Traffic Impact Study for the Los Gamos Apartments Project

Prepared for the City of San Rafael

Submitted by
W-Trans

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Executive Summary

The proposed Los Gamos Apartments Project would include construction of 192 apartments, 12 percent of which would be affordable units, together with a small supermarket on a currently vacant site at the southerly terminus of Los Gamos Drive in the City of San Rafael. The project would be expected to generate an average of 1,368 vehicle trips per day, including 76 a.m. peak hour trips and 98 trips during the p.m. peak hour. After discounting for pass-by trips to the market that would be captured from nearby businesses, the project would be expected to generate 1,275 net new daily trips, including 73 new trips during the morning peak hour and 88 new trips during the evening peak hour.

The four intersections of Lucas Valley Road with Las Gallinas Avenue, Los Gamos Drive, US 101 South, and US 101 North were evaluated under existing and future volumes, as well as with trips from the proposed project added. The study intersections are currently operating acceptably at LOS C or better overall and would be expected to continue operating at the same service levels with project traffic added. Under anticipated Future volumes all four study intersections are expected to operate acceptably at LOS D or better during both peaks. Upon adding project-generated traffic to Future volumes, the study intersections would continue operating at the same service levels.

The project would be expected to have a less than significant VMT impact but should consider implementing TDM strategies to further reduce its VMT.

Facilities providing access to the site via alternative modes, including pedestrians, bicyclists, and transit riders, are adequate and will be improved as plans to expand the bike system are realized. The project applicant should work with the property owners to the south to provide a multi-use path connecting existing sidewalks and bicycle facilities on Los Gamos Drive to Los Gamos Road. Racks or other structures to provide secure parking for at least 18 bicycles should be provided as part of the project.

Sight distances along Los Gamos Drive at the location of the proposed project driveway are adequate; however, landscaping near the proposed driveway should be maintained to retain clear sight lines. A left-turn lane is not warranted on Los Gamos Drive at the location of the project driveway.

Emergency vehicle access and circulation was evaluated and determined to be adequate for the proposed layout; however, the design of the driveway should conform to City design standards for hillside developments.

The proposed on-site parking supply of 224 spaces is expected to be adequate to meet the demand of the project assuming that parking is shared between the market and other guests of the development.

Introduction

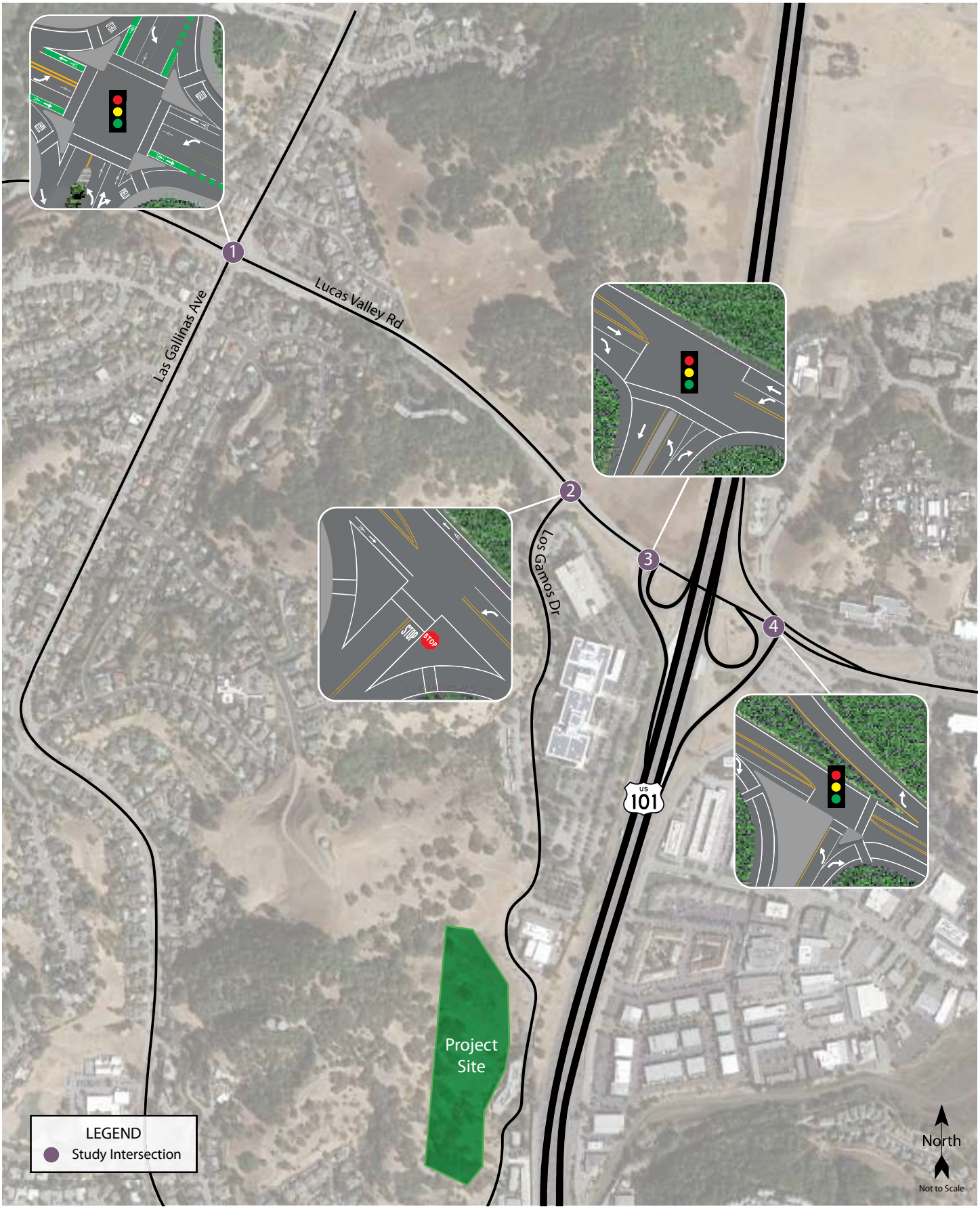
This report presents an analysis of the potential traffic impacts that would be associated with the proposed multi-family residential development and small supermarket to be located on Los Gamos Drive in the City of San Rafael. The traffic study was completed in accordance with the criteria established by the City of San Rafael, reflects a scope of work reviewed and approved by City staff, 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 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 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 or roadway segments. Impacts relative to access for pedestrians, bicyclists, and to transit are also addressed.

Project Profile

The proposed project would include construction of 192 apartment units, 23 of which would be affordable, and 9,335 square-foot community center consisting of a 4,323 square-foot market that would be open to the public and a 3,112 square-foot community room and patio for use by project residents. The project would be located on a currently vacant site located at the southerly terminus of Los Gamos Drive in the City of San Rafael, as shown in Figure 1.



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Traffic Impact Study for the Los Gamos Apartments

Figure 1 – Study Area and Existing Lane Configurations

Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the section of Los Gamos Drive fronting the project site, the project access point as well as the following intersections.

1. Lucas Valley Road/Las Gallinas Avenue
2. Lucas Valley Road/Los Gamos Drive
3. Lucas Valley Road/US 101 South Ramps
4. Lucas Valley Road/US 101 North Ramps

Operating conditions during the 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.

Study Intersections

Lucas Valley Road/Las Gallinas Avenue is a signalized four-legged intersection with protected left-turn phasing and yield-controlled channelized right-turn lanes on all approaches. Marked pedestrian crosswalks and phasing are provided on all legs and pedestrians can take refuge on "pork chop" islands on all four corners of the intersection.

Lucas Valley Road/Los Gamos Drive is a signalized tee-intersection with protected left-turn phasing on the westbound Lucas Valley Road and right-turn overlap phasing on the northbound Los Gamos Drive approach. There are marked crosswalks across the west and south legs.

Lucas Valley Road/US 101 South Ramps is a signalized tee-intersection with protected left-turn phasing on the westbound Lucas Valley Road approach and right-turn overlap phasing on the eastbound Lucas Valley Road approach. A marked crosswalk with pedestrian phasing is provided on the south leg, which is comprised of the on- and off-ramps for US 101 South.

Lucas Valley Road/US 101 North Ramps is a signalized tee-intersection with free channelized right-turn lanes on the eastbound and northbound approaches which serve the US 101 North on- and off-ramps, respectively. There are "pork chop" islands located at the southwest and southeast corners of the intersection and marked crosswalks with pedestrian phasing are provided on the south and east legs.

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

Collision History

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on records available from the California Highway Patrol as published in their Statewide Integrated Traffic Records System (SWITRS) reports. The most current five-year period available is May 1, 2014 through April 30, 2019.

As presented in Table 1, the calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2014 Collision Data on California State Highways*, California Department of Transportation (Caltrans). The calculated collision rates for all four study intersections were below the statewide averages, indicating that there is no apparent safety concern at these locations. The collision rate calculations are provided in Appendix A.

Table 1 – Collision Rates at the Study Intersections

Study Intersection	Number of Collisions (2014-2019)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Lucas Valley Rd/Las Gallinas Ave	1	0.02	0.24
2. Lucas Valley Rd/Los Gamos Dr	2	0.06	0.19
3. Lucas Valley Rd/US 101 S Ramps	8	0.16	0.19
4. Lucas Valley Rd/US 101 N Ramps	8	0.18	0.19

Note: c/mve = collisions per million vehicles entering

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; however, sidewalk gaps, obstacles, and barriers can be found along Los Gamos Drive near its connection to Los Gamos Road. Existing gaps and obstacles along the connecting roadways impact convenient and continuous access for pedestrians and present safety concerns in those locations where appropriate pedestrian infrastructure would address potential conflict points. Sidewalks along the south side of Lucas Valley Road are continuous from Las Gallinas Avenue to Silveira Parkway.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2017, classifies bikeways into four 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 IV Bikeway** – also known as a separated bikeway, a Class IV Bikeway is for the exclusive use of bicycles and includes a separation between the bikeway and the motor vehicle traffic lane. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

In the project area, Class II bike lanes exist on Las Gallinas Avenue and Lucas Valley Road and there are existing Class III bike routes on Los Gamos Drive and Los Gamos Road. Table 2 summarizes the existing and planned bicycle facilities in the project vicinity, as contained in the *San Rafael Bicycle & Pedestrian Master Plan,* Alta Planning + Design, 2018.

Table 2 – Bicycle Facility Summary				
Status Facility	**Class**	**Length (miles)**	**Begin Point**	**End Point**
Existing				
Las Gallinas Ave	II	1.8	Miller Creek Rd	Nova Albion Wy
Lucas Valley Rd	II	3.4	Westgate Dr	Los Gamos Dr
Los Gamos Dr	III	0.5	Lucas Valley Rd	Los Gamos Dr Limit
Los Gamos Rd	III	0.4	Los Gamos Dr	Manuel T Freitas Pkwy
Planned				
Lucas Valley Rd-Smith Ranch Rd	II	1.0	Los Gamos Dr	McInnis County Park

Source: *San Rafael Bicycle & Pedestrian Master Plan*, Alta Planning + Design, 2018

Transit Facilities

Local, fixed-route bus transit service is provided by the County of Marin through its Marin Transit Service. Additional regional service is provided by Golden Gate Transit. The Lucas Valley Road and Smith Ranch Road bus pads are located along both sides of US 101, a walk of approximately one-half mile from the project site via the parking lot for 1650 Los Gamos Drive. Table 3 provides a summary of both local and regional transit services that are provided near the project site.

Table 3 – Transit Routes							
Transit Agency Route – Regions Served	**Service Times**						**Nearest Stop**
	Weekday		**Saturday**		**Sunday**		
	Times	**Headway**	**Times**	**Headway**	**Times**	**Headway**	
Marin Transit							
35 – Canal – Novato	5:00 AM – 2:30 AM	30 min	5:00 AM – 2:30 AM	30 min	5:00 AM – 2:30 AM	30 min	Lucas Valley/ Smith Ranch BP
49 – San Rafael – Novato	6:15 AM – 9:00 PM	30 min	7:15 AM – 11:00 PM	1 hr	7:15 AM – 11:00 PM	1 hr	Lucas Valley/ Smith Ranch BP
Golden Gate Transit							
54/54C SB – Novato to San Francisco	4:45 AM – 10:00 AM	30 min					Lucas Valley Bus Pad
54/54C NB – San Francisco to Novato	2:30 PM – 8:30 PM	30 min					Smith Ranch Bus Pad
58 SB – Novato to San Francisco	6:00AM – 9:00 AM	30 min					Lucas Valley Bus Pad
58 NB – San Francisco to Novato	4:00 PM – 7:00 PM	30 min					Smith Ranch Bus Pad
70 SB – Novato to San Francisco	5:00 AM – 12:30 AM	1 hr	5:00 AM – 12:30 AM	1 hr	5:00 AM – 12:30 AM	1 hr	Lucas Valley Bus Pad
70 NB – San Francisco to Novato	5:00 AM – 1:30 AM	1 hr	6:00 AM – 1:30 AM	1 hr	6:00 AM – 1:30 AM	1 hr	Smith Ranch Bus Pad

Notes: SB = Southbound; NB = Northbound; BP = Bus Pad

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

Marin Access Paratransit is designed to serve the needs of individuals with disabilities within the City of San Rafael and the greater Marin County area who are unable to independently use fixed-route transit services. Trips can be reserved for travel seven days a week from 8:30 a.m. to 5:00 p.m.

Sonoma-Marin Area Rail Transit (SMART)

The project site is located approximately a mile-and-a-half north of the Marin Civic Center SMART train station. The SMART commuter rail system currently includes 45 miles of rail corridor and twelve stations from the Sonoma County Airport to Larkspur Landing. Upon completion, the passenger rail service will extend 70 miles from Cloverdale, at the north end of Sonoma County, to Larkspur where the Golden Gate Ferry connects Marin County with San Francisco. Along with commuter rail service, portions of the multi-use pathway have been constructed parallel to the rail corridor.

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, 2010. 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 study intersections 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 the signals are coordinated or not, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology. For purposes of this study, delays were calculated using signal timing obtained from the City of San Rafael.

The ranges of delay associated with the various levels of service are indicated in Table 4.

Table 4 – Signalized Intersection Level of Service Criteria	
LOS A	Delay of 0 to 10 seconds. Most vehicles arrive during the green phase, so do not stop at all.
LOS B	Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop.
LOS C	Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.
LOS D	Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop.
LOS E	Delay of 55 to 80 seconds. Most, if not all, vehicles must stop and drivers consider the delay excessive.
LOS F	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, 2010

Traffic Operation Standards

City of San Rafael

The City of San Rafael's Level of Service (LOS) standard is published in the *San Rafael General Plan 2020 Final EIR*. It states that a project would have an adverse impact on an unsignalized intersection if it is operating acceptably at LOS E or better without the project and would deteriorate to LOS F operation with project traffic added or, if already operating at LOS F, would add five seconds or more to the average delay. For a signalized intersection in the study area the operational standard is LOS D.

Existing Conditions

The Existing Conditions scenario provides an evaluation of current traffic operation based on existing traffic volumes during the a.m. and p.m. peak periods. This condition does not include project-generated traffic volumes. Volume data was collected in November 2019 while local schools were in session.

Intersection Levels of Service

Under existing conditions, all four study intersections operate acceptably during both peak periods. The existing traffic volumes are shown in Figure 2. A summary of the intersection level of service calculations is contained in Table 5, and copies of the Level of Service calculations are provided in Appendix B. It is noted that the analysis was prepared prior to completion of the traffic signal at Lucas Valley Road/Los Gamos Drive and the right-turn overlap provided as part of the installation was not included in the assumptions for the signal's operation. The results of the analysis are therefore slightly conservative in that they do not include this capacity enhancement.

