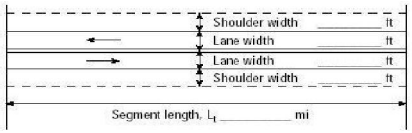
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday PM	Analysis Year	Existing (2009) Baseline

Project Description: Jamul Indian Village

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	612 veh/h
Directional split	68 / 32
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ mi	2

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	768
v_p * highest directional split proportion[2] (pc/h)	522

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	mi/h	Base free-flow speed, $BFFS_{FM}$	55.0 mi/h
Observed volume, V_f	veh/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 mi/h
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	mi/h	Adj. for access points, f_A (Exhibit 20-6)	0.5 mi/h
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	2.8
Average travel speed, ATS (mi/h) ATS=FFS-0.00776v_p-f_{np}	44.4

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	736
v_p * highest directional split proportion[2] (pc/h)	500
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	47.6
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	15.9
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	63.5

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.24
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)= 0.25L_t(V/PHF)	632
Peak-hour vehicle-miles of travel, VMT_{60}(veh- mi)=V*L_t	2326
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	14.2

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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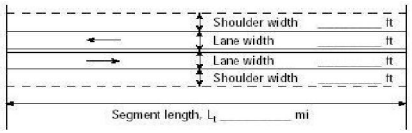
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Friday PM	Analysis Year	Existing (2009) Baseline

Project Description: Jamul Indian Village

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	685 veh/h
Directional split	73 / 27
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ mi	2

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	860
v_p * highest directional split proportion[2] (pc/h)	628

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	mi/h	Base free-flow speed, $BFFS_{FM}$	55.0 mi/h
Observed volume, V_f	veh/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 mi/h
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	mi/h	Adj. for access points, f_A (Exhibit 20-6)	0.5 mi/h
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	2.5
Average travel speed, ATS (mi/h) ATS=FFS-0.00776v_p-f_{np}	44.0

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	824
v_p * highest directional split proportion[2] (pc/h)	602
Base percent time-spent-following, BPTSF(%)=100(1-e$^{-0.000879v_p}$)	51.5
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	14.5
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	66.0

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.27
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)= 0.25L_t(V/PHF)	707
Peak-hour vehicle-miles of travel, VMT_{60}(veh- mi)=V*L_t	2603
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	16.1

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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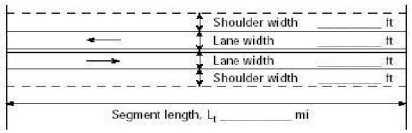
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Saturday PM	Analysis Year	Existing (2009) Baseline

Project Description: Jamul Indian Village

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	512 veh/h
Directional split	57 / 43
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ mi	2

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	643
v_p * highest directional split proportion[2] (pc/h)	367

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	mi/h	Base free-flow speed, $BFFS_{FM}$	55.0 mi/h
Observed volume, V_f	veh/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 mi/h
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	mi/h	Adj. for access points, f_A (Exhibit 20-6)	0.5 mi/h
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	3.2
Average travel speed, ATS (mi/h) ATS=FFS-0.00776v_p-f_{np}	45.0

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	616
v_p * highest directional split proportion[2] (pc/h)	351
Base percent time-spent-following, BPTSF(%)=100(1-e$^{-0.000879v_p}$)	41.8
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	19.3
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	61.1

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.20
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)= 0.25L_t(V/PHF)	529
Peak-hour vehicle-miles of travel, VMT_{60}(veh- mi)=V*L_t	1946
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	11.8

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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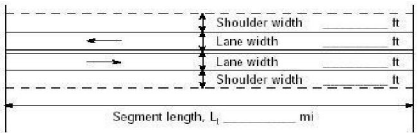
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday AM	Analysis Year	Existing (2009) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1272 veh/h
Directional split	51 / 49
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1392
v_p * highest directional split proportion[2] (pc/h)	710

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.7
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	37.2

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1383
v_p * highest directional split proportion[2] (pc/h)	705
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	70.3
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	8.1
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	78.5

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.44
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	311

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1145
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	8.4

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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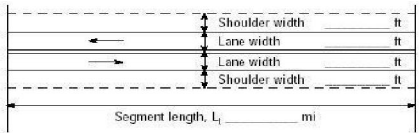
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday PM	Analysis Year	Existing (2009) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1640 veh/h
Directional split	58 / 42
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1795
v_p * highest directional split proportion[2] (pc/h)	1041

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.3
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	34.5

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1783
v_p * highest directional split proportion[2] (pc/h)	1034
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	79.1
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	5.7
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	84.8

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.56
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	401

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1476
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	11.6

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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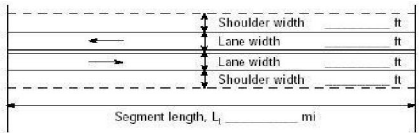
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Friday PM	Analysis Year	Existing (2009) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	2061 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2256
v_p * highest directional split proportion[2] (pc/h)	1241

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	31.1

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2240
v_p * highest directional split proportion[2] (pc/h)	1232
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	86.0
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	3.5
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	89.6

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.70
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	504

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1855
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	16.2

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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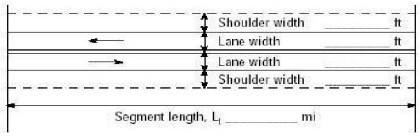
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Saturday PM	Analysis Year	Existing (2009) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1881 veh/h
Directional split	52 / 48
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2059
v_p * highest directional split proportion[2] (pc/h)	1071

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	32.6

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2045
v_p * highest directional split proportion[2] (pc/h)	1063
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	83.4
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	4.2
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	87.7

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.64
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	460

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1693
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	14.1

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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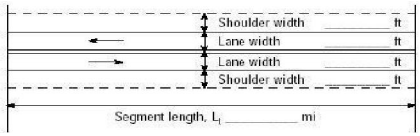
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday AM	Analysis Year	Existing (2009) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1172 veh/h
Directional split	51 / 49
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	1

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1341
v_p * highest directional split proportion[2] (pc/h)	684

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.3 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.8
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	41.2

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1274
v_p * highest directional split proportion[2] (pc/h)	650
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	67.4
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	9.5
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	76.8

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.42
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	96

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	352
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	2.3

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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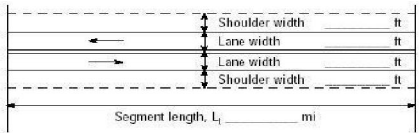
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday PM	Analysis Year	Existing (2009) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1590 veh/h
Directional split	60 / 40
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	1

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1819
v_p * highest directional split proportion[2] (pc/h)	1091

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.3 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.3
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	38.1

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1728
v_p * highest directional split proportion[2] (pc/h)	1037
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	78.1
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	6.0
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	84.1

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.57
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	130

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	477
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	3.4

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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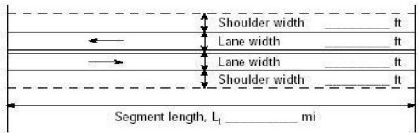
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Friday PM	Analysis Year	Existing (2009) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	2051 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	1

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2346
v_p * highest directional split proportion[2] (pc/h)	1290

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.3 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	34.1

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2229
v_p * highest directional split proportion[2] (pc/h)	1226
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	85.9
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	3.6
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	89.5

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.73
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	167

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	615
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	4.9

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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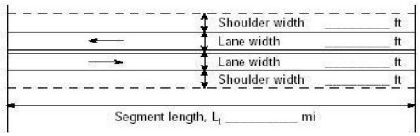
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Saturday PM	Analysis Year	Existing (2009) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1843 veh/h
Directional split	52 / 48
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	1

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2108
v_p * highest directional split proportion[2] (pc/h)	1096

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.3 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	36.0

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2003
v_p * highest directional split proportion[2] (pc/h)	1042
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	82.8
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	4.4
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	87.2

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.66
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	150

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	553
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	4.2

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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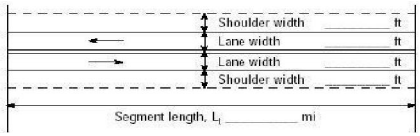
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday AM	Analysis Year	Existing (2009) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	733 veh/h
Directional split	68 / 32
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	2

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	920
v_p * highest directional split proportion[2] (pc/h)	626

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.5 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	2.4
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	43.7

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	881
v_p * highest directional split proportion[2] (pc/h)	599
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	53.9
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	13.1
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	67.0

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.29
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	757

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	2785
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	17.3

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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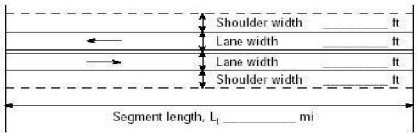
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday PM	Analysis Year	Existing (2009) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	819 veh/h
Directional split	62 / 38
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	2

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1028
v_p * highest directional split proportion[2] (pc/h)	637

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.5 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	2.2
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	43.1

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	985
v_p * highest directional split proportion[2] (pc/h)	611
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	57.9
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	11.9
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	69.8

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.32
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	846

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	3112
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	19.6

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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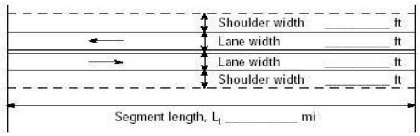
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Friday PM	Analysis Year	Existing (2009) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	974 veh/h
Directional split	67 / 33
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	2

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1114
v_p * highest directional split proportion[2] (pc/h)	746

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.5 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	2.0
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	42.5

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1171
v_p * highest directional split proportion[2] (pc/h)	785
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	64.3
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	10.1
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	74.4

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.35
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	1006

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	3701
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	23.7

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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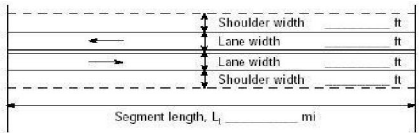
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Saturday PM	Analysis Year	Existing (2009) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	801 veh/h
Directional split	56 / 44
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	2

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1005
v_p * highest directional split proportion[2] (pc/h)	563

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.5 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	2.2
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	43.2

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	963
v_p * highest directional split proportion[2] (pc/h)	539
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	57.1
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	12.2
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	69.4

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.31
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	827

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	3044
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	19.1

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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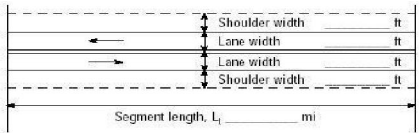
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday AM	Analysis Year	Near Term (2015) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1449 veh/h
Directional split	52 / 48
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1586
v_p * highest directional split proportion[2] (pc/h)	825

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.5
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	35.9

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1575
v_p * highest directional split proportion[2] (pc/h)	819
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	75.0
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	6.9
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	81.9

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.50
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	354

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1304
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	9.9

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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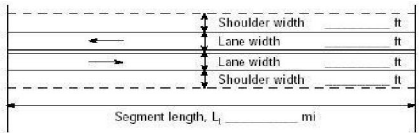
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday PM	Analysis Year	Near Term (2015) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1864 veh/h
Directional split	59 / 41
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2040
v_p * highest directional split proportion[2] (pc/h)	1204

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	32.8

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2026
v_p * highest directional split proportion[2] (pc/h)	1195
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	83.2
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	4.2
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	87.4

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.64
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	456

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1678
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	13.9

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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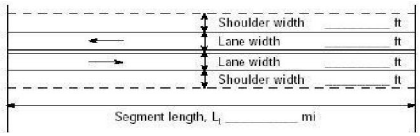
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Friday PM	Analysis Year	Near Term (2015) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	2034 veh/h
Directional split	57 / 43
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2226
v_p * highest directional split proportion[2] (pc/h)	1269

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	31.3

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2211
v_p * highest directional split proportion[2] (pc/h)	1260
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	85.7
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	3.6
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	89.3

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.70
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	497

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1831
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	15.9

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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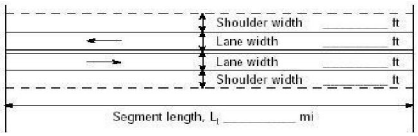
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Saturday PM	Analysis Year	Near Term (2015) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1811 veh/h
Directional split	51 / 49
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1982
v_p * highest directional split proportion[2] (pc/h)	1011

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	33.2

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1968
v_p * highest directional split proportion[2] (pc/h)	1004
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	82.3
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	4.6
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	86.8

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.62
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	443

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1630
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	13.3

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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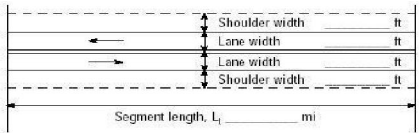
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday AM	Analysis Year	Near Term (2015) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1159 veh/h
Directional split	50 / 50
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	1

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1326
v_p * highest directional split proportion[2] (pc/h)	663

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.3 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.8
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	41.3

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1260
v_p * highest directional split proportion[2] (pc/h)	630
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	67.0
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	9.6
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	76.6

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.41
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	94

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	348
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	2.3

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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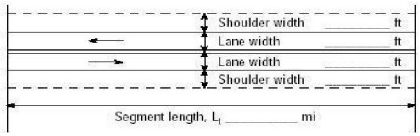
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday PM	Analysis Year	Near Term (2015) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1516 veh/h
Directional split	59 / 41
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	1

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1734
v_p * highest directional split proportion[2] (pc/h)	1023

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.3 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.4
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	38.6
Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1648
v_p * highest directional split proportion[2] (pc/h)	972
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	76.5
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	6.5
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	83.0
Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.54
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	124

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	455
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	3.2

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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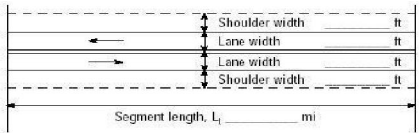
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Friday PM	Analysis Year	Near Term (2015) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1903 veh/h
Directional split	56 / 44
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	1

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2177
v_p * highest directional split proportion[2] (pc/h)	1219

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.3 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	35.5

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2068
v_p * highest directional split proportion[2] (pc/h)	1158
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	83.8
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	4.1
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	87.9

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.68
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	155

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	571
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	4.4

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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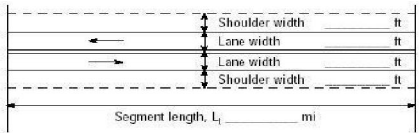
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Saturday PM	Analysis Year	Near Term (2015) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	*1696* veh/h
Directional split	*50 / 50*
Peak-hour factor, PHF	*0.92*
No-passing zone	*100*
% Trucks and Buses , P_T	*8* %
% Recreational vehicles, P_R	*2%*
Access points/ *mi*	*1*

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	*0.99*
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	*1.1*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*0.960*
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	*1940*
v_p * highest directional split proportion[2] (pc/h)	*970*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	*55.0 mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	*1.3 mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	*0.3 mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*53.5 mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	*1.2*
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	*37.2*

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	*1.00*
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	*1.000*
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	*1843*
v_p * highest directional split proportion[2] (pc/h)	*922*
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	*80.2*
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	*5.3*
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	*85.5*

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	*E*
Volume to capacity ratio, v/c=V_p/ 3,200	*0.61*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	*138*

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	*509*
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	*3.7*

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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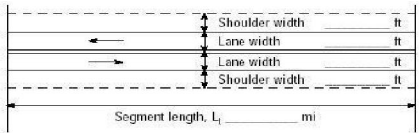
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday AM	Analysis Year	Near Term (2015) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	816 veh/h
Directional split	61 / 39
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	2

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1024
v_p * highest directional split proportion[2] (pc/h)	625

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.5 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	2.2
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	43.1

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	981
v_p * highest directional split proportion[2] (pc/h)	598
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	57.8
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	11.9
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	69.7

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.32
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	843

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	3101
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	19.6

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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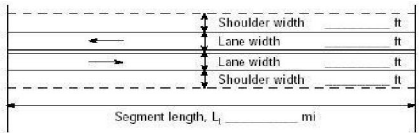
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday PM	Analysis Year	Near Term (2015) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	884 veh/h
Directional split	66 / 34
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	2

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1110
v_p * highest directional split proportion[2] (pc/h)	733

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.5 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	2.0
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	42.6

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1063
v_p * highest directional split proportion[2] (pc/h)	702
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	60.7
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	11.2
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	71.9

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.35
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	913

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	3359
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	21.5

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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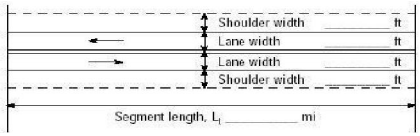
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Friday PM	Analysis Year	Near Term (2015) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1032 veh/h
Directional split	63 / 37
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	2

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1181
v_p * highest directional split proportion[2] (pc/h)	744

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.5 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.9
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	42.1

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1122
v_p * highest directional split proportion[2] (pc/h)	707
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	62.7
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	10.5
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	73.2

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.37
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	1066

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	3922
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	25.3

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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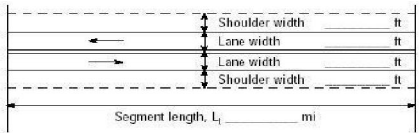
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Saturday PM	Analysis Year	Near Term (2015) With Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	803 veh/h
Directional split	58 / 42
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	2

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.93
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.9
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.931
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1008
v_p * highest directional split proportion[2] (pc/h)	585

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.5 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	2.2
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	43.2

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	0.94
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.962
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	966
v_p * highest directional split proportion[2] (pc/h)	560
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	57.2
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	12.1
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	69.3

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.31
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	829

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	3051
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	19.2

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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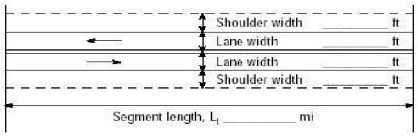
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday AM	Analysis Year	Horizon Year (2035) Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1519 veh/h
Directional split	52 / 48
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1663
v_p * highest directional split proportion[2] (pc/h)	865

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.4
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	35.4

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1651
v_p * highest directional split proportion[2] (pc/h)	859
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	76.6
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	6.5
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	83.0

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.52
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	371

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1367
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	10.5

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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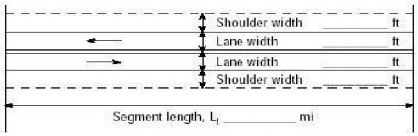
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday PM	Analysis Year	Horizon Year (2035) Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	2107 veh/h
Directional split	62 / 38
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2306
v_p * highest directional split proportion[2] (pc/h)	1430

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	30.7

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2290
v_p * highest directional split proportion[2] (pc/h)	1420
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	86.6
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	3.5
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	90.1

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.72
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	515

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1896
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	16.8

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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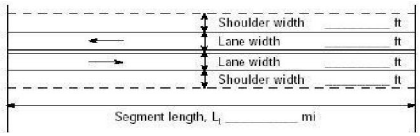
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Friday PM	Analysis Year	Horizon Year (2035) Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	2245 veh/h
Directional split	62 / 38
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2457
v_p * highest directional split proportion[2] (pc/h)	1523

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	29.6

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2440
v_p * highest directional split proportion[2] (pc/h)	1513
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	88.3
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	3.0
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	91.3

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.77
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	549

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	2020
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	18.6

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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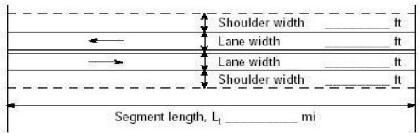
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Saturday PM	Analysis Year	Horizon Year (2035) Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1892 veh/h
Directional split	52 / 48
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2071
v_p * highest directional split proportion[2] (pc/h)	1077

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	32.5

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2057
v_p * highest directional split proportion[2] (pc/h)	1070
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	83.6
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	4.2
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	87.8

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.65
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	463

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1703
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	14.2

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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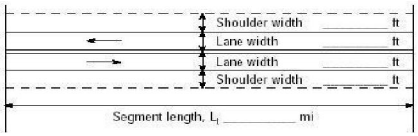
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday AM	Analysis Year	Horizon Year (2035) Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1519 veh/h
Directional split	52 / 48
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1663
v_p * highest directional split proportion[2] (pc/h)	865

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.4
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	35.4

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1651
v_p * highest directional split proportion[2] (pc/h)	859
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	76.6
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	6.5
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	83.0

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.52
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	371

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1367
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	10.5

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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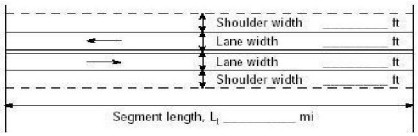
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Proctor Valley Rd / Melody Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday PM	Analysis Year	Horizon Year (2035) Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	2107 veh/h
Directional split	62 / 38
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	7 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	16

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2306
v_p * highest directional split proportion[2] (pc/h)	1430

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	4.0 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	49.7 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	30.7

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2290
v_p * highest directional split proportion[2] (pc/h)	1420
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	86.6
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	3.5
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	90.1

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.72
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	515

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	1896
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	16.8

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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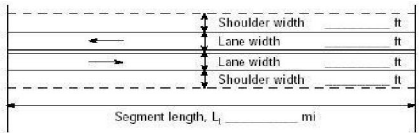
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Friday PM	Analysis Year	Horizon Year (2035) Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1982 veh/h
Directional split	60 / 40
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	1

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2268
v_p * highest directional split proportion[2] (pc/h)	1361

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.3 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	34.8

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2154
v_p * highest directional split proportion[2] (pc/h)	1292
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	84.9
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	3.8
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	88.7

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.71
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	162

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	595
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	4.7

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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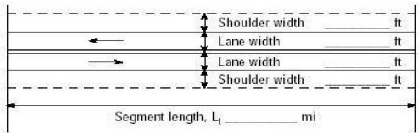
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Melody Rd / Project Dwy
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Saturday PM	Analysis Year	Horizon Year (2035) Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1760 veh/h
Directional split	53 / 47
Peak-hour factor, PHF	0.92
No-passing zone	100
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	1

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2014
v_p * highest directional split proportion[2] (pc/h)	1067

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.3 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.5 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	36.7

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1913
v_p * highest directional split proportion[2] (pc/h)	1014
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	81.4
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	4.9
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	86.3

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.63
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	143

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	528
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	3.9

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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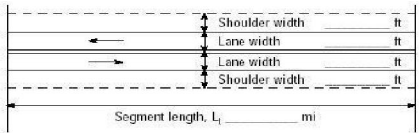
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday AM	Analysis Year	Horizon Year (2035) Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1497 veh/h
Directional split	62 / 38
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	2

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1713
v_p * highest directional split proportion[2] (pc/h)	1062

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.5 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.2
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	38.7

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1627
v_p * highest directional split proportion[2] (pc/h)	1009
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	76.1
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	6.3
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	82.3

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.54
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	1546

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	5689
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	39.9

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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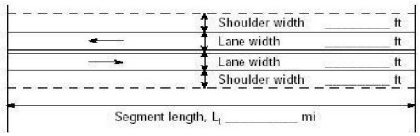
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Weekday PM	Analysis Year	Horizon Year (2035) Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1555 veh/h
Directional split	65 / 35
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	2

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1779
v_p * highest directional split proportion[2] (pc/h)	1156

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.5 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.1
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	38.3

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1690
v_p * highest directional split proportion[2] (pc/h)	1099
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	77.4
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	5.9
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	83.3

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.56
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	1606

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	5909
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	42.0

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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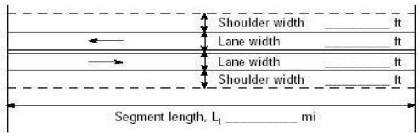
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Friday PM	Analysis Year	Horizon Year (2035) Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1762 veh/h
Directional split	72 / 28
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	2

Average Travel Speed	
Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2016
v_p * highest directional split proportion[2] (pc/h)	1452

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.5 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.0
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	36.6

Percent Time-Spent-Following	
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1915
v_p * highest directional split proportion[2] (pc/h)	1379
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	81.4
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	4.6
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	86.1

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.63
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	1819

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	6696
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	49.7

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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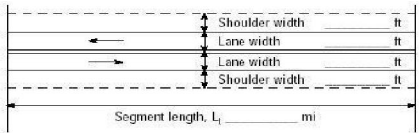
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MDL	Highway	SR-94
Agency or Company	Kimley-Horn and Associates	From/To	Project Dwy / Otay Lakes Rd
Date Performed	11/8/2011	Jurisdiction	County of San Diego
Analysis Time Period	Saturday PM	Analysis Year	Horizon Year (2035) Project

Project Description: *Jamul Indian Village*

Input Data





☑ Class I highway ☐ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	1320 veh/h
Directional split	58 / 42
Peak-hour factor, PHF	0.92
No-passing zone	80
% Trucks and Buses , P_T	8 %
% Recreational vehicles, P_R	2%
Access points/ *mi*	2

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.960
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1510
v_p * highest directional split proportion[2] (pc/h)	876

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	*mi/h*	Base free-flow speed, $BFFS_{FM}$	55.0 *mi/h*
Observed volume, V_f	*veh/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	1.3 *mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Adj. for access points, f_A (Exhibit 20-6)	0.5 *mi/h*
		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	53.2 *mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	1.3
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	40.1

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	1435
v_p * highest directional split proportion[2] (pc/h)	832
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	71.7
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	7.3
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	79.0

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio, v/c=V_p/ 3,200	0.47
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	1363

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	5016
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	34.0

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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APPENDIX I

- Cumulative Project Information

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TRAFFIC IMPACT ANALYSIS

PEACEFUL VALLEY RANCH (TM – 5341 RPL5)

Log No. 04-19-007, GPA 03-05, R03-15, MUP 04-048

JAMUL, CALIFORNIA

April 24, 2007

LLG Ref. 3-03-1266

Prepared by:
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Under the Supervision of:
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2.0 Project Description

The Peaceful Valley Ranch project proposes the subdivision of 181.31-acres for an estate residential development, equestrian uses and amenities, and fire service facilities. The development plan includes a total of 57 lots consisting of:

a) 1 – estate residential lot of 4.0-acres for the existing Ranch House (Lot 5);
b) 46 new estate residential lots ranging in size from a minimum of 2-acres up to approximately 7.7 acres (Lots 1-4 and 6-47);
c) 1 - 6.7-acre equestrian facility lot (Lot 48);
d) 1 - 3.7-acre lot reserved for a new joint-use fire station and administrative offices of the RFPD and US Fish and Wildlife Service (Lot 49);
e) 1- 3.7-acre open space lot for the protection of biological resources (Lot 50);
f) 1 -28.9 acre private horse stable and training facilities / polo field lot (Lot 51); and,
g) 6 private roadway lots (Lots 52-57)

The proposed project requires the approval of a tentative map (TM 5341RPL[5]) by the County of San Diego.

The project also includes a General Plan Amendment (GPA) to amend the existing land use designation of the easterly 152.4-acres of the 181.31-acre property from (18) Multiple Rural Use (1 du/4,8,20 ac) with an A72 (8) General Agriculture zone, to the (17) Estate Residential (1 du/2, 4ac) designation with an A72 (2) General Agriculture zone. The General Plan Amendment covers APN's 597-050-13, 597-070-02, and 597-070-07. The GPA request also seeks removal of a segment of a County of San Diego Circulation Element Road, SC 760, which is currently aligned through the project site. SC 760 is a planned two-lane Light Collector Road. The segment of SC 760 proposed for removal with the project extends from SR 94 north to Olive Vista Drive. The project also includes the annexation of the 152.46 acres of the easterly portion of the site into the San Diego County Water Authority and Metropolitan Water District.

Figure 3 shows the conceptual tentative map.

4.0 Project Traffic

4.1 Project Traffic Generation

Trip generation estimates for the residential portion of the development were calculated based on SANDAG rates provided in the *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region, April 2002*. Project trips were calculated using the trip rate for single-family detached estate homes of 12.0 trips/ Dwelling Unit for the 47-new estate residential lots. It should be noted that subsequent to this iteration of the traffic report, the single-family portion of the project has been reduced from 47 to 46 dwelling units. The analysis reflects the more conservative 47 dwelling units. Trip generation for the equestrian facilities and the fire station were estimated based on the typical day-today use since SANDAG rates were not available. **Table 2** shows the total project is calculated to generate approximately 750 ADT with 43 inbound / 46 outbound trips during the AM peak hour and 56 inbound / 46 outbound trips during the PM peak hour.

TABLE 2
PROJECT TRIP GENERATION SUMMARY

LAND USE	SIZE	DAILY TRIP ENDS		AM PEAK HOUR TRIPS				PM PEAK HOUR TRIPS			
		RATE[1]	ADT	% of ADT	IN:OUT SPLIT	VOLUME IN	VOLUME OUT	% of ADT	IN:OUT SPLIT	VOLUME IN	VOLUME OUT
Single-Family Homes	47[2]	12.0 / DU[3]	564	8%	30:70	14	31	10%	70:30	39	17
Equestrian Facilities/ Private Horse Stables	-	-	50[4]	-	-	3	3	-	-	3	3
Fire Station[5]	-	-	133	-	-	26	12	-	-	14	26
TOTAL	-	-	**750[6]**			**43**	**46**			**56**	**46**

NOTES:
1. Rate Source except as noted: SANDAG Trip Generation Brief Guide (April, 2002).
2. The 47 units include 46 new residential lots and one existing estate residential lot.
3. DU – Dwelling Unit.
4. Estimated traffic generation based on typical day-to-day activity. SANDAG rates were not available.
5. Traffic generation obtained from a stand-alone traffic study prepared by LLG for the Fire Station (January, 2005).
6. Rounded total ADT

4.2 Project Traffic Distribution /Assignment

The generated project traffic was distributed and assigned to the street system based on project access, the characteristics of the roadway system, and the proximity of the project to employment, retail, and educational opportunities. The vast majority of project traffic is expected to be oriented to/from the north. The project distribution was completed assuming only the existing roadway network (i.e. no SC 760), which provides a worst-case distribution of traffic with the most limited roadway network. **Figure 6** depicts the estimated project traffic distribution in the site environs without SC 760. **Figure 6A** shows the estimated distribution of traffic if SC 760 was constructed. Project traffic was assigned to the surrounding circulation system based on the estimated distribution and is illustrated in **Figure 7**. **Figure 8** shows the existing + project traffic volumes.

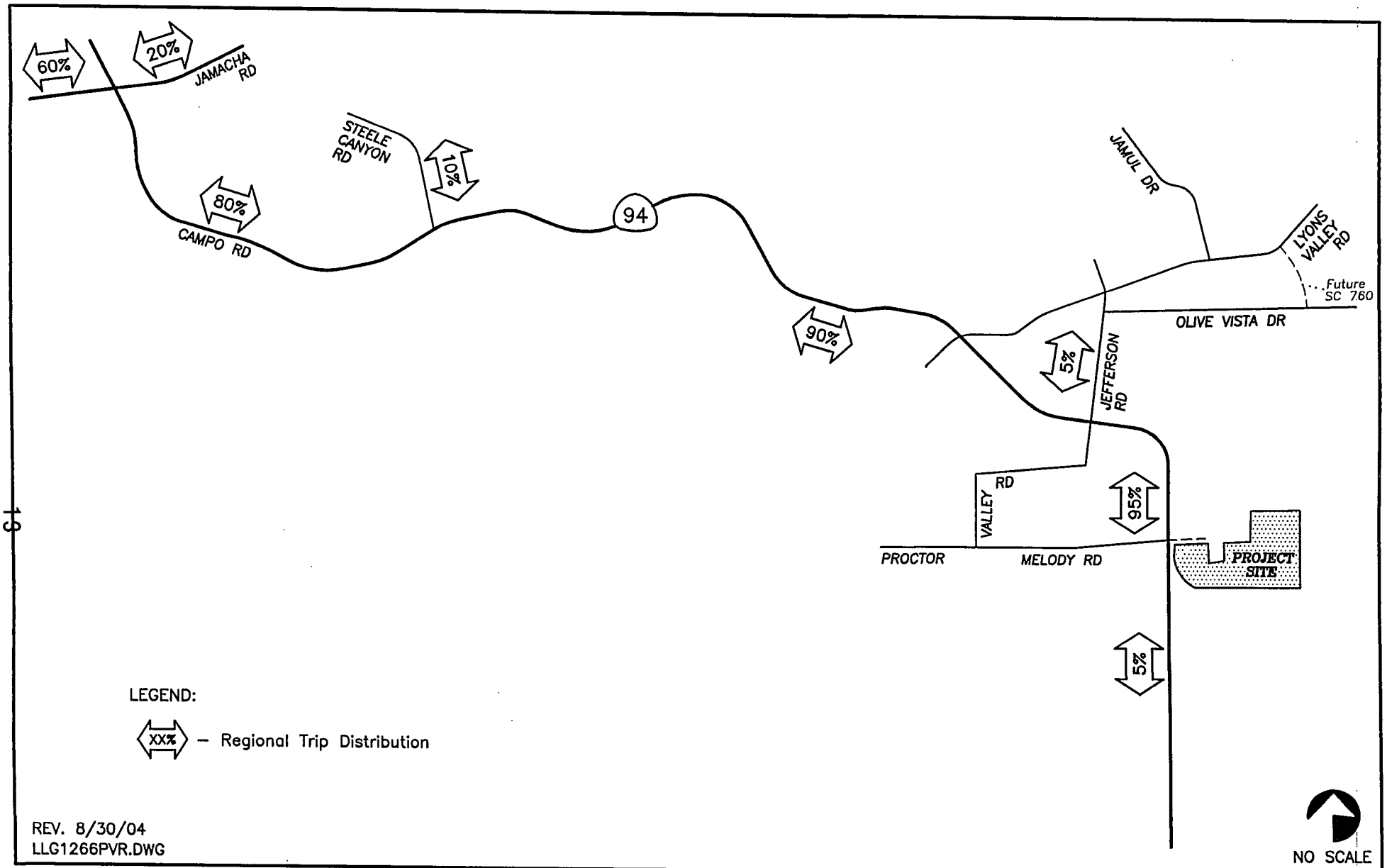

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Figure 6

REGIONAL TRAFFIC DISTRIBUTION WITHOUT THE FUTURE SC 760

PEACEFUL VALLEY RANCH

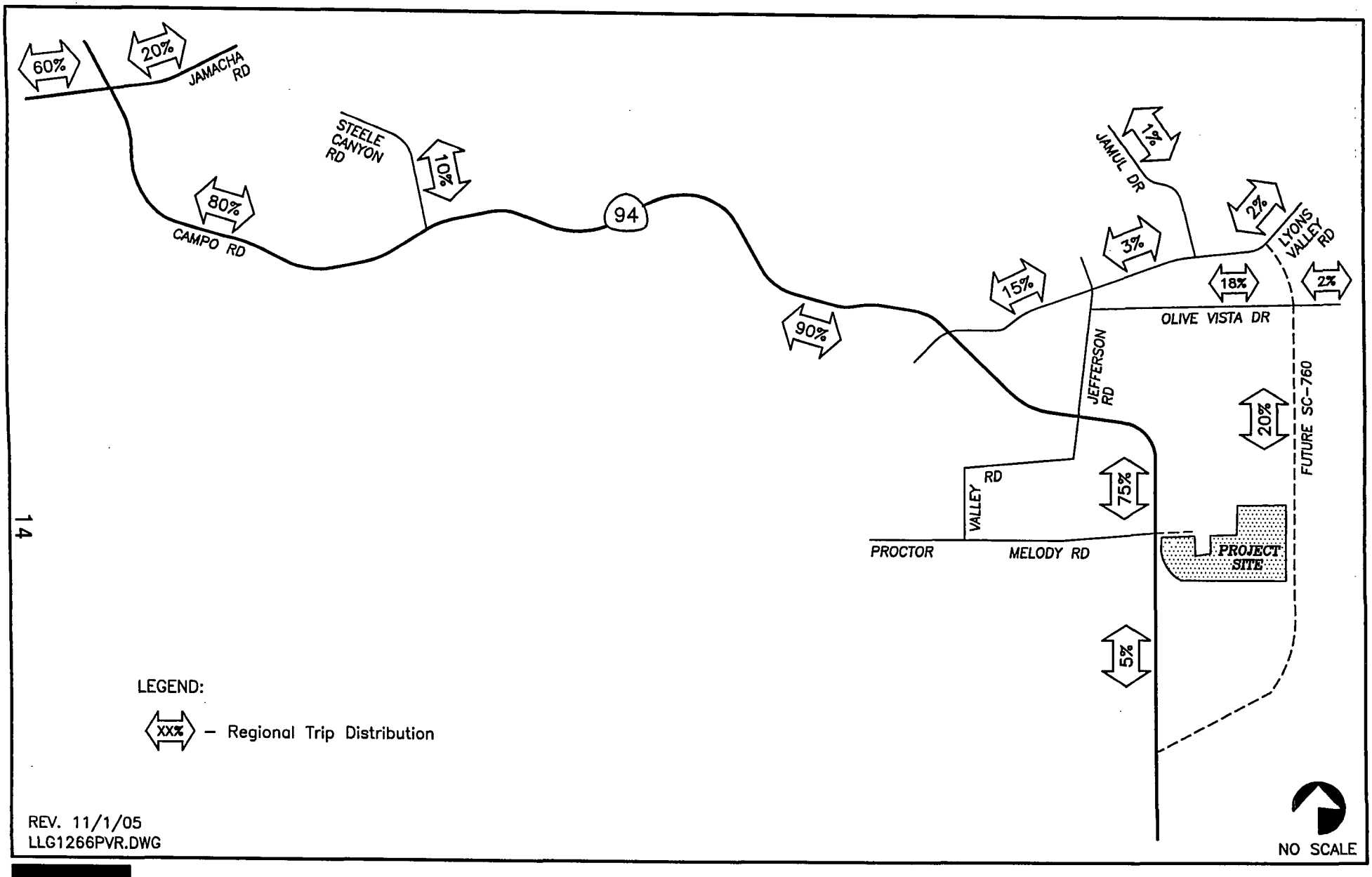

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Figure 6a

REGIONAL TRAFFIC DISTRIBUTION WITH SC 760

PEACEFUL VALLEY RANCH

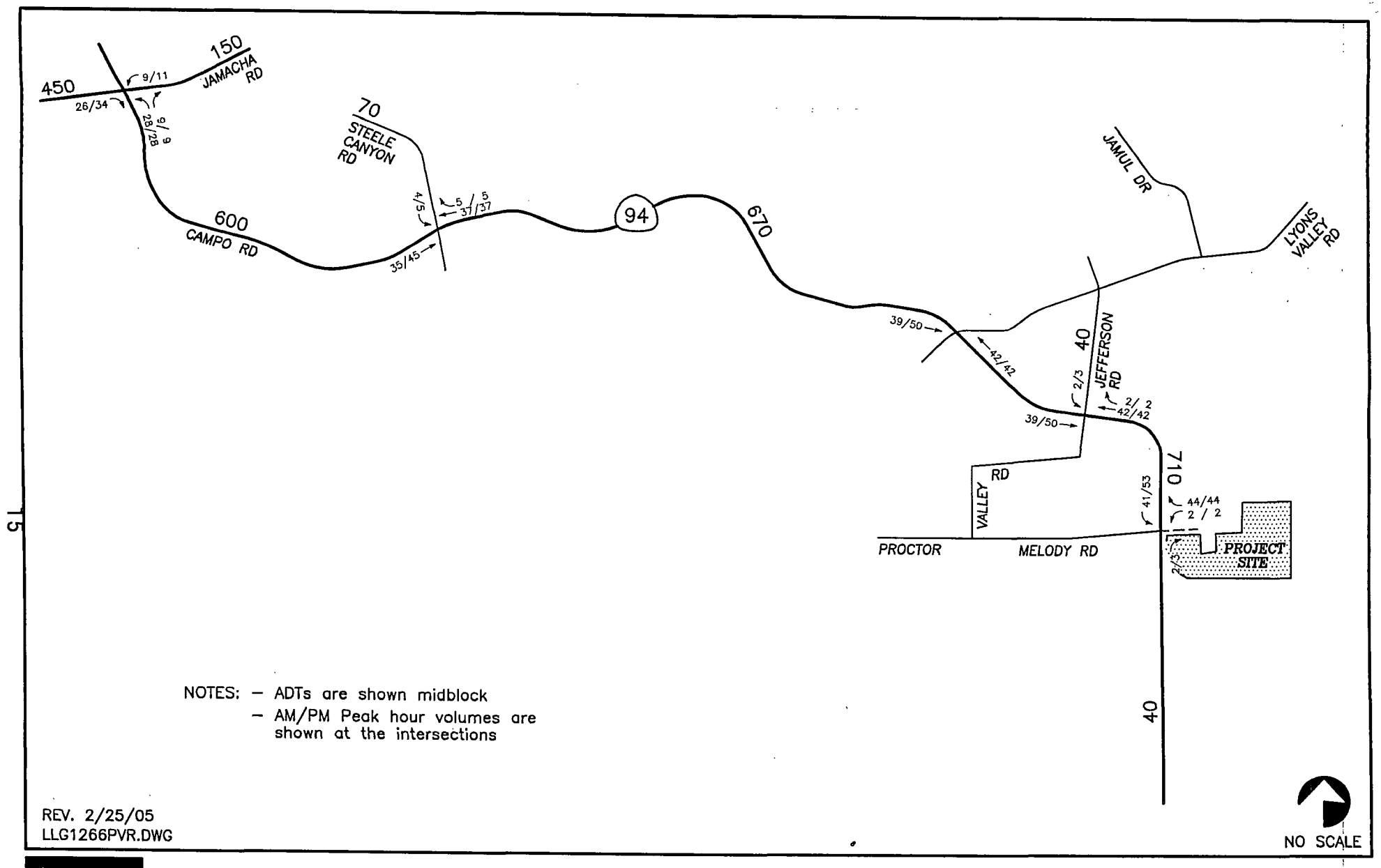

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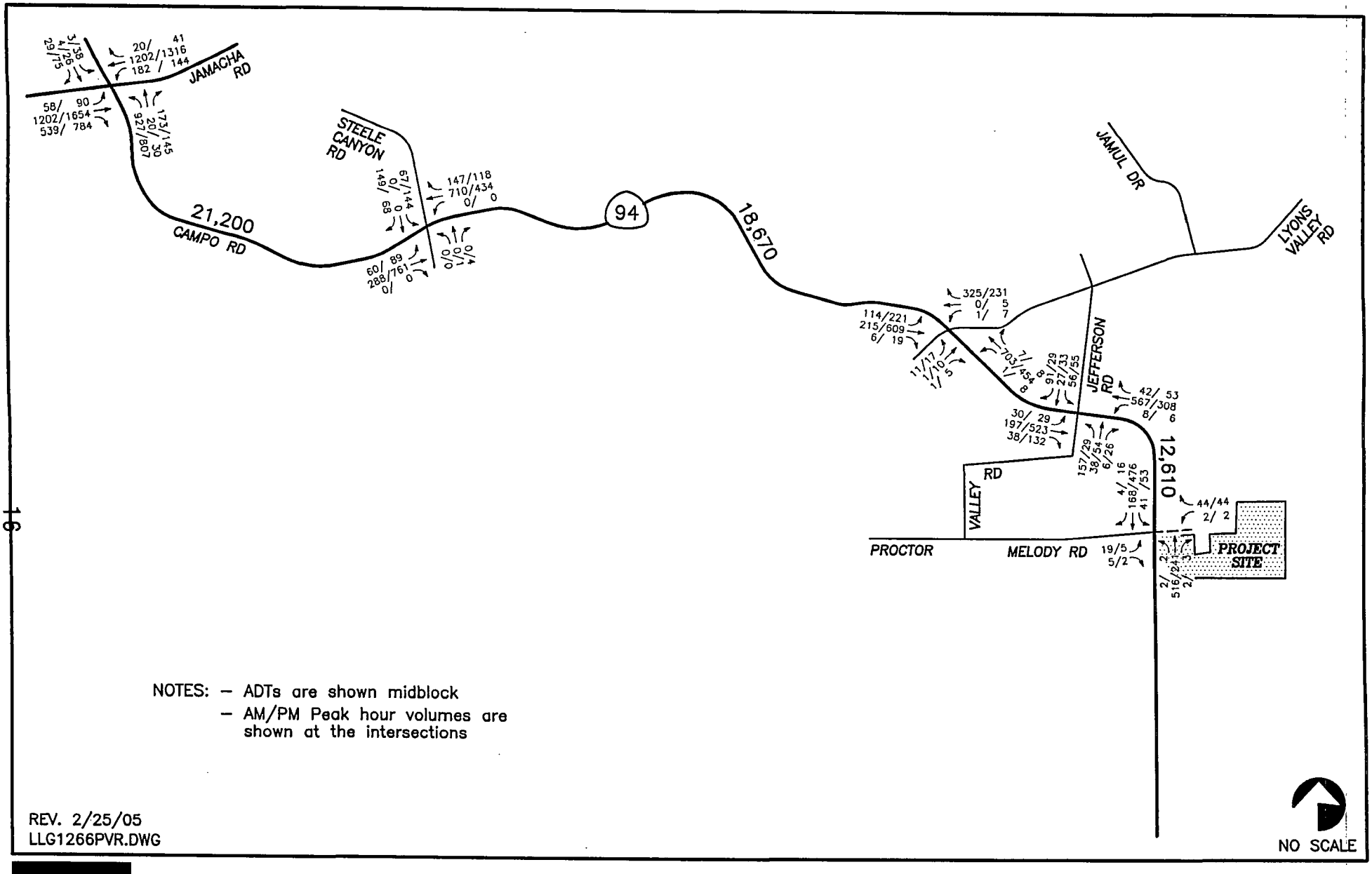
Figure 7

PROJECT TRAFFIC VOLUMES AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH



REV. 2/25/05
LLG1266PVR.DWG

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Figure 8

EXISTING + PROJECT TRAFFIC VOLUMES AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH

5.0 Cumulative Projects

There are other planned projects in the vicinity, which could potentially add traffic to the roadways and intersections in the study area. Based on research conducted at the County of San Diego Department of Planning and Land Use (DPLU) and previous traffic reports completed within the project vicinity, fourteen (14) cumulative development projects were identified for inclusion in this traffic study. In addition, to account for any future unforeseen projects, a 10% growth was added to the total cumulative project traffic volumes. The following is a brief description of each cumulative project.

1. **The Jamul Indian Village** is located at the southwest corner of Melody Drive and SR 94. The preferred project proposes to develop a two-story, 265,000 square foot gambling and entertainment facility, and a multi-story parking structure (2,600 spaces). The proposed project is calculated to generate 9,660 daily trip ends (ADT). Traffic data for this project was obtained from a draft traffic study prepared by Katz, Okitzu & Associates (KOA) on November 2002.

   A worst case Retail Alternative is discussed and analyzed in the KOA traffic study. This alternative would generate 37,000 ADT. The proposed casino project was included in the near-term cumulative analysis and both the proposed and worst-case project alternatives are included in the long-term (Year 2030) analysis.

2. **TPM 20550 (Morgan Minor Subdivision)** proposes to construct 2 single-family estate homes. The project site is proposed north of the Procter Valley Road/Poplar Meadow Lane intersection. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 24 ADT with 1-inbound/1 outbound trips during the AM peak hour and 1 inbound/1 outbound trips during the PM peak hour.

3. **TM 5154 RPL1 (Hendrix Subdivision)** is located east of Campo Road on Las Palmas Road. The project proposes to develop 5 single-family estate homes. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 60 ADT with 2 inbound/3 outbound trips during the AM peak hour and 4 inbound/2 outbound trips during the PM peak hour.

4. **TM 5213 RPL2 (Mintz Subdivision)** is located north of Skyline Truck Trail and east of Hidden Trail drive. The project proposes to develop approximately 25 acres of land into 10 single-family estate homes. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 120 ADT with 3 inbound/7 outbound trips during the AM peak hour and 8 inbound/4 outbound trips during the PM peak hour.

5. **TM 5289 RPL2 (Jamul Highlands Subdivision)** proposes to construct 25 single-family estate homes. The project site is proposed south of the Valley Road/Jamul Highlands Road intersection. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 300 ADT with 7 inbound/19 outbound trips during the AM peak hour and 21 inbound/9 outbound trips during the PM peak hour.

6. **TPM 20626 Development** proposes to construct 3 single-family estate homes. The project site is proposed on the west side of Procter Valley Road, just north of the Proctor Valley Road/Melody Road intersection. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 36 ADT with 1 inbound/2 outbound trips during the AM peak hour and 3 inbound/1 outbound trips during the PM peak hour.

7. **TPM 20628 RPL1 (Yacoo Minor Subdivision)** proposes to construct 4 single-family estate homes. The project site is proposed on Schlee Canyon Road north of Procter Valley Road. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 48 ADT with 1 inbound/3 outbound trips during the AM peak hour and 4 inbound/1 outbound trips during the PM peak hour.

8. **A Residential Development** is located just east of the proposed project and south of Olive Vista Drive. The project proposes to develop 20 single-family estate homes. The project is calculated to generate 240 ADT with 6 inbound/13 outbound trips during the AM peak hour and 17 inbound/7 outbound trips during the PM peak hour.

9. **TPM 20599 RPL1 (Blanco Parcel Map)** proposes to construct 4 single-family estate homes. The project site is proposed on the east side of SR 94, north of the Melody Road. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for Estate homes. The project is calculated to generate 48 ADT with 1inbound/3 outbound trips during the AM peak hour and 4 inbound/1 outbound trips during the PM peak hour.

10. **TPM 20868 (Steinbarth Minor Subdivision)** is located just north of the proposed project and south of Olive Vista Drive. The project proposes to develop 2 single-family estate homes. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 24 ADT with 1 inbound/1 outbound trips during the AM peak hour and 1 inbound/1 outbound trips during the PM peak hour.

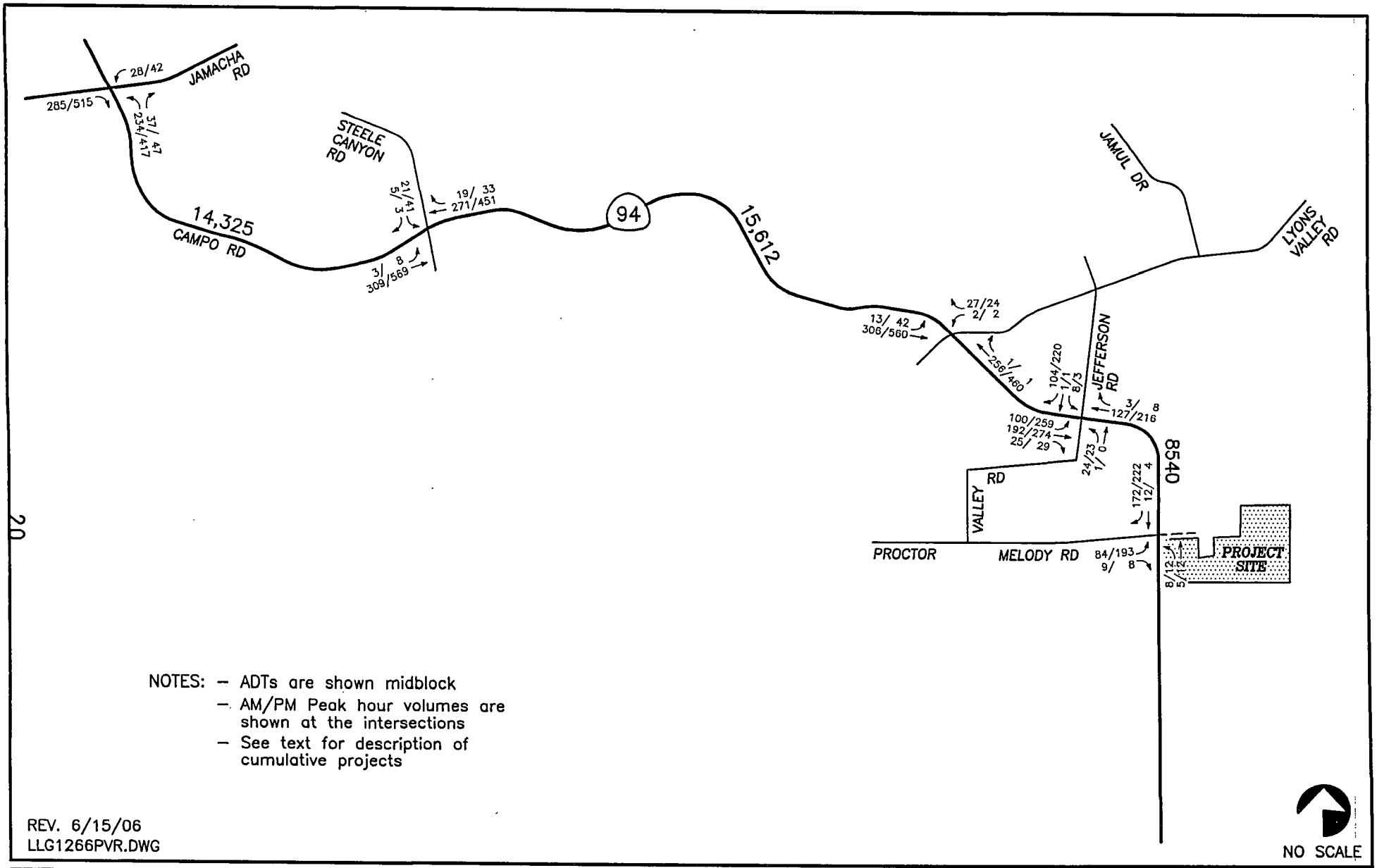
11. **TPM 20594 (Pioneer Minor Subdivision)** is located just west of the proposed project and north of Melody Lane. The project proposes to develop 3 single-family estate homes. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 36 ADT with 1 inbound/2 outbound trips during the AM peak hour and 3 inbound/1 outbound trips during the PM peak hour.

12. **Otay Ranch – Village 19** is located south west of the proposed project and south of Melody Lane. The project proposes to develop 20 single-family estate homes. The project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 240 ADT with 6 inbound/13 outbound trips during the AM peak hour and 17 inbound/7 outbound trips during the PM peak hour.

13. **Jamul Estates II** is located just north east of the proposed project. The maximum allowable developable lots are 68 single-family estate homes based on the current zoning. Therefore, the project was manually calculated using SANDAG's Trip Rates (April, 2002) for estate homes. The project is calculated to generate 816 ADT with 20 inbound/46 outbound trips during the AM peak hour and 57 inbound/24 outbound trips during the PM peak hour.

14. **Simpson Farms** is generally located on the northeast corner of the SR 94 (Campo Road)/Jefferson Road intersection in the Jamul Community of San Diego County. The project proposes to develop 98 single-family estate homes and 115,000 square feet (sf) of commercial uses. The project was calculated to generate approximately 6,500 ADT with approximately 124 inbound/130 outbound trips during the AM peak hour and 323 inbound/275 outbound trips during the PM peak hour.

Appendix B contains the individual assignments for each cumulative project. **Figure 9** shows the total assignment of cumulative project traffic including the 10% growth factor. **Figure 10** shows the existing + project + cumulative projects traffic volumes.



NOTES: – ADTs are shown midblock
– AM/PM Peak hour volumes are shown at the intersections
– See text for description of cumulative projects

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NO SCALE

LINSCOTT LAW & GREENSPAN engineers

Figure 9

CUMULATIVE PROJECTS TRAFFIC VOLUMES AM/PM PEAK HOURS & ADTs

PEACEFUL VALLEY RANCH

Draft Traffic Impact Study

Jamul Indian Village Gaming Project

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~~February~~November, 2012

KHA NO. 095848000

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4.0 PROJECT TRAFFIC

The following section describes the traffic generation and traffic distribution related to the proposed Jamul Indian Village Gaming project.

Trip Generation

SANDAG's *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region (*April, 2002) is a typical source for trip generation estimates for traffic impact studies within the County of San Diego. Another common source for trip generation rates is the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 8th Edition. Unfortunately, neither of these two sources provides rates for gaming facilities. In 2003, the County of San Diego prepared the *Traffic Needs Assessment of Tribal Development Projects in the San Diego Region*, March 2003 Update. For that particular study the County of San Diego reviewed environmental evaluations and traffic impact studies for Indian gaming facilities both inside and outside the County of San Diego. In consultation with private traffic engineering consultants and discussion with representatives from some of the tribes, a trip generation rate of 100 average daily trips per 1,000 square feet of gaming area was agreed as the appropriate trip rate for the traffic evaluations of these types of facilities. The total square footage of the gaming area was used since this was the main attraction of the Tribal Gaming Project facilities and other uses supplement this activity. The supplemental uses are intended to provide support to the gaming facility and will not generate additional daily traffic. Examples of these facilities would be the administrative office, storage, employee area, cage area, public spaces, etc. For the food and beverage ~~s~~ uses, it was determined that SANDAG's trip generation rate for a "Quality Restaurant" was the appropriate rate to use with a 50 percent reduction. This reduction was applied to recognize that the primary attractor of this site is gaming and that the food and beverage establishments are a secondary attraction.

The County of San Diego study established rate for the Indian gaming facility only addresses the daily trip generation, not peak-hour trip rates. ~~KHA~~ Kimley Horn and Associates (KHA) has completed the *Traffic Study for the Graton Rancheria Gaming and Hotel* in Sonoma County, California. As part of this study, KHA researched peak-hour trip generation rates for two other facilities similar to the Jamul Indian Village Gaming project. The facilities investigated were the Auburn Rancheria/Thunder Valley Gaming and Shingle Springs. **Appendix I** contains the trip generation data for the three mentioned casino sites. Based on the research, it was determined that the trip rate used for Shingle Springs is a reasonable, but also more conservative, assumption for this traffic study~~, . chosen to eliminate the possibility of underestimating project trips.~~ The Shingle Springs studies used the following peak-hour rates for the trip generation calculation:

- Weekday AM Peak-Hour: 2.95 trips/1,000 square feet of total gaming area
- Weekday PM Peak-Hour: 4.95 trips/1,000 square feet of total gaming area
- Friday/Saturday PM Peak-Hour: 6.9 trips/1,000 square feet of total gaming area

These peak-hour trip generation rates from the Shingle Springs study were found acceptable by Caltrans for the peak-hour traffic estimation for the proposed Jamul Indian Village project based on comparison with the Pauma Casino existing traffic generation. The rates used in this study include the traffic generated by visitors, employees, delivery trucks and other typical activity of the facility.

Table 4-1 displays the trip generation calculation for the Proposed Project development. As shown in the table, the Proposed Project development would generate a total of ~~10,325~~9,000 average daily trips. Table 4-1 also indicates that ~~602~~ 599 (~~422~~ 420 in, ~~180~~ 179 out) trips would occur during the weekday morning peak-hour period. During the weekday afternoon peak-hour period, the project would generate ~~1,010~~1,005 (~~536~~ 533 in, ~~474~~ 472 out) trips. During each of the Friday and Saturday peak-hour periods, the project would generate 1,~~456~~ 401 (~~696~~ 645 in, ~~760~~ 756 out) trips.

TABLE 4-1:
TRIP GENERATION SUMMARY FOR PROPOSED PROJECT
(UPDATED OCTOBER 2012)

Land Use	Units		Trip Rate	Daily Trips	Weekday									Friday and Saturday				
					AM Peak-Hour					PM Peak-Hour				PM Peak-Hour				
					Trip Rate [2]	In:Out Ratio[2]	In	Out	Total	Trip Rate [2]	In:Out Ratio[2]	In	Out	Total	Trip Rate [2]	In:Out Ratio[2]	In	Out	Total
Gaming Area [(1)]	70.000	ksf	100 / ksf	7,000															
Food and Beverage [(3)]	40.000	ksf	50 / ksf	2,000															
Gaming Total [(4)]	**203.000**	**ksf**		**9,000**	2.95 / ksf	0.70 : 0.30	**420**	**179**	**599**	4.95 / ksf	0.53 : 0.47	**533**	**472**	**1,005**	6.9 / ksf	0.46 : 0.54	**645**	**756**	**1,401**
NET TRIP GENERATION =				**9,000**			**420**	**179**	**599**			**533**	**472**	**1,005**			**645**	**756**	**1,401**

Note:
ksf=thousand square feet

1. Reference: San Diego County, *Update on Impacts of Tribal Economic Development Projects in San Diego County, April 2003.*
2. Reference: David Evans and Associates, Inc. and California Department of Transporation, *Transporation/Circulation Technical Study- Shingles Springs Rancheria Interchange Project, April 2002.*
3. For the Food and Beverage use, the SANDAG's trip generation rate for a "Quality Restaunt" was used with a 50 percent reduction. This reduction was applied to recognize that the primary attractor of this site is the gaming facility and that the food and beverage establishments are a secondary attraction.
4. This square footage includes facilities that provides operational support to the gaming facility. Daily trip generation for this support uses are included in the 100 trips/thousand square foot per the San Diego County, *Update on Impacts of Tribal Economic Development Projects in San Diego County,* April 2003. For this facility the additional square footage includes the following: 13.000 ksf of public space, 17.100 ksf of gaming support, 5.000 ksf of cage area space, 13.000 ksf of administration space, 10.000 ksf of employee area space and 34.000 ksf of back-of-house space.

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Table 4-2 displays the trip generation calculation for the Alternative 1 project development. As shown in the table, the Alternative 1 development would generate a total of 4,995 average daily trips. Table 4-2 also indicates that 330 (231 in, 99 out) trips would occur during the morning peak-hour period. During the weekday afternoon peak-hour period, the project would generate 553 (294 in, 259 out) trips. During the Friday and Saturday peak-hour periods, the project would generate 786 (369 in, 417 out) trips. Alternative 1 will include the traffic for a 7,200 square foot Event Center facility.

It should be noted that the traffic generation for the Proposed Project development includes traffic generated by a 24,000 square foot Event Center facility. For the daily traffic generation for the Event Center, a 40 trips per 1,000 square foot rate was used based on the *Updates on Impacts of Tribal Economic Development Project in San Diego County*, April 2003, study. For the peak-hour generation of the Event Center, it was assumed that approximately 10 percent of the traffic generated by this use would arrive to the facility during the afternoon peak-hour analyzed during only Fridays and Saturdays. The Event Center would not generate peak-hour volumes during the typical weekday. The 10 percent assumption was based on the fact that most events would have a start time of 7:30 p.m.

Table 4-3 displays the trip generation calculation for the Alternative 2 project development. As shown in the table, the Alternative 2 development would generate a total of 1,189 average daily trips. Table 4-3 also indicates that 52 (37 in, 15 out) trips would occur during the morning peak-hour period. During the weekday afternoon peak-hour analyzed, the project would generate 87 (46 in, 41 out) trips. During the Friday and Saturday peak-hour periods analyzed, the project would generate 121 (56 in, 65 out) trips. Alternative 2 will not include the Event Center facility.

Trip Distribution

Two project trip distributions patterns were generated for the Jamul Indian Village project. One distribution pattern was generated for the Near Term conditions, which would also include the existing plus project conditions. This distribution pattern represents the likely traffic patterns of Gaming traffic based on the existing land use densities and roadway network within the vicinity of the project site. The basis of the distribution for the Near Term conditions was a Select Zone model run prepared by SANDAG for the Tribal Gaming site for the Year 2015. **Figure 4-1** displays the assumed Jamul Indian Village Gaming project traffic distribution for the Existing (2009) and Near Term (2015) conditions.

A second Select Zone model run was prepared by SANDAG for the Year 2030 scenario. This new distribution includes more development to the south of SR-94 and therefore assumes more traffic coming from and to the south. **Figure 4-2** displays the assumed Jamul Indian Village Gaming project traffic distribution for the Horizon Year 2035 conditions.

Figures 4-3 and **Figure 4-4** display the assumed project traffic distributions through the study intersections within the study area for the Near Term (2015) and Horizon Year (2035) conditions, respectively.

Trip Assignment

Based on the Jamul Indian Village Gaming project trip distributions, project related trips were assigned to the roadway network and through the study intersections. **Figures 4-5** thru **4-22** illustrate the project trip assignment for the weekday morning and afternoon peak periods, the Friday and Saturday afternoon peak period and the typical weekday daily trip assignment for both the Near Term and Horizon Year conditions.

TABLE 4-2:
TRIP GENERATION SUMMARY FOR ALTERNATIVE 1
(UPDATED OCTOBER 2012)

Land Use	Units		Trip Rate[1]	Daily Trips	Weekday AM Peak-Hour Trip Rate[2]	In:Out Ratio[2]	In	Out	Total	Weekday PM Peak-Hour Trip Rate[2]	In:Out Ratio[2]	In	Out	Total	Friday and Saturday PM Peak-Hour Trip Rate[2]	In:Out Ratio[2]	In	Out	Total
Gaming Area [(1)]	37.550	ksf	100 / ksf	3,755															
Food and Beverage [(3)]	19.040	ksf	50 / ksf	952															
Gaming Total [(4)]	**111.800**	**ksf**		**4,707**	2.95 / ksf	0.70 : 0.30	**231**	**99**	**330**	4.95 / ksf	0.53 : 0.47	**294**	**259**	**553**	6.9 / ksf	0.46 : 0.54	**355**	**416**	**771**
Event Center [(1)]	**7.200**	**ksf**	40 / ksf	**288**	See note 5					See note 5					2 / ksf	1.00 : 0.00	**14**	**1**	**14**
Total Square footage	**119.000**	**ksf**																	
NET TRIP GENERATION =				**4,995**			**231**	**99**	**330**			**294**	**259**	**553**			**369**	**417**	**786**

Note:
ksf=thousand square feet

1. Reference: San Diego County, *Update on Impacts of Tribal Economic Development Projects in San Diego County, April 2003.*
2. Reference: David Evans and Associates, Inc. and California Department of Transporation, *Transporation/Circulation Technical Study- Shingles Springs Rancheria Interchange Project, April 2002.*
3. For the Food and Beverage use, the SANDAG's trip generation rate for a "Quality Restaunt" was used with a 50 percent reduction. This reduction was applied to recognize that the primary attractor of this site is the gaming facility and that the food and beverage establishments are a secondary attraction.
4. This square footage includes facilities that provides operational support to the gaming facility. Daily trip generation for this support uses are included in the 100 trips/thousand square foot per the San Diego County, *Update on Impacts of Tribal Economic Development Projects in San Diego County* , April 2003. For this facility the additional square footage includes the following: 7.908 ksf of public space, 11.610 ksf of Gaming support space, 4.831 ksf of cage area space, 8.269 ksf of administration space, 12.875 ksf of storage area space and 9.717 ksf of employee area space.
5. This use will not generate peak-hour trips during a typical weekday.

TABLE 4-3:
TRIP GENERATION SUMMARY FOR ALTERNATIVE 2
(UPDATED OCTOBER 2012)

Land Use	Units		Trip Rate	Daily Trips	Weekday									Friday and Saturday				
					AM Peak-Hour					PM Peak-Hour				PM Peak-Hour				
					Trip Rate [2]	In:Out Ratio[2]	In	Out	Total	Trip Rate [2]	In:Out Ratio[2]	In	Out	Total	Trip Rate [2]	In:Out Ratio[2]	In	Out	Total
Gaming Area [(1)]	11.376	ksf	100 / ksf	1,138														
Food and Beverage [(3)]	1.019	ksf	50 / ksf	51														
Gaming Total [(4)]	**17.500**	**ksf**		**1,189**	2.95 / ksf	0.70 : 0.30	**37**	**15**	**52**	4.95 / ksf	0.53 : 0.47	**46**	**41**	**87**	6.9 / ksf	0.46 : 0.54	**56**	**65**	**121**
NET TRIP GENERATION =				**1,189**			**37**	**15**	**52**			**46**	**41**	**87**			**56**	**65**	**121**

Note:
ksf=thousand square feet

1. Reference: San Diego County, *Update on Impacts of Tribal Economic Development Projects in San Diego County, April 2003.*
2. Reference: David Evans and Associates, Inc. and California Department of Transporation, *Transporation/Circulation Technical Study- Shingles Springs Rancheria Interchange Project, April 2002.*
3. For the Food and Beverage use the SANDAG's trip generation rate for a "Quality Restaunt" was used with a 50 percent reduction. This reduction was applied to recognize that the primary attractor of this site is the gaming facility and that the food and beverage establishments are a secondary attraction.
4. This square footage includes facilities that provides operational support to the gaming facility. Daily trip generation for this support uses are included in the 100 trips/thousand square foot per the San Diego County, *Update on Impacts of Tribal Economic Development Projects in San Diego County*, April 2003. For this facility the additional square footage includes the following: 1.140 ksf of public space, 1.6 ksf of Gaming support space, and 2.365 ksf of employee area space.

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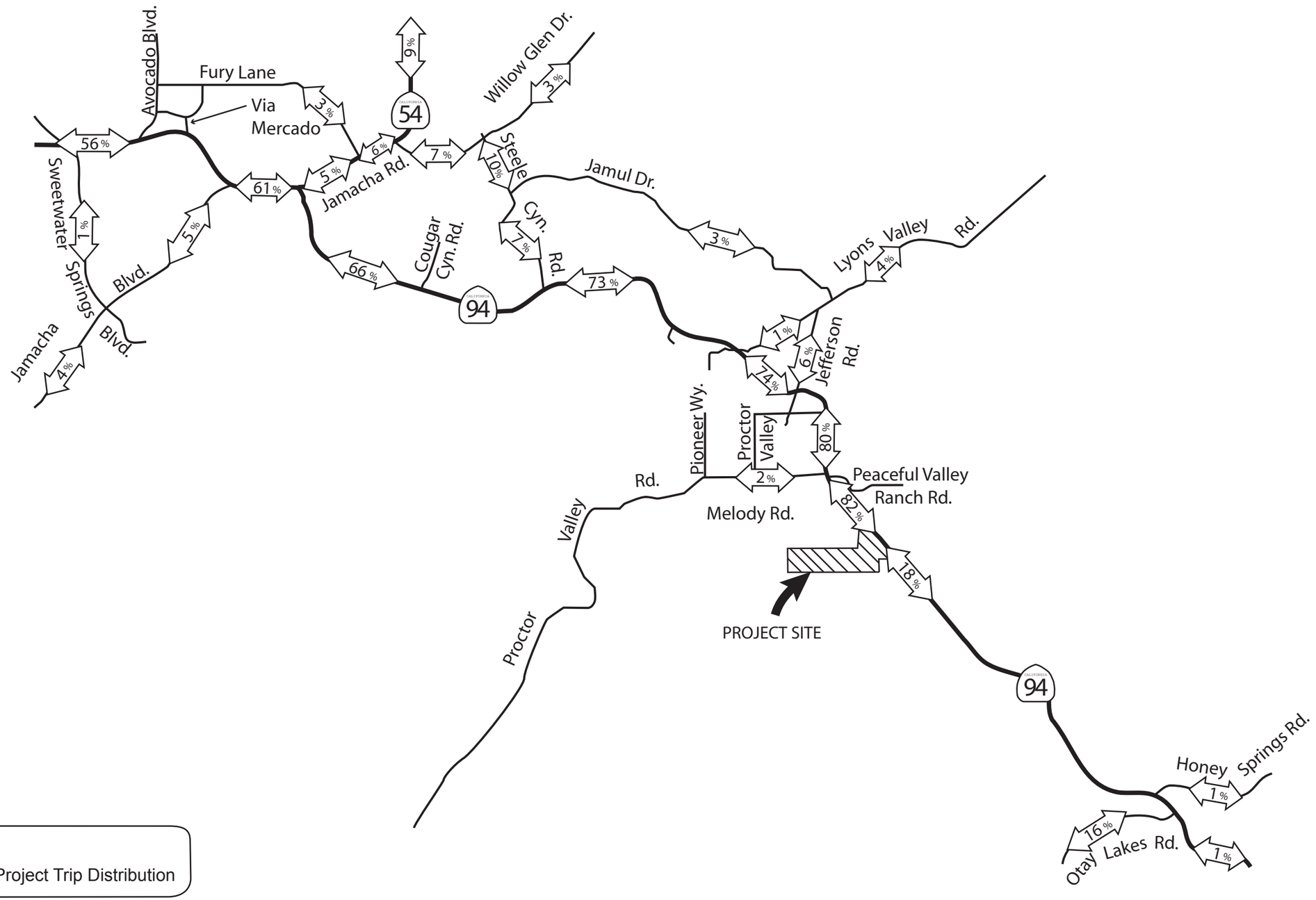

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FIGURE 4-1
Project Trip Distribution for Near-Term Conditions (Updated October 2012)

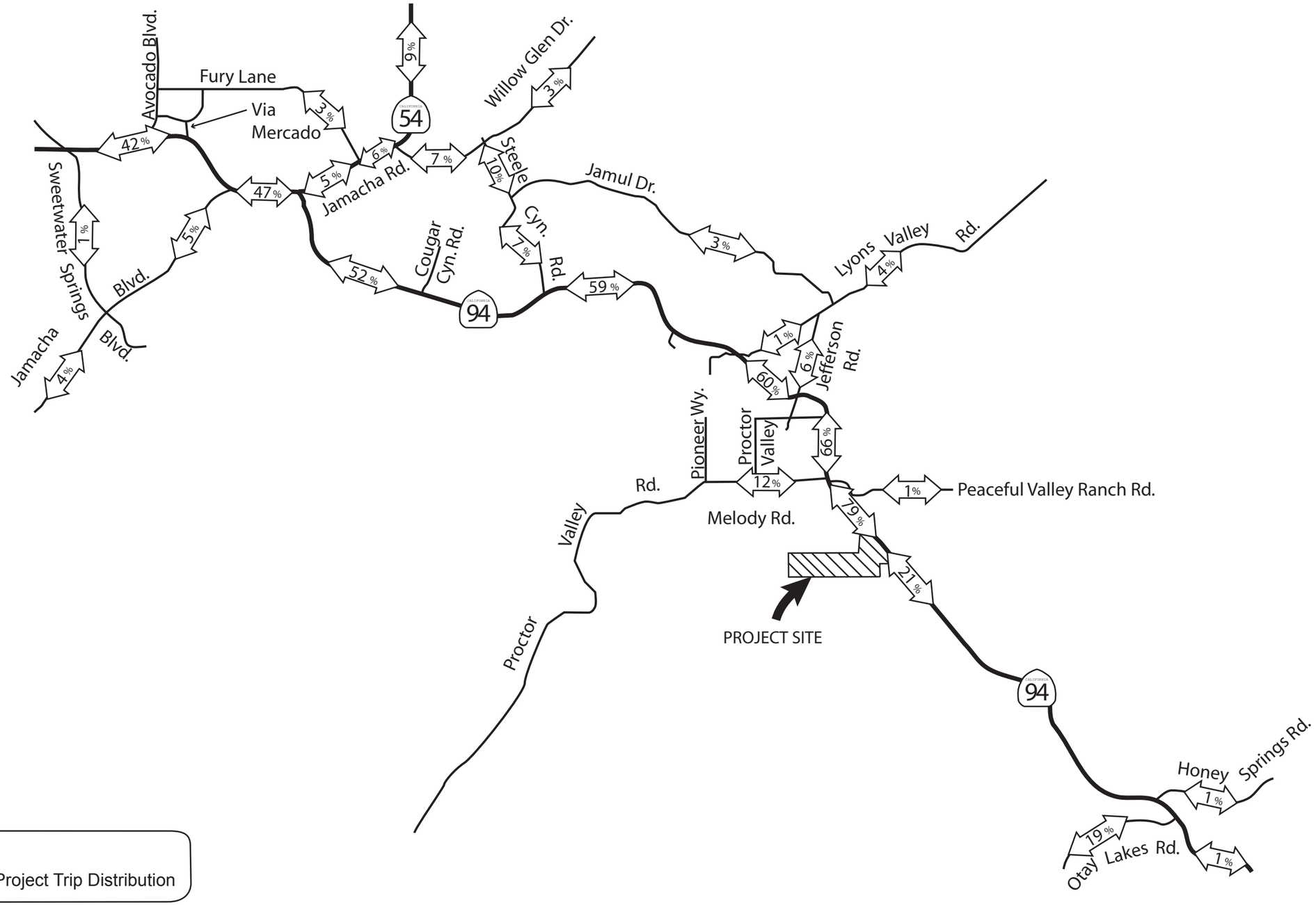
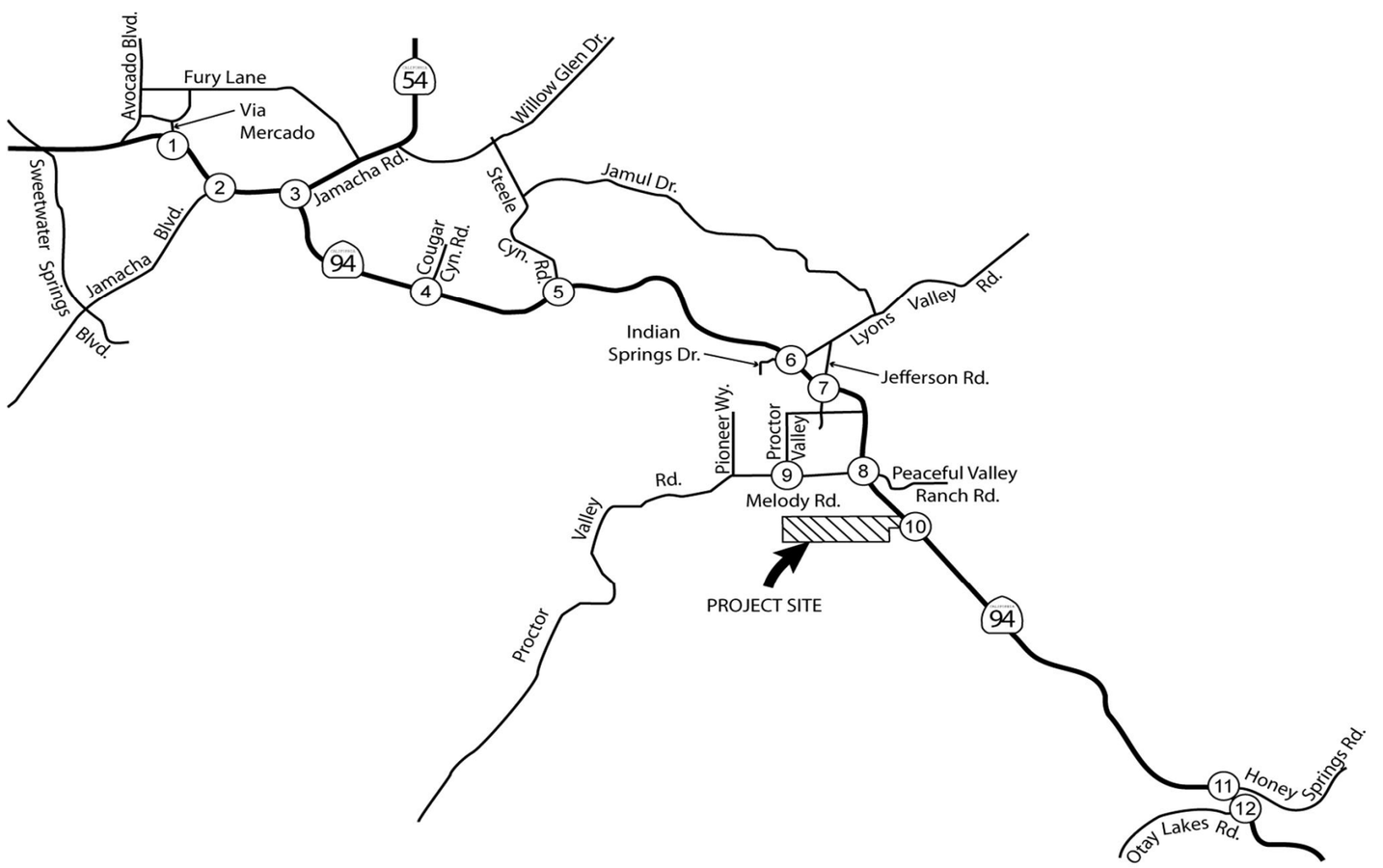


FIGURE 4-2
Project Trip Distribution for Horizon-Year Conditions (Updated October 2012)

Jamul Indian Village (Updated October 2012)

1		2		3		4	
Via Mercado	(56%) SR 94	Jamacha Blvd.	(56%) (5%) SR 94	Dwy. SR 94	5% Jamacha Rd.	Cougar Canyon Rd.	(66%) SR 94
56%		56%	5%	61% SR 94	(61%) (5%)	66%	
5		**6**		**7**		**8**	
7% Steele Canyon Rd.	(7%) (66%) SR 94	1% Lyons Valley Rd.	(1%) (73%) SR 94	6% Jefferson Rd.	(6%) (74%) SR 94	80% SR 94 Melody Rd.	Peacefull Valley Ranch Rd.
66%		73% Indian Springs Dr.		74% Proctor Valley Rd.		2%	(2%) (80%)
9		**10**		**11**		**12**	
Proctor Valley Rd.	(2%) Melody Rd.	82% SR 94 Reservation Rd.		(17%) (1%) SR 94	1% Honey Springs Rd.	(16%) (1%) SR 94 Otay Lakes Rd.	
2%		(82%) (18%)	18%		17%	16%	1%



Legend

X% / (Y%) = IN / OUT PERCENT DISTRIBUTION

NOT TO SCALE

FIGURE 4-3

Project Trip Distribution for Near Term (2015) Conditions -Study Intersections

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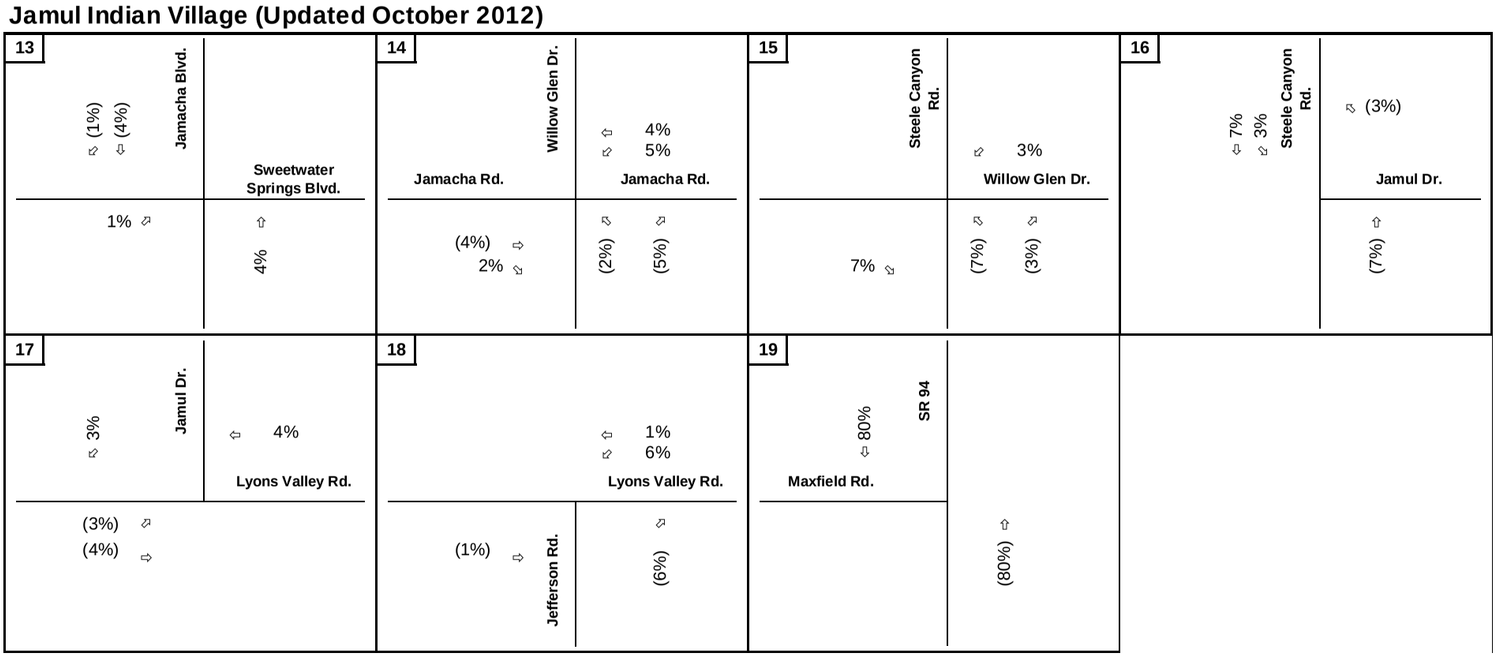
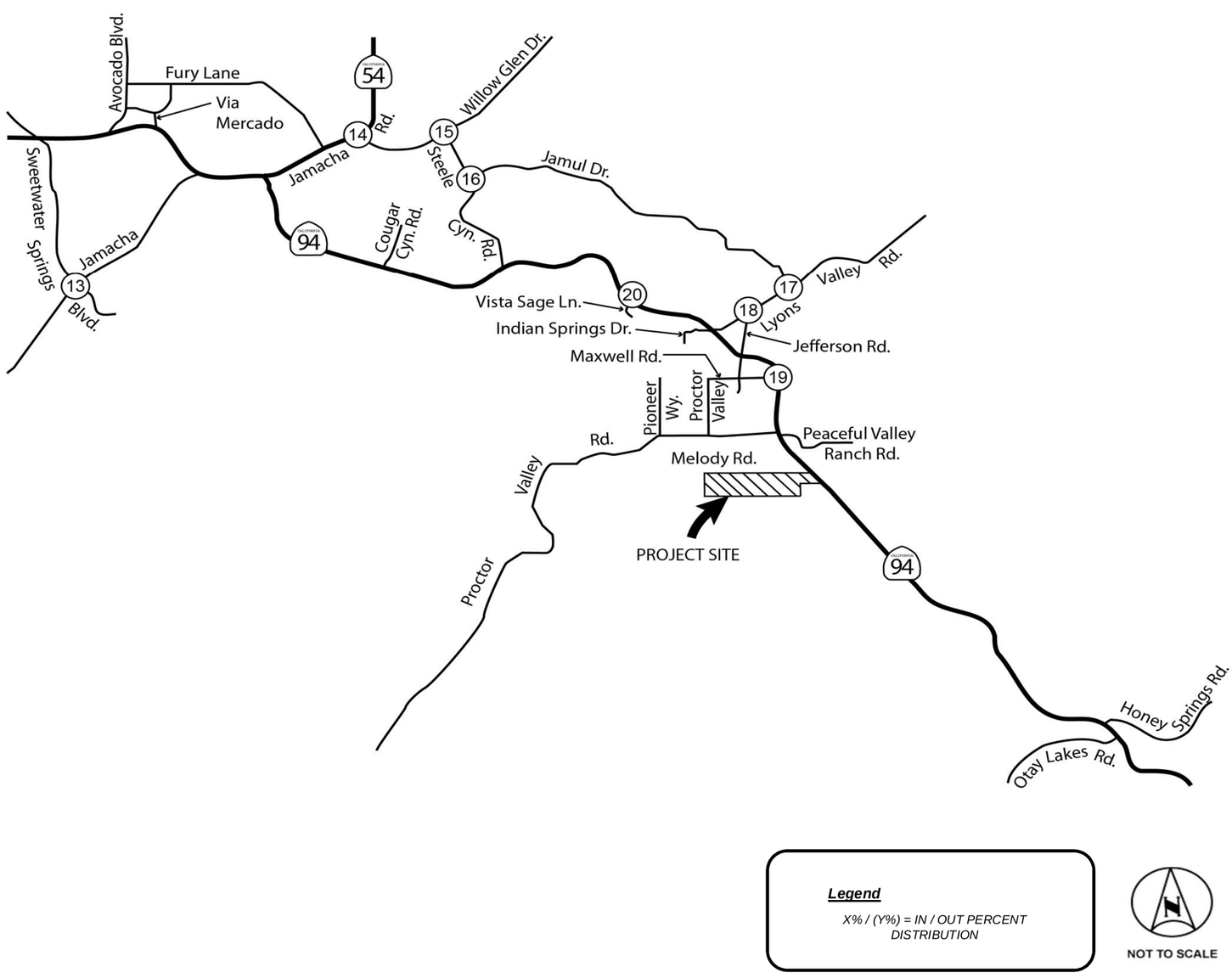
Jamul Indian Village (Updated October 2012)





Kimley-Horn and Associates, Inc.

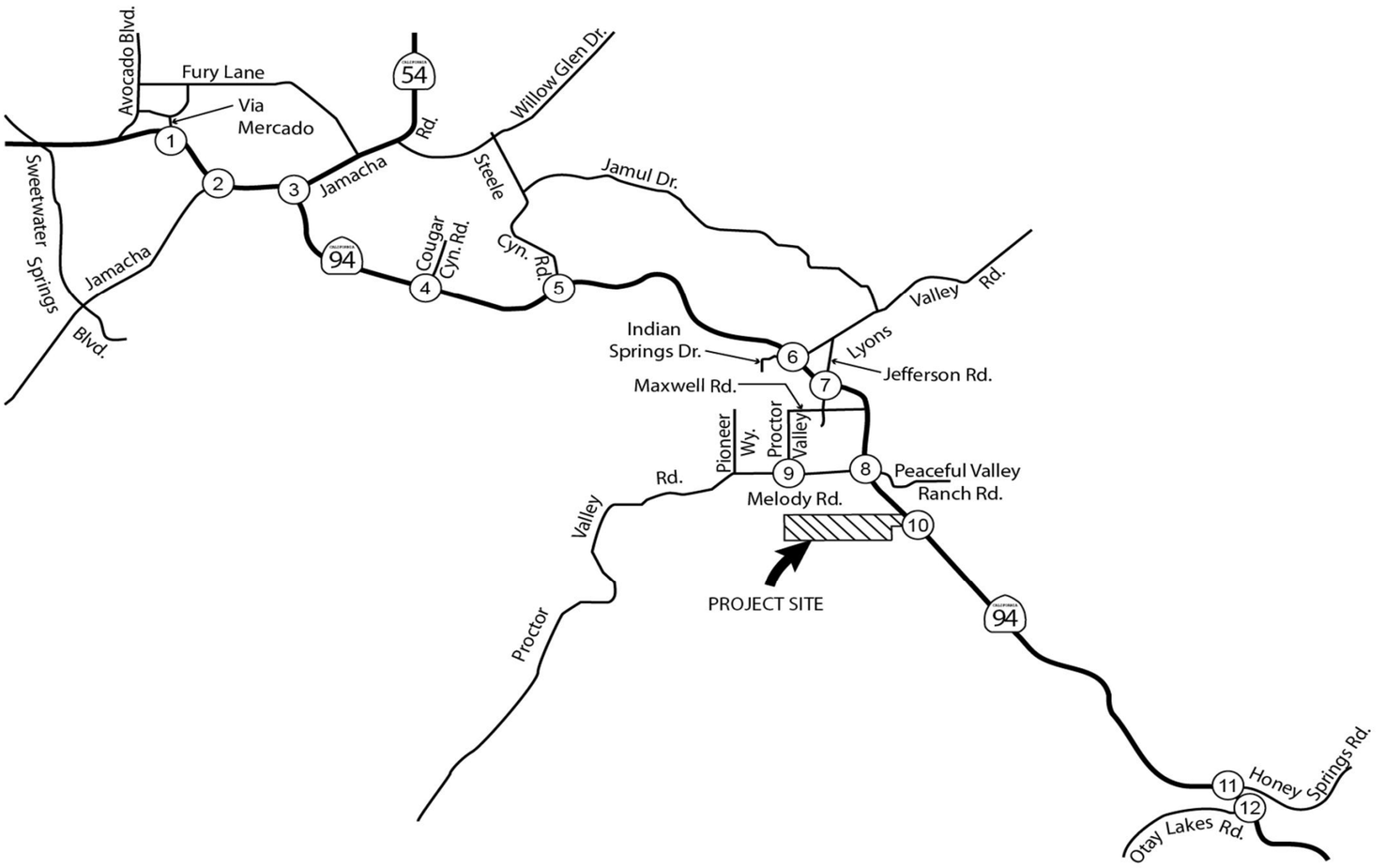
FIGURE 4-3.1

Project Trip Distribution for Near Term (2015) Conditions -Study Intersections (cont.)

