Traffic Impact Study for the Petaluma Riverfront Project

Prepared for the

City of Petaluma

Submitted by

Whitlock & Weinberger Transportation, Inc.

490 Mendocino Avenue
Suite 201
Santa Rosa, CA 95401

voice 707.542.9500

475 14th Street
Suite 290
Oakland, CA 94612

voice 510.444.2600

web www.w-trans.com

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Balancing Functionality and Livability
Traffic Engineering • Transportation Planning

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Executive Summary

The proposed Riverfront mixed-use project will be located at 500 Hopper Street in Petaluma, bounded by the SMART rail corridor on the north, Petaluma River on the south, US 101 on the east, and industrial uses to the west. The site is currently vacant. The project is expected to generate an average of 4,958 daily vehicle trips, including 373 during the a.m. peak hour and 430 during the p.m. peak hour.

Vehicle operations were studied for the five signalized intersections along Lakeville Street – Lakeville Highway between East Washington Street and the US 101 northbound ramps, the intersection at Hopper Street/Caulfield Lane, and at six new intersections created within the project site. It was determined that under existing conditions the study intersections all operate acceptably and will continue to do so with the addition of project generated traffic. Under Baseline conditions, which includes traffic associated with approved (but not yet constructed) projects in the City, all intersections would be expected to operate acceptably with the exception of Lakeville Street/D Street, which is projected to operate at LOS E both with and without the Riverfront project.

Two intersections are projected to operate unacceptably in the future with buildout of the City's General Plan. The intersections at Lakeville Street/D Street and Lakeville Street/Caulfield Lane are projected to operate unacceptably in the LOS E/F range. These results are consistent with the City's General Plan and associated EIR, which adopted overriding considerations for these two intersections, finding that capacity improvements would be inconsistent with goals supporting multimodal circulation in Central Petaluma. Development of a mixed-use project at the Riverfront project site was included in the General Plan's traffic projections. While LOS F operation at Lakeville Street/Caulfield Lane is projected in the future, it is recommended that the Riverfront development be responsible for constructing several improvements in order to improve capacity and safety at the intersection. These improvements include lengthening the westbound left turn pocket to approximately 250 feet in order to reduce the occurrence of spillover blockages into adjacent through lanes, and the installation of a raised median on the westbound approach to physically prohibit illegal left turn movements into and out of adjacent properties, thereby improving safety.

In the future with development of the Riverfront project and completion of the General Plan's "southern crossing" extension of Caulfield Lane through the project site and over the Petaluma River to Petaluma Boulevard South, the intersection at Hopper Street/Caulfield Lane would be expected to operate unacceptably at LOS F in its current configuration. Signalization of the intersection and the addition of a northbound left turn pocket on the Caulfield Lane extension would improve operation to LOS C. These improvements are not included as part of the Riverfront project but should be constructed once Caulfield Lane is extended over the Petaluma River.

Segments of US 101 to the north and south of Lakeville Highway are anticipated to operate at LOS E/F during the existing, baseline, and future p.m. peak hours. The Riverfront project would contribute traffic to the freeway, though in each time period would result in changes to the volume-to-capacity ratio of less than 0.01, which is considered to be less-than-significant.

Vehicle queues on northbound Caulfield Lane at the Lakeville Street intersection are projected to remain within the available 500 feet of storage under existing and baseline conditions both with and without the Riverfront project. Under future conditions with buildout of the General Plan and completion of the "southern crossing" extension of Caulfield Lane over the Petaluma River, maximum queues are projected to extend beyond the SMART rail crossing. These queues are projected to occur both without and with the Riverfront project. These queues could be reduced by adding a "queue cutter" signal and advance detection at the Lakeville Street/Caulfield Lane intersection. This type of signal would detect vehicle queues before they extend across the railroad, and trigger the Lakeville

Street/Caulfield Lane signal controller to give a green indication to traffic on northbound Caulfield Lane, clearing queues before they extend across the tracks.

The project includes a network of pedestrian facilities that is consistent with the Central Petaluma Specific Plan and City requirements, and would effectively tie into the regional pedestrian network and transit services. Through provision of a network of new minor streets and connections to the existing and planned regional bicycle network, the project also accommodates and supports bicycle travel. As development plans are generated for the project, bicycle parking and bike lockers should be incorporated into the retail, employment, and mixed-use areas of the project to further support and encourage bicycle travel.

The onsite vehicular circulation network is projected to operate acceptably into the future. Adequate intersection sight distances appear to be achievable given the street geometries and recommended traffic controls, though should be confirmed during the future design of buildings and landscaping. The one-way counterclockwise loop street located within the core of the project's mixed-use area would be expected to function acceptably as long as stop controls are located on entering side streets (rather than on approaches within the circle itself).

The Riverfront project currently has one access point through the intersection of Lakeville Street/Caulfield Lane. An additional access point will be created in the future upon construction of a bridge over the Petaluma River and extension of Caulfield Lane to Petaluma Boulevard South. The Riverfront project proposes to construct and utilize an emergency vehicle access (EVA) that connects the current one-way southbound portion of Hopper Street along the west side of SMART to a point on D Street approximately 100 feet west of the railroad tracks. The EVA would be for use only during an emergency or evacuation. Construction of this EVA by the Riverfront project has been evaluated by the City's Fire Department, Public Works Department, and Planning Department, and was found to be acceptable and consistent with life safety fire codes by an independent third-party review conducted by HolmesFire. The EVA is therefore considered to be an acceptable interim solution until such time that a bridge over the Petaluma River is completed in the future.

Introduction

This report presents an analysis of the potential traffic impacts that would be associated with development of a proposed mixed use project on approximately 40 acres located at 500 Hopper Street in the City of Petaluma. The proposed project includes development of a variety of residential housing types (single family residences, apartments, townhomes, and live/work units), as well as a hotel, mixed use commercial space, office space, parks, and a central green. The traffic study was completed in accordance with the criteria established by the City of Petaluma, and is consistent with standard traffic engineering techniques.

Prelude

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

Project Profile

The proposed project will include the development of 60,000 square feet of office space; 37 townhouse units, including six units designated as live/work spaces; a 120-room hotel; 30,000 square feet of mixed use commercial development with 100 apartment units; 135 single family residential units; and approximately 6.2 acres of parks including a 0.38-acre central green, 2.14-acre active park, and 3.67-acre river park. The project includes a series of interconnected internal roadways that would provide access to the various project components and that would connect to the surrounding street network via Hopper Street and Caulfield Lane. A series of future roadway connections would be provided via an additional extension of Caulfield Lane and/or a southern crossing of the Petaluma River. The project would include a full sidewalk network, as well as multi-use pathways on the entire periphery of the site including along the Petaluma River. An offsite emergency vehicle only access point would also be established between D Street and the northernmost terminus of Hopper Street.

The project site is located south of Lakeville Street. The approximately 40-acre site is bounded by the Petaluma River on the south, US 101 to the east, the SMART railroad corridor to the north, and the proposed extension of Caulfield Lane to the west, as shown in Figure 1.

Traffic Impact Study for the Petaluma Riverfront Project

City of Petaluma

Figure 1

Study Area and Lane Configurations

Operational Analysis

Study Area and Periods

The study area consists of the following intersections:

1. Lakeville Street/East Washington Street
2. Lakeville Street/D Street
3. Lakeville Highway/Caulfield Lane
4. Lakeville Highway/US 101 South Ramps
5. Lakeville Highway/US 101 North Ramps
6. Hopper Street/Caulfield Lane

The study area also includes six new intersections to be created within the development, and operation on US 101 between Lakeville Highway and adjacent interchanges to the north and south was also analyzed.

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

Lakeville Street/East Washington Street is a four-legged signalized intersection with protective-permissive left-turn phasing on Washington Street and northbound Lakeville Street, and permitted phasing used on the southbound single-lane Lakeville Street approach. The SMART/Northwest Pacific Railroad tracks run parallel to and along the west side of Lakeville Street and pass through the western leg of the intersection. Railroad signal infrastructure and crossing arms are located across the western leg of the intersection. Marked crosswalks and pedestrian signals are provided across all four legs, with a median island/pedestrian refuge on the western leg of the intersection. High visibility crosswalk markings are provided on the intersection's west and north legs. A "pork chop" island exists on the westbound approach from Washington Street, creating a free right-turn from westbound Washington Street to northbound Lakeville Street.

Lakeville Street/D Street is a four-legged signalized intersection with protected left-turn phasing on the northbound Lakeville Street approach, permitted left-turn phasing on the southbound approach, and split phasing on the D Street approaches. The SMART/Northwest Pacific Railroad tracks run parallel to and along the southwest side of Lakeville Street and pass through the western leg of the intersection. Railroad signal infrastructure and crossing arms are located across the intersection's eastern and western legs. Marked crosswalks and pedestrian signals are provided for all four legs of the intersection.

Lakeville Street/Caulfield Lane is a four-legged signalized intersection with split phasing on the Caulfield Lane approaches, and protected left-turn phasing on Lakeville Street. Pedestrian crosswalks and signals are provided on the north, south, and west legs of the intersection.

Lakeville Highway/US 101 South Ramps is a four-legged signalized intersection with protected left-turn phasing on Lakeville Highway, and split phasing on the US 101 offramp approach and the driveway

approach which forms the southern leg of the intersection. Pedestrian crossings and signals are provided on the north, south, and west intersection legs.

Lakeville Highway/US 101 North Ramps is a three-legged signalized intersection with protected left-turn phasing on Lakeville Highway. A crosswalk and associated pedestrian signal heads exist on the west leg of the intersection.

Hopper Street/Caulfield Lane is a four-legged intersection with stop controls on the eastbound and westbound Hopper Street approaches as well as on the Petaluma Water Pollution Control Plant driveway which forms the southern or fourth leg of the intersection opposite Caulfield Lane. The SMART/Northwest Pacific Railroad tracks run parallel to and along the north side of Hopper Street and pass through the northern leg of the intersection. Pedestrian crosswalks and curb ramps exist on both Hopper Lane approaches.

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 for which records were available at the time of the analysis was April 1, 2005, through March 31, 2010.

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 *2007 Accident Data on California State Highways*, California Department of Transportation (Caltrans). The Lakeville Street/East Washington Street intersection has a calculated collision rate that is significantly higher than the statewide average, although injury and fatality rates for this intersection are lower than the statewide averages for similar facilities. A recently completed citywide study of protective-permissive left-turns recommended converting the signal operations at the Lakeville Street/East Washington Street intersection to protected left-turn phasing in order to help reduce left-turn collisions at the intersection. The Lakeville Street/D Street intersection also has a collision rate that is slightly higher than the statewide average. The predominant collision type for this intersection was a "rear end" collision attributed to unsafe speeds. The collision rates for all other study intersections are below the statewide average collision rates for similar types of intersections, indicating that they are operating acceptably. The Hopper Avenue/ Caulfield Lane intersection was recently constructed and opened; no collisions were reported for the intersection during the review period, and City Staff has confirmed that no reported collisions have occurred since its opening.

Table 1
Collision Rates at the Study Intersections

Study Intersection	Number of Collisions (April 2005-March 2010)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Lakeville St/East Washington St	50	0.97	0.43
2. Lakeville St/D St	24	0.59	0.43
3. Lakeville Hwy/Caulfield Ln	13	0.32	0.43
4. Lakeville Hwy/US 101 S Ramps	10	0.20	0.28
5. Lakeville Hwy/US 101 N Ramps	10	0.17	0.28
6. Hopper Ave/Caulfield Ln	0	-	-

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, pedestrian facilities are built-out along the Lakeville Street and Caulfield Lane corridors. Existing facilities to the north of the SMART corridor provide access to nearby commercial destinations and transit stops, as well as destinations in the downtown area and on the east side of US 101. High volumes of traffic on Lakeville Street-Lakeville Highway present real and perceived conflicts for pedestrians.

Continuous sidewalks are provided along both sides of Lakeville Street-Lakeville Highway between Washington Street and the US 101 South Ramps; sidewalks extend under US 101 on the north side of Lakeville Highway. Continuous sidewalks are provided along both side of Caulfield Lane between Hopper Street and Payran Street, and sidewalks extend over US 101 on the north side of the Caulfield Lane overpass. Intermittent sidewalk coverage is provided along the frontage of improved properties on Hopper Street. Near the northern end of Hopper Street, a multi-use pathway connects Hopper Street to D Street and the Copeland Transit Mall/SMART station area. Street lights are provided on Lakeville Street-Highway and Caulfield Lane. Sidewalks in the study area generally range between four and eight feet wide. Crosswalks and curb ramps are provided at most intersections in the study area; however, in general existing curb ramps throughout the study area do not appear to meet current ADA standards. Pedestrian signals are provided at signalized intersections, and many crosswalks are marked with high-visibility treatments.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2006, classifies bikeways into three categories:

- *Class I Multi-Use Path*: a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.

- *Class II Bike Lane*: a striped and signed lane for one-way bike travel on a street or highway.

- *Class III Bike Route*: signing only for shared use with motor vehicles within the same travel lane on a street or highway.

In the project area, Class II bike lanes exist on Caulfield Lane and on Lakeville Street to the west of US 101. To the east of US 101 on Lakeville Highway, which is a Caltrans facility (SR 116), striped shoulders that provide a space for bicyclists to travel are provided, though the facility is not marked and signed as a bike lane. 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 City of Petaluma *2008 Bicycle and Pedestrian Master Plan*.

Table 2
Bicycle Facility Summary

Status Facility	Class	Length (miles)	Begin Point	End Point
Existing				
Lakeville St	II	0. 90	SB US 101 Ramps	Washington St
Caulfield Ln	II	1.42	Ely Blvd S	Hopper St
Planned				
Petaluma River Trail (North side of River)	I	1.40	Hopper Ave/Jefferson St	SMART/NWP Rail Line "Haystack" Bridge
Petaluma River Trail (South side of River)	I	0.40	Chetwood Dr	SMART/NWP Rail Line "Haystack" Bridge
SMART Multi-Use Pathway	I	1.00	Hopper/Jefferson St	Baywood Dr
River Trail Connector 1 (along western project boundary)	I	0.30	SMART Path	Petaluma River Trail
River Trail Connector 2 (along eastern project boundary)	I	0.30	SMART Path	Petaluma River Trail
Caulfield Lane Extension	II	0.60	Hopper Ave	Petaluma Blvd S

Source: *City of Petaluma Bicycle and Pedestrian Plan*

Transit Facilities

Petaluma Transit provides fixed-route bus service in the City of Petaluma. Route 24 provides loop service to destinations throughout the southern and eastern parts of the City including stops on Lakeville Street at Caulfield Lane in the vicinity of the proposed project, and service to the Copeland Transit Mall. Route 24 operates weekdays from approximately 7:00 a.m. to 6:00 p.m. with one-hour headways. Transit stops are located in the vicinity of the project on Lakeville Street adjacent to Caulfield Lane.

Sonoma County Transit (SCT) provides intercity service between Petaluma and outlying communities. SCT Route 40 provides weekday service between Petaluma and the City of Sonoma during the morning and evening commute periods with approximately 90-minute headways. SCT Route 40 stops on Lakeville Street adjacent to Caulfield Lane in the vicinity of the proposed project, as well as at the Lakeville Highway Park and Ride lot and the Copeland Transit Mall.

Golden Gate Transit (GGT) provides regional service between Petaluma and San Francisco. GGT Route 76 provides weekday service along US 101 during the morning and evening commute periods with approximately 30-minute headways. In the vicinity of the proposed project, GGT Route 76 stops at various locations along Lakeville Highway including the Lakeville Highway Park and Ride.

At least two bicycles can be carried on busses operated by each of the transit providers operating in the project area. Bike rack space is on a first come, first served basis. Additional bicycles are generally allowed on buses at the discretion of the driver.

Dial-a-ride, also known as paratransit, or door-to-door service, is available for those who are unable to independently use the transit system due to a physical or mental disability. Petaluma Paratransit is designed to serve the needs of individuals with disabilities within the City and the greater Petaluma area. Trips can be reserved for travel Monday through Friday, 6:20 a.m. to 6:45 p.m., and Saturday, 7:20 a.m. to 5:45 p.m. Trips must be reserved at least one day in advance. The fare is $2.50 per trip. Persons must be registered with Petaluma Paratransit prior to booking trips.

SMART Commuter Rail Service. The project site is bordered on the north by the Sonoma-Marin Area Rail Transit (SMART) Corridor. Commuter rail service and a multi-use pathway are planned within the corridor. Rail service is expected to begin sometime between 2014 and 2016. The Copeland Transit Mall and SMART Rail platform are located approximately 0.75 miles west of the project site on Lakeville Street. The transit mall/train station will be accessible by bicycle or on foot via existing on-street facilities, or by a planned multi-use pathway along the SMART corridor. The planned multi-use trail along the SMART corridor in this area is included in the City's Bicycle and Pedestrian Plan; the pedestrian and bicycle facility proposed as part of the SMART project diverges from the rail alignment through southern Petaluma, shifting to an on-street facility along Petaluma Boulevard South before returning to the rail corridor downtown.

Intersection Level of Service Methodologies

Level of Service (LOS) is used to rank traffic operation on various types of facilities based on traffic volumes and roadway capacity using a series of letter designations ranging from A to F. Generally, Level of Service A represents free flow conditions and Level of Service F represents forced flow or breakdown conditions. A unit of measure that indicates a level of delay generally accompanies the LOS designation. The study intersections were analyzed using methodologies published in the *Highway Capacity Manual* (HCM), Transportation Research Board, 2000. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle.

The Levels of Service for the intersections with side-street stop controls, or those which are unsignalized and have one or two approaches stop controlled, were analyzed using the "Two-Way Stop-Controlled" intersection capacity method from the HCM. This methodology determines a level of service for each minor turning movement by estimating the level of average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall age delay for the intersection.

The study intersections that are currently controlled by a traffic signal, or may be in the future, were evaluated using the signalized methodology from the HCM. This methodology is based on factors including traffic volumes, green time for each movement, phasing, whether or not the signals are coordinated, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology. Signal timing for the Lakeville corridor was obtained from the City of Petaluma and is reflective of a recent signal optimization project.

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

Table 3
Intersection Level of Service Criteria

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

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

Freeway Analysis

The freeway analysis methodology contained in Chapter 23 of the HCM, "Basic Freeway Segments," was used to determine levels of service on US 101. The method uses variables such as traffic volumes, geometric configuration of the freeway (i.e., number of lanes, widths of lanes and shoulders), topography, the percentage of heavy vehicles, and free-flow speeds to determine LOS criteria including the "service flow rate." Service flow rates are indicative of the travel demand on a freeway facility and are measured in the number of passenger cars per hour per lane. The ranges of service flow rates associated with the various Levels of Service are presented in Table 4.

Table 4
Freeway Level of Service Criteria

Level of Service	Maximum Service Flow Rate
A	710 pc/h/ln
B	1,170 pc/h/ln
C	1,680 pc/h/ln
D	2,090 pc/h/ln
E	2,350 pc/h/ln
F	Greater than 2,350 pc/h/ln

Notes: pc/h/ln = passenger cars per hour per lane
Criteria are for a freeway with 65 mph free-flow speed
Source: *Guide for the Preparation of Traffic Impact Studies*, California Department of Transportation, 2002

Traffic Operation Standards

City of Petaluma

The Petaluma General Plan 2025 has an adopted Level of Service (LOS) standard for streets that indicates the minimum acceptable operation is LOS D, with the following standard of significance for motor vehicle circulation:

> ***Policy 5-P-10:*** *Maintain an intersection level of service (LOS) standard for motor vehicle circulation that ensures efficient traffic flow and supports multi-modal mobility goals. LOS should be maintained at Level D or better for motor vehicles due to traffic from any development project.*

With the current General Plan, the City is shifting toward a multimodal emphasis and LOS standard. "A multimodal analysis that, in addition to motor vehicles, takes into consideration the overall mobility and conditions for non-auto road users (i.e., bicycles and pedestrians) is highly encouraged." The Community Character Element of the General Plan also contains circulation-related objectives and policies. This element directs that pedestrian and bicycle circulation be integrated into street designs and improvements. It also states that the amount of paving and the apparent width of streets should be reduced where possible.

The *Petaluma General Plan 2025 Draft Environmental Impact Report*, 2006, included cumulative analysis of the Lakeville corridor study intersections. On pages 3.2-34 and 3.2-35 of the DEIR it is acknowledged that buildout of the General Plan would result in unacceptable intersection operations at the intersections of Lakeville Street/Caulfield Lane and Lakeville Street/D Street. The DEIR found these

impacts to be significant and unavoidable, citing that the addition of new lanes and/or expanded capacity would be in conflict with the Plan's policies relating to improving multi-modal circulation.

Caltrans

Caltrans maintains a target LOS at the transition between LOS C and LOS D for freeway facilities, which translates to a service flow rate of approximately 1,680 passenger cars per hour per lane. Where an existing freeway is operating at less than the LOS C/D threshold an existing "measure of effectiveness" should be maintained. In determining whether a project would create an adverse impact to a freeway facility already operating at LOS E or F, the forecast service flow rate was compared to ideal freeway capacity to establish a theoretical volume-to-capacity (v/c) ratio. A significant cumulative impact is considered to occur if a project would increase the freeway v/c ratio on a facility already operating at LOS E or F by 0.01 or more.

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the a.m. and p.m. peak periods. This condition does not include project-generated traffic volumes. Traffic volume data for all study intersections along the Lakeville Street-Lakeville Highway corridor was collected in 2011 while schools were in session as part of the City's signal optimization project. Supplemental counts were obtained in September 2011 at the intersection of Caulfield Lane/Hopper Street specifically for this analysis.

