



Traffic Impact Study for Los Pinos Apartments



Prepared for the County of Sonoma

Submitted by
W-Trans

August 27, 2020



**TRAFFIC ENGINEERING
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Project Information

File Number: DRH19-0014

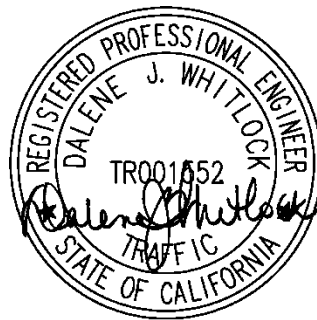
Address: 3496 Santa Rosa Avenue, Santa Rosa CA

APN: 134-132-015

Project Name: Los Pinos Apartments

Applicant Name: Los Pinos Apartments, LLC.

Property Owner Name: Los Pinos Apartments LLC.





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Table of Contents

Executive Summary	1
Introduction.....	2
Transportation Setting.....	4
Capacity Analysis	8
Alternative Modes	23
Access and Circulation.....	25
Parking.....	26
Conclusions and Recommendations.....	27
Study Participants and References.....	28

Figures

1. Study Area and Existing Lane Configurations	3
2. Existing Traffic Volumes.....	12
3. Future Traffic Volumes	13
4. Site Plan	15
5. Project Traffic Volumes and Trip Distribution	16
6. Existing plus Project Traffic Volumes.....	17
7. Future plus Project Traffic Volumes	19

Tables

1. Collision Rates at the Study Intersections.....	5
2. Bicycle Facility Summary	7
3. Signalized Intersection Level of Service Criteria	8
4. Existing Peak Hour Intersection Levels of Service	11
5. Future Peak Hour Intersection Levels of Service	11
6. Trip Generation Summary.....	14
7. Trip Distribution Assumptions.....	14
8. Existing and Existing plus Project Peak Hour Intersection Levels of Service	18
9. Future and Future plus Project Peak Hour Intersection Levels of Service	18
10. Maximum Left-Turn Queues.....	20
11. Vehicle Miles Traveled Analysis Summary	22
12. Trip Generation Summary.....	23
13. Trip Distribution Assumptions.....	23
14. Parking Analysis Summary	26



Appendices

- A. Collision Rate Calculations
- B. Traffic Counts
- C. Intersection Level of Service Calculations
- D. Concept Striping Plan from the *Final Traffic Impact Study for the Ghilotti Construction Yard*
- E. SIMTRAFFIC Projections
- F. VMT Findings

Executive Summary

The proposed project is a 50-unit apartment complex to be located at 3496 Santa Rosa Avenue. The project is expected to add an average of 366 new trips to the surrounding roadway network daily, including 23 new trips during the morning peak hour and 28 trips during the evening peak hour.

Vehicle operations five intersections providing access from the site to US 101 were studied. It was determined that these intersections are operating acceptably under Existing volumes and would be expected to continue operating acceptably under Existing plus Approved volumes as well as with the addition of project-generated traffic.

Under Future volumes the study intersections are expected to operate acceptably both without and with project traffic added except that Santa Rosa Avenue/Todd Road is expected to operate deficiently at LOS E during both peak hours. Adding a second northbound left-turn lane on Santa Rosa Avenue has previously been recommended to achieve acceptable operation. With this improvement and with project trips added, the intersection is expected to operate acceptably.

Queuing analyses were performed for the left-turn pockets at the study intersections. Increases in queueing due to adding project traffic is expected to be within the limits considered acceptable except at South Moorland Avenue/US 101 Overpass. Queuing under Future volumes would be expected to extend beyond the adjacent intersections in both directions along South Moorland Avenue between Todd Road and the US 101 Overpass, requiring capacity improvements to accommodate the project as well as all other development in the area. Because this enhancement is needed without the project, it is recommended that the County establish a fee into which developers can pay a proportional share of the cost for the widening necessary to accommodate future demand and that the applicant pay into this fund.

Existing facilities along Santa Rosa Avenue for pedestrians, cyclists and transit riders are adequate. A midblock crosswalk is not warranted. The project includes 40 bicycle parking spaces on site.

The vehicular and emergency vehicle access to the site are acceptable. Sight distances to the north and south on Santa Rosa Avenue from the project's driveway are adequate. Landscaping within the vision triangle should be planted and maintained to be either low-lying shrubbery less than three feet tall and trees more than seven feet above the ground.

The proposed parking supply satisfies County and City of Santa Rosa requirements.

Introduction

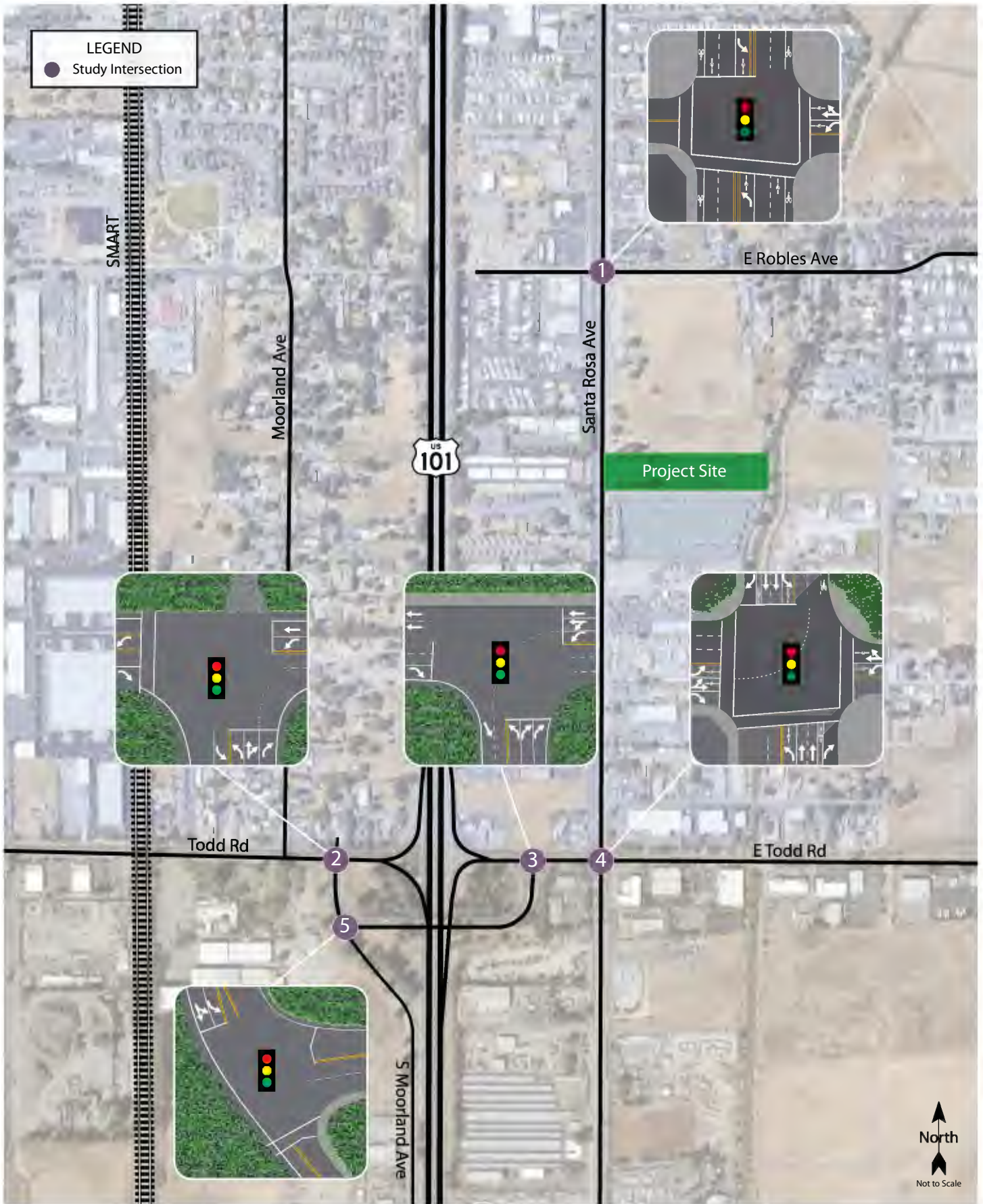
This report presents an analysis of the potential traffic impacts that would be associated with the proposed construction of a new 50-unit apartment complex to be located at 3496 Santa Rosa Avenue in the County of Sonoma. The traffic study was completed in accordance with the criteria established by the County of Sonoma, reflects a scope of work reviewed and approved by County staff, and is consistent with standard traffic engineering techniques.

Prelude

The purpose of a traffic impact study is to provide County 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 County'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 is a 50-unit apartment complex that would be constructed on a currently-vacant parcel at 3496 Santa Rosa Avenue in the County of Sonoma, as shown in Figure 1. The site would be accessed via a new driveway on Santa Rosa Avenue, approximately 280 feet south of East Robles Avenue.



Traffic Impact Study for Los Pinos Apartments
Figure 1 – Study Area and Existing Lane Configurations

Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the following intersections:

1. Santa Rosa Avenue/East Robles Avenue
2. South Moorland Avenue/Todd Road-US 101 South Ramps
3. US 101 Overpass/Todd Road
4. Santa Rosa Avenue/Todd Road
5. South Moorland Avenue/US 101 Overpass

It is noted that the “intersection” created by project driveway at Santa Rosa Avenue was not considered as a study intersection. The *California Vehicle Code* defines an intersection as “the area embraced within the prolongation of the lateral curb lines, or, if none, then the lateral boundary lines of the roadways, of two highways which join one another at approximately right angles or the area within which vehicles traveling upon different highways joining at any other angle may come in conflict.” This definition specifies that intersections are created where two “highways,” or public streets, intersect. As driveways are not public streets, where they connect with a public road is not an intersection, so it would be unreasonable to evaluate it as such. The driveway connection should, however, be evaluated for operational issues such as adequacy of sight distance, need for turn lanes, and delay may be relevant in some cases, though it would not be associated with a Level of Service.

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

Santa Rosa Avenue/East Robles Avenue is a signalized four-legged intersection. Protected left-turn phasing is provided on the northbound and southbound Santa Rosa Avenue approaches, while the eastbound and westbound approaches have permitted left-turn phasing. Marked crosswalks and pedestrian countdown signal heads are present on the east, west, and south legs.

South Moorland Avenue/Todd Road-US 101 South Ramps is a signalized tee intersection with left-turn pockets and protected left-turn phasing on the northbound and westbound approaches. A marked crosswalk is present on the west leg.

US 101 Overpass/Todd Road is a signalized tee intersection with left-turn pockets and protected left-turn phasing on the northbound and westbound approaches. Additionally, a left-turn lane on the eastbound approach provides access to the service station located northwest of the intersection.

Santa Rosa Avenue/Todd Road is a four-legged intersection that is signalized with protected left turns on the northbound and southbound Santa Rosa Avenue approaches. The eastbound and westbound Todd Road approaches are split-phased or are served sequentially. Marked crosswalks and pedestrian countdown signal heads are present on the east, west, and south legs.

South Moorland Avenue/US 101 Overpass is a signalized tee intersection with protected left-turn phasing on the northbound and westbound approaches. A marked crosswalk is present on the south leg.

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 September 1, 2014 through August 31, 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 *2016 Collision Data on California State Highways*, California Department of Transportation (Caltrans). The collision rates at the intersections of Santa Rosa Avenue/East Robles Avenue, South Moorland Avenue/Todd Road-US 101 South Ramps, and Santa Rosa Avenue/Todd Road were higher than the statewide average. The US 101 Overpass/Todd Road and South Moorland Avenue/US 101 Overpass intersections had collision rates lower than the statewide average for similar facilities indicating that there are no readily apparent safety issues. The collision rate calculations are provided in Appendix A.

Study Intersection	Number of Collisions (2014-2019)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Santa Rosa Ave/E Robles Ave	11	0.32	0.24
2. S Moorland Ave/Todd Rd-US 101 S Ramps	13	0.39	0.19
3. US 101 Overpass/Todd Rd	3	0.09	0.19
4. Santa Rosa Ave/Todd Rd	36	0.77	0.24
5. S Moorland Ave/US 101 Overpass	12	0.44	0.19

Note: c/mve = collisions per million vehicles entering; **Bold** = calculated collision rate higher than statewide average

Of the 11 collisions that occurred at Santa Rosa Avenue/East Robles Avenue during the study period, six were rear-ends, five were broadside, two were head-on, two were hit objects collisions and one was a sideswipe collision. Rear-end and sideswipe crashes are common at signalized intersections during congested conditions and broadsides often occur when motorists try to clear the intersection after the phase has ended. Given the distribution of different types of collisions, there is no clear trend, but the City may wish to review the signal timing at this location to make sure that adequate clearance time is provided.

Further review of collisions at South Moorland Avenue/Todd Road-US 101 South Ramps shows primary collision factors that include five sideswipes, three hit objects, three overturned, one head-on, and one “other”. Despite the above-average collision rate, injuries were reported in only 23.1 percent of crashes while statewide the average rate is 46.8 percent. Given the low injury rate, no remedial action is suggested.

For Santa Rosa Avenue/Todd Road the review revealed that the above-average collision rate appears to have been largely due to the proximity of neighboring gas stations. Santa Rosa Avenue/Todd Road has gas stations on the northwest and southwest corners and Todd Road/US 101 North Ramps has a gas station on the northwest corner. The driveways to the gas stations are located within 90 feet of the intersections and create additional conflict zones. Consolidation of the driveways or restricting access to right turns in and out could help to reduce the

incidence of collisions, though as the injury rate was only 16.7 percent compared to the statewide average of 44.7 percent, there does not appear to be a safety concern despite the above-average collision rate.

Of the twelve collisions reported at the intersection of South Moorland Avenue/US 101 Overpass there were five sideswipes, three drivers hit fixed objects, one rear end, two vehicle-pedestrian collisions and one overturned vehicle. A review of the severity of crashes shows that 33.3 percent of crashes resulted in injuries, which is lower than the statewide average of 46.8 percent. The below-average incidence of injuries indicates that there is not a demonstrated safety concern at this location warranting remedial action.

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 adequate access for pedestrians on Santa Rosa Avenue, but not on East Robles Avenue.

- **Santa Rosa Avenue** – Continuous sidewalk coverage is provided on both sides of the street on Santa Rosa Avenue between El Portal Way and Todd Road. Curb ramps and marked crosswalks at side street approaches are present throughout the study segment. The Santa Rosa Avenue/East Robles Avenue intersection includes a crosswalk on the southern leg, which provides pedestrians with access to the opposite side of Santa Rosa Avenue. Lighting is provided by overhead streetlights.

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, the Class I Hunter Creek Trail exists between Santa Rosa Avenue and Hunter Lane and there are Class II bike lanes on Santa Rosa Avenue between Todd Road and State Route (SR) 12. Bicyclists ride in the roadway along all other streets within the project study area. Class II bike lanes are proposed on Santa Rosa Avenue south of Todd Road that would connect to the Hunter Creek Trail. Table 2 summarizes the existing and planned bicycle facilities in the project vicinity, as contained in the *City of Santa Rosa Bicycle & Pedestrian Master Plan Update 2018* and the *SCTA Countywide Bicycle and Pedestrian Master Plan*.

Table 2 – Bicycle Facility Summary

Status Facility	Class	Length (miles)	Begin Point	End Point
Existing				
Hunter Creek Trail	I	1.5	Santa Rosa Ave	Hunter Ln
Santa Rosa Ave*	II	3.1	SR 12	Todd Rd
Planned				
Bellevue Ave	II	0.31	Santa Rosa Ave	Eastern end
Santa Rosa Ave	II	0.4	Todd Rd	Hunter Creek Trail

Notes: * All or portions of these bikeways are located within the City of Santa Rosa

Source: *City of Santa Rosa Bicycle & Pedestrian Master Plan Update 2018*, City of Santa Rosa, 2018

SCTA Countywide Bicycle and Pedestrian Master Plan, Sonoma County Transportation Authority, 2014

Transit Facilities

Sonoma County Transit (SCT) provides fixed route bus service in Sonoma County. Routes 44, 48, and 54 provide regional service to the project site and surrounding communities, with stops in the vicinity of the project on the west and east sides of Santa Rosa Avenue. Both routes stop at the Santa Rosa Avenue/East Robles Avenue and Santa Rosa Avenue/Todd Road intersections, which are within a short walking distance of the project site. Route 44 operates Monday through Friday with approximately 30-minute to 90-minute headways between 5:20 a.m. and 10:30 p.m. Weekend service operates with approximately one- to three-hour headways between 4:20 p.m. and 10:10 p.m. Route 48 operates Monday through Friday with approximately one-half hour to two-hour headways between 6:15 a.m. and 8:00 p.m. Weekend service operates with approximately two- to three-hour headways between 7:00 a.m. and 9:00 p.m. Route 54 operates Monday through Friday with a 30-minute headway between 6:35 a.m. and 7:05 a.m. and a 90-minute headway between 4:20 p.m. and 5:50 p.m. There is no weekend service for this route.

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

Dial-a-ride, also known as paratransit, or door-to-door service, is available for those who are unable to independently use the transit system due to a physical or mental disability. Sonoma County Paratransit is designed to serve the needs of individuals with disabilities within Sonoma County.

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 the signalized methodology 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 signalized 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 County of Sonoma.

The ranges of delay associated with the various levels of service are indicated in Table 3.

Table 3 – 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

Based on the most recent criteria published by the County of Sonoma in May 2016, as updated in June 2019, the project would have an adverse traffic impact if it results in any of the following conditions.

1. **On-site roads and frontage improvements** – Proposed on-site circulation and street frontage would not meet the County’s minimum standards for roadway or driveway design, or potentially result in safety hazards, as determined by the County in consultation with a registered Traffic Engineer or Civil Engineer.
2. **Parking** – Proposed on-site parking supply does not meet County standards and does not adequately accommodate parking demand.
3. **Emergency Access** – The project site would have inadequate emergency access.
4. **Alternative Transportation** – The project provides inadequate facilities for alternative transportation modes (e.g., bus turnouts, bicycle racks, pedestrian pathways) and/or the project creates potential conflicts with the County’s Complete Streets Policy, other adopted policies, plans, or programs supporting alternative transportation.

5. **Road Hazards** – Road design features that do not meet standards (e.g., sharp curves or skewed intersections) or any perceived incompatible uses (e.g., farm equipment, major bicycle route, rail or pedestrian crossings).
6. **Vehicle Queues** – An impact on projected 95th percentile queues shall be considered adverse when any of the following occur:
 - A. The projected queue can be accommodated within the available stacking in a dedicated turn lane (defined as the length of the channelized turn pocket together plus 8 feet in length) but would exceed the available stacking upon adding project-generated traffic. Where a left-turn lane transitions into a two-way left-turn lane, the center turn lane is to be considered part of the available stacking space.
 - B. There is adequate sight distance between the end of the queue and following traffic without the project, and the addition of project traffic increases the queue to a point where sight lines are no longer adequate to meet stopping sight distance criteria.
7. **Signal Warrants** – The addition of the project's vehicle or pedestrian traffic causes an intersection to meet or exceed Caltrans or CA-MUTCD signal warrant criteria.
8. **Turn Lanes** – The addition of project traffic causes an intersection to meet or exceed criteria for provision of a right or left turn lane on an intersection approach.
9. **Sight Lines** – The project constructs an unsignalized intersection (including driveways) and/or adds traffic to an existing unsignalized intersection approach that does not have adequate sight lines based upon Caltrans criteria for State highway intersections and AASHTO criteria for County roadway intersections.
10. **County Intersection Operations** – The County level of service standard for County intersection operations is to maintain a Level of Service D or better pursuant to General Plan Policy CT-4.2. The project would have an adverse traffic impact if the project's traffic would cause an intersection currently operating at an acceptable level of service (LOS D or better) to operate at an unacceptable level (LOS E or worse).

If the intersection currently operates or is projected to operate below the County standard, the project's impact is considered adverse and cumulatively considerable if it causes the average delay to increase by five seconds or more. The delay will be determined by comparing intersection operations with and without the project's traffic for both the existing baseline and projected future conditions.

The above criterion applies to all controlled intersections except for driveways and minor side streets that have less than 30 vehicle trips per hour per approach or exclusive left turn movement.

11. **County Roadway Operations** – The County level of service standard for County roadway operations is to maintain a Level of Service C pursuant to General Plan Policy CT-4.1; or, for specific roadway segments, the level of service standard adopted in the General Plan Figure CT-3. The project would have an adverse traffic impact if the project's traffic would cause a road currently operating at an acceptable level of service (LOS C or better) to operate at an unacceptable level (LOS D or worse).

If a road segment currently operates or is projected to operate below the County standard, the project's impact is considered adverse and cumulatively considerable if it causes the average speed to decrease by 2 mph for a roadway operating at LOS D without the project, 1 mph if existing operation is LOS E, and any reduction in travel speed is adverse for a roadway operating at LOS F. The change will be determined by comparing roadway conditions with and without the project's traffic for both the existing baseline and projected future conditions.

12. **State Highways** – Caltrans' general level of service policy on State highways is to maintain the level of service at the transition between LOS C and LOS D. However, level of service goals for specific Caltrans facilities should be taken from transportation planning documents for that facility. A project would have an adverse impact if the project traffic would cause the operation of a State highway to operate below LOS C. If a State highway currently operates or is projected to operate below the standard, the project's impact is considered adverse and cumulatively considerable if it does not maintain the existing "measure of effectiveness." Measures of effectiveness are: (a) control delay per vehicle for signalized intersections; (b) average control delay per vehicle for unsignalized intersections; (c) average speed for two-lane highways, and (d) density for multi-lane highways.
13. **Mitigation Measures** – In order to reduce project impacts to levels of insignificance, the proposed mitigation measures must result in post-development affected intersections and roadways that have an LOS that is no worse than the County General Plan LOS standard for roadways and intersections, reduce safety impacts to insignificance by bringing the site up to Caltrans or AASHTO design standards, and provide adequate parking and alternative transportation facilities consistent with County plans and policies. The scope of the mitigation measures must reduce the project impacts below the identifiable thresholds mentioned.

The payment of County wide traffic impact fees in and of itself may not be adequate to mitigate a project's local impacts if the existing facilities are already below standard, and the required improvements are not fully funded or programmed to be operational at the time of project completion. The timing of the mitigation measure implementation may require construction of off-site improvements by the developer using a Reimbursement Agreement to pay for any oversized facilities associated with the public share of the improvement pursuant to Section 26-670 of the Sonoma County Code. Traffic impact fees do not address specific impacts related to a particular project. Payment of the traffic impact fee only mitigates or addresses cumulative countywide impacts related to projects that are programmed or listed to be funded by the fees on file with DTPW.

The project's contribution to cumulative impacts must also be addressed in proportion to the project's impact. A proportional fair share contribution to a traffic improvement related to a cumulative impact may be required based on the "Methodology for Calculating Equitable Mitigation Measures" included in Caltrans' *Guide for the Preparation of Traffic Impact Studies* as referenced above. Mitigation measures for both project impacts and cumulative impacts must be implemented prior to occurrence of the impact. An analysis of the timing, funding and responsibilities for implementation of mitigation measures should be included in the traffic study.

Caltrans

In the *Guide for the Preparation of Traffic Impact Studies*, Caltrans indicates that they endeavor to maintain operation at the transition from LOS C to LOS D. The Caltrans criteria was applied to the intersections of South Moorland Avenue/Todd-Road-US 101 S Ramps, US 101 Overpass/Todd Road, and South Moorland Avenue/US 101 Overpass.

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the a.m. and p.m. peak periods. This condition does not include project-generated traffic volumes. Volume data was collected when local schools were in session. Peak hour factors (PHF's) were calculated based on the counts obtained and used in the analysis. Copies of the counts are provided in Appendix B.

Intersection Levels of Service

Under Existing Conditions, all intersections operate acceptably during the a.m. and p.m. peak hours. A summary of the intersection level of service calculations is contained in Table 4, and copies of the Level of Service calculations are provided in Appendix C. The existing traffic volumes are shown in Figure 2.

Table 4 – Existing Peak Hour Intersection Levels of Service

Study Intersection	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. Santa Rosa Ave/E Robles Ave	8.1	A	8.1	A
2. S Moorland Ave/Todd Rd-US 101 S Ramps	5.3	A	5.7	A
3. US 101 Overpass/Todd Rd	8.1	A	8.6	A
4. Santa Rosa Ave/Todd Rd	16.7	B	20.3	C
5. S Moorland Ave/US 101 Overpass	15.2	B	16.3	B

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

Future Conditions

Segment volumes for the horizon year of 2040 were obtained from the County's gravity demand model maintained by the Sonoma County Transportation Authority (SCTA) and translated to peak hour turning movement volumes at the study intersections using the "Furness" method. The Furness method is an iterative process that employs existing turn movement data, existing link volumes, and future link volumes to project likely future turning movement volumes at intersections.

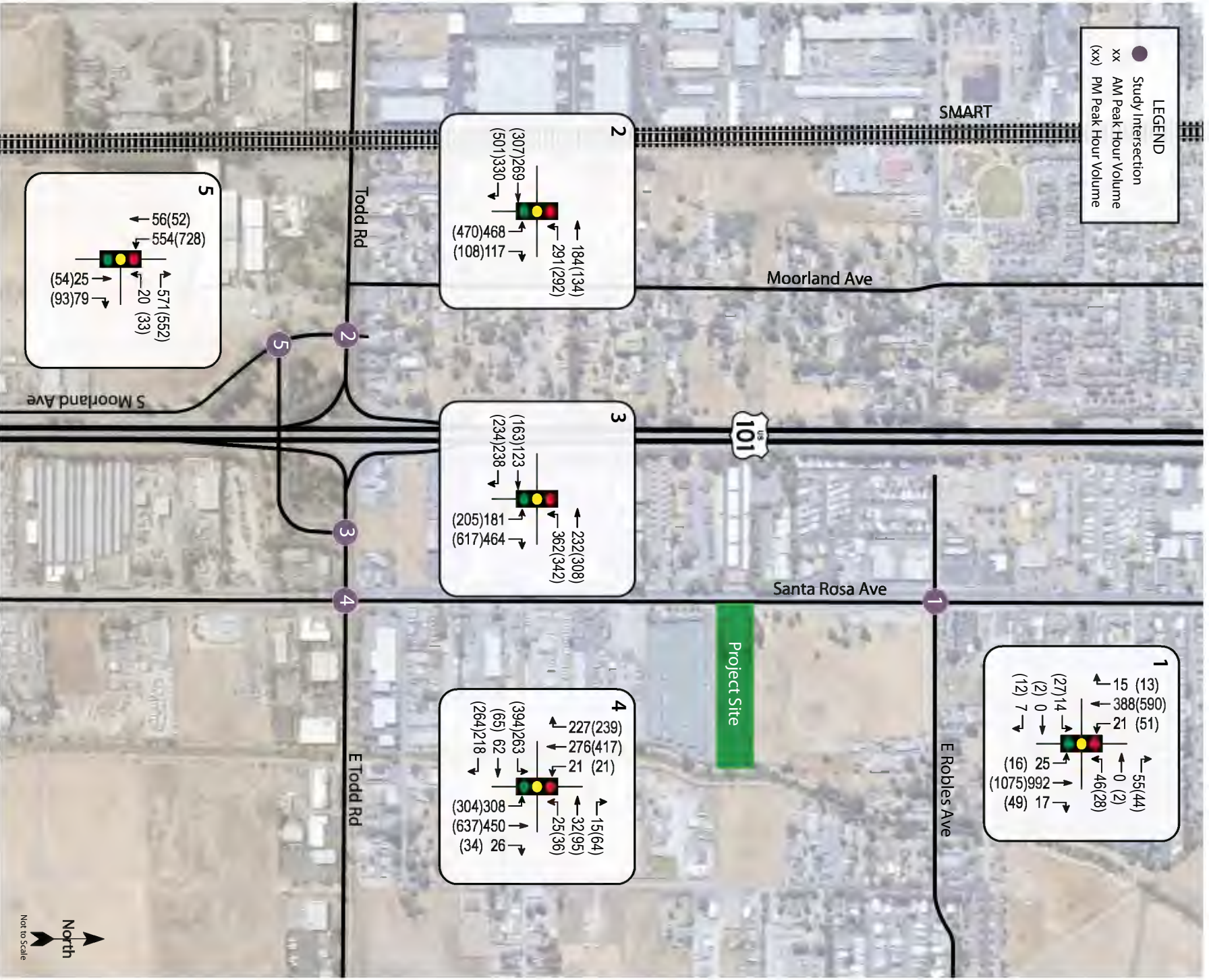
Under the anticipated Future volumes, the study intersections are expected to continue to operate acceptably except for Santa Rosa Avenue/Todd Road which would operate at LOS E during the p.m. peak hour. Operating conditions are summarized in Table 5 and Future volumes are shown in Figure 3.

