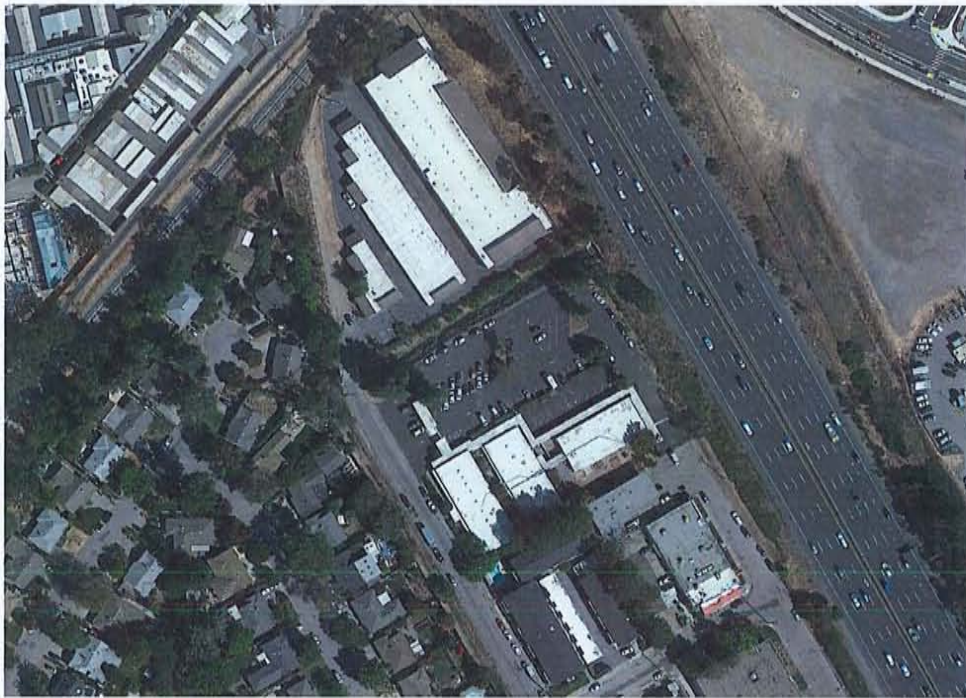




350 Merrydale Road and 3833 Redwood Highway Project Traffic Impact Study



Prepared for the City of San Rafael

Submitted by
W-Trans

October 3, 2019



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Executive Summary

The project as proposed is a 45-townhome development to be located at 350 Merrydale Road and 3833 Redwood Highway. The project would be accessed via two driveways, one on Merrydale Road and one on Redwood Highway.

Under Existing conditions, based on the all-way stop control analysis methodology from the *Highway Capacity Manual*, the intersection of Merrydale Road/US 101 South Ramps is operating unacceptably at LOS F during both the a.m. and p.m. peak hours. However, it has been observed, and field verified by City staff, to be operating acceptably at LOS C during both peak hours. The difference between these theoretical results and field observations are related to limitations of the methodology that require the free right turn northbound to be treated as if it were stop-controlled, introducing substantial delay that is not actually experienced. The intersection of Merrydale Road/North San Pedro Road is currently operating acceptably at LOS C or better during both peak hours.

Under Future conditions the intersection of Merrydale Road/US 101 South Ramps is expected to operate acceptably at LOS D during both peak hours based on current field conditions and anticipated growth. The intersection of Merrydale Road/North San Pedro Road is expected to operate acceptably at LOS D or better during both peak hours.

The project is expected to generate an average of 245 trips per day, including 16 a.m. peak hour trips and 20 trips during the p.m. peak hour. With the added project trips, the study intersections are all expected to continue operating acceptably and at the same levels of service as without the project-generated trips for both short-term and future conditions. The project would be expected to cause delay to increase by a maximum of one second using the overly conservative analysis with all movements treated as stop-controlled.

The peak hour signal warrant is met based on existing a.m. and p.m. peak hour volumes at Merrydale Road/US 101 South Ramps. The signalization of the intersection would be expected to result in LOS C or D operations under all conditions for both peak hours.

On-site pedestrian facilities will be adequate as planned; however, a sidewalk gap exists on the east side of Merrydale Road approximately 1000 feet from the project site and on the west side of Redwood Highway approximately 700 feet from the project site. When the parcels fronting the sidewalk gaps are redeveloped, the property owners should close the sidewalk gaps to provide continuous pedestrian access on Merrydale Road and Redwood Highway. Bicycle and transit facilities are adequate.

Sight distance at the project driveways is adequate. Landscaping and/or place-making signage should be designed to ensure that adequate sight lines are maintained. If on-street parking is allowed, some limitations may be required to maintain adequate sight distance.

Introduction

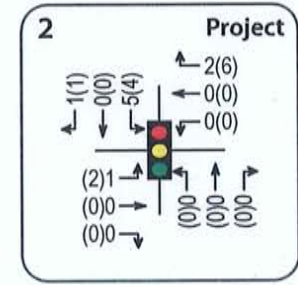
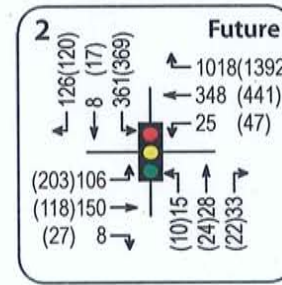
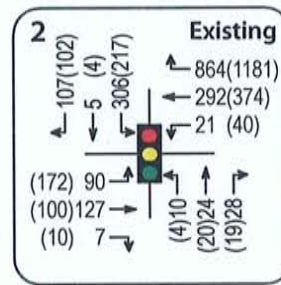
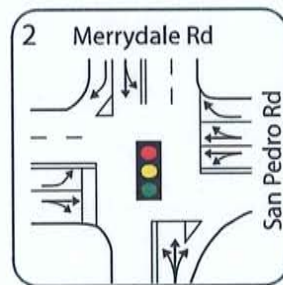
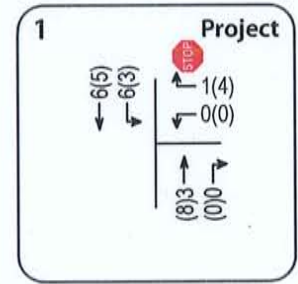
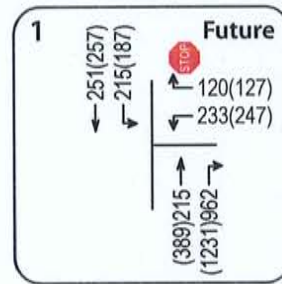
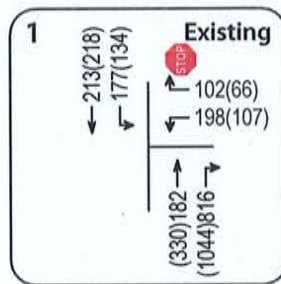
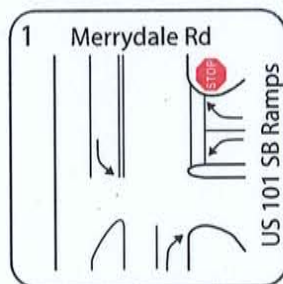
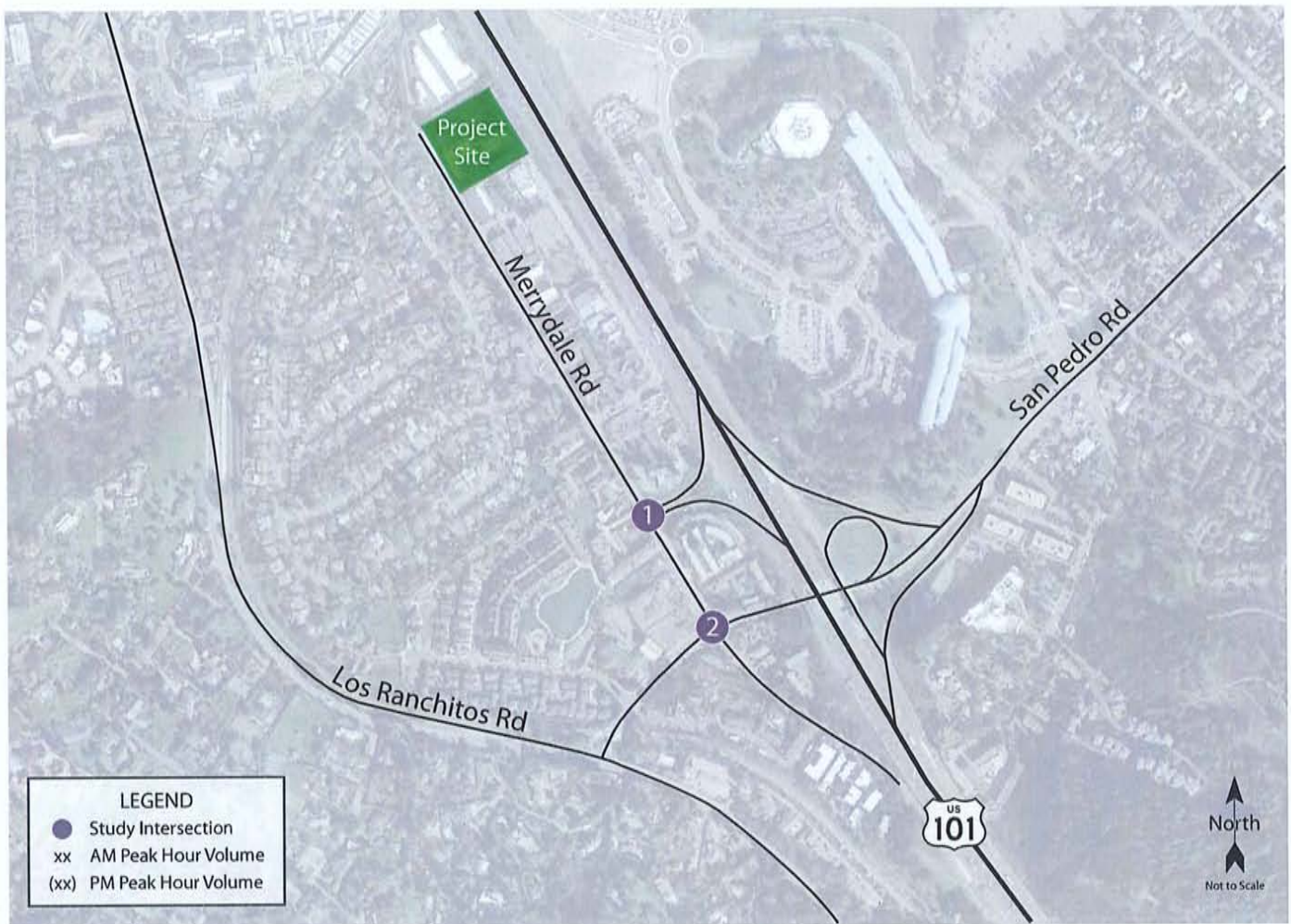
This report presents an analysis of the potential traffic impacts associated with a housing development that would include 45 three-story townhomes. The project site is located at 350 Merrydale Road and 3833 Redwood Highway in the City of San Rafael. The traffic study was completed in accordance with the criteria established by the City of San Rafael, and is consistent with standard traffic engineering techniques.

Prelude

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

Project Profile

The project as proposed includes 45 three-story townhomes and would redevelop a site currently occupied by an unused school at 350 Merrydale Road and 3833 Redwood Highway. The project site is shown in Figure 1.



350 Merrydale Road and 3833 Redwood Highway Traffic Impact Study
Figure 1 – Study Area, Lane Configurations, and Traffic Volumes

Transportation Setting

Operational Analysis

Study Area and Periods

The study area selected with input from City staff consists of the roadway segment of Merrydale Road fronting the project, the project access points, and the following intersections.

1. Merrydale Road/US 101 South Ramps
2. Merrydale Road/North San Pedro Road

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

Study Intersections

Merrydale Road/US 101 South Ramps is an all-way stop-controlled tee intersection with a yield-controlled channelized northbound right-turn. The intersection has a crosswalk on the east ramp leg.

Merrydale Road/North San Pedro Road is a signalized intersection with split phasing on the eastbound and westbound Merrydale Road approaches, protected left-turn phasing on eastbound North San Pedro Road, and a right-turn overlap on westbound North San Pedro Road. Crosswalks are provided on the north and west legs, and sidewalks are provided except the southeast corner.

Study Roadway

Merrydale Road is a two-lane north-south roadway with on-street parking and a posted speed limit of 25 miles per hour (mph). Merrydale Road is discontinuous, terminating at the Sonoma-Marin Area Rail Transit (SMART) railroad tracks and beginning again north of the railroad tracks.

Redwood Highway runs north-south parallel to Merrydale Road and US-101. The roadway has two lanes with on-street parking. The prima facie speed limit is 25 mph.

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 April 1, 2013 through March 31, 2018.

As presented in Table 1, the calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2014 Collision Data on California State Highways*,

California Department of Transportation (Caltrans). Both locations had below-average collision rates. Collision rate calculations are provided in Appendix A.

Table 1 – Collision Rates at the Study Intersections

Study Intersection	Number of Collisions (2013-2018)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Merrydale Rd/US 101 South Ramps	4	0.09	0.14
2. Merrydale Rd/N San Pedro Rd	13	0.32	0.43

Note: c/mve = collisions per million vehicles entering

Alternative Modes

Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. In general, a network of sidewalks, crosswalks, pedestrian signals, and curb ramps provide access for pedestrians in the vicinity of the proposed project site; however, sidewalk gaps, obstacles, and barriers can be found along all of the roadways connecting to the project site. Existing gaps and obstacles along the connecting roadways impact convenient and continuous access for pedestrians and present safety concerns in those locations where appropriate pedestrian infrastructure would address potential conflict points.

- **Merrydale Road** – Nearly continuous sidewalk coverage is provided on the east side of Merrydale Road except along one parcel where sidewalk has not been constructed by the property owner or the City. Pedestrians walking on the east side of Merrydale Road are able to walk adjacent to parked vehicles, out of the travel lane. No sidewalk is provided on the west side of Merrydale Road. Curb ramps and crosswalks at side street approaches are intermittent. At both study intersections along Merrydale Road channelized right turns conflict with pedestrian movements. Lighting is provided by overhead street lights.
- **Redwood Highway** – Nearly continuous sidewalk coverage is provided on the west side of Redwood Highway except along one parcel where sidewalk has not been constructed by the property owner or the City. Pedestrians do not need to enter the travel lane to walk on the west side of the street. There is no sidewalk coverage provided on the east side of Redwood Highway. Curb ramps at side street approaches are provided; however, there are no marked crosswalks. Overhead street lighting provides intermittent coverage.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2017, classifies bikeways into four categories:

- **Class I Multi-Use Path** – a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.
- **Class II Bike Lane** – a striped and signed lane for one-way bike travel on a street or highway.
- **Class III Bike Route** – signing only for shared use with motor vehicles within the same travel lane on a street or highway.
- **Class IV Bikeway** – also known as a separated bikeway, a Class IV Bikeway is for the exclusive use of bicycles and includes a separation between the bikeway and the motor vehicle traffic lane. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

In the project area, there is a Class I bike path along the western side of the SMART tracks from Lincoln Avenue to Civic Center Drive. Bicyclists ride in the roadway and/or on sidewalks along all other streets within the project study area. Table 2 summarizes the existing and planned bicycle facilities in the project vicinity, as contained in the *San Rafael Bicycle and Pedestrian Master Plan, 2018 Update: City Council Draft*.

Table 2 – Bicycle Facility Summary

Status Facility	Class	Length (miles)	Begin Point	End Point
Existing				
Civic Center Station Pathway	I	1.31	Civic Center Dr	Lincoln Ave
Walter Place Pathway	I	0.06	Los Ranchitos Rd	Corillo Dr
Las Gallinas Ave	III	0.18	Corillo Dr	Merrydale Rd
Planned				
North San Pedro Rd	I	0.49	Los Ranchitos Rd	Civic Center Dr/San Pablo Ave
Merrydale Rd	III	0.74	SMART Pathway	Puerto Suello Hill Pathway

Source: *San Rafael Bicycle and Pedestrian Master Plan, 2018 Update: City Council Draft*, City of San Rafael, 2018

Transit Facilities

Marin Transit provides fixed route bus service in Marin County, including the City of San Rafael. Marin Transit Route 35 provides regional service between San Rafael and Novato, and stops at Merrydale Road and North San Pedro Road. Route 35 operates seven days per week with approximately one-half hour headways between 6:05 a.m. and 11:12 p.m. Monday to Friday, and 6:49 a.m. to 11:05 p.m. on Saturday and Sunday.

Route 49 also stops at Merrydale Road and North San Pedro Road, although only the southbound stop is near the project site. Southbound Route 49 service connects San Rafael and Novato, and is provided seven days per week with approximately one-half hour headways between 6:11 a.m. and 8:10 p.m. Monday to Friday. On Saturday and Sunday, hourly service is provided between 8:20 a.m. and 10:55 p.m.

Route 145 is a school route that stops at Merrydale Road and North San Pedro Road, and connects various neighborhoods in San Rafael to Terra Linda High School on the north side of the City. Service is provided on school days, with one northbound trip per day that starts at the San Rafael Transit Center at 7:20 a.m. and arrives at Terra Linda High School at 7:44 a.m. Depending on the school bell schedule, one or two southbound trips are provided on school days between 2:00 p.m. and 4:10 p.m.

Route 233 provides service between downtown San Rafael and the communities along North San Pedro Road, with a stop at Merrydale Road and North San Pedro Road in the southbound direction only. Southbound service is provided seven days per week with approximately one-hour headways between 6:24 a.m. and 6:55 p.m. Monday to Friday, and 7:24 a.m. to 5:55 p.m. on Saturday and Sunday.