Intersection Levels of Service

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

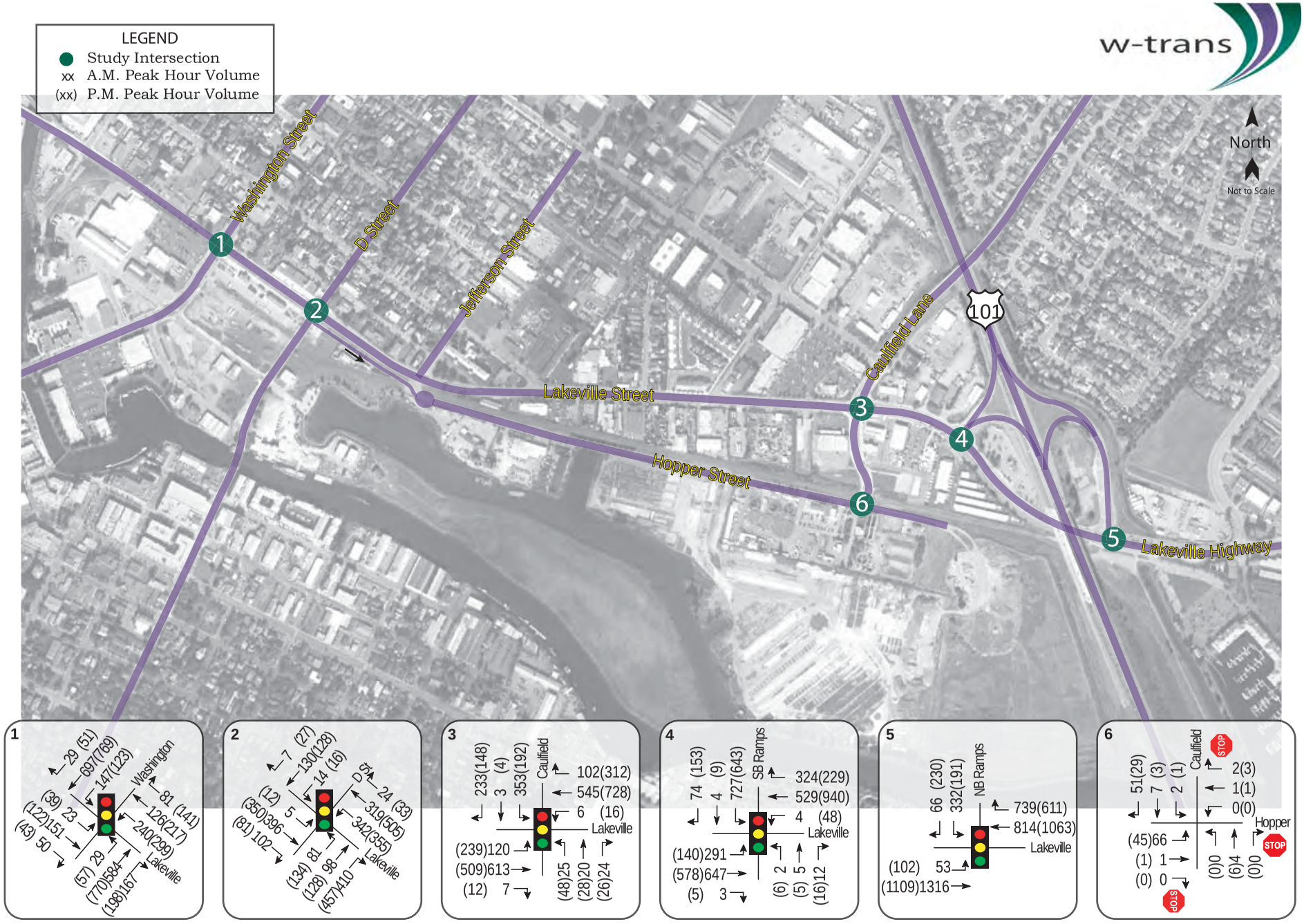

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Figure 2

Existing Traffic Volumes

Table 5
Summary of Existing Peak Hour Intersection Level of Service Calculations

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. Lakeville St/E Washington St	36.9	D	40.9	D	38.8	D	44.9	D
2. Lakeville St/D St	34.8	C	38.5	D	35.0	C	40.7	D
3. Lakeville St/Caulfield Ln	23.0	C	24.3	C	27.8	C	36.9	D
4. Lakeville Hwy/US 101 N Ramps	32.1	C	32.8	C	39.3	D	34.1	C
5. Lakeville Hwy/US 101 N Ramps	11.8	B	25.0	C	13.1	B	25.3	C
6. Hopper St/Caulfield Ln[1]	4.9	A	5.1	A	8.5	A	8.7	A
Eastbound Approach	*9.1*	*A*	*8.9*	*A*	*17.2*	*C*	*18.0*	*C*
Westbound Approach	*8.7*	*A*	*8.6*	*A*	*9.2*	*A*	*9.4*	*A*
7. Hopper St/Hotel N-S St		‡		‡	1.3	A	2.4	A
Northbound Approach					*10.3*	*B*	*11.1*	*B*
8. Hopper St/Caulfield Cir		‡		‡	2.7	A	4.7	A
Southbound Approach					*8.6*	*A*	*8.9*	*A*
9. Caulfield Ln (North)/Hotel N-S St		‡		‡	0.0	A	0.0	A
Southbound Approach					*0.0*	*A*	*0.0*	*A*
10. Caulfield Ln (North)/Caulfield Cir		‡		‡	1.1	A	1.1	A
Eastbound Approach					*8.5*	*A*	*8.8*	*A*
11. Caulfield Ln (South)/Caulfield Cir		‡		‡	5.5	A	2.5	A
Northbound Approach					*8.7*	*A*	*8.8*	*A*
12. Caulfield Ln (South)/River St		‡		‡	7.0	A	4.9	A
Eastbound Approach					*8.6*	*A*	*8.7*	*A*
Westbound Approach					*8.3*	*A*	*8.3*	*A*

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service
Results for minor approaches to two-way stop-controlled intersections are indicated in *italic*
[1] Includes project-constructed westbound right turn lane in "plus project" scenario
‡ Future intersection

Baseline Conditions

The Baseline analysis scenario represents the traffic conditions anticipated to occur upon completion and occupation of projects in the City that have been approved, but have not yet been constructed. The following baseline projects from the City's Major Development Projects list (updated September 2011) were included.

- *East Washington Place* – Approximately 377,951 square feet of retail/office mixed use on 33.7 acres adjacent to the Sonoma Marin Fairgrounds

- *Lindberg Circle* – 14,900 square foot, two-story commercial building and thirty-seven (37) single family homes; project is occupied with the exception of nine residential units

- *Park Square* – 154 multifamily units and approximately 26,000 square feet of commercial space on Lakeville Highway at Casa Grande Road (Phase II of Park Central); residential portion is complete but commercial portion is not fully constructed or occupied

- *North River Landing* – Four high-density buildings on three lots, with apartments, retail/office space and an 80-unit assisted living facility on Petaluma Boulevard North at Oak Street

- *PEP Housing Wood Sorrel* – 50-unit low income senior housing project on Wood Sorrel Drive near North McDowell Boulevard

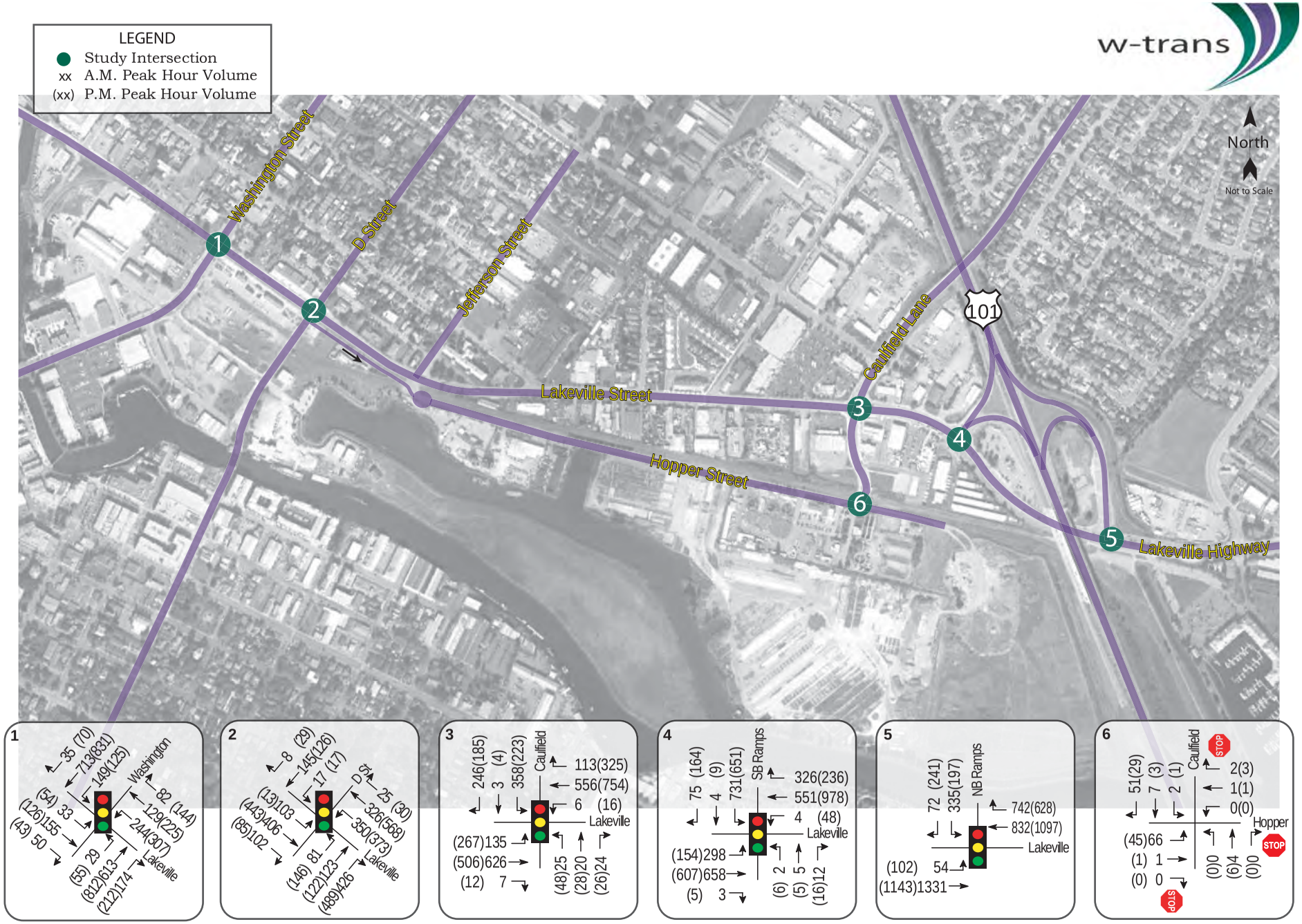
- *The Birches* – 21-lot single family residential subdivision on Wood Sorrel Drive near North McDowell Boulevard

- *Vintage Chateau II* – 68-unit senior apartment complex on North McDowell Boulevard near Lynch Creek Way

- *Quarry Heights* – 274-unit subdivision on Petaluma Boulevard South just west of US 101

- *Sunnyslope II* – 22-parcel subdivision on Sunnyslope Road

The traffic associated with these projects was added to existing traffic volumes in order to obtain Baseline volumes. Under these conditions, the study intersections are projected to operate acceptably at LOS D or better, with the exception of Lakeville Street/D Street, which is projected to operate unacceptably at LOS E during the morning peak hour. Baseline volumes are shown in Figure 3, resulting levels of service are summarized in Table 6, and copies of the level of service calculations are provided in Appendix A.



Traffic Impact Study for the Petaluma Riverfront Project

City of Petaluma

Figure 3

Baseline Traffic Volumes

Table 6
Summary of Baseline Peak Hour Intersection Level of Service Calculations

Study Intersection *Approach*	Baseline Conditions				Baseline plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Lakeville St/E. Washington St	38.1	D	44.6	D	40.3	D	50.8	D
2. Lakeville St/D St	**55.0**	**E**	41.3	D	**68.6**	**E**	46.5	D
3. Lakeville St/Caulfield Ln	20.7	C	26.3	C	28.0	C	38.0	D
4. Lakeville Hwy/US 101 N Ramps	40.1	D	33.6	C	39.3	D	34.9	C
5. Lakeville Hwy/US 101 N Ramps	13.1	B	25.8	C	13.3	B	25.9	C
6. Hopper St/Caulfield Ln[1]	4.9	A	5.1	A	8.5	A	8.7	A
Eastbound Approach	*9.1*	*A*	*8.9*	*A*	*17.2*	*C*	*18.0*	*C*
Westbound Approach	*8.7*	*A*	*8.6*	*A*	*9.2*	*A*	*9.4*	*A*
7. Hopper St/Hotel N-S St		‡		‡	1.3	A	2.4	A
Northbound Approach					*10.3*	*B*	*11.1*	*B*
8. Hopper St/Caulfield Cir		‡		‡	2.7	A	4.7	A
Southbound Approach					*8.6*	*A*	*8.9*	*A*
9. Caulfield Ln (North)/Hotel N-S St		‡		‡	0.0	A	0.0	A
Southbound Approach					*0.0*	*A*	*0.0*	*A*
10. Caulfield Ln (North)/Caulfield Cir		‡		‡	1.1	A	1.1	A
Eastbound Approach					*8.5*	*A*	*8.8*	*A*
11. Caulfield Ln (South)/Caulfield Cir		‡		‡	5.5	A	2.5	A
Northbound Approach					*8.7*	*A*	*8.8*	*A*
12. Caulfield Ln (South)/River St		‡		‡	7.0	A	4.9	A
Eastbound Approach					*8.6*	*A*	*8.7*	*A*
Westbound Approach					*8.3*	*A*	*8.3*	*A*

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service
Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*
Bold text = deficient operation; ‡ Future intersection
[1] Includes project-constructed westbound right turn lane in "plus project" scenario

Future Conditions

Cumulative traffic forecasts for the five study intersections along the Lakeville Street-Lakeville Highway corridor at buildout of the City's General Plan are included in the General Plan EIR. The projections were developed through the use of the City's traffic model, and assume construction of the "southern crossing," which is the extension of Caulfield Lane over the Petaluma River to Petaluma Boulevard. Buildout of the City's General Plan is not expected to occur by the year 2025 because of economic conditions, and would not be exceeded in this timeframe due to the City's adopted urban growth boundary (UGB). The horizon year for the projections can therefore be considered to be *at least* 2035.

Cumulative Land Use Adjustments

The City's traffic model includes three traffic analysis zones (TAZs) that comprise the area bounded by Lakeville Street, US 101, the Petaluma River, and D Street. TAZs contain the land use information on which traffic projections are based. TAZ 221 is the westernmost zone, incorporating several parcels served by the northernmost portion of Hopper Street (including Shamrock Materials) as well as the McNear peninsula open space and park area. TAZ 125 includes the central portion of the area, and includes the former Pomeroy manufacturing industrial facility, City of Petaluma corporation yard, and former water treatment facility. TAZ 477 is the easternmost zone and conforms to the boundaries of the Riverfront project. An exhibit showing the TAZ boundaries is included in Appendix B.

The General Plan buildout land use projections for TAZs 125 and 477 include 110,000 square feet of industrial uses, 500 multi-family residential units, 39,000 square feet of institutional uses (the Mary Isaac Center), and 550,000 square feet of office uses. The projections assume a more intense development pattern on the Riverfront parcel than currently proposed. Additionally, the majority of TAZ 125 (the former Pomeroy facility) is designated as "River Dependent Industrial" by the General Plan and Central Petaluma Specific Plan, limiting allowable uses to those involving industrial, warehousing, and manufacturing types of uses intended to be supported by river transportation on the Petaluma River.

City of Petaluma staff examined the land use assumptions for TAZs 125 and 477 to determine if adjustments were needed in order to more accurately reflect the expected buildout in the area. The resulting revised land use assumptions for the combined zones include 376,000 square feet of light industrial space, 135 single family housing units, 137 multi-family units, 120 hotel rooms, 39,000 square feet of institutional uses, 60,000 square feet of office space, 30,000 square feet of retail space, and 6.2 acres of parks. The industrial and institutional uses are assumed to be sited in TAZ 125, with the remainder of uses in TAZ 477.

The updated land use assumptions translate to a reduction in vehicle trips compared to what is contained in the City traffic model and General Plan EIR cumulative traffic forecasts. The revised land use assumptions translate to 334 fewer a.m. peak hour trips and 152 fewer p.m. peak hour trips compared to the original assumptions. Using the Traffix traffic analysis software and travel patterns assumed in the City's traffic model, these trip deductions were distributed throughout the study area roadway network in order to obtain revised cumulative projections. In order to determine cumulative traffic forecasts *without* the Riverfront project (i.e., assuming that TAZ 477 remains vacant), the Riverfront-specific traffic projections were removed from the revised projections. When analyzing the "Cumulative plus Project" conditions, the Riverfront traffic was once again added to the forecasts.

The applied Future volumes are shown in Figure 4.

Future Traffic Operation

Under the anticipated Future volumes without Riverfront, including construction of the Caulfield Lane extension over the Petaluma River, four of the six study intersections are expected to operate acceptably at LOS D or better. During the p.m. peak hour, the intersection at Lakeville Street/D Street is projected to operate unacceptably at LOS F, and the intersection at Lakeville Street/Caulfield Lane is projected to operate unacceptably at LOS E. The City's General Plan EIR included adoption of overriding considerations for future traffic operations below LOS D at these two intersections. Because of potential queuing concerns at the Lakeville Street/Caulfield Lane intersection, however, future improvements to reduce vehicle queues are projected to be necessary at this intersection upon extension of Caulfield Lane over the Petaluma River (see the queuing evaluation which appears later in this report). These improvements would be needed both without and with the Riverfront project. Future level of service results are summarized in Table 7, and copies of the level of service calculations are provided in Appendix A.

Traffic Impact Study for the Petaluma Riverfront Project

Figure 4

City of Petaluma

Future Traffic Volumes

Table 7
Summary of Future Peak Hour Intersection Level of Service Calculations

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. Lakeville St/E Washington St	31.1	C	40.1	D	31.7	C	41.5	D
2. Lakeville St/D St	52.3	D	**92.9**	**F**	53.3	D	**98.0**	**F**
3. Lakeville St/Caulfield Ln	40.0	D	**62.0**	**E**	44.2	D	**89.3**	**F**
4. Lakeville Hwy/US 101 N Ramps	27.9	C	30.7	C	26.7	C	31.2	C
5. Lakeville Hwy/US 101 N Ramps	12.8	B	16.1	B	13.7	B	17.5	B
6. Hopper St/Caulfield Ln[1]	1.9	A	7.1	A	21.6	C	**83.1**	**F**
Eastbound Approach	*16.8*	*C*	*46.2*	*E*	**	***F***	**	***F***
Westbound Approach	*15.1*	*C*	*16.4*	*C*	*20.4*	*C*	*16.2*	*C*
Mitigated[2]	-	-	-	-	15.0	B	25.8	C
7. Hopper St/Hotel N-S St		‡		‡	0.7	A	1.5	A
Northbound Approach					*14.3*	*B*	*13.0*	*B*
8. Hopper St/Caulfield Cir		‡		‡	0.3	A	1.9	A
Southbound Approach					*10.6*	*B*	*10.3*	*B*
9. Caulfield Ln (North)/Hotel N-S St		‡		‡	1.2	A	0.4	A
Southbound Approach					*10.1*	*B*	*12.8*	*B*
10. Caulfield Ln (North)/Caulfield Cir		‡		‡	4.4	A	16.5	B
Eastbound Approach					*9.0*	*A*	*20.5*	*C*
11. Caulfield Ln (South)/Caulfield Cir		‡		‡	13.5	B	6.6	A
Northbound Approach					*16.6*	*C*	*20.1*	*C*
12. Caulfield Ln (South)/River St		‡		‡	0.6	A	0.6	A
Eastbound Approach					*12.1*	*B*	*18.0*	*C*
Westbound Approach					*15.3*	*C*	*19.1*	*C*

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service
Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*
** = delay greater than 120 seconds; **Bold** text = deficient operation; ‡ Future intersection
[1] Includes project-constructed westbound right turn lane in "plus project" scenario
[2] Mitigation includes signalization and addition of a left-turn pocket on northbound Caulfield Ln

The queuing analysis at the intersection of Lakeville Street/Caulfield Lane was used to assess the potential for vehicle queues to extend across the newly-completed at-grade rail crossing 500 feet to the south. The analysis identifies the need to implement upgrades to the Lakeville Street/Caulfield Lane intersection's signal timing and vehicle detection in order to avoid potential rail conflicts. With projected future volumes and without Riverfront, improvements needed to alleviate this condition include installation of an advance detector loop just north of the railroad gates on northbound Caulfield Lane which will be connected to the Lakeville Street/Caulfield Lane traffic signal controller. In the

occurrence of a vehicle stopping on the advance detector for several seconds (indicating presence of a queue that could potentially continue over the railroad tracks), the Lakeville Street/Caulfield Lane signal controller will be "triggered" to give a green indication to northbound traffic, clearing the vehicle queue. This type of operation is sometimes referred to as a "queue cutter" signal, and is often used to eliminate potential vehicle conflicts with railroad facilities. Further discussion of the queuing assessment is provided in the section on queuing.

Project Description

The project as proposed includes construction of a mix of uses including 60,000 square feet of office space; 37 townhouse units (6 units are designated as live/work spaces); a 120-room hotel; 30,000 square feet of mixed use commercial development with 100 apartment units; 135 single family residential units; and approximately 6.2 acres of parks, including a 0.38-acre central green, a 2.14-acre active park, and a 3.67-acre river park. The project is located on approximately 40 acres at 500 Hopper Street. The site is bounded by the Petaluma River on the south, US 101 to the east, the SMART railroad corridor to the north, and the future extension of Caulfield Lane to the west. A series of future roadway connections would be provided via the extension of Caulfield Lane and/or a southern crossing of the Petaluma River. The proposed project's site plan is shown in Figure 5.

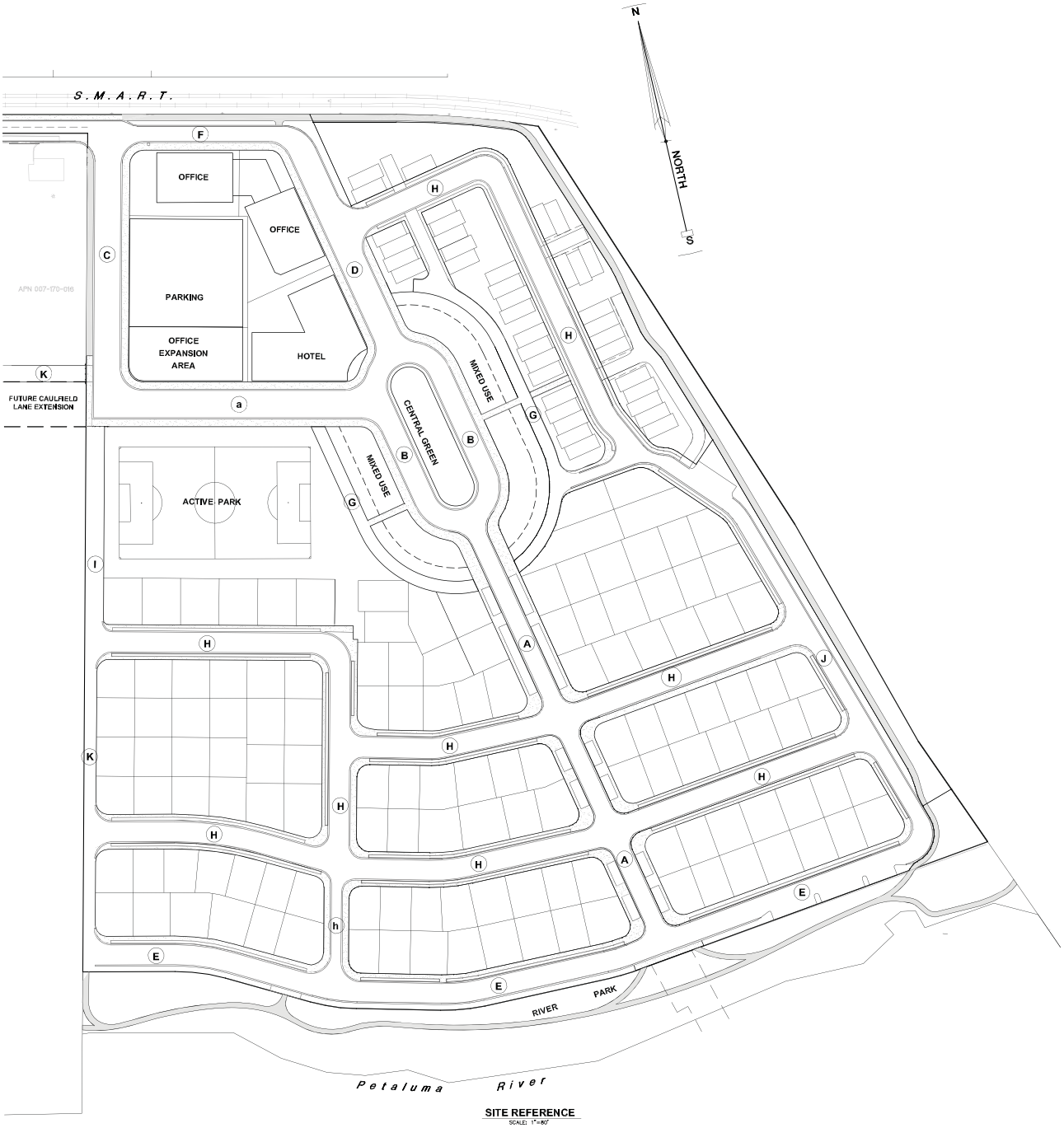
Internal Street Network

The site includes one primary north-south street and several minor north-south connections. A "central green" is proposed in the mixed-use core of the site, featuring a one-way loop along the axis of the primary north-south street. To the south of the central green (called "Caulfield Circle" for the purposes of the traffic analysis), Caulfield Lane would eventually extend over the Petaluma River to Petaluma Boulevard South. An extension of Hopper Street north of the central green would create the northern portion of the primary north-south street. In the future, Caulfield Lane would extend from its current terminus at Hopper Street through the City's former water treatment facility, shifting to an east-west alignment and intersecting the west side of the central green. Another minor north-south street would connect Hopper Street to the future Caulfield extension (west of the central green), serving parking areas for the hotel and office portions of the project, referred to in the traffic analysis as the Hotel North-South Street. Several additional grid-pattern streets would serve the residential uses in the southern portion of the site, including one running along the north bank of the Petaluma River, referred to herein as River Street. In order to maintain efficient traffic operation at the offsite Caulfield Lane/Hopper Lane intersection, the Project would construct a 50-foot long westbound right turn lane plus taper.

