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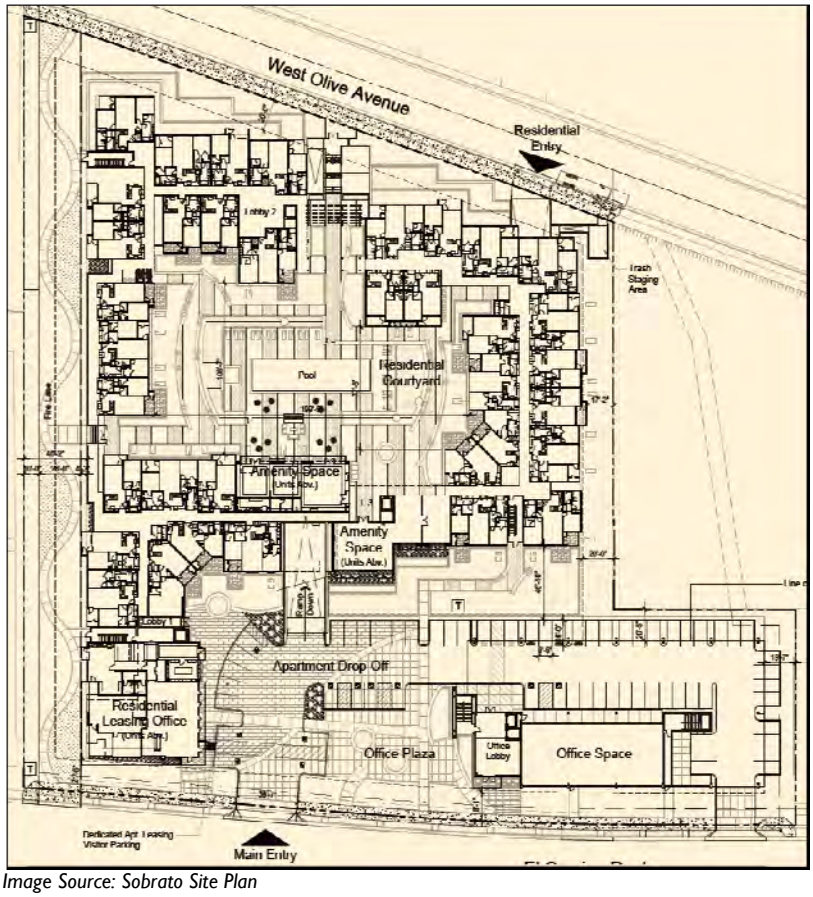

Image Source: Sobrato Site Plan

Final Report

Transportation Impact Analysis for Sobrato Mixed-Use Project

In the City of Sunnyvale

November 20, 2013

Pleasanton
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Sacramento
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Prepared by:
TJKM Transportation Consultants
4305 Hacienda Drive
Suite 550
Pleasanton, CA 94588-2798
Tel: 925.463.0611
Fax: 925.463.3690

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Executive Summary

Introduction

This report presents the results of TJKM's transportation impact analysis for the proposed Sobrato Mixed-Use project in the City of Sunnyvale. The proposed Sobrato Mixed-Use development is to be located within two new buildings on the north side of El Camino Real between Bernardo and Mary Avenues in the City of Sunnyvale. The project site is bounded by existing commercial development to the west and east, Olive Avenue to the north, and El Camino Real to the south. The proposed project consists of constructing a four-story residential apartment building with 156 total dwelling units and a three-story commercial office building with a total of 40,554 sq. ft. gross floor area. The project will include a total of 443 parking spaces, with 163 spaces dedicated to Office, 239 spaces dedicated to Residential, and 41 shared parking spaces. Figure 1 shows the project vicinity map, and Figure 2 shows the project site plan.

This report includes traffic analysis results for six study scenarios, 13 study intersections, and two freeway segments that would potentially be impacted by proposed project traffic. For the purposes of this analysis, potential traffic operational effects from the Sobrato Mixed-Use project are identified based on established traffic operational thresholds for the Santa Clara County Valley Transportation Authority (VTA) Congestion Management Program (CMP) and the City of Sunnyvale. For study intersections or freeway segments exceeding these thresholds, transportation improvements are then identified and evaluated for the potential to bring overall level of service (LOS) back within acceptable thresholds.

The report also includes evaluations and recommendations concerning project site access for vehicles, transit, bicycle, and pedestrians, evaluation of onsite vehicle and bicycle parking supply, a shared parking analysis, and evaluation of potential traffic impacts during construction.

Project Trip Generation

The proposed Sobrato Mixed-Use project is expected to generate 1,656 new daily vehicle trips, including 168 during the a.m. peak hour and 217 during the p.m. peak hour. These trip totals include application of a maximum three (3) percent trip discount that accounts for the project's internal trips given its mixed-use configuration, as well as a maximum two (2) percent reduction given its proximity to major bus stops per VTA Transportation Impact Analysis guidelines.

Existing Conditions

Currently, all study intersections operate at acceptable level of service (LOS) during both weekday a.m. and p.m. peak hours based on City of Sunnyvale (LOS D) and VTA CMP (LOS E) traffic operational standards.

Based on operational results reported in VTA's *2011 CMP Monitoring and Conformance Report*, the following freeway segments exceed the VTA CMP operational standard of LOS E or better during specified peak hours:

- SR 85 Southbound, SR 237 to El Camino Real (p.m. peak hour)
- SR 85 Southbound, El Camino Real to Fremont Avenue (p.m. peak hour)
- SR 85 Northbound, Fremont Avenue El Camino Real (a.m. peak hour)

Existing plus Project Conditions
With the addition of traffic from the proposed Sobrato Mixed-Use project, all intersections are expected to continue operating at acceptable service levels of LOS D or better. Therefore, the proposed project is expected to have a less-than-significant impact with respect to project traffic under Existing plus Project Conditions, and no mitigations are required.

In terms of freeway operations under this scenario, the proposed project is not expected to add trips greater than one percent of the capacity of any freeway segment already operating at LOS F under Existing Conditions per VTA CMP standards. Therefore, the addition of proposed project traffic is expected to result in a less-than-significant impact for the study freeway segments under Existing plus Project Conditions. As a result, no mitigation measures are required.

Background No Project Conditions (2015)
Background Conditions represent the anticipated year of project completion, 2015. Under Background No Project Conditions (without the proposed project), all study intersections are expected to continue operating at acceptable level of service (LOS) during both weekday a.m. and p.m. peak hours based on City of Sunnyvale and VTA CMP traffic operational standards.

Background plus Project Conditions (2015)
With the addition of traffic from the proposed Sobrato Mixed-Use project to baseline Background Conditions, all intersections are expected to continue operating at acceptable service levels of LOS D or better. Therefore, the proposed project is expected to have a less-than-significant impact with respect to project traffic under Background plus Project Conditions, and no mitigations are required under this scenario.

Cumulative No Project Conditions (2023)
Under Cumulative No Project Conditions, all study intersections are expected to continue operating at acceptable level of service (LOS) during both weekday a.m. and p.m. peak hours based on City of Sunnyvale and VTA CMP traffic operational standards.

Cumulative plus Project Conditions (2023)
With the addition of traffic from the proposed Sobrato Mixed-Use project to baseline Cumulative Conditions, all intersections are expected to continue operating within the applicable jurisdictional standards of LOS D (Sunnyvale) and LOS E (CMP) or better. Therefore, the proposed project is expected to have a less-than-significant impact with respect to project traffic under Cumulative plus Project Conditions, and no mitigations are required under this scenario.

Vehicle Access Evaluation
In terms of external access, the project conceptual plan shows three 2-way access driveways that the proposed project would use, including two existing driveways. Of these driveways, the two existing are on El Camino Real, while the proposed driveway would access Olive Avenue. El Camino Real west of Bernardo Avenue provides direct access to the northbound and southbound SR 85 on- and off-ramps. TJKM review of the three access driveways finds that the proposed configurations would be adequate for the proposed mixed-use project.

Pedestrian and Bicycle Access Evaluation
In terms of pedestrian facilities, the project site has good accessibility. The proposed project will utilize well-defined existing pedestrian facilities external to the existing project site, and will include internal pedestrian paths upon completion of the project. Sidewalks are provided along the El Camino Real and Olive Avenue project frontages. Both of these streets connect pedestrians to Bernardo

Avenue, where VTA bus stops are located in addition to those on El Camino Real. In terms of internal circulation, the proposed project will include pedestrian paths connecting the two buildings, as well as an additional pathway along the project's western boundary, which will provide access to the residential building on its west side, and provide a connection between Olive Avenue and El Camino Real.

In terms of bicycle access to the project site, there are no existing Class I bicycle paths or Class II bicycle lanes in the vicinity that serve the project site. Primary bicycle access would be provided at the existing site driveways on El Camino Real, the proposed driveway on Olive Avenue, and the potential multi-use path along the project site's western boundary. El Camino Real and Olive Avenue are sufficiently wide for bicyclists to share the road with vehicles. Overall, most of the existing infrastructure appropriately accommodates bicyclists and pedestrians, since the project site is located within a developed area.

Transit Access

The proposed Sobrato Mixed-Use project would not have a potentially significant impact on transit service. The project will have access to three VTA bus routes within 2,000 feet walking distance. It should be noted that the 1.7-mile walking distance from the project site to the Sunnyvale Caltrain Station is greater than the VTA CMP guideline of 2,000 feet reasonable walking distance to a transit stop. The bus stops are accessible via sidewalks for pedestrians and roadways for bicyclists on a relatively flat terrain amenable to these transportation modes. The impacts that would occur on these transit lines are expected to be less than significant, even if full VTA TDM reductions were shifted to just these public transit lines and not to carpools, bicyclists, pedestrians, or other transit lines. This is because the average commute peak hour load factors on the area VTA bus routes are below 1.0 (seating capacity), except one route that has a slightly higher overall average commute peak hour load factor of 1.05 (Route 522). However, VTA planning staff expects that Route 522 would still be able to accommodate additional riders using available standing room capacity. Therefore, the number of peak hour riders the project would potentially add to any individual bus route would be negligible and no impact on existing VTA area transit operations is anticipated.

Onsite Vehicle Parking

The proposed project includes a total of 443 parking spaces, including 41 shared-use spaces, 239 residential spaces and 163 commercial office spaces. The City Municipal Code requires multi-family residential uses to provide a minimum of one covered assigned space per unit and an additional 0.5 unassigned spaces per each one-bedroom unit or one unassigned space per each two-bedroom unit. Additionally, commercial office uses are required to provide between 3.3 to four spaces per 1,000 sq. ft. of gross floor area. The overall site commercial office parking supply rate of four spaces per 1,000 sq. ft. resulting from the proposed project is at the maximum end of the Municipal Code required range. Therefore, the proposed project is expected to be adequately parked with respect to the Municipal Code requirements.

Shared Parking

Based TJKM's shared parking analysis, the project is expected to generate its highest weekday parking demand in January at the peak hour of 10:00 a.m., when 362 parked vehicles are expected on site. Similarly, a worst-case weekend peak parking demand of 252 vehicles is expected during the peak month of January at the peak hour of 9:00 p.m. These totals represent the highest parking demand expected on the project site during a typical year of operation. Therefore, the proposed onsite parking supply of 443 spaces is expected to easily satisfy expected peak parking demand generated by the proposed project throughout the year, based on shared parking principles.

Onsite Bicycle Parking

The City Municipal Code includes specific bicycle parking supply requirements for both multi-family and general office uses. Multi-family uses of five or more units shall provide bicycle parking in the amount of one Class I space for every four units. Non-residential uses shall provide bicycle parking in the amount of five percent of the total number of vehicular parking spaces provided, with at least 75 percent of the required amount of bicycle parking consisting of Class II spaces. Class I bicycle parking consists of facilities such as bicycle lockers or enclosed rooms, while Class II facilities include bicycle racks.

Based on the Municipal Code requirements, the proposed project would be required to provide a total of 48 bicycle parking spaces, including 41 Class I spaces and seven Class II spaces. According to the project site plan, 60 bicycle spaces will be provided by 15 Class II bicycle racks, with a capacity of four bicycle spaces per rack. To conform to the Municipal Code requirements, TJKM recommends that the applicant revise the site plan to identify the locations of a minimum 41 Class I bicycle spaces.

Construction Impacts / Recommendations

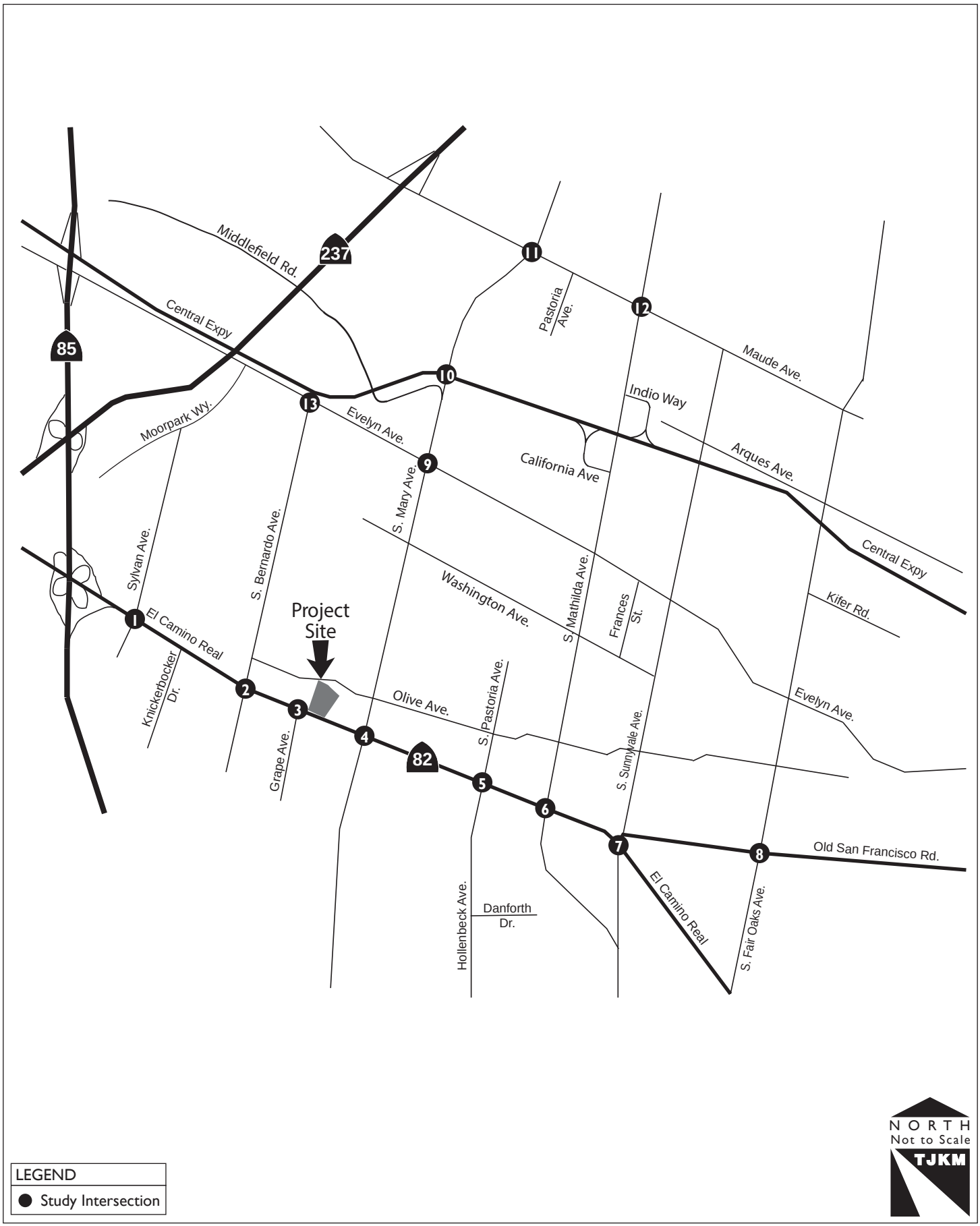
Traffic Operations

TJKM recommends that construction truck traffic be limited to using Mathilda Avenue if traveling from/to SR 237 or US 101, El Camino Real if traveling from/to SR 85, and Evelyn and Mathilda Avenues if traveling from/to Central Expressway. These roadways provide the most direct access for construction trucks to/from the project site and would generally avoid residential areas.

The addition of construction truck traffic is not expected to have a significant impact in terms of intersection operations, since all study intersections are expected to operate at LOS D or better under Existing plus Project and Background plus Project Conditions. It should also be noted that construction traffic would not follow the same circulation patterns as project trips. However, since Mathilda Avenue currently experiences significant congestion at the closely spaced SR 237 ramp terminals north of the project site during commute peak hours, TJKM recommends that construction truck access to the site be restricted during weekday commute peak periods (7:00-9:00 a.m. and 4:00-6:00 p.m.), to limit potential impacts to traffic operations for that section of Mathilda Avenue.

City of Sunnyvale–Transportation Impact Analysis for Sobrato Mixed-Use Project
Vicinity Map

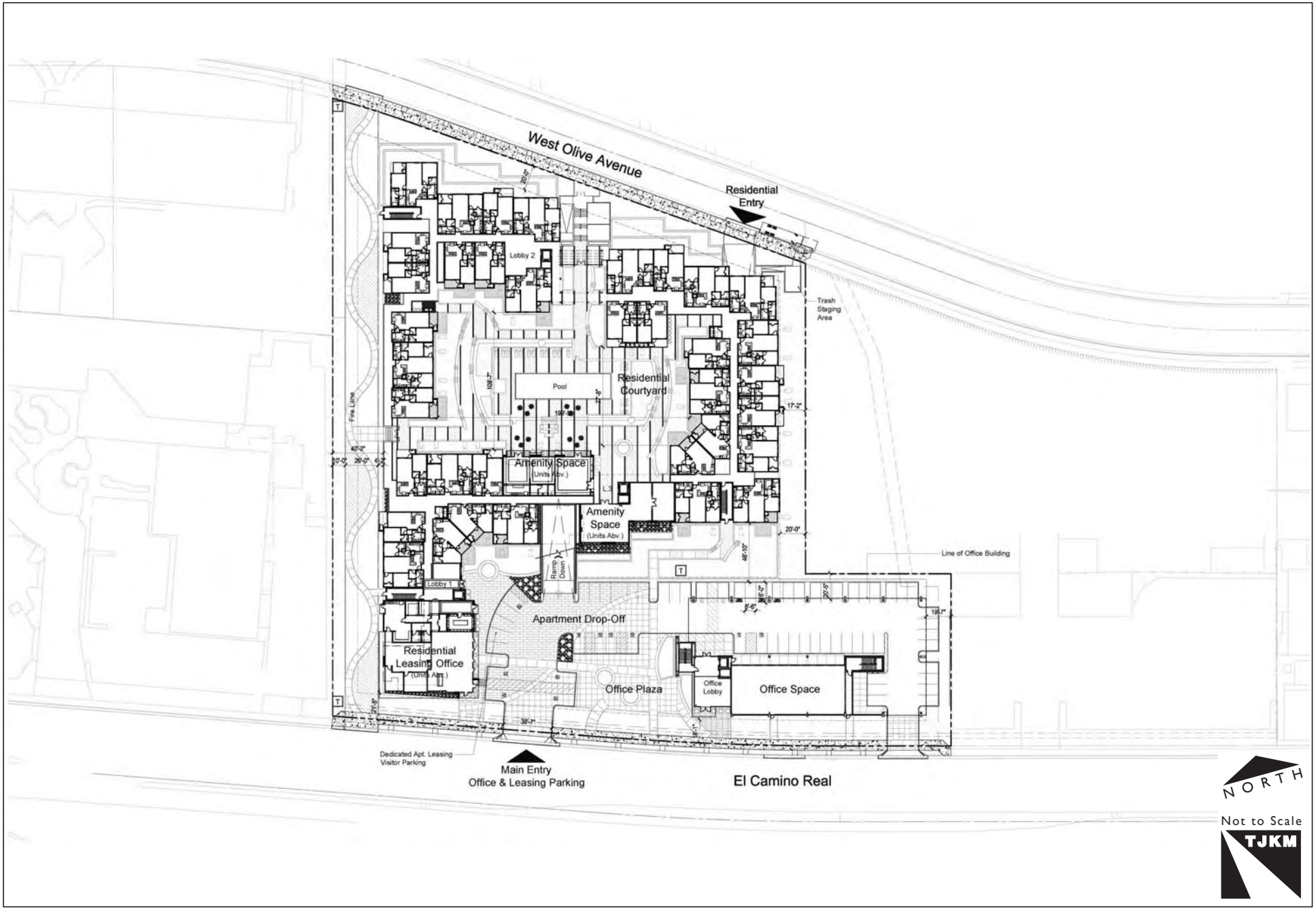
Figure 1



City of Sunnyvale–Transportation Impact Analysis for Sobrato Mixed-Use Project

Figure 2

Project Site Plan



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Source: GTGY Group, Inc.

Level of Service Analysis Methodology

Level of service is a qualitative measure that describes operational conditions as they relate to the traffic stream and perceptions by motorists and passengers. The level of service generally describes these conditions in terms of such factors as speed and travel time, delays, freedom to maneuver, traffic interruptions, comfort, convenience and safety. The operational levels of service (LOS) are given letter designations from "A" to "F," with "A" representing the best operating conditions (free-flow) and "F" the worst (severely congested flow with high delays). Intersections generally are the capacity-controlling locations with respect to traffic operations on arterial and collector streets.

Signalized Intersections

The study intersections under traffic signal control were analyzed using the *Highway Capacity Manual 2000* (HCM 2000) Operations Method contained in the standard traffic software TRAFFIX. This methodology determines LOS based on average control delay per vehicle for the overall intersection during peak hour intersection operating conditions. LOS "A" indicates free flow conditions with little or no delay, while LOS "F" indicates jammed conditions with excessive delay and long back-ups. The methodology is described in detail in Appendix A.

Level of Service Threshold Criteria

The study intersections fall within City of Sunnyvale jurisdiction but are subject to different traffic operational standards depending on whether they are monitored as part of the Santa Clara County Valley Transportation Authority (VTA) Congestion Management Program (CMP).

Signalized Intersections

The City of Sunnyvale level of service (LOS) traffic operational standard for intersections is LOS D, except for City intersections that are designated as regionally significant and accordingly have a LOS E standard. For purposes of this study, regionally significant facilities include intersections along Mathilda Avenue, Mary Avenue, El Camino Real, Central Expressway and freeway ramp junctions at SR 237 and SR 85. Traffic impacts due to implementation of a proposed project occur when:

- Non-regionally significant intersection operations deteriorate from LOS D or better (acceptable) under the baseline conditions to LOS E or F (unacceptable), or
- Regionally significant intersection operations deteriorate from LOS E or better (acceptable) to LOS F (unacceptable)
- Unacceptable operations are exacerbated by increasing average critical delay by more than four (4) seconds and increasing the critical volume-to-capacity (v/c) ratio by 0.01 or more at an intersection operating at LOS E or F (LOS F for regionally significant intersections).

Freeway Segments

According to VTA's 2010 *Transportation Impact Analysis Guidelines*, a freeway segment analysis should be conducted if a proposed project meets one of the following criteria:

- It is expected to add traffic equal to at least one percent of a freeway segment's capacity.
- It is adjacent to one of the freeway segment's access or egress points.
- Based on engineering judgment, Lead Agency staff determines that the freeway segment should be included in the analysis.

For mixed-flow lanes, freeway segment capacities are defined as 2,200 vehicles per hour per lane (vphpl) for four-lane freeway segments and 2,300 vphpl for six-lane freeway segments. Capacities of high-occupancy vehicle (HOV) lanes are defined as between 1,800 and 1,900 vphpl.

Study Traffic Analysis Scenarios

The study evaluated traffic operational conditions under the following six (6) analysis scenarios:

1. Existing Conditions – this scenario is based on existing 2013 roadway conditions, traffic controls, lane geometry, and traffic counts collected as part of this TIA.
2. Existing plus Project Conditions – this scenario is identical to Existing Conditions, but with the addition of traffic generated by the proposed Sobrato Mixed-Use project, which represents a net increase of 156 multi-family residential dwelling units, and 40,554 sq. ft. of gross floor area of office use.
3. Background Conditions – this scenario is based on the Existing Conditions scenario, but includes approved/pending City of Sunnyvale developments that are not yet built or occupied.
4. Background plus Project Conditions – this scenario is identical to Background Conditions, but with the addition of traffic generated by the proposed Sobrato Mixed-Use project.
5. Cumulative Conditions – this scenario is based on existing traffic volumes that are factored using annual growth rates based on the City traffic model to year 2023 (ten years from Existing Conditions). The scenario accounts for City of Sunnyvale developments that are not yet built or occupied, but does not include the proposed project.
6. Cumulative plus Project Conditions - this scenario is identical to Cumulative Conditions, but with the addition of traffic generated by the proposed Sobrato Mixed-Use project.

Study Intersections

The study focused on evaluating traffic conditions at the following 13 study intersections within the City of Sunnyvale that the proposed project may potentially impact (see Figure 1), selected in consultation with City of Sunnyvale staff:

1. El Camino Real/Sylvan Avenue
2. El Camino Real/S. Bernardo Avenue
3. El Camino Real/Grape Avenue
4. El Camino Real/S. Mary Avenue
5. El Camino Real/S. Pastoria Avenue/Hollenbeck Avenue
6. El Camino Real/S. Mathilda Avenue
7. El Camino Real/S. Sunnyvale Avenue
8. S. Fair Oaks Avenue/Old San Francisco Road
9. S. Mary Avenue/Evelyn Avenue
10. S. Mary Avenue/Central Expressway
11. S. Mary Avenue/Maude Avenue
12. S. Mathilda Avenue/Maude Avenue
13. Evelyn Avenue/S. Bernardo Avenue

Study Freeway Segments

The study focused on evaluating traffic conditions at two study freeway segments that the proposed project may potentially impact, selected in consultation with City of Sunnyvale staff. The freeway segments analyzed are:

1. SR 85 between SR 237 and El Camino Real
2. SR 85 between El Camino Real and Fremont Avenue

Existing Conditions

This section describes existing conditions in the project site vicinity, including roadway facilities, bicycle and pedestrian facilities, and available transit service. In addition, existing traffic volumes and operations are presented for both study intersection and freeway segments, including the results of level of service calculations.

Existing Roadway System and Setting

Regional roadway facilities providing access to the Sobrato Mixed-Use project include State Route 85 (SR 85) and State Route 237 (SR 237) freeways, as well as El Camino Real, and Central Expressway. Local roadways providing local access include Bernardo Avenue, Mary Avenue, and Olive Avenue. Descriptions of each roadway facility are presented below. Current City policy for acceptable service levels on all local roadways is LOS D unless otherwise noted.

SR 85 is a regionally significant freeway that provides access between the Cities of Mountain View to the west and San Jose to the east. From Mountain View, it is a north-south freeway until it reaches Cupertino where it begins to take an east-west alignment into San Jose. It has two mixed-flow lanes and one high occupancy vehicle (HOV) lane in each direction. The HOV lanes are restricted to vehicles with two or more persons (carpool, vanpool, and buses) or motorcycles during the morning (5:00 a.m. to 9:00 a.m.) and evening (3:00 p.m. to 7:00 p.m.) commute periods. Access from SR 85 in the project vicinity is provided by interchanges with El Camino Real, SR 237, and Central Expressway. Near the project site, SR 85 currently averages 119,000 daily vehicles. The City of Sunnyvale's General Plan classifies SR 85 as a State Freeway.

SR 237 is a regionally significant freeway located northwest of the project site that provides access between the City of Mountain View to the west and Milpitas to the east. It is an east-west freeway with two mixed-flow lanes and one HOV lane in each direction east of Mathilda Avenue. Access from SR 237 in the project vicinity is provided by interchanges with S. Whisman Road, E. Middlefield Road and W. Maude Avenue, as well as its terminus at El Camino Real. Near the project site, SR 237 currently averages 62,000 daily vehicles.

Central Expressway is a regionally significant roadway located north of the project site that provides access between the City of Mountain View to the west and Santa Clara to the east. It is an east-west expressway with two mixed flow lanes in each direction and an acceptable service level threshold of LOS E. The City's Bicycle Plan designates Central Expressway as a Class III bicycle route, as County policy permits bicycles to use the wide shoulders. Access from Central Expressway in the project vicinity is provided by interchanges with E. Arques Avenue, San Anselmo Way, San Bernardino Way, Soquel Way, Sobrante Way, Potrero Avenue, Pajaro Avenue, and Mary Avenue. Central Expressway currently averages approximately 21,000 daily vehicles.

El Camino Real (State Route 82) is adjacent to the project site's southern boundary and provides regional access between the cities of San Francisco to the north and San Jose to the south. It is a regionally significant east-west (in the project vicinity) arterial with three mixed flow lanes in each direction and an acceptable service level threshold of LOS E. It provides direct access to the project site through two driveways in the westbound direction. The roadway provides local connections with Sylvan Avenue, S. Bernardo Avenue, S. Mary Avenue, S. Pastoria Avenue/Hollenbeck Avenue, S. Mathilda Avenue, S. Sunnyvale Avenue, as well as State Routes 85 and 237. El Camino Real currently averages 56,000 daily vehicles. The City of Sunnyvale's General Plan classifies El Camino Real as a Class I Arterial.