Route 245 provides service between downtown San Rafael and the northern neighborhoods of San Rafael, with a stop along US 101 South between the Merrydale off-ramp and on-ramp, in the southbound direction only. Service is provided seven days per week with approximately one-hour headways between 7:28 a.m. and 6:55 p.m.

Route 257 provides regional service between San Rafael and unincorporated communities south of Novato, with stops at Los Ranchitos Road and Golden Hinde Boulevard. Route 257 operates Monday to Friday with approximately one-hour headways between 6:01 a.m. and 10:25 p.m.

Golden Gate Transit provides service between San Francisco and various communities in Marin and Sonoma Counties. Routes 44, 54, and 70 share a stop along US 101 South between the Merrydale off-ramp and on-ramp, in the southbound direction only. Route 44 service is provided Monday to Friday with two trips between 6:47 a.m. and 9:13 a.m. Route 54 service is provided Monday to Friday with four trips between 4:40 a.m. and 7:59 a.m. Route 70 service is provided seven days per week with approximately one-hour headways between 5:00 a.m. and 12:30 a.m. daily.

Two or three bicycles can be carried on most Marin Transit and Golden Gate Transit buses. Bike rack space is on a first come, first served basis.

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 Transit Paratransit is designed to serve the needs of individuals with disabilities within San Rafael and the greater Marin County area.

At present, rail transit is located within one-half mile of the project site at the at-grade crossing on Civic Center Drive and the SMART Tracks. SMART provides service between San Rafael and Airport Road north of Santa Rosa, including stops in Novato, Petaluma, Cotati, Rohnert Park, and Santa Rosa. Extensions are planned to Windsor, Healdsburg, and Cloverdale in the north, and Larkspur in the south, where passengers can transfer to ferries to San Francisco. Service is provided seven days per week with approximately one-half hour to one-and-one-half hour headways from 4:19 a.m. to 9:42 p.m. Monday to Friday, and one to four-hour headways from 10:13 a.m. to 9:57 p.m. on Saturdays and Sundays.

Each SMART car has 12 bicycle spaces, and trains usually have two or three cars. Bike rack space is on a first come, first service basis.

Capacity Analysis

Intersection Level of Service Methodologies

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

The study intersections were analyzed using methodologies published in the *Highway Capacity Manual* (HCM), Transportation Research Board, 2010. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle.

The Levels of Service for the intersection of Merrydale Road/US 101 South Ramps were evaluated 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. This methodology considers the yield-controlled channelized right-turn lane as a stop-controlled approach. Average vehicle delay is computed for the intersection as a whole and then related to a Level of Service.

The study intersection of Merrydale Road/North San Pedro Road, which is controlled by a traffic signal, was evaluated using the signalized methodology from the HCM. This methodology is based on factors including traffic volumes, green time for each movement, phasing, whether the signals are coordinated or not, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology. For purposes of this study, delays were calculated using signal timing provided by the City.

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, 2010

Traffic Operation Standards

The City of San Rafael's Level of Service (LOS) standard as contained in *The City of San Rafael General Plan 2020 Draft EIR* (DEIR) indicates that the minimum acceptable service level for signalized intersections outside the downtown area or as specified in the DEIR is LOS D. The project would have a significant traffic impact if the project's traffic would cause a signalized intersection currently operating at an acceptable level of service (LOS D or better) to operate below the standard (LOS E or F). The City of San Rafael's LOS standard for unsignalized intersections is LOS E. The project would have a significant traffic impact if the project's traffic would cause an unsignalized intersection currently operating at an acceptable level of service (LOS E or better) to operate below the standard (LOS F).

Existing Conditions

Under existing conditions, the HCM methodology indicates that the Merrydale Road/US 101 South Ramps intersection is operating unacceptably at LOS F during both peak periods; however, it has been observed, and field verified by City staff, to be operating acceptably at LOS C during both peak hours. This discrepancy between field observations and theoretical results is attributed to a shortcoming in the methodology as it does not allow the northbound right-turn movement to be treated as a free movement, resulting in theoretical delays that do not match field conditions. As can be seen in the calculation output, delay on the southbound and westbound approaches that are actually stop-controlled averages less than 15 seconds, which is LOS B operation; the majority of the reported delay is associated with the northbound right turn, which is not stop-controlled and therefore does not experience the high delays indicated due to the limitations of the methodology. Under Existing conditions, and with the installation of a traffic signal, the intersection of Merrydale Road/US 101 South Ramps would be expected to operate at LOS C during both peak hours. The Merrydale Road/North San Pedro Road intersection operates acceptably at LOS C or better during both peak periods.

The existing traffic volumes are shown in Figure 1. A summary of the intersection level of service calculations is contained in Table 4, and copies of the Level of Service calculations are provided in Appendix B.

Table 4 – Existing Peak Hour Intersection Levels of Service

Study Intersection Approach	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. Merrydale Rd/US 101 South Ramps	85.2	F	160.4	F
Field Observed LOS	-	C	-	C
Signalized	22.1	C	26.4	C
2. Merrydale Rd/N San Pedro Rd	19.2	B	23.9	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Estimated level of service are indicated in *italics*; **Bold** text = deficient operation; Shaded cells = conditions with proposed change in controls

Future Conditions

Future volumes were projected out to the year 2040 using 2015 and 2020 volumes provided by City staff and a growth rate of 0.75 percent per year. This growth rate was approved by City staff and is comparable to data used to evaluate other projects located near US 101 interchanges in San Rafael. To arrive at the future year 2040 volumes, the growth rate was applied to the 2018 traffic counts collected for this project. To be conservative, where these volumes were less than the 2020 volumes provided by the City, the City's 2020 volumes were applied as the "floor." The 2020 volumes provided by the City included all approved projects in the area expected to be built and occupied by 2020.

Under future conditions, both study intersections are expected to continue operating acceptably under the criteria applied during both the a.m. and p.m. peak hours. Under Future conditions, and with the installation of a traffic signal, the intersection of Merrydale Road/US 101 South Ramps is expected to operate at LOS C or D during both peak hours. Future volumes are shown in Figure 1 and operating conditions are summarized in Table 5.

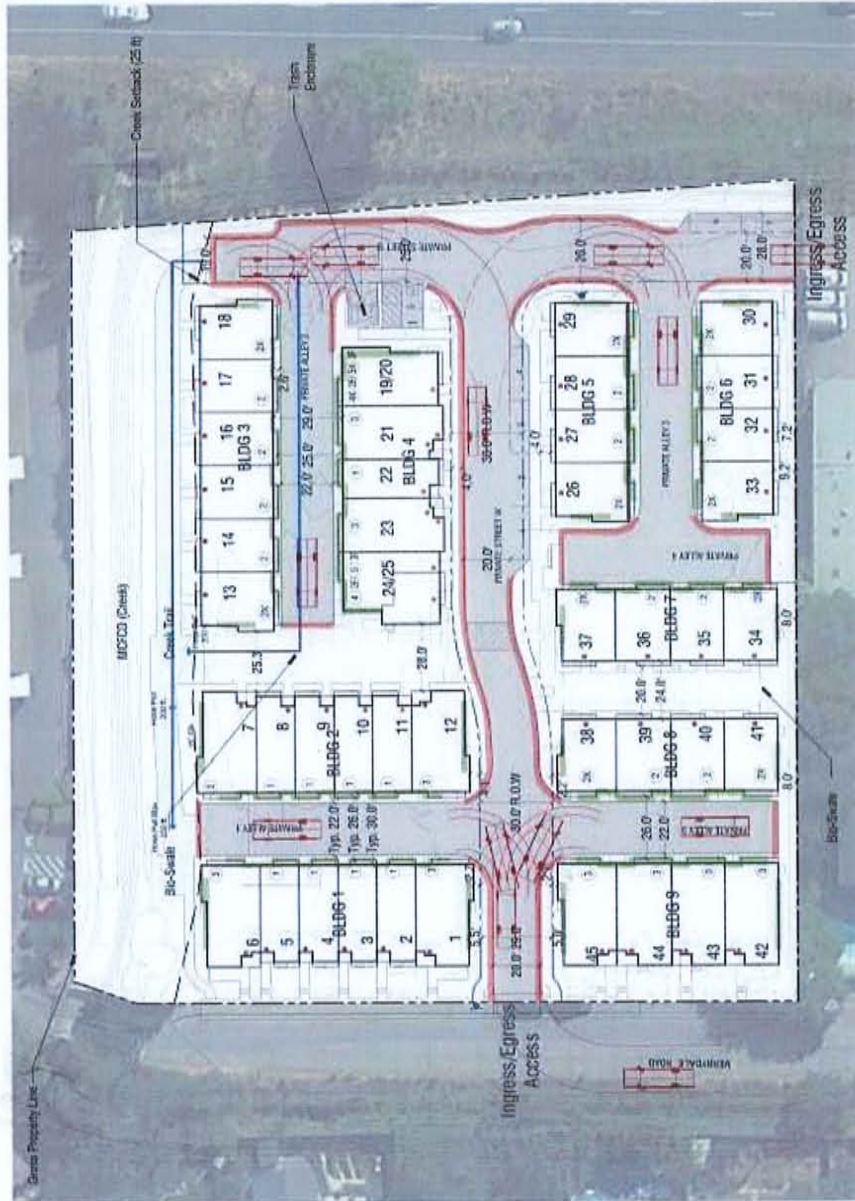
Table 5 – Future Peak Hour Intersection Levels of Service

Study Intersection Approach	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. Merrydale Rd/US 101 South Ramps	145.9	F	260.8	F
Estimated LOS Based on Current Conditions	-	D	-	D
Signalized	22.1	C	40.2	D
2. Merrydale Rd/N San Pedro Rd	23.5	C	50.8	D

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Estimated level of service are indicated in *italics*; **Bold** text = deficient operation; Shaded cells = conditions with proposed change in controls

Project Description

The project as proposed consists of 45 three-story townhomes and would redevelop a site currently occupied by an adult day care center and a vacant school building at 350 Merrydale Road and 3833 Redwood Highway. The proposed project site plan is shown in Figure 2.



FIRE ENGINE ACCESS PLAN **350 MERRYDALE ROAD** **SAN RAFAEL, CALIFORNIA**

CAMPUS
PROPERTY GROUP



SP-6
CITY SUBMITTAL
SCALE: 1" = 20'

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350 Merrydale Road and 3833 Redwood Highway Traffic Impact Study
Figure 2 – Site Plan

Trip Generation

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 10th Edition, 2017 for "Mid-Rise Multi-Family Housing" (ITE LU #221). The proposed project is expected to generate an average of 245 trips per day, including 16 a.m. peak hour trips and 20 trips during the p.m. peak hour. No credits were taken for existing uses. These results are summarized in Table 6.

Table 6 – Trip Generation Summary

Land Use	Units	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Multifamily Housing (Mid-Rise)	45	5.44	245	0.36	16	4	12	0.44	20	12	8

Note: du = dwelling unit

Trip Distribution

The pattern used to allocate new project trips to the street network was determined by reviewing probable travel patterns given school locations as well as employment centers. The applied distribution assumptions are shown in Table 7.

Table 7 – Trip Distribution Assumptions

Route	Percent
To/from US 101 south of N San Pedro Rd	45%
To/from US 101 north of N San Pedro Rd	35%
To/from N San Pedro Rd west of Merrydale Rd	10%
To/from N San Pedro Rd east of US 101	10%
TOTAL	100%

Intersection Operation

Existing plus Project Conditions

Upon the addition of project-related traffic to Existing volumes, both study intersections are expected to operate acceptably at the same levels of service as under Existing Conditions. If signalized, Merrydale Road/US 101 South Ramps would be anticipated to operate at LOS C during both peak hours. Results are summarized in Table 8 and project traffic volumes are shown in Figure 1.

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

Study Intersection Approach	Existing Conditions				Existing plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Merrydale Rd/US 101 SB Ramps	85.2	F	160.4	F	85.8	F	161.4	F
<i>Estimated LOS Based on Current Conditions</i>	-	C	-	C	-	C	-	C
Signalized	22.1	C	26.4	C	22.1	C	26.4	C
2. Merrydale Rd/N San Pedro Rd	19.2	B	23.9	C	19.6	B	24.9	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Estimated level of service are indicated in *italics*; **Bold** text = deficient operation; **Shaded cells** = conditions with proposed changes in controls; WB = Westbound

Finding – The study intersections are expected to continue operating at the same levels of service upon the addition of project-generated traffic, with a maximum increase in delay due to project-added traffic of 1.0 seconds, indicating a less-than-significant impact.

Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes the study intersections are expected to continue operating acceptably overall and at the same acceptable levels of service. With signalization, Merrydale Road/US 101 South Ramps would be expected to operate at LOS C or D during both peak hours. The Future plus Project operating conditions are summarized in Table 9.

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

Study Intersection Approach	Future Conditions				Future plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Merrydale Rd/US 101 SB Ramps	145.9	F	260.8	F	146.5	F	261.6	F
<i>Estimated LOS Based on Current Conditions</i>	-	D	-	D	-	D	-	D
Signalized	22.1	C	40.2	D	22.1	C	40.2	D
2. Merrydale Rd/N San Pedro Rd	23.5	C	50.8	D	23.8	C	52.7	D

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Estimated level of service are indicated in *italics*; **Bold** text = deficient operation; **Shaded cells** = conditions with proposed change in controls; WB = Westbound

Finding – The study intersections are expected to continue operating acceptably upon the addition of project-generated traffic. The addition of project traffic would be expected to cause an increase in delay of 0.8 seconds or less, which would be imperceptible and is therefore considered less-than-significant.

Active Modes

Pedestrian Facilities

Given the proximity of retail centers and restaurants to the south of the site, it is reasonable to assume that some residents will want to walk, bicycle, and/or use transit for trips from and to the project site. Existing facilities are discontinuous, including gaps in the sidewalk on Merrydale Road and Redwood Highway south of the project site.

Project Site – Sidewalks are planned throughout and along the boundaries of the project site. Sidewalks exist along Merrydale Road and Redwood Highway adjacent to the project site and provide access to all residences. Curb ramps are provided where the project driveways intersect Merrydale Road and Redwood Highway. Directly adjacent to the Redwood Road project driveway is the vehicular access point to the adjacent business; there is no clear path for pedestrians to walk between the project site and the existing sidewalk. Most of the sidewalks on the project site will be lined with trees.

Finding – On-site pedestrian facilities serving the project site are adequate.

Recommendation – Construct a sidewalk, subject to the availability of right-of-way and the feasibility of the drainage design, connecting the project site to the existing sidewalk along the west side of Redwood Road directly adjacent to the project driveway.

Bicycle Facilities

Existing bicycle facilities, together with shared use of minor streets provide adequate access for bicyclists.

Bicycle Storage

The City of San Rafael Municipal Code does not require residential bicycle storage and the project site plan does not identify the provision of public bicycle parking or storage facilities; however, each townhome has a garage that can be used for bicycle storage.

Finding – Bicycle facilities serving the project site are adequate.

Transit

Existing transit routes are adequate to accommodate project-generated transit trips. Existing stops are within acceptable walking distance of the site.

Finding – Transit facilities serving the project site are adequate.

Access and Circulation

Site Access

Sight Distance

At driveways a substantially clear line of sight should be maintained between the driver of a vehicle waiting at the crossroad and the driver of an approaching vehicle. Adequate time must be provided for the waiting vehicle to either cross, turn left, or turn right, without requiring the through traffic to radically alter their speed. Sight distance should be measured from a 3.5-foot height. Setback for the driver on the crossroad shall be a minimum of 15 feet, measured from the edge of the traveled way.

Although sight distance requirements are not technically applicable to urban driveways, sight distances along Merrydale Road and Redwood Highway at the project driveways were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distances for driveway approaches are based on stopping sight distance, with approach travel speeds used as the basis for determining the recommended sight distance. Additionally, the stopping sight distance needed for a following driver to stop if there is a vehicle waiting to turn into a side street or driveway is evaluated based on stopping sight distance criterion and the approach speed on the major street.

Based on the posted and prima facie speed limit of 25 mph, the minimum stopping sight distance needed is 150 feet. Based on a review of existing conditions, a clear line of sight to the north and south of the Merrydale Road driveway exceeds the minimum stopping sight distance required for 25 mph speeds. The Redwood Highway driveway is a continuation of the existing street, so stopping sight distance is not relevant.

Finding – Stopping sight distance at the project driveways is adequate to meet the applied criteria from the HDM.

Recommendation – Because landscaping and signs can impede clear sight lines, any residential landscaping or signs should be designed to ensure that adequate sight lines would be maintained. If on-street parking is retained, some restrictions may be necessary to maintain adequate sight lines on Merrydale Road.

Access Analysis

Left-Turn Lane Warrants

The need for left-turn channelization in the form of a left-turn pocket on Merrydale Road was not evaluated due to Merrydale Road dead-ending north of the project site at the Public Storage facility.

Traffic Signal Warrants

A signal warrant analysis was performed to determine potential need for a traffic signal at Merrydale Road/US 101 South Ramps.

Chapter 4C of the *California Manual on Uniform Traffic Control Devices* (CA-MUTCD) provides guidance on when a traffic signal should be considered. There are nine different warrants, or criteria, presented, as follows:

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour Volume

- Warrant 4, Pedestrian Volume
- Warrant 5, School Crossing
- Warrant 6, Coordinated Signal System
- Warrant 7, Crash Experience
- Warrant 8, Roadway Network
- Warrant 9, Intersection Near a Grade Crossing

Warrant 3, which is often the first warrant to be met, was used for this analysis, which is common practice for planning studies. Under the Peak Hour Warrant the need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:

- A. If all three of the following conditions exist for the same one hour (any four consecutive 15-minute periods) of an average day:
 1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: four vehicle-hours for a one-lane approach; or five vehicle-hours for a two-lane approach, and
 2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, and
 3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.
- B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

Finding – Under Existing Conditions, without the addition of project-generated traffic, the peak hour volumes at Merrydale Road/US 101 South Ramps satisfy the criteria of Warrant 3.