The lane configurations at the six study intersections within the project site are shown in Figure 6 for near-term conditions without the Caulfield Lane extension, and in Figure 7 for long-range conditions with completion of the Caulfield Lane extension and bridge over the Petaluma River.

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*, 8th Edition, 2008. The trip generation potential of the project as planned was developed using the published standard rates for General Office (Land Use #710), Townhouse (Land Use #230), Hotel (Land Use #310), Specialty Retail (Land Use #814), Apartments (Land Use #220), Single Family Detached Housing (Land Use #210), and a custom rate for the proposed Live/Work Units, along with the City Park rate from the San Diego Association of Governments (SANDAG) which was applied to the total acreage of proposed park lands.



Source: STEVEN J. LAFRANCHI & ASSOCIATES, INC. 8/11

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Traffic Impact Study for the Petaluma Riverfront Project

City of Petaluma

Figure 5

Site Plan

Traffic Impact Study for the Petaluma Riverfront Project — Figure 6

City of Petaluma — Project Lane Configurations without Caulfield Lane Extension

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Traffic Impact Study for the Petaluma Riverfront Project

Figure 7

City of Petaluma

Project Lane Configurations with Caulfield Lane Extension

Internal Capture Trips

Internal trips occur at mixed-use developments, and in the case of the Riverfront Project would likely consist of residents patronizing adjacent retail and restaurant uses, employees of nonresidential uses patronizing other nonresidential uses, hotel guests who shop at the retail destinations, and/or shoppers who visit the parks. The majority of these trips would be made by walking, and the few that would be made by automobile would utilize only the on-site roadways, so would not affect the adjacent street network. Trip reduction rates were based upon data from the publication *NCHRP Report 684: Enhancing Internal Capture Estimation for Mixed-Use Developments*, Transportation Research Board (TRB), 2011. The publication indicates that these methodologies will be incorporated into the next edition of ITE's *Trip Generation*.

Through application of the internal capture methodologies, it is estimated that the Riverfront project will generate 7 percent fewer a.m. peak hour trips and 12 percent fewer p.m. peak hour trips than would be expected through direct application of ITE's standard trip generation rates. While the methodology currently does not include daily trip reductions, it was determined that a 9.5 percent deduction could reasonably be applied, representing the average of the two peak hour deductions. Copies of the spreadsheets indicating the derivation of the internal capture rates are provided in Appendix C.

Total Project Trip Generation

The expected trip generation potential for the proposed project is indicated in Table 8, including deductions taken for internal trips. The proposed project is expected to generate an average of 4,958 new trips on a daily basis, including 373 during the morning peak hour and 430 during the evening peak hour. These new trips represent the increase in traffic associated with the project compared to existing volumes.

Table 8
Trip Generation Summary

Land Use	Units	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Proposed											
Office	60 ksf	11.01	661	1.55	93	82	11	1.49	89	15	74
Townhouse	31 du	5.81	180	0.44	14	2	12	0.52	16	11	5
Hotel	120 rms	8.17	980	0.56	67	41	26	0.59	71	38	33
Specialty Retail [1]	30 ksf	44.32	1330	1.00	30	18	12	2.71	81	36	45
Apartments	100 du	6.65	665	0.51	51	10	41	0.62	62	40	22
Single Family Housing	135 du	9.57	1292	0.75	101	25	76	1.01	136	86	50
Live/Work Units (custom rate)	6 du	9.95	60	0.86	5	3	2	0.94	6	2	4
City Park (SANDAG)	6.2 ac	50	310	6.50	40	20	20	4.50	28	14	14
SUBTOTAL			*5478*		*401*	*201*	*200*		*489*	*242*	*247*
Internal Capture		*-9.5%*[2]	*-520*	*-7%*	*-28*	*-14*	*-14*	*-12%*	*-59*	*-29*	*-30*
Net Trip Generation			**4,958**		**373**	**187**	**186**		**430**	**213**	**217**

Notes: ksf = 1,000 square feet; du = dwelling units; rms = rooms; ac = acres
[1] AM Rate from LU #820 (Shopping Center)
[2] Methodology does not produce daily rates; assumed to be average between AM and PM rates

Trip Distribution

The pattern used to allocate new commercial and residential project trips to the street network was based on a review of turning movement counts, as well as distribution assumptions applied in the recent East Washington Place EIR. The applied distribution assumptions are shown in Table 9.

Table 9
Trip Distribution Assumptions

Route	Commercial Distribution	Residential Distribution
W Petaluma and Downtown (via D St, E Washington St, and N Lakeville St)	35%	35%
E Petaluma (via Caulfield Lane and Lakeville Hwy)	30%	20%
US 101 N	15%	15%
US 101 S	10%	10%
Lakeville Hwy (east of Petaluma city limits)	5%	10%
Central Petaluma (area bounded by Petaluma River, E Washington St, and US 101)	5%	10%
TOTAL	**100%**	**100%**

Intersection Operation

Existing plus Project Conditions

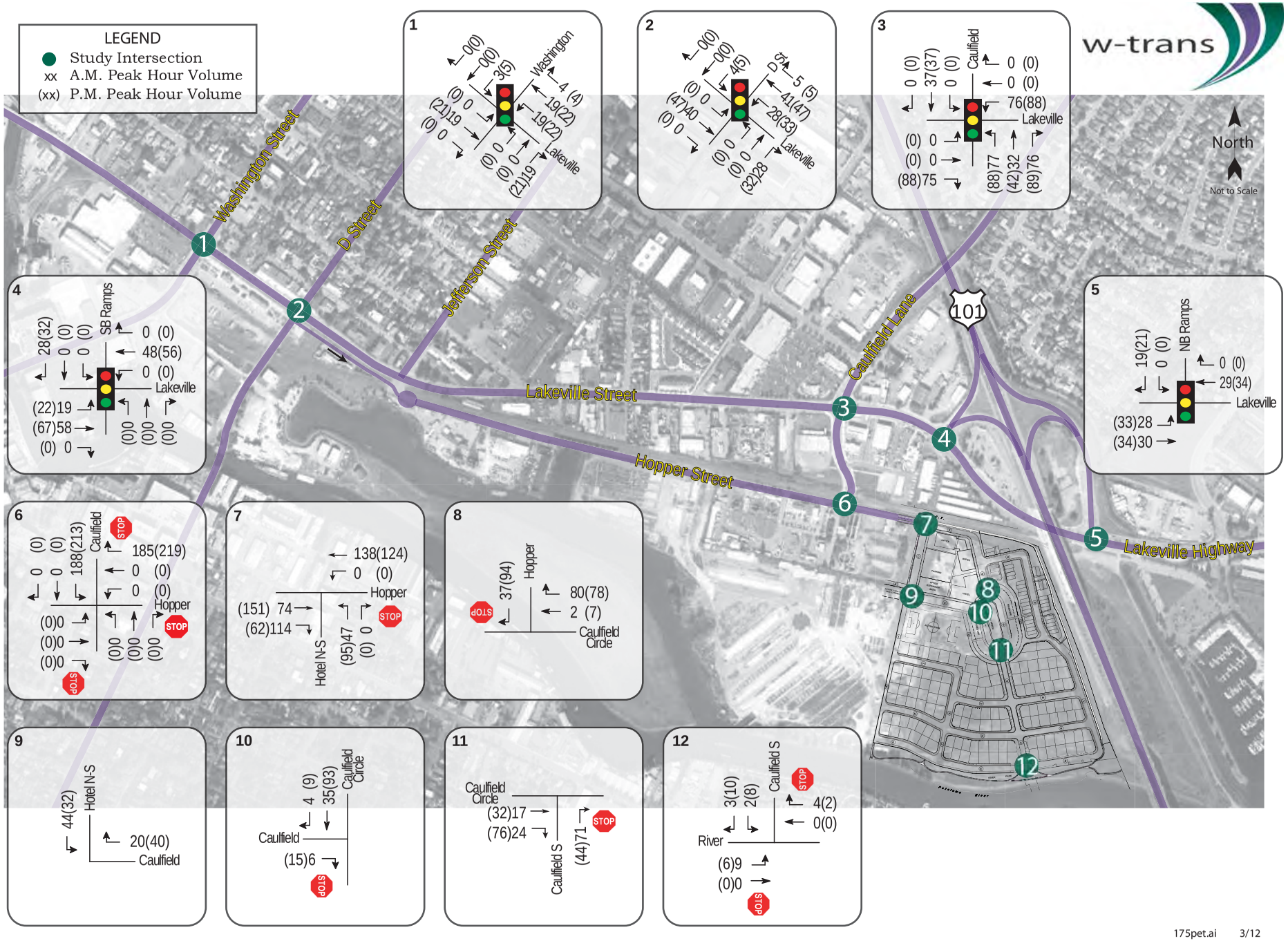
Upon the addition of project-related traffic to the Existing volumes, the study intersections are expected to operate acceptably at LOS D or better. These results are summarized in Table 5. Near term project traffic volumes (without the western Caulfield extension and the Caulfield river crossing) are shown in Figure 8, and Existing plus Project volumes are shown in Figure 9.

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

Baseline plus Project Conditions

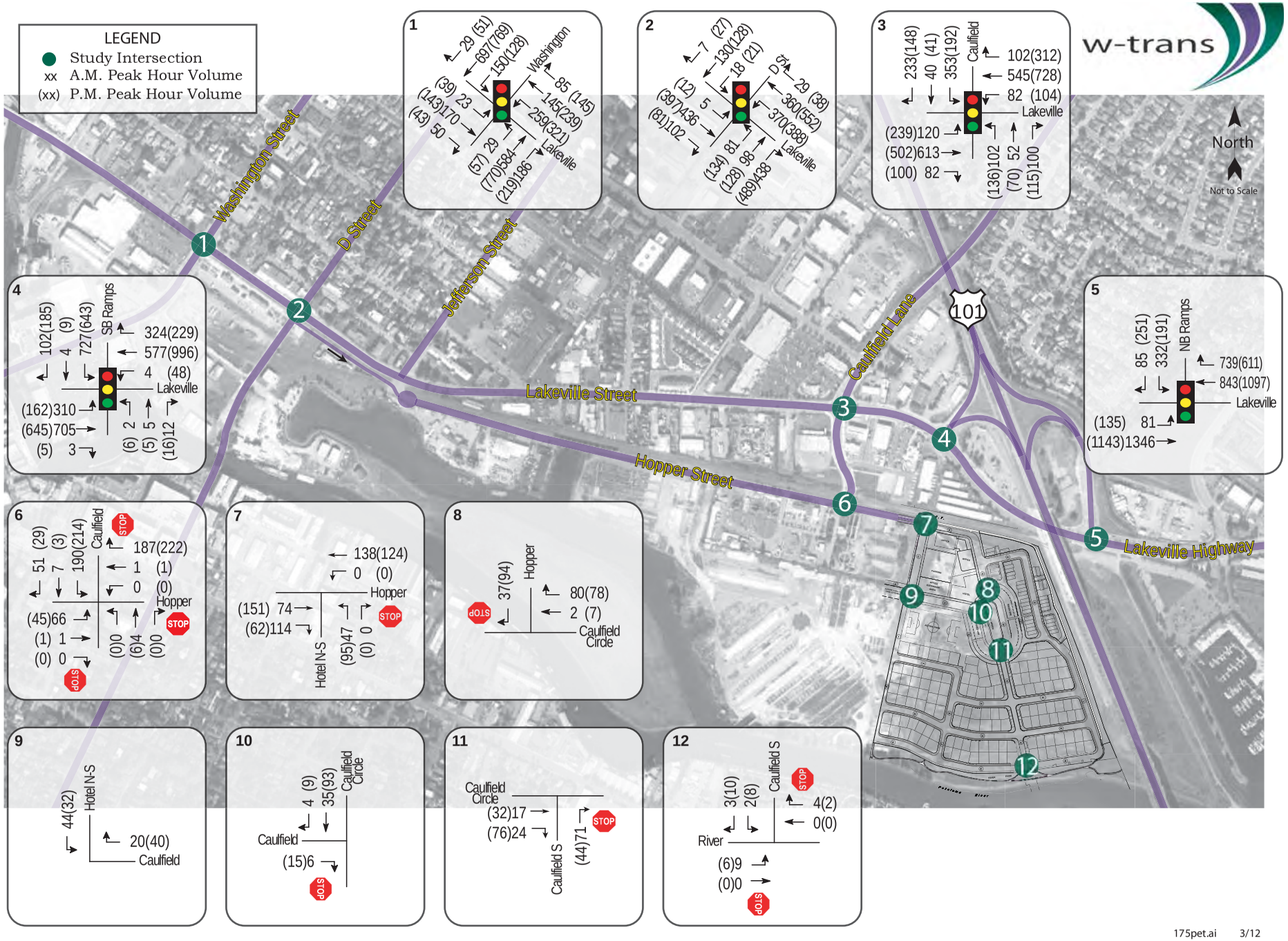
With project-related traffic added to Baseline volumes, the study intersections are expected to operate acceptably at LOS D or better, with the exception of Lakeville Street/D Street, which is projected to operate at LOS E during the morning peak hour. These results are summarized in Table 6. Baseline plus Project traffic volumes are shown in Figure 10.

Finding: The study intersection at Lakeville Street/D Street is expected to operate at LOS E both without and with traffic generated by the Riverfront project. Adoption of the City's General Plan included overriding considerations relative to this intersection's operation, finding that capacity improvements would be inconsistent with goals supporting multimodal circulation in Central Petaluma. The project will contribute to traffic impact fees that will help to improve multimodal circulation in central Petaluma.



Traffic Impact Study for the Petaluma Riverfront Project — Figure 8

City of Petaluma — Project Volumes without Caulfield Extension or River Crossing



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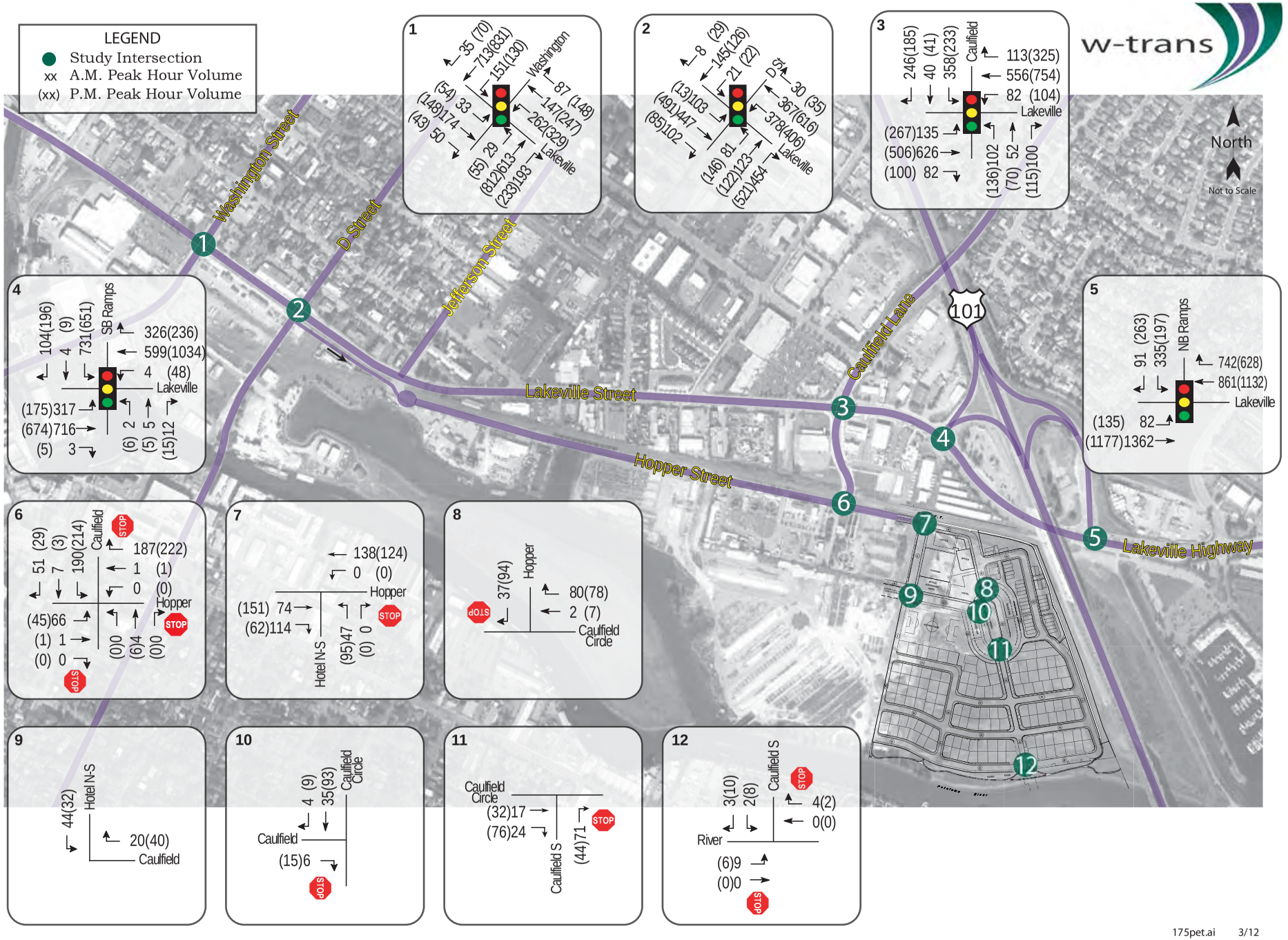
Traffic Impact Study for the Petaluma Riverfront Project

Figure 9

City of Petaluma

Existing plus Project Traffic Volumes



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Traffic Impact Study for the Petaluma Riverfront Project

Figure 10

City of Petaluma

Baseline plus Project Traffic Volumes

Future plus Project Conditions

The project's traffic patterns would change upon construction of the Caulfield Lane extension and bridge over the Petaluma River. The project trips anticipated with the future roadway network are shown in Figure 11. Upon the addition of project-generated traffic to the anticipated Future volumes, nine of the 12 study intersections are expected to operate acceptably at LOS D or better. The intersections at Lakeville Street/D Street and Lakeville Street/Caulfield Lane are projected to operate unacceptably during the p.m. peak hour, increasing average delay and the unacceptable operation already projected to occur at these intersections without the project. The intersection at Hopper Street/ Caulfield Lane is also projected to operate unacceptably at LOS F during both peak hours. Future plus Project operating conditions are summarized in Table 7, and Future plus Project traffic volumes are shown in Figure 12.

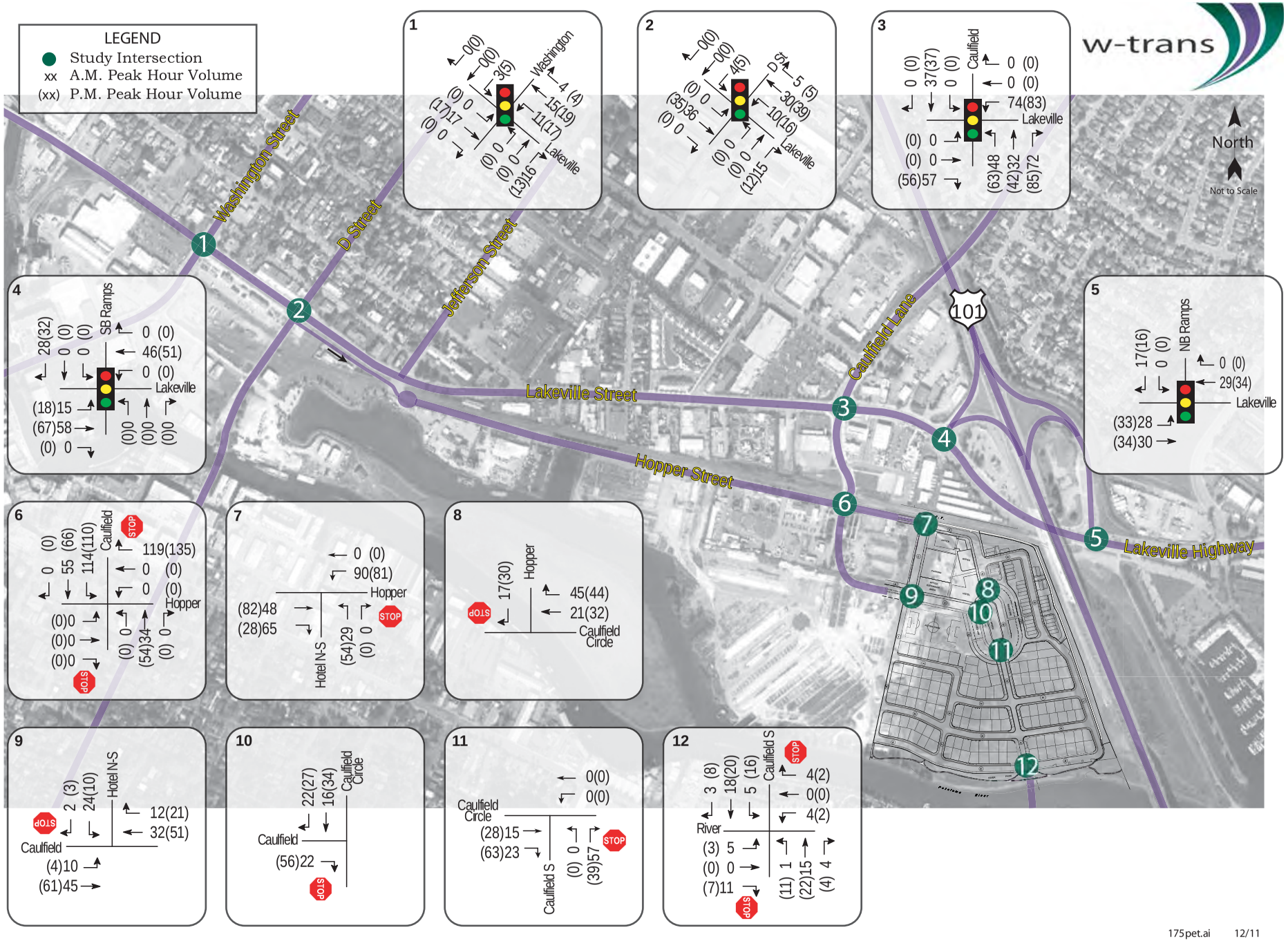
While the projected future LOS F operation at Lakeville Street/Caulfield Lane is allowable per the City's General Plan, improvements that may increase the intersection's safety and efficiency while still supporting or enhancing multimodal circulation should be pursued. This is particularly important when notable shifts or increases in traffic volumes are anticipated, such as the increases in traffic volumes expected with the Riverfront Project. While constraints on the north, south, and west legs of the intersection limit the types of improvements which can be made, there are some improvements to the east leg (i.e., the westbound approach) that may benefit both safety and capacity. The existing westbound left turn pocket is striped with a 50-foot storage length, and vehicles in this lane regularly spill back into the through travel lanes. The segment between Caulfield Lane and the US 101 South Ramps also serves several driveways including two gas stations. Drivers are often observed making illegal left turn movements into and out of the gas stations despite the presence of a painted median.