K:\SND_TPTO\095848000\Excel\[848000TA01.xlsm]Dist NT 13-19

Jamul Indian Village (Updated October 2012)

1 Via Mercado ⇦ (42%) SR 94 42% ⇨	**2** Jamacha Blvd. ⇦ (42%) ⇖ (5%) SR 94 42% ⇨ ⇗ 5%	**3** SR 94 Dwy. ⇖ 5% Jamacha Rd. 47% ⇖ SR 94 (47%) ⇗ (5%) ⇗	**4** Cougar Canyon Rd. ⇦ (52%) SR 94 52% ⇨
5 7% ⇙ Steele Canyon Rd. ⇗ (7%) ⇦ (52%) SR 94 52% ⇨	**6** 1% ⇙ Lyons Valley Rd. ⇗ (1%) ⇦ (59%) SR 94 59% ⇨ Indian Springs Dr.	**7** 6% ⇙ Jefferson Rd. ⇗ (6%) ⇦ (60%) SR 94 60% ⇨ Proctor Valley Rd.	**8** 66% ⇩ SR 94 ⇖ 1% Peacefull Valley Ranch Rd. Melody Rd. 12% ⇙ (12%) ⇗ (66%) ⇧ (1%) ⇗
9 Proctor Valley Rd. ⇦ (12%) Melody Rd. 12% ⇨	**10** 79% ⇙ SR 94 Reservation Rd. (79%) ⇗ (21%) ⇙ 21% ⇗	As part of the County of San Diego's General Plan, the intersection of Honey Springs Road will be realigned to form a four-way intersection with Otay Lakes Road and the intersection of SR-94	**12** (19%) ⇙ (1%) ⇩ (1%) ⇘ SR 94 Otay Lakes Rd. 19% ⇗ Honey Springs Rd. ⇧ 1%



Legend

X% / (Y%) = IN / OUT PERCENT DISTRIBUTION

NOT TO SCALE

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FIGURE 4-4

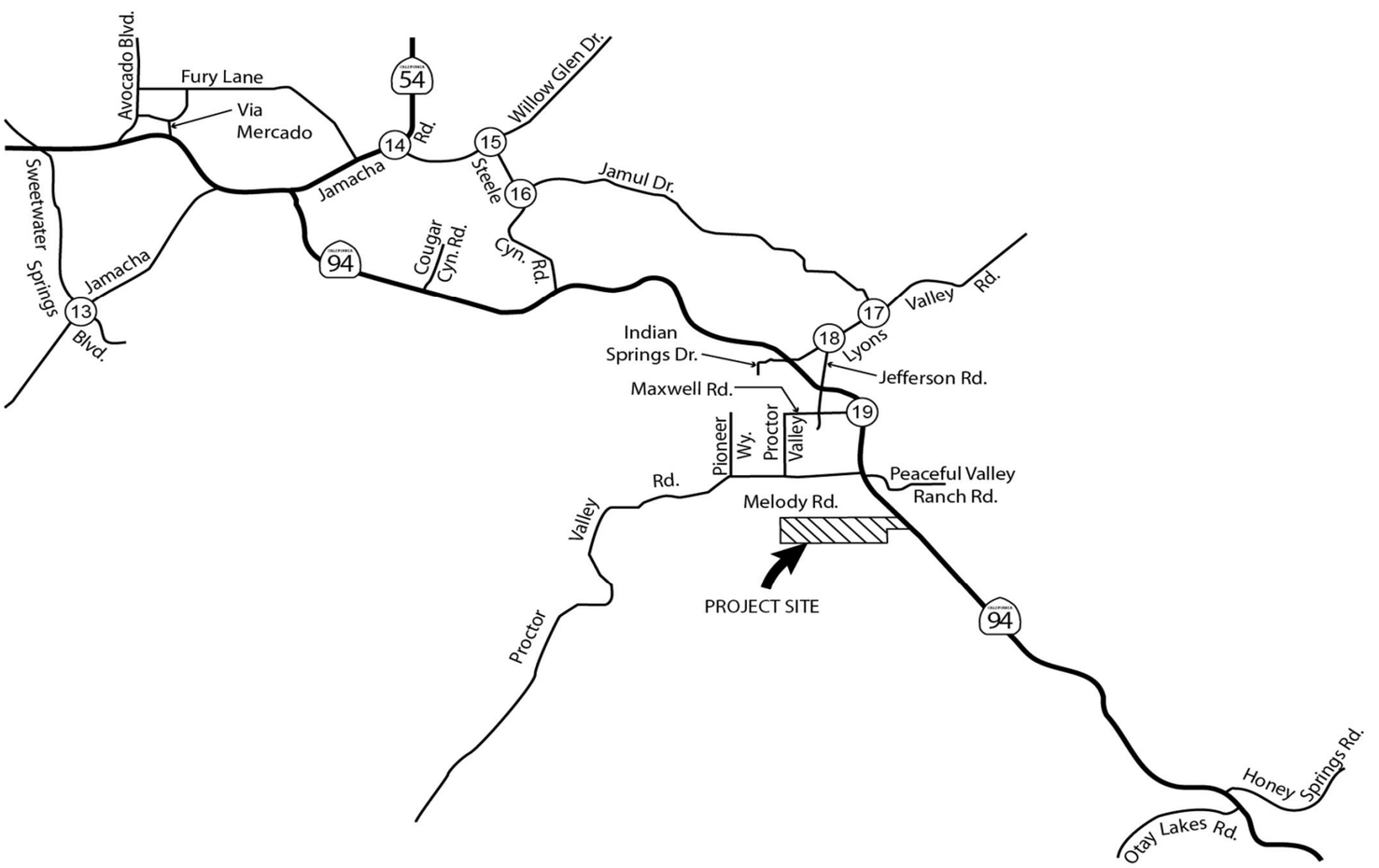
Project Trip Distribution for Horizon Year (2035) Conditions -Study Intersections

K:\SND_TPTO\095848000\Excel\[848000TA01.xlsm]Dist BO 1-12

Jamul Indian Village (Updated October 2012)

13		14		15		16	
Jamacha Blvd.	Sweetwater Springs Blvd.	Willow Glen Dr.	Jamacha Rd.	Steele Canyon Rd.	Willow Glen Dr.	Steele Canyon Rd.	Jamul Dr.
(1%) (4%)		4% 5%		3%		7% 3%	(3%)
1%	4%	(4%) 2%	(2%) (5%)	7%	(7%) (3%)		(7%)

17		18		19	
Jamul Dr.	Lyons Valley Rd.	Lyons Valley Rd.	Jefferson Rd.	SR 94	Maxfield Rd.
3%	4%	1% 6%		66%	
(3%) (4%)		(1%)	(6%)		(66%)



Legend

X% / (Y%) = IN / OUT PERCENT DISTRIBUTION

NOT TO SCALE

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FIGURE 4-4.1

Project Trip Distribution for Horizon Year (2035) Conditions -Study Intersections (cont.)

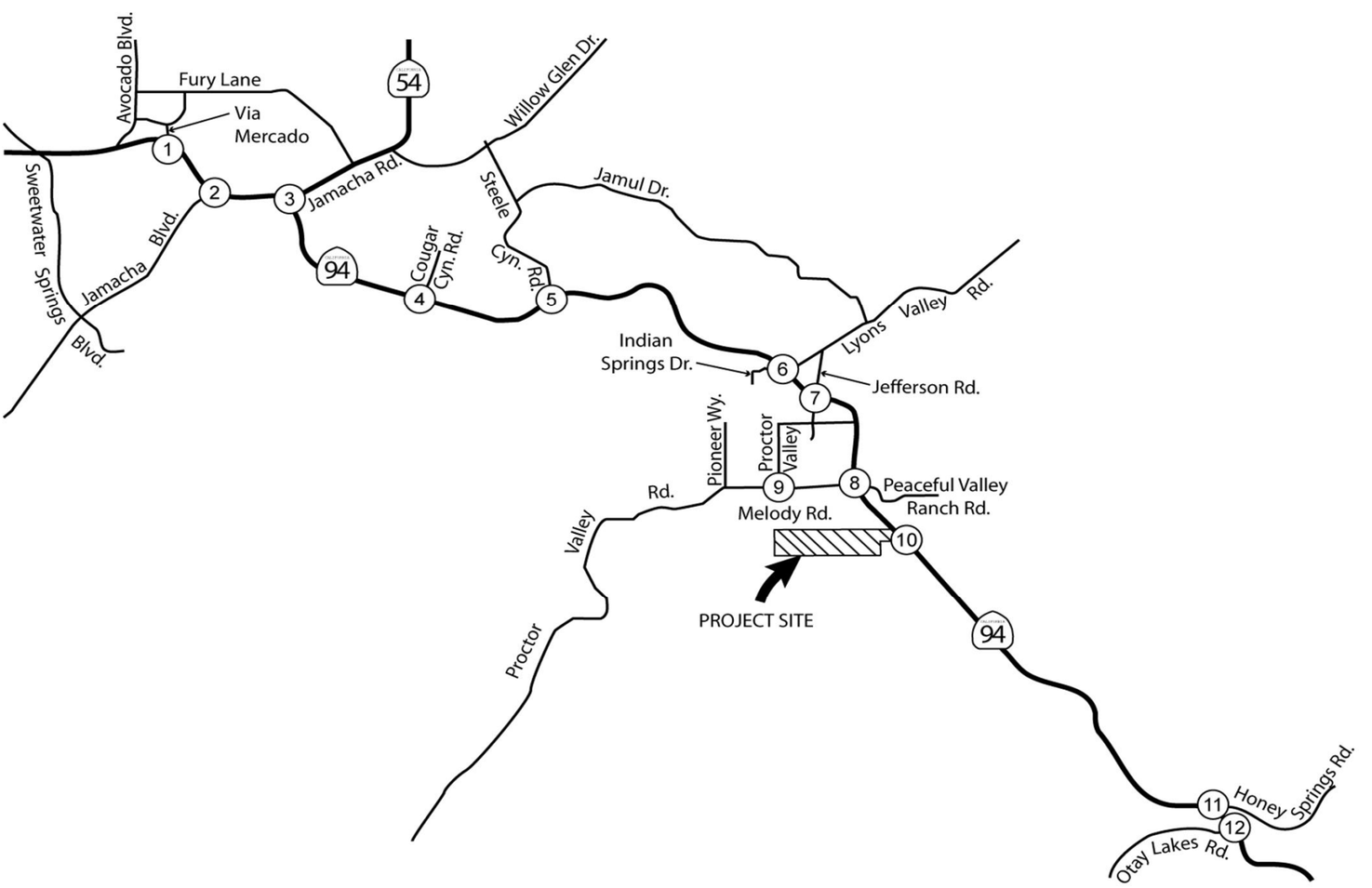
K:\SND_TPTO\095848000\Excel\[848000TA01.xlsm]Dist BO 13-19

Jamul Indian Village (Updated October 2012)

1			2			3			4		
	Via Mercado			Jamacha Blvd.			Dwy.			Cougar Canyon Rd.	
	⇦ 100 / 264			⇦ 100 / 264			⇦ 21 / 27			⇦ 118 / 311	
	SR 94			⇙ 9 / 24		SR 94	Jamacha Rd.			SR 94	
235 / 298 ⇨			235 / 298 ⇨	SR 94		256 / 325 ⇙ SR 94	⇗ 109 / 288	⇗ 9 / 24	277 / 352 ⇨		
				⇗ 21 / 27							

5			6			7			8		
	⇙ 29 / 37 Steele Canyon Rd.			⇙ 4 / 5 Lyons Valley Rd.			⇙ 25 / 32 Jefferson Rd.			⇗ 336 / 426 ⇩ SR 94	
	⇗ 13 / 33			⇗ 2 / 5			⇗ 11 / 28			Melody Rd.	
	⇦ 118 / 311			⇦ 131 / 344			⇦ 132 / 349				⇗ ⇧ Peacefull Valley Ranch Rd.
	SR 94			SR 94			SR 94				
277 / 352 ⇨			307 / 389 ⇨	Indian Springs Dr.		311 / 394 ⇨	Proctor Valley Rd.		8 / 11 ⇙		4 / 9 ⇧ 143 / 377

9			10			11			12		
	Proctor Valley Rd.			⇩ 344 / 437 SR 94			⇩ 30 / 80 ⇙ 2 / 5 SR 94			⇩ 29 / 75 ⇙ 2 / 5 SR 94	
	⇦ 4 / 9			⇙				⇗ 4 / 5		⇙ ⇩	
	Melody Rd.		Reservation Rd.					Honey Springs Rd.	Otay Lakes Rd.		
8 / 11 ⇨			147 / 387 ⇗		⇗ 76 / 96			⇧ 71 / 91	67 / 85 ⇗		⇧ 4 / 5
			32 / 85 ⇙								



Legend

X / Y = AM / PM PEAK HOUR TURNING VOLUMES

NOT TO SCALE

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FIGURE 4-5

Proposed Project Assignment for Near Term (2015) Conditions -Study Int.(Weekday)

K:\SND_TPTO\095848000\Excel\[848000TA01_2000.xlsm]NT Proj Assign Fig1-12 weekday

Jamul Indian Village (Updated October 2012)

13 2 / 5 ⇦ 7 / 19 ⇩ **Jamacha Blvd.** **Sweetwater Springs Blvd.** 4 / 5 ⇨ ⇧ 17 / 21	**14** **Willow Glen Dr.** ⇨ 7 / 19 ⇦ 8 / 11 ⇧ 17 / 21 ⇦ 21 / 27 **Jamacha Rd.** ⇦ 4 / 9 ⇧ 9 / 24	**15** **Steele Canyon Rd.** 29 / 37 ⇦ ⇦ 13 / 16 **Willow Glen Dr.** ⇦ 13 / 33 ⇧ 5 / 14	**16** 29 / 37 ⇩ 13 / 16 ⇦ **Steele Canyon Rd.** ⇦ 5 / 14 **Jamul Dr.** ⇧ 13 / 33				
17 13 / 16 ⇦ **Jamul Dr.** ⇦ 17 / 21 **Lyons Valley Rd.** 5 / 14 ⇨ 7 / 19 ⇨	**18** ⇧ 4 / 5 ⇦ 25 / 32 **Lyons Valley Rd.** 2 / 5 ⇨ **Jefferson Rd.** ⇧ 11 / 28	**19** 336 / 426 ⇩ **SR 94** **Maxfield Rd.** ⇧ 143 / 377					

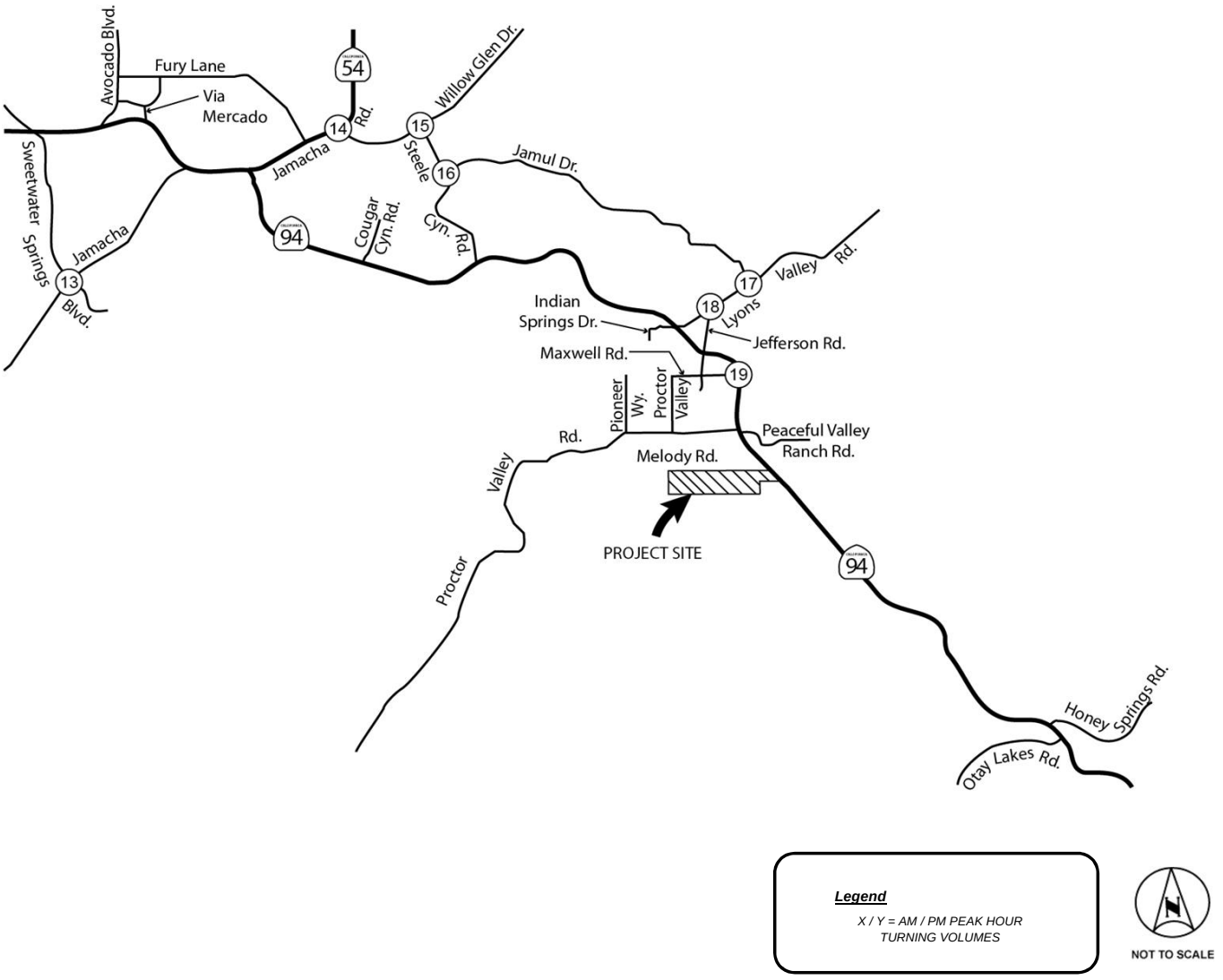

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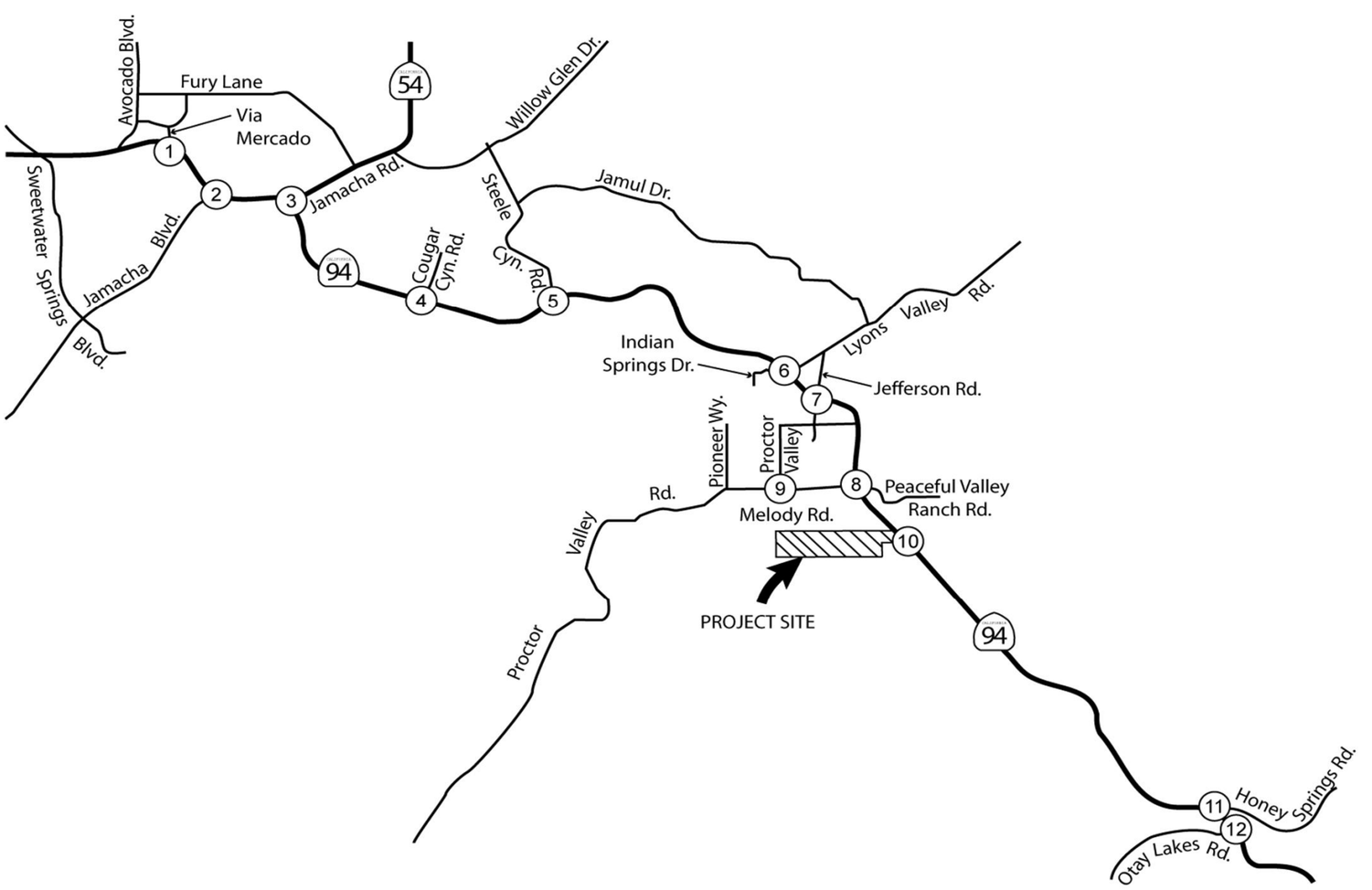
FIGURE 4-5.1

Proposed Project Assignment for Near Term (2015) Conditions -Study Int.(Weekday) (cont.)

K:\SND_TPTO\095848000\Excel\[848000TA01_2000.xlsm]NT Proj Assign Fig13-24 weekday

Jamul Indian Village (Updated October 2012)

1 Via Mercado ⇦ 423 / 423 SR 94 361 / 361 ⇨	**2** Jamacha Blvd. ⇦ 423 / 423 ⇖ 38 / 38 SR 94 361 / 361 ⇨ ⇗ 32 / 32	**3** SR 94 Dwy. ⇖ 32 / 32 Jamacha Rd. ⇘ 393 / 393 SR 94 ⇖ 461 / 461 ⇗ 38 / 38	**4** Cougar Canyon Rd. ⇦ 499 / 499 SR 94 426 / 426 ⇨
5 45 / 45 ⇙ Steele Canyon Rd. ⇗ 53 / 53 ⇦ 499 / 499 SR 94 426 / 426 ⇨	**6** 6 / 6 ⇙ Lyons Valley Rd. ⇗ 8 / 8 ⇦ 552 / 552 SR 94 471 / 471 ⇨ Indian Springs Dr.	**7** 39 / 39 ⇙ Jefferson Rd. ⇖ 45 / 45 ⇦ 559 / 559 SR 94 477 / 477 ⇨ Proctor Valley Rd.	**8** 516 / 516 ⇩ SR 94 Melody Rd. Peacefull Valley Ranch Rd. ⇘ 13 / 13 ⇖ 15 / 15 ⇑ 605 / 605
9 Proctor Valley Rd. ⇦ 15 / 15 Melody Rd. 13 / 13 ⇨	**10** 529 / 529 SR 94 ⇙ Reservation Rd. 620 / 620 ⇗ 136 / 136 ⇙ ⇗ 116 / 116	**11** 128 / 128 ⇩ 8 / 8 ⇩ SR 94 ⇖ 6 / 6 Honey Springs Rd. ⇑ 110 / 110	**12** 121 / 121 ⇙ 8 / 8 ⇩ SR 94 Otay Lakes Rd. 103 / 103 ⇗ ⇑ 6 / 6



Legend

X / Y = FRIDAY / SATURDAY
PM PEAK HOUR TURNING VOLUMES

NOT TO SCALE

Kimley-Horn and Associates, Inc.

FIGURE 4-6

Proposed Project Assignment for Near Term (2015) Conditions -Study Int.(Friday/Saturday)

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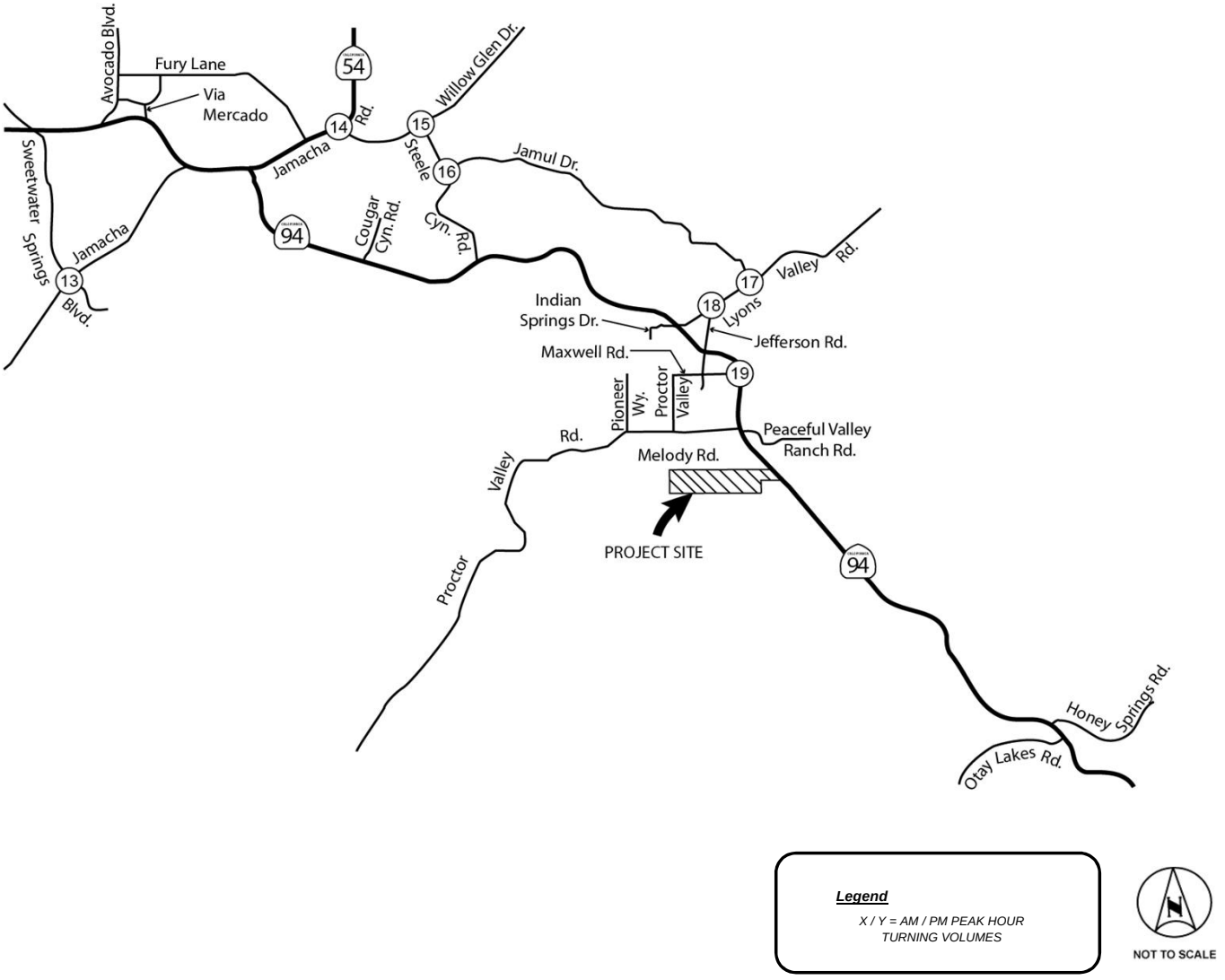
Jamul Indian Village (Updated October 2012)

13			14			15			16		
8 / 8 30 / 30 Jamacha Blvd.		Sweetwater Springs Blvd.	Willow Glen Dr.		26 / 26 32 / 32 Jamacha Rd.	Steele Canyon Rd.		19 / 19 Willow Glen Dr.	45 / 45 19 / 19 Steele Canyon Rd.		23 / 23 Jamul Dr.
6 / 6		26 / 26	30 / 30 13 / 13		15 / 15 38 / 38	45 / 45		53 / 53 23 / 23			53 / 53

17			18			19		
19 / 19 Jamul Dr.		26 / 26 Lyons Valley Rd.			6 / 6 39 / 39 Lyons Valley Rd.	516 / 516 SR 94 Maxfield Rd.		
23 / 23 30 / 30			8 / 8 Jefferson Rd.		45 / 45			605 / 605

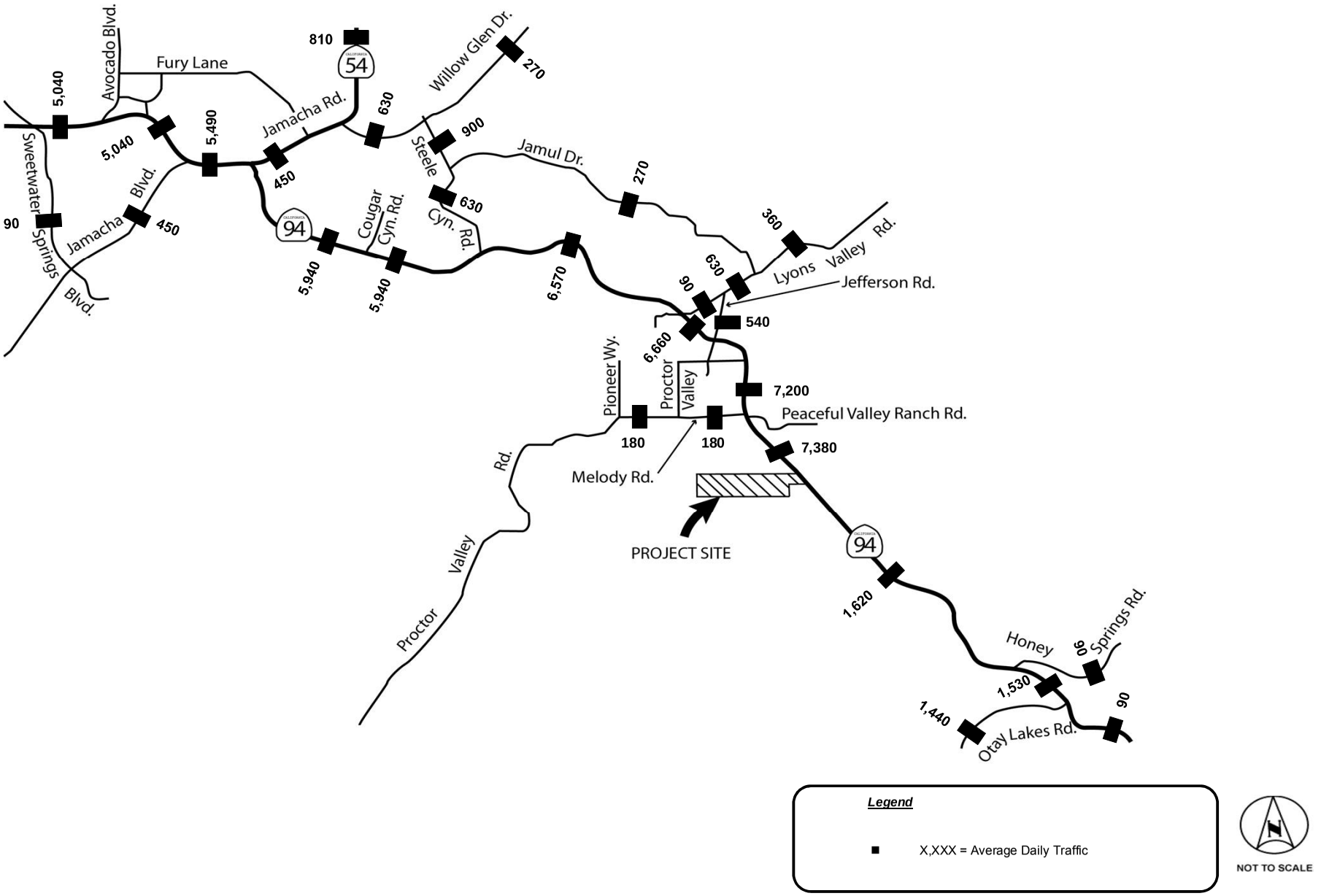


Kimley-Horn and Associates, Inc.

FIGURE 4-6.1

Proposed Project Assignment for Near Term (2015) Conditions -Study Int.(Friday/Saturday) (cont.)

K:\SND_TPTO\095848000\Excel\[848000TA01_2000.xlsm]NT Proj Assign Fig13-24 weekend



Kimley-Horn and Associates, Inc.

FIGURE 4-7

Proposed Project Assignment for Near Term (2015) Conditions -Roadway Segments

K:\SND_TPTO\095848000\Excel\[848000RS01.xlsm]ADT Fig\Proposed Project Assignment for Near Term (2015) Conditions -Roadway Segments

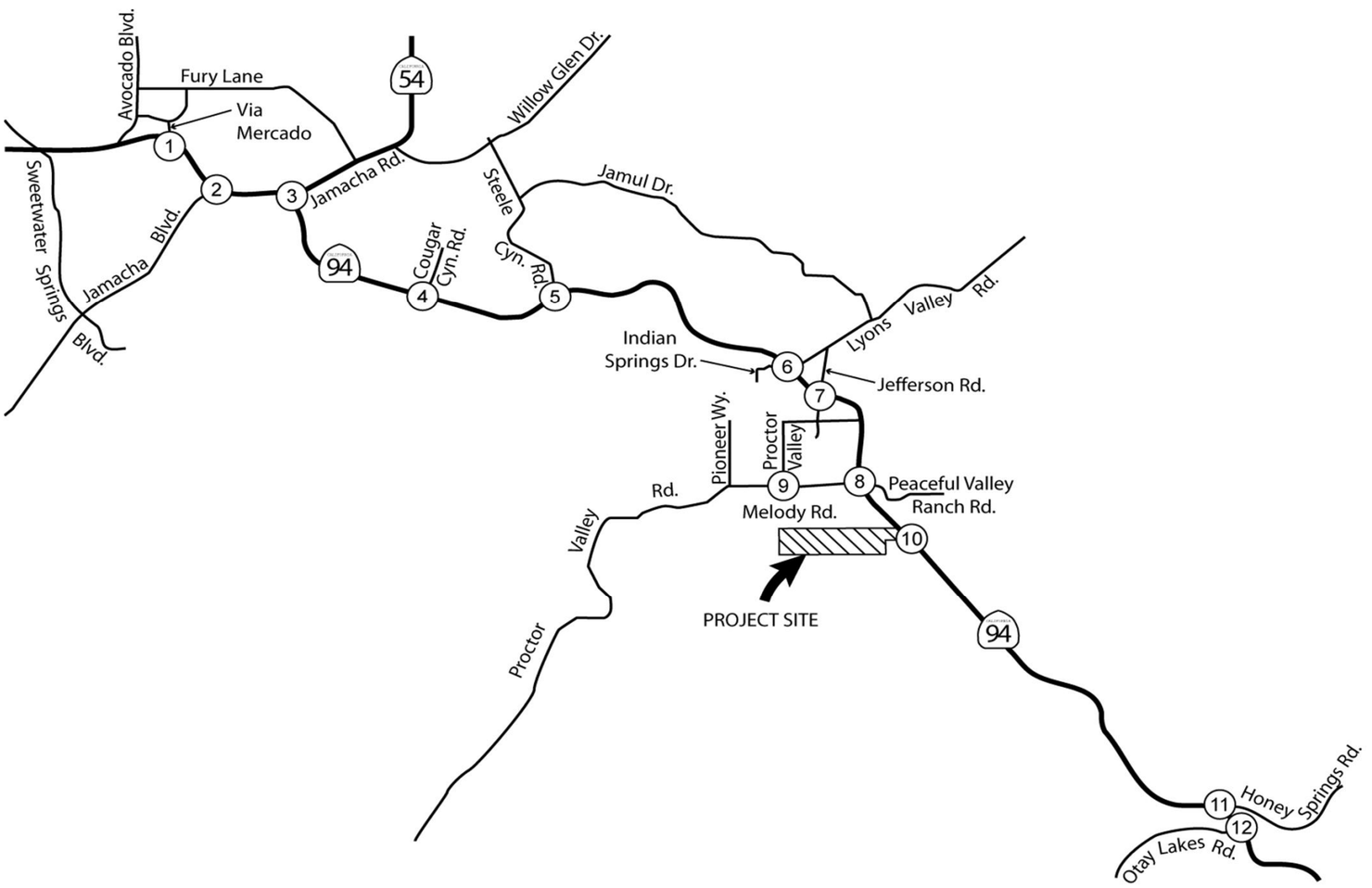
Jamul Indian Village (Updated October 2012)

1			2			3			4		
	Via Mercado			Jamacha Blvd.			Dwy.			Cougar Canyon Rd.	
	⇦ 75 / 198			⇦ 75 / 198 ⇙ 9 / 24		SR 94	⇗ 21 / 27			⇦ 93 / 245	
	SR 94			SR 94			Jamacha Rd.			SR 94	
176 / 224 ⇨			176 / 224 ⇨		⇗ 21 /27	197 / 251 ⇙ SR 94		⇖ 84 /222 ⇗ 9 /24	218 / 277 ⇨		

5			6			7			8		
29 / 37 ⇙	Steele Canyon Rd.		4 / 5 ⇙	Lyons Valley Rd.		25 / 32 ⇙	Jefferson Rd.		277 / 352 ⇩	SR 94	⇗ 4 / 5
⇦ 13 / 33 ⇦ 93 / 245	SR 94		⇦ 2 / 5 ⇦ 106 / 278	SR 94		⇦ 11 / 28 ⇦ 107 / 283	SR 94		Melody Rd.		Peacefull Valley Ranch Rd.
218 / 277 ⇨			248 / 314 ⇨	Indian Springs Dr.		252 / 320 ⇨	Proctor Valley Rd.		50 / 64 ⇙		⇖ ⇧ ⇗ 21 / 57 118 /311 2 / 5

9			10				12		
	Proctor Valley Rd.		332 / 421 ⇩	SR 94			34 /90 ⇙ 2 / 5 ⇩ 2 / 5 ⇘	SR 94	
⇦ 21 / 57			⇗				Otay Lakes Rd.		Honey Springs Rd.
Melody Rd.			Reservation Rd.						
50 / 64 ⇨			141 / 373 ⇗		⇗ 88 / 112		80 / 101 ⇗		⇧ 4 / 5
			38 / 99 ⇙						

As part of the County of San Diego's General Plan, the intersection of Honey Springs Road will be realigned to form a four-way intersection with Otay Lakes Road and the intersection of SR-94



Legend

X / Y = AM / PM PEAK HOUR TURNING VOLUMES

NOT TO SCALE

Kimley-Horn and Associates, Inc.

FIGURE 4-8

Proposed Project Assignment for Horizon Year (2035) Conditions -Study Int. (Weekday)

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Jamul Indian Village (Updated October 2012)

13			**14**			**15**			**16**		
	2 / 5 7 / 19 **Jamacha Blvd.**	**Sweetwater Springs Blvd.**		**Willow Glen Dr.**	17 / 21 21 / 27 **Jamacha Rd.**		**Steele Canyon Rd.**	13 / 16 **Willow Glen Dr.**		29 / 37 13 / 16 **Steele Canyon Rd.**	5 / 14 **Jamul Dr.**
4 / 5		17 / 21	7 / 19 8 / 11		4 / 9 9 / 24	29 / 37		13 / 33 5 / 14			13 / 33
17			**18**			**19**					
	13 / 16 **Jamul Dr.**	17 / 21 **Lyons Valley Rd.**			4 / 5 25 / 32 **Lyons Valley Rd.**		277 / 352 **SR 94**				
5 / 14 7 / 19			2 / 5	**Jefferson Rd.**	11 / 28	**Maxfield Rd.**		118 / 311			

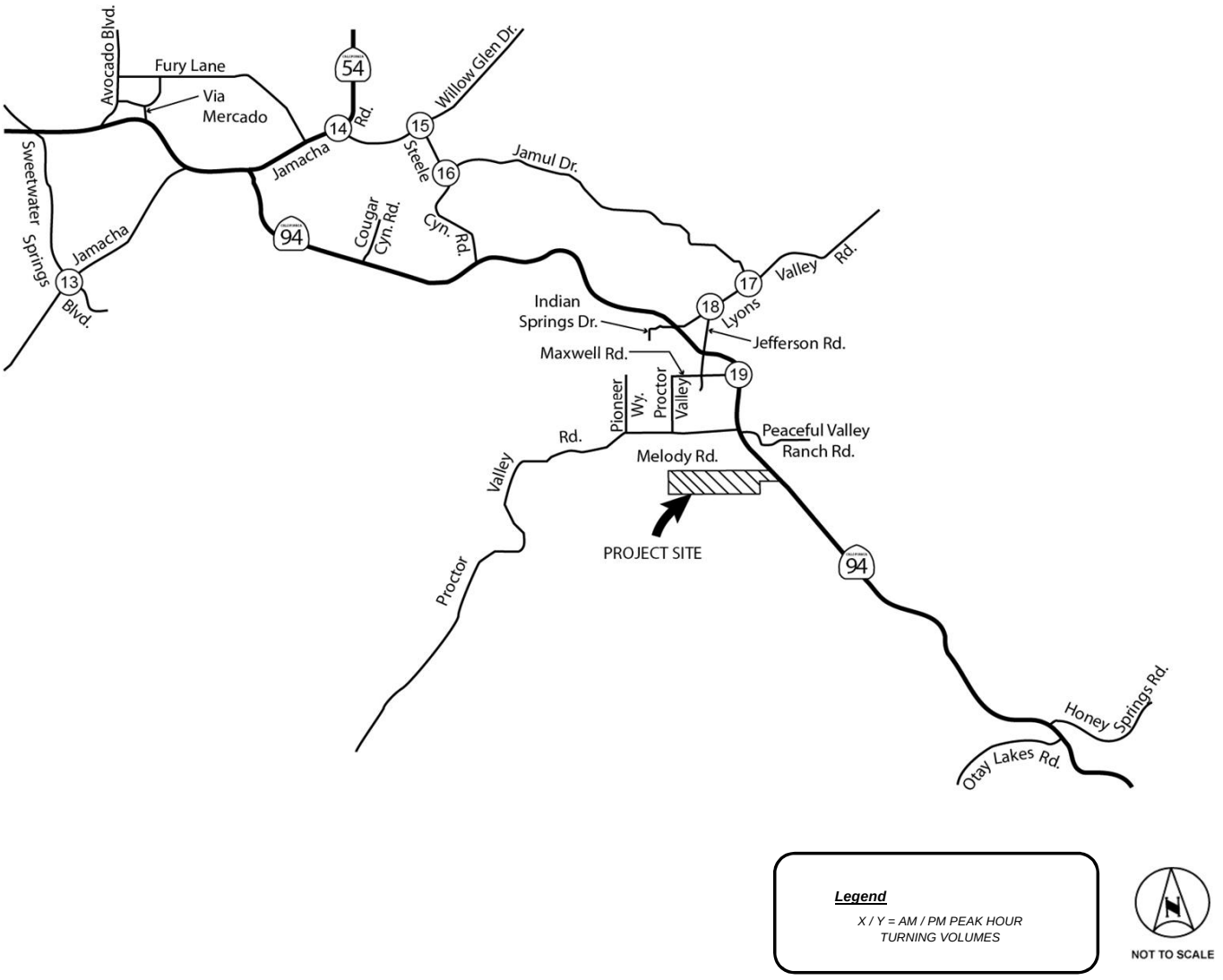

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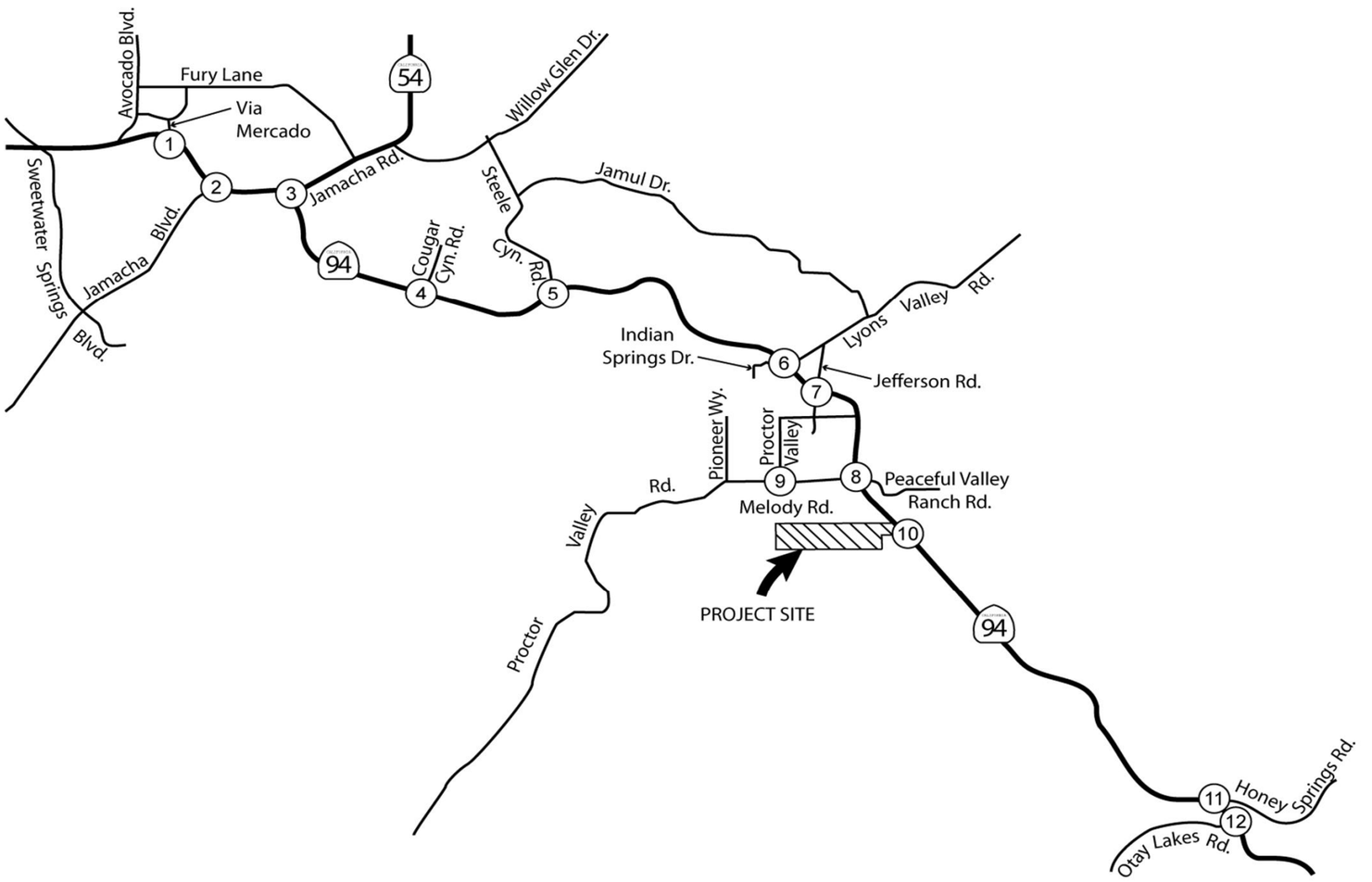
FIGURE 4-8.1

Proposed Project Assignment for Horizon Year (2035) Conditions -Study Int. (Weekday) (cont.)

Jamul Indian Village (Updated October 2012)

1 Via Mercado ⇦ 317 / 317 SR 94 271 / 271 ⇨	**2** Jamacha Blvd. ⇦ 317 / 317 ⇖ 38 / 38 SR 94 271 / 271 ⇨ ⇗ 32 / 32	**3** SR 94 Dwy. ⇖ 32 / 32 Jamacha Rd. 303 / 303 ⇖ SR 94 ⇗ 355 / 355 ⇗ 38 / 38	**4** Cougar Canyon Rd. ⇦ 393 / 393 SR 94 335 / 335 ⇨
5 45 / 45 ⇙ Steele Canyon Rd. ⇗ 53 / 53 ⇦ 393 / 393 SR 94 335 / 335 ⇨	**6** 6 / 6 ⇙ Lyons Valley Rd. ⇗ 8 / 8 ⇦ 446 / 446 SR 94 381 / 381 ⇨ Indian Springs Dr.	**7** 39 / 39 ⇙ Jefferson Rd. ⇗ 45 / 45 ⇦ 453 / 453 SR 94 387 / 387 ⇨ Proctor Valley Rd.	**8** 426 / 426 ⇩ SR 94 Melody Rd. ⇙ 6 / 6 Peacefull Valley Ranch Rd. 77 / 77 ⇙ ⇖ 91 / 91 ⇧ 499 / 499 ⇗ 8 / 8
9 Proctor Valley Rd. ⇦ 91 / 91 Melody Rd. 77 / 77 ⇨	**10** 510 / 510 ⇙ SR 94 Reservation Rd. 597 / 597 ⇗ 159 / 159 ⇙ ⇗ 135 / 135	As part of the County of San Diego's General Plan, the intersection of Honey Springs Road will be realigned to form a four-way intersection with Otay Lakes Road and the intersection of SR-94	**12** 144 / 144 ⇙ 8 / 8 ⇩ 8 / 8 ⇘ SR 94 Otay Lakes Rd. Honey Springs Rd. 123 / 123 ⇗ ⇧ 6 / 6



Legend

X / Y = FRIDAY / SATURDAY
PM PEAK HOUR TURNING VOLUMES

NOT TO SCALE

FIGURE 4-9

Proposed Project Assignment for Horizon Year (2035) Conditions -Study Int. (Friday/Saturday)

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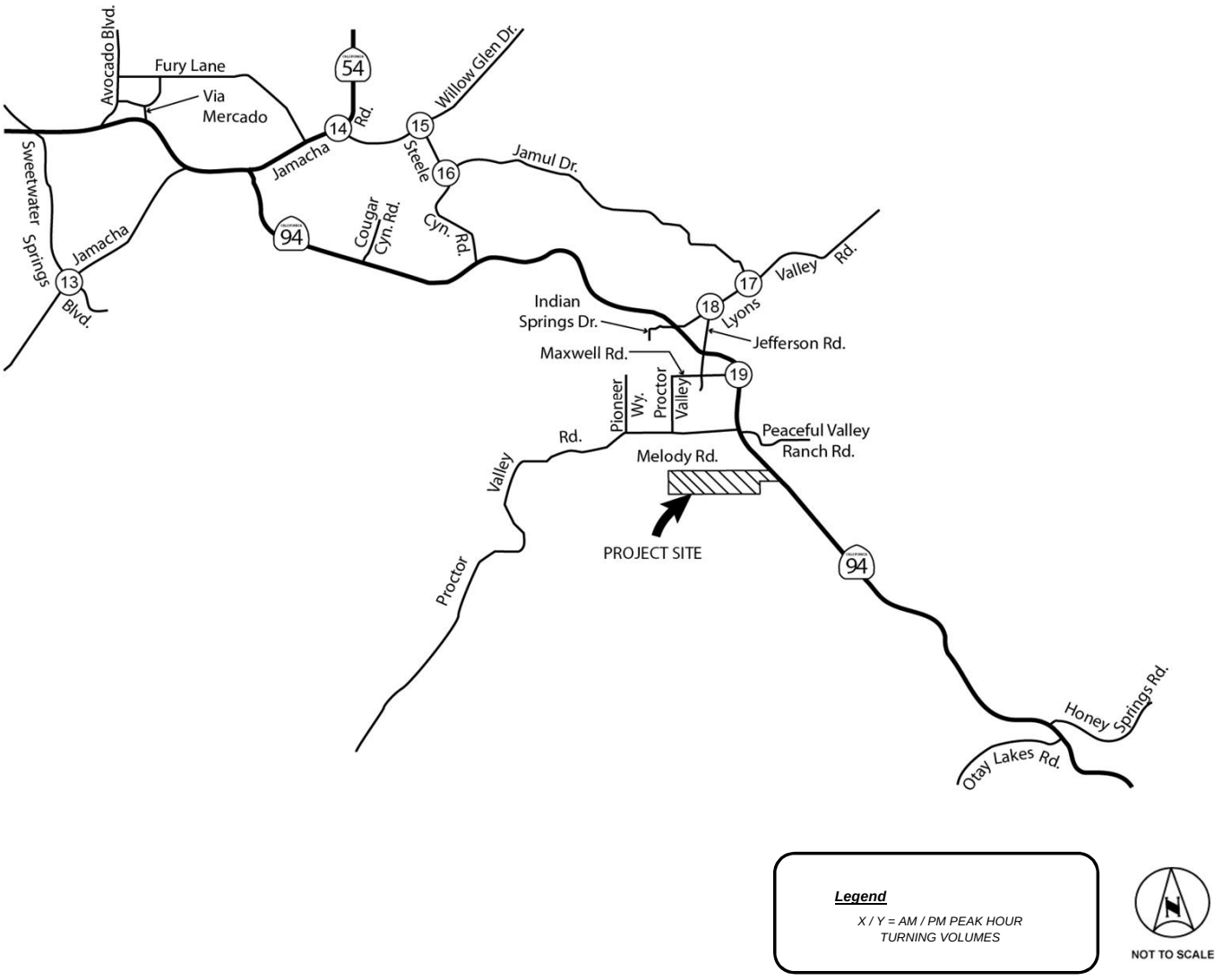
Jamul Indian Village (Updated October 2012)

13	8 / 8 30 / 30 **Jamacha Blvd.**	**Sweetwater Springs Blvd.**	**14**	**Willow Glen Dr.**	26 / 26 32 / 32 **Jamacha Rd.**	**15**	**Steele Canyon Rd.**	19 / 19 **Willow Glen Dr.**	**16**	45 / 45 19 / 19 **Steele Canyon Rd.**	23 / 23 **Jamul Dr.**
6 / 6		26 / 26		30 / 30 13 / 13	15 / 15 38 / 38		45 / 45	53 / 53 23 / 23			53 / 53
17	19 / 19 **Jamul Dr.**	26 / 26 **Lyons Valley Rd.**	**18**		6 / 6 39 / 39 **Lyons Valley Rd.**	**19**	426 / 426 **SR 94**				
23 / 23 30 / 30				8 / 8 **Jefferson Rd.**	45 / 45		**Maxfield Rd.**	499 / 499			



Legend

X / Y = AM / PM PEAK HOUR TURNING VOLUMES

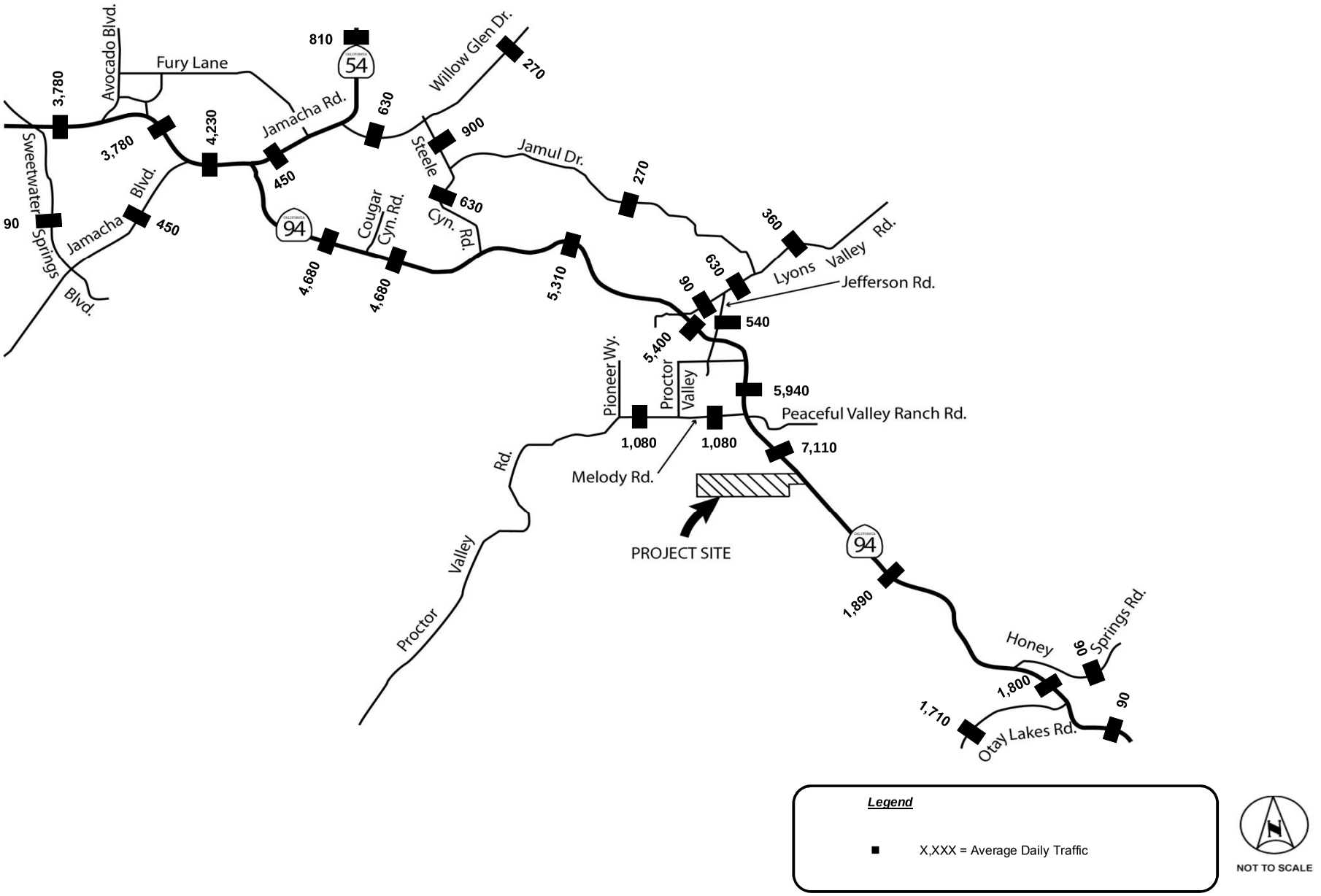
NOT TO SCALE

Kimley-Horn and Associates, Inc.

FIGURE 4-9.1

Proposed Project Assignment for Horizon Year (2035) Conditions -Study Int. (Friday/Saturday) (cont.)

K:\SND_TPTO\095848000\Excel\[848000TA01_2000.xlsm]BO Proj Assign Fig13-24 weekend



Kimley-Horn and Associates, Inc.

FIGURE 4-10

Proposed Project Assignment for Horizon Year (2035) Conditions -Roadway Segments

K:\SND_TPTO\095848000\Excel\[848000RS01.xlsm]ADT Fig\Proposed Project Assignment for Horizon Year (2035) Conditions -Roadway Segments

APPENDIX 5

ACCESS ROAD OPTION PHASE 1 SURVEY

PHASE 1 ENVIRONMENTAL SITE ASSESSMENT
FOR THE
ACCESS ALTERNATIVES

STATE ROUTE 94 IMPROVEMENT PROJECT



June 2, 2014

Prepared for:

California Department of Transportation District 11

4050 Taylor Street San Diego, CA 92110

Prepared by:

G. O. Graening, PhD, MSE
Registered Environmental Assessor, License #08060

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6124 Shadow Lane, Citrus Heights, CA 95621
(916) 452-5442

Caltrans

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SUMMARY

This report presents the findings of a Phase I Environmental Site Assessment (ESA) for the access alternatives considered in the State Route 94 Improvement Project. The study area is located approximately 1 mile south of Jamul, California. For the purposes of this assessment, all access road options were combined into one study area. The focal properties of this assessment are portions of 3 parcels: an 87-acre parcel (APN 597-060-05-00), 4-acre parcel (APN 597-060-04-00), and a 10-acre parcel (APN 597-042-13-00)—as well as the affected portions of the CalTrans right-of-way corridor of State Route 94 from 1/4-mile north of Melody Road to 1/2 mile south of the Jamul Indian Village, Melody Road, and the frontage and driveways of other affected parcels.

Natural Investigations Company has performed this Phase I ESA in conformance with the scope and limitations of the American Society for Testing and Materials (ASTM) Practice E 1527-13 and in accordance with the prevailing standard of care for completing such assessments in California at this time. Exceptions to, or deletions from, this practice are described in Section 10 of this report.

The 87-acre parcel has been used for at least 60 years as cattle pasture. The 4-acre parcel served as the Jamul fire station, but is now vacant with no improvements other than remnant pavement. The 10-acre parcel has a defunct orchard and irrigation system, as well as 2 wells and old pumping equipment. The surrounding land uses are as follows: to the south, the Rancho Jamul Ecological Reserve and the Hollenbeck Canyon Wildlife Area, and private rangeland; to the north, residential subdivisions and the town of Jamul; to the east, Highway 94, the new Jamul Fire Station, private estates (Peaceful Valley Ranch Estates), and hayfields; and to the west, private estates and smaller residences. The Jamul Indian Village (JIV) contains 2 pre-fabricated buildings that are used for tribal administrative purposes. Approximately 15 pre-fabricated homes have been removed from the Village. A community center was just constructed; a church and cemetery are contiguous to this center.

No environmental liens or value reductions were found in association with the Property. No indication of heavy industrial uses was detected from title review. The Property was not listed in any of the environmental databases queried. A review of physical setting sources and historical use information (topographic maps, aerial photography, fire insurance maps, city directories, and building permits) did not detect any indications of possible recognized environmental conditions within the Study Area. Site reconnaissance was performed on May 15, 2013; no indications of possible recognized environmental conditions were noted on the Property. On May 15, 2013, the environmental assessor met with Caltrans staff: no indications of possible recognized environmental conditions were uncovered.

There were a few minor data failures with the physical setting and historical information sources. However, a combination of other data sources was available such that no significant data gap existed, and the historical research objectives were achieved. There were no data gaps that significantly affected our ability to identify recognized environmental conditions associated with the property. Except for the limitations and exceptions discussed in Section 2.4, this Phase I ESA complies with the ASTM Standard 1527-13. No additional services beyond the scope of the ASTM Standard 1527-13 were conducted as part of this assessment.

The Study Area is located in a rural area and has historical development of rangeland, roadways, residences, tribal administrative buildings, an orchard, and a fire station. The only known historical usage of hazardous materials or petroleum products was that that was associated with the fueling station at the fire station, which was a permitted facility that was regularly inspected by the County.

One minimal, or *de minimis*, environmental condition exists pursuant to the ASTM standard:

- the Study Area has been subject to illegal dumping of residential garbage. Most of the visible material consists of household trash and abandoned automobile parts and household appliances. Note that

both the California Integrated Waste Management Board (CalRecycle) and the Upper San Luis Rey Community Services District are funding a project to remove such nuisance solid waste and prevent future illicit dumping.

It is Natural Investigations Company's opinion that there are no historical or current recognized environmental conditions in connection with the Study Area pursuant to the ASTM Practice E 1527-13. Records review, database searches, or interviews failed to identify any environmental conditions in connection with the Study Area. Therefore, no further site investigation is recommended by Natural Investigations Co.

Although the ASTM standard practice for Phase I ESA's considers lead paint an out-of-scope subject, California Department of Transportation (Caltrans) requested a discussion of the potential hazard of lead in construction/demolition materials for this project.

Historical lead emissions from automobiles are a recognized source of contamination in soils along heavily-used roadways (i.e., aerially deposited lead or ADL). Thus, surface and near-surface soils along such roadways have the potential to contain elevated concentrations of lead. Implementation of the project may require the excavation and export of soils from the project area; soil within, and adjacent to, the Caltrans rights-of-way usually contain ADL. According to Caltrans' requirements, prior to construction ADL levels must be determined in order to handle the soil appropriately. Caltrans has a variance with the DTSC that will allow the Department to keep soil with hazardous levels of ADL within the right-of-way depending on the level of contamination that is found.

Yellow traffic paint used prior to 1999 contained high concentrations of lead. Implementation of the project may require the removal of traffic stripe paint from the underlying asphalt concrete by grinding or sand blasting, which would create a paint waste stream. All traffic striping and traffic marking paints contain lead, but it is not known whether it is at hazardous levels or not. According to Caltrans' requirements, this paint waste must be sampled and analyzed prior to disposal. Disposal of removed traffic stripe paint materials is also dependent on the method utilized to remove these materials (i.e. focused stripe removal vs. pavement grinding).

According to Caltrans' requirements, no soil shall be disturbed or exported from the State right-of-way project area before an ADL study is completed. No paint striping shall be removed before a lead compliance plan is implemented. Cal/OSHA and Caltrans require a lead compliance plan when lead is known to be present. The potential presence of elevated lead concentrations requires sampling and analytical testing of any exported soil and any traffic paint materials to determine appropriate health and safety procedures and proper management and disposal practices. A project-specific Lead Compliance Plan will be required and must be prepared by a Certified Industrial Hygienist and properly implemented by the contractor. As specified in this plan, lead-containing materials must be sampled and analyzed prior to disposal. A dust control plan and health and safety plan should also be prepared and implemented to minimize worker exposure to lead and any other hazardous materials.

Two common hazards should also be noted: portions of the Study Area near the Willow Creek channel may be located within a 100-year or 500-year floodplain, and the region is prone to flash floods; and the Study Area contains dense, dry vegetation that may fuel wildfire, and the region is located within an area of moderate to high level of fire hazard.

This summary should only be read in conjunction with the full text of the report. The scope of work, significant assumptions, limitations, and exceptions should be understood prior to reading the site-specific information, findings, opinions, and conclusions. Except for any limitations and exceptions discussed in Section 2.4, this Phase I ESA complies with the ASTM Standard 1527-13. No additional services beyond the scope of the ASTM Standard 1527-13 were conducted as part of this assessment.

1. INTRODUCTION

1.1. PURPOSE

The ASTM (2013) defines the purpose of the Phase I ESA as quoted:

> "*The purpose of this practice is to define good commercial and customary practice in the United States of America for conducting an environmental site assessment of a parcel of commercial real estate with respect to the range of contaminants within the scope of Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)(42 U.S.C. §9601) and petroleum products. As such, this practice is intended to permit a user to satisfy one of the requirements to qualify for the innocent landowner, contiguous property owner, or bona fide prospective purchaser limitations on CERCLA liability (hereinafter, the 'landowner liability protections,' or 'LLPs'): that is, the practice that constitutes 'all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice' as defined at 42 USC § 9601(35)(B)*." (page 1, ASTM, 2013).

In 2002, the Small Business Liability Relief and Brownfields Revitalization Act was passed, and it directed the United States Environmental Protection Agency (USEPA) to promulgate a rule defining due diligence for compliance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This rule, which is generally referred to as All Appropriate Inquiry (AAI), was adopted in 2002; it states that ASTM E1527-13 complies with the USEPA requirements for AAI. In some cases the ASTM 1527-13 is more stringent than AAI.

1.2. DETAILED SCOPE OF SERVICES

The ASTM (2013) describes the general scope of services in the following excerpts:

> "*A Phase I Environmental Site Assessment shall have four components: records review; site reconnaissance; interviews; and report*." (page 12, ASTM, 2013).

> "*In defining a standard of good commercial and customary practice for conducting an environmental site assessment of a parcel of a property, the goal of the processes established by this practice is to identify recognized environmental conditions. The term recognized environmental conditions means the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a threat to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies*." (page 1, ASTM, 2013).

> "*The scope of this practice includes research and reporting requirements that support the user's ability to qualify for the LLPs. As such, sufficient documentation of all sources, records, and resources utilized in conducting the inquiry required by this practice must be provided in the written report*." (page 2, ASTM, 2013).

The scope of services was limited to a qualitative evaluation of environmental conditions of the Study Area. The specific scope of services performed for this Phase I ESA included the following tasks:

- Records research, including review of title records (title report provided by user), historical aerial photography, topographic maps, fire insurance maps and municipal and county case files, where available
- Requisition and analysis of an environmental database query report from a reputable research company

- Site reconnaissance, including photographic documentation
- Interviews, where possible, with previous and current property owners and tenants
- Interaction with applicable municipal and state agency personnel to review available environmental records and permits
- Preparation and submittal of a Phase I ESA report summarizing the results of the records research, site reconnaissance, and interviews, the rendering of a professional opinion on any recognized environmental conditions and impacts upon the property, and the inclusion of all reference material.

The scope of services does not include other services that are not described in this report. Section 1.3 details significant assumptions, limitations, and exceptions to the performance of this Phase I ESA.

1.3. SIGNIFICANT ASSUMPTIONS, LIMITATIONS, AND EXCEPTIONS

ASTM Standard Practice E 1527-13 cites many assumptions, limitations, and exceptions in the performance of a Phase I ESA. Some of the most important are quoted in the following excerpts:

> "*This practice does not address whether requirements in addition to appropriate inquiry have been met in order to qualify for the LLPs (for example, the duties specified in 42 U.S.C. § 9607(b)(3)(a) and (b)*." (page 1, ASTM, 2013).
>
> "*This practice does not address requirements of any state of local laws or of any federal laws other than the all appropriate inquiry provisions of the LLPs. Users are cautioned that federal, state, and local laws may impose environmental assessment obligations that are beyond the scope of this practice. Users should also be aware that there are likely to be other legal obligations with regard to hazardous substances or petroleum products discovered on property that are not addressed in this practice and that may pose risks of civil and/or criminal sanctions for non-compliance*." (pages 1-2, ASTM, 2013).
>
> "*No environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property. Performance of this practice is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions in connection with a property, and this practice recognizes reasonable limits of time and cost*." (page 9, ASTM, 2013).
>
> "*Appropriate inquiry does not mean an exhaustive assessment of a clean property. There is a point at which the cost of information obtained or the time required to gather it outweighs the usefulness of the information and, in fact, may be a material detriment to the orderly completion of transactions. One of the purposes of this practice is to identify a balance between the competing goals of limiting the costs and time demands inherent in performing an environmental site assessment and the reduction of uncertainty about unknown conditions resulting from additional information*." (page 9, ASTM, 2013).
>
> "*Not every property will warrant the same level of assessment. Consistent with good commercial or customary practice, the appropriate level of environmental site assessment will be guided by the type of property subject to assessment, the expertise and risk tolerance of the user, and the information developed in the course of the inquiry*" (page 10, ASTM, 2013).
>
> "*This practice does not include any testing or sampling of materials (for example, soil, water, air, building materials*." (page 12, ASTM, 2013).
>
> "*There may be environmental issues or conditions at a property that parties may wish to assess in connection with commercial real estate that are outside of the scope of this practice (the non-scope considerations). As noted by the legal analysis in Appendix X1 of this practice, some substances may be present on the property in quantities and under conditions that may lead to contamination of*

the property or of nearby properties but are not included in CERCLA's definition of hazardous substances (42 U.S.C. § 9601(14)) or do not otherwise present potential CERCLA liability. In any case, they are beyond the scope of this practice." (page 21, ASTM, 2013).

"*Whether or not a user elects to inquire into non-scope considerations in connection with this practice or any other environmental site assessment, no assessment of such non-scope considerations is required for appropriate inquiry as defined by this practice*." (page 21, ASTM, 2013).

"*There may be standards of protocols for assessment of potential hazards and conditions associated with non-scope conditions developed by governmental entities, professional organizations, or other private entities*." (page 21, ASTM, 2013).

"*Following are several non-scope considerations that persons may want to assess in connection with commercial real estate. No implication is intended as to the relative importance of inquiry into such non-scope considerations, and this list of non-scope considerations is not intended to be all-inclusive: asbestos-containing materials; radon; lead-based paint; lead in drinking water; wetlands; regulatory compliance; cultural and historical resources; industrial hygiene; health and safety; ecological resources; endangered species; indoor air quality; biological agents; and mold*." (page 22, ASTM, 2013).

Natural Investigations Company, as an independent and impartial contractor, has completed this Phase I ESA in accordance with ASTM guidelines and in accordance with the prevailing standard of care for completing such assessments in California at this time. Natural Investigations Company shall not be subject to any express or implied warranties whatsoever. Phase I ESAs are non-comprehensive by nature and are unlikely to identify all environmental problems or eliminate all risk. This report is a qualitative assessment. Although risk can never be eliminated, more detailed and extensive investigations yield more information, which may help the User understand and better manage risks associated with the property. No warranty, either expressed or implied, is made. Land use, Site conditions, and other factors will change over time. This report should not be relied upon after **180 days** from the date of issuance, unless additional services are performed as defined in ASTM E 1527-13 - Section 4.7.

The property owner is solely responsible for notifying all governmental agencies, and the public at large, of the existence, release, treatment, or disposal of, any hazardous substance or petroleum product occurring on the Site, either before, during, or after Natural Investigation Company's services. Natural Investigation Company assumes no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury which results from pre-existing materials being encountered or being present on the Site, or from the discovery of such hazardous substances or petroleum products.

This report and other instruments or service are prepared and made available for the sole use of the User and their agents. The contents may not be used or relied upon by any other persons without the express written consent and authorization of the User.

1.4. SPECIAL TERMS AND CONDITIONS

There are no special terms or contractual conditions for this assessment.

1.5. INFORMATION RELIANCE

Information reliance is defined by ASTM as:

"*An environmental professional is not required to verify independently the information provided but may rely on information provided unless he or she has actual knowledge that certain information is incorrect or unless it is obvious that certain information is incorrect based on other information obtained in the*

Phase I Environmental Site Assessment or otherwise actually known to the environmental professional." (page 12, ASTM, 2013).

This report is for the sole benefit and exclusive use of the User in accordance with the contract under which these services have been provided. It is possible that information exists beyond the scope of this assessment. Additional information, which was not found or available to Natural Investigations Company at the time of report preparation, may result in a modification of the conclusions and recommendations presented herein. Any reliance on this report by third parties shall be at their own risk.

2. SITE DESCRIPTION

2.1. LOCATION AND LEGAL DESCRIPTION

The study area is located approximately 1 mile south of Jamul, California (Figure 2.1). The SR-94 access road improvements would tie into a new access road to the Jamul Indian Village on either: (1) Reservation Road, which connects the JIV to SR-94; (2) Daisy Drive on the adjacent 4-acre parcel (north of the JIV) contiguous with the JIV and SR-94; or (3) via a new roadway constructed from Melody Road south to the JIV. For the purposes of this assessment, all access options were combined into one study area (Figure 2.1). The focal properties of this assessment are portions of 3 parcels—an 87-acre parcel (APN 597-060-05-00), 4-acre parcel (APN 597-060-04-00), and a 10-acre parcel (APN 597-042-13-00)—as well as the affected portions of the CalTrans right-of-way corridor of State Route 94 from 1/4-mile north of Melody Road to 1/2 mile south of the Jamul Indian Village, Melody Road, and the frontage and driveways of other affected parcels, as shown in Figures 3A through 3E.

2.2. SITE AND VICINITY GENERAL CHARACTERISTICS

The Study Area is located within the Peninsular Ranges geographic subregion, which is contained within the Southwestern geographic subdivision of the larger California Floristic Province (Hickman 1993). The region is in climate Zone 21 – "Ocean-influenced southern California", characterized by infrequent frost, with mild to hot, dry summers and mild, wet winters moderated by marine air influx (Hickman, 1993; Brenzel, 2001). The topography of the Study Area is variable and slopes generally to the south. The elevation ranges from approximately 840 feet to 1,120 feet above mean sea level. The general direction of surface runoff in the Study Area is to the south via Willow Creek, an intermittent drainage tributary to Jamul Creek. Surrounding parcels consist of a combination of residences on lots several acres in size, rangeland, or lands in their natural state. Dirt roads serve as fire breaks. Jamul is a residential rural community, which serves as a "bedroom community" to the greater metropolitan San Diego area and also includes ranching and cattle raising.

2.3. CURRENT USE OF THE STUDY AREA AND IMPROVEMENTS

The 4-acre parcel and the 10-acre parcel are not currently in active use and existing improvements have been removed or abandoned. The 87-acre parcel is used as cattle pasture. Weeds and tall grass appear to have been periodically mowed or cut back. The 87-acre parcel has been used for at least 60 years as cattle pasture. The 4-acre parcel served as the Jamul fire station, but is now vacant with no improvements other than remnant pavement. The 10-acre parcel has a defunct orchard and irrigation system, as well as 2 wells and old pumping equipment.

2.4. CURRENT USES OF ADJOINING PROPERTIES

The surrounding land uses are as follows: to the south, the Jamul Indian Village (JIV), Rancho Jamul Ecological Reserve and the Hollenbeck Canyon Wildlife Area, and private rangeland; to the north, residential subdivisions and the town of Jamul; to the east, Highway 94, the new Jamul Fire Station, private estates (Peaceful Valley Ranch Estates), and hayfields; and to the west, private estates and smaller residences.

The Jamul Indian Village is used for administrative purposes, and also a church, cemetery, and community center. The Jamul Indian Village contains 2 pre-fabricated buildings that are used for tribal administrative purposes. Approximately 15 pre-fabricated homes have been removed from the Village. A community center was just constructed.

3. USER-PROVIDED INFORMATION

The "User" is defined as the party seeking to use Practice E 1527 to complete an environmental site assessment of the property. A user may include, without limitation, a potential purchaser of property, a potential tenant of property, an owner of property, a lender, or a property manager.

In the case of this assessment, the User is the project proponent, Jamul Indian Village, its consultants, such as Environmental Data Systems Inc., and the lead CEQA agency, Caltrans.

3.1. USER'S RESPONSIBILITIES

User's responsibilities are defined by the ASTM E 1527-13 standard, and include the following, as quoted:

> "*Any environmental liens or activity and use limitations so identified shall be reported to the environmental professional conducting a Phase I Environmental Site Assessment. Unless added by a change in the scope of work to be performed by the environmental professional, this practice does not impose on the environmental professional the responsibility to undertake a review of recorded land title records and judicial records for environmental liens or activity and use limitations*." (p. 11, ASTM, 2013)

> "*If the user is aware of any specialized knowledge or experience that is material to recognized environmental conditions in connection with the property, it is the user's responsibility to communicate any information based on such specialized knowledge or experience to the environmental professional*." (p. 11, ASTM, 2013)
>
> "*The user should try to identify an explanation for a lower price which does not reasonable reflect fair market value if the property were not contaminated, and make a written record of such explanation*." (p. 11, ASTM, 2013)
>
> "*If the user is aware of any commonly known or reasonably ascertainable information within the local community about the property that is material to recognized environmental conditions in connection with the property, it is the user's responsibility to communicate such information to the environmental professional*." (p. 11, ASTM, 2013)
>
> "*Either the user shall make known to the environmental professional the reason why the user wants to have the Phase I Environmental Site Assessment performed or, if the user does not identify the purpose of the Phase I Environmental Site Assessment, the environmental professional shall assume the purpose is to qualify for an LLP to CERCLA liability and state this in the report*." (page 11, ASTM, 2013).

In order to exert an LLP, the User must satisfy a number of statutory requirements that are generally referred to as Continuing Obligations, which are outside the Scope of Services of the Phase I ESA. Examples of Continuing Obligations include providing legally required notices stopping continuing releases and complying with land use restrictions. Failure to comply with these and other statutory post-acquisition requirements will jeopardize liability protection. It is the responsibility of the User to comply with the Continuing Obligations requirements of ASTM E1527-13 and All Appropriate Inquiry.

3.2. REQUESTED DOCUMENTS AND INFORMATION

The following documents and information were requested of Caltrans on May 16, 2013:

- Previous environmental site assessments or environmental compliance audit reports
- Environmental permits or hazardous waste generator notices/reports
- Registrations for aboveground or underground storage tanks
- Location of septic systems, oil wells, or water wells
- Registrations for underground injection systems
- Material Safety Data Sheets; Community Right to Know Plans or Safety, Preparedness and prevention Plans; Spill Protection, Countermeasures and Control Plans
- Hazardous Material Business Plans
- Geotechnical studies or hydrological studies
- Notices or other correspondence from any government agency relating to past or current violations of environmental laws with respect to the Property or relating to environmental liens encumbering the Property.
- Risk assessments
- Recorded Activity Use Limitations
- Proceedings regarding hazardous substances and petroleum products including any pending, threatened or past: litigation; administrative proceedings; or notices from any governmental entity regarding possible violations of environmental laws or other possible liability related to hazardous substances or petroleum products.

No documents specific to the Study Area were provided in response to Natural Investigations' information request. Documents were either provided in an earlier version of this assessment, or they were not available or they did not exist / did not apply to the Study Area.

3.3. TITLE RECORDS

No title reports were provided to Natural Investigations Co. Surrounding parcel information is listed in Table 3-1, according to the County Assessor database. No indication of heavy industrial uses was detected from title review.

A title report was not provided by the User. Title records of the Study Area were previously searched by Dr. Graening on 4 May 2010 at the County of San Diego Assessor's Office and Recorder's Office. An attempt was made to build the chain of title back at least 50 years from the present, with focus upon the names of entities in deeds and leases that might indicate industrial uses, and any statement of reduced value or liens on the title, especially environmental protection liens recorded pursuant to CERCLA. No indication of industrial uses was detected from chain of title review. The chain of title for the 10-acre parcel (APN 597-04-213) is typical for the entire Study Area (Table 1), and documents ownership by families for non-industrial uses.

Table 3-1. Chain of Title for 10-acre parcel (APN 597-04-213)

Grantor **Grantee**	**Deed Type**	**Document Type**
Sacco Adolph & Dorothy and Louis Dolores Lakes Resort Kean Arqevitz Calif. LLC	Grant Deed	2000
Nicholas Pellegrino Sacco et ux	Grant Deed	1989
APN changed to 597-040-99-00		1989
Unknown APN change in 1950s-1960s		unknown

3.4. ENVIRONMENTAL LIENS OR ACTIVITY AND USE LIMITATIONS

An environmental lien is a charge, security, or encumbrance upon the title to a property to secure the payment of a cost, damage, debt, obligation, or duty arising out of response actions, cleanup, or other remediation of hazardous substances or petroleum products upon the property. No environmental liens or activity and use limitations were made aware to Natural Investigations Company. No evidence of environmental liens was identified during the title review, interview process, or records review.

3.5. SPECIALIZED KNOWLEDGE OR ACTUAL KNOWLEDGE

No specialized knowledge or actual knowledge that is material to recognized environmental conditions in connection with the Study Area was provided by the User to Natural Investigations Company.

The following environmental assessments analyzed parcels that included the entirety of, or portions of, the Study Area (presented in Appendix 15.1.2).

Level I Survey – 2002. Prepared by ESA, Inc.

A Level I Survey was conducted for the Jamul Indian Village project area in 2000 by ESA Inc. for Jamul Indian Village Environmental Assessment (BIA 2001), and updated by Analytical Environmental Services Inc. in 2002 for the Jamul Indian Village Environmental Impact Statement (BIA 2003). These previous assessment areas consisted of the 87-acre parcel, the 4-acre parcel, the 10-acre parcel, and the Jamul Indian Village. The surveys included a contaminant survey checklist, field reconnaissances,

and database queries by EDR, in accordance with the ASTM Standard Practice for Environmental Site Assessments E 1527-00 and the Bureau of Indian Affairs guidelines. Existing hazardous materials usage was reported as follows:

- Minor quantities of household debris (consisting of paper refuse, glass bottles, aluminum cans, etc.) were observed to be scattered along the eastern edge of the project area (along Highway 94), at the northern end of the project area (along Melody Road), and around the southern end of the project area (along the un-named dirt road near the fire station, residential area and cemetery). Such trash is typical of vacant land located near major roadways. Discarded chemical products or drums were not observed on the subject Study Area.
- Each of the 15 residential structures [within the Jamul Indian Village] has a five-hundred-gallon propane tank associated with it (BIA 2003).

The report concluded that no recognized environmental conditions existed at the site other than *de minimis* (i.e., insignificant) conditions such as roadside litter. No further investigation was recommended.

Level I Hazardous Materials Assessment – 2007. Prepared by Natural Investigations Co.

In 2007, a Level I hazardous materials assessment was conducted by Natural Investigations Co. (2007) of the majority of the current Study Area. The hazards/hazardous materials assessment consisted of a field reconnaissance, database queries, and impact analysis. The field survey detected no significant environmental conditions other than de minimis presence of trash. Database searches produced no reported sites within the project area or immediate vicinity, except licensed use of fuel storage tanks by the Jamul fire station and household propane usage.

Level I Hazardous Materials Assessment – 2009. Prepared by Natural Investigations Co.

A follow-up Level I hazardous materials assessment was conducted for the proposed project by Natural Investigations Co. in 2009. This assessment included a database query and field reconnaissance to update previous assessments, and to survey areas that were not previously surveyed. Since the previous survey was completed, the homes and buildings on the JIV have been removed, and the fire station on the 4-acre parcel was removed and relocated across SR-94, and roadway improvements were made on the JIV and the 4-acre parcel.

Phase I Environmental Site Assessment for the Jamul Gaming Project, San Diego Co., CA, 2010. Prepared for Environmental Data Systems Inc. & Jamul Indian Village. Prepared by Natural Investigations Co.

In 2010, a Phase I ESA was conducted by Natural Investigations Co. of the current Study Area, but not the Jamul Indian Village itself. Records review, database searches, and interviews failed to identify any environmental conditions in connection with the Study Area other than *de minimis* disposal of household solid waste onto the Study Area. The assessment concluded that no further site investigation was warranted.

Phase I Environmental Site Assessment for the Jamul Gaming Project and Access Project, San Diego Co., CA, 2012. Prepared for Environmental Data Systems Inc. & Jamul Indian Village. Prepared by Natural Investigations Co.

In 2012, a Phase I ESA was conducted by Natural Investigations Co. of the current Study Area, including the Jamul Indian Village itself. Records review, database searches, and interviews failed to identify any environmental conditions in connection with the Study Area other than *de minimis* disposal of household solid waste onto the Study Area. The assessment concluded that no further site investigation was warranted.

These documents are incorporated by reference.

3.6. VALUATION REDUCTION FOR ENVIRONMENTAL ISSUES

No valuation reductions for environmental issues were made aware to Natural Investigations Company. No valuation reductions were identified during the interview process or by the title review.

3.7. OWNER, PROPERTY MANAGER, AND OCCUPANT INFORMATION

The 87-acre parcel, and the 10-acre parcel are owned by Lakes Entertainment, LLC. The Jamul Indian Village and the 4-acre parcel are owned by the Jamul Indian Village. The owner of the road rights-of-way is either Caltrans or County of San Diego.

3.8. REASON FOR PERFORMING PHASE I ESA

Natural Investigations Company performed this Phase I ESA at the request of Environmental Data Systems, Inc. This assessment was performed in support of the requirements of the California Environmental Quality Act and the National Environmental Policy Act as they apply to the proposed access improvement project and the accompanying environmental impact reports and statement. Specifically, this Phase I ESA is intended to be used to evaluate the hazards and hazardous materials setting in the Study Area, determine potential impacts of hazards and hazardous materials upon the proposed project, and identify potential mitigation measures to reduce negative impacts of hazardous materials to a less-than-significant level.

4. RECORDS REVIEW

The purpose of the records review is to obtain and review records that will help identify recognized environmental conditions in connection with the property.

4.1. STANDARD ENVIRONMENTAL RECORD SOURCES

As part of this assessment, Natural Investigations Company retained the services of Environmental Data Resources, Incorporated (EDR), which queries and maintains comprehensive environmental databases and historical information, including proprietary databases, aerial photography, topographic maps, Sanborn Maps, and city directories. EDR's Phase I ESA standard package - "Radius Map with GeoCheck" was ordered and performed on April 18, 2013. In this report, EDR presents the results of searches of all reasonably ascertainable environmental databases (federal, state, local, and private) for records of potential environmental impacts of the Property and vicinity. EDR performed these database searches within the prescribed radii of ASTM Practice E 1527-13 (ASTM, 2013). The databases queried by EDR included the following:

> Federal ASTM Standard and Supplemental – National Priority List (NPL); proposed NPL; Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS); CERCLIS No Further Remedial Action Planned; Corrective Action Report; Resource Conservation and Recovery Act (RCRA) Information; RCRA Large Quantity Generator; Emergency Response Notification System; Superfund Consent Decrees; Records of Decision; NPL Deletions, Hazardous Materials Information Reporting System; Material Licensing Tracking System; Mines Master Index File; Federal Superfund Liens; PCB Activity Database System; Department of Defense Sites; Indian Reservations; Uranium Mill Tailings Sites; Engineering Controls Sites List; Open Dump Inventory; Formerly Used Defense Sites; RCRA Administrative Action Tracking System; Toxic Chemical Release Inventory System; Toxic Substances Control Act (TSCA); Section 7 Tracking Systems; Federal Insecticide, Fungicide, and Rodenticide Act / TSCA; US Brownfields; US Institutional Control Sites; Voluntary Clean-up Program Properties; State ASTM Standard and Supplemental – Proposition 65 Records; Toxic Pits Cleanup Act Sites; Bond Expenditure Plan; List of Underground Storage Tank (UST) Facilities; Voluntary Cleanup Program Facilities; Leaking UST on Indian Land; UST on Indian Land; Waste Discharge System; Deed Restriction Listing; Properties Needing Further Evaluation; No Further Action Determination; Well Investigation Program Case List; Emissions Inventory Data; School Property Evaluation Program; Former Manufactured Gas Sites.