Narrow Streets

Roadways with volumes of 400 vehicles per day or less are considered “Very Low Volume Roadways” under criteria published by the American Association of State Highway and Transportation Officials (AASHTO). With an estimated daily volume of approximately 250 vehicles, the portion of “Private Street A,” as shown in Figure 2, would be considered a “very low volume” roadway.

In the AASHTO *Guidelines for Geometric Design of Very Low-Volume Local Roads* published in 2001, design criteria are presented that are less restrictive than those applied on higher volume roads. Under these guidelines, an 18-foot width would be desirable. These standards do not compromise safety, but discourage widening of lanes and shoulders, changes in horizontal and vertical alignment, and other roadside improvements except where such changes are likely to provide *substantial* safety benefits. The proposed internal roadways are a minimum of 20 feet wide and are expected to function adequately as a two-way private street. A speed-table, or raised crosswalk, is proposed on “Private Street A” to further reduce on-site speed and manage traffic flow.

Adequacy of Narrow Streets for Fire Apparatus

Minimum street widths are set forth in Section 15.06.050 of the City of San Rafael’s *Municipal Code*. A limited service residential street has a required minimum width of 40 feet. The proposed width under the site plan provided is 20 feet, which is 20 feet less than the minimum width required by the City. Because the proposed road

width is less than required under the City's standard, some investigation was done to determine if the proposed width might be adequate under other industry standards.

In *Emergency Response, Traffic Calming and Traditional Neighborhood Response* published by the Local Government Commission, concerns that fire departments and other emergency responders have about efforts by residents and developers to calm traffic and build narrower streets are addressed. This reference discusses the impact of different treatments on emergency response times and explains what works and what does not. Fire departments have traditionally required a 36-foot curb-to-curb width on residential streets to ensure a 20-foot clear path for their use in the case of an emergency, assuming that parking takes up 8 feet on each side. Based on recent experience, the Commission has found that a 30 to 32-foot cross-section is adequate on low-volume residential streets. For the proposed private street, parking would be prohibited to ensure a 20-foot clear path for the ingress and egress of emergency vehicles. Figure 2 includes a fire engine access plan, completed by WHA, which demonstrates adequate maneuverability on-site.

Conclusions and Recommendations

Conclusions

- The proposed project is expected to generate an average of 245 trips daily, including 16 trips during the morning peak hour and 20 during the evening peak hour.
- The study intersections operate acceptably at LOS C or better overall during both peak hours under existing conditions.
- Under Future volumes the study intersections are expected to operate acceptably overall during both peak hours evaluated.
- The peak hour volume warrant is met based on existing a.m. and p.m. peak hour volumes, without the addition of project generated traffic, indicating potential need for signalization of the intersection of Merrydale Road/US 101 South Ramps. Under Existing and Future conditions, with a traffic signal, the study intersection would be expected to operate at LOS C or D during both peak hours.
- The study intersections are expected to continue operating acceptably and generally at the same levels of service upon the addition of project-generated traffic to existing and future volumes, indicating a less-than-significant impact.
- Pedestrian, transit and bicycle facilities near the project site are generally adequate.
- Sight distance at the project driveways is adequate.
- The proposed on-site roadway configuration is expected to adequately facilitate low-volume two-way traffic and emergency vehicle access.

Recommendations

- Construct sidewalk, subject to the availability of right-of-way and the feasibility of the drainage design, on the west side of Redwood Road directly adjacent to the project driveway connecting to the existing sidewalk.
- To maintain clear sight lines, any residential landscaping or signs should be designed to ensure that adequate sight lines would be maintained. If on-street parking is permitted, a no parking zone should be established near the Merrydale Road driveway to maintain adequate sight lines.

Study Participants and References

Study Participants

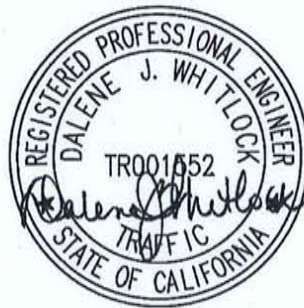
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Appendix A

Collision Rate Calculations



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Intersection Collision Rate Calculations

350 Merrydale Road/3833 Redwood Highway TIS

Intersection # 1: Merrydale Road & US 101 South Ramps

Date of Count: Tuesday, June 05, 2018

Number of Collisions: 4

Number of Injuries: 1

Number of Fatalities: 0

ADT: 24200

Start Date: January 1, 2013

End Date: December 31, 2017

Number of Years: 5

Intersection Type: Tee

Control Type: Stop & Yield Controls

Area: Suburban

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

$$\text{collision rate} = \frac{4}{24,200} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.09 c/mve	0.0%	25.0%
Statewide Average*	0.14 c/mve	0.7%	38.0%

ADT = average daily total vehicles entering intersection

c/mve = collisions per million vehicles entering intersection

* 2014 Collision Data on California State Highways, Caltrans

Intersection # 2: Merrydale Road & North San Pedro Road

Date of Count: Tuesday, June 05, 2018

Number of Collisions: 13

Number of Injuries: 9

Number of Fatalities: 0

ADT: 22400

Start Date: April 1, 2013

End Date: March 31, 2018

Number of Years: 5

Intersection Type: Four-Legged

Control Type: Signals

Area: Suburban

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

$$\text{collision rate} = \frac{13}{22,400} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.32 c/mve	0.0%	69.2%
Statewide Average*	0.43 c/mve	0.4%	37.9%

ADT = average daily total vehicles entering intersection

c/mve = collisions per million vehicles entering intersection

* 2014 Collision Data on California State Highways, Caltrans



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Appendix B

Intersection Level of Service Calculations



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Intersection Level Of Service Report

Control Type: All-way stop
Analysis Method: HCM 2010
Analysis Period: 15 minutes
Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh): 85.2
Level Of Service: F
Volume to Capacity (V/C): 1.293

Intersection Setup

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Approach	Northbound	Southbound	Westbound
Lane Configuration	IR	IR	IR
Turning Movement	Thru	Left	Left
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	100.00	115.00	100.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	Yes	Yes	Yes

Volumes

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Base Volume Input [veh/h]	182	177	198
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	182	177	198
Peak Hour Factor	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	45	51
Total Analysis Volume [veh/h]	186	181	202
Pedestrian Volume [ped/h]	1	0	9

Intersection Level Of Service Report

Control Type: All-way stop
Analysis Method: HCM 2010
Analysis Period: 15 minutes
Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh): 85.2
Level Of Service: F
Volume to Capacity (V/C): 1.293

Intersection Setup

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Approach	Northbound	Southbound	Westbound
Lane Configuration	IR	IR	IR
Turning Movement	Thru	Left	Left
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	100.00	115.00	100.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	Yes	Yes	Yes

Volumes

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Base Volume Input [veh/h]	182	177	198
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	182	177	198
Peak Hour Factor	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	45	51
Total Analysis Volume [veh/h]	186	181	202
Pedestrian Volume [ped/h]	1	0	9

Control Type: Signalized
Analysis Method: HCM 2010
Analysis Period: 15 minutes

Intersection Level of Service Report
Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh): 22.1
C
Volume to Capacity (V/C): 0.513

Intersection Setup				
Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps	
Approach	Northbound	Southbound	Westbound	
Lane Configuration	IR	IR	IR	
Turning Movement	Thru	Left	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0	1
Pocket Length [ft]	160.00	115.00	160.00	225.00
Speed [mph]	30.00	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00	0.00
Crosswalk	No	Yes	Yes	Yes

Volumes				
Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps	
Base Volume Input [veh/h]	182	177	198	102
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0
Diverged Trips [veh/h]	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0
Other Volume [veh/h]	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0
Total Hourly Volume [veh/h]	182	177	198	102
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	45	51	26
Total Analysis Volume [veh/h]	186	181	202	104
Presence of On-Street Parking	No	No	No	No
On-Street Parking Maneuver Rate [h]	0	0	0	0
Local Bus Stopping Rate [h]	0	0	0	0
Pedestrian Volume [ped/h]	0	0	0	9
Bicyclist Volume [bicyclist/h]	0	0	0	0

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing				
Control Type	Permissive	Overlap	Protected	Permissive
Signal Group	2	4	1	5
Auxiliary Signal Groups		2,4		
Lead / Lag			Lead	Lag
Minimum Green [s]	5	5	5	5
Maximum Green [s]	30	30	30	30
Amber [s]	3.0	3.0	3.0	3.0
All red [s]	1.0	1.0	1.0	1.0
Split [s]	39	24	17	56
Vehicle Extension [s]	3.0	3.0	3.0	3.0
Walk [s]	7	7	0	7
Pedestrian Clearance [s]	28	13	0	13
Rest In Walk	No		No	No
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0
Minimum Recall	No	No	No	No
Maximum Recall	No	No	No	No
Pedestrian Recall	No	No	No	No
Detector Location [ft]	6.0	6.0	6.0	6.0
Detector Length [ft]	50.0	50.0	50.0	50.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase				
Pedestrian Signal Group			0	
Pedestrian Walk [s]			0	
Pedestrian Clearance [s]			0	

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
ITL _{AB} , Remitted Start-Up Lost Time [s]	3.69	0.00	3.69	0.00	3.69	3.69
LT, Clearance Lost Time [s]	2.00	0.00	2.00	2.00	2.00	2.00
G/L Effective Green Time [s]	22	54	11	37	28	28
g/C, Green Cycle	0.27	0.68	0.14	0.46	0.35	0.35
(V/L)/Volume / Saturation Flow Rate s, saturation flow rate [veh/h]	1676	1415	1597	1676	1597	1425
c, Capacity [veh/h]	457	955	224	776	562	502
d1, Uniform Delay [s]	23.80	10.28	33.33	13.24	19.22	18.11
t, delay calibration	0.11	0.50	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.58	10.82	6.73	0.19	0.39	0.20
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rq, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
Pf, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X _i volumes / capacity		0.41	0.87	0.81	0.28	0.36	0.21
α _i Delay for Lane Group [s/veh]		24.38	21.10	40.06	13.44	18.61	18.52
Lane Group LOS		C	C	D	B	B	B
Critical Lane Group		Mid	Yes	Yes	No	No	No
50th-Percentile Queue Length [veh]		2.85	11.65	3.73	2.30	2.72	1.32
50th-Percentile Queue Length [ft/m]		71.26	291.22	93.27	57.40	68.08	33.00
85th-Percentile Queue Length [veh]		5.13	17.35	6.72	4.13	4.50	2.38
85th-Percentile Queue Length [ft/m]		128.27	437.16	167.89	103.33	123.55	59.40

Movement, Approach, & Intersection Results

d _A , Delay for Movement [s/veh]	24.38	21.10	40.06	13.44	19.61	18.32
Movement LOS	C	C	D	B	B	B
d _A , Approach Delay [s/veh]	21.70		25.55		19.17	
Approach LOS	C		C		B	
d _I , Intersection Delay [s/veh]			22.14			
Intersection LOS			C			
Intersection V/C			0.513			

Sequence

sequence	1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192	16384	32768	65536	131072	262144	524288	1048576	2097152	4194304	8388608	16777216	33554432	67108864	134217728	268435456	536870912	1073741824	2147483648	4294967296	8589934592	17179869184	34359738368	68719476736	137438953472	274877906944	549755813888	1099511627776	2199023255552	4398046511104	8796093022208	17592186044416	35184372088832	70368744177664	140737488355328	281474976710656	562949953421312	1125899906842624	2251799813685248	4503599627370496	9007199254740992	18014398509481984	36028797018963968	72057594037927936	144115188075855872	288230376151711744	576460752303423488	1152921504606846976	2305843009213693952	4611686018427387904	9223372036854775808	18446744073709551616	36893488147419103232	73786976294838206464	147573952589676412928	295147905179352825856	590295810358705651712	1180591620717411303424	2361183241434822606848	4722366482869645213696	9444732965739290427392	18889465931478580854784	37778931862957161709568	75557863725914323419136	151115727451828646838272	302231454903657293676544	604462909807314587353088	1208925819614629174706176	2417851639229258349412352	4835703278458516698824704	9671406556917033397649408	19342813113834066795298816	38685626227668133590597632	77371252455336267181195264	154742504910672534362390528	309485009821345068724781056	618970019642690137449562112	1237940039285380274899124224	2475880078570760549798248448	4951760157141521099596496896	9903520314283042199192993792	19807040628566084398385987584	39614081257132168796771975168	79228162514264337593543950336	158456325028528675187087900672	316912650057057350374175801344	633825300114114700748351602688	1267650600228229401496703205376	2535301200456458802993406410752	5070602400912917605986812821504	10141204801825835211973625643008	20282409603651670423947251286016	40564819207303340847894502572032	81129638414606681695789005144064	162259276829213363391578010288128	324518553658426726783156020576256	649037107316853453566312041152512	1298074214633706907132624082305024	2596148429267413814265248164610048	5192296858534827628530496329220096	10384593717069655257060992658440192	20769187434139310514121985316880384	41538374868278621028243970633760768	83076749736557242056487941267521536	166153499473114484112975882535043072	332306998946228968225951765070086144	664613997892457936451903530140172288	1329227995784915872903807060280344576	2658455991569831745807614120560689152	5316911983139663491615228241121378304	10633823966279326983230456482242756608	21267647932558653966460912964485513216	42535295865117307932921825928971026432	85070591730234615865843651857942052864	170141183460469231731687303715884105728	340282366920938463463374607431768211456	680564733841876926926749214863536422912	1361129467683753853853498429727072845824	2722258935367507707706996859454145691648	5444517870735015415413993718908291383296	10889035741470030830827987437816582766592	21778071482940061661655974875633165533184	43556142965880123323311949751266331066368	87112285931760246646623899502532662132736	174224571863520493293247799005065324265472	348449143727040986586495598010130648530944	696898287454081973172991196020261297061888	1393796574908163946345982392040522594123776	2787593149816327892691964784081045188247552	5575186299632655785383929568162090376495104	11150372599265311570767859136324180752990208	22300745198530623141535718272648361505
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Control Type: Intersection Level of Service Report
Signalized HCM 2010
Analysis Method: Delay (sec / veh): 19.2
Analysis Period: 15 minutes Level of Service: B
Volume to Capacity (v/c): 0.766

Intersection Setup												
Name	Merrydale Road			Merrydale Road			North San Pedro Road			North San Pedro Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	1	1	0	0	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	225.00	110.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			35.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			Yes			No		

Volumes												
Name	Merrydale Road			Merrydale Road			North San Pedro Road			North San Pedro Road		
Base Volume Input [veh/h]	10	24	28	306	5	107	90	127	7	21	292	864
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	24	28	306	5	107	90	127	7	21	292	749
Peak Hour Factor	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	6	8	82	1	29	24	34	2	6	78	201
Total Analysis Volume [veh/h]	11	26	30	329	5	115	97	137	8	23	314	805
Presence of On-Street Parking	No	No	No	No	No	No	No	No	No	No	No	No
On-Street Parking Maneuver Rate [h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0	0	0	0	0	0	0	0	0	0	0	0
Blonde Volume [bicyclist/h]	4	4	4	0	0	0	0	0	0	0	0	0



Intersection Settings												
Located in CBD	No											
Signal Coordination Group	-											
Cycle Length [s]	133											
Coordination Type	Time of Day Pattern Isolated											
Activation Type	Fully actuated											
Offset [s]	0.0											
Offset Reference	LeadGreen											
Permissive Mode	SingleBand											
Lost time [s]	16.00											

Phasing & Timing												
Control Type	Split	Split	Split	Split	Split	Protect	Protect	Protect	Protect	Protect	Protect	Protect
Signal group	0	8	0	0	4	0	5	0	0	0	0	6
Auxiliary Signal Groups	-	-	-	-	-	-	-	-	-	-	-	-
Lead / Lag	-	-	-	-	-	Lead	-	-	-	-	-	-
Minimum Green [s]	0	4	0	0	4	0	4	0	0	0	4	0
Maximum Green [s]	0	30	0	0	30	0	30	0	0	0	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0
Split [s]	0	20	0	0	39	0	29	74	0	0	45	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0
Walk [s]	0	5	0	0	7	0	0	5	0	0	11	0
Pedestrian Clearance [s]	0	10	0	0	13	0	0	10	0	0	12	0
Rest In Walk	No	No	No	No	No	No	No	No	No	No	No	No
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0
Minimum Recall	No	No	No	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase												
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											



Lane Group Calculations

[illegible]

Lane Group Results

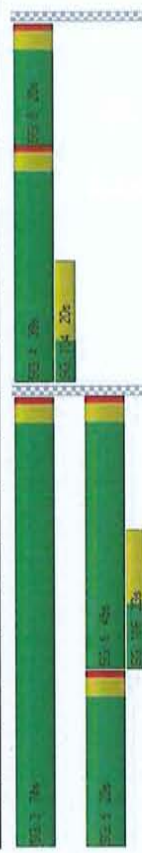
	X, volume / capacity	0.78	0.60	0.31	0.75	0.16	0.47	0.80	0.73
d, Delay for Lane Group [s/veh]	39.72	23.34	17.73	33.18	7.63	14.61	11.25	104.42	17.42
Lane Group LOS		D	C	B	A	B	B	B	B
Critical Lane Group	Yes	Yes	Yes	No	Yes	No	No	No	No
50th-Percentile Queue Length [veh]	1.12	3.91	1.10	1.47	0.60	3.06	4.45	4.18	
50th-Percentile Queue Length [m]	26.03	97.70	27.50	36.69	20.10	76.42	111.25	104.42	
95th-Percentile Queue Length [veh]	2.02	7.03	1.98	2.64	1.45	5.50	7.51	7.52	
95th-Percentile Queue Length [m]	50.49	175.85	49.49	69.04	36.19	137.56	197.74	187.96	