It is recommended that the striping on this segment of Lakeville Street be modified to extend the westbound left turn pocket to approximately 250 feet. A raised median should also be installed to physically prohibit left turn movements in and out of fronting businesses. These improvements appear to be feasible within the available curb-to-curb width and would preserve existing bike lanes as well as existing left turn pocket lengths at the US 101 South ramps intersection. Because these improvements would improve both capacity and safety in an area where the Riverfront project would add traffic, it is recommended that they be installed as an offsite improvement in association with development of the project.

Finding: As under Future Conditions without the project, the study intersections at Lakeville Street/D Street and Lakeville Street/Caulfield Lane are expected to operate unacceptably during the p.m. peak hour. Adoption of the City's General Plan included overriding considerations relative to these intersections' operation, finding that capacity improvements would be inconsistent with goals supporting multimodal circulation in Central Petaluma. The project will contribute to traffic impact fees that will help to improve multimodal circulation in central Petaluma.

Recommendation: The westbound left turn pocket at Lakeville Street/Caulfield Lane should be lengthened to an approximate length of 250 feet. A raised median should also be installed on the westbound approach to physically prohibit illegal left turn movements into and out of adjacent properties. Construction of these improvements should be the responsibility of the Riverfront development.

Finding: The intersection at Hopper Street/Caulfield Lane is projected to operate unacceptably in the future during both peak hours upon the addition of traffic generated by the Riverfront project.



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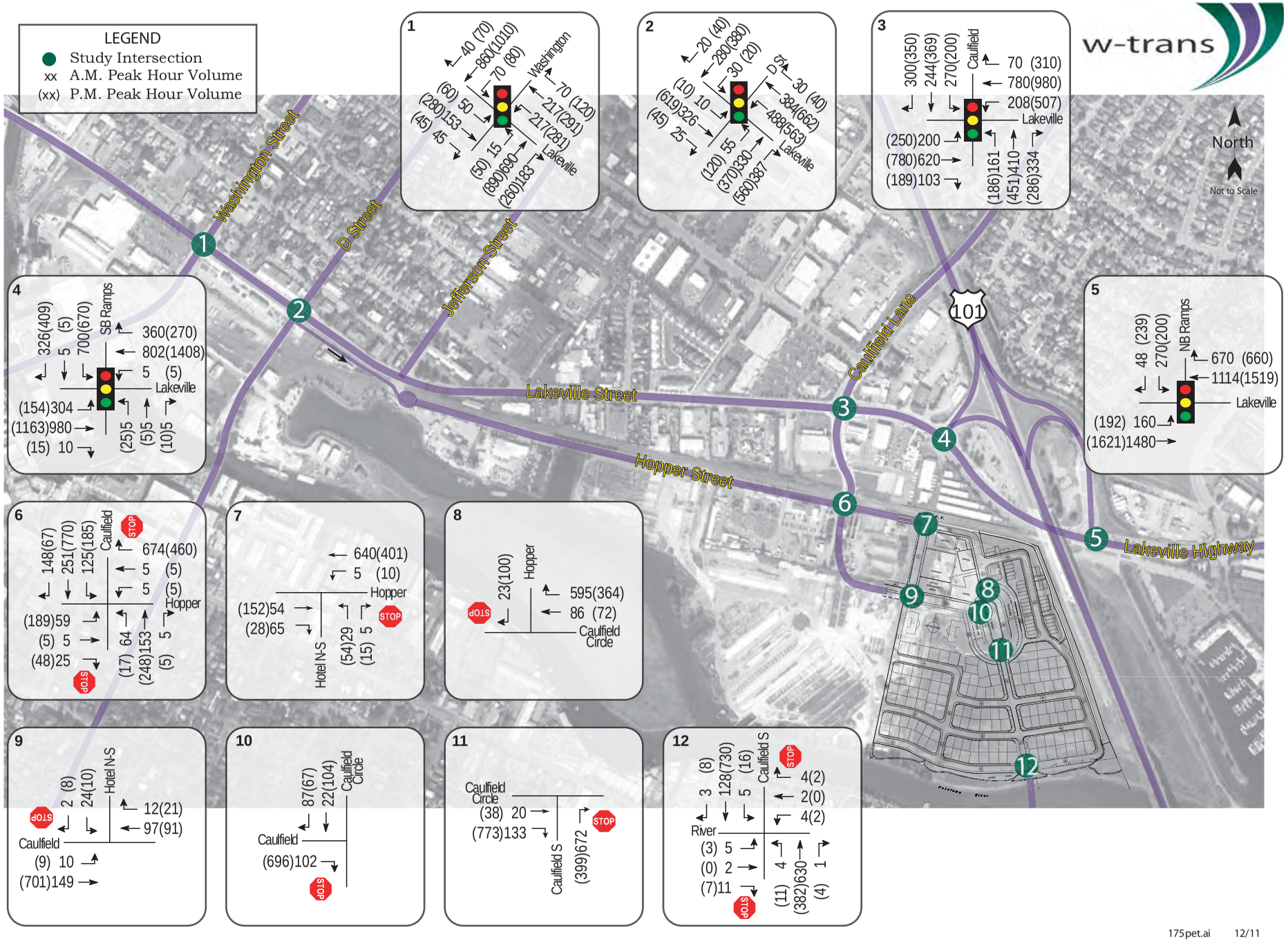
Traffic Impact Study for the Petaluma Riverfront Project

Figure 11

City of Petaluma

Project Volumes with Caulfield Extension and River Crossing



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Traffic Impact Study for the Petaluma Riverfront Project

Figure 12

City of Petaluma

Future plus Project Traffic Volumes

Recommendations:

- *Hopper Street/Caulfield Lane* – Install a traffic signal. Add a 50-foot left-turn pocket on the northbound Caulfield Lane approach. Install the southbound limit line and signal heads on the north of the SMART tracks in order to preclude drivers from stopping on the railroad tracks during a red light. These improvements would be necessary to accommodate project traffic once the Caulfield extension over the Petaluma River is completed.

- The Riverfront project should contribute its fair share toward the cost of signalization at Hopper Street/Caulfield Lane. The project's share of cumulative traffic growth, which includes traffic using the southern crossing, is estimated to be 21 percent (average of the a.m. and p.m. peak hours).

Freeway Evaluation

The segments of US 101 to the north and south of the Lakeville Highway (SR 116) interchange were evaluated for the existing, baseline, and future scenarios. The freeway currently includes two mixed-flow lanes in each direction, though the addition of high-occupancy vehicle (HOV) lanes is included in the SCTA Comprehensive Transportation Plan and the Measure M half-cent sales tax measure. The HOV lanes are anticipated to be constructed within the next decade so are included in the future analysis. Existing U.S. 101 freeway volumes for the year 2010 were obtained from the Caltrans Traffic and Vehicle Data Systems Unit website (http://www.dot.ca.gov/hq/traffops/saferesr/trafdata). Year 2035 future volumes were developed from the SCTA's SCTM\07 regional travel demand model. The year 2035 volumes represent traffic in the freeway's mixed-flow lanes.

US 101 currently operates in the LOS E/F range in the northbound direction of both study segments during the p.m. peak hour, and at LOS C on both segments in the southbound direction. These same levels of service are projected to continue under Baseline conditions. In the future, even with the addition of HOV lanes, the freeway is still anticipated to operate at LOS E/F in the northbound direction and at LOS E in the southbound direction between East Washington Street and Lakeville Highway. The projected flow rates and levels of service on the two US 101 freeway segments are shown in Table 10. Copies of the freeway-related LOS calculation sheets are provided in Appendix D.

Table 10
Existing PM Peak Hour Freeway Service Flow Rates With and Without Project

US 101 Freeway Segment	Without Project		With Project	
	NB	SB	NB	SB
Existing				
Petaluma Blvd S to Lakeville Hwy	2,090/E	1,289/C	2,101/E	1,301/C
Lakeville Hwy to E Washington St	2,362/F	1,556/C	2,379/F	1,574/C
Baseline				
Petaluma Blvd S to Lakeville Hwy	2,135/E	1,349/C	2,146/E	1,361/C
Lakeville Hwy to E Washington St	2,409/F	1,620/C	2,427/F	1,638/C
Future (2035)				
Petaluma Blvd S to Lakeville Hwy	2,274/E	1,766/D	2,286/E	1,778/D
Lakeville Hwy to E Washington St	2,555/F	2,152/E	2,572/F	2,170/E

Notes: NB = Northbound; SB = Southbound; Results are expressed as Service flow rate/Level of Service; Freeway service flow rate is measured in passenger cars per hour per lane

The increases in the freeway v/c ratio associated with the Project are shown in Table 11. An increase of 0.01 or greater is considered to be cumulatively significant.

Table 11
PM Peak Hour Changes to Freeway V/C With Project Traffic Added

US 101 Freeway Segment	V/C Without Project		V/C With Project		Change to V/C Ratio	
	NB	SB	NB	SB	NB	SB
Existing						
Petaluma Blvd S to Lakeville Hwy	0.909	0.560	0.913	0.566	0.004	0.006
Lakeville Hwy to E Washington St	1.027	0.677	1.034	0.684	0.007	0.007
Baseline						
Petaluma Blvd S to Lakeville Hwy	0.928	0.587	0.933	0.592	0.005	0.005
Lakeville Hwy to E Washington St	1.047	0.704	1.055	0.712	0.008	0.008
Future (2035)						
Petaluma Blvd S to Lakeville Hwy	0.989	0.768	0.994	0.773	0.005	0.005
Lakeville Hwy to E Washington St	1.111	0.936	1.118	0.943	0.007	0.007

Notes: V/C = volume to capacity ratio; NB = Northbound; SB = Southbound
Ideal freeway capacity assumed to be 2,300 vehicles per hour per lane within study area

Finding: US 101 currently operates below Caltrans' target LOS C/D threshold during the p.m. peak hour under and is expected to continue to do so under Baseline and Future p.m. peak hour volumes. The Riverfront project would contribute traffic to the freeway, though in each time period the project would result in changes to the volume-to-capacity ratios of less than 0.010. This level of increase is considered to be less-than-significant.

Queuing

Vehicle queuing was assessed on the northbound Caulfield Lane approach at Lakeville Street due to the proximity of the SMART rail tracks to the south. The rail crossing is located 500 feet south of Lakeville Street, and so any vehicular queues extending beyond this length at the Lakeville Street/Caulfield Lane signal would present safety concerns.

The projected vehicle queues were determined using Simtraffic, which is a traffic simulation extension of the Synchro application that is used to determine intersection operation and levels of service. Simtraffic generates random "seeding" of vehicles on the street network and then simulates how vehicles will flow through the system using the actual volumes, signal phasing, and signal timing developed in Synchro. Because each Simtraffic run is unique, a series of five separate "runs" was used to develop queuing estimates. The resulting 95th percentile queues on the northbound approach were then recorded. Given the critical safety implications of adverse queuing in this location, it is recommended that the 95th percentile queues remain at 500 feet or less. It should be noted that the observed maximum queues reported by Simtraffic were also reviewed, but in all scenarios were slightly less than the reported 95th percentile queues. For this reason the analysis focuses on the 95th percentile queues since they represent the most conservative metric.

Vehicle queues on the subject segment of Caulfield Lane are projected to remain well within the 500 feet of available storage under existing and baseline conditions both without and with the Riverfront

project. In the future upon completion of the Caulfield extension and bridge to Petaluma Boulevard, the 95th percentile queue is projected to reach 569 feet, exceeding the available storage and extending across the railroad tracks. Upon the addition of Riverfront-related traffic to the projected future volumes, the projected 95th percentile queues would extend to 578 feet. Safety-related queuing concerns are therefore anticipated upon buildout of the General Plan and completion of the Caulfield extension over the river both without and with the proposed project.

The Lakeville Street/Caulfield Lane intersection's signal timing and vehicle detection should be modified in the future in order to avoid potential rail conflicts. Recommended improvements include the installation of an advance detector loop just north of the railroad gates on northbound Caulfield Lane, which will be connected to the Lakeville Street/Caulfield Lane traffic signal controller. In the occurrence of a vehicle stopping on the advance detector for several seconds (indicating presence of a queue that could potentially continue over the railroad tracks), the Lakeville Street/Caulfield Lane signal controller will be "triggered" to give a green indication to northbound traffic, clearing the vehicle queue. This type of operation is sometimes referred to as a "queue cutter" signal and is often used to eliminate potential vehicle conflicts with railroad facilities. Queues could alternatively be managed by interconnecting the Lakeville Street/Caulfield Lane signal with the rail crossing signals, preempting the traffic signal to give northbound Caulfield Lane a green indication that is long enough to clear traffic from the tracks every time a train approaches. This alternative method would be effective though would be more disruptive to traffic flow than the queue cutter signal option.

A summary of the queuing projections on northbound Caulfield Lane between Lakeville Street and the SMART tracks is shown in Table 12, and copies of the Simtraffic queuing runs are provided in Appendix E.

Table 12
Caulfield Lane 95th Percentile Queues Between Lakeville Street and SMART

	Without Riverfront		With Riverfront	
	AM	**PM**	**AM**	**PM**
Existing	66	98	147	173
Baseline	81	105	155	200
Future	419	**569**[1]	460	**578**[1]

Notes: **Bold** text = queue exceeds 500 foot available storage; [1] With recommended mitigation measure (installation of a "queue cutter" signal), queue would be cleared before queue lengths reach the railroad tracks

Finding: Vehicle queues on the northbound Caulfield Lane approach to Lakeville Street are projected to remain within the available 500-foot storage under existing and baseline conditions both without and with the project.

Finding: With future traffic volumes that include buildout of the City's General Plan and construction of the Caulfield extension over the Petaluma River, vehicle queues on northbound Caulfield Lane may extend across the SMART railroad tracks both without and with the project.

Recommendation: Install a "queue cutter" signal consisting of an advance detector loop just north of the railroad gates on northbound Caulfield Lane, which will detect vehicle queues and trigger the Lakeville Street/Caulfield Lane signal controller to give a green indication to northbound Caulfield Lane, clearing queues before they extend over the railroad tracks. This improvement would become necessary once Caulfield Lane is extended over the Petaluma River.

Alternative Modes

Pedestrian Facilities

Given the proximity of the proposed Riverfront Project to the Gateway Plaza Shopping Center on Lakeville Highway and other nearby commercial and retail uses, restaurants, transit stops, and recreation destinations, it is reasonable to assume that residents, project patrons, hotel guests, and employees will want to walk, bicycle, and/or utilize transit to travel to and from the project site.

Street and sidewalk sections proposed in the project site plan have been developed in accordance with the standards defined in the Central Petaluma Specific Plan. Sidewalks and/or pathways ranging in width between five and seventeen feet are proposed along all streets within the project development except for alleys. Multi-use pathways are proposed along the northern, western, eastern, and southern edges of the project. The pathway along the southern edge of the project would be a segment of the Petaluma River Trail, and the pathways along the eastern and western edges of the project would connect the path adjacent to the SMART right-of-way to the River Trail. Sidewalks and pedestrian improvements currently exist on Caulfield Lane and Hopper Street leading to the project site.

Finding: The project would include a network of pedestrian facilities that is consistent with the Central Petaluma Specific Plan and City requirements, and would effectively tie into the regional pedestrian network.

Bicycle Facilities

The multi-use paths described above will serve bicyclists as well as pedestrians. In addition to these paths, the project includes on-street (Class II) bicycle lanes on all segments of Caulfield Lane through the project site, consistent with the City's Bicycle and Pedestrian plan. Existing bicycle facilities, including bike lanes on adjacent streets, together with shared use of minor streets, and the proposed pathway improvements identified in the project site plan provide adequate access to and from the project site for bicyclists. The project is at the tentative map stage, so currently does not identify the provision of bicycle parking or bicycle storage facilities.

Finding: Through provision of a network of new minor streets and connections to the existing and planned regional bicycle network, the project site effectively accommodates and supports bicycle travel. Bicycling will be a particularly attractive travel mode given the project site's proximity to downtown Petaluma and the downtown SMART commuter rail station.

Recommendation: Bicycle parking and bike lockers should be incorporated into the retail, employment, and mixed-use areas of the project as development plans are generated.

Transit

Existing transit routes are adequate to accommodate project-generated transit trips. Existing stops for local, regional, and interregional transit services are located within approximately one-half mile or less of the project site, which is generally considered an acceptable walking distance. Upon completion of the Caulfield Lane extension across the Petaluma River, opportunities will exist for Petaluma Transit (and potentially regional services including Sonoma County Transit and Golden Gate Transit) to efficiently serve the project area through rerouting of existing bus lines. The project site is also located approximately one mile east of the future SMART commuter rail station in downtown Petaluma. Good

pedestrian and bicycle linkages to the station will exist along the SMART corridor and Hopper Street, supporting the use of rail transit by project employees, visitors, and residents.

Finding: The project site is accessible to transit services, including good pedestrian and bicycle connections to existing and future bus and rail facilities.

Access and Circulation

Site Access

Vehicular access to the project site will be provided from the north via Lakeville Highway, Caulfield Lane, and the extension of Hopper Street. Future access will be provided from the northwest via the Caulfield Lane Extension. In the long-term, a southern extension of Caulfield Lane including a bridge over the Petaluma River may provide access from the south. Bicycle and pedestrian access would be provided via existing streets, a planned multi-use pathway along the SMART corridor, and the Petaluma River Trail.

On-Site Circulation

On-site circulation was evaluated to determine if internal roadways would be expected to operate acceptably and to ensure that adequate space is provided for passenger vehicles, large trucks, and emergency equipment to negotiate the site. The project site plan includes a set of interconnected internal roadways that connect to an elliptical loop in the center of the project site and are designed to allow for future connections to Caulfield Lane and streets in the adjacent former Pomeroy site. The central loop would operate as a one-way roadway with on-street parking circulating around a central green.

The project's tentative map does not indicate traffic control configurations (i.e., stop sign locations) on internal streets. As part of the transportation analysis, traffic control options were considered for each of the internal study intersections, with the preferred option chosen for the operational analysis. The recommended traffic controls are described below.

Finding: All project streets have been designed in accordance with the street standards adopted in the Central Petaluma Specific Plan, and would be expected to provide for sufficient operation both with and without future traffic associated with the extension of Caulfield Lane over the Petaluma River.

Recommendations:

- *Intersections 7 and 9 (Hotel N-S Street)* – The north-south street serving the western portion of the mixed-use area, including the parking lot that will serve the proposed office and hotel uses, is recommended to include stop controls at the Hopper Street and Caulfield Lane intersections, with both of those east-west streets remaining uncontrolled.

- *Intersections 8, 10, and 11 (Caulfield Circle)* – In order to maintain a consistent form of traffic control that meets driver expectations while simultaneously reducing the potential for adverse queuing into adjacent intersections, it is recommended that stop controls be added to all streets entering Caulfield Circle, with traffic flow on the circulating roadway itself remaining uncontrolled.

- *Intersection 12 (Caulfield Lane/River Street)* – The intersection would be expected to handle very low traffic volumes until such time as Caulfield Lane is extended over the Petaluma River. The street should include stop controls on the east and west River Street approaches, with the Caulfield Lane approaches remaining uncontrolled.

Sight Distance

At unsignalized intersections 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 is typically evaluated based on criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance at intersections of public streets is based on corner sight distances, while recommended sight distances for minor street approaches that are either a private road or a driveway are based on stopping sight distance. Both use the approach travel speeds as the basis for determining the recommended sight distance. Table 13 summarizes the minimum sight distance requirements.

Table 13
Intersection Sight Distance Criteria

Speed	Public Road Major Approach Stopping Sight Distance	Public Road Minor Approach Corner Sight Distance	Private Road and Rural Driveway Stopping Sight Distance
20 mph	125 feet	n/a	125 feet
25 mph	150 feet	275 feet	150 feet
30 mph	200 feet	330 feet	200 feet
35 mph	250 feet	385 feet	250 feet
40 mph	300 feet	440 feet	300 feet
45 mph	360 feet	495 feet	360 feet
50 mph	430 feet	550 feet	430 feet

Source: *Highway Design Manual*, 6th Edition, California Department of Transportation, 2006

Internal Study Intersections

While specific information regarding future building and landscaping placement is not included in a project's tentative map stage, it is possible to evaluate whether adequate sight distance will be achievable at internal intersections given the roadway geometries and recommended traffic controls. Based on a review of these factors, it appears that sufficient sight distances will be achievable at all internal study intersections including those surrounding Caulfield Circle. Adequate sight distances at non-study intersections within the development also appear to be achievable given the proposed street configurations.

Finding: Provision of adequate sight distances at intersections within the development appears to be achievable given the street geometries and recommended traffic controls.

Recommendation: Intersection sight distance requirements should be confirmed during the design of buildings and landscaping within the development.