The complete EDR Radius Map report is provided in Appendix 15.2.1. Results are summarized in EDR's overview map (Figure 4-1). The Study Area was not listed in any of the databases queried by EDR. The Study Area was previously listed in a few databases:

- Jamul Fire Station No. 66, 14145 Hwy 99, NPDES, HIST UST, SWEEPS, San Diego Co. Hazardous Materials Management Division Database, enrolled under construction general stormwater permit, registered diesel and gasoline underground storage tanks (USTs).

In the vicinity of the Study Area the following sites were listed, as summarized in EDR's Executive Summary:

- Peaceful Valley Ranch, San Diego Co. Hazardous Materials Management Division Database, leaking UST incident, petroleum substance release to soil, case open.
- Ameri/Mex, 14063 Hwy 94, HAZNET database, waste oil generator & disposal
- Rancho Jamul Auto Care, 13975 Campo Rd., HAZNET database, waste oil and solvents generator & disposal
- Fletcher Hills Medical Group 13967, San Diego Co. HMMD, hazmat inventory, unspecified
- Las Montanas Golf Course, Vista Rancho Miguel Road, SWEEPS UST database;
- Jamul Burnsite, Jamul Drive, LDS, FINDS, SWF/LF databases, licensed landfill;
- Rancho Miguel Estates, Jamacha Road and Steele Canyon, San Diego Co. Hazardous Materials Management Division Database, leaking UST incident, case closed;
- Jamul Christian School, P.O. Box 74, FINDS database, registered pesticide use;
- Gus Batton, 13212 Highway 94, San Diego Co. Dept. of Environmental Health database, leaking UST incident, oil release to soil, case closed

All of the sites are either historic hazardous materials release cases or involve permitted uses of hazardous materials.

It should be noted that the computerized geocoding technology used in the database search is based on available census data and is only accurate to ±300 feet. The EDR report indicates that poor or inadequate address information was provided for various properties that are potentially located in the vicinity of the Study Area; therefore, these sites could not be readily mapped by EDR. Because the location of these sites with respect to the Study Area could not be determined, the evaluation of the unmappable sites is limited in terms of determining the potential impact on the Study Area. Although the list of the unmappable sites was reviewed for adjacent or nearby properties observed during the site reconnaissance, locating each of the unmapped sites identified by EDR is not considered practicable. None of these orphan sites appear to be connected to the Study Area in any way.

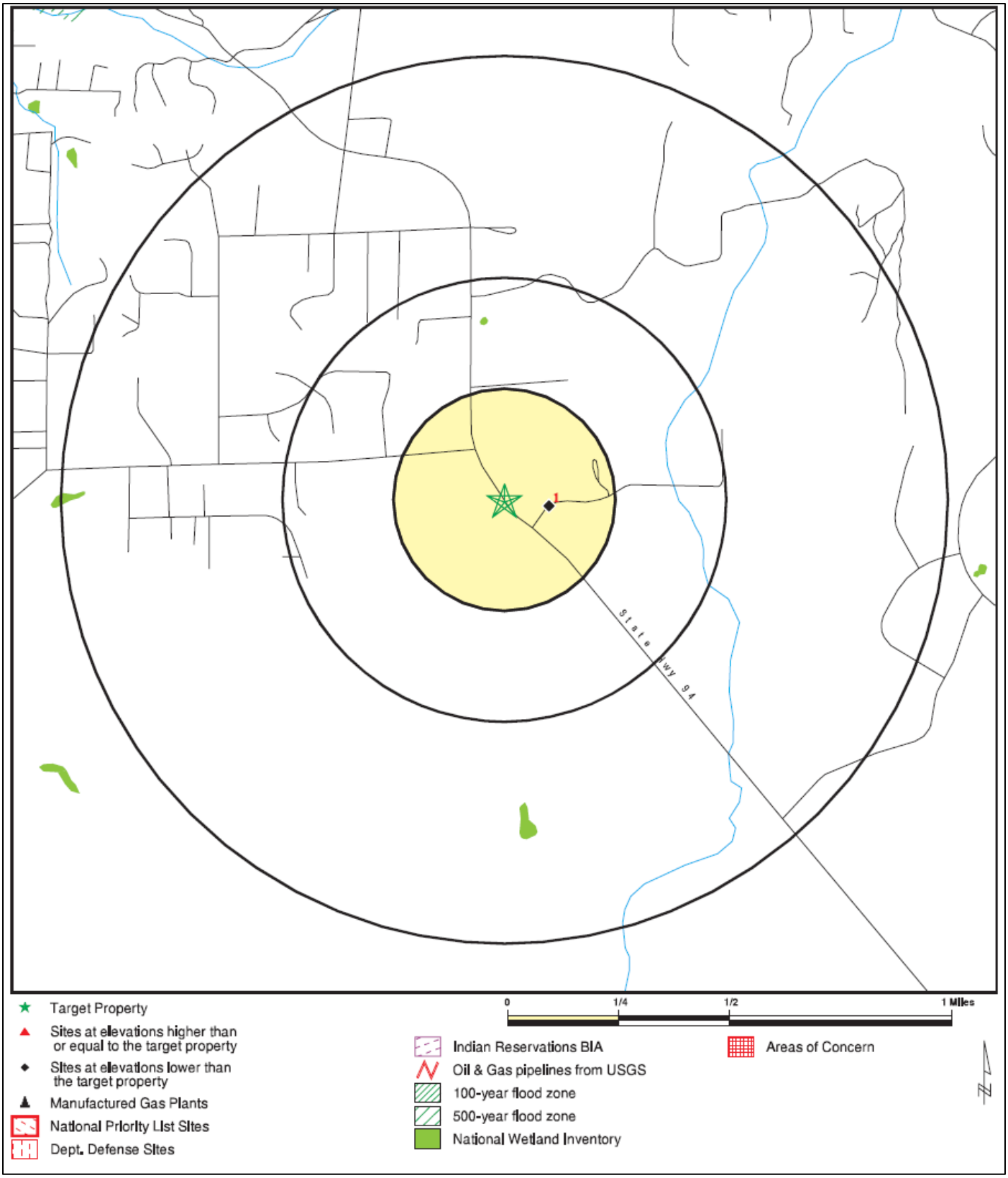

Figure 4-1. Overview Map, EDR Radius Report

4.2. ADDITIONAL ENVIRONMENTAL RECORD SOURCES

4.2.1.State of California Department of Toxic Substances Control Records

4.2.1.1. Envirostor Database

EnviroStor is an online search and Geographic Information System tool for identifying sites that have known contamination or sites for which there may be reasons to investigate further. Public Access to EnviroStor is accessible via the DTSC Web Page located at: http://www.envirostor.dtsc.ca.gov/public/. The EnviroStor database includes the following site types: Federal Superfund sites (National Priority List); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. You can obtain information that includes site name, site type, status, address, any restricted use (recorded deed restrictions), past use(s) that caused contamination, potential contaminants of concern, potential environmental media affected, site history, planned and completed activities. The EnviroStor database also contains current and historical information relating to Permitted and Corrective Action facilities. The EnviroStor database includes current and historical information on the following permit-related documents: facility permits; permit renewal applications; permit modifications to an existing permit; closure of hazardous waste management units (HWMUs) or entire facilities; facility corrective action (investigation and/or cleanup); and/or post-closure permits or other required postclosure activities.

The EnviroStor database was queried on May 30, 2013. The following screen capture (Figure 4-2) summarizes the results of the query. No reported cases were found on the Property. No new information was retrieved beyond that already found from EDR's report, summarized in the previous section of this assessment. The following cases were returned within 4,000 feet of the Study Area:

- Raul Rodriquez, 13886 Campo Rd., Jamul: LUST Cleanup Site; Cleanup Status: Completed - Case Closed
- Peaceful Valley Ranch, northeast corner of Peaceful Valley Ranch Rd. and Hwy 94, Jamul: Cleanup Program Site; Cleanup Status: Open - Site Assessment; Case opened 6/12/2006; site assessment began; no potential contaminants of concern specified.

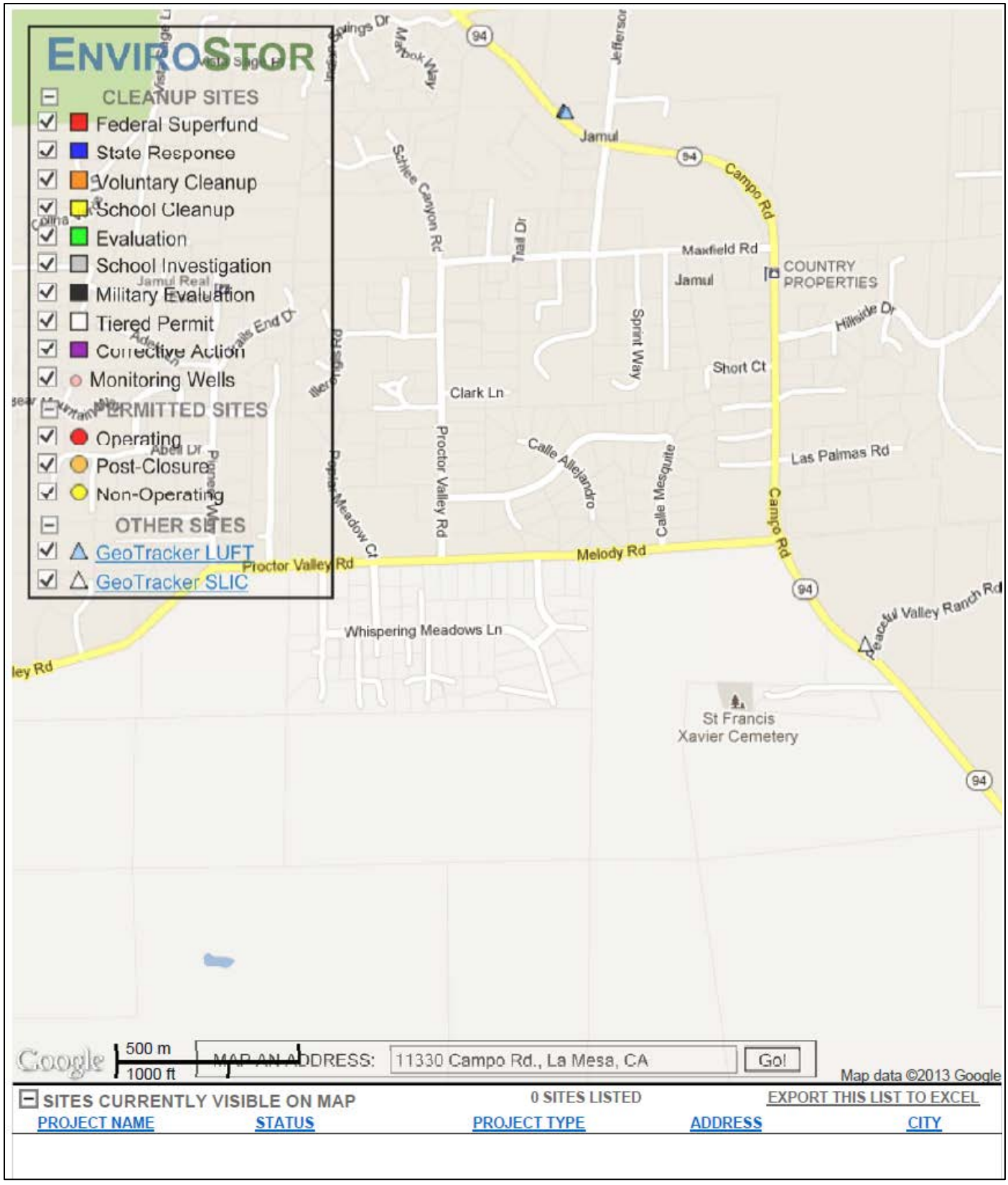

Figure 4-2. Screen capture of EnviroStor database query

4.2.2.California State Water Resources Control Board / Regional Board Records

4.2.2.1. GeoTracker Database

GeoTracker is a geographic information system (GIS) maintained by the California State Water Resources Control Board (SWRCB) that provides online access to environmental data at the Internet address (URL) = http://www.geotracker.swrcb.ca.gov\. GeoTracker is the interface to the Geographic Environmental Information Management System (GEIMS), a data warehouse which tracks regulatory data about underground fuel tanks, fuel pipelines, and public drinking water supplies. GeoTracker and GEIMS were developed pursuant to a mandate by the California State Legislature (AB 592, SB 1189) to investigate the feasibility of establishing a statewide GIS for leaking underground fuel tank (LUFT) sites. GEIMS can store extensive data related to LUFT sites, or any other contaminant release. In addition, GEIMS is used to store and display information from various agencies including water quality information, water use information, and infrastructure data needed to assess both water supplies and contaminant sites. For the SWRCB's groundwater quality assessment goal, GEIMS has been populated with LUFT, public drinking water wells, and fuel pipelines for California. Site information from the Spills, Leaks, Investigations, and Cleanups (SLIC) Program is also included in GeoTracker.

The GeoTracker database was queried for environmental data pertaining to the Site on May 30, 2013. Using both spatial queries and text-based searches of bounding street addressees in GeoTracker, no reported cases were found on the Study Area or adjoining properties (Figure 4-3). The nearest reported cases are shown in the following table. The nearest is the Peaceful Valley Ranch case, from the Leaking Underground Fuel Tank database, which involved a petroleum release to soil circa 2006; the case has not been formally closed.

Table 4-1. GeoTracker Cases in the Vicinity of the Study Area

SITE NAME	ADDRESS	CITY	CLEANUP STATUS
DIANES MARKET	13886 CAMPO RD	JAMUL	
JAMUL BURN SITE	CORNER OF JAMUL DR & MEX CAN	JAMUL	OPEN - INACTIVE
GEORGE BARBER LIVING TRUST	13330 PROCTOR VALLEY RD	JAMUL	COMPLETED - CASE CLOSED
PEACEFUL VALLEY RANCH	0 PEACEFUL VALLEY RANCH (NE CORNER @ HY 94)	JAMUL	OPEN - SITE ASSESSMENT
RAUL RODRIQUEZ	13886 CAMPO RD	JAMUL	COMPLETED - CASE CLOSED
RAUL RODRIQUEZ	13886 CAMPO RD	JAMUL	COMPLETED - CASE CLOSED
RAUL RODRIQUEZ	13886 CAMPO RD	JAMUL	COMPLETED - CASE CLOSED
JAMUL PRIMARY SCHOOL	14581 LYONS VALLEY RD	JAMUL	COMPLETED - CASE CLOSED
GUS BATTON	13212 HY 94	JAMUL	COMPLETED - CASE CLOSED
BECKER PROPERTY	14232 OLIVE VISTA DR	JAMUL	COMPLETED - CASE CLOSED
JAMUL PRIMARY SCHOOL	14581 LYONS VALLEY RD	JAMUL	COMPLETED - CASE CLOSED

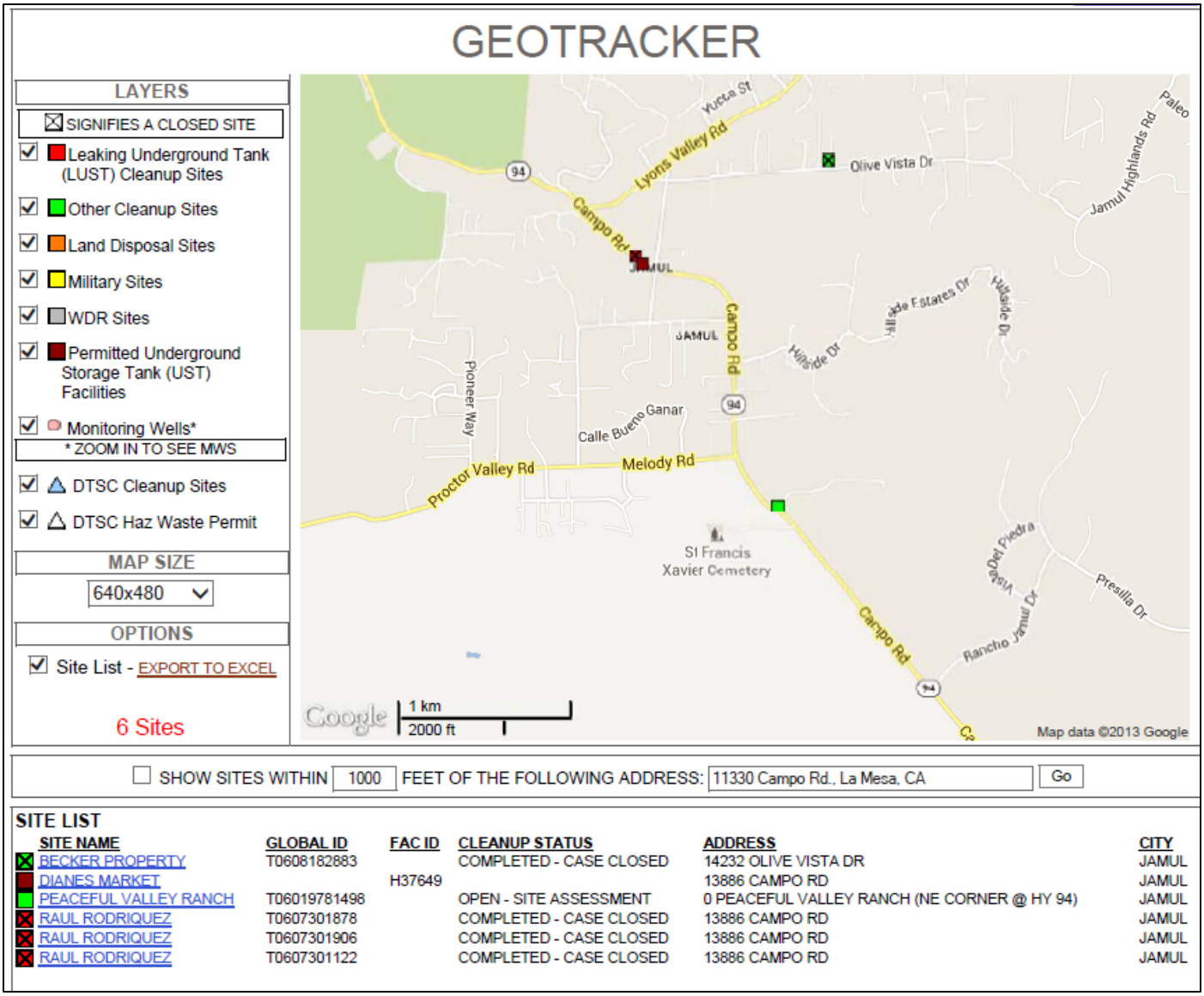

Figure 4-3. Spatial results of GeoTracker query

4.2.3.County / CUPA Records Search

The Unified Program (http://www.calepa.ca.gov/CUPA/) consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of six environmental and emergency response programs. Cal/EPA and other state agencies set the standards for their programs while local governments implement the standards—these local implementing agencies are called Certified Unified Program Agencies (CUPA). For San Diego County, the County's Hazardous Materials Division is the CUPA.

The Hazardous Materials Division has made available on the Internet the Hazardous Materials Establishment Database, which contains database information such as: CUPA Facility Permit Number, Business Address, Business Name, Hazardous Waste & Materials Inventory (for active sites only), and Underground Storage Tank Information. The database is updated on a quarterly basis, and is available on the Internet at URL = http://www.sdcounty.ca.gov/deh/doing_business/hazmat_search.html. The Hazardous Materials Division has also made available on the Internet the Scanned Files Search, which is a digitizing of the former paper files, including written Inspection Reports, Notices, Correspondence, Permit

Applications, Underground Storage Tank Permits, Enforcement Case Information (completed cases), etc. The database is updated on a quarterly basis, and is available on the Internet at URL = http://www.sdcounty.ca.gov/deh/doing_business/hazmat_search.html. No relevant information was retrieved other than documents pertaining to the old Jamul Fire Station: 2 USTs removed in 1986, and replaced with ASTs; ASTs removed under permit in 2007.

4.3. PHYSICAL SETTING SOURCES

4.3.1.Geology, Soils, Topography, and Hydrology

The Study Area is located in the Peninsular Ranges geomorphic province, and specifically, in a shallow valley in the coastal mountains. Habitats in the vicinity consist primarily of disturbed roadside areas, developed areas, coastal sage scrub, coast oak woodland, and annual grassland. Naturally occurring soil in the vicinity include Fallbrook rocky sandy loam (FaC2, FaD2, FeE2), Ramona sandy loam (RaC2), Placentia sandy loam (PeC2, PfC), and Fallbrook-Vista sandy loam (FvE), and Cienega very rocky coarse sandy loam (CmrG), which has a high to very high erosion hazard (USDA, 1973). The topography of the Study Area is variable; elevation ranges from about 1,040 feet in the north along to about 860 feet in the lowest portion (Figure 4-4). No specific hydrogeologic data were readily available. Public and private groundwater wells and public water supplies identified in EDR's query of readily-available databases are over ½ mile from the Study Area.

The State Public Water Supply database lists the following wells in the Jamul area (from previous EDR reports): Circle J Ranch (no address); Sunrise Estates Municipal Water Supply (no address); Skyline Ranch Campground (no address); Indian Hills Camp at 15763 Lyons Valley Road, and Diamond Jack RV Ranch at 15724 Lyons Valley Rd.

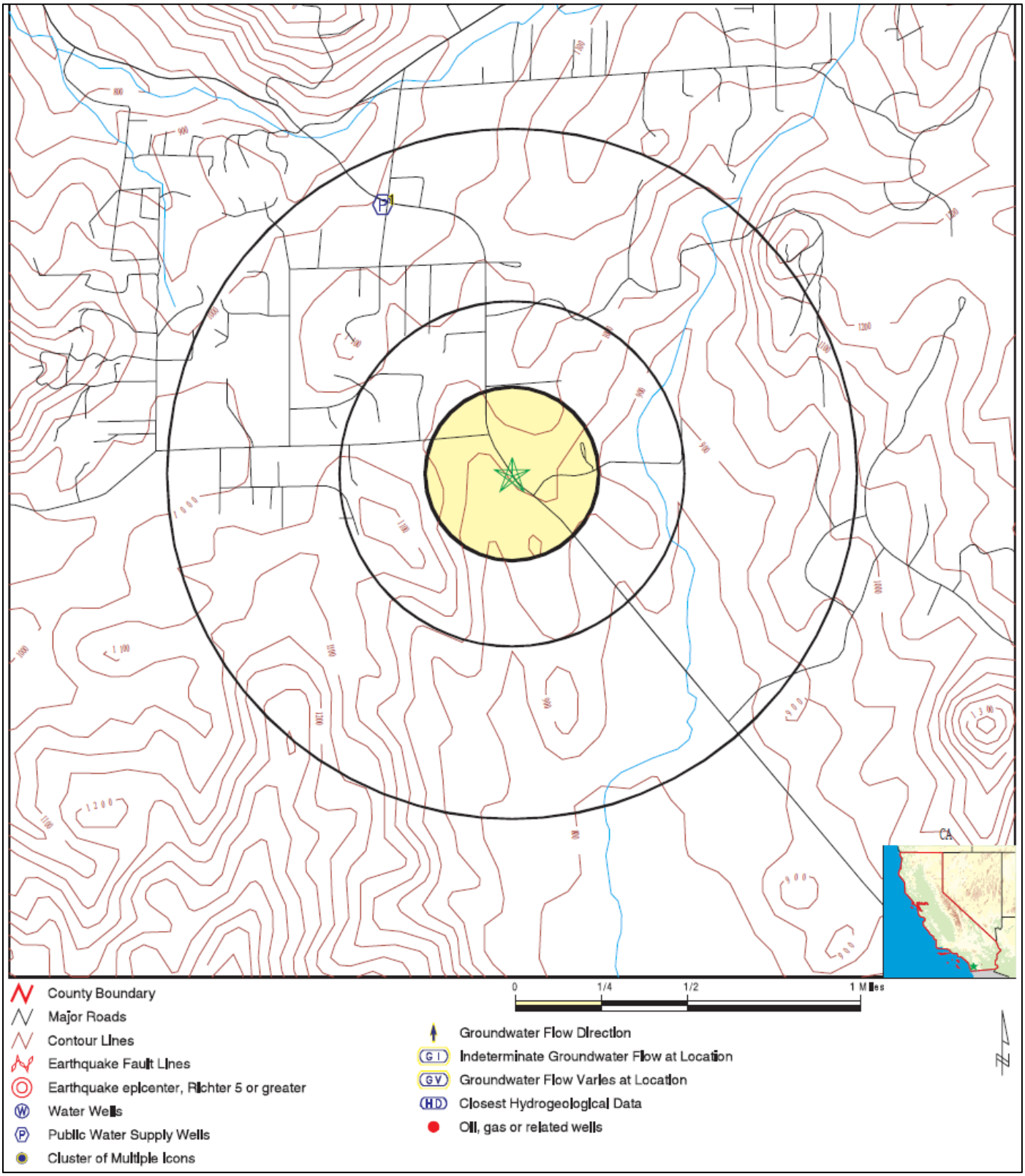

Figure 4-4. EDR's Physical Setting Map

4.4. HISTORICAL USE INFORMATION ON THE PROPERTY

The objective of consulting historical sources is to develop a history of the previous uses of the property and surrounding area, in order to help identify the likelihood of past uses having led to recognized environmental conditions in connection with the property.

4.4.1.Topographic Map Analysis

Historical and current topographic maps of the Study Area were analyzed to determine any of the following: topography and inferred surface water and ground water flow direction; current and historical land use; and current and historical structures, utilities, and roads. All available USGS topographic quadrangle maps were obtained through EDR (Appendix 15.3), and span almost 1 century. The resolution of these maps was so coarse that only general land uses could be inferred. The topo sequence shows little change in land use in the Study Area, other than the gradual increase of residential subdivisions. No visual clues as to any possible recognized environmental conditions were evident from any of these topographic maps.

4.4.2.Aerial Photography Analysis

Historical aerial photographs of the Study Area were analyzed to determine the any of the following: current and historical land use; any current and historical structures, utilities, and roads; and any current or historical drum storage, above ground tanks, garbage dumps or landfills, or pits, ponds, or lagoons. The aerial photo chronology was provided by EDR (Appendix 15.3). The resolution of these maps was so coarse that only general land uses could be inferred. This historical aerial photo sequence, beginning with 1953, documents relatively little change in land use of the Study Area, except for an increase of residential development in the vicinity. On the 4-acre parcel, the fire station is not visible in 1990 aerial photos, but is visible by 1994, and through 2002; the station was removed circa 2006-2007. On the 10-acre parcel, aerial photography spanning the last 50 years shows the majority of the parcel being used as an orchard and the rest pasture; by the 1980s, several structures were built in the southwest, which appear to be a residence. The Jamul Indian Village shows the addition of several residences over the years; all structures were torn down and removed circa 2007. No visual clues as to any possible recognized environmental conditions were found.

4.4.3.Fire Insurance (Sanborn Company) Maps

Fire insurance maps are historical city and building layout maps produced for private fire insurance companies (primarily by the former Sanborn Company). These historical city maps can indicate the presence of structures on, or uses of, properties at specified dates. EDR now owns the Sanborn Company, and provides any available fire insurance maps for the target address. EDR's Sanborn report indicated that there was no coverage of the Study Area by Sanborn maps (Appendix 15.3).

4.4.4.City Directories

City directories have been published for cities and towns across the US since the 1700s. Originally a list of residents, the city directory developed into a tool for locating individuals and businesses in a particular urban or suburban area. Current directories are generally divided into three sections: a business index, a list of resident names and addresses, and a street index. With each address, the directory lists the name of the resident or, if a business is operated from this address, the name and type of business. While city directory coverage is comprehensive for large cities, it may be incomplete or unavailable for small towns and unincorporated, rural areas. The target address was the 14000 to 15000 block of Campo Road (SR-94); the EDR City Directory report is presented in Appendix 15.3. No relevant information was found pertaining to this address range other than the following:

- Year 2005 Haines Criss-Cross Directory - Jamul Tribal Hall at 14191 Campo Road and Fire Station Dulzura at 14145 Campo Road
- Year 1990 Haines Criss-Cross Directory – residences at 14135 and 14136 Campo Road

4.5. HISTORICAL USE INFORMATION ON ADJOINING PROPERTIES

No additional relevant information was found. Other historical use information on adjoining properties is summarized in other sections of this report.

5. SITE RECONNAISSANCE

The objective of the site reconnaissance is to obtain information indicating the likelihood of identifying recognized environmental conditions in connection with the property.

5.1. METHODOLOGY AND LIMITING CONDITIONS

The site visit is limited to visual and/or physical observation of the exterior and interior of the Property and its improvements, the past and current uses of the Property and adjoining properties, and the condition of the Property. The site visit evaluated the Property and adjoining properties for potential hazardous materials/waste and petroleum product use, storage, disposal, or accidental release, including the following: presence of tank and drum storage; mechanical or electrical equipment likely to contain liquids; evidence of soil or pavement staining or stressed vegetation; ponds, pits, lagoons, or sumps; suspicious odors; fill and depressions; or any other condition indicative of potential contamination. The site visit did not evaluate the presence of asbestos-containing materials, radon, lead-based paint, mold, indoor air quality, or structural defects, or other non-scope items.

In 2007, 2009, 2010, 2011 and most recently, May 15, 2013, registered environmental assessor G.O. Graening performed site reconnaissances of the Study Area. All accessible portions of the Study Area were observed by a pedestrian survey; adjoining properties were observed primarily by binocular or windshield (automobile) survey. Photographic documentation (Appendix 15.4) accompanies the following summary of the site reconnaissance.

5.2. EXTERIOR OBSERVATIONS

The Study Area and its improvements are generally well kept and litter free. The following text discusses focus areas of the site reconnaissance.

5.2.1.Stained Soil / Distressed Vegetation / Odors

No stained soil, distressed vegetation, or unusual odors was noted.

5.2.2.Roads

Roads within the Study Area are unimproved dirt roads or paved with asphalt or concrete, and show no suspicious staining.

5.2.3.Wells / Potable Water Supply

Regionally, potable water is supplied by private groundwater wells or by the municipal water district. No water wells were visible on the Study Area other than 2 on the 10-acre parcel (see following photo).



Groundwater pump and appurtenances on the 10-acre parcel

5.2.4.Sewage Disposal System

Historical residences located on Jamul Indian Village were serviced by septic systems/leachfields; most current residences are now served by the municipal sanitary sewer system.

5.2.5.Storage Tanks, Containers, or Drums

No storage tanks or drum storage was noted on the Study Area or adjoining properties during the site reconnaissance. There is no municipal subterranean natural gas utility service to the JIV or the surrounding area. Residences in the vicinity use individual propane storage tanks, serviced by private propane distribution companies. Historical residences on the Jamul Indian Village used such propane tanks

It is beyond the scope of this assessment to open any container.

5.2.6.Hazardous Substances and Petroleum Products

No hazardous substances or petroleum product usage or storage was noted within the Study Area or adjoining properties during the site reconnaissance.

No petroleum product usage or storage was noted on the Study Area or adjoining properties during the site reconnaissance. The historical fire station that was located on the 4-acre parcel used 2 fuel USTs until 1986, then switched to 2 ASTs; these were removed when the fire station was relocated across Highway 94 circa 2006-2007. No staining of the concrete pads or surrounding pavement was evident during the site reconnaissance.

Small quantities of potentially hazardous materials such as cleaning supplies, landscape maintenance chemicals, and vehicle maintenance chemicals are associated with residences in the vicinity of the Study Area.



Concrete pad that housed the Fire Station's diesel ASTs on the 4-acre parcel.

5.2.7.Electrical or Mechanical Equipment Likely to Contain Fluids

Polychlorinated biphenyls, or PCBs, were commonly used historically in electrical equipment such as transformers, fluorescent lamp ballasts, and capacitors. According to United States EPA regulation 40 CFR, Part 761, there are three categories for classifying such equipment: <50 ppm of PCBs is considered "Non-PCB"; between 50 and 500 ppm is considered "PCB-Contaminated"; and >500 ppm is considered "PCB-Containing". Pursuant to 15 U.S.C. 2605(e)(2)(A), the manufacture, process, or distribution in commerce or use of any polychlorinated biphenyl in any manner other than in a totally enclosed manner was prohibited after January 1, 1977.

Electricity is supplied to residences in the vicinity by the San Diego Gas and Electric Company via a single 12 kV above-ground transmission line running along SR-94. Pacific Bell provides telecommunications to the vicinity via above-ground lines along SR-94; these utility poles also carry cable television by Cox communications. No poly-chlorinated biphenyl (PCB)-containing equipment (electric or hydraulic) was observed during the site reconnaissance. Pole-mounted transformers were observed in the vicinity, but all appear to be modern and non-leaking.

5.2.8.Pits / Ponds / Lagoons

No pits, ponds, or lagoons were observed during the site reconnaissance.

5.2.9.Storm Water / Pools of Liquid

No municipal stormwater facilities were noted on the Study Area or on adjacent properties, except for road culverts that direct water to the nearest natural channels such as Willow Creek.

5.2.10. Solid Waste

Companies such as Jones Disposal Company and Waste Management Inc. provide solid waste collection for the region, and the collected waste is hauled to the Otay landfill and the Sycamore Sanitary landfill. No municipal solid waste service was noted for the Study Area. Some solid waste has been dumped off the edge of the Campo Road at various places along the Study Area in an unauthorized manner. Most of the

visible material consists of household waste. The largest items dumped onto the Study Area are automobile tires and household appliances. These items are considered a nuisance, but not a recognized environmental condition.

5.3. INTERIOR OBSERVATIONS

No buildings exist on the 4-acre parcel, 10-acre parcel, or the 87-acre parcel. Two pre-fabricated buildings (trailer-mounted) are located on the Jamul Indian Village, used as administrative office space. The interiors were previously viewed and no hazardous materials use or storage was noted.

5.4. LIMITATIONS

There were no limitations that affected the conclusions of this assessment.

6. INTERVIEWS

The ASTM explains that, "*The objective of interviews is to obtain information indicating the likelihood of identifying recognized environmental conditions in connection with the property*" (page 16, ASTM, 2013). The following text summarizes interviews performed and questionnaires answered.

On May 15, 2013, Dr. Graening met with Caltrans staff. Caltrans staff did not disclose any environmental conditions or provide any documentation of the Study Area.

The Tribe provided information about the Study Area in other formats in previous assessments.

7. FINDINGS

The Study Area is located in a rural area and has historical development of rangeland, roadways, residences, tribal administrative buildings, an orchard, and a fire station. The only known historical usage of hazardous materials or petroleum products was that that was associated with the fueling station at the fire station, which was a permitted facility that was regularly inspected by the County.

7.1. RATIONALE FOR DETERMINATION OF SIGNIFICANT FINDINGS

Offsite properties identified in the vicinity of the Property were evaluated to determine if they are likely to have adversely affected the Property. The criteria used to evaluate whether an offsite property pose potential environmental concerns to the Property include:

- Distance from the Property: Offsite properties within one-quarter mile of the Property were evaluated. The one-quarter-mile radius was used because it is unlikely a hazardous material released to the subsurface will migrate laterally within the soil for a significant distance, although in some cases, a hazardous material can migrate in groundwater in a generally downgradient direction for distances greater than one-quarter mile.
- Expected depth and direction of groundwater and surface water flow: The identification of a site as potentially upgradient or downgradient is based on the expected direction of groundwater flow determined by site-specific measurement, where available, or inferred from the regional topography.
- The presence of documented contaminant releases at the identified sites.
- The media that the documented contaminant releases affected (i.e., soil and/or groundwater). For the evaluation of potential environmental contamination in the Property, offsite properties with releases to soil only are assumed to pose no significant impact on the Property, as the contaminants are unlikely to migrate towards the Property.

Based on the review and evaluation of information available in the environmental databases and regulatory agency files, no adverse environmental effect is expected because the identified vicinity sites are in assumed down-gradient or cross-gradient locations, have obtained case closure, were contained at the

ground surface, or releases to the subsurface affected soil only, in which case the contaminants are unlikely to migrate towards the Property in groundwater. In addition, offsite properties located further than one-quarter mile from the study are not expected to adversely affect the Property conditions, as it is unlikely a hazardous material released to the subsurface will migrate laterally within the soil for a significant distance, although a hazardous material can migrate in groundwater in a generally downgradient direction.

It should be noted that Leaking Underground Storage Tank and DTSC EnviroStor sites closed by the RWQCB or local agencies prior to April 1, 2008, would not necessarily have been closed based on a risk assessment that considered volatile organic compounds and the vapor intrusion pathway. Assembly Bill 422, which now requires such a risk assessment, did not take effect until January 1, 2008. Evaluation of the vapor intrusion pathway is not included in the scope of this hazardous materials/wastes study.

7.2. *DE MINIMIS* ENVIRONMENTAL CONDITIONS

De minimis environmental conditions are conditions that are not believed to present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies (ASTM, 2013). One minimal, or *de minimis*, environmental condition exists pursuant to the ASTM standard:

- the Study Area has been subject to illegal dumping of residential garbage. Most of the visible material consists of household trash and abandoned automobile parts and household appliances. Note that both the California Integrated Waste Management Board (CalRecycle) and the Upper San Luis Rey Community Services District are funding a project to remove such nuisance solid waste and prevent future illicit dumping.

7.3. HISTORICAL RECOGNIZED ENVIRONMENTAL CONDITIONS

ASTM (2013) defines a historical recognized condition as

> "...*an environmental condition which in the past would have been considered a recognized environmental condition, but which may or may not be considered a recognized environmental condition currently. The final decision rests with the environmental professional and will be influenced by the current impact of the historical recognized environmental condition on the property. If a past release of any hazardous substances or petroleum products has occurred in connection with the property and has been remediated, with such remediation accepted by the responsible regulatory agency (for example, as evidenced by the issuance of a no further action letter or equivalent), this condition shall be considered an historical recognized environmental condition*." (p. 5, ASTM 2013)

No historical recognized environmental conditions were found in connection with the Study Area pursuant to the ASTM Practice E 1527-13.

7.4. KNOWN OR SUSPECT RECOGNIZED ENVIRONMENTAL CONDITIONS

No recognized environmental conditions were found in connection with the Study Area pursuant to the ASTM Practice E 1527-13.

8. OPINION AND RECOMMENDATION

8.1. IMPACT OF ENVIRONMENTAL CONDITIONS ON PROPERTY

It is Natural Investigations Co.'s opinion that there are no current recognized environmental conditions, in connection with the Study Area pursuant to the ASTM Practice E 1527-13. Records review, site reconnaissance, and interviews failed to identify any current environmental conditions in connection with the Study Area.

8.2. ADDITIONAL INVESTIGATION

It is Natural Investigations Co.'s opinion that there are no historical or current recognized environmental conditions in connection with the Study Area pursuant to the ASTM Practice E 1527-13. Records review, database searches, or interviews failed to identify any environmental conditions in connection with the Study Area. No significant data gaps or data failures were identified that affect the ability of the Environmental Professional to identify recognized environmental conditions. There are no unusual circumstances where greater certainty is required regarding recognized environmental conditions. Therefore, no additional assessment is recommended at this time by Natural Investigations Co.

Although the ASTM standard practice for Phase I ESA's considers lead paint an out-of-scope subject (ASTM, 2013), California Department of Transportation (Caltrans) requested a discussion of the potential hazard of lead in construction/demolition materials for this project.

8.2.1. Potential Hazard of Lead in Construction/Demolition Materials

8.2.1.1. Potential Lead Soil Impacts "Earth Material Containing Lead"

Leaded gasoline was used as a vehicle fuel in the USA from the 1920s through the 1980s. Although lead is no longer used in gasoline formulations, historical lead emissions from automobiles are a recognized source of contamination in soils along heavily-used roadways (i.e., aerially deposited lead or ADL). Thus, surface and near-surface soils along such roadways have the potential to contain elevated concentrations of lead. Ongoing testing by Caltrans throughout California has indicated that ADL exists along major freeway routes. At sites where soil has not been disturbed, the ADL is generally limited to the upper 2 feet of soil within unpaved shoulder and median areas.

Implementation of the project may require the excavation and export of soils from the project area; soil within, and adjacent to, the Caltrans rights-of-way usually contain ADL. It is not known whether the level of lead at the project area is at a hazardous level. Prior to construction ADL levels must be determined in order to handle the soil appropriately. Caltrans has a variance with the DTSC that will allow the Department to keep soil with hazardous levels of ADL within the right-of-way depending on the level of contamination that is found.

8.2.1.2. Potential Lead-based Traffic Stripe Paint Impacts

Current Caltrans paint specifications require paints to have lead concentrations less than 20 mg/kg. Old non-yellow paints (e.g., white, blue, black, etc.) had higher concentrations of lead, but not high enough for removed paint to be classified as a hazardous waste. Residue from the removal of these paints is a non-hazardous waste. Yellow traffic paint used prior to 1999 contained high concentrations of lead. Application of yellow thermoplastic material containing high concentrations of lead was phased out during 2004 to 2006. The lead concentrations in these paints and thermoplastics are high enough to make these materials hazardous wastes when they are removed.

Implementation of the project may require the removal of traffic stripe paint from the underlying asphalt concrete by grinding or sand blasting, which would create a paint waste stream. All traffic striping and traffic marking paints contain lead, but it is not known whether it is at hazardous levels or not. According to Caltrans' requirements, this paint waste must be sampled and analyzed prior to disposal. Disposal of removed traffic stripe paint materials is also dependent on the method utilized to remove these materials (i.e. focused stripe removal vs. pavement grinding).

8.2.1.3. Recommended Mitigation

According to Caltrans' requirements, no soil shall be disturbed or exported from the State right-of-way project area before an ADL study is completed. No paint striping shall be removed before a lead compliance plan is implemented. Cal/OSHA and Caltrans require a lead compliance plan when lead is

known to be present. The potential presence of elevated lead concentrations requires sampling and analytical testing of any exported soil and any traffic paint materials to determine appropriate health and safety procedures and proper management and disposal practices. A project-specific Lead Compliance Plan will be required and must be prepared by a Certified Industrial Hygienist and properly implemented by the contractor. The requirements for the lead compliance plan can be found in the Caltrans Standard Specifications in Section 7-1.02K(6)(j)(ii) and CCR Title 8, Section 1532.1. Note that just one lead compliance plan that addresses all types of lead exposures on the project is to be prepared.

As specified in this plan, lead-containing materials must be sampled and analyzed prior to disposal. If the analytical results show that lead levels are below the regulated hazardous level the materials may be disposed with other construction and demolition debris. If the analytical results show that lead levels are above the regulated hazardous level, the waste must be transported under manifest to a Class I landfill appropriately permitted to receive the material.

The project-specific Lead Compliance Plan is intended, among other things, to minimize worker exposure to lead. The plan should include protocols for environmental and personnel monitoring, requirements for the use of personal protective equipment, and other health and safety protocols and procedures for the handling of lead-containing materials. A dust control plan and health and safety plan should also be prepared and implemented to minimize worker exposure to lead and any other hazardous materials.

8.2.2.Other Potential Hazards

Two common hazards should also be noted: portions of the Study Area near the Willow Creek channel may be located within a 100-year or 500-year floodplain, and the region is prone to flash floods; and the Study Area contains dense, dry vegetation that may fuel wildfire, and the region is located within an area of moderate to high level of fire hazard.

9. CONCLUSIONS

Natural Investigations Company has performed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E 1527-13 of the Study Area: a combined access road study corridor involving portions of 3 parcels—an 87-acre parcel (APN 597-060-05-00), 4-acre parcel (APN 597-060-04-00), and a 10-acre parcel (APN 597-042-13-00)—as well as the affected portions of the CalTrans right-of-way corridor of State Route 94 from 1/4-mile north of Melody Road to 1/2 mile south of the Jamul Indian Village, Melody Road, and the frontage and driveways of other affected parcels. Any exceptions to, or deletions from, this practice are described in Section 10 of this report. This assessment has revealed that there are no historic recognized environmental conditions and no current recognized environmental conditions in connection with the Study Area pursuant to the ASTM Practice E 1527-13. No further site investigation is recommended.

9.1. DATA FAILURE OR OTHER DATA GAPS

ASTM (2013) defines data failure as the failure to achieve the historical research objectives even after reviewing the standard historical sources that are reasonably ascertainable and likely to be useful. Data failure is one type of data gap. ASTM (2013) defines a data gap as a lack, of or inability to obtain, information required by this practice despite good faith efforts by the environmental professional to gather such information. Data gaps may result from incompleteness in any of the activities required by this practice, including, but not limited to site reconnaissance (for example, an inability to conduct the site visit), and interviews (for example, an inability to interview the key site manager, regulatory officials, etc.)

The available historical USGS quadrangle maps and aerial photography were too coarse in resolution to discern any specific land uses or structures on the Property or adjacent properties, and Sanborn fire insurance maps did not cover the Property. These constitute data failures. However, a combination of

other historical data sources was available such that no significant data gap existed, and the historical research objectives were achieved.

10. DEVIATIONS

There were no deletions or deviations from the standard practice.

11. ADDITIONAL SERVICES

No additional services beyond the scope of the ASTM Standard 1527-13 were conducted as part of this assessment.

There may be environmental issues or conditions at a property that parties may wish to assess in connection with commercial real estate that are outside the scope of this practice. No implication is intended as to the relative importance of inquiry into such non-scope considerations, and this list of non-scope considerations is not intended to be all-inclusive: asbestos-containing building materials, radon, lead-based paint, lead in drinking water, wetlands, regulatory compliance, cultural and historic resources, industrial hygiene, health and safety, ecological resources, endangered species, indoor air quality, biological agents, and mold.

Phase I ESAs are non-comprehensive by nature and are unlikely to identify all environmental problems or eliminate all risk. Natural Investigations Company offers a range of investigative and consulting services to suit the needs of our clients, including more quantitative investigations. Although risk can never be eliminated, more detailed and extensive investigations yield more information, which may help the User understand and better manage risks associated with their property. Since such detailed services involve greater expense and time, we ask that our clients participate in the identification of the level of service that will provide them with what they consider to be an acceptable level of risk. Please contact the signatory of this report if you would like to discuss the issue of risk further. Land use, site conditions, and other factors will change over time. This report should not be relied upon after 180 days from the date of issuance, unless additional services are performed as defined in Section 4.7 of ASTM E 1527-13.

12. REFERENCES

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13. SIGNATURE OF ENVIRONMENTAL PROFESSIONAL

As required by 40 CFR 312.21(d), this report shall include the following statements of the environmental professional responsible for conducting the Phase I ESA and preparation of the report (page 21, ASTM, 2013):

> *I declare that, to the best of my professional knowledge, I meet the definition of 'Environmental Professional' as defined in §312.10 of 40 CFR*.
>
> *I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312*.





G. O. Graening, PhD, MSE
Registered Environmental Assessor, Number 08060

14. QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONAL

Dr. Gary O. Graening was certified by California Department of Toxic Substances Control as a Registered Environmental Assessor I (registration # 08060,) from 2005 to 2012 (when DTSC retired the certification program). Dr. Graening holds a PhD in Biological Sciences and a Master of Science in Engineering. Dr. Graening has over 13 years of experience in environmental research and site assessment, including preparation of program-level Phase I ESAs, limited Phase II investigations, as well as environmental impact assessments for National Environmental Policy Act compliance and California Environmental Quality Act compliance. Dr. Graening has completed the 40-hour OSHA Hazardous Waste Operations and Emergency Response certification (with 8-hour annual refresher courses). Dr. Graening's full résumé, and the Company's statement of qualifications, is available on the Internet at the Company's website: www.naturalinvestigations.com.

15. APPENDICES

All appendices are presented as electronic files on the attached compact disc.

15.1. USER-PROVIDED INFORMATION

15.1.1. Title Reports

15.1.2. Previous Phase I ESAs

15.2. REGULATORY RECORDS DOCUMENTATION

15.2.1. EDR Radius Map Reports

15.2.2. County / CUPA Records

15.3. HISTORICAL RESEARCH DOCUMENTATION

15.3.1. Historical Topographic Maps

15.3.2. Historical Aerial Photographs

15.3.3. Fire Insurance (Sanborn Company) Maps

15.3.4. City Directories

15.4. SITE RECONNAISSANCE PHOTOGRAPHY

15.5. INTERVIEW DOCUMENTATION

Jamul Indian Village Access
14100 Campo Road
Jamul, CA 91935

Inquiry Number: 3580276.1s
April 18, 2013

EDR Summary Radius Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
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with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

14100 CAMPO ROAD
JAMUL, CA 91935

COORDINATES

Latitude (North):	32.7054000 - 32° 42' 19.44''
Longitude (West):	116.8697000 - 116° 52' 10.92''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	512212.7
UTM Y (Meters):	3618445.8
Elevation:	961 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	TP
Source:	USGS 7.5 min quad index

Target Property:	W
Source:	USGS 7.5 min quad index

AERIAL PHOTOGRAPHY IN THIS REPORT

Photo Year:	2010
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
14100 CAMPO ROAD
JAMUL, CA 91935

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft.) DIRECTION
1	PEACEFUL VALLEY RENC	14026 PEACEFUL VALLE	SAN DIEGO CO. SAM	Lower	536, East

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

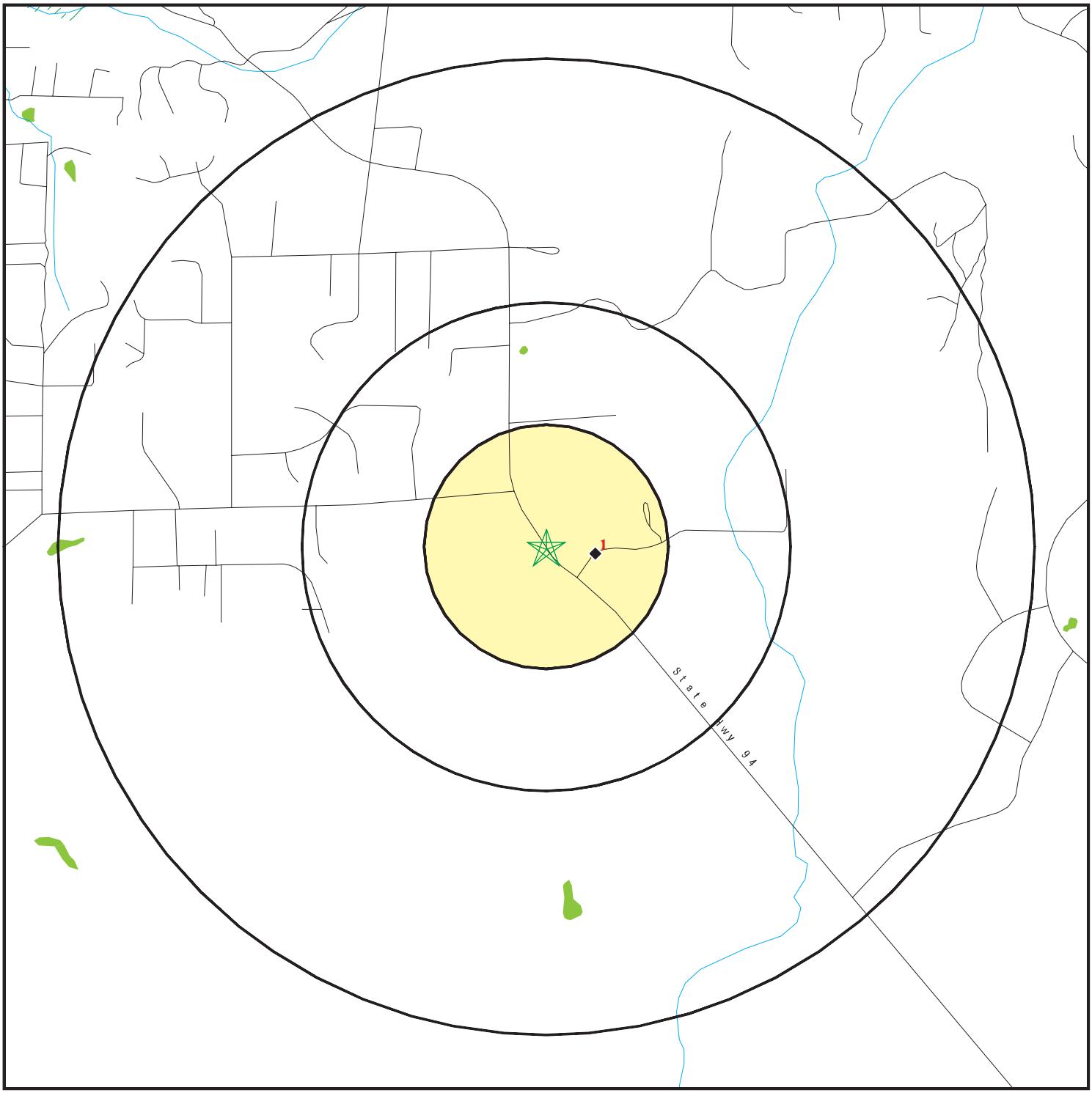
Unmappable (orphan) sites are not considered in the foregoing analysis.
SAN DIEGO CO. SAM: A review of the SAN DIEGO CO. SAM list, as provided by EDR, and dated 03/23/2010 has revealed that there is 1 SAN DIEGO CO. SAM site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
PEACEFUL VALLEY RENC	14026 PEACEFUL VALLE	E 0 - 1/8 (0.102 mi.)	1	8

Count: 6 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
JAMUL	1004439457	JAMUL CHRISTIAN SCHOOL	P.O. BOX 74	91935	FINDS
JAMUL	S105155612	JAMUL BURNSITE	JAMUL DR		SWF/LF
JAMUL	1006829595	JAMUL BURNSITE	JAMUL DR.	91935	FINDS
JAMUL	S109521465	PEACEFUL VALLEY RANCH	ZERO PEACEFUL VALLEY RNCH & H	91935	SLIC
SAN DIEGO COUNTY	M300003197	MUHT-HEI, INC.	CAMPO MATERIALS PIT		US MINES
SAN DIEGO COUNTY	2011975012	MARINA VILLAGE	MARINA VILLAGE		ERNS

OVERVIEW MAP - 3580276.1s



0 1/4 1/2 1 Miles

N

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Jamul Indian Village Access ADDRESS: 14100 Campo Road Jamul CA 91935 LAT/LONG: 32.7054 / 116.8697	CLIENT: Natural Investigations CONTACT: G.O. Graening INQUIRY #: 3580276.1s DATE: April 18, 2013 12:27 pm

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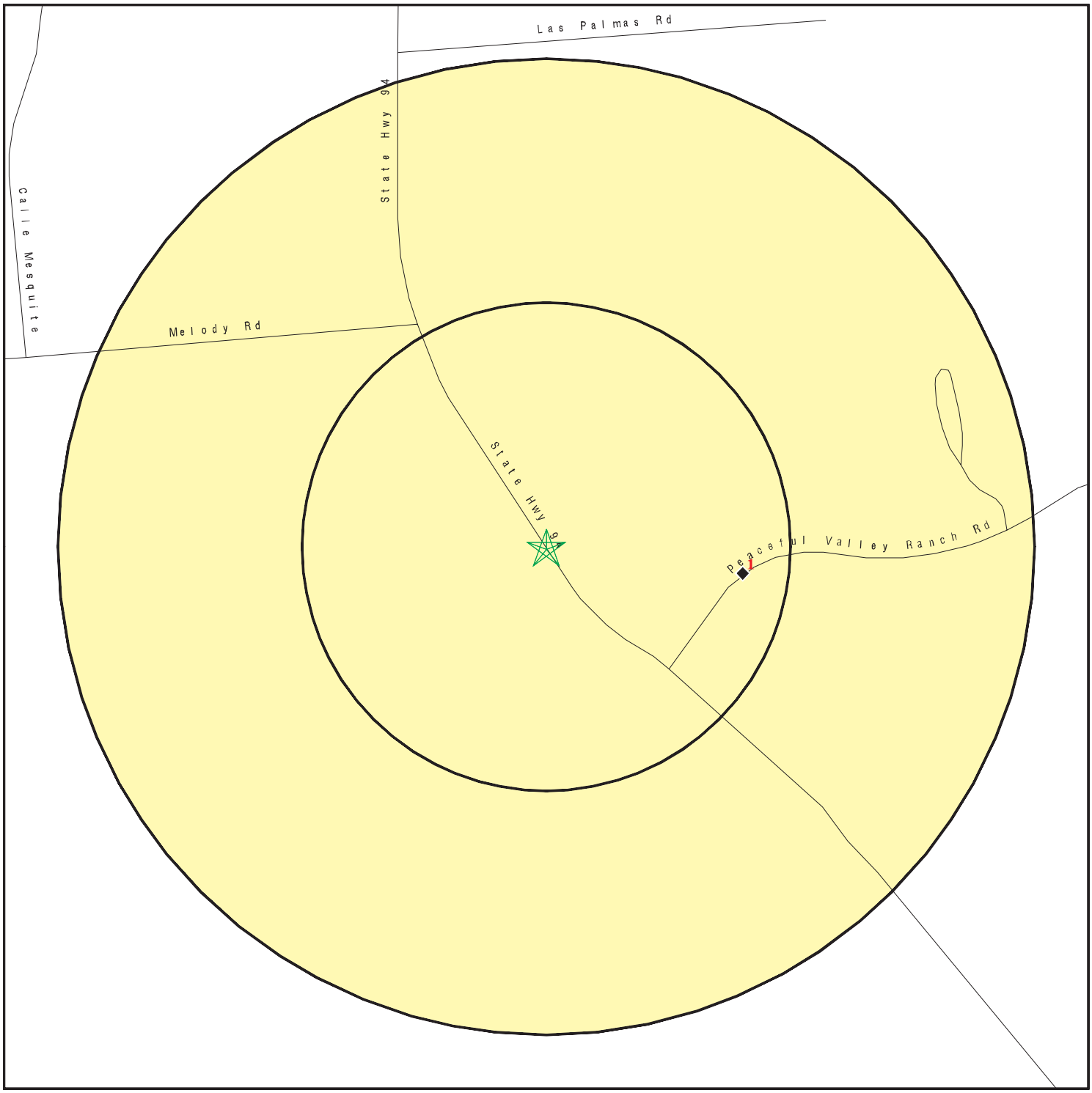
DETAIL MAP - 3580276.1s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites

0 1/16 1/8 1/4 Miles

- Indian Reservations BIA
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- Areas of Concern

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Jamul Indian Village Access ADDRESS: 14100 Campo Road Jamul CA 91935 LAT/LONG: 32.7054 / 116.8697	CLIENT: Natural Investigations CONTACT: G.O. Graening INQUIRY #: 3580276.1s DATE: April 18, 2013 12:29 pm

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
CERCLIS	0.500		0	0	0	NR	NR	0
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
LUCIS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
RESPONSE	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
ENVIROSTOR	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
SLIC	0.500		0	0	0	NR	NR	0
SAN DIEGO CO. SAM	0.500		1	0	0	NR	NR	1
INDIAN LUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
FEMA UST	0.250		0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
WMUDS/SWAT	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
HAULERS	TP		NR	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL	TP		NR	NR	NR	NR	NR	0
HIST Cal-Sites	1.000		0	0	0	0	NR	0
SCH	0.250		0	0	NR	NR	NR	0
Toxic Pits	1.000		0	0	0	0	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
San Diego Co. HMMD	TP		NR	NR	NR	NR	NR	0
US HIST CDL	TP		NR	NR	NR	NR	NR	0
Local Lists of Registered Storage Tanks								
CA FID UST	0.250		0	0	NR	NR	NR	0
HIST UST	0.250		0	0	NR	NR	NR	0
SWEEPS UST	0.250		0	0	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
LIENS	TP		NR	NR	NR	NR	NR	0
DEED	0.500		0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
CHMIRS	TP		NR	NR	NR	NR	NR	0
LDS	TP		NR	NR	NR	NR	NR	0
MCS	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
DOD	1.000		0	0	0	0	NR	0
FUDS	1.000		0	0	0	0	NR	0
CONSENT	1.000		0	0	0	0	NR	0
ROD	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
CA BOND EXP. PLAN	1.000		0	0	0	0	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
Cortese	0.500		0	0	0	NR	NR	0
HIST CORTESE	0.500		0	0	0	NR	NR	0
CUPA Listings	0.250		0	0	NR	NR	NR	0
Notify 65	1.000		0	0	0	0	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
WIP	0.250		0	0	NR	NR	NR	0
ENF	TP		NR	NR	NR	NR	NR	0
HAZNET	TP		NR	NR	NR	NR	NR	0
EMI	TP		NR	NR	NR	NR	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
MWMP	0.250		0	0	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
HWT	0.250		0	0	NR	NR	NR	0
HWP	1.000		0	0	0	0	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
WDS	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
PROC	0.500		0	0	0	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR US Hist Auto Stat	0.250		0	0	NR	NR	NR	0
EDR US Hist Cleaners	0.250		0	0	NR	NR	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

1
East
< 1/8
0.102 mi.
536 ft.

Relative:
Lower

PEACEFUL VALLEY RENCH
14026 PEACEFUL VALLEY RANCH RD
JAMUL, CA 91935

SAN DIEGO CO. SAM

S109118211
N/A

Click here for full text details

SAN DIEGO CO. SAM
Facility Status: Preliminary Assessment

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
CA	AST	Aboveground Petroleum Storage Tank Facilities	State Water Resources Control Board	08/01/2009	09/10/2009	10/01/2009
CA	CA BOND EXP. PLAN	Bond Expenditure Plan	Department of Health Services	01/01/1989	07/27/1994	08/02/1994
CA	CA FID UST	Facility Inventory Database	California Environmental Protection Agency	10/31/1994	09/05/1995	09/29/1995
CA	CDL	Clandestine Drug Labs	Department of Toxic Substances Control	06/30/2012	09/12/2012	10/03/2012
CA	CHMIRS	California Hazardous Material Incident Report System	Office of Emergency Services	12/06/2012	01/29/2013	03/19/2013
CA	CORTESE	"Cortese" Hazardous Waste & Substances Sites List	CAL EPA/Office of Emergency Information	01/02/2013	01/03/2013	02/22/2013
CA	DEED	Deed Restriction Listing	Department of Toxic Substances Control	03/11/2013	03/12/2013	03/25/2013
CA	DRYCLEANERS	Cleaner Facilities	Department of Toxic Substance Control	12/11/2012	12/12/2012	01/04/2013
CA	EMI	Emissions Inventory Data	California Air Resources Board	12/31/2008	09/29/2010	10/18/2010
CA	ENF	Enforcement Action Listing	State Water Resoruces Control Board	01/08/2013	01/29/2013	03/19/2013
CA	ENVIROSTOR	EnviroStor Database	Department of Toxic Substances Control	03/13/2013	03/14/2013	03/27/2013
CA	Financial Assurance 1	Financial Assurance Information Listing	Department of Toxic Substances Control	03/01/2007	06/01/2007	06/29/2007
CA	Financial Assurance 2	Financial Assurance Information Listing	California Integrated Waste Management Board	02/19/2013	02/20/2013	03/20/2013
CA	HAULERS	Registered Waste Tire Haulers Listing	Integrated Waste Management Board	03/13/2013	03/14/2013	03/27/2013
CA	HAZNET	Facility and Manifest Data	California Environmental Protection Agency	12/31/2011	06/22/2012	07/06/2012
CA	HIST CAL-SITES	Calsites Database	Department of Toxic Substance Control	08/08/2005	08/03/2006	08/24/2006
CA	HIST CORTESE	Hazardous Waste & Substance Site List	Department of Toxic Substances Control	04/01/2001	01/22/2009	04/08/2009
CA	HIST UST	Hazardous Substance Storage Container Database	State Water Resources Control Board	10/15/1990	01/25/1991	02/12/1991
CA	HWP	EnviroStor Permitted Facilities Listing	Department of Toxic Substances Control	02/25/2013	02/26/2013	03/25/2013
CA	HWT	Registered Hazardous Waste Transporter Database	Department of Toxic Substances Control	01/15/2013	01/15/2013	02/22/2013
CA	LDS	Land Disposal Sites Listing	State Water Qualilty Control Board	03/18/2013	03/19/2013	03/27/2013
CA	LIENS	Environmental Liens Listing	Department of Toxic Substances Control	03/15/2013	03/15/2013	03/27/2013
CA	LUST	Geotracker's Leaking Underground Fuel Tank Report	State Water Resources Control Board	03/18/2013	03/19/2013	03/27/2013
CA	LUST REG 1	Active Toxic Site Investigation	California Regional Water Quality Control Boa	02/01/2001	02/28/2001	03/29/2001
CA	LUST REG 2	Fuel Leak List	California Regional Water Quality Control Boa	09/30/2004	10/20/2004	11/19/2004
CA	LUST REG 3	Leaking Underground Storage Tank Database	California Regional Water Quality Control Boa	05/19/2003	05/19/2003	06/02/2003
CA	LUST REG 4	Underground Storage Tank Leak List	California Regional Water Quality Control Boa	09/07/2004	09/07/2004	10/12/2004
CA	LUST REG 5	Leaking Underground Storage Tank Database	California Regional Water Quality Control Boa	07/01/2008	07/22/2008	07/31/2008
CA	LUST REG 6L	Leaking Underground Storage Tank Case Listing	California Regional Water Quality Control Boa	09/09/2003	09/10/2003	10/07/2003
CA	LUST REG 6V	Leaking Underground Storage Tank Case Listing	California Regional Water Quality Control Boa	06/07/2005	06/07/2005	06/29/2005
CA	LUST REG 7	Leaking Underground Storage Tank Case Listing	California Regional Water Quality Control Boa	02/26/2004	02/26/2004	03/24/2004
CA	LUST REG 8	Leaking Underground Storage Tanks	California Regional Water Quality Control Boa	02/14/2005	02/15/2005	03/28/2005
CA	LUST REG 9	Leaking Underground Storage Tank Report	California Regional Water Quality Control Boa	03/01/2001	04/23/2001	05/21/2001
CA	MCS	Military Cleanup Sites Listing	State Water Resources Control Board	03/18/2013	03/19/2013	03/27/2013
CA	MWMP	Medical Waste Management Program Listing	Department of Public Health	03/06/2013	03/12/2013	03/25/2013
CA	NOTIFY 65	Proposition 65 Records	State Water Resources Control Board	10/21/1993	11/01/1993	11/19/1993
CA	NPDES	NPDES Permits Listing	State Water Resources Control Board	02/18/2013	02/18/2013	03/20/2013
CA	PROC	Certified Processors Database	Department of Conservation	03/18/2013	03/19/2013	03/27/2013
CA	RESPONSE	State Response Sites	Department of Toxic Substances Control	03/13/2013	03/14/2013	03/27/2013
CA	SCH	School Property Evaluation Program	Department of Toxic Substances Control	03/13/2013	03/14/2013	03/27/2013
CA	SLIC	Statewide SLIC Cases	State Water Resources Control Board	03/18/2013	03/19/2013	03/27/2013
CA	SLIC REG 1	Active Toxic Site Investigations	California Regional Water Quality Control Boa	04/03/2003	04/07/2003	04/25/2003
CA	SLIC REG 2	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	Regional Water Quality Control Board San Fran	09/30/2004	10/20/2004	11/19/2004
CA	SLIC REG 3	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	California Regional Water Quality Control Boa	05/18/2006	05/18/2006	06/15/2006
CA	SLIC REG 4	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	Region Water Quality Control Board Los Angele	11/17/2004	11/18/2004	01/04/2005
CA	SLIC REG 5	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	Regional Water Quality Control Board Central	04/01/2005	04/05/2005	04/21/2005
CA	SLIC REG 6L	SLIC Sites	California Regional Water Quality Control Boa	09/07/2004	09/07/2004	10/12/2004

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
CA	SLIC REG 6V	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	Regional Water Quality Control Board, Victorv	05/24/2005	05/25/2005	06/16/2005
CA	SLIC REG 7	SLIC List	California Regional Quality Control Board, Co	11/24/2004	11/29/2004	01/04/2005
CA	SLIC REG 8	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	California Region Water Quality Control Board	04/03/2008	04/03/2008	04/14/2008
CA	SLIC REG 9	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	California Regional Water Quality Control Boa	09/10/2007	09/11/2007	09/28/2007
CA	SWEEPS UST	SWEEPS UST Listing	State Water Resources Control Board	06/01/1994	07/07/2005	08/11/2005
CA	SWF/LF (SWIS)	Solid Waste Information System	Department of Resources Recycling and Recover	02/18/2013	02/18/2013	03/20/2013
CA	SWRCY	Recycler Database	Department of Conservation	03/18/2013	03/19/2013	03/27/2013
CA	TOXIC PITS	Toxic Pits Cleanup Act Sites	State Water Resources Control Board	07/01/1995	08/30/1995	09/26/1995
CA	UIC	UIC Listing	Deaprtment of Conservation	03/05/2013	03/19/2013	03/27/2013
CA	UST	Active UST Facilities	SWRCB	03/18/2013	03/19/2013	04/18/2013
CA	UST MENDOCINO	Mendocino County UST Database	Department of Public Health	09/23/2009	09/23/2009	10/01/2009
CA	VCP	Voluntary Cleanup Program Properties	Department of Toxic Substances Control	03/13/2013	03/14/2013	03/27/2013
CA	WDS	Waste Discharge System	State Water Resources Control Board	06/19/2007	06/20/2007	06/29/2007
CA	WIP	Well Investigation Program Case List	Los Angeles Water Quality Control Board	07/03/2009	07/21/2009	08/03/2009
CA	WMUDS/SWAT	Waste Management Unit Database	State Water Resources Control Board	04/01/2000	04/10/2000	05/10/2000
US	2020 COR ACTION	2020 Corrective Action Program List	Environmental Protection Agency	11/11/2011	05/18/2012	05/25/2012
US	BRS	Biennial Reporting System	EPA/NTIS	12/31/2009	03/01/2011	05/02/2011
US	CERCLIS	Comprehensive Environmental Response, Compensation, and Liab	EPA	02/04/2013	03/01/2013	03/13/2013
US	CERCLIS-NFRAP	CERCLIS No Further Remedial Action Planned	EPA	02/05/2013	03/01/2013	03/13/2013
US	COAL ASH DOE	Sleam-Electric Plan Operation Data	Department of Energy	12/31/2005	08/07/2009	10/22/2009
US	COAL ASH EPA	Coal Combustion Residues Surface Impoundments List	Environmental Protection Agency	08/17/2010	01/03/2011	03/21/2011
US	CONSENT	Superfund (CERCLA) Consent Decrees	Department of Justice, Consent Decree Library	12/31/2011	01/15/2013	03/13/2013
US	CORRACTS	Corrective Action Report	EPA	02/12/2013	02/21/2013	02/27/2013
US	DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations	EPA, Region 9	01/12/2009	05/07/2009	09/21/2009
US	DELISTED NPL	National Priority List Deletions	EPA	02/01/2013	03/01/2013	03/13/2013
US	DOD	Department of Defense Sites	USGS	12/31/2005	11/10/2006	01/11/2007
US	DOT OPS	Incident and Accident Data	Department of Transporation, Office of Pipeli	07/31/2012	08/07/2012	09/18/2012
US	EDR MGP	EDR Proprietary Manufactured Gas Plants	EDR, Inc.			
US	EDR US Hist Auto Stat	EDR Exclusive Historic Gas Stations	EDR, Inc.			
US	EDR US Hist Auto Stat	EDR Proprietary Historic Gas Stations - Cole				
US	EDR US Hist Cleaners	EDR Proprietary Historic Dry Cleaners - Cole				
US	EDR US Hist Cleaners	EDR Exclusive Historic Dry Cleaners	EDR, Inc.			
US	EPA WATCH LIST	EPA WATCH LIST	Environmental Protection Agency	07/31/2012	08/13/2012	09/18/2012
US	ERNS	Emergency Response Notification System	National Response Center, United States Coast	12/31/2012	01/17/2013	02/15/2013
US	FEDERAL FACILITY	Federal Facility Site Information listing	Environmental Protection Agency	07/31/2012	10/09/2012	12/20/2012
US	FEDLAND	Federal and Indian Lands	U.S. Geological Survey	12/31/2005	02/06/2006	01/11/2007
US	FEMA UST	Underground Storage Tank Listing	FEMA	01/01/2010	02/16/2010	04/12/2010
US	FINDS	Facility Index System/Facility Registry System	EPA	10/23/2011	12/13/2011	03/01/2012
US	FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fu	EPA/Office of Prevention, Pesticides and Toxi	04/09/2009	04/16/2009	05/11/2009
US	FTTS INSP	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fu	EPA	04/09/2009	04/16/2009	05/11/2009
US	FUDS	Formerly Used Defense Sites	U.S. Army Corps of Engineers	12/31/2011	02/26/2013	03/13/2013
US	HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing	Environmental Protection Agency	10/19/2006	03/01/2007	04/10/2007
US	HIST FTTS INSP	FIFRA/TSCA Tracking System Inspection & Enforcement Case Lis	Environmental Protection Agency	10/19/2006	03/01/2007	04/10/2007
US	HMIRS	Hazardous Materials Information Reporting System	U.S. Department of Transportation	12/31/2012	01/03/2013	02/27/2013
US	ICIS	Integrated Compliance Information System	Environmental Protection Agency	07/20/2011	11/10/2011	01/10/2012
US	INDIAN LUST R1	Leaking Underground Storage Tanks on Indian Land	EPA Region 1	09/28/2012	11/01/2012	04/12/2013
US	INDIAN LUST R10	Leaking Underground Storage Tanks on Indian Land	EPA Region 10	02/05/2013	02/06/2013	04/12/2013

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
US	INDIAN LUST R4	Leaking Underground Storage Tanks on Indian Land	EPA Region 4	02/06/2013	02/08/2013	04/12/2013
US	INDIAN LUST R6	Leaking Underground Storage Tanks on Indian Land	EPA Region 6	09/12/2011	09/13/2011	11/11/2011
US	INDIAN LUST R7	Leaking Underground Storage Tanks on Indian Land	EPA Region 7	12/31/2012	02/28/2013	04/12/2013
US	INDIAN LUST R8	Leaking Underground Storage Tanks on Indian Land	EPA Region 8	08/27/2012	08/28/2012	10/16/2012
US	INDIAN LUST R9	Leaking Underground Storage Tanks on Indian Land	Environmental Protection Agency	03/01/2013	03/01/2013	04/12/2013
US	INDIAN ODI	Report on the Status of Open Dumps on Indian Lands	Environmental Protection Agency	12/31/1998	12/03/2007	01/24/2008
US	INDIAN RESERV	Indian Reservations	USGS	12/31/2005	12/08/2006	01/11/2007
US	INDIAN UST R1	Underground Storage Tanks on Indian Land	EPA, Region 1	09/28/2012	11/07/2012	04/12/2013
US	INDIAN UST R10	Underground Storage Tanks on Indian Land	EPA Region 10	02/05/2013	02/06/2013	04/12/2013
US	INDIAN UST R4	Underground Storage Tanks on Indian Land	EPA Region 4	02/06/2013	02/08/2013	04/12/2013
US	INDIAN UST R5	Underground Storage Tanks on Indian Land	EPA Region 5	08/02/2012	08/03/2012	11/05/2012
US	INDIAN UST R6	Underground Storage Tanks on Indian Land	EPA Region 6	05/10/2011	05/11/2011	06/14/2011
US	INDIAN UST R7	Underground Storage Tanks on Indian Land	EPA Region 7	12/31/2012	02/28/2013	04/12/2013
US	INDIAN UST R8	Underground Storage Tanks on Indian Land	EPA Region 8	08/27/2012	08/28/2012	10/16/2012
US	INDIAN UST R9	Underground Storage Tanks on Indian Land	EPA Region 9	02/21/2013	02/26/2013	04/12/2013
US	INDIAN VCP R1	Voluntary Cleanup Priority Listing	EPA, Region 1	09/28/2012	10/02/2012	10/16/2012
US	INDIAN VCP R7	Voluntary Cleanup Priority Lisitng	EPA, Region 7	03/20/2008	04/22/2008	05/19/2008
US	LIENS 2	CERCLA Lien Information	Environmental Protection Agency	02/16/2012	03/26/2012	06/14/2012
US	LUCIS	Land Use Control Information System	Department of the Navy	12/09/2005	12/11/2006	01/11/2007
US	MLTS	Material Licensing Tracking System	Nuclear Regulatory Commission	06/21/2011	07/15/2011	09/13/2011
US	NPL	National Priority List	EPA	02/01/2013	03/01/2013	03/13/2013
US	NPL LIENS	Federal Superfund Liens	EPA	10/15/1991	02/02/1994	03/30/1994
US	ODI	Open Dump Inventory	Environmental Protection Agency	06/30/1985	08/09/2004	09/17/2004
US	PADS	PCB Activity Database System	EPA	11/01/2010	11/10/2010	02/16/2011
US	PCB TRANSFORMER	PCB Transformer Registration Database	Environmental Protection Agency	02/01/2011	10/19/2011	01/10/2012
US	PRP	Potentially Responsible Parties	EPA	12/02/2012	01/03/2013	03/13/2013
US	Proposed NPL	Proposed National Priority List Sites	EPA	02/01/2013	03/01/2013	03/13/2013
US	RAATS	RCRA Administrative Action Tracking System	EPA	04/17/1995	07/03/1995	08/07/1995
US	RADINFO	Radiation Information Database	Environmental Protection Agency	01/08/2013	01/09/2013	04/12/2013
US	RCRA NonGen / NLR	RCRA - Non Generators	Environmental Protection Agency	02/12/2013	02/15/2013	02/27/2013
US	RCRA-CESQG	RCRA - Conditionally Exempt Small Quantity Generators	Environmental Protection Agency	02/12/2013	02/15/2013	02/27/2013
US	RCRA-LQG	RCRA - Large Quantity Generators	Environmental Protection Agency	02/12/2013	02/15/2013	02/27/2013
US	RCRA-SQG	RCRA - Small Quantity Generators	Environmental Protection Agency	02/12/2013	02/15/2013	02/27/2013
US	RCRA-TSDF	RCRA - Treatment, Storage and Disposal	Environmental Protection Agency	02/12/2013	02/15/2013	02/27/2013
US	RMP	Risk Management Plans	Environmental Protection Agency	05/08/2012	05/25/2012	07/10/2012
US	ROD	Records Of Decision	EPA	12/18/2012	03/13/2013	04/12/2013
US	SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing	Environmental Protection Agency	03/07/2011	03/09/2011	05/02/2011
US	SSTS	Section 7 Tracking Systems	EPA	12/31/2009	12/10/2010	02/25/2011
US	TRIS	Toxic Chemical Release Inventory System	EPA	12/31/2009	09/01/2011	01/10/2012
US	TSCA	Toxic Substances Control Act	EPA	12/31/2006	09/29/2010	12/02/2010
US	UMTRA	Uranium Mill Tailings Sites	Department of Energy	09/14/2010	10/07/2011	03/01/2012
US	US AIRS (AFS)	Aerometric Information Retrieval System Facility Subsystem (	EPA	11/15/2012	11/16/2012	02/15/2013
US	US AIRS MINOR	Air Facility System Data	EPA	11/15/2012	11/16/2012	02/15/2013
US	US BROWNFIELDS	A Listing of Brownfields Sites	Environmental Protection Agency	12/10/2012	12/11/2012	12/20/2012
US	US CDL	Clandestine Drug Labs	Drug Enforcement Administration	11/14/2012	12/11/2012	02/15/2013
US	US ENG CONTROLS	Engineering Controls Sites List	Environmental Protection Agency	12/19/2012	12/26/2012	02/27/2013
US	US FIN ASSUR	Financial Assurance Information	Environmental Protection Agency	11/20/2012	11/30/2012	02/27/2013

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
US	US HIST CDL	National Clandestine Laboratory Register	Drug Enforcement Administration	09/01/2007	11/19/2008	03/30/2009
US	US INST CONTROL	Sites with Institutional Controls	Environmental Protection Agency	12/19/2012	12/26/2012	02/27/2013
US	US MINES	Mines Master Index File	Department of Labor, Mine Safety and Health A	08/18/2011	09/08/2011	09/29/2011
CT	CT MANIFEST	Hazardous Waste Manifest Data	Department of Energy & Environmental Protecti	02/18/2013	02/18/2013	03/21/2013
NJ	NJ MANIFEST	Manifest Information	Department of Environmental Protection	12/31/2011	07/19/2012	08/28/2012
NY	NY MANIFEST	Facility and Manifest Data	Department of Environmental Conservation	02/01/2013	02/07/2013	03/15/2013
PA	PA MANIFEST	Manifest Information	Department of Environmental Protection	12/31/2011	07/23/2012	09/18/2012
RI	RI MANIFEST	Manifest information	Department of Environmental Management	12/31/2011	06/22/2012	07/31/2012
WI	WI MANIFEST	Manifest Information	Department of Natural Resources	12/31/2011	07/19/2012	09/27/2012
US	Oil/Gas Pipelines	GeoData Digital Line Graphs from 1:100,000-Scale Maps	USGS			
US	Electric Power Lines	Electric Power Transmission Line Data	Rextag Strategies Corp.			
US	AHA Hospitals	Sensitive Receptor: AHA Hospitals	American Hospital Association, Inc.			
US	Medical Centers	Sensitive Receptor: Medical Centers	Centers for Medicare & Medicaid Services			
US	Nursing Homes	Sensitive Receptor: Nursing Homes	National Institutes of Health			
US	Public Schools	Sensitive Receptor: Public Schools	National Center for Education Statistics			
US	Private Schools	Sensitive Receptor: Private Schools	National Center for Education Statistics			
CA	Daycare Centers	Sensitive Receptor: Licensed Facilities	Department of Social Services			
US	Flood Zones	100-year and 500-year flood zones	Emergency Management Agency (FEMA)			
US	NWI	National Wetlands Inventory	U.S. Fish and Wildlife Service			
US	USGS 7.5' Topographic Map	Scanned Digital USGS 7.5' Topographic Map (DRG)	USGS			

STREET AND ADDRESS INFORMATION

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GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

JAMUL INDIAN VILLAGE ACCESS
14100 CAMPO ROAD
JAMUL, CA 91935

TARGET PROPERTY COORDINATES

Latitude (North):	32.7054 - 32° 42' 19.44''
Longitude (West):	116.8697 - 116° 52' 10.92''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	512212.7
UTM Y (Meters):	3618445.8
Elevation:	961 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	32116-F7 DULZURA, CA
Most Recent Revision:	1988
West Map:	32116-F8 JAMUL MOUNTAINS, CA
Most Recent Revision:	1994

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

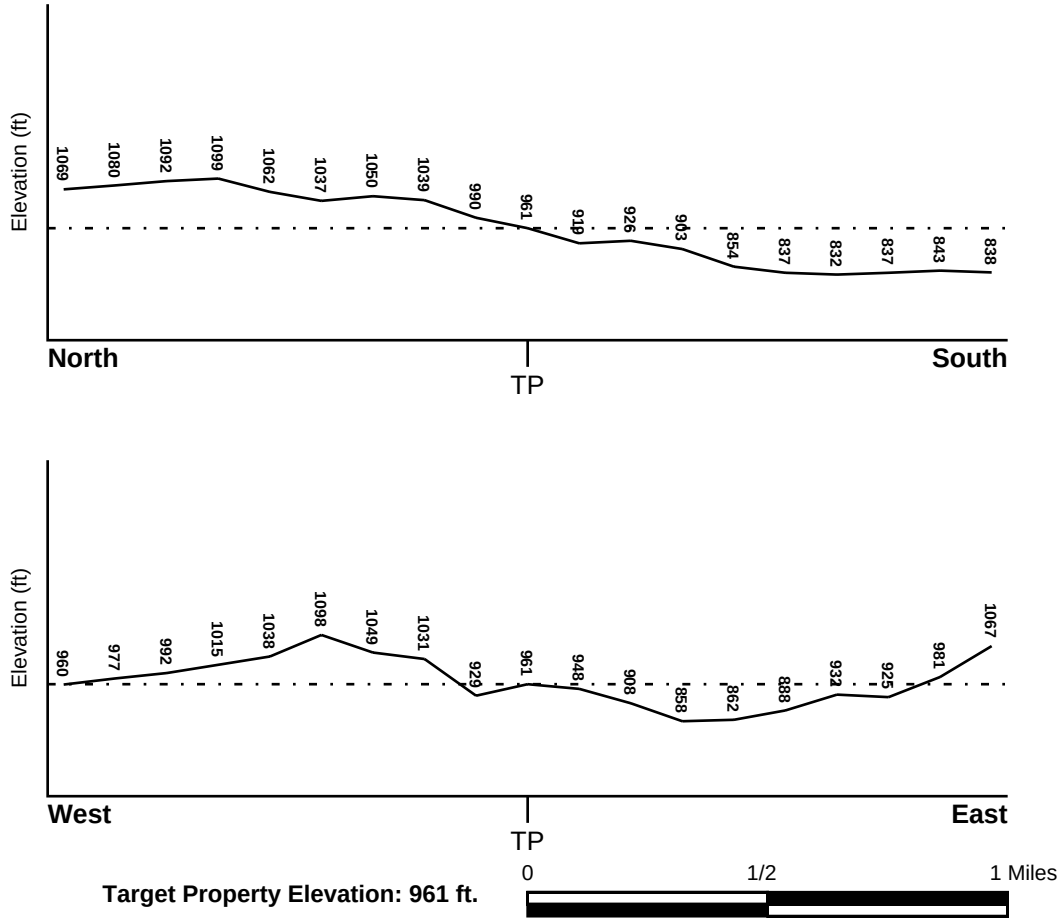
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SE

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Target Property Elevation: 961 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
SAN DIEGO, CA	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 06073C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
DULZURA	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

* ©1996 Site−specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

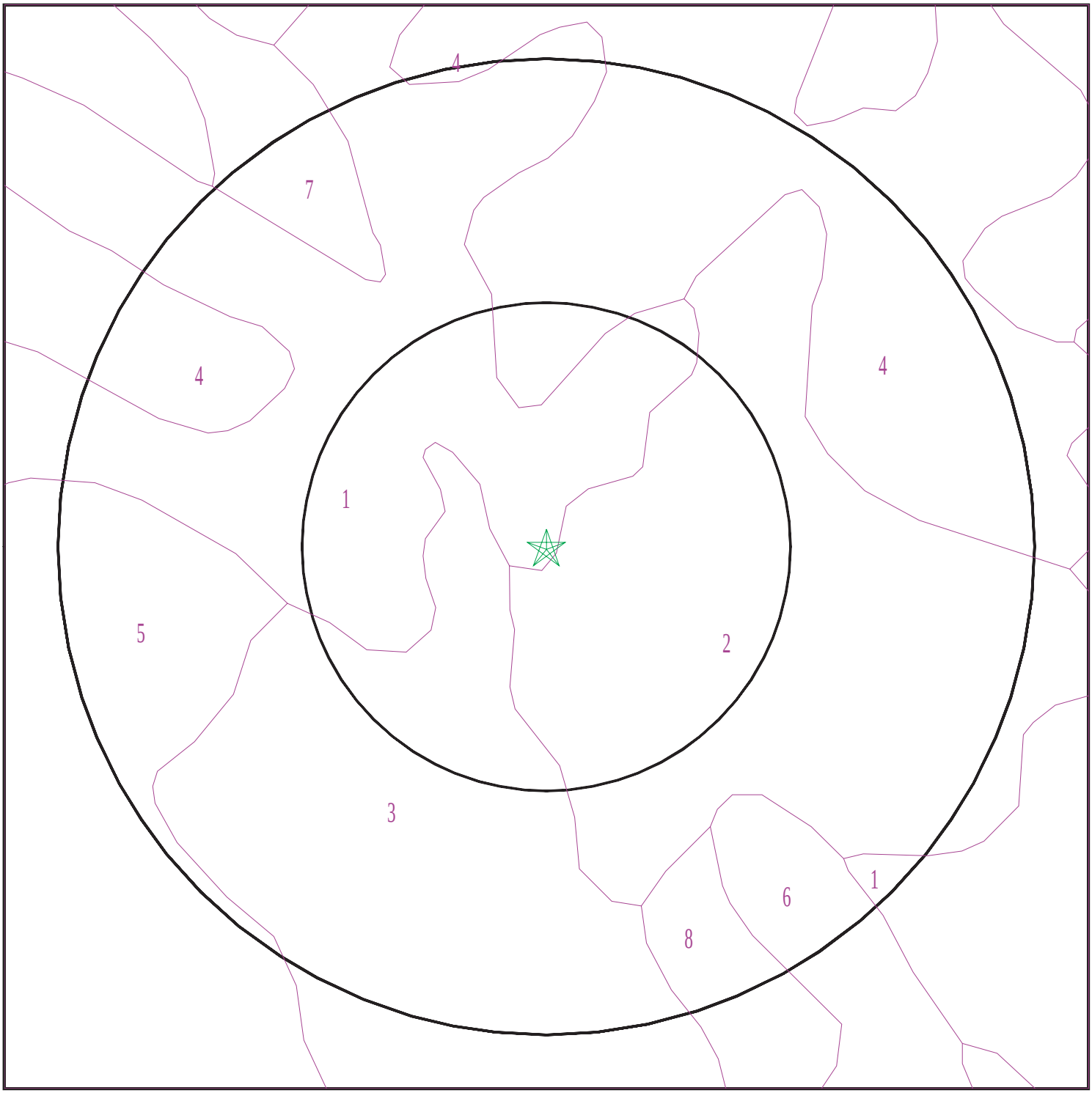
Era:	Mesozoic
System:	Cretaceous
Series:	Cretaceous granitic rocks
Code:	Kg *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Plutonic and Intrusive Rocks

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 3580276.1s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Jamul Indian Village Access	CLIENT:	Natural Investigations
ADDRESS:	14100 Campo Road Jamul CA 91935	CONTACT:	G.O. Graening
LAT/LONG:	32.7054 / 116.8697	INQUIRY #:	3580276.1s
		DATE:	April 18, 2013 12:29 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: RAMONA

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 4 Min: 1.4	Max: 7.3 Min: 6.6
2	9 inches	59 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 4 Min: 1.4	Max: 7.3 Min: 6.6
3	59 inches	74 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 4 Min: 1.4	Max: 7.3 Min: 6.6

Soil Map ID: 2

Soil Component Name: FALLBROOK

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
2	5 inches	11 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
3	11 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
4	27 inches	46 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
5	46 inches	51 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:

Soil Map ID: 3

Soil Component Name: LAS POSAS

Soil Surface Texture: fine sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	3 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
2	3 inches	33 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
3	33 inches	37 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:

Soil Map ID: 4

Soil Component Name: FALLBROOK

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	1 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
2	1 inches	24 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
3	24 inches	27 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
4	27 inches	31 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:

Soil Map ID: 5

Soil Component Name: CIENEBA

Soil Surface Texture: coarse sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 5 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	Not reported	Max: Min:	Max: Min:
2	7 inches	11 inches	weathered bedrock	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	Not reported	Max: Min:	Max: Min:

Soil Map ID: 6

Soil Component Name: LAS POSAS

Soil Surface Texture: fine sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	3 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	3 inches	33 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:
3	33 inches	37 inches	weathered bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	Not reported	Max: Min:	Max: Min:

Soil Map ID: 7

Soil Component Name: WYMAN

Soil Surface Texture: loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	12 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.6

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	12 inches	40 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.6
3	40 inches	66 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.6
4	66 inches	72 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.6

Soil Map ID: 8

Soil Component Name: CIENEBA

Soil Surface Texture: coarse sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Somewhat excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	Not reported	Max: Min:	Max: Min:
2	9 inches	14 inches	weathered bedrock	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	Not reported	Max: Min:	Max: Min:

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	CA3700174	1/2 - 1 Mile NNW

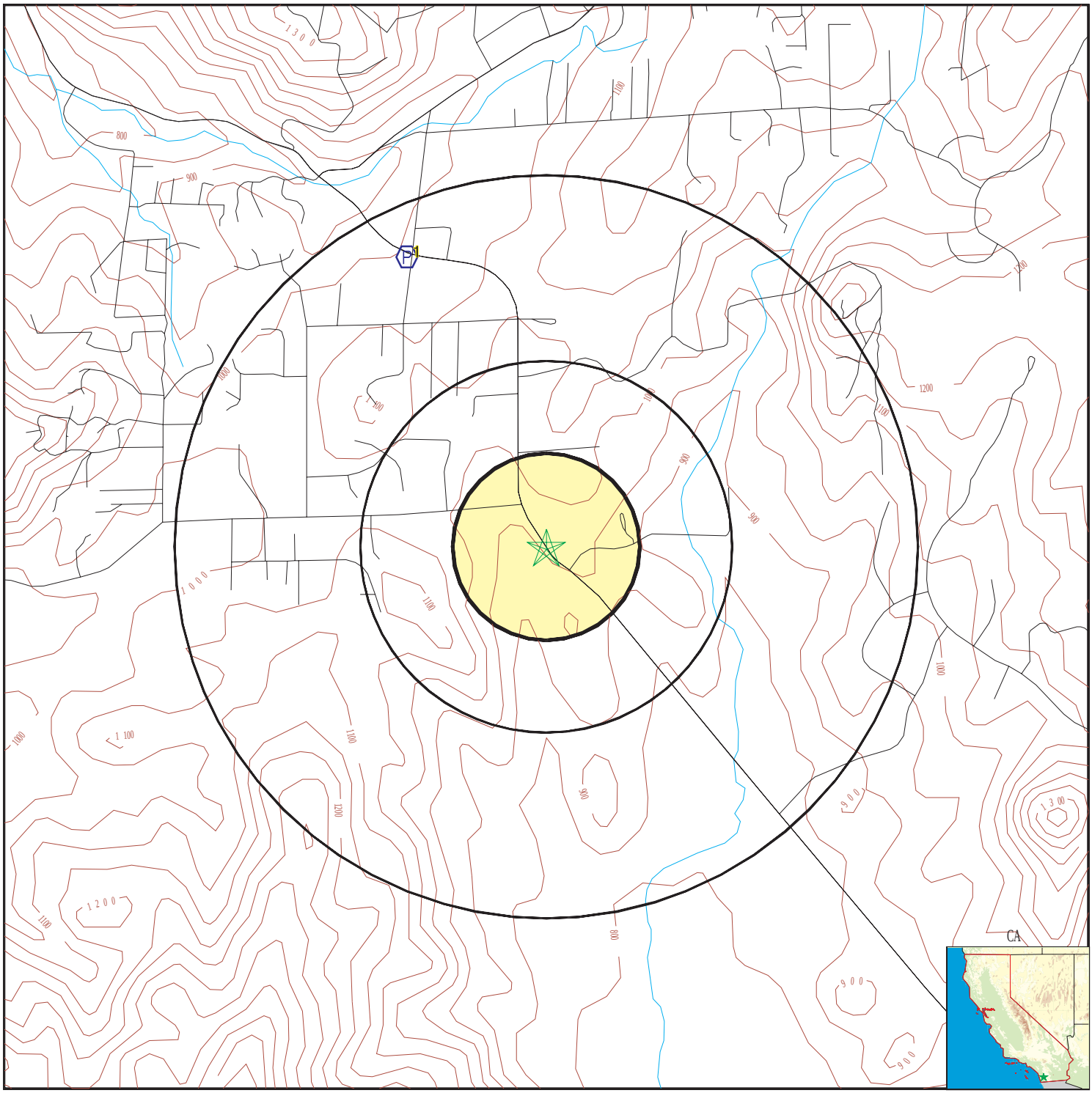
Note: PWS System location is not always the same as well location.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

PHYSICAL SETTING SOURCE MAP - 3580276.1s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake Fault Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- HD Closest Hydrogeological Data
- Oil, gas or related wells

SITE NAME: Jamul Indian Village Access	CLIENT: Natural Investigations
ADDRESS: 14100 Campo Road Jamul CA 91935	CONTACT: G.O. Graening
LAT/LONG: 32.7054 / 116.8697	INQUIRY #: 3580276.1s DATE: April 18, 2013 12:29 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation		Database	EDR ID Number
1 **NNW** **1/2 - 1 Mile** **Higher**	**Click here for full text details**	**FRDS PWS**	**CA3700174**

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: CA Radon

Radon Test Results

Zipcode	Num Tests	> 4 pCi/L
91935	6	0

Federal EPA Radon Zone for SAN DIEGO County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for SAN DIEGO COUNTY, CA

Number of sites tested: 30

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.677 pCi/L	100%	0%	0%
Living Area - 2nd Floor	0.400 pCi/L	100%	0%	0%
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Health Services
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

RADON

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

STREET AND ADDRESS INFORMATION

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APPENDIX 6

JAMUL GAMING FACILITY
PRELIMINARY HYDRAULIC STUDY

SDE

Engineering | Surveying | Planning

Annie S. Aguilar, PE | **Ivan R. Fox,** PE | **Barry L. Munson,** PE, QSD | **Andrew G. Karydes,** PLS | **Laurie Simon,** Principal Planner

SDE 5481

January 28, 2014

Brandon T. Moore
Marnell Companies
222 Via Marnell Way
Las Vegas, Nevada 89119

Subject: Preliminary Hydraulic Analysis for Northerly Bridge

Reference: 1. *Willow Creek Bridge Locations, Hollywood Casino-Jamul, California*, prepared by Marnell Architecture, dated January 16, 2014.