Movement, Approach, & Intersection Results

d _M , Delay for Movement [s/veh]	39.72	39.72	36.72	23.34	17.73	32.18	7.63	14.61
Movement LOS	D	D	C	B	A	A	A	B
d _A , Approach Delay [s/veh]	39.72	36.72	21.91	17.27	17.19	17.19	17.19	17.19
Approach LOS	D	D	C	B	B	B	B	B
d _I , Intersection Delay [s/veh]	15.19							
Intersection LOS	B							
Intersection V/C	0.796							

Sequence

	sequence							
Ring 1	-	-	-	-	-	-	-	-
Ring 2	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-



Intersection Level of Service Report

Control Type: HCM 2010
Analysis Method: HCM 2010
Analysis Period: 15 minutes
Level of Service: F
Volume to Capacity (v/c): 1.300

Intersection Setup

Name	Approach	Memdale Road Northbound	Memdale Road Southbound	Southbound US-101 Ramps Westbound
Lane Configuration		IR	IR	IR
Turning Movement		Thru Right	Left Thru Right	Left Right
Lane Width [ft]		12.00	12.00	12.00
No. of Lanes in Pocket		0	1	0
Pocket Length [ft]		400.00	115.00	400.00
Speed [mph]		30.00	30.00	30.00
Grade [%]		0.00	0.00	0.00
Crosswalk		Yes	Yes	Yes

Volumes

Name	Memdale Road Northbound	Memdale Road Southbound	Southbound US-101 Ramps Westbound
Base Volume Input [veh/h]	182	177	198
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	3	6	1
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	185	183	198
Peak Hour Factor	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	47	51
Total Analysis Volume [veh/h]	189	187	202
Pedestrian Volume [ped/h]	1	0	9

Intersection Level of Service Report

Control Type: HCM 2010
Analysis Method: HCM 2010
Analysis Period: 15 minutes
Level of Service: F
Volume to Capacity (v/c): 1.300

Intersection Setup

Name	Approach	Memdale Road Northbound	Memdale Road Southbound	Southbound US-101 Ramps Westbound
Lane Configuration		IR	IR	IR
Turning Movement		Thru Right	Left Thru Right	Left Right
Lane Width [ft]		12.00	12.00	12.00
No. of Lanes in Pocket		0	1	0
Pocket Length [ft]		400.00	115.00	400.00
Speed [mph]		30.00	30.00	30.00
Grade [%]		0.00	0.00	0.00
Crosswalk		Yes	Yes	Yes

Volumes

Name	Memdale Road Northbound	Memdale Road Southbound	Southbound US-101 Ramps Westbound
Base Volume Input [veh/h]	182	177	198
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	3	6	1
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	185	183	198
Peak Hour Factor	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	47	51
Total Analysis Volume [veh/h]	189	187	202
Pedestrian Volume [ped/h]	1	0	9

Intersection Level of Service Report

Control Type: HCM 2010
Analysis Method: HCM 2010
Analysis Period: 15 minutes
Level of Service: F
Volume to Capacity (v/c): 1.300

Intersection Setup

Name	Approach	Memdale Road Northbound	Memdale Road Southbound	Southbound US-101 Ramps Westbound
Lane Configuration		IR	IR	IR
Turning Movement		Thru Right	Left Thru Right	Left Right
Lane Width [ft]		12.00	12.00	12.00
No. of Lanes in Pocket		0	1	0
Pocket Length [ft]		400.00	115.00	400.00
Speed [mph]		30.00	30.00	30.00
Grade [%]		0.00	0.00	0.00
Crosswalk		Yes	Yes	Yes

Volumes

Name	Memdale Road Northbound	Memdale Road Southbound	Southbound US-101 Ramps Westbound
Base Volume Input [veh/h]	182	177	198
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	3	6	1
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	185	183	198
Peak Hour Factor	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	47	51
Total Analysis Volume [veh/h]	189	187	202
Pedestrian Volume [ped/h]	1	0	9

Intersection Level Of Service Report

Intersection Level Of Service Report

Control Type: Signalized
Analysis Method: HCM 2010
Analysis Period: 15 minutes

Intersection 1: Merrydale Road / Southbound US-101 Ramps
Signalized
HCM 2010
Level Of Service: C
Volume to Capacity (v/c): 0.517

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Approach	Northbound	Southbound	Westbound
Lane Configuration	IR	IR	IR
Turning Movement	Thru	Right	Left
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	900.00	100.00	100.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	Yes	Yes

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Approach	Northbound	Southbound	Westbound
Lane Configuration	IR	IR	IR
Turning Movement	Thru	Right	Left
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	900.00	100.00	100.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	Yes	Yes

Volumes

Volumes

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Base Volume Input [veh/h]	182	177	188
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	3	6	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	185	183	188
Peak Hour Factor	0.9600	0.9600	0.9600
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	47	51
Total Analysis Volume [veh/h]	189	187	202
Presence of On-Street Parking	No	No	No
On-Street Parking Maneuver Rate [h]	0	0	0
Local Bus Stopping Rate [h]	0	0	0
Pedestrian Volume [ped/h]	0	0	0
Bicycle Volume [bicycl/h]	0	0	0

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Base Volume Input [veh/h]	182	177	188
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	3	6	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	185	183	188
Peak Hour Factor	0.9600	0.9600	0.9600
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	47	47	51
Total Analysis Volume [veh/h]	189	187	202
Presence of On-Street Parking	No	No	No
On-Street Parking Maneuver Rate [h]	0	0	0
Local Bus Stopping Rate [h]	0	0	0
Pedestrian Volume [ped/h]	0	0	0
Bicycle Volume [bicycl/h]	0	0	0

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Permissive	Overlap	Protected	Permissive	Permissive
Signal Group	2	4	1	6	3
Auxiliary Signal Groups		2.4			
Lead / Lag			Lead		Lag
Minimum Green [s]	5	5	5	5	5
Maximum Green [s]	30	30	30	30	30
Amber [s]	3.0	3.0	3.0	3.0	3.0
All red [s]	1.0	1.0	1.0	1.0	1.0
Split [s]	39	24	17	56	24
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0
Walk [s]	7	7	0	0	7
Pedestrian Clearance [s]	28	13	0	0	13
Rest in Walk	No			No	No
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0
Minimum Recall	No	No	No	No	No
Maximum Recall	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No
Detector Location [ft]	6.0	6.0	6.0	6.0	6.0
Detector Length [ft]	50.0	50.0	50.0	50.0	50.0
I, Upstream Flaring Factor	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	80	80	80	80	80	80
C, Cycle Length per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
I1, P, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	2.00	2.00	2.00
I2, Clearance Lost Time [s]	12	0.00	12	2.00	2.00	2.00
I3, Effective Green Time [s]	22	54	22	37	28	28
g/C, Green / Cycle	0.27	0.68	0.12	0.47	0.35	0.35
v / s _j , J Volume / Saturation Flow Rate s, saturation flow rate [veh/h]	0.11	0.59	0.12	0.13	0.13	0.07
c, Capacity [veh/h]	1676	1415	1597	1676	1597	1425
d1, Uniform Delay [s]	457	955	231	783	562	502
k, delay calibration	22.85	10.28	33.16	13.10	19.22	18.12
L, Upstream Filtering Factor	0.11	0.50	0.11	0.11	0.11	0.11
d2, Incremental Delay [s]	1.00	1.00	1.00	1.00	1.00	1.00
d3, Initial Queue Delay [s]	0.60	10.81	6.69	0.20	0.39	0.20
Rp, platoon ratio	0.00	0.00	0.00	0.00	0.00	0.00
Pf, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

	X, volume / capacity	0.41	0.67	0.81	0.26	0.36	0.21
d, Delay for Lane Group [s/veh]		24.45	21.09	39.84	13.30	19.61	18.33
	Lane Group LOS	C	C	D	B	B	B
	Critical Lane Group	No	Yes	Yes	No	No	No
50th-Percentile Queue Length [veh/m]		2.90	11.64	3.85	2.35	2.72	1.33
50th-Percentile Queue Length [min]		72.57	291.11	66.13	58.64	68.08	33.34
95th-Percentile Queue Length [veh/m]		5.23	17.02	6.92	4.22	4.50	2.40
95th-Percentile Queue Length [min]		130.63	431.24	173.03	105.55	119.54	60.01

Movement, Approach, & Intersection Results

d_M Delay for Movement [μs]	24.45	21.09	39.64	13.30	19.61	18.33
Movement LOS	C	C	D	B	B	B
d_A Approach Delay [μs]		21.71	25.40		19.17	
Approach LOS	C	C	C		B	
d_I Intersection Delay [μs]		22.13		22.13		
Intersection LOS		C		C		
Intersection VIC						0.517

Sequence

Sequence	1	2	4
Ring 1	-	-	-
Ring 2	-	-	-
Ring 3	-	-	-
Ring 4	-	-	-



Control Type: Signalized
Analysis Method: HCM 2010
Analysis Period: 15 minutes

Intersection 2: Merrydale Road / North San Pedro Road
Signalized Delay (sec / veh): 19.6
Level of Service: B
Volume to Capacity (v/c): 0.794

Intersection Setup

Name	Merrydale Road Northbound	Merrydale Road Southbound	North San Pedro Road Eastbound	North San Pedro Road Westbound
Approach	+	+	+	+
Lane Configuration	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right
Turning Movement	12.00 12.00 12.00	12.00 12.00 12.00	12.00 12.00 12.00	12.00 12.00 12.00
Lane Width [ft]	12.00 12.00 12.00	12.00 12.00 12.00	12.00 12.00 12.00	12.00 12.00 12.00
No. of Lanes in Pocket	0 0 0	0 0 0	0 0 0	0 0 0
Pocket Length [ft]	100.00 100.00 100.00	100.00 100.00 100.00	100.00 100.00 100.00	100.00 100.00 100.00
Speed [mph]	35.00	35.00	25.00	25.00
Grade [%]	0.00	0.00	0.00	0.00
Crosswalk	No	Yes	Yes	No

Volumes

Name	Merrydale Road Northbound	Merrydale Road Southbound	North San Pedro Road Eastbound	North San Pedro Road Westbound
Base Volume Input [veh/h]	10 24 28	306 5 107	90 127 7	21 292 864
Base Volume Adjustment Factor	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000
Heavy Vehicles Percentage [%]	2.00 2.00 2.00	2.00 2.00 2.00	2.00 2.00 2.00	2.00 2.00 2.00
Growth Factor	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000
In-Process Volume [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Site-Generated Trips [veh/h]	0 0 0	5 0 1	1 0 0	0 0 0
Diverted Trips [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Pass-by Trips [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Existing Site Adjustment Volume [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Other Volume [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Right-Turn on Red Volume [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Total Hourly Volume [veh/h]	10 24 28	311 5 108	91 127 7	21 292 864
Peak Hour Factor	0.9300 0.9300 0.9300	0.9300 0.9300 0.9300	0.9300 0.9300 0.9300	0.9300 0.9300 0.9300
Other Adjustment Factor	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000
Total 15-Minute Volume [veh/h]	3 6 8	84 1 29	34 2 6	78 202 615
Total Analysis Volume [veh/h]	11 26 30	334 5 115	98 137 8	23 314 808
Presence of On-Street Parking	No	No	No	No
On-Street Parking Maneuver Rate [h]	0 0 0	0 0 0	0 0 0	0 0 0
Local Bus Stopping Rate [h]	0 0 0	0 0 0	0 0 0	0 0 0
Pedestrian Volume [ped/h]	0	3	8	0
Bicycle Volume [bicyclist/h]	4	0	0	0

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	133
Coordination Type	Time of Day Pattern Isolated
Activation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead/Green
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Protect	Permiss	Permiss	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0
Auxiliary Signal Groups	-	-	-	-	-	-	-	-	-
Lead / Lag	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	4	0	0	4	0	4	0	0
Maximum Green [s]	0	30	0	0	30	0	30	0	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0
Split [s]	0	20	0	0	39	0	29	74	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	0.0
Walk [s]	0	5	0	0	7	0	5	0	11
Pedestrian Clearance [s]	0	10	0	0	13	0	10	0	12
Rest-In-Walk	No	No	No	No	No	No	No	No	No
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0
Minimum Recall	No	No	No	No	No	No	No	No	No
Maximum Recall	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	C	R	L	C	C	C	R
C, Cycle Length [s]	56	56	56	56	56	56	56	56
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
11, P, Permitted Start-Up Lost Time [s]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
12, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
13, Effective Green Time [s]	3	14	14	4	28	19	19	19
g/C, Green / Cycle	0.05	0.24	0.24	0.07	0.49	0.35	0.35	0.35
(V/s), Volume / Saturation Flow Rate	0.04	0.19	0.07	0.06	0.08	0.18	0.28	0.28
s, saturation flow rate [veh/h]	1713	1775	1583	1774	1845	1834	1435	1577
c, Capacity [veh/h]	85	431	394	131	910	707	500	549
dt, Uniform Delay [s]	26.33	19.86	17.36	25.46	7.81	14.54	16.58	16.02
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
l, Upstream Flaring Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
dt, Incremental Delay [s]	13.99	3.24	0.44	8.27	0.08	0.50	3.17	1.84
dt, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

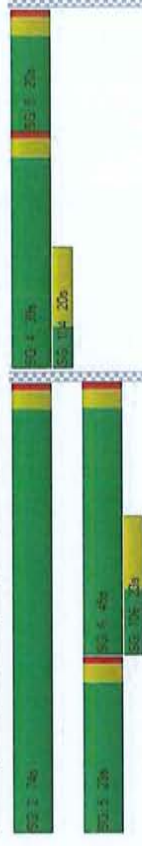
X, volume / capacity	0.78	0.79	0.30	0.75	0.16	0.48	0.81	0.74
d, Delay for Lane Group [s/veh]	40.32	23.12	17.60	33.73	7.89	15.04	19.75	17.56
Lane Group LOS	D	C	B	C	A	B	B	B
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh]	1.15	4.02	1.13	1.52	0.84	3.17	4.64	4.35
50th-Percentile Queue Length [ft]	28.66	100.38	28.26	37.94	21.03	79.28	116.02	108.84
95th-Percentile Queue Length [veh]	2.06	7.23	2.04	2.73	1.51	5.71	8.17	7.78
95th-Percentile Queue Length [ft]	51.58	180.69	50.88	68.29	37.85	142.71	204.34	194.38

Movement, Approach, & Intersection Results

d, M, Delay for Movement [s/veh]	40.32	40.32	23.12	23.12	17.80	33.73	7.89	15.04	15.04	18.85
Movement LOS	D	D	C	C	B	C	A	B	B	B
d, A, Approach Delay [s/veh]		40.32				18.31				17.73
Approach LOS		D				B				B
d, I, Intersection Delay [s/veh]					19.56					
Intersection LOS					B					
Intersection V/C					0.794					

Sequence

Ring 1	2	4	8	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-



Intersection Level of Service Report

Control Type: All-way stop
Analysis Method: HCM 2010
Analysis Period: 15 minutes
Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh): 160.4
Level of Service: F
Volume to Capacity (V/C): 1.576

Intersection Setup

Name	Merrydale Road Northbound	Merrydale Road Southbound	Southbound US-101 Ramps Westbound
Approach	IR	IR	IR
Lane Configuration	Thru Right	Left Thru Right	Left Right
Turning Movement	12.00	12.00	12.00
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	100.00	115.00	100.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	Yes	Yes	Yes

Volumes

Name	Merrydale Road Northbound	Merrydale Road Southbound	Southbound US-101 Ramps Westbound
Base Volume Input [veh/h]	330	134	107
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diversified Trips [veh/h]	0	0	0
Piano-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	330	134	107
Peak Hour Factor	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	88	36	29
Total Analysis Volume [veh/h]	355	144	115
Pedestrian Volume [ped/h]	0	0	1

Intersection Level of Service Report

Control Type: All-way stop
Analysis Method: HCM 2010
Analysis Period: 15 minutes
Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh): 160.4
Level of Service: F
Volume to Capacity (V/C): 1.576

Intersection Setup

Name	Merrydale Road Northbound	Merrydale Road Southbound	Southbound US-101 Ramps Westbound
Approach	IR	IR	IR
Lane Configuration	Thru Right	Left Thru Right	Left Right
Turning Movement	12.00	12.00	12.00
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	100.00	115.00	100.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	Yes	Yes	Yes

Volumes

Name	Merrydale Road Northbound	Merrydale Road Southbound	Southbound US-101 Ramps Westbound
Base Volume Input [veh/h]	330	134	107
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diversified Trips [veh/h]	0	0	0
Piano-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	330	134	107
Peak Hour Factor	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	88	36	29
Total Analysis Volume [veh/h]	355	144	115
Pedestrian Volume [ped/h]	0	0	1

Intersection Settings

Lanes	Capacity per Entry Lane [veh/h]	Degree of Utilization, x	522	522	522
	625	0.57	1.58	0.42	0.25

Movement, Approach, & Intersection Results

50th-Percentile Queue Length [veh]	50th-Percentile Queue Length [ft]	Approach Delay [s/veh]	Approach LOS	Intersection Delay [s/veh]	Intersection LOS
3.57	58.52	1.12	2.04	160.39	F
89.17	1462.96	27.94	50.95		
216.72		13.07			
F		B			

Intersection Level Of Service Report
Signalized
HCM 2010
Analysis Method:
Analysis Period:
15 minutes

Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh):
Level Of Service:
Volume to Capacity (v/c):

26.4
C
0.692

Intersection Setup				
Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps	
Approach	Northbound	Southbound	Westbound	
Lane Configuration	IR	IR	IR	
Turning Movement	Thru	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0	1
Pocket Length [ft]	100.00	115.00	100.00	225.00
Speed [mph]	30.00	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00	0.00
Crosswalk	No	Yes	Yes	Yes

