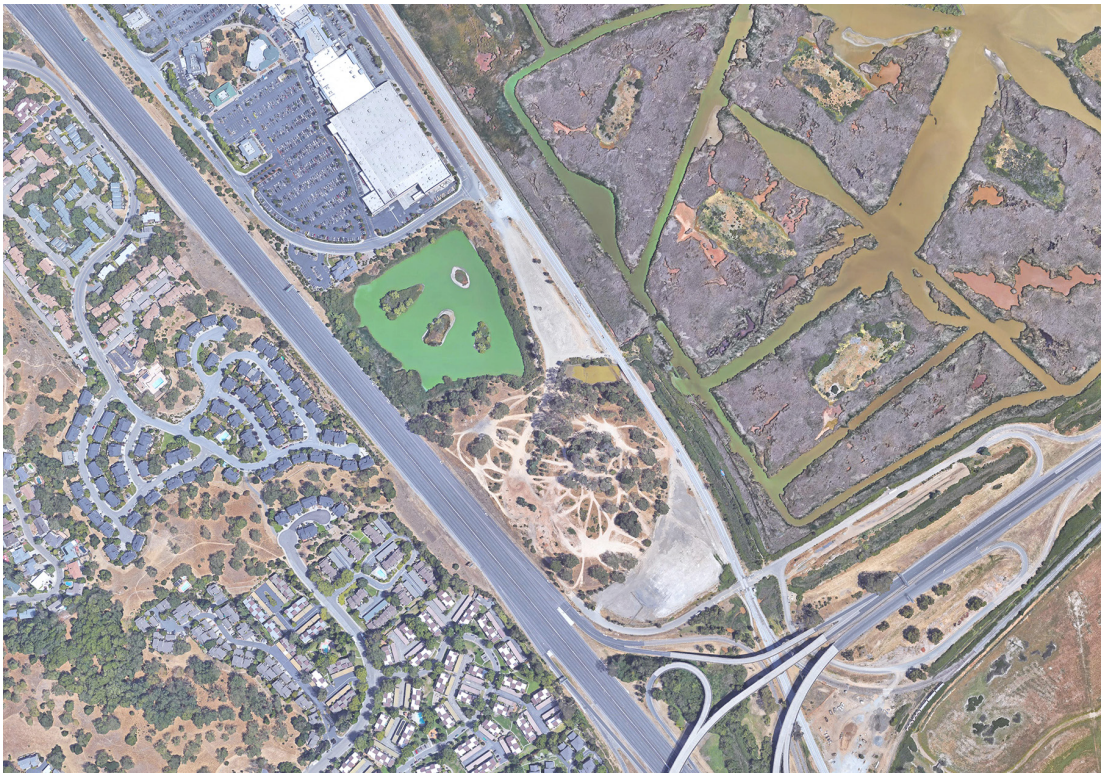
Traffic Impact Study for the Hanna Ranch Project



Prepared for the City of Novato

Submitted by
W-Trans

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Executive Summary

The proposed Hanna Ranch development includes 12,540 square feet of restaurant space, 13,500 square feet of retail space, 48 residential apartment units, a 125-room hotel, and a Costco gas station with 24 vehicle fueling positions. This study is a supplement to the analysis previously performed in 2011 for the Hanna Ranch Project, as presented in the *Traffic Impact Study for the Hann Ranch EIR in the City of Novato*. The project has since been updated with plans to eliminate the 21,190 square feet of office space and reduce the retail space by 21,121 square feet, replacing these uses with a Costco gas station and 48 apartment units.

The proposed mixed-use project is expected to generate an average of 10,752 trips per day including 819 trips during the weekday p.m. peak hour and 982 trips during the weekend midday peak hour. After deductions for internally captured trips are taken into account, the project would be expected to generate 574 new trips during the weekday p.m. peak hour and 682 during the weekend midday peak hour.

Peak hour traffic conditions at six nearby intersections as well as on US 101, north and south of Rowland Boulevard, and SR 37 east of US 101, were evaluated to determine the potential impacts associated with development of this project under existing, baseline, and future conditions. Under existing conditions, baseline conditions, and future conditions all six intersections and freeway segments are or are expected to operate acceptably. Upon adding project-generated trips to existing, baseline and future volumes, all six study intersections and three freeway segments are expected to continue to operate acceptably.

Existing and planned pedestrian and bicycle facilities would provide adequate access to the proposed project site assuming that infrastructure as required for the project as previously approved is provided. A new transit stop near the project site should be provided in order to provide adequate transit access.

Compared to the 2011 analysis, the project results in no new impacts; however, the following mitigation measures included in the EIR would still apply:

- Widen the north side of Rowland Boulevard to include an additional westbound shared through/right-turn lane between Rowland Way and Vintage Way (north). The City shall determine the cost of the improvements and collect a proportional share from the project applicant.
- Relocate and maintain the proposed on-site trees to accommodate a truck clearance of at least 14 feet.
- Install sidewalks within the project area to connect to Rowland Boulevard and Vintage Way as identified in the project site plan. It is recommended that sidewalks within the project site be a minimum of six feet wide; however, it is recommended that the project provide sidewalk with widths of eight to ten feet where possible.
- Install ADA compliant curb ramps at all driveway crossings and sidewalk transition points within the project site.
- Coordinate with the City of Novato and SMART to provide a public access easement between the proposed project and the SMART Trail at an appropriate location for pedestrian, bicycle, and emergency access.
- The project applicant shall work with Marin Transit to identify a suitable location near or at the project access to install a bus stop and shelter for future transit users.

Introduction

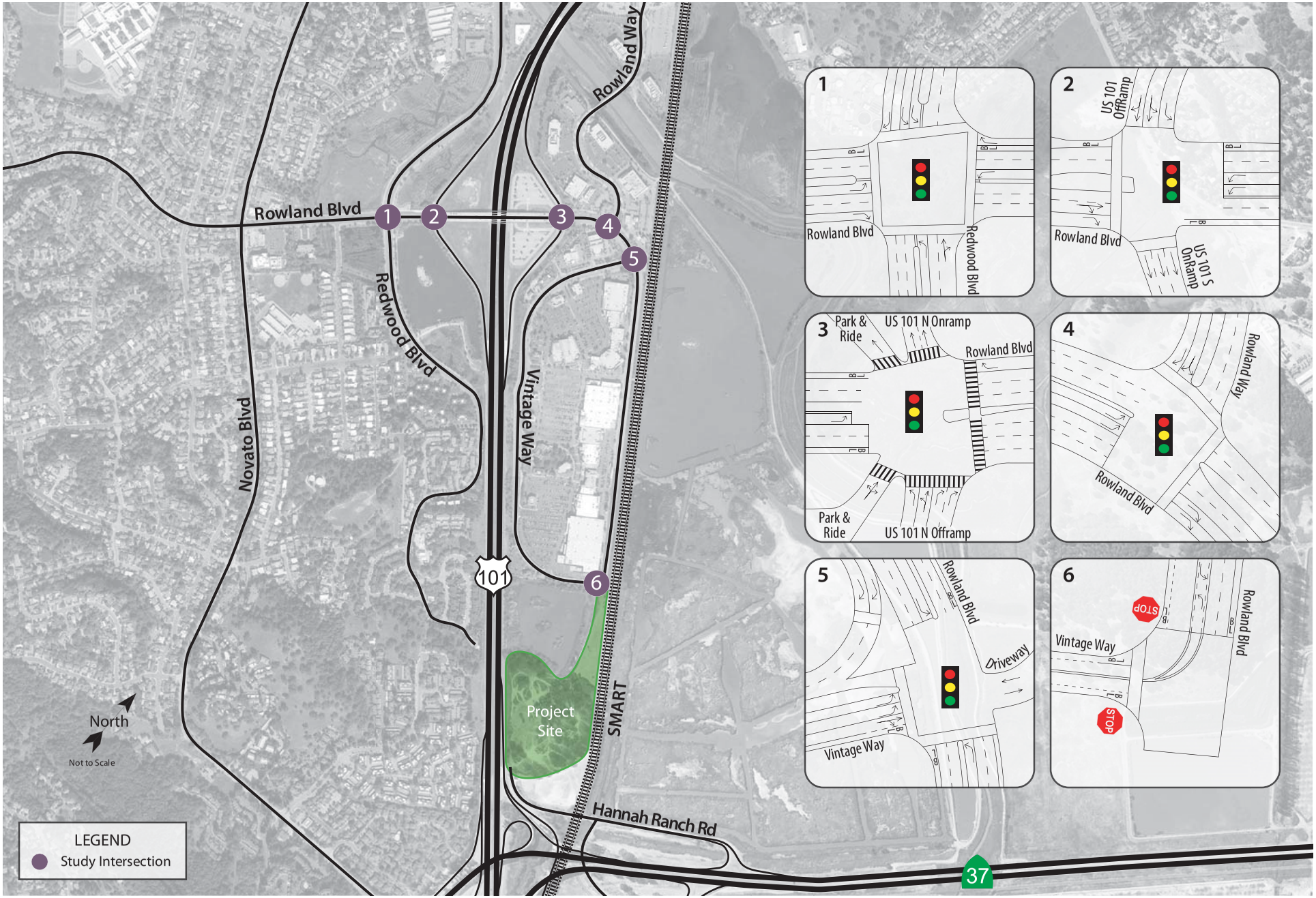
This report presents an analysis of the potential traffic impacts that would be associated with development of a proposed mixed-use project to be located at the terminus of Rowland Boulevard, east of US 101, in the City of Novato. The traffic study was completed in accordance with the criteria established by the City of Novato, and is consistent with standard traffic engineering techniques.

Prelude

The purpose of a traffic impact study is to provide City of Novato staff and policy makers with data that they can use to make an informed decision regarding the potential traffic impacts of a proposed project, and any associated improvements that would be required in order to mitigate these impacts to a level of insignificance as defined by the City of Novato'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 mixed-use development as evaluated would include 12,540 square feet of restaurant space, 13,500 of retail space, 48 residential apartment units, a 125-room hotel, and a Costco gas station with 24 vehicle-fueling positions. The proposed Hanna Ranch development had previously been analyzed in 2011 for the Hanna Ranch EIR. The project has since been updated with plans to eliminate the office space and reduce the retail space by about 21,100 square feet of retail space, instead proposing a Costco gas station and 48 apartment units. The project site is located at the terminus of Rowland Boulevard, as shown in Figure 1.



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Traffic Impact Study for the Hanna Ranch Project

Figure 1 – Study Area and Lane Configurations

Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the following intersections:

1. Rowland Boulevard/Redwood Boulevard
2. Rowland Boulevard/US 101 South Ramps
3. Rowland Boulevard/US 101 North Ramps
4. Rowland Boulevard/Rowland Way
5. Rowland Boulevard/Vintage Way (north)
6. Rowland Boulevard/Vintage Way (south)

Operating conditions during the weekday p.m. and weekend midday peak periods were evaluated as these time periods reflect the highest traffic volumes areawide and for the proposed project. The evening peak hour occurs between 4:00 and 6:00 p.m. and typically reflects the highest level of congestion of the day during the homeward bound commute, while the weekend midday peak occurs between 12:00 p.m. and 1:00 p.m.

Study Intersections

Through the study area Rowland Boulevard runs generally southwest to northeast, changing direction to northwest to southeast just east of the northerly Vintage Way intersections. Because US 101 is a north-south highway, the study area is referenced around the highway, with Rowland Boulevard considered as being east-west except at the Vintage Way intersections.

Rowland Boulevard/Redwood Boulevard is a four-legged, signalized intersection, with protected left-turn phasing on all approaches. Marked pedestrian crosswalks are provided on each leg.

Rowland Boulevard/US 101 South Ramps is a signalized, four-legged intersection, with protected left-turn phasing on the westbound approach. Marked pedestrians crosswalks and phasing are provided on the west and south legs. The north and south legs also serve as the on- and off-ramps for from and to 101 South.

Rowland Boulevard/US 101 North Ramps is a six-legged, signalized intersection, with protected left-turn phasing on the eastbound approach and split phasing on the two northbound approaches. There are marked pedestrian crosswalks on the north, south, and east legs. The northwesterly and southwesterly legs serve as the entrance to and exit from a Caltrans Park & Ride lot, while the easterly legs on the north and south side of the intersection are the on- and off-ramps from and to US 101 North.

Rowland Boulevard/Rowland Way is a three-legged signalized, tee intersection with protected left-turn phasing on the eastbound approach. Marked pedestrian crosswalks are provided on the north and east legs.

Rowland Boulevard/Vintage Way (north) is a signalized tee intersection tee intersection with protected left-turn phasing on the eastbound and westbound Rowland Boulevard approaches and split phasing on the northbound and southbound approaches. There are marked pedestrian crosswalks on the south and east legs.

Rowland Boulevard/Vintage Way (south) is a two-legged unsignalized intersection with stop controls on the southbound and eastbound approaches; because these are the only two approaches currently used, the intersection operates as all-way stop-controlled. There is a marked pedestrian crosswalk provided on the west

leg. Upon construction of the proposed project, a south leg would be added at this intersection and it would operate as an all-way stop-controlled "tee" intersection. This is the same configuration as was evaluated in the 2011 EIR.

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 July 1, 2011 through June 30, 2016.

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 *2013 Collision Data on California State Highways*, California Department of Transportation. Five of the six study intersections had collision rates below the statewide average; only the northbound ramps intersection had a collision rate exceeding the statewide average. The collision rate calculations are provided in Appendix A.

Table 1 – Collision Rates at the Study Intersections

Study Intersection	Number of Collisions (2011-2016)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Rowland Blvd/Redwood Blvd	10	0.23	0.27
2. Rowland Blvd/US 101 S Ramps	13	0.24	0.27
3. Rowland Blvd/US 101 N Ramps	24	**0.40**	0.27
4. Rowland Blvd/Rowland Way	6	0.13	0.21
5. Rowland Blvd/Vintage Way (north)	8	**0.22**	0.21
6. Rowland Blvd/Vintage Way (south)	0	0.00	0.18

Note: c/mve = collisions per million vehicles entering

A more detailed review of the crash data for Rowland Boulevard/US 101 North Ramps indicates that most of the crashes were sideswipes or rear-ends, both types that are typical as drivers jockey for position approaching a traffic signal or fail to react soon enough when approaching a queue of stopped traffic. Of these 24 crashes, only six resulted in injuries, or an injury rate of 25 percent. This is considerably lower than the Statewide average of 41.9 percent. Finally, it is noted that eight of the incidents reported as involving two northbound vehicles were included in the count for the intersection though these crashes could have occurred on the mainline of the freeway. It is therefore likely that the actual number of incidents related to the intersection is lower. Given the types of crashes occurring as well as the low injury rate and potential for including freeway incidents in the count for the intersection, no measures are suggested to address the collision experience at this location.

Similarly, many of the incidents reported at Rowland Boulevard/Vintage Way (north) were rear-end or sideswipe crashes, and likely associated with congestion and lane changes. There were also three single-vehicle crashes, which may be due to the curvilinear nature of Rowland Boulevard and drivers being unfamiliar with the area. Given that the collision rate was barely above average, no measures appears to be warranted.

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, and curb ramps provide access for pedestrians in and along the perimeter of the Vintage Oaks shopping center north of the proposed project site. However, as US 101 lies to the west of the project site, the US 101/SR 37 junction is to the south, and the SMART tracks lie to the east, there has not been any need for pedestrian facilities south of the shopping center.

Bicycle Facilities

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

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

Guidance for Class IV Bikeways is provided in *Design Information Bulletin Number 89: Class IV Bikeway Guidance (Separated Bikeways/Cycle Tracks)*, Caltrans, 2015.

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

In the project area, Class II bike lanes exist on Rowland Boulevard between South Novato Boulevard and Vintage Way (south). There is also a Class I facility on the south side of Rowland Boulevard along the curved segment of Rowland Boulevard, between the US 101 North Ramps and Vintage Way (North). A portion of the SMART multi-use path has been built from Hanna Ranch Road to Hamilton Drive. Plans for future bicycle facilities include extending the SMART multi-use path parallel to the tracks from the Sonoma County Airport to San Rafael for Phase 1. Table 2 summarizes the existing and planned bicycle facilities in the project vicinity, as contained in Novato's Bicycle/Pedestrian Plan.

Table 2 – Bicycle Facility Summary

Status Facility	Class	Length (miles)	Begin Point	End Point
Rowland Blvd	I	0.10	US 101 North Ramps	Vintage Way (north)
SMART Multi-Use Path	I	0.65	Hannah Ranch Rd	Hamilton Dr
Rowland Blvd	II	1.30	Novato Blvd	Vintage Way (south)
Vintage Way	II	0.80	Rowland Blvd (north)	Rowland Blvd (south)
Rowland Blvd	I	0.10	US 101 North Ramps	Vintage Way (north)
Planned				
SMART Multi-Use Path	I	43.0	Sonoma County Airport	San Rafael

Source: *City of Novato Bicycle/Pedestrian Plan*, 2015

Transit Facilities

Golden Gate Transit and Marin Transit provide fixed route bus service between Novato and neighboring communities to the north and south along US 101. Marin Transit Route 251 provides service to destinations throughout the City and has stops along the perimeter of the Vintage Oaks shopping center, with the closest stop to the project site 0.2 miles away. Route 251 operates Monday through Friday with approximately one-hour headways between 6:30 a.m. and 9:00 p.m. Saturday, Sunday, and holiday service is provided between 8:00 a.m. and 10:00 p.m. with approximately one-hour headways.

Several routes stop at the US 101 northbound and southbound exits between Redwood Boulevard and Rowland Way, approximately one mile away from the project site. These stops are served by Marin Transit Route 35 and Golden Gate Transit Routes 56, 70, 71X, and 101.

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

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. Marin Access is designed to serve the needs of individuals with disabilities within Novato and the greater Marin County area.

Capacity Analysis

Intersection Level of Service Methodologies

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

The study intersections were analyzed using methodologies published in the *Highway Capacity Manual* (HCM), Transportation Research Board, 2000. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle.

The study intersection of Rowland Boulevard/Vintage Way (south), which has stop signs on all approaches, was analyzed using the "All-Way Stop-Controlled" Intersection methodology from the HCM. This methodology evaluates delay for each approach based on turning movements, opposing and conflicting traffic volumes, and the number of lanes. Average vehicle delay is computed for the intersection as a whole, and is then related to a Level of Service.

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

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

Table 3 – Intersection Level of Service Criteria

LOS	All-Way Stop-Controlled	Signalized
A	Delay of 0 to 10 seconds. Upon stopping, drivers are immediately able to proceed.	Delay of 0 to 10 seconds. Most vehicles arrive during the green phase, so do not stop at all.
B	Delay of 10 to 15 seconds. Drivers may wait for one or two vehicles to clear the intersection before proceeding from a stop.	Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop.
C	Delay of 15 to 25 seconds. Drivers will enter a queue of one or two vehicles on the same approach, and wait for vehicle to clear from one or more approaches prior to entering the intersection.	Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.
D	Delay of 25 to 35 seconds. Queues of more than two vehicles are encountered on one or more approaches.	Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop.
E	Delay of 35 to 50 seconds. Longer queues are encountered on more than one approach to the intersection.	Delay of 55 to 80 seconds. Most, if not all, vehicles must stop and drivers consider the delay excessive.
F	Delay of more than 50 seconds. Drivers enter long queues on all approaches.	Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

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

Freeway and Level of Service Methodology

The freeway analysis methodology contained in Chapter 11 of the HCM, "Basic Freeway Segments," was used to determine levels of service on US 101 and SR 37. The method uses variables such as traffic volumes, geometric configuration of the freeway (i.e., number of lanes, widths of lanes and shoulders), topography, the percentage of heavy vehicles, and free-flow speeds to determine the "density," which is indicative of the travel demand on a freeway facility and measured in the number of passenger cars per mile per lane. The ranges of service flow rates associated with the various Levels of Service are presented in Table 2.

Table 4 – Basic Freeway Segments Level of Service Criteria

LOS	Density (pc/mi/ln)
A	>0-11
B	>11-18
C	>18-26
D	>26-35

Notes: LOS = Level of Service; mph = miles per hour; pc/mi/ln=passenger cars per mile per lane

Traffic Operation Standards

City of Novato

In the *1996 Novato General Plan*, the City of Novato has adopted the following policy and program:

> ***TR Policy 4: Level of Service Standards*** *– Establish traffic Level of Service (LOS) standards for use in (1) evaluating the impacts of proposed development projects so the project can be redesigned or effective mitigation measures can be implemented, (2) making improvements to the roadway system, and (3) determining appropriate traffic impact fees.*
>
> ***TR Program 4.1*** *– Establish traffic Level of Service standards as follows:*
> *a. At intersections with signals or four-way stop signs: operation at LOS D*
> *b. At intersections with stop signs on side streets only: operation at LOS E.*
>
> *Mitigation measures which reduce side street delay, such as traffic signals, all-way stops and/or center two-way left turn lanes will be considered when LOS F conditions are projected for side street traffic. The volume of traffic should also be considered when evaluating the severity of side street traffic operations.*

Caltrans and Marin County

Caltrans maintains a target LOS at the transition between LOS C and LOS D for freeway facilities. Though US 101 and SR 37 are Caltrans facilities, the County of Marin has adopted an operational standard of LOS E for freeways and rural expressways, and this standard was applied to the analysis. Because freeway operation is more critical during the weekday p.m. peak hour than the weekend midday peak period, and because weekend volumes for these freeway segments were unavailable, freeway operation was only evaluated for the weekday p.m. peak period.

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the weekday p.m. peak hour and weekend midday peak hour. This condition does not include project-generated traffic volumes.

Intersection Levels of Service

Under existing conditions, all study intersections are operating acceptably at LOS D or better. A summary of the intersection level of service calculations is contained in Table 5, the existing traffic volumes are shown in Figure 2, and copies of the Level of Service calculations are provided in Appendix B.

Table 5 – Existing Peak Hour Intersection Levels of Service

Study Intersection	Weekday PM Peak		Weekend Mid Peak	
	Delay	LOS	Delay	LOS
1. Rowland Blvd/Redwood Blvd	24.8	C	23.4	C
2. Rowland Blvd/US 101 S Ramps	12.4	B	17.0	B
3. Rowland Blvd/US 101 N Ramps	33.7	C	35.2	D
4. Rowland Blvd/Rowland Way	15.3	B	13.1	B
5. Rowland Blvd/Vintage Way (north)	17.2	B	19.1	B
6. Rowland Blvd/Vintage Way (south)	7.7	A	8.4	A

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

Freeway Level of Service

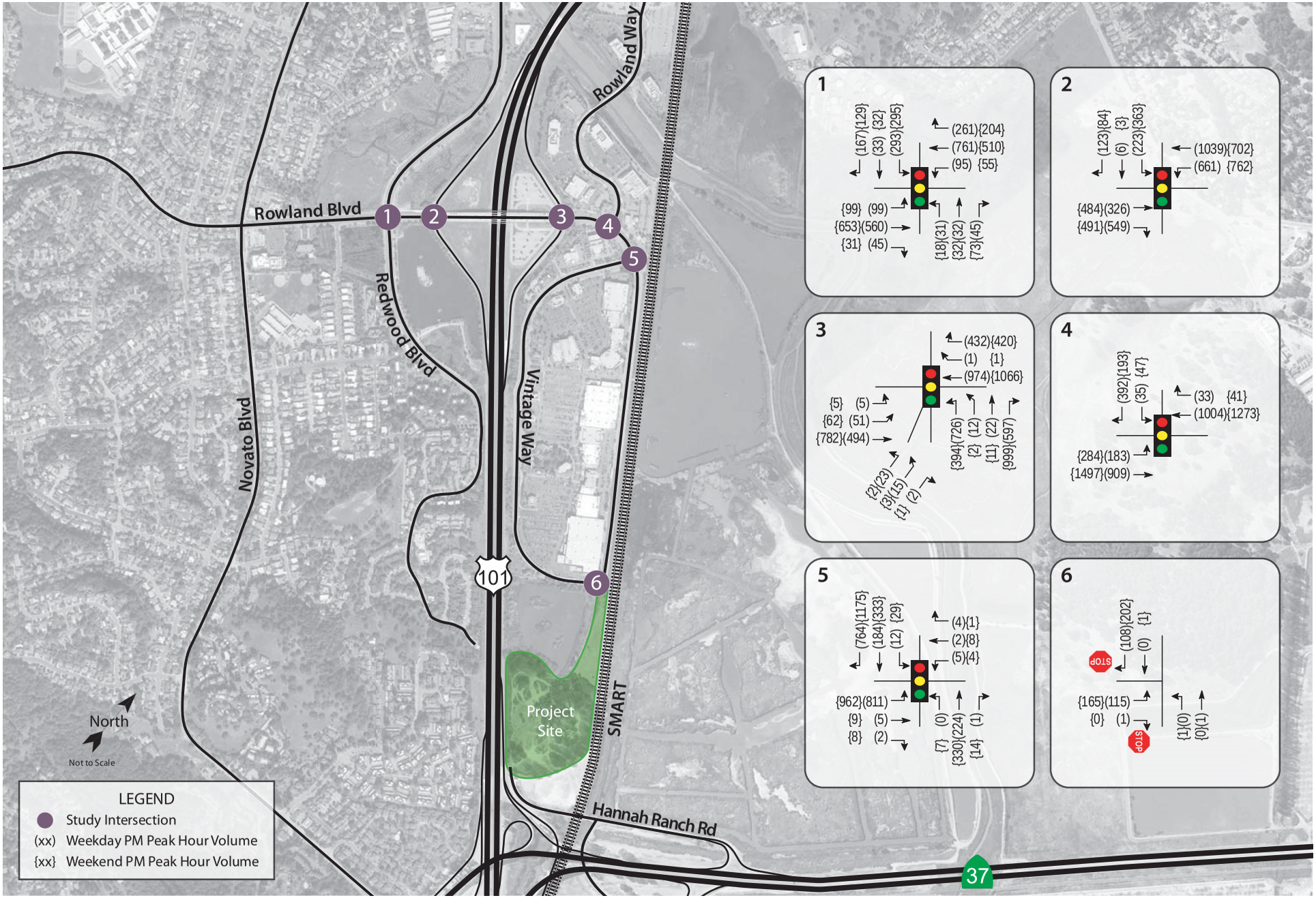
Under Existing conditions, the study segments of US 101 to the north and south of Rowland Boulevard are operating acceptably at LOS D or better in both directions during the p.m. peak hour. The segment of SR 37 east of US 101 is operating acceptably at LOS C in the eastbound direction and LOS A in the westbound direction.

The existing levels of service for the freeway segments are summarized in Table 6. Levels of Service calculations for freeway segments are included in Appendix C.

Table 6 – Existing PM Peak Hour Freeway Levels of Service

Facility Segment	Density	LOS	Density	LOS
US 101	**Northbound**		**Southbound**	
South of Rowland Blvd	20.7	C	18.3	C
North of Rowland Blvd	27.1	D	19.9	C
SR 37	**Eastbound**		**Westbound**	
East of US 101	22.0	C	3.9	A

Note: Density is measured in the number of passenger cars per mile per lane (pc/mi/ln)



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Traffic Impact Study for the Hanna Ranch Project

Figure 2 – Existing Traffic Volumes

Baseline Conditions

The Baseline traffic scenario reflects conditions with traffic from projects that the City deems likely to be constructed and generating traffic by the opening of the proposed Hanna Ranch project. For the purposes of this analysis, the following projects affecting the study area were included in the Baseline scenario.

- Oakmont Senior Living, located at 1461 South Novato Boulevard, include 50 assisted living units and 28 senior memory care units.
- Former Sports Authority, which is currently vacant, in the Vintage Oaks Shopping Center will be converted into a Nordstrom Rack.

The traffic associated with these projects was added to existing traffic volumes in order to obtain Baseline volumes. Under these conditions, all study intersections are expected to operate acceptably at LOS D or better. A summary of the intersection level of service calculations is contained in Table 7, and Baseline volumes are shown in Figure 3.

Table 7 – Baseline Peak Hour Intersection Levels of Service

Study Intersection ***Approach***	**Weekday PM Peak**		**Weekend PM Peak**	
	Delay	**LOS**	**Delay**	**LOS**
1. Rowland Blvd/Redwood Blvd	25.2	C	23.7	C
2. Rowland Blvd/US 101 S Ramps	13.0	B	24.7	C
3. Rowland Blvd/US 101 N Ramps	35.1	D	35.9	D
4. Rowland Blvd/Rowland Way	15.2	B	13.4	B
5. Rowland Blvd/Vintage Way (north)	17.8	B	19.9	B
6. Rowland Blvd/Vintage Way (south)	7.7	A	8.6	A

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

Freeway Level of Service

Under Baseline conditions the study segments of US 101 to the north and south of Rowland Boulevard are expected to continue operating acceptably at LOS D or better in both directions during the study period of the weekday p.m. peak hour. The segment of SR 37 east of US 101 is expected to operate acceptably at LOS C in the eastbound direction and LOS A in the westbound direction.

The baseline levels of service for the freeway segments are summarized in Table 8. Copies of the Level of Service calculations for freeway segments are included in Appendix C.

Table 8 – Baseline PM Peak Hour Freeway Levels of Service

Facility **Segment**	**Density**	**LOS**	**Density**	**LOS**
US 101	**Northbound**		**Southbound**	
South of Rowland Blvd	20.8	C	18.4	C
North of Rowland Blvd	27.2	D	19.9	C
SR 37	**Eastbound**		**Westbound**	
East of US 101	22.1	C	7.8	A

Notes Density is measured in the number of passenger cars per mile per lane (pc/mi/ln)

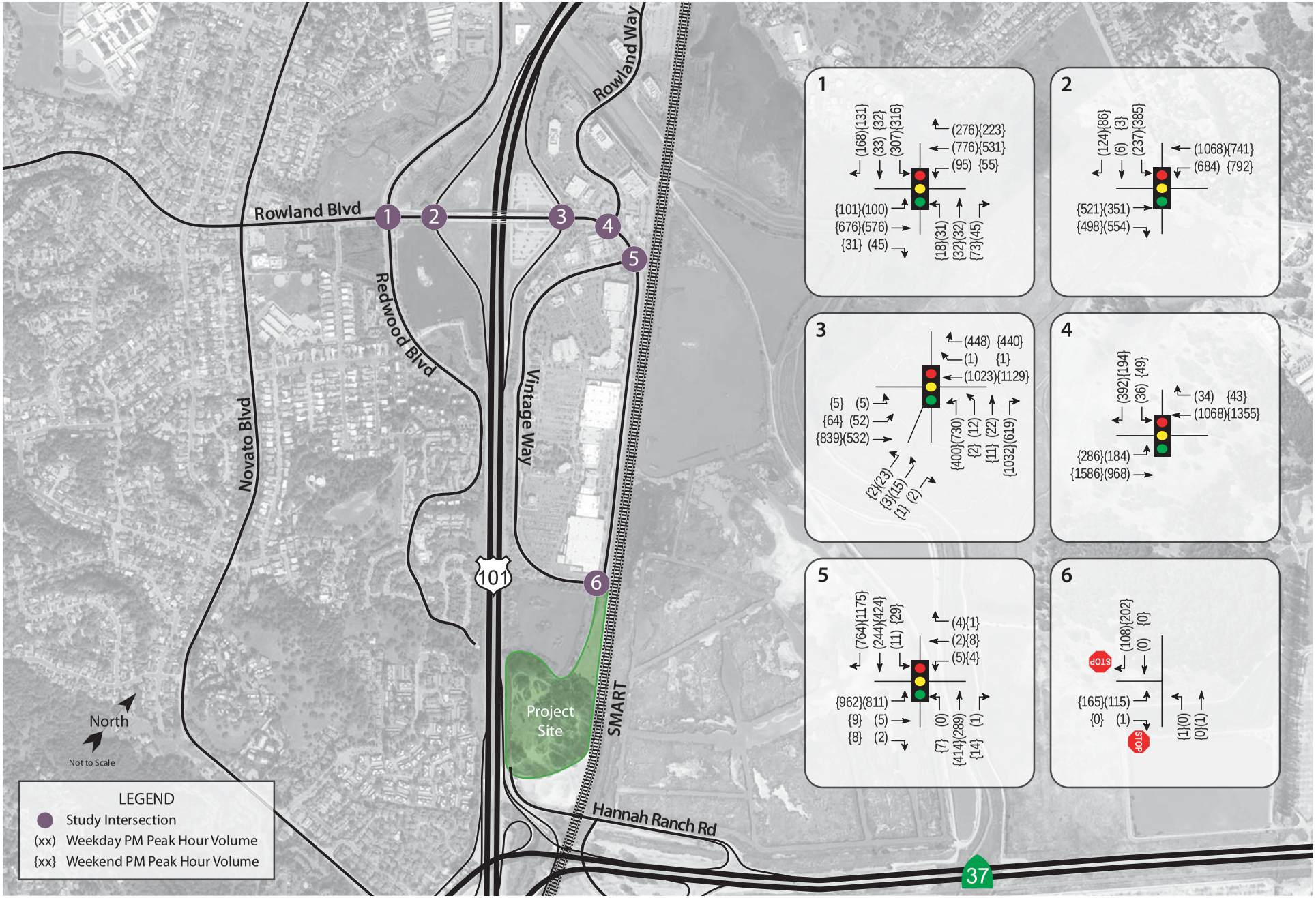

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Figure 3 – Baseline Traffic Volumes

Future Conditions

The impacts of the proposed project on intersection operation under Future conditions were assessed using the latest TRAFFIX model developed for the City of Novato, and maintained by W-Trans to contain the most recent available land use and development potential projections based on the City's current General Plan. Based on discussions with City staff as well as a review of the City of Novato's Capital Improvement Plan (CIP), no intersection improvements are planned for any of the study intersections.

Under the anticipated Future volumes the study intersections are expected to operate acceptably at LOS D or better. These operating conditions are summarized in Table 9 and Future volumes are shown in Figure 4.