Offsite Study Intersections

The five study intersections along Lakeville Street-Lakeville Highway are existing signalized intersections that are not anticipated to change substantially in the future. The intersection at Caulfield Lane/Hopper Street, however, is an existing unsignalized intersection that will need to be modified in the future both without and with the project, warranting further consideration of sight distance requirements. Approach speeds on Caulfield Lane at this intersection are currently low since nearly all drivers are

slowing to turn right. For an assumed 25 mph approach speed, the required sight distance on each of the Hopper Street approaches is 275 feet. Available sight distance currently exceeds 350 feet, so is sufficient for approach speeds of more than 30 mph.

Once Caulfield Lane is extended to the south through the former water treatment facility, through traffic speeds on the corridor may increase, assuming that stop controls remain on Hopper Street and Caulfield remains uncontrolled. While design plans for the extension have yet to be developed, it is possible that speeds of 35 mph could be achieved on the new northbound approach. Corner sight distance of at least 385 feet would be needed on this approach for these higher speeds. Prevailing speeds on the southbound approach are unlikely to exceed 30 mph due to the roadway's curvature. The required 330-foot sight distance corresponding to this speed is currently available.

In the future with completion of both the Caulfield Lane bridge and the Riverfront project, the intersection of Hopper Street/Caulfield Lane would need to be signalized. Stopping sight distance on each of the approaches would then become the key criteria. With a signal, the southbound intersection stop bar would be located on the north side of the railroad tracks. Available stopping sight distance would exceed 500 feet in all directions, which is well within the 200 to 250-foot required stopping sight distances.

Finding: Sufficient stopping sight distance currently exists at the Caulfield Lane/Hopper Street intersection, and is expected to remain adequate in the future upon the extension of Caulfield Lane and ultimate signalization of the intersection.

Emergency Access

The Riverfront project applicant has coordinated with the City's Public Works, Planning, and Fire Departments in establishing a design that appropriately accommodates emergency access. Until future extension of Caulfield Lane over the Petaluma River, nearly all vehicular access to Riverfront will occur via the Caulfield Lane crossing of the SMART corridor. A very minor inbound-only connection does exist at the northerly terminus of Hopper Street at D Street, though crossing of the SMART rail tracks is required as this location as well, raising concerns of emergency access during a period when a train is stopped or disabled.

In order to provide a secondary access to the Riverfront project and other parcels south of the SMART corridor, the applicant has proposed construction of an emergency vehicle access (EVA) point on D Street that would connect to the existing one-way southbound portion of Hopper Street along the west side of the SMART tracks. The newly-constructed portion of the EVA would create a new gated, emergency use only connection to D Street that is approximately 100 feet west of the tracks. The current southbound-only section of Hopper Street would remain in its current configuration. Provision of the EVA would create a full secondary access point to the area that does not require crossing the rail corridor. The EVA would be for use only during an emergency or evacuation, and at all other times would not result in a change to traffic patterns or to any of the operational conclusions in the traffic analysis. Emergency access was also evaluated by an independent third-party review conducted by HolmesFire, described in the report *Emergency Vehicle Access Assessment: Riverfront Mixed Use Development*, October 2011. HolmesFire found the proposed configuration to be acceptable and consistent with life safety fire codes.

Finding: With provision of the proposed EVA on D Street, emergency access to the Riverfront project and adjacent parcels is considered to be adequate until such time that a bridge is constructed over the Petaluma River in the future.

Conclusions

- The project is expected to generate an average of 4,958 new daily vehicle trips, including 373 during the a.m. peak hour and 430 during the p.m. peak hour.

- Under existing conditions, all six existing study intersections are operating acceptably at LOS D or better. Under baseline conditions, five of the intersections would continue to operate acceptably though the intersection at Lakeville Street/D Street is projected to operate unacceptably at LOS E during the p.m. peak hour. The intersections would operate at the same levels of service upon the addition of traffic associated with the project.

- In the future with buildout of the City's General Plan and associated new roadways, including extension of Caulfield Lane over the Petaluma River to Petaluma Boulevard, the study intersections at Lakeville Street/D Street and Lakeville Street/Caulfield Lane are projected to operate unacceptably at LOS E/F both without and with the Riverfront project.

- The City's General Plan EIR identified the intersections of Lakeville Street/D Street and Lakeville Street/Caulfield Lane as operating unacceptably at buildout. The City adopted overriding considerations for these intersections, finding that capacity improvements would be inconsistent with goals supporting multimodal circulation in Central Petaluma.

- The westbound left turn pocket at Lakeville Street/Caulfield Lane currently has insufficient storage, causing vehicles stacking to extend into through lanes. The Lakeville Street segment between Caulfield Lane and U.S. 101 also serves several driveways including two gas stations where drivers are often observed making illegal left turn movements despite the presence of a painted median.

- US 101 is anticipated to operate below Caltrans' target LOS C/D threshold during the p.m. peak hour under baseline and future volumes. The Riverfront project would contribute traffic to the freeway, though in each time period would result in changes to the volume-to-capacity ratio of less than 0.01. This level of increase is considered to be less-than-significant.

- Vehicle queues on the northbound Caulfield Lane approach to Lakeville Street are projected to remain within the available 500-foot storage under existing and baseline conditions both without and with the project.

- With future traffic volumes that include buildout of the City's General Plan and construction of the Caulfield extension over the Petaluma River, vehicle queues on northbound Caulfield Lane may extend across the SMART railroad tracks. These queues are projected to occur both without and with development of Riverfront.

- Bicycling and walking will be attractive travel modes given the project site's proximity to downtown Petaluma and the downtown SMART commuter rail station. The project would include a network of pedestrian and bicycle facilities that are consistent with the Central Petaluma Specific Plan and City requirements, and would effectively tie into the regional pedestrian network and transit facilities.

- Provision of adequate sight distances at intersections within the development appears to be achievable given the street geometries and recommended traffic controls.

- Sufficient stopping sight distance currently exists at the Caulfield Lane/Hopper Street intersection, and is expected to be retained in the future upon the extension of Caulfield Lane and ultimate signalization of the intersection.

- With provision of the proposed EVA on D Street, emergency access to the Riverfront project and adjacent parcels is considered to be adequate until such time that a bridge is constructed over the Petaluma River.

Recommendations

- It is recommended that the Riverfront development be responsible for constructing the following improvements to the segment of Lakeville Street between Caulfield Lane and the U.S. 101 South Ramps in order to improve capacity and safety at the intersection.
  - Lengthen the westbound left turn pocket at Lakeville Street/Caulfield Lane to approximately 250 feet, and install a raised median on the westbound approach to physically prohibit illegal left turn movements into and out of adjacent properties.

- The following intersection modification is recommended to take place once Caulfield Lane is extended over the Petaluma River to Petaluma Boulevard South. This improvement would be necessary both without the project and with the project.
  - *Lakeville Street/Caulfield Lane* – Install a "queue cutter" signal consisting of an advance detector loop just north of the railroad gates on northbound Caulfield Lane, which will detect vehicle queues and trigger the Lakeville Street/Caulfield Lane signal controller to give a green indication to northbound Caulfield Lane, clearing queues before they extend over the railroad tracks.

- The following intersection modification is recommended to take place once Caulfield Lane is extended over the Petaluma River to Petaluma Boulevard South and the Riverfront project is complete.
  - *Hopper Street/Caulfield Lane* – Install a traffic signal. Add a 50-foot left-turn pocket on the northbound Caulfield Lane approach. Install the southbound limit line and signal heads on the north side of the SMART tracks in order to preclude drivers from stopping on the railroad tracks during a red light.
  - The Riverfront project should contribute its fair share toward the cost of signalization. The project's share of the cumulative traffic growth is estimated to be 21 percent.

- Bicycle parking and bike lockers should be incorporated into the retail, employment, and mixed-use areas of the project as development plans are generated.

- Internal project intersections should include the following stop controls.
  - *Intersections 7 and 9* – On the north-south street's approaches to Hopper Street and Caulfield Lane
  - *Intersections 8, 10, and 11* – On all streets entering Caulfield Circle, with traffic flow on the circulating roadway itself remaining uncontrolled.
  - *Intersection 12* – On the east and west River Street approaches, with the Caulfield Lane approaches remaining uncontrolled.

- Intersection sight distance requirements should be confirmed during the design of buildings and landscaping within the development.

Study Participants and References

Study Participants

Principal in Charge:	Dalene J. Whitlock, PE, PTOE
Project Manager:	Zachary Matley, AICP
Engineer:	Tony Henderson, PE
Transportation Planner:	Josh Abrams
Technician/Graphics:	Deborah J. Mizell
Editing/Formatting:	Angela McCoy

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Appendix A

Intersection Level of Service Calculations

HCM Signalized Intersection Capacity Analysis
1: Washington St. & Lakeville St.

10/25/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	151	50	240	126	81	29	584	167	147	697	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2		4.0	4.2		4.0	4.2		4.0	4.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	0.98		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.94		1.00	0.97		1.00	0.99	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1695		1770	1643		1768	3359		1768	3512	
Flt Permitted		0.99		0.95	1.00		0.26	1.00		0.17	1.00	
Satd. Flow (perm)		1695		1770	1643		492	3359		323	3512	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	26	168	56	267	140	90	32	649	186	163	774	32
RTOR Reduction (vph)	0	0	0	0	17	0	0	17	0	0	2	0
Lane Group Flow (vph)	0	250	0	267	213	0	32	818	0	163	804	0
Confl. Peds. (#/hr)	6		7	7		6	4		18	18		4
Confl. Bikes (#/hr)			8			13			20			12
Heavy Vehicles (%)	2%	10%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Split	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	7		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		24.8		34.0	33.8		57.3	53.3		68.8	60.8	
Effective Green, g (s)		24.8		34.0	33.8		57.3	53.3		68.8	60.8	
Actuated g/C Ratio		0.18		0.24	0.24		0.41	0.38		0.49	0.43	
Clearance Time (s)		4.2		4.0	4.2		4.0	4.2		4.0	4.2	
Vehicle Extension (s)		2.5		2.5	2.5		2.0	4.0		2.0	4.0	
Lane Grp Cap (vph)		300		430	397		238	1279		277	1525	
v/s Ratio Prot		c0.15		c0.15	0.13		0.00	c0.24		c0.05	0.23	
v/s Ratio Perm							0.05			0.24		
v/c Ratio		0.83		0.62	0.54		0.13	0.64		0.59	0.53	
Uniform Delay, d1		55.6		47.3	46.3		25.5	35.5		23.7	29.1	
Progression Factor		1.00		0.85	0.83		0.78	0.82		1.00	1.00	
Incremental Delay, d2		17.4		2.3	5.0		0.1	2.4		2.1	1.3	
Delay (s)		73.0		42.6	43.3		19.9	31.6		25.7	30.4	
Level of Service		E		D	D		B	C		C	C	
Approach Delay (s)		73.0			42.9			31.1			29.6	
Approach LOS		E			D			C			C	

Intersection Summary				
HCM Average Control Delay	36.9	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.67			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.4	
Intersection Capacity Utilization	87.0%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: E D St. & Lakeville St.

10/25/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	396	102	342	319	24	81	98	410	14	130	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5	4.5		4.2	4.2	4.2	4.2	
Lane Util. Factor		0.95		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes		0.97		1.00	1.00	0.89		1.00	1.00	1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.97		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected		1.00		0.95	1.00	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (prot)		3120		1770	1712	1412		1822	1583	1770	1846	
Flt Permitted		0.95		0.95	1.00	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (perm)		2968		1770	1712	1412		1822	1583	1770	1846	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	6	440	113	380	354	27	90	109	456	16	144	8
RTOR Reduction (vph)	0	13	0	0	0	10	0	0	247	0	0	0
Lane Group Flow (vph)	0	546	0	380	354	17	0	199	209	16	152	0
Confl. Peds. (#/hr)	22		31	31		22						
Confl. Bikes (#/hr)			21			17			1			1
Heavy Vehicles (%)	2%	10%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	
Protected Phases		4		3	8		2	2	2 3	6	6	
Permitted Phases	4					8						
Actuated Green, G (s)		42.0		43.5	90.0	90.0		20.8	68.8	16.3	16.3	
Effective Green, g (s)		42.0		43.5	90.0	90.0		20.8	64.3	16.3	16.3	
Actuated g/C Ratio		0.30		0.31	0.64	0.64		0.15	0.46	0.12	0.12	
Clearance Time (s)		4.5		4.5	4.5	4.5		4.2		4.2	4.2	
Vehicle Extension (s)		4.0		2.0	4.0	4.0		2.5		2.5	2.5	
Lane Grp Cap (vph)		890		550	1101	908		271	727	206	215	
v/s Ratio Prot				c0.21	0.21			c0.11	0.13	0.01	c0.08	
v/s Ratio Perm		c0.18				0.01						
v/c Ratio		0.61		0.69	0.32	0.02		0.73	0.29	0.08	0.71	
Uniform Delay, d1		42.0		42.3	11.3	9.0		57.0	23.6	55.1	59.6	
Progression Factor		0.68		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.6		3.0	0.8	0.0		9.3	0.2	0.1	9.4	
Delay (s)		31.2		45.4	12.0	9.1		66.3	23.7	55.3	69.0	
Level of Service		C		D	B	A		E	C	E	E	
Approach Delay (s)		31.2			28.6			36.7			67.7	
Approach LOS		C			C			D			E	

Intersection Summary				
HCM Average Control Delay	34.8	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.67			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	65.3%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Caulfield Ln. & Lakeville St.

10/25/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	613	7	6	545	102	25	20	24	353	3	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.97		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00
Satd. Flow (prot)	1770	3277		1770	3252	1554	1770	3154		1681	1687	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00
Satd. Flow (perm)	1770	3277		1770	3252	1554	1770	3154		1681	1687	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	133	681	8	7	606	113	28	22	27	392	3	259
RTOR Reduction (vph)	0	1	0	0	0	56	0	25	0	0	0	128
Lane Group Flow (vph)	133	688	0	7	606	57	28	24	0	196	199	131
Confl. Peds. (#/hr)	4		6	6		4			3	3		
Confl. Bikes (#/hr)			8			5			8			3
Heavy Vehicles (%)	2%	10%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	pt+ov
Protected Phases	5	2		1	6		3	3		4	4	4 5
Permitted Phases						6						
Actuated Green, G (s)	13.0	53.9		1.4	42.3	42.3	7.2	7.2		29.7	29.7	47.6
Effective Green, g (s)	13.0	53.9		1.4	42.3	42.3	7.2	7.2		29.7	29.7	47.6
Actuated g/C Ratio	0.12	0.49		0.01	0.38	0.38	0.07	0.07		0.27	0.27	0.43
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	209	1606		23	1251	598	116	206		454	455	685
v/s Ratio Prot	c0.08	0.21		0.00	c0.19		c0.02	0.01		0.12	c0.12	0.08
v/s Ratio Perm						0.04						
v/c Ratio	0.64	0.43		0.30	0.48	0.10	0.24	0.12		0.43	0.44	0.19
Uniform Delay, d1	46.2	18.1		53.8	25.6	21.6	48.8	48.4		33.2	33.2	19.3
Progression Factor	1.00	1.00		1.41	0.55	0.42	1.00	1.00		0.86	0.87	1.05
Incremental Delay, d2	6.2	0.8		2.5	1.3	0.3	0.4	0.1		2.9	3.0	0.1
Delay (s)	52.5	18.9		78.6	15.2	9.3	49.2	48.5		31.6	31.7	20.3
Level of Service	D	B		E	B	A	D	D		C	C	C
Approach Delay (s)		24.4			14.9			48.8			27.2	
Approach LOS		C			B			D			C	

Intersection Summary				
HCM Average Control Delay	23.0	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.47			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.8	
Intersection Capacity Utilization	64.7%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Lakeville St./Lakeville Hwy. & US-101 SB Ramps

10/25/2011

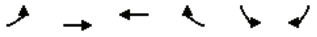
Movement	EBL	EBT	EBR	WBL	WBT	WBR2	SBL	SBR	SBR2	NEL2	NET	NER
Lane Configurations												
Volume (vph)	291	647	3	4	529	324	727	4	74	2	5	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		3.5	5.0	5.0	4.9		4.9		3.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	0.97		0.91		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00		0.98		0.93	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		1.00		1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00		0.85		0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95		1.00		1.00	
Satd. Flow (prot)	3433	3281		1770	3139	1559	3435		1416		1579	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95		1.00		1.00	
Satd. Flow (perm)	3433	3281		1770	3139	1559	3435		1416		1579	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	323	719	3	4	588	360	808	4	82	2	6	13
RTOR Reduction (vph)	0	0	0	0	0	233	1	0	52	0	13	0
Lane Group Flow (vph)	323	722	0	4	588	127	819	0	22	0	8	0
Confl. Peds. (#/hr)	4					4	3		2	2		3
Confl. Bikes (#/hr)								4	4		6	9
Heavy Vehicles (%)	2%	10%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	NA		Perm	Split	NA	
Protected Phases	5	2		1	6		4			3	3	
Permitted Phases						6			4			
Actuated Green, G (s)	18.3	56.8		1.2	38.7	38.7	32.1		32.1		3.0	
Effective Green, g (s)	18.3	56.8		1.2	38.7	38.7	32.1		32.1		3.0	
Actuated g/C Ratio	0.17	0.52		0.01	0.35	0.35	0.29		0.29		0.03	
Clearance Time (s)	4.5	5.0		3.5	5.0	5.0	4.9		4.9		3.5	
Vehicle Extension (s)	3.0	3.0		2.0	3.0	3.0	3.0		3.0		3.0	
Lane Grp Cap (vph)	571	1694		19	1104	548	1002		413		43	
v/s Ratio Prot	c0.09	0.22		0.00	c0.19		c0.24				c0.01	
v/s Ratio Perm						0.08			0.02			
v/c Ratio	0.57	0.43		0.21	0.53	0.23	0.82		0.05		0.19	
Uniform Delay, d1	42.2	16.5		53.9	28.4	25.2	36.2		28.0		52.3	
Progression Factor	0.90	0.71		0.85	0.73	2.28	1.00		1.00		1.00	
Incremental Delay, d2	1.2	0.7		1.9	1.7	0.9	5.3		0.1		2.2	
Delay (s)	39.4	12.5		47.9	22.5	58.2	41.5		28.1		54.5	
Level of Service	D	B		D	C	E	D		C		D	
Approach Delay (s)		20.8			36.1		40.4				54.5	
Approach LOS		C			D		D				D	

Intersection Summary				
HCM Average Control Delay	32.1	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.9	
Intersection Capacity Utilization	79.5%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lakeville Hwy. & US-101 NB Ramps

10/25/2011

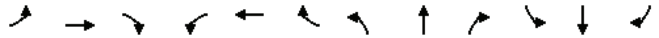


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	53	1316	814	739	332	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	4.4	4.4
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3112	3139	1547	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3112	3139	1547	3433	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	59	1462	904	821	369	73
RTOR Reduction (vph)	0	0	0	277	0	54
Lane Group Flow (vph)	59	1462	904	544	369	19
Confl. Peds. (#/hr)	4			4	4	2
Heavy Vehicles (%)	2%	16%	15%	2%	2%	2%
Turn Type	Prot	NA	NA	Perm	NA	pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	7.4	84.3	72.9	72.9	16.3	28.1
Effective Green, g (s)	7.4	84.3	72.9	72.9	16.3	28.1
Actuated g/C Ratio	0.07	0.77	0.66	0.66	0.15	0.26
Clearance Time (s)	4.0	5.0	5.0	5.0	4.4	
Vehicle Extension (s)	2.0	3.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	119	2385	2080	1025	509	404
v/s Ratio Prot	0.03	c0.47	0.29		c0.11	0.01
v/s Ratio Perm				0.35		
v/c Ratio	0.50	0.61	0.43	0.53	0.72	0.05
Uniform Delay, d1	49.5	5.7	8.8	9.7	44.7	30.9
Progression Factor	0.84	0.97	0.51	0.65	1.00	1.00
Incremental Delay, d2	1.0	1.0	0.5	1.6	4.3	0.0
Delay (s)	42.6	6.6	5.0	7.9	49.0	30.9
Level of Service	D	A	A	A	D	C
Approach Delay (s)		7.9	6.4		46.0	
Approach LOS		A	A		D	

Intersection Summary				
HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.4
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
6: Hopper St & Caulfield Ln.

