SummerHill Apartment Project Traffic Impact Analysis

Prepared for

THE CITY OF PLEASANTON

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Balancing Functionality and Livability
Traffic Engineering • Transportation Planning

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Executive Summary

The proposed project would demolish the existing vacant office building located at the southwest corner of the West Las Positas Boulevard/Hacienda Drive intersection in the City of Pleasanton and construct 177 residential apartment units. This project was included in the recently approved *Pleasanton Housing Element EIR*.

The project is anticipated to generate an average of 1,177 new trips on a daily basis, including 90 trips (65 school related and 25 non-school related) during the morning peak hour and 110 trips (all non-school related) during the evening peak hour.

The proposed project would include improvements at the intersection of West Las Positas Boulevard/Hacienda Drive. These improvements were included in all the plus project conditions traffic analysis.

Currently, all of the study intersections operate at an acceptable LOS C or better during the a.m. and p.m. peak hours and would continue to do so with the addition of project-generated trips. Under Existing plus Approved Projects Conditions, all the study intersections are expected to operate acceptably without and with the addition of project generated traffic. Under Cumulative Conditions and considering the planned TIF improvements, all the study intersections would operate acceptably without and with the addition of project-generated traffic.

The 95th percentile queues in the left-turn pockets at the West Las Positas Boulevard/ Hacienda Drive intersection would fit within the available storage length during the a.m. and p.m. peak hours under Existing plus Approved Projects Conditions, and also Cumulative Conditions without and with the project.

Access to the project site would be maintained via an existing right-turn in/right-turn out driveway off of West Las Positas Boulevard and the south leg of the signalized intersection of West Las Positas Boulevard/Hacienda Drive.

The proposed project would provide 304 parking spaces, including 254 covered spaces, and would satisfy the City of Pleasanton parking requirements.

Pedestrian access to the site is expected to be adequate. Existing and proposed bicycle facilities, including secured on-site bicycle parking and proposed trail facilities, would adequately serve the project site. Existing transit routes and bus stops adjacent to the project site on West Las Positas Boulevard would adequately serve the project-generated transit trips. The City of Pleasanton Climate Action Plan requires new residential developments within one-half mile of transit to offer discounted transit passes as part of the Home Owners Association (HOA) amenities, payable through the HOA dues. It is therefore recommended that the project developer shall work with the Hacienda Business Park Association to provide ECO passes to the residents for free use of the LAVTA transit system.

The proposed project would have a less-than-significant impact at the study intersections along the routes to Donlon Elementary School and Hart Middle school during the a.m. and school p.m. peak hours.

Introduction

This report presents an analysis of the potential traffic impacts that would be associated with the development of 177 residential apartment units to be located at 5850 West Las Positas Boulevard in the City of Pleasanton. The traffic study was completed in accordance with the criteria established by the City of Pleasanton, and is consistent with standard traffic engineering techniques.

Prelude

The purpose of a traffic impact study is to provide City staff and policy makers with data that they can use to make an informed decision regarding the potential traffic impacts of a proposed project, and any associated improvements that would be required in order to mitigate these impacts to a level of insignificance as defined by the City's General Plan or other policies. Vehicular traffic impacts are typically evaluated by determining the number of new trips that the proposed use would be expected to generate, distributing these trips to the surrounding street system based on existing travel patterns or anticipated travel patterns specific to the proposed project, then analyzing the impact the new traffic would be expected to have on critical intersections. Impacts relative to safety, including for pedestrians and bicyclists, and to transit are also addressed.

Project Profile

The project site is located in the southwest quadrant of the West Las Positas Boulevard/Hacienda Drive intersection and currently has a vacant one-story office building. The project as proposed would demolish the existing vacant building and construct 177 residential apartment units. Vehicular access to the project site is currently provided via a right-turn in/right-turn out only driveway on West Las Positas Boulevard and the signalized intersection of West Las Positas Boulevard at Hacienda Drive, and these access points would remain with the proposed project.

Transportation Setting

Operational Analysis

Study Area and Periods

The study area includes the immediate site vicinity and local roadways, as well as the following seven intersections; the numbering for the intersections as contained in the City's Synchro model and used for the analysis output is indicated in parentheses:

1. Stoneridge Drive/Hacienda Drive (#57)
2. Willow Road/Gibraltar Drive (south) (#946)
3. Hacienda Drive at Gibraltar Drive (south) (#58)
4. West Las Positas Boulevard at Hopyard Road (#35)
5. West Las Positas Boulevard at Willow Road (#52)
6. West Las Positas Boulevard at Hacienda Drive (#59)
7. West Las Positas Boulevard at Stoneridge Drive (#64)

Typical operating conditions during the weekday a.m. and p.m. peak periods were evaluated to capture the highest potential impacts for the proposed project as well as the highest volumes on the local transportation network. The morning peak hour occurs between 7:00 and 9:00 a.m. and reflects conditions during the home to work or school commute, while the p.m. peak hour occurs between 4:00 and 6:00 p.m. and typically reflects the highest level of congestion during the homeward bound commute.

At the direction of City staff, traffic volume data presented in the recently approved *Pleasanton Housing Element Transportation Analysis* (Fehr & Peers, 2011), were incorporated into this analysis. Existing traffic volume data was not available for the study intersection of Willow Road/Gibraltar Drive South; therefore, new a.m. (7:00-9:00) and p.m. (4:00-6:00) peak hour turning movement counts were conducted on a typical weekday in November 2013 while local schools were in session.

Study Intersections

Stoneridge Drive/Hacienda Drive is a four-way, signalized intersection with protected left-turn phasing on all four approaches. Marked crosswalks with pedestrian signals heads and push buttons are provided on all legs of the intersection.

Willow Road/Gibraltar Drive (south) is an unsignalized, four-legged intersection. The Willow Road northbound and southbound approaches are uncontrolled and the eastbound and westbound Gibraltar Drive (south) approaches are stop-controlled. Marked crosswalks are provided on all legs of the intersection except the western leg.

Hacienda Drive/Gibraltar Drive (south) is a four-legged, signalized intersection. The northbound and southbound Hacienda Drive approaches have protected left-turn phasing and the Gibraltar Drive (south) eastbound and westbound approaches have permissive left-turn phasing. Marked crosswalks and pedestrian crossing signal equipment are provided on all legs of the intersection.

West Las Positas Boulevard/Hopyard Road is a signalized, four-way intersection with protected left-turn phasing on all four approaches. Right-turning movements are uncontrolled on all legs of the intersection except the northern leg. Marked crosswalks are provided across all legs of the intersection along with pedestrian crossing signal equipment.

West Las Positas Boulevard/Willow Road is a signalized, four-legged intersection; the southern leg is a driveway. The eastbound and westbound West Las Positas Boulevard approaches have protected left-turn phasing and the northbound driveway approach and southbound Willow Road approach each have permissive left-turn phasing. Marked crosswalks with pedestrian signal heads and push buttons are provided on all legs of the intersection.

West Las Positas Boulevard/Hacienda Drive is a four-way, signalized intersection; the southern leg is a driveway serving an office building located at the southeast corner of this intersection. The eastbound and westbound Las Positas Boulevard approaches have protected left-turn phasing. The northbound driveway approach and the southbound Hacienda Drive approach has exclusive (split) phasing. Marked crosswalks are provided on all legs of the intersection, along with pedestrian crossing signal equipment.

West Las Positas Boulevard/Stoneridge Drive is a signalized, four-way intersection with protected left-turn phasing on all four approaches. Marked crosswalks and pedestrian signal heads and push buttons are provided on all legs of the intersection.

The locations of the study intersections as well as the existing lane configurations and traffic controls are shown in Figure 1.

Alternative Modes

Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. In general, a network of sidewalks, crosswalks, pedestrian signals, and curb ramps provide access for pedestrians in the vicinity of the proposed project site. Marked crosswalks and pedestrian signal phasing are provided at all signalized intersections.

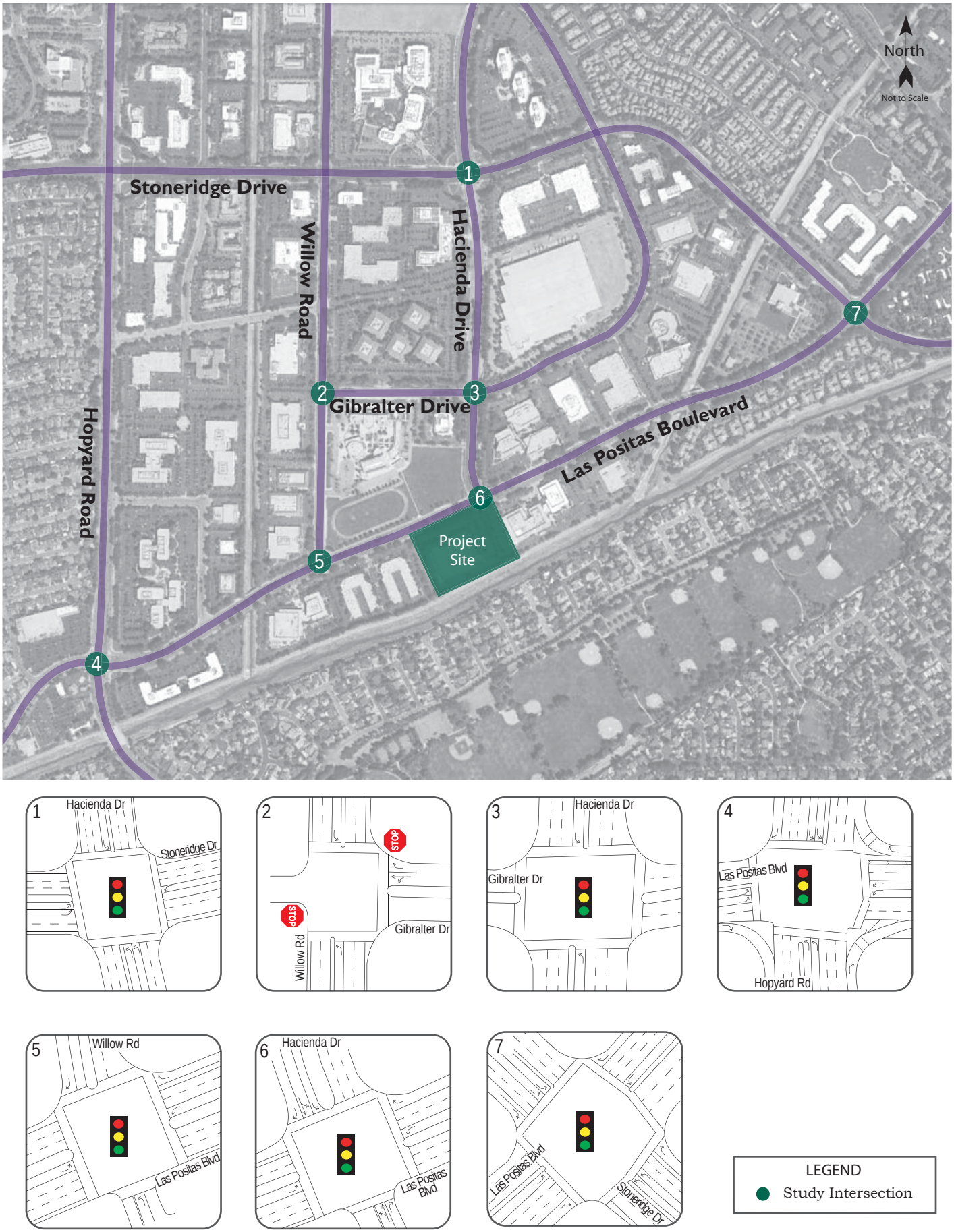
Bicycle Facilities

The *Highway Design Manual*, California Department of Transportation (Caltrans), 2012, classifies bikeways into three categories:

- *Class I Multi-Use Path*: a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.
- *Class II Bike Lane*: a striped and signed lane for one-way bike travel on a street or highway.
- *Class III Bike Route*: signing only for shared use with motor vehicles within the same travel lane on a street or highway.

Class I multi-use paths including Iron Horse Trail, and Alamo Canal Trail exist near the study area. Within the project vicinity, Class II bike lanes exist on West Las Positas Boulevard west of Haciendas Drive, Willow Road and Stoneridge Drive. Currently, bike lanes do not exist on West Las Positas Boulevard between Stoneridge Drive and Hacienda Drive.

According to the *Pleasanton Pedestrian and Bicycle Master Plan*, Fehr & Peers, January 2010, a Class I multi-use path is proposed on the south side of the Arroyo Mocho Creek. Class II bike lanes are proposed on West Las Positas Boulevard east of Hacienda Drive, Hopyard Road and Stoneridge Drive. Additionally, a new trail access point, east of the project site on West Las Positas Boulevard at Tassajara Creek, is also proposed.



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SummerHill Apartment Project Traffic Impact Analysis

Figure 1 – Study Area and Lane Configurations

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Transit Facilities

Transit service in Pleasanton is provided by three agencies: The Livermore Amador Valley Transit Authority (LAVTA) provides fixed route bus service, and the Bay Area Rapid Transit District (BART) and the Altamont Commuter Express (ACE) both operate commuter rail service. Following is a summary of the transit lines that currently serve the project site.

Wheels Bus

The LAVTA provides fixed route bus service under the name "Wheels" in the City of Pleasanton, as well as the neighboring cities of Dublin, Livermore, and unincorporated portions of Alameda County.

Wheels Bus Route 9 provides weekday morning and evening service from/to East Dublin/Pleasanton BART Station to West Las Positas Boulevard, Stoneridge Drive and Willow Road. Morning service is provided between 6:45 a.m. and 9:30 a.m. with 15-minute headways and evening service is provided between 3:30 p.m. and 6:30 p.m. with approximately 10-20 minute headways.

Wheel Bus Route 54 provides weekday morning and evening service between the Pleasanton Altamont Commuter Express (ACE) Station and East Dublin/Pleasanton BART Station connecting Hopyard Road, West Las Positas Boulevard and Stoneridge Drive. Morning service is provided between 5:30 a.m. and 9:00 a.m. with 15-60 minute headways. Evening service is provided between 3:30 p.m. and 6:30 p.m. with 60-minute headways.

Wheel Bus Route 70X provides weekday morning and evening service between Pleasant Hill BART Station and East Dublin/Pleasanton via Walnut Creek BART Station. During the morning hours, service is provided from the Pleasant Hill BART Station to the East Dublin/Pleasanton BART Station with approximately 15-30 minute headways. At the East Dublin/Pleasanton BART Station, route 70X becomes Route 9. Similarly, during the evening hours, Route 9 becomes Route 70X at the East Dublin/ Pleasanton BART Station and provides service to the Pleasant Hill BART Station with 30-minute headways.

Additionally, school focused bus routes 603, 607, 609 and 610 provide service between the various residential neighborhoods in Pleasanton and Hart Middle School from West Las Positas Boulevard, Gibraltar Drive and Hacienda Drive.

Within the project vicinity, bus stops are provided in both the eastbound and westbound directions along West Las Positas Boulevard. The eastbound direction bus stop is located on the south side of West Las Positas Boulevard just east of Hacienda Drive. The westbound direction bus stop is located on the north side of West Las Positas Boulevard just west of Hacienda Drive. These bus stops are currently being served by Wheel Bus Routes 9, 54 and 70X.

Two bicycles can be carried on most Wheels buses. Bike rack space is on a first come, first served basis. Additional bicycles are allowed on Wheels buses at the discretion of the driver.

Dial-a-ride, also known as paratransit, or door-to-door service, is available for those who are unable to independently use the transit system due to a physical or mental disability. The City of Pleasanton Dial-a-ride is designed to serve the needs of individuals with disabilities within Pleasanton which is supplemented by LAVTA in the greater Livermore-Amador Valley region.

BART

The Bay Area Rapid Transit District (BART) provides heavy-rail rapid transit service within Alameda, Contra Costa, San Francisco and San Mateo Counties. The East Dublin/Pleasanton station, located along

I-580 between Hopyard Road-Dougherty Road and Hacienda Drive, is the easternmost station along that segment of the BART system and is approximately two miles northwest of the proposed project site. Additionally the West Dublin/Pleasanton station, located near the Stoneridge Mall, also serves the City. One BART line provides service to the two Dublin/Pleasanton stations, with the line terminating in Daly City. Passengers can transfer to other BART lines that terminate at Richmond, Pittsburg/Bay Point, Fremont, Millbrae and the San Francisco International Airport. Wheels Bus Route 9 provides service between the project site and the East Dublin/Pleasanton BART Station.

ACE

The Altamont Commuter Express (ACE) is an intra-city rail transit service that provides commuter service between Stockton and San Jose with ten stations. Four westbound trains are provided in the morning and four eastbound trains are provided in the evening. The ACE station in Pleasanton is located on Pleasanton Avenue north of Bernal Avenue. Wheels Bus Route 54 provides weekday morning and evening service between the existing transit stops adjacent to the project site and the Pleasanton ACE station.

Capacity Analysis

Intersection Level of Service Methodologies

Level of Service (LOS) is used to rank traffic operation on various types of facilities based on traffic volumes and roadway capacity using a series of letter designations ranging from A to F. Generally, Level of Service A represents free flow conditions and Level of Service F represents forced flow or breakdown conditions. A unit of measure that indicates a level of delay generally accompanies the LOS designation.

The study intersections were analyzed using methodologies published in the *Highway Capacity Manual* (HCM), Transportation Research Board, 2000. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle. The use of these methodologies is consistent with the recently completed City of Pleasanton Housing Element traffic analysis.

The Levels of Service for the study intersection of Willow Road/Gibraltar Drive South, which has side-street stop controls, were analyzed using the "Two-Way Stop-Controlled" intersection capacity method from the HCM. This methodology determines a level of service for each minor turning movement by estimating the level of average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall average delay for the intersection.

All of the remaining study intersections are controlled by traffic signals and were evaluated using the signalized methodology from the HCM. This methodology is based on factors including traffic volumes, green time for each movement, phasing, whether or not the signals are coordinated, truck traffic, and pedestrian activity. Average stopped delay per vehicle (in seconds) is used as the basis for evaluation in this LOS methodology.

The ranges of delay associated with the various levels of service are indicated in Table 1.

Table 1
Intersection Level of Service Criteria

LOS	Two-Way Stop-Controlled	Signalized
A	Delay of 0 to 10 seconds. Gaps in traffic are readily available for drivers exiting the minor street.	Delay of 0 to 10 seconds. Most vehicles arrive during the green phase, so do not stop at all.
B	Delay of 10 to 15 seconds. Gaps in traffic are somewhat less readily available than with LOS A, but no queuing occurs on the minor street.	Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop.
C	Delay of 15 to 25 seconds. Acceptable gaps in traffic are less frequent, and drivers may approach while another vehicle is already waiting to exit the side street.	Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.
D	Delay of 25 to 35 seconds. There are fewer acceptable gaps in traffic, and drivers may enter a queue of one or two vehicles on the side street.	Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop.
E	Delay of 35 to 50 seconds. Few acceptable gaps in traffic are available, and longer queues may form on the side street.	Delay of 55 to 80 seconds. Most, if not all, vehicles must stop and drivers consider the delay excessive.
F	Delay of more than 50 seconds. Drivers may wait for long periods before there is an acceptable gap in traffic for exiting the side streets, creating long queues.	Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

Reference: *Highway Capacity Manual,* Transportation Research Board, 2000

Traffic Operation Standards

Levels of Service

The City of Pleasanton has adopted an operational standard of LOS D or better for intersection operations per the General Plan (adopted July 2009). However, there are a few exceptions to the LOS D standard in the Downtown area and at the City of Pleasanton gateway intersections. These intersections may have a level of service below the LOS D standard if no reasonable mitigation exists or if the necessary mitigation is contrary to other goals and policies of the City. Traffic impacts at the study intersections would be considered significant if the Project would result in any of the following:

Impact Significance Criteria

Signalized Intersections

- Deterioration of a signalized intersection from LOS D (or better) to LOS E or LOS F
- The project adds ten or more trips to a signalized intersection projected to operate at LOS E prior to the addition of project traffic

Unsignalized Intersections

- Deterioration of a controlled movement at an unsignalized intersection from LOS E or better to LOS F, or at intersections where a controlled movement already operates at LOS F, one of the following:
  - Project traffic results in satisfaction of the peak hour volume traffic signal warrant;
  - Project traffic increases minor movement delay by more than 30 seconds; or
  - Where the peak hour volume signal warrant is met without Project traffic and delay cannot be measured, Project increases traffic by 10 or more vehicles per lane on the controlled approach.

Traffic Model

The City of Pleasanton's traffic model is maintained by City Staff and uses Synchro analysis software. The model was provided by City staff to use for this analysis. This citywide model was last updated for the City's Housing Element update and is consistent with the buildout of the City's General Plan. The proposed project (and not the existing office use) was included in the environmental analysis for the City's Housing Element update, and was therefore included in this traffic model for all study scenarios except the existing conditions scenarios.

Traffic volume data were obtained directly from this model, with adjustments made as noted below:

- *Existing conditions* – traffic volume data were obtained directly from the model for the existing conditions (without project) scenario.
- *Existing plus Project conditions* – project traffic volumes were added to the existing conditions traffic volumes to represent existing plus project conditions.
- *Existing plus Approved Projects conditions* – short-term future traffic volume data provided in the traffic model includes traffic that would be generated by the proposed project. Therefore the project's traffic volumes were subtracted out from the traffic model volumes.
- *Existing plus Approved Projects plus Project conditions* – short-term future traffic volume data provided in the traffic model already includes traffic that would be generated by the proposed project, so no adjustments were made to the data provided.
- *Cumulative conditions* – to develop the Cumulative without project scenario, the project's traffic volumes were subtracted out from those presented in the traffic model.

- *Cumulative plus Project conditions* – the future traffic volume data already includes the project generated traffic; therefore, no adjustments were made.

Recent traffic volume data for the intersection of Willow Road/Gibraltar Drive South was not available. Therefore, traffic volume at this intersection under short-term and cumulative scenarios was developed based on balancing traffic volumes with adjacent intersections.

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the a.m. and p.m. peak periods. This condition does not include project-generated traffic volumes. The existing traffic volumes are shown in Figure 2.

Under existing conditions, all study intersections operate acceptably at LOS C or better during both peak hours. A summary of the intersection Level of Service calculations is contained in Table 2, and copies of the calculations are provided in Appendix A.

Table 2
Existing Peak Hour Intersection Levels of Service

Study Intersection ***Approach***	**Existing Conditions**			
	AM Peak		**PM Peak**	
	Delay	**LOS**	**Delay**	**LOS**
1. Stoneridge Dr/ Hacienda Dr	21.4	C	25.7	C
2. Willow Rd/Gibraltar Dr (south)	1.2	A	3.5	A
Eastbound (Gibraltar Dr) approach	*17.3*	*C*	*16.1*	*C*
Westbound (Gibraltar Dr) approach	*14.2*	*B*	*11.1*	*B*
3. Hacienda Dr/Gibraltar Dr (south)	6.8	A	6.1	A
4. West Las Positas Blvd/Hopyard Rd	29.0	C	23.5	C
5. West Las Positas Blvd/Willow Rd	16.0	B	10.7	B
6. West Las Positas Blvd/Hacienda Dr	14.8	B	15.6	B
7. West Las Positas Blvd/Stoneridge Dr	19.0	B	24.0	C

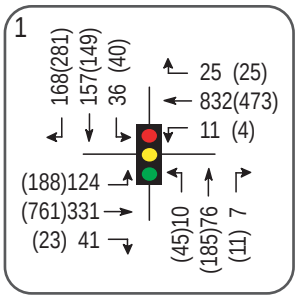
Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

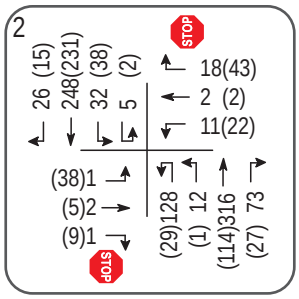
Traffic Impact Fee Program

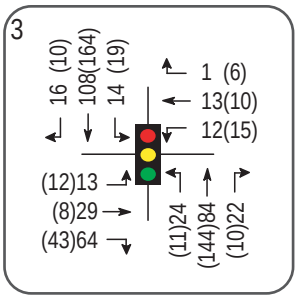
The City of Pleasanton has established a Traffic Impact Fee (TIF) program to fund future enhancements to the transportation network based on anticipated needs. As part of the City's program, there are plans to modify the following three intersections:

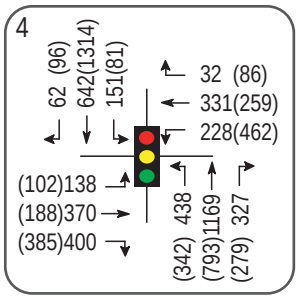
<u>West Las Positas Boulevard/Hopyard Road</u>

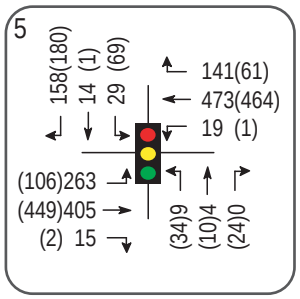
The West Las Positas westbound approach will be modified to provide three left-turn lanes, two through lanes and one right-turn lane. This improvement was included in the Cumulative Conditions scenario analysis.

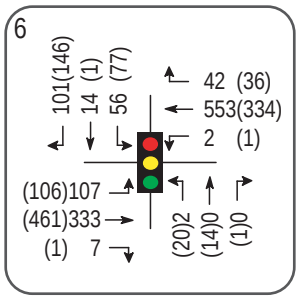


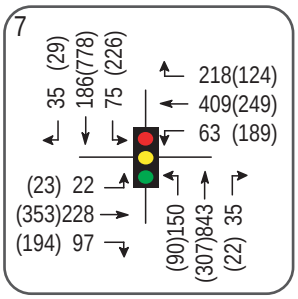












LEGEND
- Study Intersection
- xx A.M. Peak Hour Volume
- (xx) P.M. Peak Hour Volume

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SummerHill Apartment Project Traffic Impact Analysis

Figure 2 – Existing Traffic Volumes

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West Las Positas Boulevard/Hacienda Drive

Existing split phasing for the northbound and southbound Hacienda Drive approaches at West Las Positas Boulevard will be replaced with protected left-turn phasing. As part of this improvement, the northbound Hacienda Drive approach will be modified to provide one left-turn lane and one shared through/right-turn lane. The southbound Hacienda Drive approach would be modified to include one left-turn lane, one through lane and one right-turn lane. It was noted that the above intersection improvements are being proposed by the project. Therefore, these improvements were included in all the plus project scenarios.

West Las Positas Boulevard/Stoneridge Drive

The eastbound and westbound West Las Positas Boulevard approaches would be converted to two left-turn lanes, two through lanes and one right-turn lane. These improvements were included in the Cumulative Conditions traffic analysis.

Project Description

The proposed project would demolish the existing vacant office building and construct 177 residential apartment units at the southwest corner of the West Las Positas/Hacienda Drive intersection. The project site is currently accessed via a right-turn in/right-turn out driveway off of West Las Positas Boulevard and the south leg of the West Las Positas Boulevard/Hacienda Drive intersection. These access points would remain with the proposed project. The most recent site plan dated January 2014 is shown in Figure 3.

Trip Generation

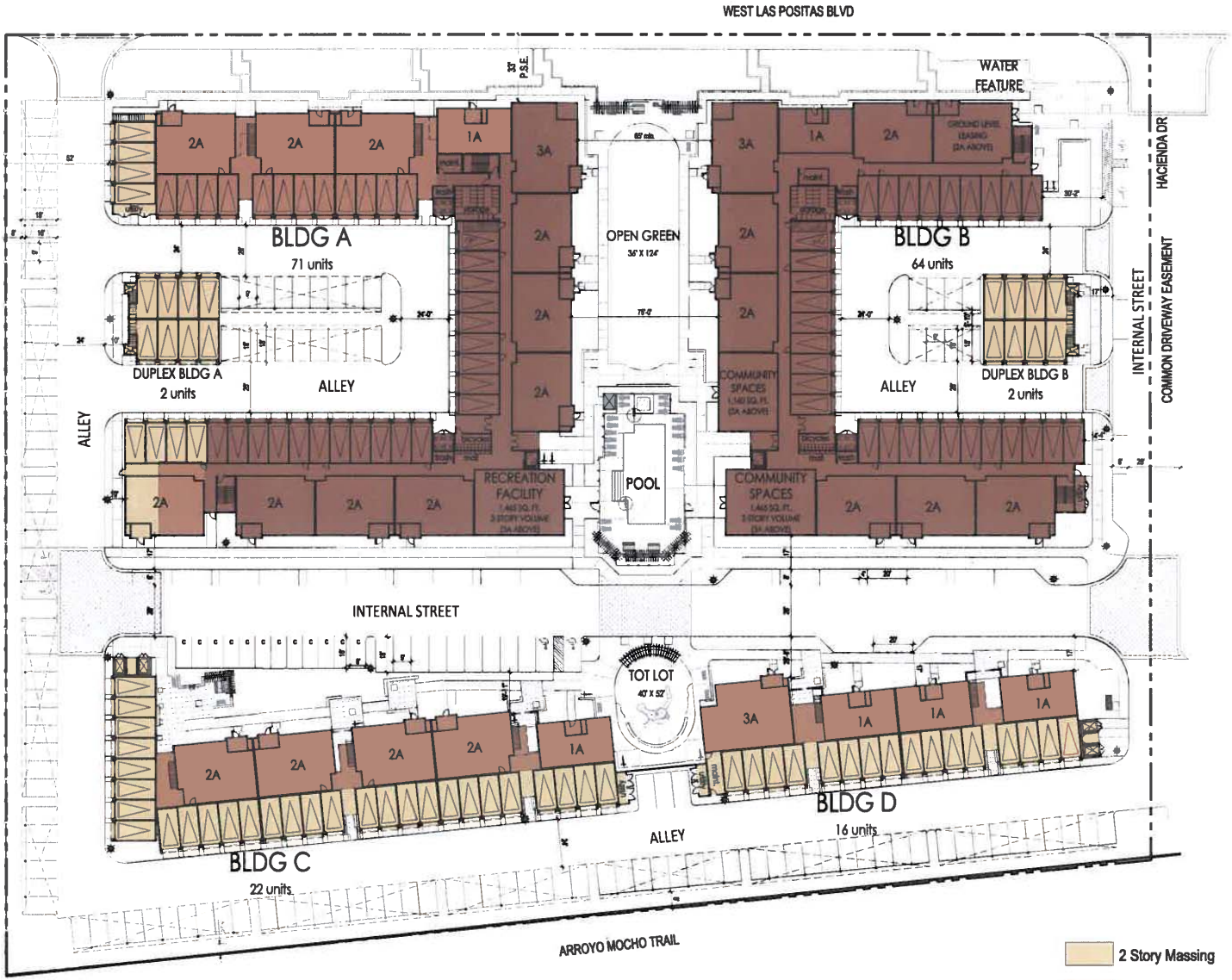
The anticipated trip generation for the proposed project was estimated using the average rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 9th Edition, 2012 for an "Apartment" (LU# 220). As indicated in Table 3, the proposed project is expected to generate an average of 1,177 daily trips, including 90 trips during the a.m. peak hour and 110 trips during the p.m. peak hour.

Table 3
Trip Generation Summary

Land Use	Units	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Proposed											
Apartment	177 du	6.65	1,177	0.51	90	18	72	0.62	110	71	39
Project Trips			**1,177**		**90**	**18**	**72**		**110**	**71**	**39**

Note: du = dwelling unit

Donlon Elementary School (4150 Dorman Road) and Hart Middle School (4433 Willow Road) are located within the study area. Due to the proximity of these schools to the project site, it was anticipated that some of the trips generated by the project would be to and from these schools. Based on the bell schedule (school start and end time) posted on each school's website, it was determined that the a.m. peak hour for the school and the project would coincide; however, the school p.m. peak hour (2:00-4:00 p.m.) would be outside the project p.m. peak hour (4:00-6:00 p.m.). Therefore, school-related traffic generated from the proposed project was included only in distribution for the a.m. peak hour traffic analysis.



UNIT MIX:	BUILDING A	B	C	D	TOTAL
1-BEDROOM	32	30	10	13	85
2-BEDROOM	35	30	12		77
3-BEDROOM	6	6		3	15
	73	66	22	16	177 units

2 Story Massing
3 Story Massing
4 Story Massing
Carport

Source: KTGY Group, Inc.

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SummerHill Apartment Project Traffic Impact Analysis

Figure 3 – Site Plan

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Per the information provided by the City staff, it was estimated that the proposed 177 apartment units would include a total of 47 students (31 elementary school and 16 middle school students). To provide a conservative analysis, it was assumed that all of the 47 students would be driven to school, resulting in 47 a.m. peak hour outbound trips from the site. It was also assumed that some of the project patrons would return back to the project site after dropping their children off to school (i.e., parents returning home after dropping their child off at school). Therefore, all of the 18 inbound project trips were assumed to be school-related. A summary of both school and non-school related trips is provided in Table 4.

Table 4
School and Non-School Trips Summary Assignment

Description	AM Peak Hour			PM Peak Hour		
	Trips	In	Out	Trips	In	Out
School	65	18	47	-	-	-
Non-School	25	0	25	110	71	39
Total Project Trips	**90**	**18**	**72**	**110**	**71**	**39**

Trip Distribution/Assignment

The trip distribution patterns used to allocate new project trips to the street network were determined by reviewing the existing and existing plus project volumes at the study intersections given in the *Pleasanton Housing Element Transportation Analysis*, Fehr & Peers, 2011, as well as the assignment assumptions indicated above. The applied distribution (non-school related) is shown in Figure 4.

Non-school related project trips were distributed to the roadway network based on the access scheme and trip distribution pattern shown in Figure 4. School related project trips were distributed based on the access scheme, elementary and middle school locations and the assumption that some of the project patrons after dropping their children off to school would return, while others would continue on to work or other destinations following the trip distribution pattern given in Figure 4. Further, it was assumed that project patrons exiting the site from the right-turn in/right-turn out driveway off of West Las Positas Boulevard and heading west (either to the schools or other destinations) would make a U-turn from eastbound West Las Positas Boulevard to westbound West Las Positas Boulevard at Hacienda Drive. The resulting project added traffic volumes during the a.m. and p.m. peak hour are shown in Figure 5.

Existing plus Project Conditions

Upon the addition of project-related traffic to the existing volumes and considering the roadway and traffic signal improvements at the West Las Positas Boulevard/Hacienda Drive intersection, all of the study intersections would continue to operate at an acceptable LOS C or better during both the a.m. and p.m. peak hours. A summary of the intersection Level of Service analysis is provided in Table 5 with Existing Conditions values shown for comparison purposes. Copies of the Level of Service calculations are provided in Appendix A.