Volumes				
Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps	
Base Volume Input [veh/h]	330	1044	134	107
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0
Diverged Trips [veh/h]	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0
Other Volume [veh/h]	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0
Total Hourly Volume [veh/h]	330	1044	134	107
Peak Hour Factor	0.9300	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	89	281	36	29
Total Analysis Volume [veh/h]	355	1123	144	115
Presence of On-Street Parking	No	No	No	No
On-Street Parking Maneuver Rate [h]	0	0	0	0
Local Bus Stopping Rate [h]	0	0	0	0
Pedestrian Volume [ped/h]	0	0	0	1
Bicyclist Volume [bicyclist/h]	0	0	0	0

Intersection Settings
Located in CBD
Signal Coordination Group
Cycle Length [s]
Coordination Type
Actuation Type
Offset [s]
Offset Reference
Permissive Mode
Lost time [s]

Yes
80
Time of Day Pattern Isolated
Semi-actuated
0.0
LeadGreen
SingleBand
12.00

Phasing & Timing				
Control Type	Permissive	Overlap	Protected	Permissive
Signal Group	2	4	1	4
Auxiliary Signal Groups		2.4	Lead	Lag
Lead / Lag				
Minimum Green [s]	5	5	5	5
Maximum Green [s]	30	30	30	30
Amber [s]	3.0	3.0	3.0	3.0
All red [s]	1.0	1.0	1.0	1.0
SPRT [s]	42	27	11	53
Vehicle Extension [s]	3.0	3.0	3.0	3.0
Walk [s]	7	7	0	7
Pedestrian Clearance [s]	28	13	0	13
Rest In Walk	No	No	No	No
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0
Minimum Recall	No	No	No	No
Maximum Recall	No	No	No	No
Pedestrian Recall	No	No	No	No
Detector Location [ft]	6.0	6.0	6.0	6.0
Detector Length [ft]	50.0	50.0	50.0	50.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00
Exclusive Pedestrian Phase				
Pedestrian Signal Group			0	
Pedestrian Walk [s]			0	
Pedestrian Clearance [s]			0	

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	80	80	80	80	80	80
C, Cycle Length per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
L, Total Lost Time per Cycle [s]	8.00	8.00	8.00	8.00	8.00	8.00
l1, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	2.00	2.00	2.00
l2, Clearance Lost Time [s]	3.00	64	9	43	30	30
g1, Effective Green Time [s]	0.38	0.80	0.11	0.54	0.37	0.37
g/C, Green/Cycle	0.21	0.79	0.09	0.14	0.07	0.05
(v/s), Volume / Saturation Flow Rate	1676	1424	1597	1676	1597	1425
s, saturation flow rate [veh/h]	630	1139	182	905	597	532
c, Capacity [veh/h]	1977	761	3453	866	1691	1652
d1, Uniform Delay [s]	0.13	0.50	0.11	0.11	0.11	0.11
i, delay calibration	1.00	1.00	1.00	1.00	1.00	1.00
l, Upstream Filtering Factor	0.96	23.60	7.59	0.15	0.16	0.11
d2, Incremental Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
d3, Initial Queue Delay [s]	1.00	1.00	1.00	1.00	1.00	1.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PFF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

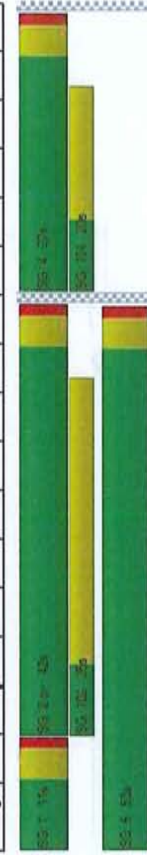
Lane Group Results

X , volume / capacity	0.56	0.59	0.79	0.26	0.19	0.13
d , Delay for Lane Group [s/veh]	20.73	31.21	42.13	10.01	17.07	16.83
Lane Group LOS	C	C	D	B	B	B
Critical Lane Group	Yes	Yes	Yes	No	Yes	No
50th-Percentile Queue Length [veh/m]	5.12	15.78	3.04	2.04	1.39	0.84
50th-Percentile Queue Length [ft/m]	128.01	394.55	76.08	50.94	34.79	21.00
95th-Percentile Queue Length [veh/m]	8.83	22.30	5.48	3.67	2.50	1.51
95th-Percentile Queue Length [ft/m]	220.78	557.43	136.94	94.70	62.61	37.80

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.73		31.21	42.13	10.01	17.07	16.83
Movement LOS	C		C	D	B	B	B
d_A, Approach Delay [s/veh]							
Approach LOS							
d_I, Intersection Delay [s/veh]	28.69		C		22.24		16.50
Intersection LOS					C		B
Intersection V/C				25.42			
				C			
				0.692			

Sequence

[illegible]

Intersection Level of Service Report

Control Type: Signalized
Analysis Method: HCM 2010
Analysis Period: 15 minutes
Intersection 2: Merrydale Road / North San Pedro Road
Delay (sec / veh): 23.9
Level of Service: C
Volume to Capacity (V/C): 0.814

Intersection Setup

Name	Merrydale Road Northbound	Merrydale Road Southbound	North San Pedro Road Eastbound	North San Pedro Road Westbound
Approach				
Lane Configuration	+	+	+	+
Turning Movement				
Lane Width [ft]	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0
Pocket Length [ft]	100.00	100.00	225.00	100.00
Speed [mph]	35.00	35.00	25.00	25.00
Grade [%]	0.00	0.00	0.00	0.00
Crosswalk	No	Yes	Yes	No

Volumes

Name	Merrydale Road Northbound	Merrydale Road Southbound	North San Pedro Road Eastbound	North San Pedro Road Westbound
Base Volume Input [veh/h]	4	20	19	172
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0
Diverged Trips [veh/h]	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0
Other Volume [veh/h]	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0
Total Hourly Volume [veh/h]	4	20	19	172
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	5	5	27
Total Analysis Volume [veh/h]	4	22	21	187
Prevalence of On-Street Parking	No	No	No	No
On-Street Parking Maneuver Rate [h]	0	0	0	0
Local Bus Stopping Rate [h]	0	0	0	0
Pedestrian Volume [ped/h]	0	0	0	0
Bicyclist Volume [bicyclist/h]	0	0	0	0

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	133
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadScreen
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Protects	Permiss	Permiss	Permiss	Permiss
Signal group	0	8	0	4	0	5	2	0	6
Auxiliary Signal Groups	-	-	-	-	-	-	-	-	-
Lead / Lag	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	4	0	4	0	4	4	0	4
Maximum Green [s]	0	30	0	30	0	30	30	0	30
Amber [s]	0.0	3.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0
All red [s]	0.0	1.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0
Split [s]	0	10	0	48	0	24	72	0	51
Vehicle Extension [s]	0.0	3.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0
Walk [s]	0	5	0	7	0	0	5	0	11
Pedestrian Clearance [s]	0	10	0	13	0	0	10	0	12
Rest In Walk	No	No	No	No	No	No	No	No	No
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0
Minimum Recall	No	No	No	No	No	No	No	No	No
Maximum Recall	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	C	R	L	C	C	C	R
C, Cycle Length [s]	70	70	70	70	70	70	70	70
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
11, P, Permited Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Q, Effective Green Time [s]	2	12	12	9	43	30	30	30
P / G, Green / Cycle	0.03	0.17	0.17	0.13	0.62	0.43	0.43	0.43
(V / s), Volume / Saturation Flow Rate	0.03	0.14	0.07	0.11	0.07	0.25	0.36	0.33
s, saturation flow rate [veh/h]	1720	1775	1550	1774	1829	1814	1365	1524
c, Capacity [veh/h]	61	305	268	239	1136	837	599	658
d1, Uniform Delay [s]	33.38	27.70	25.79	29.22	5.37	15.00	17.75	16.80
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.14	0.33	0.27
l, Upstream Flaming Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	18.06	4.53	1.03	5.55	0.04	0.70	0.05	4.60
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

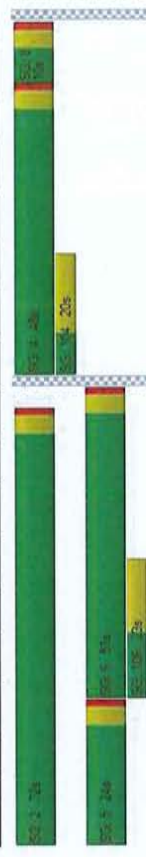
X, volume / capacity	0.77	0.79	0.41	0.78	0.11	0.54	0.84	0.76
d, Delay for Lane Group [s/veh]	51.44	32.22	26.81	34.77	5.41	15.70	26.80	21.50
Lane Group LOS	D	C	C	C	A	B	C	C
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh]	1.05	3.97	1.52	3.31	0.61	5.12	8.04	7.06
50th-Percentile Queue Length [m]	26.46	90.27	40.53	82.67	15.27	128.05	200.88	176.52
95th-Percentile Queue Length [veh]	1.90	7.15	2.92	5.97	1.10	8.83	12.69	11.42
95th-Percentile Queue Length [m]	47.62	178.68	72.95	149.17	27.49	220.86	317.23	265.47

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	51.44	51.44	51.44	32.22	32.22	26.81	34.77	5.41	15.70	15.70	24.15
Movement LOS	D	D	D	C	C	C	C	A	B	B	C
d_A, Approach Delay [s/veh]											
Approach LOS											
d_I, Intersection Delay [s/veh]											
Intersection LOS											
Intersection V/C											

Sequence

Ring 1	2	-	4	8	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-



Intersection Level of Service Report

Control Type: All-way stop
Analysis Method: HCM 2010
Analysis Period: 15 minutes
Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh): 161.4
Level of Service: F
Volume to Capacity (v/c): 1.586

Intersection Setup

Name	Merrydale Road Northbound	Merrydale Road Southbound	Southbound US-101 Ramps Westbound
Approach			
Lane Configuration	Thru Right	Left Thru	Left Right
Turning Movement	12.00	12.00	12.00
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	400.00	115.00	500.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	Yes	Yes	Yes

Volumes

Name	Merrydale Road Northbound	Merrydale Road Southbound	Southbound US-101 Ramps Westbound
Base Volume Input [veh/h]	330	134	107
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	6	3	5
Diversified Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	336	137	107
Peak Hour Factor	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	91	37	29
Total Analysis Volume [veh/h]	363	147	115
Pedestrian Volume [ped/h]	0	0	1

Intersection Level of Service Report

Control Type: All-way stop
Analysis Method: HCM 2010
Analysis Period: 15 minutes
Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh): 161.4
Level of Service: F
Volume to Capacity (v/c): 1.586

Intersection Setup

Name	Merrydale Road Northbound	Merrydale Road Southbound	Southbound US-101 Ramps Westbound
Approach			
Lane Configuration	Thru Right	Left Thru	Left Right
Turning Movement	12.00	12.00	12.00
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	400.00	115.00	500.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	Yes	Yes	Yes

Volumes

Name	Merrydale Road Northbound	Merrydale Road Southbound	Southbound US-101 Ramps Westbound
Base Volume Input [veh/h]	330	134	107
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	6	3	5
Diversified Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	336	137	107
Peak Hour Factor	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	91	37	29
Total Analysis Volume [veh/h]	363	147	115
Pedestrian Volume [ped/h]	0	0	1

Intersection Level Of Service Report
Signalized
HCM 2010
Analysis Method:
Analysis Period:
15 minutes
Intersection 1: Merridale Road / Southbound US-101 Ramps
Delay (sec / veh):
Level Of Service:
Volume to Capacity (v/c):
26.4
C
0.694

Intersection Setup		Merridale Road Northbound	Merridale Road Southbound	Southbound US-101 Ramps Westbound
Name				
Approach				
Lane Configuration		IR	IR	IR
Turning Movement		Thru	Left	Thru
Lane Width [ft]		12.00	12.00	12.00
No. of Lanes in Pocket		0	1	0
Pocket Length [ft]		103.00	115.00	103.00
Speed [mph]		30.00	30.00	30.00
Grade [%]		0.00	0.00	0.00
Crosswalk		No	Yes	Yes

Volumes		Merridale Road Northbound	Merridale Road Southbound	Southbound US-101 Ramps Westbound
Name				
Base Volume Input [veh/h]		330	134	218
Base Volume Adjustment Factor		1.0000	1.0000	1.0000
Heavy Vehicle Percentage [%]		2.00	2.00	2.00
Growth Factor		1.0000	1.0000	1.0000
In-Process Volume [veh/h]		0	0	0
Site-Generated Trips [veh/h]		8	3	5
Overlaid Trips [veh/h]		0	0	0
Pass-by Trips [veh/h]		0	0	0
Existing Site Adjustment Volume [veh/h]		0	0	0
Other Volume [veh/h]		0	0	0
Right-Turn on Red Volume [veh/h]		0	0	0
Total Hourly Volume [veh/h]		338	137	223
Peak Hour Factor		0.9300	0.9300	0.9300
Other Adjustment Factor		1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]		91	37	60
Total Analysis Volume [veh/h]		353	147	240
Presence of On-Street Parking		No	No	No
On-Street Parking Maneuver Rate [h]		0	0	0
Local Bus Stopping Rate [h]		0	0	0
Pedestrian Volume [ped/h]		0	0	0
Bicycle Volume [bicyde/h]		0	0	0

Intersection Settings
Located in CBD
Signal Coordination Group
Cycle Length [s]
Coordination Type
Time of Day Pattern Isolated
Actuation Type
Semi-actuated
Offset [s]
0.0
Offset Reference
Lead/Green
Permissive Mode
SingleBand
Lost time [s]
12.00

Phasing & Timing		Control Type	Permissive	Overlap	Protected	Permissive	Permissive
Signal Group		Auxiliary Signal Groups	2	4	1	5	4
Lead / Lag		Lead / Lag	-	-	-	-	Lag
Minimum Green [s]		Minimum Green [s]	5	5	5	5	5
Maximum Green [s]		Maximum Green [s]	30	30	30	30	30
Amber [s]		Amber [s]	3.0	3.0	3.0	3.0	3.0
All red [s]		All red [s]	1.0	1.0	1.0	1.0	1.0
Split [s]		Split [s]	42	27	11	53	27
Vehicle Extension [s]		Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0
Walk [s]		Walk [s]	7	7	0	0	7
Pedestrian Clearance [s]		Pedestrian Clearance [s]	28	13	0	0	13
Rest In Walk		Rest In Walk	No	No	No	No	No
I1, Start-Up Lost Time [s]		I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]		I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0
Minimum Recall		Minimum Recall	No	No	No	No	No
Maximum Recall		Maximum Recall	No	No	No	No	No
Pedestrian Recall		Pedestrian Recall	No	No	No	No	No
Detector Location [ft]		Detector Location [ft]	6.0	6.0	6.0	6.0	6.0
Detector Length [ft]		Detector Length [ft]	50.0	50.0	50.0	50.0	50.0
I, Upstream Filtering Factor		I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
Exclusive Pedestrian Phase							
Pedestrian Signal Group		Pedestrian Signal Group	0	0	0	0	0
Pedestrian Walk [s]		Pedestrian Walk [s]	0	0	0	0	0
Pedestrian Clearance [s]		Pedestrian Clearance [s]	0	0	0	0	0

Movement, Approach, & Intersection Results						
d_M, Delay for Movement [s/veh]	20.87	31.21	41.96	9.96	17.07	16.69
Movement LOS	C	C	D	A	B	B
d_A, Approach Delay [s/veh]	28.71		22.12		16.92	
Approach LOS	C		C		B	
d_I, Intersection Delay [s/veh]				26.38		
Intersection LOS				C		
Intersection V/C				0.694		

Sequence									
Ring 1	1	2	4	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-

Lane Group Calculations									
Lane Group	C	R	L	C	L	R	L	R	
C, Cycle Length [s]	80	80	80	80	80	80	80	80	
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
11, D, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
12, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
13, Effective Green Time [s]	30	64	9	43	30	30	30	30	
g/C, Green / Cycle	0.80	0.80	0.12	0.54	0.37	0.37	0.37	0.37	
(v/s), Volume / Saturation Flow Rate	0.22	0.79	0.09	0.14	0.07	0.07	0.05	0.05	
s, saturation flow rate [veh/h]	1676	1424	1597	1676	1597	1424	1597	1424	
c, Capacity [veh/h]	630	1139	185	608	597	532	597	532	
d1, Uniform Delay [s]	19.89	7.61	34.44	9.81	16.91	16.57	16.91	16.57	
k, delay calibration	0.14	0.50	0.11	0.11	0.11	0.11	0.11	0.11	
1, Upstream Flaring Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
d2, Incremental Delay [s]	1.08	23.60	7.52	0.15	0.16	0.12	0.16	0.12	
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

Lane Group Results									
X, volume / capacity	0.58	0.99	0.79	0.26	0.19	0.14			
d, Delay for Lane Group [s/veh]	20.87	31.21	41.96	9.96	17.07	16.69			
Lane Group LOS	C	C	D	A	B	B			
Critical Lane Group	No	Yes	Yes	No	Yes	No			
50th-Percentile Queue Length [veh]	5.28	15.78	3.10	2.09	1.39	0.89			
50th-Percentile Queue Length [ft]	132.10	384.54	77.50	52.13	34.79	22.25			
95th-Percentile Queue Length [veh]	9.05	22.30	5.58	3.75	2.50	1.60			
95th-Percentile Queue Length [ft]	226.35	557.41	139.51	93.84	62.61	40.06			

Control Type: Signalized
Analysis Method: HCM 2010
Analysis Period: 15 minutes

Intersection Level Of Service Report
Intersection 2: Merrydale Road / North San Pedro Road
Delay (sec / veh): 24.9
Level Of Service: C
Volume to Capacity (V/C): 0.816