10/25/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	66	1	0	0	1	2	0	4	0	2	7	51
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	73	1	0	0	1	2	0	4	0	2	8	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	48	45	36	17	73	4	64			4		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	48	45	36	17	73	4	64			4		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	100	100	100	100	100			100		
cM capacity (veh/h)	949	846	1036	995	816	1079	1538			1617		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	74	3	4	2	64
Volume Left	73	0	0	2	0
Volume Right	0	2	0	0	57
cSH	947	974	1538	1617	1700
Volume to Capacity	0.08	0.00	0.00	0.00	0.04
Queue Length 95th (ft)	6	0	0	0	0
Control Delay (s)	9.1	8.7	0.0	7.2	0.0
Lane LOS	A	A		A	
Approach Delay (s)	9.1	8.7	0.0	0.2	
Approach LOS	A	A			

Intersection Summary				
Average Delay	4.9			
Intersection Capacity Utilization	20.6%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Signalized Intersection Capacity Analysis
1: Washington St. & Lakeville St.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	122	43	299	217	141	57	770	198	123	769	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2		4.0	4.2		4.0	4.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.98		1.00	0.98		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.94		1.00	0.97		1.00	0.99	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1734		1770	1662		1769	3351		1770	3494	
Flt Permitted		0.99		0.95	1.00		0.20	1.00		0.09	1.00	
Satd. Flow (perm)		1734		1770	1662		369	3351		174	3494	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	43	136	48	332	241	157	63	856	220	137	854	57
RTOR Reduction (vph)	0	8	0	0	17	0	0	14	0	0	3	0
Lane Group Flow (vph)	0	219	0	332	381	0	63	1062	0	137	908	0
Confl. Peds. (#/hr)	28		18	18		28	7		32	32		7
Confl. Bikes (#/hr)			8			13			20			12
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Split	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	7		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		22.4		35.3	35.1		61.6	55.5		70.1	60.0	
Effective Green, g (s)		22.4		35.3	35.1		61.6	55.5		70.1	60.0	
Actuated g/C Ratio		0.16		0.25	0.25		0.44	0.40		0.50	0.43	
Clearance Time (s)		4.0		4.0	4.2		4.0	4.2		4.0	4.2	
Vehicle Extension (s)		2.5		2.5	2.5		2.0	4.0		2.0	4.0	
Lane Grp Cap (vph)		277		446	417		223	1328		208	1497	
v/s Ratio Prot		c0.13		0.19	c0.23		0.01	c0.32		c0.05	0.26	
v/s Ratio Perm							0.11			0.28		
v/c Ratio		0.79		0.74	0.91		0.28	0.80		0.66	0.61	
Uniform Delay, d1		56.6		48.2	51.0		24.4	37.3		26.3	30.9	
Progression Factor		1.00		0.83	0.83		0.77	0.79		1.00	1.00	
Incremental Delay, d2		13.9		5.3	21.0		0.2	4.6		5.6	1.8	
Delay (s)		70.5		45.3	63.5		19.0	34.3		31.9	32.7	
Level of Service		E		D	E		B	C		C	C	
Approach Delay (s)		70.5			55.2			33.4			32.6	
Approach LOS		E			E			C			C	

Intersection Summary				
HCM Average Control Delay	40.9	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.4	
Intersection Capacity Utilization	90.2%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: E D St. & Lakeville St.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	350	81	355	505	33	134	128	457	16	128	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5	4.5		4.2	4.2	4.2	4.2	
Lane Util. Factor		0.95		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes		0.97		1.00	1.00	0.91		1.00	1.00	1.00	0.99	
Flpb, ped/bikes		1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.97		1.00	1.00	0.85		1.00	0.85	1.00	0.97	
Flt Protected		1.00		0.95	1.00	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (prot)		3229		1770	1776	1444		1816	1583	1770	1805	
Flt Permitted		0.89		0.95	1.00	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (perm)		2886		1770	1776	1444		1816	1583	1770	1805	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	13	389	90	394	561	37	149	142	508	18	142	30
RTOR Reduction (vph)	0	12	0	0	0	15	0	0	261	0	0	0
Lane Group Flow (vph)	0	480	0	394	561	22	0	291	247	18	172	0
Confl. Peds. (#/hr)	16		32	32		16	2		4	4		2
Confl. Bikes (#/hr)			21			17			1			1
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	
Protected Phases		4		3	8		2	2	2 3	6	6	
Permitted Phases	4					8						
Actuated Green, G (s)		39.5		37.5	81.5	81.5		27.5	69.5	18.1	18.1	
Effective Green, g (s)		39.5		37.5	81.5	81.5		27.5	65.0	18.1	18.1	
Actuated g/C Ratio		0.28		0.27	0.58	0.58		0.20	0.46	0.13	0.13	
Clearance Time (s)		4.5		4.5	4.5	4.5		4.2		4.2	4.2	
Vehicle Extension (s)		4.0		2.0	4.0	4.0		2.5		2.5	2.5	
Lane Grp Cap (vph)		814		474	1034	841		357	735	229	233	
v/s Ratio Prot				c0.22	0.32			c0.16	0.16	0.01	c0.10	
v/s Ratio Perm		c0.17				0.01						
v/c Ratio		0.59		0.83	0.54	0.03		0.82	0.34	0.08	0.74	
Uniform Delay, d1		43.3		48.3	17.9	12.4		53.8	23.8	53.6	58.7	
Progression Factor		0.68		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		2.3		11.3	2.0	0.1		13.0	0.2	0.1	10.9	
Delay (s)		31.6		59.6	19.9	12.5		66.8	24.0	53.7	69.6	
Level of Service		C		E	B	B		E	C	D	E	
Approach Delay (s)		31.6			35.4			39.6			68.1	
Approach LOS		C			D			D			E	

Intersection Summary				
HCM Average Control Delay	38.5	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	80.2%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Caulfield Ln. & Lakeville St.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	239	502	12	16	728	312	48	28	26	192	4	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.98		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00
Satd. Flow (prot)	1770	3395		1770	3374	1552	1770	3215		1681	1688	1551
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00
Satd. Flow (perm)	1770	3395		1770	3374	1552	1770	3215		1681	1688	1551
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	266	558	13	18	809	347	53	31	29	213	4	164
RTOR Reduction (vph)	0	1	0	0	0	67	0	27	0	0	0	148
Lane Group Flow (vph)	266	570	0	18	809	280	53	33	0	109	108	16
Confl. Peds. (#/hr)	5		2	2		5	1					1
Confl. Bikes (#/hr)			8			5			8			3
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	26.6	97.2		3.2	73.8	73.8	8.1	8.1		13.7	13.7	13.7
Effective Green, g (s)	26.6	97.2		3.2	73.8	73.8	8.1	8.1		13.7	13.7	13.7
Actuated g/C Ratio	0.19	0.69		0.02	0.53	0.53	0.06	0.06		0.10	0.10	0.10
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.9
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	336	2357		40	1779	818	102	186		164	165	152
v/s Ratio Prot	c0.15	0.17		0.01	c0.24		c0.03	0.01		c0.06	0.06	
v/s Ratio Perm						0.18						0.01
v/c Ratio	0.79	0.24		0.45	0.45	0.34	0.52	0.18		0.66	0.65	0.11
Uniform Delay, d1	54.1	7.9		67.5	20.6	19.1	64.1	62.8		60.9	60.9	57.6
Progression Factor	1.00	1.00		0.64	0.28	0.12	1.00	1.00		0.92	0.92	1.11
Incremental Delay, d2	12.0	0.2		2.4	0.7	1.0	1.9	0.2		7.4	6.7	0.1
Delay (s)	66.1	8.1		45.3	6.5	3.3	65.9	62.9		63.5	62.7	63.8
Level of Service	E	A		D	A	A	E	E		E	E	E
Approach Delay (s)		26.5			6.2			64.3			63.4	
Approach LOS		C			A			E			E	

Intersection Summary				
HCM Average Control Delay	24.3	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	17.8	
Intersection Capacity Utilization	67.1%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Lakeville St./Lakeville Hwy. & US-101 SB Ramps

10/28/2011

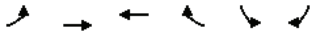
Movement	EBL	EBT	EBR	WBL	WBT	WBR2	SBL	SBR	SBR2	NEL2	NET	NER
Lane Configurations												
Volume (vph)	140	578	5	48	940	229	643	9	153	6	5	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0	5.0	4.9		4.9		4.4	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	0.97		0.91		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		0.98		0.92	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		1.00		1.00	
Frt	1.00	1.00		1.00	1.00	0.85	0.99		0.85		0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95		1.00		0.99	
Satd. Flow (prot)	3433	3401		1770	3312	1583	3425		1419		1566	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95		1.00		0.99	
Satd. Flow (perm)	3433	3401		1770	3312	1583	3425		1419		1566	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	156	642	6	53	1044	254	714	10	170	7	6	18
RTOR Reduction (vph)	0	1	0	0	0	126	1	0	114	0	18	0
Lane Group Flow (vph)	156	647	0	53	1044	128	740	0	39	0	13	0
Confl. Peds. (#/hr)			2	2			5					5
Confl. Bikes (#/hr)								4	4		6	9
Heavy Vehicles (%)	2%	6%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	NA		Perm	Split	NA	
Protected Phases	5	2		1	6		4			3	3	
Permitted Phases						6			4			
Actuated Green, G (s)	11.7	55.9		26.3	70.5	70.5	35.7		35.7		3.8	
Effective Green, g (s)	11.7	55.9		26.3	70.5	70.5	35.7		35.7		3.8	
Actuated g/C Ratio	0.08	0.40		0.19	0.50	0.50	0.26		0.26		0.03	
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0	4.9		4.9		4.4	
Vehicle Extension (s)	3.0	3.0		2.0	3.0	3.0	3.0		3.0		2.0	
Lane Grp Cap (vph)	287	1358		333	1668	797	873		362		43	
v/s Ratio Prot	c0.05	0.19		0.03	c0.32		c0.22				c0.01	
v/s Ratio Perm						0.08			0.03			
v/c Ratio	0.54	0.48		0.16	0.63	0.16	0.85		0.11		0.31	
Uniform Delay, d1	61.6	31.2		47.6	25.2	18.8	49.6		39.9		66.8	
Progression Factor	1.04	0.69		0.76	0.63	1.08	1.00		1.00		1.00	
Incremental Delay, d2	2.1	1.2		0.1	1.4	0.3	7.6		0.1		1.5	
Delay (s)	66.3	22.8		36.2	17.4	20.5	57.2		40.1		68.3	
Level of Service	E	C		D	B	C	E		D		E	
Approach Delay (s)		31.3			18.7		54.3				68.3	
Approach LOS		C			B		D				E	

Intersection Summary				
HCM Average Control Delay	32.8	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.67			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.3	
Intersection Capacity Utilization	70.6%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lakeville Hwy. & US-101 NB Ramps

10/28/2011

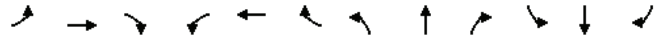


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	102	1109	1063	611	191	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3374	3312	1550	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3374	3312	1550	3433	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	113	1232	1181	679	212	256
RTOR Reduction (vph)	0	0	0	317	0	1
Lane Group Flow (vph)	113	1232	1181	362	212	255
Confl. Peds. (#/hr)	1			1	3	3
Heavy Vehicles (%)	2%	7%	9%	2%	2%	2%
Turn Type	Prot	NA	NA	Perm	NA	pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	9.6	50.9	37.3	37.3	9.6	23.2
Effective Green, g (s)	9.6	50.9	37.3	37.3	9.6	19.2
Actuated g/C Ratio	0.14	0.73	0.53	0.53	0.14	0.27
Clearance Time (s)	4.0	5.0	5.0	5.0	4.5	
Vehicle Extension (s)	2.0	3.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	243	2453	1765	826	471	434
v/s Ratio Prot	0.06	0.37	c0.36		0.06	c0.16
v/s Ratio Perm				0.23		
v/c Ratio	0.47	0.50	0.67	0.44	0.45	0.59
Uniform Delay, d1	27.8	4.1	11.9	10.0	27.8	22.0
Progression Factor	0.90	1.16	1.37	7.24	1.00	1.00
Incremental Delay, d2	0.4	0.6	1.3	1.1	0.2	1.3
Delay (s)	25.4	5.4	17.6	73.2	28.0	23.3
Level of Service	C	A	B	E	C	C
Approach Delay (s)		7.1	37.9		25.4	
Approach LOS		A	D		C	

Intersection Summary				
HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
6: Hopper St & Caulfield Ln.

10/28/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	45	1	0	0	1	3	0	6	0	1	3	29
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	50	1	0	0	1	3	0	7	0	1	3	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	32	28	19	13	44	7	36			7		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	32	28	19	13	44	7	36			7		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	100	100	100	100	100			100		
cM capacity (veh/h)	971	864	1059	1003	847	1076	1575			1614		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	51	4	7	1	36
Volume Left	50	0	0	1	0
Volume Right	0	3	0	0	32
cSH	968	1008	1575	1614	1700
Volume to Capacity	0.05	0.00	0.00	0.00	0.02
Queue Length 95th (ft)	4	0	0	0	0
Control Delay (s)	8.9	8.6	0.0	7.2	0.0
Lane LOS	A	A		A	
Approach Delay (s)	8.9	8.6	0.0	0.2	
Approach LOS	A	A			

Intersection Summary				
Average Delay	5.1			
Intersection Capacity Utilization	19.2%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Signalized Intersection Capacity Analysis
1: Washington St. & Lakeville St.

10/25/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	170	50	259	145	85	29	584	186	150	697	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2		4.0	4.2		4.0	4.2		4.0	4.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	0.98		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.94		1.00	0.96		1.00	0.99	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1698		1770	1647		1768	3343		1770	3512	
Flt Permitted		1.00		0.95	1.00		0.26	1.00		0.16	1.00	
Satd. Flow (perm)		1698		1770	1647		487	3343		291	3512	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	26	189	56	288	161	94	32	649	207	167	774	32
RTOR Reduction (vph)	0	0	0	0	15	0	0	20	0	0	2	0
Lane Group Flow (vph)	0	271	0	288	240	0	32	836	0	167	804	0
Confl. Peds. (#/hr)	6		7	7		6	4		18	18		4
Confl. Bikes (#/hr)			8			13			20			12
Heavy Vehicles (%)	2%	10%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Split	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	7		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		26.1		34.0	33.8		55.6	51.6		67.5	59.5	
Effective Green, g (s)		26.1		34.0	33.8		55.6	51.6		67.5	59.5	
Actuated g/C Ratio		0.19		0.24	0.24		0.40	0.37		0.48	0.42	
Clearance Time (s)		4.2		4.0	4.2		4.0	4.2		4.0	4.2	
Vehicle Extension (s)		2.5		2.5	2.5		2.0	4.0		2.0	4.0	
Lane Grp Cap (vph)		317		430	398		230	1232		266	1493	
v/s Ratio Prot		c0.16		c0.16	0.15		0.00	c0.25		c0.05	0.23	
v/s Ratio Perm							0.05			0.25		
v/c Ratio		0.85		0.67	0.60		0.14	0.68		0.63	0.54	
Uniform Delay, d1		55.1		47.9	47.1		26.5	37.2		24.9	30.0	
Progression Factor		1.00		0.84	0.82		0.79	0.83		1.00	1.00	
Incremental Delay, d2		19.4		3.4	6.3		0.1	2.9		3.3	1.4	
Delay (s)		74.5		43.5	44.8		21.0	34.0		28.3	31.4	
Level of Service		E		D	D		C	C		C	C	
Approach Delay (s)		74.5			44.1			33.5			30.9	
Approach LOS		E			D			C			C	

Intersection Summary				
HCM Average Control Delay	38.8	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.4	
Intersection Capacity Utilization	88.0%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: E D St. & Lakeville St.

10/25/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	436	102	370	360	29	81	98	438	18	130	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5	4.5		4.2	4.2	4.2	4.2	
Lane Util. Factor		0.95		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes		0.97		1.00	1.00	0.89		1.00	1.00	1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.97		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected		1.00		0.95	1.00	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (prot)		3132		1770	1712	1412		1822	1583	1770	1846	
Flt Permitted		0.95		0.95	1.00	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (perm)		2979		1770	1712	1412		1822	1583	1770	1846	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	6	484	113	411	400	32	90	109	487	20	144	8
RTOR Reduction (vph)	0	12	0	0	0	11	0	0	263	0	0	0
Lane Group Flow (vph)	0	591	0	411	400	21	0	199	224	20	152	0
Confl. Peds. (#/hr)	22		31	31		22						
Confl. Bikes (#/hr)			21			17			1			1
Heavy Vehicles (%)	2%	10%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	
Protected Phases		4		3	8		2	2	2 3	6	6	
Permitted Phases	4					8						
Actuated Green, G (s)		42.0		43.5	90.0	90.0		20.8	68.8	16.3	16.3	
Effective Green, g (s)		42.0		43.5	90.0	90.0		20.8	64.3	16.3	16.3	
Actuated g/C Ratio		0.30		0.31	0.64	0.64		0.15	0.46	0.12	0.12	
Clearance Time (s)		4.5		4.5	4.5	4.5		4.2		4.2	4.2	
Vehicle Extension (s)		4.0		2.0	4.0	4.0		2.5		2.5	2.5	
Lane Grp Cap (vph)		894		550	1101	908		271	727	206	215	
v/s Ratio Prot				c0.23	0.23			c0.11	0.14	0.01	c0.08	
v/s Ratio Perm		c0.20				0.01						
v/c Ratio		0.66		0.75	0.36	0.02		0.73	0.31	0.10	0.71	
Uniform Delay, d1		42.8		43.3	11.6	9.1		57.0	23.8	55.3	59.6	
Progression Factor		0.67		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		3.0		4.8	0.9	0.0		9.3	0.2	0.2	9.4	
Delay (s)		31.5		48.1	12.6	9.1		66.3	24.0	55.4	69.0	
Level of Service		C		D	B	A		E	C	E	E	
Approach Delay (s)		31.5			29.8			36.3			67.4	
Approach LOS		C			C			D			E	

Intersection Summary				
HCM Average Control Delay	35.0	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	67.9%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Caulfield Ln. & Lakeville St.

10/25/2011

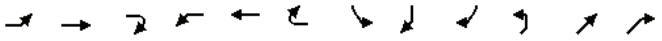
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	613	82	82	545	102	102	52	100	353	40	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.97		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00
Satd. Flow (prot)	1770	3237		1770	3252	1554	1770	3098		1681	1702	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00
Satd. Flow (perm)	1770	3237		1770	3252	1554	1770	3098		1681	1702	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	133	681	91	91	606	113	113	58	111	392	44	259
RTOR Reduction (vph)	0	9	0	0	0	55	0	102	0	0	0	76
Lane Group Flow (vph)	133	763	0	91	606	58	113	67	0	216	220	183
Confl. Peds. (#/hr)	4		6	6		4			3	3		
Confl. Bikes (#/hr)			8			5			8			3
Heavy Vehicles (%)	2%	10%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	pt+ov
Protected Phases	5	2		1	6		3	3		4	4	4 5
Permitted Phases						6						
Actuated Green, G (s)	13.0	49.1		7.0	43.1	43.1	9.0	9.0		27.1	27.1	45.0
Effective Green, g (s)	13.0	49.1		7.0	43.1	43.1	9.0	9.0		27.1	27.1	45.0
Actuated g/C Ratio	0.12	0.45		0.06	0.39	0.39	0.08	0.08		0.25	0.25	0.41
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	209	1445		113	1274	609	145	253		414	419	648
v/s Ratio Prot	c0.08	c0.24		c0.05	0.19		c0.06	0.02		0.13	c0.13	0.12
v/s Ratio Perm						0.04						
v/c Ratio	0.64	0.53		0.81	0.48	0.09	0.78	0.27		0.52	0.53	0.28
Uniform Delay, d1	46.2	22.1		50.8	25.0	21.1	49.5	47.4		35.8	35.9	21.7
Progression Factor	1.00	1.00		1.50	0.25	0.02	1.00	1.00		0.88	0.88	0.75
Incremental Delay, d2	6.2	1.4		26.4	1.0	0.3	21.0	0.2		4.5	4.5	0.2
Delay (s)	52.5	23.4		102.5	7.3	0.7	70.5	47.6		36.0	36.1	16.4
Level of Service	D	C		F	A	A	E	D		D	D	B
Approach Delay (s)		27.7			17.1			56.8			28.7	
Approach LOS		C			B			E			C	

Intersection Summary				
HCM Average Control Delay	27.8	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.9	
Intersection Capacity Utilization	69.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Lakeville St./Lakeville Hwy. & US-101 SB Ramps

10/25/2011



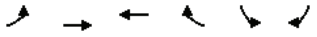
Movement	EBL	EBT	EBR	WBL	WBT	WBR2	SBL	SBR	SBR2	NEL2	NET	NER
Lane Configurations												
Volume (vph)	310	705	3	4	577	324	727	4	102	2	5	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		3.5	5.0	5.0	4.9		4.9		3.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	0.97		0.91		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00		0.98		0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		1.00		1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00		0.85		0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95		1.00		1.00	
Satd. Flow (prot)	3433	3281		1770	3139	1559	3433		1416		1658	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95		1.00		1.00	
Satd. Flow (perm)	3433	3281		1770	3139	1559	3433		1416		1658	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	344	783	3	4	641	360	808	4	113	2	6	13
RTOR Reduction (vph)	0	0	0	0	0	265	1	0	72	0	12	0
Lane Group Flow (vph)	344	786	0	4	641	95	822	0	30	0	9	0
Confl. Peds. (#/hr)	4					4	3		2	2		3
Confl. Bikes (#/hr)								4	4		6	9
Heavy Vehicles (%)	2%	10%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	NA		Perm		NA	
Protected Phases	5	2		1	6		4				3	
Permitted Phases						6			4			
Actuated Green, G (s)	18.9	47.8		1.2	29.1	29.1	32.2		32.2		11.9	
Effective Green, g (s)	18.9	47.8		1.2	29.1	29.1	32.2		32.2		11.9	
Actuated g/C Ratio	0.17	0.43		0.01	0.26	0.26	0.29		0.29		0.11	
Clearance Time (s)	4.5	5.0		3.5	5.0	5.0	4.9		4.9		3.5	
Vehicle Extension (s)	3.0	3.0		2.0	3.0	3.0	3.0		3.0		3.0	
Lane Grp Cap (vph)	590	1426		19	830	412	1005		415		179	
v/s Ratio Prot	0.10	c0.24		0.00	c0.20		c0.24					
v/s Ratio Perm						0.06			0.02		0.01	
v/c Ratio	0.58	0.55		0.21	0.77	0.23	0.82		0.07		0.05	
Uniform Delay, d1	41.9	23.1		53.9	37.4	31.7	36.2		28.1		44.0	
Progression Factor	0.86	0.76		0.81	0.83	2.71	1.00		1.00		1.00	
Incremental Delay, d2	1.3	1.3		1.8	6.3	1.2	5.3		0.1		0.1	
Delay (s)	37.2	18.9		45.4	37.4	87.2	41.4		28.2		44.1	
Level of Service	D	B		D	D	F	D		C		D	
Approach Delay (s)		24.5			55.2		40.0				44.1	
Approach LOS		C			E		D				D	

Intersection Summary				
HCM Average Control Delay	39.3	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.4	
Intersection Capacity Utilization	80.2%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lakeville Hwy. & US-101 NB Ramps

10/25/2011

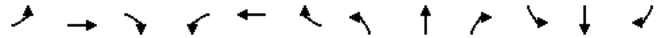


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	81	1346	843	739	332	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	4.4	4.4
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3112	3139	1547	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3112	3139	1547	3433	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	90	1496	937	821	369	94
RTOR Reduction (vph)	0	0	0	299	0	64
Lane Group Flow (vph)	90	1496	937	522	369	30
Confl. Peds. (#/hr)	4			4	4	2
Heavy Vehicles (%)	2%	16%	15%	2%	2%	2%
Turn Type	Prot	NA	NA	Perm	NA	pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	10.4	84.3	69.9	69.9	16.3	31.1
Effective Green, g (s)	10.4	84.3	69.9	69.9	16.3	31.1
Actuated g/C Ratio	0.09	0.77	0.64	0.64	0.15	0.28
Clearance Time (s)	4.0	5.0	5.0	5.0	4.4	
Vehicle Extension (s)	2.0	3.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	167	2385	1995	983	509	448
v/s Ratio Prot	0.05	c0.48	0.30		c0.11	0.02
v/s Ratio Perm				0.34		
v/c Ratio	0.54	0.63	0.47	0.53	0.72	0.07
Uniform Delay, d1	47.5	5.8	10.4	11.0	44.7	28.8
Progression Factor	0.81	1.29	0.51	0.63	1.00	1.00
Incremental Delay, d2	1.4	1.1	0.6	1.7	4.3	0.0
Delay (s)	39.9	8.5	5.9	8.6	49.0	28.9
Level of Service	D	A	A	A	D	C
Approach Delay (s)		10.3	7.2		44.9	
Approach LOS		B	A		D	

Intersection Summary				
HCM Average Control Delay	13.1	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.4	
Intersection Capacity Utilization	60.4%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Hopper St & Caulfield Ln.