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● Study Intersection

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SummerHill Apartment Project Traffic Impact Analysis

Figure 4 – Trip Distribution (Non-School)

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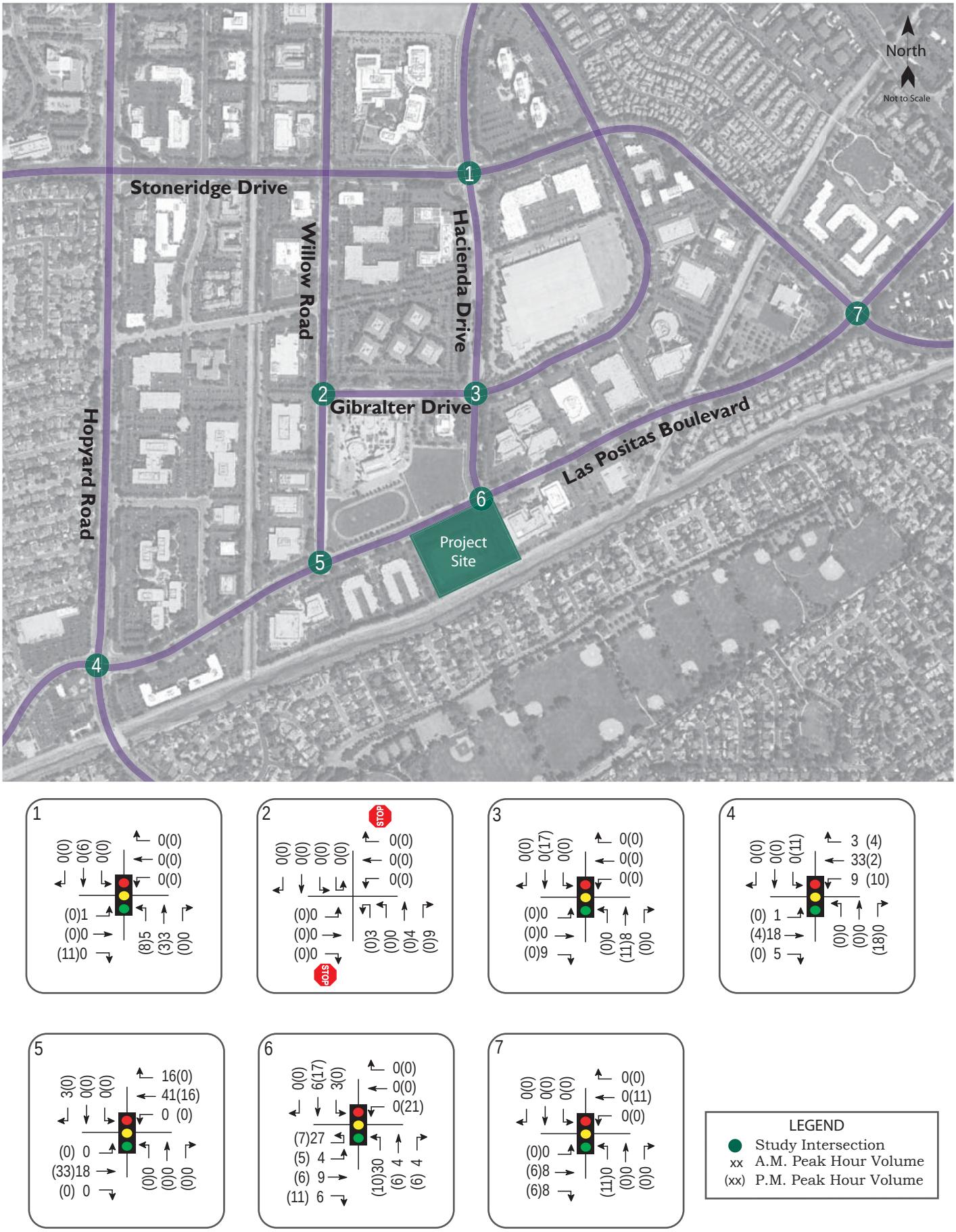

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SummerHill Apartment Project Traffic Impact Analysis

Figure 5 – Project Traffic Volumes

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Table 5
Existing and Existing plus Project Peak Hour Intersection Levels of Service

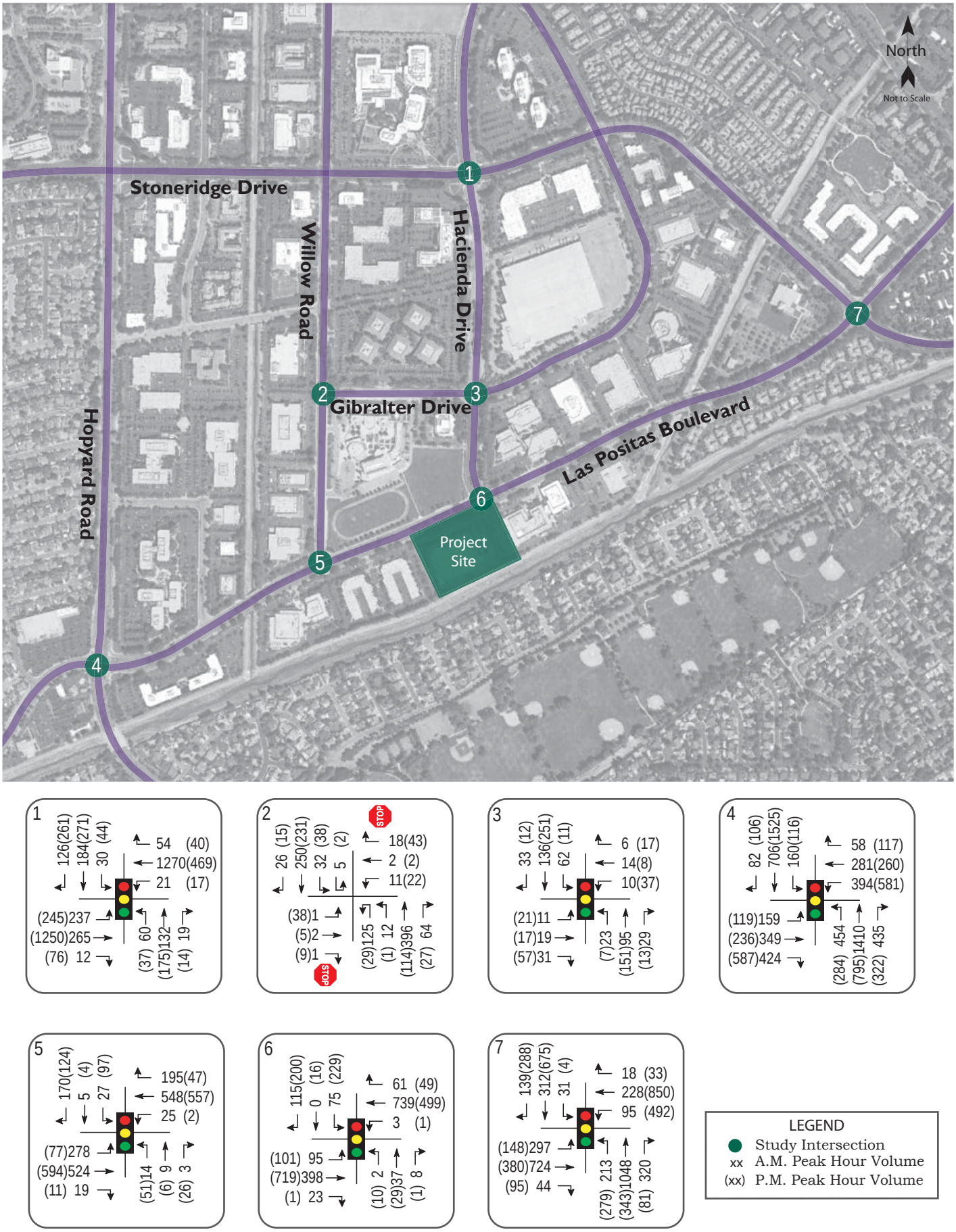
Study Intersection *Approach*	Existing Conditions				Existing plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Stoneridge Dr/ Hacienda Dr	21.4	C	25.7	C	21.7	C	25.9	C
2. Willow Rd/Gibraltar Dr (south)	1.2	A	3.5	A	1.2	A	3.5	A
Eastbound (Gibraltar Dr) approach	*17.3*	*C*	*16.1*	*C*	*17.5*	*C*	*16.1*	*C*
Westbound (Gibraltar Dr) approach	*14.2*	*B*	*11.1*	*B*	*14.4*	*B*	*11.1*	*B*
3. Hacienda Dr/Gibraltar Dr (south)	6.8	A	6.1	A	6.8	A	6.0	A
4. West Las Positas Blvd/Hopyard Rd	29.0	C	23.5	C	29.3	C	23.7	C
5. West Las Positas Blvd/Willow Rd	16.0	B	10.7	B	16.3	B	10.7	B
6. West Las Positas Blvd/Hacienda Dr*	14.8	B	15.6	B	21.1	C	16.9	B
7. West Las Positas Blvd/Stoneridge Dr	19.0	B	24.0	C	19.0	B	24.1	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in italics;
* = Under plus project conditions, roadway and traffic signal improvements were considered at this intersection

Finding: The study intersections are expected to continue operating at an acceptable level of service with the addition of project-generated traffic.

Existing plus Approved Projects Conditions

Existing plus Approved Projects operating conditions were determined with traffic that would be generated by all approved and pending projects, (including the City's Housing Element but excluding the SummerHill Apartments project) as contained in the City's Synchro traffic model. The Existing plus Approved Projects volumes are shown in Figure 6. Under these conditions, all of the study intersections are expected to operate at an acceptable LOS D or better during both peak hours. A summary of the analysis is provided in Table 6, and copies of Level of Service calculations are provided in Appendix A.



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SummerHill Apartment Project Traffic Impact Analysis

Figure 6 – Existing plus Approved Projects Traffic Volumes

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Table 6
Existing plus Approved Projects Peak Hour Intersection Levels of Service

Study Intersection ***Approach***	**Existing Plus Approved Projects Conditions**			
	AM Peak		**PM Peak**	
	Delay	**LOS**	**Delay**	**LOS**
1. Stoneridge Dr/ Hacienda Dr	27.0	C	23.5	C
2. Willow Rd/Gibraltar Dr (south)	1.2	A	3.5	A
Eastbound (Gibraltar Dr) approach	*18.7*	*C*	*16.1*	*C*
Westbound (Gibraltar Dr) approach	*15.6*	*C*	*11.1*	*B*
3. Hacienda Dr/Gibraltar Dr (south)	7.4	A	6.4	A
4. West Las Positas Blvd/Hopyard Rd	24.7	C	32.9	C
5. West Las Positas Blvd/Willow Rd	15.0	B	8.5	A
6. West Las Positas Blvd/Hacienda Dr	17.4	B	17.5	B
7. West Las Positas Blvd/Stoneridge Dr	29.4	C	36.6	D

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics.*

Existing plus Approved Projects plus Project Conditions

Upon the addition of project-related traffic to the Existing plus Approved Projects volumes and considering the roadway and traffic signal improvements at the West Las Positas Boulevard/Hacienda Drive intersection, all of the study intersections are anticipated to operate at an acceptable LOS D or better during both peak hours. A summary of the intersection Level of Service analysis is provided in Table 7 and copies of the calculations are provided in Appendix A.

Table 7
Existing plus Approved Projects plus Project Peak Hour Intersection Levels of Service

Study Intersection *Approach*	Existing plus Approved Projects Conditions							
	Without Project				With Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Stoneridge Dr/ Hacienda Dr	27.0	C	23.5	C	27.1	C	23.9	C
2. Willow Rd/Gibraltar Dr (south)	1.2	A	3.5	A	1.1	A	3.5	A
Eastbound (Gibraltar Dr) approach	*18.7*	*C*	*16.1*	*C*	*18.9*	*C*	*16.1*	*C*
Westbound (Gibraltar Dr) approach	*15.6*	*C*	*11.1*	*B*	*15.8*	*C*	*11.1*	*B*
3. Hacienda Dr/Gibraltar Dr (south)	7.4	A	6.4	A	7.4	A	6.4	A
4. West Las Positas Blvd/Hopyard Rd	24.7	C	32.9	C	25.1	C	33.3	C
5. West Las Positas Blvd/Willow Rd	15.0	B	8.5	A	15.2	B	8.4	A
6. West Las Positas Blvd/Hacienda Dr*	17.4	B	17.5	B	17.0	B	21.4	C
7. West Las Positas Blvd/Stoneridge Dr	29.4	C	36.6	D	29.4	C	37.2	D

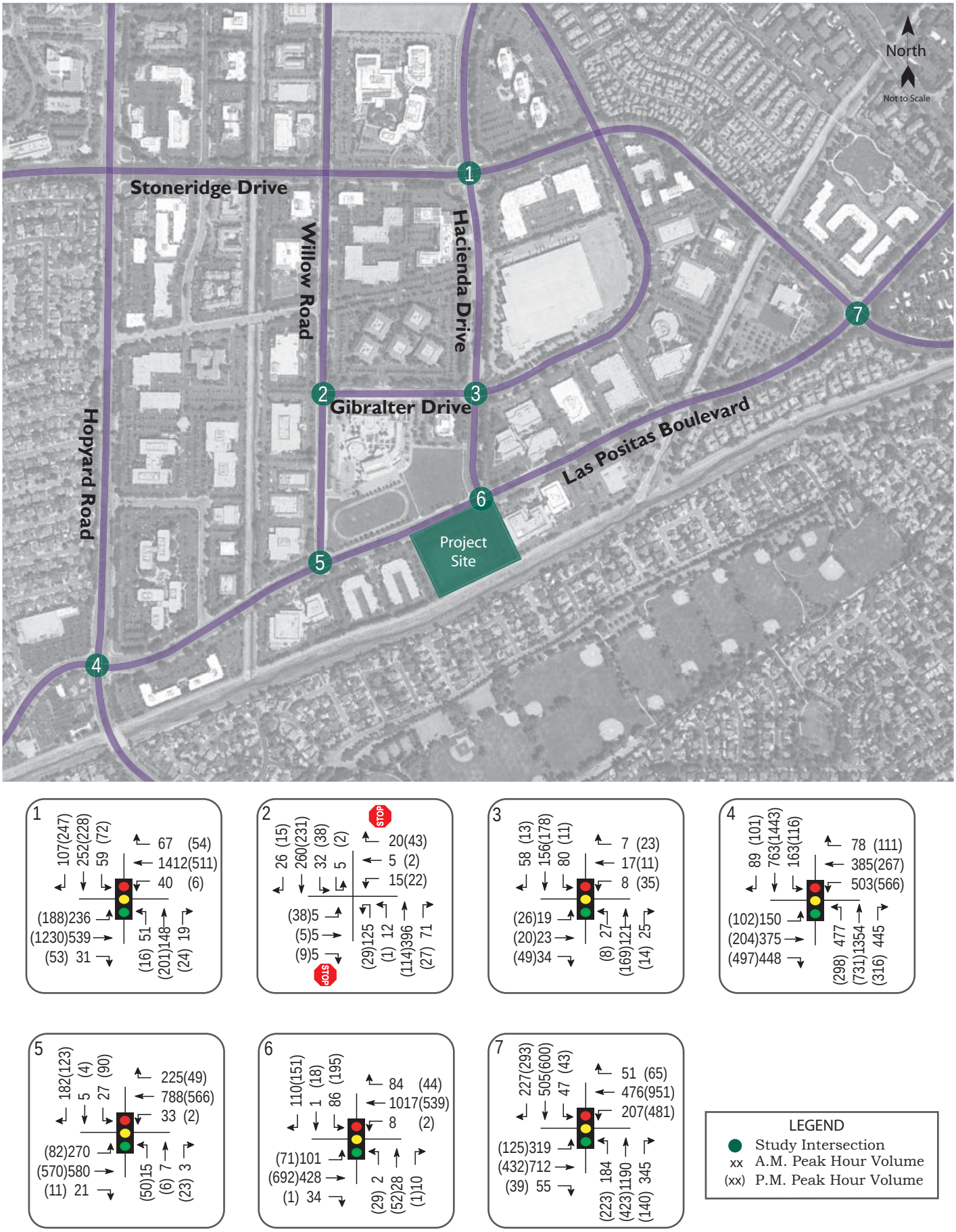
Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;*
* =Under plus project conditions, roadway and traffic signal improvements were considered at this intersection

Finding: With the addition of project-generated traffic to Existing plus Approved Projects volumes, the study intersections are expected to continue operating at acceptable levels of service.

Cumulative Conditions

Cumulative peak hour volume projections were taken from the build-out analysis contained in the *Pleasanton Housing Element Transportation Analysis*. This scenario represents cumulative traffic conditions that would be expected upon build out of the land uses identified in the *General Plan,* including the updated Housing Element. Since the proposed project conforms to the proposed land use for the site in the Housing Element, the cumulative traffic volumes include those that would be generated by the proposed project. Therefore, to analyze Cumulative without Project conditions, traffic generated by the proposed project was subtracted from the Cumulative conditions in the City's traffic model. The Cumulative Conditions traffic volumes are shown in Figure 7. It should be noted that the planned TIF improvements at the intersections of West Las Positas Boulevard/Hopyard Road and West Las Positas Boulevard/Stoneridge Drive were included in this analysis.

Under the anticipated future volumes and considering the planned TIF improvements, all of the study intersections are expected to operate at an acceptable LOS C or better during both peak hours. A summary of the intersection Level of Service analysis is provided in Table 8 and copies of the calculations are provided in Appendix A.



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SummerHill Apartment Project Traffic Impact Analysis

Figure 7 – Buildout Traffic Volumes

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Table 8
Cumulative Peak Hour Intersection Levels of Service

Study Intersection ***Approach***	**Cumulative Conditions**			
	AM Peak		**PM Peak**	
	Delay	**LOS**	**Delay**	**LOS**
1. Stoneridge Dr/ Hacienda Dr	27.7	C	21.5	C
2. Willow Rd/Gibraltar Dr (south)	1.6	A	3.5	A
Eastbound (Gibraltar Dr) approach	*18.4*	*C*	*16.1*	*C*
Westbound (Gibraltar Dr) approach	*17.4*	*C*	*11.1*	*B*
3. Hacienda Dr/Gibraltar Dr (south)	7.9	A	6.5	A
4. West Las Positas Blvd/Hopyard Rd (with planned TIF improvements)	25.7	C	28.4	C
5. West Las Positas Blvd/Willow Rd	16.3	B	8.5	A
6. West Las Positas Blvd/Hacienda Dr	19.3	B	18.7	B
7. West Las Positas Blvd/Stoneridge Dr (with planned TIF improvements)	33.2	C	30.4	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

It was noted that some intersections are expected to operate better during the p.m. peak hour under Cumulative conditions than they would under the Existing plus Approved Projects Conditions. This is attributed to the TIF planned improvements that were assumed to be implemented for the Cumulative Conditions traffic analysis, and the fact that the City is anticipating regional improvements that would increase capacity elsewhere, resulting in a shift in traffic patterns.

Cumulative plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Cumulative volumes and considering the roadway and traffic signal improvements at the West Las Positas Boulevard/Hacienda Drive intersection, all of the study intersections are expected to continue operating at an acceptable LOS C or better during both peak hours. The intersection Level of Service analysis is summarized in Table 9 and copies of the calculations are provided in Appendix A.

Table 9
Cumulative and Cumulative plus Project Peak Hour Intersection Levels of Service

Study Intersection *Approach*	Cumulative				Cumulative plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Stoneridge Dr/ Hacienda Dr	27.7	C	21.5	C	27.9	C	21.8	C
2. Willow Rd/Gibraltar Dr (south)	1.6	A	3.5	A	1.6	A	3.5	A
Eastbound (Gibraltar Dr) approach	*18.4*	*C*	*16.1*	*C*	*18.5*	*C*	*16.1*	*C*
Westbound (Gibraltar Dr) approach	*17.4*	*C*	*11.1*	*B*	*17.7*	*C*	*11.1*	*B*
3. Hacienda Dr/Gibraltar Dr (south)	7.9	A	6.5	A	7.9	A	6.5	A
4. West Las Positas Blvd/Hopyard Rd (with planned TIF improvements)	25.7	C	28.4	C	26.0	C	28.6	C
5. West Las Positas Blvd/Willow Rd	16.3	B	8.5	A	16.4	B	8.4	A
6. West Las Positas Blvd/Hacienda Dr*	19.3	B	18.7	B	25.5	C	21.8	C
7. West Las Positas Blvd/Stoneridge Dr (with planned TIF improvements)	33.2	C	30.4	C	33.3	C	30.7	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;*
* = Under plus project conditions, roadway and traffic signal improvements were considered at this intersection

Finding: Upon the addition of project-generated traffic to Cumulative volumes, the study intersections are expected to operate at acceptable levels of service during both peak hours.

Queuing

Queuing analysis was performed for the study intersection of West Las Positas Boulevard/Hacienda Drive to determine if there would be adequate left-turn lane storage at this location with the addition of project-generated traffic. The proposed roadway and traffic signal improvements at this intersection were also included in the analysis. Under the Existing plus Approved Projects Conditions and Cumulative Conditions, the queue lengths for left-turn pockets that would potentially receive project-generated traffic were determined using the SIMTRAFFIC application of Synchro, and averaging the 95th percentile queues for each of five runs.

The 95th percentile queue length for all the left-turn movements at the study intersection would fit within the available storage length during both peak hours without and with the addition of project-generated traffic. The queue lengths are summarized in Table 10 and copies of the SIMTRAFFIC projections are provided in Appendix B.

Table 10
95th Percentile Left-Turn Queues

Intersection ***movement***	**Available Storage**	**95th percentile Queues AM Peak Hour**				**95th percentile Queues PM Peak Hour**			
		E+A	**E+A+P**	**C**	**C+P**	**E+A**	**E+A+P**	**C**	**C+P**
West Las Positas Blvd/Hacienda Dr									
Eastbound left-turn	290	94	124	104	149	102	127	118	94
Westbound left-turn	150	*	*	*	*	**	34	8	28
Southbound left-turn	285	36	74	46	68	67	181	81	136

Notes: All distances are measured in feet; E+A = existing plus approved projects conditions, E+A+P = existing plus approved projects plus project conditions, C = cumulative conditions, C+P = cumulative plus project conditions;
* = the project would not add traffic to this movement; therefore the queue length has not been reported;
** = under existing plus approved projects conditions, there would be no traffic volume for this movement

Findings: At the intersection of West Las Positas Boulevard/Hacienda Drive, the queue length for all the left-turn movements would fit within the available storage length during both peak hours under Existing plus Approved Projects Conditions, and Cumulative Conditions without and with the project.

Site Access and Parking

Site Access

Access to the project site would be maintained through an existing right-turn in/right-turn out only driveway off of West Las Positas Boulevard and the south leg of the signalized intersection of West Las Positas Boulevard at Hacienda Drive. Internally, pathways would connect the building units to the parking areas and streets.

Based on information provided by the project team, the West Las Positas Boulevard/Hacienda Drive intersection would be modified to align the Hacienda Drive southbound through lane with the project driveway. The northbound Hacienda Drive (project driveway) approach would be modified to provide one left-turn lane and one shared through/right-turn lane. The southbound Hacienda Drive approach would be modified to include one left-turn lane, one through lane and one right-turn lane. The intersection exhibit showing the above improvements is provided in Appendix C.

Sight Distance

At unsignalized intersections a substantially clear line of sight should be maintained between the driver of a vehicle waiting on the driveway and the driver of an approaching vehicle. Adequate time must be provided for the waiting vehicle to either cross, turn left, or turn right, without requiring the through traffic to radically alter their speed.

Sight distance at the existing driveway on West Las Positas Boulevard was evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance for minor-street approaches that are either a private road or a driveway are based on stopping sight distance with the approach travel speeds as the basis for determining the recommended sight distance.

Sight distance at the proposed project driveway was field measured. Within the project vicinity, West Las Positas Boulevard is within the school zone with a posted speed limit of 25 miles per hour (mph) when children are present. The posted speed limit on West Las Positas Boulevard outside the school zone is 45 mph which was considered for sight distance evaluation. The minimum stopping sight distance needed for a design speed of 45 mph is 360 feet. West Las Positas Boulevard is relatively flat and straight on either side of the project site; therefore, sight distance from the project driveway to both the east and west is adequate.

Finding: Sight distance at the existing project driveway on Las Positas Boulevard is adequate in either direction.

Parking

The City of Pleasanton parking requirements were reviewed to ensure that the project would provide adequate on-site parking. For an apartment land use, the City of Pleasanton Municipal Code (§ 18.88.030) has the following parking requirement:

- Apartments with two bedrooms or less: Two (2) spaces for each of the first four units and one and one-half (1.5) spaces for each additional unit.
- Apartments with three or more bedrooms: Two (2) spaces per unit.
- Visitor parking: one (1) space per seven (7) units.
- One (1) space per dwelling unit of the off-street parking required above shall be located in a garage or carport.

Based on the above parking code requirements, 300 parking spaces, including 177 covered spaces, are required at the project site. As proposed, 304 parking spaces (including 254 covered spaces) would be provided on-site which would satisfy the City parking requirements. The parking analysis summary is presented in Table 11.

Table 11
Parking Requirements Analysis

Description	Required Spaces	Provided Spaces
Two bedrooms or less (162 units)	245	
Three or more bedrooms (15 units)	30	
Visitor	25	
Total	**300**	**304**
Covered	177	254

Finding: The proposed 304 parking spaces, including 254 covered spaces on the project site would satisfy the City's requirements.

Alternative Modes

Pedestrian Facilities

Sidewalks currently exist on the project frontage along West Las Positas Boulevard connecting the project site to the surrounding areas. The existing pedestrian facilities are expected to adequately serve the project site.

Finding: Existing pedestrian facilities would adequately serve the project site.

Bicycle Facilities

Bike Lanes exist on West Las Positas Boulevard west of Hacienda Drive and on Willow Road adjacent to the Hart Middle School. According to the *Pleasanton Pedestrian and Bicycle Master Plan*, bike lanes are proposed on West Las Positas Boulevard east of Hacienda Drive and along Stoneridge Drive. Also proposed is a trail access point, east of the project site on West Las Positas Boulevard at Tassajara Creek that would connect to the proposed Class I multi-use path on the south side of the Arroyo Mocho Creek and other existing trails in the study area. It is anticipated that the existing and proposed bicycle and trail facilities would provide adequate access for bicyclists.

<u>Bicycle Storage</u>

The proposed project would provide secured bicycle parking inside private garages (130 spaces) and bicycle storage rooms (20 spaces).

Finding: Existing and proposed bicycle facilities are expected to adequately serve the project site.

Transit

The existing transit bus stops located on the project frontage at West Las Positas Boulevard are less than a quarter-mile from the site, which is considered an acceptable walking distance to a transit stop. Pedestrian facilities that connect the project site to the bus stops are adequate. The existing transit and pedestrian facilities are anticipated to adequately accommodate the project-generated transit trips. According to the *City of Pleasanton Climate Action Plan, July 2011, ESA*, new residential developments within one-half mile of transit are required to offer discounted transit passes as part of the Home Owners Association (HOA) amenities, payable through the HOA dues. It is therefore recommended that the project developer shall work with the Hacienda Business Park Association to provide ECO passes to the residents for free use of the LAVTA transit system.

Finding: Existing transit route and bus stops adjacent to the project site are expected to be adequate.

Recommendation: The project developer shall work with the Hacienda Business Park Association to provide ECO passes to the residents for free use of the LAVTA transit system.

Collision History

The collision histories for the study intersections were reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on collision data available from the California Highway Patrol as published in their *Statewide Integrated Traffic Records System* (SWITRS) reports between January 1, 2007, and December 31, 2011, and data provided by the City. The calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2010 Collision Data on California State Highways*, Caltrans.

All of the study intersections experienced collision rates lower than the statewide averages for similar facilities. No fatalities were reported during the five-year period studied, although the injury rate for all the signalized intersections was higher than the statewide average for similar facilities. The calculated collision rates are presented in Table 12 and details are provided in Appendix D.

Table 12
Collision Rates at the Study Intersections

Study Intersection	Number of Collisions	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Stoneridge Dr/ Hacienda Dr	12	0.30	0.36
2. Willow Rd/Gibraltar Dr (south)	0	0.00	0.15
3. Hacienda Dr/Gibraltar Dr (south)	2	0.24	0.36
4. West Las Positas Blvd/Hopyard Rd	10	0.12	0.36
5. West Las Positas Blvd/Willow Rd	4	0.16	0.36
6. West Las Positas Blvd/Hacienda Dr	3	0.14	0.36
7. West Las Positas Blvd/Stoneridge Dr	12	0.25	0.36

Note: c/mve = collisions per million vehicles entering the intersection

School Related Traffic Analysis

Additional analysis was conducted to evaluate the potential impact of site-generated traffic traveling to and from the Donlon Elementary and Hart Middle Schools.

Operating conditions during typical weekday a.m. (7:00-9:00) and school pick-up p.m. peak periods (2:00-4:00) were evaluated at the following three intersections:

4. West Las Positas Boulevard at Hopyard Road
5. West Las Positas Boulevard at Willow Road
6. West Las Positas Boulevard at Hacienda Drive

Existing Conditions

New traffic counts during the school p.m. peak hour (2:00-4:00) were collected at the intersections of West Las Positas Boulevard/Hopyard Road and West Las Positas Boulevard/Willow Road on a typical weekday in November 2013. At the intersection of West Las Positas Boulevard/Hacienda Drive, school p.m. peak hour traffic counts provided by the City were used for analysis. During the a.m. peak hour, traffic counts provided in the City's Synchro model were used in the analysis. The existing traffic volumes are shown in Figure 8.

Under Existing Conditions, all of the study intersections are operating at an acceptable LOS C or better during the a.m. and school p.m. peak hour. The intersection Level of Service calculations are summarized in Table 13, and copies of the calculations are provided in Appendix E.

Table 13
Existing Peak Hour Intersection Levels of Service

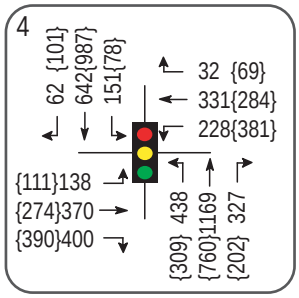
Study Intersection ***Approach***	**Existing Conditions**			
	AM Peak		**School PM Peak**	
	Delay	**LOS**	**Delay**	**LOS**
4. West Las Positas Blvd/Hopyard Rd	29.0	C	23.9	C
5. West Las Positas Blvd/Willow Rd	16.0	B	11.3	B
6. West Las Positas Blvd/Hacienda Dr	14.8	B	14.8	B

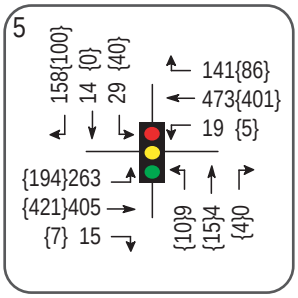
Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service

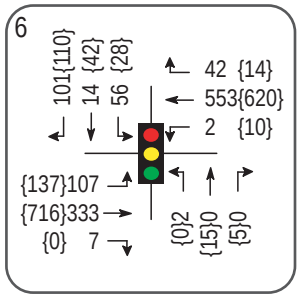
Trip Generation

Trip generation for the proposed project during the a.m. peak hour was estimated using the average rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 9th Edition, 2012 for an "Apartment" (LU# 220). The proposed project is expected to generate 90 trips during the a.m. peak hour, including 18 inbound and 72 outbound trips. Due to the proximity of Donlon Elementary School (4150 Dorman Road) and Hart Middle School (4433 Willow Road) to the project site, it was anticipated that some of the trips generated by the project would be to and from these schools during the a.m. and school p.m. peak hours. Per the information provided by City staff, it was estimated that the proposed 177 apartment units would include a total of 47 students (31 elementary school and 16 middle school students).

To provide a conservative analysis, it was assumed that during the a.m. peak hour, every student would be driven to school, resulting in 47 school related outbound trips. Therefore, out of 72 outbound







LEGEND
- ● Study Intersection
- xx A.M. Peak Hour Volume
- {xx} Midday P.M. Peak Hour Volume

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SummerHill Apartment Project Traffic Impact Analysis

Figure 8 – Existing Traffic Volumes (School Traffic Analysis)

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project trips, 47 trips would be school related and the remaining 25 trips would be non-school related. It was also assumed that all of the 18 inbound project trips would be school related.

The trip generation and assignment for the a.m. peak hour were previously discussed. During the school p.m. peak hour (school pick-up time period), it was conservatively assumed that each of the 47 students assumed to be living at the project site would be picked up and driven home. This would result in 94 trips including 47 inbound and 47 outbound trips. Since the school p.m. peak hour (2:00-4:00) is outside the project's p.m. peak hour (4:00-6:00), trips generated during the midday p.m. peak hour would be all school related. Since this trip estimate exceeds what is projected for the a.m. peak hour, it would be expected to capture all trips to and from the site and not just those that are school-related. School and non-school related trips provided in Table 14.

Table 14
School and Non-School Trip Assignment

Description	AM Peak Hour			School PM Peak Hour		
	Trips	In	Out	Trips	In	Out
School	65	18	47	94	47	47
Non-School	25	0	25	-	-	-
Total Project Trips	**90**	**18**	**72**	**94**	**47**	**47**

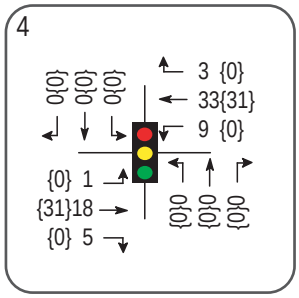
Trip Assignment

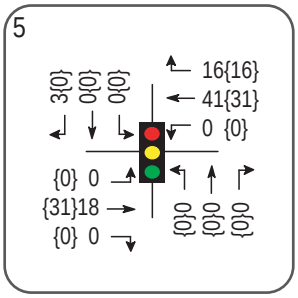
During the a.m. peak hour, non-school related project trips were assigned to the roadway network based on the access scheme and the trip distribution pattern shown in Table 5. School related project trips were distributed based on the access scheme, elementary and middle school locations and the conservative assumption that some of the project patrons after dropping their children to school would return back while others would continue and follow the trip distribution pattern given in Table 5.

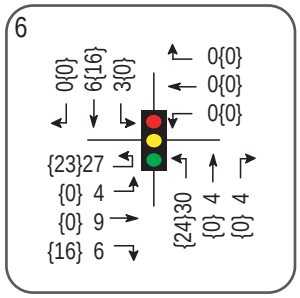
During the school p.m. peak hour, trips were assigned to the roadway network based on the access scheme and the assumption that all of the project patrons would leave the site to pick up their children and then return back to the project site. The resulting project added traffic volumes during the a.m. and school p.m. peak hour are shown in Figure 9.

Existing plus Project Conditions

Upon the addition of project-related traffic to the existing volumes, and considering the roadway and traffic signal improvements at the West Las Positas Boulevard/Hacienda Drive intersection, all of the study intersections would continue to operate at an acceptable LOS C or better during both the a.m. and school p.m. peak hours. A summary of the intersection Level of Service analysis is provided in Table 15 with Existing Conditions values shown for comparison purposes. Copies of the calculations are provided in Appendix E.