Table 5 – Existing Peak Hour Intersection Levels of Service

Study Intersection *Approach*	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. Lucas Valley Rd/Las Gallinas Ave	20.7	C	15.2	B
2. Lucas Valley Rd/Los Gamos Dr	25.4	C	15.2	B
3. Lucas Valley Rd/US 101 S Ramps	12.4	B	12.2	B
4. Lucas Valley Rd/US 101 N Ramps	16.1	B	13.2	B

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

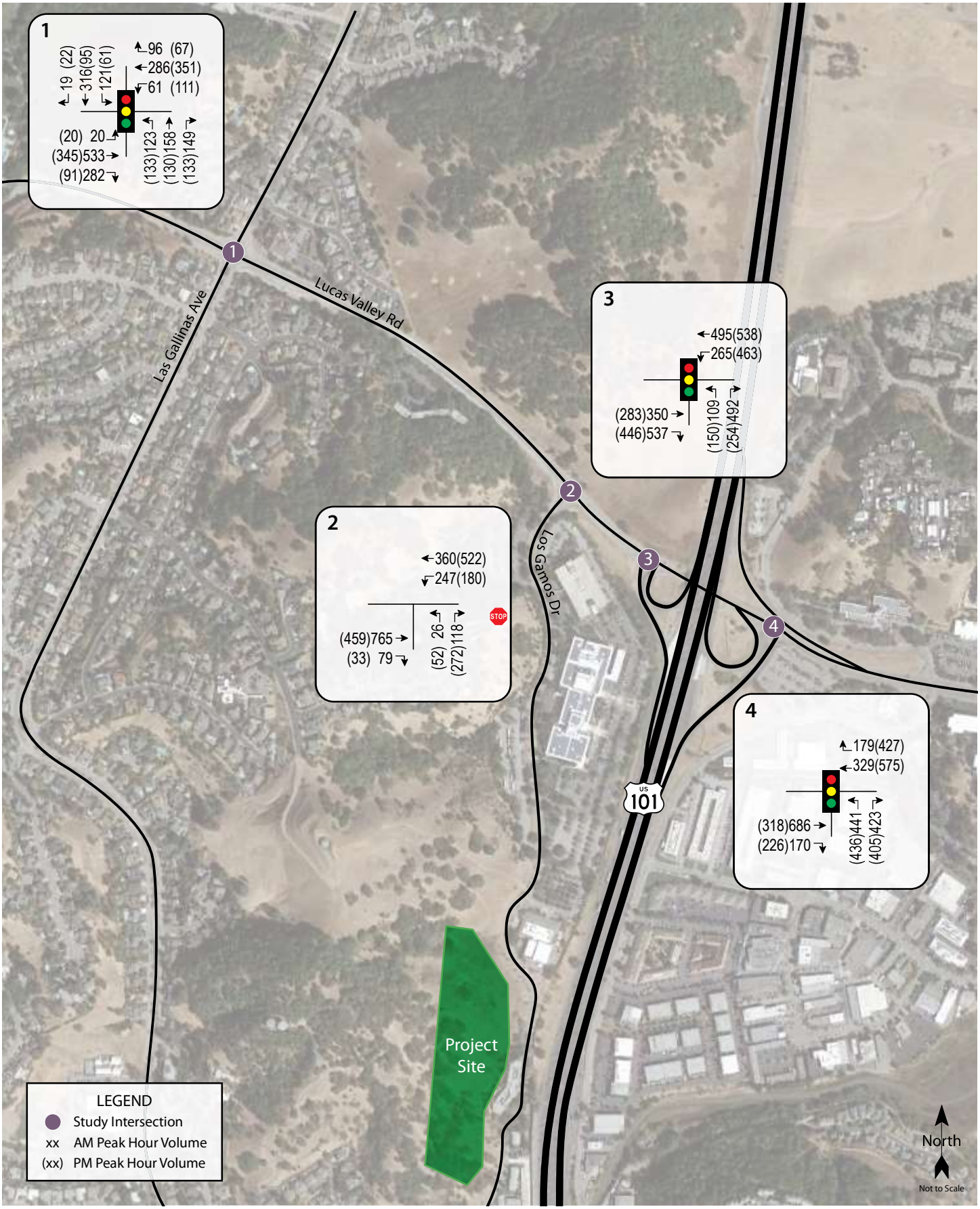
Future Conditions

Future p.m. peak hour volume projections were taken from the City of San Rafael's traffic database, which is consistent with assumptions developed in the *City of San Rafael General Plan 2020*, and matches the future volumes used in the *Transportation Impact Analysis for the 1650 Los Gamos Drive Kaiser* by Fehr and Peers, February 2017. Under the anticipated Future volumes, the study intersections are expected to operate acceptably at LOS D or better during both peak periods. Future volumes are shown in Figure 3 and operating conditions are summarized in Table 6.

Table 6 – Future Peak Hour Intersection Levels of Service

Study Intersection	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. Lucas Valley Rd/Las Gallinas Ave	31.7	C	17.7	B
2. Lucas Valley Rd/Los Gamos Dr	42.2	D	46.0	D
3. Lucas Valley Rd/US 101 S Ramps	14.9	B	49.0	D
4. Lucas Valley Rd/US 101 N Ramps	48.5	D	33.4	C

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



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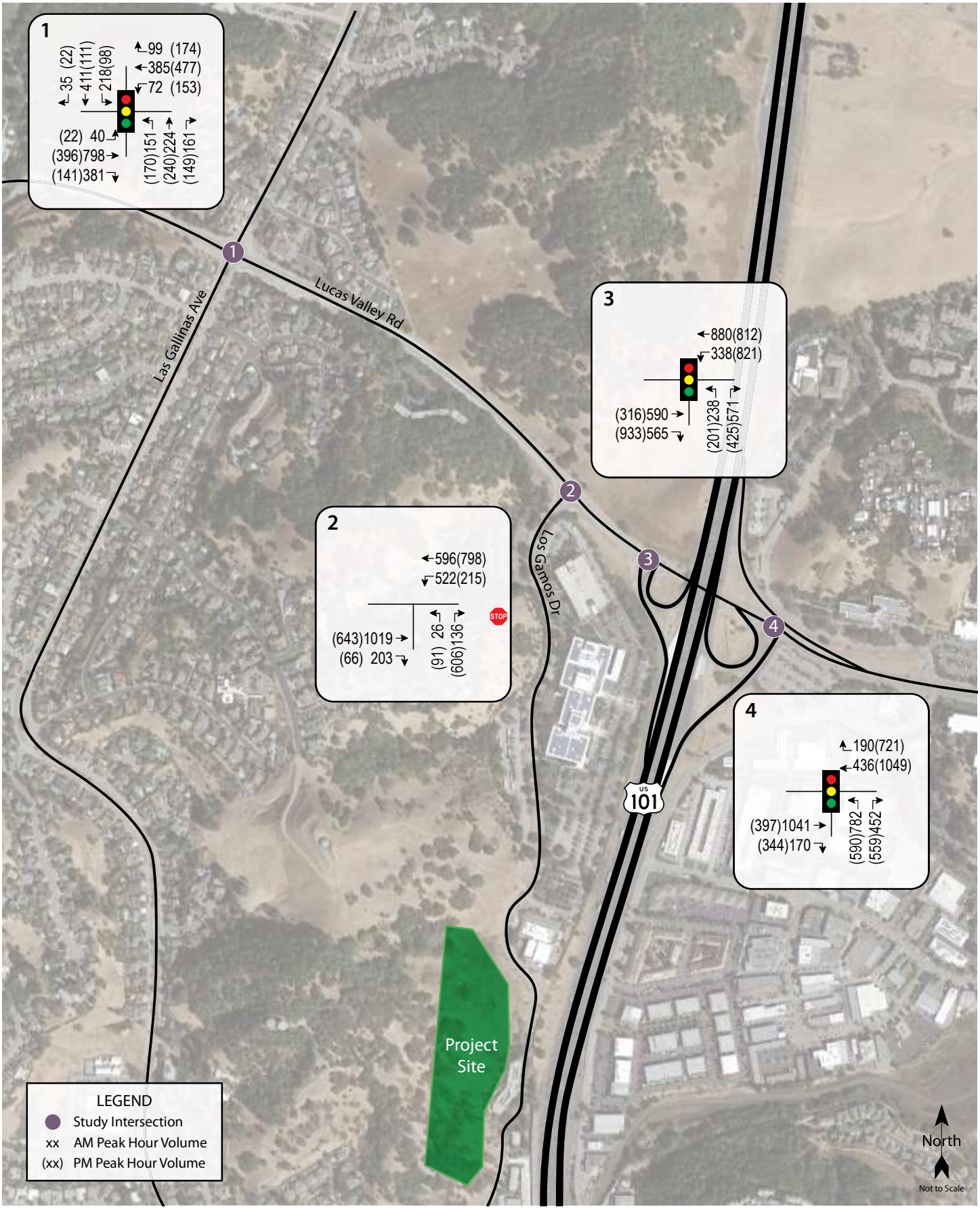
Traffic Impact Study for the Los Gamos Apartments

Figure 2 – Existing Traffic Volumes



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Traffic Impact Study for the Los Gamos Apartments

Figure 3 – Future Traffic Volumes

Project Description

The proposed project includes the development of 192 apartment units, of which 20 percent, or 36 units would be affordable, as well as a 4,323 square-foot market and a 3,112 square-foot community room on a site that is currently vacant. The proposed project site plan is shown in Figure 4.

Trip Generation

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 10th Edition, 2017 for "Multi-Family Housing (Mid-Rise)" (LU #221) and "Supermarket" (LU #850), as these descriptions most closely match the proposed uses.

Internal Capture Trips

The *Trip Generation Manual* also includes data and methodologies that can be applied to determine the proportion of internal trips that may occur within a development area that includes a variety of land uses. Internal trips occur at mixed-use developments, and in the case of the proposed project would consist of residents patronizing the adjacent community market. The majority of these trips would be made by walking, and the few that would be made by automobile would only travel on-site, so would not affect the adjacent street network. Copies of the spreadsheets indicating the derivation of the internal capture rates for peak hours are provided in Appendix C.

In light of the site's location and with staff input an internal capture rate of 15 percent of the daily supermarket trips was adopted. Since the concept of internal capture is that it eliminates both ends of a trip that occurs between on-site housing and the market, the volume that was captured at the market end of the trip was then also deducted from the housing end.

Pass-by Trips

Some portion of traffic associated with the proposed supermarket would be drawn from existing traffic to and from uses located along Los Gamos Drive. These vehicle trips are not considered "new," but are instead comprised of drivers who are already traveling in the area and choose to make an interim stop. While the trips would generally be diverted to the south end of Los Gamos because it ends near the site, this type of trip is typically drawn from traffic passing by the site and is therefore referred to as "pass-by."

The percentage of these pass-by trips was developed based on information also provided in the Trip Generation Handbook, 2018 which includes pass-by data collected at numerous locations for many land uses. It is noted that only a p.m. peak hour rate is provided for this land use; it was assumed that the pass-by rate during the morning peak hour and for the day overall would be less than that for the p.m. peak hour.

Total Project Trip Generation

Based on application of these rates and after deducting the internal capture trips, the proposed project is expected to generate an average of 1,368 vehicle trips per day, including 76 a.m. peak hour trips and 98 trips during the p.m. peak hour. After deductions are made to reflect pass-by trips, the project would be expected to generate 1,270 net new trips daily, with 73 trips occurring during the a.m. peak hour and 88 trips during the p.m. peak hour. Taken individually, after discounting the internal capture trips, the proposed residences would be expected to generate an average of 975 trips daily (1,044 less the 69 internally captured trips), with 64 of these occurring during the morning peak hour and 71 during the evening peak hour. These results are summarized in Table 7.

Traffic Impact Study for the Los Gamos Apartments

Figure 4 – Site Plan

Source: STOEV Design Group Inc, 1/21

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STOEV design group

THE NEIGHBORHOOD AT LOS GAMOS

San Rafael, CA

L1.01

OVERALL SITE PLAN

November 2020

Table 7 – Trip Generation Summary											
Land Use	**Units**	**Daily**		**AM Peak Hour**				**PM Peak Hour**			
		Rate	**Trips**	**Rate**	**Trips**	**In**	**Out**	**Rate**	**Trips**	**In**	**Out**
Multifamily Housing	192 du	5.44	1,044	0.36	69	18	51	0.44	84	52	32
Supermarket	4.323 ksf	106.78	462	3.82	17	10	7	9.24	40	20	20
Subtotal			***1,506***		***86***	***28***	***58***		***124***	***72***	***52***
Internal Capture		*-15%**	*-138*	*n/a*	*-10*	*-4*	*-6*	*n/a*	*-26*	*-14*	*-12*
Subtotal (Driveway Trips)			**1,368**		**76**	**24**	**52**		**98**	**58**	**40**
Primary Supermarket Trips			*393*		*12*	*8*	*4*		*27*	*13*	*14*
Pass-By		*-25%*	*-98*	*-25%*	*-3*	*-2*	*-1*	*-36%*	*-10*	*-5*	*-5*
Net New Trips			**1,270**		**73**	**22**	**51**		**88**	**53**	**35**

Note: ksf = 1,000 square feet; du = dwelling unit

* Assumed 15% of supermarket daily trips would be internally captured; that value was then doubled to account for both ends of the trip.

Trip Distribution

The pattern used to allocate new project trips to the street network was determined by reviewing Census data and assuming it would apply to employment patterns for the site's residents. The distribution assumptions are shown in Table 8.

Table 8 – Trip Distribution Assumptions	
Route	**Percent**
To/from US 101 south of Lucas Valley Rd	58
To/from US 101 north of Lucas Valley Rd	36
To/from Las Gallinas Ave north of Lucas Valley Rd	3
To/from Las Gallinas Ave south of Lucas Valley Rd	3
TOTAL	**100**

Vehicle Miles Traveled (VMT)

Senate Bill (SB) 743 established a change in the metric to be applied under the California Environmental Quality Act (CEQA) for determining traffic impacts associated with development projects. As of July 1, 2020, rather than the delay-based criteria associated with a Level of Service analysis, the increase in Vehicle Miles Traveled (VMT) as a result of a project became the basis for determining transportation impacts. The *City of San Rafael Traffic Impact Analysis Guidelines*, Draft, March 2021, describes the City's methodology for assessing and evaluating VMT for development projects. Per these guidelines, since the project includes both residential and retail uses, VMT was evaluated separately for each use.

The City's guidelines indicate that a residential project located in a low VMT area for its land use can be screened out from further VMT analysis, as it is presumed to have a less-than-significant transportation impact. Low VMT areas for residential projects are defined as generating vehicle travel that is 15 or more percent below the existing residential VMT per capita for the nine-county Bay Area, as determined by the Transportation Authority of Marin Demand Model (TAMDM); the residential VMT per capita for the nine-county Bay Area is 13.3 miles. Applying the

City's threshold, a residential project generating a VMT of 11.3 miles per capita or less can be presumed to have a less-than-significant VMT impact. The TAMDM model includes traffic analysis zones (TAZ) covering geographic areas throughout Marin County, including 1,400 Micro Analysis Zones (MAZ) within which VMT characteristics are estimated. The Los Gamos Apartments project site is located within MAZ 5349, which has a baseline VMT per capita of 10.8 miles.