2. *Jamul Casino and Resort Project, Hydrology and Drainage & Flood Storage Study*, prepared by Martin and Ziemniak, dated September 9, 2006.

Mr. Moore,

SDE has performed a preliminary hydraulic analysis for the northerly bridge crossing proposed for the Hollywood Casino as shown on Reference 1. This analysis was performed to compare the existing and proposed water surface elevations at the northerly property line to determine if bridge construction affected upstream (offsite) water surface conditions during peak flow events. The peak flow used for the analysis was 392 cfs, which is from Reference 2.

The analysis for the existing condition consisted of analyzing the existing asphalt road crossing Willow Creek and culvert (36" cmp) in the flow line of Willow Creek. This section was taken approximately 25' south of the northerly property line of the project site. The road section was modeled as a parabolic weir and the culvert using inlet control. Our analysis indicated that the headwater elevation upstream from the weir/culvert will be approximately 888.9, which is 1.8 feet above the low point in the weir. This indicates that the headwater upstream from the weir will create ponding northerly of the north property line of the project site in excess of 100'.

The bridge crossing for the proposed condition was modeled along the northerly property line as an irregular channel with a bridge abutment within the channel on the easterly side. The analysis assumed that the abutment is a constriction that creates a ponded condition upstream. This is a conservative assumption since a majority of the channel section is in its natural state and flow in the westerly side of the creek is not affected by the abutment. The headwater for the ponded condition upstream from the bridge was determined to be 888.1.

Based on a comparison of the analyses of existing and proposed conditions, the headwater for the weir crossing in the existing condition is higher and controls. This indicates that any backwater effects, or increase of headwater from the bridge abutment, will be submerged below the weir headwater and any upstream effects from the bridge abutment will be minimal.

In addition, we have reviewed the proposed southerly bridge crossing along the south property line. The abutments do not encroach into the channel on either side and will have no downstream effects on the flow. Further, the CIDH piles represent a small encroachment relative to the entire cross section of flow and will not create any significant impact to the flow downstream from the site.

If you have any questions, please do not hesitate to contact our office.

San Dieguito Engineering, Inc.
Sincerely,

Barry L. Munson, PE
Principal Engineer



SAN DIEGUITO ENGINEERING, INC.
sdeinc.com
760.753.5525 | 760.943.8236 fax | 4407 Manchester Avenue | Suite 105 | Encinitas, CA 92024

JAMVL

HYDROLOGIC STUDY

WEIR AND PIPE ANALYSIS

PROJECT NAME:	Jamul Indian Village	
PROJECT NUMBER:	5481	
DATE:	1/21/2014	
COMMENT:		
COORD:	N32°42'	E116°52'
Q100 (cfs)	392	
Weir Coeff "C")	2.005	

Elev	T	Hm	Q weir <1>	Q pipe <2>	Qtotal	
889.0	69	1.8	334	77	411	Solution between 88.9 and 89.0=
888.9	67	1.7	298	76	374	Headwater Elevation
888.8	64	1.6	260	75	335	
888.7	62	1.5	228	73	301	
888.6	59	1.4	196	72	268	
888.5	57	1.3	169	71	240	
888.4	55	1.2	145	70	215	
888.3	52	1.1	120	69	189	
888.2	50	1	100	67	167	
888.1	47	0.9	80	66	146	
888.0	45	0.8	65	65	130	
887.2	0	0	0	58	58	Low Point in Dip
882.4	0	0	0	0	0	Inlet 36" CMP

<1> Q=C x T x Hm^1.5

<2> From Bureau of Public Roads Inlet Control Chart

Worksheet for Section 115+00 w/bridge 20140116

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01139	ft/ft
Discharge	392.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+90.00	898.00
0+90.01	891.30
0+91.60	891.00
0+98.30	890.00
1+00.00	889.28
1+14.85	887.74
1+36.30	886.62
1+46.61	883.39
1+57.99	885.19
1+58.00	898.00

LOW PT NORTH R
886.94
POST DEV

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+90.00, 898.00)	(0+90.01, 891.30)	0.013
(0+90.01, 891.30)	(1+57.99, 885.19)	0.030
(1+57.99, 885.19)	(1+58.00, 898.00)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	3.55	ft

Worksheet for Section 115+00 w/bridge 20140116

Results

Elevation Range	883.39 to 898.00 ft		
Flow Area		50.99	ft²
Wetted Perimeter		30.14	ft
Hydraulic Radius		1.69	ft
Top Width		27.75	ft
Normal Depth		3.55	ft
Critical Depth		3.55	ft
Critical Slope		0.01139	ft/ft
Velocity		7.69	ft/s
Velocity Head		0.92	ft
Specific Energy		4.46	ft
Froude Number		1.00	
Flow Type	Subcritical		

← $\frac{V_n^2}{2g}$

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.55	ft
Critical Depth	3.55	ft
Channel Slope	0.01139	ft/ft
Critical Slope	0.01139	ft/ft

* $HW_{U/S} = FL + D_n + (1 + k_e)\frac{V_n^2}{2g}$

$= 883.39 + 3.55 + (1+0.3)\,0.92$

$= 898.14$ OK < 898.9 WEIR TAILWATER

* ASSUMED FULL PONDED CONDITION → WORST CASE

Cross Section for Section 115+00 w/bridge 20140116

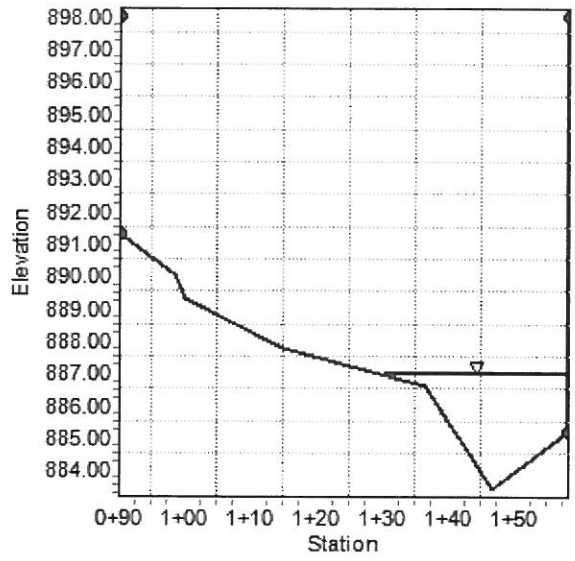
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01139	ft/ft
Normal Depth	3.55	ft
Discharge	392.00	ft^3/s

Cross Section Image



Worksheet for Section 115+00 Pre-Development

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02130	ft/ft
Discharge	392.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)	
0+84.50	892.00	
0+91.60	891.00	
0+98.30	890.00	
1+00.00	889.28	
1+14.85	887.74	
1+36.30	886.62	
1+46.61	883.39	NORTH R. LOW POINT WS = 886.38
1+59.86	885.55	
1+69.70	888.25	
1+70.40	889.00	
1+72.30	890.00	
1+74.30	891.00	
1+75.40	892.00	

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+84.50, 892.00)	(1+75.40, 892.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Worksheet for Section 115+00 Pre-Development

Results

Normal Depth		2.99	ft
Elevation Range	883.39 to 892.00 ft		
Flow Area		40.75	ft²
Wetted Perimeter		26.54	ft
Hydraulic Radius		1.54	ft
Top Width		25.80	ft
Normal Depth		2.99	ft
Critical Depth		3.45	ft
Critical Slope		0.01147	ft/ft
Velocity		9.62	ft/s
Velocity Head		1.44	ft
Specific Energy		4.43	ft
Froude Number		1.35	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.99	ft
Critical Depth	3.45	ft
Channel Slope	0.02130	ft/ft
Critical Slope	0.01147	ft/ft

Cross Section for Section 115+00

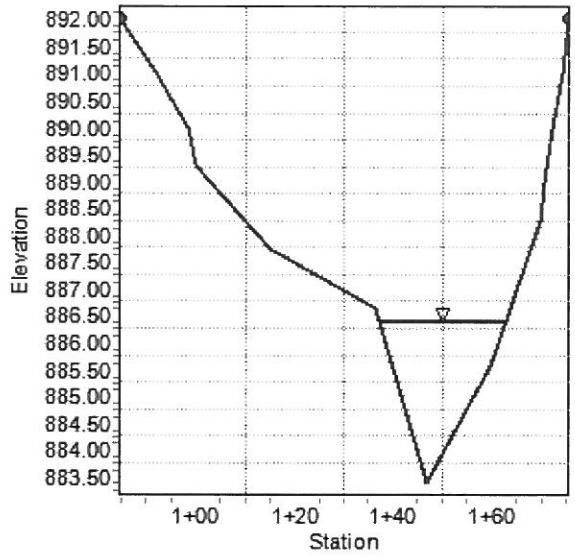
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

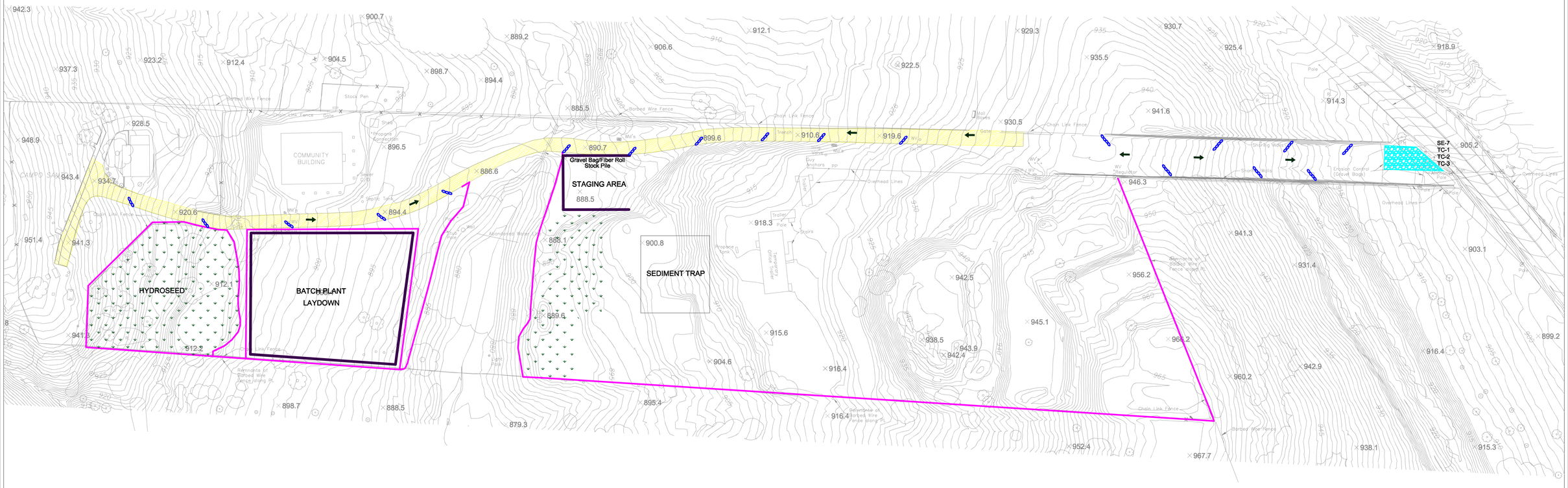
Channel Slope	0.02130	ft/ft
Normal Depth	2.99	ft
Discharge	392.00	ft^3/s

Cross Section Image



APPENDIX 7

JAMUL GAMING FACILITY
SOIL EROSION PLAN



LEGEND

- SE-4 Reinforced Silt Fence
- SE-5 Fiber Roll
- TC-1 Construction Entrance
- Hydroseed
- Stabilized Roadway
- Gravel Bag Berm - 2 Bag High
- Drainage

Hollywood Casino

Jamul Indian Reservation

PROJECT #	PROJECT MANAGER	DRAWN BY	DATE
	Wes Udwin	Samuel Scroggin	Dec 23, 2013
SCALE	DIVISION	DRAWING TITLE	SHEET OF
NOT TO SCALE	Erosion Control	Erosion Plan Phase 2	1 1

GST
EROSION CONTROL DIVISION

APPENDIX 8

JAMUL GAMING FACILITY
AIR QUALITY DATA SHEETS

2/24/2014 3:06:53 PM

Urbemis 2007 Version 9.2.4

Combined Summer Emissions Reports (Pounds/Day)

File Name: C:\Noise & Air Tools\Models\Urbemis 2007 9.2.4\JIC Gaming - Grading 40 miles.urb924

Project Name: Jamual Gaming Facility - Grading

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2014 TOTALS (lbs/day unmitigated)	20.68	252.54	96.13	0.45	431.90	9.41	441.31	90.40	8.66	99.06	53,448.52
2014 TOTALS (lbs/day mitigated)	20.68	241.28	96.13	0.45	89.75	9.41	99.16	18.94	8.66	27.60	53,448.52

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

2/24/2014 3:06:53 PM

Time Slice 2/3/2014-9/3/2014 Active Days: 183	20.68	252.54	96.13	0.45	431.90	9.41	441.31	90.40	8.66	99.06	53,448.52
Mass Grading 02/03/2014-09/03/2014	20.68	252.54	96.13	0.45	431.90	9.41	441.31	90.40	8.66	99.06	53,448.52
Mass Grading Dust	0.00	0.00	0.00	0.00	430.22	0.00	430.22	89.85	0.00	89.85	0.00
Mass Grading Off Road Diesel	4.72	37.54	17.38	0.00	0.00	1.46	1.46	0.00	1.34	1.34	5,594.29
Mass Grading On Road Diesel	15.92	214.91	77.01	0.44	1.67	7.95	9.61	0.55	7.31	7.86	47,619.15
Mass Grading Worker Trips	0.05	0.09	1.74	0.00	0.01	0.01	0.02	0.00	0.01	0.01	235.08

Phase Assumptions

Phase: Mass Grading 2/3/2014 - 9/3/2014 - Site Grading

Total Acres Disturbed: 5

Maximum Daily Acreage Disturbed: 1.25

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 3540 cubic yards/day; Offsite Cut/Fill: 0 cubic yards/day

On Road Truck Travel (VMT): 11827.88

Off-Road Equipment:

1 Crawler Tractors (310 hp) operating at a 0.64 load factor for 9.6 hours per day

1 Excavators (428 hp) operating at a 0.57 load factor for 9.6 hours per day

1 Graders (135 hp) operating at a 0.61 load factor for 9.6 hours per day

1 Skid Steer Loaders (44 hp) operating at a 0.55 load factor for 9.6 hours per day

1 Tractors/Loaders/Backhoes (270 hp) operating at a 0.55 load factor for 9.6 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 9.6 hours per day

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

Time Slice 2/3/2014-9/3/2014 Active Days: 183	20.68	241.28	96.13	0.45	89.75	9.41	99.16	18.94	8.66	27.60	53,448.52
Mass Grading 02/03/2014-09/03/2014	20.68	241.28	96.13	0.45	89.75	9.41	99.16	18.94	8.66	27.60	53,448.52
Mass Grading Dust	0.00	0.00	0.00	0.00	88.07	0.00	88.07	18.39	0.00	18.39	0.00
Mass Grading Off Road Diesel	4.72	26.28	17.38	0.00	0.00	1.46	1.46	0.00	1.34	1.34	5,594.29
Mass Grading On Road Diesel	15.92	214.91	77.01	0.44	1.67	7.95	9.61	0.55	7.31	7.86	47,619.15
Mass Grading Worker Trips	0.05	0.09	1.74	0.00	0.01	0.01	0.02	0.00	0.01	0.01	235.08

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 2/3/2014 - 9/3/2014 - Site Grading

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Graders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Excavators, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Skid Steer Loaders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Crawler Tractors, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

2/24/2014 3:07:02 PM

Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Noise & Air Tools\Models\Urbemis 2007 9.2.4\JIC Gaming - Grading 40 miles.urb924

Project Name: Jamual Gaming Facility - Grading

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2014 TOTALS (tons/year unmitigated)	1.89	23.11	8.80	0.04	39.52	0.86	40.38	8.27	0.79	9.06	4,890.54
2014 TOTALS (tons/year mitigated)	1.89	22.08	8.80	0.04	8.21	0.86	9.07	1.73	0.79	2.53	4,890.54
Percent Reduction	0.00	4.46	0.00	0.00	79.22	0.00	77.53	79.04	0.00	72.14	0.00

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

2014	1.89	23.11	8.80	0.04	39.52	0.86	40.38	8.27	0.79	9.06	4,890.54
Mass Grading 02/03/2014-09/03/2014	1.89	23.11	8.80	0.04	39.52	0.86	40.38	8.27	0.79	9.06	4,890.54
Mass Grading Dust	0.00	0.00	0.00	0.00	39.37	0.00	39.37	8.22	0.00	8.22	0.00
Mass Grading Off Road Diesel	0.43	3.43	1.59	0.00	0.00	0.13	0.13	0.00	0.12	0.12	511.88
Mass Grading On Road Diesel	1.46	19.66	7.05	0.04	0.15	0.73	0.88	0.05	0.67	0.72	4,357.15
Mass Grading Worker Trips	0.00	0.01	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.51

Phase Assumptions

Phase: Mass Grading 2/3/2014 - 9/3/2014 - Site Grading

Total Acres Disturbed: 5

Maximum Daily Acreage Disturbed: 1.25

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 3540 cubic yards/day; Offsite Cut/Fill: 0 cubic yards/day

On Road Truck Travel (VMT): 11827.88

Off-Road Equipment:

1 Crawler Tractors (310 hp) operating at a 0.64 load factor for 9.6 hours per day

1 Excavators (428 hp) operating at a 0.57 load factor for 9.6 hours per day

1 Graders (135 hp) operating at a 0.61 load factor for 9.6 hours per day

1 Skid Steer Loaders (44 hp) operating at a 0.55 load factor for 9.6 hours per day

1 Tractors/Loaders/Backhoes (270 hp) operating at a 0.55 load factor for 9.6 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 9.6 hours per day

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

2014	1.89	22.08	8.80	0.04	8.21	0.86	9.07	1.73	0.79	2.53	4,890.54
Mass Grading 02/03/2014-09/03/2014	1.89	22.08	8.80	0.04	8.21	0.86	9.07	1.73	0.79	2.53	4,890.54
Mass Grading Dust	0.00	0.00	0.00	0.00	8.06	0.00	8.06	1.68	0.00	1.68	0.00
Mass Grading Off Road Diesel	0.43	2.40	1.59	0.00	0.00	0.13	0.13	0.00	0.12	0.12	511.88
Mass Grading On Road Diesel	1.46	19.66	7.05	0.04	0.15	0.73	0.88	0.05	0.67	0.72	4,357.15
Mass Grading Worker Trips	0.00	0.01	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.51

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 2/3/2014 - 9/3/2014 - Site Grading

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Graders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Excavators, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Skid Steer Loaders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Crawler Tractors, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

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Urbemis 2007 Version 9.2.4

Combined Summer Emissions Reports (Pounds/Day)

File Name: C:\Noise & Air Tools\Models\Urbemis 2007 9.2.4\JIC Gaming - Grading 60 miles.urb924

Project Name: Jamual Gaming Facility - Grading

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2014 TOTALS (lbs/day unmitigated)	21.10	258.27	98.18	0.46	318.66	9.62	328.29	66.76	8.85	75.61	54,718.36
2014 TOTALS (lbs/day mitigated)	21.10	247.01	98.18	0.46	66.60	9.62	76.23	14.12	8.85	22.97	54,718.36

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

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Time Slice 2/3/2014-9/3/2014 Active Days: 183	**21.10**	**258.27**	**98.18**	**0.46**	**318.66**	**9.62**	**328.29**	**66.76**	**8.85**	**75.61**	**54,718.36**
Mass Grading 02/03/2014-09/03/2014	21.10	258.27	98.18	0.46	318.66	9.62	328.29	66.76	8.85	75.61	54,718.36
Mass Grading Dust	0.00	0.00	0.00	0.00	316.94	0.00	316.94	66.19	0.00	66.19	0.00
Mass Grading Off Road Diesel	4.72	37.54	17.38	0.00	0.00	1.46	1.46	0.00	1.34	1.34	5,594.29
Mass Grading On Road Diesel	16.34	220.64	79.07	0.45	1.71	8.16	9.87	0.56	7.51	8.07	48,889.00
Mass Grading Worker Trips	0.05	0.09	1.74	0.00	0.01	0.01	0.02	0.00	0.01	0.01	235.08

Phase Assumptions

Phase: Mass Grading 2/3/2014 - 9/3/2014 - Site Grading

Total Acres Disturbed: 5

Maximum Daily Acreage Disturbed: 1.25

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 2580 cubic yards/day; Offsite Cut/Fill: 0 cubic yards/day

On Road Truck Travel (VMT): 12143.29

Off-Road Equipment:

1 Crawler Tractors (310 hp) operating at a 0.64 load factor for 9.6 hours per day

1 Excavators (428 hp) operating at a 0.57 load factor for 9.6 hours per day

1 Graders (135 hp) operating at a 0.61 load factor for 9.6 hours per day

1 Skid Steer Loaders (44 hp) operating at a 0.55 load factor for 9.6 hours per day

1 Tractors/Loaders/Backhoes (270 hp) operating at a 0.55 load factor for 9.6 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 9.6 hours per day

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

Time Slice 2/3/2014-9/3/2014 Active Days: 183	**21.10**	247.01	**98.18**	**0.46**	66.60	**9.62**	76.23	14.12	**8.85**	22.97	**54,718.36**
Mass Grading 02/03/2014-09/03/2014	21.10	247.01	98.18	0.46	66.60	9.62	76.23	14.12	8.85	22.97	54,718.36
Mass Grading Dust	0.00	0.00	0.00	0.00	64.88	0.00	64.88	13.55	0.00	13.55	0.00
Mass Grading Off Road Diesel	4.72	26.28	17.38	0.00	0.00	1.46	1.46	0.00	1.34	1.34	5,594.29
Mass Grading On Road Diesel	16.34	220.64	79.07	0.45	1.71	8.16	9.87	0.56	7.51	8.07	48,889.00
Mass Grading Worker Trips	0.05	0.09	1.74	0.00	0.01	0.01	0.02	0.00	0.01	0.01	235.08

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 2/3/2014 - 9/3/2014 - Site Grading

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Graders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Excavators, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Skid Steer Loaders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Crawler Tractors, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Noise & Air Tools\Models\Urbemis 2007 9.2.4\JIC Gaming - Grading 60 miles.urb924

Project Name: Jamual Gaming Facility - Grading

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2014 TOTALS (tons/year unmitigated)	1.93	23.63	8.98	0.04	29.16	0.88	30.04	6.11	0.81	6.92	5,006.73
2014 TOTALS (tons/year mitigated)	1.93	22.60	8.98	0.04	6.09	0.88	6.97	1.29	0.81	2.10	5,006.73
Percent Reduction	0.00	4.36	0.00	0.00	79.10	0.00	76.78	78.85	0.00	69.62	0.00

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

2014	1.93	23.63	8.98	0.04	29.16	0.88	30.04	6.11	0.81	6.92	5,006.73
Mass Grading 02/03/2014-09/03/2014	1.93	23.63	8.98	0.04	29.16	0.88	30.04	6.11	0.81	6.92	5,006.73
Mass Grading Dust	0.00	0.00	0.00	0.00	29.00	0.00	29.00	6.06	0.00	6.06	0.00
Mass Grading Off Road Diesel	0.43	3.43	1.59	0.00	0.00	0.13	0.13	0.00	0.12	0.12	511.88
Mass Grading On Road Diesel	1.50	20.19	7.23	0.04	0.16	0.75	0.90	0.05	0.69	0.74	4,473.34
Mass Grading Worker Trips	0.00	0.01	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.51

Phase Assumptions

Phase: Mass Grading 2/3/2014 - 9/3/2014 - Site Grading

Total Acres Disturbed: 5

Maximum Daily Acreage Disturbed: 1.25

Fugitive Dust Level of Detail: Low

Onsite Cut/Fill: 2580 cubic yards/day; Offsite Cut/Fill: 0 cubic yards/day

On Road Truck Travel (VMT): 12143.29

Off-Road Equipment:

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1 Graders (135 hp) operating at a 0.61 load factor for 9.6 hours per day

1 Skid Steer Loaders (44 hp) operating at a 0.55 load factor for 9.6 hours per day

1 Tractors/Loaders/Backhoes (270 hp) operating at a 0.55 load factor for 9.6 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 9.6 hours per day

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

2014	1.93	22.60	8.98	0.04	6.09	0.88	6.97	1.29	0.81	2.10	5,006.73
Mass Grading 02/03/2014-09/03/2014	1.93	22.60	8.98	0.04	6.09	0.88	6.97	1.29	0.81	2.10	5,006.73
Mass Grading Dust	0.00	0.00	0.00	0.00	5.94	0.00	5.94	1.24	0.00	1.24	0.00
Mass Grading Off Road Diesel	0.43	2.40	1.59	0.00	0.00	0.13	0.13	0.00	0.12	0.12	511.88
Mass Grading On Road Diesel	1.50	20.19	7.23	0.04	0.16	0.75	0.90	0.05	0.69	0.74	4,473.34
Mass Grading Worker Trips	0.00	0.01	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.51

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 2/3/2014 - 9/3/2014 - Site Grading

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:

PM10: 69% PM25: 69%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Graders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Excavators, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Skid Steer Loaders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Crawler Tractors, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

APPENDIX 9

CALIFORNIA GNATCATCHER SURVEYS;
QUINO CHECKERSPOT BUTTERFLY; HERMES COPPER BUTTERFLY

APPENDIX 9A

California Gnatcatcher

JAMUL RANCHERIA ACCESSS PROJECT
ROADWAYS AND PROPOSED ROUTES
JAMUL, SAN DIEGO COUNTY, CALIFORNIA

COASTAL CALIFORNIA GNATCATCHER (*POLIOPTILA CALIFORNICA CALIFORNICA*) PRESENCE/ABSENCE SURVEY

Study Area 3 (20 acres) Lat, Long: 32.707094, -116.870897

Prepared for

Joe Broadhead
Environmental Data Systems, Inc.
1007 7th Street, Suite 308 Sacramento CA 95814
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Prepared by

Michael U. Evans
Pacific Southwest Biological Services, Inc.
Post Office Box 985
National City CA 91951-0985
Telephone (619) 477-5333
Facsimile (619) 477-5380
E-mail: bio@psbs.com

PSBS # T707E

May 12, 2011



Michael U. Evans, M. Sc., Permittee
Sec.10. (a)(1)(A) permit # TE830219-3

JAMUL ACCESSS PROJECT
JAMUL RANCHERIA ACCESSS PROJECT
ROADWAYS AND PROPOSED ROUTES
JAMUL, SAN DIEGO COUNTY, CALIFORNIA
STUDY AREA 3 (20 ACRES)

COASTAL CALIFORNIA GNATCATCHER (*POLIOPTILA CALIFORNICA CALIFORNICA*) PRESENCE/ABSENCE SURVEY

Summary

A presence/absence survey for the Threatened California Gnatcatcher (*Polioptila californica californica*) (Gnatcatcher) was performed on three different parcels in close proximity: on a 4-acre parcel (abandoned fire station site), a 6-acre parcel (Jamul Rancheria) and a separate area proposed for a road corridor (approximately 20-acres, most of which is paved—see attached study area maps). At the request of the project client, Dr. Joe Broadhead of Environmental Data Systems, a separate report for each of the three parcels has been created, including the following parcels/areas: This report addresses portions of the 20-acre parcel (approximate location [Lat, Long]: 32.707094, -116.870897), including areas adjacent to Campo Road/State Route (SR) 94 offsite from the parcel itself.

This survey was carried out according the protocol for such surveys for the Coastal California Gnatcatcher established by the U. S. Fish and Wildlife Service (Service 1997). Gnatcatchers were not detected from or within this parcel.

Purpose of the Study

The purpose of the survey was to determine if the Coastal California Gnatcatcher is present within the study area.

Project Location

This report addresses portions of the 20-acre parcel and includes an irregular polygon, mostly along both sides of Campo Road (SR 94), generally from Short Court to the north (approximately 1,550 ft north of Melody Rd, Lat, Long = 32.711378, -116.87093) to an area approximately 2,880 ft south of Melody Rd), to about Lat, Long = 32.700897, -116.86493; also along Melody Rd, approximately 1,035 ft feet east of the intersection of Melody Rd and Campo Rd, at a point at approximately Lat, Long = 32.706801, -116.87420, and an irregular corridor traversing from that point, south of Melody Rd, and then east to Campo Road at the 4-acre parcel previously described.

Project Description

No specific project has been defined at this time.

Survey Methods

Biologist Michael U. Evans (Endangered Species Act, Sec.10. (a)(1)(A) permit # TE830219-3) performed the survey, which was carried out according to Service California Gnatcatcher presence/absence survey protocol (Service 1997). The survey schedule and field conditions during the field visits are summarized below.

DATE	TIME	FIELD CONDITIONS
4/17/11	0745-0900	52.70-56.8°F, dense fog to sunny haze, <5% clouds, wind 1.7 mph (SW) to 2.7 mph (W)
4/27/11	0900-1045	67.5-69°F, sunny, wind 2 mph (W)
5/5/11	0810-0945	76-86.5°F, 10% cloud cover, wind 0.9-0 mph from (SW)

Field methods consisted of walking slowly through appropriate habitat (or watching from adjacent viewpoints) while watching and listening for wildlife, as described by the protocol (Service 1997). A taped vocalization of the Gnatcatcher was occasionally played. "Pishing," a technique commonly used to attract the interest of passerines and draw them into view, was occasionally employed. Binoculars (10x40) were used to assist in the detection and identification of wildlife. Generally, wildlife detected was recorded in written field notes, augmented by notation with software on an Apple iPhone with GPS capabilities, which allowed recordation of the locations and numbers of various species observed (Birdwatcher's Diary by Stevens Creek Software). The site was of such size that the entire property could be covered on each visit, although routes taken were not identical.

Definitions

Vegetation Communities

Vegetation habitats or communities are assemblages of plant species that usually coexist in the same area. The classification of vegetation communities is based upon the life form of the dominant species within the community and the associated flora. Nomenclature for vegetation communities follows Holland's Preliminary Descriptions of the Terrestrial Natural Communities of California (1986), as modified by Oberbauer (1996).

Species Nomenclature

The scientific nomenclature used in this report is from the following standard references: vascular plants (Beauchamp 1986, Hickman 1993); vegetation communities (Holland 1986, Oberbauer 1996); birds (American Ornithologists' Union 1998 and Chesser, et al 2010); and mammals (Jameson and Peeters 2004).

Survey Results

Site Physiography

Geology mapped for the area of the road and routes is Mesozoic granodioritic rocks in the northern portion of the study area and Jurassic-Triassic Metavolcanic rocks in the southern portion (Strand 1962).

The soils mapped for the area are: Las Posas fine sandy loam, 15 to 30 percent slopes (LpE2) in the village area, Las Posas fine sandy loam, 5 to 9 percent (LpC2) in the eastern annual grassland area, Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes (CmrG) in the western portion of the northwestern parcel, Exchequer rocky silt loam, 30 to 70 percent (ExG) at the southern end of the northwestern parcel, Fallbrook sandy loam, 15 to 30 percent

slopes, eroded (FaE2) in the northwestern and northern parcels, Wyman loam, 5 to 9 percent slope (WmC) in the field north of Melody Road, and Ramona sandy loam , 5 to 9 percent slopes eroded (RaC2) in the north western parcel (Bowman 1973). The elevation range of the parcels is 1139 feet at the southwestern peak and 873 feet at the downstream end of the drainage through the village.

Rainfall prior to the survey was above normal rainfall averages for the 2010 – 2011 season.

Botanical Resources

Vegetation Communities

The site consists of an Indian Reservation with temporary office buildings placed near former residential structures, which have been removed. Additionally, the historic Saint Francis Xavier cemetery and associated building exist on the site. Cattle are actively grazing on a large penned field that includes remnant scattered Coast Live Oaks and a discrete Oak Riparian Woodland that runs through the northern portion of the property east from Melody Road, generally fronting on SR94. The results of heavy grazing have created a savanna-like habitat on the majority of the property with scattered oaks and boulders that are not typical habitat for California Gnatcatchers because of the absence of shrubs, particularly Artemisia californica and Flattop Buckwheat, which typically support Gnatcatchers.

Coastal Sage Scrub

The open field area has a very disturbed remnant of Coastal Sage Scrub elements, i.e., Flat-top Buckwheat/California Sagebrush and Laurel-leaf Sumac. Past and current cattle grazing has destroyed the structural nature of this vegetation, leaving a field of scattered, isolated shrubs amidst open areas charged with manure and a thriving infestation of Filaree (*Erodium moschatum*).

Riparian Woodland

The principal drainage through the northern and northwestern parcel has a woodland of Arroyo and Black Willows (*Salix lasiolepis, S. gooddingii*), along with Coast Live and Engelmann Oaks (*Quercus agrifolia, Q. engelmannii*). The woodland varies in its width, from a narrow 5-foot wide channel to a luxuriant woodland 90-feet wide. The understory has been sterilized by the cattle grazing. The area of the crossing is limited to Coast Live Oaks and Black Willow.

Mule-fat Scrub

One of the reaches of the drainages on the open field in the area of the proposed route crossing has a depauperate cover of Mule-fat (*Baccharis salicifolia*) and lies upstream of the more diverse Willow Riparian Woodland.

Disturbed/Developed Areas

The majority of the habitat within the 10-foot wide zone observed along State Route 94 and Melody Lane is highly disturbed by road maintenance activities. Most of the plants are non-native annuals.

Zoological Resources

Fauna

The fauna observed (combined from all three survey areas) reflected those typically found in the southern coastal foothills of San Diego County, in the location habitats in early spring (see Appendix 1). These included one amphibian, five species of reptiles, 39 species of birds and four species of mammals

Sensitive Fauna

No fauna on the federal or California endangered or threatened species lists were observed (no Coastal California Gnatcatchers were observed).

Discussion

Three presence/absence Gnatcatcher surveys were conducted by federally-permitted biologists on the Jamul Rancheria Tribal lands and/or adjacent areas in 2000, 2001 and 2006. These surveys did not reveal any Gnatcatchers on the project site or on Tribal lands. However, the 2001 survey did reveal two Gnatcatchers in the Ecological Reserve adjacent to the southern boundary of project site. Examination of the habitats on the Tribal lands and on the adjacent Ecological Reserve was made (Pacific Southwest 2002) to determine potential habitat suitability for Gnatcatcher and to determine any potential indirect impact to Gnatcatchers from the construction and use of the proposed project. The investigation revealed potential habitat for the Gnatcatcher within 50 feet of the proposed project site. A single male Gnatcatcher was observed on 29 November 2006 and two Gnatcatchers were observed on 6 December 2006 on Reserve lands south of the Rancheria village (Figure 3). No Gnatcatchers were observed on 13 December, although it is assumed they were still present. All the Gnatcatcher observations were approximately 800 feet south of the village boundary and within the confluence of several shallow drainages; south of the Coast Live Oak Riparian Forest mentioned above. The location was recorded on a Global Positioning System (GPS) receiver as: 32.70076° N; -116.87001° W [NAD 83]. The two Gnatcatchers were seen together and identified as male (with male plumage characteristics) and a female (identified by the predominance of brown wash in the back and lower flanks). The pair was found in sparse Flat-top Buckwheat, Coast Sagebrush, Spiny Redberry (*Rhamnus crocea*), California Everlasting (*Gnaphalium californicum*), and Fennel (*Foeniculum vulgare*), where Diegan Coastal Sage Scrub transitions to Non-native Grassland (32.70076, -116.87001).

During the present survey, the margins of the survey area were also carefully surveyed for Gnatcatchers and none were detected. It is concluded that Gnatcatchers are not on the surveyed area or on the immediately surrounding areas.

Certification

I hereby certify that the statements furnished above and in attached exhibits present the data and information required by the Service protocol for a presence/absence survey for the Coastal California Gnatcatcher (*Polioptila californica californica*) and that the facts, statements and information presented here are true and correct to the best of my knowledge and belief.

DATE: May 12, 2011

SIGNED



Michael U. Evans
Sec.10. (a)(1)(A) permit # TE830219-3

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Appendix A. Observed Species List – Fauna

INVERTEBRATES

Lepidoptera (Butterflies and Moths)

Nymphalidae --Brush-footed Butterflies

Mourning Cloak	*Nymphalis antiopa*

Pieridae--Whites, Sulfurs, Marbles, and Orange-tips

Common White	*Pontia protodice*
Sara Orangetip	*Anthocharis sara*

Hymenoptera (Ants, Wasps and Bees)

Formicaridae--Ants

California Harvester Ant	*Pogonomyrmex californicus*

AMPHIBIANS

Bufonidae--True Toads

Western Toad	*Bufo boreas*

REPTILES

Phrynosomatidae --North American spiny lizards

Granite Spiny Lizard	*Sceloporus orcutti*
Western Fence Lizard	*Sceloporus occidentalis*
Side-blotched Lizard	*Uta stansburiana*

Teiidae (Whiptails and Relatives)

Orange-throated Whiptail	*Aspidoscelis hyperythra*

BIRDS

Anseriformes - Screamers, Swans, Geese, and Ducks

Anatidae - Ducks, Geese, and Swans

*Mallard	*Anas platyrhynchos*

Falconiformes - American Vultures and Diurnal Birds of Prey

Cathartidae - New World Vultures

Turkey Vulture	*Cathartes aura*

Accipitridae - Hawks, Kites, Eagles, and Allies

Cooper's Hawk	*Accipiter cooperii*
Red-shouldered Hawk	*Buteo lineatus**
Red-tailed Hawk	*Buteo jamaicensis*

Columbiformes - Pigeons, and Doves

Columbidae - Pigeons and Doves

Mourning Dove	*Zenaida macroura*

Cuculiformes - Cuckoos and Allies

Cuculidae - Cuckoos, Roadrunners, and Anis

Greater Roadrunner	*Geococcyx californianus*

Appendix A. Observed Species List – Fauna (continued)

Apodiformes - Swifts, and Hummingbirds

Apodidae - Swifts	
White-throated Swift	*Aeronautes saxatalis*
Trochilidae - Hummingbirds	
Anna's Hummingbird	*Calypte anna*
Costa's Hummingbird	*Calypte costae*

Piciformes - Puffbirds, Jacamars, Toucans, Woodpeckers, and Allies

Picidae - Woodpeckers and Allies	
Nuttall's Woodpecker	*Picoides nuttallii*

Passeriformes - Passerine Birds

Tyrannidae - Tyrant Flycatchers	
Black Phoebe	*Sayornis nigricans*
Say's Phoebe	*Sayornis saya*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Cassin's Kingbird	*Tyrannus vociferans*
Western Kingbird	*Tyrannus verticalis*
Corvidae - Crows and Jays	
Western Scrub-Jay	*Aphelocoma californica*
American Crow	*Corvus brachyrhynchos*
Common Raven	*Corvus corax*
Hirundinidae - Swallows	
Cliff Swallow	*Petrochelidon pyrrhonota*
Aegithalidae - Long-tailed Tits and Bushtits	
Bushtit	*Psaltriparus minimus*
Troglodytidae - Wrens	
Bewick's Wren	*Thryomanes bewickii*
House Wren	*Troglodytes aedon*
Turdidae - Thrushes	
Western Bluebird	*Sialia mexicana*
Timaliidae - Babblers	
Wrentit	*Chamaea fasciata*
Mimidae - Mockingbirds and Thrashers	
Northern Mockingbird	*Mimus polyglottos*
Sturnidae - Starlings	
European Starling	*Sturnus vulgaris*
Parulidae - Wood-Warblers	
Yellow-rumped Warbler	*Dendroica coronata*
Hermit Warbler	*Dendroica occidentalis*
Yellow-breasted Chat	*Icteria virens*

Appendix A. Observed Species List – Fauna (continued)

Emberizidae - Emberizids	
Spotted Towhee	*Pipilo maculatus*
California Towhee	*Pipilo crissalis*
Lark Sparrow	*Chondestes grammacus*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
White-crowned Sparrow	*Zonotrichia leucophrys*
Golden-crowned Sparrow	*Zonotrichia atricapilla*
Cardinalidae - Cardinals and Allies	
Black-headed Grosbeak	*Pheucticus melanocephalus*
Lazuli Bunting	*Passerina amoena*
Icteridae - Blackbirds	
Hooded Oriole	*Icterus cucullatus*
Bullock's Oriole	*Icterus bullockii*
Fringillidae - Fringilline and Cardueline Finches and Allies	
House Finch	*Carpodacus mexicanus*
Lesser Goldfinch	*Spinus psaltria*

MAMMALS

Leporidae--Rabbits and Hares	
Desert Cottontail	*Sylvilagus audubonii*
Sciuridae--Squirrels, Chipmunks, and Marmots	
California Ground Squirrel	*Spermophilus beecheyi*
Geomyidae--Pocket Gophers	
Botta's Pocket Gopher	*Thomomys bottae*
Canidae--Foxes, Wolves, and Relatives	
Coyote	*Canis latrans*

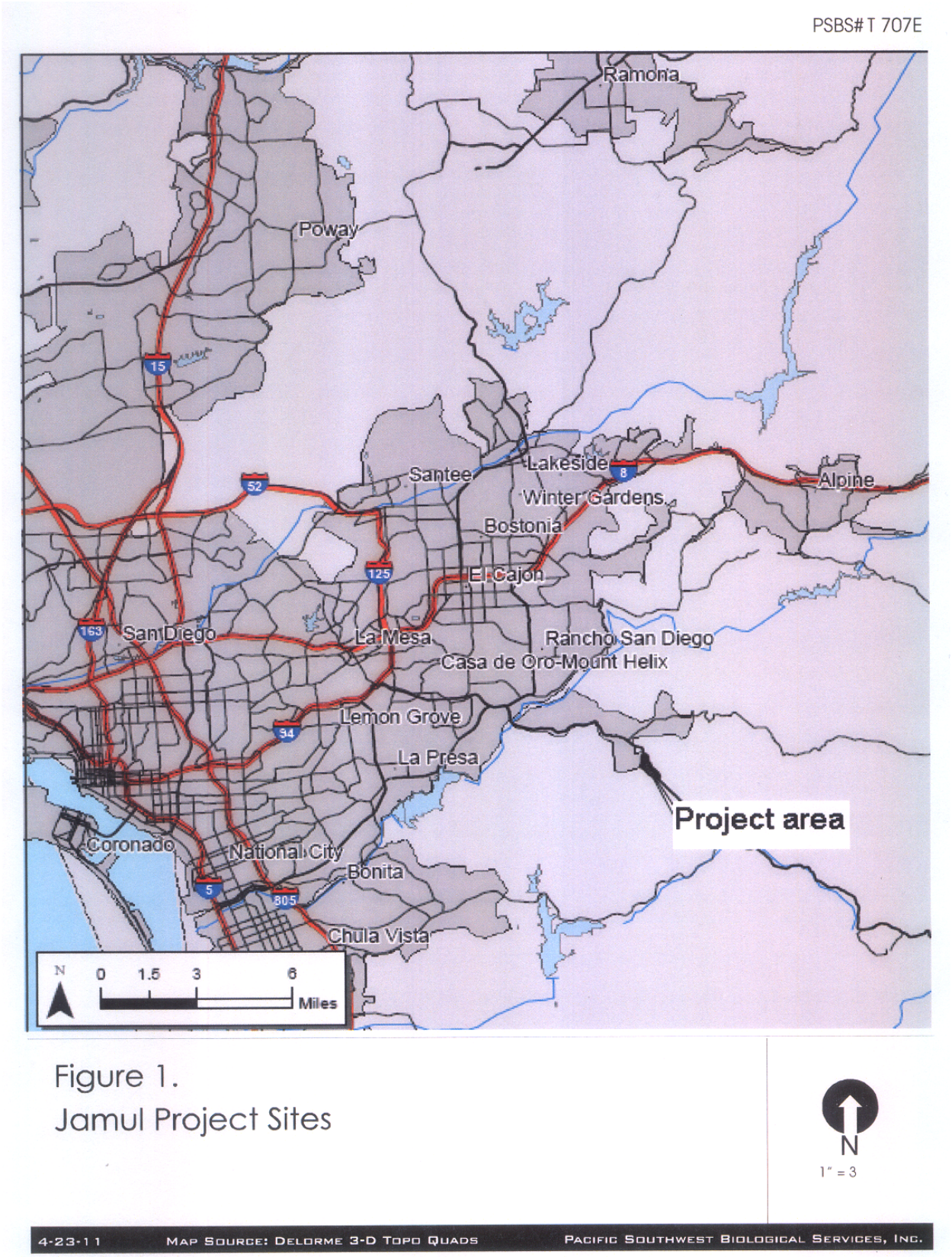
PSBS# T 707E
Ramona
Poway
15
52
Santee
Lakeside
8
Alpine
Winter Gardens
Bostonia
125
El Cajon
163
San Diego
La Mesa
Rancho San Diego
Casa de Oro-Mount Helix
Lemon Grove
94
La Presa
Project area
Coronado
National City
Bonita
5
805
Chula Vista
N
0 1.5 3 6
Miles
Figure 1.
Jamul Project Sites
N
1" = 3
4-23-11
Map Source: Delorme 3-D Topo Quads
Pacific Southwest Biological Services, Inc.



Figure 2.
Jamul Routes and Roads

JAMUL RANCHERIA ACCESSS PROJECT
JAMUL, SAN DIEGO COUNTY, CALIFORNIA

COASTAL CALIFORNIA GNATCATCHER (*POLIOPTILA CALIFORNICA CALIFORNICA*) PRESENCE/ABSENCE SURVEY

Study Area 1 (4 acres) Lat, Long: 32.703980, -116.868728

Prepared for

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PSBS # T707E

May 12, 2011

Michael U. Evans, M. Sc., Permittee
Sec.10. (a)(1)(A) permit # TE830219-3

JAMUL RANCHERIA ACCESSS PROJECT
JAMUL, SAN DIEGO COUNTY, CALIFORNIA
STUDY AREA 1 (4 ACRES)

COASTAL CALIFORNIA GNATCATCHER (*POLIOPTILA CALIFORNICA CALIFORNICA*) PRESENCE/ABSENCE SURVEY

Summary

A presence/absence survey for the Threatened California Gnatcatcher (*Polioptila californica californica*) (Gnatcatcher) was performed on three different parcels in close proximity: on a 4-acre parcel (abandoned fire station site), a 6-acre parcel (Jamul Rancheria) and a separate area proposed for a road corridor (approximately 20-acres, most of which is paved). At the request of the project client, Dr. Joe Broadhead of Environmental Data Systems, a separate report for each of the three parcels has been created, including the following parcels/areas: This report addresses the 4-acre parcel (approximate location [Lat, Long]: 32.703980, -116.868728), which is the site of the former fire station (since rebuilt across SR94).

This survey was carried out according the protocol for such surveys for the Coastal California Gnatcatcher established by the U. S. Fish and Wildlife Service (Service 1997). Gnatcatchers were not detected within or from this parcel.

Purpose of the Study

The purpose of the survey was to determine if the Coastal California Gnatcatcher is present within the study area.

Project Location

This report addresses the 4-acre parcel, at approximate Latitude, Longitude: 32.703980, -116.868728, is the site of the previous Jamul rural protection district fire station, since demolished. This site is adjacent and to the west of State Route 94 (aka Campo Road), between Melody Road to the north (and Peaceful Valley Ranch Road, which serves the new fire station) and the access road to the Jamul Rancheria and Saint Francis Xavier Cemetery to the immediate south. The site is located in the unincorporated community of Jamul, San Diego County, California. Remnants of the concrete building floors and driveways as well as non-native landscaping still occur on the site.

Project Description

No specific project has been defined at this time.

Survey Methods

Biologist Michael U. Evans (Endangered Species Act, Sec.10. (a)(1)(A) permit # TE830219-3) performed the survey, which was carried out according to Service California Gnatcatcher presence/absence survey protocol (Service 1997). The survey schedule and field conditions during the field visits are summarized below.

DATE	TIME*	FIELD CONDITIONS
4/12/11	0845-1000	62.1-63.9°F, sunny haze, no clouds, wind 1.7 mph (SW) to <0.5 mph
4/21/11	0830-0930	63.4-62.4°F, sunny, wind 1-2.3 mph (W)
4/28/11	0900-1030	75°F, 0% cloud cover, wind 0.6 mph

*Note that survey times for this parcel were combined with the larger 6-acre parcel surveys (Study Area 2).

Field methods consisted of walking slowly through appropriate habitat (or watching from adjacent viewpoints) while watching and listening for wildlife, as described by the protocol (Service 1997). A taped vocalization of the Gnatcatcher was occasionally played. "Pishing," a technique commonly used to attract the interest of passerines and draw them into view, was occasionally employed. Binoculars (10x40) were used to assist in the detection and identification of wildlife. Generally, wildlife detected was recorded in written field notes, augmented by notation with software on an Apple iPhone with GPS capabilities, which allowed recordation of the locations and numbers of various species observed (Birdwatcher's Diary by Stevens Creek Software). The site was of such size that the entire property could be covered on each visit, although routes taken were not identical.

Definitions

Vegetation Communities

Vegetation habitats or communities are assemblages of plant species that usually coexist in the same area. The classification of vegetation communities is based upon the life form of the dominant species within the community and the associated flora. Nomenclature for vegetation communities follows Holland's Preliminary Descriptions of the Terrestrial Natural Communities of California (1986), as modified by Oberbauer (1996).

Species Nomenclature

The scientific nomenclature used in this report is from the following standard references: vascular plants (Beauchamp 1986, Hickman 1993); vegetation communities (Holland 1986, Oberbauer 1996); birds (American Ornithologists' Union 1998 and Chesser, et al 2010); and mammals (Jameson and Peeters 2004).

Survey Results

Site Physiography

Geology mapped for the area of the road and routes is Mesozoic granodioritic rocks in the northern portion of the study area and Jurassic-Triassic Metavolcanic rocks in the southern portion (Strand 1962).

The soils mapped for the area are: Las Posas fine sandy loam, 15 to 30 percent slopes (LpE2) in the village area, Las Posas fine sandy loam, 5 to 9 percent (LpC2) in the eastern annual grassland area, Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes (CmrG) in the western portion of the northwestern parcel, Exchequer rocky silt loam, 30 to 70 percent (ExG) at the southern end of the northwestern parcel, Fallbrook sandy loam, 15 to 30 percent slopes, eroded (FaE2) in the northwestern and northern parcels, Wyman loam, 5 to 9 percent slope (WmC) in the field north of Melody Road, and Ramona sandy loam , 5 to 9 percent slopes eroded (RaC2) in the north western parcel (Bowman 1973). The elevation range of the parcels is 1139 feet at the southwestern peak and 873 feet at the downstream end of the drainage through the village.

Rainfall prior to the survey was above normal rainfall averages for the 2010 – 2011 season.

Botanical Resources

Vegetation Communities

Disturbed Areas

Areas of the parcel formerly occupied by the fire station and associated structures include paved areas and persisting landscaping.

Non-native Grassland

The southern, majority of the parcel is covered with non-native grasses, largely bromes and wild oats. The small knoll at the southeast corner has persisting Purple Needlegrass (*Nassella pulchra*), suggesting a cover of native grassland prior to the grazing and disturbance of the site.

Zoological Resources

Fauna

The fauna observed reflected those typically found in the southern coastal foothills of San Diego County, in the location habitats in early spring (see Appendix 1). These included one amphibian, five species of reptiles, 39 species of birds and four species of mammals.

Sensitive Fauna

No fauna on the federal or California endangered or threatened species were observed (no Coastal California Gnatcatchers were observed).

Discussion

Because the survey site is the location of a former rural fire station and consist of parts of a paved parking area and driveways and no native shrub vegetation, Gnatcatchers would not be expected to utilize the site. The only wildlife species utilizing the site observed in the native and non-native trees occupying parts of the site.

Certification

I hereby certify that the statements furnished above and in attached exhibits present the data and information required by the Service protocol for a presence/absence survey for the Coastal California Gnatcatcher (*Polioptila californica californica*) and that the facts, statements and information presented here are true and correct to the best of my knowledge and belief.

DATE: May 12, 2011

SIGNED



Michael U. Evans
Sec.10. (a)(1)(A) permit # TE830219-3

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Appendix A. Observed Species List – Fauna

INVERTEBRATES

Lepidoptera (Butterflies and Moths)

Nymphalidae --Brush-footed Butterflies

Mourning Cloak	*Nymphalis antiopa*

Pieridae--Whites, Sulfurs, Marbles, and Orange-tips

Common White	*Pontia protodice*
Sara Orangetip	*Anthocharis sara*

Hymenoptera (Ants, Wasps and Bees)

Formicaridae--Ants

California Harvester Ant	*Pogonomyrmex californicus*

AMPHIBIANS

Bufonidae--True Toads

Western Toad	*Bufo boreas*

REPTILES

Phrynosomatidae --North American spiny lizards

Granite Spiny Lizard	*Sceloporus orcutti*
Western Fence Lizard	*Sceloporus occidentalis*
Side-blotched Lizard	*Uta stansburiana*

Teiidae (Whiptails and Relatives)

Orange-throated Whiptail	*Aspidoscelis hyperythra*

BIRDS

Anseriformes - Screamers, Swans, Geese, and Ducks

Anatidae - Ducks, Geese, and Swans

*Mallard	*Anas platyrhynchos*

Falconiformes - American Vultures and Diurnal Birds of Prey

Cathartidae - New World Vultures

Turkey Vulture	*Cathartes aura*

Accipitridae - Hawks, Kites, Eagles, and Allies

Cooper's Hawk	*Accipiter cooperii*
Red-shouldered Hawk	*Buteo lineatus**
Red-tailed Hawk	*Buteo jamaicensis*

Columbiformes - Pigeons, and Doves

Columbidae - Pigeons and Doves

Mourning Dove	*Zenaida macroura*

Cuculiformes - Cuckoos and Allies

Cuculidae - Cuckoos, Roadrunners, and Anis

Greater Roadrunner	*Geococcyx californianus*

Appendix A. Observed Species List – Fauna (continued)

Apodiformes - Swifts, and Hummingbirds

Apodidae - Swifts	
White-throated Swift	*Aeronautes saxatalis*
Trochilidae - Hummingbirds	
Anna's Hummingbird	*Calypte anna*
Costa's Hummingbird	*Calypte costae*

Piciformes - Puffbirds, Jacamars, Toucans, Woodpeckers, and Allies

Picidae - Woodpeckers and Allies	
Nuttall's Woodpecker	*Picoides nuttallii*

Passeriformes - Passerine Birds

Tyrannidae - Tyrant Flycatchers	
Black Phoebe	*Sayornis nigricans*
Say's Phoebe	*Sayornis saya*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Cassin's Kingbird	*Tyrannus vociferans*
Western Kingbird	*Tyrannus verticalis*
Corvidae - Crows and Jays	
Western Scrub-Jay	*Aphelocoma californica*
American Crow	*Corvus brachyrhynchos*
Common Raven	*Corvus corax*
Hirundinidae - Swallows	
Cliff Swallow	*Petrochelidon pyrrhonota*
Aegithalidae - Long-tailed Tits and Bushtits	
Bushtit	*Psaltriparus minimus*
Troglodytidae - Wrens	
Bewick's Wren	*Thryomanes bewickii*
House Wren	*Troglodytes aedon*
Turdidae - Thrushes	
Western Bluebird	*Sialia mexicana*
Timaliidae - Babblers	
Wrentit	*Chamaea fasciata*
Mimidae - Mockingbirds and Thrashers	
Northern Mockingbird	*Mimus polyglottos*
Sturnidae - Starlings	
European Starling	*Sturnus vulgaris*
Parulidae - Wood-Warblers	
Yellow-rumped Warbler	*Dendroica coronata*
Hermit Warbler	*Dendroica occidentalis*
Yellow-breasted Chat	*Icteria virens*

Appendix A. Observed Species List – Fauna (continued)

Emberizidae - Emberizids	
Spotted Towhee	*Pipilo maculatus*
California Towhee	*Pipilo crissalis*
Lark Sparrow	*Chondestes grammacus*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
White-crowned Sparrow	*Zonotrichia leucophrys*
Golden-crowned Sparrow	*Zonotrichia atricapilla*
Cardinalidae - Cardinals and Allies	
Black-headed Grosbeak	*Pheucticus melanocephalus*
Lazuli Bunting	*Passerina amoena*
Icteridae - Blackbirds	
Hooded Oriole	*Icterus cucullatus*
Bullock's Oriole	*Icterus bullockii*
Fringillidae - Fringilline and Cardueline Finches and Allies	
House Finch	*Carpodacus mexicanus*
Lesser Goldfinch	*Spinus psaltria*

MAMMALS

Leporidae--Rabbits and Hares	
Desert Cottontail	*Sylvilagus audubonii*
Sciuridae--Squirrels, Chipmunks, and Marmots	
California Ground Squirrel	*Spermophilus beecheyi*
Geomyidae--Pocket Gophers	
Botta's Pocket Gopher	*Thomomys bottae*
Canidae--Foxes, Wolves, and Relatives	
Coyote	*Canis latrans*

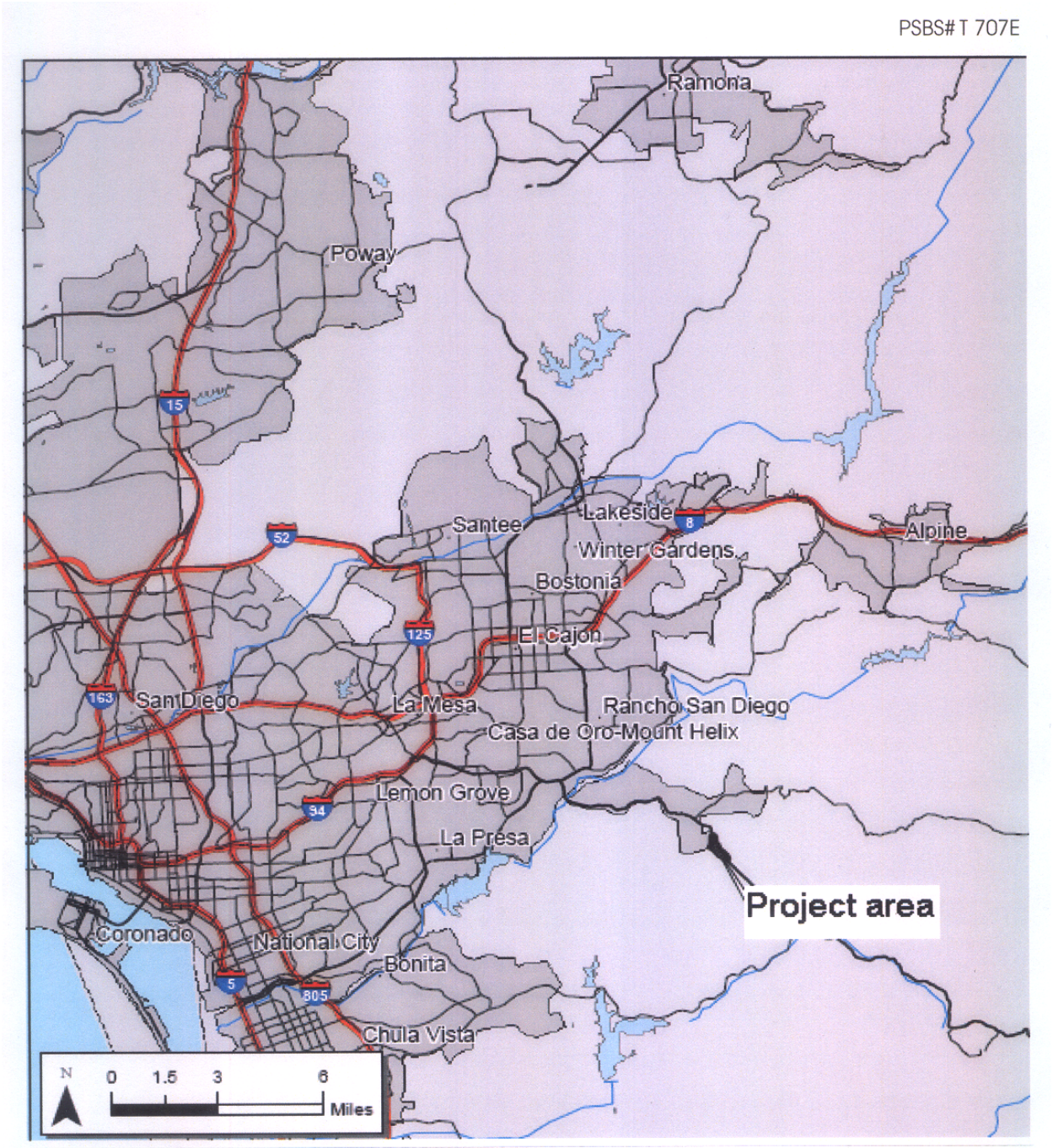

Figure 1.
Jamul Project Sites

N
1" = 3

4-23-11 Map Source: Delorme 3-D Topo Quads Pacific Southwest Biological Services, Inc.

PSBS#T 707E

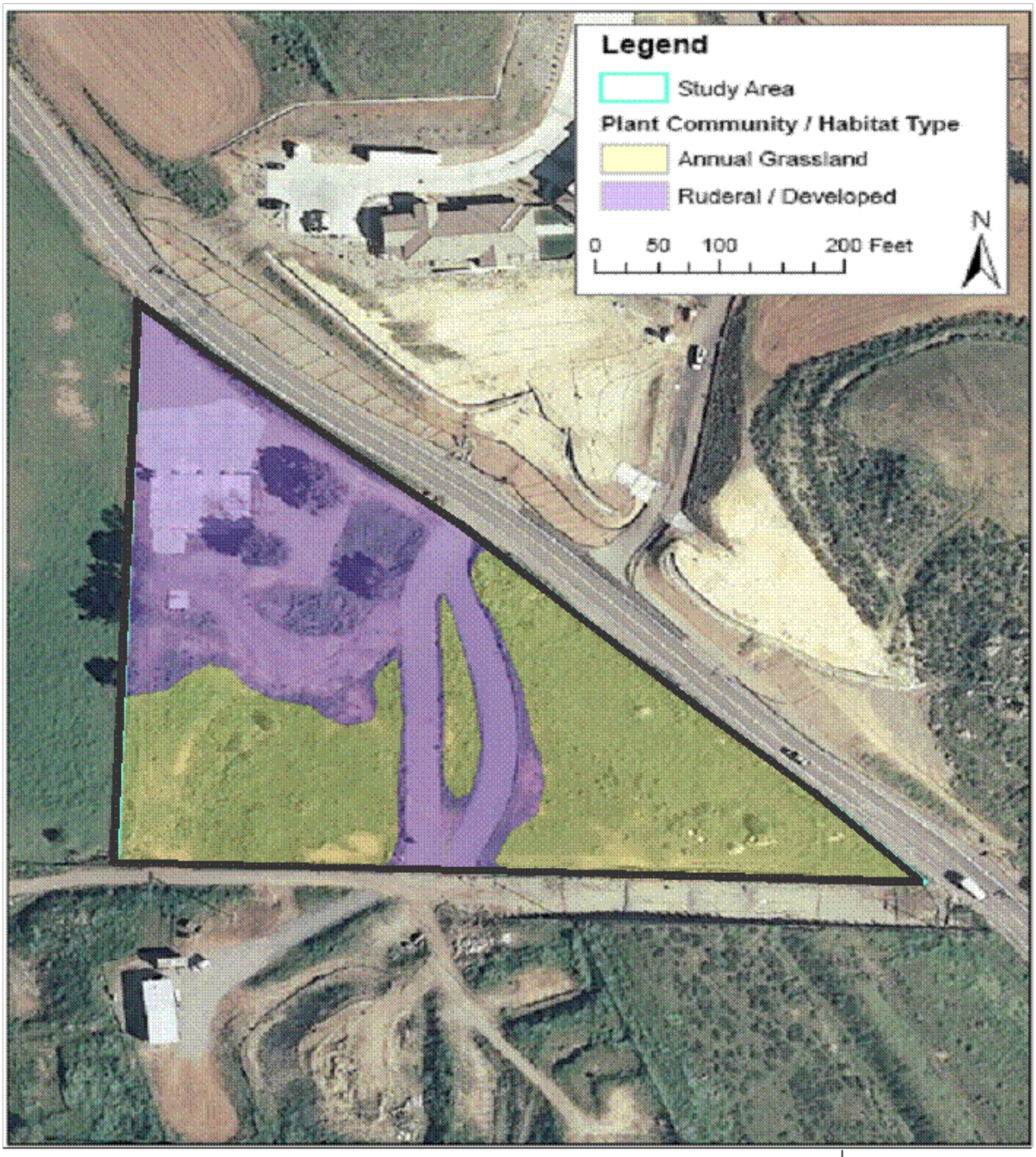

Figure 2.
Jamul Triangule Parcel

N
1"=100'

4-23-11 Map Source: Bellomy 3-D Topo Quads Pacific Southwest Biological Services, Inc.

APPENDIX 9B

Quino Checkerspot Butterfly

FORENSIC ENTOMOLOGY SERVICES

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7 June 2011

Ted J. Griswold
Procopio, Cory, Hargreaves & Savitch LLP
530 B Street, Suite 2100
San Diego, California 92101

RE: Quino Checkerspot Surveys, 2011
All Access Alternatives, Jamul Village Site, Jamul
San Diego County, California

INTRODUCTION

The All Access Alternative parcel was surveyed on the Jamul Village (Rancheria) Site for the presence/absence of the federally listed Quino Checkerspot Butterfly (QCB), *Euphydryas editha quino* during the 2011 adult flight season for western San Diego County. The other two parcels parcel will be addressed separately, but general information applies to all three. The protocol surveys were initiated on 23 March 2011 following over 2 weeks of cool and rainy conditions for San Diego County. Although QCB adults were seen in late February, the later survey dates still included the usual seasonal flight period for this species, with adult QCB being recorded within a few miles of these survey sites the week they were initiated. Habitat conditions were excellent to good during the entire survey period from 23 March until the conclusion on 24 April 2011.

The entire property was assessed for QCB on 21 March 2011 and previously in 2000 and again in 2007. General habitat conditions are similar to what they were following the other assessments. Most of the sites will not support QCB colonies because of a total lack of larval host plants and limited adult butterfly nectar sources and would normally be excluded from protocol surveys except for some of the habitat features present, such as open soils, hilltops, and close proximity to known QCB populations. Given these conditions, adult QCB encounters would still be rare at best. However, this parcel does contain these features along with numerous adult nectar sources and patches of larval host plants.

Survey methods, following the site assessment, required covering less than 10 acres per hour, concentrating on the few physical features that might reveal QCB activity. Other butterfly species encountered were documented along with prevailing weather conditions on each visit. Additional time was spent in areas containing actual QCB habitat that were found during the assessment this year and in 2000 and 2007. The survey season was

terminated with the flowering of buckwheat and the emergence of late season butterfly indicators such as the emergence of Bernardino Blue butterflies.

RESULTS

No adult Quino Checkerspot Butterflies were recorded during the six protocol surveys. This third parcel, referred to as the "All Access Alternatives" site contained rock outcrops, exposed soils, dirt roads, adult nectar sources, ridgelines, and abundant larval host plants (*Plantago erecta*). Larvae detected during the surveys on *Plantago* were buckeye caterpillars and not QCB immatures. Cattle activity on this site had a significant impact on the overall habitat quality.

Table 1 shows the weather conditions during each survey visit while Table 2 lists the other butterfly and skipper species recorded.

Table 1. Survey Dates and Weather Conditions, 2011

DATE	TIME	WEATHER °F	LOCATION
21 March	1200-1600	55/60, 50-80% clouds, 2-3mph wind	Site Assessment
23 March	1330-1630	71/68, 0-10% clouds, 3-6mph wind	All 3 Parcels
29 March	1330-1530	75/77, 0-10% high clds., 1-2 mph wind	All 3 Parcels
5 April	1330-1530	77/78, 10-20% high clds., 1-2mph wind	All 3 Parcels
11 April	1000-1200	67/69, 20-30% high clds., 2-6mph wind	All 3 Parcels
17 April	1230-1430	78/79, clear, 2-5mph wind	All 3 Parcels
24 April	1100-1300	66/68, 10% clouds, 3-7mph wind	All 3 Parcels

Temperatures were a significant factor during the adult QCB survey season throughout San Diego County. This resulted in a delayed and extended flowering season for many annuals used as butterfly nectar sources. The primary QCB larval host plant, *P. erecta*, remained in good condition during the entire survey season and did not begin to dry out until mid-May.

Table 2. Butterfly and Skipper Species

GENUS/SPECIES	COMMON NAME
Papilio eurymedon	Pale swallowtail
Pieris rapae	Cabbage white
Pontia protodice	Checkered white
Anthocharis sara	Sara orangetip
Colias eurytheme	Orange (Alfalfa) sulphur
Callophrys augustinus	Brown elfin
C. perplexa	Perplexing hairstreak

Leptotes marina	Marine blue
Plebejus acmon	Acmon blue
Apodemia virgulti	Behr's metalmark
Chlosyne gabbii	Gabb's checkerspot
Nymphalis antiopa	Mourning cloak
Euphilotes bernardino	Bernardino blue
Vanessa cardui	Painted lady
V. annabella	West coast lady
V. virginiensis	American lady
Junonia coenia	Buckeye
Erynnis species	"Duskywing"
E. funeralis	Funereal duskywing
Hylephila phyelus	Fiery skipper

Only 20 butterfly/skipper species were recorded during the surveys. This lack of diversity, and low abundance, were repeated throughout the county during the QCB flight season. Part of the reason for this was the two weeks of cold and rainy weather conditions during mid-March. Although this extended the season for many annual plants utilized by insects, it also delayed the adult emergence of many species and impacted their relative abundance. Many of the species were found to have extended their adult flight periods, but with lower populations. The colder temperatures began at the beginning of the QCB flight season and probably resulted in delayed emergence and lower numbers of adult insects.

SUMMARY

The habitat quality of this parcel varied based on past and current impacts. These issues are addressed for this property on the Jamul Village Site.

1. **All Access Alternatives.** There is no question that this parcel contains all features necessary for QCB populations. The property supports extensive *Plantago erecta* patches on both north and south facing slopes, hilltops and ridgelines, rock outcrops, adult nectar sources, open soils, and dirt roads. The only significant impact to the property results from cattle that graze within the fenced boundaries of the property. However, the presence of cattle does not appear to prevent QCB from utilizing the habitat as seen from populations on Otay Mesa. For any future impacts to this parcel, further QCB protocol surveys will be required.

David K. Faulkner
Entomologist
USFWS Permit No. TE-838743-5

FORENSIC ENTOMOLOGY SERVICES

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7 June 2011

Ted J. Griswold
Procopio, Cory, Hargreaves & Savitch LLP
530 B Street, Suite 2100
San Diego, California 92101

RE: Quino Checkerspot Surveys, 2011
4-Acre Parcel, Jamul Village Site, Jamul
San Diego County, California

INTRODUCTION

The 4-Acre Parcel was surveyed on the Jamul Village (Rancheria) Site for the presence/absence of the federally listed Quino Checkerspot Butterfly (QCB), *Euphydryas editha quino* during the 2011 adult flight season for western San Diego County. All three parcels were surveyed during the same time frame, but are addressed separately. The protocol surveys were initiated on 23 March 2011 following over 2 weeks of cool and rainy conditions for San Diego County. Although QCB adults were seen in late February, the later survey dates still included the usual seasonal flight period for this species, with adult QCB being recorded within a few miles of these survey sites the week they were initiated. Habitat conditions were excellent to good during the entire survey period from 23 March until the conclusion on 24 April 2011.

The entire property was assessed for QCB on 21 March 2011 and previously in 2000 and again in 2007. General habitat conditions are similar to what they were following the other assessments. Most of the sites will not support QCB colonies because of a total lack of larval host plants and limited adult butterfly nectar sources. These sites would normally be excluded from protocol surveys except for some of the habitat features present, such as open soils, hilltops, and close proximity to known QCB populations. Given these conditions, adult QCB encounters would still be rare at best.

Survey methods, following the site assessment, required covering less than 10 acres per hour, concentrating on the few physical features that might reveal QCB activity. Other butterfly species encountered were documented along with prevailing weather conditions on each visit. Additional time was spent in areas containing actual QCB habitat that were found during the assessment this year and in 2000 and 2007. The survey season was terminated with the flowering of buckwheat and the emergence of late season butterfly indicators such as the emergence of Bernardino blues.

RESULTS

No adult Quino Checkerspot Butterflies were recorded during the six protocol surveys, and for two of the parcels, no QCB would have been expected given the limited features on the property.

Table 1 shows the weather conditions during each survey visit while Table 2 lists the other butterfly and skipper species recorded.

Table 1. Survey Dates and Weather Conditions, 2011

DATE	TIME	WEATHER °F	LOCATION
21 March	1200-1600	55/60, 50-80% clouds, 2-3mph wind	Site Assessment
23 March	1330-1630	71/68, 0-10% clouds, 3-6mph wind	All 3 Parcels
29 March	1330-1530	75/77, 0-10% high clds., 1-2 mph wind	All 3 Parcels
5 April	1330-1530	77/78, 10-20% high clds., 1-2mph wind	All 3 Parcels
11 April	1000-1200	67/69, 20-30% high clds., 2-6mph wind	All 3 Parcels
17 April	1230-1430	78/79, clear, 2-5mph wind	All 3 Parcels
24 April	1100-1300	66/68, 10% clouds, 3-7mph wind	All 3 Parcels

Temperatures were a significant factor during the adult QCB survey season throughout San Diego County. This resulted in a delayed and extended flowering season for many annuals used as butterfly nectar sources. The primary QCB larval host plant, *P. erecta*, was not present on the 4-Acre Parcel.

Table 2. Butterfly and Skipper Species

GENUS/SPECIES	COMMON NAME
Papilio eurymedon	Pale swallowtail
Pieris rapae	Cabbage white
Pontia protodice	Checkered white
Anthocharis sara	Sara orangetip
Colias eurytheme	Orange (Alfalfa) sulphur
Callophrys augustinus	Brown elfin
C. perplexa	Perplexing hairstreak
Leptotes marina	Marine blue
Plebejus acmon	Acmon blue
Apodemia virgulti	Behr's metalmark
Chlosyne gabbii	Gabb's checkerspot
Nymphalis antiopa	Mourning cloak
Euphilotes bernardino	Bernardino blue
Vanessa cardui	Painted lady
V. annabella	West coast lady

V. virginiensis	American lady
Junonia coenia	Buckeye
Erynnis species	"Duskywing"
E. funeralis	Funereal duskywing
Hylephila phyelus	Fiery skipper

Only 20 butterfly/skipper species were recorded during the surveys. This lack of diversity, and low abundance, were repeated throughout the county during the QCB flight season. Part of the reason for this was the two weeks of cold and rainy weather conditions during mid-March. Although this extended the season for many annual plants utilized by insects, it also delayed the adult emergence of many species and impacted their relative abundance. Many of the species were found to have extended their adult flight periods, but with lower populations. The colder temperatures began at the beginning of the QCB flight season and probably resulted in delayed emergence and lower numbers of adult insects.

SUMMARY

The habitat quality of the three parcels varied based on past and current impacts. The 4-Acre Parcel was the poorest quality habitat surveyed on the Jamul Village Site.

1. **4-Acre Parcel.** This part of the site offered nothing for adult or larval QCB except for the presence of introduced annuals as possible nectar sources. The parcel consists of concrete slabs, paved roads, enclosed grassy fields with extensive filaree and an abundance of other invasive and weedy vegetation. There are no physical features that would attract adult QCB and nothing to promote colonization. Future protocol surveys for QCB would exclude this portion of the property.

David K. Faulkner
Entomologist
USFWS Permit No. TE-838743-5

APPENDIX 9C

Hermes Copper Butterfly

FORENSIC ENTOMOLOGY SERVICES

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3 October 2012

Joe Broadhead, Principal
EDS, Inc.
1007 7th Street, Suite 308
Sacramento, California 95814

RE: Hermes Copper Butterfly Surveys, 2011-2012
Jamul Village Site, All-Access Alternatives Parcel, Jamul,
San Diego County, California

INTRODUCTION

Following the completion of protocol surveys for the federally listed Quino Checkerspot Butterfly (QCB) on the All-Access Alternatives Parcel of the Jamul Village Site, additional surveys were conducted for the presence/absence of Hermes Copper Butterfly. This insect, *Lycaena hermes* (Edwards, 1870), was recently listed as a candidate species by the U.S. Fish and Wildlife Service (2011) for the Federal List of Threatened and Endangered Wildlife and Plants. Given the butterfly's current status, surveys are necessary to establish potential habitat and current occupation within the known range of this species. Two site visits were taken to the property, one each in 2011 (14 June) and in 2012 (7 June). Both days occurred after adult Hermes Copper activity was confirmed in San Diego County. Surveys began after 1000 and were concluded around 1500 during adequate weather conditions for adult butterfly activity.

The Hermes Copper Butterfly is a San Diego County endemic within the United States. There are a limited number of records for northwestern Baja California, Mexico. The expected adult flight period is from mid-May through late June, and butterflies are closely associated with their only known larval host plant, Spiny Redberry (*Rhamnus crocea*). Adults will nectar on a variety of flowering plants, but there is a preference for California Buckwheat (*Eriogonum faciculatum*). Critical to the emergence of Hermes Copper is the amount and timing of winter precipitation and its impact on the larval host plant. Absence or delay in normal rainfall results in limited larval survival as reflected in few surviving adults and a limited flight season. In recent years, this butterfly's known colonies and abundance have been greatly reduced by prevailing weather conditions, habitat fragmentation, fires, and loss of habitat.

RESULTS

No Hermes Copper Butterfly adults were found on the All-Access Alternative Parcel. This was not expected owing to the significant amount of larval host plants along with California buckwheat in both 2011 and 2012. The reason for the absence of Hermes Copper is due to cattle grazing on the larval host plant. Hermes Copper females tend to deposit their eggs more towards the terminal end of the branches on the underside of the leaves. Grazing continually removes these sites both before and after eggs have been deposited.

For all sites, survey dates and weather conditions are given in **Table 1**, and additional butterfly and skipper species recorded are listed in **Table 2**.

Table 1. Survey Dates and Weather Conditions

DATE	TIME	WEATHER (°F)	LOCATION
14 June 2011	1130-1500	82/82, clear, 1-2 mph wind	All 3 Parcels
7 June 2012	1030-1430	73/79, clear, 2-5 mph wind	All 3 Parcels

Temperatures, sunshine, and winds were adequate for adult Hermes Copper activity. Other butterfly species were encountered during the visits.

Table 2. Butterfly and Skipper Species (2011-2012)

FAMILY	GENUS/SPECIES	COMMON NAME	SITE
Papilionidae	*Papilio zelicaon*	Anise swallowtail	Rancheria
Pieridae	*Pieris rapae*	Cabbage white	Rancheria, 4-Acre
	Pontia protodice	Checkered white	4-Acre, All-Access
Lycaenidae	*Strymon melinus*	Gray hairstreak	Rancheria, All-Access
	Euphilotes bernardino	Bernardino blue	All-Access
	Leptotes marina	Marine blue	Rancheria
	Plebejus acmon	Acmon blue	4-Acre, All-Access
Riodinidae	*Apodemia virgulti*	Behr's metalmark	All-Access
Nymphalidae	*Junonia coenia*	Buckeye	Rancheria, All-Access
	Vanessa virginensis	American lady	Rancheria, All-Access
	V. annabella	West coast lady	Rancheria, 4-Acre

No skippers were recorded during the brief visit and seven butterfly species were encountered, all of which were observed both years. The site continues to be grazed and reduces the amount of available adult butterfly nectar sources, especially native vegetation. The site currently supports abundant invasive vegetation such as *Erodium*, grasses, and mustard.

CONCLUSION

Owing to the grazing impact on existing larval host plants, Hermes Copper Butterfly is currently not present on the All-Access Alternatives Parcel and would not be expected to colonize from other off-site populations unless cattle grazing is reduced, restricted, or eliminated from the property.

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3 October 2012

Joe Broadhead, Principal
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1007 7th Street, Suite 308
Sacramento, California 95814

RE: Hermes Copper Butterfly Surveys, 2011-2012
Jamul Village Site, Rancheria Parcel, Jamul,
San Diego County, California

INTRODUCTION

Following the completion of protocol surveys for the federally listed Quino Checkerspot Butterfly (QCB) on the Rancheria Parcel of the Jamul Village Site, additional surveys were conducted for the presence/absence of Hermes Copper Butterfly. This insect, *Lycaena hermes* (Edwards, 1870), was recently listed as a candidate species by the U.S. Fish and Wildlife Service (2011) for the Federal List of Threatened and Endangered Wildlife and Plants. Given the butterfly's current status, surveys are necessary to establish potential habitat and current occupation within the known range of this species. Two site visits were taken to the property, one each in 2011 (14 June) and in 2012 (7 June). Both days occurred after adult Hermes Copper activity was confirmed in San Diego County. Surveys began after 1000 and were concluded around 1500 during adequate weather conditions for adult butterfly activity.

The Hermes Copper Butterfly is a San Diego County endemic within the United States. There are a limited number of records for northwestern Baja California, Mexico. The expected adult flight period is from mid-May through late June, and butterflies are closely associated with their only known larval host plant, Spiny Redberry (*Rhamnus crocea*). Adults will nectar on a variety of flowering plants, but there is a preference for California Buckwheat (*Eriogonum faciculatum*). Critical to the emergence of Hermes Copper is the amount and timing of winter precipitation and its impact on the larval host plant. Absence or delay in normal rainfall results in limited larval survival as reflected in few surviving adults and a limited flight season. In recent years, this butterfly's known colonies and abundance have been greatly reduced by prevailing weather conditions, habitat fragmentation, fires, and loss of habitat.

RESULTS

No Hermes Copper Butterfly adults were found on the Rancheria Parcel. This would be expected due to the total absence of the larval host plant and limited California buckwheat in 2012 and 2012. There is currently no habitat available to support colonies of Hermes Copper on this site.
For all sites, survey dates and weather conditions are given in **Table 1**, and additional butterfly and skipper species recorded are listed in **Table 2**.

Table 1. Survey Dates and Weather Conditions

DATE	TIME	WEATHER (°F)	LOCATION
14 June 2011	1130-1500	82/82, clear, 1-2 mph wind	All 3 Parcels
7 June 2012	1030-1430	73/79, clear, 2-5 mph wind	All 3 Parcels

Temperatures, sunshine, and winds were adequate for adult Hermes Copper activity. Other butterfly species were encountered during the visits.