LEGEND
- ● Study Intersection
- xx A.M. Peak Hour Volume
- {xx} Midday P.M. Peak Hour Volume

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SummerHill Apartment Project Traffic Impact Analysis

Figure 9 – Project Added Traffic Volumes (School Traffic Analysis)

w-trans

Table 15
Existing and Existing plus Project Peak Hour Intersection Levels of Service

Study Intersection *Approach*	Existing Conditions				Existing plus Project			
	AM Peak		School PM Peak		AM Peak		School PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
4. West Las Positas Blvd/Hopyard Rd	29.0	C	23.9	C	29.3	C	24.3	C
5. West Las Positas Blvd/Willow Rd	16.0	B	11.3	B	16.3	B	11.3	B
6. West Las Positas Blvd/Hacienda Dr*	14.8	B	14.8	B	21.1	C	15.9	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service;
* = Roadway and traffic signal improvements were considered at this intersection under Existing plus Project conditions

Finding: The study intersections are expected to continue operating at acceptable Levels of Service with the addition of school-related project-generated traffic.

Queuing

A queuing analysis was performed for the three study intersections to determine if there would be adequate storage in the left-turn lanes at these locations with the addition of project-generated traffic. Under Existing Conditions, the queue lengths for through or turn pockets along West Las Positas Boulevard that would potentially receive project-generated traffic were determined using the SIMTRAFFIC application of Synchro, and averaging the 95th percentile queues for each of five runs.

As shown in Table 16, the 95th percentile queue length for all the movements at the study intersections fit within the available storage length during the a.m. and school p.m. peak hours under Existing Conditions. With the addition of project-generated traffic, the queue lengths would generally increase slightly but would not exceed the available storage. Copies of the SIMTRAFFIC projections are provided in Appendix F.

The City of Pleasanton has plans at Hart Middle School to provide a secondary drop-off/pick zone on the east side of Willow Road adjacent to the school frontage between the school entry and exit points. This would result in narrowing of the northbound Willow Road segment between the school access points from two lanes to one lane. The provision of a second drop-off/pick-up zone would allow the parents to either drop-off/pick-up their children to/from the primary school zone located inside the school or along Willow Road. It is anticipated that the proposed second drop-off/pick-up zone would ease the school related a.m. and p.m. peak hour northbound through queuing on Willow Road south of the school entry point.

Table 16
95th Percentile Queues

Intersection *movement*	Available Storage	AM Peak Hour		School PM Peak Hour	
		E	E+P	E	E+P
4. West Las Positas Blvd/Hopyard Rd					
Eastbound through	315	189	248	165	178
Westbound through	695	165	165	135	148
Westbound left-turn	230	134	149	221*	207*
5. West Las Positas Blvd/Willow Rd					
Eastbound through	825	63	71	46	48
Westbound through	835	144	126	102	100
Westbound right-turn	240	74	49	49	41
6. West Las Positas Blvd/Hacienda Dr					
Eastbound left-turn	290	86	106	96	130
Westbound left-turn	150	14*	9*	23	30

Notes: All distances are measured in feet; E = existing conditions, E+P = existing plus project conditions;
* = the project would not add traffic to these movements.

Finding: The queue lengths at the study intersections would fit within the available storage length without and with the addition of project-generated traffic. The slight increase in queue lengths due to the addition of project-generated traffic would be less-than-significant.

Summary

Under Existing Conditions, all of the study intersections operate at an acceptable LOS C or better during the a.m. and school p.m. peak hours and would continue to do so with the addition of project-generated traffic. Similarly, the queue lengths at the study intersections would fit within the available storage length without and with the addition of project-generated traffic. The proposed project would have a less-than-significant impact at the study intersections along the routes to Donlon Elementary School and Hart Middle School.

Conclusions and Recommendations

Conclusions

Existing Conditions

- Currently, all the study intersections operate at an acceptable LOS C or better during the a.m. and p.m. hours.
- The City's Traffic Impact Fee (TIF) program includes planned improvements to West Las Positas Boulevard/Hopyard Road, West Las Positas Boulevard/Hacienda Drive, and West Las Positas Boulevard/Stoneridge Drive intersections.

Project Conditions

- The proposed project is anticipated to generate an average of 1,177 new vehicle trips on a daily basis, including 90 additional trips during the a.m. peak hour and 110 additional trips during the p.m. peak hour. Out of the 90 a.m. peak hour trips, 65 trips were assumed to be school-related; while the remaining 25 trips would be non-school related. During the p.m. peak hour, none of the 110 new trips would be school-related.
- The proposed project would modify the West Las Positas Boulevard/Hacienda Drive intersection to align the Hacienda Drive southbound through lane with the project driveway. The northbound Hacienda Drive (project driveway) approach would be modified to provide one left-turn lane and one shared through/right-turn lane. The southbound Hacienda Drive approach would be modified to include one left-turn lane, one through lane and one right-turn lane. Additionally, the northbound and southbound Hacienda Drive approaches would have protected left-turn phasing.

Existing plus Project Conditions

- The study intersections are expected to continue operating at an acceptable LOS C or better with the addition of project-generated traffic to existing volumes during both peak hours.

Existing plus Approved Projects Condition

- Under Existing plus Approved Projects Conditions, all of the study intersections are expected to continue operating at acceptable levels of service without and with the addition of project-generated traffic.
- During both peak hours, the left-turn queues at the West Las Positas Boulevard/Hacienda Drive intersection are expected to be accommodated within the available storage length without and with the project.

Cumulative Scenario

- Under Cumulative without Project Conditions and considering the planned improvements at the intersections of West Las Positas Boulevard/Hopyard Road, and West Las Positas Boulevard/ Stoneridge Drive, all of the study intersections are expected to operate at an acceptable LOS C or better.
- With the addition of project-generated traffic, all study intersections are expected to operate acceptably.

- During both the peak hours, the left-turn queues at the West Las Positas Boulevard/Hacienda Drive intersection are expected to be accommodated within the available storage length without and with the project.

Project Access/Parking

- The project site would continue to be accessed via an existing right-turn in/right-turn out driveway on West Las Positas Boulevard and the signalized intersection of West Las Positas Boulevard/ Hacienda Drive.

- Sight distance in either direction from the existing project driveway on Las Positas Boulevard is adequate.

- The proposed parking supply for the project site would meet the City's requirement.

Alternative Modes of Transportation

- Existing pedestrian facilities as well as existing and proposed bicycle and trail facilities would adequately serve the project site.

- Existing transit routes and bus stops adjacent to the project site on West Las Positas Boulevard would adequately serve the project-generated transit trips.

Collision History

- The calculated collision rates for all study intersections were determined to be lower than the statewide average rates for similar facilities and do not indicate any safety concern.

School Related Traffic Analysis

- The proposed project was assumed to generate an average of 90 new trips (65 school and 25 non-school) during the a.m. peak hour and 94 new trips (all school related) during the school p.m. peak hour.

- Under Existing Conditions, the three study intersections operate at an acceptable LOS C or better during the a.m. and school p.m. peak hours. With the addition of project-generated traffic, the study intersections would continue to operate acceptably.

- The 95th percentile queue lengths for the study intersections fit within the available storage length and would continue to do so with the addition of project-generated traffic. The City of Pleasanton has plans at Hart Middle School to provide a secondary drop-off/pick zone on the east side of Willow Road adjacent to the school frontage between the school entry and exit points. This would result in narrowing of the northbound Willow Road segment between the school access points from two lanes to one lane. The proposed project would have a less-than-significant impact at the study intersections along the routes to Donlon Elementary School and Hart Middle School.

Recommendations

- The project developer shall work with the Hacienda Business Park Association to provide ECO passes to the residents for free use of the LAVTA transit system.

Study Participants and References

Study Participants

Principal in Charge:	Mark E. Spencer, PE
Engineer:	Jaspreet Anand, PE
Technician/Graphics:	Deborah J. Mizell
Editing/Formatting:	Angela McCoy
Quality Control Review:	Dalene J. Whitlock, PE, PTOE

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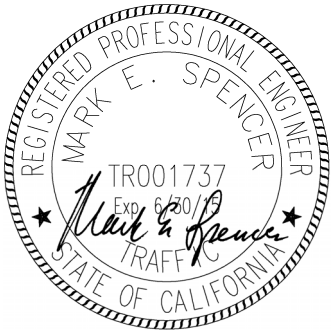


Appendix A

Intersection Level of Service Calculations

HCM Signalized Intersection Capacity Analysis
35: W Las Positas & Hopyard

11/27/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	138	370	400	228	331	32	438	1169	327	151	642	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	150	402	435	248	360	35	476	1271	355	164	698	67
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	36
Lane Group Flow (vph)	150	402	435	248	360	35	476	1271	355	164	698	31
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	9.0	20.2	120.0	12.8	24.0	120.0	14.0	58.6	120.0	8.4	53.0	53.0
Effective Green, g (s)	10.0	23.2	120.0	13.8	27.0	120.0	15.0	61.6	120.0	9.4	56.0	56.0
Actuated g/C Ratio	0.08	0.19	1.00	0.12	0.22	1.00	0.12	0.51	1.00	0.08	0.47	0.47
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	296	707	1603	408	823	1613	443	2698	1615	278	2452	742
v/s Ratio Prot	0.04	c0.11		c0.07	0.10		c0.13	c0.24		c0.05	0.13	
v/s Ratio Perm			0.27			0.02			0.22			0.02
v/c Ratio	0.51	0.57	0.27	0.61	0.44	0.02	1.07	0.47	0.22	0.59	0.28	0.04
Uniform Delay, d1	52.6	43.9	0.0	50.5	40.0	0.0	52.5	18.7	0.0	53.4	19.7	17.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.76	0.47	1.00	1.25	0.65	0.84
Incremental Delay, d2	0.5	1.7	0.4	1.8	0.8	0.0	60.8	0.5	0.3	2.1	0.3	0.1
Delay (s)	53.1	45.6	0.4	52.3	40.8	0.0	100.7	9.3	0.3	69.0	13.0	14.7
Level of Service	D	D	A	D	D	A	F	A	A	E	B	B
Approach Delay (s)		26.8			43.0			28.4			23.0	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

11/27/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	263	405	15	19	473	141	9	4	0	29	14	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1829	5223		1829	3657	1636	1817	1925			1859	1605
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.72	1.00			0.83	1.00
Satd. Flow (perm)	1829	5223		1829	3657	1636	1379	1925			1601	1605
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	333	513	19	24	599	178	11	5	0	37	18	200
RTOR Reduction (vph)	0	2	0	0	0	122	0	0	0	0	0	162
Lane Group Flow (vph)	333	530	0	24	599	56	11	5	0	0	55	38
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	20.8	34.8		2.4	16.4	16.4	9.9	9.9			9.9	9.9
Effective Green, g (s)	21.8	37.8		3.4	19.4	19.4	11.9	11.9			11.9	11.9
Actuated g/C Ratio	0.35	0.61		0.05	0.31	0.31	0.19	0.19			0.19	0.19
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	642	3179		100	1142	511	264	369			307	308
v/s Ratio Prot	c0.18	0.10		0.01	c0.16			0.00				
v/s Ratio Perm						0.03	0.01				c0.03	0.02
v/c Ratio	0.52	0.17		0.24	0.52	0.11	0.04	0.01			0.18	0.12
Uniform Delay, d1	16.0	5.3		28.1	17.6	15.2	20.5	20.3			21.0	20.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.12	1.61
Incremental Delay, d2	0.7	0.0		1.2	0.4	0.1	0.1	0.0			0.3	0.2
Delay (s)	16.7	5.3		29.4	18.0	15.3	20.5	20.4			23.8	33.7
Level of Service	B	A		C	B	B	C	C			C	C
Approach Delay (s)		9.7			17.7			20.5			31.6	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	62.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
57: Stoneridge & Hacienda

11/27/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	124	331	41	11	832	25	10	76	7	36	157	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.95		1.00	0.91		0.97	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.91	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.99		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3547	3584		1829	5224		3547	3601		1829	4423	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3547	3584		1829	5224		3547	3601		1829	4423	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	131	348	43	12	876	26	11	80	7	38	165	177
RTOR Reduction (vph)	0	4	0	0	1	0	0	6	0	0	148	0
Lane Group Flow (vph)	131	387	0	12	901	0	11	81	0	38	194	0
Confl. Peds. (#/hr)			12			24			24			120
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	9.8	76.7		5.2	72.1		1.3	12.6		5.5	16.8	
Effective Green, g (s)	10.8	79.7		6.2	75.1		2.3	15.6		6.5	19.8	
Actuated g/C Ratio	0.09	0.66		0.05	0.63		0.02	0.13		0.05	0.17	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	319	2380		94	3269		68	468		99	730	
v/s Ratio Prot	c0.04	0.11		0.01	c0.17		0.00	0.02		c0.02	c0.04	
v/s Ratio Perm												
v/c Ratio	0.41	0.16		0.13	0.28		0.16	0.17		0.38	0.27	
Uniform Delay, d1	51.6	7.6		54.3	10.1		57.9	46.5		54.8	43.8	
Progression Factor	0.89	0.98		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.1		0.6	0.2		1.1	0.2		2.5	0.2	
Delay (s)	46.5	7.5		54.9	10.4		59.0	46.6		57.3	44.0	
Level of Service	D	A		D	B		E	D		E	D	
Approach Delay (s)		17.3			10.9			48.0			45.3	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
58: Gibraltar Dr (S) & Hacienda

11/27/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	29	64	12	13	1	24	84	22	14	108	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.91			0.99		1.00	0.97		1.00	0.98	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3261			3541		1829	5063		1829	5138	
Flt Permitted		0.92			0.81		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3014			2942		1829	5063		1829	5138	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.88	0.85	0.85	0.85	0.85
Adj. Flow (vph)	15	34	75	14	15	1	28	95	26	16	127	19
RTOR Reduction (vph)	0	55	0	0	1	0	0	19	0	0	14	0
Lane Group Flow (vph)	0	69	0	0	29	0	28	102	0	16	132	0
Confl. Peds. (#/hr)	20		20	20		20			20			20
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		4.3			4.3		0.8	3.5		0.7	3.4	
Effective Green, g (s)		6.3			6.3		1.8	6.5		1.7	6.4	
Actuated g/C Ratio		0.27			0.27		0.08	0.28		0.07	0.27	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		808			789		140	1400		132	1399	
v/s Ratio Prot							c0.02	0.02		0.01	c0.03	
v/s Ratio Perm		c0.02			0.01							
v/c Ratio		0.09			0.04		0.20	0.07		0.12	0.09	
Uniform Delay, d1		6.4			6.4		10.2	6.3		10.2	6.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.0			0.0		0.7	0.0		0.4	0.0	
Delay (s)		6.5			6.4		10.9	6.3		10.6	6.4	
Level of Service		A			A		B	A		B	A	
Approach Delay (s)		6.5			6.4			7.2			6.8	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	6.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	23.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
59: W Las Positas & Hacienda

11/27/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	333	7	2	553	42	2	0	0	56	14	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.95		0.95	0.97	1.00
Satd. Flow (prot)	1829	5238		1829	3657	1636		1829		1737	1775	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.95		0.95	0.97	1.00
Satd. Flow (perm)	1829	5238		1829	3657	1636		1829		1737	1775	1615
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	134	416	9	2	691	52	2	0	0	70	18	126
RTOR Reduction (vph)	0	1	0	0	0	29	0	0	0	0	0	106
Lane Group Flow (vph)	134	424	0	2	691	23	0	2	0	43	45	20
Confl. Peds. (#/hr)									3			1
Turn Type	Prot			Prot		Perm	Split		Perm	Split		Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases						6			4			3
Actuated Green, G (s)	8.9	35.5		0.7	27.3	27.3		2.9		8.0	8.0	8.0
Effective Green, g (s)	9.9	38.5		1.7	30.3	30.3		5.9		11.0	11.0	11.0
Actuated g/C Ratio	0.14	0.56		0.02	0.44	0.44		0.09		0.16	0.16	0.16
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0		6.0		6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	262	2918		45	1604	717		156		277	283	257
v/s Ratio Prot	c0.07	0.08		0.00	c0.19			c0.00		0.02	c0.03	
v/s Ratio Perm						0.01						0.01
v/c Ratio	0.51	0.15		0.04	0.43	0.03		0.01		0.16	0.16	0.08
Uniform Delay, d1	27.4	7.4		32.9	13.4	11.0		28.9		25.0	25.1	24.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	1.7	0.1		0.4	0.2	0.0		0.0		0.3	0.3	0.1
Delay (s)	29.0	7.5		33.3	13.6	11.1		29.0		25.3	25.3	24.9
Level of Service	C	A		C	B	B		C		C	C	C
Approach Delay (s)		12.6			13.5			29.0			25.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	69.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
64: Stoneridge & W Las Positas

11/27/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	186	35	150	843	35	22	228	97	63	409	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1588	1829	5255	1636	1829	5255	1618
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1588	1829	5255	1636	1829	5255	1618
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	84	209	39	169	947	39	25	256	109	71	460	245
RTOR Reduction (vph)	0	0	27	0	0	24	0	0	84	0	0	88
Lane Group Flow (vph)	84	209	12	169	947	15	25	256	25	71	460	157
Confl. Peds. (#/hr)			12			24			36			12
Turn Type	Prot		Perm	Prot		Perm	Prot		custom	Prot		custom
Protected Phases	7	4		3	8		5	2	2	1	6	6
Permitted Phases			4			8			2			4
Actuated Green, G (s)	5.5	21.7	21.7	9.4	25.6	25.6	2.2	14.5	14.5	6.6	17.9	39.6
Effective Green, g (s)	6.5	24.7	22.7	10.4	28.6	26.6	3.2	16.5	16.5	7.6	20.9	45.6
Actuated g/C Ratio	0.09	0.35	0.32	0.15	0.40	0.37	0.04	0.23	0.23	0.11	0.29	0.64
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	5.0	5.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	324	1269	511	518	1469	593	82	1218	379	195	1543	1036
v/s Ratio Prot	0.02	0.06		c0.05	c0.26		0.01	0.05	0.02	c0.04	c0.09	0.04
v/s Ratio Perm			0.01			0.01						0.05
v/c Ratio	0.26	0.16	0.02	0.33	0.64	0.02	0.30	0.21	0.07	0.36	0.30	0.15
Uniform Delay, d1	30.1	16.1	16.6	27.3	17.2	14.1	32.9	22.1	21.3	29.6	19.5	5.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	0.0	0.4	1.0	0.0	2.1	0.1	0.1	1.2	0.1	0.1
Delay (s)	30.5	16.2	16.7	27.6	18.2	14.1	35.0	22.2	21.4	30.7	19.6	5.2
Level of Service	C	B	B	C	B	B	D	C	C	C	B	A
Approach Delay (s)		19.9			19.4			22.8			16.0	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	71.2	Sum of lost time (s)	6.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

11/27/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (veh/h)	1	2	1	11	2	18	128	12	316	73	5	32
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	1	2	1	14	2	22	0	15	395	91	0	40
Pedestrians		20			20				20			
Lane Width (ft)		13.0			13.0				13.0			
Walking Speed (ft/s)		4.0			4.0				4.0			
Percent Blockage		2			2				2			
Right turn flare (veh)												
Median type									None			
Median storage veh)												
Upstream signal (ft)									1264			
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	698	962	211	748	933	283	0	362			0	506
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	698	962	211	748	933	283	0	362			0	506
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	100	99	100	95	99	97	0	99			0	96
cM capacity (veh/h)	283	233	766	269	242	688	0	1171			0	1036

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	5	16	22	15	263	223	40	207	136
Volume Left	1	14	0	15	0	0	40	0	0
Volume Right	1	0	22	0	0	91	0	0	32
cSH	298	264	688	1171	1700	1700	1036	1700	1700
Volume to Capacity	0.02	0.06	0.03	0.01	0.15	0.13	0.04	0.12	0.08
Queue Length 95th (ft)	1	5	3	1	0	0	3	0	0
Control Delay (s)	17.3	19.5	10.4	8.1	0.0	0.0	8.6	0.0	0.0
Lane LOS	C	C	B	A			A		
Approach Delay (s)	17.3	14.2		0.2			0.9		
Approach LOS	C	B							

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		45.4%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

11/27/2013

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	248	26
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.80	0.80
Hourly flow rate (vph)	310	32
Pedestrians	20	
Lane Width (ft)	13.0	
Walking Speed (ft/s)	4.0	
Percent Blockage	2	
Right turn flare (veh)		
Median type	None	
Median storage veh)		
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		

Direction, Lane #

SummerHill Apartments Traffic Impact Study
AM Peak Hour Existing Conditions
Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis
35: W Las Positas & Hopyard

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	102	188	385	462	259	86	342	793	279	81	1314	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	110	202	414	497	278	92	368	853	300	87	1413	103
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	58
Lane Group Flow (vph)	110	202	414	497	278	92	368	853	300	87	1413	45
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	7.9	15.3	120.0	20.8	28.2	120.0	14.0	56.8	120.0	7.1	49.9	49.9
Effective Green, g (s)	8.9	18.3	120.0	21.8	31.2	120.0	15.0	59.8	120.0	8.1	52.9	52.9
Actuated g/C Ratio	0.07	0.15	1.00	0.18	0.26	1.00	0.12	0.50	1.00	0.07	0.44	0.44
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	263	558	1603	644	951	1613	443	2619	1615	239	2317	700
v/s Ratio Prot	c0.03	c0.06		c0.14	0.08		c0.10	0.16		0.02	c0.27	
v/s Ratio Perm			0.26			0.06			0.19			0.03
v/c Ratio	0.42	0.36	0.26	0.77	0.29	0.06	0.83	0.33	0.19	0.36	0.61	0.06
Uniform Delay, d1	53.1	45.6	0.0	46.7	35.6	0.0	51.3	18.0	0.0	53.5	25.7	19.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.72	0.46	1.00	1.18	0.69	1.03
Incremental Delay, d2	0.4	0.8	0.4	5.2	0.4	0.1	11.4	0.3	0.2	0.3	1.2	0.2
Delay (s)	53.5	46.5	0.4	51.9	35.9	0.1	48.3	8.6	0.2	63.3	18.9	20.1
Level of Service	D	D	A	D	D	A	D	A	A	E	B	C
Approach Delay (s)		21.2			41.3			16.6			21.4	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM Average Control Delay	23.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	106	449	2	1	464	61	34	10	24	69	1	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1829	5251		1829	3657	1636	1820	1703			1831	1608
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.71	1.00			0.73	1.00
Satd. Flow (perm)	1829	5251		1829	3657	1636	1353	1703			1396	1608
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	118	499	2	1	516	68	38	11	27	77	1	200
RTOR Reduction (vph)	0	0	0	0	0	45	0	20	0	0	0	151
Lane Group Flow (vph)	118	501	0	1	516	23	38	18	0	0	78	49
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	9.4	21.1		0.8	12.5	12.5	9.3	9.3			9.3	9.3
Effective Green, g (s)	10.4	24.1		1.8	15.5	15.5	11.3	11.3			11.3	11.3
Actuated g/C Ratio	0.23	0.52		0.04	0.34	0.34	0.24	0.24			0.24	0.24
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	412	2739		71	1227	549	331	417			341	393
v/s Ratio Prot	c0.06	0.10		0.00	c0.14			0.01				
v/s Ratio Perm						0.01	0.03				c0.06	0.03
v/c Ratio	0.29	0.18		0.01	0.42	0.04	0.11	0.04			0.23	0.12
Uniform Delay, d1	14.8	5.8		21.3	11.9	10.3	13.6	13.3			14.0	13.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	1.05
Incremental Delay, d2	0.4	0.0		0.1	0.2	0.0	0.2	0.0			0.3	0.1
Delay (s)	15.2	5.9		21.4	12.1	10.4	13.7	13.4			14.3	14.4
Level of Service	B	A		C	B	B	B	B			B	B
Approach Delay (s)		7.7			11.9			13.5			14.4	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	46.2	Sum of lost time (s)	9.0
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
57: Stoneridge & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	188	761	23	4	473	25	45	185	11	40	149	281
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.95		1.00	0.91		0.97	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.89	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3547	3637		1829	5201		3547	3619		1829	4216	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3547	3637		1829	5201		3547	3619		1829	4216	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	211	855	26	4	531	28	51	208	12	45	167	316
RTOR Reduction (vph)	0	1	0	0	3	0	0	4	0	0	265	0
Lane Group Flow (vph)	211	880	0	4	556	0	51	216	0	45	218	0
Confl. Peds. (#/hr)			12			24			24			120
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	12.4	75.2		2.6	65.4		6.0	14.9		7.3	16.2	
Effective Green, g (s)	13.4	78.2		3.6	68.4		7.0	17.9		8.3	19.2	
Actuated g/C Ratio	0.11	0.65		0.03	0.57		0.06	0.15		0.07	0.16	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	396	2370		55	2965		207	540		127	675	
v/s Ratio Prot	c0.06	c0.24		0.00	c0.11		0.01	c0.06		c0.02	0.05	
v/s Ratio Perm												
v/c Ratio	0.53	0.37		0.07	0.19		0.25	0.40		0.35	0.32	
Uniform Delay, d1	50.3	9.6		56.6	12.4		54.0	46.2		53.3	44.6	
Progression Factor	0.79	1.14		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.4		0.6	0.1		0.6	0.5		1.7	0.3	
Delay (s)	40.9	11.4		57.1	12.6		54.6	46.7		55.0	44.9	
Level of Service	D	B		E	B		D	D		D	D	
Approach Delay (s)		17.1			12.9			48.2			45.8	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
58: Gibraltar Dr (S) & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	8	43	15	10	6	11	144	10	19	164	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.90			0.97		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3196			3436		1829	5196		1829	5202	
Flt Permitted		0.90			0.84		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		2891			2957		1829	5196		1829	5202	
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	15	10	55	19	13	8	14	185	13	24	210	13
RTOR Reduction (vph)	0	45	0	0	7	0	0	8	0	0	8	0
Lane Group Flow (vph)	0	35	0	0	33	0	14	190	0	24	215	0
Confl. Peds. (#/hr)	20		20	20		20			20			20
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		2.6			2.6		0.6	7.5		0.7	7.6	
Effective Green, g (s)		4.6			4.6		1.6	10.5		1.7	10.6	
Actuated g/C Ratio		0.18			0.18		0.06	0.41		0.07	0.41	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		515			527		113	2115		121	2137	
v/s Ratio Prot							0.01	0.04		c0.01	c0.04	
v/s Ratio Perm		c0.01			0.01							
v/c Ratio		0.07			0.06		0.12	0.09		0.20	0.10	
Uniform Delay, d1		8.8			8.8		11.4	4.7		11.4	4.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.1		0.5	0.0		0.8	0.0	
Delay (s)		8.9			8.9		11.9	4.7		12.2	4.7	
Level of Service		A			A		B	A		B	A	
Approach Delay (s)		8.9			8.9			5.2			5.4	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	6.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.09		
Actuated Cycle Length (s)	25.8	Sum of lost time (s)	6.0
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
59: W Las Positas & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	106	461	1	1	334	36	20	14	1	77	1	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1829	5253		1829	3657	1636		1870	1613	1737	1744	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1829	5253		1829	3657	1636		1870	1613	1737	1744	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	113	490	1	1	355	38	21	15	1	82	1	155
RTOR Reduction (vph)	0	0	0	0	0	23	0	0	1	0	0	127
Lane Group Flow (vph)	113	491	0	1	355	15	0	36	0	42	41	28
Confl. Peds. (#/hr)									3			1
Turn Type	Prot			Prot		Perm	Split		Perm	Split		Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases						6			4			3
Actuated Green, G (s)	8.6	32.7		0.7	24.8	24.8		4.5	4.5	9.4	9.4	9.4
Effective Green, g (s)	9.6	35.7		1.7	27.8	27.8		7.5	7.5	12.4	12.4	12.4
Actuated g/C Ratio	0.14	0.52		0.02	0.40	0.40		0.11	0.11	0.18	0.18	0.18
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	253	2706		45	1467	656		202	175	311	312	289
v/s Ratio Prot	c0.06	0.09		0.00	c0.10			c0.02		c0.02	0.02	
v/s Ratio Perm						0.01			0.00			0.02
v/c Ratio	0.45	0.18		0.02	0.24	0.02		0.18	0.00	0.14	0.13	0.10
Uniform Delay, d1	27.4	9.0		33.0	13.8	12.5		28.1	27.6	23.9	23.9	23.8
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.1		0.2	0.1	0.0		0.4	0.0	0.2	0.2	0.1
Delay (s)	28.7	9.1		33.2	13.8	12.6		28.5	27.6	24.1	24.1	23.9
Level of Service	C	A		C	B	B		C	C	C	C	C
Approach Delay (s)		12.8			13.8			28.5			24.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	15.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	69.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
64: Stoneridge & W Las Positas

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	226	778	29	90	307	22	23	353	194	189	249	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1601	3547	3657	1584	1829	5255	1636	1829	5255	1620
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1601	3547	3657	1584	1829	5255	1636	1829	5255	1620
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	240	828	31	96	327	23	24	376	206	201	265	132
RTOR Reduction (vph)	0	0	20	0	0	17	0	0	159	0	0	36
Lane Group Flow (vph)	240	828	11	96	327	6	24	376	47	201	265	96
Confl. Peds. (#/hr)			12			24			36			12
Turn Type	Prot		Perm	Prot		Perm	Prot		custom	Prot		custom
Protected Phases	7	4		3	8		5	2	2	1	6	6
Permitted Phases			4			8			2			4
Actuated Green, G (s)	10.8	25.0	25.0	5.4	19.6	19.6	2.3	16.4	16.4	14.8	27.9	52.9
Effective Green, g (s)	11.8	28.0	26.0	6.4	22.6	20.6	3.3	18.4	18.4	15.8	30.9	58.9
Actuated g/C Ratio	0.15	0.35	0.32	0.08	0.28	0.26	0.04	0.23	0.23	0.20	0.38	0.73
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	5.0	5.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	519	1270	516	282	1025	405	75	1200	373	359	2015	1184
v/s Ratio Prot	c0.07	c0.23		0.03	0.09		0.01	c0.07	0.03	c0.11	0.05	0.03
v/s Ratio Perm			0.01			0.00						0.03
v/c Ratio	0.46	0.65	0.02	0.34	0.32	0.01	0.32	0.31	0.13	0.56	0.13	0.08
Uniform Delay, d1	31.5	22.2	18.6	35.1	22.9	22.4	37.6	25.8	24.7	29.3	16.1	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	1.2	0.0	0.7	0.2	0.0	2.5	0.2	0.2	1.9	0.0	0.0
Delay (s)	32.2	23.4	18.6	35.8	23.1	22.4	40.0	26.0	24.9	31.2	16.2	3.1
Level of Service	C	C	B	D	C	C	D	C	C	C	B	A
Approach Delay (s)		25.2			25.8			26.2			18.3	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM Average Control Delay	24.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	9.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (veh/h)	38	5	9	22	2	43	29	1	114	27	2	38
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.80	0.80	0.80	0.90	0.80
Hourly flow rate (vph)	48	6	11	28	2	54	0	1	142	34	0	48
Pedestrians		20			20				20			
Lane Width (ft)		13.0			13.0				13.0			
Walking Speed (ft/s)		4.0			4.0				4.0			
Percent Blockage		2			2				2			
Right turn flare (veh)												
Median type									None			
Median storage veh)												
Upstream signal (ft)									1264			
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	562	612	194	456	604	128	0	328			0	196
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	562	612	194	456	604	128	0	328			0	196
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	86	98	99	94	99	94	0	100			0	96
cM capacity (veh/h)	349	378	786	433	382	866	0	1207			0	1349

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	65	30	54	1	95	81	48	192	115
Volume Left	48	28	0	1	0	0	48	0	0
Volume Right	11	0	54	0	0	34	0	0	19
cSH	389	428	866	1207	1700	1700	1349	1700	1700
Volume to Capacity	0.17	0.07	0.06	0.00	0.06	0.05	0.04	0.11	0.07
Queue Length 95th (ft)	15	6	5	0	0	0	3	0	0
Control Delay (s)	16.1	14.0	9.4	8.0	0.0	0.0	7.8	0.0	0.0
Lane LOS	C	B	A	A			A		
Approach Delay (s)	16.1	11.1		0.1			1.0		
Approach LOS	C	B							

Intersection Summary				
Average Delay		3.5		
Intersection Capacity Utilization		42.4%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

12/2/2013

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	231	15
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.80	0.80
Hourly flow rate (vph)	289	19
Pedestrians	20	
Lane Width (ft)	13.0	
Walking Speed (ft/s)	4.0	
Percent Blockage	2	
Right turn flare (veh)		
Median type	None	
Median storage veh)		
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		

Direction, Lane #

SummerHill Apartments Traffic Impact Study
PM Peak Hour Existing Conditions
Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis
35: W Las Positas & Hopyard

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	139	388	405	237	364	35	438	1169	327	151	642	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	151	422	440	258	396	38	476	1271	355	164	698	67
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	36
Lane Group Flow (vph)	151	422	440	258	396	38	476	1271	355	164	698	31
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	9.1	20.8	120.0	13.0	24.7	120.0	14.0	57.8	120.0	8.4	52.2	52.2
Effective Green, g (s)	10.1	23.8	120.0	14.0	27.7	120.0	15.0	60.8	120.0	9.4	55.2	55.2
Actuated g/C Ratio	0.08	0.20	1.00	0.12	0.23	1.00	0.12	0.51	1.00	0.08	0.46	0.46
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	299	725	1603	414	844	1613	443	2663	1615	278	2417	731
v/s Ratio Prot	0.04	c0.12		c0.07	0.11		c0.13	c0.24		c0.05	0.13	
v/s Ratio Perm			0.27			0.02			0.22			0.02
v/c Ratio	0.51	0.58	0.27	0.62	0.47	0.02	1.07	0.48	0.22	0.59	0.29	0.04
Uniform Delay, d1	52.6	43.6	0.0	50.5	39.8	0.0	52.5	19.3	0.0	53.4	20.2	17.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.76	0.48	1.00	1.25	0.65	0.83
Incremental Delay, d2	0.5	1.8	0.4	2.1	0.9	0.0	60.8	0.5	0.3	2.1	0.3	0.1
Delay (s)	53.0	45.4	0.4	52.6	40.7	0.0	100.7	9.7	0.3	68.6	13.4	15.0
Level of Service	D	D	A	D	D	A	F	A	A	E	B	B
Approach Delay (s)		27.0			42.9			28.7			23.2	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	263	423	15	19	514	157	9	4	0	29	14	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1829	5224		1829	3657	1636	1816	1925			1859	1605
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.72	1.00			0.83	1.00
Satd. Flow (perm)	1829	5224		1829	3657	1636	1379	1925			1599	1605
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	333	535	19	24	651	199	11	5	0	37	18	204
RTOR Reduction (vph)	0	2	0	0	0	135	0	0	0	0	0	166
Lane Group Flow (vph)	333	552	0	24	651	64	11	5	0	0	55	38
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	21.1	36.2		2.4	17.5	17.5	9.9	9.9			9.9	9.9
Effective Green, g (s)	22.1	39.2		3.4	20.5	20.5	11.9	11.9			11.9	11.9
Actuated g/C Ratio	0.35	0.62		0.05	0.32	0.32	0.19	0.19			0.19	0.19
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	637	3225		98	1181	528	258	361			300	301
v/s Ratio Prot	c0.18	0.11		0.01	c0.18			0.00				
v/s Ratio Perm						0.04	0.01				c0.03	0.02
v/c Ratio	0.52	0.17		0.24	0.55	0.12	0.04	0.01			0.18	0.13
Uniform Delay, d1	16.5	5.2		28.8	17.7	15.2	21.1	21.0			21.7	21.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.12	1.62
Incremental Delay, d2	0.8	0.0		1.3	0.6	0.1	0.1	0.0			0.3	0.2
Delay (s)	17.3	5.2		30.1	18.3	15.3	21.2	21.0			24.6	35.0
Level of Service	B	A		C	B	B	C	C			C	C
Approach Delay (s)		9.7			17.9			21.1			32.8	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	63.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
57: Stoneridge & Hacienda