In addition to considering the project location, other elements of the project can impact the project's estimated VMT, such as density and the provision of on-site affordable housing. The publication *Quantifying Greenhouse Gas Mitigation Measures*, California Air Pollution Control Officers Association (CAPCOA), 2010, includes a methodology to determine the VMT reductions associated with increases in residential density using conventional single-family home development as a baseline. For the proposed Los Gamos Apartments project, which has a residential density of 16.48 units per acre, an 8.2 percent reduction in VMT is projected. A methodology published in *Income, Location Efficiency, and VMT: Affordable Housing as a Climate Strategy*, The California Housing Partnership, 2015, was used to determine the VMT reductions associated with provision of on-site affordable housing (this method is also currently being used by the City of San Jose). The Los Gamos Apartments project would designate 20 percent of its apartments, or 36 units, as affordable units with below-market rate rents. The corresponding reduction in the project's VMT is projected to be 2.0 percent.

Combined, the project's proposed density and provision of onsite affordable housing would reduce its per capita VMT by 10.2 percent, thereby resulting in a project-specific rate of 9.7 VMT per capita. This is below the applied VMT significance threshold of 11.3 VMT per capita. Accordingly, the residential component of the project as proposed would be expected to result in a less-than-significant VMT impact. A summary of the VMT input variables and adjustments is included in Appendix D.

A summary of the VMT findings for the resident component is provided in Table 9.

Table 9 – Vehicle Miles Traveled Analysis Summary

VMT Metric	Baseline VMT Rate	Significance Threshold	Project VMT Rate	Resulting Significance
Residential VMT per Capita (Regional Baseline)	13.3	11.3	9.7	Less than significant

Note: VMT Rate is measured in VMT/Capita, or the number of daily miles driven per resident

The project also includes an on-site 4,323 square foot market. Based on the City's draft TIA guidelines, local-serving retail of less than 50,000 square feet can generally be presumed to have a less-than-significant impact on VMT. This presumption is readily validated by the fact that customers of the market will include on-site residents who would not generate VMT when patronizing the market, as well as employees in the surrounding area that would otherwise need to travel a longer distance, mostly by vehicle, to visit a competing retail use. The retail component of the project would therefore be expected to result in a less-than-significant VMT impact.

While the project is expected to fall below VMT significance thresholds, several additional transportation demand management (TDM) strategies are available that could further reduce the amount of vehicle traffic and VMT generated by the project. One effective option could be provision of "unbundled" parking, which entails separating the cost associated with parking from the cost of renting an apartment, thereby providing a financial benefit through lower housing costs to those who do not own a vehicle (or own fewer vehicles). Another TDM option would be to provide an on-site car share vehicle (often offered through a vendor such as ZipCar or similar service) to be used by residents who do not own cars and those who generally rely on walking, bicycling, and transit for transportation but occasionally require use of a vehicle. A third, easily-implemented, TDM measure would be to designate an on-site manager or employee to provide transit and ridesharing information to residents, particularly those just moving in who may be unfamiliar with the area and available services.

Finding – The project would be expected to have a less-than-significant transportation impact on vehicle miles traveled.

Recommendation – The project proponents should consider implementing Transportation Demand Management techniques such as "unbundled" parking, providing an on-site car share vehicle, and providing transit and ridesharing information to help further reduce the project's VMT.

Intersection Operation

Existing plus Project Conditions

Upon the addition of project-related traffic to the Existing volumes, the study intersections are expected to continue operating acceptably during both peak hours. These results are summarized in Table 10. Project traffic volumes are shown in Figure 5.

Table 10 – 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. Lucas Valley Rd/Las Gallinas Ave	20.7	C	15.2	B	20.7	C	15.2	B
2. Lucas Valley Rd/Los Gamos Dr	25.4	C	15.2	B	26.0	C	16.7	B
3. Lucas Valley Rd/US 101 S Ramps	12.4	B	12.2	B	12.9	B	13.0	B
4. Lucas Valley Rd/US 101 N Ramps	16.1	B	13.2	B	16.2	B	13.7	B

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

Finding – The study intersections would continue operating acceptably with project traffic added to Existing volumes.

Future plus Project Conditions

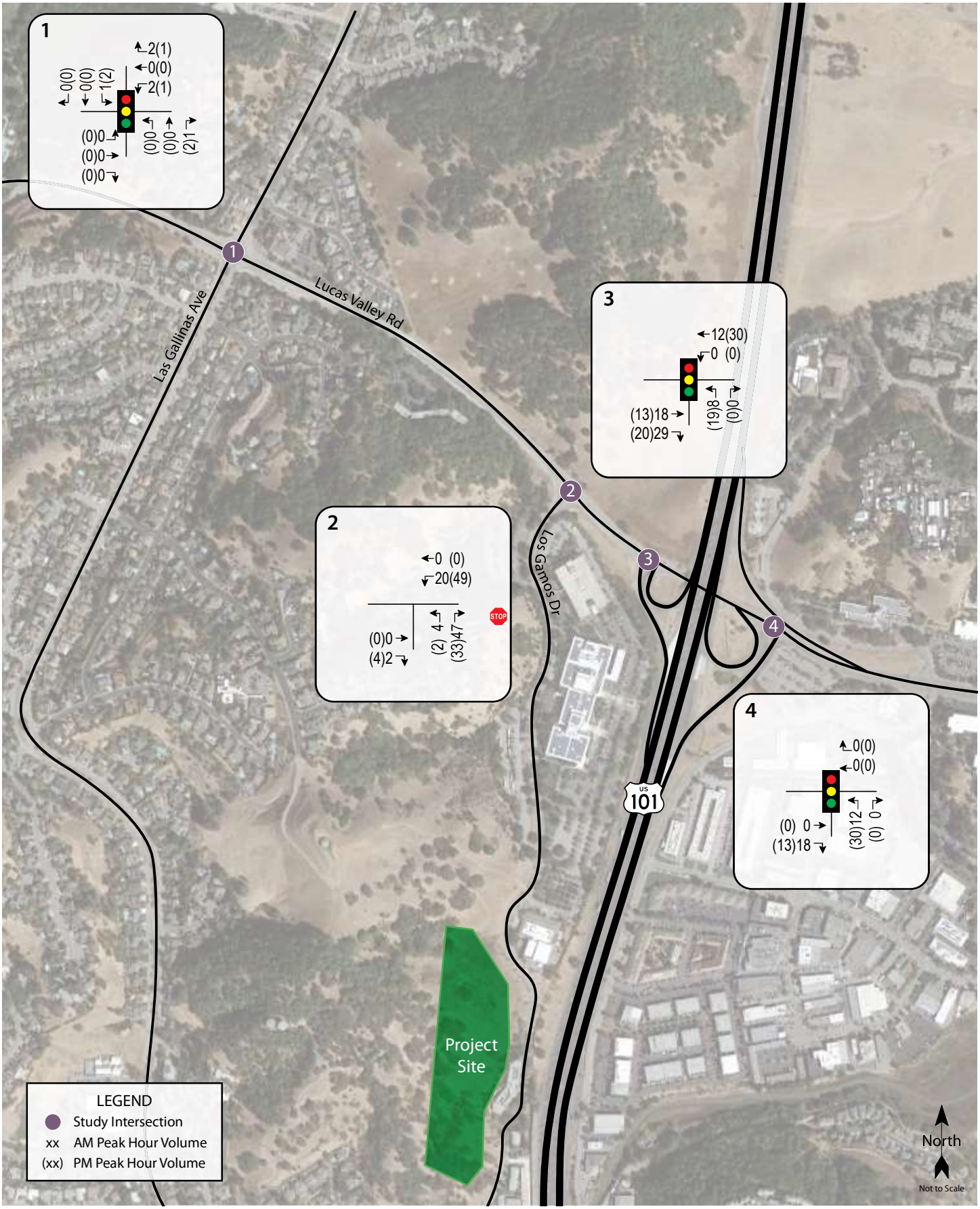
Upon the addition of project-generated traffic to the anticipated Future volumes, the study intersections are expected to continue operating acceptably at LOS D or better during both peak periods. The Future plus Project operating conditions are summarized in Table 11.

Table 11 – Future and Future plus Project Peak Hour Intersection Levels of Service

Study Intersection	Future Conditions				Future plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Lucas Valley Rd/Las Gallinas Ave	31.7	C	17.7	B	32.0	C	17.8	B
2. Lucas Valley Rd/Los Gamos Dr	42.2	D	46.0	D	50.4	D	53.9	D
3. Lucas Valley Rd/US 101 S Ramps	14.9	B	49.0	D	15.6	B	53.6	D
4. Lucas Valley Rd/US 101 N Ramps	48.5	D	33.4	C	49.9	D	36.5	D

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

Finding – The study intersections will continue operating acceptably with project traffic added to anticipated Future volumes.



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Traffic Impact Study for the Los Gamos Apartments

Figure 5 – Project Traffic Volumes

Alternative Modes

Pedestrian Facilities

Given that the site is located approximately one half-mile north of numerous commercial land uses, including Safeway and the Northgate Mall, it is reasonable to assume that some project residents would want to walk and/or bike to reach their destinations. The existing, continuous sidewalk on Los Gamos Road connects to the surrounding pedestrian network on Manual T Freitas Parkway, which provides access to several commercial uses; however, there are no existing pedestrian facilities connecting Los Gamos Road to Los Gamos Drive. These two roads terminate just south of 1401 Los Gamos Drive and the existing sidewalks on both Los Gamos Drive and Los Gamos Road are effectively split by the parking lot to 1401 Los Gamos Drive.

Finding – Pedestrian facilities serving the project site are discontinuous. The existing gap in the sidewalk network between Los Gamos Drive and Los Gamos Road impacts convenient access to and from the commercial uses south of the project site.

Recommendation – The project applicant should work with the property owners to the south to provide a multi-use path connecting existing sidewalks on Los Gamos Drive to Los Gamos Road. It is noted that improving connected pedestrian facilities would also be expected to contribute to a reduction in the site's VMT.

Bicycle Facilities

Existing bike lanes on Los Gamos Drive would be maintained with the planned project frontage improvements. These existing facilities, along with planned future bicycle facilities on Lucas Valley Road, provide adequate access for bicyclists.

Finding – Bicycle facilities serving the project site are generally adequate.

Recommendation – As recommended above, the project applicant should work with the neighboring property owners to the south to provide a multi-use path that would connect to existing bicycle facilities on Los Gamos Road.

Transit

Existing transit routes are adequate to accommodate project-generated transit trips. Although the existing stops are not within what is generally considered an "acceptable" walking distance of the site, they are sufficiently close that residents could walk or bicycle to the Lucas Valley Bus Pad or the Marin Civic Center SMART Station.

Finding – Transit facilities serving the project site are adequate for the anticipated demand.

Access and Circulation

Site Access

The site would be accessed via a new driveway located at the southern terminus of Los Gamos Drive, just north of the driveway and parking lot to 1401 Los Gamos Drive. Given the location of the proposed driveway, it is noted that project trips will predominantly turn right to enter the site and turn left to exit the site.

Given that the project would be constructed on the hillside on the west side of Los Gamos Drive, the project driveway would approach the roadway at a grade. To ensure that the proposed on-site streets and driveway operate acceptably, the design should conform to the City of San Rafael Fire Department standards, the City of San Rafael Municipal Code, the City of San Rafael Hillside Design Guidelines, and any other applicable standards as determined by the City. Per Chapter 14.12.030; Property Development Standards (-H), the maximum driveway grade should not exceed eighteen percent unless an exception is granted by the City. A suitable transition at the street and driveway apron should be provided to allow vehicles to safely transition from the roadway to the driveway and vice versa.

Sight Distance

Sight distances along Los Gamos Drive at the project driveway were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance for driveway approaches is based on stopping sight distance. Based on a posted speed of 30 mph, the minimum stopping sight distance needed is 200 feet.

Based on a review of field conditions, sight distance from the location of the proposed project driveway extends 150 north towards the horizontal curve along Los Gamos Drive. Similarly, sight lines from the proposed driveway location extend 150 feet south into the parking lot of 1401 Los Gamos Drive.

Finding – Sight distances along Los Gamos Drive are adequate to accommodate all turns into and out of the site; however, existing trees and vegetation have the potential to obstruct sight lines.

Recommendation – To provide adequate sight distance from the proposed project driveway, nearby trees should be trimmed to clear vegetation below a height of seven feet. Because landscaping and signs can impede clear sight lines, any new plantings or signs should be designed to ensure that adequate sight lines will be maintained.

Access Analysis

Left-Turn Lane Warrants

Given that that the project driveway would be located at the southern terminus of Los Gamos Drive, project trips are anticipated to come from the north, resulting in a right turn into the site. A left-turn lane analysis was therefore not performed.

Finding – A left-turn lane is not warranted on Los Gamos Drive at the project driveway as there are unlikely to be many left turns into the site.

On-site Circulation

The AutoTURN application of AutoCAD was used to evaluate the adequacy of access for emergency vehicles. As designed, there would be no anticipated issues with fire truck access. It is noted that the AutoTURN analysis software

does not consider roadway grades. The analysis, therefore, only addresses the adequacy of turning movements in a horizontal plane. An exhibit showing the expected travel path is provided in Appendix E.

Finding – On-site circulation would be expected to operate acceptably.

Parking

The project was analyzed to determine whether the proposed parking supply would be sufficient for the anticipated parking demand. The project site as proposed would provide 171 covered parking spaces for the apartments, 11 spaces for the community center and market, and 42 surface parking spaces for a total of 224 on-site parking spaces.

As this is a planned development, the proposed parking supply was evaluated against the anticipated parking demand using standard rates from the ITE *Parking Generation*, 5th Edition, 2019. The land uses "Affordable Housing: Income Limits" (ITE LU 223) and "Multifamily Housing (Mid-Rise)" (ITE LU 221) and rates based on number of bedrooms were used per ITE's guidance. Given the density of the development and its relatively isolated location, the community and market are considered to be only local-serving and not generating substantial outside parking demand.

In addition, several transportation amenities will be provided to residents to reduce both vehicle ownership and use. These amenities include:

- Pre-wiring for electric bike charging with storage for residents throughout the development and for the community at Community Center.
- Pre-wiring of the development to allow Wi-Fi accessibility throughout the site.
- Implementation of redesigned bollards between Los Gamos Road and the Parking Lot of 1401 to improve both the safety and functionality for walkers and bikers.
- Pre-paid public transit clipper cards including five round-trips per week to Santa Rosa or San Francisco to facilitate the use of public transportation, included in annual rent.
- Potential shuttle service from the Neighborhood to the US 101 Corridor Lucas Valley transit stops and/or the Las Gallinas and Lucas Valley Road intersection, and to downtown San Rafael.
- Storage per unit of up to 76 square feet, wired for possible post-COVID 19 work from home optionality.
- Unbundled parking pricing to discourage excessive car ownership.
- Installation of required electric vehicle (EV) charging stations and pre-wiring of all parking spaces to be capable of EV charging.
- Seven-to-ten EV's for residents to utilize on-demand, similar to Turo.com.

The measures above were evaluated using modeling detailed in the California Air Pollution Control Officers Association's (CAPCOA) *Quantifying Greenhouse Gas Mitigation Measures.* CAPCOA is currently one of the most updated and accurate models in forecasting reductions in traffic and parking from mitigation measures and is an accepted standard in communities across California. According to the model's output, the set of transportation amenities would reduce parking demand by 15 percent.

Other available sources corroborate this finding. For example, unbundled parking as a stand-alone strategy is estimated to reduce parking demand by 10 to 15 percent based on the Metropolitan Transportation Commission (MTC)'s *Reforming Parking Policies to Support Smart Growth,* 2017.

Based on the ITE rates, the average peak parking demand for the residential component would be 226 parking spaces. A 15-percent reduction in parking demand, or 34 spaces, would result in a total parking demand of 192 spaces. The proposed parking supply of 224 spaces would exceed the anticipated demand. The estimated project parking demand is shown in Table 12.