Table 5 – Future Peak Hour Intersection Levels of Service

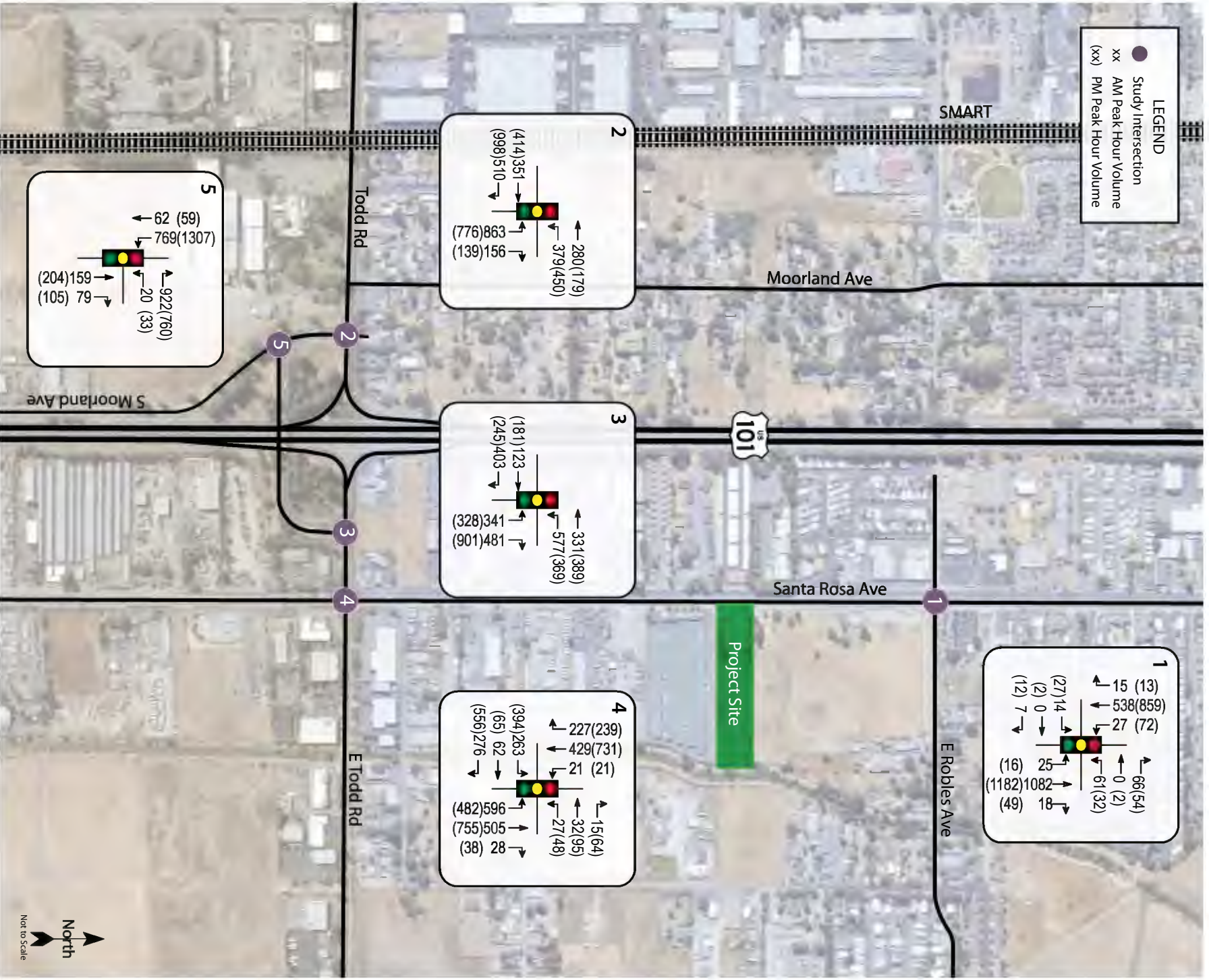
Study Intersection	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. Santa Rosa Ave/E Robles Ave	8.2	A	8.4	A
2. S Moorland Ave/Todd Rd-US 101 S Ramps	6.6	A	18.9	B
3. US 101 Overpass/Todd Rd	13.7	B	9.7	A
4. Santa Rosa Ave/Todd Rd	43.8	D	71.3	E
Dual NB left-turn lanes	22.2	C	31.8	C
5. S Moorland Ave/US 101 Overpass	31.4	C	40.7	D

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; **Bold** text = deficient operation; Shaded cells = conditions with recommended improvements

As noted in traffic studies completed for other developments in the area, the northbound approach to Todd Road/Santa Rosa Avenue would need to be restriped to provide two left-turn lanes to accommodate the large increase in traffic anticipated for this movement. This improvement could be accomplished by restriping the western through lane into a second left-turn lane and converting the dedicated right-turn lane into a shared through/right-turn lane. This configuration would result in two left-turn lanes, a single through lane, and a shared



Traffic Impact Study for Los Pinos Apartments
Figure 2 – Existing Traffic Volumes



Traffic Impact Study for Los Pinos Apartments
Figure 3 – Future Traffic Volumes

through/right-turn lane within the street width that currently exists. A conceptual striping plan for this improvement that was prepared for the *Final Traffic Impact Study for the Ghilotti Construction Yard* is contained in Appendix D.

Project Description

The proposed project is a 50-unit apartment complex that would be constructed on a currently vacant parcel at 3496 Santa Rosa Avenue in the County of Sonoma. The site would be accessed via a new driveway on Santa Rosa Avenue, approximately 280 feet south of East Robles Avenue. 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 Multifamily Housing (Low-Rise) (Land Use #220). The proposed project is expected to generate an average of 366 trips per day, including 23 a.m. peak hour trips and 28 trips during the p.m. peak hour. These results are summarized in Table 6.

Land Use	Units	Daily Trips		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Multifamily Housing (Low-Rise)	50 du	7.32	366	0.46	23	5	18	0.56	28	18	10

Note: du = dwelling units

Trip Distribution

The suggested pattern to allocate new project trips to the street network was determined based on existing turning movement data, local knowledge of the study area, and likely origins/destinations for residents of the project. The applied assumptions are shown in Table 7.

Route	Percent
To/from the north on Santa Rosa Ave	40
To/from the south on Santa Rosa Ave	10
To/from the south on US 101	50
TOTAL	100

Intersection Operation

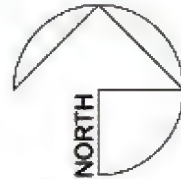
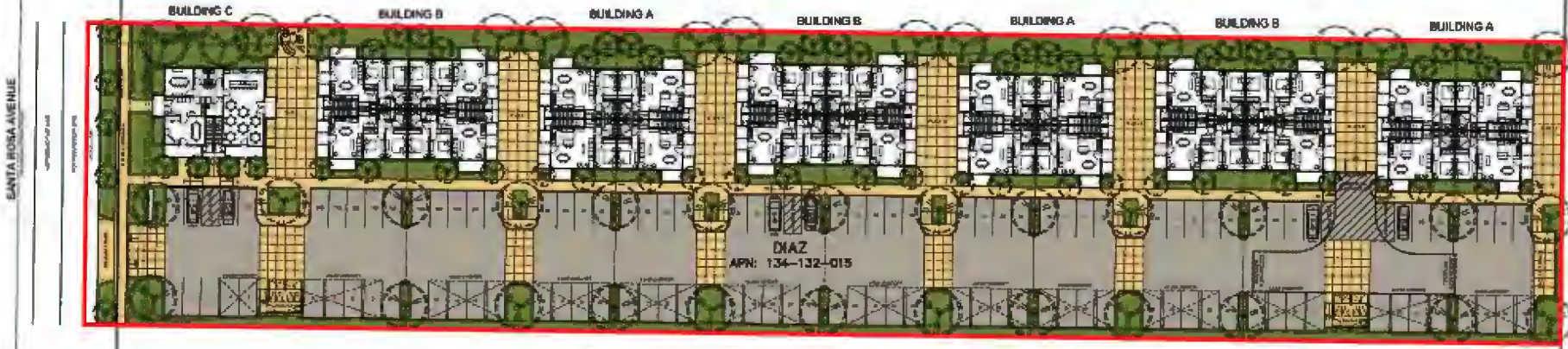
Existing plus Project Conditions

Upon the addition of project-related traffic to existing volumes the study intersections are expected to continue operating at the same Levels of Service as without the project. Project traffic volumes are shown in Figure 5 and Existing plus Project traffic volumes are shown in Figure 6. These results are summarized in Table 8.

Legend

 Action Area

LANDS OF
STERCK TRUST
APN: 134-132-016



Architectural Site Plan

LANDS OF
SANTA ROSA SELF STORAGE
APN: 134-132-014



File/Rev
1012: 5.30 4-pier design
1001: 1.00 8-pier design
1003: 4.50 2-bath units
1004/30.00 Overlay 2D
1002: 2.00 Site 3D View

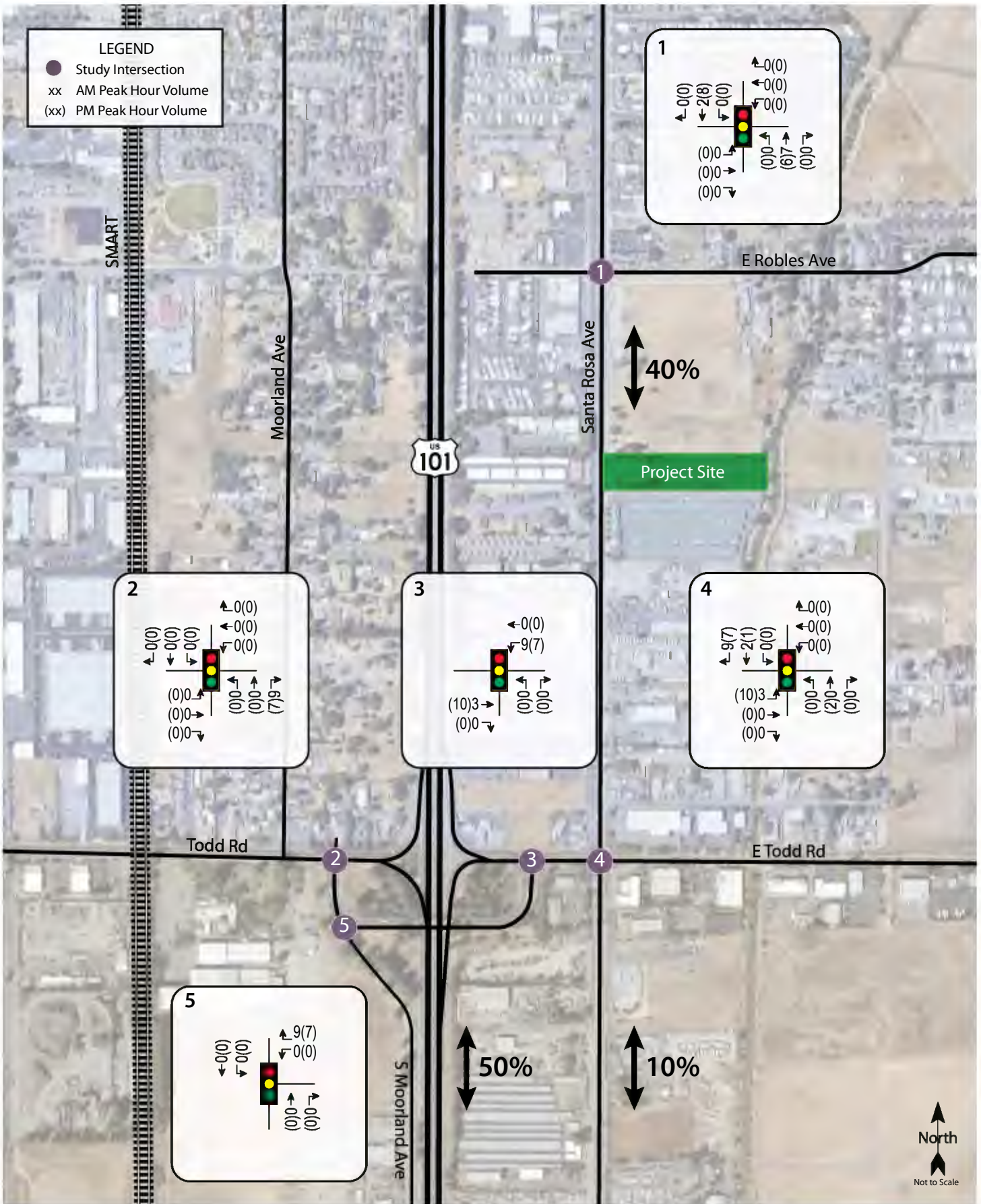
Job Number
1056

Project Designer
PAUL GRIGER

Drawn By
GILBERT

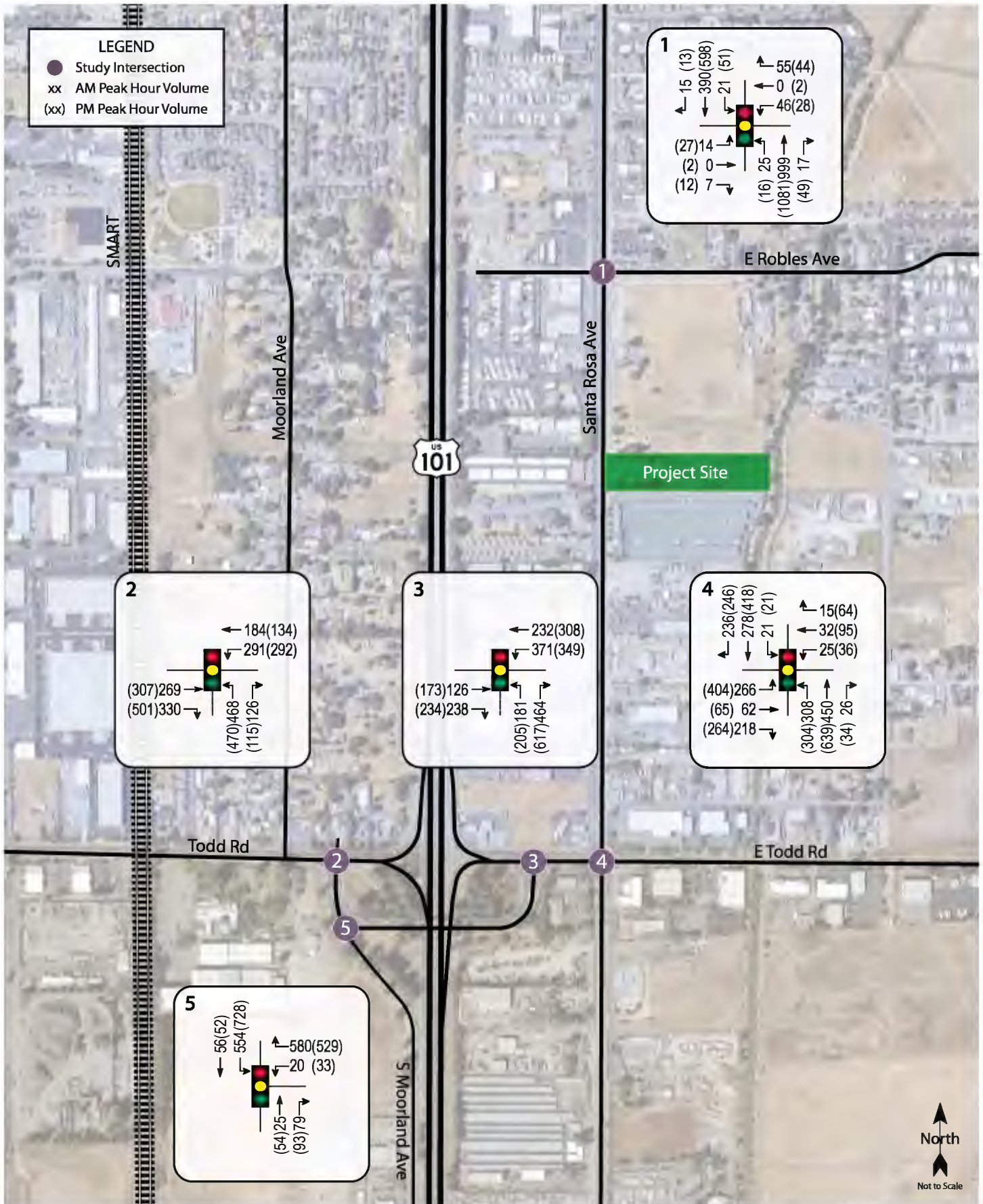
Date
Contract # 666-0-005





Traffic Impact Study for Los Pinos Apartments
Figure 5 – Project Traffic Volumes and Trip Distribution





Traffic Impact Study for Los Pinos Apartments
Figure 6 – Existing plus Project Traffic Volumes



Table 8 – Existing and Existing plus Project Peak Hour Intersection Levels of Service

Study Intersection	Existing Conditions				Existing plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Santa Rosa Ave/E Robles Ave	8.1	A	8.1	A	8.1	A	8.1	A
2. S Moorland Ave/Todd Rd-US 101 S Ramps	5.3	A	5.7	A	5.3	A	5.7	A
3. US 101 Overpass/Todd Rd	8.1	A	8.6	A	8.2	A	8.6	A
4. Santa Rosa Ave/Todd Rd	16.7	B	20.3	C	16.8	B	20.5	C
5. S Moorland Ave/US 101 Overpass	15.2	B	16.3	B	15.3	B	16.3	B

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

Finding – The study intersections are expected to continue operating acceptably at the same levels of service upon the addition of project-generated traffic.

Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes, the study intersections are expected to operate at the same service levels as without project-added trips. The Future plus Project operating conditions are summarized in Table 9. Future plus Project traffic volumes are shown in Figure 7.

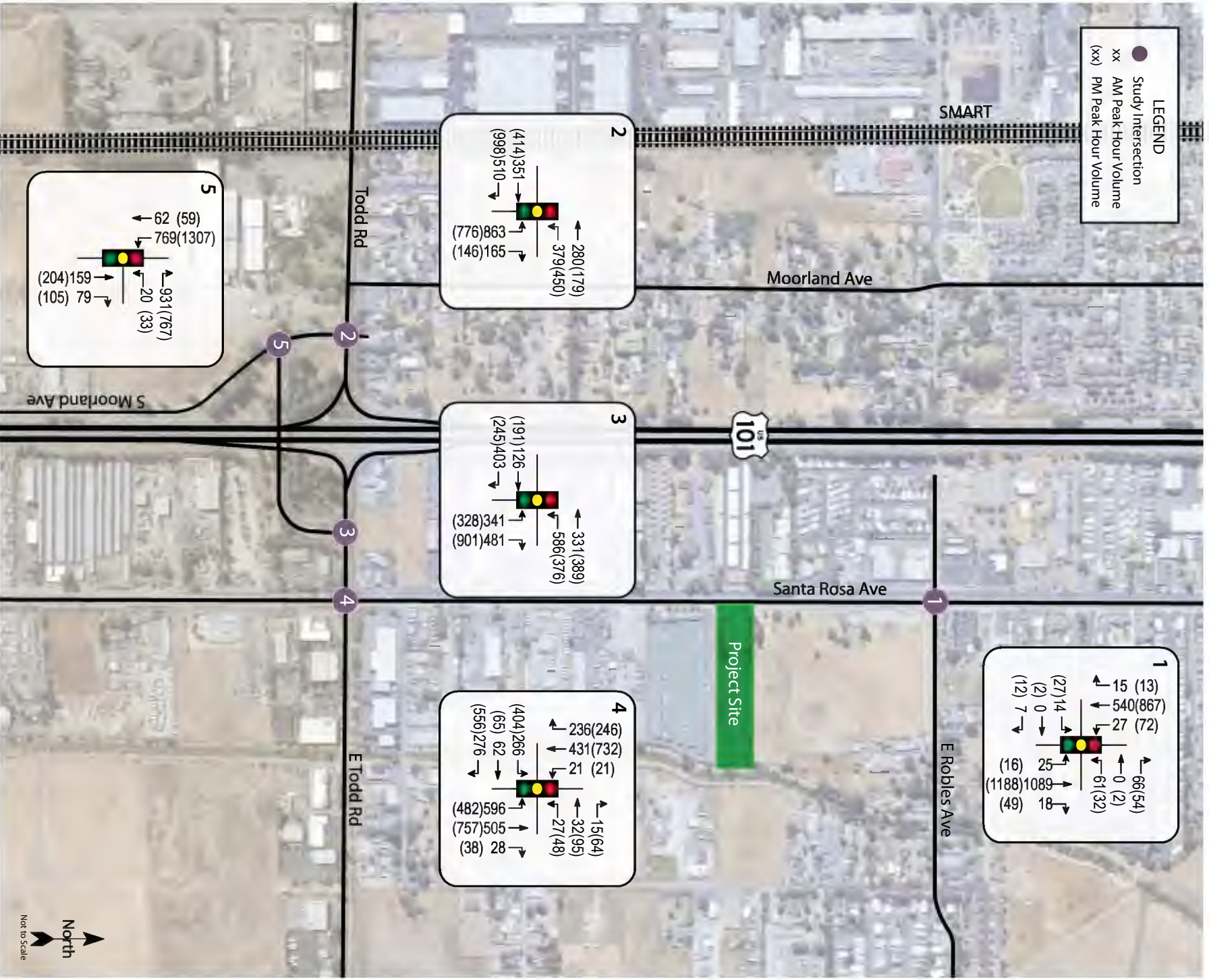
Table 9 – Future and Future plus Project Peak Hour Intersection Levels of Service

Study Intersection	Future Conditions				Future plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Santa Rosa Ave/E Robles Ave	8.2	A	8.4	A	8.2	A	8.4	A
2. S Moorland Ave/Todd Rd-US 101 S Ramps	6.6	A	18.9	B	9.1	A	18.9	B
3. US 101 Overpass/Todd Rd	13.7	B	9.7	A	13.7	B	9.8	A
4. Santa Rosa Ave/Todd Rd	43.8	D	71.3	E	43.9	D	71.2	E
Dual NB left-turn lanes	22.2	C	31.8	C	22.2	C	31.9	C
5. S Moorland Ave/US 101 Overpass	31.4	C	40.7	D	32.2	C	40.7	D

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; **Bold** text = deficient operation; Shaded cells = conditions with recommended improvements

It should be noted that with the addition of project-related traffic volumes, average delay at Santa Rosa Avenue/Todd Road decreases slightly during the p.m. peak hour. While this is counter-intuitive, this condition occurs when a project adds trips to movements that have delays that are below the intersection average, resulting in a better balance between movements and lower average delay for the intersection. At this location, the project adds trips to the southbound through and right-turn movements, which have delays that are lower than the intersection average, resulting in a slight reduction in the average delay.

Finding – Although Santa Rosa Avenue/Todd Road is expected to operate at LOS E under Future Conditions, the addition of project traffic would result in less than a five-second increase in delay, making the impact acceptable under the County's criteria.



Traffic Impact Study for Los Pinos Apartments
Figure 7 – Future plus Project Traffic Volumes

Queuing

Under each scenario, projected 95th percentile queues in left-turn pockets were determined using the SimTraffic application of Synchro and averaging the 95th percentile for each of five runs. The study intersections were evaluated with their existing controls and lane configurations under all scenarios. Summarized in Table 10 are the predicted queue lengths for the left-turn lanes at all five study intersections. Copies of the SIMTRAFFIC projections are contained in Appendix E.

Table 10 – Maximum Left-Turn Queues

Study Intersection Approach	Available Storage	Maximum Queues							
		AM Peak Hour				PM Peak Hour			
		E	E+P	F	F+P	E	E+P	F	F+P
1. Santa Rosa Ave/E Robles Ave									
Westbound	100	32	50	63	63	52	46	53	62
Northbound	100	39	22	36	39	45	46	31	32
Southbound	100	21	24	51	42	52	51	62	64
2. S Moorland Ave/Todd Rd-US 101 S Ramps									
Westbound	280	130	237	324	320	319	235	321	322
Northbound	200	251	300	282	283	307	295	290	281
3. US 101 Overpass/Todd Rd									
Westbound	190	141	145	237	244	141	136	259	272
Northbound	100	137	162	186	195	119	126	135	119
4. Santa Rosa Ave/Todd Rd									
Eastbound	190	69	97	107	129	150	152	106	130
Westbound	85	32	32	80	86	51	71	80	76
Northbound	350*	141	176	341	343	190	263	341	340
Southbound	205	18	19	35	30	47	25	29	40
5. S Moorland Ave/US 101 Overpass									
Westbound	100	15	76	232	247	245	247	239	237
Southbound	205	189	303	291	305	302	331	317	295

Notes: Maximum Queue based on the average of the maximum value from five SIMTRAFFIC runs; all distances are measured in feet; E = existing conditions; E+P = existing plus project conditions; F = future conditions; F+P = future plus project conditions; **Bold** text = queue length exceeds available storage; * indicates that the turn pocket leads into a two-way left-turn lane that extends the available queuing space

Queuing is expected to exceed available stacking space at numerous locations, though in most cases the project would only add to a queue that is already beyond the stacking space and the additional length would not cause any new queuing issues (it would not cause extension to a point where stopping sight distance is no longer adequate) so the impact is considered less than significant (LTS). The impacts at locations identified in Table 10 as having excessive queuing are as follows; if "LTS" is indicated, it is for the reasons stated above.

- South Moorland Avenue/Todd Road-US 101 South Ramps
 - Westbound, Future, a.m. and p.m. peak hours: LTS.
 - Northbound, all scenarios: LTS.

- US 101 Overpass/Todd Road
 - Westbound, Future, both peak hours: LTS.
 - Northbound, Existing, both peak hours, Future, a.m. peak hour: While the queue will extend beyond the end of the left-turn pocket, the adjacent lane is a right-turn lane, so all traffic is slowing to turn. Because there is no potential for conflict with higher speed traffic, the impact is LTS.
- South Moorland Avenue/US 101 Overpass
 - Westbound, Existing p.m. peak hour, Future, a.m. and p.m. peak hours: LTS.
 - Southbound, Existing a.m. peak hour: the increase in queueing would be less than is anticipated under Future volumes but would occur in the short term. The stacking deficiencies between this intersection and South Moorland Avenue/Todd Road are directly associated with the close spacing of these intersections and while some relief can be achieved with improved phasing, additional capacity is needed to accommodate long-term growth in traffic volumes. The southbound queueing could be reduced by widening on the north side of the overpass to provide separate left-turn and right-turn lanes, thereby allowing implementation of a right-turn overlap phase. These changes require approval by Caltrans. Further, these improvements are needed to accommodate future increases in traffic, regardless of whether the project goes forward or not. Given the magnitude of the improvements needed as well as the need for them without the project, it appears most reasonable for these improvements to be made part of a County-sponsored project with fees established for all developments contributing to this need.
 - Southbound, Existing p.m. peak hour, Future a.m. peak hour: LTS.

Finding – The project would impact queueing on the southbound South Moorland Avenue approach to the US 101 Overpass. Though the project’s impact is not significant at the South Moorland Avenue/Todd Road-US 101 South Ramps intersection, queueing at that location could be reduced by converting the northbound approach to a left-turn/through lane and a right-turn lane with overlap signal phasing. Improvements are needed to the two South Moorland Avenue intersections to accommodate future growth without the project. Such improvements should be coordinated by the County to achieve Caltrans concurrence, and funds should be collected from all developments in the area as the costs are more than a single, small development can incur.

Recommendation – The County should establish a fee program to pay for capacity and operational improvements needed at South Moorland Avenue/Todd Road-US 101 South Ramps and South Moorland Avenue/US 101 Overpass.

Vehicle Miles Traveled (VMT)

Senate Bill (SB) 743 established a change in the metric to be applied for determining traffic impacts associated with development projects. 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 is now the basis for determining transportation impacts. Because the County of Sonoma has not yet adopted standards of significance for evaluating VMT, guidance provided by the California Governor’s Office of Planning and Research (OPR) in the publication *Technical Advisory on Evaluating Transportation Impacts in CEQA*, 2018, was used. This document indicates that a residential project generating vehicle travel that is 15 or more percent below the existing countywide residential VMT per capita may indicate a less-than-significant transportation impact.

Based on data from the recently updated Sonoma County Transportation Authority (SCTA) travel demand model, the County of Sonoma has a baseline average residential VMT of 15.56 miles per capita. Applying OPR’s guidance, a residential project generating a VMT that is 15 percent or more below this value, or no more than 13.23 miles per capita, would have a less-than-significant VMT impact. The SCTA model includes traffic analysis zones (TAZ) covering geographic areas throughout Sonoma County. The Los Pinos Apartments project site is located within TAZ 569, which has a baseline VMT per capita of 13.59 miles.

The VMT associated with a development project is influenced by factors including 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 Pinos Apartments project, which has a residential density of 20 units per acre, an 11.5 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 Pinos Apartments project would designate two apartments as “very low income” deed-restricted affordable units. The corresponding reduction in the project’s VMT is projected to be 1.0 percent.

Combined, the project’s proposed density and provision of on-site affordable housing would reduce its per capita VMT by 12.5 percent, thereby resulting in a project-specific rate of 11.89 VMT per capita. This is below the applied VMT significance threshold of 13.23 VMT per capita. Accordingly, the project as proposed would be expected to result in a less-than-significant VMT impact. The VMT findings are summarized in Table 11, and information including a summary of the input variables and adjustments is included in Appendix F.

Table 11 – Vehicle Miles Traveled Analysis Summary

VMT Metric	Baseline VMT Rate (Countywide Average)	Significance Threshold (15% Below Countywide Average)	Project VMT Rate		
			Base Unadjusted (TAZ 569)	With Adjustments	Significance Finding
Residential VMT per Capita (Countywide Baseline)	15.56	13.23	13.59	11.89	Less than significant

Note: VMT Rate is measured in VMT per Capita, or the number of daily miles driven per resident; TAZ=Traffic Analysis Zone

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

Alternative Modes

Pedestrian Facilities

Sidewalks exist along the project frontage with Santa Rosa Avenue, providing connectivity to nearby transit stops. Given the proximity of a variety of land uses in all directions from the project site uses including commercial, industrial, residential, and an elementary school, it is reasonable to assume that some project patrons and employees will want to walk, bicycle, and/or use transit to reach the project site.

Though nearby transit stops are located adjacent to signalized intersections, at the request of County staff the need for a midblock pedestrian crossing south of the project sight was evaluated. The potential volume of pedestrian traffic that the project would generate was estimated using standard person-trip rates published in the *Trip Generation Manual for Multifamily Housing (Low-Rise)* (Land Use #220). As shown in Table 12, application of these rates indicates that the project would be expected to generate approximately 18 pedestrian trips during the morning peak hour, and 27 person-trips during the evening peak hour.

Table 12 – Person Trip Generation Summary

Land Use	Units	AM Peak Hour				PM Peak Hour			
		Rate	Trips	In	Out	Rate	Trips	In	Out
Multifamily Housing (Low-Rise)	50 du	0.36	18	3	15	0.53	27	16	11

Note: du = dwelling units

To be consistent with the distribution used for vehicle trips, it was assumed that 60 percent of these person trips would be to and from the south where the midblock crossing would be located. Of these, only the 9 outbound trips during the morning and 7 outbound evening peak hour trips would be expected to use the crossing. This distribution is shown in Table 13.

Table 13 – Person Trip Distribution Assumptions

Route	Percent	AM Peak Hour		PM Peak Hour	
		In	Out	In	Out
To/from the north on Santa Rosa Ave	40	1	6	6	4
To/from the south on Santa Rosa Ave	60	2	9	10	7
TOTAL	100	3	15	16	11

Given the speed and volume of traffic on Santa Rosa Avenue, an unprotected midblock crossing would generally be inappropriate. The need for such a crossing was therefore evaluated within the context of warrants indicating when enhancements such as rectangular rapid flashing beacons (RRPBs) or a more restrictive device such as a HAWK would be appropriate. Based on criteria prescribed in the *California Manual on Uniform Traffic Control Devices* (MUTCD), and standards published by the National Cooperative Highway Research Program (NCHRP), a minimum of 20 pedestrian crossings per hour are needed to trigger warrants for any of the enhanced crossing devices. The project would generate an estimated maximum of 9 pedestrian crossings during either peak hour, with is only 45 percent of the number needed to meet the minimum volume warrant. As the project would not generate sufficient pedestrian traffic to warrant crossing treatments such as RRFBs, a midblock crosswalk is not recommended.

Finding – Pedestrian facilities serving the project site are generally adequate, though the nearest location where there is a marked crossing of Santa Rosa Avenue is about 800 feet north of the site at East Robles Avenue. Though consideration was given to installing a midblock crossing, given the nominal volume of traffic that the project would generate, one is not warranted and therefore not recommended.

Bicycle Facilities

There are existing bike lanes on Santa Rosa Avenue that connect the site to the nearby Hunter Creek Trail. The project plans indicate that 24 bicycle parking spaces would be provided on-site. This is more than adequate to meet the supply of one space for every four units that do not have a garage or other locations to store bicycles, or a requirement of facilities to store 13 bikes.

Finding – Existing bicycle facilities, together with shared use of minor streets provide adequate access for bicyclists. The proposed bike parking supply is adequate to meet City requirements.

Transit

Existing transit routes are adequate to accommodate project-generated transit trips and stops are within a generally acceptable walking distance of the site. There is a northbound stop approximately 400 feet north of the project site, and a southbound stop approximately 100 feet north of the project site; however, to reach the southbound bus stop the pedestrian would need to walk 800 feet north to East Robles Avenue, and then back south 700 feet to the bus stop. While this is slightly greater than one quarter of a mile, it is still an acceptable walking distance for most patrons. Because the stops for SCT are not located proximate to the signalized crossing at East Robles Avenue, the County may wish to consider relocating their stops to make crossings more accessible.