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	331	41	11	832	25	15	79	7	36	157	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.95		1.00	0.91		0.97	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.91	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.99		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3547	3584		1829	5224		3547	3603		1829	4423	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3547	3584		1829	5224		3547	3603		1829	4423	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	132	348	43	12	876	26	16	83	7	38	165	177
RTOR Reduction (vph)	0	4	0	0	1	0	0	6	0	0	151	0
Lane Group Flow (vph)	132	387	0	12	901	0	16	84	0	38	191	0
Confl. Peds. (#/hr)			12			24			24			120
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	9.8	77.3		5.2	72.7		2.7	12.0		5.5	14.8	
Effective Green, g (s)	10.8	80.3		6.2	75.7		3.7	15.0		6.5	17.8	
Actuated g/C Ratio	0.09	0.67		0.05	0.63		0.03	0.12		0.05	0.15	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	319	2398		94	3295		109	450		99	656	
v/s Ratio Prot	c0.04	0.11		0.01	c0.17		0.00	0.02		c0.02	c0.04	
v/s Ratio Perm												
v/c Ratio	0.41	0.16		0.13	0.27		0.15	0.19		0.38	0.29	
Uniform Delay, d1	51.6	7.4		54.3	9.9		56.6	47.0		54.8	45.5	
Progression Factor	0.88	0.98		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.1		0.6	0.2		0.6	0.2		2.5	0.2	
Delay (s)	46.5	7.3		54.9	10.1		57.2	47.2		57.3	45.7	
Level of Service	D	A		D	B		E	D		E	D	
Approach Delay (s)		17.2			10.7			48.7			46.9	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	21.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
58: Gibraltar Dr (S) & Hacienda

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	29	73	12	13	1	24	92	22	14	108	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.90			0.99		1.00	0.97		1.00	0.98	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3243			3541		1829	5078		1829	5138	
Flt Permitted		0.92			0.81		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3004			2923		1829	5078		1829	5138	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.88	0.85	0.85	0.85	0.85
Adj. Flow (vph)	15	34	86	14	15	1	28	105	26	16	127	19
RTOR Reduction (vph)	0	63	0	0	1	0	0	19	0	0	14	0
Lane Group Flow (vph)	0	72	0	0	29	0	28	112	0	16	132	0
Confl. Peds. (#/hr)	20		20	20		20			20			20
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		4.2			4.2		0.8	3.5		0.7	3.4	
Effective Green, g (s)		6.2			6.2		1.8	6.5		1.7	6.4	
Actuated g/C Ratio		0.26			0.26		0.08	0.28		0.07	0.27	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		796			774		141	1411		133	1405	
v/s Ratio Prot							c0.02	0.02		0.01	c0.03	
v/s Ratio Perm		c0.02			0.01							
v/c Ratio		0.09			0.04		0.20	0.08		0.12	0.09	
Uniform Delay, d1		6.5			6.4		10.1	6.2		10.2	6.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.0			0.0		0.7	0.0		0.4	0.0	
Delay (s)		6.5			6.4		10.8	6.3		10.6	6.4	
Level of Service		A			A		B	A		B	A	
Approach Delay (s)		6.5			6.4			7.1			6.8	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	6.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	23.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	27	111	342	13	2	553	42	32	4	4	59	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Util. Factor		1.00	0.91		1.00	0.95	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	0.99		1.00	1.00	0.85	1.00	0.93		1.00	1.00
Flt Protected		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)		1829	5226		1829	3657	1636	1829	1767		1829	1925
Flt Permitted		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)		1829	5226		1829	3657	1636	1829	1767		1829	1925
Peak-hour factor, PHF	0.90	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	30	139	428	16	2	691	52	40	5	5	74	25
RTOR Reduction (vph)	0	0	3	0	0	0	31	0	4	0	0	0
Lane Group Flow (vph)	0	169	441	0	2	691	21	40	6	0	74	25
Confl. Peds. (#/hr)										3		
Turn Type	Prot	Prot			Prot		Perm	Prot			Prot	
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases							6					
Actuated Green, G (s)		8.4	36.2		0.8	28.6	28.6	8.6	11.1		9.3	11.8
Effective Green, g (s)		9.4	39.2		1.8	31.6	31.6	11.6	14.1		12.3	14.8
Actuated g/C Ratio		0.12	0.49		0.02	0.40	0.40	0.15	0.18		0.15	0.19
Clearance Time (s)		4.0	6.0		4.0	6.0	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		217	2580		41	1455	651	267	314		283	359
v/s Ratio Prot		c0.09	0.08		0.00	c0.19		0.02	0.00		c0.04	0.01
v/s Ratio Perm							0.01					
v/c Ratio		0.78	0.17		0.05	0.47	0.03	0.15	0.02		0.26	0.07
Uniform Delay, d1		34.0	11.1		38.0	17.7	14.6	29.6	26.9		29.5	26.6
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		16.0	0.1		0.5	0.2	0.0	0.3	0.0		0.5	0.1
Delay (s)		50.0	11.3		38.5	18.0	14.6	29.9	27.0		30.0	26.7
Level of Service		D	B		D	B	B	C	C		C	C
Approach Delay (s)			22.0			17.8			29.3			27.8
Approach LOS			C			B			C			C

Intersection Summary			
HCM Average Control Delay	21.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	79.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR
Lane Configurations	
Volume (vph)	101
Ideal Flow (vphpl)	1900
Total Lost time (s)	3.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.99
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1615
Flt Permitted	1.00
Satd. Flow (perm)	1615
Peak-hour factor, PHF	0.80
Adj. Flow (vph)	126
RTOR Reduction (vph)	103
Lane Group Flow (vph)	23
Confl. Peds. (#/hr)	1
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	11.8
Effective Green, g (s)	14.8
Actuated g/C Ratio	0.19
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	301
v/s Ratio Prot	
v/s Ratio Perm	c0.01
v/c Ratio	0.08
Uniform Delay, d1	26.7
Progression Factor	1.00
Incremental Delay, d2	0.1
Delay (s)	26.8
Level of Service	C
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
64: Stoneridge & W Las Positas

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	186	35	150	843	35	22	236	105	63	409	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1588	1829	5255	1636	1829	5255	1618
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1588	1829	5255	1636	1829	5255	1618
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	84	209	39	169	947	39	25	265	118	71	460	245
RTOR Reduction (vph)	0	0	27	0	0	24	0	0	91	0	0	88
Lane Group Flow (vph)	84	209	12	169	947	15	25	265	27	71	460	157
Confl. Peds. (#/hr)			12			24			36			12
Turn Type	Prot		Perm	Prot		Perm	Prot		custom	Prot		custom
Protected Phases	7	4		3	8		5	2	2	1	6	6
Permitted Phases			4			8			2			4
Actuated Green, G (s)	5.5	21.7	21.7	9.4	25.6	25.6	2.2	14.6	14.6	6.6	18.0	39.7
Effective Green, g (s)	6.5	24.7	22.7	10.4	28.6	26.6	3.2	16.6	16.6	7.6	21.0	45.7
Actuated g/C Ratio	0.09	0.35	0.32	0.15	0.40	0.37	0.04	0.23	0.23	0.11	0.29	0.64
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	5.0	5.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	323	1267	510	517	1467	592	82	1223	381	195	1548	1037
v/s Ratio Prot	0.02	0.06		c0.05	c0.26		0.01	0.05	0.02	c0.04	c0.09	0.04
v/s Ratio Perm			0.01			0.01						0.05
v/c Ratio	0.26	0.16	0.02	0.33	0.65	0.02	0.30	0.22	0.07	0.36	0.30	0.15
Uniform Delay, d1	30.2	16.2	16.7	27.3	17.3	14.1	33.0	22.1	21.3	29.6	19.4	5.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1	0.0	0.4	1.0	0.0	2.1	0.1	0.1	1.2	0.1	0.1
Delay (s)	30.6	16.2	16.7	27.7	18.2	14.2	35.1	22.2	21.4	30.8	19.6	5.2
Level of Service	C	B	B	C	B	B	D	C	C	C	B	A
Approach Delay (s)		19.9			19.5			22.8			16.0	
Approach LOS		B			B			C			B	

Intersection Summary				
HCM Average Control Delay	19.0	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.45			
Actuated Cycle Length (s)	71.3	Sum of lost time (s)	6.0	
Intersection Capacity Utilization	63.1%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (veh/h)	1	2	1	11	2	18	131	12	320	82	5	32
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	1	2	1	14	2	22	0	15	400	102	0	40
Pedestrians		20			20				20			
Lane Width (ft)		13.0			13.0				13.0			
Walking Speed (ft/s)		4.0			4.0				4.0			
Percent Blockage		2			2				2			
Right turn flare (veh)												
Median type									None			
Median storage veh)												
Upstream signal (ft)									1264			
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	700	979	211	759	944	291	0	362			0	522
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	700	979	211	759	944	291	0	362			0	522
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	100	99	100	95	99	97	0	99			0	96
cM capacity (veh/h)	282	228	766	264	239	680	0	1171			0	1021

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	5	16	22	15	267	236	40	207	136
Volume Left	1	14	0	15	0	0	40	0	0
Volume Right	1	0	22	0	0	102	0	0	32
cSH	293	260	680	1171	1700	1700	1021	1700	1700
Volume to Capacity	0.02	0.06	0.03	0.01	0.16	0.14	0.04	0.12	0.08
Queue Length 95th (ft)	1	5	3	1	0	0	3	0	0
Control Delay (s)	17.5	19.8	10.5	8.1	0.0	0.0	8.7	0.0	0.0
Lane LOS	C	C	B	A			A		
Approach Delay (s)	17.5	14.4		0.2			0.9		
Approach LOS	C	B							

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

1/24/2014

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	248	26
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.80	0.80
Hourly flow rate (vph)	310	32
Pedestrians	20	
Lane Width (ft)	13.0	
Walking Speed (ft/s)	4.0	
Percent Blockage	2	
Right turn flare (veh)		
Median type	None	
Median storage veh)		
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		
Direction, Lane #		

HCM Signalized Intersection Capacity Analysis
35: W Las Positas & Hopyard

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	102	192	385	472	261	90	342	793	297	92	1314	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	110	206	414	508	281	97	368	853	319	99	1413	103
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	58
Lane Group Flow (vph)	110	206	414	508	281	97	368	853	319	99	1413	45
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	7.9	15.4	120.0	21.4	28.9	120.0	14.0	55.8	120.0	7.4	49.2	49.2
Effective Green, g (s)	8.9	18.4	120.0	22.4	31.9	120.0	15.0	58.8	120.0	8.4	52.2	52.2
Actuated g/C Ratio	0.07	0.15	1.00	0.19	0.27	1.00	0.12	0.49	1.00	0.07	0.44	0.44
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	263	561	1603	662	972	1613	443	2575	1615	248	2286	691
v/s Ratio Prot	c0.03	c0.06		c0.14	0.08		c0.10	0.16		0.03	c0.27	
v/s Ratio Perm			0.26			0.06			0.20			0.03
v/c Ratio	0.42	0.37	0.26	0.77	0.29	0.06	0.83	0.33	0.20	0.40	0.62	0.06
Uniform Delay, d1	53.1	45.6	0.0	46.3	35.0	0.0	51.3	18.6	0.0	53.4	26.2	19.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.72	0.47	1.00	1.17	0.69	1.02
Incremental Delay, d2	0.4	0.9	0.4	4.8	0.3	0.1	11.4	0.3	0.3	0.4	1.2	0.2
Delay (s)	53.5	46.4	0.4	51.1	35.4	0.1	48.3	9.0	0.3	63.0	19.4	20.4
Level of Service	D	D	A	D	D	A	D	A	A	E	B	C
Approach Delay (s)		21.4			40.5			16.6			22.2	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	106	482	2	1	480	61	34	10	24	69	1	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1829	5251		1829	3657	1636	1820	1703			1831	1608
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.71	1.00			0.73	1.00
Satd. Flow (perm)	1829	5251		1829	3657	1636	1353	1703			1395	1608
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	118	536	2	1	533	68	38	11	27	77	1	200
RTOR Reduction (vph)	0	0	0	0	0	45	0	20	0	0	0	151
Lane Group Flow (vph)	118	538	0	1	533	23	38	18	0	0	78	49
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	9.5	21.4		0.8	12.7	12.7	9.3	9.3			9.3	9.3
Effective Green, g (s)	10.5	24.4		1.8	15.7	15.7	11.3	11.3			11.3	11.3
Actuated g/C Ratio	0.23	0.52		0.04	0.34	0.34	0.24	0.24			0.24	0.24
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	413	2755		71	1235	552	329	414			339	391
v/s Ratio Prot	c0.06	0.10		0.00	c0.15			0.01				
v/s Ratio Perm						0.01	0.03				c0.06	0.03
v/c Ratio	0.29	0.20		0.01	0.43	0.04	0.12	0.04			0.23	0.12
Uniform Delay, d1	14.9	5.9		21.5	11.9	10.3	13.7	13.5			14.1	13.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	1.05
Incremental Delay, d2	0.4	0.0		0.1	0.2	0.0	0.2	0.0			0.3	0.1
Delay (s)	15.3	5.9		21.6	12.2	10.4	13.9	13.5			14.5	14.6
Level of Service	B	A		C	B	B	B	B			B	B
Approach Delay (s)		7.6			12.0			13.7			14.6	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	46.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
57: Stoneridge & Hacienda

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	188	761	34	4	473	25	53	188	11	40	155	281
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.95		1.00	0.91		0.97	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.89	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3547	3629		1829	5201		3547	3619		1829	4230	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3547	3629		1829	5201		3547	3619		1829	4230	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	211	855	38	4	531	28	60	211	12	45	174	316
RTOR Reduction (vph)	0	1	0	0	3	0	0	4	0	0	266	0
Lane Group Flow (vph)	211	892	0	4	556	0	60	219	0	45	224	0
Confl. Peds. (#/hr)			12			24			24			120
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	12.4	75.1		2.6	65.3		6.3	15.0		7.3	16.0	
Effective Green, g (s)	13.4	78.1		3.6	68.3		7.3	18.0		8.3	19.0	
Actuated g/C Ratio	0.11	0.65		0.03	0.57		0.06	0.15		0.07	0.16	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	396	2362		55	2960		216	543		127	670	
v/s Ratio Prot	c0.06	c0.25		0.00	c0.11		0.02	c0.06		c0.02	0.05	
v/s Ratio Perm												
v/c Ratio	0.53	0.38		0.07	0.19		0.28	0.40		0.35	0.33	
Uniform Delay, d1	50.3	9.7		56.6	12.5		53.8	46.1		53.3	44.9	
Progression Factor	0.78	1.14		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.4		0.6	0.1		0.7	0.5		1.7	0.3	
Delay (s)	40.8	11.5		57.1	12.6		54.5	46.6		55.0	45.2	
Level of Service	D	B		E	B		D	D		D	D	
Approach Delay (s)		17.1			12.9			48.3			46.0	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
58: Gibraltar Dr (S) & Hacienda

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	8	43	15	10	6	11	155	10	19	181	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.90			0.97		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3196			3436		1829	5200		1829	5207	
Flt Permitted		0.90			0.84		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		2891			2957		1829	5200		1829	5207	
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	15	10	55	19	13	8	14	199	13	24	232	13
RTOR Reduction (vph)	0	45	0	0	7	0	0	8	0	0	8	0
Lane Group Flow (vph)	0	35	0	0	33	0	14	204	0	24	237	0
Confl. Peds. (#/hr)	20		20	20		20			20			20
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		2.6			2.6		0.6	7.7		0.7	7.8	
Effective Green, g (s)		4.6			4.6		1.6	10.7		1.7	10.8	
Actuated g/C Ratio		0.18			0.18		0.06	0.41		0.07	0.42	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		511			523		113	2140		120	2163	
v/s Ratio Prot							0.01	0.04		c0.01	c0.05	
v/s Ratio Perm		c0.01			0.01							
v/c Ratio		0.07			0.06		0.12	0.10		0.20	0.11	
Uniform Delay, d1		8.9			8.9		11.5	4.7		11.5	4.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.1		0.5	0.0		0.8	0.0	
Delay (s)		9.0			9.0		12.0	4.7		12.3	4.7	
Level of Service		A			A		B	A		B	A	
Approach Delay (s)		9.0			9.0			5.2			5.4	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	6.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.09		
Actuated Cycle Length (s)	26.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
59: W Las Positas & Hacienda

1/24/2014

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	7	111	467	12	23	334	36	30	20	7	77	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Util. Factor		1.00	0.91		1.00	0.95	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	1.00		1.00	1.00	0.85	1.00	0.96		1.00	1.00
Flt Protected		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)		1829	5235		1829	3657	1636	1829	1846		1829	1925
Flt Permitted		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)		1829	5235		1829	3657	1636	1829	1846		1829	1925
Peak-hour factor, PHF	0.90	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	8	118	497	13	24	355	38	32	21	7	82	19
RTOR Reduction (vph)	0	0	2	0	0	0	23	0	6	0	0	0
Lane Group Flow (vph)	0	126	508	0	24	355	15	32	22	0	82	19
Confl. Peds. (#/hr)										3		
Turn Type	Prot	Prot			Prot		Perm	Prot			Prot	
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases							6					
Actuated Green, G (s)		7.9	30.7		2.1	24.9	24.9	4.3	7.4		7.0	10.1
Effective Green, g (s)		8.9	33.7		3.1	27.9	27.9	7.3	10.4		10.0	13.1
Actuated g/C Ratio		0.13	0.49		0.04	0.40	0.40	0.11	0.15		0.14	0.19
Clearance Time (s)		4.0	6.0		4.0	6.0	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		235	2549		82	1474	660	193	277		264	364
v/s Ratio Prot		c0.07	0.10		0.01	c0.10		0.02	0.01		c0.04	0.01
v/s Ratio Perm							0.01					
v/c Ratio		0.54	0.20		0.29	0.24	0.02	0.17	0.08		0.31	0.05
Uniform Delay, d1		28.2	10.1		32.0	13.6	12.4	28.2	25.3		26.5	23.0
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		2.3	0.2		2.0	0.1	0.0	0.4	0.1		0.7	0.1
Delay (s)		30.6	10.3		34.0	13.7	12.5	28.6	25.4		27.2	23.0
Level of Service		C	B		C	B	B	C	C		C	C
Approach Delay (s)			14.3			14.8			27.1			24.5
Approach LOS			B			B			C			C

Intersection Summary			
HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	69.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
59: W Las Positas & Hacienda

1/24/2014

Movement	SBR
Lane Configurations	
Volume (vph)	146
Ideal Flow (vphpl)	1900
Total Lost time (s)	3.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.99
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1615
Flt Permitted	1.00
Satd. Flow (perm)	1615
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	155
RTOR Reduction (vph)	126
Lane Group Flow (vph)	29
Confl. Peds. (#/hr)	1
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	10.1
Effective Green, g (s)	13.1
Actuated g/C Ratio	0.19
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	306
v/s Ratio Prot	
v/s Ratio Perm	c0.02
v/c Ratio	0.10
Uniform Delay, d1	23.2
Progression Factor	1.00
Incremental Delay, d2	0.1
Delay (s)	23.3
Level of Service	C
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
64: Stoneridge & W Las Positas

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	226	778	29	101	307	22	23	359	200	189	260	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1601	3547	3657	1584	1829	5255	1636	1829	5255	1620
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1601	3547	3657	1584	1829	5255	1636	1829	5255	1620
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	240	828	31	107	327	23	24	382	213	201	277	132
RTOR Reduction (vph)	0	0	20	0	0	17	0	0	164	0	0	35
Lane Group Flow (vph)	240	828	11	107	327	6	24	382	49	201	277	97
Confl. Peds. (#/hr)			12			24			36			12
Turn Type	Prot		Perm	Prot		Perm	Prot		custom	Prot		custom
Protected Phases	7	4		3	8		5	2	2	1	6	6
Permitted Phases			4			8			2			4
Actuated Green, G (s)	10.8	25.0	25.0	5.4	19.6	19.6	2.3	16.5	16.5	14.8	28.0	53.0
Effective Green, g (s)	11.8	28.0	26.0	6.4	22.6	20.6	3.3	18.5	18.5	15.8	31.0	59.0
Actuated g/C Ratio	0.15	0.35	0.32	0.08	0.28	0.26	0.04	0.23	0.23	0.20	0.38	0.73
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	5.0	5.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	519	1269	516	281	1024	404	75	1205	375	358	2019	1184
v/s Ratio Prot	c0.07	c0.23		0.03	0.09		0.01	c0.07	0.03	c0.11	0.05	0.03
v/s Ratio Perm			0.01			0.00						0.03
v/c Ratio	0.46	0.65	0.02	0.38	0.32	0.01	0.32	0.32	0.13	0.56	0.14	0.08
Uniform Delay, d1	31.5	22.2	18.7	35.3	23.0	22.5	37.6	25.8	24.7	29.3	16.2	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	1.2	0.0	0.9	0.2	0.0	2.5	0.2	0.2	2.0	0.0	0.0
Delay (s)	32.2	23.5	18.7	36.1	23.1	22.5	40.1	26.0	24.9	31.3	16.2	3.1
Level of Service	C	C	B	D	C	C	D	C	C	C	B	A
Approach Delay (s)		25.2			26.2			26.2			18.4	
Approach LOS		C			C			C			B	

Intersection Summary

HCM Average Control Delay	24.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	80.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (veh/h)	38	5	9	22	2	43	29	1	114	27	2	38
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.80	0.80	0.80	0.90	0.80
Hourly flow rate (vph)	48	6	11	28	2	54	0	1	142	34	0	48
Pedestrians		20			20				20			
Lane Width (ft)		13.0			13.0				13.0			
Walking Speed (ft/s)		4.0			4.0				4.0			
Percent Blockage		2			2				2			
Right turn flare (veh)												
Median type									None			
Median storage veh)												
Upstream signal (ft)									1264			
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	562	612	194	456	604	128	0	328			0	196
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	562	612	194	456	604	128	0	328			0	196
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	86	98	99	94	99	94	0	100			0	96
cM capacity (veh/h)	349	378	786	433	382	866	0	1207			0	1349

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	65	30	54	1	95	81	48	192	115
Volume Left	48	28	0	1	0	0	48	0	0
Volume Right	11	0	54	0	0	34	0	0	19
cSH	389	428	866	1207	1700	1700	1349	1700	1700
Volume to Capacity	0.17	0.07	0.06	0.00	0.06	0.05	0.04	0.11	0.07
Queue Length 95th (ft)	15	6	5	0	0	0	3	0	0
Control Delay (s)	16.1	14.0	9.4	8.0	0.0	0.0	7.8	0.0	0.0
Lane LOS	C	B	A	A			A		
Approach Delay (s)	16.1	11.1		0.1			1.0		
Approach LOS	C	B							

Intersection Summary				
Average Delay		3.5		
Intersection Capacity Utilization		42.4%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

1/24/2014

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	231	15
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.80	0.80
Hourly flow rate (vph)	289	19
Pedestrians	20	
Lane Width (ft)	13.0	
Walking Speed (ft/s)	4.0	
Percent Blockage	2	
Right turn flare (veh)		
Median type	None	
Median storage veh)		
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		

Direction, Lane #

SummerHill Apartments Traffic Impact Study
PM Peak Hour Existing Conditions plus Project
Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis
12: Stoneridge & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	237	265	12	21	1270	54	60	132	19	30	184	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.95		1.00	0.91		0.97	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.93	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3547	3628		1829	5211		3547	3570		1829	4596	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3547	3628		1829	5211		3547	3570		1829	4596	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	252	282	13	22	1351	57	64	140	20	32	196	134
RTOR Reduction (vph)	0	2	0	0	2	0	0	11	0	0	107	0
Lane Group Flow (vph)	252	293	0	22	1406	0	64	149	0	32	223	0
Confl. Peds. (#/hr)			12			24			24			120
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	13.8	67.8		4.7	58.7		6.4	22.3		5.2	21.1	
Effective Green, g (s)	14.8	70.8		5.7	61.7		7.4	25.3		6.2	24.1	
Actuated g/C Ratio	0.12	0.59		0.05	0.51		0.06	0.21		0.05	0.20	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	437	2141		87	2679		219	753		94	923	
v/s Ratio Prot	c0.07	0.08		0.01	c0.27		0.02	0.04		c0.02	c0.05	
v/s Ratio Perm												
v/c Ratio	0.58	0.14		0.25	0.52		0.29	0.20		0.34	0.24	
Uniform Delay, d1	49.6	11.0		55.1	19.4		53.8	39.0		54.9	40.3	
Progression Factor	0.79	1.37		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.1		1.5	0.7		0.7	0.1		2.2	0.1	
Delay (s)	40.8	15.1		56.6	20.1		54.5	39.1		57.1	40.4	
Level of Service	D	B		E	C		D	D		E	D	
Approach Delay (s)		27.0			20.7			43.5			41.9	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	27.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: W Las Positas & Hopyard

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	159	349	424	394	281	58	454	1410	435	160	706	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	185	406	493	458	327	67	528	1640	506	186	821	95
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	68
Lane Group Flow (vph)	185	406	493	458	327	67	528	1640	506	186	821	27
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	9.7	20.7	120.0	18.6	29.6	120.0	30.1	52.0	120.0	8.7	30.6	30.6
Effective Green, g (s)	10.7	23.7	120.0	19.6	32.6	120.0	31.1	55.0	120.0	9.7	33.6	33.6
Actuated g/C Ratio	0.09	0.20	1.00	0.16	0.27	1.00	0.26	0.46	1.00	0.08	0.28	0.28
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	316	722	1603	579	993	1613	919	2409	1615	287	1471	445
v/s Ratio Prot	0.05	c0.11		c0.13	0.09		0.15	c0.31		c0.05	0.16	
v/s Ratio Perm			0.31			0.04			0.31			0.02
v/c Ratio	0.59	0.56	0.31	0.79	0.33	0.04	0.57	0.68	0.31	0.65	0.56	0.06
Uniform Delay, d1	52.5	43.5	0.0	48.2	35.0	0.0	38.7	25.6	0.0	53.5	36.9	31.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.72	0.62	1.00	0.77	0.68	0.72
Incremental Delay, d2	1.8	1.7	0.5	6.8	0.4	0.0	0.5	1.4	0.4	3.7	1.5	0.3
Delay (s)	54.3	45.1	0.5	55.0	35.4	0.0	28.2	17.3	0.4	45.0	26.7	23.0
Level of Service	D	D	A	E	D	A	C	B	A	D	C	C
Approach Delay (s)		26.4			43.2			16.2			29.5	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: W Las Positas & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	95	398	23	3	739	61	2	37	8	75	0	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1829	5212		1829	3657	1636		1921	1601	1737	1737	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1829	5212		1829	3657	1636		1921	1601	1737	1737	1615
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	112	468	27	4	869	72	2	44	9	88	0	135
RTOR Reduction (vph)	0	4	0	0	0	40	0	0	8	0	0	108
Lane Group Flow (vph)	112	491	0	4	869	32	0	46	1	44	44	27
Confl. Peds. (#/hr)									3			1
Turn Type	Prot			Prot		Perm	Split		Perm	Split		Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases						6			4			3
Actuated Green, G (s)	7.2	37.5		1.0	31.3	31.3		4.4	4.4	12.8	12.8	12.8
Effective Green, g (s)	8.2	40.5		2.0	34.3	34.3		7.4	7.4	15.8	15.8	15.8
Actuated g/C Ratio	0.11	0.52		0.03	0.44	0.44		0.10	0.10	0.20	0.20	0.20
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	193	2717		47	1614	722		183	152	353	353	328
v/s Ratio Prot	c0.06	0.09		0.00	c0.24			c0.02		c0.03	0.03	
v/s Ratio Perm						0.02			0.00			0.02
v/c Ratio	0.58	0.18		0.09	0.54	0.04		0.25	0.01	0.12	0.12	0.08
Uniform Delay, d1	33.1	9.8		37.0	15.9	12.4		32.6	31.8	25.3	25.3	25.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.4	0.1		0.8	0.3	0.0		0.7	0.0	0.2	0.2	0.1
Delay (s)	37.5	10.0		37.7	16.2	12.4		33.3	31.8	25.5	25.5	25.2
Level of Service	D	A		D	B	B		C	C	C	C	C
Approach Delay (s)		15.1			16.0			33.1			25.3	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM Average Control Delay	17.4	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.41			
Actuated Cycle Length (s)	77.7	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	44.9%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Stoneridge & W Las Positas

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	312	139	123	1048	320	297	724	44	95	228	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1598	3547	3657	1578	1829	5255	1636	1829	5255	1613
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1598	3547	3657	1578	1829	5255	1636	1829	5255	1613
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	34	347	154	137	1164	356	330	804	49	106	253	20
RTOR Reduction (vph)	0	0	105	0	0	185	0	0	33	0	0	9
Lane Group Flow (vph)	34	347	49	137	1164	171	330	804	16	106	253	11
Confl. Peds. (#/hr)			12			24			36			12
Turn Type	Prot		Perm	Prot		Perm	Prot		custom	Prot		custom
Protected Phases	7	4		3	8		5	2	2	1	6	6
Permitted Phases			4			8			2			4
Actuated Green, G (s)	3.5	29.8	29.8	8.1	34.4	34.4	21.6	28.4	28.4	10.6	16.4	46.2
Effective Green, g (s)	4.5	32.8	30.8	9.1	37.4	35.4	22.6	30.4	30.4	11.6	19.4	52.2
Actuated g/C Ratio	0.05	0.34	0.32	0.09	0.39	0.37	0.24	0.32	0.32	0.12	0.20	0.54
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	5.0	5.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	166	1251	513	337	1426	582	431	1666	519	221	1063	878
v/s Ratio Prot	0.01	0.09		c0.04	c0.32		c0.18	c0.15	0.01	0.06	0.05	0.00
v/s Ratio Perm			0.03			0.11						0.00
v/c Ratio	0.20	0.28	0.10	0.41	0.82	0.29	0.77	0.48	0.03	0.48	0.24	0.01
Uniform Delay, d1	44.0	22.9	22.8	40.9	26.2	21.4	34.2	26.4	22.6	39.3	32.1	10.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.1	0.8	3.7	0.3	7.9	0.2	0.0	1.6	0.1	0.0
Delay (s)	44.6	23.1	22.9	41.7	29.9	21.7	42.1	26.6	22.6	41.0	32.2	10.0
Level of Service	D	C	C	D	C	C	D	C	C	D	C	B
Approach Delay (s)		24.4			29.1			30.8			33.5	
Approach LOS		C			C			C			C	

Intersection Summary				
HCM Average Control Delay	29.4	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	95.9	Sum of lost time (s)	9.0	
Intersection Capacity Utilization	74.4%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	278	524	19	25	548	195	14	9	3	27	5	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.96	1.00
Satd. Flow (prot)	1829	5224		1829	3657	1636	1817	1841			1844	1606
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.73	1.00			0.80	1.00
Satd. Flow (perm)	1829	5224		1829	3657	1636	1400	1841			1537	1606
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.91	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	327	616	22	29	602	229	16	11	4	32	6	200
RTOR Reduction (vph)	0	2	0	0	0	157	0	3	0	0	0	162
Lane Group Flow (vph)	327	636	0	29	602	72	16	12	0	0	38	38
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	20.2	33.7		2.5	16.0	16.0	9.6	9.6			9.6	9.6
Effective Green, g (s)	21.2	36.7		3.5	19.0	19.0	11.6	11.6			11.6	11.6
Actuated g/C Ratio	0.35	0.60		0.06	0.31	0.31	0.19	0.19			0.19	0.19
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	638	3153		105	1143	511	267	351			293	306
v/s Ratio Prot	c0.18	0.12		0.02	c0.16			0.01				
v/s Ratio Perm						0.04	0.01				c0.02	0.02
v/c Ratio	0.51	0.20		0.28	0.53	0.14	0.06	0.03			0.13	0.12
Uniform Delay, d1	15.7	5.4		27.4	17.2	15.0	20.1	20.0			20.4	20.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.10	1.48
Incremental Delay, d2	0.7	0.0		1.4	0.4	0.1	0.1	0.0			0.2	0.2
Delay (s)	16.4	5.5		28.9	17.6	15.2	20.2	20.1			22.7	30.4
Level of Service	B	A		C	B	B	C	C			C	C
Approach Delay (s)		9.2			17.4			20.2			29.2	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
58: Gibraltar Dr (S) & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	19	31	10	14	6	23	95	29	62	136	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.97		1.00	0.96		1.00	0.97	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3306			3462		1829	5040		1829	5079	
Flt Permitted		0.90			0.85		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3002			2998		1829	5040		1829	5079	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.88	0.85	0.85	0.85	0.85
Adj. Flow (vph)	13	22	36	12	16	7	27	108	34	73	160	39
RTOR Reduction (vph)	0	28	0	0	5	0	0	24	0	0	25	0
Lane Group Flow (vph)	0	43	0	0	30	0	27	118	0	73	174	0
Confl. Peds. (#/hr)	20		20	20		20			20			20
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		4.0			4.0		0.8	4.9		2.1	6.2	
Effective Green, g (s)		6.0			6.0		1.8	7.9		3.1	9.2	
Actuated g/C Ratio		0.23			0.23		0.07	0.30		0.12	0.35	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		693			692		127	1531		218	1797	
v/s Ratio Prot							0.01	0.02		c0.04	c0.03	
v/s Ratio Perm		c0.01			0.01							
v/c Ratio		0.06			0.04		0.21	0.08		0.33	0.10	
Uniform Delay, d1		7.8			7.8		11.4	6.5		10.5	5.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.0			0.0		0.8	0.0		0.9	0.0	
Delay (s)		7.8			7.8		12.3	6.5		11.4	5.6	
Level of Service		A			A		B	A		B	A	
Approach Delay (s)		7.8			7.8			7.4			7.2	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	7.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	26.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (veh/h)	1	2	1	11	2	18	125	12	396	64	5	32
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	1	2	1	14	2	22	0	15	495	80	0	40
Pedestrians		20			20				20			
Lane Width (ft)		13.0			13.0				13.0			
Walking Speed (ft/s)		4.0			4.0				4.0			
Percent Blockage		2			2				2			
Right turn flare (veh)												
Median type									None			
Median storage veh)												
Upstream signal (ft)									1264			
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	750	1054	212	844	1030	328	0	365			0	595
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	750	1054	212	844	1030	328	0	365			0	595
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	100	99	100	94	99	97	0	99			0	96
cM capacity (veh/h)	258	205	764	228	212	644	0	1169			0	960