Table 12 – Parking Analysis			
Land Use	**Units**	**Rate**	**Parking Spaces**
ITE Parking Demand			
Affordable Housing	45 bedrooms	0.54 space per unit	24
Multifamily Housing (Mid-Rise)	269 bedrooms	0.75 spaces per unit	202
Parking Demand Subtotal			*226 spaces*
Transportation Amenities (-15%)			*-34 spaces*
Parking Demand Total			**192 spaces**
Proposed Parking Supply			
Market Spaces			11
Residential Spaces			171 covered, 42 uncovered
Total Proposed			**224 spaces (171covered, 53 uncovered)**

Finding – The project's total proposed parking supply exceeds anticipated parking demand based on ITE rates with reductions for transportation amenities.

Recommendation – Since the convenience market would be used primarily by the residents, and residents would likely walk to the market, the parking demand for the convenience market would be limited. It is recommended that parking for the market also be available for use by visitors to the development.

Bicycle Storage

The project site plan does not indicate the provision of on-site bicycle parking. The City's bicycle parking supply requirements are included in the City of San Rafael's Municipal Code, Chapter 14.18.090; Bicycle Parking. Based on City requirements, multi-family residential uses should provide five percent of the total required vehicle parking spaces with a minimum of one two-bike capacity rack. With a total of 353 required automobile parking spaces per the City's requirements, the project would be required to provide at least 18 short-term bicycle parking spaces.

Conclusions and Recommendations

Conclusions

- The project is expected to generate an average of 1,270 net new trips per day, including 73 trips during the a.m. peak hour and 88 trips during the p.m. peak hour.
- The project would be expected to have a less-than-significant transportation impact on vehicle miles traveled.
- Under Existing Conditions, all study intersections operate acceptably during both peak hours.
- Upon the addition of project-generated traffic to Existing volumes, all intersections are expected to continue operating acceptably.
- Under the anticipated Future volumes, all four study intersections are expected to operate acceptably at LOS D or better during both peak hours and would be expected to continue doing so upon the addition of project-generated traffic.
- Bicycle access is generally adequate and would be improved in the future with the implementation of the recommended facilities surrounding the project site indicated in the *San Rafael Bicycle and Pedestrian Master Plan, 2018 Update* and with the recommended connection to Los Gamos Road.
- Existing transit facilities near the project site are adequate.
- Sight distances along Los Gamos Drive at the project driveway are adequate for the posted speed limit.
- A left-turn lane is not warranted on Los Gamos Drive at the project driveway.
- On-site circulation is expected to operate acceptably assuming the driveway connection is designed to provide an adequate transition between the road and the driveway.
- Peak parking demand based on ITE parking demand rates with adjustments for transportation amenities results in a demand of 192 spaces, less than the proposed supply of 224 spaces. Since the convenience market will be used primarily by the residents, and they would be expected to walk to the market much of the time, the parking demand for the convenience market could reasonably be assumed to be shared by guests of the development.

Recommendations

- To maintain adequate sight lines for vehicles leaving the site, it is recommended that landscaping be trimmed such that tree canopies are at least seven feet above the ground. Low-lying vegetation should be no greater than three feet in height. Any signs or monuments planned along the project's frontage should not obstruct sight distance at the project driveway.
- The design of the driveway should conform to City design standards for hillside developments.
- The project proponents should consider implementing Transportation Demand Management techniques such as providing an on-site car share vehicle and transit and ridesharing information to help further reduce the project's VMT.
- Secure parking facilities for at least 18 bicycles should be provided on-site.

Study Participants and References

Study Participants

Principal in Charge	Dalene J. Whitlock, PE, PTOE
Principal Planner	Brian Canepa, AICP
Assistant Engineer	Kimberly Tellez
Graphics	Cameron Wong
Editing/Formatting	Alex Scrobonia, Hannah Yung-Boxdell
Quality Control	Dalene J. Whitlock, PE, PTOE

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Communications

Davini, Lauren "Re: Los Gamos Apartments." Message to Kevin Rangel regarding vertical curve analysis. January 3, 2020. Email.

Minshall, Josh "Re: Los Gamos Apartments." Message to Kevin Rangel regarding vertical curve analysis. January 6, 2020. Email.

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Appendix A

Collision Rate Calculations

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Intersection Collision Rate Calculations

TIS for the Los Gamos Apartments Project

Intersection # 1: Lucas Valley Road & Las Gallinas Avenue

Date of Count: Tuesday, November 19, 2019

Number of Collisions: 1
Number of Injuries: 0
Number of Fatalities: 0
ADT: 27100
Start Date: May 1, 2014
End Date: April 30, 2019
Number of Years: 5

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

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

$$\text{collision rate} = \frac{1 \times 1{,}000{,}000}{27{,}100 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.02 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.24 c/mve**	**0.5%**	**44.6%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 2: Lucas Valley Road & Los Gamos Road

Date of Count: Tuesday, November 19, 2019

Number of Collisions: 2
Number of Injuries: 0
Number of Fatalities: 0
ADT: 19900
Start Date: May 1, 2014
End Date: April 30, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Urban

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

$$\text{collision rate} = \frac{2 \times 1{,}000{,}000}{19{,}900 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.06 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.19 c/mve**	**0.4%**	**46.8%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

TIS for the Los Gamos Apartments Project

Intersection # 3: Lucas Valley Road & US 101 South Ramps

Date of Count: Tuesday, November 19, 2019

Number of Collisions: 8
Number of Injuries: 4
Number of Fatalities: 0
ADT: 28100
Start Date: May 1, 2014
End Date: April 30, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Urban

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

$$\text{collision rate} = \frac{8 \times 1{,}000{,}000}{28{,}100 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.16 c/mve**	**0.0%**	**50.0%**
Statewide Average*	**0.19 c/mve**	**0.4%**	**46.8%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 4: Lucas Valley Road & US 101 North Ramps

Date of Count: Tuesday, November 19, 2019

Number of Collisions: 8
Number of Injuries: 5
Number of Fatalities: 0
ADT: 23900
Start Date: May 1, 2014
End Date: April 30, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Urban

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

$$\text{collision rate} = \frac{8 \times 1{,}000{,}000}{23{,}900 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.18 c/mve**	**0.0%**	**62.5%**
Statewide Average*	**0.19 c/mve**	**0.4%**	**46.8%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Appendix B

Intersection Level of Service Calculations

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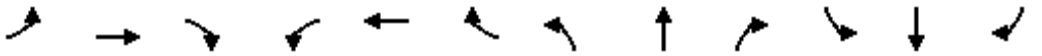


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	533	282	61	286	96	123	158	149	121	316	19
Future Volume (vph)	20	533	282	61	286	96	123	158	149	121	316	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	13	15	13	13	13	16	12	12	12	13	14	12
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.97	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)	1732	1941	1518	1732	1824	1665	1676	1765	1449	1732	1882	1449
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)	1732	1941	1518	1732	1824	1665	1676	1765	1449	1732	1882	1449
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	22	586	310	67	314	105	135	174	164	133	347	21
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	22	586	310	67	314	105	135	174	164	133	347	21
Confl. Peds. (#/hr)						1			8			22
Confl. Bikes (#/hr)			1						27			8
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			Free			Free			Free
Actuated Green, G (s)	2.0	29.7	81.0	4.4	32.1	81.0	9.0	20.5	81.0	8.4	19.9	81.0
Effective Green, g (s)	3.0	31.7	81.0	5.4	34.1	81.0	10.0	22.5	81.0	9.4	21.9	81.0
Actuated g/C Ratio	0.04	0.39	1.00	0.07	0.42	1.00	0.12	0.28	1.00	0.12	0.27	1.00
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	64	759	1518	115	767	1665	206	490	1449	200	508	1449
v/s Ratio Prot	0.01	c0.30		c0.04	0.17		c0.08	0.10		0.08	c0.18	
v/s Ratio Perm			c0.20			0.06			0.11			0.01
v/c Ratio	0.34	0.77	0.20	0.58	0.41	0.06	0.66	0.36	0.11	0.67	0.68	0.01
Uniform Delay, d1	38.0	21.5	0.0	36.7	16.4	0.0	33.9	23.4	0.0	34.3	26.4	0.0
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	1.2	4.5	0.3	4.8	0.1	0.1	5.6	0.2	0.2	6.3	3.0	0.0
Delay (s)	39.2	26.0	0.3	41.5	16.5	0.1	39.5	23.6	0.2	40.6	29.5	0.0
Level of Service	D	C	A	D	B	A	D	C	A	D	C	A
Approach Delay (s)		17.6			16.4			20.0			31.2	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	765	79	247	360	26	118
Future Volume (veh/h)	765	79	247	360	26	118
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.98	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1652	1652	1588	1652	1652	1652
Adj Flow Rate, veh/h	805	83	260	379	27	124
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	839	698	663	1288	201	180
Arrive On Green	0.51	0.51	0.23	0.78	0.13	0.13
Sat Flow, veh/h	1652	1374	2934	1652	1573	1404
Grp Volume(v), veh/h	805	83	260	379	27	124
Grp Sat Flow(s),veh/h/ln	1652	1374	1467	1652	1573	1404
Q Serve(g_s), s	30.4	2.1	4.9	4.3	1.0	5.5
Cycle Q Clear(g_c), s	30.4	2.1	4.9	4.3	1.0	5.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	839	698	663	1288	201	180
V/C Ratio(X)	0.96	0.12	0.39	0.29	0.13	0.69
Avail Cap(c_a), veh/h	839	698	663	1288	411	367
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.94	0.94	1.00	1.00
Uniform Delay (d), s/veh	15.4	8.4	21.4	2.0	25.1	27.1
Incr Delay (d2), s/veh	22.7	0.3	0.4	0.5	0.3	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.9	0.8	2.0	2.1	0.4	2.4
LnGrp Delay(d),s/veh	38.1	8.7	21.7	2.6	25.4	31.8
LnGrp LOS	D	A	C	A	C	C
Approach Vol, veh/h	888			639	151	
Approach Delay, s/veh	35.4			10.4	30.6	
Approach LOS	D			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	17.7	36.0				53.7		11.3
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	5.0	32.0				41.0		16.0
Max Q Clear Time (g_c+I1), s	6.9	32.4				6.3		7.5
Green Ext Time (p_c), s	0.0	0.0				1.4		0.3

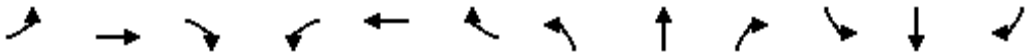
Intersection Summary	
HCM 2010 Ctrl Delay	25.4
HCM 2010 LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	350	537	265	495	109	492
Future Volume (veh/h)	350	537	265	495	109	492
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	2	0	0	0
Ped-Bike Adj(A_pbT)		0.98	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1631	1765	1835	1733	1733
Adj Flow Rate, veh/h	372	421	282	527	116	76
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	706	668	635	1507	171	700
Arrive On Green	0.40	0.39	0.76	1.00	0.10	0.10
Sat Flow, veh/h	1765	1353	1681	1835	1651	1473
Grp Volume(v), veh/h	372	421	282	527	116	76
Grp Sat Flow(s),veh/h/ln	1765	1353	1681	1835	1651	1473
Q Serve(g_s), s	12.8	6.2	4.9	0.0	5.4	0.0
Cycle Q Clear(g_c), s	12.8	6.2	4.9	0.0	5.4	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	706	668	635	1507	171	700
V/C Ratio(X)	0.53	0.63	0.44	0.35	0.68	0.11
Avail Cap(c_a), veh/h	706	668	635	1507	248	768
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.75	0.75	1.00	1.00
Uniform Delay (d), s/veh	18.2	9.9	6.8	0.0	34.6	11.6
Incr Delay (d2), s/veh	2.8	4.5	0.4	0.5	9.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.1	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	3.0	2.5	0.2	2.9	0.9
LnGrp Delay(d),s/veh	21.1	14.4	7.3	0.5	44.2	11.8
LnGrp LOS	C	B	A	A	D	B
Approach Vol, veh/h	793			809	192	
Approach Delay, s/veh	17.5			2.9	31.3	
Approach LOS	B			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	33.7	35.0				68.7		11.3
Change Period (Y+Rc), s	4.5	* 4.5				4.5		3.5
Max Green Setting (Gmax), s	26.0	* 31				60.5		11.5
Max Q Clear Time (g_c+I1), s	6.9	14.8				2.0		7.4
Green Ext Time (p_c), s	1.3	6.4				2.3		0.5

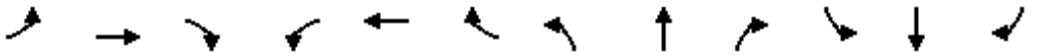
Intersection Summary	
HCM 2010 Ctrl Delay	12.4
HCM 2010 LOS	B

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	686	170	0	329	179	441	0	423	0	0	0
Future Volume (vph)	0	686	170	0	329	179	441	0	423	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	14	16	12	13	13	14	12	16	12	12	12
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0		3.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Frpb, ped/bikes		1.00	0.97		1.00	1.00	1.00		1.00			
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		1882	1656		1824	1550	1788		1700			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		1882	1656		1824	1550	1788		1700			
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)	0	722	179	0	346	188	464	0	445	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	144	0	0	0
Lane Group Flow (vph)	0	722	179	0	346	188	464	0	301	0	0	0
Confl. Peds. (#/hr)			11									
Confl. Bikes (#/hr)			2									
Turn Type		NA	Free		NA	Free	Prot		Prot			
Protected Phases		6			2		4		4			
Permitted Phases			Free			Free	4		4			
Actuated Green, G (s)		48.4	80.0		48.4	80.0	24.6		24.6			
Effective Green, g (s)		49.4	80.0		49.4	80.0	24.6		24.6			
Actuated g/C Ratio		0.62	1.00		0.62	1.00	0.31		0.31			
Clearance Time (s)		4.0			4.0		3.0		3.0			
Vehicle Extension (s)		5.0			4.0		3.0		3.0			
Lane Grp Cap (vph)		1162	1656		1126	1550	549		522			
v/s Ratio Prot		c0.38			0.19		c0.26		0.18			
v/s Ratio Perm			0.11			0.12						
v/c Ratio		0.62	0.11		0.31	0.12	0.85		0.58			
Uniform Delay, d1		9.5	0.0		7.2	0.0	25.9		23.3			
Progression Factor		0.72	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		2.1	0.1		0.7	0.2	11.4		1.5			
Delay (s)		8.9	0.1		7.9	0.2	37.4		24.9			
Level of Service		A	A		A	A	D		C			
Approach Delay (s)		7.2			5.2			31.2			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	345	91	111	351	67	133	130	133	61	95	22
Future Volume (vph)	20	345	91	111	351	67	133	130	133	61	95	22
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	13	15	13	13	13	16	12	12	12	13	14	12
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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	1.00	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	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)	1732	1941	1550	1732	1824	1700	1676	1765	1468	1732	1882	1464
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)	1732	1941	1550	1732	1824	1700	1676	1765	1468	1732	1882	1464
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	21	356	94	114	362	69	137	134	137	63	98	23
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	21	356	94	114	362	69	137	134	137	63	98	23
Confl. Peds. (#/hr)												3
Confl. Bikes (#/hr)									4			7
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			Free			Free			Free
Actuated Green, G (s)	1.9	20.8	60.9	6.3	25.2	60.9	6.1	11.8	60.9	4.0	9.7	60.9
Effective Green, g (s)	2.9	22.8	60.9	7.3	27.2	60.9	7.1	13.8	60.9	5.0	11.7	60.9
Actuated g/C Ratio	0.05	0.37	1.00	0.12	0.45	1.00	0.12	0.23	1.00	0.08	0.19	1.00
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	82	726	1550	207	814	1700	195	399	1468	142	361	1464
v/s Ratio Prot	0.01	0.18		c0.07	c0.20		c0.08	c0.08		0.04	0.05	
v/s Ratio Perm			0.06			0.04			c0.09			0.02
v/c Ratio	0.26	0.49	0.06	0.55	0.44	0.04	0.70	0.34	0.09	0.44	0.27	0.02
Uniform Delay, d1	28.0	14.6	0.0	25.3	11.6	0.0	25.9	19.7	0.0	26.6	21.0	0.0
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	0.2	0.1	1.8	0.1	0.0	9.0	0.2	0.1	0.8	0.1	0.0
Delay (s)	28.6	14.8	0.1	27.1	11.8	0.0	34.9	19.9	0.1	27.4	21.1	0.0
Level of Service	C	B	A	C	B	A	C	B	A	C	C	A
Approach Delay (s)		12.5			13.5			18.3			20.6	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.9	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			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	459	33	180	522	52	272
Future Volume (veh/h)	459	33	180	522	52	272
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1835	1835	1765	1835	1835	1835
Adj Flow Rate, veh/h	483	35	189	549	55	286
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	856	728	497	1228	404	360
Arrive On Green	0.47	0.47	0.15	0.67	0.23	0.23
Sat Flow, veh/h	1835	1560	3261	1835	1748	1560
Grp Volume(v), veh/h	483	35	189	549	55	286
Grp Sat Flow(s),veh/h/ln	1835	1560	1630	1835	1748	1560
Q Serve(g_s), s	11.4	0.7	3.1	8.5	1.5	10.4
Cycle Q Clear(g_c), s	11.4	0.7	3.1	8.5	1.5	10.4
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	856	728	497	1228	404	360
V/C Ratio(X)	0.56	0.05	0.38	0.45	0.14	0.79
Avail Cap(c_a), veh/h	856	728	497	1228	495	442
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.91	0.91	1.00	1.00
Uniform Delay (d), s/veh	11.6	8.7	22.9	4.7	18.3	21.7
Incr Delay (d2), s/veh	2.7	0.1	0.4	1.1	0.2	7.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	0.3	1.4	4.5	0.7	5.3
LnGrp Delay(d),s/veh	14.3	8.9	23.3	5.8	18.5	29.6
LnGrp LOS	B	A	C	A	B	C
Approach Vol, veh/h	518			738	341	
Approach Delay, s/veh	13.9			10.3	27.8	
Approach LOS	B			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	12.1	31.0				43.1		16.9
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	5.0	27.0				36.0		16.0
Max Q Clear Time (g_c+I1), s	5.1	13.4				10.5		12.4
Green Ext Time (p_c), s	0.0	1.7				2.2		0.5