Table 2. Butterfly and Skipper Species (2011-2012)

FAMILY	GENUS/SPECIES	COMMON NAME	SITE
Papilionidae	*Papilio zelicaon*	Anise swallowtail	Rancheria
Pieridae	*Pieris rapae*	Cabbage white	Rancheria, 4-Acre
	Pontia protodice	Checkered white	4-Acre, All-Access
Lycaenidae	*Strymon melinus*	Gray hairstreak	Rancheria, All-Access
	Euphilotes bernardino	Bernardino blue	All-Access
	Leptotes marina	Marine blue	Rancheria
	Plebejus acmon	Acmon blue	4-Acre, All-Access
Riodinidae	*Apodemia virgulti*	Behr's metalmark	All-Access
Nymphalidae	*Junonia coenia*	Buckeye	Rancheria, All-Access
	Vanessa virginensis	American lady	Rancheria, All-Access
	V. annabella	West coast lady	Rancheria, 4-Acre

No skippers were recorded during the brief visit and seven butterfly species were encountered, six of which were seen both years. The site was impacted by building construction between 2011 and 2012, but the site had previously been graded. Adult butterfly nectar sources, especially composites and non-native perennials were abundant. The site currently supports extensive native vegetation, including well-established oaks, associated with an intermittent stream.

CONCLUSION

Owing to the total lack of larval host plants, even with adequate adult nectar sources, Hermes Copper Butterfly is currently not present on the Rancheria Parcel and would not be expected to occupy it in the future.

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3 October 2012

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RE: Hermes Copper Butterfly Surveys, 2011-2012
Jamul Village Site, 4-Acre Parcel, Jamul,
San Diego County, California

INTRODUCTION

Following the completion of protocol surveys for the federally listed Quino Checkerspot Butterfly (QCB) on the 4-Acre Parcel of the Jamul Village Site, additional surveys were conducted for the presence/absence of Hermes Copper Butterfly. This insect, *Lycaena hermes* (Edwards, 1870), was recently listed as a candidate species by the U.S. Fish and Wildlife Service (2011) for the Federal List of Threatened and Endangered Wildlife and Plants. Given the butterfly's current status, surveys are necessary to establish potential habitat and current occupation within the known range of this species. Two site visits were taken to the property, one each in 2011 (14 June) and in 2012 (7 June). Both days occurred after adult Hermes Copper activity was confirmed in San Diego County. Surveys began after 1000 and were concluded around 1500 during adequate weather conditions for adult butterfly activity.

The Hermes Copper Butterfly is a San Diego County endemic within the United States. There are a limited number of records for northwestern Baja California, Mexico. The expected adult flight period is from mid-May through late June, and butterflies are closely associated with their only known larval host plant, Spiny Redberry (*Rhamnus crocea*). Adults will nectar on a variety of flowering plants, but there is a preference for California Buckwheat (*Eriogonum faciculatum*). Critical to the emergence of Hermes Copper is the amount and timing of winter precipitation and its impact on the larval host plant. Absence or delay in normal rainfall results in limited larval survival as reflected in few surviving adults and a limited flight season. In recent years, this butterfly's known colonies and abundance have been greatly reduced by prevailing weather conditions, habitat fragmentation, fires, and loss of habitat.

RESULTS

No Hermes Copper Butterfly adults were found on the 4-Acre Parcel. This was expected because of the total absence of the larval host plant and only a single California buckwheat plant in 2011 that was not located in 2012. There is currently no habitat available to support colonies of Hermes Copper on this site. For all sites, survey dates and weather conditions are given in **Table 1**, and additional butterfly and skipper species recorded are listed in **Table 2**.

Table 1. Survey Dates and Weather Conditions

DATE	TIME	WEATHER (°F)	LOCATION
14 June 2011	1130-1500	82/82, clear, 1-2 mph wind	All 3 Parcels
7 June 2012	1030-1430	73/79, clear, 2-5 mph wind	All 3 Parcels

Temperatures, sunshine, and winds were adequate for adult Hermes Copper activity. Other butterfly species were encountered during the visits.

Table 2. Butterfly and Skipper Species (2011-2012)

FAMILY	GENUS/SPECIES	COMMON NAME	SITE
Papilionidae	*Papilio zelicaon*	Anise swallowtail	Rancheria
Pieridae	*Pieris rapae*	Cabbage white	Rancheria, 4-Acre
	Pontia protodice	Checkered white	4-Acre, All-Access
Lycaenidae	*Strymon melinus*	Gray hairstreak	Rancheria, All-Access
	Euphilotes bernardino	Bernardino blue	All-Access
	Leptotes marina	Marine blue	Rancheria
	Plebejus acmon	Acmon blue	4-Acre, All-Access
Riodinidae	*Apodemia virgulti*	Behr's metalmark	All-Access
Nymphalidae	*Junonia coenia*	Buckeye	Rancheria, All-Access
	Vanessa virginensis	American lady	Rancheria, All-Access
	V. annabella	West coast lady	Rancheria, 4-Acre

No skippers were recorded during the brief visit and only four butterfly species were encountered, three of which were seen only in 2011. The site was mowed between 2011 and 2012, and adult butterfly nectar sources, especially composites, were absent. The site currently supports limited native vegetation.

CONCLUSION

Owing to the total lack of larval host plants and suitable adult nectar sources, Hermes Copper Butterfly is currently not present on the 4-Acre Parcel and would not be expected to occupy it in the future.

David K. Faulkner
Entomologist
USFWS Permit #TE-838743-5

APPENDIX 10

JAMUL GAMING FACILITY
MITIGATION MONITORING AND REPORTING PLAN

Mitigation Measure

The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.

A. Hazardous Materials (4.6)

1. Buried Hazards or Hazardous Materials – Construction (4.6(2))

If contaminated soil or groundwater, or a buried hazardous material storage container, is encountered during project construction, work shall be halted in that area, and the type and extent of the contamination shall be identified and characterized by qualified professionals. A qualified professional, in consultation with regulatory agencies shall then develop an appropriate method to remediate the contamination. If necessary, a remediation plan shall be implemented in conjunction with continued project construction.

If any hazardous materials issues are encountered, a Health and Safety Plan (HASP) should also be implemented. A HASP prepared for the construction process, consistent with general industry standards and the Occupational Safety and Health Administration, could address any risks to construction personnel and public safety such that these health and safety risks could be mitigated to an acceptable level.

2. Risk of Causing Wildfire During Project Construction (4.6(4))

A. Use spark arresters on construction equipment,

B. Restrict vehicular parking to areas devoid of grasses or other fuels,

C. Designate safe areas for welding and metal cutting operations,

D. Prohibit smoking,

E. Properly store flammable or explosive materials, and

F. Keep construction areas wetted with water trucks and implement a fire safety/fire response plan.

B. Biological Resources (4.7)

1. Special Status Species/Protected Species (4.7(1))

A. Because special-status species or protected species that occur in the vicinity could migrate onto the Reservation between the time that the field surveys were completed and the start of construction, pre-construction surveys for special-status species and protected species should be performed by a qualified biologist to ensure that threatened or endangered species are not present. If any special-status species or protected species are detected, construction should be delayed, the appropriate wildlife agencies should be consulted (e.g. USFWS) and avoidance measures implemented. To comply with the federal laws protecting eagles and migratory birds, and to avoid any direct and indirect impacts to nesting birds (especially raptors and migratory species), pre-construction surveys for nesting birds will be performed. If active nesting is detected, the nesting area will be protected by creating a fenced buffer area that excludes construction activities until the young have fledged.

B. To comply with Fish and Game Code sections protecting nesting birds, and to avoid any direct and indirect impacts to nesting birds (especially raptors and migratory species), grubbing and clearing of vegetation on non-federal lands that may support active nests and construction activities adjacent to nesting habitat, should occur outside of the breeding season (February 15 to September 15; and as early as January 1 for raptors). If removal of habitat and/or construction activities on non-federal lands is necessary adjacent to nesting habitat during the breeding season, the applicant should retain a CDFW-approved biologist to conduct a pre-construction survey to determine the presence or absence of non-listed nesting migratory birds on or within 100 feet of the construction area, determine the presence or absence of ESA- or CESA-listed birds (e.g., coastal California gnatcatcher, least Bell's vireo) on or within 300 feet of the construction area, and determine the presence or absence of nesting raptors within 500 feet of the construction area. The pre-construction survey should be conducted within 10 calendar days prior to the start of construction on non-federal lands, the results of which should be submitted to CDFW for review and approval prior to initiating any construction activities. If nesting birds are detected by the biologist, the following buffers should be established:

Mitigation Measure

The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.

(1) No work should occur within 100 feet of a non-listed nesting migratory bird nest,

(2) No work should occur within 300 feet of a listed bird nest, and

(3) No work should occur within 500 feet of a raptor nest.

There may be a reduction of buffer size depending on site-specific conditions (e.g., the width and type of screening vegetation between the nest and proposed activity) or the existing ambient level of activity (e.g., existing level of human activity within the buffer distance). If construction on non-federal lands must take place within the recommended buffer widths above, the project applicant should contact CDFW to determine the appropriate buffer.

2. Operational Effects from Noise or Lighting (4.7(5))

Glass used in the proposed gaming facility will contain less than 10% reflectivity.

C. Transportation (4.9)

1. Construction Traffic (4.9(1))

A. To lessen the concentration of construction traffic, the contractor shall implement a Construction Management Plan (CMP) for the project. This CMP shall be implemented as a project feature and shall include the following:

(1) Encourage construction workers to rideshare to the site,

(2) Staggering of work hours to avoid all workers arriving at the same time,

(3) Restrict alternative work hours to avoid the peak-hour commuter traffic along SR-94, and

(4) Schedule deliveries or equipment hauling to occur at off-peak times.

The above listed CMP strategies shall be documented in an appropriate format.

B. To reduce traffic safety impacts related to construction activities, the Tribe shall implement the following listed measures or other equally effective measures, including but not limited to, the use of California Highway Patrol Personnel:

(1) Speed reduction signs,

(2) Temporary flashing beacons, and

(3) Flagger managing the vehicular conflicts along SR-94 (Campo Road) and the construction entrance driveway. The flagger operations will force vehicles traveling along SR-94 (Campo Road) to reduce their speeds to a stop conditions to allow truck traffic to enter the SR-94 facility.

2. Existing Plus Project Conditions (4.9(2))

The Tribe shall finance and implement the recommended intersection improvements shown in Table 4.9-51 (see Attachment 1).

3. Near Term (2015) Plus Project Conditions (4.9(3))

A. The Tribe shall pay their fair share for the mitigation shown in Table 4.9-54 (see Attachment 2).

B. The Tribe shall pay into the County's Transportation Impact Fee for cumulatively considerable traffic impacts on County of San Diego facility (Jamacha and Sweetwater Springs Boulevard).

Mitigation Measure

The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.

4. Horizon Year (2035) Plus Project Conditions (4.9(4))

To mitigate cumulatively considerable significant traffic related impacts at intersections and roadway segments within the Caltrans jurisdiction, the Tribe shall pay a fair-share contribution toward the construction of improvements identified in Table 4.9-57, as well as mitigation phasing displayed under Mitigation 4.9-2. To mitigate cumulatively considerable significant traffic related impacts at the intersections and roadway segments within the County of San Diego, pay toward the County's Transportation Impact Fee. The improvements shown are consistent with the County of San Diego's Mobility Element approved in 2011.

D. Noise (4.10)

1. Construction Noise and Vibration (4.10(1 and 2))

The following recommended noise abatement measures would reduce noise associated with project construction:

A. Contractors should schedule construction activities to avoid simultaneous use of several pieces of high noise level-emitting equipment, to the extent practicable,

B. Construction equipment shall be fitted with manufacturer's standard, or better, noise shielding and muffling devices to reduce noise levels to the maximum extent feasible, and

C. Equipment maintenance and staging areas shall be located as far away from local residences and hotel uses, as feasible.

D. Prepare and Implement a Blast Plan and Monitor and Record Each Blast Near Sensitive Receptors. To reduce impacts associated with air blast over-pressure generated by project-related construction activities, the project applicant(s) of all project phases shall conform to the following requirements,

(1) All blasting shall be performed by a blast contractor and blasting personnel licensed to operate in the County,

(2) Each blast shall be monitored and recorded with an air blast over-pressure monitor and ground borne vibration accelerometer approved by the Tribe that is located outside the closest residence to the blast, and

(3) A blasting plan, including estimates of the air blast over-pressure level and ground borne vibration at the residence closest to the blast, shall be submitted to the Tribe for review prior to the first blast. Blasting shall not commence until the Tribe has approved the blast plan.

2. On Site Mechanical Equipment (4.10(4))

Acoustical louvers capable of a 10 decibel reduction should be installed for all ventilation and when possible orientate the ventilation away from sensitive uses. Although not required to mitigate the impact, the Tribe will also consider the use of roof top parapet walls, screening barriers, and mechanical enclosures to ensure County Code requirements are met.

E. Air Quality (4.11)

1. Criteria Pollutants – Construction (4.11.3)

A. Minimize land disturbance,

B. Use watering trucks to minimize dust; watering should be sufficient to confine, dust plumes to the project work areas,

C. Suspend grading and earth moving when wind gusts exceed 25 miles per hour unless the soil is wet enough to prevent dust plumes,

D. Cover all trucks hauling dirt when traveling at speeds greater than 15 miles per hour.

E. Stabilize the surface of dirt piles if not removed within 2 days,

Mitigation Measure

The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.

F. Limit vehicular paths on unpaved surfaces and stabilize any temporary roads.

G. Minimize unnecessary vehicular and machinery activities,

H. Sweep paved streets at least once per day where there is evidence that dirt has been carried on to the roadway,

I. Revegetate disturbed land, including vehicular paths created during construction to avoid future off-road vehicular activities, and

J. Remove unused material.

2. On Site Mechanical Equipment (4.11(4))

A. Install solar panels on the roof, where possible, in areas not being utilized for the green roof technologies,

B. Provide shuttle and bus services to and from the project to reduce vehicle trips and miles traveled,

C. Flare off and burned CH_4 produced at the wastewater treatment plant to reduce CH_4 emissions up to 95%,

D. Utilize low flow water devices High Efficiency Toilets (HET) and with specifications meeting or exceeding standards set forth by the EPA,

E. Install low energy utilities (i.e., lighting and appliances) to increase building efficiency and reduce power consumption,

F. Promote employee and patron ridesharing to help reduce vehicle trips traveled, and

G. Install dedicated parking stalls and charging stations for electric vehicles.

F. Public Services (4.12)

1. Law Enforcement (4.12(5))

A. Provide on-site security for gaming operations to reduce and prevent criminal and civil incidents.

B. All security guards would carry two-way radios so they are able to efficiently respond to back up and emergency related calls. This would aid in the prevention of criminal activity within gaming facilities.

C. Adopt a “Responsible Alcoholic Beverage Policy” which would include, but not be limited to, requiring patrons to prove their age and refusing service to those who have had too much to drink. This policy would be coordinated with the San Diego Sheriff's Office.

D. All parking areas would be well lit and monitored by parking staff and/or roving security guards at all times during operation. This would aid in the prevention of auto theft and other related criminal activity.

E. Areas surrounding the gaming facilities would have "No Loitering" signs in place, would be well lit and would be patrolled regularly by roving security guards. This would aid in the prevention of illegal loitering and all crimes that relate to, or require, loitering.

F. Provide traffic control with appropriate signage and the presence of peak-hour traffic control staff. This would aid in the prevention of off-site parking, which could create possible security issues.

G. The Tribe will make good faith efforts to enter into an agreement with the County regarding law enforcement services.

2. Fire Protection and Emergency Medical Services (4.12(6))

To reduce the risk of starting a wildfire during construction, the Tribe will make a good faith effort to implement the following best management practices during construction:

Mitigation Measure

The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.

A. Use spark arresters on construction equipment,

B. Restrict vehicular parking to areas devoid of grasses or other fuels,

C. Designate safe areas for welding and metal cutting operations,

D. Prohibit smoking,

E. Properly store flammable or explosive materials, and

F. Keep construction areas wetted with water trucks and

G. Implement a fire safety/fire response plan.

G. Effects of Mitigation Measures (4.15)

1. Hydrology and Water Quality (4.15(2))

A. Implement temporary and permanent BMPs including:

(1) Temporary BMPs: fiber rolls, hydro-seeding, temporary drainage inlet protection, preserve existing vegetation, stabilized construction entrances, self-contained concrete washout area, and covered material delivery and storage areas, and

(2) Permanent BMPs: vegetate all disturbed slopes, implementing biostrips or bioswales, and detention basins. Theses BMPs would be used to prevent pollutants from entering the Waters of the United States.

B. The drainage crossing plans shall include a design that shows improvements to be located outside of the ordinary high water mark. If unable to design outside of high water make, the Tribe shall acquire a Clean Water Act Section 404 Permit from the USACOE prior to undertaking any grading activities and shall implement all permit requirements during construction and operation. Permit conditions may include the purchase of in-lieu credits at a mitigation bank, as well as the implementation of Best Management Practices during construction activities.

C. Employ plywood shoring (or a similar temporary construction barrier) and the following erosion and sediment control measures to ensure that sediment does not enter Willow Creek during construction of retaining walls.

(1) Existing vegetation will be preserved when feasible,

(2) Erosion in concentrated flow paths will be controlled by applying fiber rolls, erosion control / fiber blankets, silt fences, and plastic sheeting, and/or lining swales as required,

(3) Concentrated water flows shall be channeled away from disturbed soil areas and stockpiles. Concentrated water flows shall be conveyed in a non-eroding fashion, and

(4) Non-active areas, and all finished slopes, will be stabilized with effective soil cover (such as aggregate, paving, or vegetation) as soon as feasible after construction or disturbance is complete and no later than 14 days after construction or disturbance in that portion of the site has temporarily or permanently ceased.

D. Designate riparian areas with warning signs and fencing and avoid completely, where feasible.

2. Biological Resources (4.15(4))

A. Implement Mitigation Measure 4.7(1).

B. Implement Mitigation Measure 4.7(1)(B)

C. A monitoring biologist (approved by CDFW) shall be on site during initial clearing and grubbing of habitat on non-federal lands, and project construction within 300 feet of preserved habitat, to ensure compliance with all conservation measures. The biologist shall be knowledgeable of upland and wetland biology and ecology. The applicant shall submit the biologist's name, address, telephone

Mitigation Measure

The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.

number, and work schedule on the Project to CDFW at least 30 days prior to initiating construction. The biologist shall perform the following duties:

(1) Oversee installation of and inspect temporary fencing and erosion control measures within or up-slope of all restoration and/or preservation areas a minimum of once per week and daily during all rain events to ensure that any breaks in the fence or erosion control devices are repaired immediately,

(2) Monitor the work area weekly to ensure that work activities do not generate excessive amounts of dust,

(3) Train all contractors and construction personnel on the biological resources associated with this project and ensure that training is implemented by construction personnel. At a minimum, training shall include:

- The purpose for resource protection.
- The conservation measures that shall be implemented during project construction, including strictly limiting activities, vehicles, equipment, and construction materials to the fenced project footprint to avoid sensitive resource areas in the field (i.e., avoided areas delineated on maps or on the project site by fencing).
- Environmentally responsible construction practices.
- The protocol to resolve conflicts that may arise at any time during the construction process.

(4) Halt work, if necessary on non-federal lands, and confer with CDFW and County PDS to ensure the proper implementation of species and habitat protection measures. The biologist shall report any violation to CDFW within 24 hours of its occurrence.

(5) Submit weekly letter reports (including photographs of impacted areas) to CDFW and County PDS during clearing of habitat and/or construction within 300 feet of preserved habitat on non-federal lands. The weekly reports will document that authorized impacts were not exceeded, and general compliance with all conditions. The reports will also outline the duration of species monitoring, the location of construction activities, the type of construction which occurred, and equipment used. These reports will specify numbers, locations, and sex of sensitive species (if present), observed species behavior (especially in relation to construction activities), and remedial measures employed to avoid, minimize, and mitigate impacts to sensitive species. Raw field notes shall be made available upon request by CDFW.

(6) Submit a final report to CDFW and County PDS within 60 days of the project completion that includes: as-built construction drawings with an overlay of habitat that was impacted and protected, photographs of habitat areas that were to be avoided, and other relevant summary information documenting that authorized impacts were not exceeded and that general compliance with all conditions was achieved.

D. Habitat Loss: Prior to grading activities, the following habitat loss mitigation shall be implemented:

(1) Prior to development of the access road, the loss of protected habitats (grasslands, coastal scrub, coast live oak riparian forest) shall be mitigated at the ratios specified by the Biological Mitigation Ordinance, which vary from 0.5:1 to 3:1 depending upon the Tier category and whether or not the land is in a Biological Resource Core Area (either by in lieu fee payment or by deed restriction of qualified lands).

3. Cultural Resources (4.15(5))

A. The Tribe shall implement inadvertent discovery measures during all construction activities within the aaccess road and off-site intersection Improvement areas. Measures include:

(1) A worker education course for all construction personnel covering immediate work curtailment to protect cultural resources and to be conducted prior to initiation of ground-disturbing activities,

(2) Monitoring by a qualified archeologist, who meets the Secretary of the Interior's Standards for archaeologists (found at 36 CFR §61), as well as a JIV tribal monitor, of all earth-disturbing activities in close proximity to site CA-SDI-7966/11410 and CA-SDI-11051, and of all off-site earth-disturbing activities in native soils/sediments; and

(3) Procedures for discovery of cultural resources, including human remains, during construction or earth-disturbing activities if an archaeological monitor is not present.

B. In the event that any prehistoric, historic, or paleontological resources are discovered during construction-related earth-moving activities, all work within 50 feet of the resources shall be halted and a qualified archaeologist or paleontologist, as appropriate, shall be consulted to assess the significance of the find. If any find is determined to be significant by the qualified professional, then appropriate agency and project representatives and the qualified archaeologist and/or paleontologist shall meet to determine the appropriate course of action. All significant cultural or paleontological materials

Mitigation Measure

The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.

recovered shall be subject to scientific analysis, professional museum curation, and a report prepared by the qualified archaeologist or paleontologist according to current professional standards.

C. If human bone or bone of unknown origin is found during construction, all work shall stop within 50 feet of the find and the San Diego County Coroner and the Tribe shall be contacted immediately. If the remains are determined to be Native American, the coroner shall notify the Native American Heritage Commission (NAHC) who shall identify the most likely descendant. The most likely descendant shall work with the Tribe and the Lead Agency, as appropriate, to develop a plan for re-interment of the human remains and any associated artifacts. No additional work shall take place within the immediate vicinity of the find until the identified actions have been implemented.

4. Off Site Intersection Improvements

A. Implement Mitigation Measures 4.6(2) and 4.12(6) to reduce potential Hazardous Materials impacts to a less than significant level.

B. Prior to grading activities for any intersections impacting jurisdictional waters, the improvement plans shall include a design that shows improvements to be located outside of the ordinary high water mark. If unable to design outside of high water make, the developer shall acquire a Clean Water Act Section 404 Permit from the USACOE prior to undertaking any grading activities. Permit conditions typically include the purchase of in-lieu credits at a mitigation bank as well as the implementation of Best Management Practices during construction activities.

C. Prior to development of any of the intersection improvement areas, impacted protected habitats (grasslands, coastal scrub, coast live oak riparian forest) shall be mitigated at the ratio specified by the Biological Mitigation Ordinance, which vary from 0.5:1 to 3:1 depending upon the Tier category and whether or not the land is in a Biological Resource Core Area (either by in lieu fee payment or by deed restriction of qualified lands),

D. Implement Mitigation Measure 4.15(2)(B) to reduce potential Jurisdictional Waters impacts to a less than significant level.

E. Implement Mitigation Measure 4.15(4) to reduce biological resource impacts to a less than significant level.

F. Implement Mitigation 4.15-5 to reduce cultural resource impacts to a less than significant level.

G. Prior to development of the intersection improvement areas, any impacted County-protected plants (Group A Plants defined by County PDS), such as San Diego thornmint or Palmer's Goldenbush, shall be compensated at a 3:1 acreage ratio (either in lieu fee payment to the County or by deed restriction of qualified lands) to the satisfaction of the County of San Diego Director of Planning and Development Services.

H. The following Best Management Practices shall be implemented to protect water bodies from impacts:

(1) create and implement a Hazardous Materials Management Plan and Spill Response Plan, including the identification of specific refueling areas,

(2) create and implement an erosion control plan and a sediment monitoring plan, including the placement of jute mats, straw bales and wattles, sand bags, and vegetative covers (e.g. Hydroseed), weather monitoring, and specific inspection protocols,

(3) designated concrete washout areas and other filters for construction materials,

(4) a visual monitoring program and a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs,

(5) create and implement a Hazardous Materials Management Plan and Spill Response Plan, including the identification of specific refueling areas,

(6) create and implement an erosion control plan and a sediment monitoring plan, including the placement of jute mats, straw bales and wattles, sand bags, and vegetative covers (e.g. Hydroseed), weather monitoring, and specific inspection protocols,

(7) designated concrete washout areas and other filters for construction materials, and

(8) a visual monitoring program and a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs.

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	Timing	Implementing Entity (IE)/ Monitoring Entity (ME)	Compliance		Remarks
			Date/Initials	Action Taken	
A. Hazardous Materials (4.6)					
1. Buried Hazards or Hazardous Materials – Construction (4.6(2)) If contaminated soil or groundwater, or a buried hazardous material storage container, is encountered during project construction, work shall be halted in that area, and the type and extent of the contamination shall be identified and characterized by qualified professionals. A qualified professional, in consultation with regulatory agencies shall then develop an appropriate method to remediate the contamination. If necessary, a remediation plan shall be implemented in conjunction with continued project construction. If any hazardous materials issues are encountered, a Health and Safety Plan (HASP) should also be implemented. A HASP prepared for the construction process, consistent with general industry standards and the Occupational Safety and Health Administration, could address any risks to construction personnel and public safety such that these health and safety risks could be mitigated to an acceptable level.	Throughout construction activities.	IE: Prime Construction Contractor/Registered Site Assessor ME: Jamul Tribe			
2. Risk of Causing Wildfire During Project Construction (4.6(4)) A. Use spark arresters on construction equipment, B. Restrict vehicular parking to areas devoid of grasses or other fuels, C. Designate safe areas for welding and metal cutting operations, D. Prohibit smoking, E. Properly store flammable or explosive materials, and F. Keep construction areas wetted with water trucks and implement a fire safety/fire response plan.	A-F. Throughout construction activities.	IE: Prime Construction Contractor ME: Jamul Tribe			

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	Timing	Implementing Entity (IE)/ Monitoring Entity (ME)	Compliance		Remarks
			Date/Initials	Action Taken	
B. Biological Resources (4.7)					
1. Special Status Species/Protected Species (4.7(1)) A. Because special-status species or protected species that occur in the vicinity could migrate onto the Reservation between the time that the field surveys were completed and the start of construction, pre-construction surveys for special-status species and protected species should be performed by a qualified biologist to ensure that threatened or endangered species are not present. If any special-status species or protected species are detected, construction should be delayed, the appropriate wildlife agencies should be consulted (e.g. USFWS) and avoidance measures implemented. To comply with the federal laws protecting eagles and migratory birds, and to avoid any direct and indirect impacts to nesting birds (especially raptors and migratory species), pre-construction surveys for nesting birds will be performed. If active nesting is detected, the nesting area will be protected by creating a fenced buffer area that excludes construction activities until the young have fledged. B. To comply with Fish and Game Code sections protecting nesting birds, and to avoid any direct and indirect impacts to nesting birds (especially raptors and migratory species), grubbing and clearing of vegetation on non-federal lands that may support active nests and construction activities adjacent to nesting habitat, should occur outside of the breeding season (February 15 to September 15; and as early as January 1 for raptors). If removal of habitat and/or construction activities on non-federal lands is necessary adjacent to nesting habitat during the breeding season, the applicant should retain a CDFW-approved biologist to conduct a pre-construction survey to determine the presence or absence of non-listed nesting migratory birds on or within 100 feet of the construction area, determine the presence or absence of ESA- or CESA-listed birds (e.g., coastal California gnatcatcher, least Bell's vireo) on or within 300 feet of the construction area, and determine the presence or absence of nesting raptors within 500 feet of the construction area. The pre-construction survey should be conducted within 10	A. Prior to commencement of construction activities. B. Throughout construction activities. Selection of CDFW-approved biologist, development of pre-construction surveys and the undertaking of CDFW consultation, if needed, shall take place prior to commencement of construction activities.	A. IE: Prime Construction Contractor/Biologist ME: Jamul Tribe B. IE: Prime Construction Contractor/Biologist ME: Jamul Tribe			

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	**Timing**	**Implementing Entity (IE)/ Monitoring Entity (ME)**	**Compliance**		**Remarks**
			Date/Initials	Action Taken	
calendar days prior to the start of construction on non-federal lands, the results of which should be submitted to CDFW for review and approval prior to initiating any construction activities. If nesting birds are detected by the biologist, the following buffers should be established: (1) No work should occur within 100 feet of a non-listed nesting migratory bird nest, (2) No work should occur within 300 feet of a listed bird nest, and (3) No work should occur within 500 feet of a raptor nest. There may be a reduction of buffer size depending on site-specific conditions (e.g., the width and type of screening vegetation between the nest and proposed activity) or the existing ambient level of activity (e.g., existing level of human activity within the buffer distance). If construction on non-federal lands must take place within the recommended buffer widths above, the project applicant should contact CDFW to determine the appropriate buffer.					
2. Operational Effects from Noise or Lighting (4.7(5)) Glass used in the proposed gaming facility will contain less than 10% reflectivity.	Prior to commencement of construction activities, a note shall be placed on the Final Plans regarding the glass specifications. The specified glass shall be installed prior to operation of gaming facility.	IE: Architect/Civil Engineer and Prime Construction Contractor ME: Jamul Tribe			
C. Transportation (4.9)					
1. Construction Traffic (4.9(1)) A. To lessen the concentration of construction traffic, the contractor shall implement a Construction Management Plan (CMP) for the project. This CMP shall be implemented as a project feature and shall include the following: (1) Encourage construction workers to rideshare to the site, (2) Staggering of work hours to avoid all workers arriving at the same time,	A. The CMP shall be submitted to Caltrans for its information prior to commencement of construction work for the gaming facility.	A. IE: Traffic Engineer ME: Jamul Tribe B. IE: Traffic Engineer ME: Jamul Tribe C. IE: Prime Construction Contractor			

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	Timing	Implementing Entity (IE)/ Monitoring Entity (ME)	Compliance		Remarks
			Date/Initials	Action Taken	
(3) Restrict alternative work hours to avoid the peak-hour commuter traffic along SR-94, and (4) Schedule deliveries or equipment hauling to occur at off-peak times. The above listed CMP strategies shall be documented in an appropriate format. B. To reduce traffic safety impacts related to construction activities, the Tribe shall implement the following listed measures or other equally effective measures, including but not limited to, the use of California Highway Patrol Personnel: (1) Speed reduction signs, (2) Temporary flashing beacons, and (3) Flagger managing the vehicular conflicts along SR-94 (Campo Road) and the construction entrance driveway. The flagger operations will force vehicles traveling along SR-94 (Campo Road) to reduce their speeds to a stop conditions to allow truck traffic to enter the SR-94 facility.		ME: Jamul Tribe			
2. Existing Plus Project Conditions (4.9(2)) The Tribe shall finance and implement the recommended intersection improvements shown in Table 4.9-51 (see Attachment 1).	The measures shall be financed and implemented when (1) plans for individual improvements are approved by Caltrans, and (2) the Encroachment Permit for the SR-94 roadway improvements has been approved by Caltrans.	IE: Jamul Tribe ME: Jamul Tribe			
3. Near Term (2015) Plus Project Conditions (4.9(3)) A. The Tribe shall pay their fair share for the mitigation shown in Table 4.9-54 (see Attachment 2). B. The Tribe shall pay into the County's Transportation Impact Fee for cumulatively considerable traffic impacts on County of San Diego facility (Jamacha and Sweetwater Springs Boulevard).	A. The fair share contributions shall be made to Caltrans (1) prior to commencement of operation for the gaming facility and (2) if the parties, after undertaking good faith efforts, are able to reach consensus on the terms of a fair share agreement. B. The payment shall be made when (1) the Encroachment Permit for the SR-94 roadway improvements has been approved by Caltrans, and (2) if	A. IE: Jamul Tribe ME: Jamul Tribe B. IE: Jamul Tribe ME: Jamul Tribe			

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	Timing	Implementing Entity (IE)/ Monitoring Entity (ME)	Compliance		Remarks
			Date/Initials	Action Taken	
	the parties, after undertaking good faith efforts, are able to reach consensus on the terms of a fair share agreement.				
4. Horizon Year (2035) Plus Project Conditions (4.9(4)) To mitigate cumulatively considerable significant traffic related impacts at intersections and roadway segments within the Caltrans jurisdiction, the Tribe shall pay a fair-share contribution toward the construction of improvements identified in Table 4.9-57, as well as mitigation phasing displayed under Mitigation 4.9-2. To mitigate cumulatively considerable significant traffic related impacts at the intersections and roadway segments within the County of San Diego, pay toward the County's Transportation Impact Fee. The improvements shown are consistent with the County of San Diego's Mobility Element approved in 2011.	The fair share payments will be made when (1) the Encroachment Permit for the SR-94 roadway improvements has been approved by Caltrans, and (2) the agreed upon fair share contribution has been calculated.	IE: Jamul Tribe ME: Jamul Tribe			
D. Noise (4.10)					
1. Construction Noise and Vibration (4.10(1 and 2)) The following recommended noise abatement measures would reduce noise associated with project construction: A. Contractors should schedule construction activities to avoid simultaneous use of several pieces of high noise level-emitting equipment, to the extent practicable, B. Construction equipment shall be fitted with manufacturer's standard, or better, noise shielding and muffling devices to reduce noise levels to the maximum extent feasible, and C. Equipment maintenance and staging areas shall be located as far away from local residences and hotel uses, as feasible. D. Prepare and Implement a Blast Plan and Monitor and Record Each Blast Near Sensitive Receptors. To reduce impacts associated with air blast over-pressure generated by project-related construction activities, the project applicant(s) of all project phases shall conform to the following requirements, (1) All blasting shall be performed by a blast contractor	A-C. Throughout construction activities. D. Preparation of the Blast Management Plan shall be completed prior to any scheduled blasting activities. The measures of the Blasting Plan shall be implemented throughout construction/blasting activities.	A-D. IE: Prime Construction Contractor ME: Jamul Tribe			

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	Timing	Implementing Entity (IE)/ Monitoring Entity (ME)	Compliance		Remarks
			Date/Initials	Action Taken	
and blasting personnel licensed to operate in the County, (2) Each blast shall be monitored and recorded with an air blast over-pressure monitor and ground borne vibration accelerometer approved by the Tribe that is located outside the closest residence to the blast, and (3) A blasting plan, including estimates of the air blast over-pressure level and ground borne vibration at the residence closest to the blast, shall be submitted to the Tribe for review prior to the first blast. Blasting shall not commence until the Tribe has approved the blast plan.					
2. On Site Mechanical Equipment (4.10(4)) Acoustical louvers capable of a 10 decibel reduction should be installed for all ventilation and when possible orientate the ventilation away from sensitive uses. Although not required to mitigate the impact, the Tribe will also consider the use of roof top parapet walls, screening barriers, and mechanical enclosures to ensure County Code requirements are met.	Prior to commencement of construction activities, a note shall be placed on the Final Plans regarding the acoustical louver specifications. The acoustical louvers shall be implemented prior to operation of the gaming facility.	IE: Architect/Civil Engineer and Prime Construction Contractor ME: Jamul Tribe			
E. Air Quality (4.11)					
1. Criteria Pollutants – Construction (4.11.3) A. Minimize land disturbance, B. Use watering trucks to minimize dust; watering should be sufficient to confine, dust plumes to the project work areas, C. Suspend grading and earth moving when wind gusts exceed 25 miles per hour unless the soil is wet enough to prevent dust plumes, D. Cover all trucks hauling dirt when traveling at speeds greater than 15 miles per hour. E. Stabilize the surface of dirt piles if not removed within 2 days, F. Limit vehicular paths on unpaved surfaces and stabilize any temporary roads.	A-J. Prior to commencement of construction activities, a note shall be placed on the Final Plans regarding Measures 4.11.3(A-J).	IE: Architect/Civil Engineer and Prime Construction Contractor ME: Jamul Tribe			

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	Timing	Implementing Entity (IE)/ Monitoring Entity (ME)	Compliance		Remarks
			Date/Initials	Action Taken	
G. Minimize unnecessary vehicular and machinery activities, H. Sweep paved streets at least once per day where there is evidence that dirt has been carried on to the roadway, I. Revegetate disturbed land, including vehicular paths created during construction to avoid future off-road vehicular activities, and J. Remove unused material.					
2. On Site Mechanical Equipment (4.11(4)) A. Install solar panels on the roof, where possible, in areas not being utilized for the green roof technologies, B. Provide shuttle and bus services to and from the project to reduce vehicle trips and miles traveled, C. Flare off and burned CH_4 produced at the wastewater treatment plant to reduce CH_4 emissions up to 95%, D. Utilize low flow water devices High Efficiency Toilets (HET) and with specifications meeting or exceeding standards set forth by the EPA, E. Install low energy utilities (i.e., lighting and appliances) to increase building efficiency and reduce power consumption, F. Promote employee and patron ridesharing to help reduce vehicle trips traveled, and G. Install dedicated parking stalls and charging stations for electric vehicles.	A-G. Measures shall be in place and operational prior to occupancy of the gaming facility.	A-G. IE: Prime Construction Contractor/Gaming Operator ME: Jamul Tribe			
F. Public Services (4.12)					
1. Law Enforcement (4.12(5)) A. Provide on-site security for gaming operations to reduce and prevent criminal and civil incidents. B. All security guards would carry two-way radios so they are able to efficiently respond to back up and emergency related	A-G. Relevant measures shall be in place and operational prior to occupancy of the gaming facility.	A-G. IE: Gaming Operator/Jamul Tribe ME: Jamul Tribe			

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	Timing	Implementing Entity (IE)/ Monitoring Entity (ME)	Compliance		Remarks
			Date/Initials	Action Taken	
calls. This would aid in the prevention of criminal activity within gaming facilities. C. Adopt a "Responsible Alcoholic Beverage Policy" which would include, but not be limited to, requiring patrons to prove their age and refusing service to those who have had too much to drink. This policy would be coordinated with the San Diego Sheriff's Office. D. All parking areas would be well lit and monitored by parking staff and/or roving security guards at all times during operation. This would aid in the prevention of auto theft and other related criminal activity. E. Areas surrounding the gaming facilities would have "No Loitering" signs in place, would be well lit and would be patrolled regularly by roving security guards. This would aid in the prevention of illegal loitering and all crimes that relate to, or require, loitering. F. Provide traffic control with appropriate signage and the presence of peak-hour traffic control staff. This would aid in the prevention of off-site parking, which could create possible security issues. G. The Tribe will make good faith efforts to enter into an agreement with the County regarding law enforcement services.					
2. Fire Protection and Emergency Medical Services (4.12(6)) To reduce the risk of starting a wildfire during construction, the Tribe will make a good faith effort to implement the following best management practices during construction: A. Use spark arresters on construction equipment, B. Restrict vehicular parking to areas devoid of grasses or other fuels, C. Designate safe areas for welding and metal cutting operations, D. Prohibit smoking, E. Properly store flammable or explosive materials, and	A-G: Throughout construction activities	A-G. IE: Prime Construction Contractor ME: Jamul Tribe			

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	Timing	Implementing Entity (IE)/ Monitoring Entity (ME)	Compliance		Remarks
			Date/Initials	Action Taken	
F. Keep construction areas wetted with water trucks and G. Implement a fire safety/fire response plan.					
G. Effects of Mitigation Measures (4.15)					
1. Hydrology and Water Quality (4.15(2)) A. Implement temporary and permanent BMPs including: (1) Temporary BMPs: fiber rolls, hydro-seeding, temporary drainage inlet protection, preserve existing vegetation, stabilized construction entrances, self-contained concrete washout area, and covered material delivery and storage areas, and (2) Permanent BMPs: vegetate all disturbed slopes, implementing biostrips or bioswales, and detention basins. Theses BMPs would be used to prevent pollutants from entering the Waters of the United States. B. The drainage crossing plans shall include a design that shows improvements to be located outside of the ordinary high water mark. If unable to design outside of high water make, the Tribe shall acquire a Clean Water Act Section 404 Permit from the USACOE prior to undertaking any grading activities and shall implement all permit requirements during construction and operation. Permit conditions may include the purchase of in-lieu credits at a mitigation bank, as well as the implementation of Best Management Practices during construction activities. C. Employ plywood shoring (or a similar temporary construction barrier) and the following erosion and sediment control measures to ensure that sediment does not enter Willow Creek during construction of retaining walls. (1) Existing vegetation will be preserved when feasible, (2) Erosion in concentrated flow paths will be controlled by applying fiber rolls, erosion control / fiber blankets, silt fences, and plastic sheeting, and/or lining swales as required, (3) Concentrated water flows shall be channeled away from disturbed soil areas and stockpiles. Concentrated water	A, C, D. Prior to commencement of construction activities, final plans shall have notes added to reflect identified measures. Identified measures shall be implemented throughout construction activities. B. Prior to commencement of construction activities, final plans shall show improvements being located outside the high water mark. If this is not possible, a 404 Permit shall be secured prior to commencement of any construction activities related to the access road.	A-D. IE: Architect/Civil Engineer and Prime Construction Contractor ME: Jamul Tribe			

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	Timing	Implementing Entity (IE)/ Monitoring Entity (ME)	Compliance		Remarks
			Date/Initials	Action Taken	
flows shall be conveyed in a non-eroding fashion, and (4) Non-active areas, and all finished slopes, will be stabilized with effective soil cover (such as aggregate, paving, or vegetation) as soon as feasible after construction or disturbance is complete and no later than 14 days after construction or disturbance in that portion of the site has temporarily or permanently ceased. D. Designate riparian areas with warning signs and fencing and avoid completely, where feasible.					
2. Biological Resources (4.15(4)) A. Implement Mitigation Measure 4.7(1). B. Implement Mitigation Measure 4.7(1)(B) C. A monitoring biologist (approved by CDFW) shall be on site during initial clearing and grubbing of habitat on non-federal lands, and project construction within 300 feet of preserved habitat, to ensure compliance with all conservation measures. The biologist shall be knowledgeable of upland and wetland biology and ecology. The applicant shall submit the biologist's name, address, telephone number, and work schedule on the Project to CDFW at least 30 days prior to initiating construction. The biologist shall perform the following duties: (1) Oversee installation of and inspect temporary fencing and erosion control measures within or up-slope of all restoration and/or preservation areas a minimum of once per week and daily during all rain events to ensure that any breaks in the fence or erosion control devices are repaired immediately, (2) Monitor the work area weekly to ensure that work activities do not generate excessive amounts of dust, (3) Train all contractors and construction personnel on the biological resources associated with this project and ensure that training is implemented by construction personnel. At a minimum, training shall include: - The purpose for resource protection. - The conservation measures that shall be	A. Prior to commencement of construction activities, notes shall be placed on Final Plans for off-global Reservation intersections regarding the need for pre-construction surveys for special status/protected species and measures to avoid impacts to nesting birds. Measures shall be implemented prior to, and throughout construction activities associated with off-Reservation intersections. Pre-construction surveys and CDFW consultation shall take place prior to construction activities of off-Reservation intersections. B. Prior to commencement of construction activities, notes shall be placed on Final Plans of off-Reservation intersections regarding measures to avoid impacts to raptors and/or migratory birds. The pre-construction survey, if needed, shall be conducted within 10 calendar days prior to the start of construction on non-federal lands, the result of which shall be submitted to CDFW for review and approval prior to initiating any construction activities of off-Reservation intersections. If a buffer is needed, it shall be approved and in place prior to commencement of grading activities off-Reservation	A-D. IE: Architect/Civil Engineer, Prime Construction Contractor, and Jamul Tribe ME: Jamul Tribe			

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	**Timing**	**Implementing Entity (IE)/ Monitoring Entity (ME)**	**Compliance**		**Remarks**
			Date/Initials	Action Taken	
implemented during project construction, including strictly limiting activities, vehicles, equipment, and construction materials to the fenced project footprint to avoid sensitive resource areas in the field (i.e., avoided areas delineated on maps or on the project site by fencing). - Environmentally responsible construction practices. - The protocol to resolve conflicts that may arise at any time during the construction process. (4) Halt work, if necessary on non-federal lands, and confer with CDFW and County PDS to ensure the proper implementation of species and habitat protection measures. The biologist shall report any violation to CDFW within 24 hours of its occurrence. (5) Submit weekly letter reports (including photographs of impacted areas) to CDFW and County PDS during clearing of habitat and/or construction within 300 feet of preserved habitat on non-federal lands. The weekly reports will document that authorized impacts were not exceeded, and general compliance with all conditions. The reports will also outline the duration of species monitoring, the location of construction activities, the type of construction which occurred, and equipment used. These reports will specify numbers, locations, and sex of sensitive species (if present), observed species behavior (especially in relation to construction activities), and remedial measures employed to avoid, minimize, and mitigate impacts to sensitive species. Raw field notes shall be made available upon request by CDFW. (6) Submit a final report to CDFW and County PDS within 60 days of the project completion that includes: as-built construction drawings with an overlay of habitat that was impacted and protected, photographs of habitat areas that were to be avoided, and other relevant summary information documenting that authorized impacts were not exceeded and that general compliance with all conditions was achieved. D. Habitat Loss: Prior to grading activities, the following habitat loss mitigation shall be implemented:	intersections. C. The monitoring biologist shall be on site prior to commencement of grading activities (within 300 feet of preserved habitat) associated with off-Reservation intersections/roadways. The biologist's name, address, telephone number, and work schedule shall be submitted to CDFW at least 30 days prior to initiating construction of off-Reservation intersections. D. Prior to grading of off-Reservation intersections.				

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	Timing	Implementing Entity (IE)/ Monitoring Entity (ME)	Compliance		Remarks
			Date/Initials	Action Taken	
(1) Prior to development of the access road, the loss of protected habitats (grasslands, coastal scrub, coast live oak riparian forest) shall be mitigated at the ratios specified by the Biological Mitigation Ordinance, which vary from 0.5:1 to 3:1 depending upon the Tier category and whether or not the land is in a Biological Resource Core Area (either by in lieu fee payment or by deed restriction of qualified lands).					
3. Cultural Resources (4.15(5)) A. The Tribe shall implement inadvertent discovery measures during all construction activities within the aaccess road and off-site intersection Improvement areas. Measures include: (1) A worker education course for all construction personnel covering immediate work curtailment to protect cultural resources and to be conducted prior to initiation of ground-disturbing activities, (2) Monitoring by a qualified archeologist, who meets the Secretary of the Interior's Standards for archaeologists (found at 36 CFR §61), as well as a JIV tribal monitor, of all earth-disturbing activities in close proximity to site CA-SDI-7966/11410 and CA-SDI-11051, and of all off-site earth-disturbing activities in native soils/sediments; and (3) Procedures for discovery of cultural resources, including human remains, during construction or earth-disturbing activities if an archaeological monitor is not present. B. In the event that any prehistoric, historic, or paleontological resources are discovered during construction-related earth-moving activities, all work within 50 feet of the resources shall be halted and a qualified archaeologist or paleontologist, as appropriate, shall be consulted to assess the significance of the find. If any find is determined to be significant by the qualified professional, then appropriate agency and project representatives and the qualified archaeologist and/or paleontologist shall meet to determine the appropriate course of action. All significant cultural or paleontological materials recovered shall be subject to scientific analysis, professional museum curation, and a report prepared by the qualified archaeologist or	A. The worker education course shall take place prior to grading activities associated with off-reservation intersections/roadways. The archaeologist shall be under contract prior to grading activities associated with off-reservation intersections/ roadways. The procedures for discovery shall be developed by the archaeologist prior to grading activities. B,C. These measures shall be implemented throughout grading activities associated with the off-reservation intersections/roadways.	A-C. IE: Prime Construction Contractor and Archaeologist ME: Jamul Tribe			

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	**Timing**	**Implementing Entity (IE)/ Monitoring Entity (ME)**	**Compliance**		**Remarks**
			Date/Initials	Action Taken	
paleontologist according to current professional standards. C. If human bone or bone of unknown origin is found during construction, all work shall stop within 50 feet of the find and the San Diego County Coroner and the Tribe shall be contacted immediately. If the remains are determined to be Native American, the coroner shall notify the Native American Heritage Commission (NAHC) who shall identify the most likely descendant. The most likely descendant shall work with the Tribe and the Lead Agency, as appropriate, to develop a plan for re-interment of the human remains and any associated artifacts. No additional work shall take place within the immediate vicinity of the find until the identified actions have been implemented.					
4. Off Site Intersection Improvements A. Implement Mitigation Measures 4.6(2) and 4.12(6) to reduce potential Hazardous Materials impacts to a less than significant level. B. Prior to grading activities for any intersections impacting jurisdictional waters, the improvement plans shall include a design that shows improvements to be located outside of the ordinary high water mark. If unable to design outside of high water make, the developer shall acquire a Clean Water Act Section 404 Permit from the USACOE prior to undertaking any grading activities. Permit conditions typically include the purchase of in-lieu credits at a mitigation bank as well as the implementation of Best Management Practices during construction activities. C. Prior to development of any of the intersection improvement areas, impacted protected habitats (grasslands, coastal scrub, coast live oak riparian forest) shall be mitigated at the ratio specified by the Biological Mitigation Ordinance, which vary from 0.5:1 to 3:1 depending upon the Tier category and whether or not the land is in a Biological Resource Core Area (either by in lieu fee payment or by deed restriction of qualified lands), D. Implement Mitigation Measure 4.15(2)(B) to reduce potential Jurisdictional Waters impacts to a less than significant level. E. Implement Mitigation Measure 4.15(4) to reduce biological resource impacts to a less than significant level.	A. Throughout construction activities. B, D. Prior to commencement of construction activities, final plans shall show improvements being located outside the high water mark. If this is not possible, a 404 Permit shall be secured prior to any construction activities related to the access road. C, G. Prior to grading of off-reservation intersections/roadways. E. See G(2) above. F. See G(3) above. H. Prior to commencement of construction activities, final plans shall have notes to reflect identified measures. Identified measures shall be implemented throughout construction activities.	A. IE: Prime Construction Contractor/Registered Site Assessor ME: Jamul Tribe B, D, H. IE: Architect/Civil Engineer and Prime Construction Contractor ME: Jamul Tribe C, G. IE: Architect/Civil Engineer, Jamul Tribe and Prime Construction Contractor ME: Jamul Tribe E. See G(2) above. F. See G(3) above.			

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	**Timing**	**Implementing Entity (IE)/ Monitoring Entity (ME)**	**Compliance**		**Remarks**
			Date/Initials	Action Taken	
F. Implement Mitigation 4.15-5 to reduce cultural resource impacts to a less than significant level. G. Prior to development of the intersection improvement areas, any impacted County-protected plants (Group A Plants defined by County PDS), such as San Diego thornmint or Palmer's Goldenbush, shall be compensated at a 3:1 acreage ratio (either in lieu fee payment to the County or by deed restriction of qualified lands) to the satisfaction of the County of San Diego Director of Planning and Development Services. H. The following Best Management Practices shall be implemented to protect water bodies from impacts: (1) create and implement a Hazardous Materials Management Plan and Spill Response Plan, including the identification of specific refueling areas, (2) create and implement an erosion control plan and a sediment monitoring plan, including the placement of jute mats, straw bales and wattles, sand bags, and vegetative covers (e.g. Hydroseed), weather monitoring, and specific inspection protocols, (3) designated concrete washout areas and other filters for construction materials, (4) a visual monitoring program and a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs, (5) create and implement a Hazardous Materials Management Plan and Spill Response Plan, including the identification of specific refueling areas, (6) create and implement an erosion control plan and a sediment monitoring plan, including the placement of jute mats, straw bales and wattles, sand bags, and vegetative covers (e.g. Hydroseed), weather monitoring, and specific inspection protocols, (7) designated concrete washout areas and other filters for construction materials, and (8) a visual monitoring program and a chemical monitoring program for "non-visible" pollutants to be implemented					

Mitigation Measure The Tribe will make good faith efforts to implement the mitigation measures below in accordance with the terms of Tribal Ordinance 2011-01.	**Timing**	**Implementing Entity (IE)/ Monitoring Entity (ME)**	**Compliance**		**Remarks**
			Date/Initials	Action Taken	
if there is a failure of BMPs.					

APPENDIX 11

JAMUL GAMING FACILITY
SUBAREA MASTER PLAN FOR POTABLE WATER SERVICE

JAMUL INDIAN VILLAGE
CASINO DEVELOPMENT PROJECT

SUBAREA MASTER PLAN
FOR POTABLE
WATER SERVICE

Prepared for:

The Otay Water District
Project No. D0388

Prepared by:

Martin & Ziemniak
9180 Camino Santa Fe
San Diego, CA 92121
(858) 831 – 9420

August, 2006



SUBAREA WATER MASTER PLAN

JAMUL INDIAN VILLAGE
CASINO DEVELOPMENT PROJECT

AUGUST, 2006

Otay Water District Project No. D0388
Martin & Ziemniak Job No. 205121.00

Prepared By:
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By: _____
David J. McCargar, P.E.
Project Engineer

Approved By:

Otay Water District
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By: _____ Date: 10/2/06
Rod Posada
Chief of Engineering

By: _____ Date: 9-29-06
Pedro Porras
Chief of Engineering

By: _____ Date: 9/28/06
Randy Klaahsm
Senior Civil Engineer, Planning

JAMUL INDIAN VILLAGE CASINO DEVELOPMENT PROJECT
SUBAREA MASTER PLAN

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JAMUL INDIAN VILLAGE CASINO DEVELOPMENT PROJECT SUBAREA MASTER PLAN

EXCUTIVE SUMMARY

The 6-acre Jamul Indian Village Casino/Hotel Project will receive water service from the Otay Water District's Regulatory Water System (1296 Pressure Zone). The recommended potable water pipelines internal to the Casino/Hotel site have been sized in accordance with Otay Water District design criteria to ensure that adequate service is provided during both phases of development. However, they will be private systems owned and operated by the Jamul Indian Village. The recommended private on-site water facilities consist of 6-inch and 10-inch domestic and fire prevention water distribution pipelines. The facilities recommended in this sub-area master plan will be designed to meet all fire flow, pressure, storage, and capacity requirements of Otay Water District and the San Diego County Rural Fire District in effect at the time the plan is approved. The design will also incorporate the American Water Works Association recommendations and requirements for private systems.

The proposed 6-acre development will be undertaken in two phases. Phase A will consist of the relocation of the existing residences from the reservation to an offsite location along with the construction of the Casino on the site. The entire first phase of the project, Phase A, will include construction of the casino, parking garage, human resource facility, fire prevention facility and a wastewater treatment plant owned and operated by the Jamul Indian Village. Phase B of the project will include the construction of a hotel connected to the casino. Figure 1-3 provides a detailed overview of the phasing and development plan.

The total estimated potable water average day demand for development is 115 gpm upon completion of Phase A. An additional 28 gpm will be required for Phase B construction development resulting in a complete build-out average day demand of 143 gpm. These demands can be reduced by approximately 60% through the use of on-site recycled water (meeting the USEPA imposed California Department of Health Services Title 22 requirements for recycled water) for toilet flushing in the casino and hotel along with landscape irrigation uses. (See Chapter 1, Introduction for further discussion). Therefore, at the projected project build-out the total average day demand for potable water, with the use of recycled water, is reduced to 54 gpm upon completion of Phase B. However, the private potable water facilities proposed herein have been designed to meet both maximum day plus fire flow (286 gpm) and peak hour (428 gpm) demand scenarios anticipated to occur at the completion of Phase B without the use of recycled water.

CHAPTER 1

INTRODUCTION

This document provides a subarea master plan (SAMP) of domestic, fire and recycled water for the Jamul Indian Casino project. This document provides information concerning water demands, existing facilities, available capacity and storage associated with serving this project. The subarea master plan is compatible with the August 2002 Otay Water District Water Resources Master Plan, and the recommended distribution plan is adequate to meet the ultimate need of future developments in the area. The design of the potable and fire water facilities shall be to the satisfaction and meet the standards of the Otay Water District and the San Diego County Rural Fire District. The design of the Wastewater Treatment Plant and use of recycled water for irrigation uses shall be to the satisfaction of the USEPA by adhering to the full requirements of the California Department of Health Services, Title 22, Water Recycling Criteria and to the California RWQCB by adhering to its Basin Plan objectives for the protection of surrounding groundwater, (see Section 5-Wastewater Disposal, of the HydroScience Jamul Indian Village Feasibility Study, November 2002, attached hereto as Appendix D).

PROJECT OVERVIEW

The Jamul Indian Casino site is located in eastern San Diego County approximately one mile south of the community of Jamul. The project site is split by Melody Road, and bounded by residential and vacant land to the north, vacant and residentially developed land to the west, vacant open space designated land to the south, and State Route 94 to the east. Figure 1-1 maps the location for the project and Figure 1-2 shows the project site boundaries in relation to adjacent developments and the Otay Water District's existing and planned distribution mains within the 1296 Pressure Zone.

DEVELOPMENT PLAN

The proposed development consists of approximately 6 acres on one parcel owned by the Jamul Indian Tribe. The Jamul Indian Casino development includes the casino, a restaurant, a human resources facility, a hotel, a fire protection facility, and an on-site wastewater treatment facility.

The proposed elevation of the building pad is approximately 894 feet. Figure 1-3 provides a rough grading plan identifying the location and elevation of the building pad. Table 1-1 (below) provides a land use summary and estimated wastewater production rates.

TABLE 1-1

Land Use Summary/Average Wastewater Production

Land Use Description	Gross Area (square feet)	Dwelling Units	Estimated Daily Occupancy (employees and patrons)	Estimated Average Wastewater Production (gpd)
Casino Gaming Floor	205,194	-----	1,696 + 9,756	123,000
Restaurant	25,956	-----	59 + 630	32,385
Human Resources Facility	30,000	-----	72	720
Hotel[a]	361,900	-----	88 + 720	37,760
Fire Protection Facility		-----	15	1,500
Phase A Net[b]		-----	11,908	157,605
Phase B Net[c]		-----	12,716	195,365

[a] Assumes 100 gpd/guest, 2 guests/room, 90% occupancy
[b] Excludes Phase B construction of hotel
[c] Used for design, includes Phase B construction

JAMUL
CASINO & RESORT
JAMUL, CALIFORNIA

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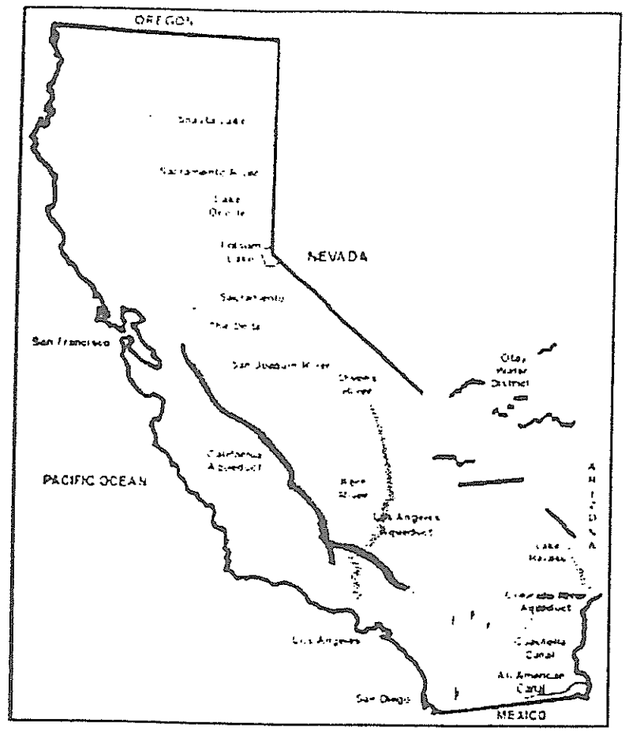
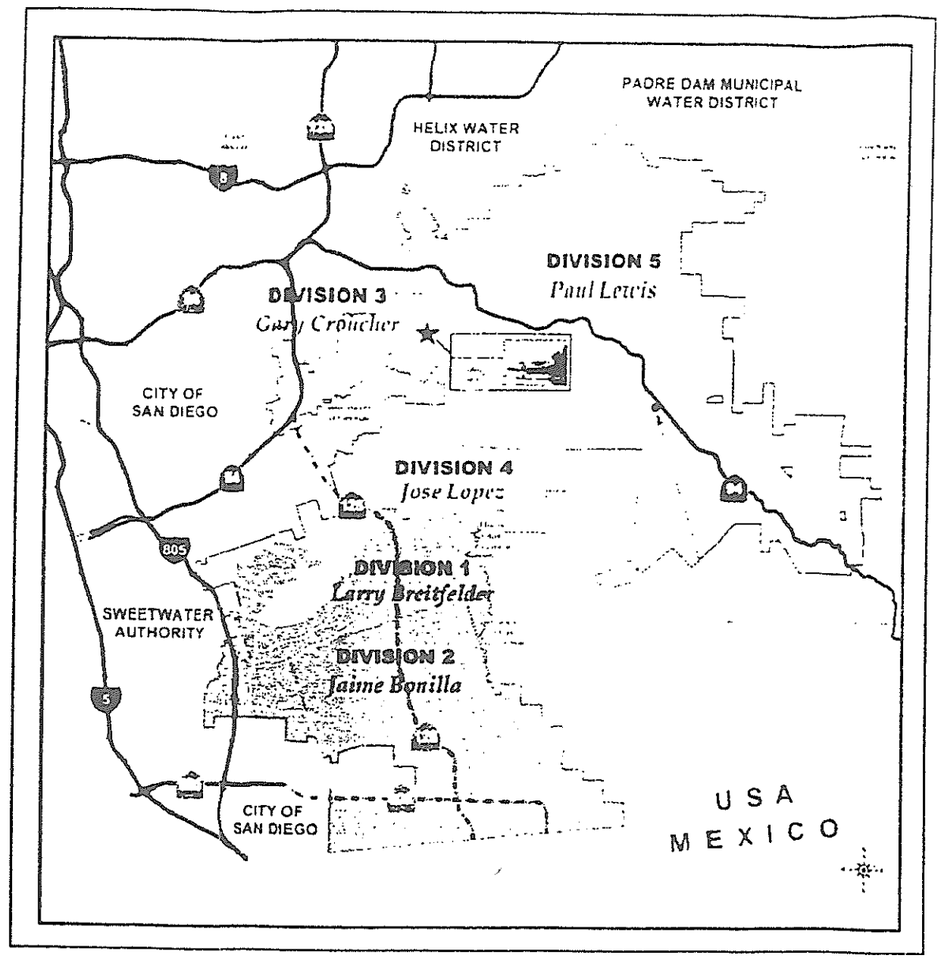


VICINITY MAP



LOCATION MAP

PROJECT SITE

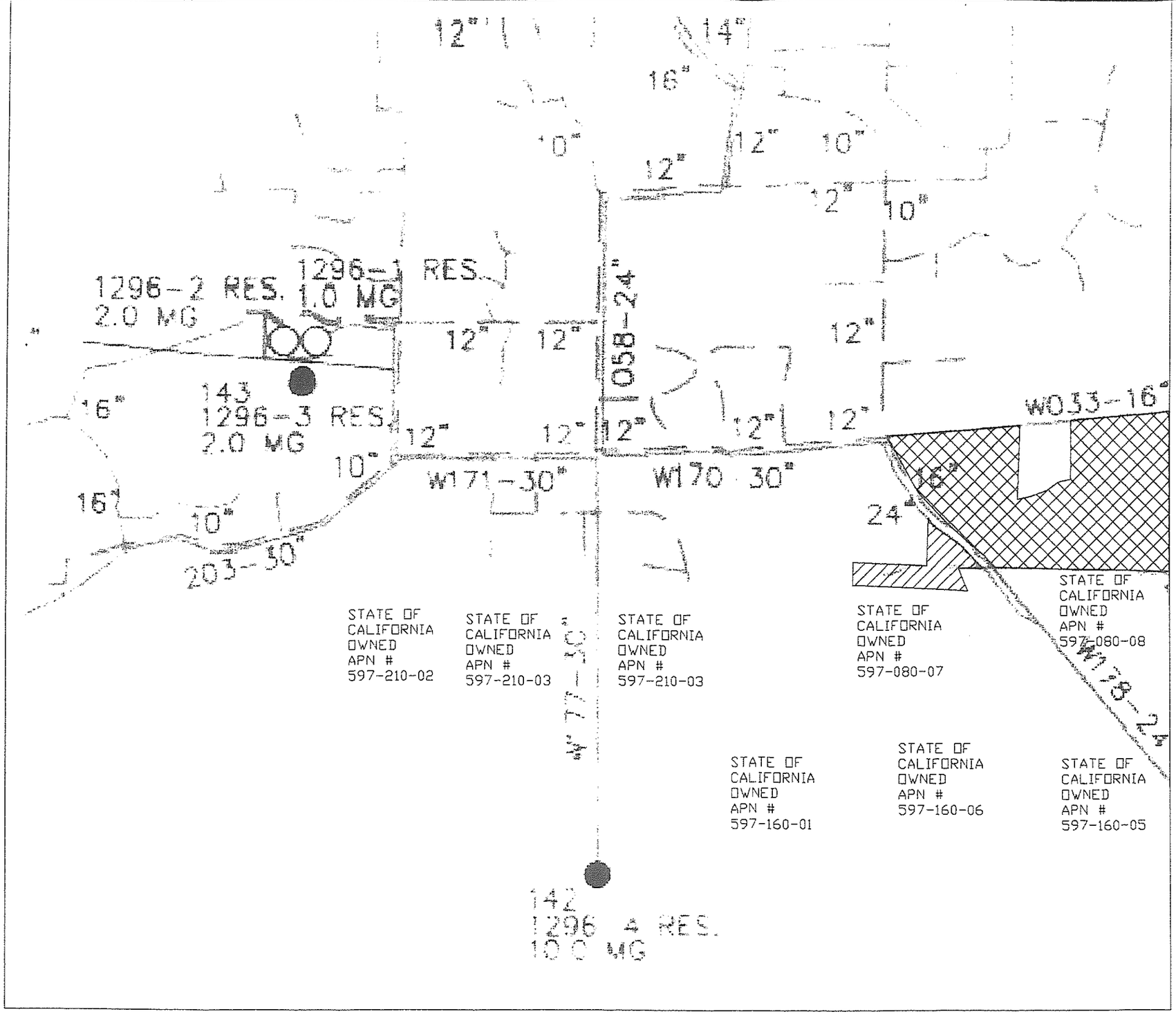
JAMUL INDIAN VILLAGE
CASINO DEVELOPMENT PROJECT

VICINITY AND SITE
MAP

FIGURE 1-2

PEACEFULL VALLEY RANCH

JAMUL INDIAN VILLAGE SITE



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PRIVATE CONTRACT

IMPROVEMENT PLANS FOR:

JAMUL
HIGHRISE CASINO

SITE/AREA/PARCEL MAP AND OTAY WATER DISTRICT
1296 PRESS. ZONE DISTRIBUTION MAIN LOCATION MAP

SCALE: 1" = 200' SHEET 1 OF 1

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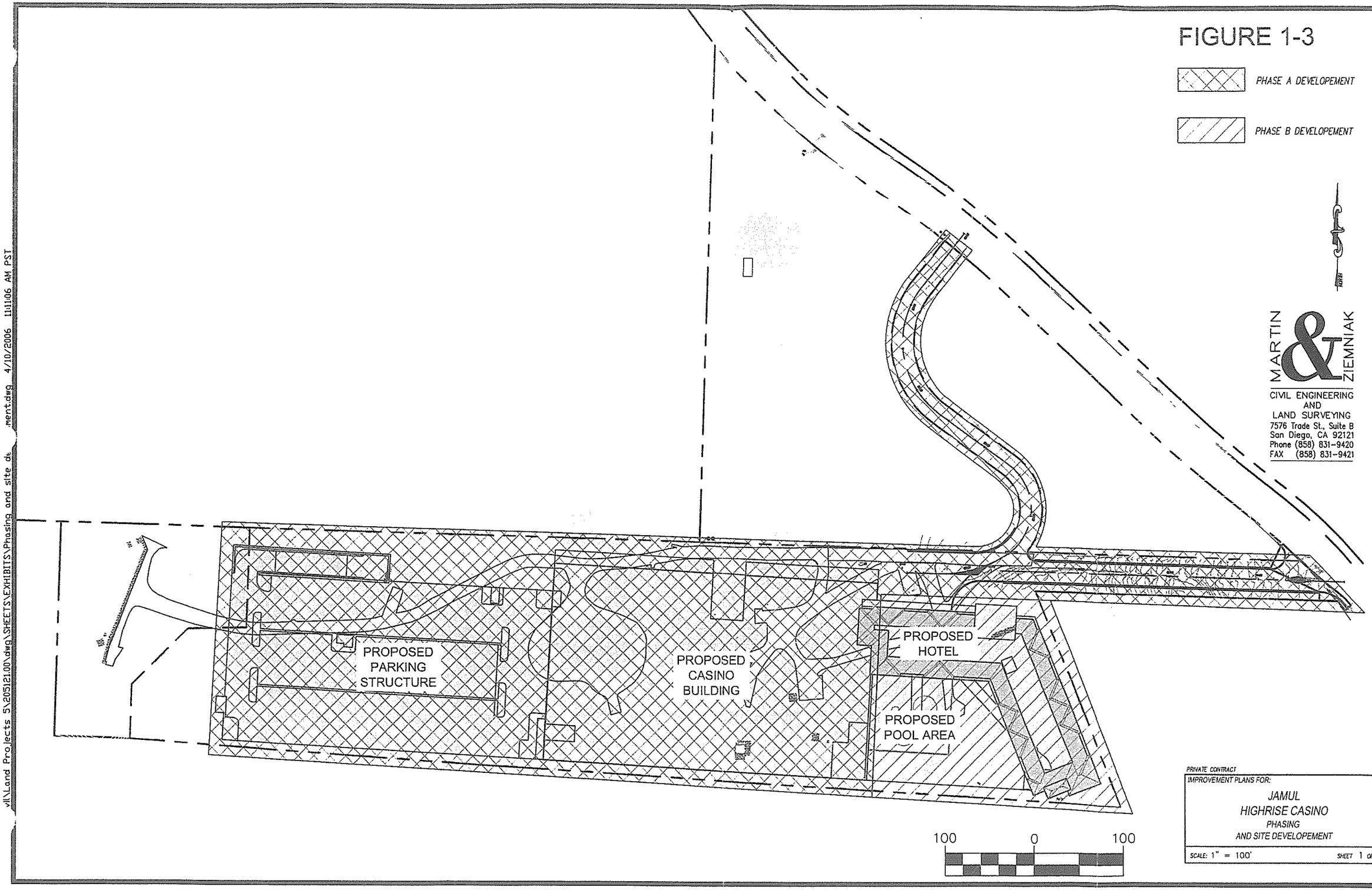
FIGURE 1-3

PHASE A DEVELOPEMENT

PHASE B DEVELOPEMENT



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PRIVATE CONTRACT

IMPROVEMENT PLANS FOR:

JAMUL
HIGHRISE CASINO
PHASING
AND SITE DEVELOPEMENT

SCALE: 1" = 100' SHEET 1 OF 1

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CHAPTER 2

DESIGN CRITERIA

The criteria utilized in this document are established in accordance with the August 2002 *Otay Water District Water Resources Master Plan, Draft Jamul Indian Village Tribal Environmental Impact Statement (*Analytical Environmental Services, March 2006), the HydroScience Engineers November 2002 *Water, Wastewater, Recycled Water Feasibility Study*, the 1998 Uniform Fire Code, and the 1999 American Water Works Association standards and guidelines. The design criteria are utilized for design and sizing of proposed on-site improvements and expansion of the existing Otay water distribution system to serve the Jamul Indian Casino while accommodating the existing Regulatory system demands and future development within the Otay Water District.

POTABLE AND FIRE WATER DESIGN

The potable and fire prevention water distribution systems have been designed to maintain static pressures between 65 and 200 psi. Computer modeling was performed to ensure that adequate residual pressures are obtained under all demand conditions. The two water distribution systems, consisting of a domestic water line and a separate fire prevention water line has been designed not to exceed a maximum static pressure of 200 psi nor fall below a minimum of 40 psi residual pressure at any location during a peak hour demand scenario and a minimum residual pressure of 20 psi during a maximum day demand plus fire flow scenario. The purpose of separating the domestic and fire water lines is that fire prevention water service does not require flow metering. The combination of domestic and fire prevention water lines would require a much larger site distribution main and metering system. The cost savings to run independent systems is significant and therefore is warranted. Per a meeting with Otay Water District on July 12, 2004 this scenario is feasible and acceptable. All on-site potable water systems will be permanent private systems. Water mains are sized to maintain a maximum velocity of 10 feet per second under a maximum day plus fire flow scenario and a maximum velocity of 6 feet per second under peak hour flow conditions.

The water demands without use of recycled water are estimated using the average wastewater flow from Table 1-1 and assuming a system loss of 5% from supply to wastewater capture. Table 2-1 shows the demands of the proposed water system without use of recycled water.

The recommended design of the Jamul Indian Casino, however, includes a wastewater treatment reclamation plant which will treat all wastewater created by the development to a level sufficient to allow its beneficial reuse as irrigation and toilet and urinal sanitation demand requirements. Dual plumbing will be used for toilets and urinals at all project facilities. Table 2-2, therefore, adjusts the total average day potable water demand estimated in Table 2-1 by applying typical toilet and urinal use percentages from the

various facilities. This information is taken from the November 2002 HydroScience Feasibility Study (Appendix D). However, water distribution network is designed based upon demand criteria computed without the use of reclamation and tabulated in Table 2-1 Estimated Potable Water Demands for Jamul Indian Casino.

The Otay Municipal Water District will not own, operate, or maintain any portion of the wastewater treatment reclamation plant or any portion of the proposed recycled water system facilities. The project proponents are solely responsible.

TABLE 2-1

Estimated Potable Water Demands for Jamul Indian Village

Land Use Description	Estimated Average Wastewater Production (gpd)[a]	Estimated Water Demand (gpd)[c]	Design Average Day Demand (gpm)	Maximum Day Demand (gpm)[d]	Peak Hour Demand (gpm)[e]
Casino	123,000	129,474	90	180	270
Restaurant	32,385	34,089	24	48	72
Human Resources Facility	720	758	0.5	1	1.5
Hotel[b]	37,760	39,748	28	56	112
Fire Protection Facility	1,500	1,579	1	2	3
Phase A Net	157,605	165,900	115	230	346
Phase B Net	195,365	205,648	143	286	428

[a] Values from Table 1

[b] Phase B construction values not included in Phase A Net

[c] Assumed 5% increase (system loss) from estimated wastewater production rates

[d] Peaking factor of 2.0 applied consistent with AWWA guidelines for water system design (Mays, 1999) and per *Draft Jamul Indian Village Tribal Environmental Impact Statement (*Analytical Environmental Services, March 2006)

[e] Peaking factor of 3.0 applied from AWWA guidelines (Mays, 1999) and per *Draft Jamul Indian Village Tribal Environmental Impact Statement (*Analytical Environmental Services, March 2006)

TABLE 2-2

Estimated Water Demands *with Reclamation* for Jamul Indian Village[a]

Land Use Description	Typical Toilet Flushing % at Varying Facilities[b, c]	Design Average Day Demand (gpm)[d]	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)[e]
Casino	80%	18	36	54
Restaurant	30%	16	32	48
Human Resources Facility	80%	0.1	0.2	0.3
Hotel[f]	30%	19	38	57
Fire Protection Facility	40%	1	2	3
Phase A Net	-----	35	70	105
Phase B Net	-----	**54**	**107**	**161**

[a] **Assumes that estimated 60 gpm Phase B site irrigation demand is satisfied by reclamation process from wastewater treatment plant**

[b] HydroScience Jamul Indian Village Feasibility Study, November 2002

[c] Assumed % usage

[d] Adjusted demands from Table 2-1 using toilet flushing percentages

[e] Recommended water supply capacity

[f] Values not included in Phase A Net

CHAPTER 3

EXISTING POTABLE WATER FACILITIES

The potable water required by the proposed development of the Jamul Indian Casino will be supplied to the site by the Otay Water District, which currently obtains its water supply for the Regulatory System from the San Diego County Water Authority's (SDCWA) Otay FCF No.11 on Pipeline No. 4 of the SDCWA Second San Diego Aqueduct. The water supply is conveyed by gravity from FCF No. 11 through a 36-inch transmission pipeline main to the Regulatory Reservoirs. The water is pumped and stored through a series of pump stations and reservoirs until it reaches the Jamul Indian Casino (1296 pressure zone). From the 1296-1 pump station the water is pumped through 12-inch diameter transmission pipelines at a consistent capacity of 3300 gpm to reservoir 1296-1 and reservoir 1296-2, which combine to provide a capacity of 3.04 million gallons of water storage. The 1485-1, the Vista Diego 1530-1, and the Rancho Jamul 1655-1 pump stations, which pump water out of the 1296 zone have firm capacities of 860, 260, and 620 gpm respectively (based on information directly from the Otay Water District Master Plan).

Based on the Otay Water District's Master Plan the existing net emergency reserve for the 1296 pressure zone is 1.08 MG, which is deficient of the stated required 1.54 MG of emergency reserve (Table 9-1 of the Otay Water District Master Plan). This translates to a net emergency reserve of approximately 70% of what is required. The current capacity for total reservoir storage volume of 3.04 MG is approximately 87% of the required 3.5 MG capacity.

The Otay Water District's Master Plan identifies these deficiencies and proposes two additional reservoirs to be added to this pressure zone by 2016. Reservoir 1296-3 with a capacity of 2 MG will be added by 2008 and reservoir 1296-4 with a capacity of 10 MG be added by 2016. The master plan accounts for future planning and development by increasing demands and pumping requirements on the system. This, in turn, increases the operational and emergency reserve components of the storage balancing calculations. The master plan's ultimate required storage for the 1296 pressure zone is met by the addition of these proposed reservoirs and incorporates projected consumption from previously planned developments that will never be developed due to some of the proposed development areas now being designated as open space areas. The areas now designated as open space include Village 14 and Village 16 now owned by the State Fish and Game Department. Figure 3-1 provides a detailed map identifying these areas in relation to the Jamul Indian Casino. Therefore, the projected ultimate consumption values are conservative due to the planned usage being decreased by open space designations.

The Otay water distribution system has two existing transmission mains adjacent to the project site. Melody Road contains a 12-inch diameter pipeline main and State Route 94 contains a 16" diameter pipeline main. There is also an existing 8-inch diameter pipeline within the current reservation land serving the existing homes.

FIGURE 3-1

VILLAGES 14 & 16

JAMUL INDIAN VILLAGE SITE

1296-2 RES
2.0 MG

1296-1 RES
1.0 MG

143
1296-3 RES
2.0 MG

142
1296-4 RES
1.0 MG

1450-1
HYDRO P.S.
100 GPM
(EXACTION)

MELODY ROAD

STATE ROUTE 94

OWD BOUNDARY

AREA OF INFLUENCE

UPPER OTAY LAKE

NORTH

MARTIN & ZIEMNIAK
CIVIL ENGINEERING
AND
LAND SURVEYING
7576 Trade St., Suite B
San Diego, CA 92121
Phone (858) 831-9420
FAX (858) 831-9421

PRIVATE CONTRACT
IMPROVEMENT PLANS FOR:

JAMUL
HIGHRISE CASINO
VILLAGES 14 & 16
LOCATION MAP

SCALE: NO SCALE SHEET 1 OF 1

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CHAPTER 4

RECOMMENDED POTABLE WATER FACILITIES

This section presents the analysis and results of the recommended on-site water system for the proposed Jamul Indian Village Casino Project.

The Jamul Indian Casino project site is oriented such that access to the existing 16-inch AC water main within State Route 94 along the project's western perimeter is suitable to obtain water supply. The site will have a domestic system and a separate dedicated fire prevention system that significantly reduces the site distribution mains and meter sizes. Two main connections are recommended to adequately supply the water demands to the proposed development. One connection is a 6-inch domestic potable water with 6-inch meter and backflow prevention device and one 10-inch connection is for fire prevention water. Both proposed water supply connections are located approximately 560 feet northwest of the current 8-inch connection that supplies water to the existing reservation homes along State Route 94. This existing 8-inch connection will be disconnected and the pipe abandoned in place. The attached exhibits show the proposed water laterals and their corresponding connection points to the existing 16-inch water main (see maps W-A in Appendix C of this report). In addition to the maps in Appendix C, the following Figure 4-1 has been included to give an overall detail of the piping network that will serve this site.

The water modeling system used to perform hydraulic analysis for various demand scenarios on the proposed water laterals is WaterCAD® v7.0 developed by Haestad Methods, Inc. The solution of the model is based on the use of the Hazen-Williams equation and uses a Hazen-Williams coefficient of 150 for PVC piping, 135 for copper piping, and 140 for the existing AC distribution pipeline mains in Melody Lane and State Route 94. The analysis was performed similar to the Otay Water District's Master Plan, which assumes that all inflows and outflows to the zone are operating at their firm (steady) capacities. Therefore, the model was run assuming that the available flow at the development site is as follows:

Firm Cap. In		Firm Cap. Out		Exist. Consumption (1296 only)
3300 gpm	–	(260 gpm + 620 gpm + 860gpm)	–	(396 gpm)

= 1164 gpm (1.68 MG)

The existing consumption, in the equation above, by the 1296 zone is 396 gpm (Table 4-2 of the Draft Otay Water District Master Plan). The existing inflow (firm capacity of pump station 1296-1) to the 1296 zone is 3300 gpm. The existing outflow (firm capacities of Vista Diego 1530-1, 1485-1, and 1655-1 pump stations plus existing consumption) is 1880 gpm plus 396 gpm for a total of 2136 gpm. Therefore, the net inflow to the existing 1296 reservoirs is 3300 gpm minus 2136, gpm, which equals 1164 gpm or 1.68 MGD. Flow at the development site is, therefore, adequate given that the

proposed water system for the Jamul Indian Village Casino requires a maximum of 428 gpm or 0.61 MGD (peak hour demand).

The Haestad Methods computer model was run using the demand values from Tables 2 & 3 for Average Day (Base) Demands, Maximum Day Demand plus Fire Flow Demands and Peak Hour Demands. Tabular Data showing results of each scenario with and without the use of reclaimed water is included at the end of this report in Appendix A. Table 4-1 (below) identifies the fire flow demands and durations taken from the 1998 Uniform Fire Code, Table A-III-A-1, 'Minimum Required Fire Flow and Flow Duration for Buildings'. For the purposes of this report it was assumed that all non-residential facilities are constructed per the Building Code as Type II or Type III One-Hr.

Table 4-1

Estimated Fire Flow Requirements and Durations

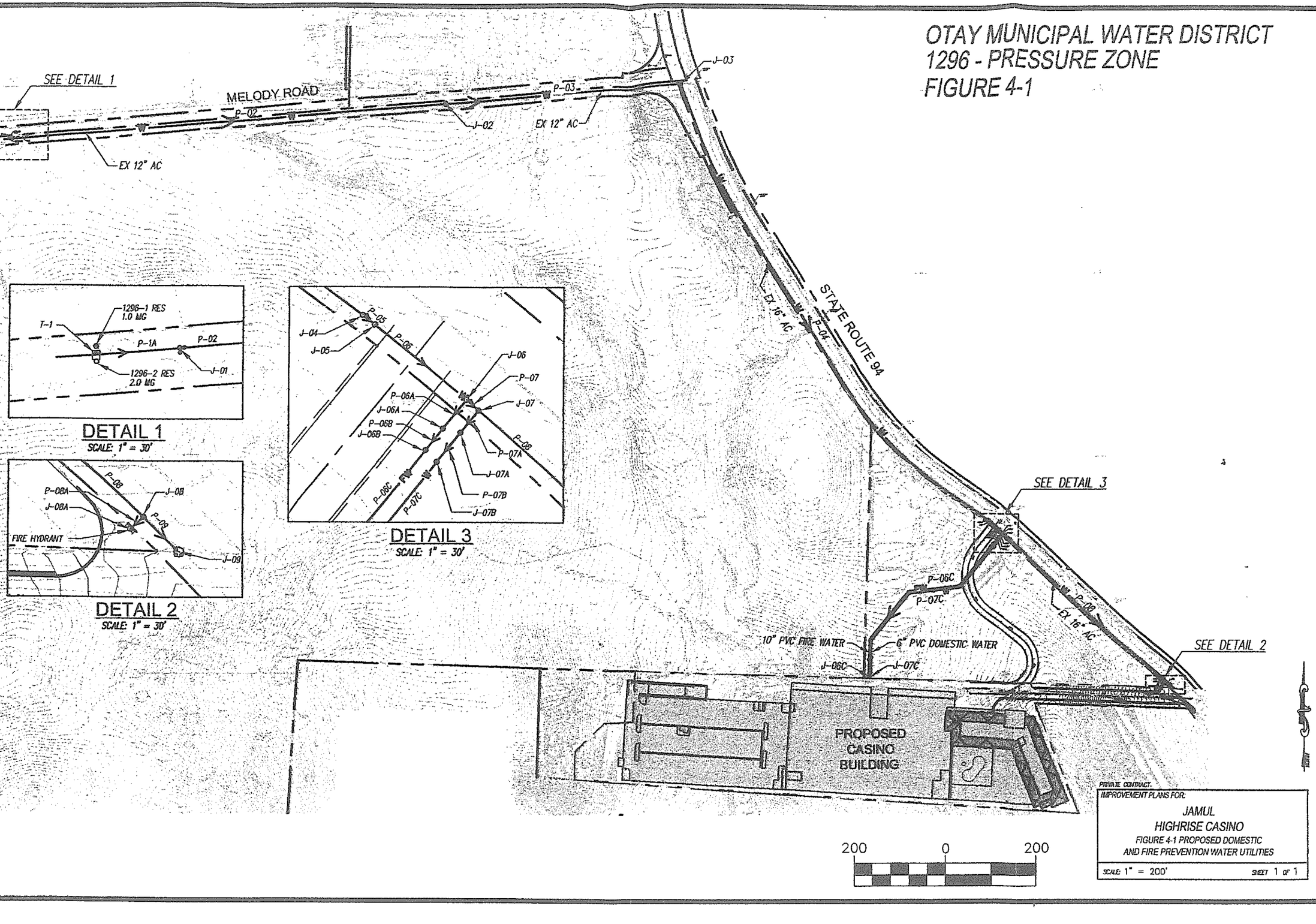
Land Use Designation	Required Fire Flow (gpm)[a]	Fire Flow (gpm) at hydrant(s) with Building Sprinkler System[b]	Required Fire Flow Duration (hrs.)
Casino	3500	1500	4
Restaurant	3500	1500	2
Human Resources Facilities	3500	1500	2
Hotel	3500	1500	4
Fire Protection Facility	3500	1500	2

[a] Values taken from 1997 Uniform Fire Code, Table A-III-A-1 for Type II & III One-HR. Construction

[b] Up to 75% reduction but not less than 1500 at hydrant(s)

[c] Per Division III, Appendix III-A, Section 5.1 of the 1997 Uniform Fire Code each single family dwelling not exceeding 3,600 square feet must have 1000 gpm for 2 hours

OTAY MUNICIPAL WATER DISTRICT
1296 - PRESSURE ZONE
FIGURE 4-1



DETAIL 1
SCALE: 1" = 30'

DETAIL 2
SCALE: 1" = 30'

DETAIL 3
SCALE: 1" = 30'

200 0 200

PRIVATE CONTRACT
IMPROVEMENT PLANS FOR:

JAMUL
HIGHRISE CASINO
FIGURE 4-1 PROPOSED DOMESTIC AND FIRE PREVENTION WATER UTILITIES

SCALE: 1" = 200' SHEET 1 OF 1

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CHAPTER 5

CONCLUSIONS

Given the proposed on-site use of reclaimed water for both phases of this development and the resulting reduction of potable water demands the **Average Day Demand upon completion of Phase A is 35 gallons per minute**. The Phase A **Maximum Day Demand is 70 gallons per minute**, and the **Peak Hour Demand is 105 gallons per minute**. Then upon the completion of Phase B (construction of the Hotel) the total **Average Day Demand is projected to be 54 gallons per minute**, the Phase B projected **Maximum Day Demand is 107 gallons per minute**, which results in a Phase B **Peak Hour Demand of 161 gallons per minute**.

Without use of reclaimed water for either phases of this development the **Average Day Demand upon completion of Phase A is 115 gallons per minute**. The Phase A **Maximum Day Demand is 230 gallons per minute**, and the **Peak Hour Demand is 346 gallons per minute**. Then upon the completion of Phase B (construction of the Hotel) the total **Average Day Demand is projected to be 143 gallons per minute**, the Phase B projected **Maximum Day Demand is 286 gallons per minute**, which results in a Phase B **Peak Hour Demand of 428 gallons per minute**.

All potable water piping has been sized to accommodate the ultimate demands of the system upon completion of Phase B thus not based upon the use of reclaimed water for toilet/urinals and irrigation on the proposed development. Static pressures are maintained under the maximum of 164 psi, a minimum of 40 psi residual pressure under peak hour demand flows is maintained, and a minimum residual pressure of 20 psi during maximum day demand plus fire flow can be sustained for a 4 hour period. The computer modeling tables confirm these conclusions and can be found in Appendix A of this report.

The maximum day demand for the proposed Jamul Indian Village with reclamation is 107 gpm (0.15 MGD) upon completion of Phase B. When added to the current Maximum Day demand from Table 9-1 of the Draft Otay Water District Master Plan for the 1296 pressure zone, the Maximum Day demand created by the development of the Jamul Indian Village results in an increased demand on pressure zone 1296 from 1.54 MGD to 1.69 MGD. The net emergency storage of 1.08 MG (Table 9-1 of the Draft Otay Water District Master Plan) is currently 30% deficient of the required 100% redundant storage of 1.54 MGD. The post Phase B development net emergency storage would be 36% deficient of the newly required 1.69 MGD resulting in an increased deficiency of approximately 6% as a result of this project.