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	5	16	22	15	330	245	40	208	137
Volume Left	1	14	0	15	0	0	40	0	0
Volume Right	1	0	22	0	0	80	0	0	32
cSH	268	226	644	1169	1700	1700	960	1700	1700
Volume to Capacity	0.02	0.07	0.03	0.01	0.19	0.14	0.04	0.12	0.08
Queue Length 95th (ft)	1	6	3	1	0	0	3	0	0
Control Delay (s)	18.7	22.2	10.8	8.1	0.0	0.0	8.9	0.0	0.0
Lane LOS	C	C	B	A			A		
Approach Delay (s)	18.7	15.6		0.2			0.9		
Approach LOS	C	C							

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		46.4%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

12/2/2013

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	250	26
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.80	0.80
Hourly flow rate (vph)	312	32
Pedestrians	20	
Lane Width (ft)	13.0	
Walking Speed (ft/s)	4.0	
Percent Blockage	2	
Right turn flare (veh)		
Median type	None	
Median storage veh)		
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		

Direction, Lane #

SummerHill Apartments Traffic Impact Study
AM Peak Hour Existing plus Approved Project Conditions-No Project
Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis
12: Stoneridge & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	245	1250	76	17	469	40	37	175	14	44	271	261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.95		1.00	0.91		0.97	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.92	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3547	3619		1829	5170		3547	3604		1829	4464	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3547	3619		1829	5170		3547	3604		1829	4464	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	258	1316	80	18	494	42	39	184	15	46	285	275
RTOR Reduction (vph)	0	3	0	0	6	0	0	6	0	0	156	0
Lane Group Flow (vph)	258	1393	0	18	530	0	39	193	0	46	404	0
Confl. Peds. (#/hr)			12			24			24			120
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	14.0	67.8		3.2	57.0		4.4	21.8		7.2	24.6	
Effective Green, g (s)	15.0	70.8		4.2	60.0		5.4	24.8		8.2	27.6	
Actuated g/C Ratio	0.12	0.59		0.04	0.50		0.05	0.21		0.07	0.23	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	443	2135		64	2585		160	745		125	1027	
v/s Ratio Prot	c0.07	c0.38		0.01	0.10		0.01	0.05		c0.03	c0.09	
v/s Ratio Perm												
v/c Ratio	0.58	0.65		0.28	0.21		0.24	0.26		0.37	0.39	
Uniform Delay, d1	49.5	16.4		56.4	16.7		55.3	39.9		53.4	39.1	
Progression Factor	1.24	0.39		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	1.3		2.4	0.2		0.8	0.2		1.8	0.3	
Delay (s)	63.0	7.7		58.8	16.9		56.1	40.1		55.3	39.4	
Level of Service	E	A		E	B		E	D		E	D	
Approach Delay (s)		16.3			18.3			42.7			40.6	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	23.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: W Las Positas & Hopyard

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	119	236	587	581	260	117	284	795	322	116	1525	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	124	246	611	605	271	122	296	828	335	121	1589	110
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	67
Lane Group Flow (vph)	124	246	611	605	271	122	296	828	335	121	1589	44
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	8.4	17.8	120.0	26.0	35.4	120.0	19.0	47.9	120.0	8.3	37.2	37.2
Effective Green, g (s)	9.4	20.8	120.0	27.0	38.4	120.0	20.0	50.9	120.0	9.3	40.2	40.2
Actuated g/C Ratio	0.08	0.17	1.00	0.22	0.32	1.00	0.17	0.42	1.00	0.08	0.34	0.34
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	278	634	1603	798	1170	1613	591	2229	1615	275	1760	532
v/s Ratio Prot	0.03	0.07		c0.17	0.07		c0.08	0.16		0.03	c0.30	
v/s Ratio Perm			c0.38			0.08			0.21			0.03
v/c Ratio	0.45	0.39	0.38	0.76	0.23	0.08	0.50	0.37	0.21	0.44	0.90	0.08
Uniform Delay, d1	52.8	44.0	0.0	43.4	30.0	0.0	45.5	23.6	0.0	52.9	38.0	27.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.40	1.66	1.00	0.89	0.78	0.22
Incremental Delay, d2	0.4	0.8	0.7	3.7	0.2	0.1	0.2	0.5	0.3	0.4	7.8	0.3
Delay (s)	53.2	44.8	0.7	47.1	30.2	0.1	63.9	39.6	0.3	47.3	37.6	6.4
Level of Service	D	D	A	D	C	A	E	D	A	D	D	A
Approach Delay (s)		18.4			36.8			35.5			36.4	
Approach LOS		B			D			D			D	

Intersection Summary			
HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: W Las Positas & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	101	719	1	1	499	49	10	29	1	229	16	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1829	5254		1829	3657	1636		1901	1602	1737	1752	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.96	1.00
Satd. Flow (perm)	1829	5254		1829	3657	1636		1901	1602	1737	1752	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	110	782	1	1	542	53	11	32	1	249	17	217
RTOR Reduction (vph)	0	0	0	0	0	35	0	0	1	0	0	161
Lane Group Flow (vph)	110	783	0	1	542	18	0	43	0	132	134	56
Confl. Peds. (#/hr)									3			1
Turn Type	Prot			Prot		Perm	Split		Perm	Split		Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases						6			4			3
Actuated Green, G (s)	8.1	28.4		0.8	21.1	21.1		4.0	4.0	15.1	15.1	15.1
Effective Green, g (s)	9.1	31.4		1.8	24.1	24.1		7.0	7.0	18.1	18.1	18.1
Actuated g/C Ratio	0.13	0.45		0.03	0.34	0.34		0.10	0.10	0.26	0.26	0.26
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	237	2347		47	1254	561		189	160	447	451	416
v/s Ratio Prot	c0.06	0.15		0.00	c0.15			c0.02		0.08	c0.08	
v/s Ratio Perm						0.01			0.00			0.03
v/c Ratio	0.46	0.33		0.02	0.43	0.03		0.23	0.00	0.30	0.30	0.13
Uniform Delay, d1	28.3	12.6		33.4	17.8	15.4		29.2	28.5	21.0	21.0	20.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.1		0.2	0.2	0.0		0.6	0.0	0.4	0.4	0.1
Delay (s)	29.8	12.7		33.6	18.1	15.4		29.8	28.5	21.3	21.4	20.2
Level of Service	C	B		C	B	B		C	C	C	C	C
Approach Delay (s)		14.8			17.8			29.7			20.8	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	70.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Stoneridge & W Las Positas

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	675	288	279	343	81	148	380	95	492	850	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1596	3547	3657	1575	1829	5255	1636	1829	5255	1619
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1596	3547	3657	1575	1829	5255	1636	1829	5255	1619
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	4	718	306	297	365	86	157	404	101	523	904	35
RTOR Reduction (vph)	0	0	222	0	0	56	0	0	82	0	0	12
Lane Group Flow (vph)	4	718	84	297	365	30	157	404	19	523	904	23
Confl. Peds. (#/hr)			12			24			36			12
Turn Type	Prot		Perm	Prot		Perm	Prot		custom	Prot		custom
Protected Phases	7	4		3	8		5	2	2	1	6	6
Permitted Phases			4			8			2			4
Actuated Green, G (s)	1.0	27.6	27.6	9.1	35.7	35.7	13.4	17.3	17.3	31.5	34.4	62.0
Effective Green, g (s)	2.0	30.6	28.6	10.1	38.7	36.7	14.4	19.3	19.3	32.5	37.4	68.0
Actuated g/C Ratio	0.02	0.29	0.27	0.10	0.37	0.35	0.14	0.18	0.18	0.31	0.36	0.65
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	5.0	5.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	68	1071	437	343	1354	553	252	971	302	569	1881	1054
v/s Ratio Prot	0.00	c0.20		c0.08	0.10		0.09	0.08	0.01	c0.29	c0.17	0.01
v/s Ratio Perm			0.05			0.02						0.01
v/c Ratio	0.06	0.67	0.19	0.87	0.27	0.05	0.62	0.42	0.06	0.92	0.48	0.02
Uniform Delay, d1	50.3	32.5	29.1	46.5	23.0	22.4	42.5	37.6	35.1	34.7	26.0	6.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	1.7	0.2	19.8	0.1	0.0	4.7	0.3	0.1	19.9	0.2	0.0
Delay (s)	50.7	34.2	29.3	66.3	23.1	22.5	47.2	37.9	35.2	54.6	26.2	6.5
Level of Service	D	C	C	E	C	C	D	D	D	D	C	A
Approach Delay (s)		32.8			40.2			39.7			35.9	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	36.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	104.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	77	594	11	2	557	47	51	6	26	97	4	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.88			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1829	5238		1829	3657	1636	1822	1668			1834	1609
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.69	1.00			0.71	1.00
Satd. Flow (perm)	1829	5238		1829	3657	1636	1318	1668			1363	1609
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	83	639	12	2	599	51	55	6	28	104	4	133
RTOR Reduction (vph)	0	3	0	0	0	29	0	22	0	0	0	102
Lane Group Flow (vph)	83	648	0	2	599	22	55	12	0	0	108	31
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	3.2	16.4		0.8	14.0	14.0	7.0	7.0			7.0	7.0
Effective Green, g (s)	4.2	19.4		1.8	17.0	17.0	9.0	9.0			9.0	9.0
Actuated g/C Ratio	0.11	0.49		0.05	0.43	0.43	0.23	0.23			0.23	0.23
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	196	2592		84	1586	709	303	383			313	369
v/s Ratio Prot	c0.05	0.12		0.00	c0.16			0.01				
v/s Ratio Perm						0.01	0.04				c0.08	0.02
v/c Ratio	0.42	0.25		0.02	0.38	0.03	0.18	0.03			0.35	0.08
Uniform Delay, d1	16.4	5.7		17.9	7.5	6.4	12.1	11.7			12.6	11.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.03	1.11
Incremental Delay, d2	1.5	0.1		0.1	0.2	0.0	0.3	0.0			0.7	0.1
Delay (s)	17.8	5.8		18.0	7.7	6.4	12.4	11.8			13.6	13.2
Level of Service	B	A		B	A	A	B	B			B	B
Approach Delay (s)		7.1			7.6			12.2			13.4	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	8.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	39.2	Sum of lost time (s)	9.0
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
58: Gibraltar Dr (S) & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	17	57	37	8	17	7	151	13	11	251	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Frt		0.91			0.96		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3244			3365		1829	5181		1829	5215	
Flt Permitted		0.88			0.79		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		2890			2722		1829	5181		1829	5215	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	22	18	59	39	8	18	7	157	14	11	261	12
RTOR Reduction (vph)	0	45	0	0	14	0	0	9	0	0	7	0
Lane Group Flow (vph)	0	54	0	0	51	0	7	162	0	11	266	0
Confl. Peds. (#/hr)	20		20	20		20			20			20
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		4.2			4.2		0.6	7.1		0.7	7.2	
Effective Green, g (s)		6.2			6.2		1.6	10.1		1.7	10.2	
Actuated g/C Ratio		0.23			0.23		0.06	0.37		0.06	0.38	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		664			625		108	1938		115	1970	
v/s Ratio Prot							0.00	0.03		c0.01	c0.05	
v/s Ratio Perm		0.02			c0.02							
v/c Ratio		0.08			0.08		0.06	0.08		0.10	0.13	
Uniform Delay, d1		8.2			8.2		12.0	5.5		11.9	5.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.1		0.3	0.0		0.4	0.0	
Delay (s)		8.2			8.2		12.2	5.5		12.3	5.5	
Level of Service		A			A		B	A		B	A	
Approach Delay (s)		8.2			8.2			5.7			5.8	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	6.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	27.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (veh/h)	38	5	9	22	2	43	29	1	114	27	2	38
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	48	6	11	28	2	54	0	1	142	34	0	48
Pedestrians		20			20				20			
Lane Width (ft)		13.0			13.0				13.0			
Walking Speed (ft/s)		4.0			4.0				4.0			
Percent Blockage		2			2				2			
Right turn flare (veh)												
Median type									None			
Median storage veh)												
Upstream signal (ft)									1264			
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	562	612	194	456	604	128	0	328			0	196
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	562	612	194	456	604	128	0	328			0	196
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	86	98	99	94	99	94	0	100			0	96
cM capacity (veh/h)	349	378	786	433	382	866	0	1207			0	1349

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	65	30	54	1	95	81	48	192	115
Volume Left	48	28	0	1	0	0	48	0	0
Volume Right	11	0	54	0	0	34	0	0	19
cSH	389	428	866	1207	1700	1700	1349	1700	1700
Volume to Capacity	0.17	0.07	0.06	0.00	0.06	0.05	0.04	0.11	0.07
Queue Length 95th (ft)	15	6	5	0	0	0	3	0	0
Control Delay (s)	16.1	14.0	9.4	8.0	0.0	0.0	7.8	0.0	0.0
Lane LOS	C	B	A	A			A		
Approach Delay (s)	16.1	11.1		0.1			1.0		
Approach LOS	C	B							

Intersection Summary				
Average Delay		3.5		
Intersection Capacity Utilization		42.4%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

12/2/2013

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	231	15
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.80	0.80
Hourly flow rate (vph)	289	19
Pedestrians	20	
Lane Width (ft)	13.0	
Walking Speed (ft/s)	4.0	
Percent Blockage	2	
Right turn flare (veh)		
Median type	None	
Median storage veh)		
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		

Direction, Lane #

SummerHill Apartments Traffic Impact Study
PM Peak Hour Existing plus Approved Projects Conditions-No Project
Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis
12: Stoneridge & Hacienda

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	238	265	12	21	1270	54	65	135	19	30	184	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.95		1.00	0.91		0.97	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.93	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3547	3628		1829	5211		3547	3572		1829	4596	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3547	3628		1829	5211		3547	3572		1829	4596	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	253	282	13	22	1351	57	69	144	20	32	196	134
RTOR Reduction (vph)	0	2	0	0	2	0	0	10	0	0	107	0
Lane Group Flow (vph)	253	293	0	22	1406	0	69	154	0	32	223	0
Confl. Peds. (#/hr)			12			24			24			120
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	13.8	67.8		4.7	58.7		6.5	22.3		5.2	21.0	
Effective Green, g (s)	14.8	70.8		5.7	61.7		7.5	25.3		6.2	24.0	
Actuated g/C Ratio	0.12	0.59		0.05	0.51		0.06	0.21		0.05	0.20	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	437	2141		87	2679		222	753		94	919	
v/s Ratio Prot	c0.07	0.08		0.01	c0.27		0.02	0.04		c0.02	c0.05	
v/s Ratio Perm												
v/c Ratio	0.58	0.14		0.25	0.52		0.31	0.20		0.34	0.24	
Uniform Delay, d1	49.7	11.0		55.1	19.4		53.8	39.0		54.9	40.4	
Progression Factor	0.79	1.37		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.1		1.5	0.7		0.8	0.1		2.2	0.1	
Delay (s)	40.9	15.1		56.6	20.1		54.6	39.2		57.1	40.5	
Level of Service	D	B		E	C		D	D		E	D	
Approach Delay (s)		27.0			20.7			43.7			42.0	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: W Las Positas & Hopyard

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	160	367	429	403	314	61	454	1410	435	160	706	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	186	427	499	469	365	71	528	1640	506	186	821	95
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	69
Lane Group Flow (vph)	186	427	499	469	365	71	528	1640	506	186	821	26
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	9.8	21.2	120.0	18.8	30.2	120.0	30.1	51.3	120.0	8.7	29.9	29.9
Effective Green, g (s)	10.8	24.2	120.0	19.8	33.2	120.0	31.1	54.3	120.0	9.7	32.9	32.9
Actuated g/C Ratio	0.09	0.20	1.00	0.17	0.28	1.00	0.26	0.45	1.00	0.08	0.27	0.27
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	319	737	1603	585	1012	1613	919	2378	1615	287	1441	436
v/s Ratio Prot	0.05	c0.12		c0.13	0.10		0.15	c0.31		c0.05	0.16	
v/s Ratio Perm			0.31			0.04			0.31			0.02
v/c Ratio	0.58	0.58	0.31	0.80	0.36	0.04	0.57	0.69	0.31	0.65	0.57	0.06
Uniform Delay, d1	52.4	43.3	0.0	48.2	34.9	0.0	38.7	26.1	0.0	53.5	37.5	32.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.72	0.62	1.00	0.74	0.69	0.73
Incremental Delay, d2	1.8	1.8	0.5	7.4	0.5	0.1	0.5	1.5	0.4	3.7	1.6	0.3
Delay (s)	54.2	45.1	0.5	55.6	35.3	0.1	28.2	17.8	0.4	43.4	27.4	23.6
Level of Service	D	D	A	E	D	A	C	B	A	D	C	C
Approach Delay (s)		26.6			43.1			16.5			29.8	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM Average Control Delay	25.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: W Las Positas & Hacienda

1/24/2014

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	27	99	407	29	3	739	61	32	41	12	78	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	1.1	3.0		1.1	3.0
Lane Util. Factor		1.00	0.91		1.00	0.95	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	0.99		1.00	1.00	0.85	1.00	0.97		1.00	1.00
Flt Protected		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)		1829	5203		1829	3657	1636	1829	1852		1829	1925
Flt Permitted		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)		1829	5203		1829	3657	1636	1829	1852		1829	1925
Peak-hour factor, PHF	0.90	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	30	116	479	34	4	869	72	38	48	14	92	7
RTOR Reduction (vph)	0	0	6	0	0	0	41	0	12	0	0	0
Lane Group Flow (vph)	0	146	507	0	4	869	31	38	50	0	92	7
Confl. Peds. (#/hr)										3		
Turn Type	Prot	Prot			Prot		Perm	Prot			Prot	
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases							6					
Actuated Green, G (s)		9.3	37.2		1.0	28.9	28.9	2.1	9.7		5.6	13.2
Effective Green, g (s)		10.3	40.2		2.0	31.9	31.9	5.1	12.7		8.6	16.2
Actuated g/C Ratio		0.14	0.55		0.03	0.43	0.43	0.07	0.17		0.12	0.22
Clearance Time (s)		4.0	6.0		4.0	6.0	6.0	4.1	6.0		4.1	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		256	2842		50	1585	709	127	320		214	424
v/s Ratio Prot		c0.08	0.10		0.00	c0.24		0.02	c0.03		c0.05	0.00
v/s Ratio Perm							0.02					
v/c Ratio		0.57	0.18		0.08	0.55	0.04	0.30	0.16		0.43	0.02
Uniform Delay, d1		29.6	8.4		34.9	15.5	12.0	32.6	25.9		30.2	22.5
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		3.1	0.1		0.7	0.4	0.0	1.3	0.2		1.4	0.0
Delay (s)		32.6	8.5		35.6	15.9	12.1	33.9	26.1		31.6	22.5
Level of Service		C	A		D	B	B	C	C		C	C
Approach Delay (s)			13.9			15.7			29.1			26.3
Approach LOS			B			B			C			C

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	10.1
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: W Las Positas & Hacienda

1/24/2014

Movement	SBR
Lane Configurations	
Volume (vph)	115
Ideal Flow (vphpl)	1900
Total Lost time (s)	3.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.99
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1615
Flt Permitted	1.00
Satd. Flow (perm)	1615
Peak-hour factor, PHF	0.85
Adj. Flow (vph)	135
RTOR Reduction (vph)	105
Lane Group Flow (vph)	30
Confl. Peds. (#/hr)	1
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	13.2
Effective Green, g (s)	16.2
Actuated g/C Ratio	0.22
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	355
v/s Ratio Prot	
v/s Ratio Perm	0.02
v/c Ratio	0.08
Uniform Delay, d1	22.8
Progression Factor	1.00
Incremental Delay, d2	0.1
Delay (s)	22.9
Level of Service	C
Approach Delay (s)	
Approach LOS	

Intersection Summary

SummerHill Apartments Traffic Impact Study
AM Peak Hour Existing plus Approved Project Conditions plus Project
Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis
18: Stoneridge & W Las Positas

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	312	139	123	1048	320	297	732	52	95	228	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1598	3547	3657	1578	1829	5255	1636	1829	5255	1613
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1598	3547	3657	1578	1829	5255	1636	1829	5255	1613
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	34	347	154	137	1164	356	330	813	58	106	253	20
RTOR Reduction (vph)	0	0	105	0	0	185	0	0	40	0	0	9
Lane Group Flow (vph)	34	347	49	137	1164	171	330	813	18	106	253	11
Confl. Peds. (#/hr)			12			24			36			12
Turn Type	Prot		Perm	Prot		Perm	Prot		custom	Prot		custom
Protected Phases	7	4		3	8		5	2	2	1	6	6
Permitted Phases			4			8			2			4
Actuated Green, G (s)	3.5	29.8	29.8	8.1	34.4	34.4	21.6	28.4	28.4	10.6	16.4	46.2
Effective Green, g (s)	4.5	32.8	30.8	9.1	37.4	35.4	22.6	30.4	30.4	11.6	19.4	52.2
Actuated g/C Ratio	0.05	0.34	0.32	0.09	0.39	0.37	0.24	0.32	0.32	0.12	0.20	0.54
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	5.0	5.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	166	1251	513	337	1426	582	431	1666	519	221	1063	878
v/s Ratio Prot	0.01	0.09		c0.04	c0.32		c0.18	c0.15	0.01	0.06	0.05	0.00
v/s Ratio Perm			0.03			0.11						0.00
v/c Ratio	0.20	0.28	0.10	0.41	0.82	0.29	0.77	0.49	0.04	0.48	0.24	0.01
Uniform Delay, d1	44.0	22.9	22.8	40.9	26.2	21.4	34.2	26.5	22.6	39.3	32.1	10.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.1	0.8	3.7	0.3	7.9	0.2	0.0	1.6	0.1	0.0
Delay (s)	44.6	23.1	22.9	41.7	29.9	21.7	42.1	26.7	22.7	41.0	32.2	10.0
Level of Service	D	C	C	D	C	C	D	C	C	D	C	B
Approach Delay (s)		24.4			29.1			30.7			33.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	29.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	95.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	278	542	19	25	589	211	14	9	3	27	5	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.96	1.00
Satd. Flow (prot)	1829	5225		1829	3657	1636	1816	1841			1844	1605
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.73	1.00			0.80	1.00
Satd. Flow (perm)	1829	5225		1829	3657	1636	1400	1841			1535	1605
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.91	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	327	638	22	29	647	248	16	11	4	32	6	204
RTOR Reduction (vph)	0	2	0	0	0	169	0	3	0	0	0	166
Lane Group Flow (vph)	327	658	0	29	647	79	16	12	0	0	38	38
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	20.6	35.0		2.5	16.9	16.9	9.6	9.6			9.6	9.6
Effective Green, g (s)	21.6	38.0		3.5	19.9	19.9	11.6	11.6			11.6	11.6
Actuated g/C Ratio	0.35	0.61		0.06	0.32	0.32	0.19	0.19			0.19	0.19
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	636	3197		103	1172	524	262	344			287	300
v/s Ratio Prot	c0.18	0.13		0.02	c0.18			0.01				
v/s Ratio Perm						0.05	0.01				c0.02	0.02
v/c Ratio	0.51	0.21		0.28	0.55	0.15	0.06	0.03			0.13	0.13
Uniform Delay, d1	16.1	5.3		28.1	17.4	15.1	20.8	20.7			21.1	21.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.10	1.49
Incremental Delay, d2	0.7	0.0		1.5	0.6	0.1	0.1	0.0			0.2	0.2
Delay (s)	16.8	5.4		29.6	18.0	15.2	20.9	20.7			23.4	31.6
Level of Service	B	A		C	B	B	C	C			C	C
Approach Delay (s)		9.2			17.6			20.8			30.3	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM Average Control Delay	15.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	62.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
58: Gibraltar Dr (S) & Hacienda

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	19	40	10	14	6	23	103	29	62	136	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.91			0.97		1.00	0.97		1.00	0.97	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3271			3462		1829	5053		1829	5079	
Flt Permitted		0.91			0.85		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		2990			2992		1829	5053		1829	5079	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.88	0.85	0.85	0.85	0.85
Adj. Flow (vph)	13	22	47	12	16	7	27	117	34	73	160	39
RTOR Reduction (vph)	0	36	0	0	5	0	0	24	0	0	25	0
Lane Group Flow (vph)	0	46	0	0	30	0	27	127	0	73	174	0
Confl. Peds. (#/hr)	20		20	20		20			20			20
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		4.1			4.1		0.8	4.9		2.1	6.2	
Effective Green, g (s)		6.1			6.1		1.8	7.9		3.1	9.2	
Actuated g/C Ratio		0.23			0.23		0.07	0.30		0.12	0.35	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		699			699		126	1529		217	1790	
v/s Ratio Prot							0.01	0.03		c0.04	c0.03	
v/s Ratio Perm		c0.02			0.01							
v/c Ratio		0.07			0.04		0.21	0.08		0.34	0.10	
Uniform Delay, d1		7.8			7.7		11.5	6.5		10.6	5.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.0			0.0		0.9	0.0		0.9	0.0	
Delay (s)		7.8			7.8		12.3	6.5		11.5	5.7	
Level of Service		A			A		B	A		B	A	
Approach Delay (s)		7.8			7.8			7.4			7.2	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	7.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	26.1	Sum of lost time (s)	6.0
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (veh/h)	1	2	1	11	2	18	128	12	400	73	5	32
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	1	2	1	14	2	22	0	15	500	91	0	40
Pedestrians		20			20				20			
Lane Width (ft)		13.0			13.0				13.0			
Walking Speed (ft/s)		4.0			4.0				4.0			
Percent Blockage		2			2				2			
Right turn flare (veh)												
Median type									None			
Median storage veh)												
Upstream signal (ft)									1264			
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	752	1070	212	854	1041	336	0	365			0	611
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	752	1070	212	854	1041	336	0	365			0	611
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	100	99	100	94	99	96	0	99			0	96
cM capacity (veh/h)	257	200	764	224	208	637	0	1169			0	946

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	5	16	22	15	333	258	40	208	137
Volume Left	1	14	0	15	0	0	40	0	0
Volume Right	1	0	22	0	0	91	0	0	32
cSH	263	222	637	1169	1700	1700	946	1700	1700
Volume to Capacity	0.02	0.07	0.04	0.01	0.20	0.15	0.04	0.12	0.08
Queue Length 95th (ft)	1	6	3	1	0	0	3	0	0
Control Delay (s)	18.9	22.5	10.9	8.1	0.0	0.0	9.0	0.0	0.0
Lane LOS	C	C	B	A			A		
Approach Delay (s)	18.9	15.8		0.2			0.9		
Approach LOS	C	C							

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

1/24/2014

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	250	26
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.80	0.80
Hourly flow rate (vph)	312	32
Pedestrians	20	
Lane Width (ft)	13.0	
Walking Speed (ft/s)	4.0	
Percent Blockage	2	
Right turn flare (veh)		
Median type	None	
Median storage veh)		
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		
Direction, Lane #		

HCM Signalized Intersection Capacity Analysis
12: Stoneridge & Hacienda

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	245	1250	87	17	469	40	45	178	14	44	277	261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.95		1.00	0.91		0.97	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.92	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3547	3613		1829	5170		3547	3605		1829	4474	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3547	3613		1829	5170		3547	3605		1829	4474	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	258	1316	92	18	494	42	47	187	15	46	292	275
RTOR Reduction (vph)	0	3	0	0	6	0	0	6	0	0	155	0
Lane Group Flow (vph)	258	1405	0	18	530	0	47	196	0	46	412	0
Confl. Peds. (#/hr)			12			24			24			120
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	14.0	68.0		3.2	57.2		5.9	21.6		7.2	22.9	
Effective Green, g (s)	15.0	71.0		4.2	60.2		6.9	24.6		8.2	25.9	
Actuated g/C Ratio	0.12	0.59		0.04	0.50		0.06	0.21		0.07	0.22	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	443	2138		64	2594		204	739		125	966	
v/s Ratio Prot	c0.07	c0.39		0.01	0.10		0.01	0.05		c0.03	c0.09	
v/s Ratio Perm												
v/c Ratio	0.58	0.66		0.28	0.20		0.23	0.27		0.37	0.43	
Uniform Delay, d1	49.5	16.4		56.4	16.6		54.0	40.1		53.4	40.6	
Progression Factor	1.24	0.39		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	1.3		2.4	0.2		0.6	0.2		1.8	0.3	
Delay (s)	63.2	7.7		58.8	16.8		54.6	40.3		55.3	40.9	
Level of Service	E	A		E	B		D	D		E	D	
Approach Delay (s)		16.3			18.1			43.0			42.0	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: W Las Positas & Hopyard

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	119	240	587	591	262	121	284	795	340	127	1525	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	124	250	611	616	273	126	296	828	354	132	1589	110
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	67
Lane Group Flow (vph)	124	250	611	616	273	126	296	828	354	132	1589	43
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	8.4	17.8	120.0	26.6	36.0	120.0	19.0	47.0	120.0	8.6	36.6	36.6
Effective Green, g (s)	9.4	20.8	120.0	27.6	39.0	120.0	20.0	50.0	120.0	9.6	39.6	39.6
Actuated g/C Ratio	0.08	0.17	1.00	0.23	0.32	1.00	0.17	0.42	1.00	0.08	0.33	0.33
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	278	634	1603	816	1189	1613	591	2190	1615	284	1734	524
v/s Ratio Prot	0.03	0.07		c0.17	0.07		c0.08	0.16		0.04	c0.30	
v/s Ratio Perm			c0.38			0.08			0.22			0.03
v/c Ratio	0.45	0.39	0.38	0.75	0.23	0.08	0.50	0.38	0.22	0.46	0.92	0.08
Uniform Delay, d1	52.8	44.0	0.0	43.0	29.5	0.0	45.5	24.2	0.0	52.7	38.6	27.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.40	1.64	1.00	0.87	0.79	0.23
Incremental Delay, d2	0.4	0.8	0.7	3.6	0.2	0.1	0.2	0.5	0.3	0.4	8.9	0.3
Delay (s)	53.2	44.9	0.7	46.6	29.7	0.1	63.9	40.3	0.3	46.4	39.4	6.6
Level of Service	D	D	A	D	C	A	E	D	A	D	D	A
Approach Delay (s)		18.5			36.3			35.4			37.9	
Approach LOS		B			D			D			D	

Intersection Summary			
HCM Average Control Delay	33.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: W Las Positas & Hacienda

1/24/2014

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	7	106	725	12	22	499	49	20	35	7	229	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Util. Factor		1.00	0.91		1.00	0.95	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	1.00		1.00	1.00	0.85	1.00	0.97		1.00	1.00
Flt Protected		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)		1829	5242		1829	3657	1636	1829	1869		1829	1925
Flt Permitted		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)		1829	5242		1829	3657	1636	1829	1869		1829	1925
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	115	788	13	24	542	53	22	38	8	249	36
RTOR Reduction (vph)	0	0	1	0	0	0	36	0	7	0	0	0
Lane Group Flow (vph)	0	123	800	0	24	542	17	22	39	0	249	36
Confl. Peds. (#/hr)										3		
Turn Type	Prot	Prot			Prot		Perm	Prot			Prot	
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases							6					
Actuated Green, G (s)		8.2	28.0		1.9	21.7	21.7	8.5	8.6		17.1	17.2
Effective Green, g (s)		9.2	31.0		2.9	24.7	24.7	11.5	11.6		20.1	20.2
Actuated g/C Ratio		0.12	0.40		0.04	0.32	0.32	0.15	0.15		0.26	0.26
Clearance Time (s)		4.0	6.0		4.0	6.0	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		217	2094		68	1164	521	271	279		474	501
v/s Ratio Prot		c0.07	0.15		0.01	c0.15		0.01	0.02		c0.14	0.02
v/s Ratio Perm							0.01					
v/c Ratio		0.57	0.38		0.35	0.47	0.03	0.08	0.14		0.53	0.07
Uniform Delay, d1		32.3	16.5		36.4	21.2	18.2	28.5	28.7		24.7	21.6
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		3.4	0.1		3.1	0.3	0.0	0.1	0.2		1.1	0.1
Delay (s)		35.7	16.6		39.6	21.5	18.2	28.6	28.9		25.7	21.7
Level of Service		D	B		D	C	B	C	C		C	C
Approach Delay (s)			19.2			21.9			28.8			23.9
Approach LOS			B			C			C			C

Intersection Summary			
HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	77.6	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: W Las Positas & Hacienda

1/24/2014

Movement	SBR
Lane Configurations	
Volume (vph)	200
Ideal Flow (vphpl)	1900
Total Lost time (s)	3.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.99
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1615
Flt Permitted	1.00
Satd. Flow (perm)	1615
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	217
RTOR Reduction (vph)	161
Lane Group Flow (vph)	56
Confl. Peds. (#/hr)	1
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	17.2
Effective Green, g (s)	20.2
Actuated g/C Ratio	0.26
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	420
v/s Ratio Prot	
v/s Ratio Perm	c0.03
v/c Ratio	0.13
Uniform Delay, d1	22.0
Progression Factor	1.00
Incremental Delay, d2	0.1
Delay (s)	22.1
Level of Service	C
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
18: Stoneridge & W Las Positas

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	675	288	290	343	81	148	386	101	492	861	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1596	3547	3657	1575	1829	5255	1636	1829	5255	1619
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1596	3547	3657	1575	1829	5255	1636	1829	5255	1619
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	4	718	306	309	365	86	157	411	107	523	916	35
RTOR Reduction (vph)	0	0	222	0	0	56	0	0	87	0	0	12
Lane Group Flow (vph)	4	718	84	309	365	30	157	411	20	523	916	23
Confl. Peds. (#/hr)			12			24			36			12
Turn Type	Prot		Perm	Prot		Perm	Prot		custom	Prot		custom
Protected Phases	7	4		3	8		5	2	2	1	6	6
Permitted Phases			4			8			2			4
Actuated Green, G (s)	1.0	27.6	27.6	9.1	35.7	35.7	13.4	17.4	17.4	31.5	34.5	62.1
Effective Green, g (s)	2.0	30.6	28.6	10.1	38.7	36.7	14.4	19.4	19.4	32.5	37.5	68.1
Actuated g/C Ratio	0.02	0.29	0.27	0.10	0.37	0.35	0.14	0.19	0.19	0.31	0.36	0.65
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	5.0	5.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	68	1070	436	342	1353	553	252	975	303	568	1884	1054
v/s Ratio Prot	0.00	c0.20		c0.09	0.10		0.09	0.08	0.01	c0.29	c0.17	0.01
v/s Ratio Perm			0.05			0.02						0.01
v/c Ratio	0.06	0.67	0.19	0.90	0.27	0.05	0.62	0.42	0.07	0.92	0.49	0.02
Uniform Delay, d1	50.4	32.6	29.1	46.8	23.1	22.5	42.5	37.6	35.1	34.8	26.1	6.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	1.7	0.2	25.9	0.1	0.0	4.7	0.3	0.1	20.4	0.2	0.0
Delay (s)	50.7	34.2	29.4	72.7	23.2	22.5	47.3	37.9	35.2	55.2	26.3	6.5
Level of Service	D	C	C	E	C	C	D	D	D	E	C	A
Approach Delay (s)		32.8			43.2			39.7			36.1	
Approach LOS		C			D			D			D	