11/3/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	66	1	0	0	1	187	0	4	0	190	7	51
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	73	1	0	0	1	208	0	4	0	211	8	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	463	463	36	435	491	4	64			4		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	463	463	36	435	491	4	64			4		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	80	100	100	100	100	81	100			87		
cM capacity (veh/h)	369	431	1036	477	416	1079	1538			1617		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	74	209	4	211	64
Volume Left	73	0	0	211	0
Volume Right	0	208	0	0	57
cSH	370	1085	1538	1617	1700
Volume to Capacity	0.20	0.19	0.00	0.13	0.04
Queue Length 95th (ft)	19	18	0	11	0
Control Delay (s)	17.2	9.2	0.0	7.6	0.0
Lane LOS	C	A		A	
Approach Delay (s)	17.2	9.2	0.0	5.8	
Approach LOS	C	A			

Intersection Summary				
Average Delay	8.5			
Intersection Capacity Utilization	34.2%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Signalized Intersection Capacity Analysis
1: Washington St. & Lakeville St.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	143	43	321	239	145	57	770	219	128	769	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2		4.0	4.2		4.0	4.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.98		1.00	0.97		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.94		1.00	0.97		1.00	0.99	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1739		1770	1667		1770	3336		1770	3494	
Flt Permitted		0.99		0.95	1.00		0.19	1.00		0.07	1.00	
Satd. Flow (perm)		1739		1770	1667		346	3336		133	3494	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	43	159	48	357	266	161	63	856	243	142	854	57
RTOR Reduction (vph)	0	7	0	0	16	0	0	16	0	0	3	0
Lane Group Flow (vph)	0	243	0	357	411	0	63	1083	0	142	908	0
Confl. Peds. (#/hr)	28		18	18		28	7		32	32		7
Confl. Bikes (#/hr)			8			13			20			12
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Split	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	7		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		23.8		36.9	36.7		58.4	52.2		67.1	56.9	
Effective Green, g (s)		23.8		36.9	36.7		58.4	52.2		67.1	56.9	
Actuated g/C Ratio		0.17		0.26	0.26		0.42	0.37		0.48	0.41	
Clearance Time (s)		4.0		4.0	4.2		4.0	4.2		4.0	4.2	
Vehicle Extension (s)		2.5		2.5	2.5		2.0	4.0		2.0	4.0	
Lane Grp Cap (vph)		296		467	437		207	1244		191	1420	
v/s Ratio Prot		c0.14		0.20	c0.25		0.01	c0.32		c0.06	0.26	
v/s Ratio Perm							0.11			0.30		
v/c Ratio		0.82		0.76	0.94		0.30	0.87		0.74	0.64	
Uniform Delay, d1		56.1		47.5	50.6		26.5	40.8		31.3	33.3	
Progression Factor		1.00		0.80	0.81		0.78	0.80		1.00	1.00	
Incremental Delay, d2		16.3		5.6	24.1		0.3	7.8		12.8	2.2	
Delay (s)		72.3		43.7	65.1		20.9	40.5		44.0	35.5	
Level of Service		E		D	E		C	D		D	D	
Approach Delay (s)		72.3			55.4			39.4			36.7	
Approach LOS		E			E			D			D	

Intersection Summary				
HCM Average Control Delay	44.9	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.4	
Intersection Capacity Utilization	92.4%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: E D St. & Lakeville St.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	397	81	388	552	38	134	128	489	21	128	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5	4.5		4.2	4.2	4.2	4.2	
Lane Util. Factor		0.95		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes		0.97		1.00	1.00	0.91		1.00	1.00	1.00	0.99	
Flpb, ped/bikes		1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.97	
Flt Protected		1.00		0.95	1.00	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (prot)		3245		1770	1776	1444		1816	1583	1770	1805	
Flt Permitted		0.85		0.95	1.00	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (perm)		2750		1770	1776	1444		1816	1583	1770	1805	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	13	441	90	431	613	42	149	142	543	23	142	30
RTOR Reduction (vph)	0	11	0	0	0	16	0	0	247	0	0	0
Lane Group Flow (vph)	0	533	0	431	613	26	0	291	296	23	172	0
Confl. Peds. (#/hr)	16		32	32		16	2		4	4		2
Confl. Bikes (#/hr)			21			17			1			1
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	
Protected Phases		4		3	8		2	2	2 3	6	6	
Permitted Phases	4					8						
Actuated Green, G (s)		39.3		37.5	81.3	81.3		27.7	69.7	18.1	18.1	
Effective Green, g (s)		39.3		37.5	81.3	81.3		27.7	65.2	18.1	18.1	
Actuated g/C Ratio		0.28		0.27	0.58	0.58		0.20	0.47	0.13	0.13	
Clearance Time (s)		4.5		4.5	4.5	4.5		4.2		4.2	4.2	
Vehicle Extension (s)		4.0		2.0	4.0	4.0		2.5		2.5	2.5	
Lane Grp Cap (vph)		772		474	1031	839		359	737	229	233	
v/s Ratio Prot				c0.24	0.35			c0.16	0.19	0.01	c0.10	
v/s Ratio Perm		c0.19				0.02						
v/c Ratio		0.69		0.91	0.59	0.03		0.81	0.40	0.10	0.74	
Uniform Delay, d1		44.9		49.6	18.8	12.5		53.6	24.6	53.8	58.7	
Progression Factor		0.67		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		3.3		20.7	2.5	0.1		12.7	0.3	0.1	10.9	
Delay (s)		33.6		70.3	21.3	12.6		66.3	24.8	53.9	69.6	
Level of Service		C		E	C	B		E	C	D	E	
Approach Delay (s)		33.6			40.4			39.3			67.7	
Approach LOS		C			D			D			E	

Intersection Summary				
HCM Average Control Delay	40.7	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	82.9%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Caulfield Ln. & Lakeville St.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	239	502	100	104	728	312	136	70	115	192	41	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.98		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	1770	3326		1770	3374	1552	1770	3149		1681	1714	1552
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (perm)	1770	3326		1770	3374	1552	1770	3149		1681	1714	1552
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	266	558	111	116	809	347	151	78	128	213	46	164
RTOR Reduction (vph)	0	10	0	0	0	74	0	116	0	0	0	146
Lane Group Flow (vph)	266	659	0	116	809	273	151	90	0	128	131	18
Confl. Peds. (#/hr)	5		2	2		5	1					1
Confl. Bikes (#/hr)			8			5			8			3
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	26.6	85.6		8.0	67.0	67.0	13.5	13.5		15.1	15.1	15.1
Effective Green, g (s)	26.6	85.6		8.0	67.0	67.0	13.5	13.5		15.1	15.1	15.1
Actuated g/C Ratio	0.19	0.61		0.06	0.48	0.48	0.10	0.10		0.11	0.11	0.11
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.9
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	336	2034		101	1615	743	171	304		181	185	167
v/s Ratio Prot	c0.15	0.20		c0.07	c0.24		c0.09	0.03		0.08	c0.08	
v/s Ratio Perm						0.18						0.01
v/c Ratio	0.79	0.32		1.15	0.50	0.37	0.88	0.30		0.71	0.71	0.11
Uniform Delay, d1	54.1	13.2		66.0	25.0	23.1	62.5	58.8		60.3	60.3	56.4
Progression Factor	1.00	1.00		0.72	0.32	0.14	1.00	1.00		0.91	0.91	1.17
Incremental Delay, d2	12.0	0.4		125.4	0.9	1.1	36.7	0.2		9.6	9.4	0.1
Delay (s)	66.1	13.6		173.0	8.8	4.4	99.2	59.0		64.5	64.4	65.9
Level of Service	E	B		F	A	A	F	E		E	E	E
Approach Delay (s)		28.5			22.6			76.0			65.0	
Approach LOS		C			C			E			E	

Intersection Summary				
HCM Average Control Delay	36.9	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	21.8	
Intersection Capacity Utilization	73.6%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Lakeville St./Lakeville Hwy. & US-101 SB Ramps

10/28/2011

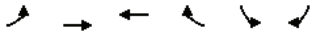
Movement	EBL	EBT	EBR	WBL	WBT	WBR2	SBL	SBR	SBR2	NEL2	NET	NER
Lane Configurations												
Volume (vph)	162	645	5	48	996	229	643	9	185	6	5	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0	5.0	4.9		4.9		4.4	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	0.97		0.91		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		0.98		0.92	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		1.00		1.00	
Frt	1.00	1.00		1.00	1.00	0.85	0.99		0.85		0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95		1.00		0.99	
Satd. Flow (prot)	3433	3402		1770	3312	1583	3422		1419		1566	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95		1.00		0.99	
Satd. Flow (perm)	3433	3402		1770	3312	1583	3422		1419		1566	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	180	717	6	53	1107	254	714	10	206	7	6	18
RTOR Reduction (vph)	0	1	0	0	0	128	1	0	138	0	18	0
Lane Group Flow (vph)	180	722	0	53	1107	126	744	0	47	0	13	0
Confl. Peds. (#/hr)			2	2			5					5
Confl. Bikes (#/hr)								4	4		6	9
Heavy Vehicles (%)	2%	6%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	NA		Perm	Split	NA	
Protected Phases	5	2		1	6		4			3	3	
Permitted Phases						6			4			
Actuated Green, G (s)	12.7	55.8		26.2	69.3	69.3	35.9		35.9		3.8	
Effective Green, g (s)	12.7	55.8		26.2	69.3	69.3	35.9		35.9		3.8	
Actuated g/C Ratio	0.09	0.40		0.19	0.50	0.50	0.26		0.26		0.03	
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0	4.9		4.9		4.4	
Vehicle Extension (s)	3.0	3.0		2.0	3.0	3.0	3.0		3.0		2.0	
Lane Grp Cap (vph)	311	1356		331	1639	784	877		364		43	
v/s Ratio Prot	0.05	c0.21		0.03	c0.33		c0.22				c0.01	
v/s Ratio Perm						0.08			0.03			
v/c Ratio	0.58	0.53		0.16	0.68	0.16	0.85		0.13		0.31	
Uniform Delay, d1	61.1	32.1		47.7	26.8	19.4	49.5		40.0		66.8	
Progression Factor	1.16	0.66		0.79	0.68	1.17	1.00		1.00		1.00	
Incremental Delay, d2	2.5	1.4		0.1	1.8	0.3	7.7		0.2		1.5	
Delay (s)	73.2	22.7		37.8	20.0	23.0	57.1		40.2		68.3	
Level of Service	E	C		D	B	C	E		D		E	
Approach Delay (s)		32.8			21.2		53.7				68.3	
Approach LOS		C			C		D				E	

Intersection Summary				
HCM Average Control Delay	34.1	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.71			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.3	
Intersection Capacity Utilization	72.5%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lakeville Hwy. & US-101 NB Ramps

10/28/2011

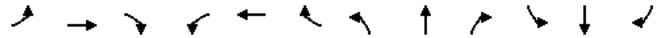


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	135	1143	1097	611	191	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3374	3312	1550	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3374	3312	1550	3433	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	150	1270	1219	679	212	279
RTOR Reduction (vph)	0	0	0	322	0	1
Lane Group Flow (vph)	150	1270	1219	357	212	278
Confl. Peds. (#/hr)	1			1	3	3
Heavy Vehicles (%)	2%	7%	9%	2%	2%	2%
Turn Type	Prot	NA	NA	Perm	NA	pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	9.7	50.5	36.8	36.8	10.0	23.7
Effective Green, g (s)	9.7	50.5	36.8	36.8	10.0	19.7
Actuated g/C Ratio	0.14	0.72	0.53	0.53	0.14	0.28
Clearance Time (s)	4.0	5.0	5.0	5.0	4.5	
Vehicle Extension (s)	2.0	3.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	245	2434	1741	815	490	446
v/s Ratio Prot	0.08	0.38	c0.37		0.06	c0.18
v/s Ratio Perm				0.23		
v/c Ratio	0.61	0.52	0.70	0.44	0.43	0.62
Uniform Delay, d1	28.4	4.4	12.5	10.2	27.4	21.9
Progression Factor	1.02	1.22	1.41	6.82	1.00	1.00
Incremental Delay, d2	2.7	0.7	1.6	1.1	0.2	2.0
Delay (s)	31.8	6.0	19.1	70.9	27.6	23.9
Level of Service	C	A	B	E	C	C
Approach Delay (s)		8.7	37.7		25.5	
Approach LOS		A	D		C	

Intersection Summary				
HCM Average Control Delay	25.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
6: Hopper St & Caulfield Ln.

11/3/2011



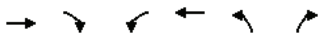
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	45	1	0	0	1	222	0	6	0	214	3	29
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	50	1	0	0	1	247	0	7	0	238	3	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	502	502	19	486	518	7	36			7		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	502	502	19	486	518	7	36			7		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	100	100	100	100	77	100			85		
cM capacity (veh/h)	327	402	1059	435	394	1076	1575			1614		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	51	248	7	238	36
Volume Left	50	0	0	238	0
Volume Right	0	247	0	0	32
cSH	328	1081	1575	1614	1700
Volume to Capacity	0.16	0.23	0.00	0.15	0.02
Queue Length 95th (ft)	14	22	0	13	0
Control Delay (s)	18.0	9.4	0.0	7.6	0.0
Lane LOS	C	A		A	
Approach Delay (s)	18.0	9.4	0.0	6.6	
Approach LOS	C	A			

Intersection Summary				
Average Delay	8.7			
Intersection Capacity Utilization	34.4%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
7: Hotel N-S Street & Hopper St

10/28/2011



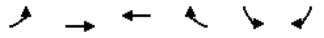
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	151	62	0	124	95	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	151	62	0	124	95	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			213		306	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			213		306	182
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		86	100
cM capacity (veh/h)			1357		686	861

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	213	124	95
Volume Left	0	0	95
Volume Right	62	0	0
cSH	1700	1357	686
Volume to Capacity	0.13	0.00	0.14
Queue Length 95th (ft)	0	0	12
Control Delay (s)	0.0	0.0	11.1
Lane LOS			B
Approach Delay (s)	0.0	0.0	11.1
Approach LOS			B

Intersection Summary				
Average Delay		2.4		
Intersection Capacity Utilization		23.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
8: Caulfield Cir & Hopper St

10/28/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	0	7	78	0	94
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	7	78	0	94
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	85				46	46
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	85				46	46
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	91
cM capacity (veh/h)	1512				964	1023

Direction, Lane #	WB 1	SB 1
Volume Total	85	94
Volume Left	0	0
Volume Right	78	94
cSH	1700	1023
Volume to Capacity	0.05	0.09
Queue Length 95th (ft)	0	8
Control Delay (s)	0.0	8.9
Lane LOS		A
Approach Delay (s)	0.0	8.9
Approach LOS		A

Intersection Summary				
Average Delay		4.7		
Intersection Capacity Utilization		17.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
10: Caulfield Cir & Caulfield Ln

10/28/2011

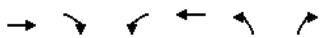
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	15	0	0	93	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	15	0	0	93	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	98	98	102			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	98	98	102			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	100			
cM capacity (veh/h)	902	959	1490			

Direction, Lane #	EB 1	SB 1
Volume Total	15	102
Volume Left	0	0
Volume Right	15	9
cSH	959	1700
Volume to Capacity	0.02	0.06
Queue Length 95th (ft)	1	0
Control Delay (s)	8.8	0.0
Lane LOS	A	
Approach Delay (s)	8.8	0.0
Approach LOS	A	

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	15.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
11: Caulfield Ln (South) & Caulfield Cir

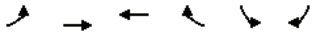
10/28/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	32	76	0	0	0	44
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	32	76	0	0	0	44
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			108		70	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			108		70	70
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	96
cM capacity (veh/h)			1483		934	993

Direction, Lane #	EB 1	NB 1
Volume Total	108	44
Volume Left	0	0
Volume Right	76	44
cSH	1700	993
Volume to Capacity	0.06	0.04
Queue Length 95th (ft)	0	3
Control Delay (s)	0.0	8.8
Lane LOS		A
Approach Delay (s)	0.0	8.8
Approach LOS		A

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	16.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	6	0	0	2	8	10
Sign Control		Stop	Stop		Free	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	6	0	0	2	8	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	23	21	26	0	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	23	21	26	0	0	
tC, single (s)	7.1	6.5	6.5	6.2	4.1	
tC, 2 stage (s)						
tF (s)	3.5	4.0	4.0	3.3	2.2	
p0 queue free %	99	100	100	100	100	
cM capacity (veh/h)	983	868	863	1085	1623	

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	6	2	18
Volume Left	6	0	8
Volume Right	0	2	10
cSH	983	1085	1623
Volume to Capacity	0.01	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	8.7	8.3	3.2
Lane LOS	A	A	A
Approach Delay (s)	8.7	8.3	3.2
Approach LOS	A	A	

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	15.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: Washington St. & Lakeville St.

10/25/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	155	50	244	129	82	29	613	174	149	713	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2		4.0	4.2		4.0	4.2		4.0	4.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	0.98		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.94		1.00	0.97		1.00	0.99	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1699		1770	1644		1769	3360		1770	3507	
Flt Permitted		0.99		0.95	1.00		0.25	1.00		0.15	1.00	
Satd. Flow (perm)		1699		1770	1644		466	3360		281	3507	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	37	172	56	271	143	91	32	681	193	166	792	39
RTOR Reduction (vph)	0	0	0	0	17	0	0	17	0	0	2	0
Lane Group Flow (vph)	0	265	0	271	217	0	32	857	0	166	829	0
Confl. Peds. (#/hr)	6		7	7		6	4		18	18		4
Confl. Bikes (#/hr)			8			13			20			12
Heavy Vehicles (%)	2%	10%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Split	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	7		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		25.7		34.0	33.8		56.0	52.0		67.9	59.9	
Effective Green, g (s)		25.7		34.0	33.8		56.0	52.0		67.9	59.9	
Actuated g/C Ratio		0.18		0.24	0.24		0.40	0.37		0.49	0.43	
Clearance Time (s)		4.2		4.0	4.2		4.0	4.2		4.0	4.2	
Vehicle Extension (s)		2.5		2.5	2.5		2.0	4.0		2.0	4.0	
Lane Grp Cap (vph)		312		430	397		224	1248		263	1500	
v/s Ratio Prot		c0.16		c0.15	0.13		0.00	c0.26		c0.05	0.24	
v/s Ratio Perm							0.05			0.25		
v/c Ratio		0.85		0.63	0.55		0.14	0.69		0.63	0.55	
Uniform Delay, d1		55.3		47.4	46.4		26.4	37.1		24.9	30.0	
Progression Factor		1.00		0.82	0.79		0.79	0.84		1.00	1.00	
Incremental Delay, d2		18.7		2.5	5.1		0.1	3.0		3.6	1.5	
Delay (s)		73.9		41.2	41.8		21.0	34.1		28.5	31.5	
Level of Service		E		D	D		C	C		C	C	
Approach Delay (s)		73.9			41.5			33.6			31.0	
Approach LOS		E			D			C			C	

Intersection Summary				
HCM Average Control Delay	38.1	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.4	
Intersection Capacity Utilization	87.7%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: E D St. & Lakeville St.

10/25/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	103	406	102	350	326	25	81	123	426	17	145	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5	4.5		4.2	4.2	4.2	4.2	
Lane Util. Factor		0.95		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes		0.97		1.00	1.00	0.89		1.00	1.00	1.00	1.00	
Flpb, ped/bikes		0.99		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected		0.99		0.95	1.00	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (prot)		3140		1770	1712	1411		1827	1583	1770	1846	
Flt Permitted		0.71		0.95	1.00	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (perm)		2242		1770	1712	1411		1827	1583	1770	1846	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	114	451	113	389	362	28	90	137	473	19	161	9
RTOR Reduction (vph)	0	10	0	0	0	11	0	0	248	0	0	0
Lane Group Flow (vph)	0	668	0	389	362	17	0	227	225	19	170	0
Confl. Peds. (#/hr)	22		31	31		22						
Confl. Bikes (#/hr)			21			17			1			1
Heavy Vehicles (%)	2%	10%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	
Protected Phases		4		3	8		2	2	2 3	6	6	
Permitted Phases	4					8						
Actuated Green, G (s)		38.3		43.5	86.3	86.3		23.1	71.1	17.7	17.7	
Effective Green, g (s)		38.3		43.5	86.3	86.3		23.1	66.6	17.7	17.7	
Actuated g/C Ratio		0.27		0.31	0.62	0.62		0.16	0.48	0.13	0.13	
Clearance Time (s)		4.5		4.5	4.5	4.5		4.2		4.2	4.2	
Vehicle Extension (s)		4.0		2.0	4.0	4.0		2.5		2.5	2.5	
Lane Grp Cap (vph)		613		550	1055	870		301	753	224	233	
v/s Ratio Prot				c0.22	0.21			c0.12	0.14	0.01	c0.09	
v/s Ratio Perm		c0.30				0.01						
v/c Ratio		1.09		0.71	0.34	0.02		0.75	0.30	0.08	0.73	
Uniform Delay, d1		50.9		42.6	13.1	10.4		55.7	22.4	54.0	58.8	
Progression Factor		0.76		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		60.8		3.4	0.9	0.0		9.8	0.2	0.1	10.2	
Delay (s)		99.6		46.0	14.0	10.5		65.5	22.6	54.1	69.1	
Level of Service		F		D	B	B		E	C	D	E	
Approach Delay (s)		99.6			29.8			36.5			67.6	
Approach LOS		F			C			D			E	

Intersection Summary				
HCM Average Control Delay	55.0	HCM Level of Service	E	
HCM Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	70.9%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Caulfield Ln. & Lakeville St.