Intersection Setup	Merrydale Road		Merrydale Road		North San Pedro Road		North San Pedro Road	
	Northbound	Southbound	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound
Lane Configuration	+ -		+ -		+ -		+ -	
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	1	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	225.00	110.00	100.00	100.00	135.00
Speed [mph]	35.00	35.00	35.00	25.00	25.00	25.00	25.00	25.00
Grade [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crosswalk	No	Yes	Yes	Yes	Yes	Yes	No	No

Volumes	Merrydale Road		Merrydale Road		North San Pedro Road		North San Pedro Road	
	4	20	19	217	4	102	100	10
Base Volume Input [veh/h]	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Base Volume Adjustment Factor	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Heavy Vehicle Percentage [%]	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Growth Factor	0	0	0	0	0	0	0	0
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverging Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	0	0	0	0	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Total 15-Minute Volume [veh/h]	1	5	5	60	1	28	47	3
Total Analysis Volume [veh/h]	4	22	21	240	4	112	189	11
Presence of On-Street Parking	No	No	No	No	No	No	No	No
On-Street Parking Maneuver Rate [h]	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [h]	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0	0	0	0	0	0	0	0
Bicycle Volume [bicydes/h]	3	3	2	2	2	2	2	4



Intersection Settings

Located in CBD	No
Signal Coordination Group	133
Cycle Length [s]	Time of Day Pattern Isolated
Coordination Type	Fully actuated
Actuation Type	0.0
Offset [s]	Lead/Lag
Offset Reference	SingleBand
Permissive Mode	16.00
Lost time [s]	

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Protect	Perms	Perms	Perms
Signal Group	0	8	0	0	4	0	5	2	0
Auxiliary Signal Groups	-	-	-	-	-	-	-	-	-
Lead / Lag	0	4	0	0	4	0	4	0	4
Minimum Green [s]	0	30	0	0	30	0	30	0	30
Maximum Green [s]	0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Amber [s]	0	1.0	0.0	0.0	1.0	0.0	1.0	0.0	1.0
All red [s]	0	10	0	0	48	0	24	0	51
Vehicle Extension [s]	0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Walk [s]	5	5	0	0	7	0	5	0	11
Pedestrian Clearance [s]	0	10	0	0	13	0	10	0	12
Rest In Walk	No	No	No	No	No	No	No	No	No
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	2.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	2.0
Minimum Recall	No	No	No	No	No	No	No	No	No
Maximum Recall	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

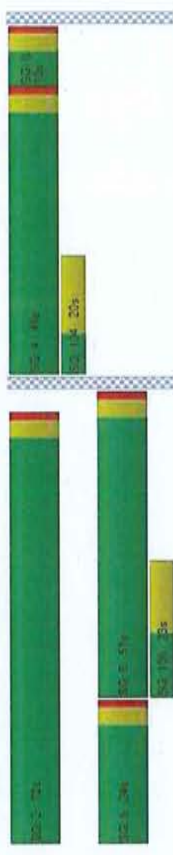


Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	52.28	52.28	31.28	31.28	26.53	35.25	5.68	5.68	16.36	16.36	26.08
Movement LOS	D	D	C	C	C	C	A	A	B	B	C
d_A, Approach Delay [s/veh]	52.28	52.28	26.79	23.77	23.77	23.77	23.77	23.77	23.77	23.77	23.77
Approach LOS	D	D	C	C	C	C	C	C	C	C	C
d_I, Intersection Delay [s/veh]	24.91	24.91	24.91	24.91	24.91	24.91	24.91	24.91	24.91	24.91	24.91
Intersection LOS	C	C	C	C	C	C	C	C	C	C	C
Intersection V/C	0.818	0.818	0.818	0.818	0.818	0.818	0.818	0.818	0.818	0.818	0.818

Sequence

Ring 1	2	-	4	8	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-



Lane Group Calculations

Lane Group	C	C	R	L	C	C	C	R
C, Cycle Length [s]	71	71	71	71	71	71	71	71
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
11_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Q_L, Effective Green Time [s]	2	13	13	10	44	30	30	30
g/C, Green / Cycle	0.03	0.18	0.18	0.13	0.62	0.42	0.42	0.42
(V/s)_I, Volume / Saturation Flow Rate	0.03	0.14	0.07	0.11	0.07	0.25	0.36	0.33
s, saturation flow rate [veh/h]	1720	1775	1560	1774	1829	1814	1365	1533
c, Capacity [veh/h]	61	321	282	240	1124	824	590	648
d1, Uniform Delay [s]	33.90	27.57	25.62	26.64	5.64	15.59	18.51	17.62
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.15	0.34	0.29
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	18.37	3.71	0.90	5.61	0.04	0.77	10.70	5.34
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.77	0.76	0.40	0.79	0.11	0.55	0.86	0.78
d, Delay for Lane Group [s/veh]	52.28	31.28	26.53	35.25	5.68	16.36	20.21	22.95
Lane Group LOS	D	C	C	D	A	B	C	C
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh]	1.08	4.01	1.64	3.41	0.64	5.31	8.59	7.47
50th-Percentile Queue Length [veh]	26.91	100.16	40.97	85.18	16.05	122.83	214.84	188.75
95th-Percentile Queue Length [veh]	1.94	7.21	2.65	6.13	1.16	9.09	13.40	11.95
95th-Percentile Queue Length [veh]	48.44	180.28	73.74	153.32	28.89	227.34	335.03	298.81

Intersection Level Of Service Report

Intersection 1: Merrydale Road / Southbound US-101 Ramps
All-way stop
HCM 2010
15 minutes
Level Of Service: F
Volume to Capacity (V/C): 1.582

Control Type:
Analysis Method:
Analysis Period:

Intersection Setup

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Approach	Northbound	Southbound	Westbound
Lane Configuration	IR	IR	IR
Turning Movement	Thru	Left	Left
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	800.00	115.00	100.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	Yes	Yes	Yes

Volumes

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Base Volume Input [veh/h]	215	215	233
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverted Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	215	215	233
Peak Hour Factor	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	54	54	58
Total Analysis Volume [veh/h]	215	215	233
Pedestrian Volume [ped/h]	1	0	9

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	543	962	486	521	451	531
Degree of Utilization, x	0.40	1.58	0.44	0.48	0.52	0.23

Movement, Approach, & Intersection Results

50th-Percentile Queue Length [veh]	1.88	51.29	2.24	2.60	2.89	0.65
95th-Percentile Queue Length [ft]	47.05	1282.25	55.95	64.90	72.34	21.57
Approach Delay [s/veh]		236.16		15.89		16.35
Approach LOS		F		C		C
Intersection Delay [s/veh]				145.88		
Intersection LOS				F		

Intersection Level Of Service Report

Intersection Level Of Service Report

Control Type: Signalized
Analysis Method: HCM 2010
Analysis Period: 15 minutes

Control Type: Signalized
Analysis Method: HCM 2010
Analysis Period: 15 minutes

Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh): 22.1
Level Of Service: C
Volume to Capacity (v/c): 0.761

Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh): 22.1
Level Of Service: C
Volume to Capacity (v/c): 0.761

Intersection Setup

Intersection Setup

Name	Merrydale Road Northbound	Merrydale Road Southbound	Southbound US-101 Ramps Westbound
Approach	IR	IR	IR
Lane Configuration	Thru Right Left	Thru Left Thru	Left Right
Turning Movement	12.00	12.00	12.00
Lane Width [ft]	0	1	0
No. of Lanes in Pocket	1	1	1
Pocket Length [ft]	100.00	100.00	100.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	Yes	Yes

Volumes

Volumes

Name	Merrydale Road Northbound	Merrydale Road Southbound	Southbound US-101 Ramps Westbound
Base Volume Input [veh/h]	215	962	251
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diversified Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	215	962	251
Peak Hour Factor	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	54	241	63
Total Analysis Volume [veh/h]	215	962	251
Presence of On-Street Parking	No	No	No
On-Street Parking Maneuver Rate [h]	0	0	0
Local Bus Stopping Rate [h]	0	0	0
Pedestrian Volume [ped/h]	0	0	0
Bicycle Volume [bicycles/h]	0	0	0

Phasing & Timing

Phasing & Timing

Control Type	Permissive	Overlap	Protected	Permissive	Permissive
Signal Group	2	4	1	5	4
Auxiliary Signal Groups		2.4			
Lead / Lag			Lead		Lag
Minimum Green [s]	5	5	5	5	5
Amber [s]	3.0	3.0	3.0	3.0	3.0
All red [s]	1.0	1.0	1.0	1.0	1.0
Split [s]	47	24	9	56	24
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0
Walk [s]	7	7	0	0	7
Pedestrian Clearance [s]	28	13	0	0	13
Rest in Walk	No			No	No
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0
Minimum Recall	No	No	No	No	No
Maximum Recall	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No
Detector Location [ft]	6.0	6.0	6.0	6.0	6.0
Detector Length [ft]	50.0	50.0	50.0	50.0	50.0
I, Upstream Flaring Factor	1.00	1.00	1.00	1.00	1.00

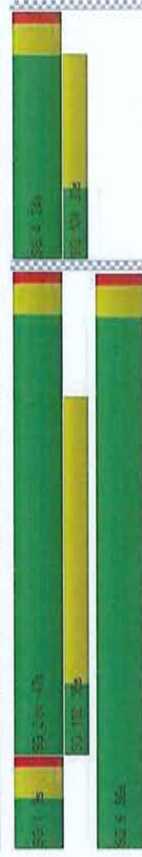
Exclusive Pedestrian Phase

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Movement, Approach, & Intersection Results						
d_M, Delay for Movement [s/veh]	21.96	22.69	39.33	10.66	18.87	17.42
Movement LOS	C	C	D	B	B	B
d_A, Approach Delay [s/veh]	22.56	23.89	18.37			
Approach LOS	C	C	C			
d_I, Intersection Delay [s/veh]				22.13		
Intersection LOS				C		
Intersection V/C				• 0.761		

Sequence									
Ring 1	1	2	4	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-



Lane Group Calculations									
C, Cycle Length [s]	80	80	80	80	80	80			
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00			
l, L, Permitted Start-Up Lost Time [s]	3.00	3.00	3.00	3.00	3.00	3.00			
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00			
g, L, Effective Green Time [s]	25	59	13	42	30	30			
g, I, C, Green / Cycle	0.74	0.74	0.16	0.53	0.37	0.37			
(V/s), Volume / Saturation Flow Rate	0.13	0.68	0.13	0.15	0.15	0.08			
s, saturation flow rate [veh/h]	1676	1416	1597	1676	1597	1425			
c, Capacity [veh/h]	530	1046	258	865	595	531			
d1, Uniform Delay [s]	21.46	8.53	32.48	10.49	18.45	17.20			
k, delay calibration	0.11	0.50	0.11	0.11	0.11	0.11			
l, Upstream Flaring Factor	1.00	1.00	1.00	1.00	1.00	1.00			
d2, Incremental Delay [s]	0.50	14.16	6.85	0.17	0.42	0.21			
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00			
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00			
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00			

Lane Group Results									
X, volume / capacity	0.41	0.92	0.83	0.28	0.39	0.23			
d, Delay for Lane Group [s/veh]	21.96	22.69	39.33	10.66	18.87	17.42			
Lane Group LOS	C	C	D	B	B	B			
Critical Lane Group	No	Yes	Yes	No	Yes	No			
50th-Percentile Queue Length [veh]	3.11	12.89	4.40	2.28	3.09	1.48			
50th-Percentile Queue Length [ft]	77.77	322.31	109.98	57.10	77.17	37.02			
95th-Percentile Queue Length [veh]	5.60	18.78	7.84	4.11	5.56	2.67			
95th-Percentile Queue Length [ft]	138.66	469.53	195.97	102.79	138.91	66.64			

Intersection Level Of Service Report

Control Type: Signalized
Analysis Method: HCM 2010
Analysis Period: 15 minutes
Intersection: Merrydale Road / North San Pedro Road
Delay (sec / veh): 23.5
Level Of Service: C
Volume to Capacity (v/c): 0.831

Intersection Setup

Name	Merrydale Road Northbound	Merrydale Road Southbound	North San Pedro Road Eastbound	North San Pedro Road Westbound
Approach	+	+	+	+
Lane Configuration	Thru Left Right	Thru Left Right	Thru Left Right	Thru Left Right
Turning Movement	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right
Lane Width [ft]	12.00 12.00 12.00	12.00 12.00 12.00	12.00 12.00 12.00	12.00 12.00 12.00
No. of Lanes in Pocket	0 0 0	0 0 1	1 0 0	0 0 1
Pocket Length [ft]	100.00 100.00 100.00	100.00 100.00 225.00	110.00 100.00 100.00	100.00 100.00 135.00
Speed [mph]	35.00	35.00	25.00	25.00
Grade [%]	0.00	0.00	0.00	0.00
Crosswalk	No	Yes	Yes	No

Volumes

Name	Merrydale Road Northbound	Merrydale Road Southbound	North San Pedro Road Eastbound	North San Pedro Road Westbound
Base Volume Input [veh/h]	15 28 33	361 8 126	106 150 8	25 348 1018
Base Volume Adjustment Factor	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000
Heavy Vehicles Percentage [%]	2.00 2.00 2.00	2.00 2.00 2.00	2.00 2.00 2.00	2.00 2.00 2.00
Growth Factor	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000
In-Process Volume [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Site-Generated Trips [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Diversified Trips [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Pass-by Trips [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Existing Site Adjustment Volume [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Other Volume [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Right-Turn on Red Volume [veh/h]	0 0 0	0 0 0	0 0 0	0 0 0
Total Hourly Volume [veh/h]	15 28 33	361 8 126	106 150 8	25 348 903
Peak Hour Factor	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000
Other Adjustment Factor	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000	1.0000 1.0000 1.0000
Total 15-Minute Volume [veh/h]	4 7 8	90 2 32	27 38 2	6 87 226
Total Analysis Volume [veh/h]	15 28 33	361 8 126	106 150 8	25 348 903
Presence of On-Street Parking	No	No	No	No
On-Street Parking Maneuver Rate [h]	0 0 0	0 0 0	0 0 0	0 0 0
Local Bus Stopping Rate [h]	0 0 0	0 0 0	0 0 0	0 0 0
Pedestrian Volume [ped/h]	0	0	0	0
Bicycle Volume [bicyclist/h]	4	0	0	0

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	133
Coordination Type	Time of Day Pattern Isolated
Activation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Protect	Permiss	Permiss	Permiss
Signal Group	0	0	0	0	0	0	0	0	0
Auxiliary Signal Groups	-	-	-	-	-	-	-	-	-
Lead / Lag	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	4	0	0	4	0	0	0	0
Maximum Green [s]	0	30	0	0	30	0	0	0	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Split [s]	0	20	0	0	39	0	29	74	45
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0
Walk [s]	0	5	0	0	7	0	5	6	11
Pedestrian Clearance [s]	0	10	0	0	13	0	10	0	12
Rest In Walk	No	No	No	No	No	No	No	No	No
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
Minimum Recall	No	No	No	No	No	No	No	No	No
Maximum Recall	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	C	C	L	R	C	C	C	C	R
C, Cycle Length [s]	65	65	65	65	65	65	65	65	65	65
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g, Effective Green Time [s]	4	16	16	5	33	24	24	24	24	24
g/C, Green / Cycle	0.06	0.25	0.25	0.08	0.51	0.37	0.37	0.37	0.37	0.37
(V/s), Volume / Saturation Flow Rate	0.04	0.21	0.08	0.08	0.09	0.20	0.31	0.31	0.29	0.29
s, saturation flow rate [veh/h]	1714	1776	1583	1774	1846	1832	1435	1577	1577	1577
c, Capacity [veh/h]	99	445	396	141	958	731	527	579	579	579
d1, Uniform Delay [s]	30.31	23.14	19.92	29.41	8.64	16.34	19.07	18.31	18.31	18.31
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.22	0.17	0.17	0.17
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	11.62	4.05	0.46	7.81	0.08	0.55	7.69	3.69	3.69	3.69
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pf, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

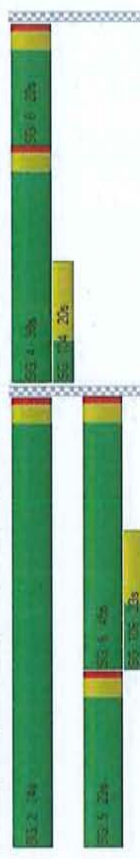
X, volume / capacity	0.77	0.83	0.32	0.75	0.17	0.51	0.66	0.78		
d, Delay for Lane Group [s/veh]	41.93	27.19	20.37	37.22	8.73	16.89	27.05	22.01		
Lane Group LOS	D	C	C	D	A	B	C	C		
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes	No		
50th-Percentile Queue Length [veh/m]	1.43	5.37	1.48	1.88	1.10	4.21	6.96	6.15		
50th-Percentile Queue Length [ft/m]	35.69	134.14	37.00	47.07	27.51	105.27	173.94	153.83		
95th-Percentile Queue Length [veh/m]	2.57	9.16	2.66	3.39	1.98	7.58	11.28	10.22		
95th-Percentile Queue Length [ft/m]	64.24	229.11	68.61	84.73	49.52	189.40	292.09	255.53		

Movement, Approach, & Intersection Results

d, M, Delay for Movement [s/veh]	41.93	41.93	41.93	27.19	27.19	27.19	20.37	37.22	8.73	16.89	16.89	24.53
Movement LOS	D	D	D	C	C	C	C	D	A	B	B	C
d, A, Approach Delay [s/veh]	41.93			25.45								
Approach LOS	D			C								C
d, I, Intersection Delay [s/veh]							23.46					
Intersection LOS							C					
Intersection V/C							0.831					

Sequence

Ring 1	2	-	4	8	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report

Intersection Level Of Service Report

Control Type: All-way stop
Analysis Method: HCM 2010
Analysis Period: 15 minutes

Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh): 146.5
Level Of Service: F
Volume to Capacity (v/c): 1.590