Table 9 – Future Peak Hour Intersection Levels of Service

Study Intersection *Approach*	Weekday PM Peak		Weekend PM Peak	
	Delay	LOS	Delay	LOS
1. Rowland Blvd/Redwood Blvd	26.3	C	27.7	C
2. Rowland Blvd/US 101 S Ramps	13.3	B	25.3	C
3. Rowland Blvd/US 101 N Ramps	40.5	D	37.1	D
4. Rowland Blvd/Rowland Way	15.1	B	13.4	B
5. Rowland Blvd/Vintage Way (north)	18.4	C	19.9	B
6. Rowland Blvd/Vintage Way (south)	7.8	A	8.6	A

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

Freeway Level of Service

Future 2040 freeway volume projections for SR 37 are from the Caltrans *Draft Transportation Concept Report, State Route 37.*

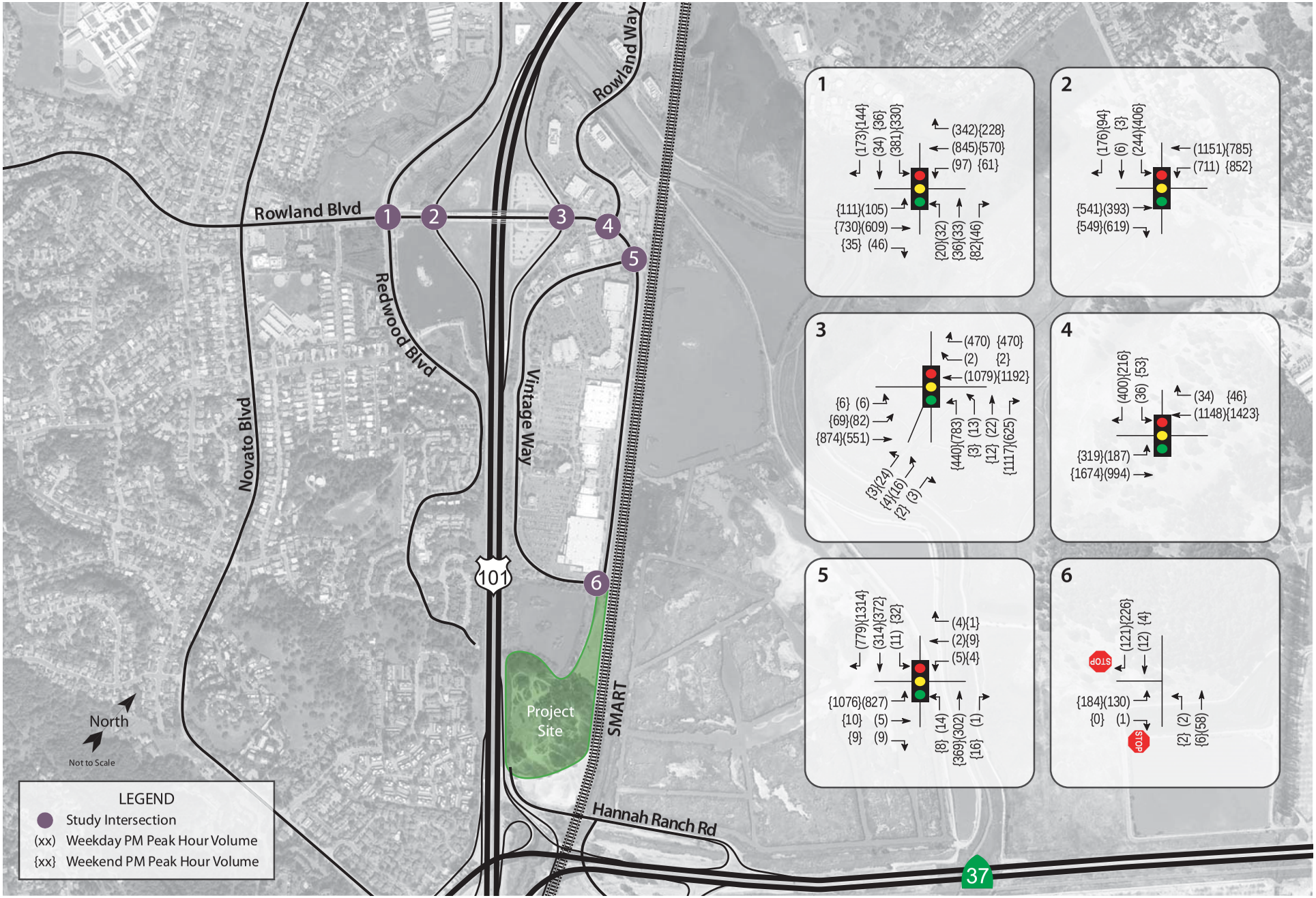
Under Future conditions, the study segments of US 101 to the north and south of Rowland Boulevard are expected to continue to operate acceptably at LOS D or better in both directions during the study period of the weekday p.m. peak hour. The segment of SR 37 east of US 101 is expected to operate acceptably at LOS D in the eastbound direction and LOS C in the westbound direction.

The future levels of service for the freeway segments are summarized in Table 10. Copies of the Level of Service calculations for freeway segments are included in Appendix C.

Table 10 – Future PM Peak Hour Freeway Levels of Service

Facility Segment	Density	LOS	Density	LOS
US 101	**Northbound**		**Southbound**	
South of Rowland Blvd	22.5	C	24.5	C
North of Rowland Blvd	30.8	D	21.3	C
SR 37	**Eastbound**		**Westbound**	
East of US 101	29.3	D	21.4	C

Notes: Density is measured in the number of passenger cars per mile per lane (pc/mi/ln)



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Traffic Impact Study for the Hanna Ranch Project

Figure 4 – Future Traffic Volumes

Project Description

The proposed project will include the development of six buildings and a Costco gas station on a currently vacant parcel. The proposed mixed-use development would include 12,540 square feet of restaurant space, 13,500 of retail space, 48 residential apartment units, a 125-room hotel, and a Costco gas station with 24 vehicle fueling positions.

The proposed project site plan is shown in Figure 5.

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*, 9th Edition, 2012 for Quality Restaurant (ITE LU 931), Specialty Retail Center (ITE LU 598), Apartment (ITE LU 220), Hotel (ITE LU 310), and Gas/Service Station (ITE LU 944).

Internal Capture Trips

Many of the trips associated with the Costco fuel center would be linked to shopping at either Costco or other nearby stores. Because these vehicles would be in the area anyway, they would not produce new trips at the study intersections, so a deduction was applied to reflect these "internally captured" trips. The percentage of such trips was estimated based on information developed by Kittleson & Associates and presented in a memorandum to Kim Katz of Costco from Chris Tiesler and Sonia Hennum Daleiden dated December 2, 2016.

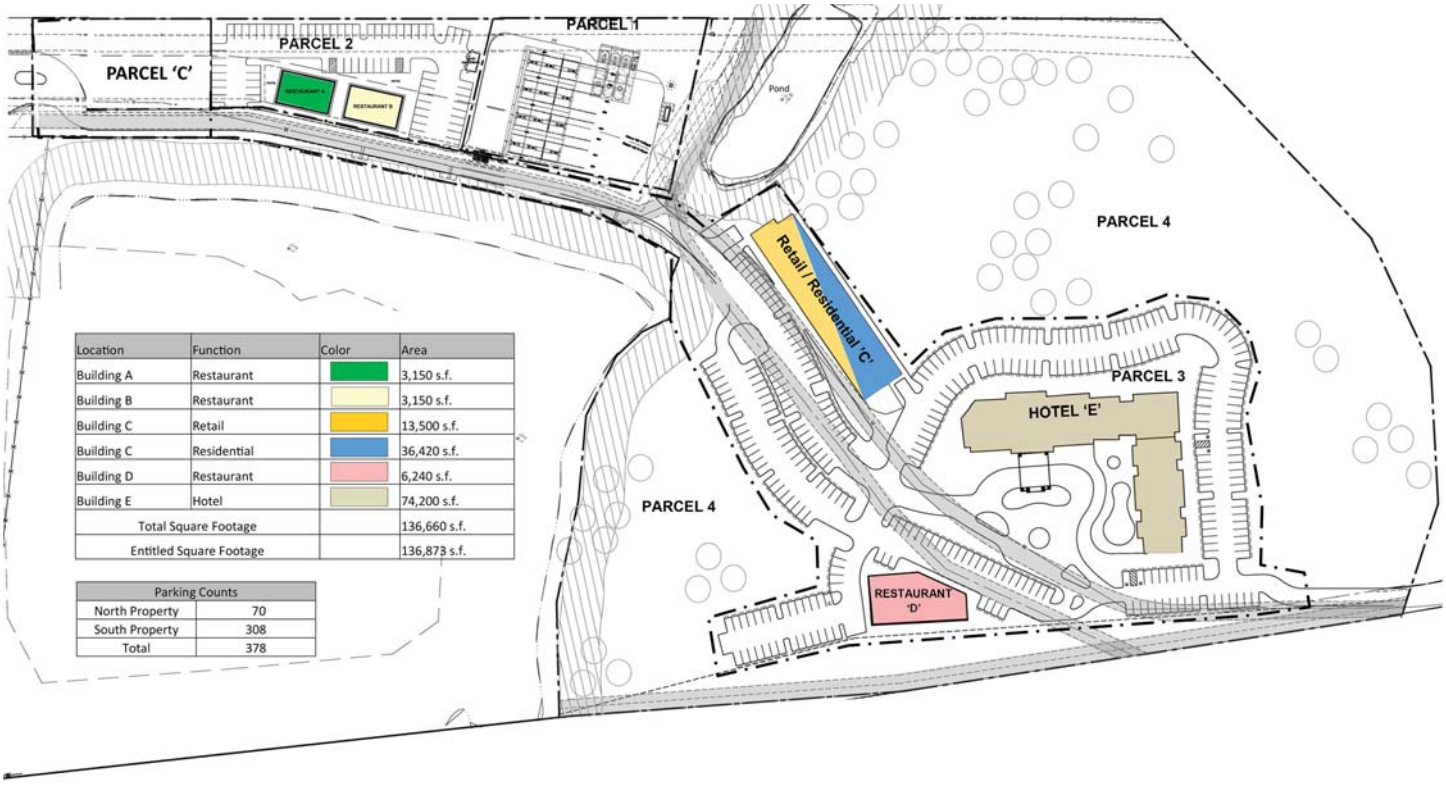
Total Project Trip Generation

As indicated in Table 11, the proposed project is expected to generate an average of 10,752 trips per day at the pump, including 819 trips during the weekday p.m. peak hour and 982 trips during the weekend midday peak hour. After deductions are taken into account, the project would be expected to generate 10,752 new trips on a daily basis, including 574 during the weekday p.m. peak hour and 682 during the weekend midday peak hour; these new trips represent the increase in traffic associated with the project compared to existing volumes.

Table 11 – Trip Generation Summary

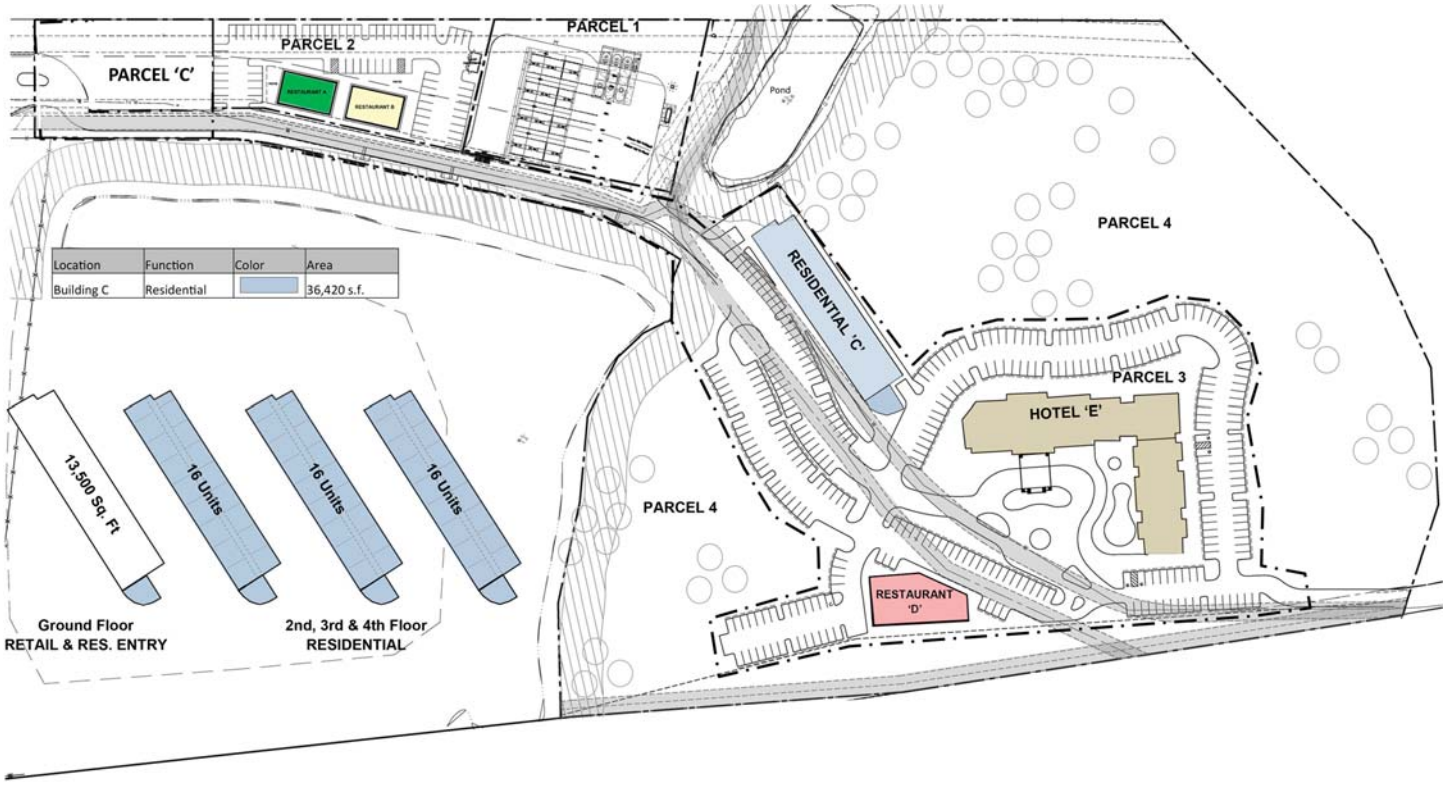
Land Use	Units	Daily		Weekday PM Peak Hour				Weekend PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Restaurant	12.5 ksf	89.95	1,128	7.49	94	91	3	10.82	136	80	56
Retail	13.5 ksf	44.32	598	2.71	37	29	8	4.82	65	34	31
Apartment	48 du	6.65	319	0.62	30	16	14	0.52	25	12	13
Hotel	125 rms	8.17	1,021	0.60	75	46	29	0.72	90	50	40
Gas Station	24 vfp	320.26	7,686	24.27	583	333	250	27.74	666	333	333
Pass-by		-44%*	-4,677	*-42%*	*-245*	*-140*	*-105*	*-45%*	*-300*	*-150*	*-150*
Total (no pass-by)			10,752		819	515	304		982	509	473
Net Total			**6,075**		**574**	**375**	**199**		**682**	**359**	**323**

Note: du = dwelling unit; ksf = 1,000 square feet; rms = rooms; vfp = vehicle fueling position; *pass-by rate for daily trips not available, the average of the a.m. peak hour and p.m. peak hour pass-by rates was applied



Location	Function	Color	Area
Building A	Restaurant		3,150 s.f.
Building B	Restaurant		3,150 s.f.
Building C	Retail		13,500 s.f.
Building C	Residential		36,420 s.f.
Building D	Restaurant		6,240 s.f.
Building E	Hotel		74,200 s.f.
Total Square Footage			136,660 s.f.
Entitled Square Footage			136,873 s.f.

Parking Counts	
North Property	70
South Property	308
Total	378



Location	Function	Color	Area
Building C	Residential		36,420 s.f.

North

Not to Scale

Source: Pacific Star Capital, LLC 1/17

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Traffic Impact Study for the Hanna Ranch Projecgt

Figure 5 – Site Plan

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Trip Distribution

Trip distribution characteristics were determined through an examination of existing traffic patterns in the study area as well as consideration of likely trip origins/destinations. The applied distribution assumptions and resulting trips are shown in Table 12.

Table 12 – Trip Distribution Assumptions

Route	Percent	Daily Trips	Weekday PM Trips	Weekend PM Trips
US 101 north of Rowland Blvd	27%	1,640	155	184
US 101 south of Rowland Blvd	23%	1,397	132	157
Rowland Blvd west of Redwood Blvd	5%	304	28	34
Redwood Blvd north of Rowland Blvd	31%	1,883	178	212
Rowland Way north of Rowland Blvd	5%	304	29	34
SR 37 east of US 101	9%	547	52	61
TOTAL		**6,075**	**574**	**682**

Intersection Operation

Existing plus Project Conditions

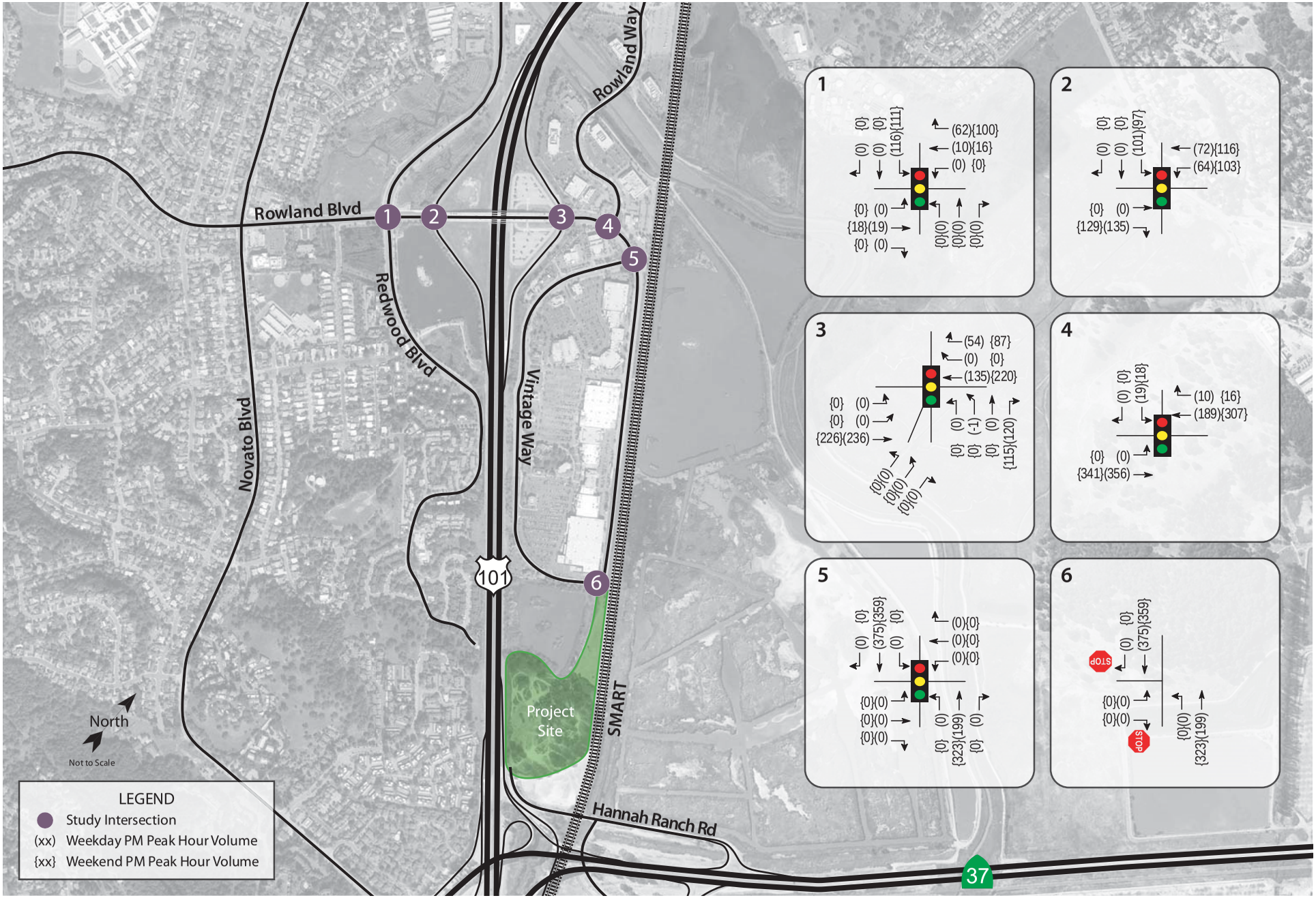
Upon the addition of project-related traffic to Existing volumes, the study intersections are expected to continue operating acceptably at LOS D or better. These results are summarized in Table 13. Project traffic volumes are shown in Figure 6.

Table 13 – Existing and Existing plus Project Peak Hour Intersection Levels of Service

Study Intersection	Existing Conditions				Existing plus Project			
	Weekday PM Peak		Weekend PM Peak		Weekday PM Peak		Weekend PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Rowland Blvd/Redwood Blvd	24.8	C	23.4	C	27.0	C	24.7	C
2. Rowland Blvd/US 101 S Ramps	12.4	B	17.0	B	16.1	B	29.8	C
3. Rowland Blvd/US 101 N Ramps	33.7	C	35.2	D	37.1	D	42.0	D
4. Rowland Blvd/Rowland Way	15.3	B	13.1	B	15.0	B	14.9	B
5. Rowland Blvd/Vintage Way (north)	17.2	B	19.1	B	20.2	C	22.8	C
6. Rowland Blvd/Vintage Way (south)	7.7	A	8.4	A	14.0	B	18.5	C

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

It should be noted that with the addition of project-related traffic volumes, average delay at the intersection of Rowland Boulevard/Rowland Way would be expected to decreases during the p.m. peak hour. While this is counter-intuitive, this condition occurs when a project adds trips to movements that are currently underutilized or have delays that are below the intersection average, resulting in a better balance between approaches and lower overall average delay. The project adds traffic to the through movement, which has an average delay that is lower than the average for the intersection as a whole, resulting in a slight reduction in the overall average delay.



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Traffic Impact Study for the Hanna Ranch Project

Figure 6 – Project Traffic Volumes

The conclusion could incorrectly be drawn that the project actually improves operation based on this data alone; however, it is more appropriate to conclude that the project trips are expected to make use of excess capacity, so drivers will experience little, if any, change in conditions as a result of the project.

Freeway Level of Service

Under Existing plus Project conditions and during the p.m. peak hour the segments of US 101 to the north and south of Rowland Boulevard are expected to continue to operate acceptably at LOS D or better in both directions. The segment of SR 37 east of US 101 is expected to operate acceptably at LOS A or C in both the westbound and eastbound directions. These results are summarized in Table 14.

Table 14 – Existing and Existing plus Project PM Peak Hour Freeway Levels of Service

Facility	Existing				Existing plus Project			
Segment	Density	LOS	Density	LOS	Density	LOS	Density	LOS
US 101	**Northbound**		**Southbound**		**Northbound**		**Southbound**	
South of Rowland Blvd	20.7	C	18.3	C	21.1	C	18.5	C
North of Rowland Blvd	27.1	D	19.9	C	27.7	D	20.5	C
SR 37	**Eastbound**		**Westbound**		**Eastbound**		**Westbound**	
East of US 101	22.0	C	3.9	A	22.2	C	8.0	A

Notes: Density is measured in the number of passenger cars per mile per lane (pc/mi/ln)

Finding – The study intersections and freeway segments are expected to continue operating acceptably at LOS D or better upon the addition of project-generated traffic.

Baseline plus Project Conditions

With project-related traffic added to Baseline volumes, the study intersections are expected to operate acceptably at LOS D or better, as summarized in Table 15.

Table 15 – Baseline and Baseline plus Project Peak Hour Intersection Levels of Service

Study Intersection *Approach*		Baseline Conditions				Baseline plus Project			
		Weekday PM Peak		Weekend PM Peak		Weekday PM Peak		Weekend PM Peak	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1.	Rowland Blvd/Redwood Blvd	25.2	C	23.7	C	28.0	C	25.5	C
2.	Rowland Blvd/US 101 S Ramps	13.0	B	24.7	C	18.1	B	36.4	D
3.	Rowland Blvd/US 101 N Ramps	35.1	D	35.9	D	38.4	D	46.7	D
4.	Rowland Blvd/Rowland Way	15.2	B	13.4	B	15.0	B	15.5	B
5.	Rowland Blvd/Vintage Way (north)	17.8	B	19.9	B	20.7	C	23.9	C
6.	Rowland Blvd/Vintage Way (south)	7.7	A	8.6	A	14.0	B	18.5	C

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

Freeway Level of Service

Under Baseline plus Project conditions and during the p.m. peak hour the segments of US 101 to the north and south of Rowland Boulevard are expected to continue to operate acceptably at LOS D or better in both directions.

The segment of SR 37 east of US 101 is expected to operate acceptably at LOS A and C in the westbound and eastbound directions respectively. These results are summarized in Table 16.

Table 16 – Baseline and Baseline plus Project PM Peak Hour Freeway Levels of Service

Facility	Baseline				Baseline plus Project			
Segment	Density	LOS	Density	LOS	Density	LOS	Density	LOS
US 101	**Northbound**		**Southbound**		**Northbound**		**Southbound**	
South of Rowland Blvd	20.8	C	18.4	C	21.1	C	18.5	C
North of Rowland Blvd	27.2	D	19.9	C	27.7	D	20.5	C
SR 37	**Eastbound**		**Westbound**		**Eastbound**		**Westbound**	
East of US 101	22.1	C	7.8	A	22.2	C	8.0	A

Notes: Density is measured in the number of passenger cars per mile per lane (pc/mi/ln)

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

Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes, the study intersections are expected to operate acceptably. The Future plus Project operating conditions are summarized in Table 17.

Table 17 – Future and Future plus Project Peak Hour Levels of Service

Study Intersection *Approach*	Future Conditions				Future plus Project			
	Weekday PM Peak		Weekend PM Peak		Weekday PM Peak		Weekend PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Rowland Blvd/Redwood Blvd	26.3	C	27.7	C	34.3	C	30.3	C
2. Rowland Blvd/US 101 S Ramps	13.3	B	25.3	C	17.6	B	44.5	D
3. Rowland Blvd/US 101 N Ramps	40.5	D	37.1	D	43.3	D	48.2	D
4. Rowland Blvd/Rowland Way	15.1	B	13.4	B	16.4	B	15.3	B
5. Rowland Blvd/Vintage Way (north)	18.4	C	19.9	B	21.3	C	23.2	C
6. Rowland Blvd/Vintage Way (south)	7.8	A	8.6	A	13.0	B	18.0	C

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

Freeway Level of Service

As shown in Table 18, under Future plus Project conditions and during the p.m. peak hour the segments of US 101 to the north and south of Rowland Boulevard are expected to continue to operate acceptably at LOS D or better in both directions. The segment of SR 37 east of US 101 is expected to operate acceptably at LOS C or D in both the westbound and eastbound directions.

Table 18 – Future and Future plus Project PM Peak Hour Freeway Levels of Service								
Facility	**Future**				**Future plus Project**			
Segment	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**	**Density**	**LOS**
US 101	**Northbound**		**Southbound**		**Northbound**		**Southbound**	
South of Rowland Blvd	22.5	C	24.5	C	22.9	C	24.7	C
North of Rowland Blvd	30.8	D	21.3	C	31.5	D	22.0	C
SR 37	**Eastbound**		**Westbound**		**Eastbound**		**Westbound**	
East of US 101	29.3	D	21.4	C	29.5	D	21.7	C

Notes: Density is measured in the number of passenger cars per mile per lane (pc/mi/ln)

Finding – The study intersections and freeway segments are expected to continue operating acceptably at LOS D or better with project trips added to Future volumes.

Vehicle Miles Traveled (VMT)

The project's VMT was assessed using trip length estimates for the Novato Transportation Analysis Zone (TAZ) as contained in the statewide model. The potential VMT generated for each land use proposed on the project site was evaluated. For the commercial uses, which include restaurants, retail, and the hotel, VMT is calculated by multiplying the number of employees per 1,000 square feet of commercial space by the average employee trip length, which is provided by the statewide model. Based on the Office of Planning Research's (OPR) most recent guidance, contained in their *Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA,* January 20, 2016, small, local-serving commercial land uses are expected to shorten trip lengths and reduce VMT. These types of commercial uses typically redistribute trips rather than creating new ones. It would be expected that the miles traveled by the customer are just being diverted from different retail establishments to this one. For example, a customer may choose to patronize a new store or restaurant as it is closer to their home than one they had previously shopped or dined at in a different location, and the trip would therefore not produce additional VMT, and in fact, may reduce VMT. Similarly, guests of the hotel would likely be redistributed from other hotels in the City, which would not produce additional VMT.

Because neither the City of Novato nor the County of Marin has standard data available regarding employee conversion factors, in order to determine the estimated number of employees per 1,000 square feet of space for the retail and hotel land uses, conversion rates used for regional modeling in neighboring Sonoma County were applied. For retail uses, a rate of 1.62 employees per 1,000 square was used and 1.09 employees per 1,000 square feet were assumed for the hotel. These conversion rates do not include estimates for restaurants. The U.S. Green Building Council recommends a rate of 2.3 employees per 1,000 square feet of retail space, which was used for this analysis.

For the Novato TAZ within which the project site is located, employees are expected to travel 15.09 miles per day. Based on the factors described above, the estimated VMT for the restaurant is 435 miles traveled per day, retail would be expected to produce 330 miles per day, and the hotel would produce 1,221 miles per day.

VMT for the proposed 48 apartment units was calculated by multiplying the average household size in Novato by the number of housing units and the home-based VMT estimates for residential land uses in Novato, provided by the statewide model. According to the 2010 US Census, the average household size in Novato is 2.5 people per household. Residents in this TAZ are expected to travel 14.72 miles per day. Based on these factors, the estimated VMT for the propose apartments would be 1,767 miles.

Generally, gas stations will not measurably alter VMT as the majority of gas station trips are convenience-based, i.e. drivers will generally stop at a gas station if it is already on their route. However, given that the proposed gas

station at the project site will be a discounted Costco gas station, some customers may divert a longer distance out of their way to access the gas station and therefore additional VMT would be generated. In order to calculate the approximate VMT that may be produced by the station, it was assumed that all diverted trips would originate from US 101. The trip length between US 101 and the fuel station (and back) along Rowland Boulevard would be about one mile each way. As shown in the project's trip generation, the gas station is expected to generate 7,686 daily trips. Based on p.m. peak hour internal capture rates, it was assumed that 42 percent of these trips would be internally captured and therefore not generate additional VMT. Therefore, it was assumed that the remaining 4,458 daily trips would be from drivers diverting from US 101 to access the Costco Station. With a trip length of one mile from US 101 to the gas station, the estimated VMT would be 4,458 miles.

Table 19 – VMT by Land Use

Land Use	Units	VMT
Restaurant	12.54 ksf	435
Retail	13.5 ksf	330
Hotel	74.2 ksf	1,221
Apartment	48 du	1,767
Gas station	24 vpf	4,458
TOTAL		**8,211**

Overall, the entire project site would produce an estimated VMT of 8,211 miles. In some cases, a reduction to VMT may be applied for mixed-use projects. However, due to the location and mix of land uses at the proposed project site, few trips would be expected to be captured internally other than those already accounted for in the trip generation estimate for the Costco gas station. Therefore, no mixed-use reductions were applied. There are currently no standards of significance against which to evaluate this estimate. Additionally, the City of Novato does not currently have a regional model to provide a comparison of VMT with or without the proposed project. Therefore, the VMT estimate is provided for informational purposes only.

Queuing

The projected vehicle queues were determined under each scenario using the applied timing schemes in SIMTRAFFIC, which is a traffic simulation extension of Synchro that generates random "seeding" of vehicles on the street network and then simulates how vehicles will flow through the system using the actual volumes, phasing, and timing developed in Synchro. Because each SIMTRAFFIC run is unique, a series of six separate "runs" was used to develop queuing estimates. The 95th percentile queues projected for each lane in the six SIMTRAFFIC runs were averaged and are reported as the maximum queue.

Under all study scenarios the projected maximum queues between intersections and in turn pockets along Rowland Boulevard can be accommodated within the available storage except at Rowland Boulevard/Rowland Way, where westbound queuing is expected to exceed storage capacity under all weekend plus project scenarios for the through and right-turn movements.

Summarized in Table 20 are the predicted queue lengths for all turn-lanes under each scenario. Copies of the SIMTRAFFIC projections are contained in Appendix D.

Table 20 – Maximum Queues Exceeding Available Storage

Study Intersection	Available Storage	Maximum Queues											
		Weekday PM Peak Hour						Weekend PM Peak Hour					
		E	E+P	B	B+P	F	F+P	E	E+P	B	B+ P	F	F+P
Rowland/Redwood Blvd													
Northbound LTL	100	53	41	50	62	48	58	48	28	39	31	42	38
Southbound LTL 1	250	116	199	148	179	180	**283**	164	229	157	250	167	223
Southbound LTL 2	380	122	203	159	177	176	313	215	221	118	279	145	189
Southbound RTL	380	44	48	24	53	56	39	33	30	32	25	38	29
Eastbound LTL	245	127	107	117	117	114	128	88	128	156	96	121	118
Westbound LTL	200	153	170	147	169	170	**202**	68	77	114	110	67	138
Rowland/US 101S Ramps													
Southbound LTL	280	82	114	84	101	77	106	116	130	114	139	116	140
Westbound LTL 1	450	181	182	157	219	226	232	232	351	197	325	216	437
Westbound LTL 2	980	188	203	176	233	227	242	245	376	210	343	232	493
Eastbound RTL	220	122	169	127	147	152	164	151	140	129	134	139	179
Rowland/US 101N Ramps													
Northbound LTL	435	316	309	329	303	353	364	220	197	225	193	234	222
Northbound RTL 1	435	214	250	243	256	208	237	360	326	344	385	383	434
Northbound RTL 2	435	267	250	281	264	221	214	383	348	372	395	377	**436**
Eastbound LTL	425	96	229	95	88	127	101	102	99	95	94	120	216
Westbound RTL	200	125	151	**206**	163	167	188	111	157	141	**202**	169	196
Westbound Through	360	185	232	206	212	237	247	220	222	203	271	244	278
Rowland/Rowland Way													
Southbound RTL	300	153	190	164	184	192	206	110	195	147	117	105	133
Eastbound LTL 1	260	104	130	111	98	110	111	142	126	170	181	155	185
Eastbound LTL 2	260	123	172	131	133	131	133	157	188	183	**284**	174	251
Westbound TRTL	300	101	289	168	290	231	**309**	198	**327**	266	**321**	287	**323**
Westbound Through	300	74	257	162	280	264	**313**	168	**317**	237	**308**	246	**321**
Rowland/Vintage Way (N)													
Eastbound LTL 1	560	245	295	272	270	212	247	305	335	325	439	422	515
Eastbound LTL 2	560	316	343	372	335	294	322	343	363	381	478	510	515

Notes: Maximum Queue based on the 95th percentile queues from six SIMTRAFFIC runs; all distances are measured in feet; E = existing conditions; E+P = existing plus project conditions; B = Baseline conditions; B+P = Baseline + Project conditions; F = future conditions; F+P = future plus project conditions; **Bold** text = queue length exceeds available storage

For all the various scenarios evaluated, the project results in either a slight increase or decrease in queue lengths—the change is less-than-significant and can be attributed to the stochastic nature of the SIMTRAFFIC program. Overall, the project itself is not expected to result in a measurable change to queue lengths except in one of the two eastbound left-turn lanes at Rowland Boulevard/Rowland Way under Baseline plus Project volumes. For this

approach, there is a storage capacity of 260 feet in each of the two turn lanes. It is likely that if the queue in one lane exceeded capacity a driver would use the other turn lane where additional space would be available. So, while a queue exceeding storage space by approximately one vehicle is projected, the other left-turn lane has available capacity for three vehicles under this analysis scenario. Therefore, the existing storage capacity at the approach is adequate. However, in the through and through/right-turn lanes at the intersection of Rowland Boulevard/Rowland Way, queuing is expected to exceed storage capacity under all weekend plus project scenarios.