Finding – Transit facilities serving the project site are adequate.

Access and Circulation

Site Access

The site would take access from one new driveway on Santa Rosa Avenue approximately 1,000 feet south of East Robles Avenue.

Sight Distance

Adequacy of sight distances along Santa Rosa Avenue at the proposed driveway location were evaluated based on sight distance criteria contained in *A Policy on Geometric Design on Highways and Streets* published by American Association of State Highway and Transportation Officials (AASHTO). These guidelines include recommended stopping sight distances for drivers traveling along the major approaches to driveways and for drivers of stopped vehicles at the minor street approaches and driveways based upon approach travel speeds. Sight distance should be measured from a 3.5-foot height at the location of the driver on the minor road to a 3.5-foot object height in the center of the approaching lane of the major road. Set-back for the driver on the crossroad shall be 14.5 feet, measured from the edge of the traveled way.

Based on the posted 40-mph speed limit on Santa Rosa Avenue, the minimum stopping sight distance needed is 305 feet. Sight distance extends more than 600 feet in each direction along Santa Rosa Avenue which is more than adequate for the posted speed limit. Additionally, Santa Rosa Avenue is straight and flat in the project vicinity so adequate sight distance is available for following drivers to see and react to a vehicle slowing to move into the center turn lane on Santa Rosa.

While sight distance is currently adequate, landscaping or signs placed along the project frontage can obstruct clear sight lines, so the design should include consideration of avoiding creating sight obstructions.

Finding – Adequate sight distance is available at the project driveway to accommodate all turns.

Recommendation – Landscaping near the driveways should be maintained such that foliage stays above seven feet or below three feet from the pavement level. Signs or monuments to be installed along the project frontage should be placed so that sight lines are not obstructed.

Emergency Access

As proposed, all interior drive aisles are of sufficient width to meet County of Sonoma design standards and there would be no anticipated issues with emergency response vehicles navigating the site.

Finding – Access for emergency vehicles is expected to be adequate.

Parking

Because the project site is just outside of Santa Rosa City limits, both Sonoma County and the City of Santa Rosa will be reviewing the report, therefore parking was examined under the policies for both jurisdictions.

Required Parking

Sonoma County

The project was analyzed to determine whether the proposed parking supply would be sufficient to satisfy County requirements. Chapter 26-86-010 of the *Sonoma County Municipal Code* requires multifamily housing developments to provide parking at a rate of one covered space per unit. To meet requirements, the proposed project would need to provide 50 covered spaces. The site plan shows 113 parking spaces, 58 of which would be covered so the proposed number of parking spaces exceeds County requirements.

Santa Rosa

Section 20-36.040 of the City of Santa Rosa Zoning Code indicates that multifamily housing developments are required to provide parking at a rate of one space per unit plus one space per unit with two or more bedrooms and one-half space per unit for guests. To meet requirements, the proposed project would need to provide at least 50 covered parking spaces and 63 uncovered spaces. The site plan shows 113 parking spaces, 58 of which would be covered so the proposed number of parking spaces meets the City requirements.

The parking requirements are summarized in Table 14.

Table 14 – Parking Analysis Summary						
Unit Size	Units	Supply (spaces)	County Requirements		City Requirements	
			Rate	Spaces Required	Rate	Spaces Required
Two Bedrooms	38 du	95 (45 covered)	1.5 spaces/du	63 (38 covered)	1 covered space plus 1.5 visitor spaces per unit	95 (38 covered)
One-Bedroom	12 du	18 (12 covered)	1 space/du	12 (12 covered)	1 covered space plus 0.5 visitor spaces per unit	18 (12 covered)
Total		113 (50 covered)		75 (50 covered)		113 (50 covered)

Notes: du = dwelling unit

Finding – The proposed parking supply satisfies County and City requirements.

Conclusions and Recommendations

Conclusions

- The project is expected to generate an average of 366 new trips per day including 23 trips during the a.m. peak hour and 28 trips during the p.m. peak hour.
- Under Existing Conditions, the study intersections operate acceptably at LOS C or better during both peak hours evaluated and they would be expected continue operating at the same Levels of Service upon the addition of project-related traffic.
- Under Future Conditions, the study intersections are expected to operate acceptably except for Santa Rosa Avenue/Todd Road, which would deteriorate to LOS E during the p.m. peak hour. Upon the addition of project-related traffic, the study intersections would continue to operate at the same service levels during both peak hours and although Santa Rosa Avenue/Todd Road would operate unacceptably the project would reduce the intersection's average delay, so the impact would be acceptable under the County's policy.
- The project would cause queuing to increase in numerous locations where the available stacking length would be exceeded without the project; this is considered an acceptable impact. Queuing under Future volumes would be expected to extend beyond the adjacent intersections in both directions along South Moorland Avenue between Todd Road and the US 101 Overpass, requiring capacity improvements to accommodate the project as well as all other development in the area.
- As proposed, pedestrian, bicycle and transit facilities serving the project site are adequate. Though consideration was given to potential need for a midblock crosswalk, based on the volume of pedestrian traffic that the project would be expected to generate one is not warranted.
- Adequate sight distance is available at the proposed access point provided that trees and other landscaping are placed out of the vision triangles or maintained adequately.
- Access for emergency vehicles, as well as passenger vehicles, is expected to be adequate.
- The proposed parking supply of 113 spaces exceeds County requirements and meets the City of Sonoma Requirements.

Recommendations

- The project applicant should contribute to a funding program for capacity-increasing improvements needed at South Moorland Avenue/Todd Road-US 101 South Ramps and South Moorland Avenue/US 101 Overcrossing.
- Landscaping should be planted and maintained such that foliage stays above seven feet and below three feet from the surface of the road. Signs or monuments to be installed along the project frontage should be placed so that sight distance is not obstructed at the project driveways.

Study Participants and References

Study Participants

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Graphics	Katia Wolfe
Editing/Formatting	Alex Scrobonia, Hannah Yung-Boxdell
Quality Control	Dalene J. Whitlock, PE, PTOE

References

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SOX681

Appendix A

Collision Rate Calculations



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Intersection Collision Rate Calculations

Los Pinos Apartments TIS

Intersection # 1: Santa Rosa Avenue & East Robles Avenue
Date of Count: Tuesday, March 03, 2020

Number of Collisions: 11
Number of Injuries: 7
Number of Fatalities: 0
ADT: 19100
Start Date: September 1, 2014
End Date: August 31, 2019
Number of Years: 5

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

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

$$\text{collision rate} = \frac{11}{19,100} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.32 c/mve	0.0%	63.6%
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
 * 2016 Collision Data on California State Highways, Caltrans

Intersection # 2: Todd Road & South Moorland Avenue
Date of Count: Monday, April 22, 2019

Number of Collisions: 13
Number of Injuries: 3
Number of Fatalities: 0
ADT: 18100
Start Date: September 1, 2014
End Date: August 31, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Urban

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

$$\text{collision rate} = \frac{13}{18,100} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.39 c/mve	0.0%	23.1%
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
 * 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculations

Los Pinos Apartments TIS

Intersection # 3: Todd Road & US 101 Overpass
Date of Count: Monday, April 22, 2019

Number of Collisions: 3
Number of Injuries: 1
Number of Fatalities: 0
ADT: 18700
Start Date: September 1, 2014
End Date: August 31, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Urban

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

$$\text{collision rate} = \frac{3 \times 1,000,000}{18,700 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.09 c/mve	0.0%	33.3%
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
 * 2016 Collision Data on California State Highways, Caltrans

Intersection # 4: Santa Rosa Avenue & Todd Road
Date of Count: Monday, April 22, 2019

Number of Collisions: 36
Number of Injuries: 6
Number of Fatalities: 0
ADT: 25700
Start Date: September 1, 2014
End Date: August 31, 2019
Number of Years: 5

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

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

$$\text{collision rate} = \frac{36 \times 1,000,000}{25,700 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.77 c/mve	0.0%	16.7%
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
 * 2016 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculations

Los Pinos Apartments TIS

Intersection # 5: South Moorland Avenue & US 101 Overpass
Date of Count: Monday, April 22, 2019

Number of Collisions: 12
Number of Injuries: 4
Number of Fatalities: 0
ADT: 14800
Start Date: September 1, 2014
End Date: August 31, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Urban

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

$$\text{collision rate} = \frac{12}{14,800} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.44 c/mve	0.0%	33.3%
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
* 2016 Collision Data on California State Highways, Caltrans



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Appendix B

Traffic Counts





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W-Trans

Weekday AM Peak
 Santa Rosa Ave at E Robles
 SOX681
 County of Sonoma

File Name : SRAve at ERobles_AM
 Site Code : 43218765
 Start Date : 3/3/2020
 Page No : 1

Groups Printed- Unshifted - Bank 1

Start Time	Santa Rosa Ave Southbound					E. Robles Westbound					Santa Rosa Ave Northbound					E. Robles Eastbound					
	Right	Thru	Left	U-Turns	App. Total	Right	Thru	Left	U-Turns	App. Total	Right	Thru	Left	U-Turns	App. Total	Right	Thru	Left	U-Turns	App. Total	Int. Total
08:30 AM	0	58	6	0	64	12	0	12	0	24	1	71	2	0	74	1	0	2	0	3	165
08:45 AM	0	87	2	0	89	15	0	11	0	26	4	100	1	0	105	4	0	5	0	9	229
Total	0	145	8	0	153	27	0	23	0	50	5	171	3	0	179	5	0	7	0	12	394
09:00 AM	0	111	4	0	115	29	0	15	0	44	2	200	1	0	203	4	1	9	0	14	376
09:15 AM	6	97	5	0	108	31	0	12	0	43	5	261	0	0	266	2	0	8	0	10	427
09:30 AM	5	103	8	0	116	5	0	20	0	25	3	234	1	0	238	0	0	2	0	2	381
09:45 AM	3	101	2	0	106	10	0	5	0	15	6	234	21	0	261	2	0	1	0	3	385
Total	14	412	19	0	445	75	0	52	0	127	16	929	23	0	968	8	1	20	0	29	1569
10:00 AM	1	87	6	0	94	9	0	9	0	18	3	263	3	0	269	3	0	3	0	6	387
10:15 AM	0	106	5	0	111	10	0	6	0	16	5	186	1	0	192	3	0	1	0	4	323
Grand Total	15	750	38	0	803	121	0	90	0	211	29	1549	30	0	1608	19	1	31	0	51	2673
Approach %	1.9	93.4	4.7	0		57.3	0	42.7	0		1.8	96.3	1.9	0		37.3	2	60.8	0		
Total %	0.6	28.1	1.4	0	30	4.5	0	3.4	0	7.9	1.1	57.9	1.1	0	60.2	0.7	0	1.2	0	1.9	
Unshifted	15	750	38	0	803	121	0	90	0	211	29	1549	30	0	1608	19	1	31	0	51	2673
% Unshifted	100	100	100	0	100	100	0	100	0	100	100	100	100	0	100	100	100	100	0	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Start Time	Santa Rosa Ave Southbound					E. Robles Westbound					Santa Rosa Ave Northbound					E. Robles Eastbound					
	Right	Thru	Left	U-Turns	App. Total	Right	Thru	Left	U-Turns	App. Total	Right	Thru	Left	U-Turns	App. Total	Right	Thru	Left	U-Turns	App. Total	Int. Total
09:15 AM	6	97	5	0	108	31	0	12	0	43	5	261	0	0	266	2	0	8	0	10	427
09:30 AM	5	103	8	0	106	10	0	5	0	15	6	234	21	0	261	2	0	1	0	3	381
09:45 AM	3	101	2	0	94	9	0	9	0	18	3	263	3	0	269	3	0	3	0	6	387
Total Volume	15	388	21	0	424	55	0	46	0	101	17	992	25	0	1034	7	0	14	0	21	1580
% App. Total	3.5	91.5	5	0		54.5	0	45.5	0		1.6	95.9	2.4	0		33.3	0	66.7	0		
PHF	.625	.942	.656	.000	.914	.444	.000	.575	.000	.587	.708	.943	.298	.000	.961	.583	.000	.438	.000	.525	.925

Peak Hour Analysis From 08:30 AM to 10:15 AM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 09:15 AM

W-Trans

Weekday PM Peak
 Santa Rosa Ave at E Robles
 SOX 681
 County of Sonoma

File Name : SRAve at ERobles_PM
 Site Code : 56781234
 Start Date : 3/3/2020
 Page No : 1

Groups Printed- Unshifted - Bank 1

Start Time	Santa Rosa Ave Southbound						E Robles Westbound						Santa Rosa Ave Northbound						E Robles Eastbound					
	Right	Thru	Left	U-Turns	App. Total		Right	Thru	Left	U-Turns	App. Total		Right	Thru	Left	U-Turns	App. Total		Right	Thru	Left	U-Turns	App. Total	
05:30 PM	3	146	11	0	160		10	1	9	0	20		15	284	2	0	301		3	0	10	0	13	
05:45 PM	2	159	12	0	173		9	0	8	0	17		12	250	3	0	265		1	0	4	0	5	
Total	5	305	23	0	333		19	1	17	0	37		27	534	5	0	566		4	0	14	0	18	
06:00 PM	6	122	9	0	137		8	0	5	0	13		13	264	8	0	285		6	0	7	0	13	
06:15 PM	2	163	19	0	184		17	1	6	0	24		9	277	3	0	289		2	2	6	0	10	
06:30 PM	3	171	8	0	182		13	1	5	0	19		18	250	1	0	269		3	0	9	0	12	
06:45 PM	2	140	15	0	157		13	0	5	0	18		16	239	4	0	259		2	0	8	0	10	
Total	13	596	51	0	660		51	2	21	0	74		56	1030	16	0	1102		13	2	30	0	45	
07:00 PM	7	120	14	0	141		8	1	5	0	14		12	258	4	0	274		2	0	9	0	11	
07:15 PM	6	126	13	0	145		9	0	6	0	15		6	218	5	0	229		0	0	9	1	10	
Grand Total	31	1147	101	0	1279		87	4	49	0	140		101	2040	30	0	2171		19	2	62	1	84	
Approach %	2.4	89.7	7.9	0	62.1		62.1	2.9	35	0	4.7		4.7	94	1.4	0	22.6		2.4	73.8	1.2	0	2.3	
Total %	0.8	31.2	2.7	0	34.8		2.4	0.1	1.3	0	3.8		2.7	55.5	0.8	0	59.1		0.5	0.1	1.7	0	2.3	
Unshifted	31	1147	101	0	1279		87	4	49	0	140		101	2040	30	0	2171		19	2	62	1	84	
% Unshifted	100	100	100	0	100		100	100	100	0	100		100	100	100	0	100		100	100	100	100	100	
Bank 1	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
% Bank 1	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	

Start Time	Santa Rosa Ave Southbound						E Robles Westbound						Santa Rosa Ave Northbound						E Robles Eastbound					
	Right	Thru	Left	U-Turns	App. Total		Right	Thru	Left	U-Turns	App. Total		Right	Thru	Left	U-Turns	App. Total		Right	Thru	Left	U-Turns	App. Total	
05:30 PM	3	146	11	0	160		10	1	9	0	20		15	284	2	0	301		3	0	10	0	13	
05:45 PM	2	159	12	0	173		9	0	8	0	17		12	250	3	0	265		1	0	4	0	5	
Total	5	305	23	0	333		19	1	17	0	37		27	534	5	0	566		4	0	14	0	18	
06:00 PM	6	122	9	0	137		8	0	5	0	13		13	264	8	0	285		6	0	7	0	13	
06:15 PM	2	163	19	0	184		17	1	6	0	24		9	277	3	0	289		2	2	6	0	10	
06:30 PM	3	171	8	0	182		13	1	5	0	19		18	250	1	0	269		3	0	9	0	12	
06:45 PM	2	140	15	0	157		13	0	5	0	18		16	239	4	0	259		2	0	8	0	10	
Total	13	590	51	0	654		51	2	28	0	74		49	1075	16	0	1140		12	2	27	0	41	
% App. Total	.542	.905	.671	.000	.889		.647	.500	.778	.000	.771		.817	.946	.500	.000	.947		.500	.250	.675	.000	.788	
PHF																								

Peak Hour Analysis From 05:30 PM to 07:15 PM - Peak 1 of 1

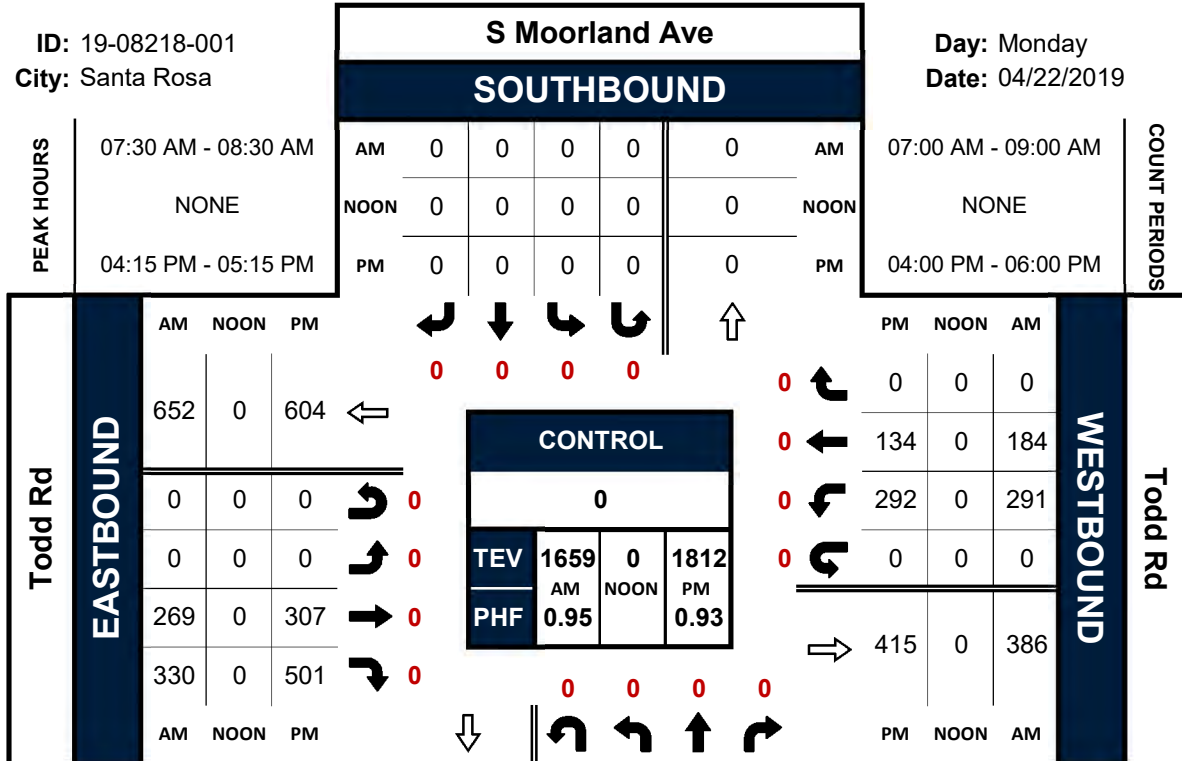
Peak Hour for Entire Intersection Begins at 05:30 PM

S Moorland Ave & Todd Rd

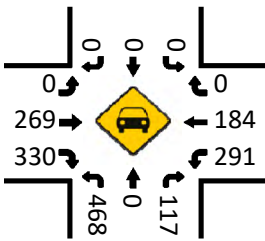
Peak Hour Turning Movement Count

ID: 19-08218-001
City: Santa Rosa

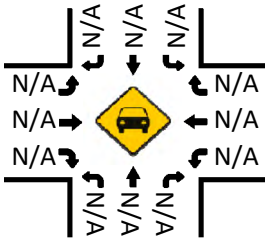
Day: Monday
Date: 04/22/2019



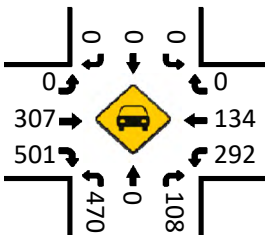
Total Vehicles (AM)



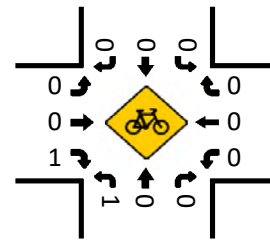
Total Vehicles (Noon)



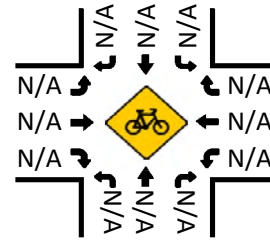
Total Vehicles (PM)



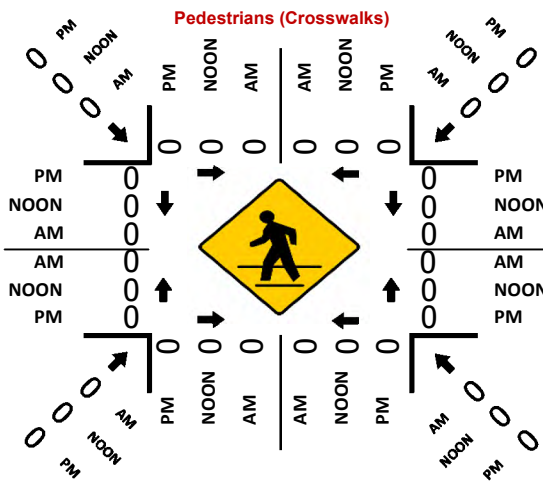
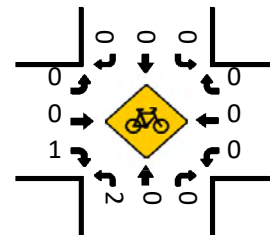
Bikes (AM)



Bikes (Noon)



Bikes (PM)

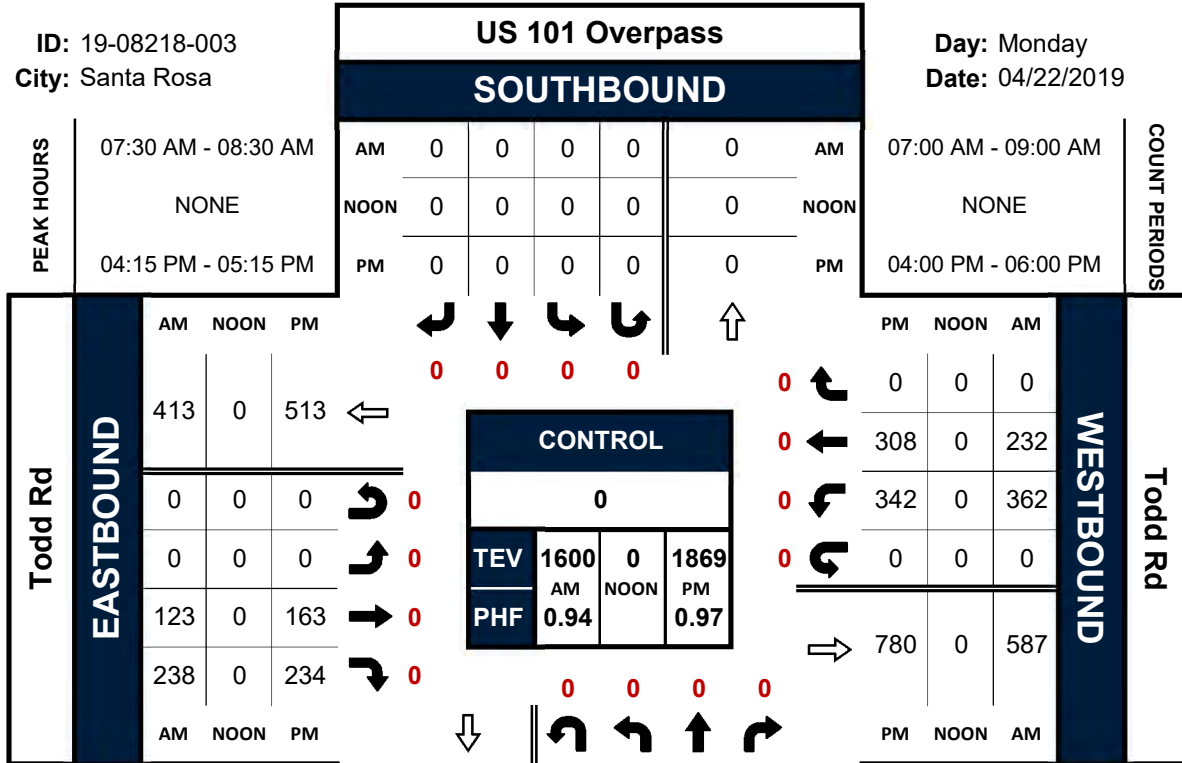


US 101 Overpass & Todd Rd

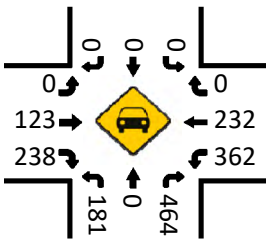
Peak Hour Turning Movement Count

ID: 19-08218-003
City: Santa Rosa

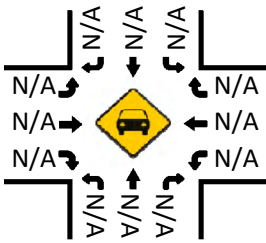
Day: Monday
Date: 04/22/2019



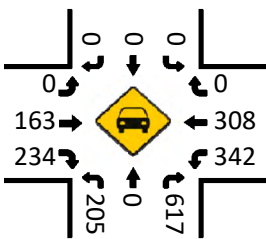
Total Vehicles (AM)



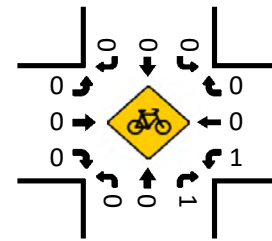
Total Vehicles (Noon)



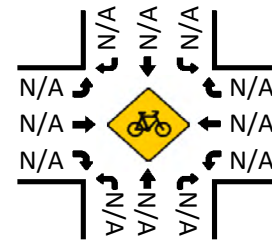
Total Vehicles (PM)



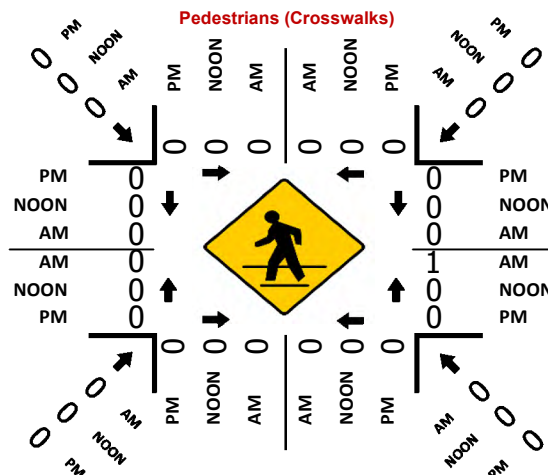
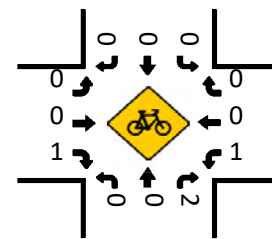
Bikes (AM)



Bikes (NOON)



Bikes (PM)

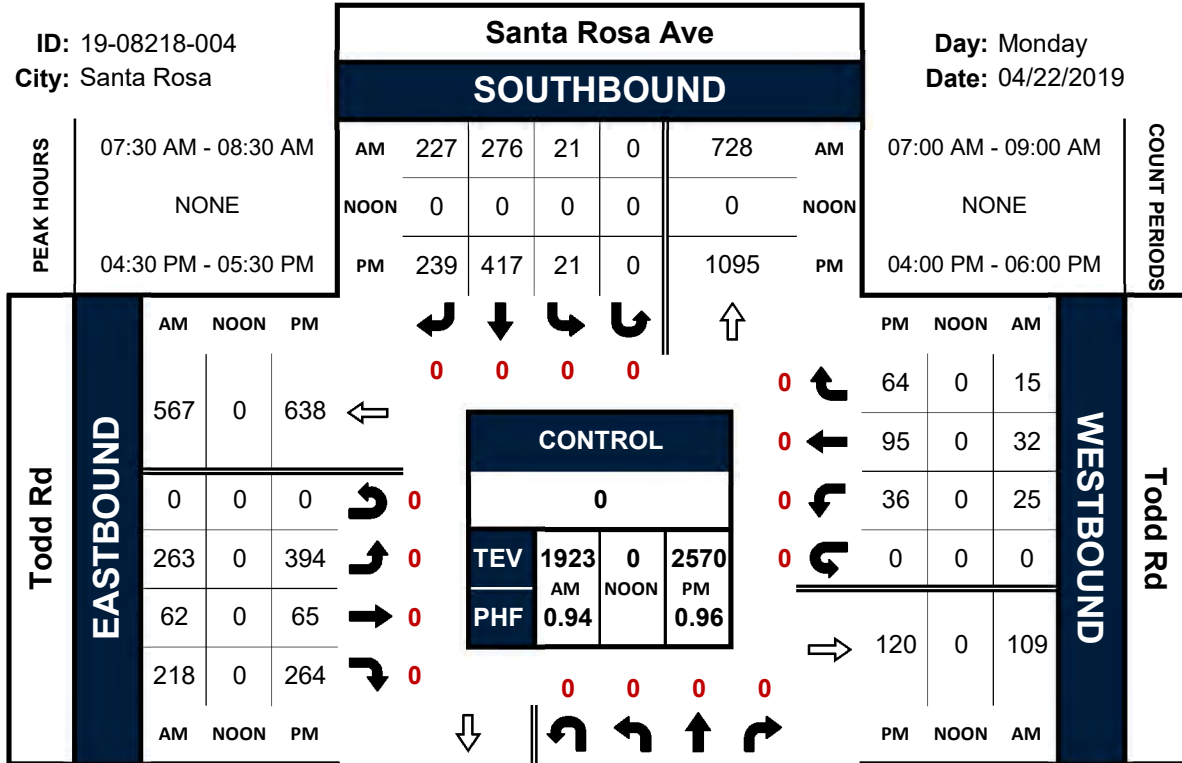


Santa Rosa Ave & Todd Rd

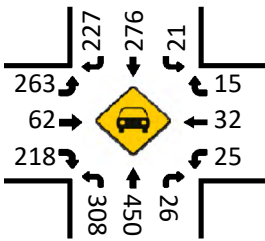
Peak Hour Turning Movement Count

ID: 19-08218-004
City: Santa Rosa

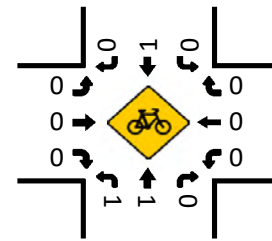
Day: Monday
Date: 04/22/2019



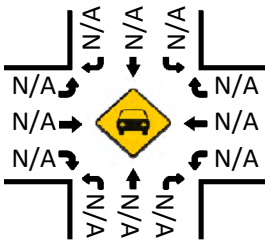
Total Vehicles (AM)