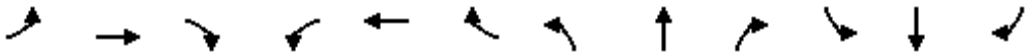
Intersection Summary	
HCM 2010 Ctrl Delay	15.2
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	283	446	463	538	150	254
Future Volume (veh/h)	283	446	463	538	150	254
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1631	1765	1835	1733	1733
Adj Flow Rate, veh/h	295	297	482	560	156	44
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	596	624	704	1469	206	792
Arrive On Green	0.34	0.32	0.84	1.00	0.12	0.12
Sat Flow, veh/h	1765	1387	1681	1835	1651	1473
Grp Volume(v), veh/h	295	297	482	560	156	44
Grp Sat Flow(s),veh/h/ln	1765	1387	1681	1835	1651	1473
Q Serve(g_s), s	10.6	0.0	8.7	0.0	7.3	0.0
Cycle Q Clear(g_c), s	10.6	0.0	8.7	0.0	7.3	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	596	624	704	1469	206	792
V/C Ratio(X)	0.50	0.48	0.68	0.38	0.76	0.06
Avail Cap(c_a), veh/h	596	624	704	1469	248	829
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.70	0.70	1.00	1.00
Uniform Delay (d), s/veh	21.1	10.6	4.5	0.0	33.8	8.8
Incr Delay (d2), s/veh	2.9	2.6	2.0	0.5	14.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	4.2	3.9	0.2	4.2	0.5
LnGrp Delay(d),s/veh	24.0	13.2	6.5	0.5	48.4	8.9
LnGrp LOS	C	B	A	A	D	A
Approach Vol, veh/h	592			1042	200	
Approach Delay, s/veh	18.6			3.3	39.7	
Approach LOS	B			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	37.0	30.0				67.0		13.0
Change Period (Y+Rc), s	4.5	* 4.5				4.5		3.5
Max Green Setting (Gmax), s	31.0	* 26				60.5		11.5
Max Q Clear Time (g_c+I1), s	10.7	12.6				2.0		9.3
Green Ext Time (p_c), s	2.5	4.1				2.5		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	12.2
HCM 2010 LOS	B

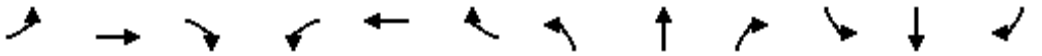
Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	318	226	0	575	427	436	0	405	0	0	0
Future Volume (vph)	0	318	226	0	575	427	436	0	405	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	14	16	12	13	13	14	12	16	12	12	12
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0		3.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Frpb, ped/bikes		1.00	0.98		1.00	1.00	1.00		1.00			
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		1882	1665		1824	1550	1788		1700			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		1882	1665		1824	1550	1788		1700			
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)	0	338	240	0	612	454	464	0	431	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	288	0	0	0
Lane Group Flow (vph)	0	338	240	0	612	454	464	0	143	0	0	0
Confl. Bikes (#/hr)			1									
Turn Type		NA	Free		NA	Free	Prot		Prot			
Protected Phases		6			2		4		4			
Permitted Phases			Free			Free	4		4			
Actuated Green, G (s)		46.5	80.0		46.5	80.0	26.5		26.5			
Effective Green, g (s)		47.5	80.0		47.5	80.0	26.5		26.5			
Actuated g/C Ratio		0.59	1.00		0.59	1.00	0.33		0.33			
Clearance Time (s)		4.0			4.0		3.0		3.0			
Vehicle Extension (s)		5.0			4.0		3.0		3.0			
Lane Grp Cap (vph)		1117	1665		1083	1550	592		563			
v/s Ratio Prot		0.18			c0.34		c0.26		0.08			
v/s Ratio Perm			0.14			0.29						
v/c Ratio		0.30	0.14		0.57	0.29	0.78		0.25			
Uniform Delay, d1		8.0	0.0		9.9	0.0	24.2		19.5			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		0.7	0.2		2.1	0.5	6.7		0.2			
Delay (s)		8.7	0.2		12.1	0.5	30.9		19.8			
Level of Service		A	A		B	A	C		B			
Approach Delay (s)		5.2			7.1			25.5			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	798	381	72	385	99	151	224	161	218	411	35
Future Volume (vph)	40	798	381	72	385	99	151	224	161	218	411	35
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	13	15	13	13	13	16	12	12	12	13	14	12
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.97	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)	1732	1941	1518	1732	1824	1665	1676	1765	1449	1732	1882	1449
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)	1732	1941	1518	1732	1824	1665	1676	1765	1449	1732	1882	1449
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	40	798	381	72	385	99	151	224	161	218	411	35
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	40	798	381	72	385	99	151	224	161	218	411	35
Confl. Peds. (#/hr)						1			8			22
Confl. Bikes (#/hr)			1						27			8
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			Free			Free			Free
Actuated Green, G (s)	2.8	35.9	86.7	3.0	36.1	86.7	9.5	18.0	86.7	11.8	20.3	86.7
Effective Green, g (s)	3.8	37.9	86.7	4.0	38.1	86.7	10.5	20.0	86.7	12.8	22.3	86.7
Actuated g/C Ratio	0.04	0.44	1.00	0.05	0.44	1.00	0.12	0.23	1.00	0.15	0.26	1.00
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	75	848	1518	79	801	1665	202	407	1449	255	484	1449
v/s Ratio Prot	0.02	c0.41		c0.04	0.21		0.09	0.13		c0.13	c0.22	
v/s Ratio Perm			c0.25			0.06			0.11			0.02
v/c Ratio	0.53	0.94	0.25	0.91	0.48	0.06	0.75	0.55	0.11	0.85	0.85	0.02
Uniform Delay, d1	40.6	23.3	0.0	41.2	17.3	0.0	36.8	29.4	0.0	36.0	30.6	0.0
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	3.6	18.0	0.4	70.8	0.2	0.1	12.4	0.9	0.2	22.6	12.6	0.0
Delay (s)	44.2	41.3	0.4	111.9	17.4	0.1	49.2	30.3	0.2	58.6	43.2	0.0
Level of Service	D	D	A	F	B	A	D	C	A	E	D	A
Approach Delay (s)		28.6			26.6			26.6			46.0	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	31.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	86.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1019	203	522	596	26	136
Future Volume (veh/h)	1019	203	522	596	26	136
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.98	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1652	1652	1588	1652	1652	1652
Adj Flow Rate, veh/h	1019	203	522	596	26	136
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	991	825	601	1371	189	169
Arrive On Green	0.60	0.60	0.20	0.83	0.12	0.12
Sat Flow, veh/h	1652	1374	2934	1652	1573	1404
Grp Volume(v), veh/h	1019	203	522	596	26	136
Grp Sat Flow(s),veh/h/ln	1652	1374	1467	1652	1573	1404
Q Serve(g_s), s	72.0	8.3	20.6	11.5	1.8	11.3
Cycle Q Clear(g_c), s	72.0	8.3	20.6	11.5	1.8	11.3
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	991	825	601	1371	189	169
V/C Ratio(X)	1.03	0.25	0.87	0.43	0.14	0.81
Avail Cap(c_a), veh/h	991	825	601	1371	223	199
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.71	0.71	1.00	1.00
Uniform Delay (d), s/veh	24.0	11.3	46.1	2.7	47.2	51.4
Incr Delay (d2), s/veh	36.0	0.7	9.6	0.7	0.3	18.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	42.4	3.3	9.1	5.4	0.8	5.3
LnGrp Delay(d),s/veh	60.0	12.0	55.7	3.4	47.6	69.9
LnGrp LOS	F	B	E	A	D	E
Approach Vol, veh/h	1222			1118	162	
Approach Delay, s/veh	52.0			27.9	66.3	
Approach LOS	D			C	E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	27.6	75.0				102.6		17.4
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	21.0	71.0				96.0		16.0
Max Q Clear Time (g_c+I1), s	22.6	74.0				13.5		13.3
Green Ext Time (p_c), s	0.0	0.0				2.6		0.1

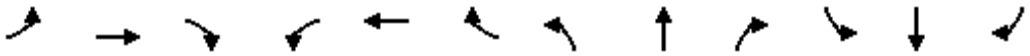
Intersection Summary	
HCM 2010 Ctrl Delay	42.2
HCM 2010 LOS	D

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	590	565	338	880	238	571
Future Volume (veh/h)	590	565	338	880	238	571
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	2	0	0	0
Ped-Bike Adj(A_pbT)		0.98	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1631	1765	1835	1733	1733
Adj Flow Rate, veh/h	590	424	338	880	238	151
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	832	857	502	1505	283	682
Arrive On Green	0.47	0.46	0.30	0.82	0.17	0.17
Sat Flow, veh/h	1765	1354	1681	1835	1651	1473
Grp Volume(v), veh/h	590	424	338	880	238	151
Grp Sat Flow(s),veh/h/ln	1765	1354	1681	1835	1651	1473
Q Serve(g_s), s	18.6	0.0	12.4	11.8	9.8	0.0
Cycle Q Clear(g_c), s	18.6	0.0	12.4	11.8	9.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	832	857	502	1505	283	682
V/C Ratio(X)	0.71	0.50	0.67	0.58	0.84	0.22
Avail Cap(c_a), veh/h	832	857	497	1499	283	678
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.42	0.42	1.00	1.00
Uniform Delay (d), s/veh	14.7	5.9	21.7	2.2	28.1	11.3
Incr Delay (d2), s/veh	5.1	2.0	1.6	0.7	21.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.4	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.2	4.3	6.2	5.8	6.1	1.8
LnGrp Delay(d),s/veh	19.8	7.9	23.6	2.9	49.5	11.6
LnGrp LOS	B	A	C	A	D	B
Approach Vol, veh/h	1014			1218	389	
Approach Delay, s/veh	14.8			8.7	34.8	
Approach LOS	B			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	24.2	36.0				60.2		15.0
Change Period (Y+Rc), s	4.5	* 4.5				4.5		3.5
Max Green Setting (Gmax), s	15.0	* 32				50.5		11.5
Max Q Clear Time (g_c+I1), s	14.4	20.6				13.8		11.8
Green Ext Time (p_c), s	0.1	6.4				4.9		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	14.9
HCM 2010 LOS	B

Notes

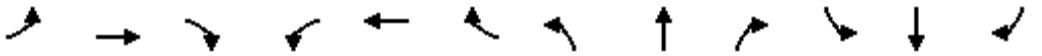


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1041	170	0	436	190	782	0	452	0	0	0
Future Volume (vph)	0	1041	170	0	436	190	782	0	452	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	14	16	12	13	13	14	12	16	12	12	12
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0		3.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Frpb, ped/bikes		1.00	0.97		1.00	1.00	1.00		1.00			
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		1882	1656		1824	1550	1788		1700			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		1882	1656		1824	1550	1788		1700			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1041	170	0	436	190	782	0	452	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	44	0	0	0
Lane Group Flow (vph)	0	1041	170	0	436	190	782	0	408	0	0	0
Confl. Peds. (#/hr)			11									
Confl. Bikes (#/hr)			2									
Turn Type		NA	Free		NA	Free	Prot		Prot			
Protected Phases		6			2		4		4			
Permitted Phases			Free			Free	4		4			
Actuated Green, G (s)		52.0	100.0		52.0	100.0	41.0		41.0			
Effective Green, g (s)		53.0	100.0		53.0	100.0	41.0		41.0			
Actuated g/C Ratio		0.53	1.00		0.53	1.00	0.41		0.41			
Clearance Time (s)		4.0			4.0		3.0		3.0			
Vehicle Extension (s)		5.0			4.0		3.0		3.0			
Lane Grp Cap (vph)		997	1656		966	1550	733		697			
v/s Ratio Prot		c0.55			0.24		c0.44		0.24			
v/s Ratio Perm			0.10			0.12						
v/c Ratio		1.04	0.10		0.45	0.12	1.07		0.59			
Uniform Delay, d1		23.5	0.0		14.5	0.0	29.5		22.9			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		40.7	0.1		1.5	0.2	52.5		1.3			
Delay (s)		64.2	0.1		16.0	0.2	82.0		24.2			
Level of Service		E	A		B	A	F		C			
Approach Delay (s)		55.2			11.2			60.8			0.0	
Approach LOS		E			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	48.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	110.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Las Gallinas Ave & Lucas Valley Rd