Evelyn Avenue, located north of the project site, is a two-lane east-west arterial with Class II bicycle lanes. It extends from Shoreline Boulevard in the west to Reed Avenue in the east, running roughly parallel to Central Expressway in Mountain View. Evelyn Avenue is a City of Sunnyvale designated route for trucks over three tons in weight. It provides access to the project site through connections with S. Bernardo and S. Mary Avenues. The roadway currently averages 12,400 daily vehicles. The City of Sunnyvale's General Plan classifies Evelyn Avenue as a Class II Arterial.

Fair Oaks Avenue is a four-lane north-south arterial east of the project site that extends from Java Drive and SR 237 in the north to El Camino Real in the south, where it becomes Remington Drive. It includes non-continuous Class II bicycle lanes between Kifer Road and Evelyn Avenue, and from Old San Francisco Road heading south onto Remington Drive. Fair Oaks Avenue provides access to the project site through connections with El Camino Real and Evelyn Avenue. The roadway currently averages 21,800 daily vehicles. The City of Sunnyvale's General Plan classifies Fair Oaks Avenue as a Class II Arterial.

Mary Avenue is a four-lane north-south arterial east of the project site that extends from Maude Avenue in the north to Homestead Road in the south. Mary Avenue is designated as a Class III bicycle route from Maude Avenue in the north to Cascade Drive in the south. It provides access to the project site through connections with El Camino Real and W. Olive Avenue. It currently averages approximately 17,800 daily vehicles. The City of Sunnyvale's General Plan classifies S Mary Avenue as a Class II Arterial.

Mathilda Avenue is a six-lane north-south arterial roadway east of the project site that provides local connections to the SR 237 and US 101 freeways. It is designated as a regional corridor in the City of Sunnyvale General Plan with an acceptable service level threshold of LOS E. North of SR 237, Mathilda Avenue connects with Caribbean Drive, which is an extension of Lawrence Expressway. To the south, Mathilda Avenue passes through central Sunnyvale and becomes Sunnyvale-Saratoga Road, providing access to I-280 and SR 85. South of El Camino Real, it includes Class II bicycle lanes. Mathilda Avenue is a City of Sunnyvale designated route for trucks over three tons in weight. It provides access to the project site through connections with El Camino Real and W. Olive Avenue, and currently averages 45,500 daily vehicles. The City of Sunnyvale's General Plan classifies Mathilda Avenue as a Class I Arterial.

Sunnyvale Avenue is a two-lane north-south arterial east of the project site that extends from Maude Avenue in the north to El Camino Real in the south, where it becomes Sunnyvale Saratoga Road. Sunnyvale Avenue includes Class II bicycle lanes south of Evelyn Avenue. It provides access to the project site through connections with El Camino Real and W. Olive Avenue. It currently averages approximately 12,500 daily vehicles. The City of Sunnyvale's General Plan classifies Sunnyvale Avenue as a Class II Arterial in the area of the project site.

Bernardo Avenue, Hollenbeck Avenue/Pastoria Avenue, Old San Francisco Road, and Maude Avenue are collector roads in the vicinity of the project site which feed traffic from local residential and commercial/industrial areas onto nearby arterials. Bernardo Avenue and Hollenbeck Avenue/ Pastoria Avenue are north-south roads and are classified as Residential Collectors in the City's General Plan. Old San Francisco Road and Maude Avenue are east-west roads and are classified as Commercial/Industrial Collectors in the City's General Plan. Portions of these roads include Class II bicycle lanes.

Local streets near the project site and adjacent to the study intersections include *Sylvan*, *Grape*, and *Olive Avenues*. Sylvan Avenue is located in Mountain View, and includes Class II bicycle lanes. Olive Avenue is immediately adjacent to the project site's northern boundary. Currently, there is no site driveway or pedestrian path providing access to the project site from Olive Avenue.

Existing and Planned Bicycle Facilities

Bicycle facilities are classified in three ways: off-street paths separated from auto traffic (Class I), on-street striped lanes (Class II), and on-street signed routes in which bicycles share the roadway with other vehicles (Class III). Currently near the project site, Class II bicycle lanes are provided along the following roadways:

- Evelyn Avenue from Downtown Mountain View to Reed Avenue
- Maude Avenue between SR 237 and Pastoria Avenue
- Mary Avenue between Almanor Avenue and Maude Avenue, and between Fremont Avenue and Homestead Road
- Fair Oaks between Kifer Road and Evelyn Avenue and between Old San Francisco Road and El Camino Real (The bicycle lanes extend onto Remington Drive and continue to Sunnyvale-Saratoga Road)
- Sunnyvale Avenue between Evelyn Avenue and El Camino Real (The bicycle lanes extend onto Sunnyvale-Saratoga and continue south into Cupertino)
- Mathilda Avenue between El Camino Real and Sunnyvale-Saratoga Road
- Moorpark Way from Evelyn Avenue to Dana Street
- Hollenbeck Avenue between El Camino Real and Danforth Drive
- Bernardo Avenue between El Camino Real and Remington Drive
- Sylvan Avenue between Moorpark Way and Continental Circle
- Knickerbocker Drive between El Camino Real and Mango Avenue
- Kifer Road between S. Fair Oaks Avenue and Lawrence Expressway
- Old San Francisco Road between Sunnyvale Avenue and Wolfe Road (the bicycle lanes extend onto Reed Avenue and continue east to Lawrence Expressway)
- Central Expressway – though not explicitly signed or striped as a bicycle lane, County Roads permit bicycles to ride on the existing wide roadway shoulders

In addition, a Class III bicycle route is currently designated along Mary Avenue extending from Maude Avenue in the north to Fremont Avenue in the south. The City is presently conducting preliminary studies regarding the feasibility to install bicycle lanes from Maude Avenue to Fremont Avenue.

In terms of Class I off-street bicycle paths, the Stevens Creek Trail is the closest. It is located just east of downtown Mountain View and west of the project site. Figure 3 shows the location of all existing bicycle facilities within the study area.

It should be noted that VTA has adopted the Santa Clara Countywide Bicycle Plan (CBP). The CBP guides the development of major bicycling facilities by designating Cross County Bicycle Corridors and identifying bicycle projects of countywide or intercity significance. Several of these routes travel through the study area, including routes along Maude Avenue, Mary Avenue, Washington Avenue, Evelyn Avenue, and El Camino Real.

In terms of future bicycle facilities within the study area, funding was recently approved to construct Class II bicycle lanes along Mathilda Avenue between California and Maude Avenue. Class II facilities are also planned along Maude Avenue east of Mathilda Avenue and along Mary Avenue between Maude Avenue and Fremont Avenue. Additionally, VTA plans to construct a non-motorized Across Barrier Connection on Bernardo Avenue that will pass underneath the Caltrain Right-Of-Way (ROW) and provide a bicycle and pedestrian connection between South Bernardo and North Bernardo Avenues.

Existing Pedestrian Facilities

Pedestrian facilities typically consist of sidewalks, crosswalks, and pedestrian signals at signalized intersections. Adjacent to the project site, sidewalks are provided on both sides of El Camino Real and Olive Avenue. Most study intersections in the project vicinity include crosswalks, pedestrian signals on all approaches, and ADA-compliant curb ramps. The sole exception is the Bernardo and Evelyn intersection, which is adjacent to the Caltrain ROW and does not feature sidewalks on the north side of the intersection, and thus no crosswalk facilities serve that side of the roadway.

Existing Transit Service

The proposed Sobrato Mixed-Use project site is very well served by public transportation. The Santa Clara Valley Transportation Authority (VTA), which operates bus and light rail service within Santa Clara County, runs multiple transit routes through the study area, including along El Camino Real. The project site is also approximately 1.7-mile walking distance from the Sunnyvale Caltrain Station. It should be noted that this distance is greater than the VTA CMP guideline of 2,000 feet reasonable walking distance to a transit stop.

VTA serves the project study area with eight fixed-route bus lines. The project site is within 2,000 feet walking distance of nine existing VTA bus stops located on El Camino Real and Bernardo Avenue. Route 22 serves three stops on the westbound side and three stops on the eastbound side of El Camino Real. The eastbound and westbound stops immediately west of the El Camino Real/Bernardo Avenue intersection additionally are served by Route 522, which is a rapid bus with limited stops. The three remaining stops located on Bernardo Avenue (north and south of the El Camino Real/Bernardo intersection) are served by Route 53 northbound and southbound. Both of these routes provide service to the Palo Alto and Eastridge Transit Centers, in addition to intermediate transit centers adjacent to El Camino Real.

Six additional routes provide service to the study area. Route 26 serves the Lockheed Martin Transit Center, while Routes 32, 53, 55 and 304 serve the Sunnyvale Transit Center. Route 54 serves both of these Transit Centers.

In addition, the Mary/Moffett and Duane Avenue Caltrain Shuttles that serve AMD, Moffett Field/NASA and other nearby businesses operate in the project vicinity. The Mary/Moffett shuttle operates between the Mountain View Caltrain Station (northwest of the project site) and Moffett Field (north of the project site). The Duane Avenue Shuttle operates between the Mountain View Caltrain Station and the Lawrence Caltrain Station to the east, via Central Expressway.

Table I on the following page summarizes the destinations, days and hours of operation, average peak load factors, and service headways for the transit routes servicing the immediate project area. The VTA bus routes' peak load factors are below 1.0, which represents a line operating with fully occupied seating, except Route 522, which has a slightly higher overall average commute peak hour load factor of 1.05. Figure 4 depicts the locations of the public transportation routes in relation to the project site.

Table I: Existing Transit Service within Study Area

Route	From	To	Weekdays			Weekends	
			Average Peak Load Factor	Operating Hours	Peak Headway (minutes)	Operating Hours	Headway (minutes)
22	Palo Alto Transit Center	Eastridge Transit Center	0.94	3:24 a.m. - 4:10 a.m. (following day)	10-17	3:23 am - 4:07 a.m. (following day)	12-81
26	Lockheed Martin Transit Center	Eastridge Transit Center	0.92	5:22 a.m. - 11:49 p.m.	15-34	6:24 a.m. - 10:53 p.m.	25-90
32	San Antonio Shopping Center	Santa Clara Transit Center	0.73	6:00 a.m. - 8:02 p.m.	30	8:50 a.m. - 5:51 p.m.	56-65
53	West Valley College	Sunnyvale Transit Center	0.83	6:54 a.m. - 6:56 p.m.	28-62	N/A	N/A
54	De Anza College	Lockheed Martin Transit Center	0.78	6:01 a.m. - 9:29 p.m.	26-32	7:57 a.m. - 7:52 p.m.	42-63
55	De Anza College	Great America	0.74	5:37 a.m. - 11:07 p.m.	13-44	7:53 a.m. - 9:12 p.m.	28-64
304	South San Jose	Sunnyvale Transit Center	0.40	5:56 a.m. - 8:42 a.m. 3:34 p.m. - 6:56 p.m.	27-46	N/A	N/A
522	Palo Alto Transit Center	Eastridge Transit Center	1.05	4:45 a.m. - 9:01 p.m.	12-19	7:50 a.m. - 8:33 p.m.	12-40
Mary/Moffett Shuttle	Mountain View Station	Moffett Field/NASA	N/A	6:35 a.m. - 10:03 a.m. 3:20 p.m. - 6:33 p.m.	66 (a.m.) 55 (p.m.)	N/A	N/A
Duane Ave Shuttle	Lawrence Station	Mountain View Station	N/A	7:12 a.m. - 10:06 a.m. 3:13 p.m. - 7:36 p.m.	24-43 (a.m.) 22-37 (p.m.)	N/A	N/A
Caltrain (Rail)	San Francisco	San Jose	N/A	4:44 a.m. – 1:44 a.m.	5-40 NB & 30-60 SB (a.m.); 60 NB & 4-35 SB (p.m.)	7:14 p.m. – 11:34 p.m.	18-60

Notes: 1. Headways are defined as the time interval between two transit vehicles traveling in the same direction over the same route.
2. N/A = not available or no weekend service
Sources: VTA, CalTrain, June 2012.

Existing Traffic Volumes
NDS collected weekday commute peak hour turning movement counts at the intersections of Bernardo Avenue/Evelyn Ave in June 2012, Sylvan Avenue/El Camino Real and Grape Avenue/El Camino Real in July 2013, and at Fair Oaks Avenue/Old San Francisco Road and Bernardo Avenue/Evelyn Avenue (a.m. peak only) in August 2013. Counts for the remaining study intersections and for the p.m. peak period at Bernardo Avenue/Evelyn Avenue were obtained from the City of Sunnyvale, and were collected as part of prior development studies and the Citywide Transportation Strategic Program in 2012 and 2013. For all study intersections, counts were taken on mid-week weekdays from 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m.

Figure 5 shows the existing weekday a.m. and p.m. peak one hour turning movement volumes at all study intersections, as well as lane configuration and traffic control devices.

Existing Pedestrian and Bicycle Volumes
NDS collected weekday commute peak hour pedestrian and bicycle turning movement counts at the intersections of El Camino Real/S. Bernardo Avenue, El Camino Real/S. Mary Avenue, El Camino Real/S. Mathilda Avenue, N. Mary Avenue/W. Evelyn Avenue, N. Mary Avenue/Central Expressway, N. Mary Avenue/Maude Avenue and E. Evelyn Avenue/S. Bernardo Avenue in May 2012; N. Mathilda Avenue/ Maude Avenue in March 2013; El Camino Real/Sylvan Avenue and El Camino Real/Grape Avenue in July 2013; and El Camino Real/S. Pastoria Avenue, El Camino Real/S. Sunnyvale Avenue and Old San Francisco Road/ S. Fair Oaks Avenue in September 2013. For all study intersections, counts were taken on mid-week weekdays from 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m.

Figure 6 shows the existing weekday a.m. and p.m. peak one hour pedestrian and bicycle turning movement volumes at all study intersections.

Intersection Level of Service Analysis Results (Existing Conditions)
Traffic operations for the study intersections were evaluated under Existing Conditions for the weekday a.m. and p.m. peak hours.

Table II summarizes the results of the intersection analysis under Existing Conditions. Detailed LOS calculations are contained in Appendix B. Currently, all study intersections are operating at LOS D or better during both weekday a.m. and p.m. peak hours, which meets City of Sunnyvale and VTA CMP standards.

Table II: Intersection Levels of Service – Existing Conditions

Intersection		Peak Hour	Existing Conditions	
			Delay	LOS
1	El Camino Real/Sylvan Avenue	A.M.	30.8	C
		P.M.	27.3	C
2	El Camino Real/S. Bernardo Avenue	A.M.	41.2	D
		P.M.	34.7	C
3	El Camino Real/Grape Avenue	A.M.	9.7	A
		P.M.	13.6	B
4	El Camino Real/S. Mary Avenue	A.M.	36.6	D
		P.M.	36.5	D
5	El Camino Real/ S. Pastoria Avenue/Hollenbeck Avenue	A.M.	28.4	C
		P.M.	26.1	C
6	El Camino Real/ S. Mathilda Avenue	A.M.	26.4	C
		P.M.	26.3	C
7	El Camino Real/ S. Sunnyvale Avenue	A.M.	24.6	C
		P.M.	30.9	C
8	S. Fair Oaks Avenue/Old San Francisco Road	A.M.	32.9	C
		P.M.	34.6	C
9	S. Mary Avenue/ Evelyn Avenue	A.M.	24.7	C
		P.M.	21.7	C
10	S. Mary Avenue/Central Expressway	A.M.	53.6	D
		P.M.	51.3	D
11	S. Mary Avenue/Maude Avenue	A.M.	25.2	C
		P.M.	28.4	C
12	S. Mathilda Avenue/Maude Avenue	A.M.	24.2	C
		P.M.	25.8	C
13	Evelyn Avenue/S. Bernardo Avenue	A.M.	19.7	B
		P.M.	20.1	C

Notes: 1) LOS=Level of Service, Delay = Average control delay per vehicle
2) Signalized intersections – Delay / LOS is for overall intersection
3) All intersections are signalized.
4) **Bold** indicates LOS exceeds applicable jurisdictional standards for operating conditions.

Freeway Level of Service Analysis Results (Existing Conditions)

Traffic operations for the study freeway segments were evaluated under Existing Conditions for the weekday a.m. and p.m. peak hours. Table III shows Existing Conditions freeway LOS for the mixed-flow lanes based on freeway segment densities as reported in VTA's *2011 CMP Monitoring and Conformance Report*. According to the table, the following freeway segments exceed the VTA operational standard of LOS E or better during specified peak hours:

- SR 85 Southbound, SR 237 to El Camino Real (p.m. peak hour)
- SR 85 Southbound, El Camino Real to Fremont Avenue (p.m. peak hour)
- SR 85 Northbound, Fremont Avenue to El Camino Real (a.m. peak hour)

Table III: Freeway Levels of Service – Existing Conditions

Freeway Segment	*Direction*	*Capacity (vphpl)*	*Peak Hour*	*Existing Conditions (Year 2011)*				
				Lanes	*Average Speed*	*Volume*	*Density (pcpmpl)*	*LOS*
SR 85, El Camino Real to SR 237	NB	4,400	A.M.	2	40	4,160	52.0	E
			P.M.	2	66	3,670	27.8	D
	SB	4,400	A.M.	2	66	4,130	31.3	C
			P.M.	2	12	3,180	132.5	F
SR 85, Fremont Ave to El Camino Real	NB	4,400	A.M.	2	29	3770	65.0	F
			P.M.	2	66	3,670	27.8	D
	SB	4,400	A.M.	2	66	3,300	25.0	C
			P.M.	2	25	3,600	72.0	F

Notes: 1) Capacity in vehicles per hour per lane.
2) Lanes are shown for mixed-flow only since project trips are assumed as added to mixed-flow lanes only.
3) Average speed in miles per hour (mph).
4) Volume in vehicles.
5) Density equal to passenger cars per mile per lane (pcpmpl).
6) LOS = level of service.

Source: VTA Monitoring and Conformance Report, VTA, June 2012.

Turning Lane Storage Analysis Results (Existing Conditions)

TJKM analyzed existing vehicle storage capacity of turning lanes at the study intersections that are expected to accommodate additional traffic from the project. The turning lane storage analysis results for Existing Conditions are summarized in Table IV. The following turn lanes currently experience 95th percentile (maximum) vehicle queue lengths that exceed the total storage length and thereby experience spillover conditions during weekday a.m. and/or p.m. peak hours.

- El Camino Real/S. Mary Avenue (northbound left turn - a.m. peak)
- El Camino Real/S. Mathilda Avenue (southbound right turn - p.m. peak)
- S. Fair Oaks/Old San Francisco Road (eastbound left turn- a.m. and p.m. peak)
- S. Mary Avenue/Central Expressway (northbound left turn – a.m. and p.m. peak; and westbound left turn- a.m. peak)

Table IV: Turn Lane Storage – Existing Conditions

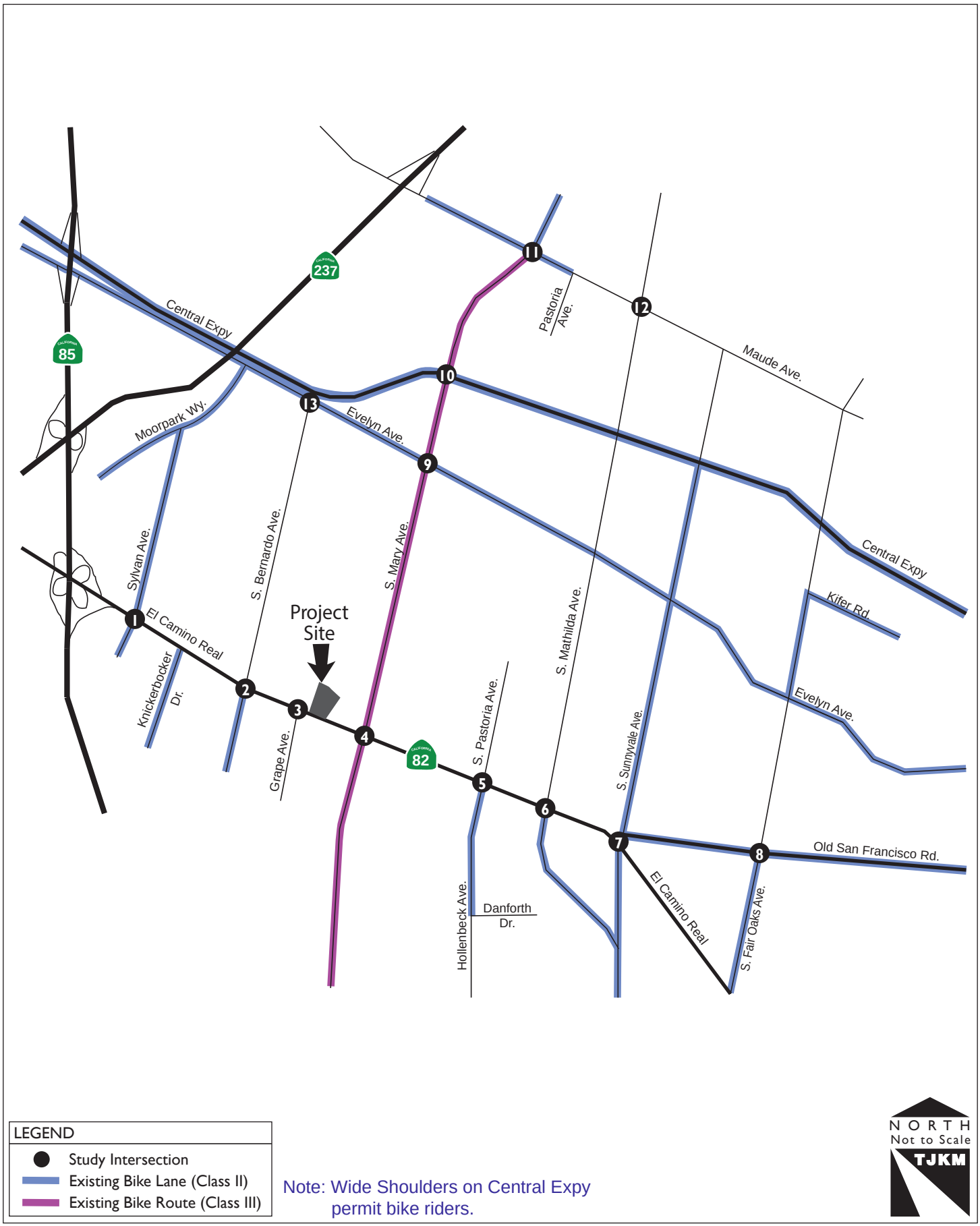
Intersection		Movement	Total Storage Length (ft)	95th Percentile Queue Length (20 ft. Average Vehicle Length)	
				Existing	
				AM	PM
2	El Camino Real/S. Bernardo Avenue	NBRT	115	81	113
3	El Camino Real/Grape Avenue	WBLT	270	58	138
4	El Camino Real/S. Mary Avenue	NBLT	220	**243**	215
		EBLT	425	239	241
6	El Camino Real/S. Mathilda Avenue	NBLT	750*	158	89
		EBLT	630*	254	118
		SBRT	275	156	**346**
7	El Camino Real/S. Sunnyvale Avenue	EBLT	785*	85	140
8	S. Fair Oaks/Old San Francisco Road	EBLT	110	**141**	**167**
10	S. Mary Avenue/Central Expressway	NBLT	220*	**507**	**280**
		WBLT	660*	263	**693**
11	S. Mary Avenue/Maude Avenue	NBLT	180*	123	91
12	S. Mathilda Avenue/Maude Avenue+	NBRT	570	27	122
		WBLT	285*	98	86

Notes: *Total Storage Length includes combined length of two turning lanes.
+The NBT lane at S. Mathilda Avenue/Maude Avenue is a wide lane able to accommodate passing right turning vehicles.
BOLD = 95th percentile queue length exceeds total storage length.

City of Sunnyvale–Transportation Impact Analysis for Sobrato Mixed-Use Project

Existing Bicycle Facilities

Figure 3



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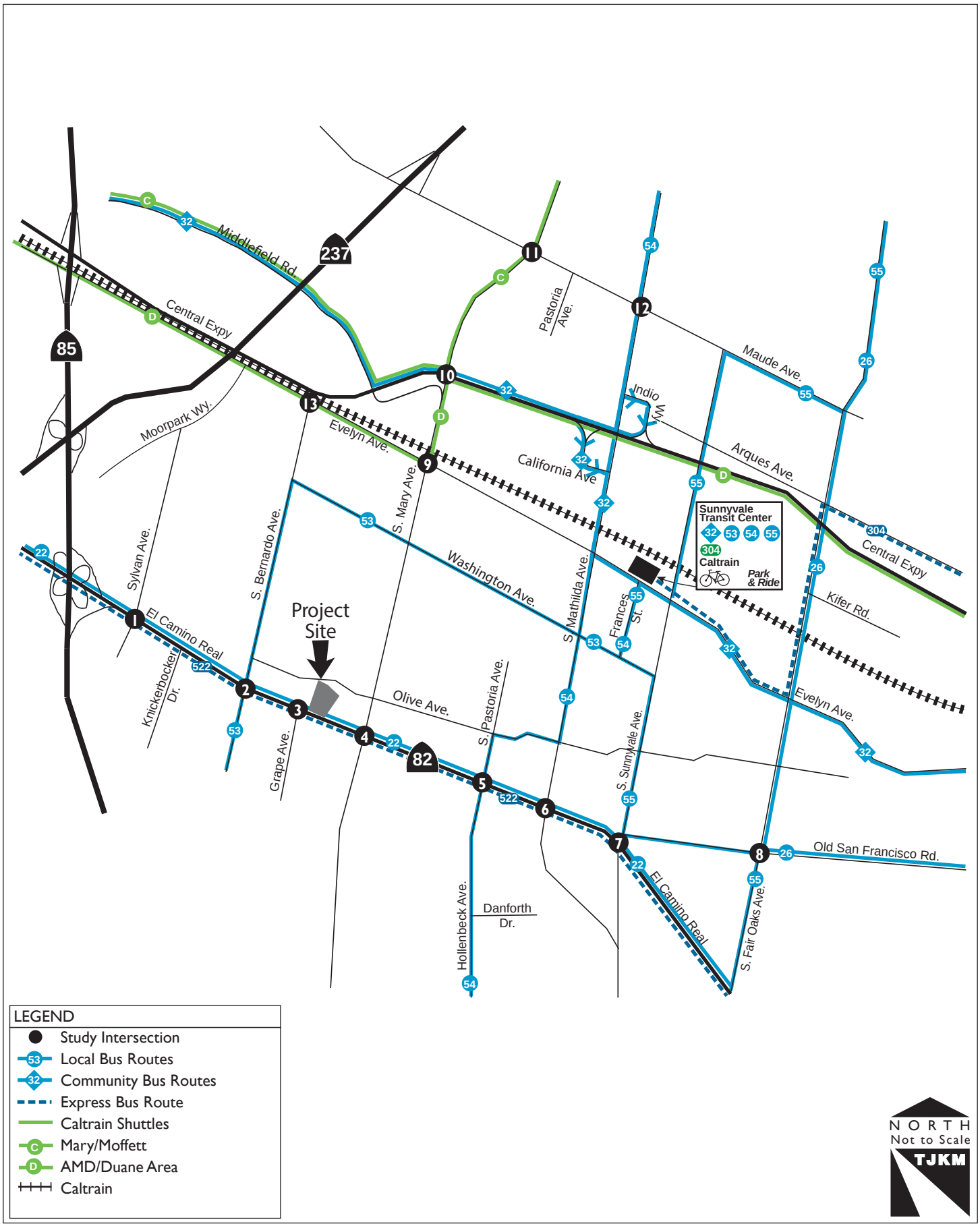
City of Sunnyvale–Transportation Impact Analysis for Sobrato Mixed-Use Project
Existing Transit and Shuttle Service