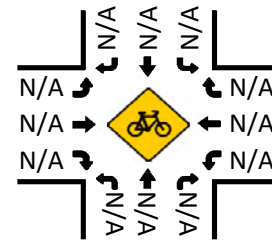
Bikes (AM)



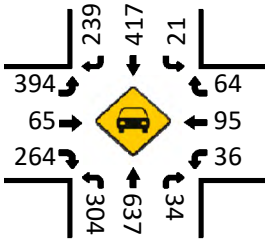
Total Vehicles (Noon)



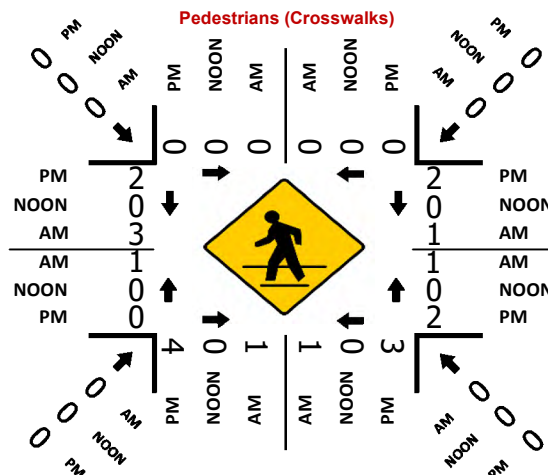
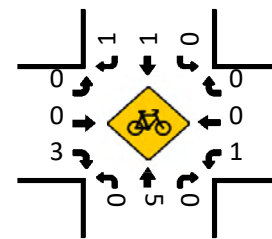
Bikes (NOON)



Total Vehicles (PM)



Bikes (PM)

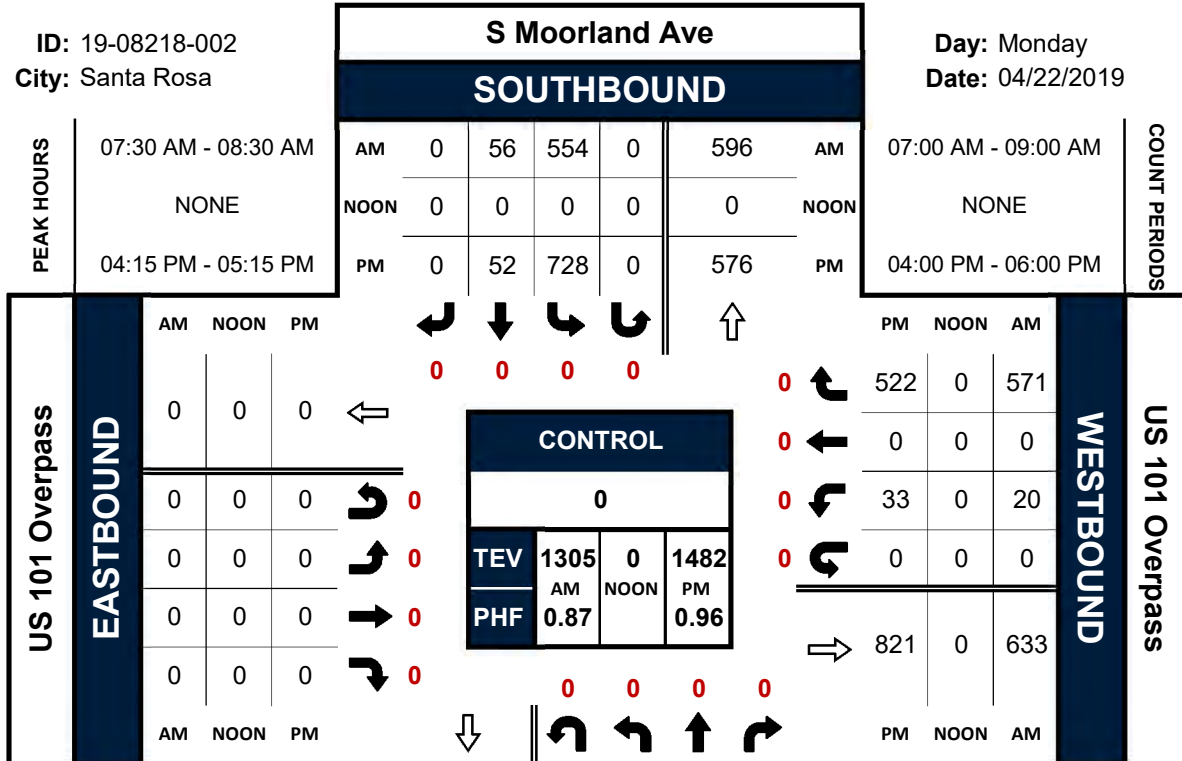


S Moorland Ave & US 101 Overpass

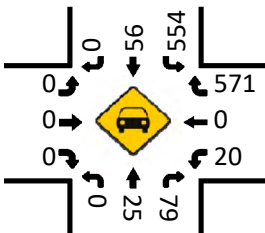
Peak Hour Turning Movement Count

ID: 19-08218-002
City: Santa Rosa

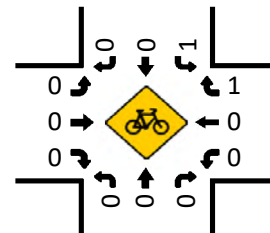
Day: Monday
Date: 04/22/2019



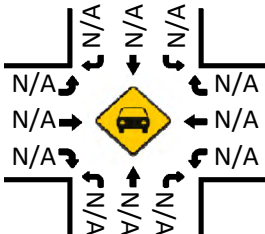
Total Vehicles (AM)



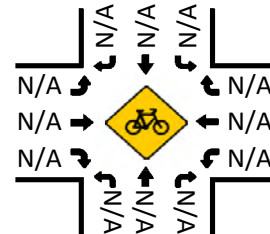
Bikes (AM)



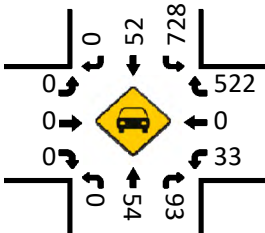
Total Vehicles (Noon)



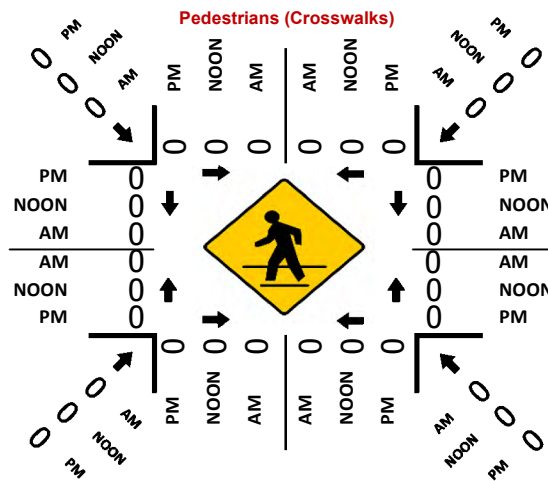
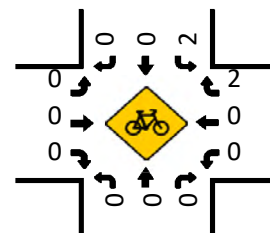
Bikes (NOON)



Total Vehicles (PM)



Bikes (PM)



Appendix C

Intersection Level of Service Calculations





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HCM 6th Signalized Intersection Summary
 1. Santa Rosa Ave & East Robles Ave

03/30/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	0	7	46	0	55	25	992	17	21	388	15
Future Volume (veh/h)	14	0	7	46	0	55	25	992	17	21	388	15
Initial Q (Obs.) veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	0.97	1.00	1.00	0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	15	0	8	49	0	59	27	1067	18	23	417	16
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	224	0	17	353	0	110	43	1428	24	37	1381	53
Arrive On Green	0.08	0.00	0.08	0.00	0.00	0.08	0.03	0.44	0.44	0.02	0.44	0.44
Sat Flow, veh/h	400	0	214	1267	0	1402	1603	3217	54	1603	3136	120
Grp Volume(v), veh/h	23	0	49	0	59	27	530	555	23	212	221	21
Grp Sat Flow(s),veh/h	614	0	0	1267	0	1402	1603	1599	1672	1603	1599	1667
Q Serve(g.s), s	0.5	0.0	0.0	0.0	0.0	1.2	0.5	8.5	8.5	0.4	2.6	2.7
Cycle Q Clear(g.c), s	1.8	0.0	0.0	0.9	0.0	1.2	0.5	8.5	8.5	0.4	2.6	2.7
Prop In Lane	0.65	0.35	1.00	1.00	1.00	1.00	1.00	0.03	1.00	0.03	1.00	0.07
Lane Grp Cap(c), veh/h	241	0	0	353	0	110	43	710	742	37	704	730
V/C Ratio(X)	0.10	0.00	0.00	0.14	0.00	0.54	0.63	0.75	0.75	0.62	0.30	0.30
Avail Cap(c), veh/h	1483	0	0	1590	0	1479	546	1454	1520	651	1557	1614
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.5	0.0	0.0	13.5	0.0	13.7	14.8	7.1	7.1	14.9	5.6	5.6
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.1	0.0	1.5	5.5	0.6	0.6	6.1	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.0	0.3	0.0	0.4	0.2	1.2	1.3	0.2	0.4	0.4
Unsig. Movement Delay, s/veh	14.6	0.0	0.0	13.6	0.0	15.2	20.3	7.7	7.7	21.0	5.6	5.7
LnGrp Delay(d),s/veh	B	A	A	B	A	B	C	A	A	C	A	A
LnGrp LOS	B	A	A	B	A	B	C	A	A	C	A	A
Approach Vol, veh/h	23			108				1112			456	
Approach Delay, s/veh	14.6			14.4				8.0			6.4	
Approach LOS	B			B				A			A	
Timer - Assigned Phs	1	2	4	5	6	8						
Phs Duration (G+Y+Rc), s	5.2	18.7	6.9	5.3	18.6	6.9						
Change Period (Y+Rc), s	4.5	5.0	4.5	4.5	5.0	4.5						
Max Green Setting (Gmax), s	12.5	28.0	32.5	10.5	30.0	32.5						
Max Q Clear Time (g_c+1), s	2.4	10.5	3.8	2.5	4.7	3.2						
Green Ext Time (p_c), s	0.0	3.0	0.0	0.0	1.1	0.2						
Intersection Summary												
HCM 6th Ctrl Delay	8.1											
HCM 6th LOS	A											

HCM 6th Signalized Intersection Summary
 2. S Moorland Ave & Todd Rd/JUS 101 South Ramps

03/30/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	269	330	291	184	0	468	0	117	0	0	0
Future Volume (veh/h)	0	269	330	291	184	0	468	0	117	0	0	0
Initial Q (Obs.) veh	0	0	0	0	0	0	3	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	283	158	306	194	0	493	0	57	0	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	590	619	513	614	645	0	0	0	0	0	10	0
Arrive On Green	0.00	0.33	0.33	0.34	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	1781	1870	1549	1781	1870	0	0	0	0	0	1870	0
Grp Volume(v), veh/h	0	283	158	306	194	0	0	0	0	0	0	0
Grp Sat Flow(s),veh/h	1781	1870	1549	1781	1870	0	0	0	0	0	1870	0
Q Serve(g.s), s	0.0	2.3	1.5	2.6	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g.c), s	0.0	2.3	1.5	2.6	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lane Grp Cap(c), veh/h	590	619	513	614	645	0	0	0	0	0	10	0
V/C Ratio(X)	0.00	0.46	0.31	0.50	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap(c), veh/h	1938	2035	1685	2795	2935	0	0	0	0	0	1859	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.0	4.8	5.0	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.3	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh	0.0	5.6	5.1	5.6	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LnGrp Delay(d),s/veh	A	A	A	A	A	A	A	A	A	A	A	A
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h	441			500							0	
Approach Delay, s/veh	5.4			5.3							0.0	
Approach LOS	A			A							A	
Timer - Assigned Phs	2	4	4	8								
Phs Duration (G+Y+Rc), s	0.0	9.5	9.5	9.6								
Change Period (Y+Rc), s	3.0	3.2	3.2	3.0								
Max Green Setting (Gmax), s	19.0	20.8	20.8	30.0								
Max Q Clear Time (g_c+1), s	0.0	4.3	4.3	4.6								
Green Ext Time (p_c), s	0.0	1.9	1.9	2.0								
Intersection Summary												
HCM 6th Ctrl Delay	5.3											
HCM 6th LOS	A											

HCM 6th Signalized Intersection Summary
 3. US 101 Overpass & Todd Rd

03/30/2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑↑	↑	↑↑
Traffic Volume (veh/h)	123	238	362	232	181	464
Future Volume (veh/h)	123	238	362	232	181	464
Initial Q (Ob), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	No	No	No	No	No	No
Work Zone On Approach	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	131	93	385	247	193	482
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	465	207	931	489	406	1364
Arrive On Green	0.13	0.13	0.26	0.26	0.23	0.23
Sat Flow, veh/h	3647	1685	3563	1870	1781	2790
Grp Volume(v), veh/h	131	93	385	247	193	482
Grp Sat Flow(s),veh/h	1777	1685	1781	1870	1781	1395
Q Serve(g,s), s	0.9	1.5	2.5	3.1	2.6	2.9
Cycle Q Clear(g,c), s	0.9	1.5	2.5	3.1	2.6	2.9
Prop In Lane	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	465	207	931	489	406	1364
V/C Ratio(X)	0.28	0.45	0.41	0.51	0.48	0.35
Avail Cap(c, a), veh/h	2637	1176	1999	1049	677	1789
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.8	11.1	8.5	8.7	9.2	4.4
Incr Delay (d2), s/veh	0.3	1.5	0.3	0.8	0.9	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back(Q/50%),veh/h	0.3	0.4	0.6	0.8	0.7	0.9
Unsig. Movement Delay, s/veh	11.2	12.6	8.7	9.5	10.1	4.5
LnGrp Delay(d),s/veh	B	B	A	A	B	A
LnGrp LOS	B	B	A	A	B	A
Approach Vol, veh/h	224		632	675		
Approach Delay, s/veh	11.8		9.0	6.1		
Approach LOS	B		A	A		
Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	7.1	14.0	11.9	6.8	5.5	20.4
Change Period (Y+Rc), s	3.5	4.0	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	20.5	17.0	32.5	10.5	10.5	38.5
Max Q Clear Time (g_c+1), s	3.5	6.9	10.0	5.4	3.0	2.6
Green Ext Time (p_c), s	0.9	0.8	0.2	1.0	0.0	1.5
Intersection Summary						
HCM 6th Ctrl Delay	8.1					
HCM 6th LOS	A					
Notes						

User approved volume balancing among the lanes for turning movement.

HCM 6th Signalized Intersection Summary
 4. Santa Rosa Ave & Todd Rd

03/30/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	263	62	218	25	32	15	308	450	26	21	276	227
Future Volume (veh/h)	263	62	218	25	32	15	308	450	26	21	276	227
Initial Q (Ob), veh	0	0	0	0	0	0	3	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	175	218	83	27	34	6	331	484	17	23	297	132
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	309	324	270	90	78	14	405	1271	564	40	581	258
Arrive On Green	0.17	0.17	0.17	0.05	0.05	0.05	0.22	0.35	0.35	0.02	0.16	0.16
Sat Flow, veh/h	1781	1870	1557	1781	1547	273	1781	3554	1578	1781	3554	1576
Grp Volume(v), veh/h	175	218	83	27	34	6	331	484	17	23	297	132
Grp Sat Flow(s),veh/h	1781	1870	1557	1781	1547	273	1781	3554	1578	1781	3554	1576
Q Serve(g,s), s	4.0	4.9	2.1	0.7	0.0	1.0	8.0	4.6	0.3	0.6	3.4	3.4
Cycle Q Clear(g,c), s	4.0	4.9	2.1	0.7	0.0	1.0	8.0	4.6	0.3	0.6	3.4	3.4
Prop In Lane	1.00	1.00	1.00	1.00	1.00	0.15	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	309	324	270	90	78	14	405	1271	564	40	581	258
V/C Ratio(X)	0.57	0.67	0.31	0.30	0.00	0.44	0.82	0.38	0.03	0.58	0.51	0.51
Avail Cap(c, a), veh/h	1407	1477	1230	416	0	425	674	3043	1352	416	2569	1140
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.2	17.6	16.4	20.8	0.0	21.0	16.8	10.8	9.5	22.0	17.4	17.4
Incr Delay (d2), s/veh	0.6	0.9	0.2	0.7	0.0	1.2	1.6	0.1	0.0	4.9	0.3	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0
%ile Back(Q/50%),veh/h	1.5	1.9	0.6	0.3	0.0	0.4	3.2	1.3	0.1	0.3	1.2	1.1
Unsig. Movement Delay, s/veh	17.8	18.5	16.6	21.5	0.0	22.2	20.5	10.9	9.5	27.0	17.6	17.9
LnGrp Delay(d),s/veh	B	B	B	C	A	C	C	B	A	C	B	B
LnGrp LOS	B	B	B	C	A	C	C	B	A	C	B	B
Approach Vol, veh/h	476			67			832				452	
Approach Delay, s/veh	17.9			21.9			14.7				18.2	
Approach LOS	B			C			B				B	
Timer - Assigned Phs	2	3	4	6	7	8						
Phs Duration (G+Y+Rc), s	12.3	14.0	11.9	6.8	5.5	20.4						
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.5						
Max Green Setting (Gmax), s	35.5	17.0	32.5	10.5	10.5	38.5						
Max Q Clear Time (g_c+1), s	6.9	10.0	5.4	3.0	2.6	6.6						
Green Ext Time (p_c), s	0.8	0.2	1.0	0.0	0.0	1.5						
Intersection Summary												
HCM 6th Ctrl Delay	16.7											
HCM 6th LOS	B											
Notes												

User approved volume balancing among the lanes for turning movement.

HCM Signalized Intersection Capacity Analysis
 5. S Moorland Ave & US 101 Overpass

03/31/2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Volume (vph)	20	571	25	79	554	56
Future Volume (vph)	20	571	25	79	554	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt	0.87	0.80	0.80	1.00	1.00	1.00
Flt Protected	1.00	1.00	1.00	0.95	0.96	0.96
Satd. Flow (prot)	1563	1672	1672	1681	1700	1700
Flt Permitted	1.00	1.00	1.00	0.95	0.96	0.96
Satd. Flow (perm)	1563	1672	1672	1681	1700	1700
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	23	656	29	91	637	64
RTOR Reduction (vph)	510	0	80	0	0	0
Lane Group Flow (vph)	169	0	40	0	350	351
Turn Type	Prot	NA	NA	Split	NA	NA
Protected Phases	8	2	2	6	6	6
Permitted Phases						
Actuated Green, G (s)	10.5	5.6	17.6	17.6	17.6	17.6
Effective Green, g (s)	10.5	5.6	17.6	17.6	17.6	17.6
Actuated g/C Ratio	0.22	0.12	0.37	0.37	0.37	0.37
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	347	198	626	633	633	633
v/s Ratio Prot	c0.11	c0.02	c0.21	0.21	0.21	0.21
v/s Ratio Perm						
Uniform Delay, d1	0.49	0.20	0.56	0.55	0.55	0.55
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.5	1.1	1.1	1.1	1.1
Delay (s)	17.1	19.3	12.8	12.8	12.8	12.8
Level of Service	B	B	B	B	B	B
Approach Delay (s)	17.1	19.3	12.8	12.8	12.8	12.8
Approach LOS	B	B	B	B	B	B
Intersection Summary						
HCM 2000 Control Delay	15.2 HCM 2000 Level of Service B					
HCM 2000 Volume to Capacity ratio	0.48					
Actuated Cycle Length (s)	47.2					
Sum of lost time (s)	13.5					
Intersection Capacity Utilization	67.4%					
Analysis Period (min)	15					
c. Critical Lane Group						

HCM 6th Signalized Intersection Summary
 1. Santa Rosa Ave & East Robles Ave

03/30/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	+	+		+	+		+	+		+	+	+
Traffic Volume (veh/h)	27	2	12	28	2	44	16	1075	49	51	590	13
Future Volume (veh/h)	27	2	12	28	2	44	16	1075	49	51	590	13
Initial Q (Obs.) veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.98	1.00	0.98	1.00	0.97	1.00	1.00	0.97	1.00	0.97	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	29	2	13	30	2	47	17	1144	52	54	628	14
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap. veh/h	203	2	11	315	4	84	28	1468	67	76	1603	36
Arrive On Green	0.06	0.06	0.06	0.06	0.06	0.06	0.02	0.47	0.47	0.05	0.50	0.50
Sat Flow, veh/h	388	27	174	1259	58	1354	1603	3111	141	1603	3196	71
Grp Volume(v), veh/h	44	0	0	30	0	49	17	588	608	54	314	328
Grp Sat Flow(s),veh/h	589	0	0	1259	0	1411	1603	1599	1653	1603	1599	1688
Q Serve(g,s), s	1.0	0.0	0.0	0.0	0.0	1.1	0.4	10.3	10.3	1.1	4.1	4.1
Cycle Q Clear(g,c), s	2.1	0.0	0.0	0.6	0.0	1.1	0.4	10.3	10.3	1.1	4.1	4.1
Prop In Lane	0.66	0.30	1.00	0.96	1.00	0.96	1.00	0.09	1.00	0.09	1.00	0.04
Lane Grp Cap(c), veh/h	215	0	0	315	0	88	28	765	780	76	802	837
V/C Ratio(X)	0.20	0.00	0.00	0.10	0.00	0.56	0.61	0.78	0.78	0.71	0.39	0.39
Avail Cap(c,a), veh/h	1386	0	0	1460	0	1372	504	1339	1385	599	1435	1497
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.3	0.0	0.0	15.0	0.0	15.2	16.3	7.4	7.4	15.7	5.2	5.2
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.0	0.0	2.1	7.6	0.7	0.6	4.6	0.1	0.1
Initial Q Delay(Q3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back(Q50%),veh/ln	0.3	0.0	0.0	0.2	0.0	0.3	0.2	1.6	1.6	0.4	0.5	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.5	0.0	0.0	15.0	0.0	17.3	23.9	8.0	8.0	20.3	5.3	5.3
LnGrp LOS	B	A	A	B	A	B	C	A	A	C	A	A
Approach Vol, veh/h	44											
Approach Delay, s/veh	16.5											
Approach LOS	B											
Timer - Assigned Phs	1	2	4	5	6	8						
Phs Duration (G+Y+Rc), s	6.1	20.8	6.6	5.1	21.8	6.6						
Change Period (Y+Rc), s	4.5	5.0	4.5	4.5	5.0	4.5						
Max Green Setting (Gmax), s	12.5	28.0	32.5	10.5	30.0	32.5						
Max Q Clear Time (g_c+1), s	3.1	12.3	4.1	2.4	6.1	3.1						
Green Ext Time (p_c), s	0.0	3.4	0.1	0.0	1.7	0.2						
Intersection Summary												
HCM 6th Ctrl Delay	8.1											
HCM 6th LOS	A											

HCM 6th Signalized Intersection Summary
 2: S Moorland Ave & Todd Rd/US 101 South Ramps

03/30/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑	↗	↖	↖	↗	↖	↗	↗	↖	↗	↖
Traffic Volume (veh/h)	0	307	501	292	134	0	470	0	108	0	0	0
Future Volume (veh/h)	0	307	501	292	134	0	470	0	108	0	0	0
Initial Q (Qb), veh	0	1	0	0	0	0	3	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No		No		No		No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	0	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	330	283	314	144	0	505	0	51	0	0	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	648	680	563	585	614	0	0	0	0	0	9	0
Arrive On Green	0.00	0.36	0.36	0.33	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	1781	1870	1548	1781	1870	0	0	0	0	1870	0	0
Grp Volume(v), veh/h	0	330	283	314	144	0	0	0	0	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1548	1781	1870	0	0	0	0	1870	0	0
Q Serve(g_s), s	0.0	2.7	2.9	2.9	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	2.7	2.9	2.9	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00			0.00	0.00		0.00
Lane Grp Cap(c), veh/h	648	680	563	585	614	0	0	0	0	9	0	0
V/C Ratio(X)	0.00	0.49	0.50	0.54	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap(c_a), veh/h	1846	1938	1605	2662	2795	0	0	0	0	1770	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.0	5.0	5.5	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.7	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.3	0.3	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	5.5	5.7	6.3	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		613			458						0	
Approach Delay, s/veh		5.6			5.9						0.0	
Approach LOS		A			A							
Timer - Assigned Phs		2		4			8					
Phs Duration (G+Y+Rc), s		0.0		10.5			9.6					
Change Period (Y+Rc), s		3.0		3.2			3.0					
Max Green Setting (Gmax), s		19.0		20.8			30.0					
Max Q Clear Time (g_c+I1), s		0.0		4.9			4.9					
Green Ext Time (p_c), s		0.0		2.7			1.7					
Intersection Summary												
HCM 6th Ctrl Delay				5.7								
HCM 6th LOS				A								

HCM 6th Signalized Intersection Summary
 3: US 101 Overpass & Todd Rd

03/30/2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔	↗	↖	↖	↗	↗
Traffic Volume (veh/h)	163	234	342	308	205	617
Future Volume (veh/h)	163	234	342	308	205	617
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	168	90	374	288	211	589
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	488	218	965	506	435	1436
Arrive On Green	0.14	0.14	0.27	0.27	0.24	0.24
Sat Flow, veh/h	3647	1585	3563	1870	1781	2790
Grp Volume(v), veh/h	168	90	374	288	211	589
Grp Sat Flow(s),veh/h/ln	1777	1585	1781	1870	1781	1395
Q Serve(g_s), s	1.3	1.6	2.6	4.0	3.1	3.9
Cycle Q Clear(g_c), s	1.3	1.6	2.6	4.0	3.1	3.9
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	488	218	965	506	435	1436
V/C Ratio(X)	0.34	0.41	0.39	0.57	0.49	0.41
Avail Cap(c_a), veh/h	2413	1076	1829	960	620	1726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.8	11.9	9.0	9.5	9.8	4.5
Incr Delay (d2), s/veh	0.4	1.3	0.3	1.0	0.8	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.5	0.7	1.2	0.9	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.2	13.2	9.2	10.5	10.6	4.7
LnGrp LOS	B	B	A	B	B	A
Approach Vol, veh/h	258		662	800		
Approach Delay, s/veh	12.5		9.8	6.3		
Approach LOS	B		A	A		
Timer - Assigned Phs		2		6		8
Phs Duration (G+Y+Rc), s		7.6		11.7		10.9
Change Period (Y+Rc), s		3.5		3.5		3.5
Max Green Setting (Gmax), s		20.5		15.5		10.5
Max Q Clear Time (g_c+I1), s		3.6		6.0		5.9
Green Ext Time (p_c), s		1.1		2.2		1.5
Intersection Summary						
HCM 6th Ctrl Delay			8.6			
HCM 6th LOS			A			
Notes						
User approved volume balancing among the lanes for turning movement.						