12/17/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	396	141	153	477	174	170	240	149	98	111	22
Future Volume (vph)	22	396	141	153	477	174	170	240	149	98	111	22
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	13	15	13	13	13	16	12	12	12	13	14	12
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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	1.00	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	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)	1732	1941	1550	1732	1824	1700	1676	1765	1468	1732	1882	1464
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)	1732	1941	1550	1732	1824	1700	1676	1765	1468	1732	1882	1464
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	23	408	145	158	492	179	175	247	154	101	114	23
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	23	408	145	158	492	179	175	247	154	101	114	23
Confl. Peds. (#/hr)												3
Confl. Bikes (#/hr)									4			7
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			Free			Free			Free
Actuated Green, G (s)	1.3	18.2	61.5	6.4	23.3	61.5	7.7	13.9	61.5	5.0	11.2	61.5
Effective Green, g (s)	2.3	20.2	61.5	7.4	25.3	61.5	8.7	15.9	61.5	6.0	13.2	61.5
Actuated g/C Ratio	0.04	0.33	1.00	0.12	0.41	1.00	0.14	0.26	1.00	0.10	0.21	1.00
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	64	637	1550	208	750	1700	237	456	1468	168	403	1464
v/s Ratio Prot	0.01	0.21		c0.09	c0.27		c0.10	c0.14		0.06	0.06	
v/s Ratio Perm			0.09			c0.11			0.10			0.02
v/c Ratio	0.36	0.64	0.09	0.76	0.66	0.11	0.74	0.54	0.10	0.60	0.28	0.02
Uniform Delay, d1	28.9	17.6	0.0	26.2	14.6	0.0	25.3	19.7	0.0	26.6	20.2	0.0
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	1.3	1.7	0.1	13.2	1.6	0.1	9.9	0.7	0.1	4.1	0.1	0.0
Delay (s)	30.1	19.2	0.1	39.4	16.2	0.1	35.2	20.4	0.1	30.7	20.3	0.0
Level of Service	C	B	A	D	B	A	D	C	A	C	C	A
Approach Delay (s)		14.8			17.1			19.5			22.8	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	61.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	643	66	215	798	91	606
Future Volume (veh/h)	643	66	215	798	91	606
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1835	1835	1765	1835	1835	1835
Adj Flow Rate, veh/h	677	69	226	840	96	638
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	760	646	326	1023	624	557
Arrive On Green	0.41	0.41	0.10	0.56	0.36	0.36
Sat Flow, veh/h	1835	1560	3261	1835	1748	1560
Grp Volume(v), veh/h	677	69	226	840	96	638
Grp Sat Flow(s),veh/h/ln	1835	1560	1630	1835	1748	1560
Q Serve(g_s), s	24.0	1.9	4.7	26.2	2.6	25.0
Cycle Q Clear(g_c), s	24.0	1.9	4.7	26.2	2.6	25.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	760	646	326	1023	624	557
V/C Ratio(X)	0.89	0.11	0.69	0.82	0.15	1.15
Avail Cap(c_a), veh/h	760	646	326	1023	624	557
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.76	0.76	1.00	1.00
Uniform Delay (d), s/veh	19.0	12.6	30.5	12.7	15.3	22.5
Incr Delay (d2), s/veh	14.8	0.3	4.7	5.7	0.1	84.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.2	0.9	2.3	14.7	1.3	23.8
LnGrp Delay(d),s/veh	33.8	12.9	35.2	18.4	15.4	107.4
LnGrp LOS	C	B	D	B	B	F
Approach Vol, veh/h	746			1066	734	
Approach Delay, s/veh	31.9			21.9	95.4	
Approach LOS	C			C	F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	10.0	32.0				42.0		28.0
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	6.0	28.0				38.0		24.0
Max Q Clear Time (g_c+I1), s	6.7	26.0				28.2		27.0
Green Ext Time (p_c), s	0.0	0.7				2.9		0.0

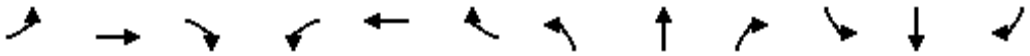
Intersection Summary	
HCM 2010 Ctrl Delay	46.0
HCM 2010 LOS	D

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	316	933	821	812	201	425
Future Volume (veh/h)	316	933	821	812	201	425
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1631	1765	1835	1733	1733
Adj Flow Rate, veh/h	329	804	855	846	209	222
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	662	702	1226	2103	236	1276
Arrive On Green	0.38	0.36	0.73	1.00	0.14	0.14
Sat Flow, veh/h	1765	1387	1681	1835	1651	1473
Grp Volume(v), veh/h	329	804	855	846	209	222
Grp Sat Flow(s),veh/h/ln	1765	1387	1681	1835	1651	1473
Q Serve(g_s), s	12.0	30.5	23.5	0.0	10.4	0.0
Cycle Q Clear(g_c), s	12.0	30.5	23.5	0.0	10.4	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	662	702	1226	2103	236	1276
V/C Ratio(X)	0.50	1.15	0.70	0.40	0.89	0.17
Avail Cap(c_a), veh/h	662	702	1226	2103	236	1276
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.09	0.09	1.00	1.00
Uniform Delay (d), s/veh	20.2	83.3	6.3	0.0	35.3	0.9
Incr Delay (d2), s/veh	2.7	81.9	0.2	0.1	32.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	16.0	10.7	0.0	6.9	0.9
LnGrp Delay(d),s/veh	22.8	165.1	6.4	0.1	67.4	1.0
LnGrp LOS	C	F	A	A	E	A
Approach Vol, veh/h	1133			1701	431	
Approach Delay, s/veh	123.8			3.3	33.2	
Approach LOS	F			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	65.3	34.5				99.8		15.0
Change Period (Y+Rc), s	4.5	* 4.5				4.5		3.5
Max Green Setting (Gmax), s	31.0	* 30				65.0		11.5
Max Q Clear Time (g_c+I1), s	25.5	32.5				2.0		12.4
Green Ext Time (p_c), s	2.5	0.0				4.7		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	49.0
HCM 2010 LOS	D

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	397	344	0	1049	721	590	0	559	0	0	0
Future Volume (vph)	0	397	344	0	1049	721	590	0	559	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	14	16	12	13	13	14	12	16	12	12	12
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0		3.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Frpb, ped/bikes		1.00	0.98		1.00	1.00	1.00		1.00			
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		1882	1665		1824	1550	1788		1700			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		1882	1665		1824	1550	1788		1700			
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)	0	422	366	0	1116	767	628	0	595	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	291	0	0	0
Lane Group Flow (vph)	0	422	366	0	1116	767	628	0	304	0	0	0
Confl. Bikes (#/hr)			1									
Turn Type		NA	Free		NA	Free	Prot		Prot			
Protected Phases		6			2		4		4			
Permitted Phases			Free			Free	4		4			
Actuated Green, G (s)		59.0	100.0		59.0	100.0	34.0		34.0			
Effective Green, g (s)		60.0	100.0		60.0	100.0	34.0		34.0			
Actuated g/C Ratio		0.60	1.00		0.60	1.00	0.34		0.34			
Clearance Time (s)		4.0			4.0		3.0		3.0			
Vehicle Extension (s)		5.0			4.0		3.0		3.0			
Lane Grp Cap (vph)		1129	1665		1094	1550	607		578			
v/s Ratio Prot		0.22			c0.61		c0.35		0.18			
v/s Ratio Perm			0.22			0.49						
v/c Ratio		0.37	0.22		1.02	0.49	1.03		0.53			
Uniform Delay, d1		10.3	0.0		20.0	0.0	33.0		26.5			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		0.9	0.3		32.4	1.1	45.7		0.9			
Delay (s)		11.3	0.3		52.4	1.1	78.7		27.4			
Level of Service		B	A		D	A	E		C			
Approach Delay (s)		6.2			31.5			53.8			0.0	
Approach LOS		A			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	33.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	99.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	533	282	63	286	98	123	158	150	122	316	19
Future Volume (vph)	20	533	282	63	286	98	123	158	150	122	316	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	13	15	13	13	13	16	12	12	12	13	14	12
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.97	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)	1732	1941	1518	1732	1824	1665	1676	1765	1449	1732	1882	1449
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)	1732	1941	1518	1732	1824	1665	1676	1765	1449	1732	1882	1449
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	22	586	310	69	314	108	135	174	165	134	347	21
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	22	586	310	69	314	108	135	174	165	134	347	21
Confl. Peds. (#/hr)						1			8			22
Confl. Bikes (#/hr)			1						27			8
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			Free			Free			Free
Actuated Green, G (s)	2.0	29.7	81.0	4.4	32.1	81.0	9.0	20.5	81.0	8.4	19.9	81.0
Effective Green, g (s)	3.0	31.7	81.0	5.4	34.1	81.0	10.0	22.5	81.0	9.4	21.9	81.0
Actuated g/C Ratio	0.04	0.39	1.00	0.07	0.42	1.00	0.12	0.28	1.00	0.12	0.27	1.00
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	64	759	1518	115	767	1665	206	490	1449	200	508	1449
v/s Ratio Prot	0.01	c0.30		c0.04	0.17		c0.08	0.10		0.08	c0.18	
v/s Ratio Perm			c0.20			0.06			0.11			0.01
v/c Ratio	0.34	0.77	0.20	0.60	0.41	0.06	0.66	0.36	0.11	0.67	0.68	0.01
Uniform Delay, d1	38.0	21.5	0.0	36.8	16.4	0.0	33.9	23.4	0.0	34.3	26.4	0.0
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	1.2	4.5	0.3	5.5	0.1	0.1	5.6	0.2	0.2	6.7	3.0	0.0
Delay (s)	39.2	26.0	0.3	42.3	16.5	0.1	39.5	23.6	0.2	41.1	29.5	0.0
Level of Service	D	C	A	D	B	A	D	C	A	D	C	A
Approach Delay (s)		17.6			16.5			20.0			31.3	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	765	81	268	360	30	165
Future Volume (veh/h)	765	81	268	360	30	165
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.98	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1652	1652	1588	1652	1652	1652
Adj Flow Rate, veh/h	805	85	282	379	32	174
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	839	698	549	1224	262	234
Arrive On Green	0.51	0.51	0.19	0.74	0.17	0.17
Sat Flow, veh/h	1652	1374	2934	1652	1573	1404
Grp Volume(v), veh/h	805	85	282	379	32	174
Grp Sat Flow(s),veh/h/ln	1652	1374	1467	1652	1573	1404
Q Serve(g_s), s	30.4	2.1	5.6	5.0	1.1	7.7
Cycle Q Clear(g_c), s	30.4	2.1	5.6	5.0	1.1	7.7
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	839	698	549	1224	262	234
V/C Ratio(X)	0.96	0.12	0.51	0.31	0.12	0.74
Avail Cap(c_a), veh/h	839	698	549	1224	411	367
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.93	0.93	1.00	1.00
Uniform Delay (d), s/veh	15.4	8.4	23.8	2.8	23.0	25.7
Incr Delay (d2), s/veh	22.7	0.4	0.8	0.6	0.2	4.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.9	0.9	2.3	2.4	0.5	3.3
LnGrp Delay(d),s/veh	38.1	8.8	24.5	3.4	23.2	30.4
LnGrp LOS	D	A	C	A	C	C
Approach Vol, veh/h	890			661	206	
Approach Delay, s/veh	35.3			12.4	29.3	
Approach LOS	D			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	15.2	36.0				51.2		13.8
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	5.0	32.0				41.0		16.0
Max Q Clear Time (g_c+I1), s	7.6	32.4				7.0		9.7
Green Ext Time (p_c), s	0.0	0.0				1.4		0.4

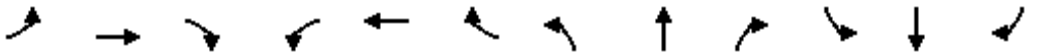
Intersection Summary	
HCM 2010 Ctrl Delay	26.0
HCM 2010 LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	368	566	265	508	117	492
Future Volume (veh/h)	368	566	265	508	117	492
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	2	0	0	0
Ped-Bike Adj(A_pbT)		0.98	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1631	1765	1835	1733	1733
Adj Flow Rate, veh/h	391	452	282	540	124	76
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	706	674	627	1499	179	700
Arrive On Green	0.40	0.39	0.75	1.00	0.11	0.11
Sat Flow, veh/h	1765	1353	1681	1835	1651	1473
Grp Volume(v), veh/h	391	452	282	540	124	76
Grp Sat Flow(s),veh/h/ln	1765	1353	1681	1835	1651	1473
Q Serve(g_s), s	13.7	7.2	5.1	0.0	5.8	0.0
Cycle Q Clear(g_c), s	13.7	7.2	5.1	0.0	5.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	706	674	627	1499	179	700
V/C Ratio(X)	0.55	0.67	0.45	0.36	0.69	0.11
Avail Cap(c_a), veh/h	706	674	627	1499	248	761
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.74	0.74	1.00	1.00
Uniform Delay (d), s/veh	18.5	10.0	7.1	0.0	34.4	11.6
Incr Delay (d2), s/veh	3.1	5.2	0.5	0.5	9.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.1	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	7.0	2.5	0.2	3.1	0.9
LnGrp Delay(d),s/veh	21.6	15.2	7.7	0.5	44.2	11.8
LnGrp LOS	C	B	A	A	D	B
Approach Vol, veh/h	843			822	200	
Approach Delay, s/veh	18.2			3.0	31.9	
Approach LOS	B			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	33.3	35.0				68.3		11.7
Change Period (Y+Rc), s	4.5	* 4.5				4.5		3.5
Max Green Setting (Gmax), s	26.0	* 31				60.5		11.5
Max Q Clear Time (g_c+I1), s	7.1	15.7				2.0		7.8
Green Ext Time (p_c), s	1.3	6.6				2.4		0.5

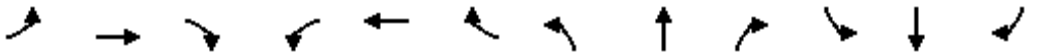
Intersection Summary	
HCM 2010 Ctrl Delay	12.9
HCM 2010 LOS	B