Finding – The project does not cause any queues to exceed available storage, except at Rowland Boulevard/ Rowland Way where queuing would exceed storage capacity at the through-right and through westbound movements under all weekend plus project scenarios.

Recommendation – Widen the north side of Rowland Boulevard to include an additional westbound shared through/right-turn lane between Rowland Way and Vintage Way (north).

Alternative Modes

Given the proximity of the Vintage Oaks Shopping Center to the project site as well as the existing San Francisco Bay Trail and proposed Sonoma Marin Area Rail Transit (SMART) Trail, it is reasonable to assume that some project residents and employees will want to walk, bicycle, and/or use transit to reach the proposed Hanna Ranch project site.

Pedestrian Facilities

Sidewalks do not currently exist along the project frontage, as the site is vacant. The proposed project includes plans to provide a Class I bike and pedestrian path that would generally begin at the northern end of the site and continue south to Hanna Ranch Road. Some of the proposed facilities would be located off-site within the SMART right-of-way. These improvements, combined with existing sidewalk to the north of the project site along the Vintage Oaks Shopping center, would provide adequate pedestrian access to the project site.

Finding – Pedestrian facilities serving the project site are expected to be adequate.

Bicycle Facilities

Existing Class I and II facilities north of the project site combined with the proposed Class I facility to be developed with the Hanna Ranch project would provide sufficient bicycle access to the proposed project site.

Bicycle Storage

The project site plan does not identify bicycle parking or storage facilities, although bicycle parking is planned to be provided upon development of the project. Chapter 19.30, Parking Standards, of the Novato Municipal Code identifies the number of bicycle parking spaces required based on the proposed land use. For retail commercial uses, bicycle parking should be equal to a minimum of five percent of the required vehicle spaces and distributed to serve employees and visitors to the project. For multi-family projects, bicycle parking should be provided equal to a minimum of 10 percent of the required vehicle spaces, unless separate secured garage space is provided for each unit. The applicant should ensure that adequate bicycle parking is provided upon construction of the project.

Finding – Bicycle facilities serving the project site are expected to be adequate upon completion of the planned bicycle path within the site.

Recommendation – Adequate bicycle parking should be provided, per City code, as part of the proposed project.

Recommendation – Coordinate with the City of Novato and SMART to provide a public access easement between the proposed project and the SMART Trail at an appropriate location for pedestrian, bicycle, and emergency access.

Transit

Existing transit routes are adequate to accommodate project-generated transit trips. Existing stops are within one-mile of the project site, which may be too far for convenient access by residents, guests, and patrons of Hanna Ranch.

Finding – Transit facilities serving the project site are not adequate. An additional bus stop should be provided near the project site

Finding – The project applicant should work with Marin Transit to identify a suitable location near or at the project access to install a bus stop for future transit users.

Consistency with 2011 EIR Mitigation Measures

Because this report is intended to supplement the EIR prepared for the previously proposed and approved Hanna Ranch project, a comparison was made to the findings of that study to ensure that all of the findings and recommendations are consistent. Following are discussions of the impacts and mitigations as presented in the *Traffic Impact Study for the Hann Ranch EIR* and subsequently folded into that EIR. The language of the impacts and mitigations is presented as written in the EIR. Table 21 provides a summary of the impacts determined in the 2011 EIR, the proposed mitigations with a comparison of the proposed 2017 updated project.

Queuing

Impact TRANS-1

***Impact*:** The maximum queue in the westbound right-turn lanes at the Redwood Boulevard/Rowland Boulevard intersection (Intersection #1) is expected to extend beyond the available storage capacity under Future Without Project and Future Plus Project p.m. peak hour conditions. Additionally, the queue in the westbound through lane at this intersection is expected to exceed available storage capacity under Future Plus Project Conditions. This is considered to be a *Significant Impact*.

Mitigation Measure: The project applicant shall fund its proportional share of the cost to widen the north side of Rowland Boulevard to include an additional westbound right-turn lane with right-turn overlap phasing. The additional right-turn lane shall provide a minimum of 200 feet of storage length. The City of Novato Public Works Department shall determine the project's proportional share and collect funds prior to issuance of a certificate of occupancy for the proposed project.

A right-turn lane has already been installed at this intersection and therefore this part of the mitigation measure has been satisfied. Since the intersection is expected to operate acceptably under the projected volumes for each scenario, right-turn overlap phasing for the westbound right-turn is no longer needed.

Impact TRANS-2

***Impact*:** The maximum queue in the westbound through and right-turn lanes at Rowland Boulevard/US 101 North Ramps (Intersection #3) is expected to extend beyond the available storage capacity under Future Without Project and Future Plus Project p.m. peak hour conditions. This is considered to be a *Significant Impact*.

Mitigation Measure: The project applicant shall design and construct to the satisfaction of the City Engineer all of the necessary improvements to widen the north side of Rowland Boulevard to include an additional westbound shared through/right-turn lane between Rowland Way and Vintage Way (north). The City of Novato Public Works Department shall contribute to the applicant funds received by the City for these improvements in the amount not-to-exceed $50,000. The applicant shall complete the construction of these improvements prior to issuance of a certificate of occupancy for the proposed project.

The queuing analysis conducted for this analysis indicates that under Future plus Project conditions there is expected to be sufficient storage space for the westbound through and right-turn movements at this intersection without the improvements required per Mitigation Measure TRANS-2. It is noted, however, that Mitigation Measure TRANS-2 is still necessary to address Impact TRANS-3, as discussed below.

Impact TRANS-3

***Impact*:** The maximum queues in the westbound through and right-turn lanes at Rowland Boulevard/Rowland Way (Intersection #4) are expected to extend beyond the available storage capacity under Future Without Project and Future Plus Project p.m. peak hour conditions. This is considered to be a *Significant Impact*.

Mitigation Measure: Implement Mitigation Measure TRANS-2.

Results from the queuing output indicate the queuing at this location for the westbound through and right-turn lanes at Rowland Boulevard/Rowland Way will continue to exceed available storage capacity under Future plus Project conditions without the improvements identified in Mitigation Measure TRANS-2; this mitigation measure would therefore still apply.

Access

Impact TRANS-4

Impact: The canopies of existing and proposed trees could obstruct larger vehicles from maneuvering throughout the entire site. This is considered to be a *Significant Impact*.

Mitigation Measure: Any proposed trees along internal streets shall be placed and maintained so as to avoid obstructing the vertical clearance of larger vehicles like fire or garbage trucks. In addition, any existing trees that would obstruct larger vehicles from maneuvering throughout the site shall be maintained to accommodate a vertical clearance of at least 14 feet for trucks.

The current site plan does not indicate the location of trees, however, landscaping plans should continue to ensure that at least 14 feet of clearance is available for trucks.

Alternative Transportation

Impact TRANS-5

Impact: Proposed pedestrian facilities may not adequately accommodate increased pedestrian traffic generated by the proposed project. The lack of adequate pedestrian facilities is considered a *Significant Impact*.

Mitigation Measure a: The project applicant shall install ADA compliant curb ramps at all driveway crossings and sidewalk transition points within the project site.

Mitigation Measure b: Prior to approval of final development plans, the project applicant shall coordinate with the City of Novato and SMART to designate on the project plans and formally establish a public access easement between the proposed project and the SMART Trail at an appropriate location for pedestrian, bicycle, and emergency access. In the event that SMART constructs the Class I bike trail prior to approval of the final development plans, the project applicant shall not be required to construct the Class I pathway on the project site or grant the easement.

These mitigation measures would still apply.

Impact TRANS-6

Impact: Proposed bicycle facilities may not adequately accommodate increased bicycle traffic generated by the proposed project. This is considered a S*ignificant Impact*.

Mitigation Measures: The project shall include a minimum of 46 short-term bicycle parking spaces for project patrons and employees at convenient locations adjacent to the project's primary entry points. Racks should be an appropriate design and installed correctly to ensure proper function. Long-term parking for employees in the form of bicycle lockers or covered bicycle parking spaces to reduce exposure to the elements and vandalism should be installed as a portion of the overall parking requirement. The appropriate number and locations of bicycle parking spaces shall be determined by the City of Novato Community Development and Public Works Departments prior to final site plan approval.

The bicycle facilities as previously required should be provided with the currently proposed project.

Impact TRANS-7

Impact: The Hanna Ranch project would increase ridership on transit routes that provide service to the project site. This is considered a *Significant Impact*.

Mitigation Measure: Prior to approval of the final site plan, the project applicant shall work with Marin Transit to identify a suitable location near or at the Rowland Boulevard/Vintage Way intersection to install a bus stop and shelter for future transit users. The project applicant shall be responsible for funding this improvement prior to operation of the proposed project.

This mitigation measure still applies.

Table 21 – Consistency with EIR Mitigation Measures

2011 EIR Impact	2011 EIR Mitigations	2017 Update
Impact TRANS-1: The maximum queues in the westbound through and right-turn lanes at Redwood Boulevard/ Rowland Boulevard are expected to extend beyond the available storage.	**MM TRANS-1:** Widen the north side of Rowland Boulevard to include an additional westbound right-turn lane with right-turn overlap phasing.	A right-turn lane has already been installed at this intersection, so this portion of the mitigation measure has been satisfied. Operation analysis indicates that right-turn overlap phasing is no longer required, so this part of the mitigation can be eliminated.
Impact TRANS-2: The maximum queue in the westbound through and right-turn lanes at Rowland Boulevard/US 101 North Ramps is expected to extend beyond the available storage lengths.	**MM TRANS-2:** Widen the north side of Rowland Boulevard to include an additional westbound shared through/right turn lane between Rowland Way and Vintage Way (north).	This impact is no longer anticipated; however, this mitigation measure addressed two distinct impacts. See Impact TRANS-3.
Impact TRANS-3: The maximum queues in the westbound through and right-turn lanes at Rowland Boulevard/Rowland Way are expected to extend beyond the available storage.	**MM TRANS-3:** Implement MM TRANS-2.	The widening of Rowland Boulevard would still be necessary to address this impact.
Impact TRANS-4: The canopies of the proposed on-site trees obstruct larger vehicles from maneuvering throughout the entire site	**MM TRANS-4:** Relocate and/or maintain the proposed on-site trees to accommodate a truck clearance of at least 14 feet.	There is no change to this Mitigation Measure due to the change in the project description.
Impact TRANS-5: Proposed pedestrian facilities are inadequate to accommodate anticipated pedestrian activity.	**MM TRANS-5a:** Install ADA compliant curb ramps at all driveway crossings and sidewalk transition points within the project site.	These mitigation measures would still apply.
	MM TRANS-5b: Coordinate with the City of Novato and SMART to provide a public access easement between the proposed project and the SMART Trail at an appropriate location for pedestrian, bicycle, and emergency access.	
Impact TRANS-6: Bike facilities would be inadequate.	**MM TRANS-6:** Provide bicycle parking facilities.	The bicycle facilities as previously required should be provided with the currently proposed project; no change to the mitigation measure as written.
Impact TRANS-7: The project would increase transit ridership.	**MM TRANS-7:** The project applicant shall install a bus stop and shelter for future transit users.	This mitigation measure still applies.

Conclusions and Recommendations

Conclusions

- The proposed project would be expected to result in 10,752 daily trips including 819 trips during the p.m. peak hour and 982 trips during the weekend midday peak hour. After apply internally captured trips are deducted the site would generate 574 during the p.m. peak hour and 682 during the weekend midday peak hour.

- All six study intersections are currently operating acceptably at LOS D or better and are expected to continue to do so with the addition of project generated trips.

- The US 101 freeway segments, both north and south of Rowland Boulevard, are operating acceptably at LOS D or better and are expected to continue doing so with the addition of project generated trips. SR 37, east of the US 101, is operating acceptably both eastbound and westbound at LOS C or better under Existing conditions and is expected to continue doing so upon adding project-generated traffic.

- Under Baseline and Future conditions, with or without project generated trips, all six study intersections are expected to operate acceptably at LOS D or better.

- The US 101 freeway segments, both north and south of Rowland Boulevard, are expected to operate acceptably at LOS D or better under Baseline and Future conditions, with or without project generated trips. SR 37 is also expected to operate acceptably at LOS C or better under Baseline conditions with or without project generated trips and LOS D or better under Future and Future plus project conditions.

- Existing and planned pedestrian, bicycle, and transit facilities are inadequate to serve the project site.

Recommendations

- The proposed project plans should ensure that adequate bicycle parking is provided upon construction of the project.

- The north side of Rowland Boulevard should be widened to include an additional westbound shared through/right-turn lane between Rowland Way and Vintage Way (north).

- New and proposed trees along internal streets should be placed and maintained so as to avoid obstructing the clearance of larger vehicles like fire or garbage trucks, with vertical clearance of at least 14 feet provided.

- ADA compliant curb ramps should be installed at all driveway crossings and sidewalk transition points within the project site.

- A public access easement between the proposed project and the SMART Trail should be provided at an appropriate location for pedestrian, bicycle, and emergency access.

- Provide a minimum of 46 short-term bicycle parking spaces for project patrons and employees at convenient locations adjacent to the project's primary entry points.

- Work with Marin Transit to identify a suitable location near or at Rowland Boulevard/Vintage Way to install a bus stop and shelter for future transit users.

Study Participants and References

Study Participants

Principal in Charge	Dalene J. Whitlock, PE, PTOE
Assistant Planner	Shannon Baker
Editing/Formatting/Graphics	Angela McCoy
Report Review	Dalene J. Whitlock, PE, PTOE

References

2013 Collision Data on California State Highways, California Department of Transportation, 2016
City of Novato Bicycle/Pedestrian Plan, Alta Planning + Design, 2015
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NOV129

Appendix A

Collision Rate Calculations

Intersection Collision Rate Calculations

Hanna Ranch Project

Intersection # 1: Rowland Blvd & Redwood Blvd

Date of Count: Friday, March 31, 2017

Number of Collisions: 10
Number of Injuries: 6
Number of Fatalities: 0
ADT: 24200
Start Date: July 1, 2011
End Date: June 30, 2016
Number of Years: 5

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

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

$$\text{collision rate} = \frac{10 \times 1{,}000{,}000}{24{,}200 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.23 c/mve**	**0.0%**	**60.0%**
Statewide Average*	**0.27 c/mve**	**0.4%**	**41.9%**

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

Intersection # 2: Rowland Blvd & US 101 South Ramps

Date of Count: Friday, March 31, 2017

Number of Collisions: 13
Number of Injuries: 2
Number of Fatalities: 0
ADT: 29300
Start Date: July 1, 2011
End Date: June 30, 2016
Number of Years: 5

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

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

$$\text{collision rate} = \frac{13 \times 1{,}000{,}000}{29{,}300 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.24 c/mve**	**0.0%**	**15.4%**
Statewide Average*	**0.27 c/mve**	**0.4%**	**41.9%**

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

Intersection Collision Rate Calculaions

Hanna Ranch Project

Intersection # 3: Rowland Blvd & US 101 North Ramps

Date of Count: Friday, March 31, 2017

Number of Collisions: 24
Number of Injuries: 6
Number of Fatalities: 0
ADT: 33000
Start Date: July 1, 2011
End Date: June 30, 2016
Number of Years: 5

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

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

$$\text{collision rate} = \frac{24 \times 1{,}000{,}000}{33{,}000 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.40 c/mve**	**0.0%**	**25.0%**
Statewide Average*	**0.27 c/mve**	**0.4%**	**41.9%**

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

Intersection # 4: Rowland Blvd & Rowland Way

Date of Count: Friday, March 31, 2017

Number of Collisions: 6
Number of Injuries: 2
Number of Fatalities: 0
ADT: 25600
Start Date: July 1, 2011
End Date: June 30, 2016
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Urban

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

$$\text{collision rate} = \frac{6 \times 1{,}000{,}000}{25{,}600 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.13 c/mve**	**0.0%**	**33.3%**
Statewide Average*	**0.21 c/mve**	**0.3%**	**42.4%**

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

Intersection Collision Rate Calculaions

Hanna Ranch Project

Intersection # 5: Rowland Blvd & Vintage Way (North)

Date of Count: Friday, March 31, 2017

Number of Collisions: 8
Number of Injuries: 4
Number of Fatalities: 0
ADT: 20100
Start Date: July 1, 2011
End Date: June 30, 2016
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Urban

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

$$\text{collision rate} = \frac{8 \times 1{,}000{,}000}{20{,}100 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.22 c/mve**	**0.0%**	**50.0%**
Statewide Average*	**0.21 c/mve**	**0.3%**	**42.4%**

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

Intersection # 6: Rowland Blvd & Vintage Way (South)

Date of Count: Friday, March 31, 2017

Number of Collisions: 0
Number of Injuries: 0
Number of Fatalities: 0
ADT: 2300
Start Date: July 1, 2011
End Date: June 30, 2016
Number of Years: 5

Intersection Type: Tee
Control Type: Stop & Yield Controls
Area: Urban

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

$$\text{collision rate} = \frac{0 \times 1{,}000{,}000}{2{,}300 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.00 c/mve**	**0.0%**	**0.0%**
Statewide Average*	**0.18 c/mve**	**0.7%**	**36.4%**

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

Appendix B

Intersection Level of Service Calculations

HCM Signalized Intersection Capacity Analysis
1: Redwood Blvd & Rowland Blvd

05/03/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	560	45	95	761	261	31	32	45	293	33	167
Future Volume (vph)	99	560	45	95	761	261	31	32	45	293	33	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	3574	1591	1805	3459		1805	3261		3502	1900	1594
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1805	3574	1591	1805	3459		1805	3261		3502	1900	1594
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	104	589	47	100	801	275	33	34	47	308	35	176
RTOR Reduction (vph)	0	0	28	0	26	0	0	40	0	0	0	136
Lane Group Flow (vph)	104	589	19	100	1050	0	33	41	0	308	35	40
Confl. Peds. (#/hr)			4			3			9			
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	8.0	33.8	33.8	8.9	34.7		5.7	12.0		13.6	19.2	19.2
Effective Green, g (s)	8.0	33.8	33.8	8.9	34.7		5.7	12.0		13.6	19.2	19.2
Actuated g/C Ratio	0.10	0.40	0.40	0.11	0.41		0.07	0.14		0.16	0.23	0.23
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0		2.0	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	172	1439	640	191	1430		122	466		567	434	364
v/s Ratio Prot	c0.06	0.16		0.06	c0.30		0.02	0.01		c0.09	0.02	
v/s Ratio Perm			0.01									c0.03
v/c Ratio	0.60	0.41	0.03	0.52	0.73		0.27	0.09		0.54	0.08	0.11
Uniform Delay, d1	36.4	17.9	15.1	35.5	20.7		37.1	31.2		32.3	25.4	25.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.1	0.3	0.0	1.2	2.1		0.4	0.1		0.8	0.1	0.1
Delay (s)	40.5	18.2	15.2	36.7	22.8		37.6	31.3		33.1	25.5	25.7
Level of Service	D	B	B	D	C		D	C		C	C	C
Approach Delay (s)		21.1			24.0			33.1			30.1	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.58				
Actuated Cycle Length (s)	83.9	Sum of lost time (s)		16.3	
Intersection Capacity Utilization	64.8%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
1: Rowland Blvd & Redwood Blvd

05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	653	31	55	510	204	18	32	73	295	32	129
Future Volume (vph)	99	653	31	55	510	204	18	32	73	295	32	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	3574	1589	1805	3439		1805	3202		3502	1900	1591
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1805	3574	1589	1805	3439		1805	3202		3502	1900	1591
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	104	687	33	58	537	215	19	34	77	311	34	136
RTOR Reduction (vph)	0	0	21	0	37	0	0	64	0	0	0	92
Lane Group Flow (vph)	104	687	12	58	715	0	19	47	0	311	34	44
Confl. Peds. (#/hr)			3			2			4			4
Confl. Bikes (#/hr)			3			4						
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	8.2	27.8	27.8	6.4	26.0		1.4	13.2		13.9	25.0	25.0
Effective Green, g (s)	8.2	27.8	27.8	6.4	26.0		1.4	13.2		13.9	25.0	25.0
Actuated g/C Ratio	0.11	0.36	0.36	0.08	0.34		0.02	0.17		0.18	0.33	0.33
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0		2.0	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	192	1292	574	150	1162		32	549		633	617	517
v/s Ratio Prot	c0.06	0.19		0.03	c0.21		0.01	0.01		c0.09	0.02	
v/s Ratio Perm			0.01									c0.03
v/c Ratio	0.54	0.53	0.02	0.39	0.62		0.59	0.09		0.49	0.06	0.09
Uniform Delay, d1	32.6	19.4	15.8	33.4	21.3		37.5	26.8		28.3	17.8	18.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.7	0.5	0.0	0.6	1.1		18.1	0.0		0.4	0.0	0.1
Delay (s)	34.2	19.9	15.8	34.0	22.4		55.6	26.8		28.8	17.9	18.1
Level of Service	C	B	B	C	C		E	C		C	B	B
Approach Delay (s)		21.6			23.2			31.0			25.0	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.46				
Actuated Cycle Length (s)	76.9	Sum of lost time (s)		16.3	
Intersection Capacity Utilization	58.2%	ICU Level of Service		B	
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd 05/03/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	326	549	661	1039	0	0	0	0	223	6	123
Future Volume (vph)	0	326	549	661	1039	0	0	0	0	223	6	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.91	0.91	
Frpb, ped/bikes		0.99	0.99	1.00	1.00					1.00	0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		0.93	0.85	1.00	1.00					1.00	0.92	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (prot)		3185	1451	3502	3610					1643	3066	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (perm)		3185	1451	3502	3610					1643	3066	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	347	584	703	1105	0	0	0	0	237	6	131
RTOR Reduction (vph)	0	180	204	0	0	0	0	0	0	0	34	0
Lane Group Flow (vph)	0	459	88	703	1105	0	0	0	0	130	210	0
Confl. Peds. (#/hr)			1						13			1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		2		1	6					4	4	
Permitted Phases			2									
Actuated Green, G (s)		15.3	15.3	13.9	32.2					11.5	11.5	
Effective Green, g (s)		15.3	15.3	13.9	32.2					11.5	11.5	
Actuated g/C Ratio		0.30	0.30	0.27	0.64					0.23	0.23	
Clearance Time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Vehicle Extension (s)		4.0	4.0	2.0	2.5					2.0	2.0	
Lane Grp Cap (vph)		961	437	960	2292					372	695	
v/s Ratio Prot		0.14		c0.20	c0.31					c0.08	0.07	
v/s Ratio Perm			0.06									
v/c Ratio		0.48	0.20	0.73	0.48					0.35	0.30	
Uniform Delay, d1		14.4	13.2	16.7	4.9					16.5	16.3	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		0.5	0.3	2.5	0.1					0.2	0.1	
Delay (s)		15.0	13.5	19.2	5.0					16.7	16.4	
Level of Service		B	B	B	A					B	B	
Approach Delay (s)		14.5			10.5			0.0			16.5	
Approach LOS		B			B			A			B	

Intersection Summary				
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	50.7	Sum of lost time (s)	10.0	
Intersection Capacity Utilization	59.5%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd 05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	484	491	762	702	0	0	0	0	363	3	84
Future Volume (vph)	0	484	491	762	702	0	0	0	0	363	3	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.91	0.91	
Frpb, ped/bikes		1.00	0.99	1.00	1.00					1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		0.96	0.85	1.00	1.00					1.00	0.95	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	
Satd. Flow (prot)		3275	1450	3502	3610					1643	3164	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	
Satd. Flow (perm)		3275	1450	3502	3610					1643	3164	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	0	489	496	770	709	0	0	0	0	367	3	85
RTOR Reduction (vph)	0	44	204	0	0	0	0	0	0	0	65	0
Lane Group Flow (vph)	0	638	99	770	709	0	0	0	0	183	207	0
Confl. Peds. (#/hr)			1						7			2
Confl. Bikes (#/hr)			1			2						
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		2		1	6					4	4	
Permitted Phases			2									
Actuated Green, G (s)		17.9	17.9	13.7	34.6					13.2	13.2	
Effective Green, g (s)		17.9	17.9	13.7	34.6					13.2	13.2	
Actuated g/C Ratio		0.33	0.33	0.25	0.63					0.24	0.24	
Clearance Time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Vehicle Extension (s)		4.0	4.0	2.0	2.5					2.0	2.0	
Lane Grp Cap (vph)		1069	473	875	2279					395	762	
v/s Ratio Prot		c0.19		c0.22	0.20					c0.11	0.07	
v/s Ratio Perm			0.07									
v/c Ratio		0.60	0.21	0.88	0.31					0.46	0.27	
Uniform Delay, d1		15.4	13.3	19.8	4.6					17.8	16.9	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.1	0.3	10.0	0.1					0.3	0.1	
Delay (s)		16.5	13.6	29.7	4.7					18.1	17.0	
Level of Service		B	B	C	A					B	B	
Approach Delay (s)		15.6			17.7			0.0			17.4	
Approach LOS		B			B			A			B	

Intersection Summary				
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	54.8	Sum of lost time (s)	10.0	
Intersection Capacity Utilization	68.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	NEL2	NEL
Lane Configurations												
Traffic Volume (vph)	5	51	494	974	1	432	726	12	22	597	23	15
Future Volume (vph)	5	51	494	974	1	432	726	12	22	597	23	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.0	4.0		4.0	3.5		3.5	3.0		3.5
Lane Util. Factor		1.00	0.95	0.86		0.86	0.95		0.95	0.88		1.00
Frpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Frt		1.00	1.00	0.98		0.85	1.00		1.00	0.85		0.99
Flt Protected		0.95	1.00	1.00		1.00	0.95		0.96	1.00		0.95
Satd. Flow (prot)		1802	3574	4618		1323	1715		1710	2842		1768
Flt Permitted		0.18	1.00	1.00		1.00	0.95		0.96	1.00		0.95
Satd. Flow (perm)		339	3574	4618		1323	1715		1710	2842		1768
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	5	53	509	1004	1	445	748	12	23	615	24	15
RTOR Reduction (vph)	0	0	0	11	0	215	0	0	0	0	0	0
Lane Group Flow (vph)	0	58	509	1114	0	111	389	0	394	615	0	41
Confl. Peds. (#/hr)					7					11		
Heavy Vehicles (%)	2%	0%	1%	4%	0%	5%	0%	2%	13%	0%	2%	0%
Turn Type		Prot	NA	NA		Perm	Split	Split	NA	custom	Perm	Prot
Protected Phases		5	2	6			8	8	8	1 8		7
Permitted Phases						6					7	
Actuated Green, G (s)		22.4	52.2	40.8		40.8	34.0		34.0	45.0		8.8
Effective Green, g (s)		22.4	52.2	40.8		40.8	34.0		34.0	45.0		8.8
Actuated g/C Ratio		0.19	0.44	0.34		0.34	0.28		0.28	0.38		0.07
Clearance Time (s)		3.0	4.0	4.0		4.0	3.5		3.5			3.5
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0		2.0			2.0
Lane Grp Cap (vph)		63	1554	1570		449	485		484	1065		129
v/s Ratio Prot			0.14	c0.24			0.23		c0.23	0.22		
v/s Ratio Perm		c0.17				0.08						0.02
v/c Ratio		0.92	0.33	0.71		0.25	0.80		0.81	0.58		0.32
Uniform Delay, d1		47.9	22.3	34.4		28.5	39.9		40.1	29.9		52.8
Progression Factor		1.00	1.00	0.72		0.74	1.00		1.00	1.00		1.00
Incremental Delay, d2		84.4	0.6	2.6		1.2	8.8		9.6	0.5		0.5
Delay (s)		132.3	22.9	27.2		22.3	48.6		49.7	30.4		53.3
Level of Service		F	C	C		C	D		D	C		D
Approach Delay (s)			34.1	26.1					40.9			53.3
Approach LOS			C	C					D			D

Intersection Summary				
HCM 2000 Control Delay	33.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	76.9%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd 05/03/2017

Movement	NER
Lane Configurations	
Traffic Volume (vph)	2
Future Volume (vph)	2
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	2
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	15%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Weekday PM Existing
Proposed Hanna Ranch Project
Synchro 9 Report
W-Trans

Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	NEL2	NEL
Lane Configurations												
Traffic Volume (vph)	5	62	782	1066	1	420	394	2	11	999	2	3
Future Volume (vph)	5	62	782	1066	1	420	394	2	11	999	2	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.0	4.0		4.0	3.5		3.5	3.0		3.5
Lane Util. Factor		1.00	0.95	0.86		0.86	0.95		0.95	0.88		1.00
Frpb, ped/bikes		1.00	1.00	1.00		0.98	1.00		1.00	1.00		0.98
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Frt		1.00	1.00	0.99		0.85	1.00		1.00	0.85		0.98
Flt Protected		0.95	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (prot)		1802	3574	4648		1301	1715		1711	2842		1702
Flt Permitted		0.18	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (perm)		336	3574	4648		1301	1715		1711	2842		1702
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	65	823	1122	1	442	415	2	12	1052	2	3
RTOR Reduction (vph)	0	0	0	7	0	236	0	0	0	0	0	0
Lane Group Flow (vph)	0	70	823	1209	0	113	216	0	213	1052	0	6
Confl. Peds. (#/hr)					3	3				5		
Confl. Bikes (#/hr)					2	2						
Heavy Vehicles (%)	2%	0%	1%	4%	0%	5%	0%	2%	13%	0%	2%	0%
Turn Type		Prot	NA	NA		Perm	Split	Split	NA	custom	Perm	Prot
Protected Phases		5	2	6			8	8	8	1 8		7
Permitted Phases						6					7	
Actuated Green, G (s)		22.6	50.3	38.7		38.7	42.5		42.5	53.5		2.2
Effective Green, g (s)		22.6	50.3	38.7		38.7	42.5		42.5	53.5		2.2
Actuated g/C Ratio		0.19	0.42	0.32		0.32	0.35		0.35	0.45		0.02
Clearance Time (s)		3.0	4.0	4.0		4.0	3.5		3.5			3.5
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0		2.0			2.0
Lane Grp Cap (vph)		63	1498	1498		419	607		605	1267		31
v/s Ratio Prot			0.23	c0.26			0.13		0.12	c0.37		
v/s Ratio Perm		c0.21				0.09						0.00
v/c Ratio		1.11	0.55	0.81		0.27	0.36		0.35	0.83		0.19
Uniform Delay, d1		48.7	26.3	37.2		30.2	28.6		28.6	29.3		58.0
Progression Factor		1.00	1.00	0.72		1.52	1.00		1.00	1.00		1.00
Incremental Delay, d2		147.1	1.5	4.2		1.4	0.1		0.1	4.6		1.1
Delay (s)		195.8	27.8	30.8		47.2	28.8		28.7	33.8		59.1
Level of Service		F	C	C		D	C		C	C		E
Approach Delay (s)			40.9	34.5					32.3			59.1
Approach LOS			D	C					C			E

Intersection Summary			
HCM 2000 Control Delay	35.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd 05/05/2017

Movement	NER
Lane Configurations	
Traffic Volume (vph)	1
Future Volume (vph)	1
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.95
Adj. Flow (vph)	1
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	5
Confl. Bikes (#/hr)	
Heavy Vehicles (%)	15%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Rowland Blvd & Rowland Way 05/03/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	183	909	1004	33	35	392
Future Volume (vph)	183	909	1004	33	35	392
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		3.2	3.2
Lane Util. Factor	0.97	0.91	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		0.98	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		0.87	0.85
Flt Protected	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)	3467	5187	3583		1593	1479
Flt Permitted	0.95	1.00	1.00		0.99	1.00
Satd. Flow (perm)	3467	5187	3583		1593	1479
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	189	937	1035	34	36	404
RTOR Reduction (vph)	0	0	1	0	166	194
Lane Group Flow (vph)	189	937	1068	0	56	24
Confl. Peds. (#/hr)				2		14
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	1%	0%	0%	7%	2%	1%
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	11.5	99.7	84.7		13.1	13.1
Effective Green, g (s)	11.5	99.7	84.7		13.1	13.1
Actuated g/C Ratio	0.10	0.83	0.71		0.11	0.11
Clearance Time (s)	3.5	4.0	4.0		3.2	3.2
Vehicle Extension (s)	2.0	4.0	4.0		2.0	2.0
Lane Grp Cap (vph)	332	4309	2529		173	161
v/s Ratio Prot	c0.05	0.18	c0.30		c0.04	
v/s Ratio Perm						0.02
v/c Ratio	0.57	0.22	0.42		0.33	0.15
Uniform Delay, d1	51.9	2.1	7.4		49.4	48.4
Progression Factor	1.03	1.25	0.68		1.00	1.00
Incremental Delay, d2	1.2	0.1	0.5		0.4	0.2
Delay (s)	54.8	2.7	5.5		49.8	48.6
Level of Service	D	A	A		D	D
Approach Delay (s)		11.5	5.5		49.2	
Approach LOS		B	A		D	