HCM 6th Signalized Intersection Summary

4: Santa Rosa Ave & Todd Rd

03/30/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	394	65	264	36	95	64	304	637	34	21	417	239
Future Volume (veh/h)	394	65	264	36	95	64	304	637	34	21	417	239
Initial Q (Q _{bb}), veh	0	0	0	0	0	0	2	0	0	0	0	0
Ped-Bike Adj(A _{pbT})	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	443	0	114	38	99	45	317	664	16	22	434	130
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	604	0	264	197	134	61	377	1331	591	37	684	304
Arrive On Green	0.17	0.00	0.17	0.11	0.11	0.11	0.21	0.37	0.37	0.02	0.19	0.19
Sat Flow, veh/h	3563	0	1557	1781	1216	553	1781	3554	1579	1781	3554	1578
Grp Volume(v), veh/h	443	0	114	38	0	144	317	664	16	22	434	130
Grp Sat Flow(s), veh/h	1781	0	1557	1781	0	1769	1781	1777	1579	1781	1777	1578
Q Serve(g, s), s	6.5	0.0	3.6	1.1	0.0	4.3	9.4	7.9	0.4	0.7	6.2	4.0
Cycle Q Clear(g, s)	6.5	0.0	3.6	1.1	0.0	4.3	9.4	7.9	0.4	0.7	6.2	4.0
Prop In Lane	1.00	1.00	1.00	1.00	1.00	0.31	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	604	0	264	197	0	195	377	1331	591	37	684	304
V/C Ratio(X)	0.73	0.00	0.43	0.19	0.00	0.74	0.84	0.50	0.03	0.60	0.63	0.43
Avail Cap(c, a), veh/h	2298	0	1004	340	0	337	550	2486	1104	340	2098	932
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.8	0.0	20.6	22.4	0.0	23.9	21.1	13.3	10.9	26.9	20.6	19.7
Incr Delay (d2), s/veh	0.7	0.0	0.4	0.2	0.0	2.0	5.2	0.1	0.0	5.6	0.4	0.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
%ile Back(Q)(50%), veh/h	2.5	0.0	1.2	0.4	0.0	1.8	4.2	2.6	0.1	0.3	2.3	1.3
Unsig. Movement Delay, s/veh	22.5	0.0	21.1	22.6	0.0	25.9	27.5	13.4	11.0	32.5	21.0	20.1
LnGrp Delay(d), s/veh	C	A	C	C	A	C	C	B	B	C	C	C
LnGrp LOS	C	A	C	C	A	C	C	B	B	C	C	C
Approach Vol, veh/h	557		182		997					586		
Approach Delay, s/veh	22.2		25.2		17.9					21.2		
Approach LOS	C		C		B					C		
Timer - Assigned Phs	2	3	4		6	7	8					
Phs Duration (G+Y+Rc), s	13.8	15.5	15.1		10.6	5.6	25.0					
Change Period (Y+Rc), s	4.5	4.0	4.5		4.5	4.5	4.5					
Max Green Setting (Gmax), s	35.5	17.0	32.5		10.5	10.5	36.5					
Max Q Clear Time (g_c+1), s	8.5	11.4	8.2		6.3	2.7	9.9					
Green Ext Time (p_c), s	0.7	0.2	1.4		0.1	0.0	2.2					
Intersection Summary												
HCM 6th Ctrl Delay	20.3											
HCM 6th LOS	C											

User approved volume balancing among the lanes for turning movement

HCM Signalized Intersection Capacity Analysis

5: S Moorland Ave & US 101 Overpass

03/31/2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	33	522	54	93	728	52
Future Volume (vph)	33	522	54	93	728	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Flt Protected	0.87	0.91	1.00	1.00	1.00	1.00
Flt Permitted	1.00	1.00	1.00	0.95	0.96	0.96
Satd. Flow (prot)	1567	1703	1681	1681	1696	1696
Satd. Flow (perm)	1567	1703	1681	1681	1696	1696
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	34	544	56	97	758	54
RTOR Reduction (vph)	437	0	68	0	0	0
Lane Group Flow (vph)	141	0	85	0	402	410
Turn Type	Prot	NA	NA	Split	NA	NA
Protected Phases	8	2	2	6	6	6
Permitted Phases						
Actuated Green, G (s)	10.2	6.8	6.8	21.3	21.3	21.3
Effective Green, g (s)	10.2	6.8	6.8	21.3	21.3	21.3
Actuated g/C Ratio	0.20	0.13	0.13	0.41	0.41	0.41
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	308	223	223	691	697	697
v/s Ratio Prot	c0.09	c0.05	0.24	c0.24	c0.24	c0.24
v/s Ratio Perm						
v/s Ratio	0.46	0.38	0.38	0.58	0.59	0.59
Uniform Delay, d1	18.4	20.6	20.6	11.8	11.8	11.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	1.1	1.1	1.3	1.3	1.3
Delay (s)	19.4	21.7	21.7	13.1	13.1	13.1
Level of Service	B	C	C	B	B	B
Approach Delay (s)	19.4	21.7	21.7	13.1	13.1	13.1
Approach LOS	B	C	C	B	B	B
Intersection Summary						
HCM 2000 Control Delay	16.3					
HCM 2000 Level of Service	B					
HCM 2000 Volume to Capacity ratio	0.52					
Actuated Cycle Length (s)	51.8					
Sum of lost time (s)	13.5					
Intersection Capacity Utilization	75.4%					
ICU Level of Service	D					
Analysis Period (min)	15					
Critical Lane Group	c					

HCM 6th Signalized Intersection Summary
 1. Santa Rosa Ave & East Robles Ave

04/01/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	0	7	61	0	66	25	1082	18	27	538	15
Future Volume (veh/h)	14	0	7	61	0	66	25	1082	18	27	538	15
Initial Q (Ob.) veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	14	0	7	61	0	66	25	1082	18	27	538	15
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	223	5	19	354	0	119	40	1434	24	43	1420	40
Arrive On Green	0.09	0.00	0.09	0.00	0.00	0.09	0.02	0.45	0.45	0.03	0.45	0.45
Sat Flow, veh/h	394	53	224	1268	0	1402	1603	3218	54	1603	3175	88
Grp Volume(v), veh/h	21	0	0	61	0	66	25	538	562	27	271	282
Grp Sat Flow(s),veh/h	671	0	0	1268	0	1402	1603	1589	1672	1603	1599	1684
Q Serve(g,s), s	0.3	0.0	0.0	0.0	0.0	1.4	0.5	8.9	8.9	0.5	3.6	3.6
Cycle Q Clear(g,c), s	1.8	0.0	0.0	1.1	0.0	1.4	0.5	8.9	8.9	0.5	3.6	3.6
Prop In Lane	0.67	0	0.33	1.00	0	1.00	1.00	1.00	0.03	1.00	0.05	0.05
Lane Grp Cap(c), veh/h	247	0	0	354	0	119	40	713	745	43	715	745
V/C Ratio(X)	0.09	0.00	0.00	0.17	0.00	0.55	0.63	0.75	0.75	0.63	0.38	0.38
Avail Cap(c,a), veh/h	1437	0	0	1549	0	1441	1603	1416	1480	634	1517	1579
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.2	0.0	0.0	13.8	0.0	13.9	15.3	7.3	7.3	15.2	5.8	5.8
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.1	0.0	1.5	5.8	0.6	0.6	5.6	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.0	0.3	0.0	0.4	0.2	1.4	1.4	0.2	0.5	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.3	0.0	0.0	13.8	0.0	15.4	21.1	7.9	7.9	20.8	5.9	5.9
LnGrp LOS	B	A	A	B	A	B	C	A	A	A	C	A
Approach Vol, veh/h	21			127				1125				580
Approach Delay, s/veh	14.3			14.6				8.2				6.6
Approach LOS	B			B				A				A
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.3	19.1		7.2	5.3	19.2		7.2				
Change Period (Y+Rc), s	4.5	5.0		4.5	4.5	5.0		4.5				
Max Green Setting (Gmax), s	12.5	28.0		32.5	10.5	30.0		32.5				
Max Q Clear Time (g_c+1), s	2.5	10.9		3.8	2.5	5.6		3.4				
Green Ext Time (p_c), s	0.0	3.0		0.0	0.0	1.4		0.3				
Intersection Summary				8.2								
HCM 6th Ctrl Delay												
HCM 6th LOS				A								

HCM 6th Signalized Intersection Summary
 2. S Moorland Ave & Todd Rd/US 101 South Ramps

04/01/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	351	510	379	280	0	863	0	156	0	0	0
Future Volume (veh/h)	0	351	510	379	280	0	863	0	156	0	0	0
Initial Q (Ob.) veh	0	0	0	0	0	0	3	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	351	330	379	280	0	863	0	93	0	0	0
Peak Hour 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
Percent Heavy Veh, %	6	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	660	693	574	660	693	0	0	0	0	0	0	8
Arrive On Green	0.00	0.37	0.37	0.37	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	1781	1870	1549	1781	1870	0	1870	0	1870	0	1870	0
Grp Volume(v), veh/h	0	351	330	379	280	0	0	0	0	0	0	0
Grp Sat Flow(s),veh/h	1781	1870	1549	1781	1870	0	1870	0	1870	0	1870	0
Q Serve(g,s), s	0.0	3.5	4.1	4.1	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g,c), s	0.0	3.5	4.1	4.1	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lane Grp Cap(c), veh/h	660	693	574	660	693	0	0	0	0	0	8	0
V/C Ratio(X)	0.00	0.51	0.58	0.57	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap(c,a), veh/h	1548	1625	1346	2232	2344	0	1485	0	1485	0	1485	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.8	6.0	6.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.6	0.9	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.6	0.6	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	6.4	6.9	6.8	6.0	0.0	6.0	0.0	6.0	0.0	6.0	0.0
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h	681			659								0
Approach Delay, s/veh	6.7			6.5								0.0
Approach LOS	A			A								
Timer - Assigned Phs	2			4				8				
Phs Duration (G+Y+Rc), s	0.0			12.1				11.9				
Change Period (Y+Rc), s	3.0			3.2				3.0				
Max Green Setting (Gmax), s	19.0			20.8				30.0				
Max Q Clear Time (g_c+1), s	0.0			6.1				6.1				
Green Ext Time (p_c), s	0.0			2.9				2.8				
Intersection Summary				6.6								
HCM 6th Ctrl Delay												
HCM 6th LOS				A								

HCM 6th Signalized Intersection Summary
3. US 101 Overpass & Todd Rd

04/01/2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑↑
Traffic Volume (veh/h)	123	403	577	331	341	481
Future Volume (veh/h)	123	403	577	331	341	481
Initial Q (Ob), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	123	253	577	331	341	470
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	801	357	962	505	431	1428
Arrive On Green	0.23	0.23	0.27	0.27	0.24	0.24
Sat Flow, veh/h	3647	1685	3563	1870	1781	2790
Grp Volume(V), veh/h	123	253	577	331	341	470
Grp Sat Flow(s),veh/h	1777	1685	1781	1870	1781	1395
Q Serve(g,s), s	1.1	5.9	5.6	6.3	7.2	4.0
Cycle Q Clear(g,c), s	1.1	5.9	5.6	6.3	7.2	4.0
Prop In Lane	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	801	357	962	505	431	1428
V/C Ratio(X)	0.15	0.71	0.60	0.66	0.79	0.33
Avail Cap(c, a), veh/h	1821	812	1381	725	488	1485
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.4	14.3	12.7	12.9	14.2	5.7
Incr Delay (d2), s/veh	0.1	2.6	0.6	1.5	8.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/h	0.4	1.9	1.8	2.2	3.2	1.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.5	16.9	13.3	14.4	22.6	5.9
LnGrp LOS	B	B	B	B	C	A
Approach Vol, veh/h	376		908		811	
Approach Delay, s/veh	15.4		13.7		12.9	
Approach LOS	B		B		B	
Timer - Assigned Phs	2	3	4	6	8	8
Phs Duration (G+Y+Rc), s	12.5		13.2		14.3	
Change Period (Y+Rc), s	3.5		3.5		3.5	
Max Green Setting (Gmax), s	20.5		10.5		15.5	
Max Q Clear Time (g_c+1), s	7.9		8.3		9.2	
Green Ext Time (p_c), s	1.3		2.5		0.5	
Intersection Summary						
HCM 6th Ctrl Delay			13.7			
HCM 6th LOS			B			
Notes	User approved volume balancing among the lanes for turning movement.					

HCM 6th Signalized Intersection Summary
4. Santa Rosa Ave & Todd Rd

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	263	62	276	27	32	15	596	505	28	21	429	227
Future Volume (veh/h)	263	62	276	27	32	15	596	505	28	21	429	227
Initial Q (Ob), veh	0	0	0	0	0	0	3	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	162	203	136	27	32	6	596	505	18	21	429	123
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	277	291	242	81	69	13	535	1640	729	35	674	299
Arrive On Green	0.16	0.16	0.16	0.05	0.05	0.05	0.30	0.46	0.46	0.02	0.19	0.19
Sat Flow, veh/h	1781	1870	1556	1781	1530	287	1781	3554	1880	1781	3554	1578
Grp Volume(V), veh/h	162	203	136	27	32	6	596	505	18	21	429	123
Grp Sat Flow(s),veh/h	1781	1870	1556	1781	1530	287	1781	3554	1880	1781	3554	1578
Q Serve(g,s), s	4.8	5.8	4.6	0.8	0.8	0.8	1.2	17.0	5.0	0.4	0.7	6.3
Cycle Q Clear(g,c), s	4.8	5.8	4.6	0.8	0.8	0.8	1.2	17.0	5.0	0.4	0.7	6.3
Prop In Lane	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	277	291	242	81	69	13	535	1640	729	35	674	299
V/C Ratio(X)	0.59	0.70	0.56	0.34	0.00	0.46	1.11	0.31	0.02	0.59	0.64	0.41
Avail Cap(c, a), veh/h	1117	1173	976	331	0	337	535	2418	1075	331	2041	906
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.2	22.6	22.1	26.2	0.0	26.3	19.8	9.6	8.3	27.5	21.1	20.1
Incr Delay (d2), s/veh	0.7	1.1	0.8	0.9	0.0	1.5	74.0	0.0	0.0	5.8	0.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/h	1.9	2.4	1.5	0.3	0.0	0.5	19.9	1.5	0.1	0.3	2.3	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.9	23.8	22.9	27.1	0.0	27.8	114.0	9.6	8.3	33.3	21.5	20.5
LnGrp LOS	C	C	C	C	A	C	F	A	A	C	C	C
Approach Vol, veh/h	501		65		1119						573	
Approach Delay, s/veh	23.3		27.5		65.2						21.7	
Approach LOS	C		C		E						C	
Timer - Assigned Phs	2	3	4	6	7	8						
Phs Duration (G+Y+Rc), s	13.3	21.0	15.2	15.2	7.1	5.6	30.6					
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.5	4.5					
Max Green Setting (Gmax), s	35.5	17.0	32.5	10.5	10.5	38.5						
Max Q Clear Time (g_c+1), s	7.8	19.0	8.3	3.2	2.7	7.0						
Green Ext Time (p_c), s	0.8	0.0	1.4	0.0	0.0	1.6						
Intersection Summary												
HCM 6th Ctrl Delay			43.8									
HCM 6th LOS			D									
Notes	User approved volume balancing among the lanes for turning movement.											

HCM Signalized Intersection Capacity Analysis
 4: Santa Rosa Ave & Todd Rd

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	W	W	W	W	W	W	W	W	W	W	W	W	
Traffic Volume (vph)	263	62	276	27	32	15	596	505	28	21	429	227	
Future Volume (vph)	263	62	276	27	32	15	596	505	28	21	429	227	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00	
Frbp_psd/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	
Fllb_psd/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	0.95	1.00	0.99	1.00	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	
Satd. Flow (prot)	1681	1716	1558	1770	1774	3433	3511	1770	3539	1561	1681	1681	
Flt Permitted	0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00	
Satd. Flow (perm)	1681	1716	1558	1770	1774	3433	3511	1770	3539	1561	1681	1681	
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)	263	62	276	27	32	15	596	505	28	21	429	227	
RTOR Reduction (vph)	0	0	224	0	14	0	0	3	0	0	0	172	
Lane Group Flow (vph)	160	165	52	27	33	0	596	530	0	21	429	55	
Conf. Ped. (#/hr)	1	1	1	1	1	3	3	3	3	7	4	4	
Conf. Bikes (#/hr)	3	3	3	3	3	3	3	3	3	7	4	4	
Turn Type	Split	NA	Perm	Split	NA	Prot	NA	Prot	NA	Prot	NA	Perm	
Protected Phases	2	2	2	6	6	3	8	8	8	7	4	4	
Permitted Phases	2	2	2	3	3	3	3	3	3	3	3	3	
Actuated Green, G (s)	12.9	12.9	12.9	3.3	3.3	18.4	33.8	33.8	0.9	16.8	16.8	16.8	
Effective Green, g (s)	12.9	12.9	12.9	3.3	3.3	18.4	33.8	33.8	0.9	16.8	16.8	16.8	
Actuated G/C Ratio	0.19	0.19	0.19	0.05	0.05	0.27	0.49	0.49	0.01	0.24	0.24	0.24	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.0	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	
Lane Grp Cap (vph)	314	321	291	84	84	916	1722	1722	23	862	380	380	
v/s Ratio Prot	0.10	c0.10	0.02	c0.02	c0.02	c0.17	0.15	0.15	0.01	c0.12	0.04	0.04	
v/s Ratio Perm	0.51	0.51	0.18	0.32	0.39	0.65	0.31	0.31	0.91	0.50	0.15	0.15	
Uniform Delay, d1	25.2	25.2	23.5	31.7	31.8	22.4	10.5	10.5	34.0	22.4	20.4	20.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.6	0.1	0.8	1.1	1.3	0.0	0.0	145.7	0.2	0.1	0.1	
Delay (s)	25.6	25.8	23.6	32.5	32.9	23.7	10.6	10.6	179.7	22.6	20.5	20.5	
Level of Service	C	C	C	C	C	C	B	B	F	C	C	C	
Approach Delay (s)	24.8	24.8	23.8	32.8	32.8	17.5	17.5	17.5	26.8	26.8	26.8	26.8	
Approach LOS	C	C	C	C	C	B	B	B	C	C	C	C	
Intersection Summary													
HCM 2000 Control Delay	22.2											HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55												
Actuated Cycle Length (s)	68.9											Sum of lost time (s)	18.0
Intersection Capacity Utilization	57.1%											ICU Level of Service	B
Analysis Period (min)	15												
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis
 5: S Moorland Ave & US 101 Overpass

04/01/2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations	W	W	W	W	W	W	
Traffic Volume (vph)	20	922	159	79	769	62	
Future Volume (vph)	20	922	159	79	769	62	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	
Frbp_psd/bikes	0.87	0.96	1.00	1.00	1.00	1.00	
Fllb_psd/bikes	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	1.00	0.95	0.96	
Flt Protected	1.00	1.00	1.00	1.00	0.95	0.96	
Satd. Flow (prot)	1561	1779	1779	1681	1681	1681	
Flt Permitted	1.00	1.00	1.00	1.00	0.95	0.96	
Satd. Flow (perm)	1561	1779	1779	1681	1681	1681	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	20	922	159	79	769	62	
RTOR Reduction (vph)	579	0	18	0	0	0	
Lane Group Flow (vph)	363	0	220	0	415	416	
Turn Type	Prot	NA	Split	NA	Split	NA	
Protected Phases	8	2	2	6	6	6	
Permitted Phases	8	2	2	6	6	6	
Actuated Green, G (s)	21.6	15.0	15.0	24.8	24.8	24.8	
Effective Green, g (s)	21.6	15.0	15.0	24.8	24.8	24.8	
Actuated G/C Ratio	0.29	0.20	0.20	0.33	0.33	0.33	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	450	356	356	556	561	561	
v/s Ratio Prot	c0.23	c0.12	c0.12	c0.25	0.25	0.25	
v/s Ratio Perm	0.81	0.62	0.62	0.75	0.74	0.74	
Uniform Delay, d1	24.7	27.3	27.3	22.3	22.2	22.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.2	3.2	3.2	5.4	5.2	5.2	
Delay (s)	34.9	30.5	30.5	27.7	27.5	27.5	
Level of Service	C	C	C	C	C	C	
Approach Delay (s)	34.9	30.5	30.5	27.6	27.6	27.6	
Approach LOS	C	C	C	C	C	C	
Intersection Summary							
HCM 2000 Control Delay	31.4					HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74						
Actuated Cycle Length (s)	74.9					Sum of lost time (s)	13.5
Intersection Capacity Utilization	105.5%					ICU Level of Service	G
Analysis Period (min)	15						
c Critical Lane Group							

HCM 6th Signalized Intersection Summary
 1. Santa Rosa Ave & East Robles Ave

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	2	12	32	2	54	16	1182	49	72	859	13
Future Volume (veh/h)	27	2	12	32	2	54	16	1182	49	72	859	13
Initial Q (Obs), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	27	2	12	32	2	54	16	1182	49	72	859	13
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	193	2	10	311	3	89	26	1491	62	92	1670	25
Arrive On Green	0.07	0.07	0.07	0.07	0.07	0.07	0.02	0.48	0.48	0.06	0.52	0.52
Sat Flow, veh/h	347	26	154	1260	50	1359	1603	3126	129	1603	3223	49
Grp Volume(v), veh/h	41	0	0	32	0	56	16	604	627	72	426	446
Grp Sat Flow(s),veh/h	527	0	0	1260	0	1410	1603	1599	1656	1603	1599	1673
Q Serve(g,s), s	0.9	0.0	0.0	0.0	0.0	1.4	0.3	11.1	11.1	1.6	6.1	6.1
Cycle Q Clear(g,c), s	2.3	0.0	0.0	0.7	0.0	1.4	0.3	11.1	11.1	1.6	6.1	6.1
Prop In Lane	0.66	0.29	1.00	0.96	1.00	0.96	1.00	0.08	1.00	0.08	1.00	0.03
Lane Grp Cap(c), veh/h	205	0	0	311	0	93	26	763	790	92	829	867
V/C Ratio(x)	0.20	0.00	0.00	0.10	0.00	0.60	0.61	0.79	0.79	0.78	0.51	0.51
Avail Cap(c,a), veh/h	1310	0	0	1397	0	1308	481	1279	1324	572	1370	1433
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.1	0.0	0.0	15.6	0.0	15.9	17.1	7.7	7.7	16.3	5.5	5.5
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.1	0.0	2.3	8.0	0.7	0.7	5.3	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.0	0.2	0.0	0.4	0.2	1.8	1.9	0.6	0.8	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.3	0.0	0.0	15.7	0.0	18.3	25.1	8.4	8.4	21.6	5.7	5.7
LnGrp LOS	B	A	A	B	A	B	C	A	A	C	A	A
Approach Vol, veh/h	41			88				1247			944	
Approach Delay, s/veh	17.3			17.3				8.6			6.9	
Approach LOS	B			B				A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.5	21.7		6.8	5.1	23.1		6.8				
Change Period (Y+Rc), s	4.5	5.0		4.5	4.5	5.0		4.5				
Max Green Setting (Gmax), s	12.5	28.0		32.5	10.5	30.0		32.5				
Max Q Clear Time (g_c+1), s	3.6	13.1		4.3	2.3	8.1		3.4				
Green Ext Time (p_c), s	0.0	3.4		0.1	0.0	2.4		0.2				
Intersection Summary												
HCM 6th Ctrl Delay				8.4								
HCM 6th LOS				A								

HCM 6th Signalized Intersection Summary
 2. S Moorland Ave & Todd Rd/JUS 101 South Ramps

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	414	988	450	179	0	776	0	139	0	0	0
Future Volume (veh/h)	0	414	988	450	179	0	776	0	139	0	0	0
Initial Q (Obs), veh	0	1	0	0	0	0	3	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	414	760	450	179	0	776	0	79	0	0	0
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	916	962	797	592	622	0	0	0	0	0	5	0
Arrive On Green	0.00	0.51	0.51	0.33	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	1781	1870	1550	1781	1870	0	0	0	0	0	1870	0
Grp Volume(v), veh/h	0	414	760	450	179	0	0	0	0	0	0	0
Grp Sat Flow(s),veh/h	1781	1870	1550	1781	1870	0	0	0	0	0	1870	0
Q Serve(g,s), s	0.0	5.6	18.9	9.1	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g,c), s	0.0	5.6	18.9	9.1	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lane Grp Cap(c), veh/h	916	962	797	592	622	0	0	0	0	0	5	0
V/C Ratio(x)	0.00	0.43	0.95	0.76	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap(c,a), veh/h	916	962	797	1321	1387	0	0	0	0	0	879	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	6.2	9.4	12.1	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	21.3	2.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.4	8.2	3.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	6.5	30.6	14.1	10.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LnGrp LOS	A	A	C	B	B	A	A	A	A	A	A	A
Approach Vol, veh/h	1174			629							0	
Approach Delay, s/veh	22.1			13.0							0.0	
Approach LOS	C			B								
Timer - Assigned Phs	2			4				8				
Phs Duration (G+Y+Rc), s	0.0			24.0				16.4				
Change Period (Y+Rc), s	3.0			3.2				3.0				
Max Green Setting (Gmax), s	19.0			20.8				30.0				
Max Q Clear Time (g_c+1), s	0.0			20.9				11.1				
Green Ext Time (p_c), s	0.0			0.0				2.3				
Intersection Summary												
HCM 6th Ctrl Delay				18.9								
HCM 6th LOS				B								

HCM 6th Signalized Intersection Summary
 3. US 101 Overpass & Todd Rd

04/01/2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑↑	↑↑	↑↑	↑↑
Traffic Volume (veh/h)	181	245	369	389	328	901
Future Volume (veh/h)	181	245	369	389	328	901
Initial Q (Ob), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	181	99	253	552	328	855
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	499	223	483	1015	504	1546
Arrive On Green	0.14	0.14	0.27	0.27	0.28	0.28
Sat Flow, veh/h	3647	1685	1781	3741	1781	2790
Grp Volume(v), veh/h	181	99	253	552	328	855
Grp Sat Flow(s),veh/h	1777	1685	1781	1870	1781	1395
Q Serve(g,s), s	1.6	2.0	4.1	4.3	5.6	6.8
Cycle Q Clear(g,c), s	1.6	2.0	4.1	4.3	5.6	6.8
Prop In Lane	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	499	223	483	1015	504	1546
V/C Ratio(x)	0.36	0.44	0.52	0.54	0.65	0.55
Avail Cap(c,a), veh/h	2120	946	803	1687	544	1609
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.4	13.5	10.6	10.7	10.8	4.9
Incr Delay (d2), s/veh	0.4	1.4	0.9	0.5	2.5	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.6	1.3	1.3	1.8	2.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.8	14.9	11.5	11.2	13.3	5.3
LnGrp LOS	B	B	B	B	B	A
Approach Vol, veh/h	280		805	1183		
Approach Delay, s/veh	14.2		11.3	7.5		
Approach LOS	B		B	A		
Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	8.3		12.8	13.2		
Change Period (Y+Rc), s	3.5		3.5	3.5		
Max Green Setting (Gmax), s	20.5		15.5	10.5		
Max Q Clear Time (g_c+1), s	4.0		6.3	8.8		
Green Ext Time (p_c), s	1.2		3.0	0.9		
Intersection Summary						
HCM 6th Ctrl Delay			9.7			
HCM 6th LOS			A			
Notes	User approved volume balancing among the lanes for turning movement.					

HCM 6th Signalized Intersection Summary
 4. Santa Rosa Ave & Todd Rd

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	394	65	556	48	95	64	482	755	38	21	731	239
Future Volume (veh/h)	394	65	556	48	95	64	482	755	38	21	731	239
Initial Q (Ob), veh	0	0	0	0	0	0	2	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	424	0	401	48	95	43	482	755	20	21	731	125
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	1002	0	439	174	119	54	328	1451	645	32	881	391
Arrive On Green	0.28	0.00	0.28	0.10	0.10	0.10	0.18	0.41	0.41	0.02	0.25	0.25
Sat Flow, veh/h	3563	0	1561	1781	1218	561	1781	3554	1579	1781	3554	1579
Grp Volume(v), veh/h	424	0	401	48	95	43	482	755	20	21	731	125
Grp Sat Flow(s),veh/h	1781	0	1561	1781	0	1769	1781	1777	1579	1781	1777	1579
Q Serve(g,s), s	9.0	0.0	23.0	2.3	0.0	7.1	17.0	14.8	0.7	1.1	18.0	6.0
Cycle Q Clear(g,c), s	9.0	0.0	23.0	2.3	0.0	7.1	17.0	14.8	0.7	1.1	18.0	6.0
Prop In Lane	1.00	1.00	1.00	1.00	1.00	0.31	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	1002	0	439	174	119	54	328	1451	645	32	881	391
V/C Ratio(x)	0.42	0.00	0.91	0.28	0.00	0.80	1.47	0.52	0.03	0.65	0.83	0.32
Avail Cap(c,a), veh/h	1388	0	599	202	0	201	328	1480	658	202	1249	555
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.1	0.0	32.1	38.7	0.0	40.8	37.7	20.5	16.4	45.1	32.9	28.4
Incr Delay (d2), s/veh	0.1	0.0	12.8	0.3	0.0	15.0	228.1	0.1	0.0	8.0	2.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	22.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.0	9.7	1.0	0.0	3.7	29.8	5.7	0.2	0.5	7.6	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.2	0.0	44.9	39.0	0.0	55.8	287.8	20.7	16.4	53.1	35.2	28.6
LnGrp LOS	C	A	D	D	A	E	F	C	B	D	D	C
Approach Vol, veh/h	825		186				1257				877	
Approach Delay, s/veh	35.8		51.4				123.0				34.7	
Approach LOS	D		D				F				C	
Timer - Assigned Phs	2	3	4	6	7	8						
Phs Duration (G+Y+Rc), s	30.5	21.0	27.4	13.5	6.2	42.2						
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.5						
Max Green Setting (Gmax), s	35.5	17.0	32.5	10.5	10.5	38.5						
Max Q Clear Time (g_c+1), s	25.0	19.0	20.0	9.1	3.1	16.8						
Green Ext Time (p_c), s	0.9	0.0	2.2	0.1	0.0	2.5						
Intersection Summary												
HCM 6th Ctrl Delay			71.3									
HCM 6th LOS			E									
Notes	User approved volume balancing among the lanes for turning movement.											

HCM Signalized Intersection Capacity Analysis
 4: Santa Rosa Ave & Todd Rd

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	W	W	W	W	W	W	W	W	W	W	W	W
Traffic Volume (vph)	394	65	556	48	95	64	482	755	38	21	731	239
Future Volume (vph)	394	65	556	48	95	64	482	755	38	21	731	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frbp_psd/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Frbp_psd/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
Flt Protected	1.00	1.00	0.85	1.00	0.94	1.00	0.99	1.00	1.00	1.00	1.00	0.85
Satd. Flow (prot)	1681	1708	1558	1770	1750	1750	3433	3514	1770	3539	1560	1681
Flt Permitted	0.95	0.97	1.00	0.95	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95
Satd. Flow (perm)	1681	1708	1558	1770	1750	1750	3433	3514	1770	3539	1560	1681
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)	394	65	556	48	95	64	482	755	38	21	731	239
RTOR Reduction (vph)	0	0	290	0	21	0	0	3	0	0	0	169
Lane Group Flow (vph)	229	230	266	48	138	0	482	790	0	21	731	70
Conf. Ped. (#/hr)	1	1	1	1	1	1	3	3	1	1	3	3
Conf. Bikes (#/hr)	3	3	3	3	3	3	3	3	3	3	3	3
Turn Type	Split	NA	Perm	Split	NA	Prot	NA	NA	Prot	NA	NA	Perm
Protected Phases	2	2	2	6	6	3	8	8	7	7	4	4
Permitted Phases	19.6	19.6	19.6	10.1	10.1	16.2	39.5	39.5	2.2	26.0	26.0	26.0
Actuated Green, G (s)	19.6	19.6	19.6	10.1	10.1	16.2	39.5	39.5	2.2	26.0	26.0	26.0
Effective Green, g (s)	0.22	0.22	0.22	0.11	0.11	0.18	0.44	0.44	0.02	0.29	0.29	0.29
Actuated G/C Ratio	4.5	4.5	4.5	4.5	4.5	4.0	4.5	4.5	4.5	4.5	4.5	4.5
Clearance Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Vehicle Extension (s)	368	374	341	199	197	622	1552	1552	43	1029	453	453
Lane Grp Cap (vph)	0.14	0.13	0.03	c0.08	c0.14	0.22	0.01	c0.21	0.01	c0.21	0.04	0.04
v/s Ratio Prot	0.62	0.61	0.78	0.24	0.70	0.77	0.51	0.51	0.49	0.71	0.15	0.15
v/s Ratio Perm	31.6	31.5	32.9	36.2	38.2	34.9	18.0	18.0	43.0	28.3	23.5	23.5
Uniform Delay, d1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Progression Factor	2.4	2.1	9.8	0.2	8.4	5.5	0.1	0.1	3.2	1.9	0.1	0.1
Incremental Delay, d2	33.9	33.6	42.7	36.4	46.6	40.3	18.1	18.1	46.2	30.3	23.6	23.6
Level of Service	C	C	D	D	D	D	B	B	D	D	C	C
Approach Delay (s)	38.6	38.6	44.2	44.2	44.2	26.5	26.5	26.5	26.5	26.5	29.0	29.0
Approach LOS	D	D	D	D	D	C	C	C	C	C	C	C
Intersection Summary												
HCM 2000 Control Delay	31.8 HCM 2000 Level of Service C											
HCM 2000 Volume to Capacity ratio	0.75											
Actuated Cycle Length (s)	89.4 Sum of lost time (s) 18.0											
Intersection Capacity Utilization	75.5% ICU Level of Service D											
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 5: S Moorland Ave & US 101 Overpass

04/01/2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	W	W	W	W
Traffic Volume (vph)	33	760	204	105	1307	59
Future Volume (vph)	33	760	204	105	1307	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frbp_psd/bikes	0.87	0.95	0.95	1.00	1.00	1.00
Flt Protected	1.00	1.00	1.00	0.95	0.95	0.96
Satd. Flow (prot)	1564	1777	1777	1681	1692	1692
Flt Permitted	1.00	1.00	1.00	0.95	0.95	0.96
Satd. Flow (perm)	1564	1777	1777	1681	1692	1692
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	33	760	204	105	1307	59
RTOR Reduction (vph)	625	0	18	0	0	0
Lane Group Flow (vph)	168	0	291	0	680	686
Turn Type	Prot	NA	Split	NA	Split	NA
Protected Phases	8	2	2	6	6	6
Permitted Phases	13.4	16.8	16.8	31.5	31.5	31.5
Actuated Green, G (s)	13.4	16.8	16.8	31.5	31.5	31.5
Effective Green, g (s)	0.18	0.22	0.22	0.42	0.42	0.42
Actuated G/C Ratio	4.5	4.5	4.5	4.5	4.5	4.5
Clearance Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Vehicle Extension (s)	278	396	396	704	708	708
Lane Grp Cap (vph)	c0.11	c0.16	c0.16	0.40	c0.41	0.41
v/s Ratio Prot	0.61	0.74	0.74	0.97	0.97	0.97
v/s Ratio Perm	28.5	27.1	27.1	21.3	21.4	21.4
Uniform Delay, d1	1.00	1.00	1.00	1.00	1.00	1.00
Progression Factor	3.7	6.9	6.9	25.5	26.0	26.0
Incremental Delay, d2	32.2	34.1	34.1	46.8	47.3	47.3
Level of Service	C	C	C	D	D	D
Approach Delay (s)	32.2	34.1	34.1	47.1	47.1	47.1
Approach LOS	C	C	C	D	D	D
Intersection Summary						
HCM 2000 Control Delay	40.7 HCM 2000 Level of Service D					
HCM 2000 Volume to Capacity ratio	0.83					
Actuated Cycle Length (s)	75.2 Sum of lost time (s) 13.5					
Intersection Capacity Utilization	115.0% ICU Level of Service H					
Analysis Period (min)	15					
c Critical Lane Group						