Per the request of the Otay Water District, a second analysis was considered. The proposed distribution system was analyzed given the assumption that no pump stations are operating (gravity flow) on pressure zone 1296 and only the existing consumption from zone 1296 (0.57 MG from Table 4-2, Draft Otay Water District Master Plan) is removed from the 70% full supply reservoirs. The 1296 reservoirs at capacity will hold 3.03 MG (Table 6-9, Otay Water District Master Plan) and at 70% full can supply 2.12

MGD by gravity flow. Therefore, the available water for the parallel looped distribution system is 1.55 MG or 1076 gpm. Given that the supply for this scenario exceeds the supply with the pumps operating, the analysis and recommendations for the proposed system were developed using the more conservative and reality based approach with the pumps operating at their respective firm (steady) capacities. Therefore, tabular results of the computer model for this set of assumptions are not included in this report. Also the Otay Water District Master Plan as received includes water use on proposed developments that of recent purchases by the State Fish and Game Department will never be developed. The property that should have its demand removed from the Otay Water District Master Plan include Village 14 and Village 16 whose combined consumption would have been a greater demand than the proposed Jamul Indian Village Development.

APPENDIX A

STEADY STATE HYRAULIC ANALYSIS
OPERATING PUMP STATIONS
DEMAND SCENARIO – WITHOUT RECLAMATION

Scenario: Ave Day + Fire Flow
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Iterations	Needed Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Maximum Hydraulic Grade (ft)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Calculated Minimum System Pressure (psi)	Fire Flow Upper Limit (gpm)	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Available Fire Flow (gpm)
J-01	N/A	6,000.00	N/A	N/A	1,294.27	20.00	N/A	N/A	6,500.00	false	false	N/A
J-02	N/A	6,000.00	N/A	N/A	1,287.04	20.00	N/A	N/A	6,500.00	false	false	N/A
J-03	N/A	6,000.00	N/A	N/A	1,282.81	20.00	N/A	N/A	6,500.00	false	false	N/A
J-04	N/A	6,000.00	N/A	N/A	1,280.74	20.00	N/A	N/A	6,500.00	false	false	N/A
J-05	N/A	6,000.00	N/A	N/A	1,280.51	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06	N/A	6,000.00	N/A	N/A	1,280.23	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06A	N/A	6,000.00	N/A	N/A	1,280.23	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06B	N/A	6,000.00	N/A	N/A	1,280.23	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06C	5	6,000.00	6,000.00	6,278.53	1,280.23	20.00	23.36	40.00	6,500.00	true	true	6,278.53
J-07	N/A	6,000.00	N/A	N/A	1,280.00	20.00	N/A	N/A	6,500.00	false	false	N/A
J-07A	N/A	6,000.00	N/A	N/A	1,279.99	20.00	N/A	N/A	6,500.00	false	false	N/A
J-07B	N/A	6,000.00	N/A	N/A	1,279.83	20.00	N/A	N/A	6,500.00	false	false	N/A
J-07C	N/A	6,000.00	N/A	N/A	1,279.12	20.00	N/A	N/A	6,500.00	false	false	N/A
J-08	N/A	6,000.00	N/A	N/A	1,279.18	20.00	N/A	N/A	6,500.00	false	false	N/A
J-08A	N/A	6,000.00	N/A	N/A	1,278.45	20.00	N/A	N/A	6,500.00	false	false	N/A
J-09	N/A	6,000.00	N/A	N/A	1,279.18	20.00	N/A	N/A	6,500.00	false	false	N/A
J-53	N/A	6,000.00	N/A	N/A	1,280.23	20.00	N/A	N/A	6,500.00	false	false	N/A
J-54	N/A	6,000.00	N/A	N/A	1,280.23	20.00	N/A	N/A	6,500.00	false	false	N/A
J-55	N/A	6,000.00	N/A	N/A	1,279.99	20.00	N/A	N/A	6,500.00	false	false	N/A
J-56	N/A	6,000.00	N/A	N/A	1,279.83	20.00	N/A	N/A	6,500.00	false	false	N/A

Scenario: Ave Day + Fire Flow
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Minimum Pressure (psi)	Total Flow Needed (gpm)	Available Fire Flow (gpm)	Maximum Demand (Calculated) (gpm)	Has Calculation Messages?	Total Flow Available (gpm)
J-01	1,008.50	2,136.00	1,294.27	123.64	123.64	N/A	N/A	2,136.00	false	N/A
J-02	990.00	0.00	1,287.04	128.51	128.51	N/A	N/A	0.00	false	N/A
J-03	954.00	0.00	1,282.81	142.26	142.26	N/A	N/A	0.00	false	N/A
J-04	921.50	0.00	1,280.74	155.43	155.43	N/A	N/A	0.00	false	N/A
J-05	922.50	0.00	1,280.51	154.89	154.89	N/A	N/A	0.00	false	N/A
J-06	921.50	0.00	1,280.23	155.21	155.21	N/A	N/A	0.00	false	N/A
J-06A	926.67	0.00	1,280.23	152.97	152.97	N/A	N/A	0.00	false	N/A
J-06B	926.34	0.00	1,280.23	153.11	153.11	N/A	N/A	0.00	false	N/A
J-06C	899.50	0.00	1,280.23	164.72	164.72	6,000.00	6,278.53	0.00	false	6,278.53
J-07	922.00	0.00	1,280.00	154.89	154.89	N/A	N/A	0.00	false	N/A
J-07A	926.67	0.00	1,279.99	152.86	152.86	N/A	N/A	0.00	false	N/A
J-07B	926.34	0.00	1,279.83	152.94	152.94	N/A	N/A	0.00	false	N/A
J-07C	890.00	143.00	1,279.12	168.35	168.35	N/A	N/A	143.00	false	N/A
J-08	901.30	0.00	1,279.18	163.49	163.49	N/A	N/A	0.00	false	N/A
J-08A	901.30	1,500.00	1,278.45	163.18	163.18	N/A	N/A	1,500.00	false	N/A
J-09	899.00	0.00	1,279.18	164.48	164.48	N/A	N/A	0.00	false	N/A
J-53	922.67	0.00	1,280.23	154.70	154.70	N/A	N/A	0.00	false	N/A
J-54	922.34	0.00	1,280.23	154.84	154.84	N/A	N/A	0.00	false	N/A
J-55	922.67	0.00	1,279.99	154.59	154.59	N/A	N/A	0.00	false	N/A
J-56	922.34	0.00	1,279.83	154.67	154.67	N/A	N/A	0.00	false	N/A

Scenario: Ave Day + Fire Flow
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Upstream Structure Hydraulic Grade (ft)	Discharge (gpm)	Minimum Velocity (ft/s)	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Has Messages?	Maximum Discharge (gpm)	Maximum Velocity (ft/s)
P-1A	28.00	12.0	Asbestos Cement	1,294.27	-3,779.00	10.72	123.64	12.98	false	-3,779.00	10.72
P-02	930.00	12.0	Asbestos Cement	1,294.27	1,643.00	4.66	123.64	128.51	false	1,643.00	4.66
P-03	521.00	12.0	Asbestos Cement	1,287.04	1,643.00	4.66	128.51	142.26	false	1,643.00	4.66
P-04	1,185.00	16.0	Asbestos Cement	1,282.81	1,643.00	2.62	142.26	155.43	false	1,643.00	2.62
P-05	5.00	16.0	Asbestos Cement	1,280.74	1,643.00	2.62	155.43	154.89	false	1,643.00	2.62
P-06	39.00	16.0	Asbestos Cement	1,280.51	1,643.00	2.62	154.89	155.21	false	1,643.00	2.62
P-06A	12.00	10.0	PVC	1,280.23	0.00	0.00	155.21	154.70	false	0.00	0.00
P-06B	8.00	8.0	Ductile Iron	1,280.23	0.00	0.00	152.97	153.11	false	0.00	0.00
P-07	5.00	16.0	Asbestos Cement	1,280.23	1,643.00	2.62	155.21	154.89	false	1,643.00	2.62
P-07A	9.00	6.0	PVC	1,280.00	143.00	1.62	154.89	154.59	false	143.00	1.62
P-07B	11.00	4.0	Ductile Iron	1,279.99	143.00	3.65	152.86	152.94	false	143.00	3.65
P-08	487.00	16.0	Asbestos Cement	1,280.00	1,500.00	2.39	154.89	163.49	false	1,500.00	2.39
P-08A	6.00	6.0	PVC	1,279.18	1,500.00	17.02	163.49	163.18	false	1,500.00	17.02
P-09	17.00	16.0	Asbestos Cement	1,279.18	0.00	0.00	163.49	164.48	false	0.00	0.00
P-96	1.00	10.0	PVC	1,280.23	0.00	0.00	154.70	152.97	false	0.00	0.00
P-97	1.00	10.0	PVC	1,280.23	0.00	0.00	153.11	154.84	false	0.00	0.00
P-98	459.00	10.0	PVC	1,280.23	0.00	0.00	154.84	164.72	false	0.00	0.00
P-100	1.00	6.0	PVC	1,279.99	143.00	1.62	154.59	152.86	false	143.00	1.62
P-101	1.00	6.0	PVC	1,279.83	143.00	1.62	152.94	154.67	false	143.00	1.62
P-102	455.00	6.0	PVC	1,279.83	143.00	1.62	154.67	168.35	false	143.00	1.62

Scenario: Max Day + Fire Flow
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Iterations	Needed Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Maximum Hydraulic Grade (ft)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Calculated Minimum System Pressure (psi)	Fire Flow Upper Limit (gpm)	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Available Fire Flow (gpm)
J-01	N/A	6,000.00	N/A	N/A	1,294.22	20.00	N/A	N/A	6,500.00	false	false	N/A
J-02	N/A	6,000.00	N/A	N/A	1,285.77	20.00	N/A	N/A	6,500.00	false	false	N/A
J-03	N/A	6,000.00	N/A	N/A	1,280.84	20.00	N/A	N/A	6,500.00	false	false	N/A
J-04	N/A	6,000.00	N/A	N/A	1,278.41	20.00	N/A	N/A	6,500.00	false	false	N/A
J-05	N/A	6,000.00	N/A	N/A	1,278.14	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06	N/A	6,000.00	N/A	N/A	1,277.81	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06A	N/A	6,000.00	N/A	N/A	1,277.81	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06B	N/A	6,000.00	N/A	N/A	1,277.81	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06C	5	6,000.00	6,000.00	6,139.49	1,277.81	20.00	24.51	40.00	6,500.00	true	true	6,139.49
J-07	N/A	6,000.00	N/A	N/A	1,277.54	20.00	N/A	N/A	6,500.00	false	false	N/A
J-07A	N/A	6,000.00	N/A	N/A	1,277.49	20.00	N/A	N/A	6,500.00	false	false	N/A
J-07B	N/A	6,000.00	N/A	N/A	1,276.91	20.00	N/A	N/A	6,500.00	false	false	N/A
J-07C	N/A	6,000.00	N/A	N/A	1,274.35	20.00	N/A	N/A	6,500.00	false	false	N/A
J-08	N/A	6,000.00	N/A	N/A	1,276.71	20.00	N/A	N/A	6,500.00	false	false	N/A
J-08A	N/A	6,000.00	N/A	N/A	1,275.99	20.00	N/A	N/A	6,500.00	false	false	N/A
J-09	N/A	6,000.00	N/A	N/A	1,276.71	20.00	N/A	N/A	6,500.00	false	false	N/A
J-53	N/A	6,000.00	N/A	N/A	1,277.81	20.00	N/A	N/A	6,500.00	false	false	N/A
J-54	N/A	6,000.00	N/A	N/A	1,277.81	20.00	N/A	N/A	6,500.00	false	false	N/A
J-55	N/A	6,000.00	N/A	N/A	1,277.49	20.00	N/A	N/A	6,500.00	false	false	N/A
J-56	N/A	6,000.00	N/A	N/A	1,276.90	20.00	N/A	N/A	6,500.00	false	false	N/A

Scenario: Max Day + Fire Flow
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Minimum Pressure (psi)	Total Flow Needed (gpm)	Available Fire Flow (gpm)	Maximum Demand (Calculated) (gpm)	Has Calculation Messages?	Total Flow Available (gpm)
J-01	1,008.50	2,136.00	1,294.22	123.62	123.62	N/A	N/A	2,136.00	false	N/A
J-02	990.00	0.00	1,285.77	127.97	127.97	N/A	N/A	0.00	false	N/A
J-03	954.00	0.00	1,280.84	141.41	141.41	N/A	N/A	0.00	false	N/A
J-04	921.50	0.00	1,278.41	154.42	154.42	N/A	N/A	0.00	false	N/A
J-05	922.50	0.00	1,278.14	153.87	153.87	N/A	N/A	0.00	false	N/A
J-06	921.50	0.00	1,277.81	154.16	154.16	N/A	N/A	0.00	false	N/A
J-06A	926.67	0.00	1,277.81	151.92	151.92	N/A	N/A	0.00	false	N/A
J-06B	926.34	0.00	1,277.81	152.06	152.06	N/A	N/A	0.00	false	N/A
J-06C	899.50	0.00	1,277.81	163.68	163.68	6,000.00	6,139.49	0.00	false	6,139.49
J-07	922.00	0.00	1,277.54	153.83	153.83	N/A	N/A	0.00	false	N/A
J-07A	926.67	0.00	1,277.49	151.78	151.78	N/A	N/A	0.00	false	N/A
J-07B	926.34	0.00	1,276.91	151.67	151.67	N/A	N/A	0.00	false	N/A
J-07C	890.00	286.00	1,274.35	166.29	166.29	N/A	N/A	286.00	false	N/A
J-08	901.30	0.00	1,276.71	162.42	162.42	N/A	N/A	0.00	false	N/A
J-08A	901.30	1,500.00	1,275.99	162.11	162.11	N/A	N/A	1,500.00	false	N/A
J-09	899.00	0.00	1,276.71	163.42	163.42	N/A	N/A	0.00	false	N/A
J-53	922.67	0.00	1,277.81	153.65	153.65	N/A	N/A	0.00	false	N/A
J-54	922.34	0.00	1,277.81	153.80	153.80	N/A	N/A	0.00	false	N/A
J-55	922.67	0.00	1,277.49	153.51	153.51	N/A	N/A	0.00	false	N/A
J-56	922.34	0.00	1,276.90	153.40	153.40	N/A	N/A	0.00	false	N/A

Scenario: Max Day + Fire Flow
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Upstream Structure Hydraulic Grade (ft)	Discharge (gpm)	Minimum Velocity (ft/s)	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Has Messages?	Maximum Discharge (gpm)	Maximum Velocity (ft/s)
P-1A	28.00	12.0	Asbestos Cement	1,294.22	-3,922.00	11.13	123.62	12.98	false	-3,922.00	11.13
P-02	930.00	12.0	Asbestos Cement	1,294.22	1,786.00	5.07	123.62	127.97	false	1,786.00	5.07
P-03	521.00	12.0	Asbestos Cement	1,285.77	1,786.00	5.07	127.97	141.41	false	1,786.00	5.07
P-04	1,185.00	16.0	Asbestos Cement	1,280.84	1,786.00	2.85	141.41	154.42	false	1,786.00	2.85
P-05	5.00	16.0	Asbestos Cement	1,278.41	1,786.00	2.85	154.42	153.87	false	1,786.00	2.85
P-06	39.00	16.0	Asbestos Cement	1,278.14	1,786.00	2.85	153.87	154.16	false	1,786.00	2.85
P-06A	12.00	10.0	PVC	1,277.81	0.00	0.00	154.16	153.65	false	0.00	0.00
P-06B	8.00	8.0	Ductile Iron	1,277.81	0.00	0.00	151.92	152.06	false	0.00	0.00
P-07	5.00	16.0	Asbestos Cement	1,277.81	1,786.00	2.85	154.16	153.83	false	1,786.00	2.85
P-07A	9.00	6.0	PVC	1,277.54	286.00	3.25	153.83	153.51	false	286.00	3.25
P-07B	11.00	4.0	Ductile Iron	1,277.49	286.00	7.30	151.78	151.67	false	286.00	7.30
P-08	487.00	16.0	Asbestos Cement	1,277.54	1,500.00	2.39	153.83	162.42	false	1,500.00	2.39
P-08A	6.00	6.0	PVC	1,276.71	1,500.00	17.02	162.42	162.11	false	1,500.00	17.02
P-09	17.00	16.0	Asbestos Cement	1,276.71	0.00	0.00	162.42	163.42	false	0.00	0.00
P-96	1.00	10.0	PVC	1,277.81	0.00	0.00	153.65	151.92	false	0.00	0.00
P-97	1.00	10.0	PVC	1,277.81	0.00	0.00	152.06	153.80	false	0.00	0.00
P-98	459.00	10.0	PVC	1,277.81	0.00	0.00	153.80	163.68	false	0.00	0.00
P-100	1.00	6.0	PVC	1,277.49	286.00	3.25	153.51	151.78	false	286.00	3.25
P-101	1.00	6.0	PVC	1,276.91	286.00	3.25	151.67	153.40	false	286.00	3.25
P-102	455.00	6.0	PVC	1,276.90	286.00	3.25	153.40	166.29	false	286.00	3.25

Scenario: Peak Hour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Minimum Pressure (psi)	Total Flow Needed (gpm)	Available Fire Flow (gpm)	Maximum Demand (Calculated) (gpm)	Has Calculation Messages?	Total Flow Available (gpm)
J-01	1,008.50	2,136.00	1,294.17	123.60	123.60	N/A	N/A	2,136.00	false	N/A
J-02	990.00	0.00	1,284.42	127.38	127.38	N/A	N/A	0.00	false	N/A
J-03	954.00	0.00	1,278.73	140.50	140.50	N/A	N/A	0.00	false	N/A
J-04	921.50	0.00	1,275.94	153.35	153.35	N/A	N/A	0.00	false	N/A
J-05	922.50	0.00	1,275.62	152.78	152.78	N/A	N/A	0.00	false	N/A
J-06	921.50	0.00	1,275.24	153.05	153.05	N/A	N/A	0.00	false	N/A
J-06A	926.67	0.00	1,275.24	150.81	150.81	N/A	N/A	0.00	false	N/A
J-06B	926.34	0.00	1,275.24	150.95	150.95	N/A	N/A	0.00	false	N/A
J-06C	899.50	0.00	1,275.24	162.56	162.56	N/A	N/A	0.00	false	N/A
J-07	922.00	0.00	1,274.92	152.69	152.69	N/A	N/A	0.00	false	N/A
J-07A	926.67	0.00	1,274.81	150.62	150.62	N/A	N/A	0.00	false	N/A
J-07B	926.34	0.00	1,273.58	150.24	150.24	N/A	N/A	0.00	false	N/A
J-07C	890.00	428.00	1,268.20	163.63	163.63	N/A	N/A	428.00	false	N/A
J-08	901.30	0.00	1,274.10	161.29	161.29	N/A	N/A	0.00	false	N/A
J-08A	901.30	1,500.00	1,273.37	160.98	160.98	N/A	N/A	1,500.00	false	N/A
J-09	899.00	0.00	1,274.10	162.29	162.29	N/A	N/A	0.00	false	N/A
J-53	922.67	0.00	1,275.24	152.54	152.54	N/A	N/A	0.00	false	N/A
J-54	922.34	0.00	1,275.24	152.68	152.68	N/A	N/A	0.00	false	N/A
J-55	922.67	0.00	1,274.82	152.36	152.36	N/A	N/A	0.00	false	N/A
J-56	922.34	0.00	1,273.57	151.96	151.96	N/A	N/A	0.00	false	N/A

Scenario: Peak Hour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Upstream Structure Hydraulic Grade (ft)	Discharge (gpm)	Minimum Velocity (ft/s)	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Has Messages?	Maximum Discharge (gpm)	Maximum Velocity (ft/s)
P-1A	28.00	12.0	Asbestos Cement	1,294.17	-4,064.00	11.53	123.60	12.98	false	-4,064.00	11.53
P-02	930.00	12.0	Asbestos Cement	1,294.17	1,928.00	5.47	123.60	127.38	false	1,928.00	5.47
P-03	521.00	12.0	Asbestos Cement	1,284.42	1,928.00	5.47	127.38	140.50	false	1,928.00	5.47
P-04	1,185.00	16.0	Asbestos Cement	1,278.73	1,928.00	3.08	140.50	153.35	false	1,928.00	3.08
P-05	5.00	16.0	Asbestos Cement	1,275.94	1,928.00	3.08	153.35	152.78	false	1,928.00	3.08
P-06	39.00	16.0	Asbestos Cement	1,275.62	1,928.00	3.08	152.78	153.05	false	1,928.00	3.08
P-06A	12.00	10.0	PVC	1,275.24	0.00	0.00	153.05	152.54	false	0.00	0.00
P-06B	8.00	8.0	Ductile Iron	1,275.24	0.00	0.00	150.81	150.95	false	0.00	0.00
P-07	5.00	16.0	Asbestos Cement	1,275.24	1,928.00	3.08	153.05	152.69	false	1,928.00	3.08
P-07A	9.00	6.0	PVC	1,274.92	428.00	4.86	152.69	152.36	false	428.00	4.86
P-07B	11.00	4.0	Ductile Iron	1,274.81	428.00	10.93	150.62	150.24	false	428.00	10.93
P-08	487.00	16.0	Asbestos Cement	1,274.92	1,500.00	2.39	152.69	161.29	false	1,500.00	2.39
P-08A	6.00	6.0	PVC	1,274.10	1,500.00	17.02	161.29	160.98	false	1,500.00	17.02
P-09	17.00	16.0	Asbestos Cement	1,274.10	0.00	0.00	161.29	162.29	false	0.00	0.00
P-96	1.00	10.0	PVC	1,275.24	0.00	0.00	152.54	150.81	false	0.00	0.00
P-97	1.00	10.0	PVC	1,275.24	0.00	0.00	150.95	152.68	false	0.00	0.00
P-98	459.00	10.0	PVC	1,275.24	0.00	0.00	152.68	162.56	false	0.00	0.00
P-100	1.00	6.0	PVC	1,274.82	428.00	4.86	152.36	150.62	false	428.00	4.86
P-101	1.00	6.0	PVC	1,273.58	428.00	4.86	150.24	151.96	false	428.00	4.86
P-102	455.00	6.0	PVC	1,273.57	428.00	4.86	151.96	163.63	false	428.00	4.86

APPENDIX B

STEADY STATE HYRAULIC ANALYSIS
OPERATING PUMP STATIONS
DEMAND SCENARIO – WITH RECLAMATION

Scenario: Ave Day + Fire Flow
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Iterations	Needed Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Maximum Hydraulic Grade (ft)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Calculated Minimum System Pressure (psi)	Fire Flow Upper Limit (gpm)	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Available Fire Flow (gpm)
J-01	N/A	6,000.00	N/A	N/A	1,294.31	20.00	N/A	N/A	6,500.00	false	false	N/A
J-02	N/A	6,000.00	N/A	N/A	1,287.78	20.00	N/A	N/A	6,500.00	false	false	N/A
J-03	N/A	6,000.00	N/A	N/A	1,283.97	20.00	N/A	N/A	6,500.00	false	false	N/A
J-04	N/A	6,000.00	N/A	N/A	1,282.10	20.00	N/A	N/A	6,500.00	false	false	N/A
J-05	N/A	6,000.00	N/A	N/A	1,281.90	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06	N/A	6,000.00	N/A	N/A	1,281.65	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06A	N/A	6,000.00	N/A	N/A	1,281.65	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06B	N/A	6,000.00	N/A	N/A	1,281.65	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06C	5	6,000.00	6,000.00	6,365.02	1,281.65	20.00	22.64	40.00	6,500.00	true	true	6,365.02
J-07	N/A	6,000.00	N/A	N/A	1,281.44	20.00	N/A	N/A	6,500.00	false	false	N/A
J-07A	N/A	6,000.00	N/A	N/A	1,281.44	20.00	N/A	N/A	6,500.00	false	false	N/A
J-07B	N/A	6,000.00	N/A	N/A	1,281.42	20.00	N/A	N/A	6,500.00	false	false	N/A
J-07C	N/A	6,000.00	N/A	N/A	1,281.30	20.00	N/A	N/A	6,500.00	false	false	N/A
J-08	N/A	6,000.00	N/A	N/A	1,280.62	20.00	N/A	N/A	6,500.00	false	false	N/A
J-08A	N/A	6,000.00	N/A	N/A	1,279.89	20.00	N/A	N/A	6,500.00	false	false	N/A
J-09	N/A	6,000.00	N/A	N/A	1,280.62	20.00	N/A	N/A	6,500.00	false	false	N/A
J-53	N/A	6,000.00	N/A	N/A	1,281.65	20.00	N/A	N/A	6,500.00	false	false	N/A
J-54	N/A	6,000.00	N/A	N/A	1,281.65	20.00	N/A	N/A	6,500.00	false	false	N/A
J-55	N/A	6,000.00	N/A	N/A	1,281.44	20.00	N/A	N/A	6,500.00	false	false	N/A
J-56	N/A	6,000.00	N/A	N/A	1,281.42	20.00	N/A	N/A	6,500.00	false	false	N/A

Scenario: Ave Day + Fire Flow
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Minimum Pressure (psi)	Total Flow Needed (gpm)	Available Fire Flow (gpm)	Maximum Demand (Calculated) (gpm)	Has Calculation Messages?	Total Flow Available (gpm)
J-01	1,008.50	2,136.00	1,294.31	123.65	123.65	N/A	N/A	2,136.00	false	N/A
J-02	990.00	0.00	1,287.78	128.84	128.84	N/A	N/A	0.00	false	N/A
J-03	954.00	0.00	1,283.97	142.76	142.76	N/A	N/A	0.00	false	N/A
J-04	921.50	0.00	1,282.10	156.02	156.02	N/A	N/A	0.00	false	N/A
J-05	922.50	0.00	1,281.90	155.50	155.50	N/A	N/A	0.00	false	N/A
J-06	921.50	0.00	1,281.65	155.82	155.82	N/A	N/A	0.00	false	N/A
J-06A	926.67	0.00	1,281.65	153.58	153.58	N/A	N/A	0.00	false	N/A
J-06B	926.34	0.00	1,281.65	153.73	153.73	N/A	N/A	0.00	false	N/A
J-06C	899.50	0.00	1,281.65	165.34	165.34	6,000.00	6,365.02	0.00	false	6,365.02
J-07	922.00	0.00	1,281.44	155.51	155.51	N/A	N/A	0.00	false	N/A
J-07A	926.67	0.00	1,281.44	153.49	153.49	N/A	N/A	0.00	false	N/A
J-07B	926.34	0.00	1,281.42	153.62	153.62	N/A	N/A	0.00	false	N/A
J-07C	890.00	54.00	1,281.30	169.30	169.30	N/A	N/A	54.00	false	N/A
J-08	901.30	0.00	1,280.62	164.11	164.11	N/A	N/A	0.00	false	N/A
J-08A	901.30	1,500.00	1,279.89	163.80	163.80	N/A	N/A	1,500.00	false	N/A
J-09	899.00	0.00	1,280.62	165.11	165.11	N/A	N/A	0.00	false	N/A
J-53	922.67	0.00	1,281.65	155.31	155.31	N/A	N/A	0.00	false	N/A
J-54	922.34	0.00	1,281.65	155.46	155.46	N/A	N/A	0.00	false	N/A
J-55	922.67	0.00	1,281.44	155.22	155.22	N/A	N/A	0.00	false	N/A
J-56	922.34	0.00	1,281.42	155.35	155.35	N/A	N/A	0.00	false	N/A

Scenario: Ave Day + Fire Flow
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Upstream Structure Hydraulic Grade (ft)	Discharge (gpm)	Minimum Velocity (ft/s)	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Has Messages?	Maximum Discharge (gpm)	Maximum Velocity (ft/s)
P-1A	28.00	12.0	Asbestos Cement	1,294.31	-3,690.00	10.47	123.65	12.98	false	3,690.00	10.47
P-02	930.00	12.0	Asbestos Cement	1,294.31	1,554.00	4.41	123.65	128.84	false	1,554.00	4.41
P-03	521.00	12.0	Asbestos Cement	1,287.78	1,554.00	4.41	128.84	142.76	false	1,554.00	4.41
P-04	1,185.00	16.0	Asbestos Cement	1,283.97	1,554.00	2.48	142.76	156.02	false	1,554.00	2.48
P-05	5.00	16.0	Asbestos Cement	1,282.10	1,554.00	2.48	156.02	155.50	false	1,554.00	2.48
P-06	39.00	16.0	Asbestos Cement	1,281.90	1,554.00	2.48	155.50	155.82	false	1,554.00	2.48
P-06A	12.00	10.0	PVC	1,281.65	0.00	0.00	155.82	155.31	false	0.00	0.00
P-06B	8.00	8.0	Ductile Iron	1,281.65	0.00	0.00	153.58	153.73	false	0.00	0.00
P-07	5.00	16.0	Asbestos Cement	1,281.65	1,554.00	2.48	155.82	155.51	false	1,554.00	2.48
P-07A	9.00	6.0	PVC	1,281.44	54.00	0.61	155.51	155.22	false	54.00	0.61
P-07B	11.00	4.0	Ductile Iron	1,281.44	54.00	1.38	153.49	153.62	false	54.00	1.38
P-08	487.00	16.0	Asbestos Cement	1,281.44	1,500.00	2.39	155.51	164.11	false	1,500.00	2.39
P-08A	6.00	6.0	PVC	1,280.62	1,500.00	17.02	164.11	163.80	false	1,500.00	17.02
P-09	17.00	16.0	Asbestos Cement	1,280.62	0.00	0.00	164.11	165.11	false	0.00	0.00
P-96	1.00	10.0	PVC	1,281.65	0.00	0.00	155.31	153.58	false	0.00	0.00
P-97	1.00	10.0	PVC	1,281.65	0.00	0.00	153.73	155.46	false	0.00	0.00
P-98	459.00	10.0	PVC	1,281.65	0.00	0.00	155.46	165.34	false	0.00	0.00
P-100	1.00	6.0	PVC	1,281.44	54.00	0.61	155.22	153.49	false	54.00	0.61
P-101	1.00	6.0	PVC	1,281.42	54.00	0.61	153.62	155.35	false	54.00	0.61
P-102	455.00	6.0	PVC	1,281.42	54.00	0.61	155.35	169.30	false	54.00	0.61

Scenario: Max Day + Fire Flow
Fire Flow Analysis
Fire Flow Report

Label	Fire Flow Iterations	Needed Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Maximum Hydraulic Grade (ft)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Calculated Minimum System Pressure (psi)	Fire Flow Upper Limit (gpm)	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Available Fire Flow (gpm)
J-01	N/A	6,000.00	N/A	N/A	1,294.29	20.00	N/A	N/A	6,500.00	false	false	N/A
J-02	N/A	6,000.00	N/A	N/A	1,287.34	20.00	N/A	N/A	6,500.00	false	false	N/A
J-03	N/A	6,000.00	N/A	N/A	1,283.29	20.00	N/A	N/A	6,500.00	false	false	N/A
J-04	N/A	6,000.00	N/A	N/A	1,281.30	20.00	N/A	N/A	6,500.00	false	false	N/A
J-05	N/A	6,000.00	N/A	N/A	1,281.08	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06	N/A	6,000.00	N/A	N/A	1,280.81	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06A	N/A	6,000.00	N/A	N/A	1,280.81	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06B	N/A	6,000.00	N/A	N/A	1,280.81	20.00	N/A	N/A	6,500.00	false	false	N/A
J-06C	5	6,000.00	6,000.00	6,313.51	1,280.81	20.00	23.07	40.00	6,500.00	true	true	6,313.51
J-07	N/A	6,000.00	N/A	N/A	1,280.59	20.00	N/A	N/A	6,500.00	false	false	N/A
J-07A	N/A	6,000.00	N/A	N/A	1,280.58	20.00	N/A	N/A	6,500.00	false	false	N/A
J-07B	N/A	6,000.00	N/A	N/A	1,280.49	20.00	N/A	N/A	6,500.00	false	false	N/A
J-07C	N/A	6,000.00	N/A	N/A	1,280.08	20.00	N/A	N/A	6,500.00	false	false	N/A
J-08	N/A	6,000.00	N/A	N/A	1,279.77	20.00	N/A	N/A	6,500.00	false	false	N/A
J-08A	N/A	6,000.00	N/A	N/A	1,279.04	20.00	N/A	N/A	6,500.00	false	false	N/A
J-09	N/A	6,000.00	N/A	N/A	1,279.77	20.00	N/A	N/A	6,500.00	false	false	N/A
J-53	N/A	6,000.00	N/A	N/A	1,280.81	20.00	N/A	N/A	6,500.00	false	false	N/A
J-54	N/A	6,000.00	N/A	N/A	1,280.81	20.00	N/A	N/A	6,500.00	false	false	N/A
J-55	N/A	6,000.00	N/A	N/A	1,280.59	20.00	N/A	N/A	6,500.00	false	false	N/A
J-56	N/A	6,000.00	N/A	N/A	1,280.49	20.00	N/A	N/A	6,500.00	false	false	N/A

Scenario: Max Day + Fire Flow
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Minimum Pressure (psi)	Total Flow Needed (gpm)	Available Fire Flow (gpm)	Maximum Demand (Calculated) (gpm)	Has Calculation Messages?	Total Flow Available (gpm)
J-01	1,008.50	2,136.00	1,294.29	123.65	123.65	N/A	N/A	2,136.00	false	N/A
J-02	990.00	0.00	1,287.34	128.65	128.65	N/A	N/A	0.00	false	N/A
J-03	954.00	0.00	1,283.29	142.47	142.47	N/A	N/A	0.00	false	N/A
J-04	921.50	0.00	1,281.30	155.67	155.67	N/A	N/A	0.00	false	N/A
J-05	922.50	0.00	1,281.08	155.14	155.14	N/A	N/A	0.00	false	N/A
J-06	921.50	0.00	1,280.81	155.46	155.46	N/A	N/A	0.00	false	N/A
J-06A	926.67	0.00	1,280.81	153.22	153.22	N/A	N/A	0.00	false	N/A
J-06B	926.34	0.00	1,280.81	153.36	153.36	N/A	N/A	0.00	false	N/A
J-06C	899.50	0.00	1,280.81	164.98	164.98	6,000.00	6,313.51	0.00	false	6,313.51
J-07	922.00	0.00	1,280.59	155.15	155.15	N/A	N/A	0.00	false	N/A
J-07A	926.67	0.00	1,280.58	153.12	153.12	N/A	N/A	0.00	false	N/A
J-07B	926.34	0.00	1,280.49	153.22	153.22	N/A	N/A	0.00	false	N/A
J-07C	890.00	107.00	1,280.08	168.77	168.77	N/A	N/A	107.00	false	N/A
J-08	901.30	0.00	1,279.77	163.74	163.74	N/A	N/A	0.00	false	N/A
J-08A	901.30	1,500.00	1,279.04	163.43	163.43	N/A	N/A	1,500.00	false	N/A
J-09	899.00	0.00	1,279.77	164.74	164.74	N/A	N/A	0.00	false	N/A
J-53	922.67	0.00	1,280.81	154.95	154.95	N/A	N/A	0.00	false	N/A
J-54	922.34	0.00	1,280.81	155.09	155.09	N/A	N/A	0.00	false	N/A
J-55	922.67	0.00	1,280.59	154.85	154.85	N/A	N/A	0.00	false	N/A
J-56	922.34	0.00	1,280.49	154.95	154.95	N/A	N/A	0.00	false	N/A

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Scenario: Max Day + Fire Flow
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Upstream Structure Hydraulic Grade (ft)	Discharge (gpm)	Minimum Velocity (ft/s)	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Has Messages?	Maximum Discharge (gpm)	Maximum Velocity (ft/s)
P-1A	28.00	12.0	Asbestos Cement	1,294.29	-3,743.00	10.62	123.65	12.98	false	-3,743.00	10.62
P-02	930.00	12.0	Asbestos Cement	1,294.29	1,607.00	4.56	123.65	128.65	false	1,607.00	4.56
P-03	521.00	12.0	Asbestos Cement	1,287.34	1,607.00	4.56	128.65	142.47	false	1,607.00	4.56
P-04	1,185.00	16.0	Asbestos Cement	1,283.29	1,607.00	2.56	142.47	155.67	false	1,607.00	2.56
P-05	5.00	16.0	Asbestos Cement	1,281.30	1,607.00	2.56	155.67	155.14	false	1,607.00	2.56
P-06	39.00	16.0	Asbestos Cement	1,281.08	1,607.00	2.56	155.14	155.46	false	1,607.00	2.56
P-06A	12.00	10.0	PVC	1,280.81	0.00	0.00	155.46	154.95	false	0.00	0.00
P-06B	8.00	8.0	Ductile Iron	1,280.81	0.00	0.00	153.22	153.36	false	0.00	0.00
P-07	5.00	16.0	Asbestos Cement	1,280.81	1,607.00	2.56	155.46	155.15	false	1,607.00	2.56
P-07A	9.00	6.0	PVC	1,280.59	107.00	1.21	155.15	154.85	false	107.00	1.21
P-07B	11.00	4.0	Ductile Iron	1,280.58	107.00	2.73	153.12	153.22	false	107.00	2.73
P-08	487.00	16.0	Asbestos Cement	1,280.59	1,500.00	2.39	155.15	163.74	false	1,500.00	2.39
P-08A	6.00	6.0	PVC	1,279.77	1,500.00	17.02	163.74	163.43	false	1,500.00	17.02
P-09	17.00	16.0	Asbestos Cement	1,279.77	0.00	0.00	163.74	164.74	false	0.00	0.00
P-96	1.00	10.0	PVC	1,280.81	0.00	0.00	154.95	153.22	false	0.00	0.00
P-97	1.00	10.0	PVC	1,280.81	0.00	0.00	153.36	155.09	false	0.00	0.00
P-98	459.00	10.0	PVC	1,280.81	0.00	0.00	155.09	164.98	false	0.00	0.00
P-100	1.00	6.0	PVC	1,280.59	107.00	1.21	154.85	153.12	false	107.00	1.21
P-101	1.00	6.0	PVC	1,280.49	107.00	1.21	153.22	154.95	false	107.00	1.21
P-102	455.00	6.0	PVC	1,280.49	107.00	1.21	154.95	168.77	false	107.00	1.21

Scenario: Peak Hour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Minimum Pressure (psi)	Total Flow Needed (gpm)	Available Fire Flow (gpm)	Maximum Demand (Calculated) (gpm)	Has Calculation Messages?	Total Flow Available (gpm)
J-01	1,008.50	2,136.00	1,294.27	123.64	123.64	N/A	N/A	2,136.00	false	N/A
J-02	990.00	0.00	1,286.88	128.45	128.45	N/A	N/A	0.00	false	N/A
J-03	954.00	0.00	1,282.57	142.16	142.16	N/A	N/A	0.00	false	N/A
J-04	921.50	0.00	1,280.45	155.30	155.30	N/A	N/A	0.00	false	N/A
J-05	922.50	0.00	1,280.22	154.77	154.77	N/A	N/A	0.00	false	N/A
J-06	921.50	0.00	1,279.94	155.08	155.08	N/A	N/A	0.00	false	N/A
J-06A	926.67	0.00	1,279.94	152.84	152.84	N/A	N/A	0.00	false	N/A
J-06B	926.34	0.00	1,279.94	152.98	152.98	N/A	N/A	0.00	false	N/A
J-06C	899.50	0.00	1,279.94	164.60	164.60	N/A	N/A	0.00	false	N/A
J-07	922.00	0.00	1,279.70	154.76	154.76	N/A	N/A	0.00	false	N/A
J-07A	926.67	0.00	1,279.68	152.73	152.73	N/A	N/A	0.00	false	N/A
J-07B	926.34	0.00	1,279.48	152.79	152.79	N/A	N/A	0.00	false	N/A
J-07C	890.00	161.00	1,278.60	168.13	168.13	N/A	N/A	161.00	false	N/A
J-08	901.30	0.00	1,278.88	163.36	163.36	N/A	N/A	0.00	false	N/A
J-08A	901.30	1,500.00	1,278.15	163.05	163.05	N/A	N/A	1,500.00	false	N/A
J-09	899.00	0.00	1,278.88	164.35	164.35	N/A	N/A	0.00	false	N/A
J-53	922.67	0.00	1,279.94	154.57	154.57	N/A	N/A	0.00	false	N/A
J-54	922.34	0.00	1,279.94	154.71	154.71	N/A	N/A	0.00	false	N/A
J-55	922.67	0.00	1,279.68	154.46	154.46	N/A	N/A	0.00	false	N/A
J-56	922.34	0.00	1,279.48	154.52	154.52	N/A	N/A	0.00	false	N/A

Scenario: Peak Hour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Upstream Structure Hydraulic Grade (ft)	Discharge (gpm)	Minimum Velocity (ft/s)	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Has Messages?	Maximum Discharge (gpm)	Maximum Velocity (ft/s)
P-1A	28.00	12.0	Asbestos Cement	1,294.27	-3,797.00	10.77	123.64	12.98	false	-3,797.00	10.77
P-02	930.00	12.0	Asbestos Cement	1,294.27	1,661.00	4.71	123.64	128.45	false	1,661.00	4.71
P-03	521.00	12.0	Asbestos Cement	1,286.88	1,661.00	4.71	128.45	142.16	false	1,661.00	4.71
P-04	1,185.00	16.0	Asbestos Cement	1,282.57	1,661.00	2.65	142.16	155.30	false	1,661.00	2.65
P-05	5.00	16.0	Asbestos Cement	1,280.45	1,661.00	2.65	155.30	154.77	false	1,661.00	2.65
P-06	39.00	16.0	Asbestos Cement	1,280.22	1,661.00	2.65	154.77	155.08	false	1,661.00	2.65
P-06A	12.00	10.0	PVC	1,279.94	0.00	0.00	155.08	154.57	false	0.00	0.00
P-06B	8.00	8.0	Ductile Iron	1,279.94	0.00	0.00	152.84	152.98	false	0.00	0.00
P-07	5.00	16.0	Asbestos Cement	1,279.94	1,661.00	2.65	155.08	154.76	false	1,661.00	2.65
P-07A	9.00	6.0	PVC	1,279.70	161.00	1.83	154.76	154.46	false	161.00	1.83
P-07B	11.00	4.0	Ductile Iron	1,279.68	161.00	4.11	152.73	152.79	false	161.00	4.11
P-08	487.00	16.0	Asbestos Cement	1,279.70	1,500.00	2.39	154.76	163.36	false	1,500.00	2.39
P-08A	6.00	6.0	PVC	1,278.88	1,500.00	17.02	163.36	163.05	false	1,500.00	17.02
P-09	17.00	16.0	Asbestos Cement	1,278.88	0.00	0.00	163.36	164.35	false	0.00	0.00
P-96	1.00	10.0	PVC	1,279.94	0.00	0.00	154.57	152.84	false	0.00	0.00
P-97	1.00	10.0	PVC	1,279.94	0.00	0.00	152.98	154.71	false	0.00	0.00
P-98	459.00	10.0	PVC	1,279.94	0.00	0.00	154.71	164.60	false	0.00	0.00
P-100	1.00	6.0	PVC	1,279.68	161.00	1.83	154.46	152.73	false	161.00	1.83
P-101	1.00	6.0	PVC	1,279.48	161.00	1.83	152.79	154.52	false	161.00	1.83
P-102	455.00	6.0	PVC	1,279.48	161.00	1.83	154.52	168.13	false	161.00	1.83

Final Report

Water, Wastewater, Recycled Water Feasibility Study

Prepared for

Jamul Indian Village

and

Analytical Environmental Services
2021 N Street, Suite 200
Sacramento, CA 95814

November 2002

HydroScience Engineers, Inc.

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916-364-[illegible]90
- SACRAMENTO -

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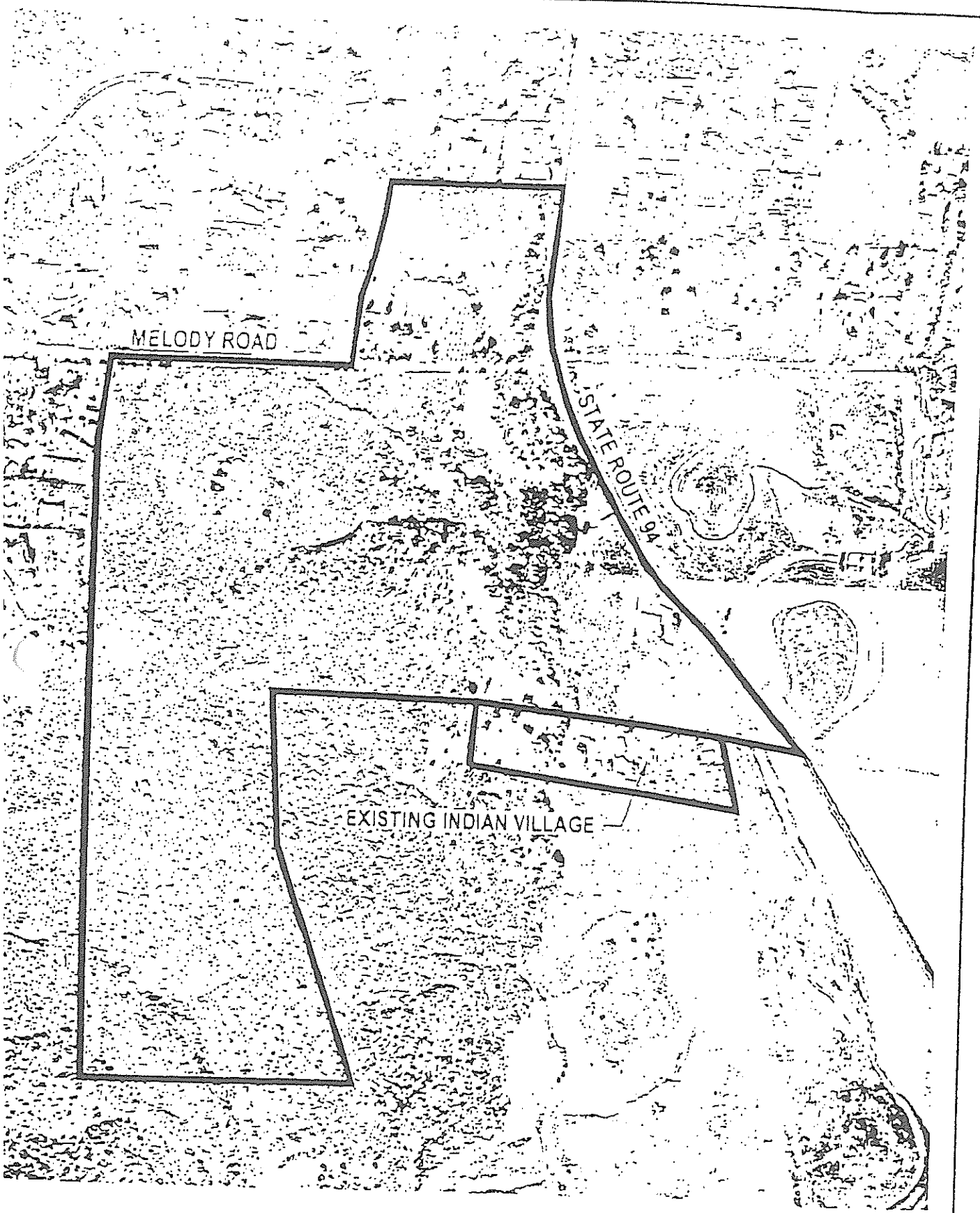


FIGURE 1-2
Jamul Indian Village Feasibility Study
Property Boundary

1.0 Introduction

HydroScience Engineers, Inc., (HSe) was retained by Analytical Environmental Services (AES) to complete a preliminary evaluation of the water and wastewater service requirements for four alternative developments proposed for construction by the Jamul Indian Village. This study will be used to support the Environmental Impact Statement (EIS) being prepared by AES for the project. The scope includes a review of background site conditions, an evaluation of the facility requirements, and a preliminary design of key water and wastewater facilities.

This report summarizes HSe's investigation, which began in June 2002, and is organized into the following sections:

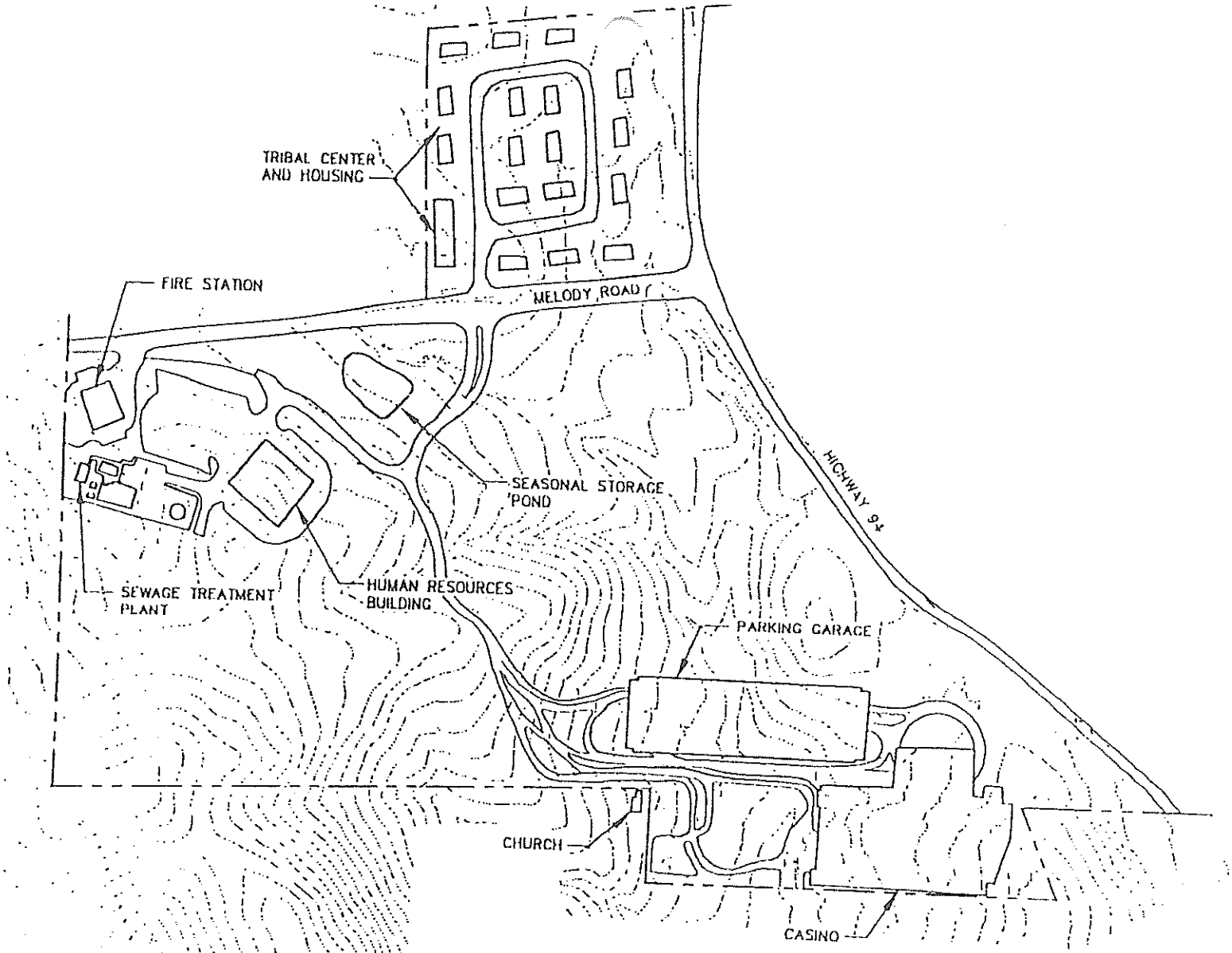
- Projected Flows,
- Water Supply,
- Wastewater Treatment,
- Wastewater Disposal, and
- Conclusion.

1.1 Background

The Jamul Indian Village is located in eastern San Diego County approximately one mile south the community of Jamul. As shown in Figure 1-1, Melody Road borders the project area to .e north, vacant and residentially developed land to the west, vacant land to the south, and State Route 94 to the east. State Route 94, a secondary highway of southern California which terminates at the Mexican border town of Tecate, provides direct access both to the Indian Village and to downtown San Diego, approximately 20 miles to the west, where it intersects with Highway 5. From the Indian Village, State Route 94 travels briefly north and then west to downtown San Diego, passing through the communities of Jamul, Casa de Oro, Spring Valley, and Lemon Grove.

The EIS is considering four project alternatives that center around a gaming facility and/or a retail center on the proposed project site. These alternatives consist of food and beverage facilities, banking and administration facilities, gaming commission offices, a conference facility, a childcare and family entertainment center, a event center, retail, and the main gaming hall. Details on each of the alternative designs are summarized in Section 1.2.

The Tribe is also proposing to place approximately 101 acres of the three adjacent parcels, shown in Figure 1-2, into Federal Trust for a future Tribal center and housing, a Tribal government and health center, a fire/sheriff station, gaming facility parking for patrons and employees, human resources building, a wastewater treatment plant (WWTP), treated recycled water urban irrigation areas and conservation areas.



HydroScience Engineers, Inc

FIGURE 1-3
Jamul Indian Village Feasibility Study
Proposed Site Layout - Alternative A Phase A

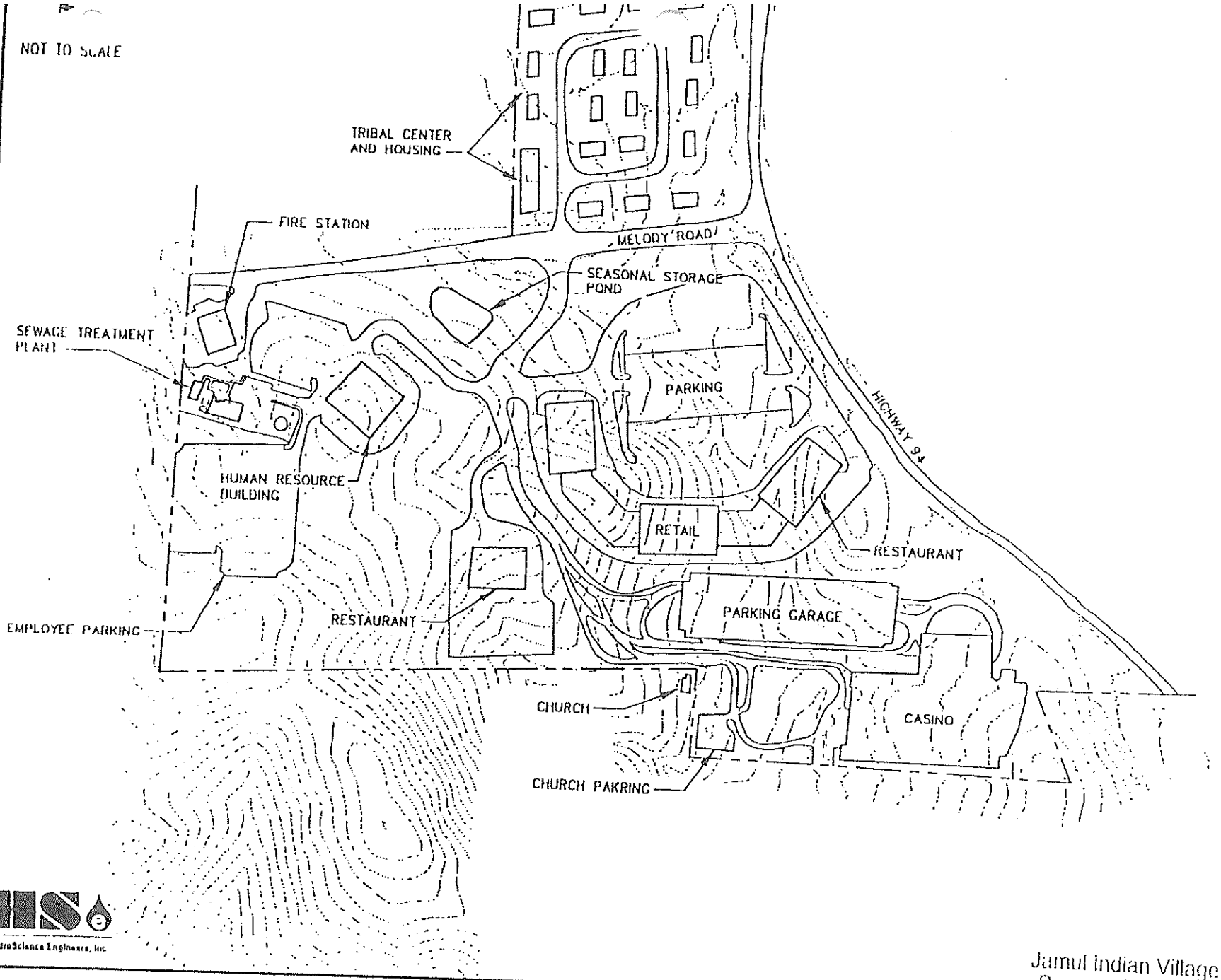


FIGURE 1-5
Jamul Indian Village Feasibility Study
Proposed Site Layout - Alternative B

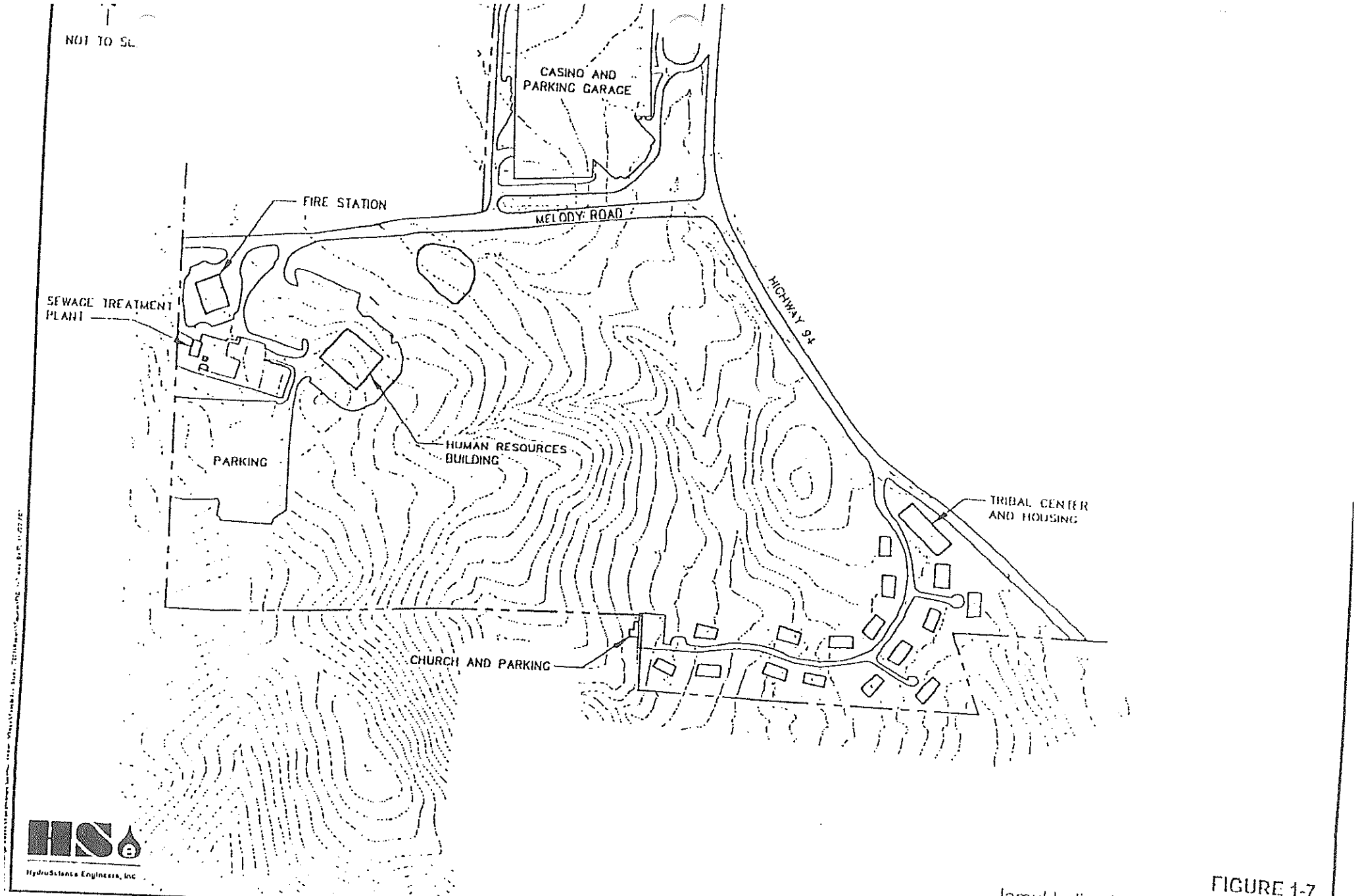


FIGURE 1-7
Jamul Indian Village Feasibility Study
Proposed Site Layout - Alternative D

- Estimate wastewater flows,
- Evaluate the impact of recycled water use on water demand,
- Develop preliminary sizing of key wastewater collection and treatment facilities, and
- Develop a wastewater disposal strategy.

TABLE 2-1
Estimated Average Wastewater Production (gpd) without Reclamation for the Jamul Indian Village

Facility	Alt. A		Alt. B	Alt. C	Alt. D
	Phase A	Phase B			
Casino	123,000	123,000	123,000	-	118,980
Casino restaurant	32,385	32,385	32,385	-	32,385
Human resources building	720	720	720	-	720
Hotel [a]	-	28,320	-	-	18,780
Events center	-	12,750	-	-	12,250
Retail [b]	-	-	4,123	15,312	-
Restaurant	-	-	22,650	13,670	-
Residential homes	8,600	8,600	8,600	8,600	8,600
Fire station and sheriff dept.	1,500	1,500	1,500	1,500	1,500
Tribal government and health center	3,000	3,000	3,000	3,000	3,000
Net	169,205	210,275	195,978	42,082	197,215

[a] Assumes 100 gpd/guest, 2 guests/room, 90% occupancy.
[b] Assumes 1 gpd/parking space, 2 passengers/vehicle.

2-2
Design Wastewater Flows (gpd) without Reclamation for the Jamul Indian Village [a]

Flow condition	Alt. A		Alt. B	Alt. C	Alt. D
	Phase A	Phase B			
Average day flow	170,000	211,000	196,000	43,000	198,000
Peak day flow [b]	339,000	421,000	392,000	85,000	395,000

[a] Rounded up to the nearest 1,000 gpd.
[b] Peaking factor of 2.0 applied.

2 Water Demand

This section estimates the water demand for the various project alternatives and details the design criteria used to develop these projections.

2.1 Design Criteria

Estimates of water demand from new facilities are typically based on the wastewater flow produced by the projected occupants. Since metered water demand data are not always available, wastewater flows, which are typically metered, are used to estimate the water demand.

TABLE 2-4
Design Water Demand (gpm) without Reclamation for the Jamul Indian Village

Flow condition	Alt. A		Alt. B	Alt. C	Alt. D
	Phase A	Phase B			
Average day demand [a]	124	154	143	31	144
Maximum day demand [b]	247	307	287	62	288
Peak hour demand [c]	371	461	430	92	432
Landscape irrigation [d]	49	60	64	58	45
Recommended water supply capacity [e]	420	521	494	150	477

[a] Estimated from anticipated wastewater flow plus allowances for system losses.
[b] Maximum day peaking factor of 2.0 applied.
[c] Peak hour peaking factor of 3.0 applied.
[d] Irrigation demand estimated based on crop uptake rates and landscaped area summarized later in Section 5.1.5.
[e] Sum of the peak hour demand and landscape irrigation.

2.3 Recycled Water

Recycled water in this report means wastewater that has been treated sufficiently to meet the California Department of Health Services' (DHS) comprehensive recycled water regulations that define treatment processes, water quality criteria, and treatment reliability requirements for [illegible]c use of recycled water. These regulations are contained in Title 22, Division 4, Chapter 3 [illegible]e California Administrative Code, more commonly referred to as Title 22.

Approved by the State in December 2000, Title 22 prescribes recycled water criteria and divides them into several categories based upon the extent of public access or risk of exposure. In general, Title 22 regulations are more stringent for uses with high potential for public contact and less stringent for uses with low potential for public contact. Depending on the use, Title 22 establishes four levels of treatment required for recycled water: undisinfected secondary, undisinfected secondary–23, undisinfected secondary–2.2, and disinfected tertiary.

Undisinfected Secondary Recycled Water. This category of recycled water is wastewater that has been treated to a secondary treatment level and is commonly referred to as secondary effluent. Secondary effluent is wastewater that contains dissolved oxygen (DO) and has undergone an oxidation process in which the organic matter content of the water has been stabilized and made nonputrescible.

Undisinfected Secondary–23 Recycled Water. This category of recycled water is secondary effluent that has been disinfected to a level such that the most probable number (MPN) of coliform bacteria in the water does not exceed 23 per 100 mL. Disinfection is the process whereby pathogenic bacteria and viruses are inactivated by chemical, physical, or biological means.

Disinfected Secondary–2.2 Recycled Water. This category of recycled water includes secondary effluent that has been disinfected to a level such that the coliform bacteria in the water does not exceed 2.2 MPN per 100 mL.

TABLE 2-5
Suitable Uses of Recycled Water[a]

Use of recycled water	Treatment level		
	Tertiary	Secondary -2.2	Secondary -23
Irrigation of:			
Food crops—contact with edible portion of crop	Allowed	Not Allowed	Not Allowed
Parks and playgrounds	Allowed	Not Allowed	Not Allowed
School yards	Allowed	Not Allowed	Not Allowed
Residential landscaping	Allowed	Not Allowed	Not Allowed
Unrestricted access golf courses	Allowed	Not Allowed	Not Allowed
Any other irrigation uses not prohibited by other provisions of CCR	Allowed	Not Allowed	Not Allowed
Food crops—edible portion above ground/not in contact with reclaimed water	Allowed	Allowed	Not Allowed
Cemeteries	Allowed	Allowed	Allowed
Freeway landscaping	Allowed	Allowed	Allowed
Restricted-access golf courses	Allowed	Allowed	Allowed
Ornamental nursery stock and sod farms	Allowed	Allowed	Allowed
ure for milk animals	Allowed	Allowed	Allowed
Any nonedible vegetation with access control to prevent use, as if it were a park, playground, or schoolyard	Allowed	Allowed	Allowed
Orchards with no contact between edible portion and reclaimed water	Allowed	Allowed	Allowed
Vineyards with no contact between edible portion and reclaimed water	Allowed	Allowed	Allowed
Non–food bearing trees not irrigated <14 days of harvest	Allowed	Allowed	Allowed
Fodder crops (e.g., alfalfa) and fiber crops (e.g., cotton)	Allowed	Allowed	Allowed
Seed crops not eaten by humans	Allowed	Allowed	Allowed
Food crops that undergo commercial pathogen-destroying processing before human consumption (e.g., sugar beets)	Allowed	Allowed	Allowed
Food crops—contact with edible portion of crop	Allowed	Not Allowed	Not Allowed
pply for impoundments:			
nrestricted rec. impound., with supplemental monitoring for athogenic organisms	Allowed[a]	Not Allowed	Not Allowed
estricted impoundment and fish hatcheries	Allowed	Allowed	Not Allowed
andscape impoundment. Without decorative fountains	Allowed	Allowed	Allowed

2.3.1 Design Criteria

Recycled water would be used for toilet flushing and landscape irrigation to the maximum ...nt possible for all four alternatives. For the toilet flushing, this means dual-plumbing of all ...cilities with the exception of the residential services. Tribal government and health center. For landscape irrigation, this means using recycled water for irrigating streetscape, street medians, and general landscape architectural fixtures for the various alternatives. Water uses with the potential for direct human contact, such as food preparation, should remain on potable water service.

To estimate the extent of the potable water applications that could be substituted with recycled water, average water usage for each facility was broken down according to the possible applications. These applications and usage breakdowns are summarized in Table 2-6. The net reduction in potable water use was then estimated and used to evaluate the impact that recycled water use could have on water demand and, consequently, on wastewater disposal.

TABLE 2-6
Breakdown in Typical Water Uses at Varying Facilities

Facility	Toilet flushing [a]	Bathing	Cooking, drinking	Laundry, dishes	Misc. [b]	Net water demand reduction due to dual-plumbing
asino	80% [c]	-	20%	-	-	80%
asino restaurant	30%	-	50%	20%	-	30%
uman resources building	80% [c]	-	20%	-	-	80%
	30%	50%	5%	15%	-	30%
vents center	80% [c]	-	20%	-	-	80%
etail	80% [c]	-	20%	-	-	80%
estaurant	30%	-	50%	20%	-	30%
sidential homes	41% [d]	34% [d]	4% [d]	21% [d]	-	41% [e]
e station and sheriff dept.	40%	30%	10%	15%	5%	40%
bal government and alth center	45%	40%	10%	5%	-	45% [e]

an be converted to recycled water service.
ncludes car wash, fire training, and other general uses.
ource: Irvine Ranch Water District.
anders and Thurow, n.d.
lthough dual-plumbing is possible, irrigation at these facilities are not planned for recycled water service.

3.2 Water and Wastewater Flows with Reclamation

vised water demand estimates for the various alternatives are summarized in Table 2-7. vised design water demand for determining water supply requirements and for sizing water stribution facilities are summarized in Table 2-8. These estimates are made assuming that ycled water is used in lieu of potable water for the uses outlined previously in Table 2-6.

TABLE 2-9
Estimated Average Wastewater Disposal Requirements (gpd) with Reclamation for the Jamul Indian Village

Facility	Alt. A		Alt. B	Alt. C	Alt. D
	Phase A	Phase B			
Casino	19,421	19,421	19,421	-	18,944
Casino restaurant	21,692	21,692	21,692	-	21,692
Human resources building	114	114	114	-	114
Hotel	-	18,682	-	-	12,155
Event center	-	2,013	-	-	1,934
Retail	-	-	651	2,418	-
Restaurant	-	-	14,629	8,737	-
Residential homes	8,600	8,600	8,600	8,600	8,600
Fire station and sheriff dept.	868	868	868	868	868
Tribal government and health center	3,000	3,000	3,000	3,000	3,000
Net	53,696	74,391	68,975	23,623	67,308

TABLE 3-1
Water Quality Data for the Otay Water District

Parameters	Units	State MCL	MCL goal	Helix R.M. Levy WTP		MWD Combined Skinner WTPs	
				Range	Average	Range	Average
Primary drinking water standards [a]							
Effluent turbidity	NTU	TT	NS	Highest Single Measurement	0.13		0.16
				Lowest monthly percentage of samples meeting MCL	100%		100%
Total coliform		5.0%		Range Combined Distribution System: 0-1.7% Average Combined Distribution System = 0.13%			
Fecal coliform and *E.coli*		ND	0	% of fecal coliform samples that were positive = 0 % of E.coli samples that were positive = 0			
TTHM [c]	ppb	100	NA	Range of all distribution sample points: 22-112 Highest running annual average = 42			
Aluminum	ppm	1	NA	ND-0.125	ND	ND-0.102	ND
Arsenic	ppb	50	NA	2.0-3.0	2.5	ND	ND
Fluoride	ppm	2	NA	0.21-0.27	0.24	0.20-0.25	0.22
Nitrate (as N)	ppm	10	NA	ND	ND	ND-0.45	ND
Gross alpha particle	pCi/L	15	NA	ND-6.4	4.7	ND-5.53	3.99
Gross beta particle	pCi/L	50	NA	ND-3.7	2.5	ND-7.48	5.24
Combined radium	pCi/L	5	NA	<5	<5	ND-2.36	1.25
Strontium-90	pCi/L	8	NA	ND-3.6	0.9	ND	ND
Tritium	pCi/L	20,000	NA	ND-400	184	ND	ND
Uranium	pCi/L	20	NA	2.7-3.7	3.1	ND-3.18	2.61
Secondary drinking water standards [b]							
Aluminum	ppb	200	NA	ND-125	ND	ND-102	ND
Chloride	ppm	500	NA	64-81	74	68-80	72
Color	Units	15	NA	1-5	2.5	1	1
MBAS [d]	ppb	500	NA	ND-51	26	ND	ND
Hardness	ppm	NA	NA	216-237	227	221-240	230
Odor threshold	Units	3	NA	NA	NA	NA	NA
Sodium	ppm	NA	NA	35-78	59	64-73	67
Specific Conductance	µmho/cm	1,600	NA	761-820	776	759-827	786
Sulfate	ppm	500	NA	147-183	170	160-176	169
TDS	ppm	1,000	NA	460-490	475	452-491	467

[a] Extracted from the Otay Water District Consumer Confidence Report, included as Appendix A.
[b] Mandatory health-related standards.
[c] Total Trihalomethane.
[d] Methylene blue agents.

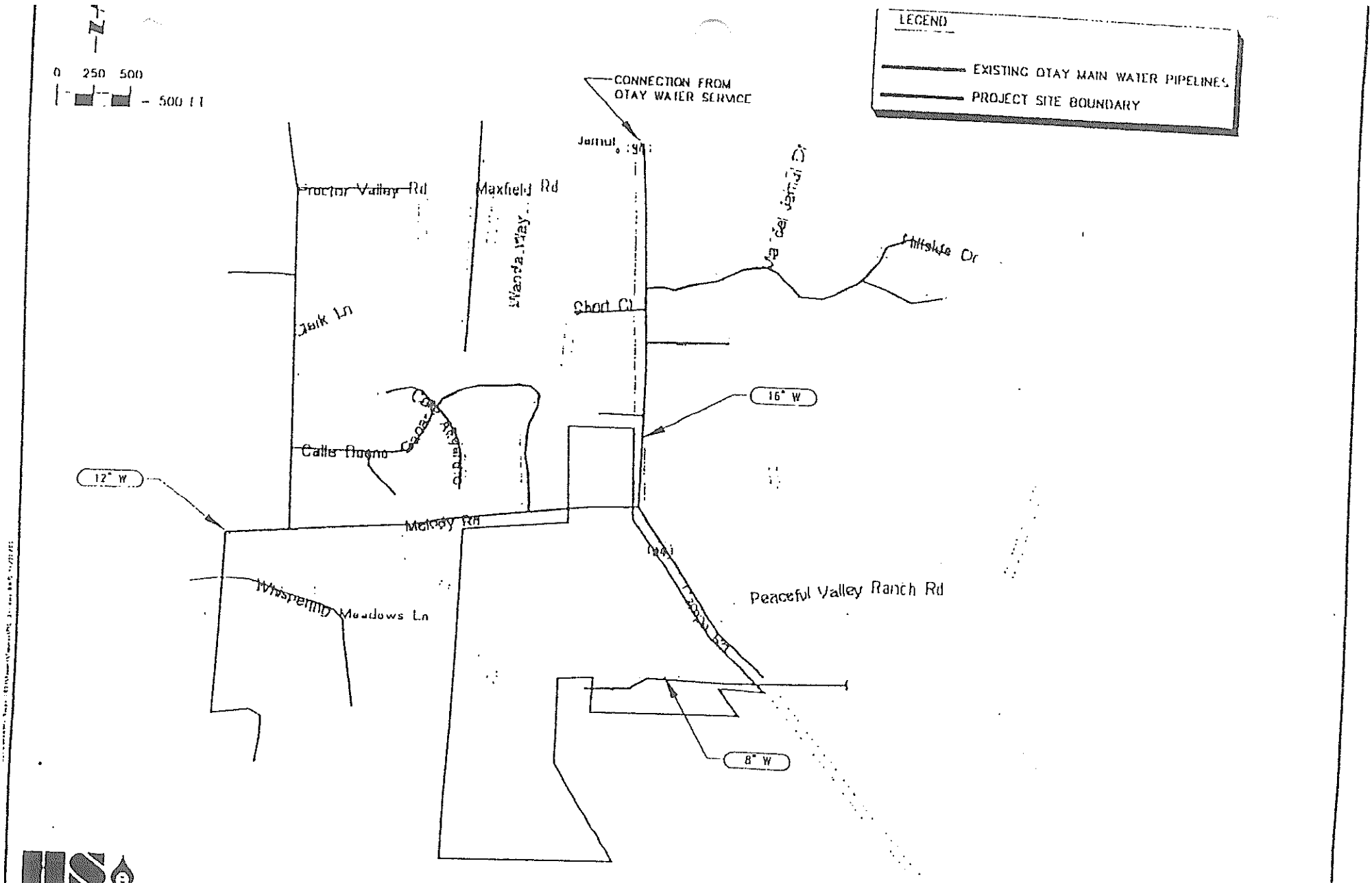


FIGURE 3-1
Jamul Indian Village Feasibility Study
Existing On-Site Water Service by Otay Water District

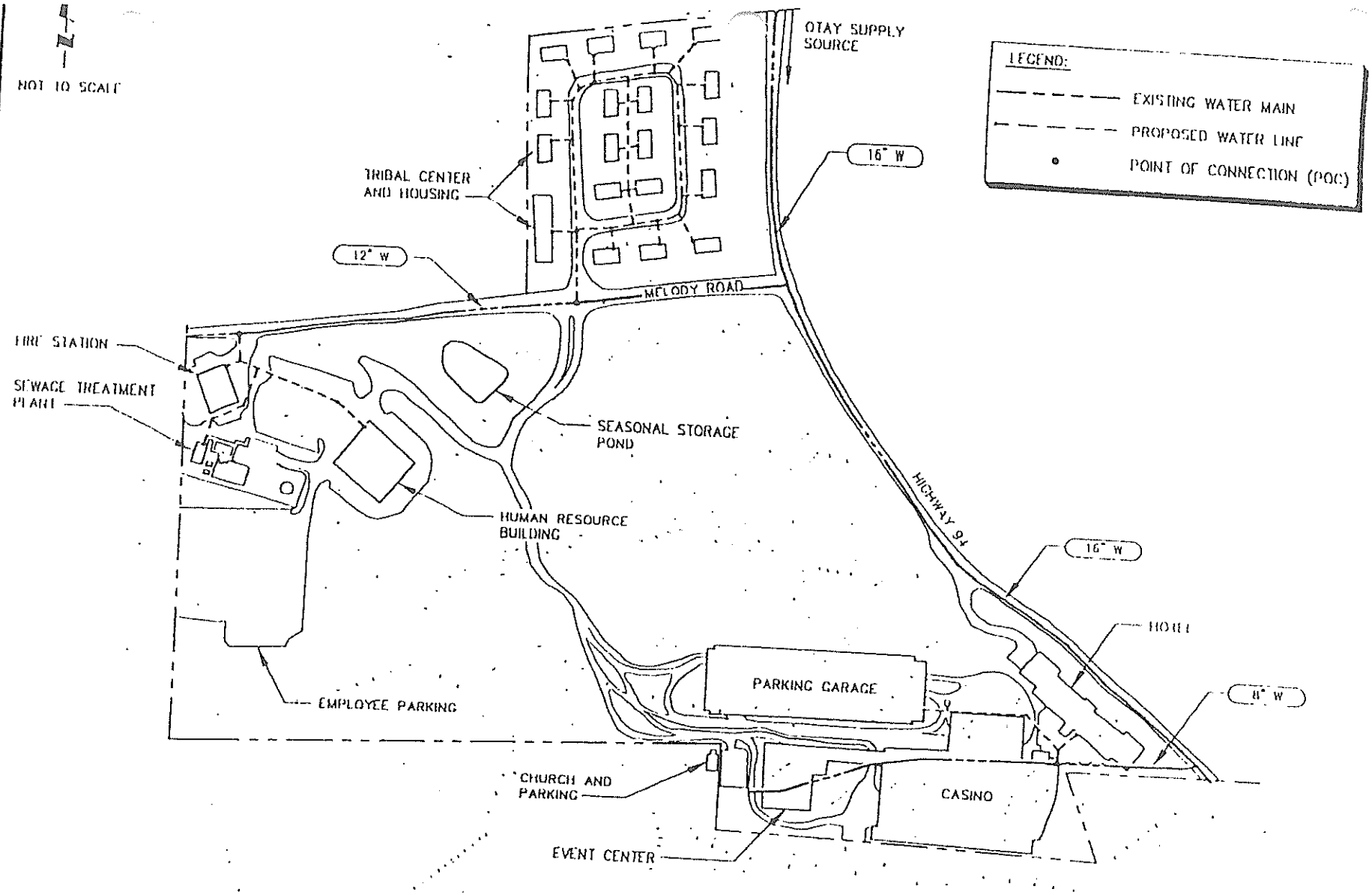


FIGURE 3-2
Jamul Indian Village Feasibility Study
Conceptual Water Service for Alternative A Phase B

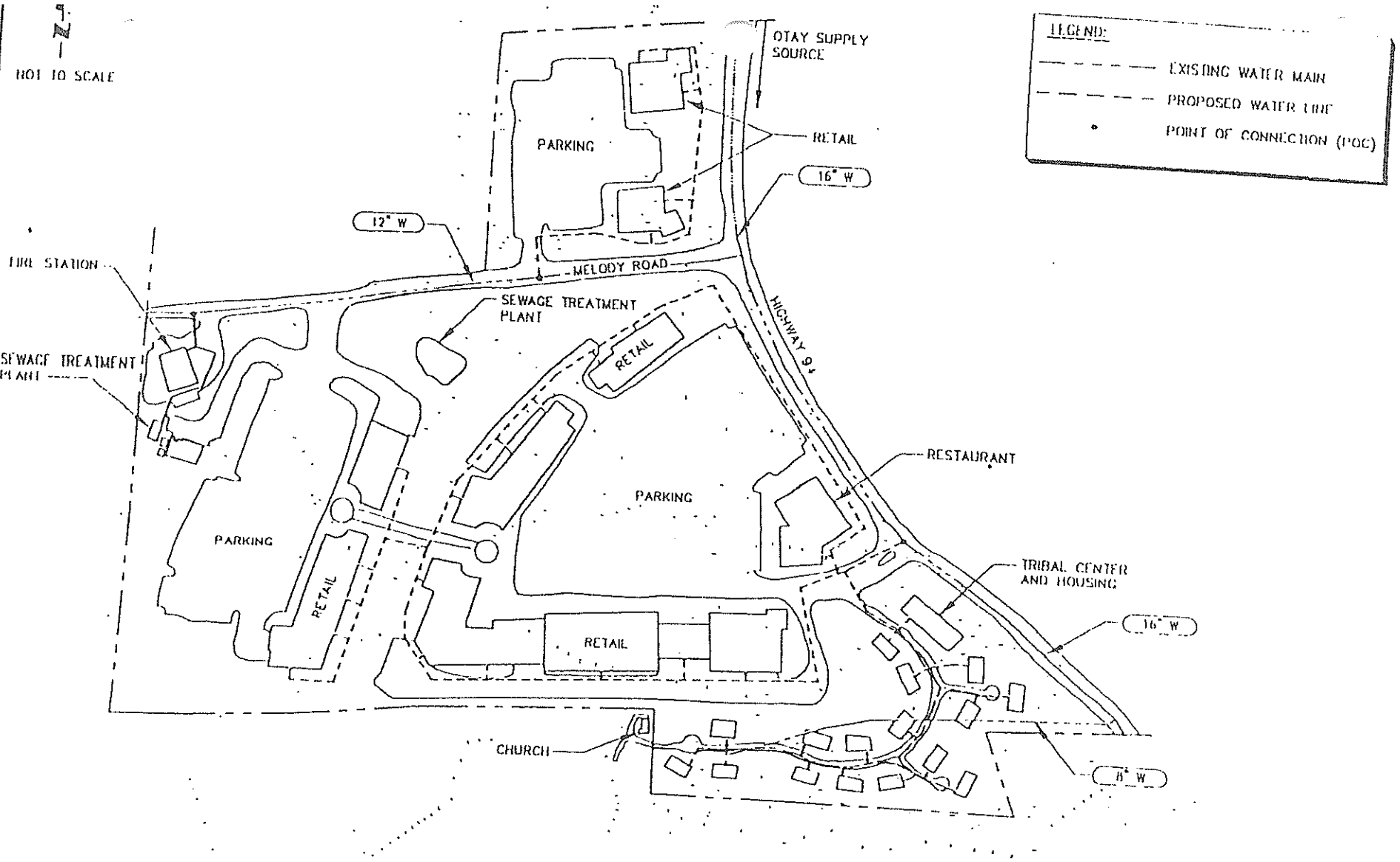


FIGURE 3-4
Jamul Indian Village Feasibility Study
Conceptual Water System for Alternative C

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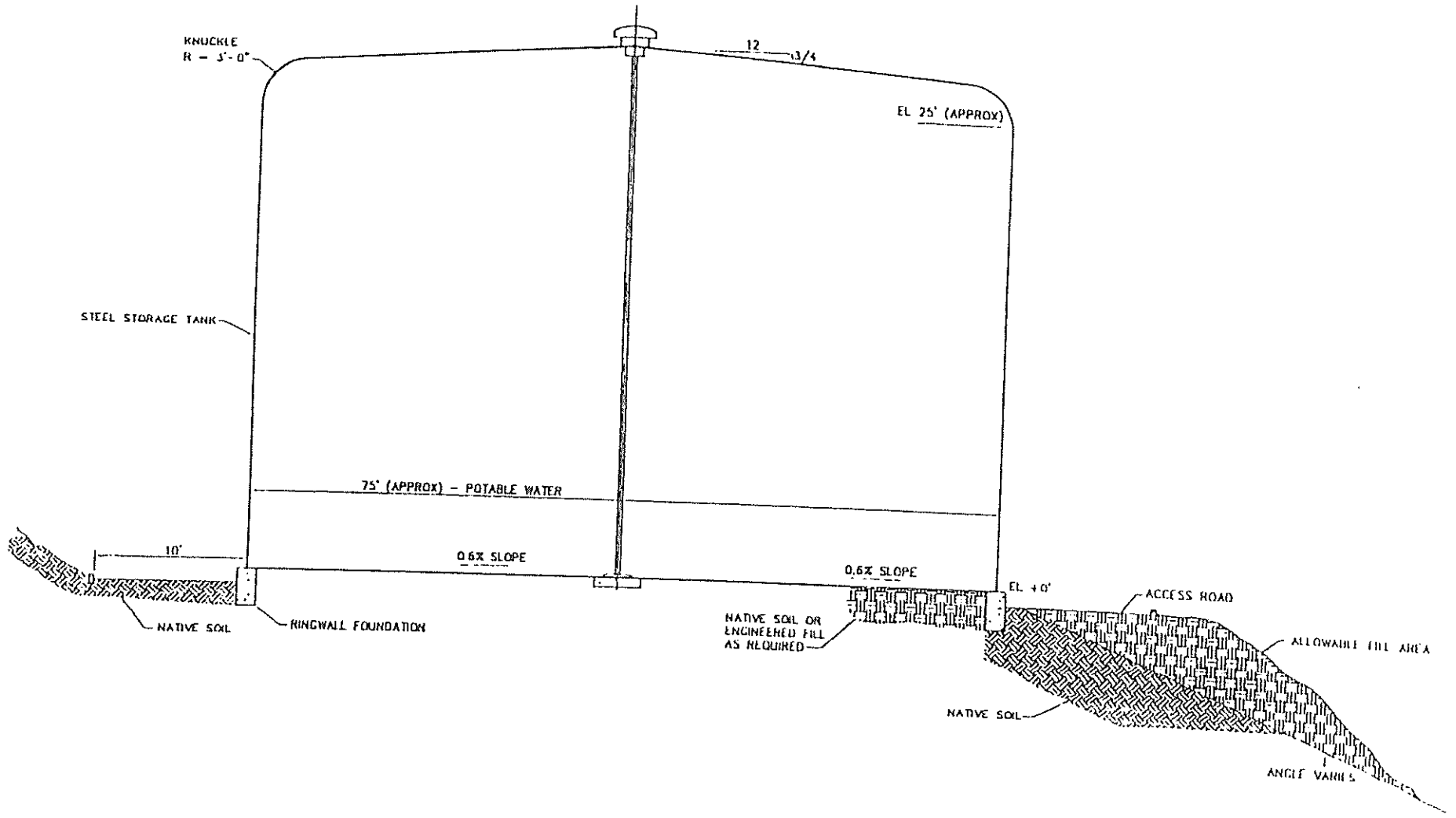

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FIGURE 3-6
Jamul Indian Village Feasibility Study
Typical Water Storage Tank

4.0 Wastewater Treatment

This section summarizes on-site facilities for wastewater collection, treatment, and disposal. An earlier study (HydroScience Engineers, 2001) evaluated the facility requirements for this project. This investigation determined that, due to the proximity of the closest WWTP, it would be more advantageous for the Tribe to develop on-site treatment and disposal capabilities to service the proposed facility. As a result, further evaluation of the proposed project's wastewater requirements focuses on developing on-site treatment and disposal. This WWTP would be designed solely to handle wastewater produced from the project site. It is not intended to service additional flows beyond the project's property boundary.

4.1 Regulatory Requirements

Wastewater treatment plants in California typically require a National Pollution Discharge Elimination System (NPDES) permit for surface discharge or a Waste Discharge Requirements (WDR) permit for discharge over land. Ordinarily, these permits are issued by the State of California Regional Water Quality Control Board (RWQCB). However, since the proposed facilities are located on tribal lands held in federal trust, they are subject to regulation by the federal government, specifically by the U.S. Environmental Protection Agency (USEPA). Permitting for any tribal WWTP that discharges on tribal land would be through the USEPA, through the RWQCB. In general, USEPA requires the same discharge standards as the local governing RWQCB.