Intersection Summary				
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.7	
Intersection Capacity Utilization	69.1%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: Rowland Blvd & Rowland Way 05/05/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	284	1497	1273	41	47	193
Future Volume (vph)	284	1497	1273	41	47	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		3.2	3.2
Lane Util. Factor	0.97	0.91	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		0.99	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		0.91	0.85
Flt Protected	0.95	1.00	1.00		0.98	1.00
Satd. Flow (prot)	3467	5187	3583		1648	1487
Flt Permitted	0.95	1.00	1.00		0.98	1.00
Satd. Flow (perm)	3467	5187	3583		1648	1487
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	296	1559	1326	43	49	201
RTOR Reduction (vph)	0	0	1	0	62	109
Lane Group Flow (vph)	296	1559	1368	0	65	14
Confl. Peds. (#/hr)				9		5
Confl. Bikes (#/hr)				2		2
Heavy Vehicles (%)	1%	0%	0%	7%	2%	1%
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	14.3	99.3	81.5		13.5	13.5
Effective Green, g (s)	14.3	99.3	81.5		13.5	13.5
Actuated g/C Ratio	0.12	0.83	0.68		0.11	0.11
Clearance Time (s)	3.5	4.0	4.0		3.2	3.2
Vehicle Extension (s)	2.0	4.0	4.0		2.0	2.0
Lane Grp Cap (vph)	413	4292	2433		185	167
v/s Ratio Prot	c0.09	0.30	c0.38		c0.04	
v/s Ratio Perm						0.01
v/c Ratio	0.72	0.36	0.56		0.35	0.08
Uniform Delay, d1	50.9	2.6	10.0		49.2	47.7
Progression Factor	0.97	1.31	0.81		1.00	1.00
Incremental Delay, d2	3.6	0.2	0.8		0.4	0.1
Delay (s)	52.9	3.5	8.9		49.6	47.8
Level of Service	D	A	A		D	D
Approach Delay (s)		11.4	8.9		48.7	
Approach LOS		B	A		D	

Intersection Summary				
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.7	
Intersection Capacity Utilization	66.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
5: Vintage Way (North) & Rowland Blvd

05/03/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	811	5	2	5	2	4	0	224	1	12	184	764
Future Volume (vph)	811	5	2	5	2	4	0	224	1	12	184	764
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6			3.2			4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00			0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	0.99			1.00			1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	1.00	1.00
Frt	1.00	0.96			0.95			1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98			1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1805			1767			3571		1805	3539	2842
Flt Permitted	0.95	1.00			0.98			1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1805			1767			3571		1805	3539	2842
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	836	5	2	5	2	4	0	231	1	12	190	788
RTOR Reduction (vph)	0	1	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	836	6	0	0	7	0	0	232	0	12	190	788
Confl. Peds. (#/hr)			10				9		10			4
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	3	3		4	4		1	6		5	2	2 3
Permitted Phases												
Actuated Green, G (s)	51.4	51.4			2.4			50.0		2.4	49.6	105.0
Effective Green, g (s)	51.4	51.4			2.4			50.0		2.4	49.6	105.0
Actuated g/C Ratio	0.43	0.43			0.02			0.42		0.02	0.41	0.88
Clearance Time (s)	3.6	3.6			3.2			4.0		3.0	4.0	
Vehicle Extension (s)	3.0	3.0			2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	1500	773			35			1487		36	1462	2486
v/s Ratio Prot	c0.24	0.00			c0.00			c0.06		0.01	0.05	c0.28
v/s Ratio Perm												
v/c Ratio	0.56	0.01			0.20			0.16		0.33	0.13	0.32
Uniform Delay, d1	25.8	19.7			57.9			21.8		58.0	21.8	1.3
Progression Factor	1.00	1.00			1.00			1.00		1.23	1.27	0.64
Incremental Delay, d2	1.5	0.0			1.0			0.2		2.0	0.2	0.3
Delay (s)	27.3	19.7			58.9			22.1		73.5	27.8	1.2
Level of Service	C	B			E			C		E	C	A
Approach Delay (s)		27.2			58.9			22.1			7.2	
Approach LOS		C			E			C			A	

Intersection Summary				
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	59.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
5: Vintage Way (North) & Rowland Blvd

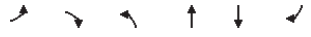
05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	962	9	8	4	8	1	7	330	14	29	333	1175
Future Volume (vph)	962	9	8	4	8	1	7	330	14	29	333	1175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.93			0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1745			1852		1805	3546		1805	3539	2842
Flt Permitted	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1745			1852		1805	3546		1805	3539	2842
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1002	9	8	4	8	1	7	344	15	30	347	1224
RTOR Reduction (vph)	0	5	0	0	1	0	0	2	0	0	0	0
Lane Group Flow (vph)	1002	12	0	0	12	0	7	357	0	30	347	1224
Confl. Peds. (#/hr)			10				9		10			4
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	3	3		4	4		1	6		5	2	2 3
Permitted Phases												
Actuated Green, G (s)	51.4	51.4			4.8		4.0	42.2		7.8	46.0	101.4
Effective Green, g (s)	51.4	51.4			4.8		4.0	42.2		7.8	46.0	101.4
Actuated g/C Ratio	0.43	0.43			0.04		0.03	0.35		0.06	0.38	0.85
Clearance Time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	
Vehicle Extension (s)	3.0	3.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	1500	747			74		60	1247		117	1356	2401
v/s Ratio Prot	c0.29	0.01			c0.01		0.00	c0.10		0.02	0.10	c0.43
v/s Ratio Perm												
v/c Ratio	0.67	0.02			0.16		0.12	0.29		0.26	0.26	0.51
Uniform Delay, d1	27.5	19.7			55.7		56.3	28.0		53.3	25.3	2.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.11	1.15	0.87
Incremental Delay, d2	2.4	0.0			0.4		0.3	0.6		0.4	0.4	0.7
Delay (s)	29.8	19.8			56.0		56.6	28.6		59.6	29.6	2.9
Level of Service	C	B			E		E	C		E	C	A
Approach Delay (s)		29.7			56.0			29.2			9.8	
Approach LOS		C			E			C			A	

Intersection Summary				
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.57			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	66.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Vintage Way (South) & Rowland Blvd

05/03/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	115	1	0	1	0	108
Future Volume (vph)	115	1	0	1	0	108
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	129	1	0	1	0	121

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	130	0	1	121
Volume Left (vph)	129	0	0	0
Volume Right (vph)	1	0	0	121
Hadj (s)	0.23	0.03	0.03	-0.57
Departure Headway (s)	4.4	4.9	4.9	3.7
Degree Utilization, x	0.16	0.00	0.00	0.13
Capacity (veh/h)	802	701	700	929
Control Delay (s)	8.2	6.7	6.7	7.3
Approach Delay (s)	8.2	6.7		7.3
Approach LOS	A	A		A

Intersection Summary				
Delay	7.7			
Level of Service	A			
Intersection Capacity Utilization	20.2%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
6: Vintage Way (South) & Rowland Blvd

05/05/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	165	0	1	0	1	202
Future Volume (vph)	165	0	1	0	1	202
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	176	0	1	0	1	215

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	176	1	0	216
Volume Left (vph)	176	1	0	0
Volume Right (vph)	0	0	0	215
Hadj (s)	0.23	0.53	0.00	-0.56
Departure Headway (s)	4.6	5.6	5.1	3.9
Degree Utilization, x	0.22	0.00	0.00	0.23
Capacity (veh/h)	745	605	689	893
Control Delay (s)	8.9	7.4	6.9	8.0
Approach Delay (s)	8.9	7.4		8.0
Approach LOS	A	A		A

Intersection Summary				
Delay	8.4			
Level of Service	A			
Intersection Capacity Utilization	28.5%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Signalized Intersection Capacity Analysis
1: Redwood Blvd & Rowland Blvd

05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	576	45	95	776	276	31	32	45	307	33	168
Future Volume (vph)	100	576	45	95	776	276	31	32	45	307	33	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	3574	1591	1805	3455		1805	3261		3502	1900	1594
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1805	3574	1591	1805	3455		1805	3261		3502	1900	1594
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	105	606	47	100	817	291	33	34	47	323	35	177
RTOR Reduction (vph)	0	0	28	0	27	0	0	40	0	0	0	137
Lane Group Flow (vph)	105	606	19	100	1081	0	33	41	0	323	35	40
Confl. Peds. (#/hr)			4			3			9			
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	8.0	35.3	35.3	8.9	36.2		5.8	12.2		13.5	19.2	19.2
Effective Green, g (s)	8.0	35.3	35.3	8.9	36.2		5.8	12.2		13.5	19.2	19.2
Actuated g/C Ratio	0.09	0.41	0.41	0.10	0.42		0.07	0.14		0.16	0.22	0.22
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0		2.0	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	168	1475	656	187	1462		122	465		552	426	357
v/s Ratio Prot	c0.06	0.17		0.06	c0.31		0.02	0.01		c0.09	0.02	
v/s Ratio Perm			0.01									c0.02
v/c Ratio	0.62	0.41	0.03	0.53	0.74		0.27	0.09		0.59	0.08	0.11
Uniform Delay, d1	37.3	17.7	14.9	36.3	20.7		37.8	31.8		33.4	26.2	26.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.1	0.3	0.0	1.5	2.1		0.4	0.1		1.3	0.1	0.1
Delay (s)	42.4	18.0	14.9	37.8	22.8		38.3	31.9		34.7	26.2	26.5
Level of Service	D	B	B	D	C		D	C		C	C	C
Approach Delay (s)		21.2			24.1			33.7			31.4	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.59				
Actuated Cycle Length (s)	85.5	Sum of lost time (s)		16.3	
Intersection Capacity Utilization	66.0%	ICU Level of Service		C	
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
1: Redwood Blvd & Rowland Blvd

05/03/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	676	31	55	531	223	18	32	73	316	32	131
Future Volume (vph)	101	676	31	55	531	223	18	32	73	316	32	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	3574	1591	1805	3436		1805	3195		3502	1900	1595
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1805	3574	1591	1805	3436		1805	3195		3502	1900	1595
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	106	712	33	58	559	235	19	34	77	333	34	138
RTOR Reduction (vph)	0	0	21	0	40	0	0	64	0	0	0	94
Lane Group Flow (vph)	106	712	12	58	754	0	19	47	0	333	34	44
Confl. Peds. (#/hr)			4			3			9			
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	8.1	28.9	28.9	6.3	27.1		1.4	13.3		13.8	25.0	25.0
Effective Green, g (s)	8.1	28.9	28.9	6.3	27.1		1.4	13.3		13.8	25.0	25.0
Actuated g/C Ratio	0.10	0.37	0.37	0.08	0.35		0.02	0.17		0.18	0.32	0.32
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0		2.0	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	187	1325	590	145	1195		32	545		620	609	511
v/s Ratio Prot	c0.06	0.20		0.03	c0.22		0.01	0.01		c0.10	0.02	
v/s Ratio Perm			0.01									c0.03
v/c Ratio	0.57	0.54	0.02	0.40	0.63		0.59	0.09		0.54	0.06	0.09
Uniform Delay, d1	33.2	19.2	15.5	34.0	21.2		38.0	27.2		29.1	18.3	18.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.3	0.5	0.0	0.7	1.2		18.1	0.1		0.7	0.0	0.1
Delay (s)	35.6	19.8	15.5	34.7	22.5		56.1	27.2		29.8	18.3	18.5
Level of Service	D	B	B	C	C		E	C		C	B	B
Approach Delay (s)		21.6			23.3			31.5			26.0	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.49				
Actuated Cycle Length (s)	77.9	Sum of lost time (s)		16.3	
Intersection Capacity Utilization	58.6%	ICU Level of Service		B	
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	351	554	684	1068	0	0	0	0	237	6	124
Future Volume (vph)	0	351	554	684	1068	0	0	0	0	237	6	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.91	0.91	
Frpb, ped/bikes		0.99	0.99	1.00	1.00					1.00	0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		0.93	0.85	1.00	1.00					1.00	0.92	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (prot)		3196	1451	3502	3610					1643	3073	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (perm)		3196	1451	3502	3610					1643	3073	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	373	589	728	1136	0	0	0	0	252	6	132
RTOR Reduction (vph)	0	163	208	0	0	0	0	0	0	0	31	0
Lane Group Flow (vph)	0	499	92	728	1136	0	0	0	0	136	223	0
Confl. Peds. (#/hr)			1						13			1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		2		1	6					4	4	
Permitted Phases			2									
Actuated Green, G (s)		15.8	15.8	13.9	32.7					11.8	11.8	
Effective Green, g (s)		15.8	15.8	13.9	32.7					11.8	11.8	
Actuated g/C Ratio		0.31	0.31	0.27	0.63					0.23	0.23	
Clearance Time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Vehicle Extension (s)		4.0	4.0	2.0	2.5					2.0	2.0	
Lane Grp Cap (vph)		980	445	945	2292					376	704	
v/s Ratio Prot		0.16		c0.21	c0.31					c0.08	0.07	
v/s Ratio Perm			0.06									
v/c Ratio		0.51	0.21	0.77	0.50					0.36	0.32	
Uniform Delay, d1		14.7	13.2	17.3	5.0					16.7	16.5	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		0.6	0.3	3.6	0.1					0.2	0.1	
Delay (s)		15.2	13.5	20.9	5.1					16.9	16.6	
Level of Service		B	B	C	A					B	B	
Approach Delay (s)		14.7			11.3			0.0			16.7	
Approach LOS		B			B			A			B	

Intersection Summary				
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.58			
Actuated Cycle Length (s)	51.5	Sum of lost time (s)	10.0	
Intersection Capacity Utilization	60.6%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

05/03/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	521	498	792	741	0	0	0	0	385	3	86
Future Volume (vph)	0	521	498	792	741	0	0	0	0	385	3	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.91	0.91	
Frpb, ped/bikes		1.00	0.99	1.00	1.00					1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		0.96	0.85	1.00	1.00					1.00	0.95	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	
Satd. Flow (prot)		3287	1451	3502	3610					1643	3168	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	
Satd. Flow (perm)		3287	1451	3502	3610					1643	3168	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	554	530	843	788	0	0	0	0	410	3	91
RTOR Reduction (vph)	0	36	219	0	0	0	0	0	0	0	69	0
Lane Group Flow (vph)	0	714	115	843	788	0	0	0	0	205	230	0
Confl. Peds. (#/hr)			1						13			1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		2		1	6					4	4	
Permitted Phases			2									
Actuated Green, G (s)		19.6	19.6	13.5	36.1					14.0	14.0	
Effective Green, g (s)		19.6	19.6	13.5	36.1					14.0	14.0	
Actuated g/C Ratio		0.34	0.34	0.24	0.63					0.25	0.25	
Clearance Time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Vehicle Extension (s)		4.0	4.0	2.0	2.5					2.0	2.0	
Lane Grp Cap (vph)		1128	498	827	2282					402	776	
v/s Ratio Prot		c0.22		c0.24	0.22					c0.12	0.07	
v/s Ratio Perm			0.08									
v/c Ratio		0.63	0.23	1.02	0.35					0.51	0.30	
Uniform Delay, d1		15.7	13.4	21.8	4.9					18.6	17.5	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.3	0.3	36.2	0.1					0.4	0.1	
Delay (s)		17.0	13.7	58.0	5.0					19.0	17.6	
Level of Service		B	B	E	A					B	B	
Approach Delay (s)		16.0			32.4			0.0			18.2	
Approach LOS		B			C			A			B	

Intersection Summary				
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	57.1	Sum of lost time (s)	10.0	
Intersection Capacity Utilization	70.1%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	NEL2	NEL
Lane Configurations												
Traffic Volume (vph)	5	52	532	1023	1	448	730	12	22	619	23	15
Future Volume (vph)	5	52	532	1023	1	448	730	12	22	619	23	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.0	4.0		4.0	3.5		3.5	3.0		3.5
Lane Util. Factor		1.00	0.95	0.86		0.86	0.95		0.95	0.88		1.00
Frpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Frt		1.00	1.00	0.98		0.85	1.00		1.00	0.85		0.99
Flt Protected		0.95	1.00	1.00		1.00	0.95		0.96	1.00		0.95
Satd. Flow (prot)		1802	3574	4622		1323	1715		1710	2842		1768
Flt Permitted		0.18	1.00	1.00		1.00	0.95		0.96	1.00		0.95
Satd. Flow (perm)		340	3574	4622		1323	1715		1710	2842		1768
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	5	54	548	1055	1	462	753	12	23	638	24	15
RTOR Reduction (vph)	0	0	0	11	0	226	0	0	0	0	0	0
Lane Group Flow (vph)	0	59	548	1165	0	116	392	0	396	638	0	41
Confl. Peds. (#/hr)					7					11		
Heavy Vehicles (%)	2%	0%	1%	4%	0%	5%	0%	2%	13%	0%	2%	0%
Turn Type		Prot	NA	NA		Perm	Split	Split	NA	custom	Perm	Prot
Protected Phases		5	2	6			8	8	8	1 8		7
Permitted Phases						6					7	
Actuated Green, G (s)		22.3	52.1	40.8		40.8	34.1		34.1	45.1		8.8
Effective Green, g (s)		22.3	52.1	40.8		40.8	34.1		34.1	45.1		8.8
Actuated g/C Ratio		0.19	0.43	0.34		0.34	0.28		0.28	0.38		0.07
Clearance Time (s)		3.0	4.0	4.0		4.0	3.5		3.5			3.5
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0		2.0			2.0
Lane Grp Cap (vph)		63	1551	1571		449	487		485	1068		129
v/s Ratio Prot			0.15	c0.25			0.23		c0.23	0.22		
v/s Ratio Perm		c0.17				0.09						0.02
v/c Ratio		0.94	0.35	0.74		0.26	0.80		0.82	0.60		0.32
Uniform Delay, d1		48.2	22.7	35.0		28.7	39.9		40.0	30.1		52.8
Progression Factor		1.00	1.00	0.76		0.95	1.00		1.00	1.00		1.00
Incremental Delay, d2		89.3	0.6	3.0		1.3	8.9		9.7	0.6		0.5
Delay (s)		137.4	23.3	29.5		28.5	48.7		49.8	30.7		53.3
Level of Service		F	C	C		C	D		D	C		D
Approach Delay (s)			34.4	29.3					41.0			53.3
Approach LOS			C	C					D			D

Intersection Summary				
HCM 2000 Control Delay	35.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.77			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	78.0%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd 05/05/2017

Movement	NER
Lane Configurations	
Traffic Volume (vph)	2
Future Volume (vph)	2
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	2
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	15%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Weekday PM Baseline
Proposed Hanna Ranch Project
Synchro 9 Report
W-Trans

Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	NEL2	NEL
Lane Configurations												
Traffic Volume (vph)	5	64	839	1129	1	440	400	2	11	1032	2	3
Future Volume (vph)	5	64	839	1129	1	440	400	2	11	1032	2	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.0	4.0		4.0	3.5		3.5	3.0		3.5
Lane Util. Factor		1.00	0.95	0.86		0.86	0.95		0.95	0.88		1.00
Frpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Frt		1.00	1.00	0.99		0.85	1.00		1.00	0.85		0.98
Flt Protected		0.95	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (prot)		1802	3574	4648		1323	1715		1711	2842		1728
Flt Permitted		0.18	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (perm)		337	3574	4648		1323	1715		1711	2842		1728
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	5	66	865	1164	1	454	412	2	11	1064	2	3
RTOR Reduction (vph)	0	0	0	7	0	239	0	0	0	0	0	0
Lane Group Flow (vph)	0	71	865	1249	0	124	214	0	211	1064	0	6
Confl. Peds. (#/hr)					7					11		
Heavy Vehicles (%)	2%	0%	1%	4%	0%	5%	0%	2%	13%	0%	2%	0%
Turn Type		Prot	NA	NA		Perm	Split	Split	NA	custom	Perm	Prot
Protected Phases		5	2	6			8	8	8	1 8		7
Permitted Phases						6					7	
Actuated Green, G (s)		22.5	50.2	38.7		38.7	42.6		42.6	53.6		2.2
Effective Green, g (s)		22.5	50.2	38.7		38.7	42.6		42.6	53.6		2.2
Actuated g/C Ratio		0.19	0.42	0.32		0.32	0.36		0.36	0.45		0.02
Clearance Time (s)		3.0	4.0	4.0		4.0	3.5		3.5			3.5
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0		2.0			2.0
Lane Grp Cap (vph)		63	1495	1498		426	608		607	1269		31
v/s Ratio Prot			0.24	c0.27			0.12		0.12	c0.37		
v/s Ratio Perm		c0.21				0.09						0.00
v/c Ratio		1.13	0.58	0.83		0.29	0.35		0.35	0.84		0.19
Uniform Delay, d1		48.8	26.8	37.7		30.4	28.5		28.5	29.4		58.0
Progression Factor		1.00	1.00	0.74		1.47	1.00		1.00	1.00		1.00
Incremental Delay, d2		152.3	1.6	4.8		1.5	0.1		0.1	4.8		1.1
Delay (s)		201.0	28.4	32.6		46.2	28.7		28.6	34.2		59.1
Level of Service		F	C	C		D	C		C	C		E
Approach Delay (s)			41.5	35.7					32.6			59.1
Approach LOS			D	D					C			E

Intersection Summary			
HCM 2000 Control Delay	35.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd 05/03/2017

Movement	NER
Lane Configurations	
Traffic Volume (vph)	1
Future Volume (vph)	1
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	1
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	15%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Proposed Hanna Ranch Project
Weekend Midday Baseline
Synchro 9 Report
W-Trans

HCM Signalized Intersection Capacity Analysis
4: Rowland Blvd & Rowland Way

05/05/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	184	968	1068	34	36	392
Future Volume (vph)	184	968	1068	34	36	392
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		3.2	3.2
Lane Util. Factor	0.97	0.91	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		0.98	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		0.87	0.85
Flt Protected	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)	3467	5187	3584		1594	1479
Flt Permitted	0.95	1.00	1.00		0.99	1.00
Satd. Flow (perm)	3467	5187	3584		1594	1479
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	190	998	1101	35	37	404
RTOR Reduction (vph)	0	0	1	0	166	194
Lane Group Flow (vph)	190	998	1135	0	57	24
Confl. Peds. (#/hr)				2		14
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	1%	0%	0%	7%	2%	1%
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	11.5	99.6	84.6		13.2	13.2
Effective Green, g (s)	11.5	99.6	84.6		13.2	13.2
Actuated g/C Ratio	0.10	0.83	0.70		0.11	0.11
Clearance Time (s)	3.5	4.0	4.0		3.2	3.2
Vehicle Extension (s)	2.0	4.0	4.0		2.0	2.0
Lane Grp Cap (vph)	332	4305	2526		175	162
v/s Ratio Prot	c0.05	0.19	c0.32		c0.04	
v/s Ratio Perm						0.02
v/c Ratio	0.57	0.23	0.45		0.33	0.15
Uniform Delay, d1	51.9	2.1	7.6		49.3	48.3
Progression Factor	1.04	1.24	0.76		1.00	1.00
Incremental Delay, d2	1.4	0.1	0.5		0.4	0.2
Delay (s)	55.1	2.8	6.4		49.7	48.5
Level of Service	E	A	A		D	D
Approach Delay (s)		11.2	6.4		49.1	
Approach LOS		B	A		D	

Intersection Summary				
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.45			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.7	
Intersection Capacity Utilization	70.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: Rowland Blvd & Rowland Way

05/03/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	286	1586	1355	43	49	194
Future Volume (vph)	286	1586	1355	43	49	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		3.2	3.2
Lane Util. Factor	0.97	0.91	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		0.98	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		0.91	0.85
Flt Protected	0.95	1.00	1.00		0.98	1.00
Satd. Flow (prot)	3467	5187	3584		1644	1479
Flt Permitted	0.95	1.00	1.00		0.98	1.00
Satd. Flow (perm)	3467	5187	3584		1644	1479
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	295	1635	1397	44	51	200
RTOR Reduction (vph)	0	0	1	0	59	108
Lane Group Flow (vph)	295	1635	1440	0	70	14
Confl. Peds. (#/hr)				2		14
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	1%	0%	0%	7%	2%	1%
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	14.2	99.1	81.4		13.7	13.7
Effective Green, g (s)	14.2	99.1	81.4		13.7	13.7
Actuated g/C Ratio	0.12	0.83	0.68		0.11	0.11
Clearance Time (s)	3.5	4.0	4.0		3.2	3.2
Vehicle Extension (s)	2.0	4.0	4.0		2.0	2.0
Lane Grp Cap (vph)	410	4283	2431		187	168
v/s Ratio Prot	c0.09	0.32	c0.40		c0.04	
v/s Ratio Perm						0.01
v/c Ratio	0.72	0.38	0.59		0.37	0.08
Uniform Delay, d1	51.0	2.7	10.4		49.2	47.5
Progression Factor	0.97	1.27	0.90		1.00	1.00
Incremental Delay, d2	3.6	0.2	0.9		0.5	0.1
Delay (s)	53.3	3.6	10.3		49.6	47.6
Level of Service	D	A	B		D	D
Approach Delay (s)		11.2	10.3		48.6	
Approach LOS		B	B		D	

Intersection Summary				
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.58			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.7	
Intersection Capacity Utilization	73.9%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
5: Vintage Way (North) & Rowland Blvd

05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	811	5	2	5	2	4	0	289	1	11	244	764
Future Volume (vph)	811	5	2	5	2	4	0	289	1	11	244	764
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6			3.2			4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00			0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	0.99			1.00			1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	1.00	1.00
Frt	1.00	0.96			0.95			1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98			1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1805			1767			3572		1805	3539	2842
Flt Permitted	0.95	1.00			0.98			1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1805			1767			3572		1805	3539	2842
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	836	5	2	5	2	4	0	298	1	11	252	788
RTOR Reduction (vph)	0	1	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	836	6	0	0	7	0	0	299	0	11	252	788
Confl. Peds. (#/hr)			10				9		10			4
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	3	3		4	4		1	6		5	2	2 3
Permitted Phases												
Actuated Green, G (s)	51.4	51.4			2.4			50.0		2.4	49.6	105.0
Effective Green, g (s)	51.4	51.4			2.4			50.0		2.4	49.6	105.0
Actuated g/C Ratio	0.43	0.43			0.02			0.42		0.02	0.41	0.88
Clearance Time (s)	3.6	3.6			3.2			4.0		3.0	4.0	
Vehicle Extension (s)	3.0	3.0			2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	1500	773			35			1488		36	1462	2486
v/s Ratio Prot	c0.24	0.00			c0.00			c0.08		0.01	0.07	c0.28
v/s Ratio Perm												
v/c Ratio	0.56	0.01			0.20			0.20		0.31	0.17	0.32
Uniform Delay, d1	25.8	19.7			57.9			22.3		58.0	22.2	1.3
Progression Factor	1.00	1.00			1.00			1.00		1.24	1.26	0.62
Incremental Delay, d2	1.5	0.0			1.0			0.3		1.7	0.3	0.3
Delay (s)	27.3	19.7			58.9			22.6		73.6	28.3	1.1
Level of Service	C	B			E			C		E	C	A
Approach Delay (s)		27.2			58.9			22.6			8.4	
Approach LOS		C			E			C			A	

Intersection Summary				
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	59.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
5: Vintage Way (North) & Rowland Blvd

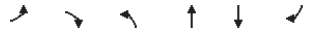
05/03/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	962	9	8	4	8	1	7	414	14	29	424	1175
Future Volume (vph)	962	9	8	4	8	1	7	414	14	29	424	1175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.93			0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1745			1852		1805	3552		1805	3539	2842
Flt Permitted	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1745			1852		1805	3552		1805	3539	2842
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	992	9	8	4	8	1	7	427	14	30	437	1211
RTOR Reduction (vph)	0	5	0	0	1	0	0	2	0	0	0	0
Lane Group Flow (vph)	992	12	0	0	12	0	7	439	0	30	437	1211
Confl. Peds. (#/hr)			10				9		10			4
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	3	3		4	4		1	6		5	2	2 3
Permitted Phases												
Actuated Green, G (s)	51.4	51.4			4.8		4.0	42.2		7.8	46.0	101.4
Effective Green, g (s)	51.4	51.4			4.8		4.0	42.2		7.8	46.0	101.4
Actuated g/C Ratio	0.43	0.43			0.04		0.03	0.35		0.06	0.38	0.85
Clearance Time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	
Vehicle Extension (s)	3.0	3.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	1500	747			74		60	1249		117	1356	2401
v/s Ratio Prot	c0.28	0.01			c0.01		0.00	c0.12		0.02	0.12	c0.43
v/s Ratio Perm												
v/c Ratio	0.66	0.02			0.16		0.12	0.35		0.26	0.32	0.50
Uniform Delay, d1	27.4	19.7			55.7		56.3	28.8		53.3	26.0	2.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.11	1.16	0.85
Incremental Delay, d2	2.3	0.0			0.4		0.3	0.8		0.4	0.6	0.7
Delay (s)	29.7	19.8			56.0		56.6	29.6		59.6	30.7	2.9
Level of Service	C	B			E		E	C		E	C	A
Approach Delay (s)		29.5			56.0			30.0			11.1	
Approach LOS		C			E			C			B	

Intersection Summary				
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.57			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	66.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Vintage Way (South) & Rowland Blvd

05/05/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	115	1	0	1	0	108
Future Volume (vph)	115	1	0	1	0	108
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	129	1	0	1	0	121

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	130	0	1	121
Volume Left (vph)	129	0	0	0
Volume Right (vph)	1	0	0	121
Hadj (s)	0.23	0.03	0.03	-0.57
Departure Headway (s)	4.4	4.9	4.9	3.7
Degree Utilization, x	0.16	0.00	0.00	0.13
Capacity (veh/h)	802	701	700	929
Control Delay (s)	8.2	6.7	6.7	7.3
Approach Delay (s)	8.2	6.7		7.3
Approach LOS	A	A		A

Intersection Summary				
Delay		7.7		
Level of Service		A		
Intersection Capacity Utilization		20.2%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
6: Vintage Way (South) & Rowland Blvd

05/03/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	165	0	1	0	0	202
Future Volume (vph)	165	0	1	0	0	202
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	185	0	1	0	0	227

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	185	1	0	227
Volume Left (vph)	185	1	0	0
Volume Right (vph)	0	0	0	227
Hadj (s)	0.23	0.53	0.00	-0.57
Departure Headway (s)	4.6	5.7	5.1	3.9
Degree Utilization, x	0.24	0.00	0.00	0.25
Capacity (veh/h)	740	600	671	888
Control Delay (s)	9.0	7.5	6.9	8.2
Approach Delay (s)	9.0	7.5		8.2
Approach LOS	A	A		A

Intersection Summary				
Delay		8.6		
Level of Service		A		
Intersection Capacity Utilization		28.6%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Signalized Intersection Capacity Analysis
1: Redwood Blvd & Rowland Blvd

05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	609	46	97	845	342	32	33	46	381	34	173
Future Volume (vph)	105	609	46	97	845	342	32	33	46	381	34	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	3574	1591	1805	3440		1805	3260		3502	1900	1594
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1805	3574	1591	1805	3440		1805	3260		3502	1900	1594
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)	105	609	46	97	845	342	32	33	46	381	34	173
RTOR Reduction (vph)	0	0	26	0	32	0	0	40	0	0	0	136
Lane Group Flow (vph)	105	609	20	97	1155	0	32	39	0	381	34	37
Confl. Peds. (#/hr)			4			3			9			
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	8.1	38.3	38.3	9.0	39.2		5.9	12.3		13.1	18.8	18.8
Effective Green, g (s)	8.1	38.3	38.3	9.0	39.2		5.9	12.3		13.1	18.8	18.8
Actuated g/C Ratio	0.09	0.43	0.43	0.10	0.44		0.07	0.14		0.15	0.21	0.21
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0		2.0	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	165	1550	690	183	1527		120	454		519	404	339
v/s Ratio Prot	c0.06	0.17		0.05	c0.34		0.02	0.01		c0.11	0.02	
v/s Ratio Perm			0.01									c0.02
v/c Ratio	0.64	0.39	0.03	0.53	0.76		0.27	0.09		0.73	0.08	0.11
Uniform Delay, d1	38.7	17.1	14.3	37.6	20.6		39.1	33.1		35.9	27.9	28.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.8	0.2	0.0	1.5	2.3		0.4	0.1		5.0	0.1	0.1
Delay (s)	44.5	17.3	14.4	39.1	22.9		39.6	33.2		41.0	27.9	28.1
Level of Service	D	B	B	D	C		D	C		D	C	C
Approach Delay (s)		20.9			24.1			35.0			36.4	
Approach LOS		C			C			D			D	

Intersection Summary					
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.64				
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	16.3		
Intersection Capacity Utilization	72.2%	ICU Level of Service	C		
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
1: Redwood Blvd & Rowland Blvd

05/03/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	730	35	61	570	228	20	36	82	330	36	144
Future Volume (vph)	111	730	35	61	570	228	20	36	82	330	36	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	3574	1591	1805	3441		1805	3193		3502	1900	1595
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1805	3574	1591	1805	3441		1805	3193		3502	1900	1595
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)	111	730	35	61	570	228	20	36	82	330	36	144
RTOR Reduction (vph)	0	0	23	0	39	0	0	64	0	0	0	95
Lane Group Flow (vph)	111	730	12	61	759	0	20	54	0	330	36	49
Confl. Peds. (#/hr)			4			3			9			
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	11.5	28.0	28.0	9.6	26.1		1.5	18.1		12.5	28.4	28.4
Effective Green, g (s)	11.5	28.0	28.0	9.6	26.1		1.5	18.1		12.5	28.4	28.4
Actuated g/C Ratio	0.14	0.33	0.33	0.11	0.31		0.02	0.22		0.15	0.34	0.34
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0		2.0	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	247	1194	531	206	1071		32	689		522	643	540
v/s Ratio Prot	c0.06	0.20		0.03	c0.22		0.01	0.02		c0.09	0.02	
v/s Ratio Perm			0.01									c0.03
v/c Ratio	0.45	0.61	0.02	0.30	0.71		0.62	0.08		0.63	0.06	0.09
Uniform Delay, d1	33.2	23.3	18.7	34.0	25.5		40.9	26.2		33.5	18.7	18.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.5	1.1	0.0	0.3	2.3		24.3	0.0		2.2	0.0	0.1
Delay (s)	33.7	24.4	18.7	34.3	27.8		65.1	26.2		35.7	18.7	18.9
Level of Service	C	C	B	C	C		E	C		D	B	B
Approach Delay (s)		25.4			28.3			31.9			29.8	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.49				
Actuated Cycle Length (s)	83.8	Sum of lost time (s)	16.3		
Intersection Capacity Utilization	60.1%	ICU Level of Service	B		
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	393	619	711	1151	0	0	0	0	244	6	176
Future Volume (vph)	0	393	619	711	1151	0	0	0	0	244	6	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.91	0.91	
Frpb, ped/bikes		0.99	0.99	1.00	1.00					1.00	0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		0.93	0.85	1.00	1.00					1.00	0.90	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (prot)		3196	1451	3502	3610					1643	3030	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (perm)		3196	1451	3502	3610					1643	3030	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	393	619	711	1151	0	0	0	0	244	6	176
RTOR Reduction (vph)	0	160	216	0	0	0	0	0	0	0	29	0
Lane Group Flow (vph)	0	536	100	711	1151	0	0	0	0	149	248	0
Confl. Peds. (#/hr)			1						13			1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		2		1	6					4	4	
Permitted Phases			2									
Actuated Green, G (s)		16.7	16.7	13.8	33.5					12.2	12.2	
Effective Green, g (s)		16.7	16.7	13.8	33.5					12.2	12.2	
Actuated g/C Ratio		0.32	0.32	0.26	0.64					0.23	0.23	
Clearance Time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Vehicle Extension (s)		4.0	4.0	2.0	2.5					2.0	2.0	
Lane Grp Cap (vph)		1012	459	917	2294					380	701	
v/s Ratio Prot		0.17		c0.20	c0.32					c0.09	0.08	
v/s Ratio Perm			0.07									
v/c Ratio		0.53	0.22	0.78	0.50					0.39	0.35	
Uniform Delay, d1		14.8	13.2	18.0	5.1					17.1	16.9	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		0.7	0.3	3.8	0.1					0.2	0.1	
Delay (s)		15.4	13.5	21.8	5.3					17.4	17.1	
Level of Service		B	B	C	A					B	B	
Approach Delay (s)		14.8			11.6			0.0			17.2	
Approach LOS		B			B			A			B	