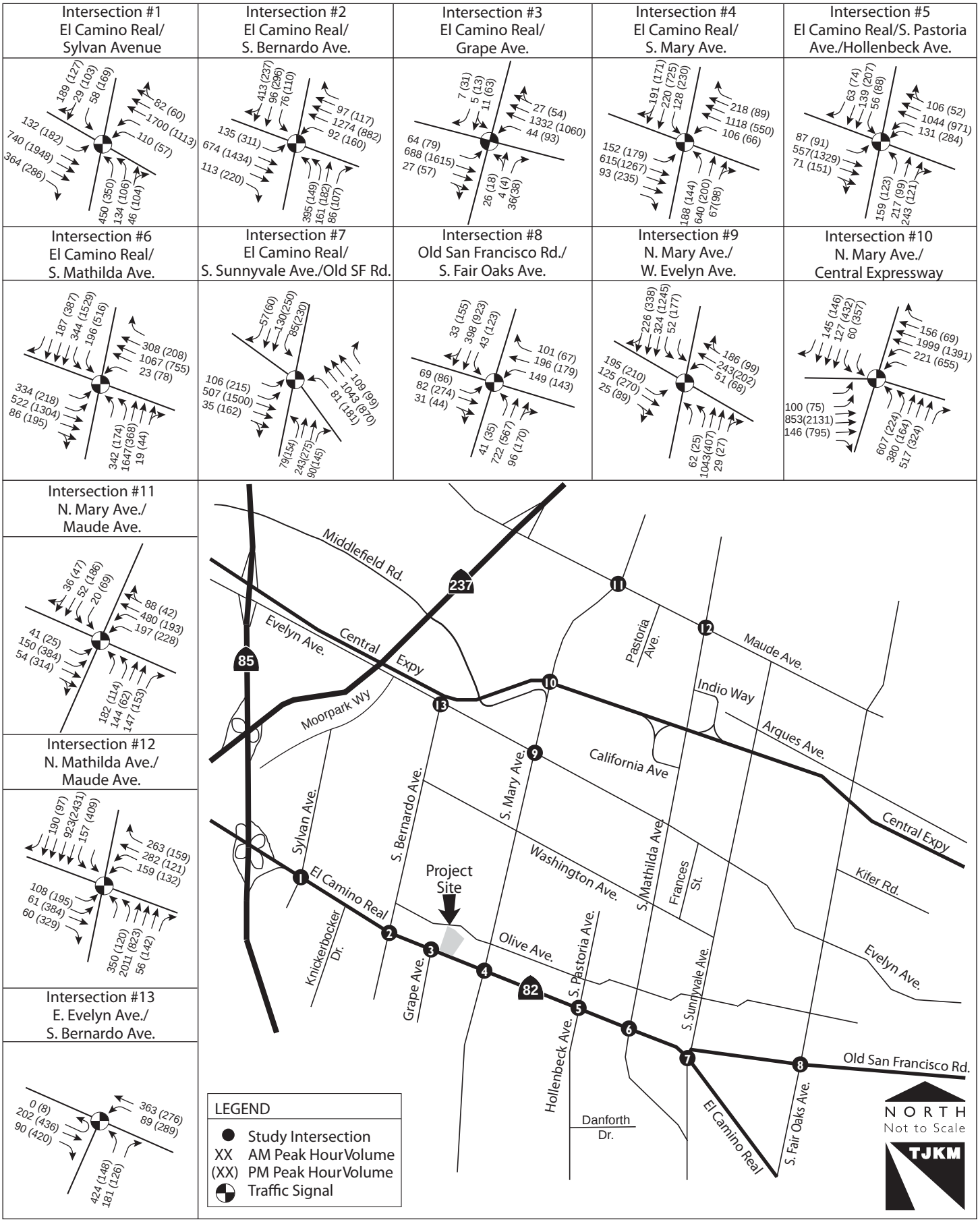
Figure 4



City of Sunnyvale–Transportation Impact Analysis for Sobrato Mixed-Use Project

Existing Condition Traffic Volumes, Lane Geometry, and Traffic Controls

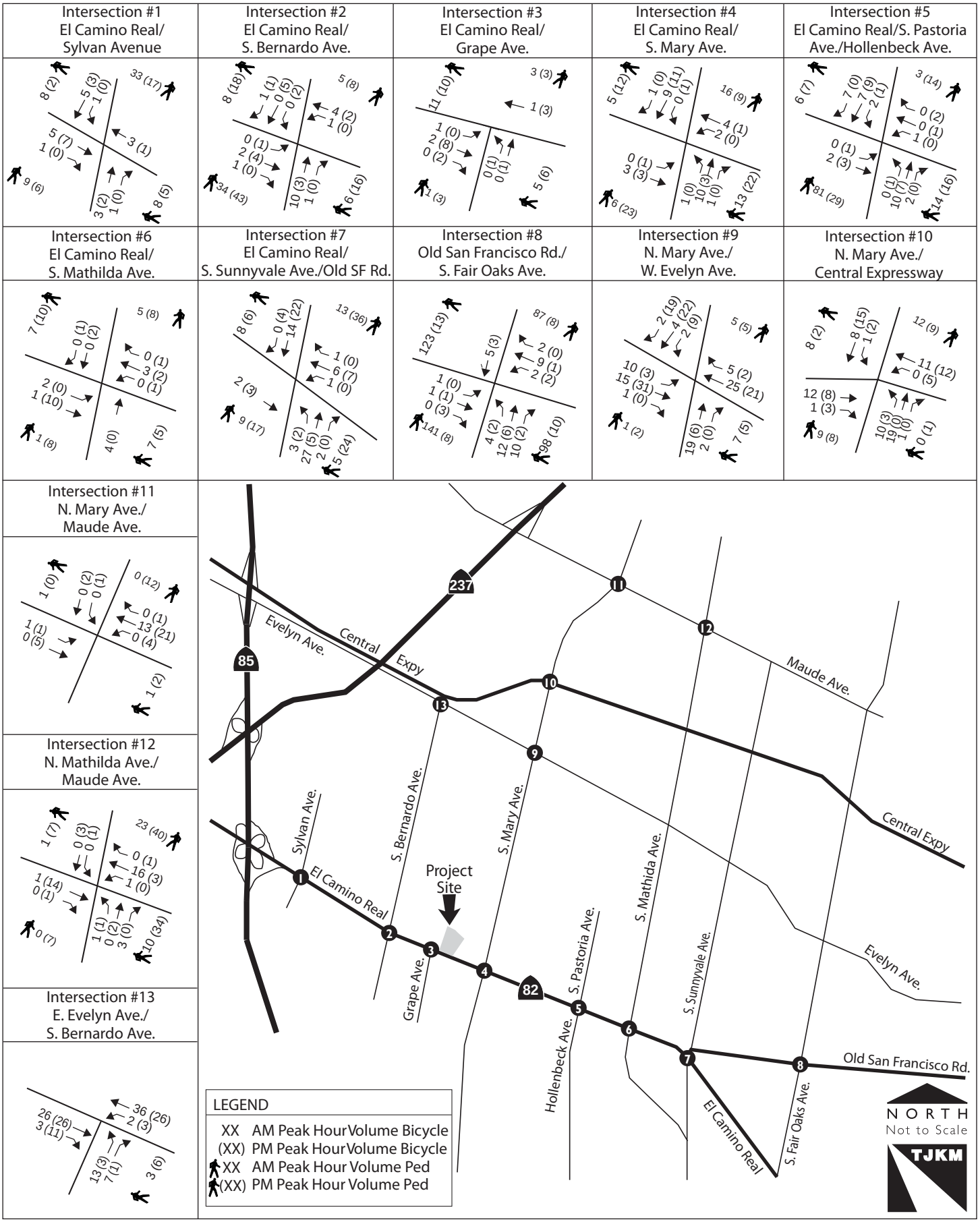
Figure 5



City of Sunnyvale–Transportation Impact Analysis for Sobrato Mixed-Use Project

Figure 6

Existing Pedestrian and Bicycle Volumes



Existing plus Project Conditions

This analysis scenario is similar to Existing Conditions, but with the addition of traffic expected to be generated by the proposed Sobrato Mixed-Use development.

Project Location and Proposal

The proposed Sobrato Mixed-Use development is to be located within two new buildings on the north side of El Camino Real between Bernardo and Mary Avenues in the City of Sunnyvale. The project site is bounded by existing commercial development to the west and east, Olive Avenue to the north, and El Camino Real to the south. The proposed project consists of a four-story residential apartment building with 156 total dwelling units and a three-story commercial office building with a total of 40,554 sq. ft. gross floor area. The project will include a total of 443 parking spaces, with 163 spaces dedicated to office, 239 spaces dedicated to residential, and 41 shared parking spaces.

Trip Generation – Proposed Project

TJKM developed expected trip generation for the proposed project based on published data in the Institute of Transportation Engineers' (ITE) reference Trip Generation (9th Edition, 2012). TJKM used ITE Codes 220 (Apartment) and 710 (General Office Building) to develop project trip generation.

In terms of trip reduction strategies, the proposed project is eligible for Mixed-Use and Transit trip reductions, consistent with VTA TIA guidelines. Thus, the project received an initial three percent Mixed-Use trip reduction for trips made between the residential and office land uses, as well as an additional two percent trip reduction given its proximity to major bus stops.

Table V shows the expected trip generation for the proposed project, including the three percent Mixed-Use and two percent transit stop reductions allowable per VTA guidelines. With these discounts, the proposed project is expected to generate a net of 1,656 daily vehicle trips, including 168 during the a.m. peak hour and 217 during the p.m. peak hour.

Table V: Proposed Project Trip Generation

Land Use (ITE Code)		*Size*	*Daily*		*A.M. Peak*				*P.M. Peak*			
			Rate	*Trips*	*Rate*	*In*	*Out*	*Total*	*Rate*	*In*	*Out*	*Total*
Apartment (220)		156 DUs	Eq. A	1,069	Eq. B	16	64	80	Eq. C	67	36	103
Office (710)		41 ksf	Eq. D	661	Eq. E	82	11	93	Eq. F	21	103	124
3 percent Mixed-Use Reduction	Apartment (220)		-3%	-20	-3%	0	-1	-1	-3%	-2	-1	-3
	Office (710)			-20		-1	0	-1		-1	-2	-3
2 percent Transit Reduction	Apartment (220)		-2%	-21	-2%	-1	-1	-2	-2%	-1	-1	-2
	Office (710)			-13		-2	0	-2		0	-2	-2
Total Trips Deducted				-74		-4	-2	-5		-4	-7	-11
Total Trips				1,656		94	74	168		84	132	217

Notes: 1) Equation A: T = 6.06(X) + 123.56
2) Equation B: T = 0.49(X) + 3.73
3) Equation C: T = 0.55(X) + 17.65
4) Equation D: Ln(T) = 0.76 Ln(X)+3.68
5) Equation E: Ln(T) = 0.80 Ln(X) + 1.57
6) Equation F: T = 1.12(X) + 78.45
7) Where T = Average Vehicle Trip Ends, X = dwelling units

Sources: Trip Generation Manual (ITE, 9th Edition, 2012), VTA Transportation Impact Analysis Guidelines (2012)

Project Trip Distribution and Assignment
Trip distribution is a process that determines in what proportion vehicles would be expected to travel between a project site and various destinations outside the project study area. The process of trip assignment determines the various routes that vehicles would take from the project site to each destination using the calculated trip distribution.

Trip distribution assumptions for the proposed Mixed-Use project were developed based on a select zone analysis using the Sunnyvale Travel Forecasting Model, TJKM's knowledge of the study area, and consultation with City transportation staff. Figure 7 illustrates the trip distribution percentages developed for the proposed Sobrato Mixed-Use project, as well as the resulting project trip assignments for the study intersections.

The assigned project trips were then added to Existing Conditions traffic volumes to generate Existing plus Project traffic volumes. Figure 8 shows the resulting traffic volumes at the study intersections under Existing plus Project Conditions. The intersection traffic controls and lane geometries assumed under this analysis scenario are the same as under the Existing Conditions analysis scenario.

Intersection Level of Service Analysis Results (Existing plus Project Conditions)
The intersection LOS analysis results for Existing plus Project Conditions are summarized in Table VI. Detailed calculation sheets for Existing plus Project Conditions are contained in Appendix C. All intersections are expected to continue operating at acceptable service levels of LOS D or better, as under Existing Conditions. Therefore, the proposed project is expected to have a less-than-significant impact with respect to project traffic under Existing plus Project Conditions, and no mitigations are required under this scenario.

Table VI: Intersection Levels of Service – Existing plus Project Conditions

Intersection		Peak Hour	Existing Conditions		Existing plus Project Conditions			
			Delay	LOS	Delay	LOS	Δ in Crit. V/C	Δ in Average Delay
1	El Camino Real/Sylvan Avenue	A.M.	30.8	C	29.0	C	-0.033	-1.8
		P.M.	27.3	C	27.3	C	0.004	0
2	El Camino Real/S. Bernardo Avenue	A.M.	41.2	D	39.9	D	-0.03	-1.3
		P.M.	34.7	C	35.3	D	0.007	0.6
3	El Camino Real/Grape Avenue	A.M.	9.7	A	9.9	A	-0.004	0.2
		P.M.	13.6	B	14.1	B	0.014	0.5
4	El Camino Real/S. Mary Avenue	A.M.	36.6	D	37.3	D	0.025	0.7
		P.M.	36.5	D	36.9	D	0.011	0.4
5	El Camino Real/ S. Pastoria Avenue/Hollenbeck Avenue	A.M.	28.4	C	28.2	C	0.007	-0.2
		P.M.	26.1	C	25.9	C	0.009	-0.2
6	El Camino Real/ S. Mathilda Avenue	A.M.	26.4	C	26.6	C	0.005	0.2
		P.M.	26.3	C	26.7	C	0.013	0.4
7	El Camino Real/ S. Sunnyvale Avenue	A.M.	24.6	C	24.7	C	0.003	0.1
		P.M.	30.9	C	30.9	C	0.002	0
8	S. Fair Oaks Avenue/Old San Francisco Road	A.M.	32.9	C	33.0	C	0	0.1
		P.M.	34.6	C	34.7	C	0.002	0.1
9	S. Mary Avenue/ Evelyn Avenue	A.M.	24.7	C	24.1	C	-0.013	-0.6
		P.M.	21.7	C	21.6	C	0.003	-0.1
10	S. Mary Avenue/Central Expressway	A.M.	53.6	D	53.6	D	0.004	0
		P.M.	51.3	D	51.7	D	0.002	0.4
11	S. Mary Avenue/Maude Avenue	A.M.	25.2	C	25.2	C	0	0
		P.M.	28.4	C	28.5	C	0.002	0.1
12	S. Mathilda Avenue/Maude Avenue	A.M.	24.2	C	24.2	C	0.002	0
		P.M.	25.8	C	25.9	C	0.002	0.1
13	Evelyn Avenue/S. Bernardo Avenue	A.M.	19.7	B	19.4	B	-0.012	-0.3
		P.M.	20.1	C	20.2	C	0.002	0.1

Notes: 1) LOS=Level of Service, Delay = Average control delay per vehicle
2) Signalized intersections – Delay / LOS is for overall intersection
3) All intersections are signalized
4) **Bold** indicates LOS exceeds applicable jurisdictional standards for operating conditions.

Freeway Level of Service Analysis Results (Existing plus Project Conditions)

Traffic operations for the study freeway segments were evaluated under Existing plus Project Conditions for the weekday a.m. and p.m. peak hours. For conservative analysis purposes, project trips were only assigned to the mixed-flow lanes, and none were assigned to the high-occupancy vehicle (HOV) lanes.

Table VII shows the estimated number of project trips added to each study freeway segment, as well estimated freeway densities and service levels under Existing plus Project Conditions expected to result from proposed project traffic.

Table VII: Freeway Levels of Service – Existing plus Project Conditions

Freeway Segment	Direction	Capacity (vphpl)	Peak Hour	Existing Conditions (Year 2011)					Existing plus Project Conditions			
				Lanes	Average Speed	Volume	Density (pcpmpl)	LOS	Project Trips	Density (pcpmpl)	LOS	% Impact
SR 85, El Camino Real to SR 237	NB	4,400	A.M.	2	40	4,160	52.0	E	5	52.1	E	0.11%
			P.M.	2	66	3,670	27.8	D	9	27.9	D	0.20%
	SB	4,400	A.M.	2	66	4,130	31.3	C	7	31.3	C	0.16%
			P.M.	2	12	3,180	132.5	F	6	132.8	F	0.14%
SR 85, Fremont Ave to El Camino Real	NB	4,400	A.M.	2	29	3770	65.0	F	7	65.1	F	0.16%
			P.M.	2	66	3,670	27.8	D	6	27.8	D	0.14%
	SB	4,400	A.M.	2	66	3,300	25.0	C	5	25.0	C	0.11%
			P.M.	2	25	3,600	72.0	F	9	72.2	F	0.20%

Notes: 1) Capacity in vehicles per hour per lane.
2) Lanes are shown for mixed-flow only since project trips are assumed as added to mixed-flow lanes only.
3) Average speed in miles per hour (mph).
4) Volume in vehicles.
5) Density equal to passenger cars per mile per lane (pcpmpl).
6) LOS = level of service.

Source: VTA Monitoring and Conformance Report, VTA, June 2012.

Based on the preceding freeway analysis, the proposed project is not expected to add trips greater than one percent of the capacity of any freeway segment already operating at LOS F under Existing Conditions. Therefore, the addition of proposed project traffic is expected to result in a less-than-significant impact for the study freeway segments under Existing plus Project Conditions. As a result, no mitigation measures are required.

Turn Lane Storage Analysis Results (Existing plus Project Conditions)

TJKM conducted a turn lane storage analysis under Existing plus Project Conditions to determine the effects of the project on turn lane storage at the study intersections. The turn lane storage analysis results for Existing plus Project Conditions are summarized in Table VIII.

Similar to Existing Conditions, the same four study intersections are expected to have 95th percentile turn lane queue lengths that exceed total turn lane storage capacity. These intersections and applicable movements include:

- El Camino Real/S. Mary Avenue (northbound left turn- a.m. peak)
- El Camino Real/S. Mathilda Avenue (southbound right turn - p.m. peak)
- S. Fair Oaks/Old San Francisco Road (eastbound left turn- a.m. and p.m. peak)
- S. Mary Avenue/Central Expressway (northbound left turn– a.m. and p.m. peak; and westbound left turn- a.m. peak)

Table VIII illustrates that the project is expected to add queues of less than one vehicle to turn lanes with existing spillover conditions. Also, turn lanes that currently have available storage capacity are expected to continue having available capacity and no new spillover with the addition of project traffic. Therefore, based on engineering judgment of these conditions, the addition of project traffic to these turning movements is not considered to be a significant impact.

Table VIII: Turn Lane Storage – Existing plus Project Conditions

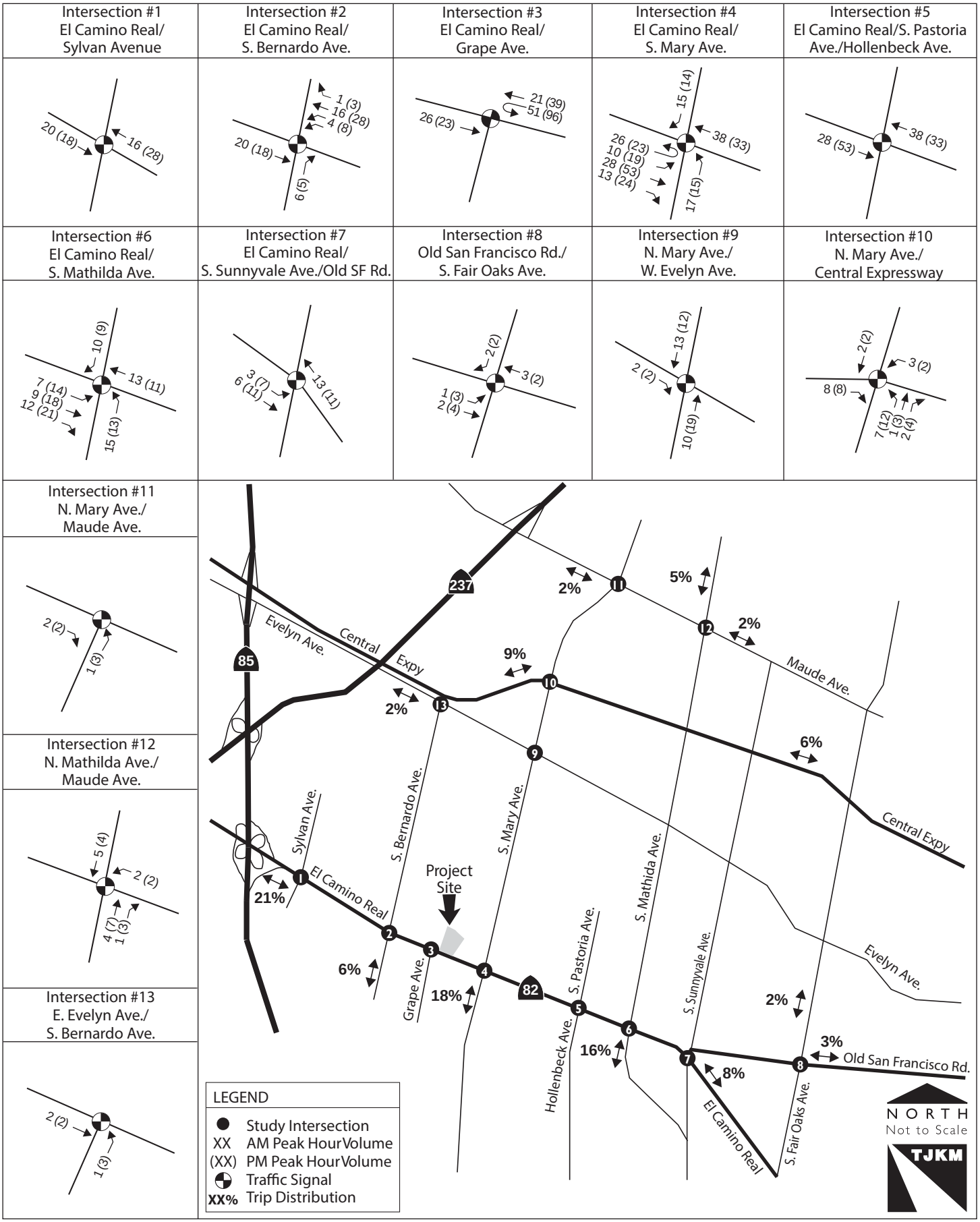
Intersection		Movement	Total Storage Length (ft)	95th Percentile Queue Length			
				Existing		Existing Plus Project	
				AM	PM	AM	PM
2	El Camino Real/S. Bernardo Avenue	NBRT	115	81	113	81	114
3	El Camino Real/Grape Avenue	WBLT	270	58	138	69	160
4	El Camino Real/S. Mary Avenue	NBLT	220	**243**	215	**248**	220
		EBLT	425	239	241	253	256
6	El Camino Real/S. Mathilda Avenue	NBLT	750*	158	89	165	97
		EBLT	630*	254	118	258	125
		SBRT	275	156	**346**	165	**360**
7	El Camino Real/S. Sunnyvale Avenue	EBLT	785*	85	140	87	143
8	S. Fair Oaks/Old San Francisco Road	EBLT	110	**141**	**167**	**143**	**169**
10	S. Mary Avenue/Central Expressway	NBLT	220*	**507**	**280**	**515**	**297**
		WBLT	660*	263	**693**	267	**696**
11	S. Mary Avenue/Maude Avenue	NBLT	180*	123	91	124	93
12	S. Mathilda Avenue/Maude Avenue+	NBRT	570	27	122	27	122
		WBLT	285*	98	86	98	86

Notes: *Total Storage Length includes combined length of two turning lanes.
+The NBT lane at S. Mathilda Avenue/Maude Avenue is a wide lane meant to accommodate right turning movements.
BOLD = 95th percentile queue length exceeds total storage length.
Average vehicle length defined as 20 feet per vehicle.

City of Sunnyvale–Transportation Impact Analysis for Sobrato Mixed-Use Project

Proposed Project Trip Distribution and Assignment

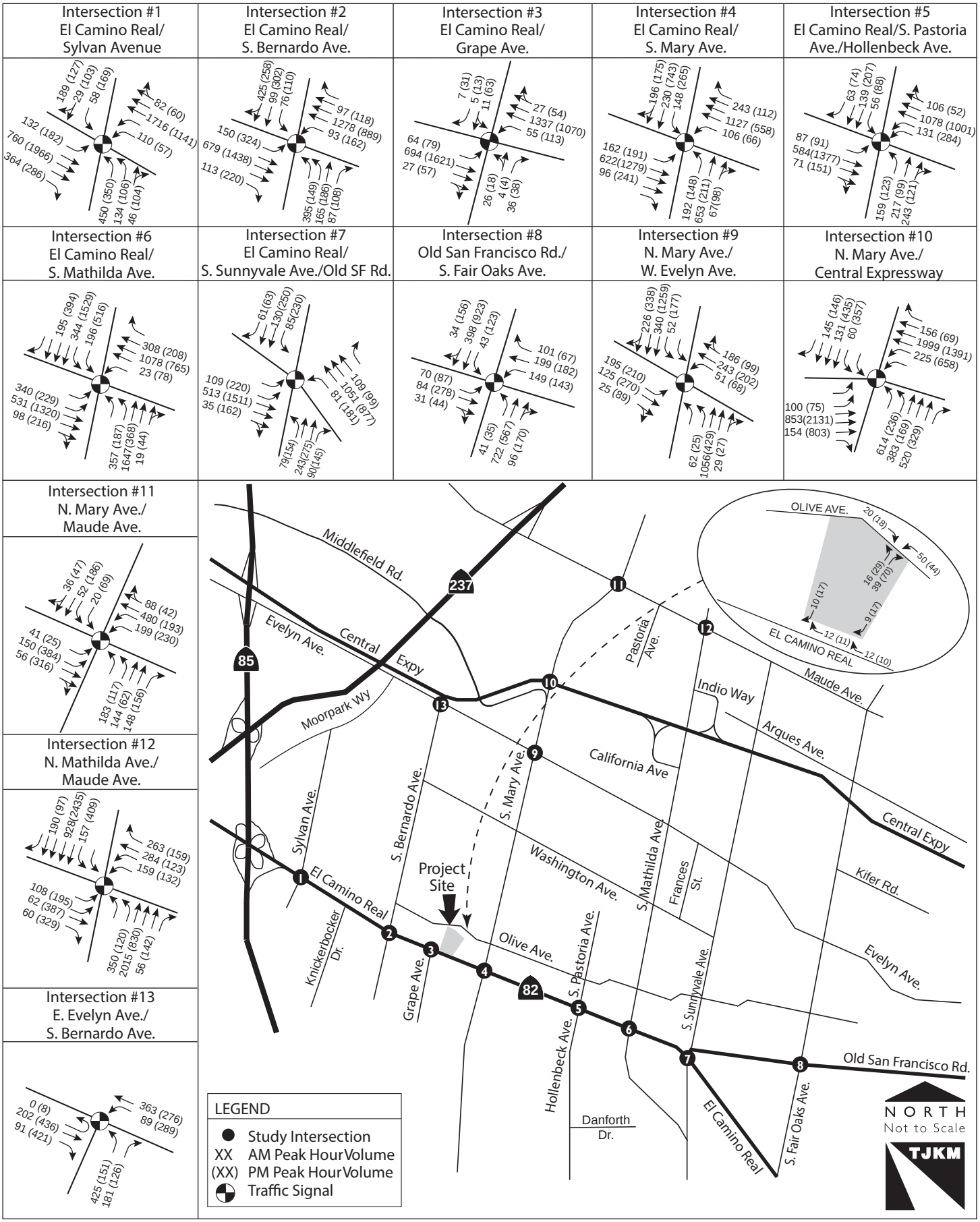
Figure 7



City of Sunnyvale–Transportation Impact Analysis for Sobrato Mixed-Use Project

Figure 8

Existing Plus Project Intersection Peak Hour Volumes



Background Conditions

This section details expected traffic conditions at the study intersections under Background No Project Conditions. This analysis scenario is defined as conditions without the proposed project in year 2015 (the anticipated year of completion of the project). Traffic volumes under Background No Project Conditions consist of existing traffic volumes, plus traffic expected to be generated by approved developments in the study area that are not yet built or occupied.

Background No Project Traffic Volumes

Approved and Not Occupied Developments

According to City staff, there are several approved and not occupied developments within the study area. Significant approved developments assumed under this analysis scenario include:

- 1000 Enterprise Way – Expansion of office campus from 370,856 sq. ft. to 1,741,083 sq. ft. (Moffett Towers project)
- 1100 Enterprise Way – Expansion of office campus from 208.000 sq. ft. to 325,000 sq. ft. (Building D in Moffett Towers project)
- 815 Eleventh – Expansion of office campus from 615,562 sq. ft. to 815,562 sq. ft. (Expansion of Ariba campus in Moffett Towers project)
- 1111 Lockheed Martin Way – Expansion of office/R&D campus from 984,000 sq. ft. to 2,430,000 sq. ft. (Juniper Networks)
- 111 Java Dr – Expansion of office R&D from existing 206,471 sq. ft. to 387,000 sq. ft.
- 495 E Java Drive – Expansion of office campus from 1,375,978 sq. ft. to 1,496,971 sq. ft. (NETAPP campus site 1)
- 549 Baltic Way – Expansion of office campus from 285,000 sq. ft. to 483,000 sq. ft. (NETAPP campus site 3.
- 589 W. Java – Expansion of office campus from 171,409 sq. ft. to 339,000 sq. ft. (Yahoo! Campus)
- 505 -599 N Mathilda, 550 Del Rey, 683 W. Maude, 510 N. Pastoria – Redevelopment of office R&D campus from 282,605 sq. ft. to 643,947 sq. ft.
- 580 N. Mary Ave. – Existing 50,406 sq. ft. Post Office to a new 124,000 sq. ft. office building
- 645 Almanor Ave - Rezone of existing 159,226 sq. ft. industrial property office R&D campus to 541,214 sq. ft. office R&D
- 600 W. California – New 106,617 s.f Office R&D campus (Sunnyvale Business Park)
- 1165 E Arques Ave – New 45,000 sq. ft. Fitness Center
- 384 Santa Trinita Ave – New 99,000 sq. ft. Office R&D building
- 1101 N Fair Oaks Ave – Existing 40,680 sq. ft. Industrial property to new 97 residential units
- 433 N Mathilda – Existing 96,300 sq. ft. industrial property to a new 210,000 sq. ft. office building
- 660 W El Camino Real – Existing 42,948 sq. ft. Auto Dealership to a mixed use project consisting of a 145 room hotel and 103 residential townhouse units (former Chevrolet site).
- 1020 Kifer Rd – Existing 93,000 sq. ft. Office R&D building to 155,000 sq. ft. Office R&D building
- 955 Stewart – Existing 140,120 sq. ft. Office R&D building to 186 residential apartment units

- 620 E. Maude – New 121 residential units
- 1287 Lawrence Station Rd. – Existing 74,316 sq. ft. Industrial property to a mixed use project consisting of 348 residential units and 16,000 sq. ft. of commercial/retail space
- 455 Mathilda Ave - Existing 29,000 sq. ft. Office building to a 105 residential dwelling unit building
- 457-475 E Evelyn Ave - Existing 31,000 sq. ft. Office building to a 117 residential dwelling unit building

Appendix D shows the expected trip generation for the above approved / pending developments within the study area under Background Conditions.