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	686	188	0	329	179	454	0	423	0	0	0
Future Volume (vph)	0	686	188	0	329	179	454	0	423	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	14	16	12	13	13	14	12	16	12	12	12
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0		3.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Frpb, ped/bikes		1.00	0.97		1.00	1.00	1.00		1.00			
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		1882	1656		1824	1550	1788		1700			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		1882	1656		1824	1550	1788		1700			
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)	0	722	198	0	346	188	478	0	445	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	143	0	0	0
Lane Group Flow (vph)	0	722	198	0	346	188	478	0	302	0	0	0
Confl. Peds. (#/hr)			11									
Confl. Bikes (#/hr)			2									
Turn Type		NA	Free		NA	Free	Prot		Prot			
Protected Phases		6			2		4		4			
Permitted Phases			Free			Free	4		4			
Actuated Green, G (s)		48.0	80.0		48.0	80.0	25.0		25.0			
Effective Green, g (s)		49.0	80.0		49.0	80.0	25.0		25.0			
Actuated g/C Ratio		0.61	1.00		0.61	1.00	0.31		0.31			
Clearance Time (s)		4.0			4.0		3.0		3.0			
Vehicle Extension (s)		5.0			4.0		3.0		3.0			
Lane Grp Cap (vph)		1152	1656		1117	1550	558		531			
v/s Ratio Prot		c0.38			0.19		c0.27		0.18			
v/s Ratio Perm			0.12			0.12						
v/c Ratio		0.63	0.12		0.31	0.12	0.86		0.57			
Uniform Delay, d1		9.7	0.0		7.4	0.0	25.8		23.0			
Progression Factor		0.72	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		2.1	0.1		0.7	0.2	12.3		1.4			
Delay (s)		9.2	0.1		8.1	0.2	38.1		24.4			
Level of Service		A	A		A	A	D		C			
Approach Delay (s)		7.2			5.3			31.5			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	345	91	112	351	68	133	130	135	63	95	22
Future Volume (vph)	20	345	91	112	351	68	133	130	135	63	95	22
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	13	15	13	13	13	16	12	12	12	13	14	12
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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	1.00	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	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)	1732	1941	1550	1732	1824	1700	1676	1765	1468	1732	1882	1464
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)	1732	1941	1550	1732	1824	1700	1676	1765	1468	1732	1882	1464
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	21	356	94	115	362	70	137	134	139	65	98	23
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	21	356	94	115	362	70	137	134	139	65	98	23
Confl. Peds. (#/hr)												3
Confl. Bikes (#/hr)									4			7
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			Free			Free			Free
Actuated Green, G (s)	1.9	20.8	60.8	6.3	25.2	60.8	6.1	11.7	60.8	4.0	9.6	60.8
Effective Green, g (s)	2.9	22.8	60.8	7.3	27.2	60.8	7.1	13.7	60.8	5.0	11.6	60.8
Actuated g/C Ratio	0.05	0.38	1.00	0.12	0.45	1.00	0.12	0.23	1.00	0.08	0.19	1.00
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	82	727	1550	207	816	1700	195	397	1468	142	359	1464
v/s Ratio Prot	0.01	0.18		c0.07	c0.20		c0.08	c0.08		0.04	0.05	
v/s Ratio Perm			0.06			0.04			c0.09			0.02
v/c Ratio	0.26	0.49	0.06	0.56	0.44	0.04	0.70	0.34	0.09	0.46	0.27	0.02
Uniform Delay, d1	27.9	14.5	0.0	25.2	11.6	0.0	25.8	19.7	0.0	26.6	21.0	0.0
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	0.2	0.1	1.8	0.1	0.0	9.0	0.2	0.1	0.9	0.2	0.0
Delay (s)	28.5	14.7	0.1	27.1	11.7	0.0	34.8	19.9	0.1	27.5	21.2	0.0
Level of Service	C	B	A	C	B	A	C	B	A	C	C	A
Approach Delay (s)		12.4			13.5			18.2			20.7	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.8	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			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	459	37	230	522	54	305
Future Volume (veh/h)	459	37	230	522	54	305
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1835	1835	1765	1835	1835	1835
Adj Flow Rate, veh/h	483	39	242	549	57	321
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	856	728	432	1191	438	391
Arrive On Green	0.47	0.47	0.13	0.65	0.25	0.25
Sat Flow, veh/h	1835	1560	3261	1835	1748	1560
Grp Volume(v), veh/h	483	39	242	549	57	321
Grp Sat Flow(s),veh/h/ln	1835	1560	1630	1835	1748	1560
Q Serve(g_s), s	11.4	0.8	4.2	9.0	1.5	11.6
Cycle Q Clear(g_c), s	11.4	0.8	4.2	9.0	1.5	11.6
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	856	728	432	1191	438	391
V/C Ratio(X)	0.56	0.05	0.56	0.46	0.13	0.82
Avail Cap(c_a), veh/h	856	728	432	1191	495	442
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.89	0.89	1.00	1.00
Uniform Delay (d), s/veh	11.6	8.8	24.4	5.3	17.4	21.2
Incr Delay (d2), s/veh	2.7	0.1	1.5	1.1	0.1	10.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	0.4	2.0	4.8	0.7	6.1
LnGrp Delay(d),s/veh	14.3	8.9	25.8	6.4	17.5	31.8
LnGrp LOS	B	A	C	A	B	C
Approach Vol, veh/h	522			791	378	
Approach Delay, s/veh	13.9			12.4	29.6	
Approach LOS	B			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	10.9	31.0				41.9		18.1
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	5.0	27.0				36.0		16.0
Max Q Clear Time (g_c+I1), s	6.2	13.4				11.0		13.6
Green Ext Time (p_c), s	0.0	1.7				2.2		0.4

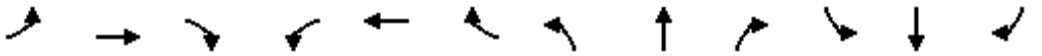
Intersection Summary	
HCM 2010 Ctrl Delay	16.7
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	296	466	463	569	169	254
Future Volume (veh/h)	296	466	463	569	169	254
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1631	1765	1835	1733	1733
Adj Flow Rate, veh/h	308	317	482	593	176	44
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	596	639	686	1449	224	792
Arrive On Green	0.34	0.32	0.82	1.00	0.14	0.14
Sat Flow, veh/h	1765	1387	1681	1835	1651	1473
Grp Volume(v), veh/h	308	317	482	593	176	44
Grp Sat Flow(s),veh/h/ln	1765	1387	1681	1835	1651	1473
Q Serve(g_s), s	11.2	0.0	9.9	0.0	8.3	0.0
Cycle Q Clear(g_c), s	11.2	0.0	9.9	0.0	8.3	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	596	639	686	1449	224	792
V/C Ratio(X)	0.52	0.50	0.70	0.41	0.79	0.06
Avail Cap(c_a), veh/h	596	639	686	1449	248	813
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.67	0.67	1.00	1.00
Uniform Delay (d), s/veh	21.3	10.3	5.3	0.0	33.4	8.8
Incr Delay (d2), s/veh	3.2	2.7	2.3	0.6	17.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	4.4	4.4	0.2	4.8	0.5
LnGrp Delay(d),s/veh	24.5	13.0	7.6	0.6	50.6	8.9
LnGrp LOS	C	B	A	A	D	A
Approach Vol, veh/h	625			1075	220	
Approach Delay, s/veh	18.7			3.7	42.3	
Approach LOS	B			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	36.1	30.0				66.1		13.9
Change Period (Y+Rc), s	4.5	* 4.5				4.5		3.5
Max Green Setting (Gmax), s	31.0	* 26				60.5		11.5
Max Q Clear Time (g_c+I1), s	11.9	13.2				2.0		10.3
Green Ext Time (p_c), s	2.5	4.2				2.7		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	13.0
HCM 2010 LOS	B

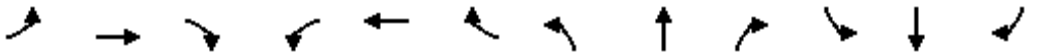
Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	313	239	9	566	427	467	0	405	0	0	0
Future Volume (vph)	5	313	239	9	566	427	467	0	405	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	14	16	12	13	13	14	12	16	12	12	12
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0		3.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Frpb, ped/bikes		1.00	0.98		1.00	1.00	1.00		1.00			
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		1881	1665		1822	1550	1788		1700			
Flt Permitted		0.99	1.00		0.99	1.00	0.95		1.00			
Satd. Flow (perm)		1871	1665		1813	1550	1788		1700			
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)	5	333	254	10	602	454	497	0	431	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	283	0	0	0
Lane Group Flow (vph)	0	338	254	0	612	454	497	0	148	0	0	0
Confl. Bikes (#/hr)			1									
Turn Type	Perm	NA	Free	Perm	NA	Free	Prot		Prot			
Protected Phases		6			2		4		4			
Permitted Phases	6		Free	2		Free	4		4			
Actuated Green, G (s)		45.5	80.0		45.5	80.0	27.5		27.5			
Effective Green, g (s)		46.5	80.0		46.5	80.0	27.5		27.5			
Actuated g/C Ratio		0.58	1.00		0.58	1.00	0.34		0.34			
Clearance Time (s)		4.0			4.0		3.0		3.0			
Vehicle Extension (s)		5.0			4.0		3.0		3.0			
Lane Grp Cap (vph)		1087	1665		1053	1550	614		584			
v/s Ratio Prot							c0.28		0.09			
v/s Ratio Perm		0.18	0.15		c0.34	0.29						
v/c Ratio		0.31	0.15		0.58	0.29	0.81		0.25			
Uniform Delay, d1		8.6	0.0		10.6	0.0	23.9		18.9			
Progression Factor		1.01	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		0.7	0.2		2.3	0.5	7.8		0.2			
Delay (s)		9.4	0.2		12.9	0.5	31.6		19.1			
Level of Service		A	A		B	A	C		B			
Approach Delay (s)		5.4			7.6			25.8			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	798	381	74	385	101	151	224	162	219	411	35
Future Volume (vph)	40	798	381	74	385	101	151	224	162	219	411	35
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	13	15	13	13	13	16	12	12	12	13	14	12
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.97	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)	1732	1941	1518	1732	1824	1665	1676	1765	1449	1732	1882	1449
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)	1732	1941	1518	1732	1824	1665	1676	1765	1449	1732	1882	1449
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	40	798	381	74	385	101	151	224	162	219	411	35
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	40	798	381	74	385	101	151	224	162	219	411	35
Confl. Peds. (#/hr)						1			8			22
Confl. Bikes (#/hr)			1						27			8
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			Free			Free			Free
Actuated Green, G (s)	2.8	35.9	86.7	3.0	36.1	86.7	9.5	18.0	86.7	11.8	20.3	86.7
Effective Green, g (s)	3.8	37.9	86.7	4.0	38.1	86.7	10.5	20.0	86.7	12.8	22.3	86.7
Actuated g/C Ratio	0.04	0.44	1.00	0.05	0.44	1.00	0.12	0.23	1.00	0.15	0.26	1.00
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	75	848	1518	79	801	1665	202	407	1449	255	484	1449
v/s Ratio Prot	0.02	c0.41		c0.04	0.21		0.09	0.13		c0.13	c0.22	
v/s Ratio Perm			c0.25			0.06			0.11			0.02
v/c Ratio	0.53	0.94	0.25	0.94	0.48	0.06	0.75	0.55	0.11	0.86	0.85	0.02
Uniform Delay, d1	40.6	23.3	0.0	41.2	17.3	0.0	36.8	29.4	0.0	36.1	30.6	0.0
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	3.6	18.0	0.4	78.5	0.2	0.1	12.4	0.9	0.2	23.0	12.6	0.0
Delay (s)	44.2	41.3	0.4	119.7	17.4	0.1	49.2	30.3	0.2	59.1	43.2	0.0
Level of Service	D	D	A	F	B	A	D	C	A	E	D	A
Approach Delay (s)		28.6			27.8			26.5			46.1	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	32.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	86.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1019	205	543	596	30	183
Future Volume (veh/h)	1019	205	543	596	30	183
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		0.98	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1652	1652	1588	1652	1652	1652
Adj Flow Rate, veh/h	1019	205	543	596	30	183
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	991	825	538	1335	223	199
Arrive On Green	0.60	0.60	0.18	0.81	0.14	0.14
Sat Flow, veh/h	1652	1374	2934	1652	1573	1404
Grp Volume(v), veh/h	1019	205	543	596	30	183
Grp Sat Flow(s),veh/h/ln	1652	1374	1467	1652	1573	1404
Q Serve(g_s), s	72.0	8.4	22.0	13.0	2.0	15.4
Cycle Q Clear(g_c), s	72.0	8.4	22.0	13.0	2.0	15.4
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	991	825	538	1335	223	199
V/C Ratio(X)	1.03	0.25	1.01	0.45	0.13	0.92
Avail Cap(c_a), veh/h	991	825	538	1335	223	199
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.70	0.70	1.00	1.00
Uniform Delay (d), s/veh	24.0	11.3	49.0	3.4	45.1	50.8
Incr Delay (d2), s/veh	36.0	0.7	34.7	0.8	0.3	42.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	42.4	3.4	11.5	6.1	0.9	8.3
LnGrp Delay(d),s/veh	60.0	12.0	83.7	4.2	45.3	92.8
LnGrp LOS	F	B	F	A	D	F
Approach Vol, veh/h	1224			1139	213	
Approach Delay, s/veh	52.0			42.1	86.2	
Approach LOS	D			D	F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	25.0	75.0				100.0		20.0
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	21.0	71.0				96.0		16.0
Max Q Clear Time (g_c+I1), s	24.0	74.0				15.0		17.4
Green Ext Time (p_c), s	0.0	0.0				2.6		0.0

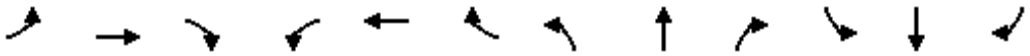
Intersection Summary	
HCM 2010 Ctrl Delay	50.4
HCM 2010 LOS	D

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	608	594	338	893	246	571
Future Volume (veh/h)	608	594	338	893	246	571
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	2	0	0	0
Ped-Bike Adj(A_pbT)		0.98	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1631	1765	1835	1733	1733
Adj Flow Rate, veh/h	608	453	338	893	246	151
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	832	857	502	1505	283	682
Arrive On Green	0.47	0.46	0.30	0.82	0.17	0.17
Sat Flow, veh/h	1765	1354	1681	1835	1651	1473
Grp Volume(v), veh/h	608	453	338	893	246	151
Grp Sat Flow(s),veh/h/ln	1765	1354	1681	1835	1651	1473
Q Serve(g_s), s	19.4	0.0	12.4	12.1	10.2	0.0
Cycle Q Clear(g_c), s	19.4	0.0	12.4	12.1	10.2	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	832	857	502	1505	283	682
V/C Ratio(X)	0.73	0.53	0.67	0.59	0.87	0.22
Avail Cap(c_a), veh/h	832	857	497	1499	283	678
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.39	0.39	1.00	1.00
Uniform Delay (d), s/veh	14.9	6.1	21.7	2.2	28.2	11.3
Incr Delay (d2), s/veh	5.6	2.3	1.5	0.7	25.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.4	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.6	4.8	6.2	6.1	6.6	1.8
LnGrp Delay(d),s/veh	20.5	8.4	23.5	2.9	53.6	11.6
LnGrp LOS	C	A	C	A	D	B
Approach Vol, veh/h	1061			1231	397	
Approach Delay, s/veh	15.4			8.6	37.6	
Approach LOS	B			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	24.2	36.0				60.2		15.0
Change Period (Y+Rc), s	4.5	* 4.5				4.5		3.5
Max Green Setting (Gmax), s	15.0	* 32				50.5		11.5
Max Q Clear Time (g_c+I1), s	14.4	21.4				14.1		12.2
Green Ext Time (p_c), s	0.1	6.2				5.1		0.0

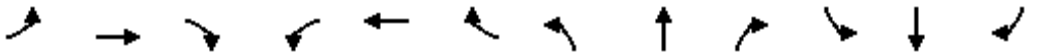
Intersection Summary	
HCM 2010 Ctrl Delay	15.6
HCM 2010 LOS	B