.1.1 Subsurface Disposal

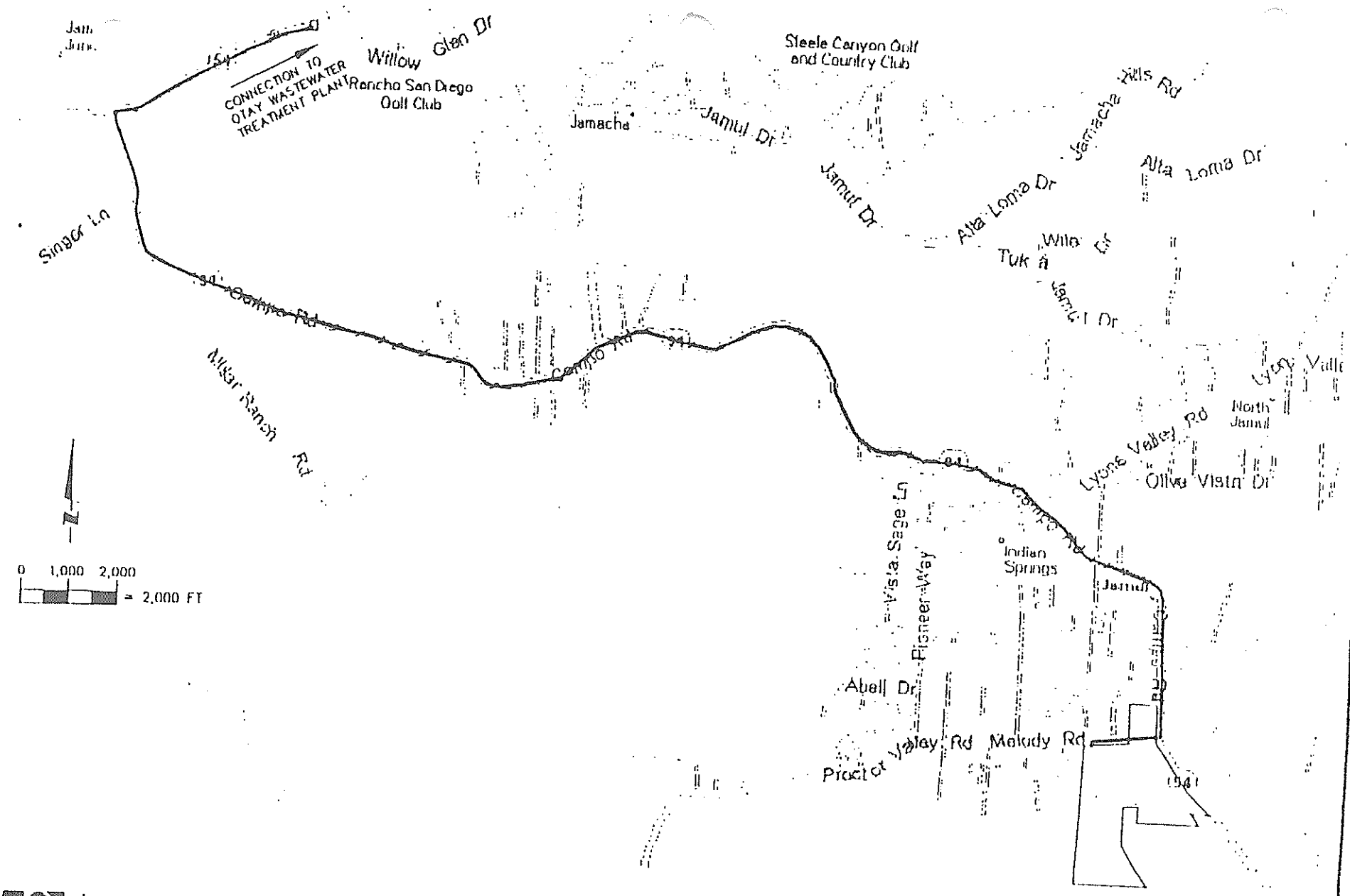
ubsurface disposal permitting would likely be based on groundwater quality degradation iteria under recent USEPA guidelines. Under this permitting strategy, it would be necessary perform a hydrogeological study to establish pollutant transport patterns in the nearest entifiable groundwater basin. An analysis would be required to determine the down-gradient vironmental impacts to the beneficial users of the groundwater and the permit would likely ntain mass-based discharge limitations.

ypical discharge prohibitions include:

Discharge of wastes to surface waters or surface water drainage courses,
Discharge of wastes to areas other than the designated treatment and disposal areas, and
Bypass or overflow of untreated or partially treated waste.

pical discharge specifications include:

Objectionable odors originating from the WWTP shall not be perceivable beyond the boundary of the WWTP and disposal areas.
Wastewater discharged to leachlines shall remain underground at all times.
The distance between any unlined pond or leaching trench bottoms and the anticipated highest groundwater shall be greater than 6 inches, or such distance as necessary to provide compliance with local groundwater limitations.



HSE
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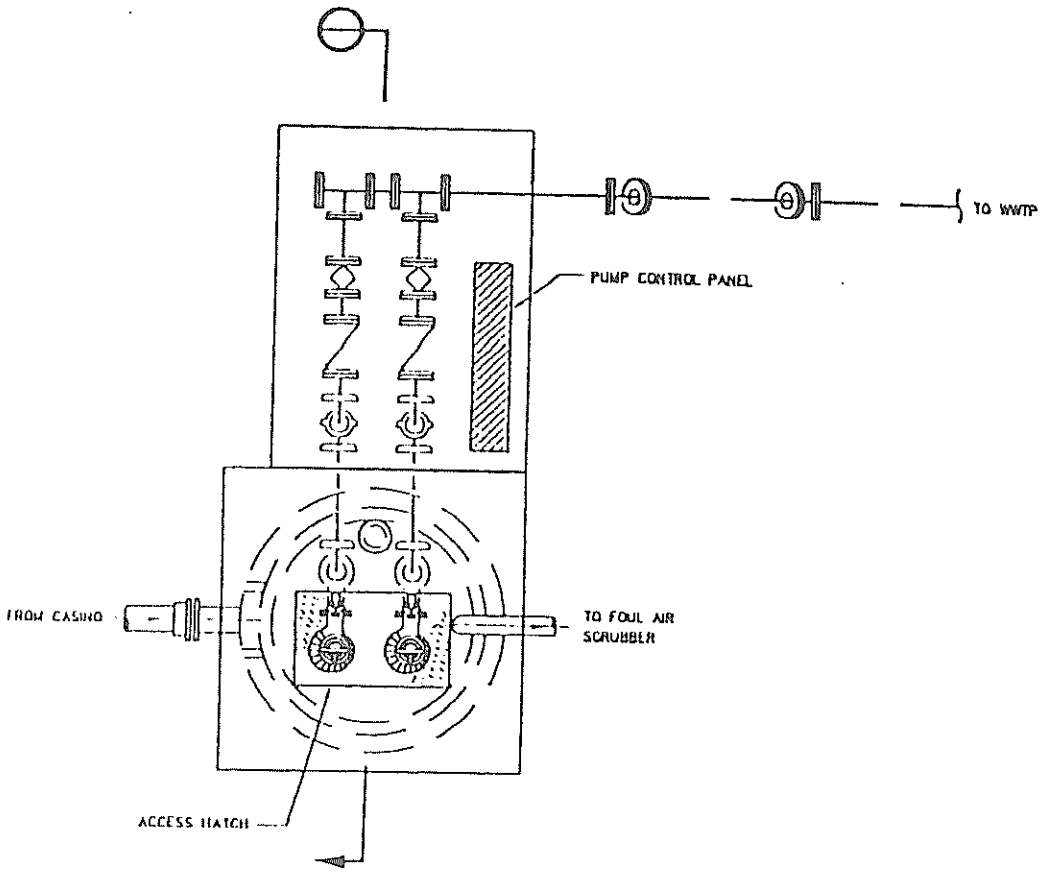
FIGURE 4-1
Jamul Indian Village Feasibility Study
Conceptual Otay Water District Wastewater Connection



LIFT STATION PLAN
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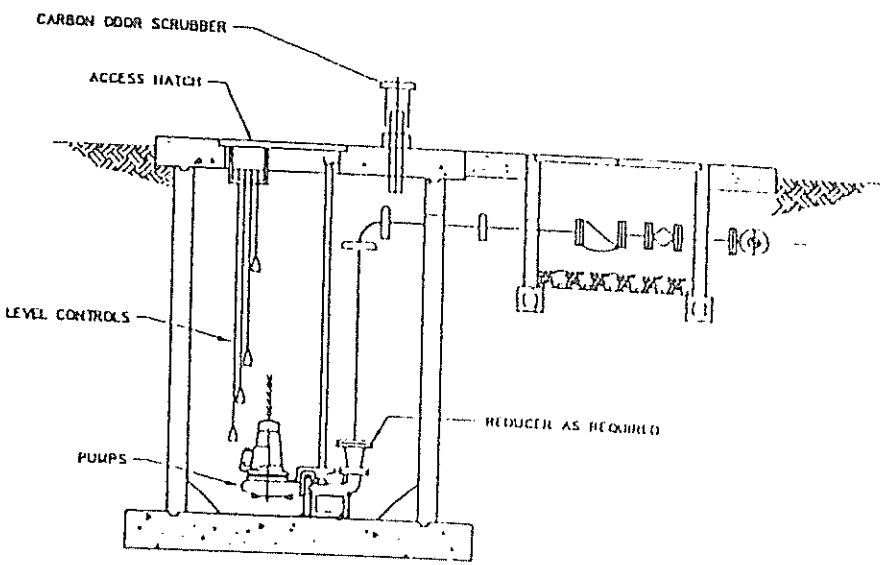

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FIGURE 4-2
Jamul Indian Village Feasibility Study
Typical Sewer Lift Station

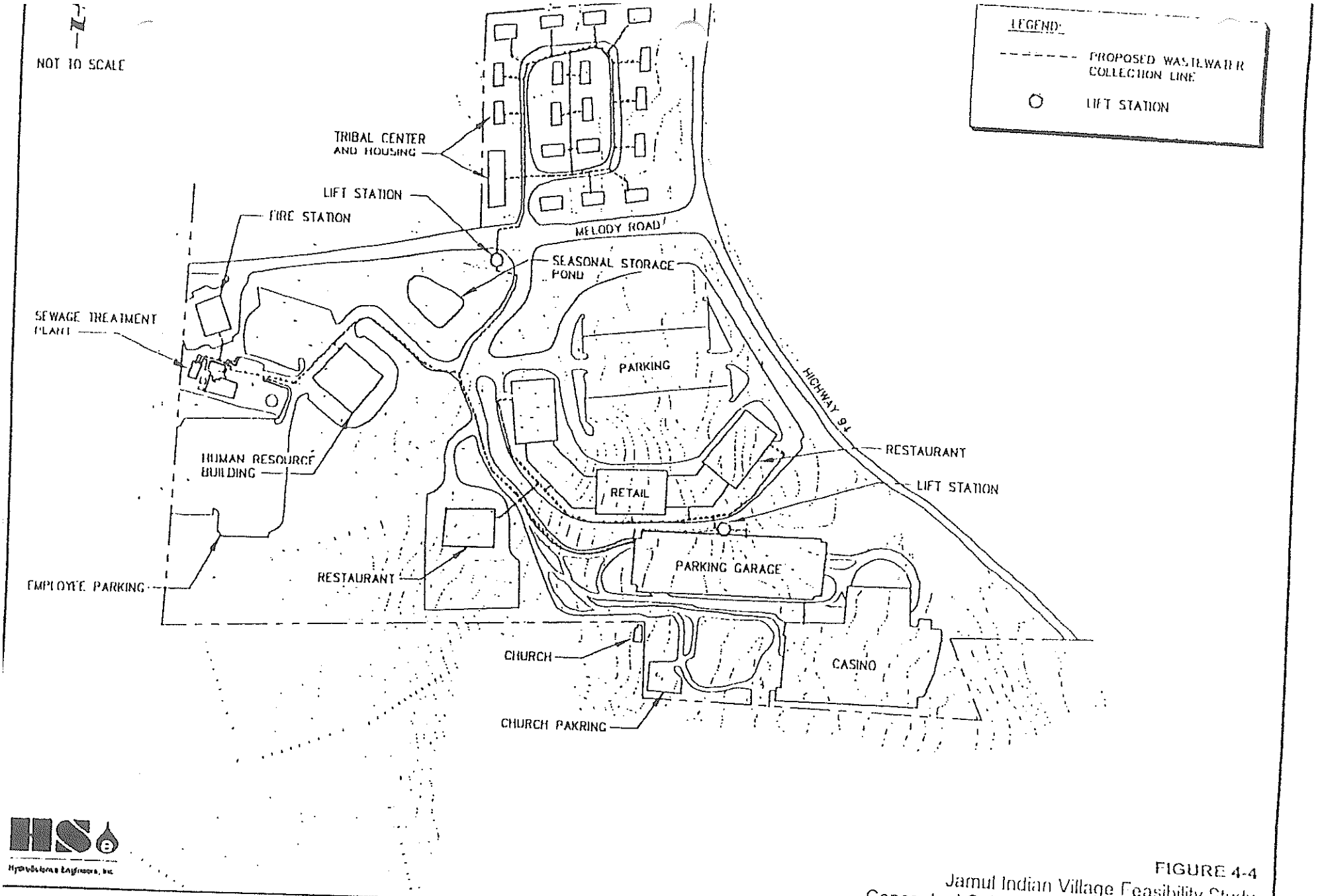

FIGURE 4-4
Jamul Indian Village Feasibility Study
Conceptual Collection System for Alternative B

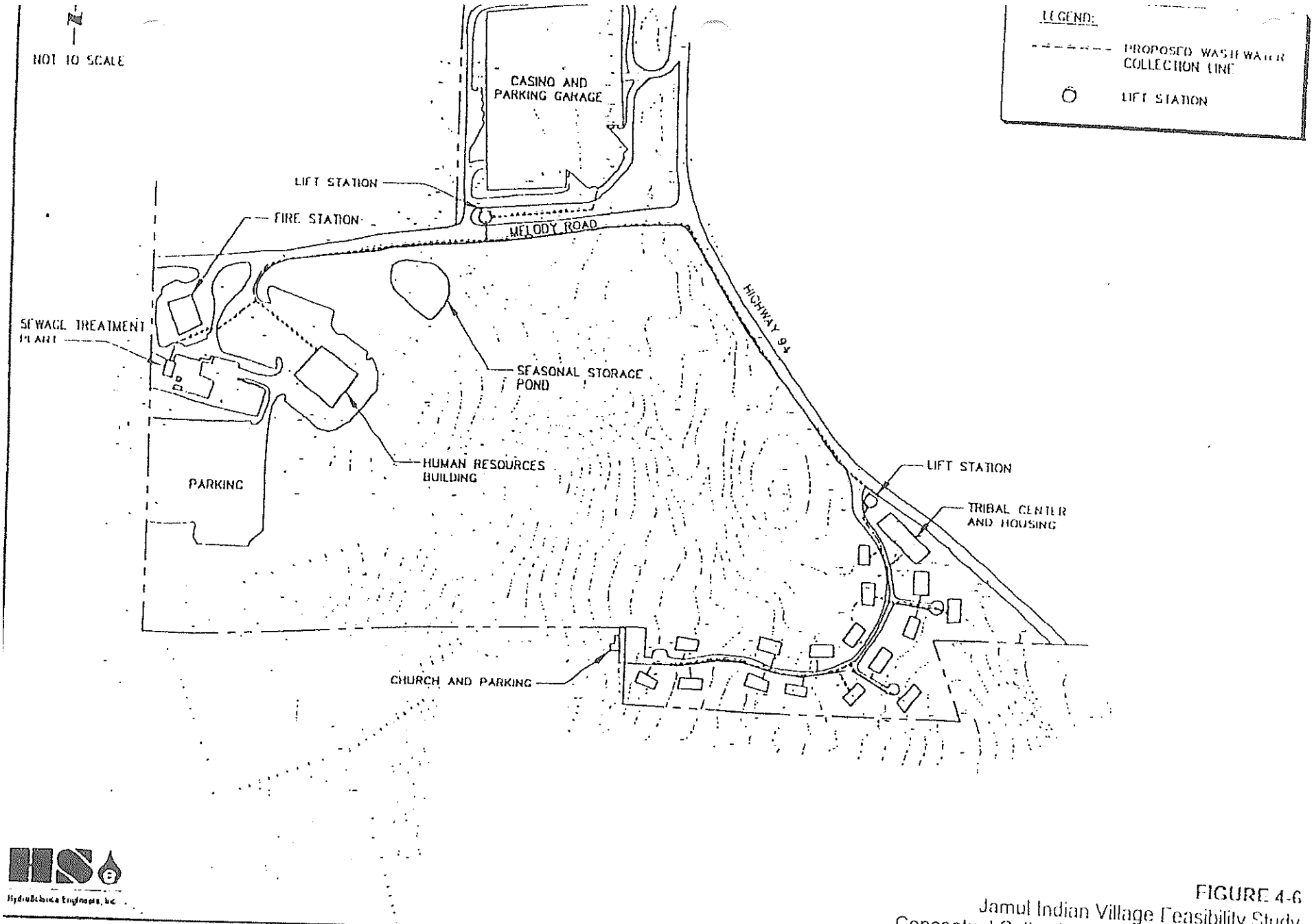

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FIGURE 4-6
Jamul Indian Village Feasibility Study
Conceptual Collection System for Alternative D

microorganism concentrations not previously possible with activated sludge due to the resulting settling problems caused by excessive solids loading to the clarifier.

MBRs systems are comprised of many unit processes, which together achieve treatment of raw wastewater to produce a high-quality effluent ideal for reclamation use. A conceptual process flow diagram showing the major unit processes for the proposed WWTP is illustrated in Figure 4-7. Treatment begins upstream of the MBR at the headworks, which uses fine screens to remove large materials that can potentially damage the membrane. Wastewater flows from the headworks by gravity into the MBR structure.

The MBR process combines oxidation, clarification, and filtration into one step. A bioreactor with separate anoxic and aerobic cells provides the environment necessary for BOD_5 oxidation, nitrification, and denitrification processes to occur. High concentrations of mixed liquor suspended solids (MLSS), up to 15,000 mg/L, are maintained in the MBR tank allowing rapid synthesis of the soluble organics in the wastewater. Nitrogen removal through nitrification and denitrification is also achieved in the MBR tank.

Membrane modules immersed in the aerobic portion of the process tank combine the functions of the clarifier and tertiary filtration processes into a single step. The membranes are classified as MF and have microscopic pores that strain solids larger than 0.1 µm to produce effluent with a very low solids concentration. Having completed filtration, the membrane effluent (called permeate) is disinfected.

Depending on the disposal point, the permeate is disinfected with either ultraviolet light (UV) or NaOCl. For disposal to the subsurface leachfield or sprayfield, UV is preferred since very low solids concentration minimizes shielding of bacteria, thereby producing a high pathogenic kill. As a result, UV disinfection provides efficient and consistent microbial inactivation without increased risk of chemical DBP formation. For disposal by reclamation, chlorination is preferred over UV since reclaimed water distribution design typically endeavors to maintain a chlorine residual in the distribution system to prevent regrowth.

Waste sludge and solids residual would be disposed of by mechanical dewatering. Waste activated sludge (WAS) and biosolids residual produced by the wastewater would be dewatered on site by means of a belt filter press and ultimately hauled off site for disposal. It is recommended that landfills in the region be contacted to determine if the landfills accept biosolids. The frequency of this operation would depend on the solids wasting frequency in the wastewater plant. All biosolids dewatering and storage facilities would be contained indoors and the foul air scrubbed to minimize odors.

A preliminary level design of the recommended MBR WWTP is included in this study. A conceptual site layout is included in Figure 4-8, which shows the WWTP at the western portion of the site. Unit process information and general design criteria are further summarized in Table 4-2.

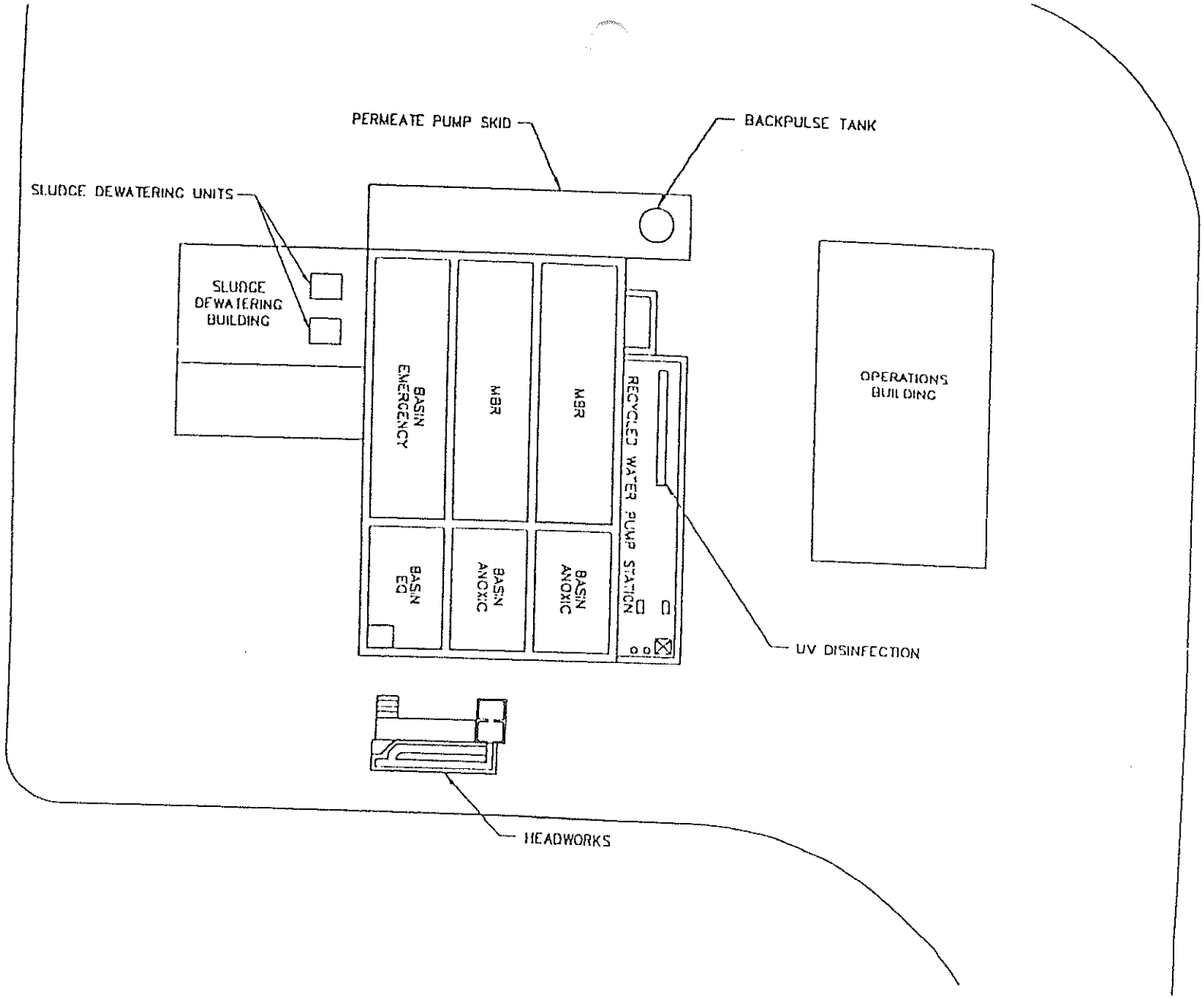

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FIGURE 4-8
Jamul Indian Village Feasibility Study
MBR WTTP Layout

4.4.2 Facility Design

cility design of the MBR WWTP was completed on a preliminary level. A conceptual site yout is included in Figure 4-8 showing major facility sizes and locations for treating 450,000 gpd average day wastewater. Future additional facilities are also shown to illustrate possible expansion designs. Unit process summaries for major processes are included in Table 4-1. Manufacturer information on the mechanical treatment processes is included in Appendix D for reference.

Although not included in the treatment plant facilities described below, experience at similar facilities shows the necessity of properly sized grease traps for all kitchens to strain wastes from the gaming facility. These traps must be serviced on a regular basis in order to remain effective.

Headworks. Headworks facilities would consist of flow measurement and screening equipment. Typical plan and section drawings are illustrated in Figure 4-9. Wastewater pumped by the raw wastewater lift stations to the headworks would enter the influent pipe, which would be reduced to a 3-inch diameter pipe upstream of a magnetic flow meter. After flow measurement, the pipe would discharge to a covered headworks influent box for distribution to the screening channels. Slide gates would control flow to the screening channels.

Fine screening would be required for protection of the MF membranes. A provided bypass around the screen would act as an emergency overflow in case of mechanical or electrical failure. The headworks screening channel would be sized to handle the peak wastewater flows for each alternative.

ning would be accomplished by a self-cleaning inclined cylindrical sieve screen with an egral screenings scraper/conveyor, compactor, and mechanical washer system. A 3-mm reen size would be required to protect the MF membranes from hair and stringy material. The /lindrical screen fits into the channel at one end. As the water level rises in the influent annel, a shaftless helical screw pushes the solids down into the channel where a mechanical asher system breaks up fecal material so that it can pass through the screen to the treatment ant. Then the screw reverses directions in order to pull the remaining inorganic solids owards to a compactor. Compacted screenings fall into a bin via a discharge chute. Excess quid from the compactor flows back to the channel.

ne headworks channel and screen system would be covered. Foul air from the headworks cilities would be scrubbed for odor removal, which would be accomplished in a soil filter. uis eliminates the need for chemicals and simplifies operational requirements typical for a emical scrubbing system.

mersed Microfiltration Membrane Bioreactor. The MBR system combines a suspended growth ological reactor with membrane filtration. Each MBR process train would consist of an anoxic ne for denitrification, an aeration zone for soluble BOD reduction and nitrification, and a embrane filtration zone for solids removal. Two MBR trains would be provided, each sized to ndle half of the peak design wastewater flow. This would allow one process train to be taken line for maintenance during off-peak days at the gaming facility. The MBRs would typically oduce an effluent with BOD and TSS levels of less than 2 mg/L, and a turbidity of less than U. The components of the MBR are described below.

Anoxic Zone. An anoxic basin would be provided for each process train. Nitrate removal, a process called denitrification, is accomplished in this basin by a suspended growth bacterial process that thrives in an anoxic environment. In the absence of oxygen, denitrifying bacteria (in energy for cell growth from the conversion of nitrates to nitrogen gas. The hydraulic ..ention time (HRT) would be approximately 8 hours for complete denitrification. The incoming raw wastewater provides a continuous carbon source needed for denitrifying bacteria cell synthesis.

In addition, some carbon would be supplied in the recirculated biomass through endogenous decay. The anoxic zones would be equipped with mechanical mixers to aid in the denitrification process. From the anoxic zones, the wastewater would flow to the aeration tanks.

Aeration Zone. An aeration basin would be provided for each process train. Wastewater entering the tank would be aerated by process air blowers, supplied through a fine bubble diffuser system installed at the bottom of the aeration tank. Soluble organics are converted into biomass by an aerobic suspended growth process. In this process, microorganisms utilize the carbon in the wastewater for energy and cellular synthesis. The recirculated mixed liquor entering the eration basin from the anoxic basin provides a continuous source of bacteria. Conversion of mmonia to nitrates, called nitrification, occurs in the aeration basin. Nitrifying bacteria ncorporate ammonia-nitrogen into respiration and cell synthesis processes and produce itrates as a byproduct.

lembranes. The membranes would be located in the corner of the aeration basin for each rocess train. Membrane cassettes would be immersed in each basin; each cassette would ontain eight membrane modules. A membrane module consists of a bundle of hollow ul( )ltration or ultrafiltration fibers, with a typical nominal pore size of approximately ..n.

vacuum would be applied to the module headers to draw the wastewater from the process nk through the membrane. Wastewater would then flow through the hollow fibers to a rmeate pump. The permeate pump would transfer the wastewater to the UV disinfection cilities or to the seasonal storage reservoir. A typical MBR tank is shown in Figure 4-10.

ixed liquor from the membrane zone would be continuously recycled back to the anoxic zone a recycle pump in each membrane tank. This oxidized and nitrified recycle stream would be ended with raw sewage, which is a source of carbon source, to enable denitrification to occur the anoxic zone. Periodically, a sludge waste pump located in each membrane zone would aste excess mixed liquor to the belt filter press where it is dewatered and eventual hauled off e for disposal.

r is fed to the underside of the membranes to prevent solids from binding on the surface of membranes. Piping and backwash storage tanks would be provided for periodic backwash the membranes. Five backwash storage tanks would be provided, each with a storage pacity of approximately 3,000 gallons. The backwash tanks would be filled with permeate m the MBRs. Sodium hypochlorite would be added to the backwash for control of regrowth the membrane strands. It is expected that the chlorine demand in the permeate would sume any chlorine introduced by the backwash cycle.

ov( )head crane with a traveling bridge would be provided for maintenance use. The crane ( )e used to maneuver membrane cassettes for service and/or soak cleaning in a chemical

dip tank (containing a mild sodium hypochlorite solution) located at the end of the basin structure. Chemical pumps would be provided for transfer of sodium hypochlorite to the dip k.

UV Disinfection. Membrane-filtered effluent is well suited for disinfection by UV light due to the very low solids content. UV disinfection would eliminate the need to store large quantities of disinfectant chemicals, such as sodium hypochlorite. An additional benefit is that disinfection by-products are not formed.

UV disinfection facilities would be provided for disinfection of wastewater prior to subsurface disposal or spray field disposal. The proposed UV disinfection facilities would be located adjacent to the MBR basins as shown in Figure 4-10. UV disinfection is accomplished by a bank of UV lamps contained in a stainless steel channel with a built-in weir-level control system.

Dosage requirements and certain operational features and controls of the UV system would meet Title 22 recycled water requirements. UV disinfection lamps would utilize low-pressure, high-intensity lamps. A packaged control system would be supplied by the UV system vendor.

Chlorine Disinfection. A hypochlorite feed system would be used to provide chlorination to the recycled water prior to being pumped into the recycled water storage tank. Chlorination disinfects the treated wastewater while maintaining a chlorine residual of 1–2 mg/L in the storage tank and the dual-plumbed piping system. This low residual should be effective in preventing any regrowth in the recycled water distribution system. The contact time needed for complete mixing of the solution would be accomplished in the recycled water distribution ip .

Recycled Water Pump Station. A recycled water pump station would be required for recycled water distribution. The size and type of pumps required would be determined based on the hydraulic flow and storage characteristics and requirements of the system.

Emergency/Equalization Storage Basin. The emergency/equalization storage basin (E/ESB) is located within the WWTP site, as shown in Figure 4-8, and is intended to serve two functions. As an equalization basin, the E/ESB is intended to attenuate peak influent flows by diverting excess wastewater upstream of the MBR tank. This ensures that the MBR receives a relatively constant flow of wastewater. Once influent flows have subsided, the stored wastewater is returned to the treatment train.

In addition, the E/ESB can also serve as a temporary storage reservoir in the event that the MBR is not in service. In the event of complete mechanical shut-down or failure, raw wastewater would be screened by the headworks via a manually-screened overflow channel and be diverted to the E/ESB for emergency storage by gravity. When wastewater treatment systems are online again, the stored wastewater can be pumped back into the process train for treatment.

Operations Building. An operations building would be required to house the plant controls, the motor control center, the blowers required for the MBR process, the chemical storage and handling facilities, and other mechanical equipment. A preliminary plan of the building is shown in Figure 4-11. The building would also include a maintenance room. A small laboratory would be provided for on-site testing and sample preparation. In addition, a small locker room

with showers would be provided. Roll-up doors would be provided for entry to the blower room. Double-doors would provide access to the electrical and chemical rooms.

The building would be a masonry, single-story structure with a standing seam-painted metal roof. A combination of plain block and split-face block would be used. Interior walls would be either masonry or metal stud with drywall. Suspended ceiling and lighting panels would be provided in some rooms with utilities and ventilation ducting in the overhead space.

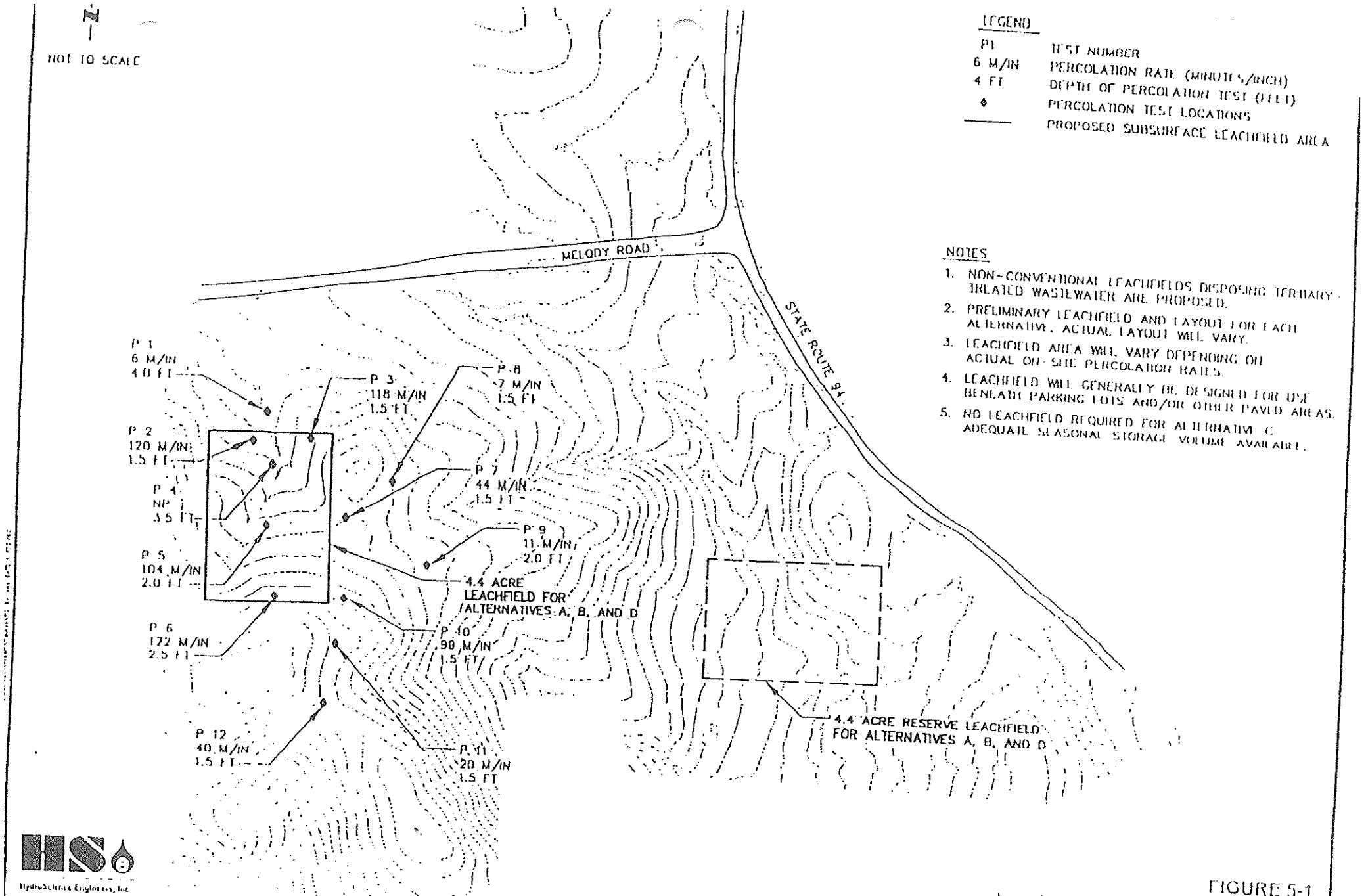
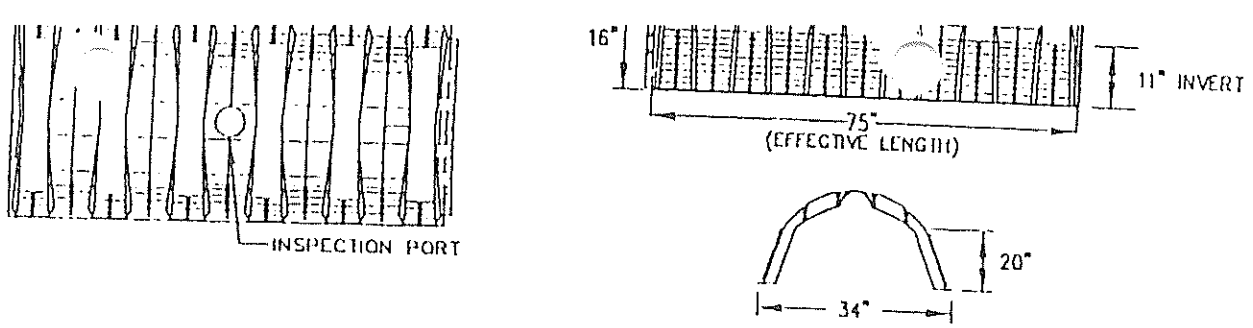


FIGURE 5-1
Jamul Indian Village Feasibility Study
Conceptual Leachfield Layouts

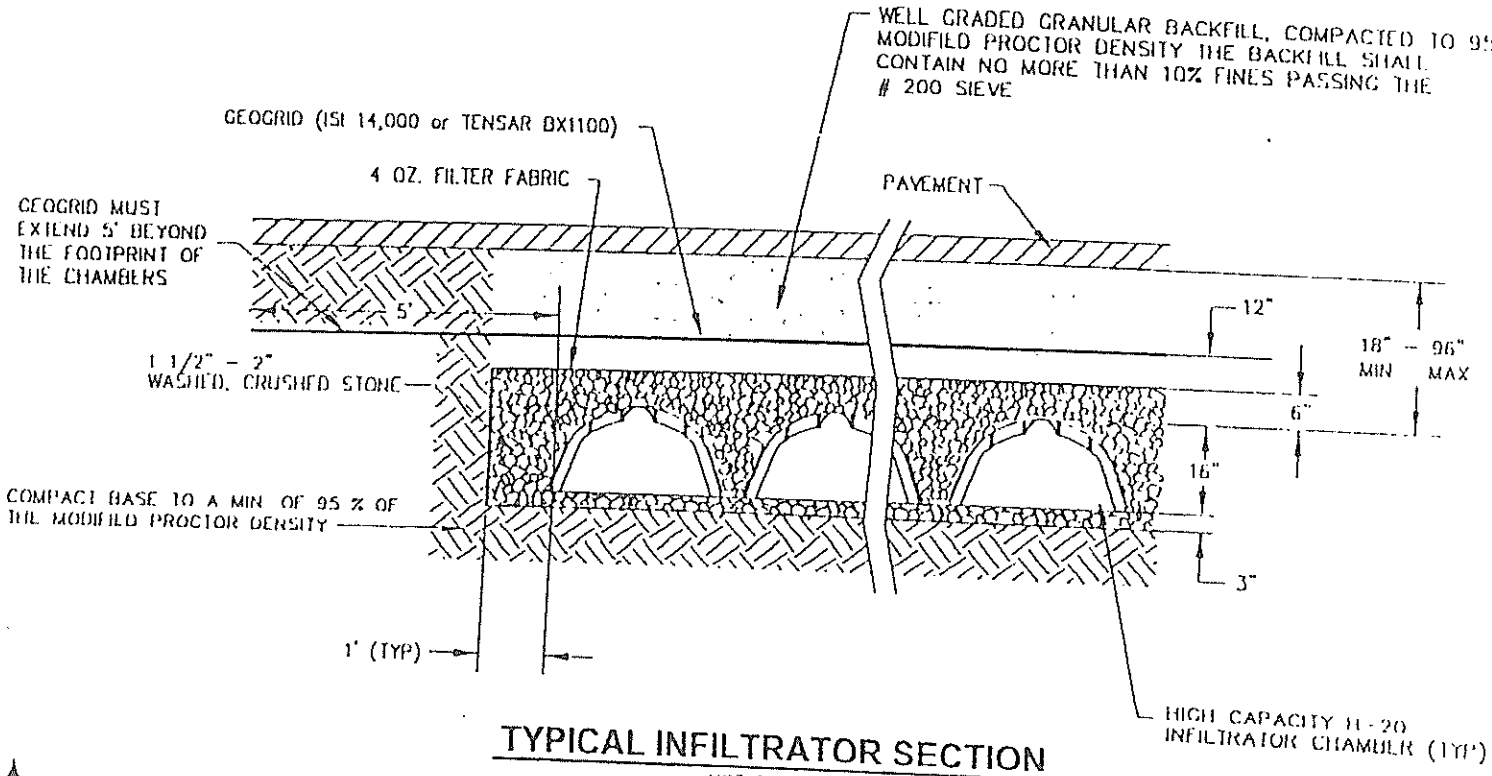


NOTES:

1. TWO VENTED MANIFOLDS, ONE AT EACH END OF THE CLUSTER TRENCH, WOULD BE INSTALLED TO INCREASE OXYGEN WITHIN THE SOIL.
2. INSTALLED ACCORDING TO STATE AND LOCAL REGULATIONS.

TYPICAL INFILTRATOR DETAIL

NOT TO SCALE



TYPICAL INFILTRATOR SECTION

NOT TO SCALE

HydroScience Engineers, Inc

FIGURE 5-2
Jamul Indian Village Feasibility Study
Typical Leachfield Layout

residential homes and Tribal government and health center. In addition, urban landscaping can also be irrigated with recycled water to further increase the recycled water demand during the summer. Irrigation demand comes from the irrigated areas distributed throughout the project ... The crop demands used in the water balance analysis assumed typical urban landscaping crop such as turf grass, evergreen shrubbery, and evergreen trees in a 60:20:20 ratio for area coverage. The total estimated monthly irrigation demands are summarized in Table 5-3 and were determined using the following formula:

$$ID_i = \frac{(ET_i - P \cdot e_p) \cdot l_r}{e_i}$$

$$ID_{tot} = \sum ID_i$$

where,

ID_{tot} = Total irrigation demand in inches.
ID_i = Irrigation demand of crop *i* in inches.
ET_i = Evapotranspiration for crop *i*.
P = Average precipitation.
e_p = Precipitation irrigation efficiency, 0.8. Assumes 20% of rainfall during growing season is lost to evaporation, runoff, etc.
l_r = Loss rate. A value of 1.1 assumes approximately 10% of the applied water passes through the crop root zone and is lost.
e_i = Irrigation efficiency, 0.8-0.9 depending on season. This assumes that 10–20% of the applied irrigation water is lost to evaporation.

shown in Table 5-3, the total annual irrigation demand is estimated at 222 inches. A peak monthly irrigation demand of 41 inches is projected for July. The irrigation season is approximately eight months long, from March through October. No irrigation demands are projected for November through February when it is anticipated that local precipitation would satisfy landscape irrigation requirements.

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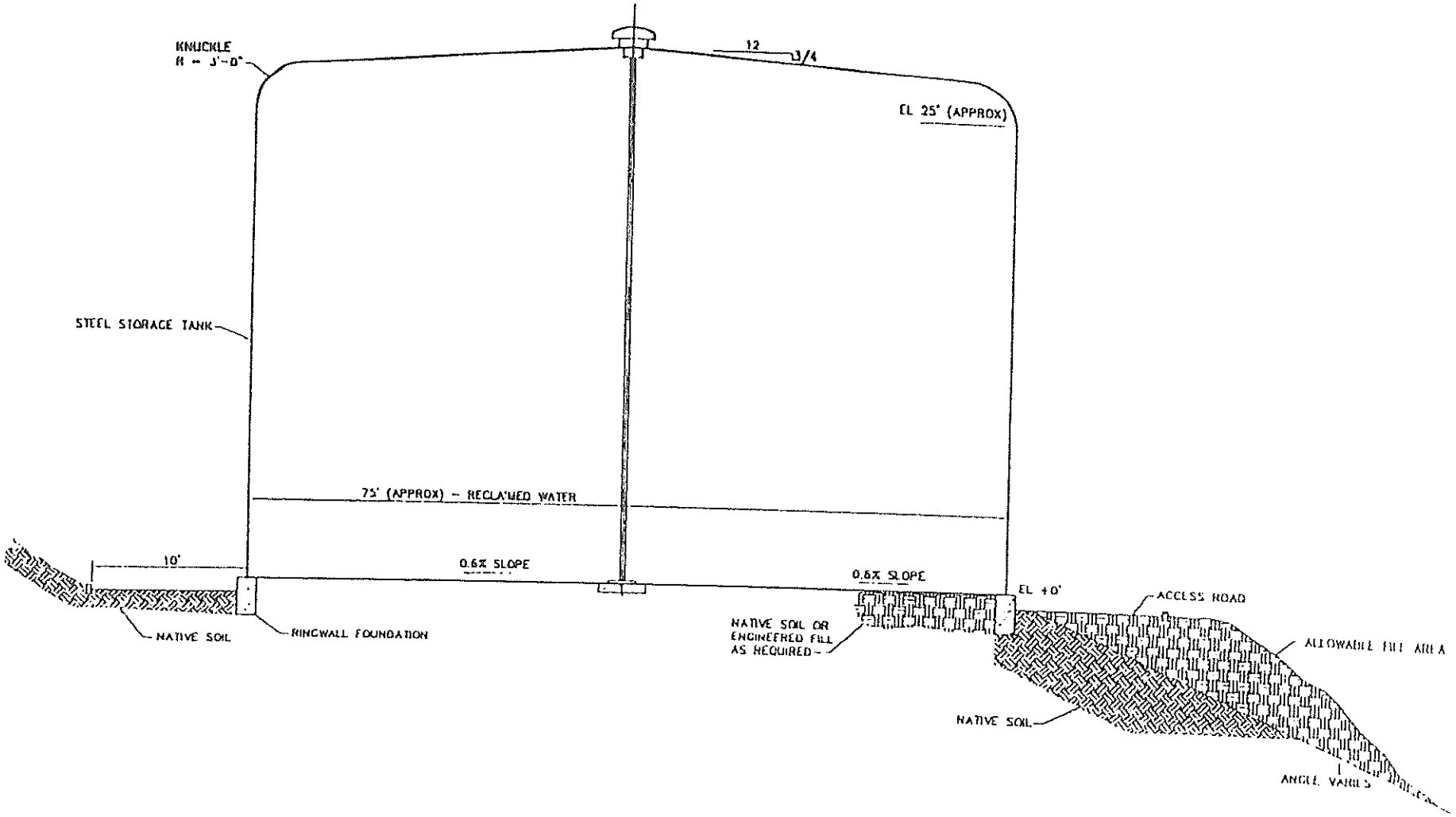

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FIGURE 5-3
Jamul Indian Village Feasibility Study
Typical Recycled Water Storage Tank

- wastewater disposal requirements are reduced by year-round reclamation used on dual-plumbed toilet fixtures, and
- irrigated areas are summarized in Table 5-5 and further illustrated in Figures 5-5 to 5-8, for Alternatives A to D, respectively.

The key element in this analysis is the seasonal storage volume. Preliminary analysis indicates sufficient landscaped area is available to dispose of the wastewater by means of irrigation during the summer. However, due to uncertainties in the leachfield capacity and to provide an added safety margin, seasonal storage is recommended to serve as a winter discharge option.

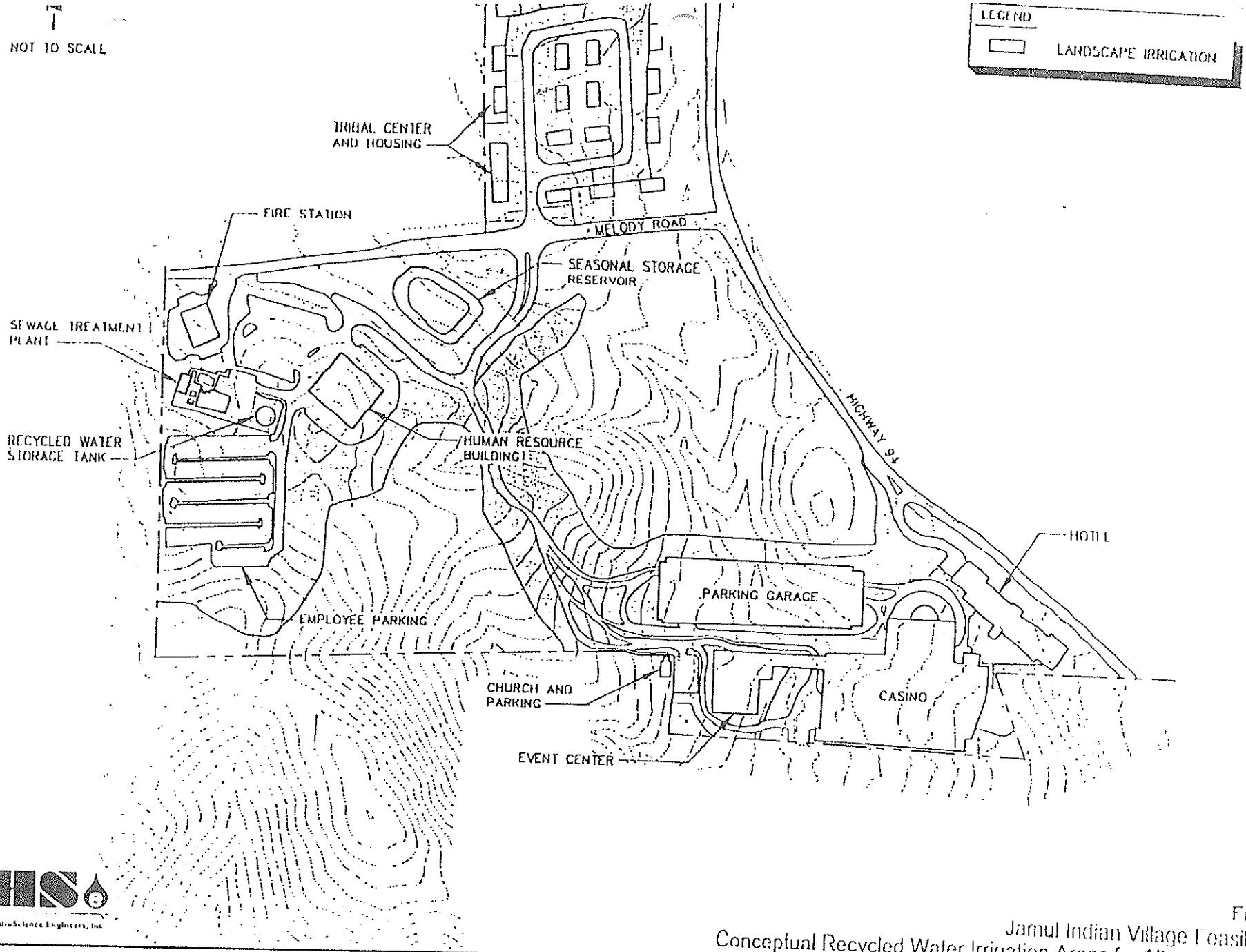
The seasonal storage reservoir would provide temporary storage of tertiary-treated effluent, particularly during the wet season when demand for recycled water from landscape irrigation is low. The seasonal storage reservoirs are not designed to receive raw wastewater. Under no circumstances would raw wastewater be placed into the seasonal storage reservoir. Consequently, there is no need to line the reservoir.

Design of the seasonal storage reservoir is limited by local site conditions. First, the amount of ground area that could be allocated for seasonal storage is limited to 0.5- to 0.75-acres. At the ame time, the shallow soil depths restrict the vertical depth of the storage reservoir to 10 feet unless excavation through the underlying bedrock was desired. For the purpose of this analysis t was assumed that a total seasonal storage volume of 10 AF could be made available either by ncreasing the available area and/or increasing the operating depth of the seasonal storage eservoir. Deeper seasonal storage reservoirs may be possible provided a minimum vertical eparation of 3-ft is maintained between the bottom of the reservoir and the top of the dwater table measured at a time when the seasonal groundwater fluctuation is the est. Knowing the quantity of wastewater to be disposed of and fixing the seasonal storage olume then allows the leachfield capacity to be determined.

2.2 Water Balance Results

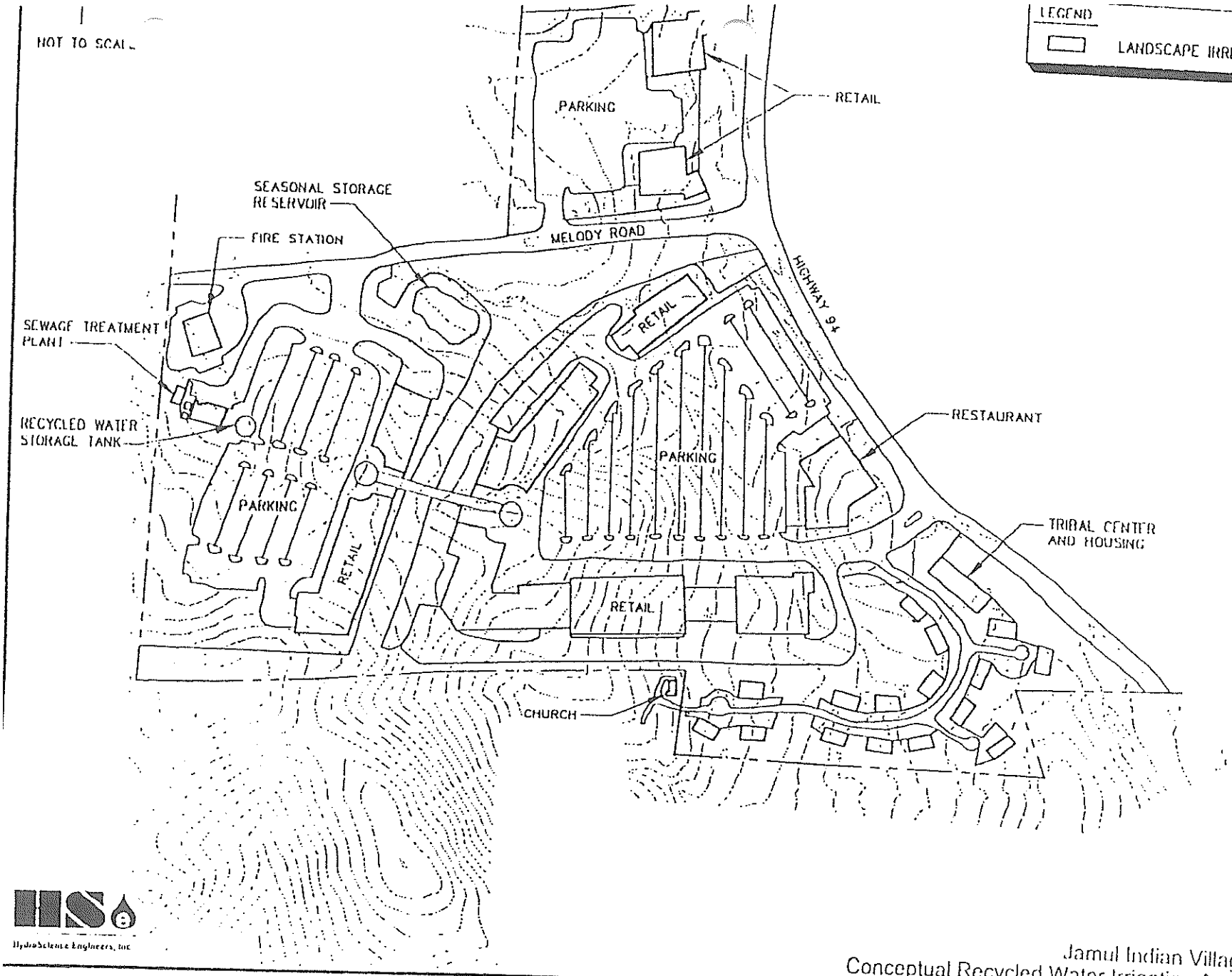
esults of this analysis, summarized in Table 5-5, indicate that approximately 49,000 to 56,000 d of leachfield capacity would be required for Alternatives A, B, and D. For Alternative C, the AF of seasonal storage is adequate to store the wet seasonal wastewater. No dedicated rayfield area was considered in this evaluation. If dedicated sprayfields are developed, they ould reduce the landscape irrigation requirements since sprayfield crops typically have higher ater uptake rates.

onthly trends showing the relation between leachfield, recycled water irrigation, and storage eration are shown in Figures 5-9 and 5-10 for each alternative. These figures illustrate the errelation between leachfield and recycled water irrigation during the year. From November March, the leachfield is used at full capacity without assistance from recycled water igation. Since the leachfield capacity is less than the wastewater being disposed of, a portion the wastewater is directed for seasonal storage. The seasonal storage continues to be filled up a maximum volume of 10 AF, and around March the irrigation demand starts increasing. entually, the irrigation demand increases beyond the amount of wastewater to be disposed. achfield use is stopped and disposal of current and stored wastewater is exclusively through dscape irrigation.



HydroScience Engineers, Inc

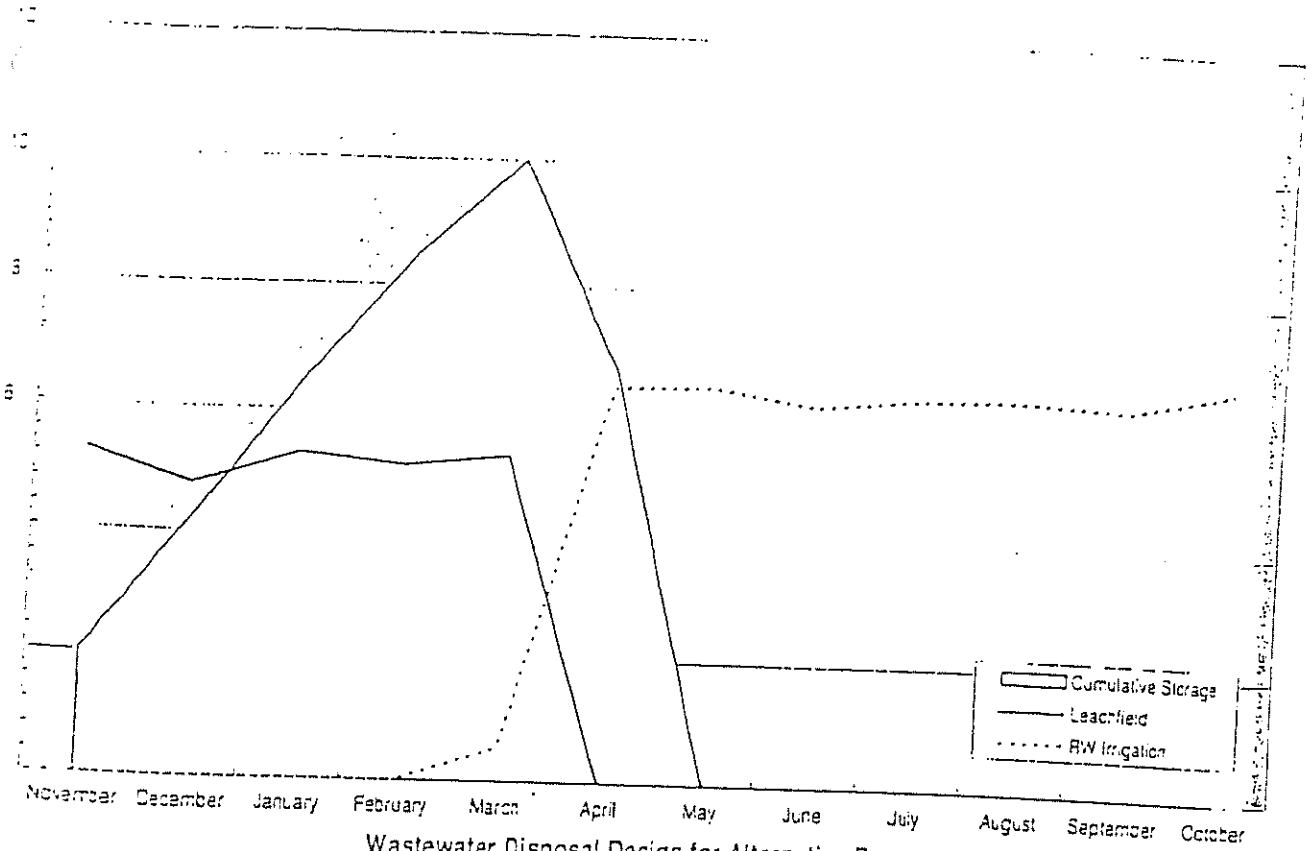
FIGURE 5-5
Jamul Indian Village Feasibility Study
Conceptual Recycled Water Irrigation Areas for Alternative A Phase B



HydroScience Engineers, Inc

FIGURE 5-7
Jamul Indian Village Feasibility Study
Conceptual Recycled Water Irrigation Areas for Alternative C

Wastewater Disposal Design for Alternative A



Wastewater Disposal Design for Alternative B

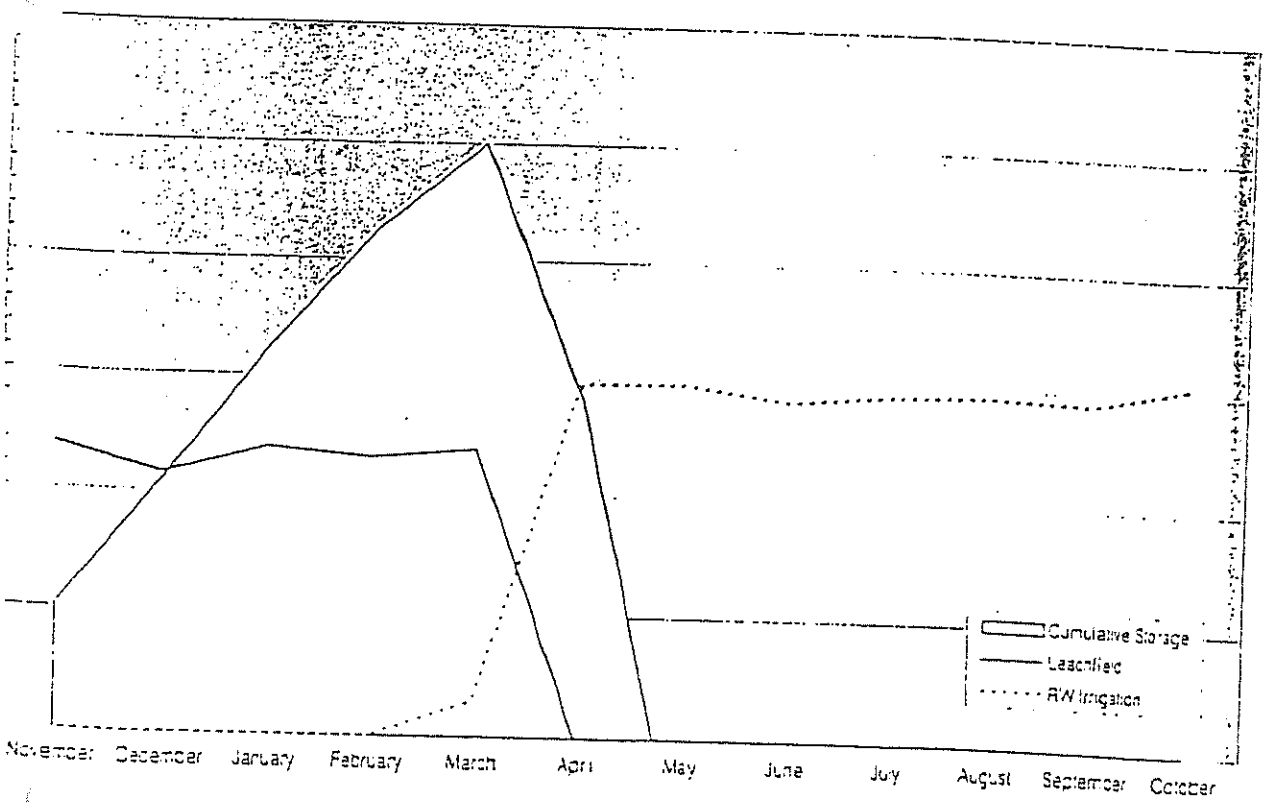


FIGURE 5-9
Jamul Indian Village Feasibility Study
Disposal Design for Alternatives A and B

TABLE 5-5
Capacity (gpd) Summary for Disposal Design Options without Sprayfield Irrigation [a, b]

	Alt. A [d]	Alt. B	Alt. C	Alt. D
Wastewater disposal [b]	75,000	69,000	24,000	68,000
Average day recycled water irrigation demand [e]	157,000	156,000	144,000	111,000
Sprayfield capacity [f]	0	0	0	0
Leachfield capacity [g]	56,000	51,000	5,000	49,000

[a] Rounded up to the nearest 1,000 gpd.
[b] Wastewater disposal requirement with reclamation.
[c] See Appendix G for water balance analysis.
[d] Buildout (Phase B) condition.
[e] Average day recycled water irrigation demand averaged over April to September.
[f] For the purpose of this study, it was assumed that no dedicated sprayfields would be developed for the project. The Tribe may elect to dedicate specific areas of the project site to effluent disposal sprayfields in lieu of landscaping irrigation to minimize peak dry season irrigation requirements.
[g] Estimated leachfield capacity required in conjunction with recycled water irrigation, seasonal storage, and dual-plumbing. The capacity shown does not currently include contingencies for redundancy during emergency conditions.

TABLE 5-6
Sizing Summary for Disposal Design Options without Sprayfield Irrigation [a]

	Units	Alt. A [f]	Alt. B	Alt. C	Alt. D
...al storage volume	AF	10	10	10	10
...ecycled water irrigated acreage [b]	acre	16.64	17.54	16.10	12.42
...prayfield acreage [c]	acre	0	0	0	0
...eachfield acreage [d]	acre	4.3	3.8	0.4	3.7
...eachfield acreage with 100% ...dundancy [e]	acre	8.6	7.6	0.8	7.4

See Appendix G for complete water balance analysis.
See Figures 5-6 to 5-9 for locations of the irrigated areas for Alternatives A to D, respectively.
Dedicated sprayfield area with restricted public access. For the purpose of this study, it was assumed that no ...dicated sprayfields would be developed for the project. The Tribe may elect to dedicate specific areas of the project ...e to effluent disposal sprayfields in lieu of landscaping irrigation to minimize peak dry season irrigation ...quirements.
Assumed per 0.3 gpd/ft^2 hydraulic loading rate. Actual rates may vary depending on on-site percolation tests. Note: ... safety factor applied. Design would increase area requirements to typically provide 100% redundancy. ...ypical leachfield design incorporating 2.0 factor of safety on land area requirement. This is equivalent to 100% ...dundancy in the event of total failure from the primary leachfield.
...uildout (Phase B) condition.

2.3 Regulatory Review

...e wastewater treatment and disposal system would be a zero-discharge system. Discharge to ...rface water, either on a regular, seasonal, or emergency basis is not anticipated to be required. ...le... ...te disposal capacity through the combination of leachfield and recycled water irrigation ... ...ted to be developed. Moreover, leachfield design would incorporate redundancy,

6.0 Conclusion

Each of the four project alternatives was evaluated and found to be feasible in terms of water, wastewater, and recycled water service. Water supply is adequate, of high-quality, and should only require transmission lines to service the individual facilities. Wastewater collection is likely to require lift stations and collection pipelines to convey the raw wastewater to the WWTF. On-site wastewater treatment using MBR technology is feasible and can produce high-quality wastewater effluent consistently and reliably. Based on the facility plans and preliminary geotechnical information, there is also adequate space to dispose of the wastewater using a combination of landscape irrigation and leachfields provided that all the facilities, except the residential homes and Tribal government and health centers, are equipped for dual-plumbed toilet fixtures. Specific conclusions from this study are outlined below.

.1 Projected Flows

ater demand and wastewater disposal is reduced with reclamation. Implementing a recycled ater program is critical to project feasibility. Use of recycled water for landscape irrigation and al-plumbing of toilet fixtures in all facilities has the dual benefit of reducing both the potable ter demand and wastewater disposal requirements. Meanwhile, reduction of the wastewater posal requirement would reduce the disposal area that needs to be developed, enabling all ject alternatives under consideration to become feasible. Site constraints inevitably could ut the alternatives available for disposal of treated wastewater.

t water demand with and without reclamation are summarized in Table 6-1. Net wastewater posal requirements with and without reclamation are summarized in Table 6-2.

LE 6-1
parative Water Demand (gpm) With and Without Reclamation [a]

Flow condition	Alt. A		Alt. B	Alt. C	Alt. D
	Phase A	Phase B			
rage day demand without reclamation	124	154	143	31	144
rage day demand with reclamation	43	59	55	18	54

unded up to the nearest 10 gpm.

6-3. This sizing is preliminary and based upon our understanding of the project. Determination of final effluent disposal facility requirements would require a detailed local hydrogeological investigation, knowledge of project landscaping, and other design parameters.

ABLE 6-3
izing Summary for Disposal Design Options without Sprayfield Irrigation [a]

	Units	Alt. A [f]	Alt. B	Alt. C	Alt. D
easonal storage volume	AF	10	10	10	10
ecycled water irrigated acreage [b]	acre	16.64	17.54	16.10	12.42
prayfield acreage [c]	acre	0	0	0	0
achfield acreage [d]	acre	4.3	3.8	0.4	3.7
achfield acreage with 100% dundancy [e]	acre	8.6	7.6	0.8	7.4

ee Appendix G for complete water balance analysis.
ee Figures 5-6 to 5-9 for locations of the irrigated areas for Alternatives A to D, respectively.
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ssumed per 0.3 gpd/ft^2 hydraulic loading rate. Actual rates may vary depending on on-site percolation tests. Note: safety factor applied. Design would increase area requirements to typically provide 100% redundancy.
pical leachfield design incorporating 2.0 factor of safety on land area requirement. This is equivalent to 100% ur cy in the event of total failure from the primary leachfield.
. (Phase B) condition.

nduct additional percolation testing. Full design of disposal leachfields would require litional information on the geotechnical properties of the soil. Additional percolation testing ecommended on candidate leachfield disposal site(s) to evaluate the suitability of leachfield struction and to establish design criteria information.

nduct hydrogeological evaluation. The purpose of a hydrogeological evaluation is to provide rmation on the local groundwater, such as identifying the predominant subsurface raulic gradient. Due to the local soil characteristics and the dependence on subsurface posal, information on the hydrogeology of the site would identify possible siting constraints reas selected for use and disposal of tertiary-treated recycled water.

all monitoring wells. Monitoring well installations are recommended to monitor ndwater quality and groundwater level to ensure use and disposal of tertiary-treated cled water effluent on-site does not cause degradation of the groundwater basin. These itoring wells, designed and constructed to meet prevailing County standards, would vide monitoring of seasonal variations in the groundwater table and also provide a venue obtaining samples for analytical testing. At a minimum, consideration should be made to alling monitoring wells at the following locations:

At the uppermost, on-site hydraulic groundwater gradient to provide background gr ndwater quality information before and during project development,
radient and downgradient of candidate leachfield disposal site(s), and

7.0 References

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9.0 Acknowledgements

This report is the collective effort of many. The contribution of planning, engineering, and design expertise of individuals on the project team added value to the project and made this report complete. This section acknowledges the HydroScience Engineers team members that contributed to this project. Key members include:

- George Harris – Principal-in-Charge
- Dennis Sanchez – Project Manager
- Eric Jones – Associate Engineer
- Shane Gibbons – Designer

We also acknowledge AES for their support. Their knowledge of the project made our efforts easier and the final document much more useful. Key members from AES include:

Joe Broadhead – Principal
Josh Ferris – Associate
Leanne Canevaro – Associate

TECHNICAL MEMORANDUM

Revised Wastewater Disposal Evaluation for the Jamul Indian Village

TO: Joe Broadhead/AES
Josh Ferris/AES

COPIES: Dennis Sanchez/HydroScience

FROM: Michael Ducker/HydroScience

DATE: June 30, 2003

Pursuant to USEPA comments on the draft environmental impact statement (DEIS) for the Jamul Indian Village, Analytical Environmental Services (AES) retained HydroScience Engineers (HSe) to re-evaluate the wastewater disposal design at the proposed Jamul Indian Village project. Preliminary wastewater disposal designs consisted of non-conventional leachfields utilizing high-capacity chambers with sufficient structural integrity to enable installation beneath paved parking lots. This leachfield system was proposed at two separate locations, the first acting as the primary leachfield and the second as a reserve for 100% redundancy. Based on recently acquired soils information however, it was determined that an alternative leachfield design would be required for improved reliability. HSe's objective were to:

- Evaluate alternative disposal designs such that each project alternative is equipped with 100% operational redundancy in disposal capacity,
- Complete a more detailed geological investigation of the site to ascertain information on site percolation capacity and groundwater levels, and
- Develop a more detailed design of the disposal system for each alternative.

In association with Applied Engineering and Geology, Inc. (AEG), HSe completed additional investigation of the site geology for disposing of tertiary treated wastewater to all four proposed project alternatives. This technical memorandum (TM) completes HSe's report on the disposal alternatives. It summarizes the soils evaluation conducted by AEG, includes preliminary disposal system layouts for each alternative, and presents conclusions for a revised disposal design.

Background

The Jamul Indian Village is considering four project alternatives, A through D, consisting of a gaming facility and/or a retail center, plus surrounding commercial and residential development. Each alternative involves varying degrees of site development and ultimately wastewater quantities that must be safely disposed of on-site. Based on the designated land use and areas, wastewater disposal would utilize a combination of urban irrigation and leachfields.

TABLE 2

Mantle and Percolation Test Results

Test Pit	Soil Type, USEPA	Layer Depth (feet)	Soil Description (USEPA)	Perc Test	Perc Test Depth (ft)	Perc Rate (mpi)
TP-1	sandy clay loam	1.5	M, SL			
	sandy clay	2.5	M, SL			
	sandy clay DG	2.5+	M, stiff, hard	P-1	3.2	150
TP-2	silty sand	0-4	SG, SL			
	DG	4+	?	P-2	4.2	43
TP-3	clayey sand	1	M, SL			
	DG	1+	?	P-3	2.75	32
TP-4	silty sand	2	M, SL	P-4	2.75	19
TP-5	sandy loam	3.5	SG, SL			
	DG, clayey sand	3.5+	M, SL	P-5	4	150
TP-6	clay loam	0-0.5	M, SL			
	sandy loam	1.5+	M, SL	P-6	2.5	8.5
TP-7	sandy loam	2.5	M, SL			
	sandy clay	4	M, SL	P-7	3.9	1000
TP-8	clay loam	0.5	M, SL			
	sandy loam	2+	M, SL	P-8	2.5	50
TP-9	clayey sandy loam	4	M, SL			
	clayey sandy silt	4.5	M, SL			
	silty sand	5.5	SG, SL	P-9	5	9
	silty sand	8	SG, SL			
TP-10	sandy silt	2	M, SL	P-10	2.6	6
TP-11	silty sand	3	M, SL			
	DG		?	P-11	3.8	100
TP-12	sandy clay loam	2.5+	M, SL	P-12	2.6	8
TP-13	sandy loam	1.5	M, SL			
	DG			P-13	2.9	300
TP-14	sandy loam	2	M, SL			
	sandy clay	3	M, SL			
	DG		?	P-14	3.6	60
TP-15	sandy loam	2	M, SL			
	DG		?	P-15	2.7	21
TP-16	sandy loam	3	M, SL			
	sandy DG		M, SL	P-16	3.9	13
TP-17	sandy clay loam	5	M, SL	P-17	3.75	16
	sand	8	SG, SL			
	DG		?			
TP-18	sandy loam	2	M, SL	P-18	2.75	7.5
TP-19	sandy clay	2	M, SL	P-19	2.3	150
TP-20	sandy loam	1	M, SL			
	sandy clay	2	M, SL			
	clayey sandy loam	5.5	M, SL			
	DG		?	P-20	3.3	10
TP-21	sandy silt	2	M, SL	P-21	2.6	10
TP-22	silty sandy loam	2.5	M, SL			
	DG, silty sand	4	loose, SG SL	P-22	3.2	20
	sand	5	SG, SL			
TP-23	sandy silt	3.5	M SL			
	DG		M SL, friable, loose	P-23	2.2	8
TP-24	silty sand	2.5	SG, SL	P-24	2.4	33
TP-25	silty sand	4	SG, SL	P-25	3.2	4
	silty sand	5	M, SL, dense			

disposal system. Additional soils information would be required that would focus on information essential for subsurface disposal on-site.

For the purpose of designing an on-site wastewater disposal system, AEG, in conjunction with HSe, completed extensive on-site soils testing in the spring of 2003. Between April 10-12, 2003, percolation and mantle tests were completed for areas south of Melody Road; similar tests were completed on areas north of Melody Road between May 14-15, 2003. A total of 29 mantle tests and 30 percolation tests were performed south of Melody Road while a total of 12 mantle tests and 12 percolation tests were performed north of Melody Road.

In addition to soil percolation characteristics, these investigations also acquired information on the local groundwater. Between June 11-13, 2003, two groundwater monitoring wells were installed in close proximity and down-gradient to proposed seasonal storage pond locations. Two existing domestic wells north of Melody Road were also mapped with a video camera to record slip angles of rock fractures to provide an idea of the fate and transport of the perched water and groundwater tables.

The following subsections summarize the results of AEG's on-site testing. It is organized according to:

- Test Locations,
- Mantle Tests,
- Percolation Tests,
- Percolation and Mantle Testing Results,
- Monitoring Wells,
- Well Logs,
- Recommended Hydraulic Loading Rates, and
- Recommended Disposal Areas.

The information included below was abstracted as it pertains to the preliminary design of the different disposal alternatives. Additional information can be acquired by referencing AEG's June 27, 2003 report, entitled *Results of Soil Mantle and Percolation Tests and Installation of Monitoring Wells*, which is attached to this TM. Ultimately, HSe utilized the test results and recommendations by AEG to generate the proposed disposal alternatives described in this TM.

Test Locations

Proposed percolation and mantle tests were located such that they could be made applicable to any of the four project alternatives under consideration. Considering each alternative presents varying degrees of site development, Alternative A, the preferred alternative, was selected as the baseline site for determining the general location of the soils tests. As necessary, individual soils test locations were adjusted to cover the other alterative design layouts. In addition, HSe and AEG also considered information from the preliminary grading plans, geographic points of interests, and proposed disposal system depths and configurations in selecting the test locations.

Percolation and Mantle Testing Results

The soils varied in moisture and rock content but are in most respects very similar. The surface soil layer consists of 1- to 5 feet of loam that was sandy, clayey or silty, loose, friable, massive, and with weak to no structure. The second layer is usually a clay layer that is sandy or silty, loose, friable, massive, sometimes firm, and exhibiting glazing or smearing on the test pit sidewalls. The third soil layer is typically deteriorated granitic rock (DG) with massive, single grain structure. The fourth layer is fractured rock or bedrock.

Percolation test results ranged from 3.3 minutes per inch (mpi) to infinity. Only 11 out of 41 tests had rates slower than 60 mpi. Using the average rate is not recommended since it would suggest certain soils have a hydraulic loading rate much greater than what is appropriate for the existing site conditions. The existing topographic, geologic, hydrogeologic, and soil conditions would be considered when developing a recommended hydraulic loading rate for each proposed disposal area. The mantle test soils logs and associated percolation test results are abstracted in Table 2.

Well Logs

An optical televiewer was used to log existing domestic Well 1 and the newly constructed monitoring well MW-2. Well 1 is a domestic well that is currently in use and located north of Melody Road and near the west property line. Water from Well 1 is considered non-potable. The existing pump and discharge piping was pulled from the well in order to perform the well log.

The borehole sidewall of Well 1 was very dark and seemingly covered with a growth. Only the larger fractures at 18, 37, 42, 51, and 56 feet bgs were observed in this well due to the poor visibility. The water level in Well 1 was at 40.5 feet and the bottom at 58 feet. It is anticipated that the borehole contained many small and hairline fractures spaced closer together.

Monitoring well was newly constructed near a proposed seasonal storage pond south of Melody Road. MW-2 had much better visibility due to the new construction and lack of growth on the borehole sidewall. The well shows fractures and hairline fractures spaced 1- to 2 feet apart with two primary strike directions of N 39-79° W and N 44-79° E.

Monitoring Wells

USEPA expressed concerned with groundwater levels and water quality beneath the proposed seasonal storage ponds. Initial concerns focused on the groundwater separation beneath the seasonal storage ponds, which are required to be a minimum of 50 ft below the bottom of the pond. Considering the proposed ponds were estimated to be 20- to 30 feet in depth, the monitoring wells were bored to depths of 70- to 80 feet down-gradient of the proposed pond locations.

Monitoring wells MW-1 and MW-2 were installed next to but not under the proposed seasonal storage ponds. The static water levels on June 2003 in MW-1 and MW-2 were 35 ft below ground surface (bgs) and 29 ft bgs respectively. Static groundwater surface elevations in Well 1, Well 2, Cistern 1 and Spring 1 suggest approximate groundwater surface elevation from 946.5 ft to 910 ft with a southeastern gradient. It is unknown if the

TABLE 3
Recommended Hydraulic Loading Rates (gpd/ft²)

Group No.	San Diego County	USEPA	AEG
1	0.76	0.37	0.40
2	0.71	0.67	0.40
3	0.87	0.50	0.40
4	0.87	0.90	0.40
5	0.71	0.66	0.60
6	0.41	0.14	0.14
7	1.61	0.53	0.50

These grouped areas did not include 13 of the 41 test locations since AEG does not recommend using these areas for disposal. Concerns include the proximity of a disposal area to a proposed cut or fill slope, a lack of knowledge about the permeability of the bedrock and direction of subsurface flow, potential landslides, proposed grading that would expose bedrock, subsurface drainage patterns, and poor soil conditions. Considering all these factors AEG recommended simplified and conservative hydraulic loading rates of 0.40-, 0.50- and 0.60 gpd/ft² for all six of the seven grouped disposal areas. Group #6 has a hydraulic loading rate of 0.14 gpd/ft². This is not to say that Group #6 is not recommended for use but that it is probably not a feasible use of land.

The USEPA hydraulic loading rates for each soil layer are taken from Table 4.3 of the EPA Onsite Wastewater Treatment Systems Manual (2002 edition). The USEPA average is the calculated average rate of all layers in all test pits in that disposal area, including those layers yielding 0.00-gpd/ft². By including the zero rates a more conservative average rate is calculated.

The San Diego County rates were calculated using the following equation.

$$AR = 5/\sqrt{T}$$

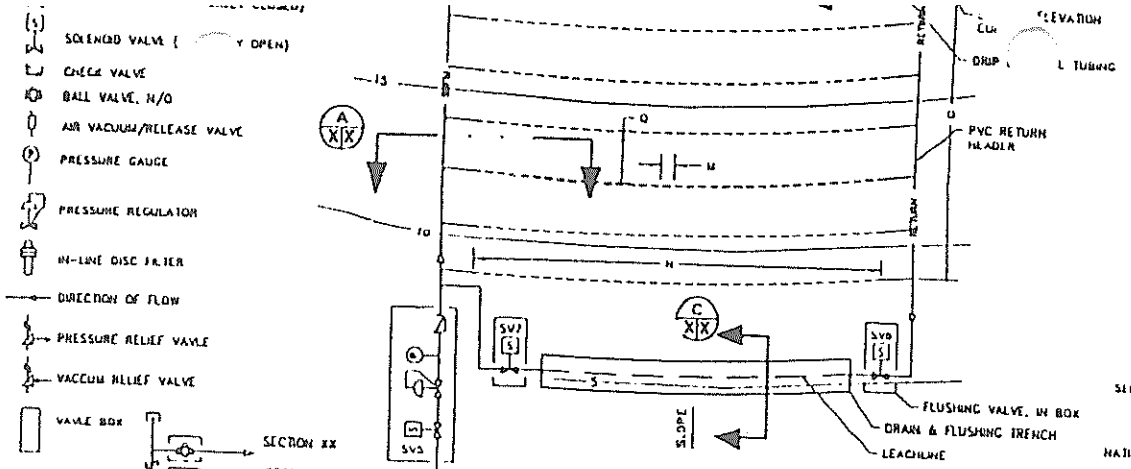
Where,

AR = Application Rate in gallons per square foot per day, (gpd/ft²)
T = Percolation rate in mpi

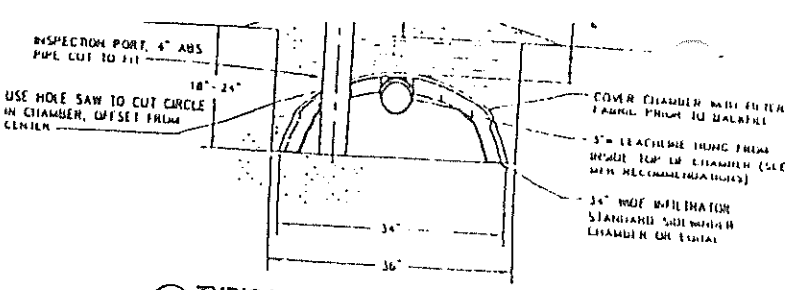
In areas where more than one percolation rate is used a geometric mean of the percolation rates is used to find T.

Recommended Subsurface Disposal Method

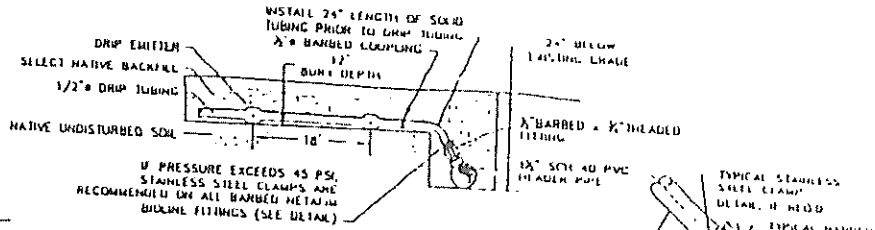
During the winter the urban irrigation system may not be in use due to storm events and wet surface soil conditions. It is recommended that a subsurface drip disposal system be used as a winter disposal system. The proposed drip disposal system consists of ½ inch



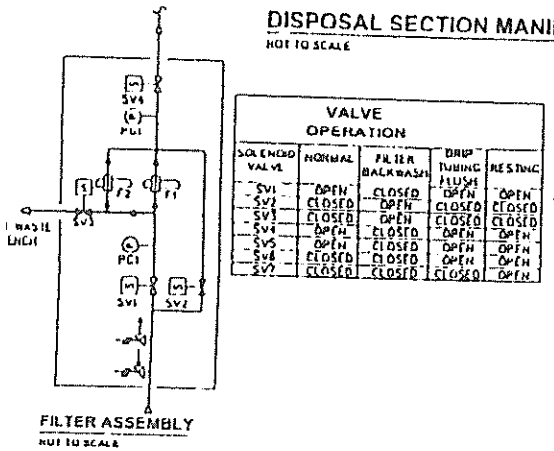
TYPICAL LAYOUT FOR DRIP DISPOSAL TUBING ON SLOPE
NOT TO SCALE



C X|X TYPICAL SECTION DRAIN AND FLUSHING TRENCH
NOT TO SCALE



A X|X TYPICAL DRIP DISPOSAL TRENCH DETAIL
NOT TO SCALE

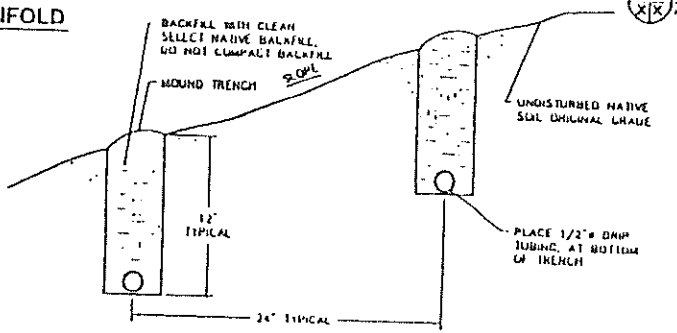


DISPOSAL SECTION MANIFOLD
NOT TO SCALE

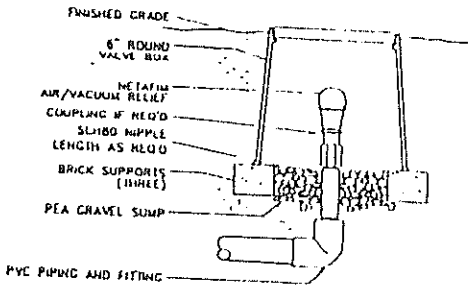
VALVE OPERATION

SOLENOID VALVE	NORMAL	FILTER BACKWASH	DRIP TUBING FLUSH	RESTING
SV1	OPEN	CLOSED	OPEN	OPEN
SV2	CLOSED	OPEN	CLOSED	CLOSED
SV3	CLOSED	OPEN	CLOSED	CLOSED
SV4	OPEN	CLOSED	OPEN	OPEN
SV5	OPEN	CLOSED	OPEN	OPEN
SV6	CLOSED	CLOSED	OPEN	OPEN
SV7	CLOSED	CLOSED	CLOSED	OPEN

FILTER ASSEMBLY
NOT TO SCALE



B X|X 1/2"Ø DRIP TUBING TYPICAL TRENCH DETAIL
NOT TO SCALE



TYPICAL 1" AIR/VACUUM RELIEF VALVE AND BOX
NOT TO SCALE

WINTER WASTEWATER DISPOSAL
FIG 1, TYPICAL DETAILS
SUB-SURFACE DRIP DISPOSAL
6-30 03

Alternative A

Alternative A is the preferred alternative and has the highest disposal requirements of all the alternatives. The proposed winter disposal for Alternative A consists of seasonal storage ponds, a larger aboveground storage tank, and leachfields in areas north and south of Melody Road. The disposal system for Alternative A is shown in Figure 2. Two seasonal storage ponds are proposed a 10 ac-ft and a 7.6 ac-ft plus a 1.0 MG above ground storage tank for a net storage capacity of 20.67 ac-ft (6,734,000 gal). The 1.0 MG above ground storage tank is proposed in place of the earlier 375,000 gal process tank near the WWTP.

For this storage capacity a total of 65,234 gpd of disposal field capacity is required. A total of 134,610 ft² (3.09 ac) of drip disposal field is proposed for Alternative A. The proposed disposal fields are located both north and south of Melody Road. The proposed disposal capacity is 65,683 gpd, which provides a redundant disposal capacity of 101%.

Alternative B

Alternative B develops the site most of any of the four alternative site plans. A balance of disposal fields and storage ponds are used to maintain a system with minimal storage and a 100% redundant disposal field. The disposal system for Alternative B is shown in Figure 2.

Three seasonal storage ponds are proposed at 10.0-, 7.6-, and 2.03 ac-ft plus a 1.0 MG above ground storage tank. The total proposed storage is 22.7 ac-ft (7,396,000 gal). The 1.0 MG above ground storage tank is proposed in lieu of the 375,000 gal recycled water storage tank the WWTP.