Intersection Setup		Merrydale Road		Southbound US-101 Ramps	
Name	Approach	Northbound	Southbound	Westbound	Eastbound
Lane Configuration		IR	IR	IR	IR
Turning Movement		Thru	Left	Thru	Right
Lane Width [ft]		12.00	12.00	12.00	12.00
No. of Lanes in Pocket		0	1	0	1
Pocket Length [ft]		500.00	115.00	500.00	225.00
Speed [mph]		30.00	30.00	30.00	30.00
Grade [%]		0.00	0.00	0.00	0.00
Crosswalk		Yes	Yes	Yes	Yes

Volumes		Merrydale Road		Southbound US-101 Ramps	
Name	Approach	Northbound	Southbound	Westbound	Eastbound
Base Volume Input [veh/h]		215	215	233	120
Base Volume Adjustment Factor		1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]		2.00	2.00	2.00	2.00
Growth Rate		1.00	1.00	1.00	1.00
In-Process Volume [veh/h]		0	0	0	0
Site-Generated Trips [veh/h]		3	6	0	1
Diverted Trips [veh/h]		0	0	0	0
Pass-by Trips [veh/h]		0	0	0	0
Existing Site Adjustment Volume [veh/h]		0	0	0	0
Other Volume [veh/h]		0	0	0	0
Total Hourly Volume [veh/h]		218	221	233	121
Peak Hour Factor		1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor		1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]		55	241	55	30
Total Analysis Volume [veh/h]		218	221	233	121
Pedestrian Volume [ped/h]		1	0	0	9

Intersection Settings

Lanes		Merrydale Road		Southbound US-101 Ramps	
Name	Approach	Northbound	Southbound	Westbound	Eastbound
Capacity per Entry Lane [veh/h]		540	540	520	528
Degree of Utilization, x		0.40	1.59	0.46	0.23

Movement, Approach, & Intersection Results

Movements		Merrydale Road		Southbound US-101 Ramps	
Name	Approach	Northbound	Southbound	Westbound	Eastbound
95th-Percentile Queue Length [veh]		1.84	51.59	2.35	2.91
95th-Percentile Queue Length [ft]		48.38	1289.78	58.70	72.71
Approach Delay [s/veh]		238.25	16.22	16.22	16.42
Approach LOS		F	C	C	C
Intersection Delay [s/veh]			146.47		
Intersection LOS			F		

Intersection Level Of Service Report

Control Type: Signalized
Analysis Method: HCM 2010
Analysis Period: 15 minutes

Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh): 22.1
Level Of Service: C
Volume to Capacity (v/c): 0.765

Intersection Setup

Name	Merrydale Road Northbound	Merrydale Road Southbound	Southbound US-101 Ramps Westbound
Approach	IR	IR	IR
Lane Configuration	Thru 12.00 0	Left 12.00 0	Left 12.00 0
Turning Movement	Thru 12.00 0	Left 12.00 0	Left 12.00 0
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	100.00	115.00	100.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	Yes	Yes

Volumes

Name	Merrydale Road Northbound	Merrydale Road Southbound	Southbound US-101 Ramps Westbound
Base Volume Input [veh/h]	215	215	233
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	3	6	0
Diverged Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	218	221	233
Peak Hour Factor	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	55	55	58
Total Analysis Volume [veh/h]	218	221	233
Presence of On-Street Parking	No	No	No
On-Street Parking Maneuver Rate [h]	0	0	0
Local Bus Stopping Rate [h]	0	0	0
Pedestrian Volume [ped/h]	0	0	0
Bicycle Volume [bicycles/h]	0	0	0

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Last time [s]	12.00

Phasing & Timing

Control Type	Permissive	Overlap	Protected	Permissive	Permissive
Signal Group	2	4	1	5	4
Auxiliary Signal Groups					
Lead / Lag		2.4	Lead		Lag
Minimum Green [s]	5	5	5	5	5
Maximum Green [s]	30	30	30	30	30
Amber [s]	3.0	3.0	3.0	3.0	3.0
All red [s]	1.0	1.0	1.0	1.0	1.0
Split [s]	45	24	11	56	24
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0
Walk [s]	7	8	8	0	7
Pedestrian Clearance [s]	28	13	0	0	13
Rest in Walk	No			No	No
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0
Minimum Recall	No	No	No	No	No
Maximum Recall	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No
Detector Location [ft]	6.0	6.0	6.0	6.0	6.0
Detector Length [ft]	50.0	50.0	50.0	50.0	50.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Intersection Level Of Service Report

Intersection 1: Merrydale Road / Southbound US-101 Ramps
Signalized
HCM 2010
15 minutes
Delay (sec / veh): 40.2
D
Level Of Service: D
Volume to Capacity (v/c): 0.823

Intersection Setup

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Approach	Northbound	Southbound	Westbound
Lane Configuration	IR	TL	TL
Turning Movement	Thru	Left	Left
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	100.00	100.00	100.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	No	Yes	Yes

Volumes

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Base Volume Input [veh/h]	1231	187	247
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0
Site-Generated Trips [veh/h]	0	0	0
Diverged Trips [veh/h]	0	0	0
Pass-by Trips [veh/h]	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	389	187	247
Peak Hour Factor	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	97	47	62
Total Analysis Volume [veh/h]	389	187	247
Presence of On-Street Parking	No	No	No
On-Street Parking Maneuver Rate [h]	0	0	0
Local Bus Stopping Rate [h]	0	0	0
Pedestrian Volume [ped/h]	0	0	0
Bicycle Volume [bicyclist/h]	0	0	0

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead/Green
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Permissive	Overlap	Protected	Permissive	Permissive
Signal Group	2	4	1	5	4
Auxiliary Signal Groups	-	-	-	-	-
Lead / Lag	-	-	Lead	-	Lag
Minimum Green [s]	5	5	5	5	5
Maximum Green [s]	30	30	30	30	30
Amber [s]	3.0	3.0	3.0	3.0	3.0
All red [s]	1.0	1.0	1.0	1.0	1.0
Split [s]	46	24	10	56	24
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0
Walk [s]	7	7	0	0	7
Pedestrian Clearance [s]	28	13	0	0	13
Rest in Walk	No	No	No	No	No
11. Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0
12. Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0
Minimum Recall	No	No	No	No	No
Maximum Recall	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No
Detector Location [ft]	6.0	6.0	6.0	6.0	6.0
Detector Length [ft]	50.0	50.0	50.0	50.0	50.0
1. Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	80	80	80	80	80	80
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00
H _{1,3} , Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
I ₂ , Clearance Lost Time [s]	2.00	0.00	2.00	2.00	2.00	2.00
G _{1,1} , Effective Green Time [s]	30	54	11	46	30	30
g/C, Green/Cycle	0.38	0.80	0.14	0.57	0.37	0.37
(N/V _s), Volume / Saturation Flow Rate %	0.23	0.88	0.12	0.15	0.15	0.09
S, saturation flow rate (veh/h)	1676	1424	1597	1676	1597	1425
c, Capacity [veh/h]	633	1140	227	955	596	532
d ₁ , Uniform Delay [s]	20.20	7.99	33.33	8.75	18.60	17.26
k, delay calibration	0.17	0.50	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d ₂ , Incremental Delay [s]	1.54	51.05	7.28	0.15	0.46	0.23
d ₃ , Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
R ₀ , platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

Same group resources					
X _i , volume / capacity d, delay for Lane Group [s/veh]	0.81 21.74	1.08 59.03	0.82 40.60	0.27 A	0.41 B
Lane Group LOS	C	F	D	A	B
Critical Lane Group	No	Yes	Yes	No	Yes
50th-Percentile Queue Length [veh/m]	5.63	25.05	3.86	2.07	3.30
50th-Percentile Queue Length [ft/m]	145.79	626.18	97.01	51.70	82.66
95th-Percentile Queue Length [veh/m]	9.79	35.58	6.98	3.72	5.94
95th-Percentile Queue Length [ft/m]	244.80	889.51	174.62	93.05	148.43
					70.71

Movement, Approach, & Intersection Results

d _A , Delay for Movement [s/veh]	21.74	59.03	40.60	8.90	19.06	17.49
Movement LOS	C	F	D	A	B	B
d _A , Approach Delay [s/veh]	50.08		22.25		18.53	
Approach LOS	D		C		B	
d _I , Intersection Delay [s/veh]			40.17			
Intersection LOS			D			
Intersection V/C			0.623			

Sequence

sequence	1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192	16384	32768	65536	131072	262144	524288	1048576	2097152	4194304	8388608	16777216	33554432	67108864	134217728	268435456	536870912	1073741824	2147483648	4294967296	8589934592	17179869184	34359738368	68719476736	137438953472	274877906944	549755813888	1099511627776	2199023255552	4398046511104	8796093022208	17592186044416	35184372088832	70368744177664	140737488355328	281474976710656	562949953421312	1125899906842624	2251799813685248	4503599627370496	9007199254740992	18014398509481984	36028797018963968	72057594037927936	144115188075855872	288230376151711744	576460752303423488	1152921504606846976	2305843009213693952	4611686018427387904	9223372036854775808	18446744073709551616	36893488147419103232	73786976294838206464	147573952589676412928	295147905179352825856	590295810358705651712	1180591620717411303424	2361183241434822606848	4722366482869645213696	9444732965739290427392	18889465931478580854784	37778931862957161709568	75557863725914323419136	151115727451828646838272	302231454903657293676544	604462909807314587353088	1208925819614629174706176	2417851639229258349412352	4835703278458516698824704	9671406556917033397649408	19342813113834066795298816	38685626227668133590597632	77371252455336267181195264	154742504910672534362390528	309485009821345068724781056	618970019642690137449562112	1237940039285380274899124224	2475880078570760549798248448	4951760157141521099596496896	9903520314283042199192993792	19807040628566084398385987584	39614081257132168796771975168	79228162514264337593543950336	158456325028528675187087900672	316912650057057350374175801344	633825300114114700748351602688	1267650600228229401496703205376	2535301200456458802993406410752	5070602400912917605986812821504	10141204801825835211973625643008	20282409603651670423947251286016	40564819207303340847894502572032	81129638414606681695789005144064	162259276829213363391578010288128	324518553658426726783156020576256	649037107316853453566312041152512	1298074214633706907132624082305024	2596148429267413814265248164610048	5192296858534827628530496329220096	10384593717069655257060992658440192	20769187434139310514121985316880384	41538374868278621028243970633760768	83076749736557242056487941267521536	166153499473114484112975882535043072	332306998946228968225951765070086144	664613997892457936451903530140172288	1329227995784915872903807060280344576	2658455991569831745807614120560689152	5316911983139663491615228241121378304	10633823966279326983230456482242756608	21267647932558653966460912964485513216	42535295865117307932921825928971026432	85070591730234615865843651857942052864	170141183460469231731687303715884105728	340282366920938463463374607431768211456	680564733841876926926749214863536422912	1361129467683753853853498429727072845824	2722258935367507707706996859454145691648	5444517870735015415413993718908291383296	10889035741470030830827987437816582766592	21778071482940061661655974875633165533184	43556142965880123323311949751266331066368	87112285931760246646623899502532662132736	174224571863520493293247799005065324265472	348449143727040986586495598010130648530944	696898287454081973172991196020261297061888	1393796574908163946345982392040522594123776	2787593149816327892691964784081045188247552	5575186299632655785383929568162090376495104	11150372599265311570767859136324180752990208	22300745198530623141535718272648361505
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Intersection Settings	
Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	133
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	18.00

Phasing & Timing										
Control Type	Signal group	Split	Split	Split	Split	Split	Protect	Permiss	Permiss	Permiss
Auxiliary Signal Groups		0	8	0	0	4	0	5	2	0
Lead / Lag		-	-	-	-	-	Lead	-	-	-
Minimum Green [s]		0	4	0	0	4	0	4	0	4
Maximum Green [s]		0	30	0	0	30	0	30	0	30
Amber [s]		0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
All red [s]		0.0	1.0	0.0	0.0	1.0	0.0	1.0	0.0	1.0
Split [s]		0	10	0	0	48	0	24	72	0
Vehicle Extension [s]		0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	3.0
Walk [s]		0	5	0	0	7	0	0	5	0
Pedestrian Clearance [s]		0	10	0	0	13	0	0	10	0
Rest in Walk		No	No	No	No	No	No	No	No	No
11, Start-Up Lost Time [s]		0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	2.0
12, Clearance Lost Time [s]		0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	2.0
Minimum Recall		No	No	No	No	No	No	No	No	No
Maximum Recall		No	No	No	No	No	No	No	No	No
Pedestrian Recall		No	No	No	No	No	No	No	No	No
Detector Location [ft]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1, Upstream Flaring Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Exclusive Pedestrian Phase										
Pedestrian Signal Group		0								
Pedestrian Walk [s]		0								
Pedestrian Clearance [s]		0								

Intersection Setup	
Name	Merrydale Road
Approach	Southbound
Lane Configuration	Left Thru Right
Turning Movement	Left Thru Right
Lane Width [ft]	12.00 12.00 12.00 12.00 12.00 12.00 12.00 12.00
No. of Lanes in Pocket	0 0 0 1 1 0 0 0
Pocket Length [ft]	100.00 100.00 100.00 100.00 100.00 100.00 100.00 100.00
Speed [mph]	35.00
Grade [%]	0.00
Crosswalk	No

Volumes	
Name	Merrydale Road
Base Volume Input [veh/h]	10 24 22 369 17 120 203 118 27 47 441 1332
Base Volume Adjustment Factor	1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
Heavy Vehicles Percentage [%]	2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00
Growth Rate	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
In-Process Volume [veh/h]	0 0 0 0 0 0 0 0 0 0 0 0
Site-Generated Trips [veh/h]	0 0 0 0 0 0 0 0 0 0 0 0
Diverted Trips [veh/h]	0 0 0 0 0 0 0 0 0 0 0 0
Pass-by Trips [veh/h]	0 0 0 0 0 0 0 0 0 0 0 0
Excluding Site Adjustment Volume [veh/h]	0 0 0 0 0 0 0 0 0 0 0 0
Other Volume [veh/h]	0 0 0 0 0 0 0 0 0 0 0 0
Right-Turn on Red Volume [veh/h]	0 0 0 0 0 0 0 0 0 0 0 0
Total Hourly Volume [veh/h]	10 24 22 369 17 120 203 118 27 47 441 1332
Peak Hour Factor	1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
Other Adjustment Factor	1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
Total 15-Minute Volume [veh/h]	3 6 6 92 4 30 51 30 7 12 110 283
Total Analysis Volume [veh/h]	10 24 22 369 17 120 203 118 27 47 441 1332
Presence of On-Street Parking	No
On-Street Parking Maneuver Rate [h]	0 0 0 0 0 0 0 0 0 0 0 0
Local Bus Stopping Rate [h]	0 0 0 0 0 0 0 0 0 0 0 0
Pedestrian Volume [ped/h]	0 0 0 0 0 0 0 0 0 0 0 0
Bicycle Volume [bicyclist/h]	0 0 0 0 0 0 0 0 0 0 0 0

Intersection Level Of Service Report	
Signalized	50.8
Analysis Method:	D
Analysis Period:	0.961
Level Of Service:	
Volume to Capacity [v/c]:	

Lane Group Calculations

Lane Group	C	C	C	R	L	C	C	C	R
C, Cycle Length [s]	81	81	81	81	81	81	81	81	81
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1, P, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g, Effective Green Time [s]	3	20	20	20	11	45	30	30	30
g / C, Green / Cycle	0.04	0.25	0.25	0.25	0.14	0.56	0.37	0.37	0.37
(V / S) Volume / Saturation Flow Rate	0.03	0.22	0.08	0.11	0.08	0.27	0.41	0.37	0.37
s, saturation flow rate [veh/h]	1728	1778	1561	1774	1765	1666	1393	1531	1531
c, Capacity [veh/h]	73	441	387	249	33.67	1008	720	517	568
d1, Uniform Delay [s]	38.28	28.18	24.74	24.9	8.45	21.70	25.39	25.35	25.35
k, delay calibration	0.11	0.15	0.11	0.11	0.11	0.25	0.50	0.45	0.45
l, Upstream Flaming Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	15.39	7.42	0.45	6.33	0.06	2.59	68.20	35.03	35.03
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.77	0.88	0.31	0.81	0.14	0.68	1.10	1.00	1.00
d, Delay for Lane Group [s/veh]	53.67	36.60	25.19	40.00	8.52	24.29	33.58	60.37	60.37
Lane Group LOS	D	D	C	D	A	C	F	E	E
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes	No	No
50th-Percentile Queue Length [veh]	1.37	7.68	1.84	4.24	1.15	8.10	19.18	15.79	15.79
50th-Percentile Queue Length [ft]	34.34	192.12	45.88	105.08	28.87	202.53	479.41	394.72	394.72
95th-Percentile Queue Length [veh]	2.47	12.23	3.30	7.62	2.06	12.77	27.99	22.31	22.31
95th-Percentile Queue Length [ft]	61.81	305.78	82.58	190.54	51.81	319.22	699.63	557.63	557.63

Movement, Approach, & Intersection Results

d, M, Delay for Movement [s/veh]	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67
Movement LOS	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
d, A, Approach Delay [s/veh]	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67	53.67
Approach LOS	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
d, I, Intersection Delay [s/veh]	50.80	50.80	50.80	50.80	50.80	50.80	50.80	50.80	50.80	50.80	50.80	50.80	50.80	50.80	50.80	50.80	50.80	50.80	50.80
Intersection LOS	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Intersection V/C	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961

Sequence

Ring 1	2	-	4	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level of Service Report

Intersection 1: Merrydale Road / Southbound US-101 Ramps

Control Type: All-way stop
Analysis Method: HCM 2010
Analysis Period: 15 minutes

261.6

F

2.070

Level Of Service:

Volume to Capacity (v/c):