Intersection Summary				
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.59			
Actuated Cycle Length (s)	52.7	Sum of lost time (s)	10.0	
Intersection Capacity Utilization	65.3%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

05/03/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	541	549	852	785	0	0	0	0	406	3	94
Future Volume (vph)	0	541	549	852	785	0	0	0	0	406	3	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.91	0.91	
Frpb, ped/bikes		1.00	0.99	1.00	1.00					1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		0.96	0.85	1.00	1.00					1.00	0.95	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	
Satd. Flow (prot)		3275	1451	3502	3610					1643	3165	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	
Satd. Flow (perm)		3275	1451	3502	3610					1643	3165	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	541	549	852	785	0	0	0	0	406	3	94
RTOR Reduction (vph)	0	43	220	0	0	0	0	0	0	0	71	0
Lane Group Flow (vph)	0	712	115	852	785	0	0	0	0	203	229	0
Confl. Peds. (#/hr)			1						13			1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		2		1	6					4	4	
Permitted Phases			2									
Actuated Green, G (s)		19.6	19.6	13.5	36.1					13.9	13.9	
Effective Green, g (s)		19.6	19.6	13.5	36.1					13.9	13.9	
Actuated g/C Ratio		0.34	0.34	0.24	0.63					0.24	0.24	
Clearance Time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Vehicle Extension (s)		4.0	4.0	2.0	2.5					2.0	2.0	
Lane Grp Cap (vph)		1126	498	829	2286					400	771	
v/s Ratio Prot		c0.22		c0.24	0.22					c0.12	0.07	
v/s Ratio Perm			0.08									
v/c Ratio		0.63	0.23	1.03	0.34					0.51	0.30	
Uniform Delay, d1		15.7	13.3	21.8	4.9					18.6	17.6	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.3	0.3	38.5	0.1					0.4	0.1	
Delay (s)		17.0	13.7	60.3	5.0					19.0	17.6	
Level of Service		B	B	E	A					B	B	
Approach Delay (s)		16.0			33.8			0.0			18.2	
Approach LOS		B			C			A			B	

Intersection Summary				
HCM 2000 Control Delay	25.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	10.0	
Intersection Capacity Utilization	73.4%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	NEL2	NEL
Lane Configurations												
Traffic Volume (vph)	6	82	551	1079	2	470	783	13	22	625	24	16
Future Volume (vph)	6	82	551	1079	2	470	783	13	22	625	24	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.0	4.0		4.0	3.5		3.5	3.0		3.5
Lane Util. Factor		1.00	0.95	0.86		0.86	0.95		0.95	0.88		1.00
Frpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Frt		1.00	1.00	0.98		0.85	1.00		1.00	0.85		0.99
Flt Protected		0.95	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (prot)		1803	3574	4613		1323	1715		1710	2842		1760
Flt Permitted		0.19	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (perm)		351	3574	4613		1323	1715		1710	2842		1760
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	6	82	551	1079	2	485	783	13	22	625	24	16
RTOR Reduction (vph)	0	0	0	13	0	230	0	0	0	0	0	0
Lane Group Flow (vph)	0	88	551	1204	0	119	407	0	411	625	0	43
Confl. Peds. (#/hr)					7					11		
Heavy Vehicles (%)	2%	0%	1%	4%	0%	5%	0%	2%	13%	0%	2%	0%
Turn Type		Prot	NA	NA		Perm	Split	Split	NA	custom	Perm	Prot
Protected Phases		5	2	6			8	8	8	1 8		7
Permitted Phases						6					7	
Actuated Green, G (s)		21.6	51.4	40.8		40.8	34.8		34.8	45.8		8.8
Effective Green, g (s)		21.6	51.4	40.8		40.8	34.8		34.8	45.8		8.8
Actuated g/C Ratio		0.18	0.43	0.34		0.34	0.29		0.29	0.38		0.07
Clearance Time (s)		3.0	4.0	4.0		4.0	3.5		3.5			3.5
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0		2.0			2.0
Lane Grp Cap (vph)		63	1530	1568		449	497		495	1084		129
v/s Ratio Prot			0.15	c0.26			0.24		c0.24	0.22		
v/s Ratio Perm		c0.25				0.09						0.02
v/c Ratio		1.40	0.36	0.77		0.26	0.82		0.83	0.58		0.33
Uniform Delay, d1		49.2	23.2	35.4		28.7	39.7		39.8	29.4		52.8
Progression Factor		1.00	1.00	0.78		1.03	1.00		1.00	1.00		1.00
Incremental Delay, d2		250.3	0.7	3.4		1.3	9.6		10.8	0.5		0.6
Delay (s)		299.5	23.8	30.8		30.8	49.3		50.7	29.9		53.4
Level of Service		F	C	C		C	D		D	C		D
Approach Delay (s)			61.8	30.8					41.3			53.4
Approach LOS			E	C					D			D

Intersection Summary				
HCM 2000 Control Delay	40.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	81.9%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd 05/05/2017

Movement	NER
Lane Configurations	
Traffic Volume (vph)	3
Future Volume (vph)	3
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	1.00
Adj. Flow (vph)	3
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	15%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Weekday PM Future
Proposed Hanna Ranch Project
Synchro 9 Report
W-Trans

Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	NEL2	NEL
Lane Configurations												
Traffic Volume (vph)	6	69	874	1192	2	470	440	3	12	1117	3	4
Future Volume (vph)	6	69	874	1192	2	470	440	3	12	1117	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.0	4.0		4.0	3.5		3.5	3.0		3.5
Lane Util. Factor		1.00	0.95	0.86		0.86	0.95		0.95	0.88		1.00
Frpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Frt		1.00	1.00	0.99		0.85	1.00		1.00	0.85		0.97
Flt Protected		0.95	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (prot)		1802	3574	4636		1323	1715		1711	2842		1706
Flt Permitted		0.18	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (perm)		345	3574	4636		1323	1715		1711	2842		1706
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	6	69	874	1192	2	485	440	3	12	1117	3	4
RTOR Reduction (vph)	0	0	0	9	0	247	0	0	0	0	0	0
Lane Group Flow (vph)	0	75	874	1297	0	126	229	0	226	1117	0	9
Confl. Peds. (#/hr)					7					11		
Heavy Vehicles (%)	2%	0%	1%	4%	0%	5%	0%	2%	13%	0%	2%	0%
Turn Type		Prot	NA	NA		Perm	Split	Split	NA	custom	Perm	Prot
Protected Phases		5	2	6			8	8	8	1 8		7
Permitted Phases						6					7	
Actuated Green, G (s)		22.0	49.7	38.7		38.7	43.1		43.1	54.1		2.2
Effective Green, g (s)		22.0	49.7	38.7		38.7	43.1		43.1	54.1		2.2
Actuated g/C Ratio		0.18	0.41	0.32		0.32	0.36		0.36	0.45		0.02
Clearance Time (s)		3.0	4.0	4.0		4.0	3.5		3.5			3.5
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0		2.0			2.0
Lane Grp Cap (vph)		63	1480	1495		426	615		614	1281		31
v/s Ratio Prot			0.24	c0.28			0.13		0.13	c0.39		
v/s Ratio Perm		c0.22				0.10						0.01
v/c Ratio		1.19	0.59	0.87		0.30	0.37		0.37	0.87		0.29
Uniform Delay, d1		49.0	27.3	38.2		30.4	28.4		28.4	29.8		58.1
Progression Factor		1.00	1.00	0.71		1.42	1.00		1.00	1.00		1.00
Incremental Delay, d2		173.8	1.7	6.0		1.5	0.1		0.1	6.6		1.9
Delay (s)		222.8	29.0	33.2		44.7	28.6		28.5	36.4		60.0
Level of Service		F	C	C		D	C		C	D		E
Approach Delay (s)			44.3	35.7					34.1			60.0
Approach LOS			D	D					C			E

Intersection Summary			
HCM 2000 Control Delay	37.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd 05/03/2017

Movement	NER
Lane Configurations	
Traffic Volume (vph)	2
Future Volume (vph)	2
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	1.00
Adj. Flow (vph)	2
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	15%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Proposed Hanna Ranch Project
Weekend Midday Future
Synchro 9 Report
W-Trans

HCM Signalized Intersection Capacity Analysis
4: Rowland Blvd & Rowland Way

05/05/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	187	994	1148	34	36	400
Future Volume (vph)	187	994	1148	34	36	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		3.2	3.2
Lane Util. Factor	0.97	0.91	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		0.98	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		0.87	0.85
Flt Protected	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)	3467	5187	3586		1594	1479
Flt Permitted	0.95	1.00	1.00		0.99	1.00
Satd. Flow (perm)	3467	5187	3586		1594	1479
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	187	994	1148	34	36	400
RTOR Reduction (vph)	0	0	1	0	164	192
Lane Group Flow (vph)	187	994	1181	0	56	24
Confl. Peds. (#/hr)				2		14
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	1%	0%	0%	7%	2%	1%
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	11.4	99.7	84.8		13.1	13.1
Effective Green, g (s)	11.4	99.7	84.8		13.1	13.1
Actuated g/C Ratio	0.10	0.83	0.71		0.11	0.11
Clearance Time (s)	3.5	4.0	4.0		3.2	3.2
Vehicle Extension (s)	2.0	4.0	4.0		2.0	2.0
Lane Grp Cap (vph)	329	4309	2534		174	161
v/s Ratio Prot	c0.05	0.19	c0.33		c0.04	
v/s Ratio Perm						0.02
v/c Ratio	0.57	0.23	0.47		0.32	0.15
Uniform Delay, d1	51.9	2.1	7.7		49.4	48.4
Progression Factor	1.04	1.20	0.79		1.00	1.00
Incremental Delay, d2	1.2	0.1	0.6		0.4	0.2
Delay (s)	55.1	2.7	6.6		49.7	48.5
Level of Service	E	A	A		D	D
Approach Delay (s)		11.0	6.6		49.1	
Approach LOS		B	A		D	

Intersection Summary				
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.46			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.7	
Intersection Capacity Utilization	73.3%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: Rowland Blvd & Rowland Way

05/03/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	319	1674	1423	46	53	216
Future Volume (vph)	319	1674	1423	46	53	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		3.2	3.2
Lane Util. Factor	0.97	0.91	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		0.98	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		0.91	0.85
Flt Protected	0.95	1.00	1.00		0.98	1.00
Satd. Flow (prot)	3467	5187	3584		1643	1479
Flt Permitted	0.95	1.00	1.00		0.98	1.00
Satd. Flow (perm)	3467	5187	3584		1643	1479
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	319	1674	1423	46	53	216
RTOR Reduction (vph)	0	0	1	0	61	117
Lane Group Flow (vph)	319	1674	1468	0	76	15
Confl. Peds. (#/hr)				2		14
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	1%	0%	0%	7%	2%	1%
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	15.0	98.8	80.3		14.0	14.0
Effective Green, g (s)	15.0	98.8	80.3		14.0	14.0
Actuated g/C Ratio	0.12	0.82	0.67		0.12	0.12
Clearance Time (s)	3.5	4.0	4.0		3.2	3.2
Vehicle Extension (s)	2.0	4.0	4.0		2.0	2.0
Lane Grp Cap (vph)	433	4270	2398		191	172
v/s Ratio Prot	c0.09	0.32	c0.41		c0.05	
v/s Ratio Perm						0.01
v/c Ratio	0.74	0.39	0.61		0.40	0.09
Uniform Delay, d1	50.6	2.8	11.1		49.1	47.3
Progression Factor	0.97	1.27	0.77		1.00	1.00
Incremental Delay, d2	3.9	0.2	0.9		0.5	0.1
Delay (s)	52.9	3.7	9.6		49.6	47.4
Level of Service	D	A	A		D	D
Approach Delay (s)		11.6	9.6		48.5	
Approach LOS		B	A		D	

Intersection Summary				
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.60			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.7	
Intersection Capacity Utilization	77.3%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
5: Vintage Way (North) & Rowland Blvd

05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	827	5	9	5	2	4	14	302	1	11	314	779
Future Volume (vph)	827	5	9	5	2	4	14	302	1	11	314	779
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	0.98			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.90			0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1689			1767		1805	3572		1805	3539	2842
Flt Permitted	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1689			1767		1805	3572		1805	3539	2842
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)	827	5	9	5	2	4	14	302	1	11	314	779
RTOR Reduction (vph)	0	5	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	827	9	0	0	7	0	14	303	0	11	314	779
Confl. Peds. (#/hr)			10				9		10			4
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	3	3		4	4		1	6		5	2	2 3
Permitted Phases												
Actuated Green, G (s)	51.4	51.4			2.4		4.0	50.0		2.4	48.4	103.8
Effective Green, g (s)	51.4	51.4			2.4		4.0	50.0		2.4	48.4	103.8
Actuated g/C Ratio	0.43	0.43			0.02		0.03	0.42		0.02	0.40	0.86
Clearance Time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	
Vehicle Extension (s)	3.0	3.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	1500	723			35		60	1488		36	1427	2458
v/s Ratio Prot	c0.24	0.01			c0.00		c0.01	0.08		0.01	0.09	c0.27
v/s Ratio Perm												
v/c Ratio	0.55	0.01			0.20		0.23	0.20		0.31	0.22	0.32
Uniform Delay, d1	25.7	19.7			57.9		56.5	22.3		58.0	23.4	1.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.22	1.23	0.60
Incremental Delay, d2	1.5	0.0			1.0		0.7	0.3		1.7	0.4	0.3
Delay (s)	27.1	19.7			58.9		57.2	22.6		72.5	29.1	1.2
Level of Service	C	B			E		E	C		E	C	A
Approach Delay (s)		27.0			58.9			24.1			9.9	
Approach LOS		C			E			C			A	

Intersection Summary				
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	60.3%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
5: Vintage Way (North) & Rowland Blvd

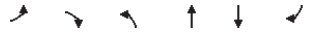
05/03/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1076	10	9	4	9	1	8	369	16	32	372	1314
Future Volume (vph)	1076	10	9	4	9	1	8	369	16	32	372	1314
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.93			0.99		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1744			1855		1805	3546		1805	3539	2842
Flt Permitted	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1744			1855		1805	3546		1805	3539	2842
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)	1076	10	9	4	9	1	8	369	16	32	372	1314
RTOR Reduction (vph)	0	5	0	0	1	0	0	2	0	0	0	0
Lane Group Flow (vph)	1076	14	0	0	13	0	8	383	0	32	372	1314
Confl. Peds. (#/hr)			10				9		10			4
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	3	3		4	4		1	6		5	2	2 3
Permitted Phases												
Actuated Green, G (s)	51.4	51.4			4.8		4.0	42.2		7.8	46.0	101.4
Effective Green, g (s)	51.4	51.4			4.8		4.0	42.2		7.8	46.0	101.4
Actuated g/C Ratio	0.43	0.43			0.04		0.03	0.35		0.06	0.38	0.85
Clearance Time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	
Vehicle Extension (s)	3.0	3.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	1500	747			74		60	1247		117	1356	2401
v/s Ratio Prot	c0.31	0.01			c0.01		0.00	c0.11		0.02	0.11	c0.46
v/s Ratio Perm												
v/c Ratio	0.72	0.02			0.18		0.13	0.31		0.27	0.27	0.55
Uniform Delay, d1	28.3	19.8			55.7		56.3	28.3		53.4	25.5	2.7
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.12	1.18	0.96
Incremental Delay, d2	3.0	0.0			0.4		0.4	0.6		0.4	0.5	0.8
Delay (s)	31.3	19.8			56.1		56.7	28.9		60.0	30.5	3.4
Level of Service	C	B			E		E	C		E	C	A
Approach Delay (s)		31.1			56.1			29.5			10.3	
Approach LOS		C			E			C			B	

Intersection Summary				
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	71.4%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Vintage Way (South) & Rowland Blvd

05/05/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	130	1	2	58	12	121
Future Volume (vph)	130	1	2	58	12	121
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	130	1	2	58	12	121

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	131	21	39	133
Volume Left (vph)	130	2	0	0
Volume Right (vph)	1	0	0	121
Hadj (s)	0.23	0.08	0.03	-0.51
Departure Headway (s)	4.5	5.0	5.0	3.9
Degree Utilization, x	0.17	0.03	0.05	0.14
Capacity (veh/h)	762	692	698	894
Control Delay (s)	8.4	7.0	7.0	7.5
Approach Delay (s)	8.4	7.0		7.5
Approach LOS	A	A		A

Intersection Summary				
Delay		7.8		
Level of Service		A		
Intersection Capacity Utilization		22.4%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
6: Vintage Way (South) & Rowland Blvd

05/03/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	184	0	2	6	4	226
Future Volume (vph)	184	0	2	6	4	226
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	184	0	2	6	4	226

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	184	4	4	230
Volume Left (vph)	184	2	0	0
Volume Right (vph)	0	0	0	226
Hadj (s)	0.23	0.28	0.03	-0.56
Departure Headway (s)	4.6	5.4	5.2	3.9
Degree Utilization, x	0.24	0.01	0.01	0.25
Capacity (veh/h)	738	628	656	883
Control Delay (s)	9.0	7.3	7.0	8.2
Approach Delay (s)	9.0	7.1		8.2
Approach LOS	A	A		A

Intersection Summary				
Delay		8.6		
Level of Service		A		
Intersection Capacity Utilization		31.3%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Signalized Intersection Capacity Analysis
1: Redwood Blvd & Rowland Blvd

05/06/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	579	45	95	771	323	31	32	45	409	33	167
Future Volume (vph)	99	579	45	95	771	323	31	32	45	409	33	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	3574	1591	1805	3436		1805	3261		3502	1900	1594
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1805	3574	1591	1805	3436		1805	3261		3502	1900	1594
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	104	609	47	100	812	340	33	34	47	431	35	176
RTOR Reduction (vph)	0	0	27	0	34	0	0	40	0	0	0	138
Lane Group Flow (vph)	104	609	20	100	1118	0	33	41	0	431	35	38
Confl. Peds. (#/hr)			4			3			9			
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	8.0	36.9	36.9	9.0	37.9		5.9	12.3		13.3	19.0	19.0
Effective Green, g (s)	8.0	36.9	36.9	9.0	37.9		5.9	12.3		13.3	19.0	19.0
Actuated g/C Ratio	0.09	0.42	0.42	0.10	0.44		0.07	0.14		0.15	0.22	0.22
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0		2.0	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	165	1514	674	186	1495		122	460		534	414	347
v/s Ratio Prot	c0.06	0.17		0.06	c0.33		0.02	0.01		c0.12	0.02	
v/s Ratio Perm			0.01									c0.02
v/c Ratio	0.63	0.40	0.03	0.54	0.75		0.27	0.09		0.81	0.08	0.11
Uniform Delay, d1	38.1	17.4	14.6	37.1	20.6		38.6	32.5		35.7	27.1	27.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.6	0.2	0.0	1.5	2.2		0.4	0.1		8.5	0.1	0.1
Delay (s)	43.8	17.7	14.7	38.6	22.8		39.0	32.6		44.1	27.2	27.4
Level of Service	D	B	B	D	C		D	C		D	C	C
Approach Delay (s)		21.1			24.1			34.4			38.6	
Approach LOS		C			C			C			D	

Intersection Summary					
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.64				
Actuated Cycle Length (s)	87.1	Sum of lost time (s)	16.3		
Intersection Capacity Utilization	70.3%	ICU Level of Service	C		
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
1: Redwood Blvd & Rowland Blvd

05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	671	31	55	526	304	18	32	73	406	32	129
Future Volume (vph)	99	671	31	55	526	304	18	32	73	406	32	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	3574	1591	1805	3394		1805	3195		3502	1900	1594
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1805	3574	1591	1805	3394		1805	3195		3502	1900	1594
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	104	706	33	58	554	320	19	34	77	427	34	136
RTOR Reduction (vph)	0	0	20	0	70	0	0	64	0	0	0	93
Lane Group Flow (vph)	104	706	13	58	804	0	19	47	0	427	34	43
Confl. Peds. (#/hr)			4			3			9			
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	8.1	30.6	30.6	6.3	28.8		1.5	13.4		13.7	24.9	24.9
Effective Green, g (s)	8.1	30.6	30.6	6.3	28.8		1.5	13.4		13.7	24.9	24.9
Actuated g/C Ratio	0.10	0.38	0.38	0.08	0.36		0.02	0.17		0.17	0.31	0.31
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0		2.0	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	183	1373	611	142	1227		34	537		602	594	498
v/s Ratio Prot	c0.06	0.20		0.03	c0.24		0.01	0.01		c0.12	0.02	
v/s Ratio Perm			0.01									c0.03
v/c Ratio	0.57	0.51	0.02	0.41	0.66		0.56	0.09		0.71	0.06	0.09
Uniform Delay, d1	34.1	18.8	15.2	34.9	21.3		38.7	27.9		31.1	19.1	19.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.4	0.4	0.0	0.7	1.4		10.8	0.1		3.6	0.0	0.1
Delay (s)	36.5	19.2	15.2	35.6	22.7		49.5	28.0		34.6	19.2	19.4
Level of Service	D	B	B	D	C		D	C		C	B	B
Approach Delay (s)		21.2			23.5			31.1			30.3	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.54				
Actuated Cycle Length (s)	79.6	Sum of lost time (s)	16.3		
Intersection Capacity Utilization	63.4%	ICU Level of Service	B		
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd 05/06/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	461	549	725	1111	0	0	0	0	324	6	123
Future Volume (vph)	0	461	549	725	1111	0	0	0	0	324	6	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.91	0.91	
Frpb, ped/bikes		1.00	0.99	1.00	1.00					1.00	0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		0.95	0.85	1.00	1.00					1.00	0.94	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	
Satd. Flow (prot)		3247	1451	3502	3610					1643	3114	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	
Satd. Flow (perm)		3247	1451	3502	3610					1643	3114	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	490	584	771	1182	0	0	0	0	345	6	131
RTOR Reduction (vph)	0	65	220	0	0	0	0	0	0	0	27	0
Lane Group Flow (vph)	0	676	113	771	1182	0	0	0	0	172	283	0
Confl. Peds. (#/hr)			1						13			1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		2		1	6					4	4	
Permitted Phases			2									
Actuated Green, G (s)		18.8	18.8	13.6	35.4					13.0	13.0	
Effective Green, g (s)		18.8	18.8	13.6	35.4					13.0	13.0	
Actuated g/C Ratio		0.34	0.34	0.25	0.64					0.23	0.23	
Clearance Time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Vehicle Extension (s)		4.0	4.0	2.0	2.5					2.0	2.0	
Lane Grp Cap (vph)		1101	492	859	2306					385	730	
v/s Ratio Prot		c0.21		c0.22	0.33					c0.10	0.09	
v/s Ratio Perm			0.08									
v/c Ratio		0.61	0.23	0.90	0.51					0.45	0.39	
Uniform Delay, d1		15.3	13.1	20.2	5.4					18.1	17.9	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.2	0.3	11.7	0.1					0.3	0.1	
Delay (s)		16.4	13.4	32.0	5.5					18.4	18.0	
Level of Service		B	B	C	A					B	B	
Approach Delay (s)		15.5			16.0			0.0			18.1	
Approach LOS		B			B			A			B	

Intersection Summary				
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	55.4	Sum of lost time (s)	10.0	
Intersection Capacity Utilization	65.4%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd 05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	613	491	865	818	0	0	0	0	460	3	84
Future Volume (vph)	0	613	491	865	818	0	0	0	0	460	3	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.91	0.91	
Frpb, ped/bikes		1.00	0.99	1.00	1.00					1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		0.97	0.85	1.00	1.00					1.00	0.96	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.96	
Satd. Flow (prot)		3320	1451	3502	3610					1643	3184	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.96	
Satd. Flow (perm)		3320	1451	3502	3610					1643	3184	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	0	619	496	874	826	0	0	0	0	465	3	85
RTOR Reduction (vph)	0	23	225	0	0	0	0	0	0	0	57	0
Lane Group Flow (vph)	0	750	117	874	826	0	0	0	0	232	264	0
Confl. Peds. (#/hr)			1						13			1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		2		1	6					4	4	
Permitted Phases			2									
Actuated Green, G (s)		19.9	19.9	13.5	36.4					14.8	14.8	
Effective Green, g (s)		19.9	19.9	13.5	36.4					14.8	14.8	
Actuated g/C Ratio		0.34	0.34	0.23	0.63					0.25	0.25	
Clearance Time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Vehicle Extension (s)		4.0	4.0	2.0	2.5					2.0	2.0	
Lane Grp Cap (vph)		1135	496	812	2257					417	809	
v/s Ratio Prot		c0.23		c0.25	0.23					c0.14	0.08	
v/s Ratio Perm			0.08									
v/c Ratio		0.66	0.24	1.08	0.37					0.56	0.33	
Uniform Delay, d1		16.3	13.7	22.4	5.3					18.8	17.6	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.6	0.3	54.2	0.1					0.9	0.1	
Delay (s)		17.9	14.0	76.5	5.4					19.8	17.7	
Level of Service		B	B	E	A					B	B	
Approach Delay (s)		16.7			42.0			0.0			18.6	
Approach LOS		B			D			A			B	

Intersection Summary				
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	58.2	Sum of lost time (s)	10.0	
Intersection Capacity Utilization	76.6%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	NEL2	NEL
Lane Configurations												
Traffic Volume (vph)	5	51	730	1109	1	486	726	12	22	717	23	15
Future Volume (vph)	5	51	730	1109	1	486	726	12	22	717	23	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.0	4.0		4.0	3.5		3.5	3.0		3.5
Lane Util. Factor		1.00	0.95	0.86		0.86	0.95		0.95	0.88		1.00
Frpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Frt		1.00	1.00	0.98		0.85	1.00		1.00	0.85		0.99
Flt Protected		0.95	1.00	1.00		1.00	0.95		0.96	1.00		0.95
Satd. Flow (prot)		1802	3574	4622		1323	1715		1710	2842		1768
Flt Permitted		0.18	1.00	1.00		1.00	0.95		0.96	1.00		0.95
Satd. Flow (perm)		348	3574	4622		1323	1715		1710	2842		1768
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	5	53	753	1143	1	501	748	12	23	739	24	15
RTOR Reduction (vph)	0	0	0	11	0	245	0	0	0	0	0	0
Lane Group Flow (vph)	0	58	753	1263	0	126	389	0	394	739	0	41
Confl. Peds. (#/hr)					7					11		
Heavy Vehicles (%)	2%	0%	1%	4%	0%	5%	0%	2%	13%	0%	2%	0%
Turn Type		Prot	NA	NA		Perm	Split	Split	NA	custom	Perm	Prot
Protected Phases		5	2	6			8	8	8	1 8		7
Permitted Phases						6					7	
Actuated Green, G (s)		21.8	51.5	40.8		40.8	34.6		34.6	45.7		8.8
Effective Green, g (s)		21.8	51.5	40.8		40.8	34.6		34.6	45.7		8.8
Actuated g/C Ratio		0.18	0.43	0.34		0.34	0.29		0.29	0.38		0.07
Clearance Time (s)		3.0	4.0	4.0		4.0	3.5		3.5			3.5
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0		2.0			2.0
Lane Grp Cap (vph)		63	1533	1571		449	494		493	1082		129
v/s Ratio Prot			0.21	c0.27			0.23		c0.23	0.26		
v/s Ratio Perm		c0.17				0.10						0.02
v/c Ratio		0.92	0.49	0.80		0.28	0.79		0.80	0.68		0.32
Uniform Delay, d1		48.2	24.8	36.0		28.9	39.3		39.5	31.1		52.8
Progression Factor		1.00	1.00	0.84		1.36	1.00		1.00	1.00		1.00
Incremental Delay, d2		84.4	1.1	4.0		1.4	7.5		8.3	1.4		0.5
Delay (s)		132.6	25.9	34.3		40.7	46.8		47.7	32.5		53.3
Level of Service		F	C	C		D	D		D	C		D
Approach Delay (s)			33.5	35.7					40.1			53.3
Approach LOS			C	D					D			D

Intersection Summary				
HCM 2000 Control Delay	37.1	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	79.9%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd 05/06/2017

Movement	NER
Lane Configurations	
Traffic Volume (vph)	2
Future Volume (vph)	2
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	2
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	15%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Proposed Hanna Ranch Project
Weekday PM Existing + Project
Synchro 9 Report
W-Trans

Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	NEL2	NEL
Lane Configurations												
Traffic Volume (vph)	5	62	1008	1286	1	507	394	2	11	1114	2	3
Future Volume (vph)	5	62	1008	1286	1	507	394	2	11	1114	2	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.0	4.0		4.0	3.5		3.5	3.0		3.5
Lane Util. Factor		1.00	0.95	0.86		0.86	0.95		0.95	0.88		1.00
Frpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Frt		1.00	1.00	0.99		0.85	1.00		1.00	0.85		0.98
Flt Protected		0.95	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (prot)		1802	3574	4645		1323	1715		1711	2842		1728
Flt Permitted		0.19	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (perm)		351	3574	4645		1323	1715		1711	2842		1728
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	65	1061	1354	1	534	415	2	12	1173	2	3
RTOR Reduction (vph)	0	0	0	7	0	241	0	0	0	0	0	0
Lane Group Flow (vph)	0	70	1061	1460	0	181	216	0	213	1173	0	6
Confl. Peds. (#/hr)					7					11		
Heavy Vehicles (%)	2%	0%	1%	4%	0%	5%	0%	2%	13%	0%	2%	0%
Turn Type		Prot	NA	NA		Perm	Split	Split	NA	custom	Perm	Prot
Protected Phases		5	2	6			8	8	8	1 8		7
Permitted Phases						6					7	
Actuated Green, G (s)		21.6	49.1	38.7		38.7	43.5		43.5	54.7		2.2
Effective Green, g (s)		21.6	49.1	38.7		38.7	43.5		43.5	54.7		2.2
Actuated g/C Ratio		0.18	0.41	0.32		0.32	0.36		0.36	0.46		0.02
Clearance Time (s)		3.0	4.0	4.0		4.0	3.5		3.5			3.5
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0		2.0			2.0
Lane Grp Cap (vph)		63	1462	1498		426	621		620	1295		31
v/s Ratio Prot			0.30	c0.31			0.13		0.12	c0.41		
v/s Ratio Perm		c0.20				0.14						0.00
v/c Ratio		1.11	0.73	0.97		0.42	0.35		0.34	0.91		0.19
Uniform Delay, d1		49.2	29.8	40.2		31.9	27.9		27.9	30.3		58.0
Progression Factor		1.00	1.00	0.83		1.13	1.00		1.00	1.00		1.00
Incremental Delay, d2		147.1	3.2	15.0		2.3	0.1		0.1	9.0		1.1
Delay (s)		196.3	33.0	48.4		38.3	28.0		28.0	39.3		59.1
Level of Service		F	C	D		D	C		C	D		E
Approach Delay (s)			43.1	46.2					36.3			59.1
Approach LOS			D	D					D			E

Intersection Summary				
HCM 2000 Control Delay	42.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.96			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	77.1%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd 05/05/2017

Movement	NER
Lane Configurations	
Traffic Volume (vph)	1
Future Volume (vph)	1
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.95
Adj. Flow (vph)	1
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	15%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Proposed Hanna Ranch Project
Weekend Midday Existing + Project
Synchro 9 Report
W-Trans

HCM Signalized Intersection Capacity Analysis
4: Rowland Blvd & Rowland Way

05/06/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	183	1265	1193	43	54	392
Future Volume (vph)	183	1265	1193	43	54	392
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		3.2	3.2
Lane Util. Factor	0.97	0.91	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		0.98	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		0.89	0.85
Flt Protected	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)	3467	5187	3581		1610	1479
Flt Permitted	0.95	1.00	1.00		0.99	1.00
Satd. Flow (perm)	3467	5187	3581		1610	1479
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	189	1304	1230	44	56	404
RTOR Reduction (vph)	0	0	1	0	121	197
Lane Group Flow (vph)	189	1304	1273	0	113	29
Confl. Peds. (#/hr)				2		14
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	1%	0%	0%	7%	2%	1%
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	11.5	97.3	82.3		15.5	15.5
Effective Green, g (s)	11.5	97.3	82.3		15.5	15.5
Actuated g/C Ratio	0.10	0.81	0.69		0.13	0.13
Clearance Time (s)	3.5	4.0	4.0		3.2	3.2
Vehicle Extension (s)	2.0	4.0	4.0		2.0	2.0
Lane Grp Cap (vph)	332	4205	2455		207	191
v/s Ratio Prot	c0.05	0.25	c0.36		c0.07	
v/s Ratio Perm						0.02
v/c Ratio	0.57	0.31	0.52		0.55	0.15
Uniform Delay, d1	51.9	2.9	9.2		49.0	46.4
Progression Factor	1.09	1.15	0.84		1.00	1.00
Incremental Delay, d2	1.1	0.2	0.7		1.6	0.1
Delay (s)	57.7	3.5	8.4		50.5	46.6
Level of Service	E	A	A		D	D
Approach Delay (s)		10.3	8.4		48.6	
Approach LOS		B	A		D	

Intersection Summary				
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.53			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.7	
Intersection Capacity Utilization	74.6%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: Rowland Blvd & Rowland Way