Background Transportation Improvements

For the year 2015, no approved and funded transportation network improvements were assumed to be completed prior to proposed project completion. Therefore, TJKM assumed the existing conditions roadway network, traffic controls, and lane geometries for Background Conditions.

Figure 9 shows the Background No Project traffic volumes at the study intersections resulting from the above growth factors and approved development traffic. This figure also shows traffic controls and lane geometries at the study intersections.

Intersection Level of Service Analysis Results (Background No Project Conditions)

Table IX shows the results of the LOS analysis conducted for the study intersections under Background No Project Conditions. Detailed calculation sheets are contained in Appendix E. All intersections are expected to continue operating within applicable jurisdictional standards of LOS D (Sunnyvale) and LOS E (CMP) under this scenario.

Table IX: Intersection Levels of Service – Background No Project Conditions

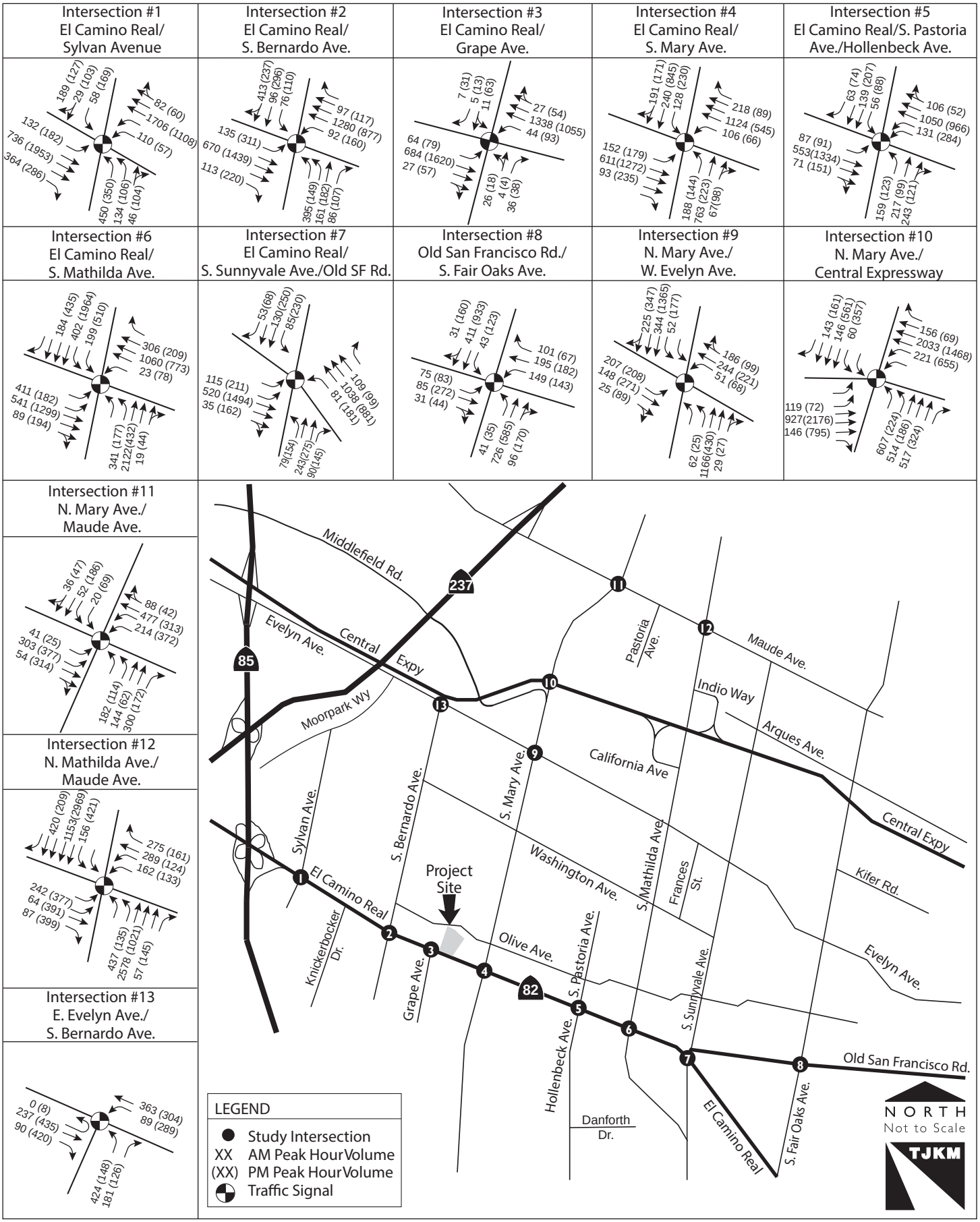
Intersection		Peak Hour	Background No Project Conditions	
			Delay	LOS
1	El Camino Real/Sylvan Avenue	A.M.	29.0	C
		P.M.	27.3	C
2	El Camino Real/S. Bernardo Avenue	A.M.	39.3	D
		P.M.	34.7	C
3	El Camino Real/Grape Avenue	A.M.	9.5	A
		P.M.	13.6	B
4	El Camino Real/S. Mary Avenue	A.M.	37.2	D
		P.M.	37.3	D
5	El Camino Real/ S. Pastoria Avenue/Hollenbeck Avenue	A.M.	28.3	C
		P.M.	26.1	C
6	El Camino Real/ S. Mathilda Avenue	A.M.	34.5	C
		P.M.	32.5	C
7	El Camino Real/ S. Sunnyvale Avenue	A.M.	24.8	C
		P.M.	30.9	C
8	S. Fair Oaks Avenue/Old San Francisco Road	A.M.	33.0	C
		P.M.	34.4	C
9	S. Mary Avenue/ Evelyn Avenue	A.M.	23.7	C
		P.M.	21.4	C
10	S. Mary Avenue/Central Expressway	A.M.	46.1	D
		P.M.	53.1	D
11	S. Mary Avenue/Maude Avenue	A.M.	25.8	C
		P.M.	29.1	C
12	S. Mathilda Avenue/Maude Avenue	A.M.	27.4	C
		P.M.	27.2	C
13	Evelyn Avenue/S. Bernardo Avenue	A.M.	19.6	B
		P.M.	19.8	B

Notes: 1) LOS=Level of Service, Delay = Average control delay per vehicle
2) Signalized intersections – Delay / LOS is for overall intersection
3) All intersections are signalized
4) **Bold** indicates LOS exceeds applicable jurisdictional standards for operating conditions.

City of Sunnyvale–Transportation Impact Analysis for Sobrato Mixed-Use Project

Figure 9

Background No Project Intersection Peak Hour Volumes



Background plus Project Conditions

This analysis scenario is similar to Background Conditions, but with the addition of traffic expected to be generated by the proposed Sobrato Mixed-Use project. Trip generation, distribution, and assignment for the proposed project are identical to that assumed under Existing plus Project Conditions. Figure 10 shows Background plus Project traffic volumes, lane geometries, and traffic controls.

Intersection Level of Service Analysis Results (Background plus Project Conditions)

The intersection LOS analysis results for Background plus Project Conditions are summarized in Table X. Detailed calculation sheets for Background plus Project Conditions are contained in Appendix F. All intersections are expected to continue operating at acceptable service levels of LOS D or better, as under Background No Project Conditions. Therefore, the proposed project is expected to have a less-than-significant impact with respect to project traffic under Background plus Project Conditions, and no mitigations are required under this scenario.

Table X: Intersection Levels of Service – Background plus Project Conditions

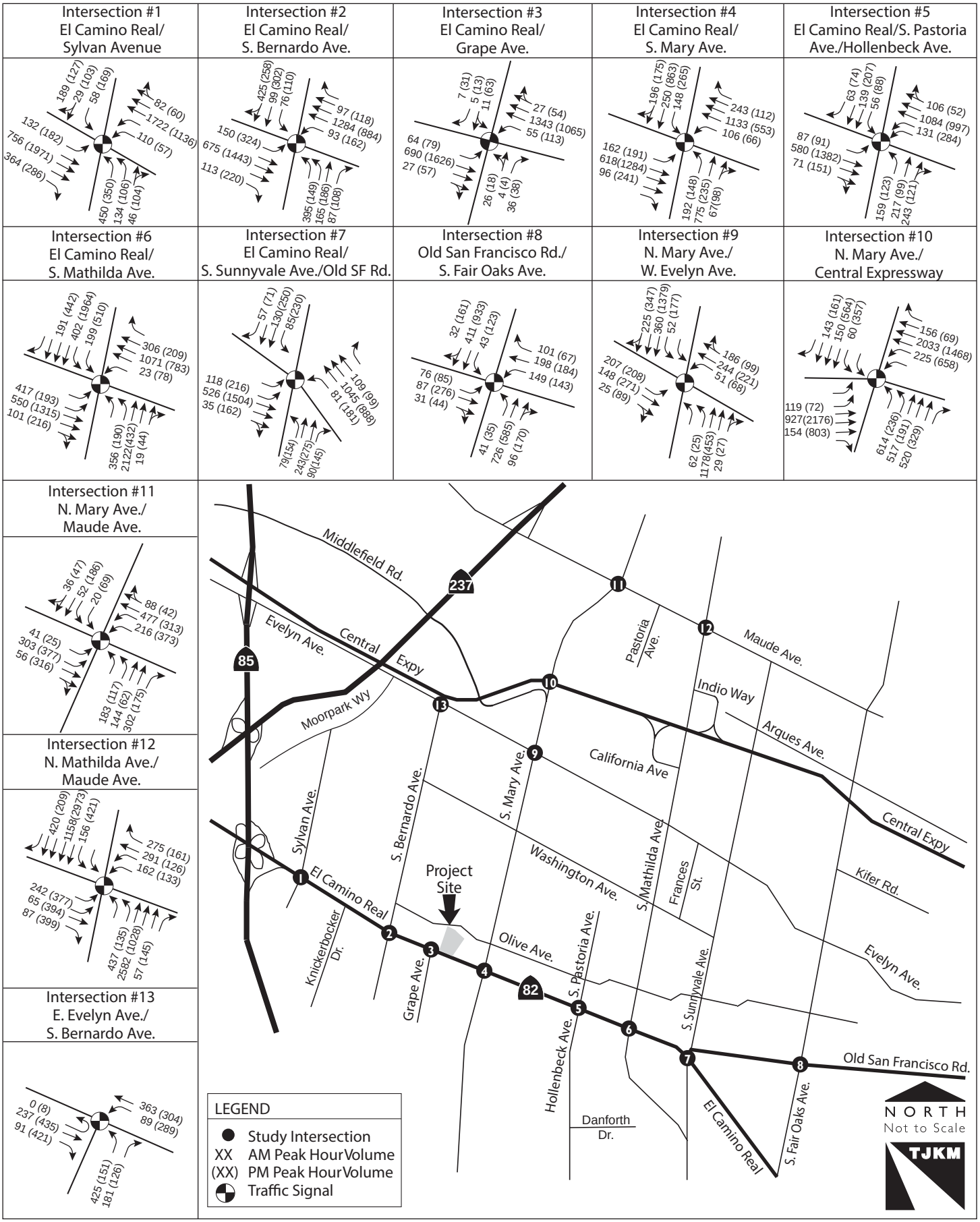
Intersection		*Peak Hour*	*Background No Project Conditions*		*Background plus Project Conditions*			
			Delay	*LOS*	*Delay*	*LOS*	*Δ in Crit. V/C*	*Δ in Average Delay*
1	El Camino Real/Sylvan Avenue	A.M.	29	C	29	C	0.003	0
		P.M.	27.3	C	27.2	C	0.004	-0.1
2	El Camino Real/S. Bernardo Avenue	A.M.	39.3	D	39.9	D	0.018	0.6
		P.M.	34.7	C	35.3	D	0.005	0.6
3	El Camino Real/Grape Avenue	A.M.	9.5	A	9.9	A	0.001	0.4
		P.M.	13.6	B	14.1	B	0.014	0.5
4	El Camino Real/S. Mary Avenue	A.M.	37.2	D	38	D	0.025	0.8
		P.M.	37.3	D	37.7	D	0.011	0.4
5	El Camino Real/ S. Pastoria Avenue/Hollenbeck Avenue	A.M.	28.3	C	28.2	C	0.007	-0.1
		P.M.	26.1	C	25.9	C	0.009	-0.2
6	El Camino Real/ S. Mathilda Avenue	A.M.	34.5	C	35	D	0.004	0.5
		P.M.	32.5	C	33.9	C	0.014	1.4
7	El Camino Real/ S. Sunnyvale Avenue	A.M.	24.8	C	24.9	C	0.003	0.1
		P.M.	30.9	C	30.8	C	0.002	-0.1
8	S. Fair Oaks Avenue/Old San Francisco Road	A.M.	33	C	33.1	C	0.001	0.1
		P.M.	34.4	C	34.5	C	0.001	0.1
9	S. Mary Avenue/ Evelyn Avenue	A.M.	23.7	C	23.6	C	0.002	-0.1
		P.M.	21.4	C	21.3	C	0.002	-0.1
10	S. Mary Avenue/Central Expressway	A.M.	46.1	D	46.4	D	0.003	0.3
		P.M.	53.1	D	53.6	D	0.006	0.5
11	S. Mary Avenue/Maude Avenue	A.M.	25.8	C	25.9	C	0	0.1
		P.M.	29.1	C	29.2	C	0.002	0.1
12	S. Mathilda Avenue/Maude Avenue	A.M.	27.4	C	27.5	C	0.002	0.1
		P.M.	27.2	C	27.3	C	0.003	0.1
13	Evelyn Avenue/S. Bernardo Avenue	A.M.	19.6	B	19.6	B	0.001	0
		P.M.	19.8	B	19.9	C	0.002	0.1

Notes: 1) LOS=Level of Service, Delay = Average control delay per vehicle
2) Signalized intersections – Delay / LOS is for overall intersection
3) All intersections are signalized
4) **Bold** indicates LOS exceeds applicable jurisdictional standards for operating conditions.

City of Sunnyvale–Transportation Impact Analysis for Sobrato Mixed-Use Project

Background Plus Project Intersection Peak Hour Volumes

Figure 10



Cumulative Conditions

This section details expected traffic conditions at the study intersections under Cumulative No Project Conditions. This analysis scenario is defined as baseline conditions without the proposed project in year 2023. Traffic volumes under Cumulative No Project Conditions consist of existing traffic volumes multiplied by an annual growth factor derived from the City of Sunnyvale travel demand model.

Cumulative No Project Traffic Volumes

Cumulative Traffic Growth

Growth factors were developed from the latest City travel demand model to estimate regional traffic growth in the study area and were applied to all turning movements at the study intersections. Based on the City model and roadway classifications, TJKM applied an annual growth factor of 2 percent during the a.m. peak hour and 1.75 percent during the p.m. peak hour for arterials and expressways, 2.28 percent during the a.m. peak hour and 2.34 percent during the p.m. peak hour for collectors, and 0.5 percent during both a.m. and p.m. peak hours for local streets.

Cumulative Transportation Improvements

For the year 2023, no approved and funded transportation network improvements were assumed to be completed prior to proposed project completion. Therefore, TJKM assumed the existing conditions roadway network, traffic controls, and lane geometries for Cumulative Conditions.

Figure 11 shows the Cumulative No Project traffic volumes at the study intersections resulting from the above growth factors and approved development traffic. This figure also shows traffic controls and lane geometries at the study intersections.

Intersection Level of Service Analysis Results (Cumulative No Project Conditions)

Table XI summarizes the results of the LOS analysis conducted for the study intersections under Cumulative No Project Conditions. Detailed calculation sheets are contained in Appendix G. All intersections are expected to continue operating within applicable jurisdictional standards of LOS D (Sunnyvale) and LOS E (CMP) under this scenario.

Table XI: Intersection Levels of Service – Cumulative No Project Conditions

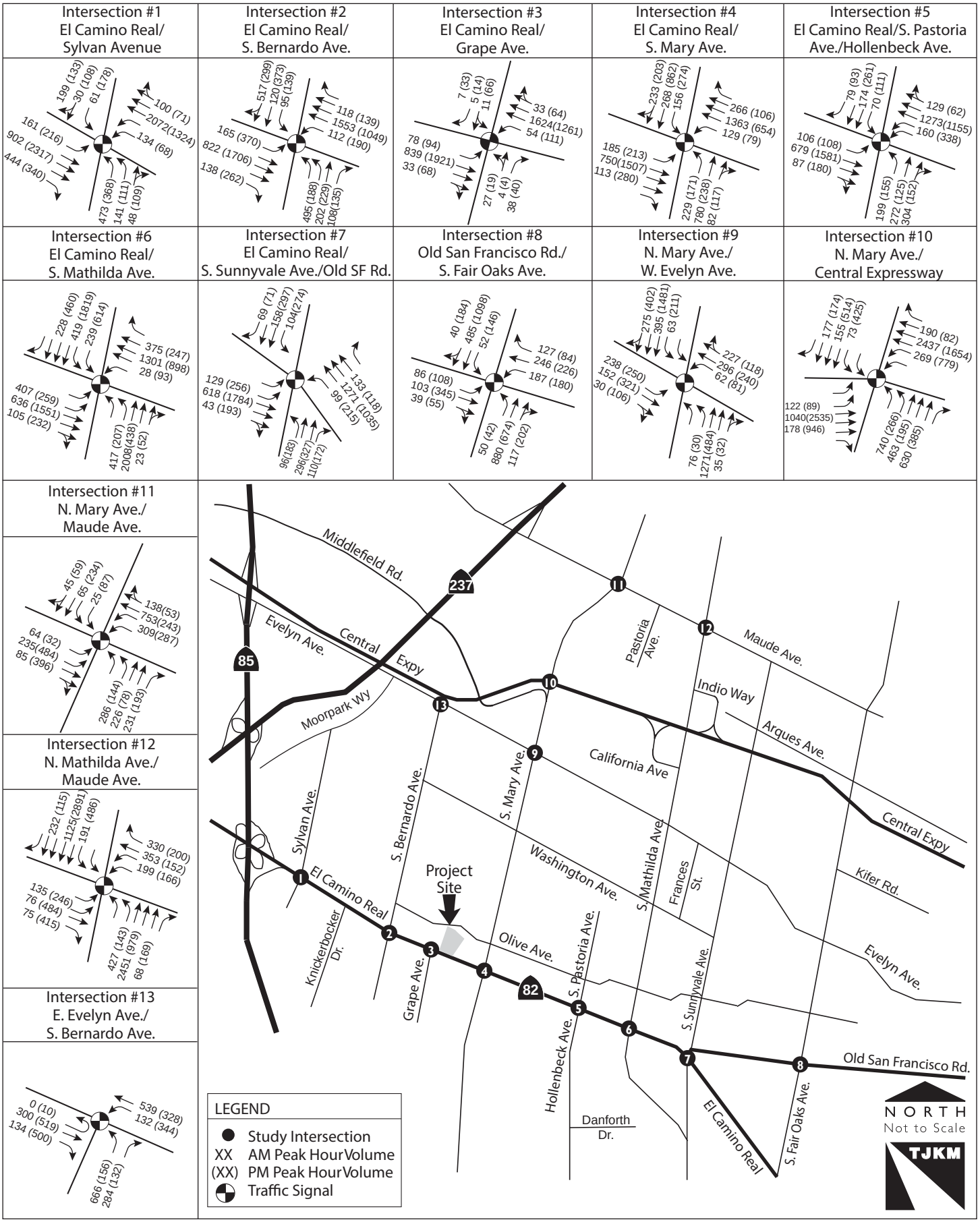
Intersection		Peak Hour	Existing Conditions	
			Delay	LOS
1	El Camino Real/Sylvan Avenue	A.M.	31.7	C
		P.M.	28.5	C
2	El Camino Real/S. Bernardo Avenue	A.M.	47.2	D
		P.M.	38.0	D
3	El Camino Real/Grape Avenue	A.M.	9.3	A
		P.M.	13.7	B
4	El Camino Real/S. Mary Avenue	A.M.	39.6	D
		P.M.	39.6	D
5	El Camino Real/ S. Pastoria Avenue/Hollenbeck Avenue	A.M.	29.8	C
		P.M.	28.3	C
6	El Camino Real/ S. Mathilda Avenue	A.M.	38.7	D
		P.M.	38.7	D
7	El Camino Real/ S. Sunnyvale Avenue	A.M.	25.4	C
		P.M.	34.3	C
8	S. Fair Oaks Avenue/Old San Francisco Road	A.M.	34.4	C
		P.M.	37.8	D
9	S. Mary Avenue/ Evelyn Avenue	A.M.	25.2	C
		P.M.	22.8	C
10	S. Mary Avenue/Central Expressway	A.M.	49.8	D
		P.M.	60.0	E
11	S. Mary Avenue/Maude Avenue	A.M.	26.3	C
		P.M.	29.9	C
12	S. Mathilda Avenue/Maude Avenue	A.M.	28.1	C
		P.M.	30.2	C
13	Evelyn Avenue/S. Bernardo Avenue	A.M.	22.5	C
		P.M.	20.7	C

Notes: 1) LOS=Level of Service, Delay = Average control delay per vehicle
2) Signalized intersections – Delay / LOS is for overall intersection
3) All intersections are signalized
4) **Bold** indicates LOS exceeds applicable jurisdictional standards for operating conditions.

City of Sunnyvale–Transportation Impact Analysis for Sobrato Mixed-Use Project

Cumulative No Project Intersection Peak Hour Volumes

Figure 11



Cumulative plus Project Conditions

This analysis scenario is similar to Cumulative Baseline Conditions, but with the addition of traffic generated by the proposed Sobrato Mixed-Use project. Trip generation, distribution, and assignment for the proposed project are identical to that assumed under Existing plus Project Conditions. Figure 12 shows Cumulative plus Project traffic volumes, lane geometries, and traffic controls.

Intersection Level of Service Analysis Results (Cumulative plus Project Conditions)
The LOS analysis results Cumulative plus Project Conditions are summarized in Table XII. Detailed calculations are contained in Appendix H. All intersections are expected to continue operating within the applicable jurisdictional standards of LOS D (Sunnyvale) and LOS E (CMP) or better, as under Cumulative No Project Conditions. Therefore, the proposed project is expected to have a less-than-significant impact with respect to project traffic under Cumulative plus Project Conditions, and no mitigations are required under this scenario.

Table XII: Intersection Levels of Service – Cumulative plus Project Conditions

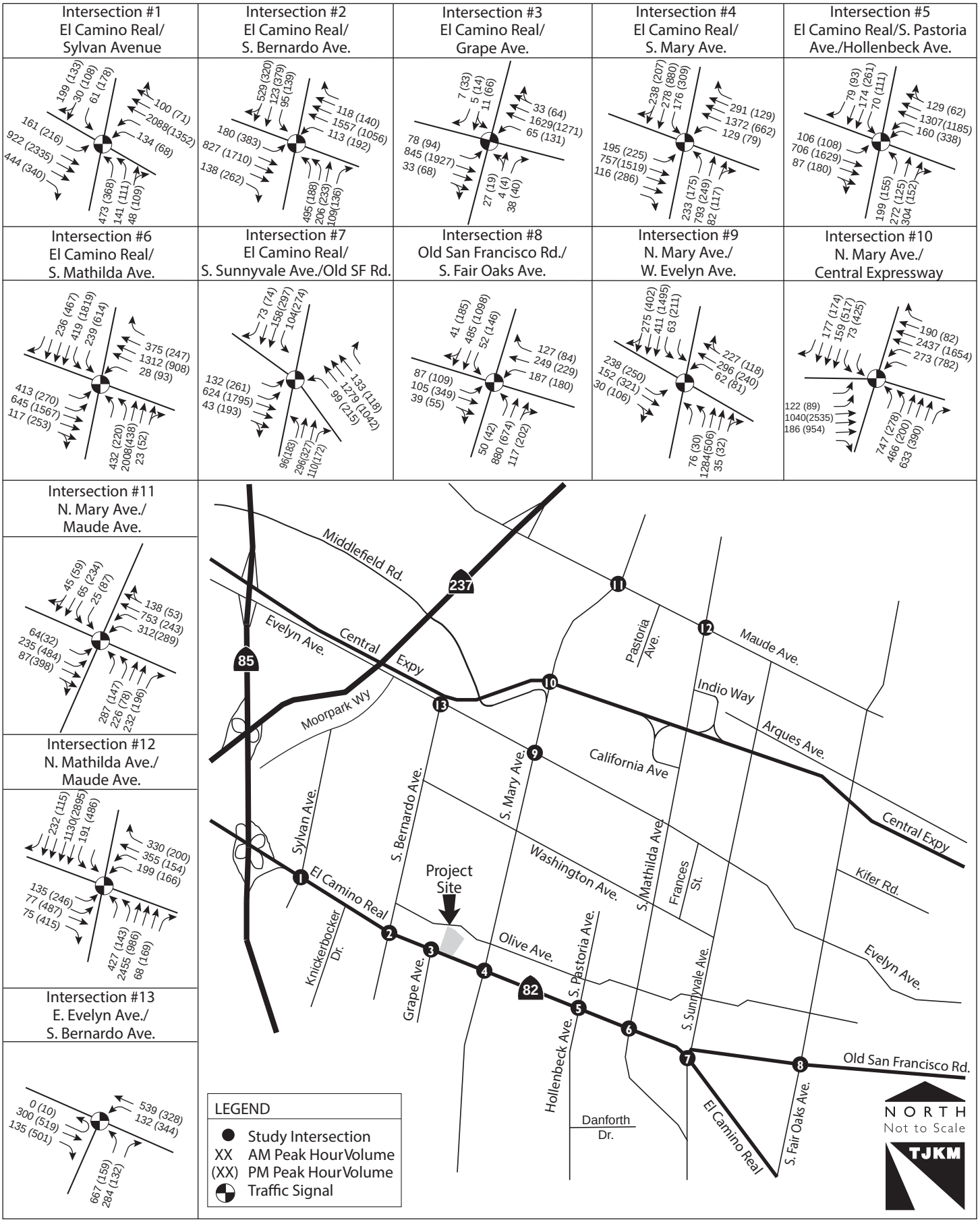
Intersection		*Peak Hour*	*Cumulative No Project Conditions*		*Cumulative plus Project Conditions*			
			Delay	*LOS*	*Delay*	*LOS*	*Δ in Crit. V/C*	*Δ in Average Delay*
1	El Camino Real/Sylvan Avenue	A.M.	31.7	C	31.7	C	0.003	0
		P.M.	28.5	C	28.5	C	0.003	0
2	El Camino Real/S. Bernardo Avenue	A.M.	47.2	D	49.0	D	0.018	1.8
		P.M.	38.0	D	38.7	D	0.005	0.7
3	El Camino Real/Grape Avenue	A.M.	9.3	A	9.7	A	0.001	0.4
		P.M.	13.7	B	14.2	B	0.014	0.5
4	El Camino Real/S. Mary Avenue	A.M.	39.6	D	40.5	D	0.025	0.9
		P.M.	39.6	D	40.1	D	0.011	0.5
5	El Camino Real/ S. Pastoria Avenue/Hollenbeck Avenue	A.M.	29.8	C	29.7	C	0.007	-0.1
		P.M.	28.3	C	28.2	C	0.009	-0.1
6	El Camino Real/ S. Mathilda Avenue	A.M.	38.7	D	39.4	D	0.005	0.7
		P.M.	38.7	D	40.5	D	0.013	1.8
7	El Camino Real/ S. Sunnyvale Avenue	A.M.	25.4	C	25.4	C	0.003	0
		P.M.	34.3	C	34.4	C	0.002	0.1
8	S. Fair Oaks Avenue/Old San Francisco Road	A.M.	34.4	C	34.6	C	0.001	0.2
		P.M.	37.8	D	38	D	0.002	0.2
9	S. Mary Avenue/ Evelyn Avenue	A.M.	25.2	C	25.1	C	0.003	-0.1
		P.M.	22.8	C	22.8	C	0.003	0
10	S. Mary Avenue/Central Expressway	A.M.	49.8	D	50.1	D	0.003	0.3
		P.M.	60.0	E	60.6	E	0.001	0.6
11	S. Mary Avenue/Maude Avenue	A.M.	26.3	C	26.3	C	0	0
		P.M.	29.9	C	30	C	0.002	0.1
12	S. Mathilda Avenue/Maude Avenue	A.M.	28.1	C	28.2	C	0.002	0.1
		P.M.	30.2	C	30.4	C	0.003	0.2
13	Evelyn Avenue/S. Bernardo Avenue	A.M.	22.5	C	22.5	C	0.001	0
		P.M.	20.7	C	20.7	C	0.002	0

Notes: 1) LOS=Level of Service, Delay = Average control delay per vehicle
2) Signalized intersections – Delay / LOS is for overall intersection
3) All intersections are signalized
4) **Bold** indicates LOS exceeds applicable jurisdictional standards for operating conditions.