Intersection Setup

Name	Merrydale Road	Southbound US-101 Ramps
Approach	Northbound	Southbound
Lane Configuration	IR	TR
Turning Movement	Thru	Left
Lane Width [ft]	12.00	12.00
No. of Lanes in Pocket	0	0
Pocket Length [ft]	100.00	100.00
Speed [mph]	30.00	30.00
Grade [%]	0.00	0.00
Crosswalk	Yes	Yes

Volumes

Name	Merrydale Road	Southbound US-101 Ramps
Base Volume Input [veh/h]	369	257
Base Volume Adjustment Factor	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00
Growth Factor	1.0000	1.0000
In-Process Volume [veh/h]	0	0
Site-Generated Trips [veh/h]	8	5
Diverted Trips [veh/h]	0	0
Pass-by Trips [veh/h]	0	0
Existing Site Adjustment Volume [veh/h]	0	0
Other Volume [veh/h]	0	0
Total Hourly Volume [veh/h]	367	262
Peak Hour Factor	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000
Total 15-Minute Volume [veh/h]	59	66
Total Analysis Volume [veh/h]	367	262
Pedestrian Volume [ped/h]	0	1

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	532	1231	483	485	440	515
Degree of Utilization, x	0.75	2.07	0.41	0.53	0.56	0.25

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	6.40	84.59	1.97	3.05	3.37	1.00
95th-Percentile Queue Length [ft]	160.03	2124.70	49.30	76.32	84.35	25.11
Approach Delay [s/veh]	368.04			15.98		17.83
Approach LOS	F			C		C
Intersection Delay [s/veh]				261.55		
Intersection LOS				F		

Intersection Level of Service Report

Control Type: Signalized
Analysis Method: HCM 2010
Analysis Period: 15 minutes
Intersection 1: Merrydale Road / Southbound US-101 Ramps
Delay (sec / veh): 40.2
Level of Service: D
Volume to Capacity (v/c): 0.824

Intersection Setup		Merrydale Road		Southbound US-101 Ramps	
Name	Approach	Northbound	Southbound	Left	Right
Lane Configuration		IR	IR	Left	Right
Turning Movement		Thru	Thru	Left	Right
Lane Width [ft]		12.00	12.00	12.00	12.00
No. of Lanes in Pocket		0	1	0	1
Pocket Length [ft]		100.00	115.00	100.00	225.00
Speed [mph]		30.00	30.00		30.00
Grade [%]		0.00	0.00		0.00
Crosswalk		No	Yes		Yes

Volumes		Merrydale Road		Southbound US-101 Ramps	
Base Volume Input [veh/h]		389	187	247	127
Base Volume Adjustment Factor		1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]		2.00	2.00	2.00	2.00
Growth Factor		1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]		0	0	0	0
Site-Saturated TIPS [veh/h]		8	3	5	4
Diverged TIPS [veh/h]		0	0	0	0
Pass-by TIPS [veh/h]		0	0	0	0
Existing Site Adjustment Volume [veh/h]		0	0	0	0
Other Volume [veh/h]		0	0	0	0
Right-Turn on Red Volume [veh/h]		0	0	0	0
Total Hourly Volume [veh/h]		387	190	247	131
Peak Hour Factor		1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor		1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]		99	46	62	33
Total Analysis Volume [veh/h]		387	190	247	131
Presence of On-Street Parking		No	No	No	No
On-Street Parking Maneuver Rate [h]		0	0	0	0
Local Bus Stopping Rate [h]		0	0	0	0
Pedestrian Volume [ped/h]		0	0	0	1
Bicyclist Volume [bicyclist/h]		0	0	0	0

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Permissive	Overlap	Protected	Permissive	Permissive
Signal Group	2	4	1	6	4
Auxiliary Signal Groups	-	2.4	Lead	-	Lag
Lead / Lag	5	5	5	5	5
Minimum Green [s]	30	30	30	30	30
Maximum Green [s]	3.0	3.0	3.0	3.0	3.0
Amber [s]	1.0	1.0	1.0	1.0	1.0
All red [s]	4.3	24	11	54	24
Split [s]	3.0	3.0	3.0	3.0	3.0
Vehicle Extension [s]	7	7	0	0	7
Walk [s]	28	13	0	0	13
Pedestrian Clearance [s]	No	No	No	No	No
Rest in Walk	2.0	2.0	2.0	2.0	2.0
IT, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0
IT, Clearance Lost Time [s]	No	No	No	No	No
Minimum Recall	No	No	No	No	No
Maximum Recall	No	No	No	No	No
Pedestrian Recall	6.0	6.0	6.0	6.0	6.0
Detector Location [ft]	50.0	50.0	50.0	50.0	50.0
Detector Length [ft]	1.00	1.00	1.00	1.00	1.00
Upstream Filtering Factor	0	0	0	0	0

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Intersection Level of Service Report

Signalized
HCM 2010
Analysis Method:
Analysis Period:
15 minutes

Intersection 2: Merrydale Road / North San Pedro Road
Delay (sec / veh):
Level of Service:
Volume to Capacity (v/c):

52.7
D
0.667

Intersection Setup

Name	Merrydale Road	Merrydale Road	North San Pedro Road	North San Pedro Road
Approach	Northbound	Southbound	Eastbound	Westbound
Lane Configuration	+	+	+	+
Turning Movement	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right
Lane Width [ft]	12.00 12.00 12.00	12.00 12.00 12.00	12.00 12.00 12.00	12.00 12.00 12.00
No. of Lanes in Pocket	0 0 0	0 0 1	1 0 0	0 0 1
Pocket Length [ft]	100.00 100.00 100.00	100.00 100.00 100.00	100.00 100.00 100.00	100.00 100.00 100.00
Speed [mph]	35.00	35.00	25.00	25.00
Grade [%]	0.00	0.00	0.00	0.00
Crosswalk	No	Yes	Yes	No

Volumes

Name	Merrydale Road	Merrydale Road	North San Pedro Road	North San Pedro Road
Base Volume Input [veh/h]	10 24 22 369	17 120 1000 10000	203 118 27 47	1352 441 1352
Base Volume Adjustment Factor	1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000
Heavy Vehicles Percentage [%]	2.00 2.00 2.00 2.00	2.00 2.00 2.00 2.00	2.00 2.00 2.00 2.00	2.00 2.00 2.00 2.00
Growth Factor	1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000
In-Process Volume [veh/h]	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
Site-Generated Trips [veh/h]	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
Diverted Trips [veh/h]	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
Pass-by Trips [veh/h]	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
Existing Site Adjustment Volume [veh/h]	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
Other Volume [veh/h]	0 0 0 0	0 0 0 0	0 0 0 0	0 259
Right-Turn on Red Volume [veh/h]	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
Total Hourly Volume [veh/h]	10 24 22 373	17 121 1000 10000	205 118 27 47	1359 441 1359
Peak Hour Factor	1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000
Other Adjustment Factor	1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 1.0000
Total 15-Minute Volume [veh/h]	3 6 6 93	4 30 51 30	7 12 110 285	1139 441 1139
Total Analysis Volume [veh/h]	10 24 22 373	17 121 1000 10000	205 118 27 47	1359 441 1359
Presence of On-Street Parking	No	No	No	No
On-Street Parking Maneuver Rate [h]	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
Local Bus Stopping Rate [h]	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
Pedestrian Volume [ped/h]	0 0 0 0	7 0 0 0	8 0 0 0	0 0 0 0
Bicycle Volume [bicydes/h]	0 0 0 0	2 0 0 0	2 0 0 0	4 0 0 0

Intersection Settings

Located In CBD
Signal Coordination Group
Cycle Length [s]
Coordination Type
Actuation Type
Offset [s]
Offset Reference
Permissive Mode
Lost time [s]

No
133
Time of Day Pattern Isolated
Fully actuated
0.0
LeadGreen
SingleBand
16.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss
Signal Group	0	8	0	0	4	0	0	0	0	2	0	0	6
Auxiliary Signal Groups	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	4	0	0	4	0	4	0	0	4	0	0	4
Maximum Green [s]	0	30	0	0	30	0	30	0	0	30	0	0	30
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0
Split [s]	0	10	0	0	48	0	24	0	0	72	0	0	51
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0
Walk [s]	0	5	0	0	7	0	0	0	0	5	0	0	11
Pedestrian Clearance [s]	0	10	0	0	13	0	10	0	0	10	0	0	12
Rest In Walk	No	No	No	No	No	No	No	No	No	No	No	No	No
11, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0
12, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0
Minimum Recall	No	No	No	No	No	No	No	No	No	No	No	No	No
Maximum Recall	No	No	No	No	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No	No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Movement, Approach, & Intersection Results

$d_{M,1}$ Delay for Movement [s/veh]	53.87	53.87	53.87	37.05	37.05	23.21	40.17	8.81	8.81	24.65	80.30
Movement LOS	D	D	D	C	C	D	D	A	A	C	F
$d_{A,1}$ Approach Delay [s/veh]	53.87	53.87	34.24								
Approach LOS	D	D	C								
$d_{I,1}$ Intersection Delay [s/veh]	52.74	52.74									
Intersection LOS	D	D									
Intersection V/C			0.957								

Sequence

	sequences			
Ring 1	2	-	4	8
Ring 2	5	-	-	-
Ring 3	-	-	-	-
Ring 4	-	-	-	-



Free Group Calculations

[illegible]

Large Group Results

Lane group results									
X, volume / capacity	0.77	0.68	0.31	0.82	0.14	0.68	1.11	1.01	
d, Delay for Lane Group [s/veh]	53.87	37.05	25.21	40.17	8.51	24.65	98.08	63.73	
Lane Group LOS	D	D	C	D	A	C	F	F	
Critical Lane Group	Yes	Yes	No	Yes	No	No	No	No	
50th-Percentile Queue Length [veh/m]	1.38	7.85	1.85	4.31	1.16	8.20	19.75	16.31	
50th-Percentile Queue Length [ft/m]	34.51	193.26	46.43	107.74	29.00	204.97	493.77	407.81	
95th-Percentile Queue Length [veh/m]	2.48	12.45	3.34	7.71	2.09	12.86	28.89	23.06	
95th-Percentile Queue Length [ft/m]	62.11	311.14	83.58	192.85	52.15	322.37	722.46	576.50	

Intersection Level Of Service Report

Signalized
HCM 2010
Analysis Method:
Analysis Period:
15 minutes

Delay (sec / veh):
Level Of Service:
Volume to Capacity (V/C):

23.8
C
0.833

Intersection Setup

Name	Merrydale Road	Merrydale Road	North San Pedro Road	North San Pedro Road
Approach	Northbound	Southbound	Eastbound	Westbound
Lane Configuration				
Turning Movement	Left 12.00 0 100.00	Thru 12.00 0 100.00	Right 12.00 0 100.00	Left 12.00 0 100.00
Lane Width [m]	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0
Pocket Length [m]	100.00	100.00	100.00	100.00
Speed [mph]	35.00	35.00	25.00	25.00
Grade [%]	0.00	0.00	0.00	0.00
Crosswalk	No	Yes	Yes	No

Volumes

Name	Merrydale Road	Merrydale Road	North San Pedro Road	North San Pedro Road
Base Volume Input [veh/h]	15	28	33	361
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0
Site-Generated Time [veh/h]	0	0	0	0
Diverted Time [veh/h]	0	0	0	0
Pass-by Time [veh/h]	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0
Other Volume [veh/h]	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0
Total Hourly Volume [veh/h]	15	28	33	368
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	7	8	92
Total Analysis Volume [veh/h]	15	28	33	368
Presence of On-Street Parking	No	No	No	No
On-Street Parking Maneuver Rate [h]	0	0	0	0
Local Bus Stopping Rate [h]	0	0	0	0
Pedestrian Volume [ped/h]	0	0	0	0
Bicycle Volume [bicyde/h]	4	0	0	0

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	133
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Protect	Permiss	Permiss	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	0
Auxiliary Signal Groups	-	-	-	-	-	-	-	-	-	-
Lead / Lag	-	-	-	-	-	Lead	-	-	-	-
Minimum Green [s]	0	4	0	0	4	0	4	0	0	4
Maximum Green [s]	0	30	0	0	30	0	30	0	0	30
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	0.0	3.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	1.0
Split [s]	0	20	0	0	39	0	29	74	0	45
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	0.0	0.0	3.0
Walk [s]	0	5	0	0	7	0	0	5	0	11
Pedestrian Clearance [s]	0	10	0	0	13	0	0	10	0	12
Rest in Walk	No	No	No	No	No	No	No	No	No	No
11. Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	2.0
12. Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	2.0
Minimum Recall	No	No	No	No	No	No	No	No	No	No
Maximum Recall	No	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No	No
Detector Location [m]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [m]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Movement, Approach, & Intersection Results

	D	D	D	D	C	C	A	B	C
d _M , Delay for Movement [s/veh]	42.24	42.24	42.24	27.45	20.48	37.45	8.62	17.08	25.02
Intersection LOS									
d _A , Approach Delay [s/veh]	42.24	42.24	25.69			20.38			22.71
Approach LOS									
d _I , Intersection Delay [s/veh]					23.82				
Intersection LOS					C				
Intersection V/C					0.833				

Sequence

[illegible]

Lane Group Calculations

Lane Group Calculations						
Cycle Length [s]	C	R	L	C	C	R
Total Lost Time per Cycle [s]	66	66	66	66	66	66
Cycle Length [s]	4.00	4.00	4.00	4.00	4.00	4.00
L _p , Permitted Start-Up Loss Time [s]	0.00	0.00	0.00	0.00	2.00	0.00
I _{T,p} , Permitted Start-Up Loss Time [s]	0.00	0.00	0.00	0.00	2.00	0.00
I _{T,s} , Clearance Last Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
I _s , Clearance Last Time [s]	2.00	2.00	2.00	2.00	2.00	2.00
G.L., Effective Green Time [s]	4	17	17	5	33	24
G.C., Green/Cycle	0.06	0.25	0.25	0.08	0.51	0.37
(N/g), Volume / Saturation Flow Rate	0.04	0.21	0.08	0.06	0.09	0.20
S, saturation flow rate [veh/h]	1714	Volume	1583	1774	1849	1832
C, Capacity [veh/h]	69	448	400	442	937	730
d _i , Uniform Delay [s]	30.62	23.33	20.03	29.68	8.74	16.53
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11
I _p , Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	11.61	4.13	0.45	7.77	0.08	0.55
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rq, Redout ratio	1.00	1.00	1.00	1.00	1.00	1.00
PFS, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

Queue Group	X, volume / capacity	0.77	0.83	0.32	0.75	0.17	0.51	0.66	0.78
d, Delay for Lane Group [s/veh]	42.24	27.48	27.48	20.48	37.45	8.82	17.08	27.65	22.49
Lane Group LOS	D	C	C	D	A	B	C	C	C
Critical Lane Group	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes
50th-Percentile Queue Length [veh/m]	1.44	5.51	5.51	1.52	1.12	4.27	7.11	6.28	6.28
50th-Percentile Queue Length [m/m]	36.04	137.79	37.67	47.95	27.53	106.73	177.75	156.91	156.91
90th-Percentile Queue Length [veh/m]	2.59	9.36	2.71	3.45	2.01	7.66	11.48	10.39	10.39
90th-Percentile Queue Length [m/m]	64.87	234.05	67.80	86.31	50.27	191.44	287.07	256.63	256.63

Intersection Level of Service Report
All-way stop
HCM 2010
15 minutes

Control Type: 260.8
Analysis Method: F
Analysis Period: 2.060

Intersection Setup

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Approach	Northbound	Southbound	Westbound
Lane Configuration	IR	IR	IR
Turning Movement	Thru	Left	Left
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	100.00	115.00	100.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	Yes	Yes	Yes

Volumes

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Base Volume Input [veh/h]	369	187	247
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Time [veh/h]	0	0	0
Diverged Time [veh/h]	0	0	0
Pass-by Time [veh/h]	0	0	0
Excluding Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	369	187	247
Peak Hour Factor	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	97	47	62
Total Analysis Volume [veh/h]	369	187	247
Pedestrian Volume [ped/h]	0	0	1

Intersection Level of Service Report
All-way stop
HCM 2010
15 minutes

Control Type: 260.8
Analysis Method: F
Analysis Period: 2.060

Intersection Setup

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Approach	Northbound	Southbound	Westbound
Lane Configuration	IR	IR	IR
Turning Movement	Thru	Left	Left
Lane Width [ft]	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0
Pocket Length [ft]	100.00	115.00	100.00
Speed [mph]	30.00	30.00	30.00
Grade [%]	0.00	0.00	0.00
Crosswalk	Yes	Yes	Yes

Volumes

Name	Merrydale Road	Merrydale Road	Southbound US-101 Ramps
Base Volume Input [veh/h]	369	187	247
Base Volume Adjustment Factor	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0
Site-Generated Time [veh/h]	0	0	0
Diverged Time [veh/h]	0	0	0
Pass-by Time [veh/h]	0	0	0
Excluding Site Adjustment Volume [veh/h]	0	0	0
Other Volume [veh/h]	0	0	0
Total Hourly Volume [veh/h]	369	187	247
Peak Hour Factor	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	97	47	62
Total Analysis Volume [veh/h]	369	187	247
Pedestrian Volume [ped/h]	0	0	1

Intersection Settings

Lanes	Capacity per Entry Lane [veh/h]	535	1231	465	496	441	516
Degree of Utilization, x	0.73	2.06	0.40	0.52	0.56	0.25	0.25

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	6.03	84.63	1.91	2.93	3.35	0.96	0.96
95th-Percentile Queue Length [ft]	150.76	2115.84	47.84	73.21	83.85	24.00	24.00
Approach Delay [s/veh]		383.88	16.65		17.76		
Approach LOS		F	C		C		
Intersection Delay [s/veh]			260.84				
Intersection LOS			F				