05/05/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	284	1838	1580	57	65	193
Future Volume (vph)	284	1838	1580	57	65	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		3.2	3.2
Lane Util. Factor	0.97	0.91	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		0.99	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		0.92	0.85
Flt Protected	0.95	1.00	1.00		0.98	1.00
Satd. Flow (prot)	3467	5187	3581		1666	1479
Flt Permitted	0.95	1.00	1.00		0.98	1.00
Satd. Flow (perm)	3467	5187	3581		1666	1479
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	296	1915	1646	59	68	201
RTOR Reduction (vph)	0	0	1	0	39	115
Lane Group Flow (vph)	296	1915	1704	0	99	16
Confl. Peds. (#/hr)				2		14
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	1%	0%	0%	7%	2%	1%
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	14.3	97.8	80.0		15.0	15.0
Effective Green, g (s)	14.3	97.8	80.0		15.0	15.0
Actuated g/C Ratio	0.12	0.81	0.67		0.12	0.12
Clearance Time (s)	3.5	4.0	4.0		3.2	3.2
Vehicle Extension (s)	2.0	4.0	4.0		2.0	2.0
Lane Grp Cap (vph)	413	4227	2387		208	184
v/s Ratio Prot	c0.09	0.37	c0.48		c0.06	
v/s Ratio Perm						0.01
v/c Ratio	0.72	0.45	0.71		0.47	0.09
Uniform Delay, d1	50.9	3.3	12.7		48.8	46.5
Progression Factor	1.00	1.12	1.08		1.00	1.00
Incremental Delay, d2	3.0	0.2	1.5		0.6	0.1
Delay (s)	53.7	3.9	15.2		49.5	46.5
Level of Service	D	A	B		D	D
Approach Delay (s)		10.5	15.2		48.0	
Approach LOS		B	B		D	

Intersection Summary				
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.68			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.7	
Intersection Capacity Utilization	80.6%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
5: Vintage Way (North) & Rowland Blvd

05/06/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	811	5	2	5	2	4	0	423	1	12	559	764
Future Volume (vph)	811	5	2	5	2	4	0	423	1	12	559	764
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6			3.2			4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00			0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	0.99			1.00			1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	1.00	1.00
Frt	1.00	0.96			0.95			1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98			1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1805			1767			3573		1805	3539	2842
Flt Permitted	0.95	1.00			0.98			1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1805			1767			3573		1805	3539	2842
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	836	5	2	5	2	4	0	436	1	12	576	788
RTOR Reduction (vph)	0	1	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	836	6	0	0	7	0	0	437	0	12	576	788
Confl. Peds. (#/hr)			10				9		10			4
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	3	3		4	4		1	6		5	2	2 3
Permitted Phases												
Actuated Green, G (s)	51.4	51.4			2.4			50.0		2.4	49.6	105.0
Effective Green, g (s)	51.4	51.4			2.4			50.0		2.4	49.6	105.0
Actuated g/C Ratio	0.43	0.43			0.02			0.42		0.02	0.41	0.88
Clearance Time (s)	3.6	3.6			3.2			4.0		3.0	4.0	
Vehicle Extension (s)	3.0	3.0			2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	1500	773			35			1488		36	1462	2486
v/s Ratio Prot	c0.24	0.00			c0.00			c0.12		0.01	c0.16	c0.28
v/s Ratio Perm												
v/c Ratio	0.56	0.01			0.20			0.29		0.33	0.39	0.32
Uniform Delay, d1	25.8	19.7			57.9			23.3		58.0	24.7	1.3
Progression Factor	1.00	1.00			1.00			1.00		1.22	1.22	0.90
Incremental Delay, d2	1.5	0.0			1.0			0.5		1.9	0.8	0.3
Delay (s)	27.3	19.7			58.9			23.8		72.7	30.8	1.5
Level of Service	C	B			E			C		E	C	A
Approach Delay (s)		27.2			58.9			23.8			14.4	
Approach LOS		C			E			C			B	

Intersection Summary				
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.47			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	59.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

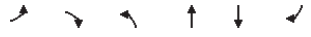
HCM Signalized Intersection Capacity Analysis
5: Vintage Way (North) & Rowland Blvd

05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	962	9	8	4	8	1	7	653	14	29	692	1175
Future Volume (vph)	962	9	8	4	8	1	7	653	14	29	692	1175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.93			0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1745			1852		1805	3559		1805	3539	2842
Flt Permitted	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1745			1852		1805	3559		1805	3539	2842
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1002	9	8	4	8	1	7	680	15	30	721	1224
RTOR Reduction (vph)	0	5	0	0	1	0	0	1	0	0	0	0
Lane Group Flow (vph)	1002	12	0	0	12	0	7	694	0	30	721	1224
Confl. Peds. (#/hr)			10				9		10			4
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	3	3		4	4		1	6		5	2	2 3
Permitted Phases												
Actuated Green, G (s)	51.4	51.4			4.8		4.0	42.2		7.8	46.0	101.4
Effective Green, g (s)	51.4	51.4			4.8		4.0	42.2		7.8	46.0	101.4
Actuated g/C Ratio	0.43	0.43			0.04		0.03	0.35		0.06	0.38	0.85
Clearance Time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	
Vehicle Extension (s)	3.0	3.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	1500	747			74		60	1251		117	1356	2401
v/s Ratio Prot	c0.29	0.01			c0.01		0.00	c0.19		0.02	0.20	c0.43
v/s Ratio Perm												
v/c Ratio	0.67	0.02			0.16		0.12	0.55		0.26	0.53	0.51
Uniform Delay, d1	27.5	19.7			55.7		56.3	31.3		53.3	28.7	2.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.14	1.16	0.80
Incremental Delay, d2	2.4	0.0			0.4		0.3	1.8		0.4	1.4	0.7
Delay (s)	29.8	19.8			56.0		56.6	33.1		61.4	34.6	2.7
Level of Service	C	B			E		E	C		E	C	A
Approach Delay (s)		29.7			56.0			33.3			15.2	
Approach LOS		C			E			C			B	

Intersection Summary				
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.60			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	66.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Vintage Way (South) & Rowland Blvd 05/06/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	115	0	0	200	375	108
Future Volume (vph)	115	0	0	200	375	108
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	129	0	0	225	421	121

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	129	75	150	542
Volume Left (vph)	129	0	0	0
Volume Right (vph)	0	0	0	121
Hadj (s)	0.23	0.03	0.03	-0.10
Departure Headway (s)	5.9	5.4	5.4	4.6
Degree Utilization, x	0.21	0.11	0.23	0.69
Capacity (veh/h)	551	636	637	767
Control Delay (s)	10.4	7.9	8.8	17.2
Approach Delay (s)	10.4	8.5		17.2
Approach LOS	B	A		C

Intersection Summary				
Delay		14.0		
Level of Service		B		
Intersection Capacity Utilization		39.8%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
6: Vintage Way (South) & Rowland Blvd 05/05/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	165	0	1	323	359	202
Future Volume (vph)	165	0	1	323	359	202
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	176	0	1	344	382	215

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	176	116	229	597
Volume Left (vph)	176	1	0	0
Volume Right (vph)	0	0	0	215
Hadj (s)	0.23	0.04	0.03	-0.18
Departure Headway (s)	6.3	5.8	5.8	4.9
Degree Utilization, x	0.31	0.19	0.37	0.81
Capacity (veh/h)	530	600	602	726
Control Delay (s)	12.2	8.9	10.9	25.2
Approach Delay (s)	12.2	10.2		25.2
Approach LOS	B	B		D

Intersection Summary				
Delay		18.5		
Level of Service		C		
Intersection Capacity Utilization		47.3%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Signalized Intersection Capacity Analysis
1: Redwood Blvd & Rowland Blvd

05/04/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	594	45	95	786	338	31	32	45	423	33	168
Future Volume (vph)	100	594	45	95	786	338	31	32	45	423	33	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	3574	1591	1805	3432		1805	3261		3502	1900	1594
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1805	3574	1591	1805	3432		1805	3261		3502	1900	1594
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	105	625	47	100	827	356	33	34	47	445	35	177
RTOR Reduction (vph)	0	0	27	0	35	0	0	40	0	0	0	139
Lane Group Flow (vph)	105	625	20	100	1148	0	33	41	0	445	35	38
Confl. Peds. (#/hr)			4			3			9			
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	8.1	38.1	38.1	9.0	39.0		5.9	12.4		13.1	18.9	18.9
Effective Green, g (s)	8.1	38.1	38.1	9.0	39.0		5.9	12.4		13.1	18.9	18.9
Actuated g/C Ratio	0.09	0.43	0.43	0.10	0.44		0.07	0.14		0.15	0.21	0.21
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0		2.0	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	165	1543	687	184	1517		120	458		520	407	341
v/s Ratio Prot	c0.06	0.17		0.06	c0.33		0.02	0.01		c0.13	0.02	
v/s Ratio Perm			0.01									c0.02
v/c Ratio	0.64	0.41	0.03	0.54	0.76		0.28	0.09		0.86	0.09	0.11
Uniform Delay, d1	38.6	17.2	14.4	37.6	20.6		39.1	33.0		36.6	27.7	27.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.8	0.2	0.0	1.8	2.3		0.5	0.1		12.9	0.1	0.1
Delay (s)	44.4	17.5	14.4	39.4	23.0		39.6	33.0		49.5	27.8	28.0
Level of Service	D	B	B	D	C		D	C		D	C	C
Approach Delay (s)		20.9			24.3			34.9			42.5	
Approach LOS		C			C			C			D	

Intersection Summary					
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.66				
Actuated Cycle Length (s)	88.2	Sum of lost time (s)	16.3		
Intersection Capacity Utilization	71.6%	ICU Level of Service	C		
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
1: Redwood Blvd & Rowland Blvd

05/04/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	694	31	55	547	323	18	32	73	427	32	131
Future Volume (vph)	101	694	31	55	547	323	18	32	73	427	32	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	3574	1591	1805	3391		1805	3195		3502	1900	1594
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1805	3574	1591	1805	3391		1805	3195		3502	1900	1594
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	106	731	33	58	576	340	19	34	77	449	34	138
RTOR Reduction (vph)	0	0	21	0	72	0	0	65	0	0	0	100
Lane Group Flow (vph)	106	731	12	58	844	0	19	46	0	449	34	38
Confl. Peds. (#/hr)			4			3			9			
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	8.1	28.7	28.7	8.8	29.4		3.6	12.7		13.7	22.1	22.1
Effective Green, g (s)	8.1	28.7	28.7	8.8	29.4		3.6	12.7		13.7	22.1	22.1
Actuated g/C Ratio	0.10	0.36	0.36	0.11	0.37		0.05	0.16		0.17	0.28	0.28
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0		2.0	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	183	1290	574	199	1254		81	510		603	528	443
v/s Ratio Prot	c0.06	0.20		0.03	c0.25		0.01	0.01		c0.13	0.02	
v/s Ratio Perm			0.01									c0.02
v/c Ratio	0.58	0.57	0.02	0.29	0.67		0.23	0.09		0.74	0.06	0.09
Uniform Delay, d1	34.1	20.4	16.4	32.5	21.0		36.6	28.5		31.2	21.1	21.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.7	0.7	0.0	0.3	1.6		0.5	0.1		4.7	0.0	0.1
Delay (s)	36.8	21.1	16.4	32.8	22.6		37.2	28.5		36.0	21.1	21.3
Level of Service	D	C	B	C	C		D	C		D	C	C
Approach Delay (s)		22.8			23.2			29.8			31.9	
Approach LOS		C			C			C			C	

Intersection Summary					
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.57				
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	16.3		
Intersection Capacity Utilization	65.1%	ICU Level of Service	C		
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd 05/04/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	486	554	748	1140	0	0	0	0	339	6	124
Future Volume (vph)	0	486	554	748	1140	0	0	0	0	339	6	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.91	0.91	
Frpb, ped/bikes		1.00	0.99	1.00	1.00					1.00	0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		0.95	0.85	1.00	1.00					1.00	0.94	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	
Satd. Flow (prot)		3255	1451	3502	3610					1643	3118	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	
Satd. Flow (perm)		3255	1451	3502	3610					1643	3118	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	517	589	796	1213	0	0	0	0	361	6	132
RTOR Reduction (vph)	0	57	224	0	0	0	0	0	0	0	24	0
Lane Group Flow (vph)	0	707	118	796	1213	0	0	0	0	180	295	0
Confl. Peds. (#/hr)			1						13			1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		2		1	6					4	4	
Permitted Phases			2									
Actuated Green, G (s)		19.5	19.5	13.5	36.0					13.3	13.3	
Effective Green, g (s)		19.5	19.5	13.5	36.0					13.3	13.3	
Actuated g/C Ratio		0.35	0.35	0.24	0.64					0.24	0.24	
Clearance Time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Vehicle Extension (s)		4.0	4.0	2.0	2.5					2.0	2.0	
Lane Grp Cap (vph)		1127	502	839	2308					388	736	
v/s Ratio Prot		c0.22		c0.23	0.34					c0.11	0.09	
v/s Ratio Perm			0.08									
v/c Ratio		0.63	0.24	0.95	0.53					0.46	0.40	
Uniform Delay, d1		15.4	13.1	21.1	5.5					18.4	18.1	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.2	0.3	19.3	0.2					0.3	0.1	
Delay (s)		16.6	13.4	40.4	5.7					18.8	18.3	
Level of Service		B	B	D	A					B	B	
Approach Delay (s)		15.6			19.4			0.0			18.4	
Approach LOS		B			B			A			B	

Intersection Summary				
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.67			
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	10.0	
Intersection Capacity Utilization	67.2%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd 05/04/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	650	498	896	857	0	0	0	0	482	3	86
Future Volume (vph)	0	650	498	896	857	0	0	0	0	482	3	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.91	0.91	
Frpb, ped/bikes		1.00	0.99	1.00	1.00					1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		0.97	0.85	1.00	1.00					1.00	0.96	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.96	
Satd. Flow (prot)		3326	1451	3502	3610					1643	3186	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.96	
Satd. Flow (perm)		3326	1451	3502	3610					1643	3186	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	0	657	503	905	866	0	0	0	0	487	3	87
RTOR Reduction (vph)	0	20	230	0	0	0	0	0	0	0	54	0
Lane Group Flow (vph)	0	788	122	905	866	0	0	0	0	243	280	0
Confl. Peds. (#/hr)			1						13			1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		2		1	6					4	4	
Permitted Phases			2									
Actuated Green, G (s)		20.6	20.6	13.4	37.0					15.2	15.2	
Effective Green, g (s)		20.6	20.6	13.4	37.0					15.2	15.2	
Actuated g/C Ratio		0.35	0.35	0.23	0.62					0.26	0.26	
Clearance Time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Vehicle Extension (s)		4.0	4.0	2.0	2.5					2.0	2.0	
Lane Grp Cap (vph)		1157	504	792	2256					421	818	
v/s Ratio Prot		c0.24		c0.26	0.24					c0.15	0.09	
v/s Ratio Perm			0.08									
v/c Ratio		0.68	0.24	1.14	0.38					0.58	0.34	
Uniform Delay, d1		16.5	13.7	22.9	5.5					19.2	17.9	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.8	0.3	79.0	0.1					1.2	0.1	
Delay (s)		18.3	14.1	101.9	5.6					20.4	18.0	
Level of Service		B	B	F	A					C	B	
Approach Delay (s)		17.0			54.8			0.0			19.0	
Approach LOS		B			D			A			B	

Intersection Summary				
HCM 2000 Control Delay	36.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.77			
Actuated Cycle Length (s)	59.2	Sum of lost time (s)	10.0	
Intersection Capacity Utilization	79.2%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	NEL2	NEL
Lane Configurations												
Traffic Volume (vph)	5	52	768	1158	1	501	730	12	22	739	23	15
Future Volume (vph)	5	52	768	1158	1	501	730	12	22	739	23	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.0	4.0		4.0	3.5		3.5	3.0		3.5
Lane Util. Factor		1.00	0.95	0.86		0.86	0.95		0.95	0.88		1.00
Frpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Frt		1.00	1.00	0.98		0.85	1.00		1.00	0.85		0.99
Flt Protected		0.95	1.00	1.00		1.00	0.95		0.96	1.00		0.95
Satd. Flow (prot)		1802	3574	4623		1323	1715		1710	2842		1768
Flt Permitted		0.19	1.00	1.00		1.00	0.95		0.96	1.00		0.95
Satd. Flow (perm)		355	3574	4623		1323	1715		1710	2842		1768
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	5	54	792	1194	1	516	753	12	23	762	24	15
RTOR Reduction (vph)	0	0	0	11	0	252	0	0	0	0	0	0
Lane Group Flow (vph)	0	59	792	1318	0	130	392	0	396	762	0	41
Confl. Peds. (#/hr)					7					11		
Heavy Vehicles (%)	2%	0%	1%	4%	0%	5%	0%	2%	13%	0%	2%	0%
Turn Type		Prot	NA	NA		Perm	Split	Split	NA	custom	Perm	Prot
Protected Phases		5	2	6			8	8	8	1 8		7
Permitted Phases						6					7	
Actuated Green, G (s)		21.4	51.0	40.8		40.8	35.0		35.0	46.2		8.8
Effective Green, g (s)		21.4	51.0	40.8		40.8	35.0		35.0	46.2		8.8
Actuated g/C Ratio		0.18	0.42	0.34		0.34	0.29		0.29	0.39		0.07
Clearance Time (s)		3.0	4.0	4.0		4.0	3.5		3.5			3.5
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0		2.0			2.0
Lane Grp Cap (vph)		63	1518	1571		449	500		498	1094		129
v/s Ratio Prot			0.22	c0.29			0.23		c0.23	0.27		
v/s Ratio Perm		c0.17				0.10						0.02
v/c Ratio		0.94	0.52	0.84		0.29	0.78		0.80	0.70		0.32
Uniform Delay, d1		48.6	25.5	36.6		29.0	39.0		39.2	31.0		52.8
Progression Factor		1.00	1.00	0.87		1.53	1.00		1.00	1.00		1.00
Incremental Delay, d2		89.3	1.3	4.9		1.4	7.3		8.0	1.6		0.5
Delay (s)		137.9	26.8	36.8		45.8	46.3		47.2	32.6		53.3
Level of Service		F	C	D		D	D		D	C		D
Approach Delay (s)			34.5	38.8					39.8			53.3
Approach LOS			C	D					D			D

Intersection Summary				
HCM 2000 Control Delay	38.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.80			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	81.0%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd 05/04/2017

Movement	NER
Lane Configurations	
Traffic Volume (vph)	2
Future Volume (vph)	2
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	2
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	15%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Proposed Hanna Ranch Project
Weekday PM Baseline + Project
Synchro 9 Report
W-Trans

Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	NEL2	NEL
Lane Configurations												
Traffic Volume (vph)	5	64	1065	1348	1	527	400	2	11	1147	2	3
Future Volume (vph)	5	64	1065	1348	1	527	400	2	11	1147	2	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.0	4.0		4.0	3.5		3.5	3.0		3.5
Lane Util. Factor		1.00	0.95	0.86		0.86	0.95		0.95	0.88		1.00
Frpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Frt		1.00	1.00	0.99		0.85	1.00		1.00	0.85		0.98
Flt Protected		0.95	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (prot)		1802	3574	4645		1323	1715		1711	2842		1728
Flt Permitted		0.19	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (perm)		351	3574	4645		1323	1715		1711	2842		1728
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	67	1121	1419	1	555	421	2	12	1207	2	3
RTOR Reduction (vph)	0	0	0	7	0	238	0	0	0	0	0	0
Lane Group Flow (vph)	0	72	1121	1530	0	200	219	0	216	1207	0	6
Confl. Peds. (#/hr)					7					11		
Heavy Vehicles (%)	2%	0%	1%	4%	0%	5%	0%	2%	13%	0%	2%	0%
Turn Type		Prot	NA	NA		Perm	Split	Split	NA	custom	Perm	Prot
Protected Phases		5	2	6			8	8	8	1 8		7
Permitted Phases						6					7	
Actuated Green, G (s)		21.6	48.8	38.7		38.7	43.5		43.5	55.0		2.2
Effective Green, g (s)		21.6	48.8	38.7		38.7	43.5		43.5	55.0		2.2
Actuated g/C Ratio		0.18	0.41	0.32		0.32	0.36		0.36	0.46		0.02
Clearance Time (s)		3.0	4.0	4.0		4.0	3.5		3.5			3.5
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0		2.0			2.0
Lane Grp Cap (vph)		63	1453	1498		426	621		620	1302		31
v/s Ratio Prot			0.31	c0.33			0.13		0.13	c0.42		
v/s Ratio Perm		c0.20				0.15						0.00
v/c Ratio		1.14	0.77	1.02		0.47	0.35		0.35	0.93		0.19
Uniform Delay, d1		49.2	30.8	40.6		32.4	28.0		27.9	30.6		58.0
Progression Factor		1.00	1.00	0.85		1.05	1.00		1.00	1.00		1.00
Incremental Delay, d2		157.6	4.0	25.2		2.6	0.1		0.1	11.2		1.1
Delay (s)		206.8	34.8	59.8		36.7	28.1		28.0	41.8		59.1
Level of Service		F	C	E		D	C		C	D		E
Approach Delay (s)			45.2	54.6					38.2			59.1
Approach LOS			D	D					D			E

Intersection Summary				
HCM 2000 Control Delay	46.7	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	78.6%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd 05/04/2017

Movement	NER
Lane Configurations	
Traffic Volume (vph)	1
Future Volume (vph)	1
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.95
Adj. Flow (vph)	1
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	15%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Proposed Hanna Ranch Project
Weekend Midday Baseline + Project
Synchro 9 Report
W-Trans

HCM Signalized Intersection Capacity Analysis
4: Rowland Blvd & Rowland Way

05/04/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	184	1324	1257	44	55	392
Future Volume (vph)	184	1324	1257	44	55	392
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		3.2	3.2
Lane Util. Factor	0.97	0.91	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		0.98	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		0.89	0.85
Flt Protected	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)	3467	5187	3582		1611	1479
Flt Permitted	0.95	1.00	1.00		0.99	1.00
Satd. Flow (perm)	3467	5187	3582		1611	1479
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	190	1365	1296	45	57	404
RTOR Reduction (vph)	0	0	1	0	119	196
Lane Group Flow (vph)	190	1365	1340	0	116	30
Confl. Peds. (#/hr)				2		14
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	1%	0%	0%	7%	2%	1%
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	11.5	97.1	82.1		15.7	15.7
Effective Green, g (s)	11.5	97.1	82.1		15.7	15.7
Actuated g/C Ratio	0.10	0.81	0.68		0.13	0.13
Clearance Time (s)	3.5	4.0	4.0		3.2	3.2
Vehicle Extension (s)	2.0	4.0	4.0		2.0	2.0
Lane Grp Cap (vph)	332	4197	2450		210	193
v/s Ratio Prot	c0.05	0.26	c0.37		c0.07	
v/s Ratio Perm						0.02
v/c Ratio	0.57	0.33	0.55		0.55	0.15
Uniform Delay, d1	51.9	3.0	9.6		48.9	46.3
Progression Factor	1.09	1.14	0.88		1.00	1.00
Incremental Delay, d2	1.2	0.2	0.8		1.8	0.1
Delay (s)	57.6	3.5	9.2		50.6	46.4
Level of Service	E	A	A		D	D
Approach Delay (s)		10.2	9.2		48.6	
Approach LOS		B	A		D	

Intersection Summary				
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.7	
Intersection Capacity Utilization	76.4%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: Rowland Blvd & Rowland Way

05/04/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	286	1927	1662	59	67	194
Future Volume (vph)	286	1927	1662	59	67	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		3.2	3.2
Lane Util. Factor	0.97	0.91	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		0.99	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		0.92	0.85
Flt Protected	0.95	1.00	1.00		0.98	1.00
Satd. Flow (prot)	3467	5187	3581		1666	1479
Flt Permitted	0.95	1.00	1.00		0.98	1.00
Satd. Flow (perm)	3467	5187	3581		1666	1479
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	298	2007	1731	61	70	202
RTOR Reduction (vph)	0	0	1	0	38	114
Lane Group Flow (vph)	298	2007	1791	0	103	17
Confl. Peds. (#/hr)				2		14
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	1%	0%	0%	7%	2%	1%
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	14.3	97.6	79.8		15.2	15.2
Effective Green, g (s)	14.3	97.6	79.8		15.2	15.2
Actuated g/C Ratio	0.12	0.81	0.66		0.13	0.13
Clearance Time (s)	3.5	4.0	4.0		3.2	3.2
Vehicle Extension (s)	2.0	4.0	4.0		2.0	2.0
Lane Grp Cap (vph)	413	4218	2381		211	187
v/s Ratio Prot	c0.09	0.39	c0.50		c0.06	
v/s Ratio Perm						0.01
v/c Ratio	0.72	0.48	0.75		0.49	0.09
Uniform Delay, d1	50.9	3.4	13.5		48.8	46.3
Progression Factor	1.01	1.07	1.14		1.00	1.00
Incremental Delay, d2	3.0	0.2	1.8		0.6	0.1
Delay (s)	54.4	3.9	17.1		49.4	46.4
Level of Service	D	A	B		D	D
Approach Delay (s)		10.4	17.1		47.9	
Approach LOS		B	B		D	

Intersection Summary				
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.7	
Intersection Capacity Utilization	82.9%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
5: Vintage Way (North) & Rowland Blvd

05/04/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	811	5	2	5	2	4	0	488	1	11	619	764
Future Volume (vph)	811	5	2	5	2	4	0	488	1	11	619	764
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6			3.2			4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00			0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	0.99			1.00			1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00	1.00	1.00
Frt	1.00	0.96			0.95			1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98			1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1805			1767			3573		1805	3539	2842
Flt Permitted	0.95	1.00			0.98			1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1805			1767			3573		1805	3539	2842
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	836	5	2	5	2	4	0	503	1	11	638	788
RTOR Reduction (vph)	0	1	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	836	6	0	0	7	0	0	504	0	11	638	788
Confl. Peds. (#/hr)			10				9		10			4
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	3	3		4	4		1	6		5	2	2 3
Permitted Phases												
Actuated Green, G (s)	51.4	51.4			2.4			50.0		2.4	49.6	105.0
Effective Green, g (s)	51.4	51.4			2.4			50.0		2.4	49.6	105.0
Actuated g/C Ratio	0.43	0.43			0.02			0.42		0.02	0.41	0.88
Clearance Time (s)	3.6	3.6			3.2			4.0		3.0	4.0	
Vehicle Extension (s)	3.0	3.0			2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	1500	773			35			1488		36	1462	2486
v/s Ratio Prot	c0.24	0.00			c0.00			c0.14		0.01	c0.18	c0.28
v/s Ratio Perm												
v/c Ratio	0.56	0.01			0.20			0.34		0.31	0.44	0.32
Uniform Delay, d1	25.8	19.7			57.9			23.8		58.0	25.2	1.3
Progression Factor	1.00	1.00			1.00			1.00		1.22	1.20	0.95
Incremental Delay, d2	1.5	0.0			1.0			0.6		1.7	0.9	0.3
Delay (s)	27.3	19.7			58.9			24.4		72.3	31.2	1.6
Level of Service	C	B			E			C		E	C	A
Approach Delay (s)		27.2			58.9			24.4			15.2	
Approach LOS		C			E			C			B	

Intersection Summary				
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	59.8%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

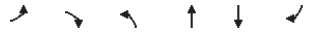
HCM Signalized Intersection Capacity Analysis
5: Vintage Way (North) & Rowland Blvd

05/04/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	962	9	8	4	8	1	7	737	14	29	783	1175
Future Volume (vph)	962	9	8	4	8	1	7	737	14	29	783	1175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.93			0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1745			1852		1805	3561		1805	3539	2842
Flt Permitted	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1745			1852		1805	3561		1805	3539	2842
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1002	9	8	4	8	1	7	768	15	30	816	1224
RTOR Reduction (vph)	0	5	0	0	1	0	0	1	0	0	0	0
Lane Group Flow (vph)	1002	12	0	0	12	0	7	782	0	30	816	1224
Confl. Peds. (#/hr)			10				9		10			4
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	3	3		4	4		1	6		5	2	2 3
Permitted Phases												
Actuated Green, G (s)	51.4	51.4			4.8		4.0	42.2		7.8	46.0	101.4
Effective Green, g (s)	51.4	51.4			4.8		4.0	42.2		7.8	46.0	101.4
Actuated g/C Ratio	0.43	0.43			0.04		0.03	0.35		0.06	0.38	0.85
Clearance Time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	
Vehicle Extension (s)	3.0	3.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	1500	747			74		60	1252		117	1356	2401
v/s Ratio Prot	c0.29	0.01			c0.01		0.00	c0.22		0.02	c0.23	0.43
v/s Ratio Perm												
v/c Ratio	0.67	0.02			0.16		0.12	0.62		0.26	0.60	0.51
Uniform Delay, d1	27.5	19.7			55.7		56.3	32.3		53.3	29.7	2.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.16	1.15	0.77
Incremental Delay, d2	2.4	0.0			0.4		0.3	2.4		0.4	1.8	0.7
Delay (s)	29.8	19.8			56.0		56.6	34.7		62.4	36.0	2.6
Level of Service	C	B			E		E	C		E	D	A
Approach Delay (s)		29.7			56.0			34.9			16.6	
Approach LOS		C			E			C			B	

Intersection Summary				
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	66.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Vintage Way (South) & Rowland Blvd 05/04/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	115	0	0	200	375	108
Future Volume (vph)	115	0	0	200	375	108
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	129	0	0	225	421	121

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	129	75	150	542
Volume Left (vph)	129	0	0	0
Volume Right (vph)	0	0	0	121
Hadj (s)	0.23	0.03	0.03	-0.10
Departure Headway (s)	5.9	5.4	5.4	4.6
Degree Utilization, x	0.21	0.11	0.23	0.69
Capacity (veh/h)	551	636	637	767
Control Delay (s)	10.4	7.9	8.8	17.2
Approach Delay (s)	10.4	8.5		17.2
Approach LOS	B	A		C

Intersection Summary			
Delay	14.0		
Level of Service	B		
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
6: Vintage Way (South) & Rowland Blvd 05/04/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	165	0	1	323	359	202
Future Volume (vph)	165	0	1	323	359	202
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	176	0	1	344	382	215

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	176	116	229	597
Volume Left (vph)	176	1	0	0
Volume Right (vph)	0	0	0	215
Hadj (s)	0.23	0.04	0.03	-0.18
Departure Headway (s)	6.3	5.8	5.8	4.9
Degree Utilization, x	0.31	0.19	0.37	0.81
Capacity (veh/h)	530	600	602	726
Control Delay (s)	12.2	8.9	10.9	25.2
Approach Delay (s)	12.2	10.2		25.2
Approach LOS	B	B		D

Intersection Summary			
Delay	18.5		
Level of Service	C		
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: Redwood Blvd & Rowland Blvd

05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	628	46	97	855	404	32	33	46	497	34	173
Future Volume (vph)	105	628	46	97	855	404	32	33	46	497	34	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	3574	1590	1805	3421		1805	3259		3502	1900	1594
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1805	3574	1590	1805	3421		1805	3259		3502	1900	1594
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)	105	628	46	97	855	404	32	33	46	497	34	173
RTOR Reduction (vph)	0	0	26	0	40	0	0	39	0	0	0	137
Lane Group Flow (vph)	105	628	20	97	1219	0	32	40	0	497	34	36
Confl. Peds. (#/hr)			4			3			9			
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	8.3	40.1	40.1	9.2	41.0		6.1	12.8		12.7	18.7	18.7
Effective Green, g (s)	8.3	40.1	40.1	9.2	41.0		6.1	12.8		12.7	18.7	18.7
Actuated g/C Ratio	0.09	0.44	0.44	0.10	0.45		0.07	0.14		0.14	0.21	0.21
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0		2.0	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	165	1585	705	183	1551		121	461		491	393	329
v/s Ratio Prot	c0.06	0.18		0.05	c0.36		0.02	0.01		c0.14	0.02	
v/s Ratio Perm			0.01									c0.02
v/c Ratio	0.64	0.40	0.03	0.53	0.79		0.26	0.09		1.01	0.09	0.11
Uniform Delay, d1	39.6	17.0	14.2	38.5	21.0		40.0	33.7		38.9	29.0	29.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.8	0.2	0.0	1.5	2.9		0.4	0.1		43.7	0.1	0.1
Delay (s)	45.4	17.2	14.2	40.0	23.8		40.4	33.8		82.6	29.0	29.2
Level of Service	D	B	B	D	C		D	C		F	C	C
Approach Delay (s)		20.8			25.0			35.7			66.9	
Approach LOS		C			C			D			E	

Intersection Summary					
HCM 2000 Control Delay	34.3	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.70				
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	16.3		
Intersection Capacity Utilization	77.8%	ICU Level of Service	D		
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
1: Redwood Blvd & Rowland Blvd

05/04/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	748	35	61	586	328	20	36	82	441	36	144
Future Volume (vph)	111	748	35	61	586	328	20	36	82	441	36	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	3574	1591	1805	3398		1805	3193		3502	1900	1594
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1805	3574	1591	1805	3398		1805	3193		3502	1900	1594
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)	111	748	35	61	586	328	20	36	82	441	36	144
RTOR Reduction (vph)	0	0	22	0	68	0	0	65	0	0	0	102
Lane Group Flow (vph)	111	748	13	61	846	0	20	53	0	441	36	42
Confl. Peds. (#/hr)			4			3			9			
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	11.4	31.0	31.0	9.5	29.1		3.9	17.5		12.5	25.4	25.4
Effective Green, g (s)	11.4	31.0	31.0	9.5	29.1		3.9	17.5		12.5	25.4	25.4
Actuated g/C Ratio	0.13	0.36	0.36	0.11	0.34		0.05	0.20		0.15	0.30	0.30
Clearance Time (s)	3.5	4.5	4.5	3.5	4.5		3.5	4.1		3.5	4.8	4.8
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0		2.0	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	238	1286	572	199	1148		81	648		508	560	470
v/s Ratio Prot	c0.06	0.21		0.03	c0.25		0.01	0.02		c0.13	0.02	
v/s Ratio Perm			0.01									c0.03
v/c Ratio	0.47	0.58	0.02	0.31	0.74		0.25	0.08		0.87	0.06	0.09
Uniform Delay, d1	34.5	22.3	17.8	35.3	25.1		39.7	27.8		36.0	21.8	22.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.5	0.8	0.0	0.3	2.7		0.6	0.0		14.4	0.0	0.1
Delay (s)	35.1	23.1	17.8	35.6	27.8		40.3	27.8		50.4	21.8	22.0
Level of Service	D	C	B	D	C		D	C		D	C	C
Approach Delay (s)		24.4			28.3			29.6			42.2	
Approach LOS		C			C			C			D	