City of Sunnyvale–Transportation Impact Analysis for Sobrato Mixed-Use Project

Figure 12

Cumulative Plus Project Intersection Peak Hour Volumes



Site Access and Multi-Modal Evaluation

Site Access Evaluation

Figure 2 shows the proposed site plan for the Sobrato Mixed-Use project. TJKM reviewed internal and external access for the project site for vehicles, pedestrians, and bicycles.

Vehicle Access Evaluation

In terms of external access, the project conceptual plan shows three 2-way access driveways that the proposed project would use, including two existing driveways. The existing driveways are located on El Camino Real, and the proposed driveway would be located on Olive Avenue. Residents accessing the project site by vehicle will proceed through either the Olive Avenue or El Camino Real driveways and down vehicular ramps that will lead to the subterranean residential parking underneath the proposed residential structure. Office employees accessing the project site by vehicle will enter through one of the two El Camino Real driveways and utilize surface level parking located between the proposed residential and office buildings as well as the shared parking underneath the proposed residential structure. TJKM review of the three access driveways finds that the proposed configurations would be adequate for the proposed mixed-use project.

Pedestrian Access Evaluation

Pedestrian access to the project site will be facilitated by existing sidewalks on Olive Avenue and El Camino Real, as well as proposed internal pedestrian circulation facilities. In terms of access to the residential structure, the project site plan indicates multiple pedestrian access points along the structure's western edge that will be accessible to a fire lane that includes a proposed pedestrian path. This path will connect Olive Avenue and El Camino Real. Additional access points on the north, south, and east edges of the residential structure will have walkable connections from Olive Avenue and El Camino Real.

The office structure will include access points on its southern and northern edges, accessible from El Camino Real and an internal pedestrian path leading from the residential structure, respectively. Existing continuous sidewalks along Olive Avenue and El Camino Real and existing crosswalks traversing El Camino Real at signalized intersections will facilitate pedestrian travel between the project site and nearby bus stops located on El Camino Real and Bernardo Avenue.

Bicycle Access Evaluation

Currently, there are no Class I bicycle paths or Class II bicycle lanes in the vicinity that directly serve the project site. Primary bicycle access to the project site would be provided at the existing site driveways on El Camino Real, the proposed driveway on Olive Avenue, and a potential shared use path adjacent to the western edge of the residential structure connecting Olive Avenue and El Camino Real.

TJKM recommends that the proposed path be constructed as a Class I multi-use pathway as per Caltrans design standards which specify a recommended ten-foot traveled way with two-foot minimum shoulders on either side.

Overall, the existing infrastructure appropriately accommodates bicyclists and pedestrians, since the project site is located within a developed area.

Transit Access

A proposed project is considered to have a significant impact on transit if it conflicts with existing or planned transit facilities, or is expected to generate additional transit trips and does not provide adequate facilities for pedestrians and bicyclists to access transit routes and stops. Based on these

criteria, the proposed Sobrato Mixed-Use project would not have a potentially significant impact on transit service.

As discussed earlier, the proposed project is directly adjacent to two VTA bus routes along El Camino Real (Route 22 & Route 522), and is within 2,000 feet walking distance of Route 53 which travels along Bernardo Avenue. The bus stops are accessible via sidewalks for pedestrians and roadways for bicyclists on a relatively flat terrain amenable to these transportation modes.
The impacts that would occur on these transit lines are expected to be less than significant, given that the average commute peak hour load factors on the area VTA bus routes are below 1.0 (below seating capacity), except Route 522 which has a slightly higher overall average commute peak hour load factor of 1.05.

For Route 522, the residual load factor over 1.0 consists of standing room riders. Based on consultation with VTA planning staff, it was determined that Line 522 would still be able to accommodate additional riders using available standing room capacity. Also, in the future VTA may consider adding additional service on this line if the current service level reaches capacity. Therefore, no impact on existing VTA area transit operations is anticipated from the potential addition of transit riders generated by the Sobrato project.

Parking Assessment

Vehicle Parking

TJKM reviewed the project site plan and consulted the City of Sunnyvale Municipal Code regarding off-street vehicle and bicycle parking requirements for the proposed project. The City Municipal Code Section 19.46.060 requires multi-family residential uses to provide a minimum of one covered assigned space per unit and an additional 0.5 unassigned spaces per each one-bedroom unit or one unassigned space per each two-bedroom unit. Additionally, commercial office uses are required to provide between 3.3 to four spaces per 1,000 sq. ft. of gross floor area. Given these requirements, the proposed project should provide at least 436 parking spaces, with 273 spaces allocated to residential and 134 spaces allocated to commercial office. The project sponsor has proposed the provision of 443 total parking spaces for residential and office, including 41 shared-use spaces, which is expected to be an adequate supply per Municipal Code requirements and based on a shared parking analysis for the site.

Shared Parking Analysis

TJKM conducted a shared parking analysis for the proposed project given the mix of land uses at the project site. The purpose was to demonstrate how residential and commercial parking demand varies by time of day and how the proposed project parking supply could adequately serve each use. Typically, residential parking peaks during overnight hours, while office parking peaks during weekday business hours. The analysis is based on several factors and assumptions contained in Urban Land Institute's (ULI) *Shared Parking* reference, including: peak hour adjustments by time of day, week, and month; noncaptive adjustments that take into account "captive" patrons who, for example, both live and work on site and thus only need one parking space; and, ULI parking demand rates that are based on empirical studies of similar mixed use development sites.

Table XIII provides a summary of the expected worst case shared parking demand for the proposed project based on the above factors. Based on the standard ULI parking rates and adjustment factors, the proposed project is expected to generate its highest weekday parking demand in January at the peak hour of 10:00 a.m., when 362 parked vehicles are expected on site. Similarly, a worst-case weekend peak parking demand of 252 vehicles is expected during the peak month of January at the

peak hour of 9:00 p.m. These totals represent the highest parking demand expected on the project site during a typical year of operation. Therefore, the proposed onsite parking supply of 443 spaces is expected to easily satisfy expected peak parking demand generated by the proposed project throughout the year, based on shared parking principles.

Table XIII: Estimated Parking Demand

Land Use	*Size*	*Weekday*		*Weekend*	
		Estimated Parking Demand		*Estimated Parking Demand*	
Apartment	156 DUs	Reserved Guest	153 5	Reserved Guest	153 23
Commercial Office	40,554 SF GLA	Guest Employee	12 192	Guest Employee	0 76
		Apartment Office Total	**158 204 362**	**Apartment Office Total**	**176 76 252**
		Proposed Project Parking Supply (spaces)	**443**		**443**
		Additional Percent Supply Provided Above Peak Demand	**22%**		**76%**

Notes: 1) SF GLA = square feet gross leasable area
2) DU = Dwelling Units
2) Peak weekday demand shown represents January peak month at 10:00 a.m. peak hour
3) Peak weekend demand shown represents January peak month at 9:00 p.m. peak hour

Bicycle Parking

The City Municipal Code includes specific bicycle parking supply requirements for both multi-family and general office uses. Multi-family uses of five or more units shall provide bicycle parking in the amount of one Class I space for every four units; non-residential uses shall provide bicycle parking in the amount of five percent of the total number of vehicular parking spaces provided, with at least 75 percent of the required amount of bicycle parking consisting of Class II spaces. Class I bicycle parking facilities such as bicycle lockers or enclosed rooms protect the entire bicycle from vandalism, theft, and weather, and are appropriate for long-term storage. Class II facilities include bicycle racks to which a bicycle's frame and at least one wheel can be secured with a user-provided bicycle lock. The bicycle lockers are more suitable for longer-term parking.

Based on the Municipal Code requirements, the proposed project would be required to provide a total of 48 bicycle parking spaces, with 39 Class I spaces allocated to residential, and two Class I spaces and seven Class II spaces allocated to commercial. According to the project site plan, sixty bicycle spaces will be provided among 15 Class II bicycle racks, with a capacity of four bicycle spaces per rack. To conform to the Municipal Code requirements, TJKM recommends that the applicant revise the site plan to show the locations of a minimum 41 Class I bicycle spaces.

Construction Impacts / Recommendations

This report section addresses potential construction impacts from the proposed Sobrato Mixed-Use project as they relate to traffic operations. General recommendations for construction-related mitigations, such as restricting construction truck routes to avoid impacting adjacent neighborhoods and limiting hours of operation when construction trucks would travel to/from the project site, are discussed.

The City of Sunnyvale has designated Mathilda Avenue, Evelyn Avenue, and El Camino Real as City truck routes. In general, TJKM recommends that construction truck traffic be limited to using Mathilda Avenue if traveling from/to SR 237 or US 101, El Camino Real if traveling from/to SR 85, and Evelyn and Mathilda Avenues if traveling from/to Central Expressway. These roadways provide the most direct access for construction trucks to/from the project site and would generally avoid residential areas.

As shown in the preceding traffic operations analysis, all study intersections near the project site are expected to operate at LOS D or better under Existing plus Project and Background plus Project Conditions. The amount of project trips expected to be added to the study intersections is greater than the level of construction-generated traffic. Therefore, the addition of construction traffic would not have a significant impact in terms of intersection operations. However, it should be noted that during existing commute peak hours there is often significant congestion on Mathilda Avenue at the closely spaced SR 237 ramp terminals north of the project site. Therefore, it is recommended that construction truck access to the site be restricted during weekday commute peak periods (7:00-9:00 a.m. and 4:00-6:00 p.m.), to limit potential impacts to traffic operations on Mathilda Avenue, especially in the vicinity of SR 237 and Moffett Park.

Study References

TJKM Personnel

Andrew Kluter, P.E.	Project Manager
Joanna Liu, P.E.	Senior Transportation Engineer
Wesley Catanzaro	Assistant Transportation Engineer
Dan Harrison	Graphics
Rosa Johnson	Word Processing

Persons Consulted

Jack Witthaus	Traffic and Transportation Manager, City of Sunnyvale
Jill Hough	Hexagon Transportation Consultants
Ling Jin	Hexagon Transportation Consultants

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Appendix A – Level of Service Methodology

APPENDIX A
LEVEL OF SERVICE

The description and procedures for calculating capacity and level of service (LOS) are found in Transportation Research Board, *Highway Capacity Manual 2000*. *Highway Capacity Manual 2000* represents the latest research on capacity and quality of service for transportation facilities.

Quality of service requires quantitative measures to characterize operational conditions within a traffic stream. LOS is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six levels of service are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each LOS represents a range of operating conditions and the driver's perception of these conditions. Safety is not included in the measures that establish service levels.

A general description of service levels for various types of facilities is shown in Table A-I

Table A-I: Level of Service Description

Facility Type	***Uninterrupted Flow***	***Interrupted Flow***
	Freeways Multi-lane Highways Two-lane Highways Urban Streets	Signalized Intersections Unsignalized Intersections Two-way Stop Control All-way Stop Control
LOS		
A	Free-flow	Very low delay.
B	Stable flow. Presence of other users noticeable.	Low delay.
C	Stable flow. Comfort and convenience starts to decline.	Acceptable delay.
D	High-density stable flow.	Tolerable delay.
E	Unstable flow.	Limit of acceptable delay.
F	Forced or breakdown flow.	Unacceptable delay

Source: *Highway Capacity Manual 2000*

Urban Streets

The term "urban streets" refers to urban arterials and collectors, including those in downtown areas.

Arterial streets are roads that primarily serve longer through trips. However, providing access to abutting commercial and residential land uses is also an important function of arterials.
Collector streets provide both land access and traffic circulation within residential, commercial and industrial areas. Their access function is more important than that of arterials, and unlike arterials their operation is not always dominated by traffic signals.

Downtown streets are signalized facilities that often resemble arterials. They not only move through traffic but also provide access to local businesses for passenger cars, transit buses, and trucks.

Pedestrian conflicts and lane obstructions created by stopping or standing buses, trucks and parking vehicles that cause turbulence in the traffic flow are typical of downtown streets.

The speed of vehicles on urban streets is influenced by three main factors, street environment, interaction among vehicles and traffic control. As a result, these factors also affect quality of service.

The street environment includes the geometric characteristics of the facility, the character of roadside activity and adjacent land uses. Thus, the environment reflects the number and width of lanes, type of median, driveway density, spacing between signalized intersections, existence of parking, level of pedestrian activity and speed limit.

The interaction among vehicles is determined by traffic density, the proportion of trucks and buses, and turning movements. This interaction affects the operation of vehicles at intersections and, to a lesser extent, between signals.

Traffic control (including signals and signs) forces a portion of all vehicles to slow or stop. The delays and speed changes caused by traffic control devices reduce vehicle speeds, however, such controls are needed to establish right-of-way.

The average travel speed for through vehicles along an urban street is the determinant of the operating LOS. The travel speed along a segment, section or entire length of an urban street is dependent on the running speed between signalized intersections and the amount of control delay incurred at signalized intersections.

LOS A describes primarily free-flow operations. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Control delay at signalized intersections is minimal.

LOS B describes reasonably unimpeded operations. The ability to maneuver within the traffic stream is only slightly restricted, and control delays at signalized intersections are not significant.

LOS C describes stable operations, however, ability to maneuver and change lanes in midblock location may be more restricted than at LOS B. Longer queues, adverse signal coordination, or both may contribute to lower travel speeds.

LOS D borders on a range in which in which small increases in flow may cause substantial increases in delay and decreases in travel speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or a combination of these factors.

LOS E is characterized by significant delays and lower travel speeds. Such operations are caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

LOS F is characterized by urban street flow at extremely low speeds. Intersection congestion is likely at critical signalized locations, with high delays, high volumes, and extensive queuing.

The methodology to determine LOS stratifies urban streets into four classifications. The classifications are complex, and are related to functional and design categories. Table A-II describes the functional and design categories, while Table A-III relates these to the urban street classification.

Once classified, the urban street is divided into segments for analysis. An urban street segment is a one-way section of street encompassing a series of blocks or links terminating at a signalized intersection. Adjacent segments of urban streets may be combined to form larger street sections, provided that the segments have similar demand flows and characteristics.

Levels of service are related to the average travel speed of vehicles along the urban street segment or section.

Travel times for existing conditions are obtained by field measurements. The maximum-car technique is used. The vehicle is driven at the posted speed limit unless impeded by actual traffic conditions. In the maximum-car technique, a safe level of vehicular operation is maintained by observing proper following distances and by changing speeds at reasonable rates of acceleration and deceleration. The maximum-car technique provides the best base for measuring traffic performance.

An observer records the travel time and locations and duration of delay. The beginning and ending points are the centers of intersections. Delays include times waiting in queues at signalized intersections. The travel speed is determined by dividing the length of the segment by the travel time. Once the travel speed on the arterial is determined, the LOS is found by comparing the speed to the criteria in Table A-IV. LOS criteria vary for the different classifications of urban street, reflecting differences in driver expectations.

Table A-II: Functional and Design Categories for Urban Streets

Criterion	***Functional Category***	
	Principal Arterial	***Minor Arterial***
Mobility function	Very important	Important
Access function	Very minor	Substantial
Points connected	Freeways, important activity centers, major traffic generators	Principal arterials
Predominant trips served	Relatively long trips between major points and through trips entering, leaving, and passing through city	Trips of moderate length within relatively small geographical areas

Criterion	***Design Category***			
	High-Speed	***Suburban***	***Intermediate***	***Urban***
Driveway access density	Very low density	Low density	Moderate density	High density
Arterial type	Multilane divided; undivided or two-lane with shoulders	Multilane divided: undivided or two-lane with shoulders	Multilane divided or undivided; one way, two lane	Undivided one way; two way, two or more lanes
Parking	No	No	Some	Usually
Separate left-turn lanes	Yes	Yes	Usually	Some
Signals per mile	0.5 to 2	1 to 5	4 to 10	6 to 12
Speed limits	45 to 55 mph	40 to 45 mph	30 to 40 mph	25 to 35 mph
Pedestrian activity	Very little	Little	Some	Usually
Roadside development	Low density	Low to medium density	Medium to moderate density	High density

Source: *Highway Capacity Manual 2000*

Table A-III: Urban Street Class based on Function and Design Categories

Design Category	*Functional Category*	
	Principal Arterial	*Minor Arterial*
High-Speed	I	Not applicable
Suburban	II	II
Intermediate	II	III or IV
Urban	III or IV	IV

Source: *Highway Capacity Manual 2000*

Table A-IV: Urban Street Levels of Service by Class

Urban Street Class	*I*	*II*	*III*	*IV*
Range of Free Flow Speeds (mph)	45 to 55	35 to 45	30 to 35	25 to 35
Typical Free Flow Speed (mph)	50	40	33	30
LOS	*Average Travel Speed (mph)*			
A	>42	>35	>30	>25
B	>34	>28	>24	>19
C	>27	>22	>18	>13
D	>21	>17	>14	>9
E	>16	>13	>10	>7
F	≤16	≤13	≤10	≤7

Source: *Highway Capacity Manual 2000*

Interrupted Flow

One of the more important elements limiting, and often interrupting the flow of traffic on a highway is the intersection. Flow on an interrupted facility is usually dominated by points of fixed operation such as traffic signals, stop and yield signs. These all operate quite differently and have differing impacts on overall flow.

Signalized Intersections

The capacity of a highway is related primarily to the geometric characteristics of the facility, as well as to the composition of the traffic stream on the facility. Geometrics are a fixed, or non-varying, characteristic of a facility.

At the signalized intersection, an additional element is introduced into the concept of capacity: time allocation. A traffic signal essentially allocates time among conflicting traffic movements seeking use of the same physical space. The way in which time is allocated has a significant impact on the operation of the intersection and on the capacity of the intersection and its approaches.

LOS for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, traffic and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions, *i. e.,* in the absence of traffic control, geometric delay, any incidents, and any other vehicles. Specifically, LOS criteria for traffic signals are stated in terms of average control delay per vehicle, typically for a 15-minute analysis period. Delay is a complex measure and depends on a number of variables, including the quality of progression, the cycle length, the ratio of green time to cycle length and the volume to capacity ratio for the lane group.

For each intersection analyzed the average control delay per vehicle per approach is determined for the peak hour. A weighted average of control delay per vehicle is then determined for the intersection. A LOS designation is given to the control delay to better describe the level of operation. A description of levels of service for signalized intersections can be found in Table A-V

Table A-V: Description of Level of Service for Signalized Intersections

LOS	*Description*
A	Very low control delay, up to 10 seconds per vehicle. Progression is extremely favorable, and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.
B	Control delay greater than 10 and up to 20 seconds per vehicle. There is good progression or short cycle lengths or both. More vehicles stop causing higher levels of delay.
C	Control delay greater than 20 and up to 35 seconds per vehicle. Higher delays are caused by fair progression or longer cycle lengths or both. Individual cycle failures may begin to appear. Cycle failure occurs when a given green phase doe not serve queued vehicles, and overflow occurs. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.
D	Control delay greater than 35 and up to 55 seconds per vehicle. The influence of congestions becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volumes. Many vehicles stop, the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Control delay greater than 55 and up to 80 seconds per vehicle. The limit of acceptable delay. High delays usually indicate poor progression, long cycle lengths, and high volumes. Individual cycle failures are frequent.
F	Control delay in excess of 80 seconds per vehicle. Unacceptable to most drivers. Oversaturation, arrival flow rates exceed the capacity of the intersection. Many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to higher delay.

Source: *Highway Capacity Manual 2000*

The use of control delay, which may also be referred to as signal delay, was introduced in the 1997 update to the *Highway Capacity Manual*, and represents a departure from previous updates. In the third edition, published in 1985 and the 1994 update to the third edition, delay only included stopped delay. Thus, the LOS criteria listed in Table A-V differs from earlier criteria.

Unsignalized Intersections

The current procedures on unsignalized intersections were first introduced in the 1997 update to the *Highway Capacity Manual* and represent a revision of the methodology published in the 1994 update to the 1985 *Highway Capacity Manual*. The revised procedures use control delay as a measure of effectiveness to determine LOS. Delay is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, traffic and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions, *i. e.,* in the absence of traffic control, geometric delay, any incidents, and any other vehicles. Control delay is the increased time of travel for a vehicle approaching and passing through an unsignalized intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection.

Two-Way Stop Controlled Intersections

Two-way stop controlled intersections in which stop signs are used to assign the right-of-way, are the most prevalent type of intersection in the United States. At two-way stop-controlled intersections the stop-controlled approaches are referred as the minor street approaches and can be either public streets or private driveways. The approaches that are not controlled by stop signs are referred to as the major street approaches.

The capacity of movements subject to delay are determined using the "critical gap" method of capacity analysis. Expected average control delay based on movement volume and movement capacity is calculated. A LOS designation is given to the expected control delay for each minor movement. LOS is not defined for the intersection as a whole. Control delay is the increased time of travel for a vehicle approaching and passing through a stop-controlled intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection. A description of levels of service for two-way stop-controlled intersections is found in Table A-VI.

Table A-VI: Description of Level of Service for Two-Way Stop Controlled Intersections

LOS	***Description***
A	Very low control delay less than 10 seconds per vehicle for each movement subject to delay.
B	Low control delay greater than 10 and up to 15 seconds per vehicle for each movement subject to delay.
C	Acceptable control delay greater than 15 and up to 25 seconds per vehicle for each movement subject to delay.
D	Tolerable control delay greater than 25 and up to 35 seconds per vehicle for each movement subject to delay.
E	Limit of tolerable control delay greater than 35 and up to 50 seconds per vehicle for each movement subject to delay.
F	Unacceptable control delay in excess of 50 seconds per vehicle for each movement subject to delay.

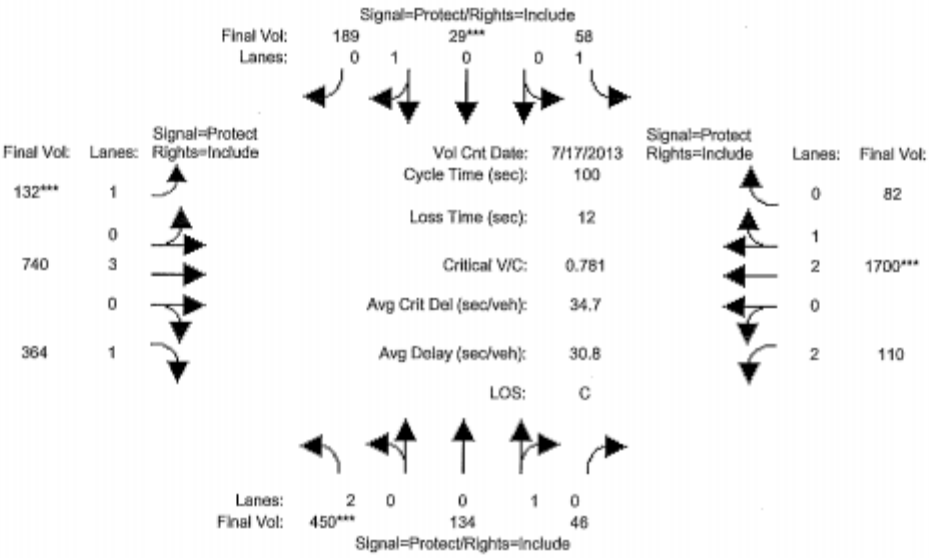
Source: *Highway Capacity Manual 2000*

Appendix B – Level of Service Worksheets: Existing Conditions

COMPARE Mon Aug 26 08:49:12 2013

Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-AM

Intersection #1001: Sylvan Ave. & El Camino Real



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0

Volume Module: >> Count Date: 17 Jul 2013 << 8:00 AM - 9:00 AM

Base Vol:	450	134	46	58	29	189	132	740	364	110	1700	82
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	450	134	46	58	29	189	132	740	364	110	1700	82
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	450	134	46	58	29	189	132	740	364	110	1700	82
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	450	134	46	58	29	189	132	740	364	110	1700	82
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	450	134	46	58	29	189	132	740	364	110	1700	82
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	450	134	46	58	29	189	132	740	364	110	1700	82

Saturation Flow Module:

Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.79	0.96	0.89	0.88	0.87	0.80	0.88	1.00	0.78	0.79	0.99	0.91
Lanes:	2.00	0.73	0.27	1.00	0.12	0.88	1.00	3.00	1.00	2.00	2.85	0.15
Final Sat.:	2992	1332	457	1663	205	1334	1663	5700	1488	2992	5378	259

Capacity Analysis Module:

Vol/Sat:	0.15	0.10	0.10	0.03	0.14	0.14	0.08	0.13	0.24	0.04	0.32	0.32
Crit Moves:	****				****		****				****	
Green/Cycle:	0.19	0.28	0.28	0.10	0.18	0.18	0.10	0.44	0.44	0.07	0.40	0.40
Volume/Cap:	0.78	0.36	0.36	0.36	0.78	0.78	0.78	0.30	0.56	0.56	0.78	0.78
Delay/Veh:	45.2	29.5	29.5	43.7	52.3	52.3	64.4	18.1	21.8	48.7	27.7	27.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	45.2	29.5	29.5	43.7	52.3	52.3	64.4	18.1	21.8	48.7	27.7	27.7
LOS by Move:	D	C	C	D	D	D	E	B	C	D	C	C
HCM2kAvgQ:	248	117	117	55	222	222	118	117	222	48	388	388

Note: Queue reported is the distance per lane in feet.