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1041	188	0	436	190	795	0	452	0	0	0
Future Volume (vph)	0	1041	188	0	436	190	795	0	452	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	14	16	12	13	13	14	12	16	12	12	12
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0		3.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Frpb, ped/bikes		1.00	0.97		1.00	1.00	1.00		1.00			
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		1882	1656		1824	1550	1788		1700			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		1882	1656		1824	1550	1788		1700			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1041	188	0	436	190	795	0	452	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	44	0	0	0
Lane Group Flow (vph)	0	1041	188	0	436	190	795	0	408	0	0	0
Confl. Peds. (#/hr)			11									
Confl. Bikes (#/hr)			2									
Turn Type		NA	Free		NA	Free	Prot		Prot			
Protected Phases		6			2		4		4			
Permitted Phases			Free			Free	4		4			
Actuated Green, G (s)		52.0	100.0		52.0	100.0	41.0		41.0			
Effective Green, g (s)		53.0	100.0		53.0	100.0	41.0		41.0			
Actuated g/C Ratio		0.53	1.00		0.53	1.00	0.41		0.41			
Clearance Time (s)		4.0			4.0		3.0		3.0			
Vehicle Extension (s)		5.0			4.0		3.0		3.0			
Lane Grp Cap (vph)		997	1656		966	1550	733		697			
v/s Ratio Prot		c0.55			0.24		c0.44		0.24			
v/s Ratio Perm			0.11			0.12						
v/c Ratio		1.04	0.11		0.45	0.12	1.08		0.59			
Uniform Delay, d1		23.5	0.0		14.5	0.0	29.5		22.9			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		40.7	0.1		1.5	0.2	58.5		1.3			
Delay (s)		64.2	0.1		16.0	0.2	88.0		24.2			
Level of Service		E	A		B	A	F		C			
Approach Delay (s)		54.4			11.2			64.9			0.0	
Approach LOS		D			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	49.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	111.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	396	141	154	477	175	170	240	151	100	111	22
Future Volume (vph)	22	396	141	154	477	175	170	240	151	100	111	22
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	13	15	13	13	13	16	12	12	12	13	14	12
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	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	1.00	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	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)	1732	1941	1550	1732	1824	1700	1676	1765	1468	1732	1882	1464
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)	1732	1941	1550	1732	1824	1700	1676	1765	1468	1732	1882	1464
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	23	408	145	159	492	180	175	247	156	103	114	23
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	23	408	145	159	492	180	175	247	156	103	114	23
Confl. Peds. (#/hr)												3
Confl. Bikes (#/hr)									4			7
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			Free			Free			Free			Free
Actuated Green, G (s)	1.3	18.2	61.5	6.4	23.3	61.5	7.7	13.9	61.5	5.0	11.2	61.5
Effective Green, g (s)	2.3	20.2	61.5	7.4	25.3	61.5	8.7	15.9	61.5	6.0	13.2	61.5
Actuated g/C Ratio	0.04	0.33	1.00	0.12	0.41	1.00	0.14	0.26	1.00	0.10	0.21	1.00
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	64	637	1550	208	750	1700	237	456	1468	168	403	1464
v/s Ratio Prot	0.01	0.21		c0.09	c0.27		c0.10	c0.14		0.06	0.06	
v/s Ratio Perm			0.09			0.11			c0.11			0.02
v/c Ratio	0.36	0.64	0.09	0.76	0.66	0.11	0.74	0.54	0.11	0.61	0.28	0.02
Uniform Delay, d1	28.9	17.6	0.0	26.2	14.6	0.0	25.3	19.7	0.0	26.6	20.2	0.0
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	1.3	1.7	0.1	13.9	1.6	0.1	9.9	0.7	0.1	4.6	0.1	0.0
Delay (s)	30.1	19.2	0.1	40.1	16.2	0.1	35.2	20.4	0.1	31.2	20.3	0.0
Level of Service	C	B	A	D	B	A	D	C	A	C	C	A
Approach Delay (s)		14.8			17.3			19.4			23.1	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	61.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	643	70	265	798	93	639
Future Volume (veh/h)	643	70	265	798	93	639
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1835	1835	1765	1835	1835	1835
Adj Flow Rate, veh/h	677	74	279	840	98	673
Adj No. of Lanes	1	1	2	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	760	646	326	1023	624	557
Arrive On Green	0.41	0.41	0.10	0.56	0.36	0.36
Sat Flow, veh/h	1835	1560	3261	1835	1748	1560
Grp Volume(v), veh/h	677	74	279	840	98	673
Grp Sat Flow(s),veh/h/ln	1835	1560	1630	1835	1748	1560
Q Serve(g_s), s	24.0	2.0	5.9	26.2	2.7	25.0
Cycle Q Clear(g_c), s	24.0	2.0	5.9	26.2	2.7	25.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	760	646	326	1023	624	557
V/C Ratio(X)	0.89	0.11	0.86	0.82	0.16	1.21
Avail Cap(c_a), veh/h	760	646	326	1023	624	557
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.72	0.72	1.00	1.00
Uniform Delay (d), s/veh	19.0	12.6	31.0	12.7	15.3	22.5
Incr Delay (d2), s/veh	14.8	0.4	14.8	5.4	0.1	109.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.2	0.9	3.3	14.6	1.3	27.6
LnGrp Delay(d),s/veh	33.8	13.0	45.8	18.1	15.4	132.1
LnGrp LOS	C	B	D	B	B	F
Approach Vol, veh/h	751			1119	771	
Approach Delay, s/veh	31.8			25.0	117.3	
Approach LOS	C			C	F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	10.0	32.0				42.0		28.0
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	6.0	28.0				38.0		24.0
Max Q Clear Time (g_c+I1), s	7.9	26.0				28.2		27.0
Green Ext Time (p_c), s	0.0	0.7				2.9		0.0

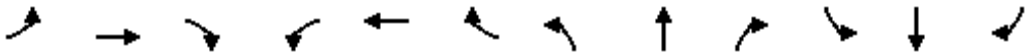
Intersection Summary	
HCM 2010 Ctrl Delay	53.9
HCM 2010 LOS	D

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	329	953	821	843	220	425
Future Volume (veh/h)	329	953	821	843	220	425
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1631	1765	1835	1733	1733
Adj Flow Rate, veh/h	343	825	855	878	229	222
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	662	702	1226	2103	236	1276
Arrive On Green	0.38	0.36	0.73	1.00	0.14	0.14
Sat Flow, veh/h	1765	1387	1681	1835	1651	1473
Grp Volume(v), veh/h	343	825	855	878	229	222
Grp Sat Flow(s),veh/h/ln	1765	1387	1681	1835	1651	1473
Q Serve(g_s), s	12.7	30.5	23.5	0.0	11.6	0.0
Cycle Q Clear(g_c), s	12.7	30.5	23.5	0.0	11.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	662	702	1226	2103	236	1276
V/C Ratio(X)	0.52	1.18	0.70	0.42	0.97	0.17
Avail Cap(c_a), veh/h	662	702	1226	2103	236	1276
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.09	0.09	1.00	1.00
Uniform Delay (d), s/veh	20.4	83.3	6.3	0.0	35.8	0.9
Incr Delay (d2), s/veh	2.9	93.7	0.2	0.1	50.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	48.9	10.7	0.0	8.6	0.9
LnGrp Delay(d),s/veh	23.3	176.9	6.4	0.1	86.5	1.0
LnGrp LOS	C	F	A	A	F	A
Approach Vol, veh/h	1168			1733	451	
Approach Delay, s/veh	131.8			3.2	44.4	
Approach LOS	F			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	65.3	34.5				99.8		15.0
Change Period (Y+Rc), s	4.5	* 4.5				4.5		3.5
Max Green Setting (Gmax), s	31.0	* 30				65.0		11.5
Max Q Clear Time (g_c+I1), s	25.5	32.5				2.0		13.6
Green Ext Time (p_c), s	2.5	0.0				5.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	53.6
HCM 2010 LOS	D

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	397	357	0	1049	721	621	0	559	0	0	0
Future Volume (vph)	0	397	357	0	1049	721	621	0	559	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	14	16	12	13	13	14	12	16	12	12	12
Total Lost time (s)		3.0	3.0		3.0	3.0	3.0		3.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Frpb, ped/bikes		1.00	0.98		1.00	1.00	1.00		1.00			
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		1882	1665		1824	1550	1788		1700			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		1882	1665		1824	1550	1788		1700			
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)	0	422	380	0	1116	767	661	0	595	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	291	0	0	0
Lane Group Flow (vph)	0	422	380	0	1116	767	661	0	304	0	0	0
Confl. Bikes (#/hr)			1									
Turn Type		NA	Free		NA	Free	Prot		Prot			
Protected Phases		6			2		4		4			
Permitted Phases			Free			Free	4		4			
Actuated Green, G (s)		59.0	100.0		59.0	100.0	34.0		34.0			
Effective Green, g (s)		60.0	100.0		60.0	100.0	34.0		34.0			
Actuated g/C Ratio		0.60	1.00		0.60	1.00	0.34		0.34			
Clearance Time (s)		4.0			4.0		3.0		3.0			
Vehicle Extension (s)		5.0			4.0		3.0		3.0			
Lane Grp Cap (vph)		1129	1665		1094	1550	607		578			
v/s Ratio Prot		0.22			c0.61		c0.37		0.18			
v/s Ratio Perm			0.23			0.49						
v/c Ratio		0.37	0.23		1.02	0.49	1.09		0.53			
Uniform Delay, d1		10.3	0.0		20.0	0.0	33.0		26.5			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		0.9	0.3		32.4	1.1	63.1		0.9			
Delay (s)		11.3	0.3		52.4	1.1	96.1		27.4			
Level of Service		B	A		D	A	F		C			
Approach Delay (s)		6.1			31.5			63.5			0.0	
Approach LOS		A			C			E			A	

Intersection Summary			
HCM 2000 Control Delay	36.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	101.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Appendix C

Internal Capture Rate Calculation

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NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	TIS for the Los Gamos Apartments Project	**Organization:**	W-Trans
Project Location:	City of San Rafael	**Performed By:**	KR
Scenario Description:	AM Existing	**Date:**	5/13/2020
Analysis Year:	2020	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				17	10	7
Restaurant				0		
Cinema/Entertainment				0		
Residential				69	18	51
Hotel				0		
All Other Land Uses[2]				0		
				86	28	58

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail	1.16	5%	5%	1.16	5%	5%
Restaurant						
Cinema/Entertainment						
Residential	1.13	5%	5%	1.13	5%	5%
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	98	32	66
Internal Capture Percentage	2%	3%	2%
External Vehicle-Trips[5]	76	24	52
External Transit-Trips[6]	5	2	3
External Non-Motorized Trips[6]	5	2	3

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	8%	0%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	0%	2%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	TIS for the Los Gamos Apartments Project	**Organization:**	W-Trans
Project Location:	City of San Rafael	**Performed By:**	KR
Scenario Description:	PM Existing	**Date:**	5/13/2020
Analysis Year:	2020	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				40	20	20
Restaurant				0		
Cinema/Entertainment				0		
Residential				84	52	32
Hotel				0		
All Other Land Uses[2]				0		
				124	72	52

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail	1.16	5%	5%	1.16	5%	5%
Restaurant						
Cinema/Entertainment						
Residential	1.13	5%	5%	1.13	5%	5%
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail					400	
Restaurant						
Cinema/Entertainment						
Residential		400				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	6	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	2	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	141	82	59
Internal Capture Percentage	11%	10%	14%
External Vehicle-Trips[5]	98	58	40
External Transit-Trips[6]	7	4	3
External Non-Motorized Trips[6]	7	4	3

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	9%	26%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	10%	6%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Appendix D

VMT Worksheet

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Los Gamos Apartments Project VMT Assessment

W-Trans 5/29/2020

Baseline VMT

10.8 Project Base VMT/Capita from TAM Model (MAZ 5349)

180 Project Units — 2.48 Occupancy/Unit

4821 Base Unadjusted Residential VMT (mi) — 446 Residents ("capita")

Applied Significance Threshold

13.3 VMT/Capita Bay Area Average

11.3 Threshold = 15% below Average

Project-Specific VMT Adjustments

10.8 Project Base VMT/Capita from TAM Model (MAZ 5349)

N/A Project Reduction Required to meet Significance Threshold

A. Density

180 Project Units

10.92 Project Acres

16.48 Project Density

8.2% VMT Reduction (compared to ITE Single Family) *source: CAPCOA*

-0.88 Adjustment to TAM VMT/Capita

B. Integrate Affordable Housing

20% of units below market rate (50-80% MFI) *sources: San Jose VMT Evaluation Tool Methodology, The California Housing Partnership*

2.0% VMT Reduction

-0.22 Adjustment to TAM VMT/Capita

Combined Project-Specific Adjustments

10.2% Combined VMT Reduction

-1.10 Adjustment to TAM VMT/Capita

VMT Significance

10.8 Average VMT/Capita in MAZ — 4821 Unadjusted Residential VMT (mi)

9.7 Project VMT/Capita with Adjustments — 4330 Adjusted Project Residential VMT (mi)

11.3 Significance Threshold — -491 VMT Reduction (mi)

YES Threshold met

Appendix E

Firetruck Access Exhibit

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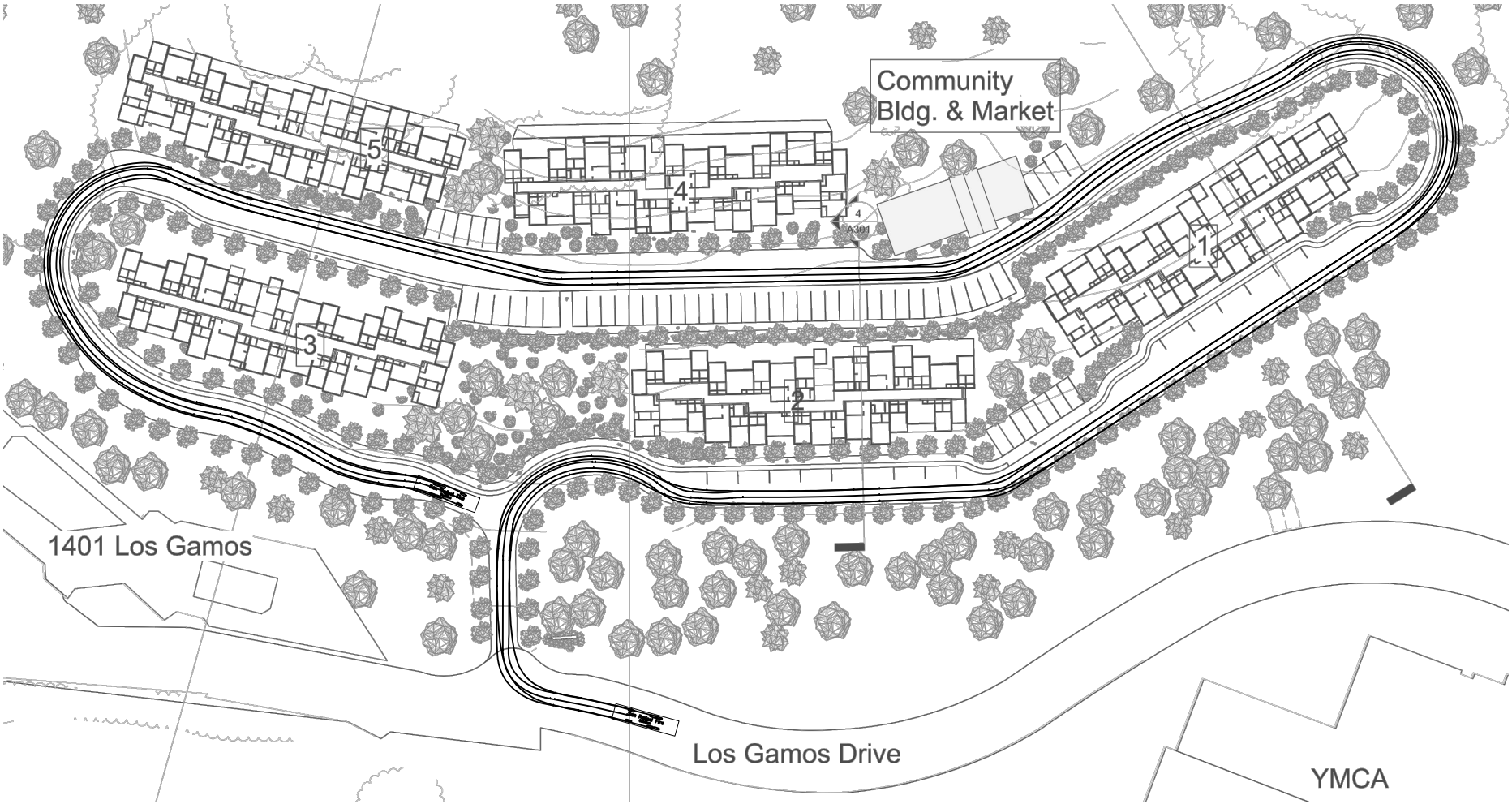

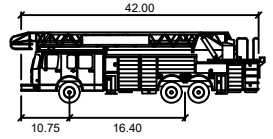

San Rafael Fire

	feet
Width	: 10.00
Track	: 8.00
Lock to Lock Time	: 6.0
Steering Angle	: 29.1

Los Gamos Apartments TIS

Firetruck Access

SRA143

January 2020