Intersection Summary					
HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.56				
Actuated Cycle Length (s)	86.1	Sum of lost time (s)	16.3		
Intersection Capacity Utilization	66.6%	ICU Level of Service	C		
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd 05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	528	619	775	1223	0	0	0	0	345	6	176
Future Volume (vph)	0	528	619	775	1223	0	0	0	0	345	6	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.91	0.91	
Frpb, ped/bikes		1.00	0.99	1.00	1.00					1.00	0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		0.95	0.85	1.00	1.00					1.00	0.92	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (prot)		3251	1451	3502	3610					1643	3082	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.98	
Satd. Flow (perm)		3251	1451	3502	3610					1643	3082	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	528	619	775	1223	0	0	0	0	345	6	176
RTOR Reduction (vph)	0	60	233	0	0	0	0	0	0	0	24	0
Lane Group Flow (vph)	0	728	126	775	1223	0	0	0	0	183	320	0
Confl. Peds. (#/hr)			1						13			1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		2		1	6					4	4	
Permitted Phases			2									
Actuated Green, G (s)		19.9	19.9	13.5	36.4					13.5	13.5	
Effective Green, g (s)		19.9	19.9	13.5	36.4					13.5	13.5	
Actuated g/C Ratio		0.35	0.35	0.24	0.64					0.24	0.24	
Clearance Time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Vehicle Extension (s)		4.0	4.0	2.0	2.5					2.0	2.0	
Lane Grp Cap (vph)		1136	507	830	2309					389	731	
v/s Ratio Prot		c0.22		c0.22	0.34					c0.11	0.10	
v/s Ratio Perm			0.09									
v/c Ratio		0.64	0.25	0.93	0.53					0.47	0.44	
Uniform Delay, d1		15.5	13.2	21.3	5.6					18.6	18.5	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.4	0.4	17.0	0.2					0.3	0.2	
Delay (s)		16.9	13.5	38.3	5.8					19.0	18.6	
Level of Service		B	B	D	A					B	B	
Approach Delay (s)		15.8			18.4			0.0			18.7	
Approach LOS		B			B			A			B	

Intersection Summary				
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.68			
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	10.0	
Intersection Capacity Utilization	70.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd 05/04/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	670	549	955	901	0	0	0	0	503	3	94
Future Volume (vph)	0	670	549	955	901	0	0	0	0	503	3	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Lane Util. Factor		0.91	0.91	0.97	0.95					0.91	0.91	
Frpb, ped/bikes		1.00	0.99	1.00	1.00					1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	
Frt		0.97	0.85	1.00	1.00					1.00	0.96	
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	
Satd. Flow (prot)		3315	1451	3502	3610					1643	3183	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	
Satd. Flow (perm)		3315	1451	3502	3610					1643	3183	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	670	549	955	901	0	0	0	0	503	3	94
RTOR Reduction (vph)	0	24	242	0	0	0	0	0	0	0	58	0
Lane Group Flow (vph)	0	822	131	955	901	0	0	0	0	251	291	0
Confl. Peds. (#/hr)			1						13			1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		2		1	6					4	4	
Permitted Phases			2									
Actuated Green, G (s)		20.9	20.9	13.4	37.3					15.4	15.4	
Effective Green, g (s)		20.9	20.9	13.4	37.3					15.4	15.4	
Actuated g/C Ratio		0.35	0.35	0.22	0.62					0.26	0.26	
Clearance Time (s)		4.0	4.0	3.0	4.0					3.0	3.0	
Vehicle Extension (s)		4.0	4.0	2.0	2.5					2.0	2.0	
Lane Grp Cap (vph)		1160	507	786	2255					423	821	
v/s Ratio Prot		c0.25		c0.27	0.25					c0.15	0.09	
v/s Ratio Perm			0.09									
v/c Ratio		0.71	0.26	1.22	0.40					0.59	0.35	
Uniform Delay, d1		16.8	13.9	23.2	5.6					19.4	18.1	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		2.2	0.4	108.3	0.1					1.5	0.1	
Delay (s)		18.9	14.2	131.5	5.7					20.9	18.2	
Level of Service		B	B	F	A					C	B	
Approach Delay (s)		17.5			70.4			0.0			19.3	
Approach LOS		B			E			A			B	

Intersection Summary				
HCM 2000 Control Delay	44.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	10.0	
Intersection Capacity Utilization	82.5%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	NEL2	NEL
Lane Configurations												
Traffic Volume (vph)	6	82	787	1214	2	524	783	12	22	745	24	16
Future Volume (vph)	6	82	787	1214	2	524	783	12	22	745	24	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.0	4.0		4.0	3.5		3.5	3.0		3.5
Lane Util. Factor		1.00	0.95	0.86		0.86	0.95		0.95	0.88		1.00
Frpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Frt		1.00	1.00	0.98		0.85	1.00		1.00	0.85		0.99
Flt Protected		0.95	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (prot)		1803	3574	4617		1323	1715		1711	2842		1760
Flt Permitted		0.19	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (perm)		361	3574	4617		1323	1715		1711	2842		1760
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	6	82	787	1214	2	540	783	12	22	745	24	16
RTOR Reduction (vph)	0	0	0	12	0	260	0	0	0	0	0	0
Lane Group Flow (vph)	0	88	787	1350	0	134	407	0	410	745	0	43
Confl. Peds. (#/hr)					7					11		
Heavy Vehicles (%)	2%	0%	1%	4%	0%	5%	0%	2%	13%	0%	2%	0%
Turn Type		Prot	NA	NA		Perm	Split	Split	NA	custom	Perm	Prot
Protected Phases		5	2	6			8	8	8	1 8		7
Permitted Phases						6					7	
Actuated Green, G (s)		21.0	50.7	40.8		40.8	35.4		35.4	46.5		8.8
Effective Green, g (s)		21.0	50.7	40.8		40.8	35.4		35.4	46.5		8.8
Actuated g/C Ratio		0.18	0.42	0.34		0.34	0.29		0.29	0.39		0.07
Clearance Time (s)		3.0	4.0	4.0		4.0	3.5		3.5			3.5
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0		2.0			2.0
Lane Grp Cap (vph)		63	1510	1569		449	505		504	1101		129
v/s Ratio Prot			0.22	c0.29			0.24		c0.24	0.26		
v/s Ratio Perm		c0.24				0.10						0.02
v/c Ratio		1.40	0.52	0.86		0.30	0.81		0.81	0.68		0.33
Uniform Delay, d1		49.5	25.7	36.9		29.1	39.1		39.2	30.5		52.8
Progression Factor		1.00	1.00	0.88		1.56	1.00		1.00	1.00		1.00
Incremental Delay, d2		250.3	1.3	5.7		1.5	8.6		9.2	1.3		0.6
Delay (s)		299.8	27.0	38.1		46.9	47.7		48.5	31.8		53.4
Level of Service		F	C	D		D	D		D	C		D
Approach Delay (s)			54.4	40.1					40.3			53.4
Approach LOS			D	D					D			D

Intersection Summary			
HCM 2000 Control Delay	43.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd 05/05/2017

Movement	NER
Lane Configurations	
Traffic Volume (vph)	3
Future Volume (vph)	3
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	1.00
Adj. Flow (vph)	3
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	15%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Proposed Hanna Ranch Project
Weekday PM Future + Project
Synchro 9 Report
W-Trans

Movement	EBL2	EBL	EBT	WBT	WBR	WBR2	NBL2	NBL	NBT	NBR	NEL2	NEL
Lane Configurations												
Traffic Volume (vph)	6	69	1100	1412	2	557	440	3	12	1232	3	4
Future Volume (vph)	6	69	1100	1412	2	557	440	3	12	1232	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	4.0	4.0		4.0	3.5		3.5	3.0		3.5
Lane Util. Factor		1.00	0.95	0.86		0.86	0.95		0.95	0.88		1.00
Frpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Flpb, ped/bikes		1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00
Frt		1.00	1.00	0.99		0.85	1.00		1.00	0.85		0.97
Flt Protected		0.95	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (prot)		1802	3574	4636		1323	1715		1711	2842		1706
Flt Permitted		0.19	1.00	1.00		1.00	0.95		0.95	1.00		0.96
Satd. Flow (perm)		351	3574	4636		1323	1715		1711	2842		1706
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	6	69	1100	1412	2	574	440	3	12	1232	3	4
RTOR Reduction (vph)	0	0	0	9	0	247	0	0	0	0	0	0
Lane Group Flow (vph)	0	75	1100	1537	0	195	229	0	226	1232	0	9
Confl. Peds. (#/hr)					7					11		
Heavy Vehicles (%)	2%	0%	1%	4%	0%	5%	0%	2%	13%	0%	2%	0%
Turn Type		Prot	NA	NA		Perm	Split	Split	NA	custom	Perm	Prot
Protected Phases		5	2	6			8	8	8	1 8		7
Permitted Phases						6					7	
Actuated Green, G (s)		21.6	48.7	38.7		38.7	43.5		43.5	55.1		2.2
Effective Green, g (s)		21.6	48.7	38.7		38.7	43.5		43.5	55.1		2.2
Actuated g/C Ratio		0.18	0.41	0.32		0.32	0.36		0.36	0.46		0.02
Clearance Time (s)		3.0	4.0	4.0		4.0	3.5		3.5			3.5
Vehicle Extension (s)		2.0	2.0	2.0		2.0	2.0		2.0			2.0
Lane Grp Cap (vph)		63	1450	1495		426	621		620	1304		31
v/s Ratio Prot			0.31	c0.33			0.13		0.13	c0.43		
v/s Ratio Perm		c0.21				0.15						0.01
v/c Ratio		1.19	0.76	1.03		0.46	0.37		0.36	0.94		0.29
Uniform Delay, d1		49.2	30.6	40.6		32.3	28.1		28.1	31.0		58.1
Progression Factor		1.00	1.00	0.84		1.09	1.00		1.00	1.00		1.00
Incremental Delay, d2		173.8	3.8	27.3		2.5	0.1		0.1	13.6		1.9
Delay (s)		223.0	34.4	61.3		37.8	28.3		28.2	44.6		60.0
Level of Service		F	C	E		D	C		C	D		E
Approach Delay (s)			46.4	56.1					40.2			60.0
Approach LOS			D	E					D			E

Intersection Summary			
HCM 2000 Control Delay	48.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd 05/04/2017

Movement	NER
Lane Configurations	
Traffic Volume (vph)	2
Future Volume (vph)	2
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	1.00
Adj. Flow (vph)	2
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	
Heavy Vehicles (%)	15%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Proposed Hanna Ranch Project
Weekend Midday Future + Project
Synchro 9 Report
W-Trans

HCM Signalized Intersection Capacity Analysis
4: Rowland Blvd & Rowland Way

05/05/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	187	1350	1337	44	55	400
Future Volume (vph)	187	1350	1337	44	55	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		3.2	3.2
Lane Util. Factor	0.97	0.91	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		0.98	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00		0.89	0.85
Flt Protected	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)	3467	5187	3583		1610	1479
Flt Permitted	0.95	1.00	1.00		0.99	1.00
Satd. Flow (perm)	3467	5187	3583		1610	1479
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	187	1350	1337	44	55	400
RTOR Reduction (vph)	0	0	1	0	122	195
Lane Group Flow (vph)	187	1350	1380	0	109	29
Confl. Peds. (#/hr)				2		14
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	1%	0%	0%	7%	2%	1%
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	11.4	97.5	82.6		15.3	15.3
Effective Green, g (s)	11.4	97.5	82.6		15.3	15.3
Actuated g/C Ratio	0.10	0.81	0.69		0.13	0.13
Clearance Time (s)	3.5	4.0	4.0		3.2	3.2
Vehicle Extension (s)	2.0	4.0	4.0		2.0	2.0
Lane Grp Cap (vph)	329	4214	2466		205	188
v/s Ratio Prot	c0.05	0.26	c0.39		c0.07	
v/s Ratio Perm						0.02
v/c Ratio	0.57	0.32	0.56		0.53	0.15
Uniform Delay, d1	51.9	2.9	9.5		49.0	46.6
Progression Factor	1.08	1.11	0.89		1.00	1.00
Incremental Delay, d2	1.1	0.2	0.8		1.3	0.1
Delay (s)	57.0	3.3	9.3		50.3	46.7
Level of Service	E	A	A		D	D
Approach Delay (s)		9.9	9.3		48.5	
Approach LOS		A	A		D	

Intersection Summary				
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.7	
Intersection Capacity Utilization	78.8%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: Rowland Blvd & Rowland Way

05/04/2017

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	319	2015	1730	62	71	216
Future Volume (vph)	319	2015	1730	62	71	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0	4.0		3.2	3.2
Lane Util. Factor	0.97	0.91	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		0.99	0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		0.92	0.85
Flt Protected	0.95	1.00	1.00		0.98	1.00
Satd. Flow (prot)	3467	5187	3581		1664	1479
Flt Permitted	0.95	1.00	1.00		0.98	1.00
Satd. Flow (perm)	3467	5187	3581		1664	1479
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	319	2015	1730	62	71	216
RTOR Reduction (vph)	0	0	1	0	41	122
Lane Group Flow (vph)	319	2015	1791	0	106	18
Confl. Peds. (#/hr)				2		14
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	1%	0%	0%	7%	2%	1%
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	15.0	97.5	79.0		15.3	15.3
Effective Green, g (s)	15.0	97.5	79.0		15.3	15.3
Actuated g/C Ratio	0.12	0.81	0.66		0.13	0.13
Clearance Time (s)	3.5	4.0	4.0		3.2	3.2
Vehicle Extension (s)	2.0	4.0	4.0		2.0	2.0
Lane Grp Cap (vph)	433	4214	2357		212	188
v/s Ratio Prot	c0.09	0.39	c0.50		c0.06	
v/s Ratio Perm						0.01
v/c Ratio	0.74	0.48	0.76		0.50	0.09
Uniform Delay, d1	50.6	3.4	14.0		48.8	46.2
Progression Factor	1.01	1.09	1.01		1.00	1.00
Incremental Delay, d2	3.2	0.2	1.8		0.7	0.1
Delay (s)	54.2	4.0	16.0		49.5	46.3
Level of Service	D	A	B		D	D
Approach Delay (s)		10.8	16.0		47.9	
Approach LOS		B	B		D	

Intersection Summary				
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.72			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.7	
Intersection Capacity Utilization	86.3%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
5: Vintage Way (North) & Rowland Blvd 05/05/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	827	5	9	5	2	4	14	501	1	11	689	779
Future Volume (vph)	827	5	9	5	2	4	14	501	1	11	689	779
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	0.98			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.90			0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1689			1767		1805	3573		1805	3539	2842
Flt Permitted	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1689			1767		1805	3573		1805	3539	2842
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)	827	5	9	5	2	4	14	501	1	11	689	779
RTOR Reduction (vph)	0	5	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	827	9	0	0	7	0	14	502	0	11	689	779
Confl. Peds. (#/hr)			10				9		10			4
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	3	3		4	4		1	6		5	2	2 3
Permitted Phases												
Actuated Green, G (s)	51.4	51.4			2.4		4.0	50.0		2.4	48.4	103.8
Effective Green, g (s)	51.4	51.4			2.4		4.0	50.0		2.4	48.4	103.8
Actuated g/C Ratio	0.43	0.43			0.02		0.03	0.42		0.02	0.40	0.86
Clearance Time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	
Vehicle Extension (s)	3.0	3.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	1500	723			35		60	1488		36	1427	2458
v/s Ratio Prot	c0.24	0.01			c0.00		0.01	c0.14		0.01	c0.19	0.27
v/s Ratio Perm												
v/c Ratio	0.55	0.01			0.20		0.23	0.34		0.31	0.48	0.32
Uniform Delay, d1	25.7	19.7			57.9		56.5	23.8		58.0	26.5	1.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.19	1.17	0.90
Incremental Delay, d2	1.5	0.0			1.0		0.7	0.6		1.7	1.1	0.3
Delay (s)	27.1	19.7			58.9		57.2	24.4		70.9	32.2	1.7
Level of Service	C	B			E		E	C		E	C	A
Approach Delay (s)		27.0			58.9			25.3			16.4	
Approach LOS		C			E			C			B	

Intersection Summary				
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.51			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	60.3%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

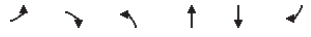
HCM Signalized Intersection Capacity Analysis
5: Vintage Way (North) & Rowland Blvd 05/04/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1076	10	9	4	9	1	8	692	16	32	731	1314
Future Volume (vph)	1076	10	9	4	9	1	8	692	16	32	731	1314
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	0.88
Frpb, ped/bikes	1.00	0.99			1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.93			0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1744			1855		1805	3559		1805	3539	2842
Flt Permitted	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1744			1855		1805	3559		1805	3539	2842
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)	1076	10	9	4	9	1	8	692	16	32	731	1314
RTOR Reduction (vph)	0	5	0	0	1	0	0	1	0	0	0	0
Lane Group Flow (vph)	1076	14	0	0	13	0	8	707	0	32	731	1314
Confl. Peds. (#/hr)			10				9		10			4
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	3	3		4	4		1	6		5	2	2 3
Permitted Phases												
Actuated Green, G (s)	51.4	51.4			4.8		4.0	42.2		7.8	46.0	101.4
Effective Green, g (s)	51.4	51.4			4.8		4.0	42.2		7.8	46.0	101.4
Actuated g/C Ratio	0.43	0.43			0.04		0.03	0.35		0.06	0.38	0.85
Clearance Time (s)	3.6	3.6			3.2		3.0	4.0		3.0	4.0	
Vehicle Extension (s)	3.0	3.0			2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	1500	747			74		60	1251		117	1356	2401
v/s Ratio Prot	c0.31	0.01			c0.01		0.00	c0.20		0.02	0.21	c0.46
v/s Ratio Perm												
v/c Ratio	0.72	0.02			0.18		0.13	0.56		0.27	0.54	0.55
Uniform Delay, d1	28.3	19.8			55.7		56.3	31.5		53.4	28.8	2.7
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.16	1.18	0.80
Incremental Delay, d2	3.0	0.0			0.4		0.4	1.9		0.4	1.4	0.8
Delay (s)	31.3	19.8			56.1		56.7	33.3		62.6	35.4	2.9
Level of Service	C	B			E		E	C		E	D	A
Approach Delay (s)		31.1			56.1			33.6			15.3	
Approach LOS		C			E			C			B	

Intersection Summary				
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8	
Intersection Capacity Utilization	71.4%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Vintage Way (South) & Rowland Blvd

05/05/2017



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	130	1	2	257	387	121
Future Volume (vph)	130	1	2	257	387	121
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	130	1	2	257	387	121

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	131	88	171	508
Volume Left (vph)	130	2	0	0
Volume Right (vph)	1	0	0	121
Hadj (s)	0.23	0.05	0.03	-0.11
Departure Headway (s)	5.9	5.4	5.4	4.6
Degree Utilization, x	0.21	0.13	0.26	0.65
Capacity (veh/h)	552	639	641	760
Control Delay (s)	10.5	8.0	9.0	15.9
Approach Delay (s)	10.5	8.7		15.9
Approach LOS	B	A		C

Intersection Summary				
Delay		13.0		
Level of Service		B		
Intersection Capacity Utilization		42.1%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
6: Vintage Way (South) & Rowland Blvd

05/04/2017

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	184	0	2	329	363	226
Future Volume (vph)	184	0	2	329	363	226
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	184	0	2	329	363	226

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	184	112	219	589
Volume Left (vph)	184	2	0	0
Volume Right (vph)	0	0	0	226
Hadj (s)	0.23	0.04	0.03	-0.20
Departure Headway (s)	6.3	5.8	5.8	4.9
Degree Utilization, x	0.32	0.18	0.35	0.80
Capacity (veh/h)	532	597	599	726
Control Delay (s)	12.2	8.8	10.7	24.3
Approach Delay (s)	12.2	10.1		24.3
Approach LOS	B	B		C

Intersection Summary				
Delay		18.0		
Level of Service		C		
Intersection Capacity Utilization		50.0%	ICU Level of Service	A
Analysis Period (min)		15		

Appendix C

Freeway Segment Level of Service Calculations

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Existing
Freeway/Direction:	Northbound US 101
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5496	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1462	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1498	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1498	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	72.3	mi/h
Number of lanes, N	4	
Density, D	20.7	pc/mi/ln
Level of service, LOS	C	

HCS 2010: Basic Freeway Segments Release 6.80

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Existing
Freeway/Direction:	Southbound US 101
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	4944	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1315	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1348	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1348	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	73.7	mi/h
Number of lanes, N	4	
Density, D	18.3	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Existing
Freeway/Direction:	Northbound US 101
From/To:	Rowland Boulevard / De Long Av
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5023	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1336	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1826	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1826	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	67.4	mi/h
Number of lanes, N	3	
Density, D	27.1	pc/mi/ln
Level of service, LOS	D	

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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Existing
Freeway/Direction:	Southbound US 101
From/To:	Rowland Boulevard / De Long Av
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5308	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1412	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1447	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1447	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	72.8	mi/h
Number of lanes, N	4	
Density, D	19.9	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	W-Trans
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Existing
Freeway/Direction:	Eastbound SR 37
From/To:	East of US 101
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	2883	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	767	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1572	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1572	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	71.4	mi/h
Number of lanes, N	2	
Density, D	22.0	pc/mi/ln
Level of service, LOS	C	

HCS 2010: Basic Freeway Segments Release 6.80

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	W-Trans
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Existing
Freeway/Direction:	SR 37 Westbound
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	1065	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	283	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	290	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	290	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	75.0	mi/h
Number of lanes, N	4	
Density, D	3.9	pc/mi/ln
Level of service, LOS	A	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Baseline
Freeway/Direction:	Northbound US 101
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5515	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1467	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1503	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1503	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	72.2	mi/h
Number of lanes, N	4	
Density, D	20.8	pc/mi/ln
Level of service, LOS	C	

HCS 2010: Basic Freeway Segments Release 6.80

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Baseline
Freeway/Direction:	Southbound US 101
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	4965	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1320	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1353	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1353	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	73.6	mi/h
Number of lanes, N	4	
Density, D	18.4	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Baseline
Freeway/Direction:	Northbound US 101
From/To:	Rowland Boulevard / De Long Av
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5040	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1340	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1832	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1832	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	67.3	mi/h
Number of lanes, N	3	
Density, D	27.2	pc/mi/ln
Level of service, LOS	D	

HCS 2010: Basic Freeway Segments Release 6.80

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Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Baseline
Freeway/Direction:	Southbound US 101
From/To:	Rowland Boulevard / De Long Av
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5323	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1416	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1451	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1451	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	72.7	mi/h
Number of lanes, N	4	
Density, D	19.9	pc/mi/ln
Level of service, LOS	C	

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Operational Analysis

Analyst:	W-Trans
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Baseline
Freeway/Direction:	Eastbound SR 37
From/To:	East of US 101
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	2891	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	769	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1576	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1576	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	71.3	mi/h
Number of lanes, N	2	
Density, D	22.1	pc/mi/ln
Level of service, LOS	C	

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Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Baseline
Freeway/Direction:	Westbound SR 37
From/To:	East of US 101
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	1072	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	285	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	584	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	584	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	75.0	mi/h
Number of lanes, N	2	
Density, D	7.8	pc/mi/ln
Level of service, LOS	A	

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Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Future
Freeway/Direction:	Northbound US 101
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	6243	veh/h
Peak-hour factor, PHF	1.00	
Peak 15-min volume, v15	1561	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1600	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1600	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	71.0	mi/h
Number of lanes, N	4	
Density, D	22.5	pc/mi/ln
Level of service, LOS	C	

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Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Future
Freeway/Direction:	Southbound US 101
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	6639	veh/h
Peak-hour factor, PHF	1.00	
Peak 15-min volume, v15	1660	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1701	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1701	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	69.6	mi/h
Number of lanes, N	4	
Density, D	24.5	pc/mi/ln
Level of service, LOS	C	

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Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Future
Freeway/Direction:	Northbound US 101
From/To:	Rowland Boulevard / De Long Av
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5803	veh/h
Peak-hour factor, PHF	1.00	
Peak 15-min volume, v15	1451	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1983	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1983	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	64.3	mi/h
Number of lanes, N	3	
Density, D	30.8	pc/mi/ln
Level of service, LOS	D	

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Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Future
Freeway/Direction:	Southbound US 101
From/To:	Rowland Boulevard / De Long Av
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5984	veh/h
Peak-hour factor, PHF	1.00	
Peak 15-min volume, v15	1496	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1533	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1533	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	71.9	mi/h
Number of lanes, N	4	
Density, D	21.3	pc/mi/ln
Level of service, LOS	C	

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Operational Analysis

Analyst:	W-Trans
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Future
Freeway/Direction:	Eastbound SR 37
From/To:	East of US 101
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	3750	veh/h
Peak-hour factor, PHF	1.00	
Peak 15-min volume, v15	938	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1922	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1922	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	65.6	mi/h
Number of lanes, N	2	
Density, D	29.3	pc/mi/ln
Level of service, LOS	D	

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Operational Analysis

Analyst:	W-Trans
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Future
Freeway/Direction:	Westbound SR 37
From/To:	East of US 101
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	3000	veh/h
Peak-hour factor, PHF	1.00	
Peak 15-min volume, v15	750	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1537	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1537	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	71.8	mi/h
Number of lanes, N	2	
Density, D	21.4	pc/mi/ln
Level of service, LOS	C	

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Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Existing + Project
Freeway/Direction:	Northbound US 101
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5582	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1485	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1522	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1522	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	72.0	mi/h
Number of lanes, N	4	
Density, D	21.1	pc/mi/ln
Level of service, LOS	C	

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Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Existing + Project
Freeway/Direction:	Southbound US 101
From/To:	Rowland Boulevard / De Long Av
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	4990	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1327	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1360	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1360	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	73.6	mi/h
Number of lanes, N	4	
Density, D	18.5	pc/mi/ln
Level of service, LOS	C	

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Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Existing + Project
Freeway/Direction:	Northbound US 101
From/To:	Rowland Boulevard / De Long Av
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5768	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1534	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	2097	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	2097	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	61.7	mi/h
Number of lanes, N	3	
Density, D	34.0	pc/mi/ln
Level of service, LOS	D	

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Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Existing + Project
Freeway/Direction:	Southbound US 101
From/To:	Rowland Boulevard / De Long Av
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5447	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1449	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1485	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1485	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	72.4	mi/h
Number of lanes, N	4	
Density, D	20.5	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
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Operational Analysis

Analyst:	W-Trans
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Existing + Project
Freeway/Direction:	Eastbound SR 37
From/To:	East of US 101
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	2901	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	772	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1582	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1582	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	71.3	mi/h
Number of lanes, N	2	
Density, D	22.2	pc/mi/ln
Level of service, LOS	C	

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Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Existing + Project
Freeway/Direction:	Westbound SR 37
From/To:	East of US 101
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	1099	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	292	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	599	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	599	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	75.0	mi/h
Number of lanes, N	2	
Density, D	8.0	pc/mi/ln
Level of service, LOS	A	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Baseline + Project
Freeway/Direction:	Northbound US 101
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5601	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1490	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1527	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1527	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	71.9	mi/h
Number of lanes, N	4	
Density, D	21.2	pc/mi/ln
Level of service, LOS	C	

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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Baseline + Project
Freeway/Direction:	Southbound US 101
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5011	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1333	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1366	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1366	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	73.5	mi/h
Number of lanes, N	4	
Density, D	18.6	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Baseline + Project
Freeway/Direction:	Northbound US 101
From/To:	Rowland Boulevard / De Long Av
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5114	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1360	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1859	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1859	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	66.8	mi/h
Number of lanes, N	3	
Density, D	27.8	pc/mi/ln
Level of service, LOS	D	

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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Baseline + Project
Freeway/Direction:	Southbound US 101
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5462	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1453	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1489	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1489	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	72.4	mi/h
Number of lanes, N	4	
Density, D	20.6	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	W-Trans
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Baseline + Project
Freeway/Direction:	Eastbound SR 37
From/To:	East of US 101
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	2909	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	774	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1586	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1586	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	71.2	mi/h
Number of lanes, N	2	
Density, D	22.3	pc/mi/ln
Level of service, LOS	C	

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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	W-Trans
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Baseline + Project
Freeway/Direction:	Westbound SR 37
From/To:	East of US 101
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	1106	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	294	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	603	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	603	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	75.0	mi/h
Number of lanes, N	2	
Density, D	8.0	pc/mi/ln
Level of service, LOS	A	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Future + Project
Freeway/Direction:	Northbound US 101
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	6329	veh/h
Peak-hour factor, PHF	1.00	
Peak 15-min volume, v15	1583	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1622	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1622	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	70.7	mi/h
Number of lanes, N	4	
Density, D	22.9	pc/mi/ln
Level of service, LOS	C	

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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Future + Project
Freeway/Direction:	Southbound US 101
From/To:	Rowland Boulevard / SR 37
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	6685	veh/h
Peak-hour factor, PHF	1.00	
Peak 15-min volume, v15	1672	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1713	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1713	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	69.4	mi/h
Number of lanes, N	4	
Density, D	24.7	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Future + Project
Freeway/Direction:	Northbound US 101
From/To:	Rowland Boulevard / De Long Av
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	5877	veh/h
Peak-hour factor, PHF	1.00	
Peak 15-min volume, v15	1470	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	2008	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	2008	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	63.8	mi/h
Number of lanes, N	3	
Density, D	31.5	pc/mi/ln
Level of service, LOS	D	

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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SCB
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Future + Project
Freeway/Direction:	Southbound US 101
From/To:	Rowland Boulevard / De Long Av
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	6123	veh/h
Peak-hour factor, PHF	1.00	
Peak 15-min volume, v15	1531	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1569	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1569	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	71.4	mi/h
Number of lanes, N	4	
Density, D	22.0	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	W-Trans
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Future + Project
Freeway/Direction:	Eastbound SR 37
From/To:	East of US 101
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	3768	veh/h
Peak-hour factor, PHF	1.00	
Peak 15-min volume, v15	942	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1931	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1931	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	65.4	mi/h
Number of lanes, N	2	
Density, D	29.5	pc/mi/ln
Level of service, LOS	D	

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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	W-Trans
Agency or Company:	W-Trans
Date Performed:	5/1/2017
Analysis Time Period:	Weekday PM Future + Project
Freeway/Direction:	Westbound SR 37
From/To:	East of US 101
Jurisdiction:	Novato
Analysis Year:	2015
Description:	Proposed Hanna Ranch Project

Flow Inputs and Adjustments

Volume, V	3034	veh/h
Peak-hour factor, PHF	1.00	
Peak 15-min volume, v15	759	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1555	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	0.50	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	1.8	mi/h
Free-flow speed, FFS	73.6	mi/h

LOS and Performance Measures

Flow rate, vp	1555	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	71.6	mi/h
Number of lanes, N	2	
Density, D	21.7	pc/mi/ln
Level of service, LOS	C	

Appendix D

Queuing Calculations

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	TR	L	T	TR	L	L
Maximum Queue (ft)	111	125	244	72	131	250	269	45	46	40	109	117
Average Queue (ft)	69	66	154	25	73	164	198	23	26	19	63	74
95th Queue (ft)	127	143	264	82	153	289	317	53	58	47	116	122
Link Distance (ft)		612	612			294	294		705	705		1269
Upstream Blk Time (%)						1	3					
Queuing Penalty (veh)						5	15					
Storage Bay Dist (ft)	245			65	208			102			248	
Storage Blk Time (%)			27	0		6		0				
Queuing Penalty (veh)			12	0		6		0				

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	26	34
Average Queue (ft)	8	17
95th Queue (ft)	36	44
Link Distance (ft)	1269	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		380
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	TR	R	L	L	T	T	L	LT	TR
Maximum Queue (ft)	96	132	113	159	171	110	122	69	74	51
Average Queue (ft)	66	91	82	104	115	64	77	49	54	32
95th Queue (ft)	106	143	122	181	188	132	141	82	90	62
Link Distance (ft)	294	294	294		1059	1059	1059	1718	1718	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				442						290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NE
Directions Served	<L	T	T	T	T	TR>	>	<	<LT	R	R	<LR
Maximum Queue (ft)	76	149	164	165	138	168	99	297	280	190	242	61
Average Queue (ft)	46	81	109	105	96	108	60	236	205	127	167	35
95th Queue (ft)	96	161	193	185	155	177	125	319	316	214	267	69
Link Distance (ft)		1059	1059	373	373	373		1898	1898	1898	1898	205
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	440						185					
Storage Blk Time (%)						1						
Queuing Penalty (veh)						2						

Intersection: 4: Rowland Blvd & Rowland Way

Movement	EB	EB	EB	EB	EB	WB	WB	SB	SB
Directions Served	UL	L	T	T	T	T	TR	LR	R
Maximum Queue (ft)	87	114	99	137	157	64	94	185	130
Average Queue (ft)	55	84	37	75	91	28	51	122	68
95th Queue (ft)	104	123	112	149	168	74	101	212	153
Link Distance (ft)			373	373	373	254	254	375	375
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	235	235							
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Vintage Way (North) & Rowland Blvd

Movement	EB	EB	EB	WB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	T	TR	L	T	T	R
Maximum Queue (ft)	222	294	46	24	75	112	24	93	48	9
Average Queue (ft)	173	225	10	9	33	68	10	62	22	2
95th Queue (ft)	245	316	69	35	86	121	31	115	56	18
Link Distance (ft)	514	514		96		1269		254	254	254
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			180		80		92			
Storage Blk Time (%)		19	0		0	5		7		
Queuing Penalty (veh)		1	0		0	5		1		

Intersection: 6: Vintage Way (South) & Rowland Blvd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	37	10	58
Average Queue (ft)	25	2	39
95th Queue (ft)	40	14	64
Link Distance (ft)	522	97	853
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 47

Intersection: 1: Rowland Blvd & Redwood Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	TR	L	T	TR	L	L
Maximum Queue (ft)	75	130	220	69	65	161	203	42	40	62	130	164
Average Queue (ft)	49	79	155	19	34	101	143	20	18	38	69	125
95th Queue (ft)	88	147	271	69	68	182	230	48	49	69	164	215
Link Distance (ft)		612	612			294	294		716	716		1269
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	245			65	208			102			248	
Storage Blk Time (%)			29			0						0
Queuing Penalty (veh)			9			0						0

Intersection: 1: Rowland Blvd & Redwood Blvd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	18	29
Average Queue (ft)	6	11
95th Queue (ft)	21	33
Link Distance (ft)	1269	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		380
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	TR	R	L	L	T	T	L	LT	TR
Maximum Queue (ft)	155	166	143	194	216	77	101	101	112	36
Average Queue (ft)	98	111	82	146	156	45	59	71	80	24
95th Queue (ft)	162	182	151	232	245	101	114	116	116	46
Link Distance (ft)	294	294			1059	1059	1059	1718	1718	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			221	442						290
Storage Blk Time (%)		0	0							
Queuing Penalty (veh)		0	0							