HCM Ops Adjusted Lane Utilization Module:

Lanes:	2	0	0	1	0	1	0	0	1	0	1	0	3	0	1	2	0	2	1	0
Lane Group:	L		RT		RT	L		RT		RT	L		T		R	L		RT		RT
#LnsInGrps:	2		1		1	1		1		1	1		3		1	2		3		3

HCM Ops Input Saturation Adj Module:

Lane Width:	12	12	12	12	12	12	12	12	12	12	12	12

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```
CrsswalkWid:          8                 8                 8                 8
% Hev Veh:             0                 0                 0                 0
Grade:               0%                0%                0%                0%
Parking/Hr:          No                No                No                No
Bus Stp/Hr:           0                 0                 0                 0
Area Type:    < < < < < < < < < < < < < < < < Other  > > > > > > > > > > > > > > > >
Cnft Ped/Hr:          0                 0                 0                 0
ExclusiveRT:     Include           Include           Include           Include
% RT Prtct:           0                 0                 0                 0
------------|---------------||---------------||---------------||---------------|
HCM Ops f(lt) Adj Case Module:
f(lt) Case:     1 xxxx  xxxx     1 xxxx  xxxx     1 xxxx  xxxx     1 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
HCM Ops Saturation Adj Module:
Ln Wid Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Hev Veh Adj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Grade Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Parking Adj: xxxx 1.00  1.00  xxxx 1.00  1.00  xxxx xxxx  1.00  xxxx 1.00  1.00
Bus Stp Adj: xxxx 1.00  1.00  xxxx 1.00  1.00  xxxx xxxx  1.00  xxxx 1.00  1.00
Area Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
RT Adj:      xxxx 0.96  0.96  xxxx 0.87  0.87  xxxx xxxx  0.85  xxxx 0.99  0.99
LT Adj:      0.95 xxxx xxxxx  0.95 xxxx xxxxx  0.95 xxxx xxxxx  0.95 xxxx xxxxx
PedBike Adj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
HCM Sat Adj: 0.95 0.96  0.96  0.95 0.87  0.87  0.95 1.00  0.85  0.95 0.99  0.99
Usr Sat Adj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Sat Adj: 0.83 1.00  0.92  0.92 1.00  0.92  0.92 1.00  0.92  0.83 1.00  0.92
Fnl Sat Adj: 0.79 0.96  0.89  0.88 0.87  0.80  0.88 1.00  0.78  0.79 0.99  0.91
------------|---------------||---------------||---------------||---------------|
Delay Adjustment Factor Module:
Coordinated:  < < < < < < < < < < < < < < < < No  > > > > > > > > > > > > > > > > >
Signal Type:  < < < < < < < < < < < < <    Actuated    > > > > > > > > > > > > > >
DelAdjFctr:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
```

Level Of Service Detailed Computation Report (HCM2000 Queue Method)
2000 HCM Operations Method
Future Volume Alternative

```
*******************************************************************************
Intersection #1001 Sylvan Ave. & El Camino Real
*******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Green/Cycle: 0.19 0.28  0.28  0.10 0.18  0.18  0.10 0.44  0.44  0.07 0.40  0.40
ArrivalType:          3                 3                 3                 3
ProgFactor:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Q1:           7.2  4.1   4.1   1.6  6.2   6.2   3.9  4.4   8.1   1.8 14.4  14.4
UpstreamVC:  0.00 0.00  0.00  0.00 0.00  0.00  0.00 0.00  0.00  0.78 0.78  0.78
UpstreamAdj: 0.00 0.00  0.00  0.00 0.00  0.00  1.00 1.00  1.00  0.53 0.53  0.53
EarlyArrAdj: 1.00 1.00  1.00  1.00 1.00  1.00  0.27 0.66  0.60  0.11 0.33  0.33
Q2:           2.8  0.6   0.6   0.5  2.7   2.7   0.8  0.3   0.7   0.1  1.1   1.1
HCM2KQueue:   9.9  4.7   4.7   2.2  8.9   8.9   4.7  4.7   8.9   1.9 15.5  15.5
------------|---------------||---------------||---------------||---------------|
70th%Factor: 1.18 1.19  1.19  1.19 1.18  1.18  1.19 1.19  1.18  1.20 1.17  1.17
HCM2k70thQ:  11.7  5.5   5.5   2.6 10.5  10.5   5.6  5.6  10.5   2.3 18.1  18.1
------------|---------------||---------------||---------------||---------------|
85th%Factor: 1.52 1.56  1.56  1.58 1.52  1.52  1.56 1.56  1.52  1.58 1.48  1.48
HCM2k85thQ:  15.1  7.3   7.3   3.5 13.5  13.5   7.3  7.3  13.5   3.0 23.0  23.0
------------|---------------||---------------||---------------||---------------|
90th%Factor: 1.64 1.72  1.72  1.76 1.66  1.66  1.72 1.72  1.66  1.76 1.58  1.58
HCM2k90thQ:  16.3  8.0   8.0   3.8 14.7  14.7   8.1  8.0  14.7   3.4 24.6  24.6
------------|---------------||---------------||---------------||---------------|
95th%Factor: 1.85 1.96  1.96  2.03 1.87  1.87  1.96 1.96  1.87  2.04 1.75  1.75
HCM2k95thQ:  18.3  9.2   9.2   4.4 16.6  16.6   9.2  9.2  16.6   3.9 27.2  27.2
------------|---------------||---------------||---------------||---------------|
98th%Factor: 2.17 2.40  2.40  2.55 2.20  2.20  2.40 2.40  2.21  2.56 2.00  2.00
HCM2k98thQ:  21.5 11.2  11.2   5.6 19.6  19.6  11.3 11.2  19.6   4.9 31.1  31.1
```

Fuel Consumption and Emissions
2000 HCM Operations Method
Future Volume Alternative

```
*******************************************************************************
Intersection #1001 Sylvan Ave. & El Camino Real
*******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
```


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```
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Run Speed:          30 MPH           30 MPH           30 MPH           30 MPH
NumOfStops: 106.9 26.9   9.2  13.6  6.9  45.1  32.2  119  67.5  26.7  370  17.8
-------------------------------------------------------------------------------
Name: year 1995 composite fleet
Fuel Consumption:    136.891 pounds
                      22.176 gallons
Carbon Dioxide:      427.099 pounds
Carbon Monoxide:      34.152 pounds
Hydrocarbons:          6.425 pounds
Nitrogen Oxides:       1.176 pounds
-------------------------------------------------------------------------------
Name: year 2000 composite fleet
Fuel Consumption:    136.891 pounds
                      22.176 gallons
Carbon Dioxide:      427.099 pounds
Carbon Monoxide:      34.152 pounds
Hydrocarbons:          6.425 pounds
Nitrogen Oxides:       1.176 pounds
-------------------------------------------------------------------------------
DISCLAIMER
The fuel consumption and emissions measures should be used with
caution and only for comparisons of different signal timings, geometric
design Future Volume Alternatives or for general planning applications, as these
calculations are applied to the analysis of a single intersection within the
CCG and TRAFFIX.  Network models are more appropriate since they can
account for the influence of the adjacent control measures and other system
elements.
```

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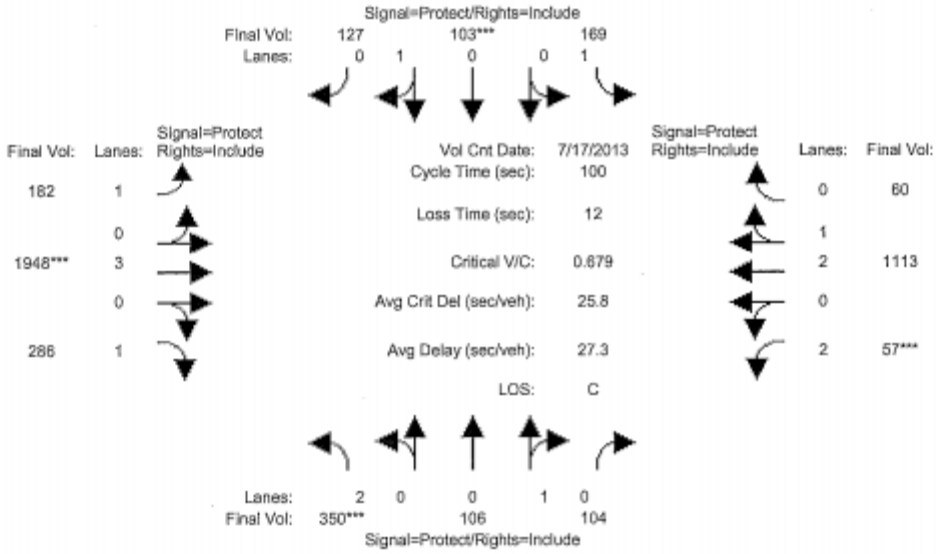
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-PM

Intersection #1001: Sylvan Ave. & El Camino Real



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 17 Jul 2013 << 5:00 PM - 6:00 PM												
Base Vol:	350	106	104	169	103	127	182	1948	286	57	1113	60
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	350	106	104	169	103	127	182	1948	286	57	1113	60
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	350	106	104	169	103	127	182	1948	286	57	1113	60
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	350	106	104	169	103	127	182	1948	286	57	1113	60
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	350	106	104	169	103	127	182	1948	286	57	1113	60
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	350	106	104	169	103	127	182	1948	286	57	1113	60
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.83	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.83	1.00	0.92
Lanes:	2.00	0.48	0.52	1.00	0.43	0.57	1.00	3.00	1.00	2.00	2.83	0.17
Final Sat.:	3150	920	903	1750	812	1002	1750	5700	1750	3150	5385	290
Capacity Analysis Module:												
Vol/Sat:	0.11	0.12	0.12	0.10	0.13	0.13	0.10	0.34	0.16	0.02	0.21	0.21
Crit Moves:	****				****			****		****		
Green/Cycle:	0.16	0.19	0.19	0.16	0.19	0.19	0.18	0.50	0.50	0.03	0.35	0.35
Volume/Cap:	0.68	0.60	0.60	0.60	0.68	0.68	0.59	0.68	0.32	0.68	0.59	0.59
Delay/Veh:	43.0	40.1	40.1	42.8	43.4	43.4	40.7	19.4	15.0	68.4	26.9	26.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.0	40.1	40.1	42.8	43.4	43.4	40.7	19.4	15.0	68.4	26.9	26.9
LOS by Move:	D	D	D	D	D	D	D	B	B	E	C	C
HCM2kAvgQ:	184	175	175	153	203	203	129	348	130	28	239	239

Note: Queue reported is the distance per lane in feet.

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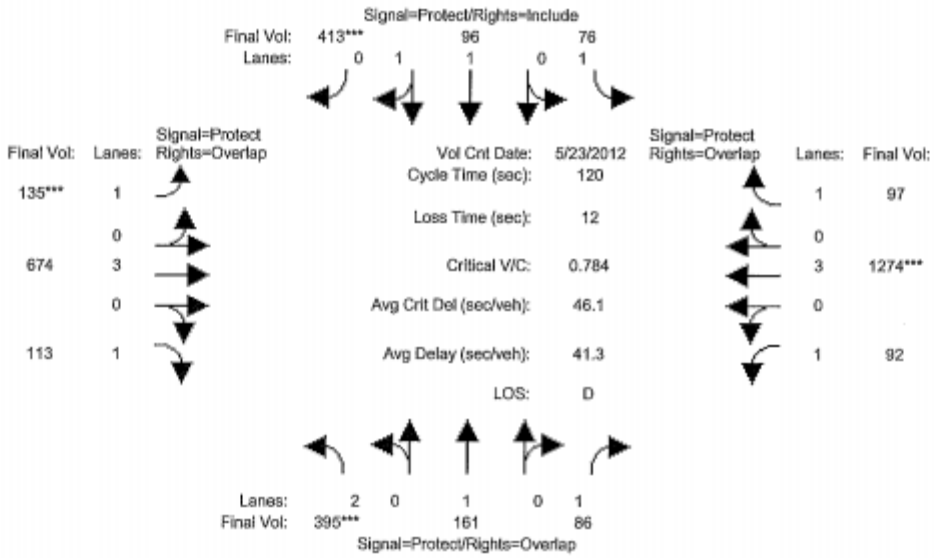
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-AM

Intersection #1002: Bernardo Ave. & El Camino Real



Street Name:	Bernardo Avenue						El Camino Real					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 May 2012 << 8:00-9:00												
Base Vol:	395	161	86	76	96	413	135	674	113	92	1274	97
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	395	161	86	76	96	413	135	674	113	92	1274	97
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	395	161	86	76	96	413	135	674	113	92	1274	97
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	395	161	86	76	96	413	135	674	113	92	1274	97
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	395	161	86	76	96	413	135	674	113	92	1274	97
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	395	161	86	76	96	413	135	674	113	92	1274	97
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.79	1.00	0.78	0.88	0.88	0.81	0.88	1.00	0.78	0.88	1.00	0.78
Lanes:	2.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00	1.00	1.00	3.00	1.00
Final Sat.:	2992	1900	1488	1663	1668	1537	1663	5700	1488	1663	5700	1488
Capacity Analysis Module:												
Vol/Sat:	0.13	0.08	0.06	0.05	0.06	0.27	0.08	0.12	0.08	0.06	0.22	0.07
Crit Moves:	****					****	****				****	
Green/Cycle:	0.17	0.30	0.43	0.21	0.34	0.34	0.10	0.26	0.43	0.13	0.29	0.49
Volume/Cap:	0.78	0.28	0.13	0.22	0.17	0.78	0.78	0.45	0.18	0.43	0.78	0.13
Delay/Veh:	55.7	32.1	20.7	39.7	27.5	41.6	73.0	37.5	21.3	49.6	42.1	16.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	55.7	32.1	20.7	39.7	27.5	41.6	73.0	37.5	21.3	49.6	42.1	16.5
LOS by Move:	E	C	C	D	C	D	E	D	C	D	D	B
HCM2kAvgQ:	222	108	50	64	61	412	141	168	67	83	369	50

Note: Queue reported is the distance per lane in feet.

HCM Ops Adjusted Lane Utilization Module:																				
Lanes:	2	0	1	0	1	1	0	1	1	0	1	0	3	0	1	1	0	3	0	1
Lane Group:	L		T		R	L		RT		RT	L		T		R	L		T		R
#LnsInGrps:	2		1		1	1		2		2	1		3		1	1		3		1

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```
HCM Ops Input Saturation Adj Module:
Lane Width:     12   12    12    12   12    12    12   12    12    12   12    12
CrsswalkWid:          8                8                8                8
% Hev Veh:            0                0                0                0
Grade:               0%               0%               0%               0%
Parking/Hr:          No               No               No               No
Bus Stp/Hr:           0                0                0                0
Area Type:    < < < < < < < < < < < < < < < < Other  > > > > > > > > > > > > > > > >
Cnft Ped/Hr:          0                0                0                0
ExclusiveRT:     Include          Include          Include          Include
% RT Prtct:           0                0                0                0
------------|---------------||---------------||---------------||---------------|
HCM Ops f(lt) Adj Case Module:
f(lt) Case:      1 xxxx  xxxx     1 xxxx  xxxx     1 xxxx  xxxx     1 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
HCM Ops Saturation Adj Module:
Ln Wid Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Hev Veh Adj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Grade Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Parking Adj: xxxx xxxx  1.00  xxxx 1.00  1.00  xxxx xxxx  1.00  xxxx xxxx  1.00
Bus Stp Adj: xxxx xxxx  1.00  xxxx 1.00  1.00  xxxx xxxx  1.00  xxxx xxxx  1.00
Area Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
RT Adj:      xxxx xxxx  0.85  xxxx 0.88  0.88  xxxx xxxx  0.85  xxxx xxxx  0.85
LT Adj:      0.95 xxxx xxxxx  0.95 xxxx xxxxx  0.95 xxxx xxxxx  0.95 xxxx xxxxx
PedBike Adj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
HCM Sat Adj: 0.95 1.00  0.85  0.95 0.88  0.88  0.95 1.00  0.85  0.95 1.00  0.85
Usr Sat Adj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Sat Adj: 0.83 1.00  0.92  0.92 1.00  0.92  0.92 1.00  0.92  0.92 1.00  0.92
Fnl Sat Adj: 0.79 1.00  0.78  0.88 0.88  0.81  0.88 1.00  0.78  0.88 1.00  0.78
------------|---------------||---------------||---------------||---------------|
Delay Adjustment Factor Module:
Coordinated:  < < < < < < < < < < < < < < < < No  > > > > > > > > > > > > > > > >
Signal Type:  < < < < < < < < < < < <     Actuated     > > > > > > > > > > > > >
DelAdjFctr:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
```

Level Of Service Detailed Computation Report (HCM2000 Queue Method)
2000 HCM Operations Method
Future Volume Alternative

```
*******************************************************************************
Intersection #1002 Bernardo Ave. & El Camino Real
*******************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Green/Cycle: 0.17 0.30  0.43  0.21 0.34  0.34  0.10 0.26  0.43  0.13 0.29  0.49
ArrivalType:          3                3                3                3
ProgFactor:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Q1:           7.6  4.1   1.9   2.3  2.2  13.4   4.8  6.3   2.5   3.1 13.0   1.9
UpstreamVC:  0.00 0.00  0.00  0.00 0.00  0.00  0.30 0.30  0.30  0.35 0.35  0.35
UpstreamAdj: 1.00 1.00  1.00  0.00 0.00  0.00  0.97 0.97  0.97  0.95 0.95  0.95
EarlyArrAdj: 0.40 0.59  0.66  1.00 1.00  1.00  0.29 0.52  0.63  0.32 0.54  0.68
Q2:           1.3  0.2   0.1   0.3  0.2   3.0   0.9  0.4   0.1   0.2  1.7   0.1
HCM2KQueue:   8.9  4.3   2.0   2.6  2.4  16.5   5.7  6.7   2.7   3.3 14.8   2.0
------------|---------------||---------------||---------------||---------------|
70th%Factor: 1.18 1.19  1.20  1.19 1.19  1.17  1.19 1.18  1.19  1.19 1.17  1.20
HCM2k70thQ:  10.5  5.1   2.4   3.1  2.9  19.2   6.7  7.9   3.2   3.9 17.3   2.4
------------|---------------||---------------||---------------||---------------|
85th%Factor: 1.52 1.56  1.58  1.58 1.58  1.47  1.55 1.54  1.57  1.57 1.48  1.58
HCM2k85thQ:  13.5  6.7   3.1   4.0  3.8  24.3   8.8 10.3   4.2   5.2 21.9   3.2
------------|---------------||---------------||---------------||---------------|
90th%Factor: 1.66 1.72  1.76  1.75 1.75  1.58  1.70 1.69  1.75  1.74 1.59  1.76
HCM2k90thQ:  14.7  7.4   3.5   4.5  4.3  25.9   9.6 11.3   4.7   5.8 23.5   3.5
------------|---------------||---------------||---------------||---------------|
95th%Factor: 1.87 1.97  2.04  2.02 2.02  1.74  1.94 1.91  2.02  2.00 1.76  2.04
HCM2k95thQ:  16.6  8.5   4.0   5.2  4.9  28.7  11.0 12.8   5.4   6.6 26.1   4.1
------------|---------------||---------------||---------------||---------------|
98th%Factor: 2.21 2.42  2.56  2.52 2.53  1.98  2.35 2.30  2.51  2.48 2.02  2.56
HCM2k98thQ:  19.6 10.4   5.1   6.5  6.2  32.6  13.3 15.4   6.7   8.2 29.9   5.1
```

Fuel Consumption and Emissions
2000 HCM Operations Method
Future Volume Alternative

```
*******************************************************************************
Intersection #1002 Bernardo Ave. & El Camino Real
```