HCM 6th Signalized Intersection Summary
 1. Santa Rosa Ave & East Robles Ave

03/30/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (veh/h)	14	0	7	46	0	55	25	999	17	21	390	15
Future Volume (veh/h)	14	0	7	46	0	55	25	999	17	21	390	15
Initial Q (Obv), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	15	0	8	49	0	59	27	1074	18	23	419	16
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	224	0	17	352	0	110	43	1434	24	37	1387	53
Arrive On Green	0.08	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	400	0	213	1267	0	1402	1603	3217	54	1603	3137	122
Grp Volume(v), veh/h	23	0	49	0	59	27	534	558	23	213	223	0
Grp Sat Flow(s),veh/h	613	0	1267	0	1402	1603	1599	1672	1603	1599	1687	0
Q Serve(g,s), s	0.5	0.0	0.0	0.0	0.0	1.3	0.5	8.6	8.6	0.4	2.7	2.7
Cycle Q Clear(g,c), s	1.8	0.0	0.0	0.0	0.0	1.3	0.5	8.6	8.6	0.4	2.7	2.7
Prop In Lane	0.65	0.35	1.00	1.00	1.00	1.00	1.00	1.00	0.03	1.00	0.07	0.07
Lane Grp Cap(c), veh/h	240	0	352	0	110	43	713	745	37	707	733	0
V/C Ratio(x)	0.10	0.00	0.00	0.14	0.00	0.54	0.63	0.75	0.75	0.62	0.30	0.30
Avail Cap(c,a), veh/h	1477	0	1584	0	1474	544	1448	1514	648	1552	1608	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.6	0.0	0.0	13.5	0.0	13.7	14.9	7.1	7.1	15.0	5.5	5.6
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.1	0.0	1.5	5.5	0.6	0.6	6.1	0.1	0.1
Initial Q Delay(Q3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/h	0.1	0.0	0.0	0.3	0.0	0.4	0.2	1.3	1.3	0.2	0.4	0.4
Unsig. Movement Delay, s/veh	14.6	0.0	0.0	13.6	0.0	15.2	20.4	7.7	7.7	21.0	5.6	5.6
LnGrp Delay(d),s/veh	B	A	A	B	A	B	C	A	A	C	A	A
LnGrp LOS	B	A	A	B	A	B	C	A	A	C	A	A
Approach Vol, veh/h	23			108			1119			458		
Approach Delay, s/veh	14.6			14.5			8.0			6.4		
Approach LOS	B			B			A			A		
Timer - Assigned Phs	1	2	4	5	6	8						
Phs Duration (G+Y+Rc), s	5.2	18.8	6.9	5.3	18.7	6.9						
Change Period (Y+Rc), s	4.5	5.0	4.5	4.5	5.0	4.5						
Max Green Setting (Gmax), s	12.5	28.0	32.5	10.5	30.0	32.5						
Max Q Clear Time (g_c+1), s	2.4	10.6	3.8	2.5	4.7	3.3						
Green Ext Time (p_c), s	0.0	3.0	0.0	0.0	1.1	0.2						
Intersection Summary												
HCM 6th Ctrl Delay	8.1 A											
HCM 6th LOS	A											

HCM 6th Signalized Intersection Summary
 2. S Moorland Ave & Todd Rd/JUS 101 South Ramps

03/30/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (veh/h)	0	269	330	291	184	0	468	0	126	0	0	0
Future Volume (veh/h)	0	269	330	291	184	0	468	0	126	0	0	0
Initial Q (Obv), veh	0	0	0	0	0	0	3	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	283	158	306	194	0	493	0	67	0	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	590	619	513	614	645	0	0	0	0	0	10	0
Arrive On Green	0.00	0.33	0.33	0.34	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	1781	1870	1549	1781	1870	0	0	0	0	0	1870	0
Grp Volume(v), veh/h	0	283	158	306	194	0	0	0	0	0	0	0
Grp Sat Flow(s),veh/h	1781	1870	1549	1781	1870	0	0	0	0	0	1870	0
Q Serve(g,s), s	0.0	2.3	1.5	2.6	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g,c), s	0.0	2.3	1.5	2.6	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lane Grp Cap(c), veh/h	590	619	513	614	645	0	0	0	0	0	10	0
V/C Ratio(x)	0.00	0.46	0.31	0.50	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap(c,a), veh/h	1988	2035	1685	2795	2935	0	0	0	0	0	1859	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.0	4.8	5.0	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.3	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(Q3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/h	0.0	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh	0.0	5.6	5.1	5.6	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LnGrp Delay(d),s/veh	A	A	A	A	A	A	A	A	A	A	A	A
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h	441			500								
Approach Delay, s/veh	5.4			5.3								
Approach LOS	A			A								
Timer - Assigned Phs	2	4	4	8								
Phs Duration (G+Y+Rc), s	0.0	9.5	3.2	9.6								
Change Period (Y+Rc), s	3.0	3.0	3.0	3.0								
Max Green Setting (Gmax), s	19.0	20.8	20.8	30.0								
Max Q Clear Time (g_c+1), s	0.0	4.3	4.3	4.6								
Green Ext Time (p_c), s	0.0	1.9	1.9	2.0								
Intersection Summary												
HCM 6th Ctrl Delay	5.3 A											
HCM 6th LOS	A											

HCM 6th Signalized Intersection Summary
 3. US 101 Overpass & Todd Rd

03/30/2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑↑
Traffic Volume (veh/h)	126	238	371	232	181	464
Future Volume (veh/h)	126	238	371	232	181	464
Initial Q (Ob), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	No	No	No	No	No	No
Work Zone On Approach	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	134	93	395	247	193	482
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	469	209	933	490	405	1365
Arrive On Green	0.13	0.13	0.26	0.26	0.23	0.23
Sat Flow, veh/h	3647	1685	3563	1870	1781	2790
Grp Volume(v), veh/h	134	93	395	247	193	482
Grp Sat Flow(s),veh/h	1777	1685	1781	1870	1781	1395
Q Serve(g,s), s	0.9	1.5	2.6	3.1	2.6	3.0
Cycle Q Clear(g,c), s	0.9	1.5	2.6	3.1	2.6	3.0
Prop In Lane	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	469	209	933	490	405	1365
V/C Ratio(X)	0.29	0.44	0.42	0.50	0.48	0.35
Avail Cap(c, a), veh/h	2629	1173	1993	1046	675	1788
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.8	11.1	8.5	8.7	9.3	4.4
Incr Delay (d2), s/veh	0.3	1.5	0.3	0.8	0.9	0.2
Initial Q Delay(Q3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back(Q50%),veh/ln	0.3	0.4	0.6	0.8	0.7	0.9
Unsig. Movement Delay, s/veh	11.2	12.6	8.8	9.5	10.2	4.5
LnGrp Delay(d),s/veh	B	B	A	A	B	A
LnGrp LOS	B	B	A	A	B	A
Approach Vol, veh/h	227		642	675		
Approach Delay, s/veh	11.8		9.1	6.1		
Approach LOS	B		A	A		
Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	7.2	14.1	12.2	6.8	5.5	20.8
Change Period (Y+Rc), s	3.5	4.0	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	20.5	17.0	32.5	10.5	10.5	38.5
Max Q Clear Time (g_c+1), s	3.5	7.0	10.1	5.7	3.0	6.6
Green Ext Time (p_c), s	0.9	0.8	0.2	1.0	0.0	1.5
Intersection Summary						
HCM 6th Ctrl Delay	8.2					
HCM 6th LOS	A					
Notes						

User approved volume balancing among the lanes for turning movement.

HCM 6th Signalized Intersection Summary
 4. Santa Rosa Ave & Todd Rd

03/30/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑	↑	↑	↑	↑	↑↑	↑↑	↑	↑	↑	↑
Traffic Volume (veh/h)	266	62	218	25	32	15	308	450	26	21	278	236
Future Volume (veh/h)	266	62	218	25	32	15	308	450	26	21	278	236
Initial Q (Ob), veh	0	0	0	0	0	0	3	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	176	220	83	27	34	6	331	484	17	23	299	142
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	309	325	270	89	77	14	404	1288	572	39	599	266
Arrive On Green	0.17	0.17	0.17	0.05	0.05	0.05	0.22	0.36	0.36	0.02	0.17	0.17
Sat Flow, veh/h	1781	1870	1557	1781	1547	273	1781	3554	1578	1781	3554	1577
Grp Volume(v), veh/h	176	220	83	27	34	6	331	484	17	23	299	142
Grp Sat Flow(s),veh/h	1781	1870	1557	1781	1547	273	1781	3554	1578	1781	3554	1577
Q Serve(g,s), s	4.1	5.0	2.1	0.7	0.7	0.0	1.0	8.1	4.6	0.3	0.6	3.5
Cycle Q Clear(g,c), s	4.1	5.0	2.1	0.7	0.7	0.0	1.0	8.1	4.6	0.3	0.6	3.5
Prop In Lane	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	309	325	270	89	77	14	404	1288	572	39	599	266
V/C Ratio(X)	0.57	0.68	0.31	0.30	0.00	0.44	0.82	0.38	0.03	0.58	0.50	0.53
Avail Cap(c, a), veh/h	1389	1458	1214	411	0	420	665	3005	1335	411	2537	1125
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.4	17.8	16.6	21.1	0.0	21.2	17.0	10.8	9.4	22.3	17.4	17.5
Incr Delay (d2), s/veh	0.6	0.9	0.2	0.7	0.0	1.2	1.6	0.1	0.0	5.0	0.2	0.6
Initial Q Delay(Q3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0
%ile Back(Q50%),veh/ln	1.5	1.9	0.6	0.3	0.0	0.4	3.2	1.4	0.1	0.3	1.2	1.2
Unsig. Movement Delay, s/veh	18.1	18.7	16.8	21.8	0.0	22.5	20.8	10.9	9.4	27.3	17.6	18.1
LnGrp Delay(d),s/veh	B	B	B	C	A	C	C	B	A	C	B	B
LnGrp LOS	B	B	B	C	A	C	C	B	A	C	B	B
Approach Vol, veh/h	479		67				832				464	
Approach Delay, s/veh	18.2		22.2				14.8				18.2	
Approach LOS	B		C				B				B	
Timer - Assigned Phs	2	3	4	6	7	8						
Phs Duration (G+Y+Rc), s	12.4	14.1	12.2	6.8	5.5	20.8						
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.5						
Max Green Setting (Gmax), s	35.5	17.0	32.5	10.5	10.5	38.5						
Max Q Clear Time (g_c+1), s	7.0	10.1	5.7	3.0	2.6	6.6						
Green Ext Time (p_c), s	0.8	0.2	1.0	0.0	0.0	1.5						
Intersection Summary												
HCM 6th Ctrl Delay	16.8											
HCM 6th LOS	B											
Notes												

User approved volume balancing among the lanes for turning movement.

HCM Signalized Intersection Capacity Analysis

4: Santa Rosa Ave & Todd Rd

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	←	←	←	←	←	←	←	←	←	←	←	←
Traffic Volume (vph)	266	62	276	27	32	15	596	505	28	21	431	236
Future Volume (vph)	266	62	276	27	32	15	596	505	28	21	431	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frbp_psd/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Frbp_psd/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
Flt	1.00	1.00	0.85	1.00	0.95	1.00	0.99	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	1716	1558	1770	1774	3433	3511	1770	3539	1561	1770	3539
Flt Permitted	0.95	0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1681	1716	1558	1770	1774	3433	3511	1770	3539	1561	1770	3539
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)	266	62	276	27	32	15	596	505	28	21	431	236
RTOR Reduction (vph)	0	0	224	0	14	0	0	3	0	0	0	178
Lane Group Flow (vph)	162	166	52	27	33	0	596	530	0	21	431	58
Conf. Ped. (#/hr)				1	1		3					3
Conf. Bikes (#/hr)				3								
Turn Type	Split	NA	Perm	Split	NA	Prot	NA	Prot	NA	Prot	NA	Perm
Protected Phases	2	2		6	6		3	8		7		4
Permitted Phases			2									4
Actuated Green, G (s)	12.9	12.9	12.9	3.3	3.3	18.4	33.8	33.8	0.9	16.8	16.8	16.8
Effective Green, g (s)	12.9	12.9	12.9	3.3	3.3	18.4	33.8	33.8	0.9	16.8	16.8	16.8
Actuated G/C Ratio	0.19	0.19	0.19	0.05	0.05	0.27	0.49	0.49	0.01	0.24	0.24	0.24
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.0	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lane Grp Cap (vph)	314	321	291	84	84	916	1722	1722	23	862	380	380
v/s Ratio Prot	0.10	c0.10	0.02	c0.02	c0.17	0.15	0.01	c0.12				
v/s Ratio Perm	0.52	0.52	0.18	0.32	0.39	0.65	0.31	0.31	0.91	0.50	0.15	0.04
Uniform Delay, d1	25.2	25.2	23.5	31.7	31.8	22.4	10.5	10.5	34.0	22.4	20.5	20.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.6	0.1	0.8	1.1	1.3	0.0	0.0	145.7	0.2	0.1	0.1
Delay (s)	25.8	25.8	23.6	32.5	32.9	23.7	10.6	10.6	179.7	22.6	20.5	20.5
Level of Service	C	C	C	C	C	C	B	B	F	C	C	C
Approach Delay (s)	24.8			32.8			17.5			26.7		
Approach LOS	C			C			B			C		
Intersection Summary												
HCM 2000 Control Delay	22.2 HCM 2000 Level of Service C											
HCM 2000 Volume to Capacity ratio	0.56											
Actuated Cycle Length (s)	68.9 Sum of lost time (s) 18.0											
Intersection Capacity Utilization	57.3% ICU Level of Service B											
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: S Moorland Ave & US 101 Overpass

03/31/2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	←	←	←	←	←	←
Traffic Volume (vph)	20	580	25	79	554	56
Future Volume (vph)	20	580	25	79	554	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frbp_psd/bikes	0.87	0.90	1.00	0.95	0.96	1.00
Flt Protected	1.00	1.00	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1563	1672	1672	1681	1700	1700
Flt Permitted	1.00	1.00	1.00	0.95	0.96	1.00
Satd. Flow (perm)	1563	1672	1672	1681	1700	1700
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	23	667	29	91	637	64
RTOR Reduction (vph)	517	0	80	0	0	0
Lane Group Flow (vph)	173	0	40	0	350	351
Turn Type	Prot	NA	Split	NA	Split	NA
Protected Phases	8		2		6	
Permitted Phases						
Actuated Green, G (s)	10.7	5.6	17.7	17.7	17.7	17.7
Effective Green, g (s)	10.7	5.6	17.7	17.7	17.7	17.7
Actuated G/C Ratio	0.23	0.12	0.37	0.37	0.37	0.37
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	352	197	626	633	633	633
v/s Ratio Prot	c0.11	c0.02	0.21	0.21	0.21	0.21
v/s Ratio Perm	0.49	0.20	0.56	0.55	0.55	0.55
Uniform Delay, d1	16.0	18.9	11.8	11.8	11.8	11.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.5	1.1	1.1	1.1	1.1
Delay (s)	17.1	19.4	12.9	12.9	12.8	12.8
Level of Service	B	B	B	B	B	B
Approach Delay (s)	17.1	19.4	12.9	12.9	12.9	12.9
Approach LOS	B	B	B	B	B	B
Intersection Summary						
HCM 2000 Control Delay	15.3 HCM 2000 Level of Service B					
HCM 2000 Volume to Capacity ratio	0.48					
Actuated Cycle Length (s)	47.5 Sum of lost time (s) 13.5					
Intersection Capacity Utilization	68.0% ICU Level of Service C					
Analysis Period (min)	15					
c Critical Lane Group						

HCM 6th Signalized Intersection Summary
 1. Santa Rosa Ave & East Robles Ave

03/30/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	2	12	28	2	44	16	1081	49	51	598	13
Future Volume (veh/h)	27	2	12	28	2	44	16	1081	49	51	598	13
Initial Q (Obs.) veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.98	1.00	0.98	1.00	0.98	1.00	0.97	1.00	1.00	0.97	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	29	2	13	30	2	47	17	1150	52	54	636	14
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	202	2	11	314	4	84	28	1473	67	76	1608	35
Arrive On Green	0.06	0.06	0.06	0.06	0.06	0.06	0.02	0.47	0.47	0.05	0.50	0.50
Sat Flow, veh/h	387	27	174	1259	58	1353	1603	3112	141	1603	3197	70
Grp Volume(V), veh/h	44	0	0	30	0	49	17	591	611	54	318	332
Grp Sat Flow(s),veh/h	588	0	0	1259	0	1411	1603	1599	1654	1603	1599	1668
Q Serve(g.s), s	1.0	0.0	0.0	0.0	0.0	1.1	0.4	10.3	10.4	1.1	4.1	4.1
Cycle Q Clear(g.c), s	2.1	0.0	0.0	0.6	0.0	1.1	0.4	10.3	10.4	1.1	4.1	4.1
Prop In Lane	0.66	0.30	1.00	0.96	1.00	0.96	1.00	0.09	1.00	0.09	1.00	0.04
Lane Grp Cap(c), veh/h	215	0	0	314	0	88	28	757	783	76	804	839
V/C Ratio(X)	0.21	0.00	0.00	0.10	0.00	0.56	0.61	0.78	0.78	0.71	0.40	0.40
Avail Cap(c.a), veh/h	1381	0	0	1456	0	1367	502	1335	1380	597	1430	1492
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.4	0.0	0.0	15.0	0.0	15.3	16.4	7.4	7.4	15.8	5.2	5.2
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.0	0.0	2.1	7.6	0.7	0.7	4.6	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.0	0.2	0.0	0.3	0.2	1.6	1.7	0.4	0.5	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.5	0.0	0.0	15.1	0.0	17.3	24.0	8.0	8.0	20.4	5.3	5.3
LnGrp LOS	B	A	A	B	A	B	C	A	A	A	C	A
Approach Vol, veh/h	44			79				1219			704	
Approach Delay, s/veh	16.5			16.5				8.3			6.4	
Approach LOS	B			B				A			A	
Timer - Assigned Phs	1	2	4	5	6			8				
Phs Duration (G+Y+Rc), s	6.1	20.9	6.6	5.1	21.9			6.6				
Change Period (Y+Rc), s	4.5	5.0	4.5	4.5	5.0			4.5				
Max Green Setting (Gmax), s	12.5	28.0	32.5	10.5	30.0			32.5				
Max Q Clear Time (g_c+1), s	3.1	12.4	4.1	2.4	6.1			3.1				
Green Ext Time (p_c), s	0.0	3.4	0.0	0.1	0.0			0.2				
Intersection Summary												
HCM 6th Ctrl Delay	8.1											
HCM 6th LOS	A											

HCM 6th Signalized Intersection Summary
 2. S Moorland Ave & Todd Rd/JUS 101 South Ramps

03/30/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	307	501	292	134	0	470	0	115	0	0	0
Future Volume (veh/h)	0	307	501	292	134	0	470	0	115	0	0	0
Initial Q (Obs.) veh	0	1	0	0	0	0	3	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.98	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	330	283	314	144	0	505	0	59	0	0	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	648	680	563	585	614	0	0	0	0	0	0	9
Arrive On Green	0.00	0.36	0.36	0.33	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	1781	1870	1548	1781	1870	0	0	0	0	0	1870	0
Grp Volume(V), veh/h	0	330	283	314	144	0	0	0	0	0	0	0
Grp Sat Flow(s),veh/h	1781	1870	1548	1781	1870	0	0	0	0	0	1870	0
Q Serve(g.s), s	0.0	2.7	2.9	2.9	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g.c), s	0.0	2.7	2.9	2.9	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lane Grp Cap(c), veh/h	648	680	563	585	614	0	0	0	0	0	9	0
V/C Ratio(X)	0.00	0.49	0.50	0.54	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap(c.a), veh/h	1846	1938	1605	2662	2795	0	0	0	0	0	1770	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.0	5.0	5.5	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.7	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.3	0.3	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	5.5	5.7	6.3	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h	613			458				0			0	
Approach Delay, s/veh	5.6			5.9				0.0			0.0	
Approach LOS	A			A				A			A	
Timer - Assigned Phs	2	4	4	8				8				
Phs Duration (G+Y+Rc), s	0.0	10.5	10.5	9.6				9.6				
Change Period (Y+Rc), s	3.0	3.2	3.2	3.0				3.0				
Max Green Setting (Gmax), s	19.0	20.8	20.8	30.0				30.0				
Max Q Clear Time (g_c+1), s	0.0	4.9	4.9	4.9				4.9				
Green Ext Time (p_c), s	0.0	2.7	2.7	1.7				1.7				
Intersection Summary												
HCM 6th Ctrl Delay	5.7											
HCM 6th LOS	A											

HCM 6th Signalized Intersection Summary
3. US 101 Overpass & Todd Rd

03/30/2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	11	11	11	11	11	11
Traffic Volume (veh/h)	173	234	349	308	205	617
Future Volume (veh/h)	173	234	349	308	205	617
Initial Q (Ob), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	178	90	378	293	211	589
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	497	222	971	510	432	1438
Arrive On Green	0.14	0.14	0.27	0.27	0.24	0.24
Sat Flow, veh/h	3647	1685	3563	1870	1781	2790
Grp Volume(v), veh/h	178	90	378	293	211	589
Grp Sat Flow(s),veh/h	1777	1685	1781	1870	1781	1395
Q Serve(g,s), s	1.4	1.6	2.6	4.1	3.1	4.0
Cycle Q Clear(g,c), s	1.4	1.6	2.6	4.1	3.1	4.0
Prop In Lane	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	497	222	971	510	432	1438
V/C Ratio(X)	0.36	0.41	0.39	0.57	0.49	0.41
Avail Cap(c, a), veh/h	2392	1067	1813	952	614	1722
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.9	11.9	9.0	9.6	9.9	4.5
Incr Delay (d2), s/veh	0.4	1.2	0.3	1.0	0.9	0.2
Initial Q Delay(Q3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back(Q50%),veh/h	0.4	0.5	0.7	1.2	0.9	1.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.3	13.1	9.3	10.6	10.8	4.7
LnGrp LOS	B	B	A	B	B	A
Approach Vol, veh/h	268		671	800		
Approach Delay, s/veh	12.6		9.8	6.3		
Approach LOS	B		A	A		
Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	7.8	14.1	15.6	15.2	10.6	25.1
Change Period (Y+Rc), s	3.5	4.5	4.0	4.5	4.5	4.5
Max Green Setting (Gmax), s	20.5	35.5	17.0	32.5	10.5	38.5
Max Q Clear Time (g_c+1), s	3.6	8.7	11.5	8.2	6.4	2.7
Green Ext Time (p_c), s	1.2	0.7	0.2	1.4	0.1	0.0
Intersection Summary						
HCM 6th Ctrl Delay	8.6					
HCM 6th LOS	A					
Notes						

User approved volume balancing among the lanes for turning movement.

HCM 6th Signalized Intersection Summary
4. Santa Rosa Ave & Todd Rd

03/30/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	11	11	11	11	11	11	11	11	11	11	11	11
Traffic Volume (veh/h)	404	65	264	36	95	64	304	639	34	21	418	246
Future Volume (veh/h)	404	65	264	36	95	64	304	639	34	21	418	246
Initial Q (Ob), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	453	0	114	38	99	45	317	666	16	22	435	137
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	613	0	268	134	61	377	1331	591	37	684	304	304
Arrive On Green	0.17	0.00	0.17	0.11	0.11	0.11	0.21	0.37	0.37	0.02	0.19	0.19
Sat Flow, veh/h	3563	0	1557	1781	1216	553	1781	3554	1579	1781	3554	1578
Grp Volume(v), veh/h	453	0	114	38	0	144	317	666	16	22	435	137
Grp Sat Flow(s),veh/h	1781	0	1557	1781	0	1769	1781	1777	1579	1781	1777	1578
Q Serve(g,s), s	6.7	0.0	3.6	1.1	0.0	4.4	9.5	8.0	0.4	0.7	6.2	4.3
Cycle Q Clear(g,c), s	6.7	0.0	3.6	1.1	0.0	4.4	9.5	8.0	0.4	0.7	6.2	4.3
Prop In Lane	1.00	1.00	1.00	1.00	0.31	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	613	0	268	196	0	195	377	1331	591	37	684	304
V/C Ratio(X)	0.74	0.00	0.43	0.19	0.00	0.74	0.84	0.50	0.03	0.60	0.64	0.45
Avail Cap(c, a), veh/h	2282	0	997	337	0	335	546	2468	1097	337	2084	925
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.9	0.0	20.7	22.6	0.0	24.1	21.2	13.4	11.0	21.1	20.7	19.9
Incr Delay (d2), s/veh	0.7	0.0	0.4	0.2	0.0	2.0	5.4	0.1	0.0	5.6	0.4	0.4
Initial Q Delay(Q3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
%ile Back(Q50%),veh/h	2.6	0.0	1.2	0.4	0.0	1.8	4.2	2.6	0.1	0.3	2.3	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.6	0.0	21.1	22.8	0.0	26.1	27.9	13.5	11.0	32.7	21.1	20.3
LnGrp LOS	C	A	C	C	A	C	C	B	B	C	C	C
Approach Vol, veh/h	567			182			999				594	
Approach Delay, s/veh	22.3			25.4			18.1				21.4	
Approach LOS	C			C			B				C	
Timer - Assigned Phs	2	3	4	6	7	8						
Phs Duration (G+Y+Rc), s	14.1	15.6	15.2	10.6	5.6	25.1						
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.5						
Max Green Setting (Gmax), s	35.5	17.0	32.5	10.5	10.5	38.5						
Max Q Clear Time (g_c+1), s	8.7	11.5	8.2	6.4	2.7	10.0						
Green Ext Time (p_c), s	0.7	0.2	1.4	0.1	0.0	2.2						
Intersection Summary												
HCM 6th Ctrl Delay	20.5											
HCM 6th LOS	C											
Notes												

User approved volume balancing among the lanes for turning movement.