Intersection: 3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NE
Directions Served	<L	T	T	T	T	TR>	>	<	<LT	R	R	<LR
Maximum Queue (ft)	84	265	263	194	164	147	89	204	171	334	357	23
Average Queue (ft)	63	159	187	136	102	90	41	143	96	218	264	9
95th Queue (ft)	102	302	306	220	180	178	111	220	188	360	383	34
Link Distance (ft)		1059	1059	373	373	373		1898	1898	1898	1898	205
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	440						185					
Storage Blk Time (%)		0				1	0					
Queuing Penalty (veh)		0				1	0					

Intersection: 4: Rowland Blvd & Rowland Way

Movement	EB	EB	EB	EB	EB	WB	WB	SB	SB
Directions Served	UL	L	T	T	T	T	TR	LR	R
Maximum Queue (ft)	123	141	98	165	160	132	156	148	81
Average Queue (ft)	90	110	41	86	90	64	95	101	46
95th Queue (ft)	142	157	106	192	198	168	198	171	110
Link Distance (ft)			373	373	373	252	252	375	375
Upstream Blk Time (%)						0	0		
Queuing Penalty (veh)						2	2		
Storage Bay Dist (ft)	235	235							
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Vintage Way (North) & Rowland Blvd

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R	R
Maximum Queue (ft)	259	300	145	25	20	104	207	62	132	100	28	30
Average Queue (ft)	203	232	38	12	6	74	121	35	95	57	6	6
95th Queue (ft)	305	343	160	36	24	126	214	75	161	126	55	59
Link Distance (ft)		498		96			1269		252	252	252	252
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	560		180		80	80		92				
Storage Blk Time (%)		20	0			5	16		11			
Queuing Penalty (veh)		97	0			9	27		3			

Intersection: 6: Vintage Way (South) & Rowland Blvd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	46	10	70
Average Queue (ft)	31	2	52
95th Queue (ft)	52	14	80
Link Distance (ft)	522	97	853
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 151

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	TR	L	T	TR	L	L
Maximum Queue (ft)	103	130	215	45	112	257	278	40	43	36	134	145
Average Queue (ft)	62	68	144	17	65	172	207	21	20	20	83	86
95th Queue (ft)	117	161	239	57	147	293	313	50	51	48	148	159
Link Distance (ft)		612	612			294	294		705	705		1269
Upstream Blk Time (%)						1	4					
Queuing Penalty (veh)						3	24					
Storage Bay Dist (ft)	245			65	208			102			248	
Storage Blk Time (%)			26			6						
Queuing Penalty (veh)			12			6						

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	22	49
Average Queue (ft)	7	22
95th Queue (ft)	24	59
Link Distance (ft)	1269	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		380
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	TR	R	L	L	T	T	L	LT	TR
Maximum Queue (ft)	109	135	118	152	171	138	146	76	69	63
Average Queue (ft)	61	91	78	106	121	69	85	51	47	33
95th Queue (ft)	132	147	127	157	176	144	154	84	81	68
Link Distance (ft)	294	294	294		1059	1059	1059	1718	1718	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				442						290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NE
Directions Served	<L	T	T	T	T	TR>	>	<	<LT	R	R	<LR
Maximum Queue (ft)	86	158	161	174	165	190	120	307	282	211	245	80
Average Queue (ft)	44	93	107	115	113	114	53	238	217	134	169	37
95th Queue (ft)	95	178	186	204	187	206	137	329	309	243	281	92
Link Distance (ft)		1059	1059	373	373	373		1898	1898	1898	1898	205
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	440						185					
Storage Blk Time (%)						2	0					
Queuing Penalty (veh)						4	0					

Intersection: 4: Rowland Blvd & Rowland Way

Movement	EB	EB	EB	EB	EB	WB	WB	SB	SB
Directions Served	UL	L	T	T	T	T	TR	LR	R
Maximum Queue (ft)	99	117	82	110	133	134	135	176	146
Average Queue (ft)	63	87	40	62	82	62	76	122	83
95th Queue (ft)	111	131	92	136	154	162	168	192	164
Link Distance (ft)			373	373	373	253	253	375	375
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	235	235							
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Vintage Way (North) & Rowland Blvd

Movement	EB	EB	EB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	LTR	T	TR	L	T	T
Maximum Queue (ft)	259	291	54	29	83	111	37	138	87
Average Queue (ft)	166	202	12	10	52	74	14	102	49
95th Queue (ft)	272	327	74	31	97	121	61	153	99
Link Distance (ft)	518	518		96	1269	1269		253	253
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			180				92		
Storage Blk Time (%)		15			3			14	
Queuing Penalty (veh)		1			0			1	

Intersection: 6: Vintage Way (South) & Rowland Blvd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	48	5	55
Average Queue (ft)	25	1	38
95th Queue (ft)	49	10	63
Link Distance (ft)	522	97	853
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 52

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	TR	L	T	TR	L	L
Maximum Queue (ft)	141	178	234	44	93	189	230	33	32	45	139	108
Average Queue (ft)	71	95	154	11	44	115	154	15	14	30	90	70
95th Queue (ft)	156	215	253	49	114	210	259	39	38	52	157	118
Link Distance (ft)		612	612			294	294		705	705		1269
Upstream Blk Time (%)						0	0					
Queuing Penalty (veh)						0	2					
Storage Bay Dist (ft)	245			65	208			102			248	
Storage Blk Time (%)		1	25			1						
Queuing Penalty (veh)		1	8			1						

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	21	29
Average Queue (ft)	7	9
95th Queue (ft)	31	32
Link Distance (ft)	1269	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		380
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	TR	R	L	L	T	T	L	LT	TR
Maximum Queue (ft)	130	152	118	168	192	64	92	111	95	36
Average Queue (ft)	88	103	79	126	140	39	59	76	70	22
95th Queue (ft)	146	166	129	197	210	72	103	114	107	40
Link Distance (ft)	294	294	294		1059	1059	1059	1718	1718	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				442						290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NE
Directions Served	<L	T	T	T	T	TR>	>	<	<LT	R	R	<LR
Maximum Queue (ft)	87	271	335	192	128	157	133	220	183	301	349	15
Average Queue (ft)	52	176	237	129	92	99	60	146	105	234	253	6
95th Queue (ft)	95	297	372	203	151	184	141	225	198	344	372	26
Link Distance (ft)		1059	1059	373	373	373		1898	1898	1898	1898	205
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	440						185					
Storage Blk Time (%)						1	0					
Queuing Penalty (veh)						1	0					

Intersection: 4: Rowland Blvd & Rowland Way

Movement	EB	EB	EB	EB	EB	WB	WB	SB	SB
Directions Served	UL	L	T	T	T	T	TR	LR	R
Maximum Queue (ft)	150	167	140	165	173	192	192	158	118
Average Queue (ft)	99	121	70	93	103	111	143	113	57
95th Queue (ft)	170	183	159	189	204	237	266	197	147
Link Distance (ft)			373	373	373	253	253	375	375
Upstream Blk Time (%)						0	1		
Queuing Penalty (veh)						2	5		
Storage Bay Dist (ft)	235	235							
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Vintage Way (North) & Rowland Blvd

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R	R
Maximum Queue (ft)	306	327	57	36	13	103	173	59	194	150	70	90
Average Queue (ft)	213	249	12	14	3	77	113	26	140	87	14	18
95th Queue (ft)	325	381	73	42	17	121	183	79	221	173	84	109
Link Distance (ft)	505	505		96		1269	1269		253	253	253	253
Upstream Blk Time (%)										0		
Queuing Penalty (veh)										0		
Storage Bay Dist (ft)			180		80			92				
Storage Blk Time (%)		22				6			24			
Queuing Penalty (veh)		4				0			7			

Intersection: 6: Vintage Way (South) & Rowland Blvd

Movement	EB	SB
Directions Served	LR	TR
Maximum Queue (ft)	42	77
Average Queue (ft)	29	55
95th Queue (ft)	46	87
Link Distance (ft)	522	853
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 32

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	TR	L	T	TR	L	L
Maximum Queue (ft)	101	191	261	75	164	276	314	38	47	41	152	154
Average Queue (ft)	69	99	192	27	85	216	270	16	23	24	100	103
95th Queue (ft)	114	214	314	87	170	308	361	48	54	50	180	176
Link Distance (ft)		612	612			294	294		705	705		1269
Upstream Blk Time (%)						1	7					
Queuing Penalty (veh)						4	45					
Storage Bay Dist (ft)	245			65	208			102			248	
Storage Blk Time (%)		0	32	0		9						
Queuing Penalty (veh)		0	15	0		9						

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	20	54
Average Queue (ft)	8	21
95th Queue (ft)	26	56
Link Distance (ft)	1269	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		380
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	TR	R	L	L	T	T	L	LT	TR
Maximum Queue (ft)	149	151	136	200	199	164	198	71	94	105
Average Queue (ft)	100	113	102	123	128	90	117	46	53	61
95th Queue (ft)	176	178	152	226	227	180	221	77	99	115
Link Distance (ft)	294	294	294		1059	1059	1059	1718	1718	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				442						290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NE
Directions Served	<L	T	T	T	T	TR>	>	<	<LT	R	R	<LR
Maximum Queue (ft)	116	171	210	186	162	185	142	332	306	203	210	79
Average Queue (ft)	70	116	138	114	105	121	83	246	229	133	159	46
95th Queue (ft)	127	213	237	214	172	207	167	353	331	208	221	86
Link Distance (ft)		1059	1059	373	373	373		1898	1898	1898	1898	205
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	440						185					
Storage Blk Time (%)						1	0					
Queuing Penalty (veh)						3	0					

Intersection: 4: Rowland Blvd & Rowland Way

Movement	EB	EB	EB	EB	EB	WB	WB	SB	SB
Directions Served	UL	L	T	T	T	T	TR	LR	R
Maximum Queue (ft)	91	116	98	139	142	216	233	209	176
Average Queue (ft)	55	82	50	69	86	115	145	136	92
95th Queue (ft)	110	131	106	153	154	231	264	232	192
Link Distance (ft)			373	373	373	256	256	375	375
Upstream Blk Time (%)						0	1		
Queuing Penalty (veh)						1	5		
Storage Bay Dist (ft)	235	235							
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: Vintage Way (North) & Rowland Blvd

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R	R
Maximum Queue (ft)	194	284	156	110	33	64	97	37	114	76	28	57
Average Queue (ft)	140	200	60	99	12	40	65	10	72	35	6	18
95th Queue (ft)	212	294	171	124	36	76	109	47	134	95	33	69
Link Distance (ft)	508	508		96		1270	1270		256	256	256	256
Upstream Blk Time (%)				15								
Queuing Penalty (veh)				0								
Storage Bay Dist (ft)			180		80			92				
Storage Blk Time (%)		13	0			1			10			
Queuing Penalty (veh)		12	0			0			1			

Intersection: 6: Vintage Way (South) & Rowland Blvd

Movement	EB	NB	NB	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	40	31	30	67
Average Queue (ft)	27	25	9	46
95th Queue (ft)	44	44	34	74
Link Distance (ft)	522	97	97	853
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 96

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	TR	L	T	TR	L	L
Maximum Queue (ft)	104	188	254	60	61	233	250	32	43	69	138	132
Average Queue (ft)	71	110	164	21	31	133	160	14	20	39	93	81
95th Queue (ft)	121	219	294	70	67	242	271	42	51	79	167	145
Link Distance (ft)		612	612			294	294		705	705		1269
Upstream Blk Time (%)						1	1					
Queuing Penalty (veh)						4	6					
Storage Bay Dist (ft)	245			65	208			102			248	
Storage Blk Time (%)		0	28			3						
Queuing Penalty (veh)		0	10			2						

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	26	31
Average Queue (ft)	10	12
95th Queue (ft)	32	38
Link Distance (ft)	1269	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		380
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	TR	R	L	L	T	T	L	LT	TR
Maximum Queue (ft)	152	170	129	185	206	71	135	105	101	44
Average Queue (ft)	93	119	95	139	156	42	68	80	74	29
95th Queue (ft)	158	186	139	216	232	88	147	116	105	56
Link Distance (ft)	294	294	294		1059	1059	1059	1718	1718	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				442						290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NE
Directions Served	<L	T	T	T	T	TR>	>	<	<LT	R	R	<LR
Maximum Queue (ft)	103	270	312	209	189	183	151	218	177	369	359	16
Average Queue (ft)	68	198	244	152	131	116	72	166	117	248	259	6
95th Queue (ft)	120	335	363	244	211	206	169	234	197	383	377	28
Link Distance (ft)		1059	1059	373	373	373		1898	1898	1898	1898	205
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	440						185					
Storage Blk Time (%)						1	0					
Queuing Penalty (veh)						2	0					

Intersection: 4: Rowland Blvd & Rowland Way

Movement	EB	EB	EB	EB	EB	WB	WB	SB	SB
Directions Served	UL	L	T	T	T	T	TR	LR	R
Maximum Queue (ft)	147	165	138	220	226	214	253	115	97
Average Queue (ft)	88	117	72	103	123	127	170	83	48
95th Queue (ft)	155	174	162	237	242	246	287	136	105
Link Distance (ft)			373	373	373	255	255	375	375
Upstream Blk Time (%)						1	2		
Queuing Penalty (veh)						5	13		
Storage Bay Dist (ft)	235	235							
Storage Blk Time (%)		0							
Queuing Penalty (veh)		0							

Intersection: 5: Vintage Way (North) & Rowland Blvd

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R	R
Maximum Queue (ft)	390	428	76	36	24	133	157	92	182	145	74	124
Average Queue (ft)	274	323	25	15	7	92	110	35	140	95	21	37
95th Queue (ft)	422	502	122	44	25	155	163	102	203	162	95	141
Link Distance (ft)	510	510		96		1269	1269		255	255	255	255
Upstream Blk Time (%)	1	2										
Queuing Penalty (veh)	0	0										
Storage Bay Dist (ft)			175		80			92				
Storage Blk Time (%)		36	0			10			31			
Queuing Penalty (veh)		7	0			1			10			

Intersection: 6: Vintage Way (South) & Rowland Blvd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	48	10	92
Average Queue (ft)	36	2	64
95th Queue (ft)	57	15	102
Link Distance (ft)	522	97	853
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 60

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	TR	L	T	TR	L	L
Maximum Queue (ft)	103	105	203	60	155	250	285	35	43	37	165	184
Average Queue (ft)	63	63	131	24	75	174	212	17	25	23	121	117
95th Queue (ft)	107	130	233	76	170	296	330	41	55	48	199	203
Link Distance (ft)		612	612			294	294		705	705		1269
Upstream Blk Time (%)						0	2					
Queuing Penalty (veh)						2	11					
Storage Bay Dist (ft)	245			65	208			102			248	
Storage Blk Time (%)			23	0		3					0	0
Queuing Penalty (veh)			10	0		3					0	0

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	13	39
Average Queue (ft)	5	20
95th Queue (ft)	16	48
Link Distance (ft)	1269	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		380
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	TR	R	L	L	T	T	L	LT	TR
Maximum Queue (ft)	139	157	123	170	190	106	145	94	94	67
Average Queue (ft)	92	111	90	115	133	67	93	68	62	37
95th Queue (ft)	151	169	135	182	203	125	164	114	102	77
Link Distance (ft)	294	294	294		1059	1059	1059	1718	1718	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				442						290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NE
Directions Served	<L	T	T	T	T	TR>	>	<	<LT	R	R	<LR
Maximum Queue (ft)	83	246	224	199	189	209	134	290	236	220	209	61
Average Queue (ft)	45	166	149	140	126	132	63	228	184	168	143	28
95th Queue (ft)	96	288	250	226	225	232	151	309	262	250	229	69
Link Distance (ft)		1059	1059	373	373	373		1898	1898	1898	1898	205
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	440						185					
Storage Blk Time (%)						4	0					
Queuing Penalty (veh)						10	1					

Intersection: 4: Rowland Blvd & Rowland Way

Movement	EB	EB	EB	EB	EB	WB	WB	SB	SB
Directions Served	UL	L	T	T	T	T	TR	LR	R
Maximum Queue (ft)	119	161	202	96	115	215	241	227	164
Average Queue (ft)	71	100	115	60	81	106	135	148	92
95th Queue (ft)	130	172	237	113	129	257	289	253	190
Link Distance (ft)			373	373	373	254	254	375	375
Upstream Blk Time (%)						1	2		
Queuing Penalty (veh)						4	10		
Storage Bay Dist (ft)	235	235							
Storage Blk Time (%)			1						
Queuing Penalty (veh)			1						

Intersection: 5: Vintage Way (North) & Rowland Blvd

Movement	EB	EB	EB	WB	NB	NB	SB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	T	TR	L	T	T	R	R
Maximum Queue (ft)	256	311	46	34	134	158	37	236	225	16	34
Average Queue (ft)	185	228	10	9	90	109	10	181	145	3	7
95th Queue (ft)	295	343	71	35	138	174	46	252	245	31	53
Link Distance (ft)		506		96	1269	1269		254	254	254	254
Upstream Blk Time (%)								0	0		
Queuing Penalty (veh)								1	1		
Storage Bay Dist (ft)	560		180				92				
Storage Blk Time (%)		22			7			34			
Queuing Penalty (veh)		92			0			4			

Queuing and Blocking Report
Weekday PM Existing + Project 05/04/2017

Intersection: 6: Vintage Way (South) & Rowland Blvd

Movement	EB	NB	NB	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	48	54	38	234
Average Queue (ft)	27	37	22	160
95th Queue (ft)	50	57	48	258
Link Distance (ft)	522	97	97	853
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 149

Queuing and Blocking Report
Weekend Midday Existing + Project 05/08/2017

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	TR	L	T	TR	L	L
Maximum Queue (ft)	100	141	178	60	84	222	246	36	36	55	198	181
Average Queue (ft)	58	94	120	22	40	137	160	14	22	32	151	100
95th Queue (ft)	106	166	212	71	89	242	258	41	45	63	237	194
Link Distance (ft)		612	612			294	294		705	705		1269
Upstream Blk Time (%)						0	0					
Queuing Penalty (veh)						0	1					
Storage Bay Dist (ft)	245			65	208			102			248	
Storage Blk Time (%)			24	0		1					2	
Queuing Penalty (veh)			7	0		0					5	

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	24	14
Average Queue (ft)	6	4
95th Queue (ft)	25	17
Link Distance (ft)	1269	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		380
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	TR	R	L	L	T	T	L	LT	TR
Maximum Queue (ft)	191	186	108	248	264	82	130	139	125	39
Average Queue (ft)	130	129	87	173	187	45	96	95	92	26
95th Queue (ft)	223	205	123	284	303	100	159	152	137	44
Link Distance (ft)	294	294	294		1059	1059	1059	1718	1718	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				442						290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NE
Directions Served	<L	T	T	T	T	TR>	>	<	<LT	R	R	<LR
Maximum Queue (ft)	172	403	386	250	235	212	178	185	153	300	283	33
Average Queue (ft)	74	320	312	163	146	127	80	126	83	226	237	11
95th Queue (ft)	209	482	483	292	293	222	184	195	163	343	323	36
Link Distance (ft)		1059	1059	373	373	373		1898	1898	1898	1898	205
Upstream Blk Time (%)					0							
Queuing Penalty (veh)					0							
Storage Bay Dist (ft)	440						185					
Storage Blk Time (%)		1				4	0					
Queuing Penalty (veh)		1				9	1					

Intersection: 4: Rowland Blvd & Rowland Way

Movement	EB	EB	EB	EB	EB	WB	WB	SB	SB
Directions Served	UL	L	T	T	T	T	TR	LR	R
Maximum Queue (ft)	168	187	219	156	173	254	268	162	115
Average Queue (ft)	108	130	138	88	109	193	231	118	57
95th Queue (ft)	178	196	246	177	191	317	327	175	136
Link Distance (ft)			373	373	373	254	254	375	375
Upstream Blk Time (%)						6	10		
Queuing Penalty (veh)						47	82		
Storage Bay Dist (ft)	235	235							
Storage Blk Time (%)			1						
Queuing Penalty (veh)			3						

Intersection: 5: Vintage Way (North) & Rowland Blvd

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R	R
Maximum Queue (ft)	385	447	114	30	31	188	249	100	251	247	52	93
Average Queue (ft)	252	316	24	17	8	146	189	42	211	198	10	22
95th Queue (ft)	420	497	125	38	41	218	277	118	282	294	63	104
Link Distance (ft)	512	512		96		1269	1269		254	254	254	254
Upstream Blk Time (%)		1							3	1		
Queuing Penalty (veh)		0							15	5		
Storage Bay Dist (ft)			180		80			92				
Storage Blk Time (%)		40				26		2	41			
Queuing Penalty (veh)		7				2		6	12			

Intersection: 6: Vintage Way (South) & Rowland Blvd

Movement	EB	NB	NB	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	57	70	51	208
Average Queue (ft)	38	49	37	152
95th Queue (ft)	63	77	55	238
Link Distance (ft)	522	97	97	853
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 202

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	TR	L	T	TR	L	L
Maximum Queue (ft)	100	162	230	54	162	262	292	50	39	44	152	156
Average Queue (ft)	63	84	156	22	72	182	224	31	21	23	112	110
95th Queue (ft)	117	168	263	80	169	312	344	62	47	54	179	177
Link Distance (ft)		612	612			294	294		705	705		1269
Upstream Blk Time (%)						1	4					
Queuing Penalty (veh)						4	28					
Storage Bay Dist (ft)	245			65	208			102			248	
Storage Blk Time (%)			31			7						
Queuing Penalty (veh)			14			7						

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	14	46
Average Queue (ft)	5	20
95th Queue (ft)	19	53
Link Distance (ft)	1269	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		380
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	TR	R	L	L	T	T	L	LT	TR
Maximum Queue (ft)	155	156	139	182	191	196	224	87	94	81
Average Queue (ft)	108	109	94	131	143	88	117	63	56	46
95th Queue (ft)	172	168	147	219	233	210	239	101	100	90
Link Distance (ft)	294	294	294		1059	1059	1059	1718	1718	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				442						290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NE
Directions Served	<L	T	T	T	T	TR>	>	<	<LT	R	R	<LR
Maximum Queue (ft)	76	263	230	183	163	187	153	282	242	245	243	58
Average Queue (ft)	45	177	142	124	112	125	70	217	187	170	167	29
95th Queue (ft)	88	311	268	204	186	212	163	303	266	256	264	65
Link Distance (ft)		1059	1059	373	373	373		1898	1898	1898	1898	205
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	440						185					
Storage Blk Time (%)						1						
Queuing Penalty (veh)						3						

Intersection: 4: Rowland Blvd & Rowland Way

Movement	EB	EB	EB	EB	EB	WB	WB	SB	SB
Directions Served	UL	L	T	T	T	T	TR	LR	R
Maximum Queue (ft)	86	120	201	114	134	250	263	180	152
Average Queue (ft)	48	86	127	60	86	122	171	125	97
95th Queue (ft)	98	133	218	130	148	280	290	203	184
Link Distance (ft)			373	373	373	253	253	375	375
Upstream Blk Time (%)						1	2		
Queuing Penalty (veh)						5	12		
Storage Bay Dist (ft)	235	235							
Storage Blk Time (%)			0						
Queuing Penalty (veh)			1						

Intersection: 5: Vintage Way (North) & Rowland Blvd

Movement	EB	EB	EB	WB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	LTR	T	TR	L	T	T
Maximum Queue (ft)	238	303	8	17	136	169	33	248	219
Average Queue (ft)	158	216	2	5	85	127	9	188	145
95th Queue (ft)	270	335	12	21	157	191	46	266	249
Link Distance (ft)	504	504		96	1269	1269		253	253
Upstream Blk Time (%)								1	0
Queuing Penalty (veh)								3	1
Storage Bay Dist (ft)			180				92		
Storage Blk Time (%)		16			9			32	
Queuing Penalty (veh)		1			0			4	

Intersection: 6: Vintage Way (South) & Rowland Blvd

Movement	EB	NB	NB	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	51	54	30	181
Average Queue (ft)	30	37	26	123
95th Queue (ft)	54	56	43	210
Link Distance (ft)	522	97	97	853
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 83

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	TR	L	T	TR	L	L
Maximum Queue (ft)	93	157	219	45	83	246	290	26	36	48	220	230
Average Queue (ft)	55	102	140	14	46	154	199	11	17	36	158	139
95th Queue (ft)	96	172	234	59	110	267	319	31	43	61	250	279
Link Distance (ft)		612	612			294	294		705	705		1269
Upstream Blk Time (%)						0	3					
Queuing Penalty (veh)						1	13					
Storage Bay Dist (ft)	245			65	208			102			248	
Storage Blk Time (%)			26			4					5	1
Queuing Penalty (veh)			8			2					10	2

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	16	21
Average Queue (ft)	5	7
95th Queue (ft)	18	25
Link Distance (ft)	1269	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		380
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	TR	R	L	L	T	T	L	LT	TR
Maximum Queue (ft)	161	178	117	285	295	125	153	123	130	54
Average Queue (ft)	119	134	86	186	201	61	91	92	87	30
95th Queue (ft)	181	192	134	325	343	134	179	139	133	55
Link Distance (ft)	294	294	294		1059	1059	1059	1718	1718	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				442						290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NE
Directions Served	<L	T	T	T	T	TR>	>	<	<LT	R	R	<LR
Maximum Queue (ft)	86	399	408	253	237	181	136	173	129	349	357	17
Average Queue (ft)	51	295	303	165	149	117	65	137	88	274	276	3
95th Queue (ft)	94	457	478	271	256	202	152	193	151	385	395	18
Link Distance (ft)		1059	1059	373	373	373		1898	1898	1898	1898	205
Upstream Blk Time (%)					0							
Queuing Penalty (veh)					0							
Storage Bay Dist (ft)	440						185					
Storage Blk Time (%)		1				1	0					
Queuing Penalty (veh)		1				3	0					

Intersection: 4: Rowland Blvd & Rowland Way

Movement	EB	EB	EB	EB	EB	WB	WB	SB	SB
Directions Served	UL	L	T	T	T	T	TR	LR	R
Maximum Queue (ft)	151	259	361	214	222	270	278	178	115
Average Queue (ft)	94	163	215	100	119	208	236	104	51
95th Queue (ft)	171	284	417	236	235	308	321	186	117
Link Distance (ft)			373	373	373	254	254	375	375
Upstream Blk Time (%)			2	0		3	8		
Queuing Penalty (veh)			18	0		27	65		
Storage Bay Dist (ft)	235	235							
Storage Blk Time (%)			8						
Queuing Penalty (veh)			23						

Intersection: 5: Vintage Way (North) & Rowland Blvd

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R	R
Maximum Queue (ft)	376	389	42	20	52	211	263	32	275	259	38	101
Average Queue (ft)	260	289	8	8	18	141	187	13	240	216	10	29
95th Queue (ft)	439	478	70	29	68	222	281	38	302	316	81	130
Link Distance (ft)	503	503		96		1269	1269		254	254	254	254
Upstream Blk Time (%)	1	4							8	2		
Queuing Penalty (veh)	0	0							40	11		
Storage Bay Dist (ft)			180		80			92				
Storage Blk Time (%)		35				23			43			
Queuing Penalty (veh)		6				2			12			

Intersection: 6: Vintage Way (South) & Rowland Blvd

Movement	EB	NB	NB	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	53	65	54	207
Average Queue (ft)	35	45	35	142
95th Queue (ft)	59	70	58	232
Link Distance (ft)	522	97	97	853
Upstream Blk Time (%)		0	0	
Queuing Penalty (veh)		0	0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 243

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	TR	L	T	TR	L	L
Maximum Queue (ft)	106	157	248	44	135	293	305	42	40	37	238	244
Average Queue (ft)	71	80	151	18	82	203	247	22	27	25	173	179
95th Queue (ft)	128	168	256	51	202	346	369	58	49	48	283	313
Link Distance (ft)		612	612			294	294		705	705		1269
Upstream Blk Time (%)						2	7					
Queuing Penalty (veh)						15	47					
Storage Bay Dist (ft)	245			65	208			102			248	
Storage Blk Time (%)			26	0		10					8	3
Queuing Penalty (veh)			12	0		9					20	6

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	16	36
Average Queue (ft)	6	13
95th Queue (ft)	20	39
Link Distance (ft)	1269	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		380
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	TR	R	L	L	T	T	L	LT	TR
Maximum Queue (ft)	164	172	145	213	217	206	224	97	100	90
Average Queue (ft)	108	127	110	141	155	98	114	68	64	51
95th Queue (ft)	178	188	164	232	242	222	251	106	111	114
Link Distance (ft)	294	294	294		1059	1059	1059	1718	1718	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				442						290
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NE
Directions Served	<L	T	T	T	T	TR>	>	<	<LT	R	R	<LR
Maximum Queue (ft)	94	308	299	204	204	206	168	346	330	214	194	69
Average Queue (ft)	52	182	194	137	129	132	88	259	243	152	152	43
95th Queue (ft)	101	333	320	225	210	219	188	364	351	237	214	87
Link Distance (ft)		1059	1059	373	373	373		1898	1898	1898	1898	205
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	440						185					
Storage Blk Time (%)						3	0					
Queuing Penalty (veh)						7	0					

Intersection: 4: Rowland Blvd & Rowland Way

Movement	EB	EB	EB	EB	EB	WB	WB	SB	SB
Directions Served	UL	L	T	T	T	T	TR	LR	R
Maximum Queue (ft)	104	124	200	112	120	274	285	235	181
Average Queue (ft)	60	84	117	66	78	201	234	163	127
95th Queue (ft)	111	133	208	126	128	313	309	250	206
Link Distance (ft)			373	373	373	253	253	375	375
Upstream Blk Time (%)						3	6		
Queuing Penalty (veh)						17	39		
Storage Bay Dist (ft)	235	235							
Storage Blk Time (%)			1						
Queuing Penalty (veh)			1						

Intersection: 5: Vintage Way (North) & Rowland Blvd

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R	R
Maximum Queue (ft)	213	308	203	111	65	148	198	36	248	245	39	63
Average Queue (ft)	172	222	88	98	24	93	142	10	195	172	8	20
95th Queue (ft)	247	322	224	128	80	163	214	47	274	278	57	96
Link Distance (ft)	507	507		96		1269	1269		253	253	253	253
Upstream Blk Time (%)				19					2	1		
Queuing Penalty (veh)				0					6	3		
Storage Bay Dist (ft)			180		80			92				
Storage Blk Time (%)		20	0			10			48			
Queuing Penalty (veh)		18	0			1			5			

Intersection: 6: Vintage Way (South) & Rowland Blvd

Movement	EB	NB	NB	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	45	58	42	202
Average Queue (ft)	29	46	32	136
95th Queue (ft)	49	69	49	226
Link Distance (ft)	522	97	97	853
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 209

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	TR	L	T	TR	L	L
Maximum Queue (ft)	107	185	215	64	91	253	277	30	49	60	200	156
Average Queue (ft)	66	110	143	24	46	152	185	16	24	37	147	113
95th Queue (ft)	118	194	244	75	138	265	313	38	57	68	223	189
Link Distance (ft)		612	612			294	294		705	705		1269
Upstream Blk Time (%)						0	3					
Queuing Penalty (veh)						0	14					
Storage Bay Dist (ft)	245			65	208			102			248	
Storage Blk Time (%)			25			3					0	
Queuing Penalty (veh)			9			2					1	

Intersection: 1: Redwood Blvd & Rowland Blvd

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	11	22
Average Queue (ft)	5	10
95th Queue (ft)	17	29
Link Distance (ft)	1269	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		380
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: US 101 SB On-Ramp/US 101 SB Off-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	T	TR	R	L	L	T	T	L	LT	TR
Maximum Queue (ft)	200	194	157	364	424	169	180	130	122	51
Average Queue (ft)	144	151	106	260	282	80	93	95	87	27
95th Queue (ft)	226	213	179	437	493	237	215	140	135	59
Link Distance (ft)	294	294	294		1059	1059	1059	1718	1718	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				442						290
Storage Blk Time (%)				3	4					
Queuing Penalty (veh)				14	20					

Intersection: 3: US 101 NB Off-Ramp/US 101 NB On-Ramp & Rowland Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	NE
Directions Served	<L	T	T	T	T	TR>	>	<	<LT	R	R	<LR
Maximum Queue (ft)	185	490	490	241	241	232	176	197	175	405	410	23
Average Queue (ft)	79	363	372	175	152	141	93	157	115	296	298	8
95th Queue (ft)	216	618	601	278	259	251	196	222	196	434	436	31
Link Distance (ft)		1059	1059	373	373	373		1898	1898	1898	1898	205
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	440						185					
Storage Blk Time (%)		5				4	0					
Queuing Penalty (veh)		4				11	1					

Intersection: 4: Rowland Blvd & Rowland Way

Movement	EB	EB	EB	EB	EB	WB	WB	SB	SB
Directions Served	UL	L	T	T	T	T	TR	LR	R
Maximum Queue (ft)	180	224	243	241	210	276	277	166	131
Average Queue (ft)	105	144	141	114	116	205	227	115	56
95th Queue (ft)	185	251	300	263	239	321	323	174	133
Link Distance (ft)			373	373	373	256	256	375	375
Upstream Blk Time (%)			1	0		5	8		
Queuing Penalty (veh)			4	0		46	68		
Storage Bay Dist (ft)	235	235							
Storage Blk Time (%)		0	3						
Queuing Penalty (veh)		0	9						

Intersection: 5: Vintage Way (North) & Rowland Blvd

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R	R
Maximum Queue (ft)	339	427	86	26	16	214	254	72	270	254	124	163
Average Queue (ft)	261	329	20	11	5	152	180	28	225	196	36	53
95th Queue (ft)	410	467	104	31	21	241	280	78	293	303	125	168
Link Distance (ft)	515	515		96		1270	1270		256	256	256	256
Upstream Blk Time (%)	0	1							5	1		
Queuing Penalty (veh)	0	0							25	6		
Storage Bay Dist (ft)			180		80			92				
Storage Blk Time (%)		42				26			38			
Queuing Penalty (veh)		8				2			12			

Intersection: 6: Vintage Way (South) & Rowland Blvd

Movement	EB	NB	NB	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	53	69	44	316
Average Queue (ft)	41	51	30	188
95th Queue (ft)	66	76	51	330
Link Distance (ft)	522	97	97	853
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 257