For this storage capacity a total of 45,508 gpd of disposal field capacity is required. A total of 91,883 ft² (2.11 ac) of drip disposal field is proposed for Alternative B. The proposed disposal fields are located both north and south of Melody Road. The proposed disposal capacity is 48,592 gpd, thereby providing a redundant disposal capacity of 107%.

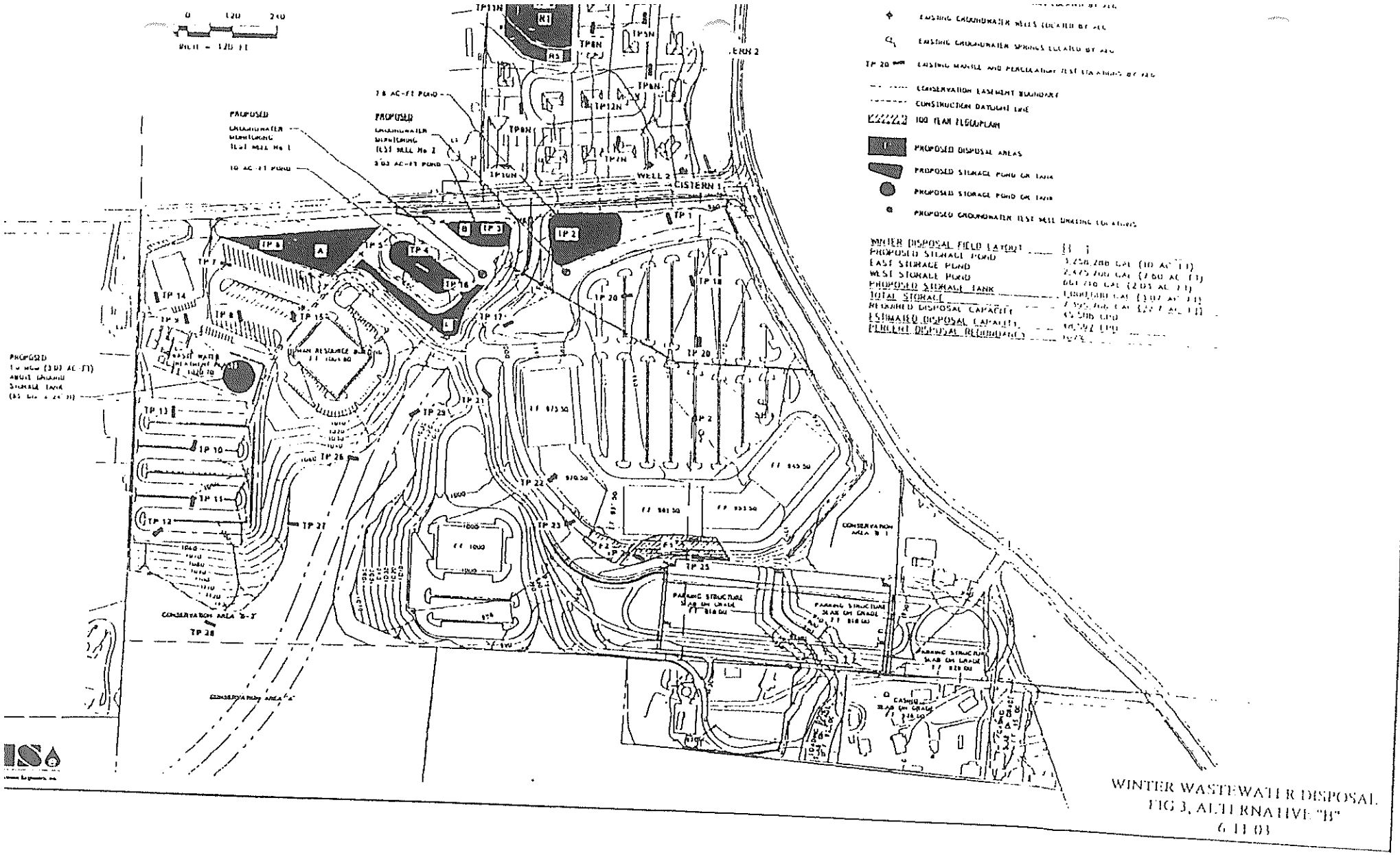
Alternative C

Alternative C has a projected wastewater flow that is the least of all the alternatives. Consequently, the winter flows can be stored in a seasonal storage pond and aboveground storage tank as shown in Figure 3. No disposal field is proposed for this alternative. Winter storage capacity is provided by the proposed 10.0 ac-ft storage pond and a 1.0 MG above ground storage tank located at the WWTP. The total proposed storage is 13.07 ac-ft (4,258,000 gal). The 1.0 MG above ground storage tank is proposed in the place of the 375,000 gal process tank at the WWTP. No redundant disposal field is required.

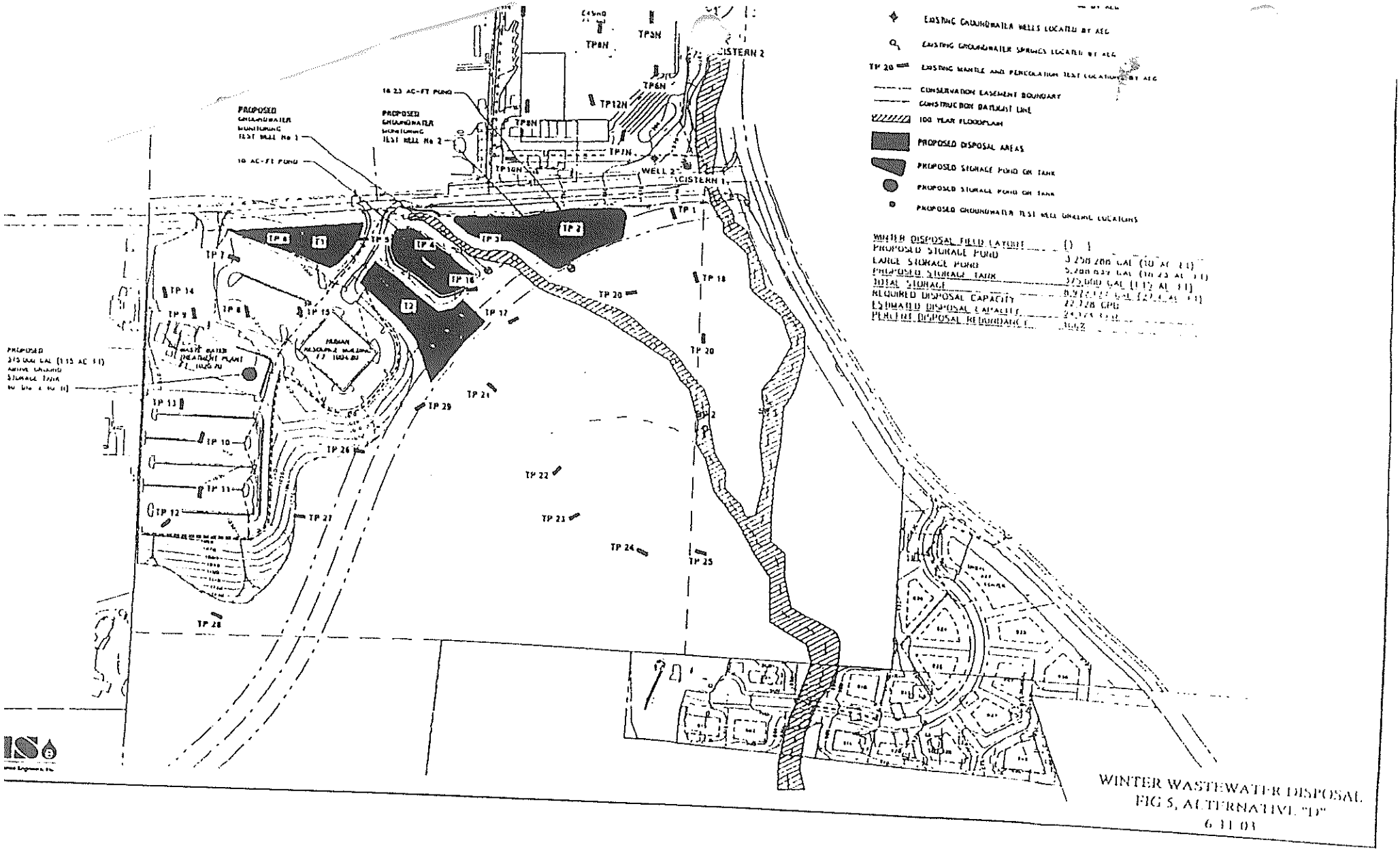
Alternative D

Alternative D has the Casino located on the 10 acre parcel north of Melody Road. The absence of a road south of Melody Road and the largest conservation area of any of the four alternatives make for a limited amount of available disposal area. Therefore, an increased amount of storage capacity is required to complement the disposal fields shown in Figure 4.

Winter storage capacity is provided by proposed 10.0, 7.6 and 16.23 ac-ft storage ponds and a 375,000 gal above ground storage tank. The total proposed storage is 27.4 ac-ft (8,922,000 gal). The 375,000 gal process tank at the WWTP is used.



WINTER WASTEWATER DISPOSAL
FIG 3, ALTERNATIVE "B"
6 11 03



WINTER WASTEWATER DISPOSAL
FIG 5, ALTERNATIVE "D"
6 11 03

APPENDIX 12

JAMUL GAMING FACILITY
WASTEWATER TREATMENT AND RE-USE ANALYSIS

JAMUL GAMING FACILITY
WASTEWATER TREATMENT AND
RE-USE ANALYSIS

January 16, 2012

Prepared by:
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January 16, 2012 536-006

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Attention: Annie Aguilar, Project Manager

Subject: Jamul Gaming Facility Wastewater Analysis

Background

Jamul Indian Village/Lakes Entertainment, Inc. plans to move forward with design and construction of a gaming facility on an approximately 6.2 acre parcel owned in Federal Trust. The project may be developed as one of the alternatives that are described in more detail below. Water service is provided to the property by the Otay Water District. There are currently no sewer facilities in the area and the project will, therefore, need to provide a method for wastewater treatment and re-use/disposal at all stages of development.

Purpose

The purpose of this letter-report is to evaluate the wastewater treatment, effluent storage, and effluent re-use/disposal requirements for the proposed project and development alternatives. Options for providing service will be evaluated and consideration will be given to the most efficient way to complete the construction of facilities to support the proposed development.

Project Description

For the purposes of this letter, it is assumed that there would be three alternatives for project development, as described below.

Proposed Project. This project alternative would have 2,000 gaming machines, approximately 228,000 square feet of gross building area, five restaurants, and a 1,000 seat event center.

Alternative 1. This project alternative would have 1,000 gaming machines, approximately 119,000 square feet of gross building area, three restaurants and a 300 person event center.

Alternative 2. This project alternative would include 349 gaming machines in an approximately 17,500 square foot building. This facility would include a 59 person snack bar/café, but no restaurants.

Projected Sewer Flows

One of the key components of this study is to provide an estimate of projected sewer flows for the proposed project and project alternatives. To accomplish this we reviewed flow data from several existing gaming facilities. In reviewing this data, it became apparent that the flows from a facility will vary depending on a variety of factors including the number of gaming guests and amount of non-gaming area (restaurants, event center, etc.). It would also be expected that newer gaming facilities would generate lower flows than existing gaming facilities due to more stringent requirements for water conserving fixtures.

In reviewing data from four existing gaming facilities, we concluded that there is not a direct correlation between the number of gaming machines and the amount of flow generated. The data we reviewed showed a range of 22 gpd/machine to 59 gpd/machine. Not surprisingly, a better indicator of projected flows is the number of guests that visit a gaming facility. We found that the average flow varied from 7 gpd/guest to 10 gpd/guest. These flows include all activities at the facilities including restaurants.

For the purposes of this study, we believe the number of guests and amount of restaurant seating will be a good indicator of the amount of sewage flow generated and allow for comparison of different project alternatives. To estimate average flows in the report, the following flow factors have been used; these factors are based on empirical data obtained from four existing tribally owned gaming facilities, including two in Southern California.

Gaming facility guests	7 gpd/guest
Restaurants	15 gpd/seat

The number of guests and restaurant seats for each alternative of the Jamul project has been assumed based on the review of data from four existing tribal gaming facilities, including two in Southern California. Table 1 summarizes the projected sewer flows for the proposed project and development alternatives. The treatment system for the project will need to consider the maximum daily flow that may occur on weekends or holidays and peak flows that may occur during the busiest hours of gaming facility operation. Table 1 lists the anticipated maximum day flow and peak flow based on factors of 1.5 and 2.0, respectively.

TABLE 1
JAMUL GAMING FACILITY
PROJECTED SEWAGE FLOWS

Description	Quantity	Unit Flow	Total Avg. Flow, gpd	Max. Day Flow, gpd	Peak Flow, gpd
Proposed Project					
Guests	10,000	7 gpd/ea	70,000	---	---
Dining Seats	840	15 gpd/seat	12,600	---	---
Total			**82,600**	**123,900**	**165,200**
Alternative 1					
Guests	5,000	7 gpd/ea	35,000	---	---
Dining Seats	350	15 gpd/seat	5,250	---	---
Total			**40,250**	**60,375**	**80,500**
Alternative 2					
Guests	1,500	7 gpd/ea	10,500	---	---
Dining Seats	59	15 gpd/seat	885	---	---
Total			**11,385**	**17,080**	**22,770**

Potential for Re-use

All effluent generated by the onsite wastewater treatment plant will either need to be beneficially re-used or properly disposed of. Beneficial re-use that will be considered for this project includes dual plumbing for re-use in toilets, landscape irrigation, and cooling tower make-up water. The potential for re-use in toilets was estimated by reviewing preliminary fixture unit count data for each development alternative to determine approximately what percentage of flow is attributed to toilets and urinals. The landscape irrigation requirements were estimated based on preliminary landscape area designs. The Alternative 2 estimate is slightly higher due to the landscaping that can be incorporated into the at-grade parking lot. A green roof system will be incorporated into each of the project alternatives. This system will consist of planting and irrigating the top of roof structures in areas not occupied by facilities such as the central plant, power generator, chiller, etc. The irrigation application rate for green roof is assumed to be lower than that for other project landscaping since the usage will be limited to the amount of evapotranspiration that occurs from the soil and plants. Recycled water will not be allowed to percolate into the soil and runoff in the roof drains. Cooling tower make-up water was based on preliminary estimates from the building mechanical engineer and data from another tribally operated gaming facility in Southern California. Table 2 summarizes the potential for re-use of recycled water for the proposed project and development alternatives.

TABLE 2
JAMUL GAMING FACILITY
POTENTIAL RECYCLED WATER
RE-USE SUMMARY

Description	Estimated Re-Use, gpd[1]	Comment
Proposed Project		
Toilets/Urinals	49,560	60% re-use
Landscaping	1,230	20,000 SF @ 2,675 gpd/ac
Green Roof	3,550	86,715 SF @ 1,785 gpd/ac
Cooling Towers	20,000	Prelim. Estimate
Total	**74,340**	
Alternative 1		
Toilets/Urinals	24,150	60% re-use
Landscaping	1,230	20,000 SF @ 2,675 gpd/ac
Green Roof	2,210	53,989 SF @ 1,785 gpd/ac
Cooling Towers	10,000	Prelim. Estimate
Total	**37,590**	

TABLE 2 JAMUL GAMING FACILITY POTENTIAL RECYCLED WATER RE-USE SUMMARY		
Description	**Estimated Re-Use, gpd[1]**	**Comment**
Alternative 2		
Toilets/Urinals	6,800	60% re-use
Landscaping	1,535	25,000 SF @ 2,675 gpd/ac
Green Roof	420	10,826 SF @ 1,785 gpd/ac
Total	**8,755**	

[1] Estimated re-use represents an annual average. See recycled water balance section for an evaluation of seasonal re-use.

Demineralization

The California State Water Resources Control Board has identified basin plan objectives for each of its nine regions. The Jamul property is within the San Diego Region 9 area, within Dulzura Hydrologic Basin 10.33. The basin quality objectives for the primary constituents in this area are summarized in Table 3.

TABLE 3 SAN DIEGO RWQCB BASIN PLAN OBJECTIVE OTAY HYDROLOGIC UNIT – DULZURA SUBAREA 10.33							
Constituent							
TDS	Cl	SO_4	Fe	Mn	B	Turb.	F
mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	NTU	mg/l
Inland Surface Water							
500	250	250	0.3	0.05	0.75	20	1.0
Ground Water							
1,000	400	500	0.3	0.05	0.75	5	1.0

If recycled water effluent is to be discharged to the creek, a TDS requirement of 500 mg/l would apply, but if recycled water effluent was discharged by subsurface disposal, a TDS requirement of 1,000 mg/l would apply. The typical TDS of potable water delivered from the Otay Water District is 500 to 600 mg/l. After going through a use cycle, the recycled effluent TDS would be expected to increase to approximately 1,000 mg/l. Thus, to dispose of effluent to the creek would require a demineralization system to lower the TDS to 500 mg/l or less.

On the other hand, if recycled water is to be beneficially re-used, demineralization would be required to prevent the effluent from continually degrading through each use cycle. To be re-used in the toilets/urinals and cooling towers, we would recommend that a portion of the effluent be demineralized so that the blended effluent has a TDS of 500 mg/l.

Thus, it appears that demineralization will be required downstream of the treatment system regardless of the method selected for disposal. The most common method for demineralization is reverse osmosis (RO). One of the downsides of RO, however, is that it includes a 15 to 20 percent brine waste stream that must be hauled away. This can result in significant hauling costs. Another alternative for demineralization is electrodialysis reversal (EDR). This technology has similar capital and operating costs, but only has a 10 percent brine waste stream. For the purposes of this analysis, we are assuming that a portion of the treatment plant effluent will be routed through an EDR system such that the blended effluent has a TDS of 500 mg/l.

Wastewater Treatment

Given that there are no public sewer facilities in the vicinity of the project, the only two options for processing wastewater flow from the project would be hauling them to an offsite facility or onsite treatment and disposal.

Hauling. It is not uncommon in San Diego County to have septage haulers pump out holding tanks and take sewage to a dumping point in the City of San Diego collection system for conveyance to Point Loma where it is treated and discharged. This is particularly common when new wastewater treatment plants are constructed and initial flows are not adequate to allow the plant to be run effectively. For the Jamul site, hauling will be necessary for a brine waste stream from the demineralization system, but to haul all

wastewater flows would likely be cost prohibitive. To haul flows from the Alternative 2 gaming facility, for example, where the average flow is 11,385 gpd would require approximately 16 truck loads per week (5,000 gallons per truck load). At an approximate cost of $500 per truck load, this would equate to an operating cost of $416,000 per year. Costs for the Proposed Project and Alternative 1 gaming facilities would rise proportionally.

Treatment Plant. There are numerous technologies and manufacturers that could provide treatment plant equipment for the flow ranges required for the various alternatives of this project. This study does not include a detailed evaluation of all of the treatment alternatives, but does provide a brief discussion of a few treatment systems that could be used for this project. The major factors considered in the evaluation of equipment for this project includes the following:

- Initial Capital Cost
- Long term operating and maintenance cost
- Expandability
- Space requirements

In addition to the above, a number of regulatory requirements must be taken into consideration when considering treatment and disposal alternatives. These include the local basin plan objectives discussed previously and requirements of the United States Environmental Protection Agency (USEPA).

Regulatory Requirements. Since the treatment plant and effluent disposal are anticipated to be constructed on federal trust property, County of San Diego Building Department and California Title 22 regulations do not apply. Notwithstanding this, however, the proposed treatment system will be designed to produce effluent that meets Title 22 requirements. The property is within Region IX of the USEPA. The amount of involvement by the USEPA will depend largely on the method for effluent disposal. If, for example, the project will propose to discharge effluent to the creek, an NPDES permit would be required. This permit may be difficult to obtain in the San Diego Region and would include ongoing monitoring/reporting requirements that can be costly. Treatment alternatives that involve beneficial re-use, onsite subsurface disposal, and hauling of effluent would require coordination with the USEPA, but would not likely be subject to a USEPA permit.

Treatment Alternatives. The final selection of wastewater treatment equipment for this site will largely be dependent on space limitations and the ability of different treatment plant manufacturers to provide for expansion of the systems. The three systems that we believe are worth further evaluation include the following:

- Packaged Extended Air Activated Sludge Plant
- Packaged Membrane Bioreactor (MBR) Plant
- Custom Plant

The packaged plants would require input from the manufacturer on recommended sizing and expansion of the plant to most efficiently meet the requirements for the project. The custom plant option may be worth considering because industrial users often face similar space constraints and are able to minimize the plant footprint by constructing a plant with more vertical tankage.

Our recommendation is to use a packaged MBR plant. This type of plant can meet the space constraints and sizing requirements for the proposed project and project alternatives. An MBR treatment skid would include two treatment trains each sized for the design flows to provide full plant redundancy. The design of the treatment system and selection of equipment components will take into consideration the maximum daily flows and peak flows listed in Table 1. The MBR system, along with the other treatment system components, will produce an effluent that meets Title 22 standards.

Recycled Water Storage

While there is no agreed upon industry standard for the required volume of recycled water storage, many agencies plan on storage equivalent to two to three days of average flow. When the primary re-use is irrigation or spray field disposal it helps to have sufficient storage since irrigation can usually only occur during an 8 hour window. In the case of the Jamul Gaming Facility, however, a large percentage of the recycled water can be used in the toilets/urinals which is a round the clock use that is directly related to plant flow. A detailed monthly recycled water balance will need to be performed to determine the actual minimum storage required, but our experience is that two to three average day of storage would be conservative in this application.

There are several types of storage facilities including bolted steel tanks, welded steel tanks, pre-stressed concrete tanks, and cast-in-place concrete tanks that could be considered for this project. The most cost effective storage for the capacity required is expected to be bolted steel tanks, but due to space constraints a concrete structure incorporated into a parking garage may also be considered. Table 4 lists the recommended storage capacities and approximate dimensions if a bolted steel tank is utilized. The storage capacities in Table 4 are based on approximately 2.5 days of storage at average flows.

TABLE 4
JAMUL GAMING FACILITY
EFFLUENT STORAGE REQUIREMENTS

Size	Storage Required, gallons	Approximate Reservoir Dimensions
Proposed Project	200,000	24' H x 38' Dia.
Alternative 1	100,000	24' H x 27' Dia.
Alternative2	25,000	16' H x 16' Dia.

Recycled Water Balance

To better evaluate the best approach for effluent disposal, it is necessary to understand how the effluent disposal requirements will vary throughout the year. While beneficial re-use in the toilets can be expected to remain relatively constant throughout the year, re-use for irrigation and cooling tower make-up water will vary according to climate. A summary of assumptions for irrigation and cooling tower evaporation is provided below, followed by a monthly recycled water balance for the proposed project and project alternatives.

Monthly Irrigation Use. Table 2 provided the estimated average annual irrigation demand for the project and project alternatives. Table 5 summarizes the estimated irrigation usage by month. The seasonal usage is estimated from our experience in preparing recycled water balances for other treatment plants in San Diego County and is based on local rainfall patterns.

TABLE 5
JAMUL GAMING FACILITY
MONTHLY IRRIGATION USAGE SUMMARY

Month	% of Yearly Usage	Irrigation Demand, MG		
		Proposed Project	Alternative 1	Alternative 2
January	2.0	0.035	0.025	0.014
February	5.0	0.087	0.063	0.036
March	5.0	0.087	0.063	0.036
April	6.0	0.105	0.075	0.043
May	7.0	0.122	0.088	0.050
June	10.0	0.175	0.126	0.071
July	14.0	0.244	0.176	0.100
August	16.0	0.279	0.201	0.114
September	13.0	0.227	0.163	0.093
October	12.0	0.209	0.151	0.086
November	6.0	0.105	0.075	0.043
December	4.0	0.070	0.050	0.029
TOTAL	**100.0**	**1.745**	**1.256**	**0.714**

Cooling Tower Evaporation. To estimate the amount of cooling tower evaporation that is projected on a monthly basis, we reviewed a year's worth of data from a tribal gaming facility in San Diego County that has meters on the cooling tower supply and blow-down lines so that the evaporative losses can be determined. We used this data in conjunction with the anticipated cooling tower evaporative losses from the building mechanical engineer for the Jamul Gaming Facility to come up with a monthly estimate. Table 6 provides a summary of monthly cooling tower evaporative losses for the Proposed Project and Alternative 1 facilities.

TABLE 6 JAMUL GAMING FACILITY PROJECTED COOLING TOWER EVAPORATIVE LOSSES			
Month	**% of Yearly Loss**	**Evaporative Loss, MG**	
		Proposed Project	**Alternative 1**
January	1.0	0.073	0.037
February	2.0	0.146	0.073
March	6.0	0.438	0.219
April	7.0	0.511	0.256
May	10.0	0.730	0.365
June	14.0	1.022	0.511
July	16.0	1.168	0.584
August	18.0	1.314	0.657
September	15.0	1.095	0.547
October	7.0	0.511	0.256
November	3.0	0.219	0.109
December	1.0	0.073	0.037
TOTAL	**100.0**	**7.30**	**3.65**

Proposed Project. Based on the information provided in this report, Table 7 summarizes the monthly recycled water balance for the Proposed Project facility. As shown, there will be no need for effluent disposal in the summer months and a maximum disposal requirement of approximately 25,000 gpd in the winter.

Alternative 1. Based on the information provided in this report, Table 8 summarizes the monthly recycled water balance for the Alternative 1 facility. As shown, there will be no need for effluent disposal in the summer months and a maximum disposal requirement of approximately 12,000 gpd in the winter.

Alternative 2. Based on the information provided in this report, Table 6 summarizes the monthly recycled water balance for the Alternative 2 facility. As shown, the effluent disposal requirements for excess recycled water range from approximately 225 gpd in the summer to approximately 3,500 gpd in the winter.

TABLE 7
JAMUL GAMING FACILITY PROPOSED PROJECT
MONTHLY RECYCLED WATER BALANCE

Month	Total Sewage Flow, MG	Brine Stream Discharge, MG	Recycled Water Produced, MG	Gaming Facility Re-use, MG	Irrigation Demand, MG	Cooling Tower Evaporation, MG	Excess Recycled Water	
							MG	Avg., gpd
January	2.561	0.153	2.408	1.536	0.035	0.073	0.764	24,645
February	2.313	0.139	2.174	1.388	0.087	0.146	0.553	19,750
March	2.561	0.153	2.408	1.536	0.087	0.438	0.347	11,194
April	2.478	0.149	2.329	1.487	0.105	0.511	0.226	7,533
May	2.561	0.153	2.408	1.536	0.122	0.730	0.020	645
June	2.478	0.149	2.329	1.487	0.175	1.022	0	0
July	2.561	0.153	2.408	1.536	0.244	1.168	0	0
August	2.561	0.153	2.408	1.536	0.279	1.314	0	0
September	2.478	0.149	2.329	1.487	0.227	1.095	0	0
October	2.561	0.153	2.408	1.536	0.209	0.511	0.152	4,809
November	2.478	0.149	2.329	1.487	0.105	0.219	0.518	17,267
December	2.561	0.153	2.408	1.536	0.070	0.073	0.729	23,516
TOTAL	**30.15**	**1.807**	**28.34**	**18.09**	**1.745**	**7.30**		

TABLE 8
JAMUL GAMING FACILITY ALTERNATIVE 1
MONTHLY RECYCLED WATER BALANCE

Month	Total Sewage Flow, MG	Brine Stream Discharge, MG	Recycled Water Produced, MG	Gaming Facility Re-use, MG	Irrigation Demand, MG	Cooling Tower Evaporation, MG	Excess Recycled Water	
							MG	Avg., gpd
January	1.248	0.075	1.173	0.749	0.025	0.037	0.362	11,677
February	1.127	0.068	1.059	0.676	0.063	0.073	0.247	8,821
March	1.248	0.075	1.173	0.749	0.063	0.219	0.142	4,581
April	1.208	0.072	1.136	0.725	0.075	0.256	0.080	2,667
May	1.248	0.075	1.173	0.749	0.088	0.365	0	0
June	1.208	0.072	1.136	0.725	0.126	0.511	0	0
July	1.248	0.075	1.173	0.749	0.176	0.584	0	0
August	1.248	0.075	1.173	0.749	0.201	0.657	0	0
September	1.208	0.072	1.136	0.725	0.163	0.547	0	0
October	1.248	0.075	1.173	0.749	0.151	0.256	0.017	548
November	1.208	0.072	1.136	0.725	0.075	0.109	0.227	7,567
December	1.248	0.075	1.173	0.749	0.050	0.037	0.337	10,871
TOTAL	**14.69**	**0.881**	**13.81**	**8.81**	**1.256**	**3.650**		

TABLE 9
JAMUL GAMING FACILITY ALTERNATIVE 2
MONTHLY RECYCLED WATER BALANCE

Month	Total Sewage Flow, MG	Brine Stream Discharge, MG	Recycled Water Produced, MG	Gaming Facility Re-use, MG	Irrigation Demand, MG	Cooling Tower Evaporation, MG	Excess Recycled Water	
							MG	Avg., gpd
January	0.353	0.021	0.332	0.211	0.014	n/a	0.107	3,452
February	0.319	0.019	0.300	0.190	0.036	n/a	0.074	2,643
March	0.353	0.021	0.332	0.211	0.036	n/a	0.085	2,742
April	0.342	0.020	0.322	0.204	0.043	n/a	0.075	2,500
May	0.353	0.021	0.332	0.211	0.050	n/a	0.071	2,290
June	0.342	0.020	0.322	0.204	0.071	n/a	0.047	1,567
July	0.353	0.021	0.332	0.211	0.100	n/a	0.021	677
August	0.353	0.021	0.332	0.211	0.114	n/a	0.007	226
September	0.342	0.020	0.322	0.204	0.093	n/a	0.025	833
October	0.353	0.021	0.332	0.211	0.086	n/a	0.035	1,129
November	0.342	0.020	0.322	0.204	0.043	n/a	0.075	2,500
December	0.353	0.021	0.332	0.211	0.029	n/a	0.092	2,968
TOTAL	**4.158**	**0.246**	**3.912**	**2.483**	**0.714**		**0.715**	

We are available to discuss the contents of this letter-report at your convenience.

Dexter Wilson Engineering, Inc.

Stephen M. Nielsen, P.E.

SMN:ck



APPENDIX 13

JAMUL GAMING FACILITY
FIRE PROTECTION PLAN

FIRE PROTECTION PLAN REPORT

JAMUL INDIAN VILLAGE

GAMING PROJECT
JAMUL, CA

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REVISED: FEBRUARY 3, 2014

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EXECUTIVE SUMMARY

This Fire Protection Plan Report (FPP) has been developed to describe a coordinated/consolidated systems approach to the Fire Suppression and Fire Protection features for a Gaming Facility with unique fire protection aspects located on the Jamul Indian Village, Jamul, California. The primary goal of the Report is to detail how Fire Protection and Life-Safety features and any unique building elements afford the varied levels of protection contained in the ~~2010~~ 2013 Edition, California Building Standards Code, the 2011 San Diego County Consolidated Fire Code and the ~~2010~~ 2013 Editions of the CA Fire, Electrical Mechanical, Plumbing and Health Codes. Prescriptive Model Code Compliance requirements are intended to be used for the Project.

The Fire Protection Plan (FPP) addresses water supply, access, structural integrity and Fire-Resistive Building features, Fire protection Systems and equipment, impacts to emergency services, defensible space and vegetation management

The proposed Gaming Project demonstrates compliance, or offers the Same Practical Effect with applicable Fire Regulations including but not limited to; the ~~2010~~ 2013 Edition, California Fire Code, the ~~2010~~ 2013 Edition, California Building Code for Wildland/Urban Interface Building Standards. The comprehensive FPP and the Project are consistent with the California Code of Regulations (CCR) Title 24, Building and Fire Code Standards.

All applicable Fire Protection features required by each Code and any additional Fire Protection features which will be incorporated into the facility are described herein. A full description of the Fire Protection features provided in the complex and how those features interact with each other is provided.

This document will be used as a basis for architectural, civil as well as fire protection systems drawing preparation. These drawings will specifically detail the way in which the facility will comply with this document and the applicable Codes. Included in the Appendices' are Enhanced Fire-Resistive Construction Requirements, the Jamal Indian Village Tribal Council Resolution 2010-06 - Establishing the Jamul Tribal Fire Department and Resolution No. 2011-08 – Adoption of California Building Standards Code for the Proposed Project, the Alternative 1 Project Option and the Alternative 2 Project Option.

GENERAL PROJECT DESCRIPTION

The proposed Jamul Indian Village Gaming Project is intended to be developed on the Jamul Indian Village Reservation consists of the following ~~three~~ Project ~~Options~~.

1. The ~~Proposed~~ Project: This Project ~~Option~~ will consist of approximately ~~228,000~~ 203,000 square feet, Two Story Gaming Project with approximately 73,000 square feet of Gaming Area constructed over an ~~multi-level~~ Eight Level Parking Structure.

~~**2. Alternative 1**: This Project Option will consist of 119,000 111,800 square feet two three story Gaming structure constructed over a multi-level parking structure. This Alternative 1 Project Option~~

DEFENSIBLE SPACE and VEGETATION MANAGMENT

Contained in the FPP are references to address the Defensible Space and Vegetation Management to provide optimum levels of Fire Protection for the Project. The FPP also includes a listing of Enhanced Fire-Resistive Construction Requirements for the Project. (Appendix A).

The Project Development Area is located between the adjacent grassland areas, located primarily to the South and the East of the Project's Improvement's within the Jamul Indian Village Reservation Parcel Boundaries. Contained in the FPP are the Defensible Space and Vegetation Management Plan to declare the Wildland separation distance equates as the Same Practical Effect (SPE) in lieu of the 100 foot of fuel treatment around the structures.

The Same Practical Effect (SPE) provisions are subject to review and Approval from the Director of Public Safety as the Authority Having Jurisdiction (AHJ) for the Project.

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APPLICABLE CODES AND STANDARDS

This outline documents the general fire protection design features based upon the Adoption by the California Building Standards Commission (CBSC) for construction standards set forth in the State of California. The applicable codes for Project include the following:

1. 2013 California Building Code (CBC) – Based on the 2012 Edition, International Building Code California State amendments.

2. 2013 California Fire Code (CFC) – Based on the 2012 Edition, International Fire Code (IFC) with California State amendments.

3. 2013 California Mechanical Code (CMC) – Based on the 2012 Edition, Uniform Mechanical Code (UMC) with California State amendments.

4. 2013 California Plumbing Code (CPC) – Based on the 2012 Edition, Uniform Plumbing Code (UPC) with California State amendments.

5. 2013 California Electrical Code (CEC) – Based on the 2011 Edition, National Electrical Code (NEC) with California State amendments.

6. 2011 Edition, San Diego County Consolidated Fire Code (CCFC)

7. NFPA Codes and Standards:

    - NFPA 13, Automatic Fire Sprinkler Systems
    - NFPA 10. Potable Fire Extinguishers
    - NFPA 14, Standpipe Systems
    - NFPA 20, Centrifugal Fire Pumps
    - NFPA 72, National Fire Alarm Standard
    - NFPA 110, Emergency and Standby Power Systems

This Fire Protection Plan (FPP) addresses the key features of these Codes, Standards and Guidelines. The intent of this document is to coordinate the Fire Protection approach between all design disciplines. Actual details of compliance will be further detailed in the construction documents and submittals by selected contractors.

1. SITE FIRE PROTECTION LIFE-SAFETY APPROACH

1.1. Property lines

~~1.1.1.~~ The Project Buildings are located ~~thirty (30)~~ twenty-four (24) feet or less from real property lines.

1.2. The Fire Department Access Road Design and Specifications will comply or exceed the 2013 Edition, CA Fire Code (CFC) Standards and the CCFC as follows:

1.2.1. The minimum dimensions along Fire Access Roads will be 25 feet (24 feet minimum width roadway) from back of curb to back of curb. Fire Access roads shall be designed for an inside Turning Radius of a minimum of 28 feet. The South and North Bridges will be one way traffic circulation only with a minimum 16 feet clear width on bridge due to Technical Infeasibility per the Environmental Report concerning Willow Creek.

1.2.2. Fire Access Roads will be designed and maintained to support the imposed loads of Fire Apparatus of not less than 75,000 and will be paved to provide all-weather driving capabilities. Roadways shall be designed to withstand actual Fire Apparatus loads and Ladder Truck Stabilizer Pads.

1.2.3. Dead-ends will not exceed 150 feet unless an approved area for turning around a Fire Apparatus is provided.

1.2.4. Slope Gradient for Fire Apparatus will not exceed 15%. The angle of departure and angle of approach of a Fire Access Road shall not exceed 12%.

1.2.5. All Fire Access Roads and areas adjacent to Buildings shall have a minimum vertical clearance of thirteen feet six inches (13'6").

1.2.6. The Project will have Primary and Secondary Fire Department/ Emergency Services Access Roads. The Jamul Indian Village will maintain, modify and perform due diligence to eliminate Fire Hazards from combustible vegetation on each side of the Primary and Secondary Fire Access Routes consistent with the 2013 Edition, CFC, the CCFC and recognized industry fire access road standards.

1.3 Water Supply/Fire Flows:

1.3.1 Onsite Potable Water will be supplied by Otay Water District. Existing 12" water line is installed at Panhandle Drive to serve the Project. Otay Water District will provide the primary ~~and secondary~~ water supply for the Project.

1.3.2 Fire Flows: The ~~Alternative 2~~ Project ~~Option~~ will require a minimum of ~~1,500~~ 2500 Gallons per Minute (GPM) for a minimum Flow Duration of ~~Two (2)~~ Four (4) Hours. ~~The Alternative 1 Project Option will~~

~~require Fire Flows of 1500~~ 2500 ~~GPM for the Flow Duration of Three (3) Hours. The Proposed Project will require a minimum of 1500~~ 2500 ~~GPM for the Flow Duration of Four (4) Hours.~~

1.4 Onsite Fire Hydrants:

1.4.1 All portions of each building shall be within 150 feet of a Fire Hydrant. A minimum of ~~Three (3) onsite Fire Hydrants shall be provided for the Proposed Alternative 2 Project Option and a minimum of~~ Four (4) onsite Fire Hydrants for the Proposed Project ~~and the Alternative 1 Project Option.~~

1.5 Tribal Fire Department:

1.5.1 The Jamul Indian Village Tribal Council Approved the establishment of a Tribal Fire Department. On July, 7, 2010, the Jamul Indian Village Tribal Council Approved Resolution #2010-06 which is authorized under Public Law 93-638 to establish a Tribal Fire Department and a Tribal Community Emergency Response Team (CERT) to provide for an onsite Fire Protection Services, Emergency Medical Services and to prepare for Disaster Reponses. (Appendix B)

1.5.2 The Jamul Indian Village Tribal Council has appointed selected individuals to perform the due diligence as the Jamul Fire Department Management Team, inclusive of Director of Public Safety and Emergency Services, Assistant Fire Chief/Fire Operations Officer, Fire Marshal, Tribal Emergency Management Coordinator and Community Liaison/Tribal CERT Coordinator.

1.5.3 The Jamul Indian Village Tribal Council adopted the National Incident Management System (NIMS) and directed staff to train all Team Members and/or Employees on NIMS Standards.

1.5.4 Fire Station: The Tribe will construct an onsite Fire Station to address the Fire Protection equipment and staffing needs for each of the three Project Options.

1.5.5 Fire Department Staffing:

The Jamul Indian Village Tribal Fire Department will be located onsite through the life of the Projects and during Casino operations. Fire Department Staffing will consist of a Director of Public Safety, responsible for management of the Department and a minimum of two FTE Fire-Fighters/Emergency Response members per shift. At the discretion of the Director of Public Safety, separate company shifts, (either three or four shifts) would be implemented throughout the life-cycles of the Projects during construction and after Occupancy

Clearances, on a continuous full time company levels for Casino operations.

1.5.6 Fire Department Equipment & Staffing

The Jamul Indian Village Fire Department will necessitate a minimum of the following Equipment & Staffing listing per ~~each of the three Gaming Project Options~~. Project Scope.

A. ~~The Alternative 2 Option:~~

This ~~Gaming~~ Project ~~Option~~ will require a minimum of two engines, staffed with three personnel; a Captain, an Engineer and a Fire-Fighter. Subject to review by the Director of Public Safety (AHJ) a four person engine Company may be preferred for the Project. Staffing estimate would be 12 -14 personnel. Equipment maintenance could be contracted out with adjacent Fire District, Fire Department or Certified Mechanic.

B. ~~The Alternative 1 Option:~~

This ~~Gaming~~ Project ~~Option~~ will necessitate a 74' -105' Ladder Truck and two engines and a "Mini-Pumper" Fire Truck for Incident Responses in the Parking Garage. Staffing allocation would be 24–26 personnel.

C. The ~~Proposed~~ Project:

The ~~Proposed~~ Project will require ~~the same~~ Fire Department Equipment & Staffing as ~~the Alternative 1 Project~~ identified in Sections A, B & C.

1.5.7 Fire Department Training Standards:

The Jamul Indian Village Fire Department intends to participate in the Mutual Aid Program, the Fire Department Personnel will maintain one Fire Response unit with a Fire-Fighter/EMT at all times. Fire Department Personnel will be trained on the following areas, inclusive of, under the Direction of the Tribal Fire Chief, will prepare a "Shelter-in-Place" Training Program to accommodate area residents whom may be displaced during natural or man-made disasters:

1. Hazardous Materials Awareness and Operations (Sara Title III, CFR: 1910.120)
2. Permit Required Confined Space (CFR: 1910:146)
3. Affirmative Action Training (Title VII; 1964 Civil Rights)
4. Injury and Illness Prevention Training (CCR: 3203
5. Personal Selective Equipment (CCR: 3401 (b)(6)

6. SCBA: CCR 3409, ANSI Z88.5.8.3 CCR: 5144 ©
7. SCBA Ability Training (ANSI Z88. 5.8.3)
8. Wildland/Fire Shelters (CCR: 3410(g), NFPA 295 3-2)
9. Multi-Casualty Incident Training (H&S Code 1797.151)
10. Triage (H&S Code 1798.170)
11. Vehicle Extraction (CCR: 100075)
12. Cardiopulmonary Resuscitation (CCR: 100025, H&S Code 1797.182, PC: 13518)
13. Sudden Infant Death Syndrome (SB 1067)
14. Bloodborne Pathogens (CCR: 5193(e)(5)
15. Incident Command System (SB 1841-1993, Firescope Act)
16. NIMS 700
17. Standardized Emergency Systems (SEMS) GC: 8707)
18. CA DMV Class B Driving Program for Fire Apparatus Engineers and Designated Drives (CA DMV DL 170)

Additional areas for Training Standards:

19. Electric Vehicle Response
20. Swift Water Emergency Rescues
21. Incident Command System (ICS)
22. High Rise Response and ICS
23. Emergency Vehicle Operations Course.
24. Cal-Fire Fighting Training Curriculum

All Jamul Indian Village Fire Department suppression personnel will be required to perform a minimum of twenty hours (20) per month of Training. The Training can be structured as either classroom or operations drills. The Captains will be responsible to ensure the Training hours are recorded. The AHJ may augment the minimum hours of Training will either specialized classes and/or designated Training at Regional Training Centers.

1.5.8 Fire Department Mutual Aid/Emergency Medical Services

The Jamul Indian Village Fire Department will offer to engage into a Mutual Aid Agreement based on the qualifications of the Department's Personnel and Equipment with local Agencies, inclusive of San Miguel Consolidated Fire Protection District, the US Fish and Wildlife Fire, area Tribal Fire Agencies, the US Dept of Forestry, Cal-Fire, and shared resources from the contracted Emergency Dispatch Center, or a

contracted Regional Tribal Emergency Dispatch Center. The Jamul Indian Village will either provide their own Ambulance Service or contract to an outside Agency (AMR) or another Agency (Sycuan, Pala, Mercy, etc.). An Advanced Life Support (ALS) or Basic Life Support (BLS) Ambulance will be assigned onsite for the Proposed Project.

1.6 Defensible Space and Vegetation Management

1.6.1 The Project Development Area is located adjacent to Wildland Areas which consists of Short Grass (less than 12in tall Grass) with small and medium height Coastal Sage Brush spread intermittingly on varied intervals. Defensive Space criteria mandates that either a one hundred foot barrier exists between Structures and the Wildland Areas requiring the 100 ft Defensible Space will be Mitigated and compliant utilizing Mitigation Measures involving the Same Practical Effect (SPE) determinations as Approved by the Authority Having Jurisdiction (AHJ).

1.6.2 Specific Mitigation Measures and Design Considerations: Each of the Project's structures will be constructed to Enhanced Fire – Resistive Building Requirements. All exterior architectural components shall be designed and constructed to Enhanced Fire-Resistive Building Materials. Each of the Projects will be equipped with Automatic Fire Sprinklers designed and installed per NFPA 13-10. The multi-level parking structures will be constructed of Concrete, Masonry and Steel Building Elements, and equipped with Automatic Fire Sprinklers (NFPA 13-10 and Wet-Standpipe Systems installed per NFPA 14-10. All exterior Glazing materials exposed to the Defensible Space will be multi-layered panels with one panel required to be tempered glazing.

1.6.3 One Hundred-foot Fuel Modifications Zones (FMZ): In the cases where the 100 ft Fuel Modification Zone (FMZ) requirement cannot be met due to Property Boundary limitations, Mitigation Measures qualifying as Same Practical Effect (SPE) may be implemented. This is consistent with the Accepted Engineering Practices for Wildland and Structures Interface. Short Grass (less than 12in. tall) which exists at the southern and Eastern Boundaries of the Project. These Parcels are Off-Reservation of which the Jamul Tribe has no direct control to mitigate the Short Grass growth.

As such, due to the Short Grass Fuel Loads that in the event of a Wildland Fire, ~~it is calculated~~ Fire Behavior Calculations were derived from the Standard National Fuel Model, FM-1 Short Grass utilizing a wind speed 41 mph will have a Rate of Spread of 732 ft/min, a Fire Line intensity of 1,415 btu/sec resulting that the anticipated Flame Lengths would not exceed Thirteen Feet (12' 7") ~~at a wind sped of 12 MPH~~, inclusive of a worst case scenario is a Santa Ana wind conditions at

excess of 41 MPH will still not exceed Thirteen Feet (12' 7") in anticipated Flame Length As designed, the Project's exterior wall would not create a negative impact for the Project's Exterior Building Envelope and a threat to the Health Safety & General Welfare of the Building's Occupants or to Emergency Services First Responders. The Jamul Indian Village Fire Department will serve as first responders with a response time in less than two minutes. Jamul Tribal Fire-Fighters will be trained on NWCG Red Carded for Wildland Fire Control. Hence, the Same Practical Effect (SPE) is concluded due to the adjacent Short Grass and minimum Sage Brush Fuel Loads. It is recommended to the AHJ to Approve the Same Practical Effect (SPE) in lieu of designing the Project with the 100 ft. Defensible Space requirements.

1.6.4 Onsite Landscaping, Green Roof Plantings: All Onsite Landscaping will be designed and consistent with the County of San Diego Acceptable Plant Listings for Fire Prone Areas. All Onsite Plants will be specified as species which will not advance Fire or threaten the Structure.

2. GENERAL FIRE-RESISTIVE CONSTRUCTION ASPECTS

2.1. General Construction Classification:

2.1.1. ~~Each of the three Gaming Project Option's~~ The Project Building will be a minimum of Type I-A Fire-Resistive Construction. The multi-level parking garages will be constructed and classified as Type I-A construction.

2.2. The fire resistance rating of the building elements (as defined in CBC Table 601) is as follows::

GIVEN: Type I-A Construction for the Proposed Project, Alternative1 & Alternative 2 Option

Building Element	Fire Resistance Rating	Construction to Comply with CBC
Structural Frame	3 Hour	Table 601, Section 602
Exterior Walls: < 30 ft to property line	2 Hour	Table 602, Section 602
Bearing Walls: Interior Exterior	3 Hour 3 Hour	Table 601 ,Section 602
Non-bearing Walls	None (or as required by other sections of the code)	N/A

Building Element	Fire Resistance Rating	Construction to Comply with CBC
Floor (including supporting members and joists)	2 Hours – NOTE: 3 Hours Separation per CBC Section 509.2	Section 712, 509.2, Table 601, Section 602
Roof Assembly (including supporting members and joists)	1 1/2 hours	Table 601, Chapter 15

2.2.1. The Structural Frame will be a minimum of 3-Hour Fire-Resistive Construction per CBC Table 601, except that portions of the structural frame and bearing walls that support the roof only may be of 2-hour fire-resistive construction.

2.2.1.1. The Secondary Members, which include members that have no direct connections to the columns and bracing members that are not designed to carry gravity loads, are not a part of the structural frame. Such secondary members will have the fire-resistance rating required for the corresponding floor/roof assembly.

2.2.1.2. All Structural Members that support more than 2 floors or more than one roof or floor will be protected individually on all sides (Section 704.2). Column protection is required to be extended through the ceiling

2.2.1.3. The required Fire-Resistance Rating for seismic isolation system components is the same as required for the column, wall or other structural element in which it is installed and is required to comply with Section 704.12.

2.3. Exterior walls

2.3.1. Exterior walls and exit enclosures will comply with the requirements of CBC Section 705 per Section 1022.1.

2.3.2. All Openings into the building will be required to be protected per the area and distance limitations of CBC Section 705.

2.4. Roof Construction

2.4.1. Roof coverings will be minimum Class A materials per CBC Table 1505.1.

3. OCCUPANCY CLASSIFICATION

3.1. The Gaming Structure and Parking Garage will be a mixed-use building. Primary Occupancy Classification is Group A-2.

3.1.1. Dining Rooms/Restaurants: A-2

3.1.2. Gaming: Floor :~~A-3~~ A-2

3.1.3. Parking Garage: S-2

3.2. Group B:

3.2.1. Offices and Back-of House Uses.

3.3. Group F:

3.3.1. Fire Pump room/mechanical and electrical equipment rooms/engineering rooms:

3.3.2. Kitchens: F-2

3.4. Group M: Retail Stores

3.5. Group S-1: Moderate Hazard Storage Rooms.

4. FIRE RESISTIVE SEPARATIONS

4.1. Occupancy Separations

4.1.1. Nonseparated use provisions will be used in accordance with CBC Section 508.3.2. Therefore, occupancy separations and incidental use separations are not required and will not be provided.

4.2. Other Separations

Separation Type	Fire Resistance Rating	Wall Type	CBC Section
Corridor	N/A – Project Building are Auto. Sprinkler Systems per NFPA 13	Fire partition (Sec. 709)	Table 1018.1; Section 1018.
Garage Separation	3 hour	Horizontal & Vertical	Section 509
Shafts	2 hour for three or more floors	Fire Barrier & Horizontal Assembly (Sec. 708 & 712)	Section 708
Trash/Laundry Chute Access & Termination Rooms	N/A	Fire barrier (Sec. 707)	Section 708.13.3 708.13.4
Stairs	1 hour, connecting 3 stories or less 2 hour, connecting 4 or more stories	Fire barrier (Sec. 707)	Section 1022.1

Separation Type	Fire Resistance Rating	Wall Type	CBC Section
Pressurized Enclosure Vestibule	2 hour NOTE: High Rise Provision >75' above Fire department Access	Fire barrier (Sec. 707)	Section 1022.9
Exit Passageway	1 hour, but not less than that required for the connecting enclosure	Fire barrier (Sec. 707)	Section 1023.3
Horizontal Exit	2 hour	Fire barrier (Sec. 707)	Section 1025.2
Elevator Lobbies	Equal to the corridor rating provided.	Fire partition (Sec. 709)	Section 708.14.1
Elevator Machine Room	2 hour	Fire barrier (Sec. 707)	Section 3006.4
Smoke Zone (smoke control)	1 hour	Smoke barrier (Sec. 710)	Section 710.3
Fire Pump Room	2 hour	Fire barrier (Sec. 707)	Section 913. NFPA 20
Fire Command Center (FCC)	1 hour	Fire barrier (Sec. 707)	Section 911.1
Emergency Electrical Room	1 hour	Fire barrier (Sec. 707)	CBC Chapter 27 & CA Electrical Code – Emergency Onsite Power Generator.

4.2.1. Elevator lobbies, where required, will be constructed of non-combustible, 1-hour rated fire partitions with smoke- and draft-control assemblies per Exception 5 to CBC Section 708.14.1.

4.2.1.1. Elevator lobbies opening into a fire-resistance rated corridor will be 1-hour fire-resistance rated fire partitions per CBC Section 708.14.1. Openings into the lobby will be 20-minute smoke- and draft-control assemblies per CBC Table 715.4.

4.2.1.2. Smoke partitions are permitted in lieu of fire partitions to separate the elevator lobby at each floor where the building is equipped throughout with an automatic sprinkler system installed in accordance with CBC Section 903.3.1.1.

4.2.1.3. Elevator lobbies are not required for elevators serving three stories or fewer.

4.2.1.4. Elevator lobbies are not required on the Ground Level per Exception No. 1 to CBC Section 708.14.1.

4.2.1.5. Smoke Management Zones; N/A at this time.

4.3. Opening Protection

4.3.1. The Exterior Wall Openings are allowed to be non-rated and of an unlimited amount since the building is fully-sprinklered. For Exterior Wall Openings at Ten feet or greater, premised on area of openings may be either Protected (45 minutes) or non-rated premised on application of CBC Table 705.8. Exception: Refer to Appendix A for Wildland Interface Exterior Wall Openings.

4.3.2. Penetrations:

4.3.2.1. All penetrations will be properly sealed and protected. Through-penetrations and membrane penetrations will be protected as required by CBC Section 713.3 and 713.4.

4.3.2.2. Penetrations in smoke barriers: N/A

4.3.2.3. Through-penetrations: An approved fire-stop system with an F-rating at least equivalent to the assembly being penetrated will be used.

4.3.2.4. Membrane penetrations: Recessed fixtures will be installed such that the fire resistance of the assembly is not compromised.

4.3.3. Doors

4.3.3.1. Fire doors will be tested in accordance with NFPA 252 or UL 10C.

4.3.3.2. Fire door fire-protection ratings will be (Table 715.4) as follows:

Type and Rating of Assembly	Door Fire Resistance Rating
3-hour fire walls and fire barriers	3 hour
2-hour fire walls and fire barriers	1½ hour
2-hour shaft or exit enclosures, Including exit passageways	1½-hour smoke- and draft-control assemblies
1-hour shaft or exit enclosures, Including exit passageways	1-hour smoke- and draft-control assemblies
Other 1-hour fire barriers	¾-hour

Type and Rating of Assembly	Door Fire Resistance Rating
1 hour corridor walls, designated smoke barrier walls, and elevator lobbies	20-minute smoke- and draft-control assemblies
Other 1-hour fire partitions	¾-hour
Vestibule to stairwell	20-minute smoke- and draft-control assemblies

4.3.3.3. Rated doors in corridors and smoke barriers are required to be smoke and draft control assemblies tested in accordance with UL 1784. The letter "S" will be shown on the label (Section 715.4.5.3)

4.3.3.4. Because the building is fully sprinklered, none of the fire doors are required to have a maximum transmitted temperature end point (Section 715.4.4, Exception).

4.3.4. The fire resistance rating of windows in fire rated assemblies is to be in accordance with Table 715.5.

4.3.5. Joint Systems

4.3.5.1. Joints in between fire rated assemblies are required to be protected by an approved fire resistant joint system. This system is intended to block the passage of fire.

4.3.5.2. The joint created at the intersection of the curtain wall and the floor is to be sealed with an approved material or system. The system is intended to prevent the passage of flame and hot gases.

4.3.6. Duct & Air Transfer Openings (Section ~~712~~ (716) and ~~716~~ 717)

4.3.6.1. Dampers are required to be provided with an access panel.

4.3.6.2. Since fans will be in operation in the system during a fire, dampers are required to be listed for use in a dynamic system.

4.3.6.3. When part of the smoke control system, smoke dampers and Combinations Fire & Smoke Dampers (CFSD) will be monitored by the fire alarm system for their appropriate position.

4.3.6.4. Required at the following:

Type of Assembly	Required Protection
Fire wall	Fire damper.

Type of Assembly	Required Protection
Fire barrier	Fire damper. Do not penetrate exit enclosures and exit passageways. *Exception:* penetration of 1 hour rated walls by a ducted HVAC system of at least 26 gage sheet steel.
Shaft enclosure	Fire/Smoke damper.
Fire partition	Fire damper.
Corridors	Smoke damper. (Fire damper also required if the corridor is rated.)
Floor penetration, when not in a shaft	Fire/Smoke damper

4.3.6.5. Fire Dampers:

4.3.6.5.1. 1½ hr rated damper is required in a wall rated less than 3 hours.

4.3.6.5.2. 3 hr rated damper is required in a wall rated 3 hr or more.

4.3.6.5.3. If a fire damper interferes with the operation of the smoke control system, use an approved alternate protection (716.2.1)

4.3.6.5.4. Fire dampers are not required when steel exhaust sub-ducts are provided or when ducts are part of an approved smoke control system. See Section 716.5.3, Exception #1.

4.3.6.5.5. Fire dampers will comply with the requirements of UL555. Only fire dampers labeled for use in dynamic systems will be installed in heating, ventilation and air-conditioning systems designed to operate with fans on during a fire.

4.3.6.6. Smoke Dampers:

4.3.6.6.1. Leakage not less than Class II.

4.3.6.6.2. Elevated temperature rated not less than 250°F. A higher temperature rating can be justified if needed as part of a smoke control system (where a higher smoke temperature is anticipated).

4.3.6.6.3. Smoke dampers will close open activation of a listed smoke detector as outlined in Section 4.3.6.9.4 of this report.

4.3.6.7. Where both a fire and a smoke damper are required, combination fire/smoke dampers (CFSD) can be used.

4.3.6.8. Damper Operation

4.3.6.8.1. Dampers will fail to the closed position, unless otherwise required as a part of a programmed smoke management sequence.

4.3.6.8.2. Smoke damper, fire damper, and CFSDs will close upon activation of specific fire alarm initiating devices within the zone of origin, as well as fixed temperature fusible link and dedicated duct mounted smoke detector, except where programmed to remain open for proper functioning of the mechanical smoke management systems.

4.3.6.8.3. When part of the smoke control system, dampers will be monitored by the fire alarm system for their appropriate position, as described in the Smoke Management System section of this report.

4.3.6.9. Combination Fire and Smoke Dampers (CFSD)

4.3.6.9.1. CFSD will have a minimum leakage rating of Class II and a minimum elevated temperature rating of 250°F per CBC Section 716.3.2.

4.3.6.9.2. CFSD will have a minimum leakage rating of Class II and a minimum elevated temperature rating of 350°F when part of a smoke control system.

4.3.6.9.3. CFSD and smoke damper actuation methods.

4.3.6.9.4. The CFSD and smoke damper will close upon actuation of a listed smoke detector or detectors installed in accordance with CBC Section 716.3.2.1 and one of the following methods, as applicable.

4.3.6.10. Where a damper is installed within a duct, a smoke detector will be installed in the duct within 5 feet of the damper with no air outlets or inlets between the detector and the damper. The detector will be listed for the air velocity, temperature and humidity anticipated at the point where it is installed. Other than in mechanical smoke control systems, dampers will be closed upon fan shutdown where local smoke detectors require a minimum velocity to operate.

4.3.6.11. Where a damper is installed above smoke barrier doors in a smoke barrier, a spot-type detector listed for releasing service will be installed on either side of the smoke barrier door opening.

4.3.6.12. Where a damper is installed within an unducted opening in a wall, a spot-type detector listed for releasing service will be installed within 5 feet horizontally of the damper.

4.3.6.13. Where a damper is installed in a corridor wall or ceiling, the damper will be permitted to be controlled by a smoke detection system installed in the corridor.

4.3.6.14. Where a total-coverage smoke detector system is provided within areas served by a heating, ventilation and air-conditioning (HVAC) system, dampers shall be permitted to be controlled by the smoke detection system.

5. INTERIOR WALL, CEILING AND FLOOR FINISHES:

5.1. Wall and ceiling flame spread allowance with automatic sprinklers throughout (per Table 803.9). Classifications are in accordance with ASTM E84.

5.1.1. Exit enclosures and passageways (all occupancies): Class B.

5.1.2. Corridors: Class C.

5.1.3. Corridors – all other occupancies: Class B.

5.1.4. Rooms and enclosed spaces (all occupancies): Class C.

5.1.5. Any space classified as an atrium: Class B.

5.2. Wall and ceiling finishes other than textiles can also be tested in accordance with NFPA 286 and comply with the acceptance criteria in Section 803.1.2.1.

5.3. Interior finish materials are to be fastened in a manner such that the materials will not become readily detached when subject to room temperatures of 200°F for not less than 30 minutes.

5.4. For application of interior finish to wall ceilings or structural elements having a fire resistance rating, see Section 803 1.4.

5.5. Insulation will have a flame spread in accordance with Section 719.3 in an exposed or concealed installation insulation (including insulation covering pipe or tubing) will have a flame spread index of not more than 25 and a smoke developed index of not more than 450.

5.6. Smoke-developed index of all ceiling and wall finish materials will not exceed 450.

5.7. Textiles on walls or ceilings will have a Class A flame spread index and will be fully protected by automatic fire sprinklers. Alternatively, the materials will meet the

criteria of the NFPA 286 room corner test, or Method B protocol of the NFPA 265 room corner test (Section 803.6). Expanded vinyl wall coverings will comply with these requirements for textile wall coverings (Section 803.7)

5.8. Floor finishes will comply with Section 804. This does not include the following finishes: wood, vinyl, linoleum or terrazzo and resilient floor covering materials not composed of fibers. Since the building is sprinklered, the floor finishes need only comply with the DOC FF-1 "pill test" (CPSC 16 CFR, Part 1630).

5.9. Decorative materials and trim will be provided in accordance with Section 806.

5.9.1. The amount of non-combustible decorative material is not limited.

5.9.2. Decorative materials meeting the flame propagation criteria of NFPA 701 will not exceed 10% of the aggregate area of walls and ceilings. Testing and approval of these materials is to be by an approved agency.

5.9.3. If covering more than 10%, the materials are required to be considered interior finish.

5.10. Imitation leather or other material consisting of or coated with a pyroxylin or similarly hazardous base is not allowed in Group A occupancies.

5.11. Interior trim, other than foam plastic, will have a minimum Class C flame spread and smoke-developed index and will not exceed 10% of the aggregate wall or ceiling area in which it is located (excluding handrails and guardrails).

5.12. Foam plastics will not be used as interior finish or trim except as provided for in Sections 2603.9 and 2604.

5.12.1. All foam plastic requires a thermal barrier between it and the interior of the building (Section 2603.4), except when used as interior trim in accordance with Section 2604.

5.12.2. Foam plastics are acceptable where tested in accordance with NFPA 286 (with the acceptance criteria of Section 803.2), FM 4880, UL 1040 or UL 1715. They must also meet the flame spread requirements of Chapter 8.

5.12.3. Foam plastics used as interior trim are required to comply with Section 2604.2. The amount is not to exceed 10% of the aggregate wall and ceiling area of the room.

5.12.4. Plastic veneer will comply with the requirements of SNBC Chapter 8.

5.13. Light-transmitting plastic used as interior finish or decorative materials will be compliant with Sections 2606, 2607, 2608 and 2611.

6. MEANS OF EGRESS

6.1. Occupant load factors for the expected occupancies:

Occupancy	Occupant Load Factor
Mechanical/Electrical equipment rooms/storage	300 ft^2 per person (gross)
Casino Floor	11 ft per person (gross)
Kitchens	200 ft^2 per person (gross)
Offices	100 ft^2 per person (gross)
BOH Locker Rooms	50 ft^2 per person (gross)
Lounge/Bar/Dining Rooms	15 ft^2 per person (net)

6.2. Egress from a space will not pass though intervening rooms except where intervening rooms are accessory, not a Group H occupancy, and provide a discernable path of travel to an exit per CBC Section 1014.2. Egress within residential units will not pass through other sleeping areas, toilet rooms or bathrooms.

6.3. Travel distance to an exit (exterior exit door, exit passageway or enclosed stair) will not exceed 250 feet per CBC Table 1016.1.

6.4. Common path of travel will not exceed 75 feet, or 100 feet in Group B, F, and S occupancies per CBC Section 1014.3.

6.5. Where more than one exit or exit access doorway is required, the exit access will be arranged such that there are no dead ends in corridors greater than 20 feet in length or when the length of the dead-end corridor will be less than 2.5 times the least width of the corridor per CBC Section 1018.4. Dead ends in corridors serving Group B and F occupancies may be extended to 50 feet.

6.6. Number of means of egress

6.6.1. Two means of egress will be provided for spaces as required by CBC Table 1015.1. For occupant loads greater than 1000, a minimum of four exits required. In particular, two means of egress will be provided from Group A, B and F spaces with an occupant load greater than 49, Group S spaces with an occupant load greater than 29.

6.6.2. Boiler rooms which exceed 500 feet of floor area and house equipment having an input of more than 400,000 Btuh will be of 1-hour fire-resistive construction and will have two means of egress per CBC Section 1015.3.

6.7. Separation of exits

6.7.1. Spaces that require access to more than one means of egress will have two exits separated by more than one-third the diagonal distance of the space per CBC Section 1015.2.

6.8. Stairs

6.8.1. Enclosed stairs will discharge directly to the exterior of the building at grade or at a point providing direct access to grade, or will continue through a 2-hour rated horizontal extension of the stair enclosure leading to the exterior at grade. When the stair is pressurized the horizontal extension will also be pressurized.

6.8.2. Per the CBC, in the event occupied floors are more than 75 feet above the lowest level of fire department access, all enclosed exit stairs will be pressurized as required by CBC Section 1022.9 Pressurized stair enclosures will contain pressurized entrance vestibules.

6.8.3. The 2-hour wall construction for the exit enclosure will include both the stair and the vestibule as a single element, with a 1½-hour door at the vestibule/corridor interface. The stair to vestibule construction will also be 2-hour wall construction with a 20-minute door at the vestibule/stair interface. Pressurized stairs are identified on the Architectural Plan.

6.9. Doors

6.9.1. Egress doors, including roof level stair entrances, will be operable from the egress side without the use of a key or special knowledge or effort.

6.9.2. Egress doors will swing in the direction of exit travel when serving an occupant load of 50 or more per CBC Section 1008.1.2.

6.9.3. Neither stair nor stair vestibule doors will be locked to restrict access from the stair into any residential unit corridor.

6.9.4. Fire doors will meet the requirements for rate of temperature rise and positive pressure, as may apply.

6.10. Exit Signs and Means of Egress Illumination

6.10.1. Illuminated exit signs will be provided at exit doors and where otherwise necessary to clearly indicate the direction of exit travel when two or more exits are required per CBC Section 1011.1. No point in a corridor will be more than 100 feet from the nearest visible exit sign.

6.10.2. Tactile exit signs shall be provided per CBC Section 1011.3 and will be located at::

6.10.2.1. Grade level exterior exit doors.

6.10.2.2. Stairwell exit doors.

6.10.2.3. Exit access doors from rooms that require visual exit signs.

6.10.2.4. Horizontal exit doors.

6.10.3. Interior corridors serving meeting rooms and lounge areas occupancies as required by the code will have internally illuminated low level exit

signs, the bottom of which will not be less than six or more than eight inches above finished floor per CBC Section 1011.6. When installed adjacent to exit doors, they will not exceed 4 inches from the door frame.

6.10.3.1. Low-level exit signs may be excluded if path marking is installed at the floor level or no higher than 8 inches above the floor level. Path marking will be continuous, except as interrupted by doors, corridors or similar architectural features.

6.10.4. Normal power for exit signage and means of egress illumination will be supplied from the building wiring. Emergency power will be provided by the emergency generator.

6.10.5. Emergency illumination of at least one footcandle will be provided at the walking surface level per CBC Section 1006.2.

6.11. Exit enclosures will not have any penetrations into the enclosure other than exit doors from normally occupied spaces. Piping and conduit may penetrate the stair but only to serve systems that are within the stair. Such penetrations will be protected by a listed through penetration firestop system of the appropriate rating.

7. EMERGENCY SIGNAGE

7.1. A sign stating "IN FIRE EMERGENCY, DO NOT USE ELEVATOR. USE EXIT STAIRS." will be posted adjacent to each elevator call station on all floors. This sign will also provide a pictorial representation and indicate that the elevator will not operate and that exit stairs should be used.

7.2. Stairway identification signs will be provided in compliance with CBC Section 1022.8

7.2.1. The signs will designate the floor level, the terminus of the top and bottom of the stair, and the stair identification.

7.2.2. The signs will state the story floor level.

7.2.3. The signs will state the availability of roof access from the stairway.

7.2.4. The signs will be located 5 feet above the floor landing in a position that is readily visible when the doors are in the open and closed positions.

7.2.5. The signs will be coordinated with the fire alarm system descriptions and elevator call level.

7.3. Tactile floor designation signs will also be installed within the stairs per CBC Section 1022. 8.1.

7.4. A sign indicating the floor level will be posted facing each set of elevator doors approximately 5 feet above the floor. Numerals will be at least 5 inches high with a 3/4 inch stroke.

7.5. The emergency elevator will be identified by the international symbol for emergency medical services (star of life), which will be at least 3 inches high and placed inside on both sides of the hoistway door frame.

7.6. Access points to fire and smoke dampers will be permanently identified on the exterior by a label with letters not less than ½-inch in height reading SMOKE DAMPER or FIRE DAMPER.

7.7. Signs will be placed on each fire department connection indicating the minimum required flow and pressure for sprinkler and standpipe system demand.

7.8. A sign will be placed on the exterior of the building at the point of access to the Fire Pump Room. Additional signage will be placed at the doors to the Fire Pump Room interior to the building.

7.9. Signage will be provided on the exterior access door of the Fire Pump Room, the FCC, Main Electric Room and the Emergency Power Generator Enclosure.

8. SUPPRESSION SYSTEMS

8.1. Automatic Sprinkler Protection

8.1.1. Wet-pipe, hydraulically calculated automatic sprinkler systems will be provided throughout.

8.1.2. Automatic sprinklers will be supplied by a combined standpipe system and will be interconnected at the lowest level.

8.1.3. Automatic sprinkler systems will be designed to comply with the requirements of NFPA 13 - 10. A minimum 10 psi safety margin will be incorporated in all sprinkler system hydraulic calculations.

8.1.4. Fire protection piping will be non-combustible where required by NFPA 13-10.

8.1.4.1. Approved steel and/or chlorinated polyvinyl chloride (CPVC) sprinkler piping may be used within the building in accordance with the requirements of NFPA 13 -10.

8.1.5. Automatic sprinklers will be zoned as follows:

8.1.5.1. Each floor MAY constitute a single sprinkler zone. The net floor area for each level served is under 52,000 ft^2, which is the maximum area allowed per zone.

8.1.5.2. The elevator machine rooms and tops of hoistways will also be sprinklered, as well as within 24-inches of the bottom of the elevator hoistway pit. Since the machine room will be sprinklered, elevator shunt trip systems are required and will be provided.

9.9.2. Duct mounted smoke detectors installed in accordance with CBC Sections 907.2.13.1.1 and 907.3.1.

9.9.3. Fire Pump status (pump running, loss of phase, phase reversal, alternate power source).

9.9.4. Fire water storage tank high and low water level status, if provided onsite.

9.10. System smoke detectors will be provided at the following locations:

9.10.1. Each elevator lobby/landing and elevator machine room.

9.10.2. In each interior corridor on floors serving residential units.

9.10.3. At the top of each elevator hoistway.

9.10.4. Where fire-protection rated doors are held open by magnetic devices.

9.10.5. Where necessary to close smoke/fire dampers when duct detectors are not installed.

9.10.6. In all rooms that contain a fire alarm control unit and are not continuously occupied.

9.10.7. In each mechanical equipment, electrical, transformer, telephone equipment or similar room which is not provided with sprinkler protection.

9.10.8. Within 5 feet of each entrance to pressurized stairs when area detection is not provided.

9.11. Duct type smoke detectors will be provided at the following locations:

9.11.1. Air handling unit supply and return air duct serving any system delivering more than 2,000 Cubic Feet per Minute (cfm).

9.11.2. Main supply and return plenums at each air conditioning system downstream of the last inlet.

9.11.3. Where necessary to close fire/smoke dampers. Duct type smoke detectors used for fire/smoke damper closure will be listed for low air flow velocities.

9.12. Heat detectors will be provided at the top of each elevator hoistway and within 2 feet of each sprinkler within elevator machine rooms for the purpose of elevator shunt trip.

10. FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEMS

10.1. Voice Alarm System

10.1.1. All fire alarm initiating devices will activate audible and visual warning devices. An alert tone, followed by automatic voice instructions, will occur throughout the building on a selective basis in accordance with

CBC Section 907.2..1.1. Alarms will occur on the fire floor, the floor above and the floor below. This includes alarms on each side of the horizontal exit.

10.1.2. The FCC will contain controls for manually activating the voice alarm system on a selective, general and all-call basis.

10.1.3. The voice alarm system will be designed and installed in accordance with CBC Section 907.5.2.2 and NFPA 72 Section 6.9. It will provide 15 db above ambient throughout the protected areas.

10.1.4. The FCC will contain controls for manual operation of the voice alarm system.

10.1.5. Speakers will be provided throughout the protected areas, including the residential units.

10.2. Audible zones

10.2.1. The voice alarm system will be zoned to be coordinated with fire alarm, sprinkler, smoke control, and egress zones.

10.2.2. Speakers in stairwells and elevator cabs will be designed such that they can only be activated manually from the FCC. Only live voice announcement capabilities will be provided in these locations (no pre-recorded messages in stairs or elevators). Live voice messages will be manually activated from the FCC.

10.2.3. Throughout the building, specific fire alarm devices, the Fire Alarm/Smoke Control Matrix Plans will initiate a general alarm on the floor of origin, the floor above and the floor below.

10.3. Listed Visual Notification Devices:

10.3.1. Will be installed in accordance with NFPA 72 National Fire Alarm Standard.

10.3.2. Will be installed at all accessible public and common use locations in accordance with ICC/ANSI A117.1 and ~~2010~~ 2013 Edition, CBC requirements.

10.3.3. Visual appliances will be wall-mounted at no less than 80 inches and no greater than 96 inches above the finished floor or 6 inches below the ceiling, whichever is lower.

10.3.4. .

10.4. Fire department phone jacks, or potable radios will be installed to allow communication between the FCC and the following locations:

10.4.1. Each elevator car and elevator landing.

~~10.4.2. Within each tower stair at every main floor landing and roof level landing, adjacent to the entry door.~~

10.4.3. Emergency and standby power rooms (generator room).

10.4.4. Fire pump room.

11. SMOKE MANAGEMENT SYSTEM

11.1. Passive Smoke Management

11.1.1. Due to the level of compartmentation proposed for this building, passive smoke control design concepts will be used for all levels.

11.1.2. Mechanical and electrical equipment rooms that do not communicate via airflow with any adjacent space will be considered passive enclosures.

11.1.3. The Basement levels, if provided, will be treated as passive zones, separated from the levels above and below by the 2-hour fire-resistive floor slab.

11.2. Stair and vestibule pressurization systems: High Rise Provisions: Occupied Floor located >75' above lowest level Fire department Access.

11.2.1. All enclosed exit stairs will be pressurized to maintain at least 0.05 inches water .column (WC) positive relative to the vestibule.

11.2.2. The vestibule will be pressurized to maintain a pressure difference of 0.05 inches W.C. negative relative to the stairway and 0.05 inches W.C. positive relative to the fire floor. These pressure differences are maintained with all the doors closed.

11.2.3. A separate fan and shaft will be used to pressurize the stair. The shaft is separated with a minimum 2-hour fire-resistance separation from the remainder of the building and considered a part of the stair enclosure.

11.2.4. Pressure differentials will not be so high as to cause the door opening forces to exceed 30 pounds maximum.

11.2.5. The upper portion of the stairway enclosure will be provided with a barometric relief vent capable of discharging a minimum of 2,500 cfm of air at the design pressure differential.

11.2.6. The systems will operate manually or automatically upon activation of specific fire alarm initiating devices as documented in the Fire Alarm/Smoke Control Matrix included in Appendix A.

11.2.7. Multiple point injection into the stair shaft will be employed with regards to stair pressurization.

11.2.7.1. Vestibule pressurization will be achieved via leakage through the door between the stair and the vestibule.

11.2.8. Manual override and status indicators will be provided on the firefighter's graphic smoke control panel in the FCC.

11.3. HVAC duct detectors will automatically de-energize air handling units and annunciate at the fire alarm system.

11.4. Monitoring of smoke management fans and dampers.

11.4.1. Fans will be monitored with UL-listed current sensors or differential pressure transmitters, to verify air flow.

11.4.2. Fire/smoke dampers associated with mechanical smoke control systems or mop-up systems will be monitored for open/closed status as required for proper operation of the smoke control systems. Where only one position required for life safety purposes, monitoring will be provided only for that position only.

11.5. Fans, dampers, controls and other elements of the mechanical smoke management systems will be connected to the standby power supply. Where volatile memories are utilized, a UPS system (battery power) will be provided with appropriate surge protection. Fans, dampers, controls and other elements of the Fire Department mop-up systems will not be connected to the standby power supply

11.6. System response time will conform to the requirements of CBC Section 909. Proper operation of fans, dampers, and automatic doors will be indicated at the smoke control panel within 60 seconds after receipt of an alarm condition at the fire alarm control panel.

11.7. Smoke Management System Ducts

11.7.1. Duct material and joints will be capable of withstanding the probable temperatures and pressures to which they are exposed.

11.7.2. Ducts that traverse smoke zones will be leak tested to 1.5 times the maximum design pressure. Measured leakage will not exceed 5 percent of design flow.

11.7.2.1. Smoke control ductwork entirely within and serving the respective smoke zone, such as the stairwell pressurization shaft will not require pressure testing.

11.7.3. Ducts will be supported directly from building structural elements by substantial, non combustible supports.

11.8. Smoke Management Fans

11.8.1. Smoke management fan motors will have a minimum service factor of 1.15.

11.8.2. Number of belts on belt drive units will be 1.5 times the standard number with a minimum of 2.

11.8.3. Fans will be of the centrifugal, tube axial or vane axial type. Propeller fans will not be used.

11.9. Doors in Smoke Barriers

11.9.1. Minimum 20-minute fire-protection rating with smoke- and draft-control assembly.

11.9.2. Doors will be automatic or self-closing.

11.9.2.1. Doors in smoke barriers that are normally open will be provided with magnetic hold open devices that will release upon activation of a local smoke detector or activation of the respective smoke control system.

11.10. General Testing Procedure is provided as follows:

11.10.1. Testing of smoke management systems will be by an approved Special Inspections Agency and will consist of the following:

11.10.1.1. Verify sequence of operation as indicated on the smoke control/fire alarm matrix and control diagrams.

11.10.1.2. Verify door opening forces on pressurized stairwells and vestibules do not exceed 30 pounds.

11.10.1.3. Verification of the proper sequence of operation for fans and dampers.

11.10.1.4. Verification of proper transfer of secondary power and operation of smoke control systems on primary and secondary power.

11.10.1.5. The Fire Protection and Life-Safety Systems will be operated and tested by the Contractor under simulated emergency conditions in the presence of the Owners Representative.

11.10.2. Passive Zone Method Testing

11.10.2.1. Passive elements will be pressure tested using a door fan test configuration. The allowable leakage rate will be calculated by the engineer of record using the criteria set forth in the CBC.

11.10.2.1.1. Pressure tests will be performed at a minimum of two dormitory units per floor. If the allowable leakage rate is exceeded, the rooms will be resealed and retested. All failed rooms will be retested to verify compliance after repairs have been completed.

11.10.2.1.2. Pressure tests will be performed within the residential unit corridors on both sides of the horizontal exits walls on a minimum of four floors. If the allowable leakage rate is exceeded, the corridors will be resealed and retested. All failed corridors will be retested to verify compliance after repairs have been completed

11.10.3. Stair/vestibule pressurization fans will be activated in accordance with the functional matrix and the pressure differential will be measured between the stair and vestibule and the vestibule and adjacent floor area. The pressure differential will be shown to maintain 0.05" w.c. positive between the stair and vestibule, as well as the vestibule and floor. Door forces will be measured to verify that a maximum 30 pound force is not exceeded. The barometric relief vent at the top of the pressurized exit enclosures will be verified to discharge a minimum of 2,500 cfm of air when the design pressure in the stair and vestibule is achieved.

11.11. A graphic Anunciator Control Panel for the mechanical smoke control systems will be provided in the FCC, and will contain the following:

11.11.1. On/off/auto control switches, which operate stairwell pressurization fans and any associated dampers.

11.11.2. Fans will be annunciated on a per-stair basis.

11.11.3. White lights will indicate that fans and dampers are configured for normal status.

11.11.4. Red lights will indicate that fans and dampers are configured for off or closed status.

11.11.5. Green lights will indicate that fans and dampers are configured for on or open status.

11.11.6. Yellow lights will indicate that fans and dampers are not properly configured (fault status).

11.11.7. Each stairwell will be provided with separate controls and status indicators.

11.11.8. A detail documenting the proposed layout of the graphic annunciator panel will be submitted for review and approval prior to fabrication.

12. FIRE COMMAND CENTER:

~~**REQUIRED FOR THE PROPOSED PROJECT AND THE PROPOSED ALTERNATIVE 1 PROJECT:**~~

12.1. The Fire Command Center (FCC) will be located in the Parking Garage and will have direct access from the exterior. A minimum of three (3) Reserve or Jamul

Tribal Firefighter/EMT will be assigned to the to the FCC 24 hours per day. The FCC will also serve as the Casino EMT Office.

12.2. The FCC is at least ~~100~~ 200 ft^2 with a minimum dimension of ~~8~~ 10 feet and will contain the required panels, equipment and reference materials.

12.3. Annunciation of active fire protection systems will be provided at the FCC. The following items will be located in the FCC.

12.3.1. Fire detection and alarm system annunciator panels including the Firefighter's Smoke Control Panel (FSCP). Annunciation will occur via LCD at the fire alarm control panel and via LED at a graphic annunciator panel in accordance with CBC Section 907.6.3.1.

12.3.2. Fire Pump status indicators. Indicators include Fire Pump running, loss of phase, phase reversal and controller connected to alternate source.

12.3.3. ~~Secondary water supply tank level indicator, as required.~~

12.3.4. Status indicators and controls for stairwell pressurization fans.

12.3.5. Standby and emergency power status indicators.

12.3.6. Elevator status panel for elevator cabs, visually indicating the location of the elevators and whether they are operational.

12.3.7. Voice alarm system panels with a microphone cord of sufficient length to reach all points of the room.

12.3.8. Fire Department voice communication system(s) and six (6) hand-held phone sets.

12.3.9. Automatic Fire Sprinkler valve and waterflow detector display panels.

12.3.10. A telephone for Fire Department use with direct access to the public telephone system. Cord will be of sufficient length to reach all parts of the room.

12.3.11. Up-to-date master gas, electric and exit drawings, as well as fire sprinkler/standpipe and fire alarm drawings, a copy of the current approved FPR and a half-size set of the approved building drawings.

12.3.12. A work table, desks and chairs.

12.3.13. Generator supervision devices, manual start and transfer features.

12.4. Details of the annunciation and control panels to be installed in the FCC

12.5. The FCC will not be used for housing of any boiler, heating unit, generators, combustible storage or similar hazardous equipment or storage.

13. EMERGENCY AND STANDBY POWER

13.1. A new emergency generator will be provided to supply emergency and standby power for this project.

13.2. The generator will be located either on the exterior or inside ~~to~~ the ~~gaming~~ Parking Structure.

13.3. The emergency power systems will supply the following:

13.3.1. Exit signs and means of egress illumination.

13.3.2. Lighting circuits for elevator cabs, FCC, mechanical equipment rooms and secondary fire department response location.

13.3.3. Fire alarm and supervisory systems.

13.3.4. Fire detection and supervisory systems.

13.3.5. Sprinkler alarm and supervisory systems.

13.3.6. All required communication and public address systems.

13.3.7. The electric fire pumps.

13.3.8. Fire pump controllers and status panels.

13.4. Standby power will be provided for the following:

13.4.1. Smoke management systems, panels and controls, including stair and vestibule pressurization systems.

13.4.2. Elevators (one at a time in each bank).

13.4.3. Continuously operating exhaust fans where fire/smoke dampers have been omitted (bathroom/toilet exhaust fans).

13.4.4. Air conditioning for elevator machine rooms.

13.4.5. Accessible means of egress elevator.

13.5. Transfer Time

13.5.1. 10 seconds for Emergency Power items listed in Section 13.3.

13.5.2. 60 seconds to full power for items listed in Section 13.4.

13.6. Generators will be provided with manual controls for activation and de-activation remotely at the fire command center.

14. ELEVATORS

14.1. Standby power will be provided for one elevator in each bank and will automatically be transferable to all other elevators in the bank to allow for recall to the designated level. Manual transfer of power to each elevator will be provided at the elevator status panel in the FCC.

14.2. Hoistway Venting

14.2.1. Elevator shafts will be vented to the exterior.

14.2.2. The vent area will be at least 3.5% of the shaft area with not less than 3 ft^2 per elevator.

14.2.3. Each hoistway will be vented independently of other hoistways.

14.2.4. Hoistways will not be vented through the elevator machine rooms.

14.2.5. Hoistway provided with an automatic vent dampers will have the dampers activated upon detection of smoke from any of the elevator lobby smoke detectors or detectors at the top of each hoistway.

14.2.5.1. In addition, manual controls for the hoistway vent dampers will be provided on the Plans located in the FCC.

14.2.5.2. Hoistway vent damper status will be provided on Building Plans.

14.3. See Section 4.2 of the FPP for information on elevator shaft construction and elevator lobby construction requirements.

14.4. Each elevator landing will be provided with area smoke detector(s) installed within its/their listing(s).

14.5. With elevators under normal or standby power, activation of an elevator lobby or machine room smoke detector will cause automatic recall of all elevators serving that bank. The cabs will return nonstop to the porte cochere level or designated Level of Exit Discharge. If detection occurs at the lobby level, the elevators will recall to the casino level.

14.6. Manual Overrides

14.6.1. A three-position (on/off/bypass) key-operated switch will be provided at the lobby level for each bank of elevators for emergency override.

14.6.2. A three-position (on/off/hold) key-operated switch will be provided inside each elevator cab.

14.6.3. Elevator keys will be provided for Jamul Village Fire Department use in case of emergency in a lockable cabinet in the FCC.

14.7. Each elevator machine room will be provided with smoke detector(s) installed within its/their listing(s).

14.8. Fire Department Emergency Elevator

14.8.1. At least one elevator will be provided for fire department emergency access to all floors. The elevator will be able to accommodate a 24-inch by 84-inch ambulance stretcher in the horizontal, open position.

14.8.2. Any emergency elevator provided in accordance with CBC Section 3002.4 will be identified with the international symbol for emergency medical services (star of life). The symbol will not be less than 3 inches high and shall be placed inside both sides of the hoistway door frame.

14.9. Since the elevator machine rooms and top of hoistways will be provided with sprinklers, elevator power shunt trip will be provided. An override for elevator

shunt will be provided within the FCC to allow for power to be transferred back to these elevators after a shunt condition.

15. HAZARDOUS MATERIALS

15.1. Emergency Generator fuel storage

15.1.1. The fuel storage is located as a self-contained double wall Fuel Tank as part of the Emergency generator

15.1.2. The Emergency Generator Manufacture will provide specifications indentifying the number gallons of diesel fuel in the Fuel Tank and hours of operation anticipated given the Fuel Tank quantity.

15.1.3. Fuel storage will comply with the hazardous materials provisions of the 2013 Edition, California Fire Code (CFC), Chapters 27 & 34. for Class II, Combustible Liquids

NOTE: Listing of HAZ-MAT as such becomes available		

15.2. Detailed lists of chemical types and quantities will be provided under separate cover as a separate permit submittal. This information will be provided to demonstrate compliance with the California Building Code Section 414.

16. PERIODIC OPERATIONS AND MAINTENANCE

16.1.1. All active Fire Protection systems and devices will be regularly tested in accordance with the applicable codes and standards by qualified individuals.

16.1.2. Records of maintenance and testing will be retained on-site and presented to AHJ representatives upon request.

17. FUTURE MODIFICATIONS

17.1.1. Any future modifications and expansions will be documented in amendments/addenda to this FPP. The document will be prepared by a design professional licensed in the State of California working within the area of their expertise.

17.1.2. As appropriate, licensed design professionals will be included in the design of all renovations/expansions.

18. CONTROL DIAGRAMS AND QUALITY ASSURANCE SPECIAL INSPECTOR

18.1.1. A Special Inspector will be retained by the Owner to verify compliance with Section 909.

18.1.2. Three (3) copies of control diagrams pertinent to the Smoke Management systems will be submitted for approval prior to beginning QAA testing and rough mechanical inspections.

19. ACCEPTANCE TESTING

19.1.1. Three (3) copies of a document describing testing procedures of all active fire protection systems will be submitted at least 60 days prior to final testing.

19.1.2. The final mechanical QAA report will be submitted inspections department by the smoke control special inspection agency for review and approval at least seven (7) days prior to final testing.

19.1.3. See also Section 11.10 of this Report for information on smoke control system testing.

20. CONCLUSION

The devices, systems and approaches outlined in this report are intended to provide a level of life safety and property protection which are in compliance with the applicable codes. This level of protection is based on the interaction of both active and passive Pire Protection features. Active systems include fire suppression and detection systems, as well as emergency and standby power, communications and mechanical smoke control. Passive features include compartmentation with fire-resistive separations, Type IA construction, MOE systems and Flame-Spread Index (FSI) limitations.

Nothing in this document is intended to imply non-code compliance.

This report provides Fire Protection Planning Guidelines as developed for the Jamul Indian Village Gaming Project Options Working drawings and specifications will be coordinated to comply with the Fire Protection features outlined in this document.

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