HCM Signalized Intersection Capacity Analysis
 5. S Moorland Ave & US 101 Overpass

03/31/2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Volume (vph)	33	529	54	93	728	52
Future Volume (vph)	33	529	54	93	728	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt	0.87	0.91	1.00	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	0.96	0.96	0.96
Satd. Flow (prot)	1567	1703	1681	1696	1696	1696
Flt Permitted	1.00	1.00	0.95	0.96	0.96	0.96
Satd. Flow (perm)	1567	1703	1681	1696	1696	1696
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	34	551	56	97	758	54
RTOR Reduction (vph)	443	0	68	0	0	0
Lane Group Flow (vph)	142	0	85	0	402	410
Turn Type	Prot	NA	NA	Split	NA	NA
Protected Phases	8	2	2	6	6	6
Permitted Phases						
Actuated Green, G (s)	10.2	6.8	21.3	21.3	21.3	21.3
Effective Green, g (s)	10.2	6.8	21.3	21.3	21.3	21.3
Actuated G/C Ratio	0.20	0.13	0.41	0.41	0.41	0.41
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	308	223	691	697	697	697
v/s Ratio Prot	c0.09	c0.05	0.24	c0.24		
v/s Ratio Perm						
v/c Ratio	0.46	0.38	0.58	0.59	0.59	0.59
Uniform Delay, d1	18.4	20.6	11.8	11.8	11.8	11.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	1.1	1.3	1.3	1.3	1.3
Delay (s)	19.5	21.7	13.1	13.1	13.1	13.1
Level of Service	B	C	B	B	B	B
Approach Delay (s)	19.5	21.7	13.1	13.1	13.1	13.1
Approach LOS	B	C	B	B	B	B
Intersection Summary						
HCM 2000 Control Delay	16.3 HCM 2000 Level of Service B					
HCM 2000 Volume to Capacity ratio	0.62					
Actuated Cycle Length (s)	51.8					
Sum of lost time (s)	13.5					
Intersection Capacity Utilization	75.9%					
Analysis Period (min)	15					
c. Critical Lane Group						

HCM 6th Signalized Intersection Summary
 1. Santa Rosa Ave & East Robles Ave

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	0	7	61	0	66	25	1089	18	27	540	15
Future Volume (veh/h)	14	0	7	61	0	66	25	1089	18	27	540	15
Initial Q (Obs.) veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A..pbT)	1.00	0.98	1.00	0.98	1.00	1.00	1.00	1.00	0.97	1.00	1.00	0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	14	0	7	61	0	66	25	1089	18	27	540	15
Peak Hour 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
Percent Heavy Veh. %	2	2	2	2	2	2	2	2	2	2	2	2
Cap. veh/h	222	5	19	353	0	119	40	1440	24	43	1426	40
Arrive On Green	0.08	0.00	0.08	0.00	0.00	0.00	0.02	0.45	0.45	0.03	0.45	0.45
Sat Flow, veh/h	383	55	224	1268	0	1402	1603	3218	53	1603	3175	88
Grp Volume(v), veh/h	21	0	0	61	0	66	25	541	566	27	272	283
Grp Sat Flow(s),veh/h/ln	672	0	0	1268	0	1402	1603	1599	1672	1603	1599	1664
Q Serve(g.s), s	0.3	0.0	0.0	0.0	0.0	1.4	0.5	9.0	9.0	0.5	3.6	3.6
Cycle Q Clear(g.c), s	1.8	0.0	0.0	1.1	0.0	1.4	0.5	9.0	9.0	0.5	3.6	3.6
Prop In Lane	0.67	0.33	1.00	1.00	1.00	1.00	1.00	0.03	0.03	1.00	0.05	0.05
Lane Grp Cap(c), veh/h	246	0	0	353	0	119	40	716	748	43	718	748
V/C Ratio(X)	0.09	0.00	0.00	0.17	0.00	0.55	0.63	0.76	0.76	0.63	0.38	0.38
Avail Cap(c.a), veh/h	1431	0	0	1543	0	1435	530	1410	1475	631	1511	1573
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.3	0.0	0.0	13.8	0.0	13.9	15.3	7.3	7.3	15.3	5.8	5.8
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.1	0.0	1.5	5.8	0.6	0.6	5.6	0.1	0.1
Initial Q Delay(Q3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back(Q50%),veh/ln	0.1	0.0	0.0	0.3	0.0	0.4	0.2	1.4	1.4	0.2	0.5	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.3	0.0	0.0	13.9	0.0	15.4	21.1	7.9	7.9	20.9	5.9	5.9
LnGrp LOS	B	A	A	B	A	B	C	A	A	C	A	A
Approach Vol, veh/h	21											
Approach Delay, s/veh	14.3											
Approach LOS	B											
Timer - Assigned Phs	1	2	4	5	6	8						
Phs Duration (G+Y+Rc), s	5.3	19.2	7.2	5.3	19.3	7.2						
Change Period (Y+Rc), s	4.5	5.0	4.5	4.5	5.0	4.5						
Max Green Setting (Gmax), s	12.5	28.0	32.5	10.5	30.0	32.5						
Max Q Clear Time (g_c+1), s	2.5	11.0	3.8	2.5	5.6	3.4						
Green Ext Time (p_c), s	0.0	3.1	0.0	0.0	1.4	0.3						
Intersection Summary												
HCM 6th Ctrl Delay	8.2											
HCM 6th LOS	A											

HCM 6th Signalized Intersection Summary
 2: S Moorland Ave & Todd Rd/US 101 South Ramps

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑	↗	↖	↖	↗	↖	↗	↖	↖	↗	↖
Traffic Volume (veh/h)	0	351	510	379	280	0	863	0	165	0	0	0
Future Volume (veh/h)	0	351	510	379	280	0	863	0	165	0	0	0
Initial Q (Qb), veh	0	2	0	15	2	0	11	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No		No		No		No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	0	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	351	330	379	280	0	863	0	102	0	0	0
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	660	693	573	690	696	0	0	0	0	0	8	0
Arrive On Green	0.00	0.37	0.37	0.37	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	1781	1870	1549	1781	1870	0	0	0	0	1870	0	0
Grp Volume(v), veh/h	0	351	330	379	280	0	0	0	0	0	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1549	1781	1870	0	0	0	0	1870	0	0
Q Serve(g_s), s	0.0	3.5	4.1	4.1	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	3.5	4.1	4.1	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00			0.00	0.00		0.00
Lane Grp Cap(c), veh/h	660	693	573	690	696	0	0	0	0	8	0	0
V/C Ratio(X)	0.00	0.51	0.58	0.55	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap(c_a), veh/h	1548	1625	1346	2232	2344	0	0	0	0	1485	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	6.1	6.4	6.8	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.6	0.9	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.1	0.0	7.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.8	0.7	3.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	6.8	7.3	15.1	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		681			659						0	
Approach Delay, s/veh		7.1			11.3						0.0	
Approach LOS		A			B							
Timer - Assigned Phs		2		4			8					
Phs Duration (G+Y+Rc), s		0.0		12.1			11.9					
Change Period (Y+Rc), s		3.0		3.2			3.0					
Max Green Setting (Gmax), s		19.0		20.8			30.0					
Max Q Clear Time (g_c+I1), s		0.0		6.1			6.1					
Green Ext Time (p_c), s		0.0		2.9			2.8					
Intersection Summary												
HCM 6th Ctrl Delay				9.1								
HCM 6th LOS				A								

HCM 6th Signalized Intersection Summary
 3: US 101 Overpass & Todd Rd

04/01/2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕	↕	↖	↖	↖	↖
Traffic Volume (veh/h)	126	403	586	331	341	481
Future Volume (veh/h)	126	403	586	331	341	481
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	126	253	586	331	341	470
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	803	358	963	505	431	1429
Arrive On Green	0.23	0.23	0.27	0.27	0.24	0.24
Sat Flow, veh/h	3647	1585	3563	1870	1781	2790
Grp Volume(v), veh/h	126	253	586	331	341	470
Grp Sat Flow(s),veh/h/ln	1777	1585	1781	1870	1781	1395
Q Serve(g_s), s	1.1	5.9	5.8	6.3	7.2	4.0
Cycle Q Clear(g_c), s	1.1	5.9	5.8	6.3	7.2	4.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	803	358	963	505	431	1429
V/C Ratio(X)	0.16	0.71	0.61	0.65	0.79	0.33
Avail Cap(c_a), veh/h	1818	811	1378	724	467	1485
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.4	14.3	12.8	13.0	14.2	5.7
Incr Delay (d2), s/veh	0.1	2.6	0.6	1.4	8.4	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	0.4	1.9	1.8	2.2	3.3	1.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.5	16.9	13.4	14.4	22.7	5.9
LnGrp LOS	B	B	B	B	C	A
Approach Vol, veh/h	379			917	811	
Approach Delay, s/veh	15.4			13.8	12.9	
Approach LOS	B			B	B	
Timer - Assigned Phs		2			6	8
Phs Duration (G+Y+Rc), s		12.5			14.3	13.2
Change Period (Y+Rc), s		3.5			3.5	3.5
Max Green Setting (Gmax), s		20.5			15.5	10.5
Max Q Clear Time (g_c+I1), s		7.9			8.3	9.2
Green Ext Time (p_c), s		1.3			2.5	0.5
Intersection Summary						
HCM 6th Ctrl Delay				13.7		
HCM 6th LOS				B		
Notes						
User approved volume balancing among the lanes for turning movement.						

HCM 6th Signalized Intersection Summary

4. Santa Rosa Ave & Todd Rd

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	←	←	←	←	←	←	←	←	←	←	←	←
Traffic Volume (veh/h)	266	62	276	27	32	15	596	405	28	21	431	236
Future Volume (veh/h)	266	62	276	27	32	15	596	505	28	21	431	236
Initial Q (Q _{bb}), veh	0	0	0	0	0	0	3	0	0	0	0	0
Ped-Bike Adj(A _{pbT})	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	164	205	136	27	32	15	596	505	18	21	431	132
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	278	292	243	81	69	13	534	1639	729	35	676	300
Arrive On Green	0.16	0.16	0.16	0.05	0.05	0.05	0.30	0.46	0.46	0.02	0.19	0.19
Sat Flow, veh/h	1781	1870	1556	1781	1530	287	1781	3554	1580	1781	3554	1578
Grp Volume(v), veh/h	164	205	136	27	32	15	596	505	18	21	431	132
Grp Sat Flow(s), veh/h	1781	1870	1556	1781	1530	287	1781	1777	1580	1781	1777	1578
Q Serve(g, s), s	4.9	5.9	4.6	0.8	0.8	0.8	1.2	17.0	5.1	0.4	0.7	6.3
Cycle Q Clear(g, s)	4.9	5.9	4.6	0.8	0.8	0.8	1.2	17.0	5.1	0.4	0.7	6.3
Prop In Lane	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	278	292	243	81	69	13	534	1639	729	35	676	300
V/C Ratio(x)	0.59	0.70	0.56	0.34	0.34	0.00	0.46	1.12	0.31	0.02	0.59	0.64
Avail Cap(c, a), veh/h	1115	1170	974	330	0	336	534	2412	1072	330	2036	904
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.2	22.7	22.1	26.3	0.0	26.4	19.9	9.6	8.3	27.6	21.2	20.3
Incr Delay (d2), s/veh	0.7	1.1	0.7	0.9	0.0	1.5	75.0	0.0	0.0	5.8	0.4	0.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	0.0	0.0	0.0	0.0
%ile Back(Q)(50%), veh/h	1.9	2.4	1.5	0.3	0.0	0.5	20.0	1.5	0.1	0.3	2.3	1.4
Unsig. Movement Delay, s/veh	23.0	23.8	22.9	27.2	0.0	27.9	115.1	9.6	8.3	33.3	21.5	20.7
LnGrp Delay(d) s/veh	C	C	C	A	C	A	C	F	A	A	C	C
LnGrp LOS	C	C	C	A	C	A	C	F	A	A	C	C
Approach Vol, veh/h	505			65			1119				584	
Approach Delay, s/veh	23.3			27.6			65.8				21.8	
Approach LOS	C			C			E				C	
Timer - Assigned Phs	2	3	4	6	7	8						
Phs Duration (G+Y+Rc), s	13.4	21.0	15.3	7.1	5.6	30.7						
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.5						
Max Green Setting (Gmax), s	35.5	17.0	32.5	10.5	10.5	36.5						
Max Q Clear Time (g_c+1), s	7.9	19.0	8.3	3.2	2.7	7.1						
Green Ext Time (p_c), s	0.8	0.0	1.4	0.0	0.0	1.6						
Intersection Summary												
HCM 6th Ctrl Delay	43.9											
HCM 6th LOS	D											

Notes
User approved volume balancing among the lanes for turning movement

HCM Signalized Intersection Capacity Analysis

5. S Moorland Ave & US 101 Overpass

04/01/2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	←	←	←	←	←	←
Traffic Volume (vph)	20	931	159	79	769	62
Future Volume (vph)	20	931	159	79	769	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Flt Protected	0.87	0.96	0.96	1.00	1.00	1.00
Flt Permitted	1.00	1.00	1.00	0.95	0.96	0.96
Satd. Flow (prot)	1561	1779	1779	1681	1681	1681
Satd. Flow (perm)	1561	1779	1779	1681	1681	1681
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	931	159	79	769	62
RTOR Reduction (vph)	574	0	18	0	0	0
Lane Group Flow (vph)	377	0	220	0	415	416
Turn Type	Prot	NA	NA	Split	NA	NA
Protected Phases	8	2	2	6	6	6
Permitted Phases						
Actuated Green, G (s)	22.3	15.0	15.0	25.0	25.0	25.0
Effective Green, g (s)	22.3	15.0	15.0	25.0	25.0	25.0
Actuated g/C Ratio	0.29	0.20	0.20	0.33	0.33	0.33
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	459	352	352	554	559	559
v/s Ratio Prot	c0.24	c0.12	c0.12	c0.25	0.25	0.25
v/s Ratio Perm						
Uniform Delay, d1	0.82	0.63	0.63	0.75	0.74	0.74
Progression Factor	24.9	27.8	27.8	22.6	22.6	22.6
Incremental Delay, d2	11.3	3.5	3.5	5.5	5.3	5.3
Delay (s)	36.2	31.3	31.3	28.1	27.9	27.9
Level of Service	D	C	C	C	C	C
Approach Delay (s)	36.2	31.3	31.3	28.0	28.0	28.0
Approach LOS	D	C	C	C	C	C
Intersection Summary						
HCM 2000 Control Delay	32.2					
HCM 2000 Level of Service	C					
HCM 2000 Volume to Capacity ratio	0.75					
Actuated Cycle Length (s)	75.8					
Sum of lost time (s)	13.5					
Intersection Capacity Utilization	106.1%					
ICU Level of Service	G					
Analysis Period (min)	15					
c. Critical Lane Group						

HCM 6th Signalized Intersection Summary
 1. Santa Rosa Ave & East Robles Ave

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	2	12	32	2	54	16	1188	49	72	867	13
Future Volume (veh/h)	27	2	12	32	2	54	16	1188	49	72	867	13
Initial Q (Obs.) veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	27	2	12	32	2	54	16	1188	49	72	867	13
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	193	2	10	310	3	89	26	1496	62	92	1675	25
Arrive On Green	0.07	0.07	0.07	0.07	0.07	0.07	0.02	0.48	0.48	0.06	0.52	0.52
Sat Flow, veh/h	347	26	154	1260	50	1359	1603	3126	129	1603	3224	48
Grp Volume(v), veh/h	41	0	0	32	0	56	16	607	630	72	430	450
Grp Sat Flow(s),veh/h	526	0	0	1260	0	1410	1603	1599	1656	1603	1599	1673
Q Serve(g.s), s	0.9	0.0	0.0	0.0	0.0	1.4	0.3	11.2	11.2	1.6	6.2	6.2
Cycle Q Clear(g.c), s	2.3	0.0	0.0	0.7	0.0	1.4	0.3	11.2	11.2	1.6	6.2	6.2
Prop In Lane	0.66	0.29	1.00	0.96	1.00	0.96	1.00	0.08	0.08	1.00	0.03	0.03
Lane Grp Cap(c), veh/h	204	0	0	310	0	92	26	765	792	92	831	869
V/C Ratio(X)	0.20	0.00	0.00	0.10	0.00	0.61	0.61	0.79	0.79	0.78	0.52	0.52
Avail Cap(c), veh/h	1305	0	0	1393	0	1304	479	1274	1320	570	1365	1428
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.2	0.0	0.0	15.7	0.0	16.0	17.2	7.7	7.7	16.3	5.5	5.5
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.1	0.0	2.4	8.0	0.7	0.7	5.3	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/h	0.3	0.0	0.0	0.2	0.0	0.4	0.2	1.9	1.9	0.6	0.8	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.3	0.0	0.0	15.7	0.0	16.3	25.2	8.4	8.4	21.6	5.7	5.7
LnGrp LOS	B	A	A	B	A	B	C	A	A	A	C	A
Approach Vol, veh/h	41			88				1253			952	
Approach Delay, s/veh	17.3			17.4				8.6			6.9	
Approach LOS	B			B				A			A	
Timer - Assigned Phs	1	2	4	5	6	8						
Phs Duration (G+Y+Rc), s	6.5	21.8	6.8	5.1	23.3	6.8						
Change Period (Y+Rc), s	4.5	5.0	4.5	4.5	5.0	4.5						
Max Green Setting (Gmax), s	12.5	28.0	32.5	10.5	30.0	32.5						
Max Q Clear Time (g_c+1), s	3.6	13.2	4.3	2.3	8.2	3.4						
Green Ext Time (p_c), s	0.0	3.4	0.1	0.0	2.4	0.2						
Intersection Summary												
HCM 6th Ctrl Delay			8.4									
HCM 6th LOS			A									

HCM 6th Signalized Intersection Summary
 2. S Moorland Ave & Todd Rd/JUS 101 South Ramps

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	414	988	450	179	0	776	0	146	0	0	0
Future Volume (veh/h)	0	414	988	450	179	0	776	0	146	0	0	0
Initial Q (Obs.) veh	0	1	0	0	0	0	3	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	414	760	450	179	0	776	0	86	0	0	0
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	916	962	797	592	622	0	0	0	0	0	5	0
Arrive On Green	0.00	0.51	0.51	0.33	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sat Flow, veh/h	1781	1870	1550	1781	1870	0	0	0	0	0	1870	0
Grp Volume(v), veh/h	0	414	760	450	179	0	0	0	0	0	0	0
Grp Sat Flow(s),veh/h	1781	1870	1550	1781	1870	0	0	0	0	0	1870	0
Q Serve(g.s), s	0.0	5.6	18.9	9.1	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g.c), s	0.0	5.6	18.9	9.1	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lane Grp Cap(c), veh/h	916	962	797	592	622	0	0	0	0	0	5	0
V/C Ratio(X)	0.00	0.43	0.95	0.76	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap(c), veh/h	916	962	797	1321	1387	0	0	0	0	0	879	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	6.2	9.4	12.1	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	21.3	2.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/h	0.0	1.4	8.2	3.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	6.5	30.6	14.1	10.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LnGrp LOS	A	A	C	B	B	A	A	A	A	A	A	A
Approach Vol, veh/h	1174			629							0	
Approach Delay, s/veh	22.1			13.0							0.0	
Approach LOS	C			B							0.0	
Timer - Assigned Phs	2	4	4	8								
Phs Duration (G+Y+Rc), s	0.0	24.0	24.0	16.4								
Change Period (Y+Rc), s	3.0	3.0	3.0	3.0								
Max Green Setting (Gmax), s	19.0	20.8	20.8	30.0								
Max Q Clear Time (g_c+1), s	0.0	20.9	20.9	11.1								
Green Ext Time (p_c), s	0.0	0.0	0.0	2.3								
Intersection Summary												
HCM 6th Ctrl Delay			18.9									
HCM 6th LOS			B									

HCM 6th Signalized Intersection Summary

3. US 101 Overpass & Todd Rd

04/01/2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑↑
Traffic Volume (veh/h)	191	245	376	389	328	901
Future Volume (veh/h)	191	245	376	389	328	901
Initial Q (Ob), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	191	99	255	558	328	855
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	506	226	485	1018	502	1545
Arrive On Green	0.14	0.14	0.27	0.27	0.28	0.28
Sat Flow, veh/h	3647	1685	1781	3741	1781	2790
Grp Volume(v), veh/h	191	99	255	558	328	855
Grp Sat Flow(s),veh/h/ln	1777	1685	1781	1870	1781	1395
Q Serve(g, s), s	1.7	2.0	4.2	4.4	5.6	6.8
Cycle Q Clear(g, c), s	1.7	2.0	4.2	4.4	5.6	6.8
Prop In Lane	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	506	226	485	1018	502	1545
V/C Ratio(X)	0.38	0.44	0.53	0.55	0.65	0.55
Avail Cap(c, a), veh/h	2107	940	798	1677	541	1607
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.4	13.6	10.7	10.8	10.9	5.0
Incr Delay (d2), s/veh	0.5	1.3	0.9	0.5	2.6	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.6	1.3	1.3	1.9	2.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.9	14.9	11.6	11.2	13.5	5.3
LnGrp LOS	B	B	B	B	B	A
Approach Vol, veh/h	290		813		1183	
Approach Delay, s/veh	14.2		11.3		7.6	
Approach LOS	B		B		A	
Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	8.4		12.9		13.2	
Change Period (Y+Rc), s	3.5		3.5		3.5	
Max Green Setting (Gmax), s	20.5		15.5		10.5	
Max Q Clear Time (g_c+1), s	4.0		6.4		8.8	
Green Ext Time (p_c), s	1.3		3.0		0.9	
Intersection Summary						
HCM 6th Ctrl Delay			9.8			
HCM 6th LOS			A			
Notes						

User approved volume balancing among the lanes for turning movement.

HCM 6th Signalized Intersection Summary

4. Santa Rosa Ave & Todd Rd

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	404	65	556	48	95	64	482	757	38	21	732	246
Future Volume (veh/h)	404	65	556	48	95	64	482	757	38	21	732	246
Initial Q (Ob), veh	0	0	0	0	0	0	2	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No	No	No	No	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	434	0	401	48	95	43	482	757	20	21	732	132
Peak Hour 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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	1002	0	439	174	119	54	327	1462	645	32	882	392
Arrive On Green	0.28	0.00	0.28	0.10	0.10	0.10	0.18	0.41	0.41	0.41	0.02	0.25
Sat Flow, veh/h	3563	0	1561	1781	1218	561	1781	3554	1579	1781	3554	1579
Grp Volume(v), veh/h	434	0	401	48	95	43	482	757	20	21	732	132
Grp Sat Flow(s),veh/h/ln	1781	0	1561	1781	0	1769	1781	1777	1579	1781	1777	1579
Q Serve(g, s), s	9.2	0.0	23.0	2.3	0.0	7.1	17.0	14.8	0.7	1.1	18.0	6.3
Cycle Q Clear(g, c), s	9.2	0.0	23.0	2.3	0.0	7.1	17.0	14.8	0.7	1.1	18.0	6.3
Prop In Lane	1.00	1.00	1.00	1.00	1.00	0.31	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	1002	0	439	174	119	54	327	1462	645	32	882	392
V/C Ratio(X)	0.43	0.00	0.91	0.28	0.00	0.80	1.47	0.52	0.03	0.65	0.83	0.34
Avail Cap(c, a), veh/h	1367	0	599	202	0	201	327	1479	657	202	1248	555
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(i)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.2	0.0	32.2	38.7	0.0	40.8	37.8	20.6	16.4	45.1	32.9	28.5
Incr Delay (d2), s/veh	0.1	0.0	12.8	0.3	0.0	15.0	228.7	0.1	0.0	8.1	2.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	22.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	9.7	1.0	0.0	3.7	29.9	5.7	0.2	0.5	7.6	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.3	0.0	45.0	39.0	0.0	55.9	288.4	20.7	16.4	53.2	35.2	28.7
LnGrp LOS	C	A	D	D	A	E	F	C	B	D	D	C
Approach Vol, veh/h	835		186		1269							
Approach Delay, s/veh	35.8		51.5		123.1							
Approach LOS	D		D		F							
Timer - Assigned Phs	2	3	4	6	7	8						
Phs Duration (G+Y+Rc), s	30.5	21.0	27.5	13.5	6.2	42.3						
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.5						
Max Green Setting (Gmax), s	35.5	17.0	32.5	10.5	10.5	38.5						
Max Q Clear Time (g_c+1), s	25.0	19.0	20.0	9.1	3.1	16.8						
Green Ext Time (p_c), s	0.9	0.0	2.2	0.1	0.0	2.5						
Intersection Summary												
HCM 6th Ctrl Delay			71.2									
HCM 6th LOS			E									
Notes												

User approved volume balancing among the lanes for turning movement.

HCM Signalized Intersection Capacity Analysis

4: Santa Rosa Ave & Todd Rd

04/01/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations	W	W	W	W	W	W	W	W	W	W	W	W		
Traffic Volume (vph)	404	65	556	48	95	64	482	757	38	21	732	246		
Future Volume (vph)	404	65	556	48	95	64	482	757	38	21	732	246		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.5	4.5	4.5	4.5	4.5		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00		
Frbp_psd/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		
Frlb_psd/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00		
Frt	1.00	1.00	0.85	1.00	0.94	1.00	1.00	0.99	1.00	1.00	1.00	0.85		
Flt Protected	0.95	0.97	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1681	1708	1558	1770	1750	3433	3514	1770	3539	1560	1560	1560		
Flt Permitted	0.95	0.97	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1681	1708	1558	1770	1750	3433	3514	1770	3539	1560	1560	1560		
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)	404	65	556	48	95	64	482	757	38	21	732	246		
RTOR Reduction (vph)	0	0	289	0	21	0	0	3	0	0	0	174		
Lane Group Flow (vph)	234	235	267	48	138	0	482	792	0	21	732	72		
Turn Type	Split	NA	Perm	Split	NA	Prot	NA	Prot	NA	Prot	NA	Perm		
Confit. Peds. (#/hr)	1	1	3	3	3	3	3	3	3	3	3	3		
Confit. Bikes (#/hr)	3	3	3	3	3	3	3	3	3	3	3	3		
Protected Phases	2	2	6	6	6	6	6	6	6	6	6	6		
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2		
Actuated Green, G (s)	20.0	20.0	20.0	10.1	10.1	16.1	39.6	39.6	2.2	26.2	26.2	26.2		
Effective Green, g (s)	20.0	20.0	20.0	10.1	10.1	16.1	39.6	39.6	2.2	26.2	26.2	26.2		
Actuated G/C Ratio	0.22	0.22	0.22	0.11	0.11	0.18	0.44	0.44	0.02	0.29	0.29	0.29		
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.0	4.5	4.5	4.5	4.5	4.5	4.5		
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Lane Grp Cap (vph)	373	379	346	198	196	614	1577	1577	43	1031	1031	454		
v/s Ratio Prot	0.14	0.14	0.03	c0.03	c0.03	c0.14	0.23	0.23	0.01	c0.21	c0.21	0.05		
v/s Ratio Perm	0.63	0.62	0.77	0.24	0.24	0.79	0.51	0.51	0.49	0.71	0.71	0.16		
Uniform Delay, d1	31.6	31.5	32.8	36.4	38.5	35.2	18.2	18.2	43.3	28.5	28.5	23.7		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	2.4	2.3	9.3	0.2	8.9	6.0	0.1	0.1	3.2	1.9	1.9	0.1		
Delay (s)	34.0	33.8	42.1	36.6	47.4	41.3	18.3	18.3	46.4	30.3	23.7	23.7		
Level of Service	C	C	D	D	D	D	B	B	D	D	C	C		
Approach Delay (s)	38.3	38.3	44.9	44.9	44.9	27.0	27.0	27.0	44.9	29.0	29.0	29.0		
Approach LOS	D	D	D	D	D	C	C	C	D	C	C	C		
Intersection Summary														
HCM 2000 Control Delay												HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio												0.75		
Actuated Cycle Length (s)												89.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization												75.5%	ICU Level of Service	D
Analysis Period (min)												15		
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis

5: S Moorland Ave & US 101 Overpass

04/01/2020

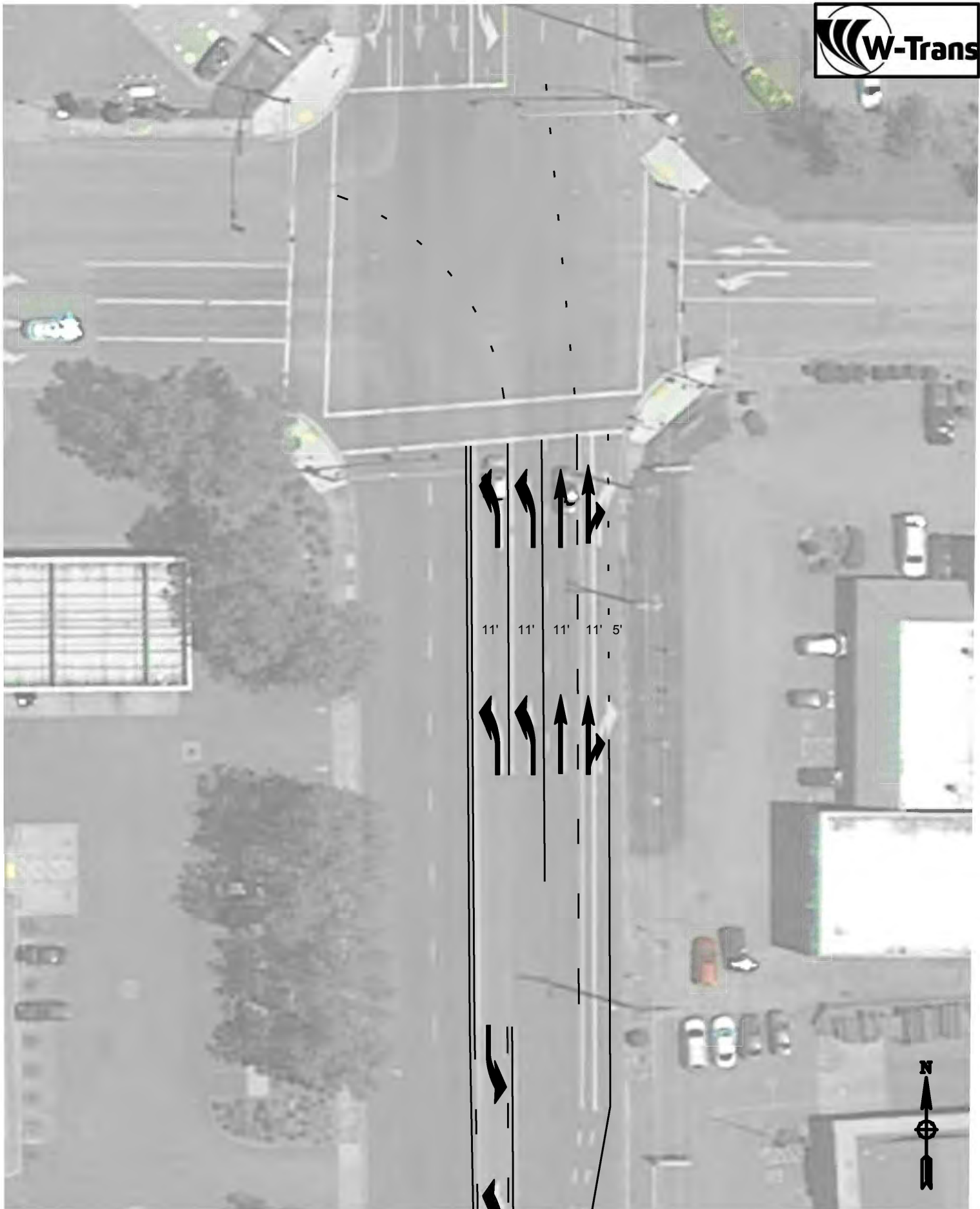
Movement	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations	W	W	W	W	W	W		
Traffic Volume (vph)	33	767	204	105	1307	59		
Future Volume (vph)	33	767	204	105	1307	59		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width	11	11	12	12	12	12		
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95		
Frbp_psd/bikes	0.87	0.95	0.95	1.00	1.00	1.00		
Frlt Protected	1.00	1.00	1.00	0.95	0.95	0.96		
Satd. Flow (prot)	1564	1564	1777	1681	1681	1692		
Flt Permitted	1.00	1.00	1.00	0.95	0.95	0.96		
Satd. Flow (perm)	1564	1564	1777	1681	1681	1692		
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Adj. Flow (vph)	33	767	204	105	1307	59		
RTOR Reduction (vph)	630	0	18	0	0	0		
Lane Group Flow (vph)	170	0	291	0	680	686		
Turn Type	Prot	NA	Split	NA	Split	NA		
Protected Phases	8	2	2	6	6	6		
Permitted Phases								
Actuated Green, G (s)	13.4	16.8	16.8	31.5	31.5	31.5		
Effective Green, g (s)	13.4	16.8	16.8	31.5	31.5	31.5		
Actuated G/C Ratio	0.18	0.22	0.22	0.42	0.42	0.42		
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	278	396	396	704	708	708		
v/s Ratio Prot	c0.11	c0.16	c0.16	0.40	c0.41	c0.41		
v/s Ratio Perm	0.61	0.74	0.74	0.97	0.97	0.97		
Uniform Delay, d1	28.5	27.1	27.1	21.3	21.4	21.4		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	3.9	6.9	6.9	25.5	26.0	26.0		
Delay (s)	32.4	34.1	34.1	46.8	47.3	47.3		
Level of Service	C	C	C	D	D	D		
Approach Delay (s)	32.4	34.1	34.1	47.1	47.1	47.1		
Approach LOS	C	C	C	D	D	D		
Intersection Summary								
HCM 2000 Control Delay						HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio						0.83		
Actuated Cycle Length (s)						75.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization						115.4%	ICU Level of Service	H
Analysis Period (min)						15		
c Critical Lane Group								

Appendix D

Concept Striping Plan from the *Final Traffic Impact Study for the Ghilotti Construction Yard*



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Appendix E

SIMTRAFFIC Projections





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Queuing and Blocking Report

04/07/2020

Intersection: 1: Santa Rosa Ave & East Robles Ave

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	L	TR	L	T	TR	L	T	TR			
Maximum Queue (ft)	31	51	55	28	99	93	50	68	68		
Average Queue (ft)	18	23	28	8	39	43	15	18	12		
95th Queue (ft)	42	50	55	28	89	86	38	45	45		
Link Distance (ft)	319		380		2578	2578		1331	1331		
Upstream Blk Time (%)											
Queuing Penalty (veh)							100				
Storage Bay Dist (ft)	100		100								
Storage Blk Time (%)							0				
Queuing Penalty (veh)							0				

Intersection: 2: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	T	R	L	TR	L	R	R	R			
Maximum Queue (ft)	133	104	232	139	250	54	30	30			
Average Queue (ft)	80	61	103	51	142	30	3	3			
95th Queue (ft)	119	98	190	111	217	56	17	17			
Link Distance (ft)	70	70	318	255	255						
Upstream Blk Time (%)	24	6			0						
Queuing Penalty (veh)	0	0			0						
Storage Bay Dist (ft)			280				150				
Storage Blk Time (%)			1								
Queuing Penalty (veh)			0		2						

Intersection: 3: US 101 Overpass & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	T	R	L	TR	L	TR	L	R	R		
Maximum Queue (ft)	53	52	64	182	96	75	135	99	77		
Average Queue (ft)	26	21	43	85	43	42	79	27	44		
95th Queue (ft)	53	52	67	154	78	69	120	67	68		
Link Distance (ft)	566		211	211	211		264				
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	180		180				100		100		
Storage Blk Time (%)							2		0		
Queuing Penalty (veh)							11		0		