```
*******************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Run Speed:          30 MPH           30 MPH           30 MPH           30 MPH
NumOfStops:  94.6 30.7  13.0  15.8 16.7  92.8  32.9  141  17.5  21.2  293  13.1
-------------------------------------------------------------------------------
Name: year 1995 composite fleet
Fuel Consumption:    149.005 pounds
                      24.139 gallons
Carbon Dioxide:      464.896 pounds
Carbon Monoxide:      38.085 pounds
Hydrocarbons:          7.471 pounds
Nitrogen Oxides:       1.191 pounds
-------------------------------------------------------------------------------
Name: year 2000 composite fleet
Fuel Consumption:    149.005 pounds
                      24.139 gallons
Carbon Dioxide:      464.896 pounds
Carbon Monoxide:      38.085 pounds
Hydrocarbons:          7.471 pounds
Nitrogen Oxides:       1.191 pounds
-------------------------------------------------------------------------------
DISCLAIMER
The fuel consumption and emissions measures should be used with
caution and only for comparisons of different signal timings, geometric
design Future Volume Alternatives or for general planning applications, as these
calculations are applied to the analysis of a single intersection within the
CCG and TRAFFIX.  Network models are more appropriate since they can
account for the influence of the adjacent control measures and other system
elements.
```

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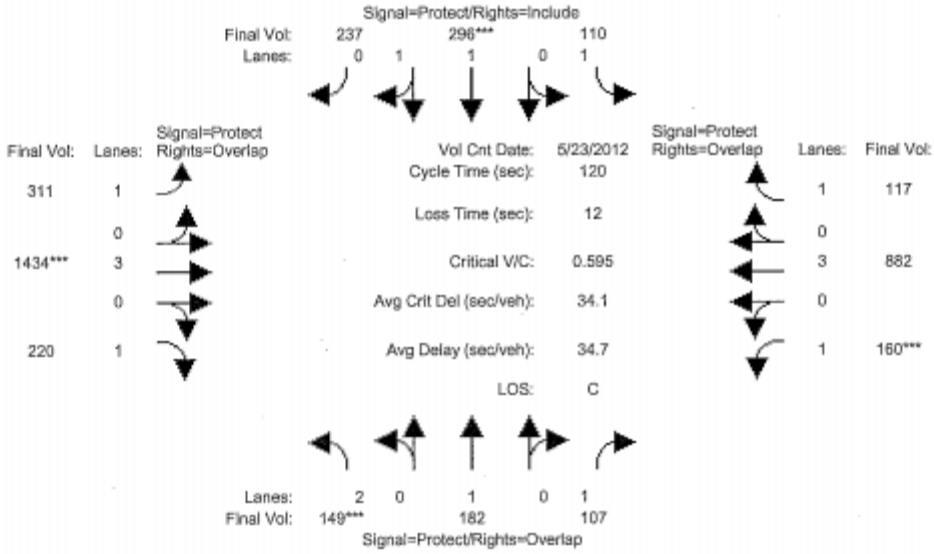
Level Of Service Computation Report
2000 HCM Operations (alternative)
Existing-PM

Intersection #1002: Bernardo Ave. & El Camino Real



Street Name:	Bernardo Avenue						El Camino Real					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 May 2012 << 5:00-6:00												
Base Vol:	149	182	107	110	296	237	311	1434	220	160	882	117
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	149	182	107	110	296	237	311	1434	220	160	882	117
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	149	182	107	110	296	237	311	1434	220	160	882	117
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	149	182	107	110	296	237	311	1434	220	160	882	117
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	149	182	107	110	296	237	311	1434	220	160	882	117
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	149	182	107	110	296	237	311	1434	220	160	882	117
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.83	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	2.00	1.00	1.00	1.00	1.07	0.93	1.00	3.00	1.00	1.00	3.00	1.00
Final Sat.:	3150	1900	1750	1750	2033	1628	1750	5700	1750	1750	5700	1750
Capacity Analysis Module:												
Vol/Sat:	0.05	0.10	0.06	0.06	0.15	0.15	0.18	0.25	0.13	0.09	0.15	0.07
Crit Moves:	****				****			****		****		
Green/Cycle:	0.08	0.20	0.35	0.13	0.24	0.24	0.31	0.42	0.50	0.15	0.27	0.40
Volume/Cap:	0.60	0.49	0.18	0.49	0.60	0.60	0.58	0.60	0.25	0.60	0.58	0.17
Delay/Veh:	57.2	44.0	27.2	50.3	41.2	41.2	36.5	27.1	17.2	50.9	38.6	23.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	57.2	44.0	27.2	50.3	41.2	41.2	36.5	27.1	17.2	50.9	38.6	23.5
LOS by Move:	E	D	C	D	D	D	D	C	B	D	D	C
HCM2kAvgQ:	81	145	70	115	239	239	250	325	118	148	230	72

Note: Queue reported is the distance per lane in feet.

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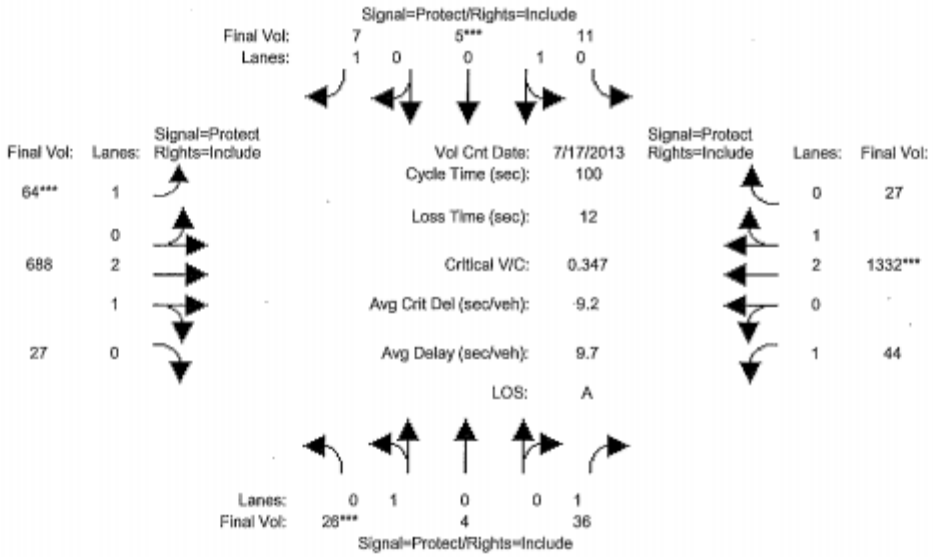
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-AM

Intersection #1003: Grape Ave. & El Camino Real



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 17 Jul 2013 << 8:00 AM - 9:00 AM												
Base Vol:	26	4	36	11	5	7	64	688	27	44	1332	27
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	26	4	36	11	5	7	64	688	27	44	1332	27
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	26	4	36	11	5	7	64	688	27	44	1332	27
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	26	4	36	11	5	7	64	688	27	44	1332	27
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	26	4	36	11	5	7	64	688	27	44	1332	27
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	26	4	36	11	5	7	64	688	27	44	1332	27
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.88	0.96	0.78	0.89	0.97	0.78	0.88	0.99	0.92	0.88	1.00	0.92
Lanes:	0.88	0.12	1.00	0.70	0.30	1.00	1.00	2.88	0.12	1.00	2.94	0.06
Final Sat.:	1468	226	1488	1193	542	1488	1663	5434	213	1663	5561	113
Capacity Analysis Module:												
Vol/Sat:	0.02	0.02	0.02	0.01	0.01	0.00	0.04	0.13	0.13	0.03	0.24	0.24
Crit Moves:	****				****		****				****	
Green/Cycle:	0.05	0.06	0.06	0.02	0.03	0.03	0.11	0.66	0.66	0.14	0.69	0.69
Volume/Cap:	0.35	0.31	0.43	0.43	0.35	0.18	0.35	0.19	0.19	0.19	0.35	0.35
Delay/Veh:	48.2	47.2	49.2	56.1	52.3	49.7	42.2	6.5	6.5	38.5	6.3	6.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	48.2	47.2	49.2	56.1	52.3	49.7	42.2	6.5	6.5	38.5	6.3	6.3
LOS by Move:	D	D	D	E	D	D	D	A	A	D	A	A
HCM2kAvgQ:	34	32	43	27	23	10	48	68	68	35	141	141

Note: Queue reported is the distance per lane in feet.

HCM Ops Adjusted Lane Utilization Module:																				
Lanes:	0	1	0	0	1	0	1	0	0	1	1	0	2	1	0	1	0	2	1	0
Lane Group:	LT		LT		R	LT		LT		R	L		RT		RT	L		RT		RT
#LnsInGrps:	1		1		1	1		1		1	1		3		3	1		3		3

HCM Ops Input Saturation Adj Module:

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Lane Width:	12	12	12	12	12	12	12	12	12	12	12	12
CrsswalkWid:		8			8			8			8	
% Hev Veh:		0			0			0			0	
Grade:		0%			0%			0%			0%	
Parking/Hr:		No			No			No			No	
Bus Stp/Hr:		0			0			0			0	
Area Type:	< < < < < < < < < < < < < < < < Other > > > > > > > > > > > > > > > >											
Cnft Ped/Hr:		0			0			0			0	
ExclusiveRT:		Include			Include			Include			Include	
% RT Prtct:		0			0			0			0	

HCM Ops f(lt) Adj Case Module:

f(lt) Case:	4	4	xxxx	4	4	xxxx	1	xxxx	xxxx	1	xxxx	xxxx

HCM Ops Saturation Adj Module:

Ln Wid Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hev Veh Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Grade Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Adj:	xxxx	xxxx	1.00	xxxx	xxxx	1.00	xxxx	1.00	1.00	xxxx	1.00	1.00
Bus Stp Adj:	xxxx	xxxx	1.00	xxxx	xxxx	1.00	xxxx	1.00	1.00	xxxx	1.00	1.00
Area Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
RT Adj:	xxxx	xxxx	0.85	xxxx	xxxx	0.85	xxxx	0.99	0.99	xxxx	1.00	1.00
LT Adj:	0.96	0.96	xxxxx	0.97	0.97	xxxxx	0.95	xxxx	xxxxx	0.95	xxxx	xxxxx
PedBike Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
HCM Sat Adj:	0.96	0.96	0.85	0.97	0.97	0.85	0.95	0.99	0.99	0.95	1.00	1.00
Usr Sat Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Sat Adj:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Fnl Sat Adj:	0.88	0.96	0.78	0.89	0.97	0.78	0.88	0.99	0.92	0.88	1.00	0.92

Delay Adjustment Factor Module:

Coordinated:	< < < < < < < < < < < < < < < < No > > > > > > > > > > > > > > > >											
Signal Type:	< < < < < < < < < < < < Actuated > > > > > > > > > > > > > >											
DelAdjFctr:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Level Of Service Detailed Computation Report (HCM2000 Queue Method)
2000 HCM Operations Method
Future Volume Alternative

****

Intersection #1003 Grape Ave. & El Camino Real

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Green/Cycle:	0.05	0.06	0.06	0.02	0.03	0.03	0.11	0.66	0.66	0.14	0.69	0.69
ArrivalType:		3			3			3			3	
ProgFactor:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Q1:	0.9	0.9	1.1	0.5	0.5	0.2	1.8	2.6	2.6	1.2	5.1	5.1
UpstreamVC:	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.45	0.45	0.00	0.00	0.00
UpstreamAdj:	0.00	0.00	0.00	0.00	0.00	0.00	0.89	0.89	0.89	0.00	0.00	0.00
EarlyArrAdj:	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.75	0.75	1.00	1.00	1.00
Q2:	0.5	0.4	0.7	0.6	0.5	0.2	0.1	0.2	0.2	0.2	0.5	0.5
HCM2KQueue:	1.4	1.3	1.7	1.1	0.9	0.4	1.9	2.7	2.7	1.4	5.6	5.6
70th%Factor:	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.19	1.19	1.20	1.19	1.19
HCM2k70thQ:	1.6	1.6	2.1	1.3	1.1	0.5	2.3	3.3	3.3	1.7	6.7	6.7
85th%Factor:	1.59	1.59	1.58	1.59	1.59	1.60	1.58	1.57	1.57	1.59	1.55	1.55
HCM2k85thQ:	2.2	2.1	2.7	1.7	1.5	0.7	3.0	4.3	4.3	2.2	8.7	8.7
90th%Factor:	1.77	1.77	1.77	1.78	1.78	1.79	1.76	1.75	1.75	1.77	1.70	1.70
HCM2k90thQ:	2.4	2.3	3.1	1.9	1.7	0.7	3.4	4.8	4.8	2.5	9.6	9.6
95th%Factor:	2.06	2.06	2.04	2.06	2.07	2.09	2.04	2.02	2.02	2.05	1.94	1.94
HCM2k95thQ:	2.8	2.7	3.5	2.2	1.9	0.9	3.9	5.5	5.5	2.9	10.9	10.9
98th%Factor:	2.60	2.61	2.58	2.62	2.63	2.67	2.56	2.51	2.51	2.60	2.35	2.35
HCM2k98thQ:	3.5	3.4	4.5	2.8	2.5	1.1	4.9	6.9	6.9	3.7	13.3	13.3

Fuel Consumption and Emissions
2000 HCM Operations Method
Future Volume Alternative

****

Intersection #1003 Grape Ave. & El Camino Real

****

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Run Speed:		30 MPH			30 MPH			30 MPH			30 MPH	
NumOfStops:	6.3	1.0	8.7	2.7	1.2	1.7	14.8	66.3	2.6	9.7	135	2.7

Name: year 1995 composite fleet

Fuel Consumption:	41.320	pounds
	6.694	gallons
Carbon Dioxide:	128.917	pounds
Carbon Monoxide:	9.191	pounds
Hydrocarbons:	1.414	pounds
Nitrogen Oxides:	0.404	pounds

Name: year 2000 composite fleet

Fuel Consumption:	41.320	pounds
	6.694	gallons
Carbon Dioxide:	128.917	pounds
Carbon Monoxide:	9.191	pounds
Hydrocarbons:	1.414	pounds
Nitrogen Oxides:	0.404	pounds

DISCLAIMER
The fuel consumption and emissions measures should be used with caution and only for comparisons of different signal timings, geometric design Future Volume Alternatives or for general planning applications, as these calculations are applied to the analysis of a single intersection within the CCG and TRAFFIX. Network models are more appropriate since they can account for the influence of the adjacent control measures and other system elements.

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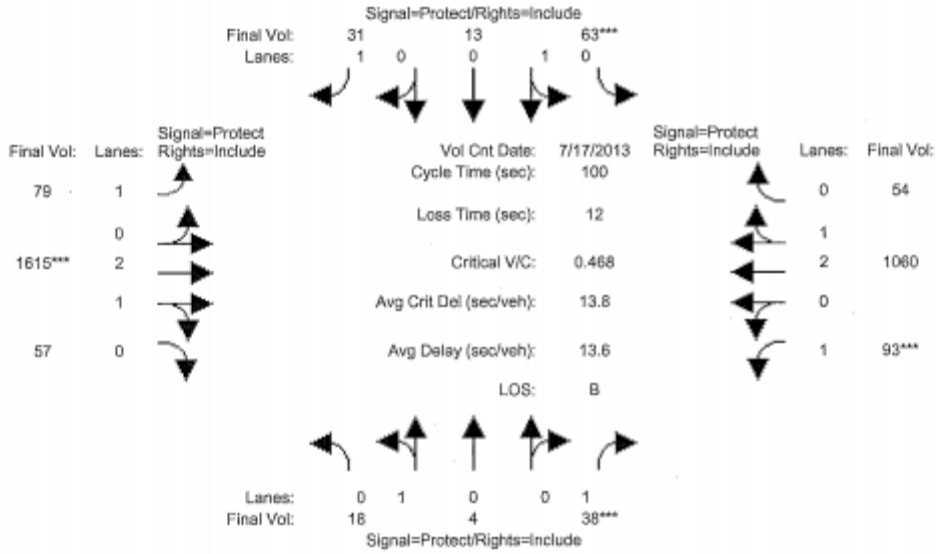
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-PM

Intersection #1003: Grape Ave. & El Camino Real



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 17 Jul 2013 << 5:00 PM - 6:00 PM												
Base Vol:	18	4	38	63	13	31	79	1615	57	93	1060	54
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	18	4	38	63	13	31	79	1615	57	93	1060	54
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	18	4	38	63	13	31	79	1615	57	93	1060	54
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	18	4	38	63	13	31	79	1615	57	93	1060	54
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	18	4	38	63	13	31	79	1615	57	93	1060	54
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	18	4	38	63	13	31	79	1615	57	93	1060	54
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.83	0.17	1.00	0.84	0.16	1.00	1.00	2.89	0.11	1.00	2.84	0.16
Final Sat.:	1453	323	1750	1471	303	1750	1750	5490	194	1750	5401	275
Capacity Analysis Module:												
Vol/Sat:	0.01	0.01	0.02	0.04	0.04	0.02	0.05	0.29	0.29	0.05	0.20	0.20
Crit Moves:			****	****				****		****		
Green/Cycle:	0.03	0.05	0.05	0.09	0.11	0.11	0.14	0.63	0.63	0.11	0.60	0.60
Volume/Cap:	0.40	0.27	0.47	0.47	0.40	0.17	0.33	0.47	0.47	0.47	0.33	0.33
Delay/Veh:	52.3	47.8	50.7	45.2	43.0	41.0	39.6	9.9	9.9	43.2	9.8	9.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	52.3	47.8	50.7	45.2	43.0	41.0	39.6	9.9	9.9	43.2	9.8	9.8
LOS by Move:	D	D	D	D	D	D	D	A	A	D	A	A
HCM2kAvgQ:	31	25	47	74	69	26	57	218	218	86	140	140

Note: Queue reported is the distance per lane in feet.

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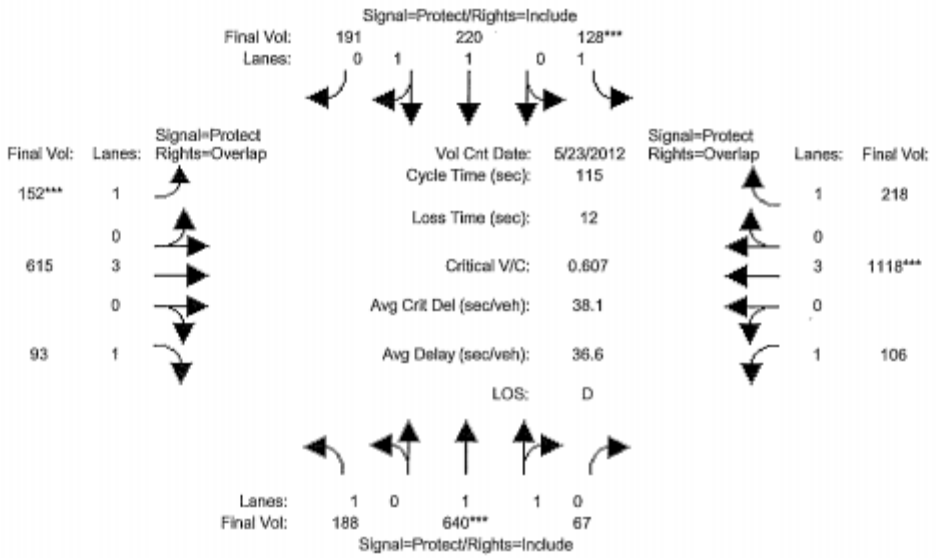
Level Of Service Computation Report
2000 HCM Operations (alternative)
Existing-AM

Intersection #1004: Mary Ave. & El Camino Real



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 May 2012 << 8-9												
Base Vol:	188	640	67	128	220	191	152	615	93	106	1118	218
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	188	640	67	128	220	191	152	615	93	106	1118	218
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	188	640	67	128	220	191	152	615	93	106	1118	218
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	188	640	67	128	220	191	152	615	93	106	1118	218
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	188	640	67	128	220	191	152	615	93	106	1118	218
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	188	640	67	128	220	191	152	615	93	106	1118	218
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	1.00	1.80	0.20	1.00	1.03	0.97	1.00	3.00	1.00	1.00	3.00	1.00
Final Sat.:	1750	3412	357	1750	1956	1698	1750	5700	1750	1750	5700	1750
Capacity Analysis Module:												
Vol/Sat:	0.11	0.19	0.19	0.07	0.11	0.11	0.09	0.11	0.05	0.06	0.20	0.12
Crit Moves:		****		****			****				****	
Green/Cycle:	0.21	0.31	0.31	0.12	0.22	0.22	0.14	0.30	0.51	0.17	0.32	0.44
Volume/Cap:	0.51	0.61	0.61	0.61	0.51	0.51	0.61	0.36	0.10	0.36	0.61	0.28
Delay/Veh:	45.3	36.2	36.2	60.3	41.8	41.8	56.7	32.4	14.9	45.8	34.3	21.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	45.3	36.2	36.2	60.3	41.8	41.8	56.7	32.4	14.9	45.8	34.3	21.2
LOS by Move:	D	D	D	E	D	D	E	C	B	D	C	C
HCM2kAvgQ:	162	276	276	140	175	175	159	143	45	89	282	130

Note: Queue reported is the distance per lane in feet.

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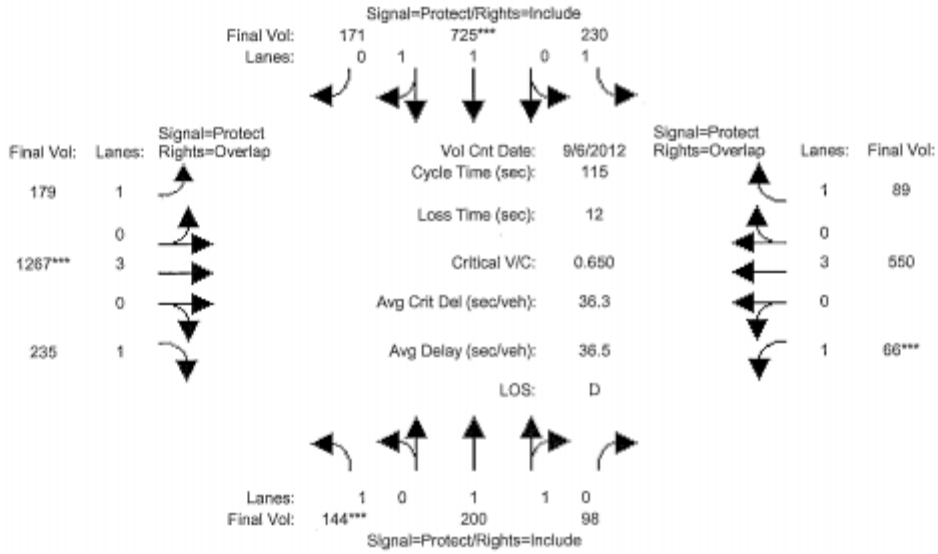
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-PM

Intersection #1004: Mary Ave. & El Camino Real



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0

Volume Module: >> Count Date: 6 Sep 2012 << not peak hour 5:00-6:00

Base Vol:	144	200	98	230	725	171	179	1267	235	66	550	89
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	144	200	98	230	725	171	179	1267	235	66	550	89
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	144	200	98	230	725	171	179	1267	235	66	550	89
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	144	200	98	230	725	171	179	1267	235	66	550	89
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	144	200	98	230	725	171	179	1267	235	66	550	89
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	144	200	98	230	725	171	179	1267	235	66	550	89

Saturation Flow Module:

Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	1.00	1.31	0.69	1.00	1.59	0.41	1.00	3.00	1.00	1.00	3.00	1.00
Final Sat.:	1750	2480	1215	1750	3025	714	1750	5700	1750	1750	5700	1750

Capacity Analysis Module:

Vol/Sat:	0.08	0.08	0.08	0.13	0.24	0.24	0.10	0.22	0.13	0.04	0.10	0.05
Crit Moves:	****				****			****		****		
Green/Cycle:	0.13	0.20	0.20	0.30	0.37	0.37	0.21	0.34	0.47	0.06	0.20	0.49
Volume/Cap:	0.65	0.41	0.41	0.44	0.65	0.65	0.49	0.65	0.29	0.62	0.49	0.10
Delay/Veh:	61.8	42.1	42.1	35.4	32.7	32.7	45.1	33.8	19.7	76.8	42.8	15.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	61.8	42.1	42.1	35.4	32.7	32.7	45.1	33.8	19.7	76.8	42.8	15.9
LOS by Move:	E	D	D	D	C	C	D	C	B	E	D	B
HCM2kAvgQ:	139	118	118	181	347	347	161	330	135	66	145	45

Note: Queue reported is the distance per lane in feet.

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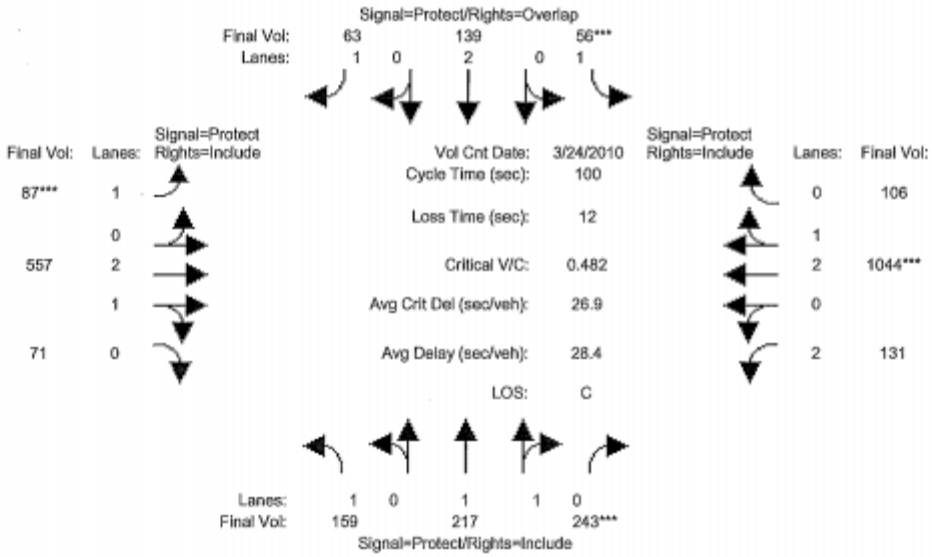
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-AM

Intersection #1005: Hollenbeck Ave. & El Camino Real



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 24 Mar 2010 <<												
Base Vol:	159	217	243	56	139	63	87	557	71	131	1044	106
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	159	217	243	56	139	63	87	557	71	131	1044	106
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	159	217	243	56	139	63	87	557	71	131	1044	106
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	159	217	243	56	139	63	87	557	71	131	1044	106
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	159	217	243	56	139	63	87	557	71	131	1044	106
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	159	217	243	56	139	63	87	557	71	131	1044	106
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.83	1.00	0.92
Lanes:	1.00	1.00	1.00	1.00	2.00	1.00	1.00	2.64	0.36	2.00	2.70	0.30
Final Sat.:	1750	1900	1750	1750	3800	1750	1750	5007	638	3150	5134	521
Capacity Analysis Module:												
Vol/Sat:	0.09	0.11	0.14	0.03	0.04	0.04	0.05	0.11	0.11	0.04	0.20	0.20
Crit Moves:			****	****			****				****	
Green/Cycle:	0.17	0.29	0.29	0.07	0.19	0.29	0.10	0.32	0.32	0.20	0.42	0.42
Volume/Cap:	0.53	0.40	0.48	0.46	0.20	0.12	0.48	0.35	0.35	0.21	0.48	0.48
Delay/Veh:	44.6	29.7	31.3	56.5	34.9	26.7	51.4	26.5	26.5	34.0	21.8	21.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	44.6	29.7	31.3	56.5	34.9	26.7	51.4	26.5	26.5	34.0	21.8	21.8
LOS by Move:	D	C	C	E	C	C	D	C	C	C	C	C
HCM2kAvgQ:	125	134	170	60	47	39	70	123	123	52	218	218

Note: Queue reported is the distance per lane in feet.

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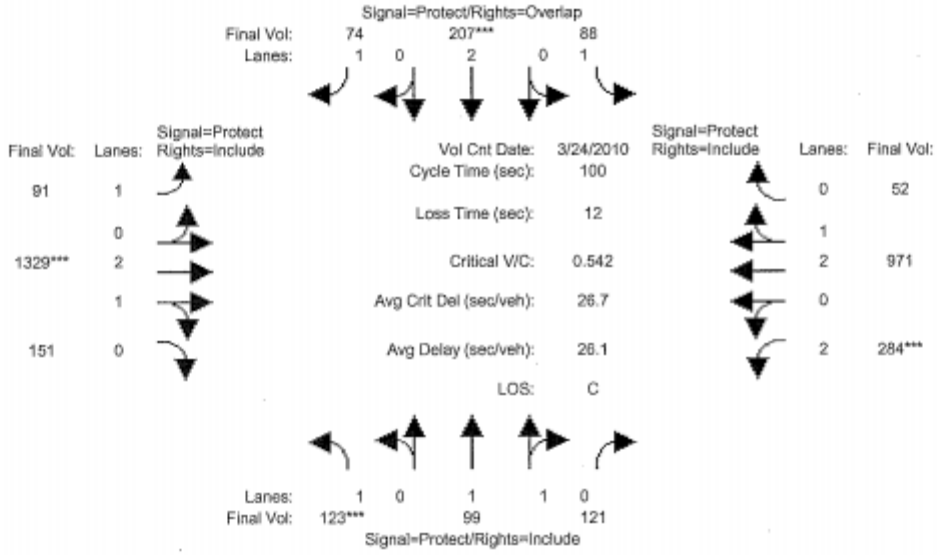
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-PM

Intersection #1005: Hollenbeck Ave. & El Camino Real



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 24 Mar 2010 <<												
Base Vol:	123	99	121	88	207	74	91	1329	151	284	971	52
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	123	99	121	88	207	74	91	1329	151	284	971	52
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	123	99	121	88	207	74	91	1329	151	284	971	52
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	123	99	121	88	207	74	91	1329	151	284	971	52
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	123	99	121	88	207	74	91	1329	151	284	971	52
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	123	99	121	88	207	74	91	1329	151	284	971	52
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.83	1.00	0.92
Lanes:	1.00	1.00	1.00	1.00	2.00	1.00	1.00	2.67	0.33	2.00	2.84	0.16
Final Sat.:	1750	1900	1750	1750	3800	1750	1750	5074	577	3150	5387	288
Capacity Analysis Module:												
Vol/Sat:	0.07	0.05	0.07	0.05	0.05	0.04	0.05	0.26	0.26	0.09	0.18	0.18
Crit Moves:	****				****			****		****		
Green/Cycle:	0.13	0.14	0.14	0.09	0.10	0.28	0.18	0.48	0.48	0.17	0.47	0.47
Volume/Cap:	0.54	0.38	0.51	0.53	0.54	0.15	0.29	0.54	0.54	0.54	0.39	0.39
Delay/Veh:	49.7	41.4	44.4	54.8	48.2	27.5	37.6	18.9	18.9	42.2	17.7	17.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	49.7	41.4	44.4	54.8	48.2	27.5	37.6	18.9	18.9	42.2	17.7	17.7
LOS by Move:	D	D	D	D	D	C	D	B	B	D	B	B
HCM2kAvgQ:	99	69	95	89	95	46	63	266	266	137	170	170

Note: Queue reported is the distance per lane in feet.

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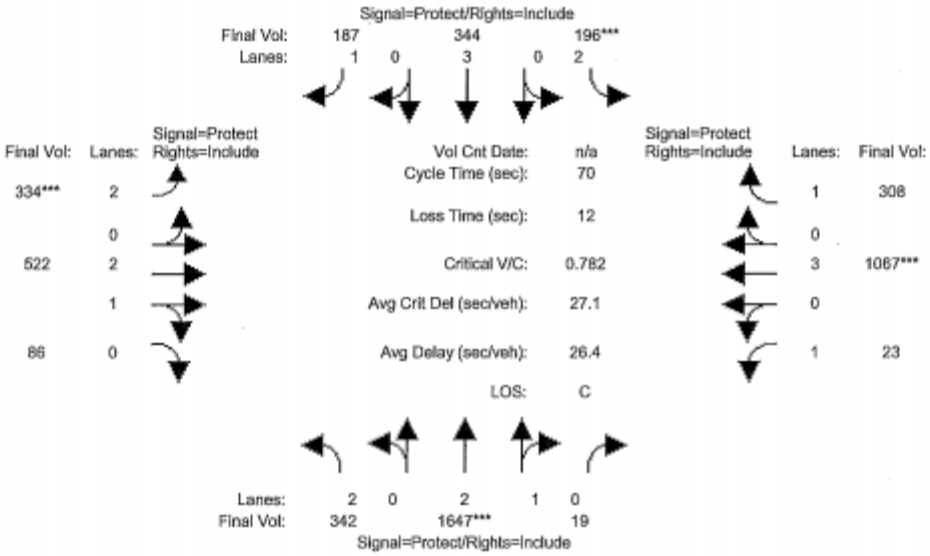
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-AM

Intersection #1006: Mathilda Ave. & El Camino Real



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Volume Module:												
Base Vol:	342	1647	19	196	344	187	334	522	86	23	1067	308
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	342	1647	19	196	344	187	334	522	86	23	1067	308
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	342	1647	19	196	344	187	334	522	86	23	1067	308
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	342	1647	19	196	344	187	334	522	86	23	1067	308
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	342	1647	19	196	344	187	334	522	86	23	1067	308
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	342	1647	19	196	344	187	334	522	86	23	1067	308
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.83	1.00	0.92	0.83	1.00	0.92	0.83	1.00	0.92	0.92	1.00	0.92
Lanes:	2.00	2.96	0.04	2.00	3.00	1.00	2.00	2.54	0.46	1.00	3.00	1.00
Final Sat.:	3150	5629	65	3150	5700	1750	3150	4835	797	1750	5700	1750
Capacity Analysis Module:												
Vol/Sat:	0.11	0.29	0.29	0.06	0.06	0.11	0.11	0.11	0.11	0.01	0.19	0.18
Crit Moves:		****		****			****				****	
Green/Cycle:	0.20	0.36	0.36	0.10	0.26	0.26	0.13	0.21	0.21	0.15	0.23	0.23
Volume/Cap:	0.54	0.80	0.80	0.62	0.23	0.41	0.80	0.50	0.50	0.09	0.80	0.76
Delay/Veh:	26.1	22.4	22.4	34.1	20.3	21.8	40.4	24.5	24.5	25.8	29.0	32.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	26.1	22.4	22.4	34.1	20.3	21.8	40.4	24.5	24.5	25.8	29.0	32.9
LOS by Move:	C	C	C	C	C	C	D	C	C	C	C	C
HCM2kAvgQ:	100	287	287	91	51	98	165	112	112	11	194	176

Note: Queue reported is the distance per lane in feet.

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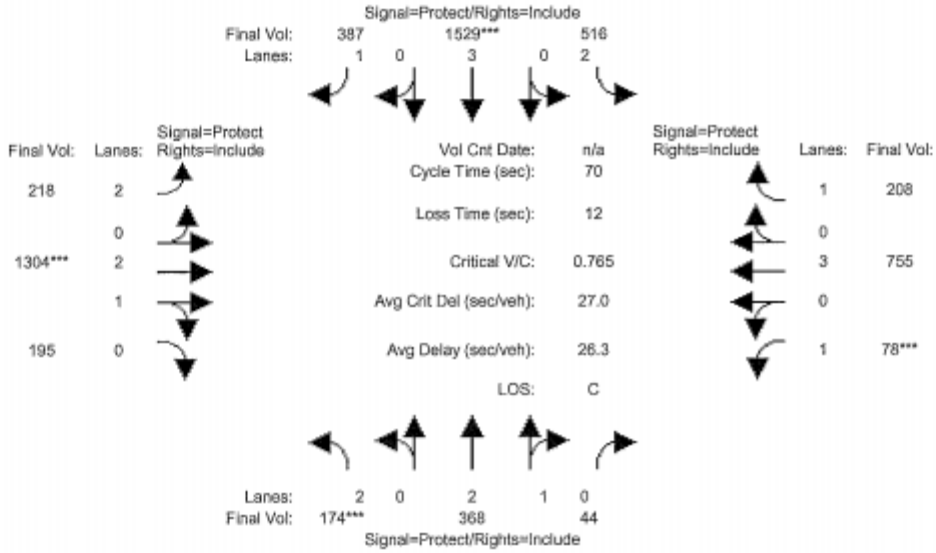
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-PM

Intersection #1006: Mathilda Ave. & El Camino Real



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Volume Module:												
Base Vol:	174	368	44	516	1529	387	218	1304	195	78	755	208
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	174	368	44	516	1529	387	218	1304	195	78	755	208
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	174	368	44	516	1529	387	218	1304	195	78	755	208
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	174	368	44	516	1529	387	218	1304	195	78	755	208
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	174	368	44	516	1529	387	218	1304	195	78	755	208
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	174	368	44	516	1529	387	218	1304	195	78	755	208
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.83	1.00	0.92	0.83	1.00	0.92	0.83	1.00	0.92	0.92	1.00	0.92
Lanes:	2.00	2.66	0.34	2.00	3.00	1.00	2.00	2.58	0.42	1.00	3.00	1.00
Final Sat.:	3150	5045	603	3150	5700	1750	3150	4904	733	1750	5700	1750
Capacity Analysis Module:												
Vol/Sat:	0.06	0.07	0.07	0.16	0.27	0.22	0.07	0.27	0.27	0.04	0.13	0.12
Crit Moves:	****				****			****		****		
Green/Cycle:	0.10	0.19	0.19	0.22	0.32	0.32	0.17	0.31	0.31	0.10	0.24	0.24