Intersection Summary

HCM Average Control Delay	37.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	104.6	Sum of lost time (s)	9.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	77	627	11	2	573	47	51	6	26	97	4	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.88			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1829	5239		1829	3657	1636	1822	1668			1834	1609
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.69	1.00			0.71	1.00
Satd. Flow (perm)	1829	5239		1829	3657	1636	1318	1668			1363	1609
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	83	674	12	2	616	51	55	6	28	104	4	133
RTOR Reduction (vph)	0	3	0	0	0	29	0	22	0	0	0	103
Lane Group Flow (vph)	83	683	0	2	616	22	55	12	0	0	108	30
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	3.2	16.6		0.8	14.2	14.2	7.0	7.0			7.0	7.0
Effective Green, g (s)	4.2	19.6		1.8	17.2	17.2	9.0	9.0			9.0	9.0
Actuated g/C Ratio	0.11	0.50		0.05	0.44	0.44	0.23	0.23			0.23	0.23
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	195	2606		84	1596	714	301	381			311	368
v/s Ratio Prot	c0.05	0.13		0.00	c0.17			0.01				
v/s Ratio Perm						0.01	0.04				c0.08	0.02
v/c Ratio	0.43	0.26		0.02	0.39	0.03	0.18	0.03			0.35	0.08
Uniform Delay, d1	16.5	5.7		18.0	7.5	6.3	12.2	11.8			12.7	12.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.03	1.11
Incremental Delay, d2	1.5	0.1		0.1	0.2	0.0	0.3	0.0			0.7	0.1
Delay (s)	18.0	5.8		18.1	7.7	6.4	12.5	11.9			13.8	13.4
Level of Service	B	A		B	A	A	B	B			B	B
Approach Delay (s)		7.1			7.6			12.3			13.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	39.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
58: Gibraltar Dr (S) & Hacienda

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	17	57	37	8	17	7	162	13	11	268	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Frt		0.91			0.96		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3244			3365		1829	5186		1829	5218	
Flt Permitted		0.88			0.79		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		2890			2722		1829	5186		1829	5218	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	22	18	59	39	8	18	7	169	14	11	279	12
RTOR Reduction (vph)	0	45	0	0	14	0	0	9	0	0	7	0
Lane Group Flow (vph)	0	54	0	0	51	0	7	174	0	11	284	0
Confl. Peds. (#/hr)	20		20	20		20			20			20
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		4.2			4.2		0.6	7.2		0.6	7.2	
Effective Green, g (s)		6.2			6.2		1.6	10.2		1.6	10.2	
Actuated g/C Ratio		0.23			0.23		0.06	0.38		0.06	0.38	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		664			625		108	1959		108	1971	
v/s Ratio Prot							0.00	0.03		c0.01	c0.05	
v/s Ratio Perm		0.02			c0.02							
v/c Ratio		0.08			0.08		0.06	0.09		0.10	0.14	
Uniform Delay, d1		8.2			8.2		12.0	5.4		12.0	5.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.1		0.3	0.0		0.4	0.0	
Delay (s)		8.2			8.2		12.2	5.4		12.4	5.6	
Level of Service		A			A		B	A		B	A	
Approach Delay (s)		8.2			8.2			5.7			5.8	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	6.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	27.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (veh/h)	38	5	9	22	2	43	29	1	114	27	2	38
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	48	6	11	28	2	54	0	1	142	34	0	48
Pedestrians		20			20				20			
Lane Width (ft)		13.0			13.0				13.0			
Walking Speed (ft/s)		4.0			4.0				4.0			
Percent Blockage		2			2				2			
Right turn flare (veh)												
Median type									None			
Median storage veh)												
Upstream signal (ft)									1264			
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	562	612	194	456	604	128	0	328			0	196
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	562	612	194	456	604	128	0	328			0	196
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	86	98	99	94	99	94	0	100			0	96
cM capacity (veh/h)	349	378	786	433	382	866	0	1207			0	1349

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	65	30	54	1	95	81	48	192	115
Volume Left	48	28	0	1	0	0	48	0	0
Volume Right	11	0	54	0	0	34	0	0	19
cSH	389	428	866	1207	1700	1700	1349	1700	1700
Volume to Capacity	0.17	0.07	0.06	0.00	0.06	0.05	0.04	0.11	0.07
Queue Length 95th (ft)	15	6	5	0	0	0	3	0	0
Control Delay (s)	16.1	14.0	9.4	8.0	0.0	0.0	7.8	0.0	0.0
Lane LOS	C	B	A	A			A		
Approach Delay (s)	16.1	11.1		0.1			1.0		
Approach LOS	C	B							

Intersection Summary				
Average Delay		3.5		
Intersection Capacity Utilization		42.4%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

1/24/2014

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	231	15
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.80	0.80
Hourly flow rate (vph)	289	19
Pedestrians	20	
Lane Width (ft)	13.0	
Walking Speed (ft/s)	4.0	
Percent Blockage	2	
Right turn flare (veh)		
Median type	None	
Median storage veh)		
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		

Direction, Lane #

SummerHill Apartments Traffic Impact Study
PM Peak Hour Existing plus Approved Projects Conditions plus Project
Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis
12: Stoneridge & Hacienda

12/5/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	236	539	31	40	1412	67	51	148	19	59	252	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.95		1.00	0.91		0.97	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.95	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3547	3621		1829	5206		3547	3578		1829	4767	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3547	3621		1829	5206		3547	3578		1829	4767	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	251	573	33	43	1502	71	54	157	20	63	268	114
RTOR Reduction (vph)	0	2	0	0	3	0	0	10	0	0	73	0
Lane Group Flow (vph)	251	604	0	43	1570	0	54	167	0	63	309	0
Confl. Peds. (#/hr)			12			24			24			120
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	13.8	64.0		7.1	57.3		6.1	20.6		8.3	22.8	
Effective Green, g (s)	14.8	67.0		8.1	60.3		7.1	23.6		9.3	25.8	
Actuated g/C Ratio	0.12	0.56		0.07	0.50		0.06	0.20		0.08	0.22	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	437	2022		123	2616		210	704		142	1025	
v/s Ratio Prot	c0.07	0.17		0.02	c0.30		0.02	0.05		c0.03	c0.06	
v/s Ratio Perm												
v/c Ratio	0.57	0.30		0.35	0.60		0.26	0.24		0.44	0.30	
Uniform Delay, d1	49.6	14.0		53.4	21.3		53.9	40.6		52.9	39.5	
Progression Factor	0.79	1.25		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.3		1.7	1.0		0.7	0.2		2.2	0.2	
Delay (s)	40.9	17.9		55.2	22.3		54.6	40.8		55.1	39.7	
Level of Service	D	B		E	C		D	D		E	D	
Approach Delay (s)		24.6			23.2			44.0			41.9	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	27.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: W Las Positas & Hopyard

12/5/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	150	375	448	503	385	78	477	1354	445	163	763	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.94	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	5157	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	5157	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	174	436	521	585	448	91	555	1574	517	190	887	103
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	73
Lane Group Flow (vph)	174	436	521	585	448	91	555	1574	517	190	887	30
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	9.6	21.4	120.0	17.0	28.8	120.0	30.0	52.9	120.0	8.7	31.6	31.6
Effective Green, g (s)	10.6	24.4	120.0	18.0	31.8	120.0	31.0	55.9	120.0	9.7	34.6	34.6
Actuated g/C Ratio	0.09	0.20	1.00	0.15	0.27	1.00	0.26	0.47	1.00	0.08	0.29	0.29
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	313	744	1603	774	969	1613	916	2448	1615	287	1515	458
v/s Ratio Prot	0.05	c0.12		c0.11	0.12		0.16	c0.30		c0.05	0.17	
v/s Ratio Perm			0.32			0.06			0.32			0.02
v/c Ratio	0.56	0.59	0.33	0.76	0.46	0.06	0.61	0.64	0.32	0.66	0.59	0.06
Uniform Delay, d1	52.4	43.2	0.0	48.9	36.9	0.0	39.1	24.4	0.0	53.6	36.6	31.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.76	0.68	1.00	0.89	0.62	0.68
Incremental Delay, d2	1.2	1.8	0.5	3.8	0.7	0.1	0.7	1.2	0.5	4.3	1.6	0.3
Delay (s)	53.7	45.1	0.5	52.7	37.7	0.1	30.6	17.9	0.5	51.9	24.5	21.4
Level of Service	D	D	A	D	D	A	C	B	A	D	C	C
Approach Delay (s)		25.9			42.4			17.2			28.6	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: W Las Positas & Hacienda

12/5/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	101	428	34	8	1017	84	2	28	10	86	1	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1829	5197		1829	3657	1636		1919	1600	1737	1743	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1829	5197		1829	3657	1636		1919	1600	1737	1743	1615
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	119	504	40	9	1196	99	2	33	12	101	1	129
RTOR Reduction (vph)	0	5	0	0	0	45	0	0	11	0	0	104
Lane Group Flow (vph)	119	539	0	9	1196	54	0	35	1	50	52	25
Confl. Peds. (#/hr)									3			1
Turn Type	Prot			Prot		Perm	Split		Perm	Split		Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases						6			4			3
Actuated Green, G (s)	8.7	42.0		1.2	34.5	34.5		4.3	4.3	13.2	13.2	13.2
Effective Green, g (s)	9.7	45.0		2.2	37.5	37.5		7.3	7.3	16.2	16.2	16.2
Actuated g/C Ratio	0.12	0.54		0.03	0.45	0.45		0.09	0.09	0.20	0.20	0.20
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	215	2828		49	1658	742		169	141	340	341	316
v/s Ratio Prot	c0.07	0.10		0.00	c0.33			c0.02		0.03	c0.03	
v/s Ratio Perm						0.03			0.00			0.02
v/c Ratio	0.55	0.19		0.18	0.72	0.07		0.21	0.01	0.15	0.15	0.08
Uniform Delay, d1	34.5	9.6		39.4	18.4	12.8		35.0	34.4	27.5	27.6	27.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	0.1		1.8	1.6	0.0		0.6	0.0	0.2	0.2	0.1
Delay (s)	37.5	9.7		41.2	19.9	12.8		35.6	34.4	27.7	27.8	27.3
Level of Service	D	A		D	B	B		D	C	C	C	C
Approach Delay (s)		14.7			19.5			35.3			27.5	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	82.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Stoneridge & W Las Positas

12/5/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	505	227	184	1190	345	319	712	55	207	476	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1596	3547	3657	1574	3547	3657	1636	3547	3657	1613
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1596	3547	3657	1574	3547	3657	1636	3547	3657	1613
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	52	561	252	204	1322	383	354	791	61	230	529	57
RTOR Reduction (vph)	0	0	162	0	0	189	0	0	43	0	0	21
Lane Group Flow (vph)	52	561	90	204	1322	194	354	791	18	230	529	36
Confl. Peds. (#/hr)			12			24			36			12
Turn Type	Prot		Perm	Prot		Perm	Prot		custom	Prot		custom
Protected Phases	7	4		3	8		5	2	2	1	6	6
Permitted Phases			4			8			2			4
Actuated Green, G (s)	5.1	36.6	36.6	10.4	41.9	41.9	13.6	28.4	28.4	11.2	25.0	61.6
Effective Green, g (s)	6.1	39.6	37.6	11.4	44.9	42.9	14.6	30.4	30.4	12.2	28.0	67.6
Actuated g/C Ratio	0.06	0.38	0.36	0.11	0.43	0.41	0.14	0.29	0.29	0.12	0.27	0.64
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	5.0	5.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	205	1371	568	383	1555	639	490	1053	471	410	970	1033
v/s Ratio Prot	0.01	0.15		c0.06	c0.36		c0.10	c0.22	0.01	0.06	0.14	0.01
v/s Ratio Perm			0.06			0.12						0.01
v/c Ratio	0.25	0.41	0.16	0.53	0.85	0.30	0.72	0.75	0.04	0.56	0.55	0.04
Uniform Delay, d1	47.6	24.4	23.2	44.6	27.3	21.2	43.6	34.2	27.1	44.2	33.3	7.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.2	0.1	1.4	4.7	0.3	5.2	3.1	0.0	1.8	0.6	0.0
Delay (s)	48.2	24.6	23.3	46.0	32.0	21.5	48.8	37.2	27.1	45.9	34.0	7.0
Level of Service	D	C	C	D	C	C	D	D	C	D	C	A
Approach Delay (s)		25.6			31.4			40.1			35.5	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	33.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	105.6	Sum of lost time (s)	6.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

12/5/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	270	580	21	33	788	225	15	7	3	27	5	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.96	1.00
Satd. Flow (prot)	1829	5223		1829	3657	1636	1816	1820			1843	1604
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.73	1.00			0.80	1.00
Satd. Flow (perm)	1829	5223		1829	3657	1636	1400	1820			1534	1604
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.91	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	318	682	25	39	866	265	18	8	4	32	6	214
RTOR Reduction (vph)	0	2	0	0	0	166	0	3	0	0	0	177
Lane Group Flow (vph)	318	705	0	39	866	99	18	9	0	0	38	37
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	20.1	38.0		4.2	22.1	22.1	9.7	9.7			9.7	9.7
Effective Green, g (s)	21.1	41.0		5.2	25.1	25.1	11.7	11.7			11.7	11.7
Actuated g/C Ratio	0.32	0.61		0.08	0.38	0.38	0.17	0.17			0.17	0.17
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	577	3201		142	1372	614	245	318			268	281
v/s Ratio Prot	c0.17	0.13		0.02	c0.24			0.00				
v/s Ratio Perm						0.06	0.01				c0.02	0.02
v/c Ratio	0.55	0.22		0.27	0.63	0.16	0.07	0.03			0.14	0.13
Uniform Delay, d1	19.0	5.8		29.1	17.1	13.9	23.1	22.9			23.4	23.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.10	1.50
Incremental Delay, d2	1.1	0.0		1.1	1.0	0.1	0.1	0.0			0.2	0.2
Delay (s)	20.1	5.8		30.1	18.1	14.0	23.2	22.9			25.9	35.2
Level of Service	C	A		C	B	B	C	C			C	D
Approach Delay (s)		10.3			17.6			23.1			33.8	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	66.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
58: Gibraltar Dr (S) & Hacienda

12/5/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	23	34	8	17	7	27	121	25	80	156	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.93			0.97		1.00	0.97		1.00	0.96	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3324			3470		1829	5097		1829	5010	
Flt Permitted		0.88			0.87		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		2956			3065		1829	5097		1829	5010	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.88	0.85	0.85	0.85	0.85
Adj. Flow (vph)	22	27	40	9	20	8	32	138	29	94	184	68
RTOR Reduction (vph)	0	32	0	0	6	0	0	18	0	0	37	0
Lane Group Flow (vph)	0	57	0	0	31	0	32	149	0	94	215	0
Confl. Peds. (#/hr)	20		20	20		20			20			20
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		4.0			4.0		0.9	8.5		3.7	11.3	
Effective Green, g (s)		6.0			6.0		1.9	11.5		4.7	14.3	
Actuated g/C Ratio		0.19			0.19		0.06	0.37		0.15	0.46	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		568			589		111	1879		276	2296	
v/s Ratio Prot							0.02	0.03		c0.05	c0.04	
v/s Ratio Perm		c0.02			0.01							
v/c Ratio		0.10			0.05		0.29	0.08		0.34	0.09	
Uniform Delay, d1		10.4			10.3		14.0	6.4		11.9	4.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.0		1.4	0.0		0.7	0.0	
Delay (s)		10.5			10.3		15.4	6.4		12.6	4.8	
Level of Service		B			B		B	A		B	A	
Approach Delay (s)		10.5			10.3			7.9			6.9	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	7.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	31.2	Sum of lost time (s)	9.0
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

12/5/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (veh/h)	5	5	5	15	5	20	125	12	396	71	5	32
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	6	6	6	19	6	25	0	15	495	89	0	40
Pedestrians		20			20				20			
Lane Width (ft)		13.0			13.0				13.0			
Walking Speed (ft/s)		4.0			4.0				4.0			
Percent Blockage		2			2				2			
Right turn flare (veh)												
Median type									None			
Median storage veh)												
Upstream signal (ft)									1264			
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	767	1075	219	861	1047	332	0	378			0	604
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	767	1075	219	861	1047	332	0	378			0	604
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	97	97	99	91	97	96	0	99			0	96
cM capacity (veh/h)	246	199	757	217	207	640	0	1156			0	952

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	19	25	25	15	330	254	40	217	141
Volume Left	6	19	0	15	0	0	40	0	0
Volume Right	6	0	25	0	0	89	0	0	32
cSH	288	214	640	1156	1700	1700	952	1700	1700
Volume to Capacity	0.07	0.12	0.04	0.01	0.19	0.15	0.04	0.13	0.08
Queue Length 95th (ft)	5	10	3	1	0	0	3	0	0
Control Delay (s)	18.4	24.0	10.9	8.2	0.0	0.0	8.9	0.0	0.0
Lane LOS	C	C	B	A			A		
Approach Delay (s)	18.4	17.4		0.2			0.9		
Approach LOS	C	C							

Intersection Summary				
Average Delay		1.6		
Intersection Capacity Utilization		46.6%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

12/5/2013

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	260	26
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.80	0.80
Hourly flow rate (vph)	325	32
Pedestrians	20	
Lane Width (ft)	13.0	
Walking Speed (ft/s)	4.0	
Percent Blockage	2	
Right turn flare (veh)		
Median type	None	
Median storage veh)		
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		

Direction, Lane #

SummerHill Apartments Project Traffic Impact Study
AM Peak Hour Buildout Conditions-No Project
Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis
12: Stoneridge & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	188	1230	53	6	511	54	16	201	24	72	228	247
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.95		1.00	0.91		0.97	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.91	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3547	3629		1829	5151		3547	3583		1829	4420	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3547	3629		1829	5151		3547	3583		1829	4420	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	198	1295	56	6	538	57	17	212	25	76	240	260
RTOR Reduction (vph)	0	2	0	0	8	0	0	8	0	0	168	0
Lane Group Flow (vph)	198	1349	0	6	587	0	17	229	0	76	332	0
Confl. Peds. (#/hr)			12			24			24			120
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	12.0	67.8		1.4	57.2		2.7	22.6		8.2	28.1	
Effective Green, g (s)	13.0	70.8		2.4	60.2		3.7	25.6		9.2	31.1	
Actuated g/C Ratio	0.11	0.59		0.02	0.50		0.03	0.21		0.08	0.26	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	384	2141		37	2584		109	764		140	1146	
v/s Ratio Prot	c0.06	c0.37		0.00	0.11		0.00	0.06		c0.04	c0.08	
v/s Ratio Perm												
v/c Ratio	0.52	0.63		0.16	0.23		0.16	0.30		0.54	0.29	
Uniform Delay, d1	50.5	16.1		57.8	16.8		56.6	39.7		53.4	35.6	
Progression Factor	1.24	0.30		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	1.1		2.1	0.2		0.7	0.2		4.2	0.1	
Delay (s)	63.8	6.0		59.9	17.0		57.3	39.9		57.6	35.7	
Level of Service	E	A		E	B		E	D		E	D	
Approach Delay (s)		13.4			17.4			41.1			38.6	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	21.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: W Las Positas & Hopyard

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	102	204	497	566	267	111	298	731	316	116	1443	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.94	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	5157	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	5157	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	106	212	518	590	278	116	310	761	329	121	1503	105
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	59
Lane Group Flow (vph)	106	212	518	590	278	116	310	761	329	121	1503	46
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	7.8	17.2	120.0	17.8	27.2	120.0	19.0	56.7	120.0	8.3	46.0	46.0
Effective Green, g (s)	8.8	20.2	120.0	18.8	30.2	120.0	20.0	59.7	120.0	9.3	49.0	49.0
Actuated g/C Ratio	0.07	0.17	1.00	0.16	0.25	1.00	0.17	0.50	1.00	0.08	0.41	0.41
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	260	616	1603	808	920	1613	591	2614	1615	275	2146	649
v/s Ratio Prot	0.03	c0.06		c0.11	0.08		c0.09	0.14		0.03	c0.29	
v/s Ratio Perm			c0.32			0.07			0.20			0.03
v/c Ratio	0.41	0.34	0.32	0.73	0.30	0.07	0.52	0.29	0.20	0.44	0.70	0.07
Uniform Delay, d1	53.1	44.1	0.0	48.2	36.4	0.0	45.7	17.7	0.0	52.9	29.4	21.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.40	1.86	1.00	1.03	0.67	0.17
Incremental Delay, d2	0.4	0.7	0.5	2.9	0.4	0.1	0.4	0.3	0.3	0.4	1.9	0.2
Delay (s)	53.5	44.8	0.5	51.1	36.8	0.1	64.1	33.2	0.3	55.0	21.7	3.8
Level of Service	D	D	A	D	D	A	E	C	A	D	C	A
Approach Delay (s)		18.5			41.1			32.3			22.9	
Approach LOS		B			D			C			C	

Intersection Summary			
HCM Average Control Delay	28.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: W Las Positas & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	692	1	2	539	44	29	52	1	195	18	151
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1829	5254		1829	3657	1636		1891	1606	1737	1756	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	0.96	1.00
Satd. Flow (perm)	1829	5254		1829	3657	1636		1891	1606	1737	1756	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	77	752	1	2	586	48	32	57	1	212	20	164
RTOR Reduction (vph)	0	0	0	0	0	32	0	0	1	0	0	123
Lane Group Flow (vph)	77	753	0	2	586	16	0	89	0	114	118	41
Confl. Peds. (#/hr)									3			1
Turn Type	Prot			Prot		Perm	Split		Perm	Split		Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases						6			4			3
Actuated Green, G (s)	6.9	27.2		0.8	21.1	21.1		7.2	7.2	14.9	14.9	14.9
Effective Green, g (s)	7.9	30.2		1.8	24.1	24.1		10.2	10.2	17.9	17.9	17.9
Actuated g/C Ratio	0.11	0.42		0.02	0.33	0.33		0.14	0.14	0.25	0.25	0.25
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	200	2201		46	1222	547		268	227	431	436	401
v/s Ratio Prot	c0.04	0.14		0.00	c0.16			c0.05		0.07	c0.07	
v/s Ratio Perm						0.01			0.00			0.03
v/c Ratio	0.39	0.34		0.04	0.48	0.03		0.33	0.00	0.26	0.27	0.10
Uniform Delay, d1	29.8	14.2		34.3	19.0	16.1		27.9	26.6	21.8	21.8	20.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.1		0.4	0.3	0.0		0.7	0.0	0.3	0.3	0.1
Delay (s)	31.1	14.3		34.7	19.3	16.2		28.6	26.6	22.1	22.2	21.0
Level of Service	C	B		C	B	B		C	C	C	C	C
Approach Delay (s)		15.9			19.1			28.6			21.7	
Approach LOS		B			B			C			C	

Intersection Summary				
HCM Average Control Delay	18.7	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.38			
Actuated Cycle Length (s)	72.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	41.9%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Stoneridge & W Las Positas

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	600	293	223	423	140	125	432	39	481	951	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1598	3547	3657	1578	3547	3657	1636	3547	3657	1620
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1598	3547	3657	1578	3547	3657	1636	3547	3657	1620
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	46	638	312	237	450	149	133	460	41	512	1012	69
RTOR Reduction (vph)	0	0	123	0	0	97	0	0	31	0	0	23
Lane Group Flow (vph)	46	638	189	237	450	52	133	460	10	512	1012	46
Confl. Peds. (#/hr)			12			24			36			12
Turn Type	Prot		Perm	Prot		Perm	Prot		custom	Prot		custom
Protected Phases	7	4		3	8		5	2	2	1	6	6
Permitted Phases			4			8			2			4
Actuated Green, G (s)	3.7	25.0	25.0	11.3	32.6	32.6	7.1	22.2	22.2	19.0	33.1	58.1
Effective Green, g (s)	4.7	28.0	26.0	12.3	35.6	33.6	8.1	24.2	24.2	20.0	36.1	64.1
Actuated g/C Ratio	0.05	0.29	0.27	0.13	0.37	0.35	0.08	0.25	0.25	0.21	0.37	0.66
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	5.0	5.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	173	1061	431	452	1349	549	298	917	410	735	1368	1076
v/s Ratio Prot	0.01	c0.17		c0.07	0.12		0.04	0.13	0.01	c0.14	c0.28	0.02
v/s Ratio Perm			0.12			0.03						0.01
v/c Ratio	0.27	0.60	0.44	0.52	0.33	0.09	0.45	0.50	0.03	0.70	0.74	0.04
Uniform Delay, d1	44.2	29.5	29.2	39.4	21.9	21.2	42.1	31.0	27.3	35.4	26.1	5.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	1.0	0.7	1.1	0.1	0.1	1.1	0.4	0.0	2.9	2.1	0.0
Delay (s)	45.1	30.4	29.9	40.5	22.1	21.3	43.1	31.4	27.3	38.3	28.3	5.6
Level of Service	D	C	C	D	C	C	D	C	C	D	C	A
Approach Delay (s)		30.9			27.1			33.6			30.5	
Approach LOS		C			C			C			C	

Intersection Summary				
HCM Average Control Delay	30.4	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	96.5	Sum of lost time (s)	9.0	
Intersection Capacity Utilization	72.7%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	570	11	2	566	49	50	6	23	90	4	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.88			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1829	5238		1829	3657	1636	1822	1674			1834	1609
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.69	1.00			0.71	1.00
Satd. Flow (perm)	1829	5238		1829	3657	1636	1326	1674			1368	1609
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	88	613	12	2	609	53	54	6	25	97	4	132
RTOR Reduction (vph)	0	3	0	0	0	30	0	19	0	0	0	102
Lane Group Flow (vph)	88	622	0	2	609	23	54	12	0	0	101	30
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	3.2	16.5		0.8	14.1	14.1	6.9	6.9			6.9	6.9
Effective Green, g (s)	4.2	19.5		1.8	17.1	17.1	8.9	8.9			8.9	8.9
Actuated g/C Ratio	0.11	0.50		0.05	0.44	0.44	0.23	0.23			0.23	0.23
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	196	2606		84	1595	714	301	380			311	365
v/s Ratio Prot	c0.05	0.12		0.00	c0.17			0.01				
v/s Ratio Perm						0.01	0.04				c0.07	0.02
v/c Ratio	0.45	0.24		0.02	0.38	0.03	0.18	0.03			0.32	0.08
Uniform Delay, d1	16.4	5.6		17.9	7.5	6.3	12.2	11.8			12.6	11.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.03	1.12
Incremental Delay, d2	1.6	0.0		0.1	0.2	0.0	0.3	0.0			0.6	0.1
Delay (s)	18.1	5.7		18.0	7.6	6.3	12.5	11.8			13.6	13.5
Level of Service	B	A		B	A	A	B	B			B	B
Approach Delay (s)		7.2			7.6			12.3			13.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	8.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	39.2	Sum of lost time (s)	9.0
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
58: Gibraltar Dr (S) & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	20	49	35	11	23	8	169	14	11	178	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.95		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3284			3346		1829	5184		1829	5191	
Flt Permitted		0.86			0.79		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		2878			2727		1829	5184		1829	5191	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	27	21	51	36	11	24	8	176	15	11	185	14
RTOR Reduction (vph)	0	39	0	0	18	0	0	10	0	0	9	0
Lane Group Flow (vph)	0	60	0	0	53	0	8	181	0	11	190	0
Confl. Peds. (#/hr)	20		20	20		20			20			20
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		4.3			4.3		0.6	6.8		0.7	6.9	
Effective Green, g (s)		6.3			6.3		1.6	9.8		1.7	9.9	
Actuated g/C Ratio		0.24			0.24		0.06	0.37		0.06	0.37	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		677			641		109	1896		116	1918	
v/s Ratio Prot							0.00	0.04		c0.01	c0.04	
v/s Ratio Perm		c0.02			0.02							
v/c Ratio		0.09			0.08		0.07	0.10		0.09	0.10	
Uniform Delay, d1		8.0			8.0		11.9	5.6		11.8	5.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.1		0.3	0.0		0.4	0.0	
Delay (s)		8.1			8.1		12.2	5.6		12.2	5.6	
Level of Service		A			A		B	A		B	A	
Approach Delay (s)		8.1			8.1			5.9			5.9	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	6.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.08		
Actuated Cycle Length (s)	26.8	Sum of lost time (s)	6.0
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (veh/h)	38	5	9	22	2	43	29	1	114	27	2	38
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	48	6	11	28	2	54	0	1	142	34	0	48
Pedestrians		20			20				20			
Lane Width (ft)		13.0			13.0				13.0			
Walking Speed (ft/s)		4.0			4.0				4.0			
Percent Blockage		2			2				2			
Right turn flare (veh)												
Median type									None			
Median storage veh)												
Upstream signal (ft)									1264			
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	562	612	194	456	604	128	0	328			0	196
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	562	612	194	456	604	128	0	328			0	196
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	86	98	99	94	99	94	0	100			0	96
cM capacity (veh/h)	349	378	786	433	382	866	0	1207			0	1349

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	65	30	54	1	95	81	48	192	115
Volume Left	48	28	0	1	0	0	48	0	0
Volume Right	11	0	54	0	0	34	0	0	19
cSH	389	428	866	1207	1700	1700	1349	1700	1700
Volume to Capacity	0.17	0.07	0.06	0.00	0.06	0.05	0.04	0.11	0.07
Queue Length 95th (ft)	15	6	5	0	0	0	3	0	0
Control Delay (s)	16.1	14.0	9.4	8.0	0.0	0.0	7.8	0.0	0.0
Lane LOS	C	B	A	A			A		
Approach Delay (s)	16.1	11.1		0.1			1.0		
Approach LOS	C	B							

Intersection Summary				
Average Delay		3.5		
Intersection Capacity Utilization		42.4%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

12/2/2013

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	231	15
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.80	0.80
Hourly flow rate (vph)	289	19
Pedestrians	20	
Lane Width (ft)	13.0	
Walking Speed (ft/s)	4.0	
Percent Blockage	2	
Right turn flare (veh)		
Median type	None	
Median storage veh)		
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		

Direction, Lane #

SummerHill Apartments Traffic Impact Study
PM Peak Hour Buildout Conditions-No Project
Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis
12: Stoneridge & Hacienda

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	237	539	31	40	1412	67	56	151	19	59	252	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.95		1.00	0.91		0.97	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.95	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3547	3621		1829	5206		3547	3580		1829	4767	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3547	3621		1829	5206		3547	3580		1829	4767	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	252	573	33	43	1502	71	60	161	20	63	268	114
RTOR Reduction (vph)	0	2	0	0	3	0	0	10	0	0	73	0
Lane Group Flow (vph)	252	604	0	43	1570	0	60	171	0	63	309	0
Confl. Peds. (#/hr)			12			24			24			120
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	13.8	63.9		7.1	57.2		6.3	20.7		8.3	22.7	
Effective Green, g (s)	14.8	66.9		8.1	60.2		7.3	23.7		9.3	25.7	
Actuated g/C Ratio	0.12	0.56		0.07	0.50		0.06	0.20		0.08	0.21	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	437	2019		123	2612		216	707		142	1021	
v/s Ratio Prot	c0.07	0.17		0.02	c0.30		0.02	0.05		c0.03	c0.06	
v/s Ratio Perm												
v/c Ratio	0.58	0.30		0.35	0.60		0.28	0.24		0.44	0.30	
Uniform Delay, d1	49.6	14.1		53.4	21.3		53.8	40.6		52.9	39.6	
Progression Factor	0.79	1.25		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.3		1.7	1.0		0.7	0.2		2.2	0.2	
Delay (s)	41.0	18.0		55.2	22.4		54.5	40.8		55.1	39.8	
Level of Service	D	B		E	C		D	D		E	D	
Approach Delay (s)		24.7			23.2			44.2			42.0	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	27.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: W Las Positas & Hopyard

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	393	453	512	418	81	477	1354	445	163	763	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.94	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	5157	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	5157	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	176	457	527	595	486	94	555	1574	517	190	887	103
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	74
Lane Group Flow (vph)	176	457	527	595	486	94	555	1574	517	190	887	29
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	9.6	21.9	120.0	17.0	29.3	120.0	30.0	52.4	120.0	8.7	31.1	31.1
Effective Green, g (s)	10.6	24.9	120.0	18.0	32.3	120.0	31.0	55.4	120.0	9.7	34.1	34.1
Actuated g/C Ratio	0.09	0.21	1.00	0.15	0.27	1.00	0.26	0.46	1.00	0.08	0.28	0.28
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	313	759	1603	774	984	1613	916	2426	1615	287	1493	452
v/s Ratio Prot	0.05	c0.12		c0.12	0.13		0.16	c0.30		c0.05	0.17	
v/s Ratio Perm			0.33			0.06			0.32			0.02
v/c Ratio	0.56	0.60	0.33	0.77	0.49	0.06	0.61	0.65	0.32	0.66	0.59	0.06
Uniform Delay, d1	52.5	43.1	0.0	49.0	37.0	0.0	39.1	24.8	0.0	53.6	37.0	31.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.76	0.69	1.00	0.87	0.63	0.69
Incremental Delay, d2	1.4	2.0	0.5	4.2	0.8	0.1	0.7	1.2	0.5	4.3	1.7	0.3
Delay (s)	53.9	45.1	0.5	53.2	37.8	0.1	30.6	18.2	0.5	50.9	24.9	21.8
Level of Service	D	D	A	D	D	A	C	B	A	D	C	C
Approach Delay (s)		26.2			42.6			17.4			28.8	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM Average Control Delay	26.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: W Las Positas & Hacienda

1/24/2014

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	27	105	437	40	8	1017	84	32	32	14	89	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Util. Factor		1.00	0.91		1.00	0.95	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	0.99		1.00	1.00	0.85	1.00	0.96		1.00	1.00
Flt Protected		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)		1829	5189		1829	3657	1636	1829	1830		1829	1925
Flt Permitted		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)		1829	5189		1829	3657	1636	1829	1830		1829	1925
Peak-hour factor, PHF	0.90	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	30	124	514	47	9	1196	99	38	38	16	105	8
RTOR Reduction (vph)	0	0	6	0	0	0	43	0	13	0	0	0
Lane Group Flow (vph)	0	154	555	0	9	1196	56	38	41	0	105	8
Confl. Peds. (#/hr)										3		
Turn Type	Prot	Prot			Prot		Perm	Prot			Prot	
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases							6					
Actuated Green, G (s)		9.5	48.9		1.1	40.5	40.5	9.8	14.2		12.5	16.9
Effective Green, g (s)		10.5	51.9		2.1	43.5	43.5	12.8	17.2		15.5	19.9
Actuated g/C Ratio		0.11	0.53		0.02	0.44	0.44	0.13	0.17		0.16	0.20
Clearance Time (s)		4.0	6.0		4.0	6.0	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		195	2729		39	1612	721	237	319		287	388
v/s Ratio Prot		c0.08	0.11		0.00	c0.33		0.02	c0.02		c0.06	0.00
v/s Ratio Perm							0.03					
v/c Ratio		0.79	0.20		0.23	0.74	0.08	0.16	0.13		0.37	0.02
Uniform Delay, d1		43.0	12.4		47.5	22.9	16.0	38.2	34.4		37.2	31.6
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		18.9	0.2		3.0	1.9	0.0	0.3	0.2		0.8	0.0
Delay (s)		61.9	12.6		50.5	24.8	16.0	38.5	34.6		38.0	31.6
Level of Service		E	B		D	C	B	D	C		D	C
Approach Delay (s)			23.2			24.3			36.2			34.6
Approach LOS			C			C			D			C