Queuing and Blocking Report

04/07/2020

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T
Maximum Queue (ft)	162	146	67	87	60	282	65	86	57	40	71
Average Queue (ft)	53	57	42	19	19	128	27	38	10	11	44
95th Queue (ft)	95	89	68	57	46	233	47	74	34	32	75
Link Distance (ft)	211	211	211		701		2840	2840			2578
Upstream Blk Time (%)											
Queuing Penalty (veh)							65		280		205
Storage Bay Dist (ft)							2		1		0
Storage Blk Time (%)									1		0
Queuing Penalty (veh)									0		0

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	54
Average Queue (ft)	41
95th Queue (ft)	60
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: S Moorland Ave & US 101 Overpass

Movement	WB	B26	NB	SB	SB	SB
Directions Served	LR	T	TR	L	LT	
Maximum Queue (ft)	218	41	95	276	303	
Average Queue (ft)	72	2	50	172	121	
95th Queue (ft)	147	16	83	258	265	
Link Distance (ft)	147	420	768	255	255	
Upstream Blk Time (%)	1			0	1	
Queuing Penalty (veh)	7			1	2	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Network Summary

Network wide Queuing Penalty: 25

Queuing and Blocking Report

04/07/2020

Intersection: 1: Santa Rosa Ave & East Robles Ave

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB	SB	TR	TR	TR	TR	TR
Directions Served	L	L	TR	L	TR	L	L	L	L	L	T	T	T	T	T
Maximum Queue (ft)	53	94	54	48	74	74	45	49	67						
Average Queue (ft)	15	30	33	14	37	38	11	21	17						
95th Queue (ft)	43	67	68	39	75	80	34	56	48						
Link Distance (ft)	319			380		2578		2578		1331		1331			
Upstream Blk Time (%)															
Queuing Penalty (veh)															
Storage Bay Dist (ft)	100			100			100								
Storage Blk Time (%)															
Queuing Penalty (veh)	0			0			0								

Intersection: 2: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB	NB	NB	NB	TR	TR	TR	TR	TR
Directions Served	T	R	L	TR	L	R	L	R	R	R					
Maximum Queue (ft)	85	104	297	99	268	67	50								
Average Queue (ft)	83	74	119	50	188	36	10								
95th Queue (ft)	91	98	199	90	282	54	36								
Link Distance (ft)	70	70		318	255	255									
Upstream Blk Time (%)	28	8		3											
Queuing Penalty (veh)	0	0		280			150								
Storage Bay Dist (ft)	51			1											
Storage Blk Time (%)															
Queuing Penalty (veh)	0			1											

Intersection: 3: US 101 Overpass & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	NB	NB	NB	NB	TR	TR	TR	TR	TR
Directions Served	T	R	L	TR	L	TR	L	R	R	R					
Maximum Queue (ft)	53	68	78	138	147	115	117	53	113						
Average Queue (ft)	27	32	46	80	51	46	66	27	52						
95th Queue (ft)	55	65	67	118	98	84	96	49	95						
Link Distance (ft)	566			211	211	211		264							
Upstream Blk Time (%)															
Queuing Penalty (veh)															
Storage Bay Dist (ft)	180			180			100		100						
Storage Blk Time (%)															
Queuing Penalty (veh)	1			3			2								

Queuing and Blocking Report

04/07/2020

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	NB	NB	NB	NB	TR	TR	TR	TR	TR
Directions Served	L	L	TR	L	TR	L	L	L	L	L	T	T	T	T	T
Maximum Queue (ft)	177	189	108	43	63	228	135	108	21	39	86	70			
Average Queue (ft)	58	65	53	13	23	116	48	53	5	10	44	38			
95th Queue (ft)	124	135	93	35	46	194	95	104	19	26	78	76			
Link Distance (ft)	211	211	211		701		2840		2840		2578		2578		
Upstream Blk Time (%)															
Queuing Penalty (veh)															
Storage Bay Dist (ft)				65		280		200	205						
Storage Blk Time (%)															
Queuing Penalty (veh)	0			0											

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	90
Average Queue (ft)	42
95th Queue (ft)	70
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	205
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: S Moorland Ave & US 101 Overpass

Movement	WB	NB	SB	SB	SB	TR	TR	TR	TR	TR	TR	TR	TR	TR	TR
Directions Served	LR	LR	L	LT	LT										
Maximum Queue (ft)	195	72	267	258											
Average Queue (ft)	86	40	181	138											
95th Queue (ft)	159	65	262	275											
Link Distance (ft)	147	768	255	255											
Upstream Blk Time (%)	1		1	1											
Queuing Penalty (veh)	9		3	4											
Storage Bay Dist (ft)															
Storage Blk Time (%)															
Queuing Penalty (veh)															

Network Summary

Network wide Queuing Penalty: 30

Queuing and Blocking Report

04/07/2020

Intersection: 1: Santa Rosa Ave & East Robles Ave

Movement	EB	WB	WB	NB	NB	WB	WB	NB	NB	SB	SB	SB	TR	SB	TR
Directions Served	L	R	L	TR	L	T	L	TR	L	L	T	T	TR	L	T
Maximum Queue (ft)	53	72	78	44	98	128	72	66	69						
Average Queue (ft)	18	37	32	13	38	32	19	26	23						
95th Queue (ft)	51	63	65	36	90	104	51	60	54						
Link Distance (ft)	319		380		2578	2578		1331	1331						
Upstream Blk Time (%)															
Queuing Penalty (veh)															
Storage Bay Dist (ft)	100		100					100							
Storage Blk Time (%)															
Queuing Penalty (veh)															

Intersection: 2: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	WB	WB	NB	NB	NB	NB	R	NB	R
Directions Served	T	R	L	TR	L	TR	T	L	TR	L	R	R	R	NB	R
Maximum Queue (ft)	112	85	318	386	450	289	268	30							
Average Queue (ft)	76	85	314	368	429	270	72	6							
95th Queue (ft)	119	86	324	374	441	282	208	25							
Link Distance (ft)	70	70		318	411	255									
Upstream Blk Time (%)	43	68	41	72	87	34	1								
Queuing Penalty (veh)	0	0	0	0	0	0	186	8							
Storage Bay Dist (ft)			260												150
Storage Blk Time (%)			56												2
Queuing Penalty (veh)			0												1

Intersection: 3: US 101 Overpass & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	WB	WB	NB	NB	NB	NB	B27	NB	B27
Directions Served	T	R	L	TR	L	TR	T	L	TR	L	R	R	T	NB	T
Maximum Queue (ft)	581	280	230	241	266	269	174	338	138	37					
Average Queue (ft)	366	239	221	226	227	113	126	79	68	3					
95th Queue (ft)	658	376	252	237	247	271	186	253	117	17					
Link Distance (ft)	566			211	211	211		264		420					
Upstream Blk Time (%)	6			86	80	22		2							
Queuing Penalty (veh)	0			244	229	62		100		100					
Storage Bay Dist (ft)			180												
Storage Blk Time (%)			5					22		1					
Queuing Penalty (veh)			3					106		6					

Queuing and Blocking Report

04/07/2020

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	TR	L	TR	L	T	T	L	T	R
Maximum Queue (ft)	129	112	172	90	716	340	2874	2855	38	1382	1382	265			
Average Queue (ft)	67	75	59	22	463	336	2691	2669	15	626	748	258			
95th Queue (ft)	107	109	112	80	797	341	3317	3341	35	1261	1298	303			
Link Distance (ft)	211	211	211		701		2840	2840		2578		2578			
Upstream Blk Time (%)					16		81	78							
Queuing Penalty (veh)							0	0							
Storage Bay Dist (ft)			65				280			205					
Storage Blk Time (%)			3				100			3					6
Queuing Penalty (veh)			2				252			1					13

Intersection: 5: S Moorland Ave & US 101 Overpass

Movement	WB	B26	B27	B27	NB	SB	SB	SB	LT
Directions Served	LR	T	T	TR	NB	L	LT		
Maximum Queue (ft)	237	527	341	326	807	303	303		
Average Queue (ft)	221	497	295	311	776	276	277		
95th Queue (ft)	232	515	326	325	813	291	298		
Link Distance (ft)	147	420	264	264	768	255	255		
Upstream Blk Time (%)	82	92	65	50	91	42	43		
Queuing Penalty (veh)	802	898	318	245	0	186	190		
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Network Summary

Network wide Queuing Penalty: 4293

Intersection: 1: Santa Rosa Ave & East Robles Ave

Movement	EB	WB	WB	NB	NB	WB	NB	SB	SB	TR	SB	SB	TR
Directions Served	L	R	L	TR	L	T	TR	L	T	T	T	TR	
Maximum Queue (ft)	53	72	78	44	98	128	72	66	69				
Average Queue (ft)	18	37	32	13	38	32	19	26	23				
95th Queue (ft)	51	63	65	36	90	104	51	60	54				
Link Distance (ft)	319		380		2578	2578		1331	1331				
Upstream Blk Time (%)													
Queuing Penalty (veh)							100						
Storage Bay Dist (ft)							0						
Storage Blk Time (%)							0						
Queuing Penalty (veh)							0						

Intersection: 2: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	WB	NB	NB	NB	NB	NB	R
Directions Served	T	R	L	TR	T	L	R	R	R				
Maximum Queue (ft)	112	85	318	386	450	289	268	30					
Average Queue (ft)	76	85	314	368	429	270	72	6					
95th Queue (ft)	119	86	324	374	441	282	208	25					
Link Distance (ft)	70	70		318	411	255							
Upstream Blk Time (%)	43	68	41	72	87	34	1						
Queuing Penalty (veh)	0	0	0	0	0	0	186	8					150
Storage Bay Dist (ft)													
Storage Blk Time (%)	56							2					
Queuing Penalty (veh)	0	255	0	0	0	0	1						

Intersection: 3: US 101 Overpass & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	WB	NB	NB	NB	NB	B27	T
Directions Served	T	R	L	TR	L	T	L	R	R	R	R		
Maximum Queue (ft)	581	280	230	241	266	269	174	338	138	37			
Average Queue (ft)	366	239	221	226	227	113	126	79	68	3			
95th Queue (ft)	658	376	252	237	247	271	186	253	117	17			
Link Distance (ft)	566			211	211	211		264		420			
Upstream Blk Time (%)	6			86	80	22		2					
Queuing Penalty (veh)	0	180	180	244	229	62		100	100				
Storage Bay Dist (ft)								22	1				
Storage Blk Time (%)								106	6				
Queuing Penalty (veh)		3	44										

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	WB	NB	NB	NB	NB	SB	SB	TR	SB	SB	TR
Directions Served	L	LT	R	L	TR	L	TR	L	T	T	T	L	T	T	L	T	T
Maximum Queue (ft)	129	112	172	90	716	340	2874	2855	38	1382	1382	285					
Average Queue (ft)	67	75	59	22	463	336	2691	2669	15	626	748	258					
95th Queue (ft)	107	109	112	80	797	341	3317	3341	35	1261	1298	303					
Link Distance (ft)	211	211	211		701		2840	2840		2578	2578						
Upstream Blk Time (%)					16		81	78									
Queuing Penalty (veh)					0		0	0									
Storage Bay Dist (ft)					65		280			205							
Storage Blk Time (%)					3		100			3							
Queuing Penalty (veh)					2		24	252	1	0							

Intersection: 5: S Moorland Ave & US 101 Overpass

Movement	WB	B26	B27	B27	NB	SB	SB	SB	SB	LT
Directions Served	LR	T	T	TR	NB	L	LT			
Maximum Queue (ft)	237	527	341	326	807	303	303			
Average Queue (ft)	221	497	295	311	776	276	277			
95th Queue (ft)	232	515	326	325	813	291	298			
Link Distance (ft)	147	420	264	264	768	255	255			
Upstream Blk Time (%)	82	92	65	50	91	42	43			
Queuing Penalty (veh)	802	898	318	245	0	186	190			
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 4293

Queuing and Blocking Report

04/07/2020

Intersection: 1: Santa Rosa Ave & East Robles Ave

Movement	EB	WB	WB	NB	NB	WB	NB	SB	SB	SB	SB	TR
Directions Served	L	TR	L	TR	L	TR	L	T	R	L	T	TR
Maximum Queue (ft)	48	74	55	48	112	116	50	68	68			
Average Queue (ft)	22	33	31	15	52	19	27	28				
95th Queue (ft)	47	63	58	39	91	97	42	58	66			
Link Distance (ft)	319			380	2578	2578		1331	1331			
Upstream Blk Time (%)												
Queuing Penalty (veh)							100					
Storage Bay Dist (ft)	100			100								
Storage Blk Time (%)							0					
Queuing Penalty (veh)							0					

Intersection: 2: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	B25	NB	NB	NB	NB
Directions Served	T	R	L	TR	T	L	R	R	R	R	R
Maximum Queue (ft)	109	122	317	367	450	298	311	75			
Average Queue (ft)	81	88	315	367	430	269	98	12			
95th Queue (ft)	107	104	320	367	442	283	267	45			
Link Distance (ft)	70	70	318	318	411	255	255				
Upstream Blk Time (%)	39	62	36	72	84	35	4				
Queuing Penalty (veh)	0	0	0	0	0	193	24	150			
Storage Bay Dist (ft)	64		280		87	3					
Storage Blk Time (%)											
Queuing Penalty (veh)	0	244	13								

Intersection: 3: US 101 Overpass & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	WB	NB	NB	NB	B27
Directions Served	T	R	L	TR	L	TR	L	R	R	R	T
Maximum Queue (ft)	494	280	230	265	246	260	174	336	175	64	
Average Queue (ft)	140	139	174	225	225	151	132	109	72	4	
95th Queue (ft)	428	335	272	244	246	316	195	312	146	27	
Link Distance (ft)	566			211	211	211		264		420	
Upstream Blk Time (%)				70	82	22		4			
Queuing Penalty (veh)				201	236	64		100		31	
Storage Bay Dist (ft)	0	2	40				32			1	
Storage Blk Time (%)											
Queuing Penalty (veh)	0	1	25				156			6	

Queuing and Blocking Report

04/07/2020

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	WB	NB	NB	NB	NB	SB
Directions Served	L	LT	R	L	TR	L	TR	L	T	R	T	SB
Maximum Queue (ft)	156	179	123	90	666	340	2855	2855	20	39	1559	1692
Average Queue (ft)	73	92	49	24	417	336	2680	2664	1	10	790	1061
95th Queue (ft)	129	162	87	86	670	343	3289	3324	8	30	1697	1858
Link Distance (ft)	211	211	211		701		2840	2840			2578	2578
Upstream Blk Time (%)							77	75				
Queuing Penalty (veh)							0	0				
Storage Bay Dist (ft)				65		280				200		2105
Storage Blk Time (%)							3	98	100			
Queuing Penalty (veh)							1	26	251			

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	265
Average Queue (ft)	261
95th Queue (ft)	285
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	205
Storage Bay Dist (ft)	95
Storage Blk Time (%)	
Queuing Penalty (veh)	204

Intersection: 5: S Moorland Ave & US 101 Overpass

Movement	WB	B26	B27	B27	NB	SB	SB	SB	SB	SB	SB
Directions Served	LR	T	T	TR	L	LT					
Maximum Queue (ft)	266	528	337	353	820	296	304				
Average Queue (ft)	225	500	289	310	776	270	269				
95th Queue (ft)	247	521	321	342	818	305	298				
Link Distance (ft)	147	420	264	264	768	255	255				
Upstream Blk Time (%)	81	92	59	43	85	33	40				
Queuing Penalty (veh)	804	914	294	214	0	147	180				
Storage Bay Dist (ft)											
Storage Blk Time (%)											
Queuing Penalty (veh)											

Network Summary

Network wide Queuing Penalty: 4230

Queuing and Blocking Report

04/07/2020

Intersection: 1: Santa Rosa Ave & East Robles Ave

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB	SB	SB	SB
	L	TR	L	TR	L	TR	L	TR	L	TR	L	TR
Directions Served	L	TR	L	TR	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	31	52	53	67	136	158	50	68	88			
Average Queue (ft)	22	24	28	14	62	79	26	24	31			
95th Queue (ft)	43	52	61	45	117	140	52	51	73			
Link Distance (ft)	319		380		2578	2578		1331	1331			
Upstream Blk Time (%)												
Queuing Penalty (veh)					100		100					
Storage Bay Dist (ft)			100									
Storage Blk Time (%)			2									
Queuing Penalty (veh)			0									

Intersection: 2: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NB	NB
	T	R	L	TR	T	L	R	L	R	L	R	R
Directions Served	T	R	L	TR	T	L	R	L	R	L	R	R
Maximum Queue (ft)	104	104	317	367	59	292	54	30				
Average Queue (ft)	82	85	195	105	4	200	33	7				
95th Queue (ft)	100	85	319	309	26	307	47	27				
Link Distance (ft)	70	70	318	411	255	255						
Upstream Blk Time (%)	41	69	4	4	4	7						
Queuing Penalty (veh)	0	0	0	0	0	21						
Storage Bay Dist (ft)			260					150				
Storage Blk Time (%)			64			13	0					
Queuing Penalty (veh)			0		18	1						

Intersection: 3: US 101 Overpass & Todd Rd

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NB	NB
	T	R	L	TR	L	TR	L	R	L	R	L	R
Directions Served	T	R	L	TR	L	TR	L	R	L	R	L	R
Maximum Queue (ft)	70	74	71	144	136	134	118	73	98			
Average Queue (ft)	38	31	48	83	62	75	81	32	54			
95th Queue (ft)	65	64	68	141	106	118	119	53	88			
Link Distance (ft)	566		211	211	211		264					
Upstream Blk Time (%)												
Queuing Penalty (veh)			180	180			100	100				
Storage Bay Dist (ft)							3	0				
Storage Blk Time (%)							20	1				
Queuing Penalty (veh)												

Queuing and Blocking Report

04/07/2020

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NB	NB
	L	LT	R	L	TR	L	T	T	T	R	L	T
Directions Served	L	LT	R	L	TR	L	T	T	T	R	L	T
Maximum Queue (ft)	160	174	132	46	130	198	148	181	40	84	143	158
Average Queue (ft)	96	98	51	23	60	137	77	97	10	14	81	93
95th Queue (ft)	150	152	91	51	105	190	131	166	29	47	129	142
Link Distance (ft)	211	211	211		701		2840	2840			2578	2578
Upstream Blk Time (%)												
Queuing Penalty (veh)					65		280		200	205		
Storage Bay Dist (ft)					0	12		0				
Storage Blk Time (%)					0	4		0				
Queuing Penalty (veh)					0	4		0				

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	98
Average Queue (ft)	55
95th Queue (ft)	84
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	205
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: S Moorland Ave & US 101 Overpass

Movement	WB	B26	B27	NB	SB	SB	SB	SB
	LR	T	T	TR	L	LT	L	LT
Directions Served	LR	T	T	TR	L	LT	L	LT
Maximum Queue (ft)	243	314	279	268	306	304		
Average Queue (ft)	150	42	13	93	273	267		
95th Queue (ft)	245	178	111	196	302	327		
Link Distance (ft)	147	420	264	768	255	255		
Upstream Blk Time (%)	24		0		34	29		
Queuing Penalty (veh)	140		0		136	115		
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Network Summary

Network wide Queuing Penalty: 458

Queuing and Blocking Report

04/07/2020

Intersection: 1: Santa Rosa Ave & East Robles Ave

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	T	TR	
Maximum Queue (ft)	54	50	55	69	183	161	69	73	109	
Average Queue (ft)	23	21	26	14	63	72	22	25	25	
95th Queue (ft)	49	46	55	46	122	124	51	65	75	
Link Distance (ft)	319		380		2578	2578		1331	1331	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	100		100		100		100			
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	T	R	L	TR	L	R	L	R		
Maximum Queue (ft)	104	122	265	220	274	74	30	30		
Average Queue (ft)	82	83	145	56	204	33	4	4		
95th Queue (ft)	102	110	235	132	295	64	21	21		
Link Distance (ft)	70	70	318	255	255					
Upstream Blk Time (%)	33	40			10					
Queuing Penalty (veh)	0	0			29					
Storage Bay Dist (ft)			280					150		
Storage Blk Time (%)			1							
Queuing Penalty (veh)	0	0	1							

Intersection: 3: US 101 Overpass & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	T	T	R	L	TR	L	TR	L	R	R
Maximum Queue (ft)	77	74	102	159	164	118	153	136	98	
Average Queue (ft)	46	34	51	88	67	61	76	34	59	
95th Queue (ft)	73	71	84	136	140	96	126	77	90	
Link Distance (ft)	566		211	211	211		264			
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	180		180		100		100		100	
Storage Blk Time (%)										
Queuing Penalty (veh)										

Queuing and Blocking Report

04/07/2020

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	LT	R	L	TR	L	TR	L	R	T
Maximum Queue (ft)	161	181	106	88	188	305	154	169	40	39
Average Queue (ft)	88	94	56	34	78	147	76	95	7	11
95th Queue (ft)	152	158	95	71	150	263	136	169	29	25
Link Distance (ft)	211	211	211		701		2840	2840		
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			65		280		200	205		
Storage Blk Time (%)			2		15		1			
Queuing Penalty (veh)			2		5		4			

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	96
Average Queue (ft)	57
95th Queue (ft)	89
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: S Moorland Ave & US 101 Overpass

Movement	WB	B26	B27	NB	SB	SB
Directions Served	LR	T	T	TR	L	LT
Maximum Queue (ft)	219	514	58	436	288	286
Average Queue (ft)	120	110	4	108	226	175
95th Queue (ft)	247	412	25	278	331	345
Link Distance (ft)	147	420	264	768	255	255
Upstream Blk Time (%)	23	4			13	15
Queuing Penalty (veh)	135	23			51	61
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Network Summary

Network wide Queuing Penalty: 328

Queuing and Blocking Report

04/13/2020

Intersection: 1: Santa Rosa Ave & East Robles Ave

Movement	EB	WB	WB	NB	NB	WB	WB	NB	NB	SB	SB	SB	SB
	L	TR	L	TR	L	TR	L	TR	L	T	TR	L	T
Directions Served	L	TR	L	TR	L	TR	L	TR	L	T	TR	L	T
Maximum Queue (ft)	69	60	58	32	139	147	68	85	102				
Average Queue (ft)	26	24	28	10	61	75	33	32	34				
95th Queue (ft)	59	53	51	31	122	138	62	69	75				
Link Distance (ft)	319		380		2578	2578		1331	1331				
Upstream Blk Time (%)													
Queuing Penalty (veh)													
Storage Bay Dist (ft)	100		100				100		0		0		0
Storage Blk Time (%)													
Queuing Penalty (veh)													

Intersection: 2: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	WB	WB	NB	NB	SB	SB	SB	SB
	T	R	L	TR	T	L	TR	T	L	R	R	R	R	R
Directions Served	T	R	L	TR	T	L	TR	T	L	R	R	R	R	R
Maximum Queue (ft)	97	120	318	389	456	291	188	46						
Average Queue (ft)	66	90	314	369	429	268	52	7						
95th Queue (ft)	108	108	321	381	444	290	154	30						
Link Distance (ft)	70	70	318	318	411	255	255							
Upstream Blk Time (%)	25	81	61	83	94	33	2							
Queuing Penalty (veh)	0	0	0	0	0	160	7							
Storage Bay Dist (ft)			280					150						
Storage Blk Time (%)			51		95	0								
Queuing Penalty (veh)			0		170	1								

Intersection: 3: US 101 Overpass & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	WB	WB	NB	NB	SB	SB	SB	SB
	T	R	L	TR	T	L	TR	T	L	R	R	R	R	R
Directions Served	T	R	L	TR	T	L	TR	T	L	R	R	R	R	R
Maximum Queue (ft)	74	126	154	223	216	214	156	112	139	27	48	6		
Average Queue (ft)	28	44	71	155	137	95	81	37	57	2	3	0		
95th Queue (ft)	67	93	134	259	257	195	135	108	25	41	5			
Link Distance (ft)	566		211	211	211	211	264	420	147	147				
Upstream Blk Time (%)			10	6	2									
Queuing Penalty (veh)			26	17	6		100	100						
Storage Bay Dist (ft)			0	0			5	1						
Storage Blk Time (%)														
Queuing Penalty (veh)			0	0			47	7						

Queuing and Blocking Report

04/13/2020

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	WB	WB	NB	NB	SB	SB	SB	SB
	L	LT	R	L	TR	L	TR	L	TR	L	R	L	R	T
Directions Served	L	LT	R	L	TR	L	TR	L	TR	L	R	L	R	T
Maximum Queue (ft)	117	119	184	90	241	340	2684	2681	30	38	256	278		
Average Queue (ft)	62	60	83	36	97	339	1857	1818	7	10	148	155		
95th Queue (ft)	106	104	154	80	197	341	2991	2969	23	29	231	239		
Link Distance (ft)	211	211	211		701		2840	2840						
Upstream Blk Time (%)							16	11						
Queuing Penalty (veh)														
Storage Bay Dist (ft)							65	280			200	205		
Storage Blk Time (%)														
Queuing Penalty (veh)							2	30	89	0	1	1		2

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	198
Average Queue (ft)	62
95th Queue (ft)	134
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	0
Queuing Penalty (veh)	1

Intersection: 5: S Moorland Ave & US 101 Overpass

Movement	WB	B26	B27	NB	B27	NB	SB	SB	SB	SB
	LR	T	T	TR	L	LT	L	LT	L	LT
Directions Served	LR	T	T	TR	L	LT	L	LT	L	LT
Maximum Queue (ft)	249	524	343	336	807	302	298			
Average Queue (ft)	223	476	242	189	776	273	272			
95th Queue (ft)	239	614	405	430	827	295	310			
Link Distance (ft)	147	420	264	264	768	255	255			
Upstream Blk Time (%)	81	84	38	22	94	41	44			
Queuing Penalty (veh)	499	516	118	69	0	300	318			
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 2634

Queuing and Blocking Report

04/09/2020

Intersection: 1: Santa Rosa Ave & East Robles Ave

Movement	EB	WB	WB	NB	NB	TR	L	TR	NB	NB	SB	SB	TR	SB	TR
Directions Served	L	TR	L	TR	L	TR	L	TR	L	TR	L	TR	L	TR	TR
Maximum Queue (ft)	67	124	80	52	151	172	68	109	98						
Average Queue (ft)	29	22	29	15	65	86	32	38	39						
95th Queue (ft)	61	54	65	42	130	162	57	87	84						
Link Distance (ft)	319		380		2578	2578		1331	1331						
Upstream Blk Time (%)							100								
Queuing Penalty (veh)							0								
Storage Bay Dist (ft)		100		0	100		0		0						
Storage Blk Time (%)		0		0	2		0		0						
Queuing Penalty (veh)		0		0	0		0		0						

Intersection: 2: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	B25	NB	NB	NB	NB	NB
Directions Served	T	R	L	TR	L	TR	T	L	R	R		
Maximum Queue (ft)	106	124	317	393	465	282	277	41				
Average Queue (ft)	61	91	314	369	430	269	60	7				
95th Queue (ft)	105	111	322	382	449	280	180	30				
Link Distance (ft)	70	70	318	411	255	255						
Upstream Blk Time (%)	17	84	61	84	95	34	2					
Queuing Penalty (veh)	0	0	0	0	0	166	11					
Storage Bay Dist (ft)			280		95	0						150
Storage Blk Time (%)			46		95	0						
Queuing Penalty (veh)			0		171	0						

Intersection: 3: US 101 Overpass & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	WB	WB	NB	NB	NB	NB
Directions Served	T	T	R	L	TR	L	TR	L	R	R		
Maximum Queue (ft)	77	125	144	207	204	172	162	148	119			
Average Queue (ft)	34	52	66	122	96	73	82	33	53			
95th Queue (ft)	71	111	129	219	204	147	146	97	95			
Link Distance (ft)	566		211	211	211	211		264				
Upstream Blk Time (%)			6	4	1							
Queuing Penalty (veh)			17	11	2							
Storage Bay Dist (ft)		180	180				100		100			
Storage Blk Time (%)		0	0				6		0			
Queuing Penalty (veh)		0	0				56		0			3

Queuing and Blocking Report

04/09/2020

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	NB	WB	WB	NB	NB	NB	NB
Directions Served	L	LT	R	L	TR	L	TR	L	TR	L	TR	TR
Maximum Queue (ft)	121	127	196	90	240	340	2417	2366	128	47	235	253
Average Queue (ft)	63	62	86	36	97	339	1561	1509	18	10	142	148
95th Queue (ft)	106	113	152	78	193	342	2703	2663	99	31	217	228
Link Distance (ft)	211	211	211		701		2840	2840				
Upstream Blk Time (%)							7		0			
Queuing Penalty (veh)							280		0			
Storage Bay Dist (ft)			65		25	88		0	2			205
Storage Blk Time (%)			2		12	331		1	1			
Queuing Penalty (veh)			3		12	331		1	1			

Intersection: 4: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	203
Average Queue (ft)	63
95th Queue (ft)	131
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	205
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: S Moorland Ave & US 101 Overpass

Movement	WB	B26	B27	B27	NB	SB	SB	SB
Directions Served	LR	T	T	TR	L	LT		
Maximum Queue (ft)	249	519	342	328	801	299	313	
Average Queue (ft)	224	466	210	142	765	273	274	
95th Queue (ft)	240	605	404	385	880	294	299	
Link Distance (ft)	147	420	264	264	768	255	255	
Upstream Blk Time (%)	82	76	28	15	89	43	42	
Queuing Penalty (veh)	509	472	86	47	0	311	302	
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Network Summary

Network wide Queuing Penalty: 2518



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Appendix F

VMT Findings



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Los Pinos Apartments Project VMT Assessment

W-Trans 6/1/2020

Baseline VMT

13.59 Project Base VMT/Capita from SCTA Model (TAZ 569)	
50 Project Units	2.34 Occupancy/Unit
1590 Base Unadjusted Residential VMT (mi)	117 Residents ("capita")

Applied Significance Threshold

15.56 VMT/Capita Sonoma Countywide Average
13.23 Significance Threshold = 15% below Average

Project-Specific VMT Adjustments

13.59 Project Base VMT/Capita from SCTA Model (TAZ 569)
-2.7% Project Reduction Required to meet Significance Threshold

A. Density

50 Project Units
2.49 Project Acres
20.08 Project Density
11.5% VMT Reduction (compared to ITE Single Family) *source: CAPCOA*
-1.56 Adjustment to SCTA VMT/Capita

B. Integrate Affordable Housing

4% of units (2 apts) restricted to very low income (30-50% MFI) *sources: San Jose VMT Evaluation Tool Methodology, The California Housing Partnership*
1.0% VMT Reduction
-0.14 Adjustment to SCTA VMT/Capita

Combined Project-Specific Adjustments

12.5% Combined VMT Reduction
-1.70 Adjustment to SCTA VMT/Capita

VMT Significance

13.59	Average VMT/Capita in TAZ	1590	Unadjusted Residential VMT (mi)
11.89	Project VMT/Capita with Adjustments	<u>1391</u>	Adjusted Project Residential VMT (mi)
13.23	Significance Threshold	-199	VMT Reduction (mi)
YES	Threshold met		



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