Volume/Cap:	0.55	0.38	0.38	0.74	0.85	0.70	0.41	0.85	0.85	0.45	0.55	0.49
Delay/Veh:	32.1	24.8	24.8	29.5	26.5	25.0	26.4	26.6	26.6	31.5	23.6	23.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	32.1	24.8	24.8	29.5	26.5	25.0	26.4	26.6	26.6	31.5	23.6	23.7
LOS by Move:	C	C	C	C	C	C	C	C	C	C	C	C
HCM2kAvgQ:	55	63	63	201	335	233	74	333	333	43	117	103

Note: Queue reported is the distance per lane in feet.

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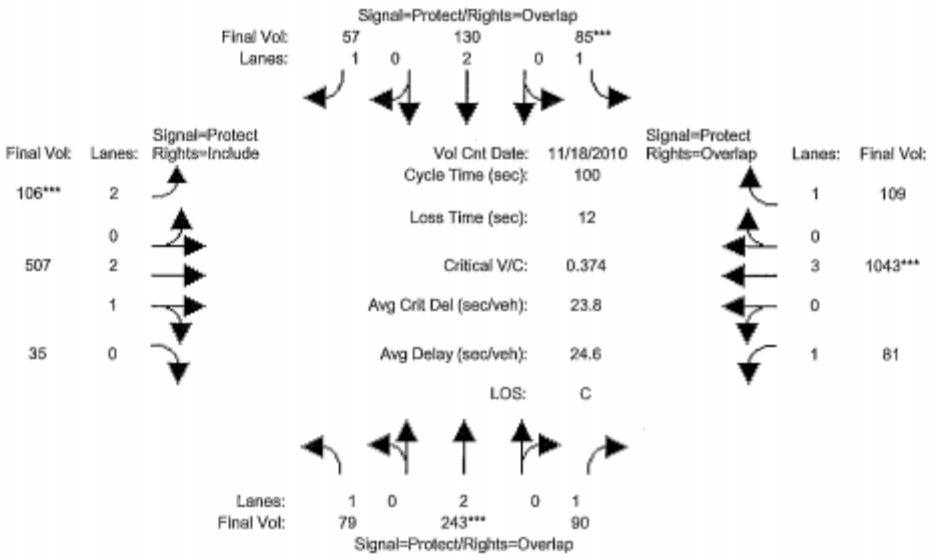
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-AM

Intersection #1007: Sunnyvale Ave. & El Camino Real



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 18 Nov 2010 <<												
Base Vol:	79	243	90	85	130	57	106	507	35	81	1043	109
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	79	243	90	85	130	57	106	507	35	81	1043	109
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	79	243	90	85	130	57	106	507	35	81	1043	109
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	79	243	90	85	130	57	106	507	35	81	1043	109
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	79	243	90	85	130	57	106	507	35	81	1043	109
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	79	243	90	85	130	57	106	507	35	81	1043	109
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.83	1.00	0.92	0.92	1.00	0.92
Lanes:	1.00	2.00	1.00	1.00	2.00	1.00	2.00	2.79	0.21	1.00	3.00	1.00
Final Sat.:	1750	3800	1750	1750	3800	1750	3150	5303	366	1750	5700	1750
Capacity Analysis Module:												
Vol/Sat:	0.05	0.06	0.05	0.05	0.03	0.03	0.03	0.10	0.10	0.05	0.18	0.06
Crit Moves:		****		****			****				****	
Green/Cycle:	0.12	0.17	0.41	0.13	0.18	0.27	0.09	0.34	0.34	0.24	0.49	0.62
Volume/Cap:	0.36	0.37	0.13	0.37	0.19	0.12	0.37	0.28	0.28	0.19	0.37	0.10
Delay/Veh:	44.9	38.4	18.7	44.4	35.7	28.3	46.6	24.4	24.4	31.4	16.4	7.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	44.9	38.4	18.7	44.4	35.7	28.3	46.6	24.4	24.4	31.4	16.4	7.9
LOS by Move:	D	D	B	D	D	C	D	C	C	C	B	A
HCM2kAvgQ:	69	89	46	73	44	36	46	99	99	55	166	36

Note: Queue reported is the distance per lane in feet.

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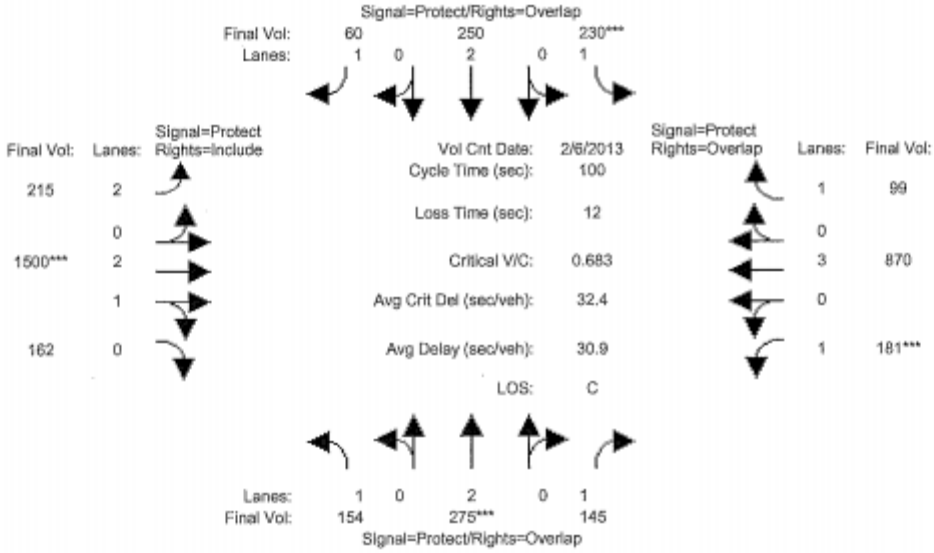
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-PM

Intersection #1007: Sunnyvale Ave. & El Camino Real



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 6 Feb 2013 <<												
Base Vol:	154	275	145	230	250	60	215	1500	162	181	870	99
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	154	275	145	230	250	60	215	1500	162	181	870	99
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	154	275	145	230	250	60	215	1500	162	181	870	99
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	154	275	145	230	250	60	215	1500	162	181	870	99
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	154	275	145	230	250	60	215	1500	162	181	870	99
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	154	275	145	230	250	60	215	1500	162	181	870	99
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.83	1.00	0.92	0.92	1.00	0.92
Lanes:	1.00	2.00	1.00	1.00	2.00	1.00	2.00	2.69	0.31	1.00	3.00	1.00
Final Sat.:	1750	3800	1750	1750	3800	1750	3150	5102	551	1750	5700	1750
Capacity Analysis Module:												
Vol/Sat:	0.09	0.07	0.08	0.13	0.07	0.03	0.07	0.29	0.29	0.10	0.15	0.06
Crit Moves:		****		****				****		****		
Green/Cycle:	0.14	0.11	0.26	0.19	0.16	0.34	0.18	0.43	0.43	0.15	0.40	0.59
Volume/Cap:	0.63	0.68	0.32	0.68	0.41	0.10	0.37	0.68	0.68	0.68	0.38	0.10
Delay/Veh:	52.3	52.2	32.0	48.3	40.0	22.8	37.7	24.6	24.6	53.6	21.8	9.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	52.3	52.2	32.0	48.3	40.0	22.8	37.7	24.6	24.6	53.6	21.8	9.0
LOS by Move:	D	D	C	D	D	C	D	C	C	D	C	A
HCM2kAvgQ:	147	136	100	209	95	34	83	336	336	176	158	35

Note: Queue reported is the distance per lane in feet.

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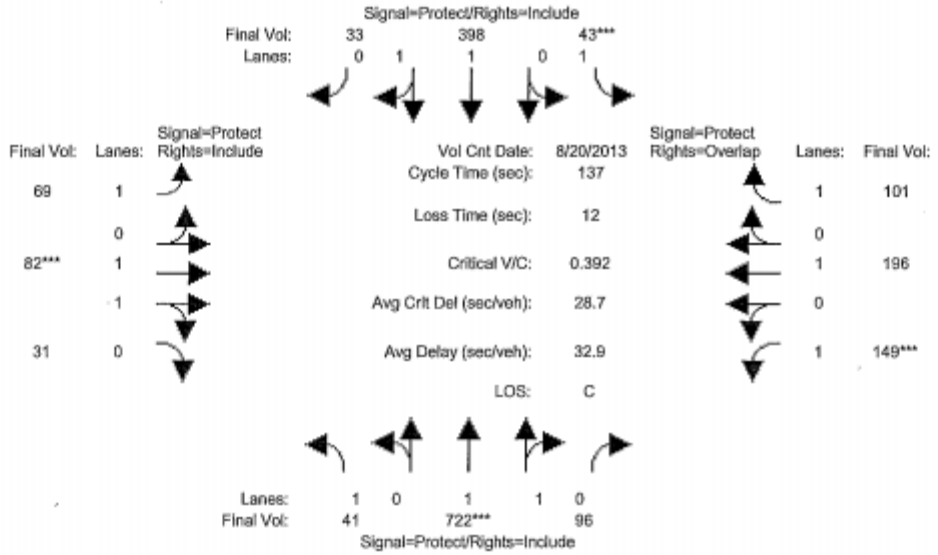
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-AM

Intersection #1008: Fair Oaks Ave. & Old San Francisco Rd.



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 20 Aug 2013 << 8:00 AM - 9:00 AM												
Base Vol:	41	722	96	43	398	33	69	82	31	149	196	101
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	41	722	96	43	398	33	69	82	31	149	196	101
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	41	722	96	43	398	33	69	82	31	149	196	101
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	41	722	96	43	398	33	69	82	31	149	196	101
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	41	722	96	43	398	33	69	82	31	149	196	101
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	41	722	96	43	398	33	69	82	31	149	196	101
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	1.00	1.75	0.25	1.00	1.83	0.17	1.00	1.42	0.58	1.00	1.00	1.00
Final Sat.:	1750	3321	442	1750	3486	289	1750	2694	1019	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.02	0.22	0.22	0.02	0.11	0.11	0.04	0.03	0.03	0.09	0.10	0.06
Crit Moves:		****		****				****		****		
Green/Cycle:	0.19	0.55	0.55	0.06	0.43	0.43	0.10	0.08	0.08	0.22	0.20	0.26
Volume/Cap:	0.12	0.39	0.39	0.39	0.27	0.27	0.40	0.39	0.39	0.39	0.52	0.22
Delay/Veh:	46.7	17.9	17.9	71.9	25.8	25.8	65.0	64.1	64.1	48.9	54.4	40.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	46.7	17.9	17.9	71.9	25.8	25.8	65.0	64.1	64.1	48.9	54.4	40.9
LOS by Move:	D	B	B	E	C	C	E	E	E	D	D	D
HCM2kAvgQ:	38	249	249	48	146	146	83	68	68	147	193	89

Note: Queue reported is the distance per lane in feet.

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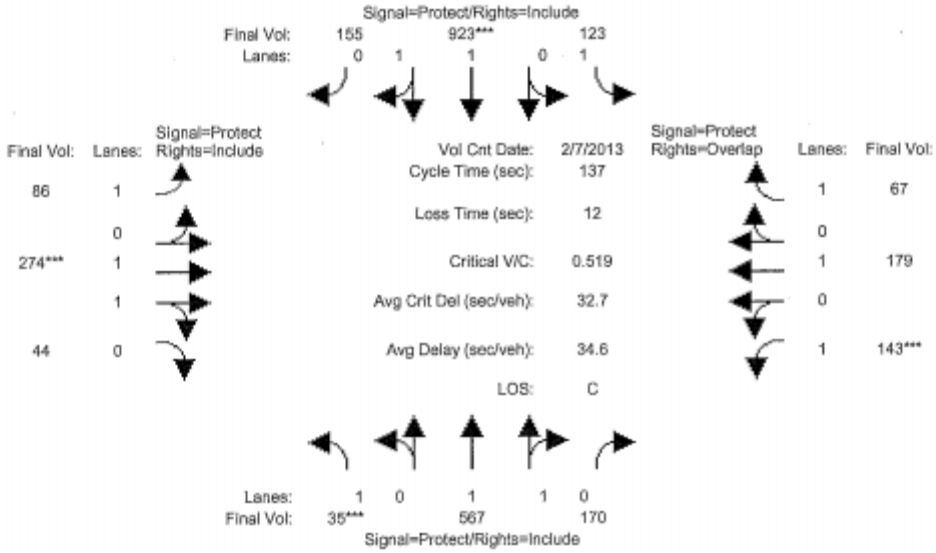
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-PM

Intersection #1008: Fair Oaks Ave. & Old San Francisco Rd.



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 7 Feb 2013 <<												
Base Vol:	35	567	170	123	923	155	86	274	44	143	179	67
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	35	567	170	123	923	155	86	274	44	143	179	67
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	35	567	170	123	923	155	86	274	44	143	179	67
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	35	567	170	123	923	155	86	274	44	143	179	67
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	35	567	170	123	923	155	86	274	44	143	179	67
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	35	567	170	123	923	155	86	274	44	143	179	67
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	1.00	1.51	0.49	1.00	1.69	0.31	1.00	1.70	0.30	1.00	1.00	1.00
Final Sat.:	1750	2867	860	1750	3214	540	1750	3236	520	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.02	0.20	0.20	0.07	0.29	0.29	0.05	0.08	0.08	0.08	0.09	0.04
Crit Moves:	****				****			****		****		
Green/Cycle:	0.05	0.44	0.44	0.16	0.55	0.55	0.11	0.16	0.16	0.16	0.20	0.36
Volume/Cap:	0.39	0.45	0.45	0.45	0.53	0.53	0.44	0.53	0.53	0.53	0.46	0.11
Delay/Veh:	75.3	27.7	27.7	57.7	20.8	20.8	64.1	56.0	56.0	60.4	51.7	29.4
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	75.3	27.7	27.7	57.7	20.8	20.8	64.1	56.0	56.0	60.4	51.7	29.4
LOS by Move:	E	C	C	E	C	C	E	E	E	E	D	C
HCM2kAvgQ:	39	272	272	127	368	368	102	167	167	162	170	49

Note: Queue reported is the distance per lane in feet.

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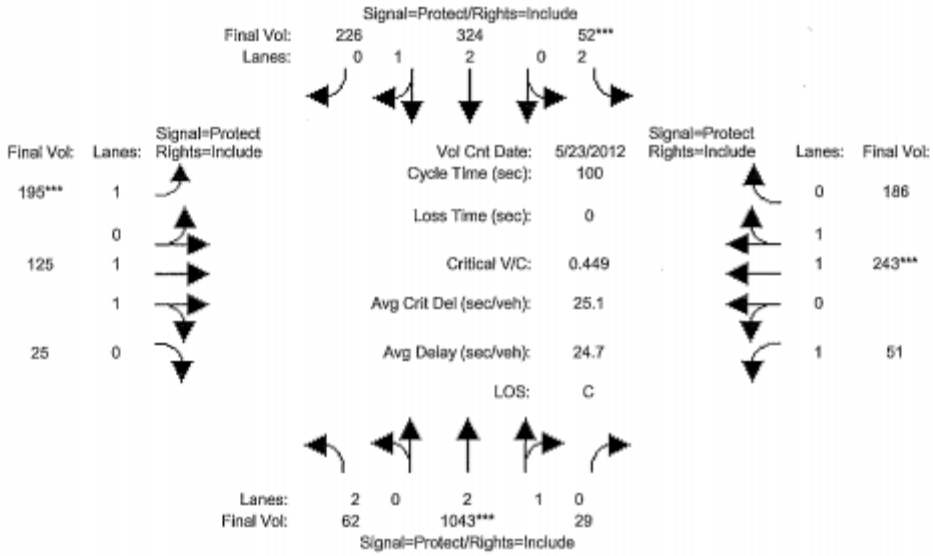
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-AM

Intersection #1009: Mary Av & Evelyn Av



Street Name:	Mary Av						Evelyn Av					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 May 2012 << 8-9												
Base Vol:	62	1043	29	52	324	226	195	125	25	51	243	186
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	62	1043	29	52	324	226	195	125	25	51	243	186
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	62	1043	29	52	324	226	195	125	25	51	243	186
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	62	1043	29	52	324	226	195	125	25	51	243	186
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	62	1043	29	52	324	226	195	125	25	51	243	186
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	62	1043	29	52	324	226	195	125	25	51	243	186
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.79	1.00	0.92	0.79	0.94	0.86	0.88	0.98	0.90	0.88	0.94	0.86
Lanes:	2.00	2.91	0.09	2.00	2.00	1.00	1.00	1.64	0.36	1.00	1.09	0.91
Final Sat.:	2992	5511	153	2992	3564	1642	1663	3044	609	1663	1940	1485
Capacity Analysis Module:												
Vol/Sat:	0.02	0.19	0.19	0.02	0.09	0.14	0.12	0.04	0.04	0.03	0.13	0.13
Crit Moves:		****		****			****				****	
Green/Cycle:	0.06	0.42	0.42	0.04	0.40	0.40	0.26	0.31	0.31	0.23	0.28	0.28
Volume/Cap:	0.34	0.45	0.45	0.45	0.23	0.34	0.45	0.13	0.13	0.13	0.45	0.45
Delay/Veh:	46.2	20.8	20.8	49.8	19.9	21.0	31.7	24.9	24.9	30.7	30.1	30.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	46.2	20.8	20.8	49.8	19.9	21.0	31.7	24.9	24.9	30.7	30.1	30.1
LOS by Move:	D	C	C	D	B	C	C	C	C	C	C	C
HCM2kAvgQ:	37	198	198	24	78	126	132	40	40	32	137	137

Note: Queue reported is the distance per lane in feet.

HCM Ops Adjusted Lane Utilization Module:																				
Lanes:	2	0	2	1	0	2	0	2	1	0	1	0	1	1	0	1	0	1	1	0
Lane Group:	L		RT		RT	L		RT		RT	L		RT		RT	L		RT		RT
#LnsInGrps:	2		3		3	2		3		3	1		2		2	1		2		2

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```
HCM Ops Input Saturation Adj Module:
Lane Width:     12   12    12    12   12    12    12   12    12    12   12    12
CrsswalkWid:          8                8                8                8
% Hev Veh:            0                0                0                0
Grade:               0%               0%               0%               0%
Parking/Hr:          No               No               No               No
Bus Stp/Hr:           0                0                0                0
Area Type:    < < < < < < < < < < < < < < < Other  > > > > > > > > > > > > > > >
Cnft Ped/Hr:          0                0                0                0
ExclusiveRT:     Include          Include          Include          Include
% RT Prtct:           0                0                0                0
------------|---------------||---------------||---------------||---------------|
HCM Ops f(lt) Adj Case Module:
f(lt) Case:      1 xxxx  xxxx     1 xxxx  xxxx     1 xxxx  xxxx     1 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
HCM Ops Saturation Adj Module:
Ln Wid Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Hev Veh Adj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Grade Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Parking Adj: xxxx 1.00  1.00  xxxx 1.00  1.00  xxxx 1.00  1.00  xxxx 1.00  1.00
Bus Stp Adj: xxxx 1.00  1.00  xxxx 1.00  1.00  xxxx 1.00  1.00  xxxx 1.00  1.00
Area Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
RT Adj:      xxxx 1.00  1.00  xxxx 0.94  0.94  xxxx 0.98  0.98  xxxx 0.94  0.94
LT Adj:      0.95 xxxx xxxxx  0.95 xxxx xxxxx  0.95 xxxx xxxxx  0.95 xxxx xxxxx
PedBike Adj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
HCM Sat Adj: 0.95 1.00  1.00  0.95 0.94  0.94  0.95 0.98  0.98  0.95 0.94  0.94
Usr Sat Adj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Sat Adj: 0.83 1.00  0.92  0.83 1.00  0.92  0.92 1.00  0.92  0.92 1.00  0.92
Fnl Sat Adj: 0.79 1.00  0.92  0.79 0.94  0.86  0.88 0.98  0.90  0.88 0.94  0.86
------------|---------------||---------------||---------------||---------------|
Delay Adjustment Factor Module:
Coordinated:  < < < < < < < < < < < < < < < < No  > > > > > > > > > > > > > > > >
Signal Type:  < < < < < < < < < < < <     Actuated     > > > > > > > > > > > > >
DelAdjFctr:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
      Level Of Service Detailed Computation Report (HCM2000 Queue Method)
                         2000 HCM Operations Method
                          Future Volume Alternative
*******************************************************************************
Intersection #1009 Mary Av & Evelyn Av
*******************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Green/Cycle: 0.06 0.42  0.42  0.04 0.40  0.40  0.26 0.31  0.31  0.23 0.28  0.28
ArrivalType:          3                3                3                3
ProgFactor:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Q1:           1.0  7.1   7.1   0.9  3.0   4.7   4.9  1.5   1.5   1.2  5.1   5.1
UpstreamVC:  0.00 0.00  0.00  0.40 0.40  0.40  0.37 0.37  0.37  0.00 0.00  0.00
UpstreamAdj: 0.00 0.00  0.00  0.92 0.92  0.92  0.94 0.94  0.94  1.00 1.00  1.00
EarlyArrAdj: 1.00 1.00  1.00  0.14 0.55  0.55  0.44 0.49  0.49  0.43 0.48  0.48
Q2:           0.5  0.8   0.8   0.1  0.2   0.3   0.4  0.1   0.1   0.1  0.4   0.4
HCM2KQueue:   1.5  7.9   7.9   1.0  3.1   5.0   5.3  1.6   1.6   1.3  5.5   5.5
------------|---------------||---------------||---------------||---------------|
70th%Factor: 1.20 1.18  1.18  1.20 1.19  1.19  1.19 1.20  1.20  1.20 1.19  1.19
HCM2k70thQ:   1.8  9.3   9.3   1.2  3.7   6.0   6.3  1.9   1.9   1.5  6.5   6.5
------------|---------------||---------------||---------------||---------------|
85th%Factor: 1.59 1.53  1.53  1.59 1.57  1.55  1.55 1.58  1.58  1.59 1.55  1.55
HCM2k85thQ:   2.4 12.1  12.1   1.5  4.9   7.8   8.2  2.5   2.5   2.0  8.5   8.5
------------|---------------||---------------||---------------||---------------|
90th%Factor: 1.77 1.67  1.67  1.78 1.74  1.71  1.71 1.77  1.77  1.78 1.70  1.70
HCM2k90thQ:   2.6 13.2  13.2   1.7  5.5   8.6   9.0  2.8   2.8   2.3  9.3   9.3
------------|---------------||---------------||---------------||---------------|
95th%Factor: 2.05 1.89  1.89  2.07 2.00  1.95  1.95 2.05  2.05  2.06 1.94  1.94
HCM2k95thQ:   3.1 14.9  14.9   2.0  6.3   9.8  10.3  3.3   3.3   2.6 10.7  10.7
------------|---------------||---------------||---------------||---------------|
98th%Factor: 2.59 2.24  2.24  2.63 2.49  2.38  2.37 2.58  2.58  2.61 2.36  2.36
HCM2k98thQ:   3.9 17.7  17.7   2.5  7.8  12.0  12.5  4.1   4.1   3.4 12.9  12.9
                        Fuel Consumption and Emissions
                         2000 HCM Operations Method
                          Future Volume Alternative
*******************************************************************************
Intersection #1009 Mary Av & Evelyn Av
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*******************************************************************************
Approach:       North Bound       South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Run Speed:          30 MPH            30 MPH            30 MPH            30 MPH
NumOfStops:  14.9  186   5.2  12.7 53.5  39.3  40.8 22.5   4.5  10.1 50.1  38.3
-------------------------------------------------------------------------------
Name: year 1995 composite fleet
Fuel Consumption:      75.489 pounds
                       12.229 gallons
Carbon Dioxide:       235.527 pounds
Carbon Monoxide:       18.467 pounds
Hydrocarbons:           3.366 pounds
Nitrogen Oxides:        0.670 pounds
-------------------------------------------------------------------------------
Name: year 2000 composite fleet
Fuel Consumption:      75.489 pounds
                       12.229 gallons
Carbon Dioxide:       235.527 pounds
Carbon Monoxide:       18.467 pounds
Hydrocarbons:           3.366 pounds
Nitrogen Oxides:        0.670 pounds
-------------------------------------------------------------------------------
DISCLAIMER
The fuel consumption and emissions measures should be used with
caution and only for comparisons of different signal timings, geometric
design Future Volume Alternatives or for general planning applications, as these
calculations are applied to the analysis of a single intersection within the
CCG and TRAFFIX.  Network models are more appropriate since they can
account for the influence of the adjacent control measures and other system
elements.
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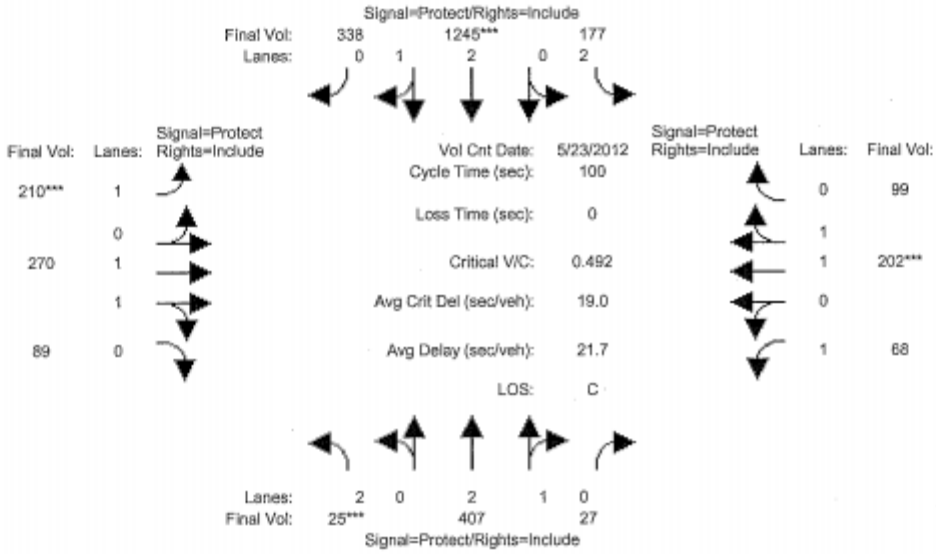
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-PM

Intersection #1009: Mary Av & Evelyn Av



Street Name:	Mary Av						Evelyn Av					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 May 2012 << 5-6												
Base Vol:	25	407	27	177	1245	338	210	270	89	68	202	99
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	25	407	27	177	1245	338	210	270	89	68	202	99
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	25	407	27	177	1245	338	210	270	89	68	202	99
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	25	407	27	177	1245	338	210	270	89	68	202	99
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	25	407	27	177	1245	338	210	270	89	68	202	99
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	25	407	27	177	1245	338	210	270	89	68	202	99
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.83	1.00	0.92	0.83	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	2.00	2.80	0.20	2.00	2.32	0.68	1.00	1.47	0.53	1.00	1.31	0.69
Final Sat.:	3150	5317	353	3150	4402	1195	1750	2798	922	1750	2480	1216
Capacity Analysis Module:												
Vol/Sat:	0.01	0.08	0.08	0.06	0.28	0.28	0.12	0.10	0.10	0.04	0.08	0.08
Crit Moves:	****				****		****				****	
Green/Cycle:	0.02	0.34	0.34	0.25	0.57	0.57	0.24	0.29	0.29	0.12	0.17	0.17
Volume/Cap:	0.49	0.22	0.22	0.22	0.49	0.49	0.49	0.33	0.33	0.33	0.49	0.49
Delay/Veh:	56.1	23.6	23.6	29.9	12.7	12.7	33.4	27.9	27.9	41.5	38.5	38.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	56.1	23.6	23.6	29.9	12.7	12.7	33.4	27.9	27.9	41.5	38.5	38.5
LOS by Move:	E	C	C	C	B	B	C	C	C	D	D	D
HCM2kAvgQ:	28	79	79	61	231	231	146	105	105	51	106	106

Note: Queue reported is the distance per lane in feet.

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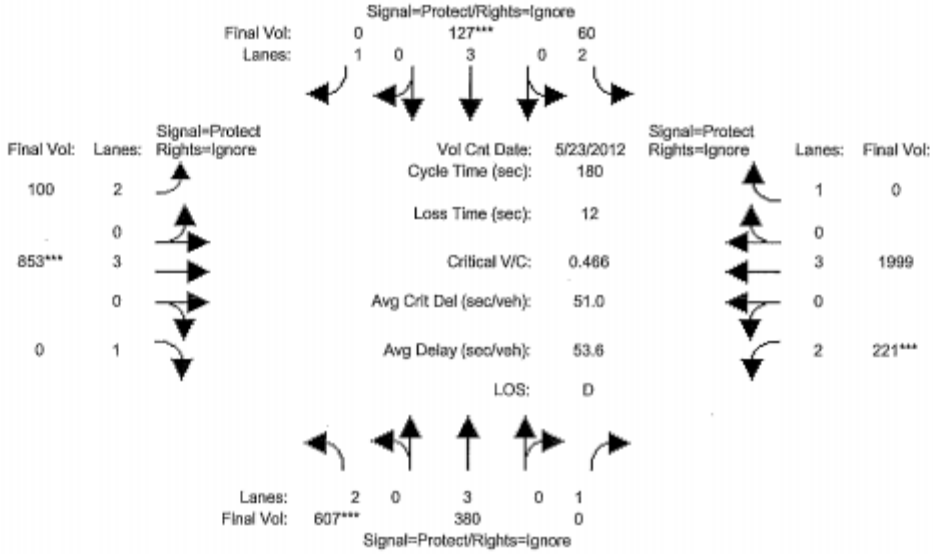
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing-AM

Intersection #1010: Mary Ave. & Central Expwy.



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	14	10	10	14	10	10	14	65	10	14	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 May 2012 << 8-9												
Base Vol:	607	380	517	60	127	145	100	853	146	221	1999	156
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	607	380	517	60	127	145	100	853	146	221	1999	156
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	607	380	517	60	127	145	100	853	146	221	1999	156
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
PHF Volume:	607	380	0	60	127	0	100	853	0	221	1999	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	607	380	0	60	127	0	100	853	0	221	1999	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
FinalVolume:	607	380	0	60	127	0	100	853	0	221	1999	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.83	1.00	0.92	0.83	1.00	0.92	0.83	1.00	0.92	0.83	1.00	0.92
Lanes:	2.00	3.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3150	5700	1750	3150	5700	1750	3150	5700	1750	3150	5700	1750
Capacity Analysis Module:												
Vol/Sat:	0.19	0.07	0.00	0.02	0.02	0.00	0.03	0.15	0.00	0.07	0.35	0.00
Crit Moves:	****				****			****		****		
Green/Cycle:	0.38	0.20	0.00	0.23	0.06	0.00	0.09	0.36	0.00	0.14	0.41	0.00
Volume/Cap:	0.51	0.33	0.00	0.08	0.40	0.00	0.35	0.41	0.00	0.51	0.86	0.00
Delay/Veh:	44.6	62.4	0.0	54.1	85.9	0.0	80.2	43.8	0.0	76.1	52.9	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	44.6	62.4	0.0	54.1	85.9	0.0	80.2	43.8	0.0	76.1	52.9	0.0
LOS by Move:	D	E	A	D	F	A	F	D	A	E	D	A
HCM2kAvgQ:	385	146	0	38	57	0	78	292	0	179	873	0

Note: Queue reported is the distance per lane in feet.

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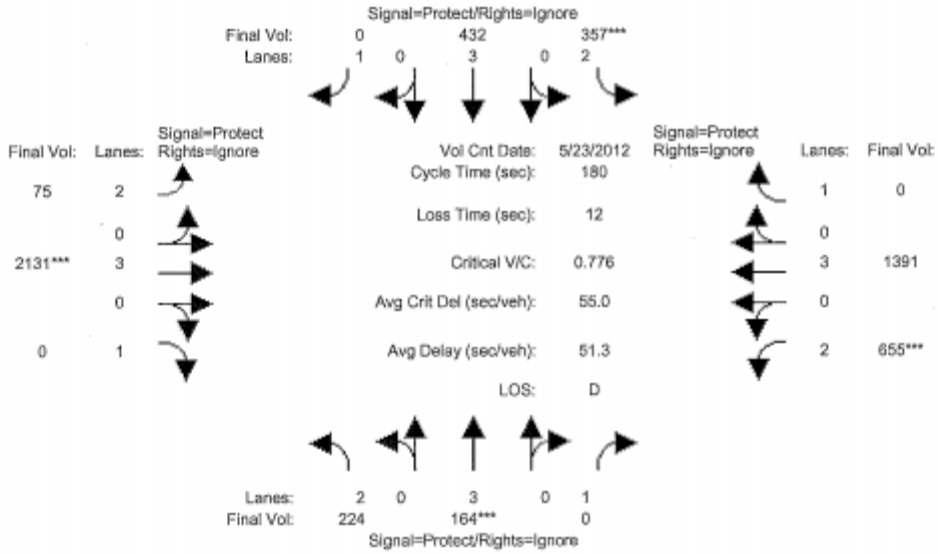
Level Of Service Computation Report
2000 HCM Operations (alternative)
Existing-PM

Intersection #1010: Mary Ave. & Central Expwy.



Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	14	10	10	14	10	10	14	65	10	14	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 May 2012 << 5-6												
Base Vol:	224	164	324	357	432	146	75	2131	795	655	1391	69
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	224	164	324	357	432	146	75	2131	795	655	1391	69
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	224	164	324	357	432	146	75	2131	795	655	1391	69
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
PHF Volume:	224	164	0	357	432	0	75	2131	0	655	1391	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	224	164	0	357	432	0	75	2131	0	655	1391	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
FinalVolume:	224	164	0	357	432	0	75	2131	0	655	1391	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.83	1.00	0.92	0.83	1.00	0.92	0.83	1.00	0.92	0.83	1.00	0.92
Lanes:	2.00	3.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3150	5700	1750	3150	5700	1750	3150	5700	1750	3150	5700	1750
Capacity Analysis Module:												
Vol/Sat:	0.07	0.03	0.00	0.11	0.08	0.00	0.02	0.37	0.00	0.21	0.24	0.00
Crit Moves:		****		****				****		****		
Green/Cycle:	0.10	0.06	0.00	0.14	0.10	0.00	0.18	0.47	0.00	0.26	0.56	0.00
Volume/Cap:	0.71	0.52	0.00	0.79	0.77	0.00	0.13	0.79	0.00	0.79	0.44	0.00
Delay/Veh:	90.9	88.6	0.0	87.8	89.2	0.0	62.9	42.5	0.0	69.4	23.8	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	90.9	88.6	0.0	87.8	89.2	0.0	62.9	42.5	0.0	69.4	23.8	0.0
LOS by Move:	F	F	A	F	F	A	E	D	A	E	C	A
HCM2kAvgQ:	193	76	0	311	211	0	50	860	0	537	359	0

Note: Queue reported is the distance per lane in feet.

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