Intersection Summary			
HCM Average Control Delay	25.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	98.7	Sum of lost time (s)	15.0
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: W Las Positas & Hacienda

1/24/2014

Movement	SBR
Lane Configurations	
Volume (vph)	110
Ideal Flow (vphpl)	1900
Total Lost time (s)	3.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.99
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1615
Flt Permitted	1.00
Satd. Flow (perm)	1615
Peak-hour factor, PHF	0.85
Adj. Flow (vph)	129
RTOR Reduction (vph)	103
Lane Group Flow (vph)	26
Confl. Peds. (#/hr)	1
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	16.9
Effective Green, g (s)	19.9
Actuated g/C Ratio	0.20
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	326
v/s Ratio Prot	
v/s Ratio Perm	c0.02
v/c Ratio	0.08
Uniform Delay, d1	32.0
Progression Factor	1.00
Incremental Delay, d2	0.1
Delay (s)	32.1
Level of Service	C
Approach Delay (s)	
Approach LOS	

Intersection Summary

SummerHill Apartments Project Traffic Impact Study
AM Peak Hour Buildout Conditions plus Project
Synchro 7 - Report
W-Trans

HCM Signalized Intersection Capacity Analysis
18: Stoneridge & W Las Positas

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	505	227	184	1190	345	319	720	63	207	476	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1596	3547	3657	1574	3547	3657	1636	3547	3657	1613
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1596	3547	3657	1574	3547	3657	1636	3547	3657	1613
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	52	561	252	204	1322	383	354	800	70	230	529	57
RTOR Reduction (vph)	0	0	162	0	0	189	0	0	50	0	0	20
Lane Group Flow (vph)	52	561	90	204	1322	194	354	800	20	230	529	37
Confl. Peds. (#/hr)			12			24			36			12
Turn Type	Prot		Perm	Prot		Perm	Prot		custom	Prot		custom
Protected Phases	7	4		3	8		5	2	2	1	6	6
Permitted Phases			4			8			2			4
Actuated Green, G (s)	5.1	36.7	36.7	10.4	42.0	42.0	13.6	28.6	28.6	11.2	25.2	61.9
Effective Green, g (s)	6.1	39.7	37.7	11.4	45.0	43.0	14.6	30.6	30.6	12.2	28.2	67.9
Actuated g/C Ratio	0.06	0.37	0.36	0.11	0.42	0.41	0.14	0.29	0.29	0.12	0.27	0.64
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	5.0	5.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	204	1371	568	382	1554	639	489	1057	473	409	974	1034
v/s Ratio Prot	0.01	0.15		c0.06	c0.36		c0.10	c0.22	0.01	0.06	0.14	0.01
v/s Ratio Perm			0.06			0.12						0.01
v/c Ratio	0.25	0.41	0.16	0.53	0.85	0.30	0.72	0.76	0.04	0.56	0.54	0.04
Uniform Delay, d1	47.7	24.4	23.3	44.7	27.4	21.3	43.7	34.3	27.1	44.3	33.3	7.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.2	0.1	1.4	4.7	0.3	5.3	3.1	0.0	1.8	0.6	0.0
Delay (s)	48.4	24.6	23.4	46.2	32.1	21.6	49.0	37.4	27.1	46.1	33.9	7.0
Level of Service	D	C	C	D	C	C	D	D	C	D	C	A
Approach Delay (s)		25.7			31.5			40.2			35.5	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	33.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	105.9	Sum of lost time (s)	6.0
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	270	598	21	33	829	241	15	7	3	27	5	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.96	1.00
Satd. Flow (prot)	1829	5224		1829	3657	1636	1815	1820			1843	1604
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.73	1.00			0.80	1.00
Satd. Flow (perm)	1829	5224		1829	3657	1636	1399	1820			1532	1604
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.91	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	318	704	25	39	911	284	18	8	4	32	6	218
RTOR Reduction (vph)	0	2	0	0	0	167	0	3	0	0	0	181
Lane Group Flow (vph)	318	727	0	39	911	117	18	9	0	0	38	37
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	20.2	39.5		4.3	23.6	23.6	9.7	9.7			9.7	9.7
Effective Green, g (s)	21.2	42.5		5.3	26.6	26.6	11.7	11.7			11.7	11.7
Actuated g/C Ratio	0.31	0.62		0.08	0.39	0.39	0.17	0.17			0.17	0.17
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	566	3241		142	1420	635	239	311			262	274
v/s Ratio Prot	c0.17	0.14		0.02	c0.25			0.00				
v/s Ratio Perm						0.07	0.01				c0.02	0.02
v/c Ratio	0.56	0.22		0.27	0.64	0.18	0.08	0.03			0.15	0.14
Uniform Delay, d1	19.8	5.7		29.8	17.1	13.8	23.9	23.7			24.1	24.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.09	1.49
Incremental Delay, d2	1.3	0.0		1.1	1.0	0.1	0.1	0.0			0.3	0.2
Delay (s)	21.0	5.8		30.8	18.1	13.9	24.0	23.7			26.6	36.1
Level of Service	C	A		C	B	B	C	C			C	D
Approach Delay (s)		10.4			17.5			23.9			34.7	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	68.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
58: Gibraltar Dr (S) & Hacienda

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	23	43	8	17	7	27	129	25	80	156	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.97		1.00	0.98		1.00	0.96	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3293			3470		1829	5105		1829	5010	
Flt Permitted		0.89			0.87		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		2948			3056		1829	5105		1829	5010	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.88	0.85	0.85	0.85	0.85
Adj. Flow (vph)	22	27	51	9	20	8	32	147	29	94	184	68
RTOR Reduction (vph)	0	41	0	0	6	0	0	18	0	0	37	0
Lane Group Flow (vph)	0	59	0	0	31	0	32	158	0	94	215	0
Confl. Peds. (#/hr)	20		20	20		20			20			20
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		4.0			4.0		0.9	8.6		3.7	11.4	
Effective Green, g (s)		6.0			6.0		1.9	11.6		4.7	14.4	
Actuated g/C Ratio		0.19			0.19		0.06	0.37		0.15	0.46	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		565			586		111	1892		275	2305	
v/s Ratio Prot							0.02	0.03		c0.05	c0.04	
v/s Ratio Perm		c0.02			0.01							
v/c Ratio		0.10			0.05		0.29	0.08		0.34	0.09	
Uniform Delay, d1		10.4			10.3		14.1	6.4		11.9	4.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.0		1.4	0.0		0.7	0.0	
Delay (s)		10.5			10.4		15.5	6.4		12.7	4.8	
Level of Service		B			B		B	A		B	A	
Approach Delay (s)		10.5			10.4			7.8			6.9	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	7.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	31.3	Sum of lost time (s)	9.0
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (veh/h)	5	5	5	15	5	20	128	12	400	80	5	32
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	6	6	6	19	6	25	0	15	500	100	0	40
Pedestrians		20			20				20			
Lane Width (ft)		13.0			13.0				13.0			
Walking Speed (ft/s)		4.0			4.0				4.0			
Percent Blockage		2			2				2			
Right turn flare (veh)												
Median type									None			
Median storage veh)												
Upstream signal (ft)									1264			
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	769	1091	219	872	1058	340	0	378			0	620
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	769	1091	219	872	1058	340	0	378			0	620
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	97	97	99	91	97	96	0	99			0	96
cM capacity (veh/h)	245	194	757	213	204	632	0	1156			0	939

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	19	25	25	15	333	267	40	217	141
Volume Left	6	19	0	15	0	0	40	0	0
Volume Right	6	0	25	0	0	100	0	0	32
cSH	284	210	632	1156	1700	1700	939	1700	1700
Volume to Capacity	0.07	0.12	0.04	0.01	0.20	0.16	0.04	0.13	0.08
Queue Length 95th (ft)	5	10	3	1	0	0	3	0	0
Control Delay (s)	18.5	24.4	10.9	8.2	0.0	0.0	9.0	0.0	0.0
Lane LOS	C	C	B	A			A		
Approach Delay (s)	18.5	17.7		0.2			0.9		
Approach LOS	C	C							

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

1/24/2014

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	260	26
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.80	0.80
Hourly flow rate (vph)	325	32
Pedestrians	20	
Lane Width (ft)	13.0	
Walking Speed (ft/s)	4.0	
Percent Blockage	2	
Right turn flare (veh)		
Median type	None	
Median storage veh)		
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		
Direction, Lane #		

HCM Signalized Intersection Capacity Analysis
12: Stoneridge & Hacienda

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	188	1230	64	6	511	54	24	204	24	72	234	247
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	0.97	0.95		1.00	0.91		0.97	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.91	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3547	3624		1829	5151		3547	3584		1829	4429	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3547	3624		1829	5151		3547	3584		1829	4429	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	198	1295	67	6	538	57	25	215	25	76	246	260
RTOR Reduction (vph)	0	2	0	0	8	0	0	8	0	0	169	0
Lane Group Flow (vph)	198	1360	0	6	587	0	25	232	0	76	337	0
Confl. Peds. (#/hr)			12			24			24			120
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	12.0	68.6		1.4	58.0		4.1	21.8		8.2	25.9	
Effective Green, g (s)	13.0	71.6		2.4	61.0		5.1	24.8		9.2	28.9	
Actuated g/C Ratio	0.11	0.60		0.02	0.51		0.04	0.21		0.08	0.24	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	384	2162		37	2618		151	741		140	1067	
v/s Ratio Prot	c0.06	c0.38		0.00	0.11		0.01	0.06		c0.04	c0.08	
v/s Ratio Perm												
v/c Ratio	0.52	0.63		0.16	0.22		0.17	0.31		0.54	0.32	
Uniform Delay, d1	50.5	15.6		57.8	16.4		55.4	40.4		53.4	37.4	
Progression Factor	1.24	0.31		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	1.1		2.1	0.2		0.5	0.2		4.2	0.2	
Delay (s)	63.8	5.9		59.9	16.6		55.9	40.6		57.6	37.6	
Level of Service	E	A		E	B		E	D		E	D	
Approach Delay (s)		13.3			17.0			42.1			40.2	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: W Las Positas & Hopyard

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	102	208	497	576	269	115	298	731	334	127	1443	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.94	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	5157	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	5157	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	106	217	518	600	280	120	310	761	348	132	1503	105
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	59
Lane Group Flow (vph)	106	217	518	600	280	120	310	761	348	132	1503	46
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	7.8	17.3	120.0	18.0	27.5	120.0	19.0	56.1	120.0	8.6	45.7	45.7
Effective Green, g (s)	8.8	20.3	120.0	19.0	30.5	120.0	20.0	59.1	120.0	9.6	48.7	48.7
Actuated g/C Ratio	0.07	0.17	1.00	0.16	0.25	1.00	0.17	0.49	1.00	0.08	0.41	0.41
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	260	619	1603	817	929	1613	591	2588	1615	284	2133	645
v/s Ratio Prot	0.03	c0.06		c0.12	0.08		c0.09	0.14		0.04	c0.29	
v/s Ratio Perm			c0.32			0.07			0.22			0.03
v/c Ratio	0.41	0.35	0.32	0.73	0.30	0.07	0.52	0.29	0.22	0.46	0.70	0.07
Uniform Delay, d1	53.1	44.0	0.0	48.1	36.1	0.0	45.7	18.1	0.0	52.7	29.7	21.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.40	1.85	1.00	1.03	0.68	0.17
Incremental Delay, d2	0.4	0.7	0.5	3.0	0.4	0.1	0.4	0.3	0.3	0.4	1.9	0.2
Delay (s)	53.5	44.7	0.5	51.1	36.5	0.1	64.1	33.6	0.3	54.9	22.0	3.9
Level of Service	D	D	A	D	D	A	E	C	A	D	C	A
Approach Delay (s)		18.6			40.9			32.1			23.4	
Approach LOS		B			D			C			C	

Intersection Summary			
HCM Average Control Delay	28.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: W Las Positas & Hacienda

1/24/2014

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	7	76	698	12	23	539	44	39	58	7	195	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Util. Factor		1.00	0.91		1.00	0.95	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	1.00		1.00	1.00	0.85	1.00	0.98		1.00	1.00
Flt Protected		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)		1829	5242		1829	3657	1636	1829	1889		1829	1925
Flt Permitted		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)		1829	5242		1829	3657	1636	1829	1889		1829	1925
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	83	759	13	25	586	48	42	63	8	212	38
RTOR Reduction (vph)	0	0	1	0	0	0	33	0	5	0	0	0
Lane Group Flow (vph)	0	91	771	0	25	586	15	42	66	0	212	38
Confl. Peds. (#/hr)										3		
Turn Type	Prot	Prot			Prot		Perm	Prot			Prot	
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases							6					
Actuated Green, G (s)		5.2	24.7		1.9	21.4	21.4	8.8	10.7		17.0	18.9
Effective Green, g (s)		6.2	27.7		2.9	24.4	24.4	11.8	13.7		20.0	21.9
Actuated g/C Ratio		0.08	0.36		0.04	0.32	0.32	0.15	0.18		0.26	0.29
Clearance Time (s)		4.0	6.0		4.0	6.0	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		149	1903		70	1169	523	283	339		479	553
v/s Ratio Prot		c0.05	0.15		0.01	c0.16		0.02	c0.03		c0.12	0.02
v/s Ratio Perm							0.01					
v/c Ratio		0.61	0.41		0.36	0.50	0.03	0.15	0.19		0.44	0.07
Uniform Delay, d1		33.9	18.1		35.8	21.0	17.8	27.9	26.6		23.5	19.8
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		7.2	0.1		3.1	0.3	0.0	0.2	0.3		0.7	0.1
Delay (s)		41.1	18.3		38.9	21.4	17.8	28.1	26.9		24.2	19.8
Level of Service		D	B		D	C	B	C	C		C	B
Approach Delay (s)			20.7			21.8			27.4			22.7
Approach LOS			C			C			C			C

Intersection Summary			
HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	76.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: W Las Positas & Hacienda

1/24/2014

Movement	SBR
Lane Configurations	
Volume (vph)	151
Ideal Flow (vphpl)	1900
Total Lost time (s)	3.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.99
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1615
Flt Permitted	1.00
Satd. Flow (perm)	1615
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	164
RTOR Reduction (vph)	121
Lane Group Flow (vph)	43
Confl. Peds. (#/hr)	1
Turn Type	custom
Protected Phases	
Permitted Phases	7
Actuated Green, G (s)	17.0
Effective Green, g (s)	20.0
Actuated g/C Ratio	0.26
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	423
v/s Ratio Prot	
v/s Ratio Perm	0.03
v/c Ratio	0.10
Uniform Delay, d1	21.3
Progression Factor	1.00
Incremental Delay, d2	0.1
Delay (s)	21.4
Level of Service	C
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
18: Stoneridge & W Las Positas

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	600	293	234	423	140	125	438	45	481	962	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	5.0	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1598	3547	3657	1578	3547	3657	1636	3547	3657	1620
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1598	3547	3657	1578	3547	3657	1636	3547	3657	1620
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	46	638	312	249	450	149	133	466	48	512	1023	69
RTOR Reduction (vph)	0	0	121	0	0	97	0	0	36	0	0	23
Lane Group Flow (vph)	46	638	191	249	450	52	133	466	12	512	1023	46
Confl. Peds. (#/hr)			12			24			36			12
Turn Type	Prot		Perm	Prot		Perm	Prot		custom	Prot		custom
Protected Phases	7	4		3	8		5	2	2	1	6	6
Permitted Phases			4			8			2			4
Actuated Green, G (s)	3.7	25.1	25.1	11.5	32.9	32.9	7.1	22.5	22.5	19.0	33.4	58.5
Effective Green, g (s)	4.7	28.1	26.1	12.5	35.9	33.9	8.1	24.5	24.5	20.0	36.4	64.5
Actuated g/C Ratio	0.05	0.29	0.27	0.13	0.37	0.35	0.08	0.25	0.25	0.21	0.37	0.66
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	5.0	5.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	172	1058	430	457	1352	551	296	923	413	731	1371	1076
v/s Ratio Prot	0.01	c0.17		c0.07	0.12		0.04	0.13	0.01	c0.14	c0.28	0.02
v/s Ratio Perm			0.12			0.03						0.01
v/c Ratio	0.27	0.60	0.44	0.54	0.33	0.09	0.45	0.50	0.03	0.70	0.75	0.04
Uniform Delay, d1	44.5	29.7	29.5	39.6	22.0	21.3	42.4	31.1	27.3	35.8	26.3	5.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	1.0	0.7	1.3	0.1	0.1	1.1	0.4	0.0	3.0	2.3	0.0
Delay (s)	45.4	30.7	30.2	41.0	22.1	21.3	43.5	31.5	27.4	38.8	28.6	5.6
Level of Service	D	C	C	D	C	C	D	C	C	D	C	A
Approach Delay (s)		31.2			27.5			33.7			30.9	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	30.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	97.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	603	11	2	582	49	50	6	23	90	4	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.88			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1829	5238		1829	3657	1636	1822	1674			1834	1609
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.69	1.00			0.71	1.00
Satd. Flow (perm)	1829	5238		1829	3657	1636	1326	1674			1368	1609
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	88	648	12	2	626	53	54	6	25	97	4	132
RTOR Reduction (vph)	0	3	0	0	0	30	0	19	0	0	0	102
Lane Group Flow (vph)	88	657	0	2	626	23	54	12	0	0	101	30
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	3.2	16.6		0.8	14.2	14.2	6.9	6.9			6.9	6.9
Effective Green, g (s)	4.2	19.6		1.8	17.2	17.2	8.9	8.9			8.9	8.9
Actuated g/C Ratio	0.11	0.50		0.05	0.44	0.44	0.23	0.23			0.23	0.23
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	195	2612		84	1601	716	300	379			310	364
v/s Ratio Prot	c0.05	0.13		0.00	c0.17			0.01				
v/s Ratio Perm						0.01	0.04				c0.07	0.02
v/c Ratio	0.45	0.25		0.02	0.39	0.03	0.18	0.03			0.33	0.08
Uniform Delay, d1	16.5	5.6		17.9	7.5	6.3	12.3	11.8			12.7	12.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.03	1.12
Incremental Delay, d2	1.7	0.1		0.1	0.2	0.0	0.3	0.0			0.6	0.1
Delay (s)	18.1	5.7		18.0	7.7	6.3	12.5	11.9			13.7	13.5
Level of Service	B	A		B	A	A	B	B			B	B
Approach Delay (s)		7.2			7.6			12.3			13.6	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	39.3	Sum of lost time (s)	9.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
58: Gibraltar Dr (S) & Hacienda

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	20	49	35	11	23	8	180	14	11	195	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		0.95			0.95		1.00	0.91		1.00	0.91	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.92			0.95		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3284			3346		1829	5188		1829	5197	
Flt Permitted		0.86			0.79		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		2875			2723		1829	5188		1829	5197	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	27	21	51	36	11	24	8	188	15	11	203	14
RTOR Reduction (vph)	0	39	0	0	18	0	0	9	0	0	9	0
Lane Group Flow (vph)	0	60	0	0	53	0	8	194	0	11	208	0
Confl. Peds. (#/hr)	20		20	20		20			20			20
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4								
Actuated Green, G (s)		4.2			4.2		0.6	6.9		0.7	7.0	
Effective Green, g (s)		6.2			6.2		1.6	9.9		1.7	10.0	
Actuated g/C Ratio		0.23			0.23		0.06	0.37		0.06	0.37	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		665			630		109	1916		116	1939	
v/s Ratio Prot							0.00	0.04		c0.01	c0.04	
v/s Ratio Perm		c0.02			0.02							
v/c Ratio		0.09			0.08		0.07	0.10		0.09	0.11	
Uniform Delay, d1		8.1			8.1		11.9	5.5		11.8	5.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.1		0.3	0.0		0.4	0.0	
Delay (s)		8.1			8.1		12.2	5.6		12.2	5.5	
Level of Service		A			A		B	A		B	A	
Approach Delay (s)		8.1			8.1			5.8			5.8	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	6.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.09		
Actuated Cycle Length (s)	26.8	Sum of lost time (s)	6.0
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (veh/h)	38	5	9	22	2	43	29	1	114	27	2	38
Sign Control		Stop			Stop				Free			
Grade		0%			0%				0%			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	48	6	11	28	2	54	0	1	142	34	0	48
Pedestrians		20			20				20			
Lane Width (ft)		13.0			13.0				13.0			
Walking Speed (ft/s)		4.0			4.0				4.0			
Percent Blockage		2			2				2			
Right turn flare (veh)												
Median type									None			
Median storage veh)												
Upstream signal (ft)									1264			
pX, platoon unblocked							0.00				0.00	
vC, conflicting volume	562	612	194	456	604	128	0	328			0	196
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	562	612	194	456	604	128	0	328			0	196
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	0.0	4.1			0.0	4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			0.0	2.2
p0 queue free %	86	98	99	94	99	94	0	100			0	96
cM capacity (veh/h)	349	378	786	433	382	866	0	1207			0	1349

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	65	30	54	1	95	81	48	192	115
Volume Left	48	28	0	1	0	0	48	0	0
Volume Right	11	0	54	0	0	34	0	0	19
cSH	389	428	866	1207	1700	1700	1349	1700	1700
Volume to Capacity	0.17	0.07	0.06	0.00	0.06	0.05	0.04	0.11	0.07
Queue Length 95th (ft)	15	6	5	0	0	0	3	0	0
Control Delay (s)	16.1	14.0	9.4	8.0	0.0	0.0	7.8	0.0	0.0
Lane LOS	C	B	A	A			A		
Approach Delay (s)	16.1	11.1		0.1			1.0		
Approach LOS	C	B							

Intersection Summary			
Average Delay		3.5	
Intersection Capacity Utilization		42.4%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
946: Gibraltar Dr (S) & Willow

1/24/2014

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	231	15
Sign Control	Free	
Grade	0%	
Peak Hour Factor	0.80	0.80
Hourly flow rate (vph)	289	19
Pedestrians	20	
Lane Width (ft)	13.0	
Walking Speed (ft/s)	4.0	
Percent Blockage	2	
Right turn flare (veh)		
Median type	None	
Median storage veh)		
Upstream signal (ft)		
pX, platoon unblocked		
vC, conflicting volume		
vC1, stage 1 conf vol		
vC2, stage 2 conf vol		
vCu, unblocked vol		
tC, single (s)		
tC, 2 stage (s)		
tF (s)		
p0 queue free %		
cM capacity (veh/h)		

Direction, Lane #

SummerHill Apartments Traffic Impact Study
PM Peak Hour Buildout Conditions plus Project
Synchro 7 - Report
W-Trans

Appendix B

Queuing Calculations

Queuing and Blocking Report
AM Peak Hour Existing plus Approved Project Conditions-No Project

12/3/2013

Intersection: 17: W Las Positas & Hacienda

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	TR	L	T	T	R	LT	R	L	LT
Maximum Queue (ft)	86	51	47	85	19	199	220	30	37	21	29	28
Average Queue (ft)	49	27	22	44	6	135	156	16	19	5	14	14
95th Queue (ft)	94	67	67	98	25	240	248	39	48	28	36	38
Link Distance (ft)		581	581	581		2482	2482	2482	182		704	704
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300				150					35		
Storage Blk Time (%)						5			5	0		
Queuing Penalty (veh)						0			0	0		

Intersection: 17: W Las Positas & Hacienda

Movement	SB
Directions Served	R
Maximum Queue (ft)	57
Average Queue (ft)	36
95th Queue (ft)	67
Link Distance (ft)	704
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
PM Peak Hour Existing plus Approved Projects Conditions-No Project

12/3/2013

Intersection: 17: W Las Positas & Hacienda

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	TR	T	T	R	LT	R	L	LT	R
Maximum Queue (ft)	91	91	90	126	122	131	31	29	1	63	84	55
Average Queue (ft)	52	56	54	85	71	84	16	12	0	39	55	33
95th Queue (ft)	102	103	104	147	136	148	39	32	2	67	94	59
Link Distance (ft)		581	581	581	2482	2482	2482	182		704	704	704
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300								35			
Storage Blk Time (%)					1			3				
Queuing Penalty (veh)					0			0				

Queuing and Blocking Report
AM Peak Hour Existing plus Approved Project Conditions plus Project

1/24/2014

Intersection: 17: W Las Positas & Hacienda

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	TR	L	T	T	R	L	TR	L	T
Maximum Queue (ft)	105	51	50	87	4	188	207	29	30	41	67	22
Average Queue (ft)	71	30	26	47	1	115	143	17	15	20	39	4
95th Queue (ft)	124	61	62	98	8	208	229	39	37	51	74	21
Link Distance (ft)		581	581	581		2482	2482	2482	182	182	704	704
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300				150							
Storage Blk Time (%)						2						
Queuing Penalty (veh)						0						

Intersection: 17: W Las Positas & Hacienda

Movement	SB
Directions Served	R
Maximum Queue (ft)	46
Average Queue (ft)	32
95th Queue (ft)	53
Link Distance (ft)	704
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
PM Peak Hour Existing plus Approved Projects Conditions plus Project

1/24/2014

Intersection: 17: W Las Positas & Hacienda

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	TR	L	T	T	R	L	TR	L	T
Maximum Queue (ft)	106	88	113	122	24	133	143	36	21	37	146	55
Average Queue (ft)	63	51	71	90	13	71	87	14	9	18	96	20
95th Queue (ft)	127	96	122	136	34	137	150	41	25	47	181	59
Link Distance (ft)		581	581	581		2482	2482	2482	182	182	704	704
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300				150							
Storage Blk Time (%)						0						
Queuing Penalty (veh)						0						

Intersection: 17: W Las Positas & Hacienda

Movement	SB
Directions Served	R
Maximum Queue (ft)	82
Average Queue (ft)	44
95th Queue (ft)	88
Link Distance (ft)	704
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
AM Peak Hour Buildout Conditions-No Project

12/3/2013

Intersection: 17: W Las Positas & Hacienda

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	TR	L	T	T	R	LT	R	L	LT
Maximum Queue (ft)	90	71	66	90	18	220	257	46	21	3	40	47
Average Queue (ft)	57	33	30	52	5	134	158	22	7	1	19	23
95th Queue (ft)	104	81	76	110	23	268	291	54	28	4	46	53
Link Distance (ft)		581	581	581		2482	2482	2482	182		704	704
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300				150					35		
Storage Blk Time (%)						5			2			
Queuing Penalty (veh)						0			0			

Intersection: 17: W Las Positas & Hacienda

Movement	SB
Directions Served	R
Maximum Queue (ft)	47
Average Queue (ft)	29
95th Queue (ft)	51
Link Distance (ft)	704
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
PM Peak Hour Buildout Conditions-No Project

12/3/2013

Intersection: 17: W Las Positas & Hacienda

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	TR	L	T	T	R	LT	R	L	LT
Maximum Queue (ft)	108	106	122	139	4	112	128	38	55	1	75	76
Average Queue (ft)	58	63	70	94	1	84	98	23	28	0	47	48
95th Queue (ft)	118	125	129	148	8	137	152	46	60	1	81	83
Link Distance (ft)		581	581	581		2482	2482	2482	182		704	704
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300				150					35		
Storage Blk Time (%)						1			9			
Queuing Penalty (veh)						0			0			

Intersection: 17: W Las Positas & Hacienda

Movement	SB
Directions Served	R
Maximum Queue (ft)	48
Average Queue (ft)	35
95th Queue (ft)	60
Link Distance (ft)	704
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
AM Peak Hour Buildout Conditions plus Project

1/24/2014

Intersection: 17: W Las Positas & Hacienda

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	TR	L	T	T	R	L	TR	L	T
Maximum Queue (ft)	127	55	48	61	24	260	312	41	43	64	62	22
Average Queue (ft)	87	28	21	41	9	146	182	22	19	27	41	8
95th Queue (ft)	149	67	53	75	27	292	334	47	48	74	68	28
Link Distance (ft)		581	581	581		2482	2482	2482	182	182	704	704
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300				150							
Storage Blk Time (%)						5						
Queuing Penalty (veh)						0						

Intersection: 17: W Las Positas & Hacienda

Movement	SB
Directions Served	R
Maximum Queue (ft)	65
Average Queue (ft)	35
95th Queue (ft)	75
Link Distance (ft)	704
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
PM Peak Hour Buildout Conditions plus Project

1/24/2014

Intersection: 17: W Las Positas & Hacienda

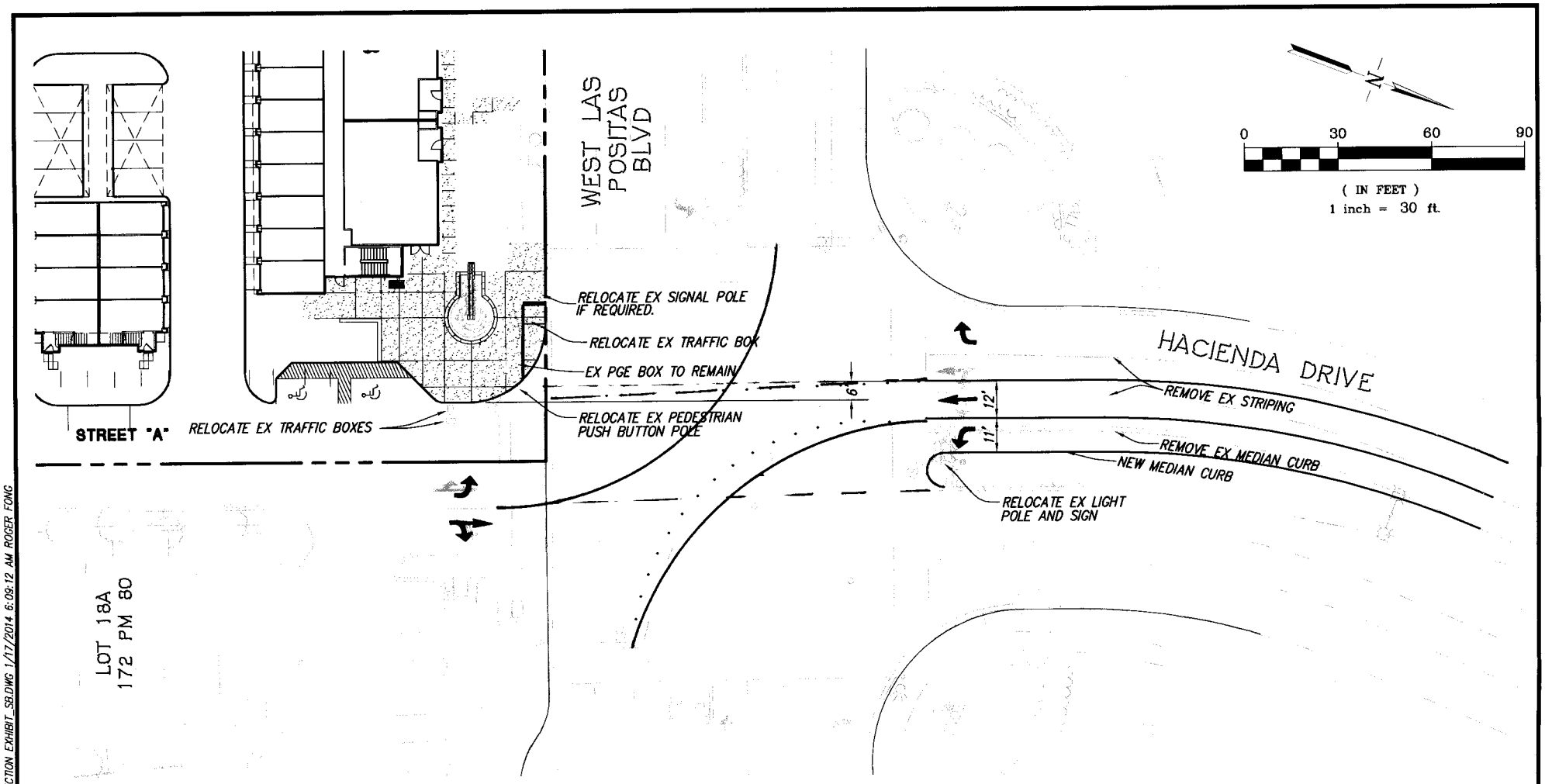
Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	TR	L	T	T	R	L	TR	L	T
Maximum Queue (ft)	86	121	124	143	15	135	152	26	39	62	119	41
Average Queue (ft)	50	70	82	101	9	88	100	12	19	27	71	23
95th Queue (ft)	94	130	139	160	28	166	177	36	46	65	136	53
Link Distance (ft)		581	581	581		2482	2482	2482	182	182	704	704
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300				150							
Storage Blk Time (%)						1						
Queuing Penalty (veh)						0						

Intersection: 17: W Las Positas & Hacienda

Movement	SB
Directions Served	R
Maximum Queue (ft)	53
Average Queue (ft)	35
95th Queue (ft)	57
Link Distance (ft)	704
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Appendix C

West Las Positas Boulevard/Hacienda Drive
Intersection Exhibit



INTERSECTION EXHIBIT
5850 WEST LAS POSITAS BLVD
CIYT OF PLEASANTON, ALAMEDA COUNTY, CALIFORNIA

RJA
RUGGERI-JENSEN-AZAR
ENGINEERS • PLANNERS • SURVEYORS
4690 CHABOT DRIVE, SUITE 200 PLEASANTON, CA 94588
PHONE: (925) 227-9100 FAX: (925) 227-9300

DATE: JANUARY 16, 2014 JOB NO. 131045 SHEET 1 OF 1

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Appendix D

Collision Rate Calculations

Intersection Collision Rate Calculaions

SummerHill Apartments Project

Intersection # 1: Stoneridge Dr & Hacienda Dr

Date of Count: February, 2012

Number of Collisions: 12
Number of Injuries: 5
Number of Fatalities: 0
ADT: 21900
Start Date: January 1, 2007
End Date: December 31, 2011
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{12 \times 1{,}000{,}000}{21{,}900 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.30 c/mve**	**0.0%**	**41.7%**
Statewide Average*	**0.36 c/mve**	**0.5%**	**39.5%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2009 Collision Data on California State Highways, Caltrans

Intersection # 2: Willow Rd & Gibraltar Dr (south)

Date of Count: November, 2013

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
ADT: 10900
Start Date: January 1, 2007
End Date: December 31, 2011
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Stop & Yield Controls
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{0 \times 1{,}000{,}000}{10{,}900 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.15 c/mve**	**0.8%**	**39.5%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2009 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

SummerHill Apartments Project

Intersection # 3: Hacienda Dr & Gibraltar Dr (south)

Date of Count: February, 2012

Number of Collisions: 2
Number of Injuries: 1
Number of Fatalities: 0
ADT: 4500
Start Date: January 1, 2007
End Date: December 31, 2011
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{2 \times 1{,}000{,}000}{4{,}500 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.24 c/mve**	**0.0%**	**50.0%**
Statewide Average*	**0.36 c/mve**	**0.5%**	**39.5%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2009 Collision Data on California State Highways, Caltrans

Intersection # 4: West Las Positas Blvd & Hopyard Rd

Date of Count: February, 2012

Number of Collisions: 10
Number of Injuries: 6
Number of Fatalities: 0
ADT: 43900
Start Date: January 1, 2007
End Date: December 31, 2011
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{10 \times 1{,}000{,}000}{43{,}900 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.12 c/mve**	**0.0%**	**60.0%**
Statewide Average*	**0.36 c/mve**	**0.5%**	**39.5%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2009 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

SummerHill Apartments Project

Intersection # 5: West Las Positas Blvd & Willow Rd

Date of Count: February, 2012

Number of Collisions: 4
Number of Injuries: 3
Number of Fatalities: 0
ADT: 14000
Start Date: January 1, 2007
End Date: December 31, 2011
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{4 \times 1{,}000{,}000}{14{,}000 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.16 c/mve**	**0.0%**	**75.0%**
Statewide Average*	**0.36 c/mve**	**0.5%**	**39.5%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2009 Collision Data on California State Highways, Caltrans

Intersection # 6: West Las Positas Blvd & Hacienda Dr

Date of Count: February, 2012

Number of Collisions: 3
Number of Injuries: 2
Number of Fatalities: 0
ADT: 12000
Start Date: January 1, 2007
End Date: December 31, 2011
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{3 \times 1{,}000{,}000}{12{,}000 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.14 c/mve**	**0.0%**	**66.7%**
Statewide Average*	**0.36 c/mve**	**0.5%**	**39.5%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2009 Collision Data on California State Highways, Caltrans

Intersection # 7: West Las Positas Blvd & Stoneridge Dr

Date of Count: February, 2012

Number of Collisions: 12
Number of Injuries: 7
Number of Fatalities: 0
ADT: 25800
Start Date: January 1, 2007
End Date: December 31, 2011
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Urban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{12 \times 1{,}000{,}000}{25{,}800 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.25 c/mve**	**0.0%**	**58.3%**
Statewide Average*	**0.36 c/mve**	**0.5%**	**39.5%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2009 Collision Data on California State Highways, Caltrans

Appendix E

Intersection Level of Service Calculations
(School Analysis)

HCM Signalized Intersection Capacity Analysis
35: W Las Positas & Hopyard

12/5/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	138	370	400	228	331	32	438	1169	327	151	642	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	150	402	435	248	360	35	476	1271	355	164	698	67
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	36
Lane Group Flow (vph)	150	402	435	248	360	35	476	1271	355	164	698	31
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	9.0	20.2	120.0	12.8	24.0	120.0	14.0	58.6	120.0	8.4	53.0	53.0
Effective Green, g (s)	10.0	23.2	120.0	13.8	27.0	120.0	15.0	61.6	120.0	9.4	56.0	56.0
Actuated g/C Ratio	0.08	0.19	1.00	0.12	0.22	1.00	0.12	0.51	1.00	0.08	0.47	0.47
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	296	707	1603	408	823	1613	443	2698	1615	278	2452	742
v/s Ratio Prot	0.04	c0.11		c0.07	0.10		c0.13	c0.24		c0.05	0.13	
v/s Ratio Perm			0.27			0.02			0.22			0.02
v/c Ratio	0.51	0.57	0.27	0.61	0.44	0.02	1.07	0.47	0.22	0.59	0.28	0.04
Uniform Delay, d1	52.6	43.9	0.0	50.5	40.0	0.0	52.5	18.7	0.0	53.4	19.7	17.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.76	0.47	1.00	1.25	0.65	0.84
Incremental Delay, d2	0.5	1.7	0.4	1.8	0.8	0.0	60.8	0.5	0.3	2.1	0.3	0.1
Delay (s)	53.1	45.6	0.4	52.3	40.8	0.0	100.7	9.3	0.3	69.0	13.0	14.7
Level of Service	D	D	A	D	D	A	F	A	A	E	B	B
Approach Delay (s)		26.8			43.0			28.4			23.0	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

12/5/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	263	405	15	19	473	141	9	4	0	29	14	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1829	5223		1829	3657	1636	1817	1925			1859	1605
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.72	1.00			0.83	1.00
Satd. Flow (perm)	1829	5223		1829	3657	1636	1379	1925			1601	1605
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	333	513	19	24	599	178	11	5	0	37	18	200
RTOR Reduction (vph)	0	2	0	0	0	122	0	0	0	0	0	162
Lane Group Flow (vph)	333	530	0	24	599	56	11	5	0	0	55	38
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	20.8	34.8		2.4	16.4	16.4	9.9	9.9			9.9	9.9
Effective Green, g (s)	21.8	37.8		3.4	19.4	19.4	11.9	11.9			11.9	11.9
Actuated g/C Ratio	0.35	0.61		0.05	0.31	0.31	0.19	0.19			0.19	0.19
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	642	3179		100	1142	511	264	369			307	308
v/s Ratio Prot	c0.18	0.10		0.01	c0.16			0.00				
v/s Ratio Perm						0.03	0.01				c0.03	0.02
v/c Ratio	0.52	0.17		0.24	0.52	0.11	0.04	0.01			0.18	0.12
Uniform Delay, d1	16.0	5.3		28.1	17.6	15.2	20.5	20.3			21.0	20.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.12	1.61
Incremental Delay, d2	0.7	0.0		1.2	0.4	0.1	0.1	0.0			0.3	0.2
Delay (s)	16.7	5.3		29.4	18.0	15.3	20.5	20.4			23.8	33.7
Level of Service	B	A		C	B	B	C	C			C	C
Approach Delay (s)		9.7			17.7			20.5			31.6	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	62.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
59: W Las Positas & Hacienda

12/5/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	333	7	2	553	42	2	0	0	56	14	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.95		0.95	0.97	1.00
Satd. Flow (prot)	1829	5238		1829	3657	1636		1829		1737	1775	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.95		0.95	0.97	1.00
Satd. Flow (perm)	1829	5238		1829	3657	1636		1829		1737	1775	1615
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	134	416	9	2	691	52	2	0	0	70	18	126
RTOR Reduction (vph)	0	1	0	0	0	29	0	0	0	0	0	106
Lane Group Flow (vph)	134	424	0	2	691	23	0	2	0	43	45	20
Confl. Peds. (#/hr)									3			1
Turn Type	Prot			Prot		Perm	Split		Perm	Split		Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases						6			4			3
Actuated Green, G (s)	8.9	35.5		0.7	27.3	27.3		2.9		8.0	8.0	8.0
Effective Green, g (s)	9.9	38.5		1.7	30.3	30.3		5.9		11.0	11.0	11.0
Actuated g/C Ratio	0.14	0.56		0.02	0.44	0.44		0.09		0.16	0.16	0.16
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0		6.0		6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	262	2918		45	1604	717		156		277	283	257
v/s Ratio Prot	c0.07	0.08		0.00	c0.19			c0.00		0.02	c0.03	
v/s Ratio Perm						0.01						0.01
v/c Ratio	0.51	0.15		0.04	0.43	0.03		0.01		0.16	0.16	0.08
Uniform Delay, d1	27.4	7.4		32.9	13.4	11.0		28.9		25.0	25.1	24.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	1.7	0.1		0.4	0.2	0.0		0.0		0.3	0.3	0.1
Delay (s)	29.0	7.5		33.3	13.6	11.1		29.0		25.3	25.3	24.9
Level of Service	C	A		C	B	B		C		C	C	C
Approach Delay (s)		12.6			13.5			29.0			25.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	69.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
35: W Las Positas & Hopyard

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	111	274	390	381	284	69	309	760	202	78	987	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	128	315	448	438	326	79	355	874	232	90	1134	116
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	65
Lane Group Flow (vph)	128	315	448	438	326	79	355	874	232	90	1134	51
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	8.5	18.0	120.0	18.4	27.9	120.0	14.0	56.4	120.0	7.2	49.6	49.6
Effective Green, g (s)	9.5	21.0	120.0	19.4	30.9	120.0	15.0	59.4	120.0	8.2	52.6	52.6
Actuated g/C Ratio	0.08	0.18	1.00	0.16	0.26	1.00	0.12	0.49	1.00	0.07	0.44	0.44
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	281	640	1603	573	942	1613	443	2601	1615	242	2303	697
v/s Ratio Prot	0.04	c0.09		c0.12	0.09		c0.10	0.17		0.03	c0.22	
v/s Ratio Perm			0.28			0.05			0.14			0.03
v/c Ratio	0.46	0.49	0.28	0.76	0.35	0.05	0.80	0.34	0.14	0.37	0.49	0.07
Uniform Delay, d1	52.8	44.7	0.0	48.1	36.3	0.0	51.1	18.4	0.0	53.4	24.1	19.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.72	0.47	1.00	1.17	0.67	1.10
Incremental Delay, d2	0.4	1.2	0.4	5.4	0.5	0.1	9.0	0.3	0.2	0.3	0.7	0.2
Delay (s)	53.2	45.9	0.4	53.5	36.8	0.1	45.7	8.9	0.2	62.9	16.9	21.6
Level of Service	D	D	A	D	D	A	D	A	A	E	B	C
Approach Delay (s)		24.1			42.0			16.4			20.4	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	194	421	7	5	401	86	10	15	4	40	0	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1829	5241		1829	3657	1636	1819	1856			1825	1607
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.73	1.00			0.74	1.00
Satd. Flow (perm)	1829	5241		1829	3657	1636	1389	1856			1426	1607
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	234	507	8	6	483	104	12	18	5	48	0	120
RTOR Reduction (vph)	0	1	0	0	0	72	0	4	0	0	0	100
Lane Group Flow (vph)	234	514	0	6	483	32	12	19	0	0	48	20
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	16.7	28.5		0.9	12.7	12.7	6.7	6.7			6.7	6.7
Effective Green, g (s)	17.7	31.5		1.9	15.7	15.7	8.7	8.7			8.7	8.7
Actuated g/C Ratio	0.35	0.62		0.04	0.31	0.31	0.17	0.17			0.17	0.17
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	634	3231		68	1124	503	236	316			243	274
v/s Ratio Prot	c0.13	0.10		0.00	c0.13			0.01				
v/s Ratio Perm						0.02	0.01				c0.03	0.01
v/c Ratio	0.37	0.16		0.09	0.43	0.06	0.05	0.06			0.20	0.07
Uniform Delay, d1	12.5	4.2		23.8	14.1	12.5	17.7	17.8			18.2	17.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.02	1.09
Incremental Delay, d2	0.4	0.0		0.6	0.3	0.1	0.1	0.1			0.4	0.1
Delay (s)	12.9	4.2		24.3	14.4	12.6	17.8	17.9			18.9	19.5
Level of Service	B	A		C	B	B	B	B			B	B
Approach Delay (s)		6.9			14.2			17.8			19.3	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	51.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
59: W Las Positas & Hacienda

12/2/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	137	716	0	10	620	14	0	15	5	28	42	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1829	5255		1829	3657	1636		1925	1613	1737	1823	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1829	5255		1829	3657	1636		1925	1613	1737	1823	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	146	762	0	11	660	15	0	16	5	30	45	117
RTOR Reduction (vph)	0	0	0	0	0	9	0	0	4	0	0	99
Lane Group Flow (vph)	146	762	0	11	660	6	0	16	1	27	48	19
Confl. Peds. (#/hr)									3			1
Turn Type	Prot			Prot		Perm	Split		Perm	Split		Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases						6			4			3
Actuated Green, G (s)	8.9	35.0		0.8	26.9	26.9		4.3	4.3	8.1	8.1	8.1
Effective Green, g (s)	9.9	38.0		1.8	29.9	29.9		7.3	7.3	11.1	11.1	11.1
Actuated g/C Ratio	0.14	0.54		0.03	0.43	0.43		0.10	0.10	0.16	0.16	0.16
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	258	2845		47	1558	697		200	168	275	288	255
v/s Ratio Prot	c0.08	0.15		0.01	c0.18			c0.01		0.02	c0.03	
v/s Ratio Perm						0.00			0.00			0.01
v/c Ratio	0.57	0.27		0.23	0.42	0.01		0.08	0.00	0.10	0.17	0.07
Uniform Delay, d1	28.1	8.6		33.5	14.1	11.6		28.4	28.2	25.3	25.6	25.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.8	0.2		2.6	0.2	0.0		0.2	0.0	0.2	0.3	0.1
Delay (s)	31.0	8.9		36.1	14.3	11.6		28.6	28.2	25.4	25.8	25.3
Level of Service	C	A		D	B	B		C	C	C	C	C
Approach Delay (s)		12.4			14.6			28.5			25.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	70.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
35: W Las Positas & Hopyard

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	139	388	405	237	364	35	438	1169	327	151	642	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	151	422	440	258	396	38	476	1271	355	164	698	67
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	36
Lane Group Flow (vph)	151	422	440	258	396	38	476	1271	355	164	698	31
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	9.1	20.8	120.0	13.0	24.7	120.0	14.0	57.8	120.0	8.4	52.2	52.2
Effective Green, g (s)	10.1	23.8	120.0	14.0	27.7	120.0	15.0	60.8	120.0	9.4	55.2	55.2
Actuated g/C Ratio	0.08	0.20	1.00	0.12	0.23	1.00	0.12	0.51	1.00	0.08	0.46	0.46
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	299	725	1603	414	844	1613	443	2663	1615	278	2417	731
v/s Ratio Prot	0.04	c0.12		c0.07	0.11		c0.13	c0.24		c0.05	0.13	
v/s Ratio Perm			0.27			0.02			0.22			0.02
v/c Ratio	0.51	0.58	0.27	0.62	0.47	0.02	1.07	0.48	0.22	0.59	0.29	0.04
Uniform Delay, d1	52.6	43.6	0.0	50.5	39.8	0.0	52.5	19.3	0.0	53.4	20.2	17.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.76	0.48	1.00	1.25	0.65	0.83
Incremental Delay, d2	0.5	1.8	0.4	2.1	0.9	0.0	60.8	0.5	0.3	2.1	0.3	0.1
Delay (s)	53.0	45.4	0.4	52.6	40.7	0.0	100.7	9.7	0.3	68.6	13.4	15.0
Level of Service	D	D	A	D	D	A	F	A	A	E	B	B
Approach Delay (s)		27.0			42.9			28.7			23.2	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	263	423	15	19	514	157	9	4	0	29	14	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1829	5224		1829	3657	1636	1816	1925			1859	1605
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.72	1.00			0.83	1.00
Satd. Flow (perm)	1829	5224		1829	3657	1636	1379	1925			1599	1605
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	333	535	19	24	651	199	11	5	0	37	18	204
RTOR Reduction (vph)	0	2	0	0	0	135	0	0	0	0	0	166
Lane Group Flow (vph)	333	552	0	24	651	64	11	5	0	0	55	38
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	21.1	36.2		2.4	17.5	17.5	9.9	9.9			9.9	9.9
Effective Green, g (s)	22.1	39.2		3.4	20.5	20.5	11.9	11.9			11.9	11.9
Actuated g/C Ratio	0.35	0.62		0.05	0.32	0.32	0.19	0.19			0.19	0.19
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	637	3225		98	1181	528	258	361			300	301
v/s Ratio Prot	c0.18	0.11		0.01	c0.18			0.00				
v/s Ratio Perm						0.04	0.01				c0.03	0.02
v/c Ratio	0.52	0.17		0.24	0.55	0.12	0.04	0.01			0.18	0.13
Uniform Delay, d1	16.5	5.2		28.8	17.7	15.2	21.1	21.0			21.7	21.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.12	1.62
Incremental Delay, d2	0.8	0.0		1.3	0.6	0.1	0.1	0.0			0.3	0.2
Delay (s)	17.3	5.2		30.1	18.3	15.3	21.2	21.0			24.6	35.0
Level of Service	B	A		C	B	B	C	C			C	C
Approach Delay (s)		9.7			17.9			21.1			32.8	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	63.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	27	111	342	13	2	553	42	32	4	4	59	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Util. Factor		1.00	0.91		1.00	0.95	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	0.99		1.00	1.00	0.85	1.00	0.93		1.00	1.00
Flt Protected		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)		1829	5226		1829	3657	1636	1829	1767		1829	1925
Flt Permitted		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)		1829	5226		1829	3657	1636	1829	1767		1829	1925
Peak-hour factor, PHF	0.90	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	30	139	428	16	2	691	52	40	5	5	74	25
RTOR Reduction (vph)	0	0	3	0	0	0	31	0	4	0	0	0
Lane Group Flow (vph)	0	169	441	0	2	691	21	40	6	0	74	25
Confl. Peds. (#/hr)										3		
Turn Type	Prot	Prot			Prot		Perm	Prot			Prot	
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases							6					
Actuated Green, G (s)		8.4	36.2		0.8	28.6	28.6	8.6	11.1		9.3	11.8
Effective Green, g (s)		9.4	39.2		1.8	31.6	31.6	11.6	14.1		12.3	14.8
Actuated g/C Ratio		0.12	0.49		0.02	0.40	0.40	0.15	0.18		0.15	0.19
Clearance Time (s)		4.0	6.0		4.0	6.0	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		217	2580		41	1455	651	267	314		283	359
v/s Ratio Prot		c0.09	0.08		0.00	c0.19		0.02	0.00		c0.04	0.01
v/s Ratio Perm							0.01					
v/c Ratio		0.78	0.17		0.05	0.47	0.03	0.15	0.02		0.26	0.07
Uniform Delay, d1		34.0	11.1		38.0	17.7	14.6	29.6	26.9		29.5	26.6
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		16.0	0.1		0.5	0.2	0.0	0.3	0.0		0.5	0.1
Delay (s)		50.0	11.3		38.5	18.0	14.6	29.9	27.0		30.0	26.7
Level of Service		D	B		D	B	B	C	C		C	C
Approach Delay (s)			22.0			17.8			29.3			27.8
Approach LOS			C			B			C			C

Intersection Summary			
HCM Average Control Delay	21.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	79.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR
Lane Configurations	
Volume (vph)	101
Ideal Flow (vphpl)	1900
Total Lost time (s)	3.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.99
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1615
Flt Permitted	1.00
Satd. Flow (perm)	1615
Peak-hour factor, PHF	0.80
Adj. Flow (vph)	126
RTOR Reduction (vph)	103
Lane Group Flow (vph)	23
Confl. Peds. (#/hr)	1
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	11.8
Effective Green, g (s)	14.8
Actuated g/C Ratio	0.19
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	301
v/s Ratio Prot	
v/s Ratio Perm	c0.01
v/c Ratio	0.08
Uniform Delay, d1	26.7
Progression Factor	1.00
Incremental Delay, d2	0.1
Delay (s)	26.8
Level of Service	C
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
35: W Las Positas & Hopyard

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	111	305	390	381	315	69	309	760	202	78	987	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3547	3657	1603	3547	3657	1613	3547	5255	1615	3547	5255	1589
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	128	351	448	438	362	79	355	874	232	90	1134	116
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	66
Lane Group Flow (vph)	128	351	448	438	362	79	355	874	232	90	1134	50
Confl. Peds. (#/hr)			27			7			3			10
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			6
Actuated Green, G (s)	8.5	18.8	120.0	18.5	28.8	120.0	14.0	55.5	120.0	7.2	48.7	48.7
Effective Green, g (s)	9.5	21.8	120.0	19.5	31.8	120.0	15.0	58.5	120.0	8.2	51.7	51.7
Actuated g/C Ratio	0.08	0.18	1.00	0.16	0.27	1.00	0.12	0.49	1.00	0.07	0.43	0.43
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	1.8	5.0		1.8	5.0		1.8	5.0		1.8	5.0	5.0
Lane Grp Cap (vph)	281	664	1603	576	969	1613	443	2562	1615	242	2264	685
v/s Ratio Prot	0.04	c0.10		c0.12	0.10		c0.10	0.17		0.03	c0.22	
v/s Ratio Perm			0.28			0.05			0.14			0.03
v/c Ratio	0.46	0.53	0.28	0.76	0.37	0.05	0.80	0.34	0.14	0.37	0.50	0.07
Uniform Delay, d1	52.8	44.4	0.0	48.0	36.0	0.0	51.1	18.9	0.0	53.4	24.8	20.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.72	0.47	1.00	1.17	0.67	1.10
Incremental Delay, d2	0.4	1.4	0.4	5.3	0.5	0.1	9.0	0.3	0.2	0.3	0.8	0.2
Delay (s)	53.2	45.9	0.4	53.3	36.5	0.1	45.7	9.3	0.2	62.8	17.4	22.3
Level of Service	D	D	A	D	D	A	D	A	A	E	B	C
Approach Delay (s)		24.9			41.6			16.7			20.9	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM Average Control Delay	24.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
52: W Las Positas & Willow

1/24/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	194	452	7	5	432	102	10	15	4	40	0	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Util. Factor	1.00	0.91		1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1829	5242		1829	3657	1636	1819	1856			1825	1607
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.73	1.00			0.74	1.00
Satd. Flow (perm)	1829	5242		1829	3657	1636	1389	1856			1426	1607
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	234	545	8	6	520	123	12	18	5	48	0	120
RTOR Reduction (vph)	0	1	0	0	0	84	0	4	0	0	0	100
Lane Group Flow (vph)	234	552	0	6	520	39	12	19	0	0	48	20
Confl. Peds. (#/hr)			1	1			6		2	2		6
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			4			4	
Permitted Phases						6	4			4		4
Actuated Green, G (s)	16.8	29.3		0.9	13.4	13.4	6.7	6.7			6.7	6.7
Effective Green, g (s)	17.8	32.3		1.9	16.4	16.4	8.7	8.7			8.7	8.7
Actuated g/C Ratio	0.34	0.62		0.04	0.32	0.32	0.17	0.17			0.17	0.17
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	627	3262		67	1156	517	233	311			239	269
v/s Ratio Prot	c0.13	0.11		0.00	c0.14			0.01				
v/s Ratio Perm						0.02	0.01				c0.03	0.01
v/c Ratio	0.37	0.17		0.09	0.45	0.08	0.05	0.06			0.20	0.07
Uniform Delay, d1	12.8	4.1		24.2	14.2	12.4	18.1	18.2			18.6	18.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.02	1.09
Incremental Delay, d2	0.4	0.0		0.6	0.3	0.1	0.1	0.1			0.4	0.1
Delay (s)	13.2	4.2		24.7	14.4	12.5	18.2	18.2			19.3	20.0
Level of Service	B	A		C	B	B	B	B			B	B
Approach Delay (s)		6.9			14.2			18.2			19.8	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	51.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	42.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	23	137	716	16	10	620	14	24	15	5	28	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Util. Factor		1.00	0.91		1.00	0.95	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	1.00		1.00	1.00	0.85	1.00	0.96		1.00	1.00
Flt Protected		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)		1829	5238		1829	3657	1636	1829	1850		1829	1925
Flt Permitted		0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)		1829	5238		1829	3657	1636	1829	1850		1829	1925
Peak-hour factor, PHF	0.90	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	26	146	762	17	11	660	15	26	16	5	30	62
RTOR Reduction (vph)	0	0	1	0	0	0	9	0	4	0	0	0
Lane Group Flow (vph)	0	172	778	0	11	660	6	26	17	0	30	62
Confl. Peds. (#/hr)										3		
Turn Type	Prot	Prot			Prot		Perm	Prot			Prot	
Protected Phases	5	5	2		1	6		3	8		7	4
Permitted Phases							6					
Actuated Green, G (s)		7.9	33.3		0.8	26.2	26.2	4.3	8.2		4.3	8.2
Effective Green, g (s)		8.9	36.3		1.8	29.2	29.2	7.3	11.2		7.3	11.2
Actuated g/C Ratio		0.13	0.53		0.03	0.43	0.43	0.11	0.16		0.11	0.16
Clearance Time (s)		4.0	6.0		4.0	6.0	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		237	2772		48	1557	696	195	302		195	314
v/s Ratio Prot		c0.09	0.15		0.01	c0.18		0.01	0.01		c0.02	c0.03
v/s Ratio Perm							0.00					
v/c Ratio		0.73	0.28		0.23	0.42	0.01	0.13	0.06		0.15	0.20
Uniform Delay, d1		28.7	8.9		32.7	13.8	11.4	27.8	24.2		27.8	24.8
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		10.5	0.3		2.4	0.2	0.0	0.3	0.1		0.4	0.3
Delay (s)		39.2	9.2		35.2	14.0	11.4	28.1	24.3		28.2	25.1
Level of Service		D	A		D	B	B	C	C		C	C
Approach Delay (s)			14.6			14.3			26.4			25.2
Approach LOS			B			B			C			C

Intersection Summary			
HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	68.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR
Lane Configurations	
Volume (vph)	110
Ideal Flow (vphpl)	1900
Total Lost time (s)	3.0
Lane Util. Factor	1.00
Frpb, ped/bikes	0.99
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1615
Flt Permitted	1.00
Satd. Flow (perm)	1615
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	117
RTOR Reduction (vph)	98
Lane Group Flow (vph)	19
Confl. Peds. (#/hr)	1
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	8.2
Effective Green, g (s)	11.2
Actuated g/C Ratio	0.16
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	264
v/s Ratio Prot	
v/s Ratio Perm	0.01
v/c Ratio	0.07
Uniform Delay, d1	24.3
Progression Factor	1.00
Incremental Delay, d2	0.1
Delay (s)	24.4
Level of Service	C
Approach Delay (s)	
Approach LOS	

Intersection Summary

Appendix F

Queuing Calculations
(School Analysis)

Intersection: 35: W Las Positas & Hopyard

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	63	78	162	165	148	112	120	140	153	33	210	222
Average Queue (ft)	45	58	120	115	86	59	81	93	107	9	185	197
95th Queue (ft)	73	81	185	189	162	116	134	151	165	33	233	245
Link Distance (ft)			1050	1050			216	216	216			
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	200	200			220	225				210	200	200
Storage Blk Time (%)			0	0							8	19
Queuing Penalty (veh)			0	1							31	74

Intersection: 35: W Las Positas & Hopyard

Movement	NB	NB	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	T	T	T	R	L	L	T	T	T	R
Maximum Queue (ft)	321	294	289	223	102	90	124	130	132	26
Average Queue (ft)	221	210	210	106	53	55	80	85	94	13
95th Queue (ft)	390	327	322	263	109	102	141	150	152	31
Link Distance (ft)	1076	1076	1076				502	502	502	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				200	260	260				275
Storage Blk Time (%)	1		6	0						
Queuing Penalty (veh)	6		18	0						

Intersection: 52: W Las Positas & Willow

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	TR	L	T	T	R	L	TR	LT	R
Maximum Queue (ft)	144	54	55	64	34	130	135	67	28	16	28	49
Average Queue (ft)	93	35	25	44	13	86	89	40	9	3	11	17
95th Queue (ft)	162	66	63	75	40	144	138	74	30	17	34	57
Link Distance (ft)		890	890	890		412	412	412		224	1176	1176
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	320				150				30			
Storage Blk Time (%)						1			4	1		
Queuing Penalty (veh)						0			0	0		

Intersection: 59: W Las Positas & Hacienda

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	L	T	T	TR	L	T	T	R	LT	L	LT	R
Maximum Queue (ft)	79	27	37	55	10	109	135	28	3	25	38	42
Average Queue (ft)	54	12	14	34	2	66	86	16	1	7	23	31
95th Queue (ft)	86	36	43	78	14	131	144	37	6	26	52	45
Link Distance (ft)		586	586	586		2515	2515	2515	182	753	753	753
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300				150							
Storage Blk Time (%)						0						
Queuing Penalty (veh)						0						

Zone Summary

Zone wide Queuing Penalty: 132

Intersection: 35: W Las Positas & Hopyard

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	49	78	137	151	189	171	211	108	124	69	158	154
Average Queue (ft)	26	58	92	85	122	123	138	68	82	22	105	117
95th Queue (ft)	60	85	159	165	216	181	221	125	135	69	169	172
Link Distance (ft)			1075	1075			218	218	218			
Upstream Blk Time (%)						0	2					
Queuing Penalty (veh)						0	3					
Storage Bay Dist (ft)	200	200			220	225				210	200	200
Storage Blk Time (%)					1	0	2				0	
Queuing Penalty (veh)					1	0	4				0	

Intersection: 35: W Las Positas & Hopyard

Movement	NB	NB	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	T	T	T	R	L	L	T	T	T	R
Maximum Queue (ft)	136	160	174	50	63	57	160	182	207	38
Average Queue (ft)	94	124	144	18	35	33	123	146	165	19
95th Queue (ft)	152	181	190	53	70	66	183	212	236	38
Link Distance (ft)	1076	1076	1076				907	907	907	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				200	260	260				275
Storage Blk Time (%)			0							
Queuing Penalty (veh)			0							

Intersection: 52: W Las Positas & Willow

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	TR	L	T	T	R	L	TR	LT	R
Maximum Queue (ft)	95	60	32	64	9	85	90	42	22	26	36	29
Average Queue (ft)	60	23	16	39	2	51	46	23	7	9	15	10
95th Queue (ft)	105	69	46	73	9	100	102	49	26	33	41	34
Link Distance (ft)		890	890	890		412	412	412		224	1176	1176
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	320				150				30			
Storage Blk Time (%)									3	3		
Queuing Penalty (veh)									1	0		

Intersection: 59: W Las Positas & Hacienda

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	TR	L	T	T	R	LT	R	L	LT
Maximum Queue (ft)	86	55	62	79	19	138	143	20	24	2	22	42
Average Queue (ft)	50	29	35	50	7	79	94	5	7	0	8	29
95th Queue (ft)	96	62	69	95	23	152	162	22	26	3	29	56
Link Distance (ft)		586	586	586		2515	2515	2515	182		753	753
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300				150					35		
Storage Blk Time (%)						0			3			
Queuing Penalty (veh)						0			0			

Intersection: 59: W Las Positas & Hacienda

Movement	SB
Directions Served	R
Maximum Queue (ft)	43
Average Queue (ft)	31
95th Queue (ft)	44
Link Distance (ft)	753
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 9

Intersection: 35: W Las Positas & Hopyard

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	82	115	178	213	152	118	132	118	146	17	203	222
Average Queue (ft)	52	70	132	145	97	82	91	78	105	3	164	192
95th Queue (ft)	96	135	206	248	176	135	149	133	165	19	228	250
Link Distance (ft)			375	375			203	203	203			
Upstream Blk Time (%)				0								
Queuing Penalty (veh)				2								
Storage Bay Dist (ft)	200	200			220	225				210	200	200
Storage Blk Time (%)			2	0	1						3	18
Queuing Penalty (veh)			2	1	2						11	69

Intersection: 35: W Las Positas & Hopyard

Movement	NB	NB	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	T	T	T	R	L	L	T	T	T	R
Maximum Queue (ft)	330	297	202	124	93	93	95	110	133	28
Average Queue (ft)	220	185	142	49	57	54	59	75	95	10
95th Queue (ft)	404	322	230	143	113	100	108	120	141	30
Link Distance (ft)	1076	1076	1076				1057	1057	1057	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				200	260	260				275
Storage Blk Time (%)	1		1	0						
Queuing Penalty (veh)	4		4	0						

Intersection: 52: W Las Positas & Willow

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	TR	L	T	T	R	L	TR	LT	R
Maximum Queue (ft)	149	62	45	68	8	98	113	41	17	5	27	25
Average Queue (ft)	97	25	15	41	2	57	62	26	5	1	7	10
95th Queue (ft)	175	71	50	76	11	117	126	49	22	10	29	34
Link Distance (ft)		890	890	890		396	396	396		224	1127	1127
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	320				150				30			
Storage Blk Time (%)									3	1		
Queuing Penalty (veh)									0	0		

Intersection: 59: W Las Positas & Hacienda

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	TR	L	T	T	R	L	TR	L	T
Maximum Queue (ft)	92	49	42	74	5	113	136	31	26	7	48	28
Average Queue (ft)	52	21	19	42	1	65	87	12	12	2	23	9
95th Queue (ft)	106	67	54	88	9	127	149	36	30	8	51	30
Link Distance (ft)		581	581	581		2482	2482	2482	182	182	704	704
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300				150							
Storage Blk Time (%)						0						
Queuing Penalty (veh)						0						

Intersection: 59: W Las Positas & Hacienda

Movement	SB
Directions Served	R
Maximum Queue (ft)	39
Average Queue (ft)	28
95th Queue (ft)	48
Link Distance (ft)	704
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 96

Intersection: 35: W Las Positas & Hopyard

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B487	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	T	L
Maximum Queue (ft)	74	103	158	168	195	180	201	120	136	19	13	126
Average Queue (ft)	53	56	102	100	141	119	125	76	94	6	3	93
95th Queue (ft)	88	124	167	178	228	188	207	135	148	26	23	132
Link Distance (ft)			375	375			203	203	203		390	
Upstream Blk Time (%)						0	2					
Queuing Penalty (veh)						0	4					
Storage Bay Dist (ft)	200	200			220	225				210		200
Storage Blk Time (%)			0		1	0	2					
Queuing Penalty (veh)			0		2	0	4					

Intersection: 35: W Las Positas & Hopyard

Movement	NB	NB	NB	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	L	T	T	T	R	L	L	T	T	T	R
Maximum Queue (ft)	155	142	154	143	42	54	60	144	173	202	20
Average Queue (ft)	116	104	115	108	18	29	27	112	127	158	12
95th Queue (ft)	163	153	173	157	48	63	71	166	192	223	29
Link Distance (ft)		1076	1076	1076				1057	1057	1057	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	200				200	260	260				275
Storage Blk Time (%)											
Queuing Penalty (veh)											

Intersection: 52: W Las Positas & Willow

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	TR	L	T	T	R	L	TR	LT	R
Maximum Queue (ft)	110	39	39	56	2	87	67	33	38	29	5	11
Average Queue (ft)	73	16	14	30	1	44	42	21	13	10	1	3
95th Queue (ft)	128	48	48	65	3	100	84	41	41	37	9	17
Link Distance (ft)		890	890	890		396	396	396		224	1127	1127
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	320				150				30			
Storage Blk Time (%)						0			5	5		
Queuing Penalty (veh)						0			1	1		

Intersection: 59: W Las Positas & Hacienda

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	TR	L	T	T	R	L	TR	L	T
Maximum Queue (ft)	97	55	56	83	24	122	133	16	20	8	34	61
Average Queue (ft)	70	25	35	56	12	71	88	6	9	4	16	36
95th Queue (ft)	130	59	68	103	30	136	152	24	26	16	41	69
Link Distance (ft)		581	581	581		2482	2482	2482	182	182	704	704
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300				150							
Storage Blk Time (%)						0						
Queuing Penalty (veh)						0						

Intersection: 59: W Las Positas & Hacienda

Movement	SB
Directions Served	R
Maximum Queue (ft)	42
Average Queue (ft)	30
95th Queue (ft)	54
Link Distance (ft)	704
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 11