10/25/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	135	626	7	6	556	113	25	20	24	358	3	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.97		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.92		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00
Satd. Flow (prot)	1770	3278		1770	3252	1554	1770	3154		1681	1687	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00
Satd. Flow (perm)	1770	3278		1770	3252	1554	1770	3154		1681	1687	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	150	696	8	7	618	126	28	22	27	398	3	273
RTOR Reduction (vph)	0	1	0	0	0	62	0	25	0	0	0	124
Lane Group Flow (vph)	150	703	0	7	618	64	28	24	0	199	202	149
Confl. Peds. (#/hr)	4		6	6		4			3	3		
Confl. Bikes (#/hr)			8			5			8			3
Heavy Vehicles (%)	2%	10%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	pt+ov
Protected Phases	5	2		1	6		3	3		4	4	4 5
Permitted Phases						6						
Actuated Green, G (s)	13.6	53.9		1.4	41.7	41.7	7.2	7.2		29.7	29.7	48.2
Effective Green, g (s)	13.6	53.9		1.4	41.7	41.7	7.2	7.2		29.7	29.7	48.2
Actuated g/C Ratio	0.12	0.49		0.01	0.38	0.38	0.07	0.07		0.27	0.27	0.44
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	219	1606		23	1233	589	116	206		454	455	694
v/s Ratio Prot	c0.08	0.21		0.00	c0.19		c0.02	0.01		0.12	c0.12	0.09
v/s Ratio Perm						0.04						
v/c Ratio	0.68	0.44		0.30	0.50	0.11	0.24	0.12		0.44	0.44	0.21
Uniform Delay, d1	46.1	18.2		53.8	26.2	22.1	48.8	48.4		33.2	33.3	19.2
Progression Factor	1.00	1.00		1.45	0.26	0.03	1.00	1.00		0.87	0.87	0.96
Incremental Delay, d2	8.6	0.9		2.3	1.2	0.3	0.4	0.1		3.0	3.0	0.2
Delay (s)	54.7	19.1		80.3	8.0	0.9	49.2	48.5		31.8	32.0	18.5
Level of Service	D	B		F	A	A	D	D		C	C	B
Approach Delay (s)		25.3			7.5			48.8			26.5	
Approach LOS		C			A			D			C	

Intersection Summary				
HCM Average Control Delay	20.7	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.8	
Intersection Capacity Utilization	65.6%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Lakeville St./Lakeville Hwy. & US-101 SB Ramps

10/25/2011

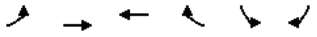
Movement	EBL	EBT	EBR	WBL	WBT	WBR2	SBL	SBR	SBR2	NEL2	NET	NER
Lane Configurations												
Volume (vph)	298	658	3	4	551	326	731	4	75	2	5	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		3.5	5.0	5.0	4.9		4.9		3.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	0.97		0.91		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00		0.98		0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		1.00		1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00		0.85		0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95		1.00		1.00	
Satd. Flow (prot)	3433	3281		1770	3139	1559	3435		1416		1658	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95		1.00		1.00	
Satd. Flow (perm)	3433	3281		1770	3139	1559	3435		1416		1658	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	331	731	3	4	612	362	812	4	83	2	6	13
RTOR Reduction (vph)	0	0	0	0	0	266	1	0	53	0	12	0
Lane Group Flow (vph)	331	734	0	4	612	96	823	0	22	0	9	0
Confl. Peds. (#/hr)	4					4	3		2	2		3
Confl. Bikes (#/hr)								4	4		6	9
Heavy Vehicles (%)	2%	10%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	NA		Perm		NA	
Protected Phases	5	2		1	6		4				3	
Permitted Phases						6			4			
Actuated Green, G (s)	18.7	47.6		1.2	29.1	29.1	32.2		32.2		12.1	
Effective Green, g (s)	18.7	47.6		1.2	29.1	29.1	32.2		32.2		12.1	
Actuated g/C Ratio	0.17	0.43		0.01	0.26	0.26	0.29		0.29		0.11	
Clearance Time (s)	4.5	5.0		3.5	5.0	5.0	4.9		4.9		3.5	
Vehicle Extension (s)	3.0	3.0		2.0	3.0	3.0	3.0		3.0		3.0	
Lane Grp Cap (vph)	584	1420		19	830	412	1006		415		182	
v/s Ratio Prot	0.10	c0.22		0.00	c0.19		c0.24					
v/s Ratio Perm						0.06			0.02		0.01	
v/c Ratio	0.57	0.52		0.21	0.74	0.23	0.82		0.05		0.05	
Uniform Delay, d1	41.9	22.8		53.9	37.0	31.7	36.2		27.9		43.8	
Progression Factor	0.91	0.76		0.82	0.85	2.77	1.00		1.00		1.00	
Incremental Delay, d2	1.2	1.2		1.9	5.4	1.2	5.3		0.1		0.1	
Delay (s)	39.2	18.6		46.2	36.9	89.1	41.5		28.0		43.9	
Level of Service	D	B		D	D	F	D		C		D	
Approach Delay (s)		25.0			56.2		40.3				43.9	
Approach LOS		C			E		D				D	

Intersection Summary				
HCM Average Control Delay	40.1	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.4	
Intersection Capacity Utilization	79.7%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lakeville Hwy. & US-101 NB Ramps

10/25/2011

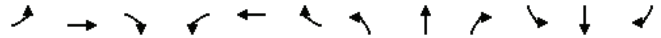


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	54	1331	832	742	335	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	4.4	4.4
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3112	3139	1547	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3112	3139	1547	3433	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	60	1479	924	824	372	80
RTOR Reduction (vph)	0	0	0	279	0	59
Lane Group Flow (vph)	60	1479	924	545	372	21
Confl. Peds. (#/hr)	4			4	4	2
Heavy Vehicles (%)	2%	16%	15%	2%	2%	2%
Turn Type	Prot	NA	NA	Perm	NA	pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	7.4	84.2	72.8	72.8	16.4	28.2
Effective Green, g (s)	7.4	84.2	72.8	72.8	16.4	28.2
Actuated g/C Ratio	0.07	0.77	0.66	0.66	0.15	0.26
Clearance Time (s)	4.0	5.0	5.0	5.0	4.4	
Vehicle Extension (s)	2.0	3.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	119	2382	2077	1024	512	406
v/s Ratio Prot	0.03	c0.48	0.29		c0.11	0.01
v/s Ratio Perm				0.35		
v/c Ratio	0.50	0.62	0.44	0.53	0.73	0.05
Uniform Delay, d1	49.5	5.8	8.9	9.7	44.7	30.8
Progression Factor	0.77	1.59	0.51	0.62	1.00	1.00
Incremental Delay, d2	1.0	1.0	0.6	1.6	4.3	0.0
Delay (s)	39.2	10.2	5.1	7.6	49.0	30.8
Level of Service	D	B	A	A	D	C
Approach Delay (s)		11.3	6.3		45.8	
Approach LOS		B	A		D	

Intersection Summary				
HCM Average Control Delay	13.1	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.4	
Intersection Capacity Utilization	60.5%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Hopper St & Caulfield Ln.

10/25/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	66	1	0	0	1	2	0	4	0	2	7	51
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	73	1	0	0	1	2	0	4	0	2	8	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	48	45	36	17	73	4	64			4		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	48	45	36	17	73	4	64			4		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	100	100	100	100	100			100		
cM capacity (veh/h)	949	846	1036	995	816	1079	1538			1617		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	74	3	4	2	64
Volume Left	73	0	0	2	0
Volume Right	0	2	0	0	57
cSH	947	974	1538	1617	1700
Volume to Capacity	0.08	0.00	0.00	0.00	0.04
Queue Length 95th (ft)	6	0	0	0	0
Control Delay (s)	9.1	8.7	0.0	7.2	0.0
Lane LOS	A	A		A	
Approach Delay (s)	9.1	8.7	0.0	0.2	
Approach LOS	A	A			

Intersection Summary				
Average Delay	4.9			
Intersection Capacity Utilization	20.6%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Signalized Intersection Capacity Analysis
1: Washington St. & Lakeville St.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	54	126	43	307	225	144	55	812	212	125	831	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2		4.0	4.2		4.0	4.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.98		1.00	0.98		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.94		1.00	0.97		1.00	0.99	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1738		1770	1663		1770	3348		1770	3483	
Flt Permitted		0.99		0.95	1.00		0.15	1.00		0.07	1.00	
Satd. Flow (perm)		1738		1770	1663		282	3348		130	3483	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	60	140	48	341	250	160	61	902	236	139	923	78
RTOR Reduction (vph)	0	7	0	0	17	0	0	15	0	0	4	0
Lane Group Flow (vph)	0	241	0	341	393	0	61	1123	0	139	997	0
Confl. Peds. (#/hr)	28		18	18		28	7		32	32		7
Confl. Bikes (#/hr)			8			13			20			12
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Split	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	7		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		23.7		36.0	35.8		59.5	53.4		68.1	58.0	
Effective Green, g (s)		23.7		36.0	35.8		59.5	53.4		68.1	58.0	
Actuated g/C Ratio		0.17		0.26	0.26		0.42	0.38		0.49	0.41	
Clearance Time (s)		4.0		4.0	4.2		4.0	4.2		4.0	4.2	
Vehicle Extension (s)		2.5		2.5	2.5		2.0	4.0		2.0	4.0	
Lane Grp Cap (vph)		294		455	425		185	1277		189	1443	
v/s Ratio Prot		c0.14		0.19	c0.24		0.01	c0.34		c0.06	0.29	
v/s Ratio Perm							0.13			0.30		
v/c Ratio		0.82		0.75	0.92		0.33	0.88		0.74	0.69	
Uniform Delay, d1		56.1		47.9	50.8		26.5	40.3		31.2	33.6	
Progression Factor		1.00		0.81	0.82		0.78	0.81		1.00	1.00	
Incremental Delay, d2		16.3		5.0	21.6		0.3	8.2		12.0	2.7	
Delay (s)		72.4		43.8	63.0		21.1	40.7		43.2	36.4	
Level of Service		E		D	E		C	D		D	D	
Approach Delay (s)		72.4			54.3			39.7			37.2	
Approach LOS		E			D			D			D	

Intersection Summary				
HCM Average Control Delay	44.6	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.4	
Intersection Capacity Utilization	92.8%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: E D St. & Lakeville St.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	443	85	373	568	30	146	122	489	17	126	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5	4.5		4.2	4.2	4.2	4.2	
Lane Util. Factor		0.95		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes		0.97		1.00	1.00	0.91		1.00	1.00	1.00	0.99	
Flpb, ped/bikes		1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.97	
Flt Protected		1.00		0.95	1.00	1.00		0.97	1.00	0.95	1.00	
Satd. Flow (prot)		3254		1770	1776	1444		1813	1583	1770	1801	
Flt Permitted		0.82		0.95	1.00	1.00		0.97	1.00	0.95	1.00	
Satd. Flow (perm)		2660		1770	1776	1444		1813	1583	1770	1801	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	14	492	94	414	631	33	162	136	543	19	140	32
RTOR Reduction (vph)	0	9	0	0	0	12	0	0	251	0	0	0
Lane Group Flow (vph)	0	591	0	414	631	21	0	298	292	19	172	0
Confl. Peds. (#/hr)	16		32	32		16	2		4	4		2
Confl. Bikes (#/hr)			21			17			1			1
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	
Protected Phases		4		3	8		2	2	2 3	6	6	
Permitted Phases	4					8						
Actuated Green, G (s)		39.0		37.5	81.0	81.0		28.0	70.0	18.1	18.1	
Effective Green, g (s)		39.0		37.5	81.0	81.0		28.0	65.5	18.1	18.1	
Actuated g/C Ratio		0.28		0.27	0.58	0.58		0.20	0.47	0.13	0.13	
Clearance Time (s)		4.5		4.5	4.5	4.5		4.2		4.2	4.2	
Vehicle Extension (s)		4.0		2.0	4.0	4.0		2.5		2.5	2.5	
Lane Grp Cap (vph)		741		474	1028	835		363	741	229	233	
v/s Ratio Prot				c0.23	0.36			c0.16	0.18	0.01	c0.10	
v/s Ratio Perm		c0.22				0.01						
v/c Ratio		0.80		0.87	0.61	0.02		0.82	0.39	0.08	0.74	
Uniform Delay, d1		46.8		49.0	19.3	12.6		53.6	24.3	53.6	58.7	
Progression Factor		0.73		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		6.8		15.7	2.7	0.1		13.5	0.3	0.1	10.9	
Delay (s)		40.9		64.7	22.0	12.7		67.1	24.6	53.8	69.6	
Level of Service		D		E	C	B		E	C	D	E	
Approach Delay (s)		40.9			38.1			39.7			68.0	
Approach LOS		D			D			D			E	

Intersection Summary				
HCM Average Control Delay	41.3	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	85.4%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Caulfield Ln. & Lakeville St.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	267	506	12	16	754	325	48	28	26	233	4	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.98		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00
Satd. Flow (prot)	1770	3395		1770	3374	1552	1770	3215		1681	1688	1552
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00
Satd. Flow (perm)	1770	3395		1770	3374	1552	1770	3215		1681	1688	1552
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	297	562	13	18	838	361	53	31	29	259	4	206
RTOR Reduction (vph)	0	1	0	0	0	71	0	27	0	0	0	183
Lane Group Flow (vph)	297	574	0	18	838	290	53	33	0	132	131	23
Confl. Peds. (#/hr)	5		2	2		5	1					1
Confl. Bikes (#/hr)			8			5			8			3
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	29.0	95.5		3.2	69.7	69.7	8.1	8.1		15.4	15.4	15.4
Effective Green, g (s)	29.0	95.5		3.2	69.7	69.7	8.1	8.1		15.4	15.4	15.4
Actuated g/C Ratio	0.21	0.68		0.02	0.50	0.50	0.06	0.06		0.11	0.11	0.11
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.9
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	367	2316		40	1680	773	102	186		185	186	171
v/s Ratio Prot	c0.17	0.17		0.01	c0.25		c0.03	0.01		c0.08	0.08	
v/s Ratio Perm						0.19						0.01
v/c Ratio	0.81	0.25		0.45	0.50	0.37	0.52	0.18		0.71	0.70	0.13
Uniform Delay, d1	52.9	8.5		67.5	23.5	21.7	64.1	62.8		60.2	60.1	56.3
Progression Factor	1.00	1.00		0.61	0.29	0.12	1.00	1.00		0.92	0.92	1.11
Incremental Delay, d2	12.4	0.3		2.4	0.9	1.1	1.9	0.2		10.1	9.3	0.1
Delay (s)	65.2	8.8		43.5	7.6	3.8	65.9	62.9		65.4	64.4	62.4
Level of Service	E	A		D	A	A	E	E		E	E	E
Approach Delay (s)		28.0			7.0			64.3			63.8	
Approach LOS		C			A			E			E	

Intersection Summary				
HCM Average Control Delay	26.3	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.60			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	17.8	
Intersection Capacity Utilization	69.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Lakeville St./Lakeville Hwy. & US-101 SB Ramps

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR2	SBL	SBR	SBR2	NEL2	NET	NER
Lane Configurations												
Volume (vph)	154	607	5	48	978	236	651	9	164	6	5	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0	5.0	4.9		4.9		4.4	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	0.97		0.91		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		0.98		0.92	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		1.00		1.00	
Frt	1.00	1.00		1.00	1.00	0.85	0.99		0.85		0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95		1.00		0.99	
Satd. Flow (prot)	3433	3402		1770	3312	1583	3424		1419		1566	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95		1.00		0.99	
Satd. Flow (perm)	3433	3402		1770	3312	1583	3424		1419		1566	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	171	674	6	53	1087	262	723	10	182	7	6	18
RTOR Reduction (vph)	0	1	0	0	0	132	1	0	122	0	18	0
Lane Group Flow (vph)	171	679	0	53	1087	130	750	0	42	0	13	0
Confl. Peds. (#/hr)			2	2			5					5
Confl. Bikes (#/hr)								4	4		6	9
Heavy Vehicles (%)	2%	6%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	NA		Perm	Split	NA	
Protected Phases	5	2		1	6		4			3	3	
Permitted Phases						6			4			
Actuated Green, G (s)	12.3	54.9		26.9	69.5	69.5	36.1		36.1		3.8	
Effective Green, g (s)	12.3	54.9		26.9	69.5	69.5	36.1		36.1		3.8	
Actuated g/C Ratio	0.09	0.39		0.19	0.50	0.50	0.26		0.26		0.03	
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0	4.9		4.9		4.4	
Vehicle Extension (s)	3.0	3.0		2.0	3.0	3.0	3.0		3.0		2.0	
Lane Grp Cap (vph)	302	1334		340	1644	786	883		366		43	
v/s Ratio Prot	0.05	c0.20		0.03	c0.33		c0.22				c0.01	
v/s Ratio Perm						0.08			0.03			
v/c Ratio	0.57	0.51		0.16	0.66	0.17	0.85		0.12		0.31	
Uniform Delay, d1	61.3	32.3		47.1	26.4	19.3	49.4		39.7		66.8	
Progression Factor	1.03	0.67		0.78	0.67	1.19	1.00		1.00		1.00	
Incremental Delay, d2	2.4	1.4		0.1	1.7	0.4	7.7		0.1		1.5	
Delay (s)	65.7	23.2		36.9	19.3	23.4	57.0		39.9		68.3	
Level of Service	E	C		D	B	C	E		D		E	
Approach Delay (s)		31.7			20.7		53.9				68.3	
Approach LOS		C			C		D				E	

Intersection Summary				
HCM Average Control Delay	33.6	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.3	
Intersection Capacity Utilization	72.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lakeville Hwy. & US-101 NB Ramps

10/28/2011

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	102	1143	1097	628	197	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3374	3312	1550	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3374	3312	1550	3433	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	113	1270	1219	698	219	268
RTOR Reduction (vph)	0	0	0	329	0	1
Lane Group Flow (vph)	113	1270	1219	369	219	267
Confl. Peds. (#/hr)	1			1	3	3
Heavy Vehicles (%)	2%	7%	9%	2%	2%	2%
Turn Type	Prot	NA	NA	Perm	NA	pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	9.7	50.7	37.0	37.0	9.8	23.5
Effective Green, g (s)	9.7	50.7	37.0	37.0	9.8	19.5
Actuated g/C Ratio	0.14	0.72	0.53	0.53	0.14	0.28
Clearance Time (s)	4.0	5.0	5.0	5.0	4.5	
Vehicle Extension (s)	2.0	3.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	245	2444	1751	819	481	441
v/s Ratio Prot	0.06	0.38	c0.37		0.06	c0.17
v/s Ratio Perm				0.24		
v/c Ratio	0.46	0.52	0.70	0.45	0.46	0.61
Uniform Delay, d1	27.7	4.3	12.3	10.2	27.6	21.9
Progression Factor	0.92	1.33	1.39	7.11	1.00	1.00
Incremental Delay, d2	0.4	0.7	1.6	1.2	0.2	1.6
Delay (s)	25.8	6.3	18.7	73.8	27.9	23.5
Level of Service	C	A	B	E	C	C
Approach Delay (s)		7.9	38.8		25.5	
Approach LOS		A	D		C	

Intersection Summary				
HCM Average Control Delay	25.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
6: Hopper St & Caulfield Ln.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	45	1	0	0	1	3	0	6	0	1	3	29
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	50	1	0	0	1	3	0	7	0	1	3	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	32	28	19	13	44	7	36			7		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	32	28	19	13	44	7	36			7		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	100	100	100	100	100			100		
cM capacity (veh/h)	971	864	1059	1003	847	1076	1575			1614		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	51	4	7	1	36
Volume Left	50	0	0	1	0
Volume Right	0	3	0	0	32
cSH	968	1008	1575	1614	1700
Volume to Capacity	0.05	0.00	0.00	0.00	0.02
Queue Length 95th (ft)	4	0	0	0	0
Control Delay (s)	8.9	8.6	0.0	7.2	0.0
Lane LOS	A	A		A	
Approach Delay (s)	8.9	8.6	0.0	0.2	
Approach LOS	A	A			

Intersection Summary				
Average Delay	5.1			
Intersection Capacity Utilization	19.2%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Signalized Intersection Capacity Analysis
1: Washington St. & Lakeville St.

10/25/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	174	50	262	147	87	29	613	193	151	713	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2		4.0	4.2		4.0	4.2		4.0	4.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.99		1.00	0.98		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.97		1.00	0.94		1.00	0.96		1.00	0.99	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1701		1770	1647		1769	3345		1770	3507	
Flt Permitted		0.99		0.95	1.00		0.25	1.00		0.13	1.00	
Satd. Flow (perm)		1701		1770	1647		459	3345		249	3507	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	37	193	56	291	163	97	32	681	214	168	792	39
RTOR Reduction (vph)	0	0	0	0	15	0	0	20	0	0	2	0
Lane Group Flow (vph)	0	286	0	291	245	0	32	875	0	168	829	0
Confl. Peds. (#/hr)	6		7	7		6	4		18	18		4
Confl. Bikes (#/hr)			8			13			20			12
Heavy Vehicles (%)	2%	10%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Split	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	7		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		27.0		34.0	33.8		54.4	50.4		66.6	58.6	
Effective Green, g (s)		27.0		34.0	33.8		54.4	50.4		66.6	58.6	
Actuated g/C Ratio		0.19		0.24	0.24		0.39	0.36		0.48	0.42	
Clearance Time (s)		4.2		4.0	4.2		4.0	4.2		4.0	4.2	
Vehicle Extension (s)		2.5		2.5	2.5		2.0	4.0		2.0	4.0	
Lane Grp Cap (vph)		328		430	398		216	1204		251	1468	
v/s Ratio Prot		c0.17		c0.16	0.15		0.00	c0.26		c0.06	0.24	
v/s Ratio Perm							0.05			0.26		
v/c Ratio		0.87		0.68	0.62		0.15	0.73		0.67	0.56	
Uniform Delay, d1		54.8		48.0	47.3		27.4	38.8		26.2	31.0	
Progression Factor		1.00		0.81	0.79		0.79	0.85		1.00	1.00	
Incremental Delay, d2		21.4		3.6	6.6		0.1	3.7		5.2	1.6	
Delay (s)		76.2		42.5	44.0		21.8	36.6		31.4	32.6	
Level of Service		E		D	D		C	D		C	C	
Approach Delay (s)		76.2			43.2			36.1			32.4	
Approach LOS		E			D			D			C	

Intersection Summary				
HCM Average Control Delay	40.3	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.4	
Intersection Capacity Utilization	88.6%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: E D St. & Lakeville St.

10/25/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	103	447	102	378	367	30	81	123	454	21	145	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5	4.5		4.2	4.2	4.2	4.2	
Lane Util. Factor		0.95		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes		0.97		1.00	1.00	0.89		1.00	1.00	1.00	1.00	
Flpb, ped/bikes		0.99		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected		0.99		0.95	1.00	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (prot)		3152		1770	1712	1411		1827	1583	1770	1846	
Flt Permitted		0.68		0.95	1.00	1.00		0.98	1.00	0.95	1.00	
Satd. Flow (perm)		2163		1770	1712	1411		1827	1583	1770	1846	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	114	497	113	420	408	33	90	137	504	23	161	9
RTOR Reduction (vph)	0	9	0	0	0	13	0	0	254	0	0	0
Lane Group Flow (vph)	0	715	0	420	408	20	0	227	250	23	170	0
Confl. Peds. (#/hr)	22		31	31		22						
Confl. Bikes (#/hr)			21			17			1			1
Heavy Vehicles (%)	2%	10%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	
Protected Phases		4		3	8		2	2	2 3	6	6	
Permitted Phases	4					8						
Actuated Green, G (s)		38.2		43.5	86.2	86.2		23.2	71.2	17.7	17.7	
Effective Green, g (s)		38.2		43.5	86.2	86.2		23.2	66.7	17.7	17.7	
Actuated g/C Ratio		0.27		0.31	0.62	0.62		0.17	0.48	0.13	0.13	
Clearance Time (s)		4.5		4.5	4.5	4.5		4.2		4.2	4.2	
Vehicle Extension (s)		4.0		2.0	4.0	4.0		2.5		2.5	2.5	
Lane Grp Cap (vph)		590		550	1054	869		303	754	224	233	
v/s Ratio Prot				c0.24	0.24			c0.12	0.16	0.01	c0.09	
v/s Ratio Perm		c0.33				0.01						
v/c Ratio		1.21		0.76	0.39	0.02		0.75	0.33	0.10	0.73	
Uniform Delay, d1		50.9		43.6	13.6	10.5		55.6	22.8	54.1	58.8	
Progression Factor		0.75		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		107.9		5.6	1.1	0.0		9.2	0.2	0.1	10.2	
Delay (s)		146.3		49.2	14.6	10.5		64.9	23.0	54.3	69.1	
Level of Service		F		D	B	B		E	C	D	E	
Approach Delay (s)		146.3			31.4			36.0			67.3	
Approach LOS		F			C			D			E	

Intersection Summary				
HCM Average Control Delay	68.6	HCM Level of Service	E	
HCM Volume to Capacity ratio	0.90			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	73.6%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Caulfield Ln. & Lakeville St.

10/25/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	135	626	82	82	556	113	102	52	100	358	40	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.97		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00
Satd. Flow (prot)	1770	3238		1770	3252	1554	1770	3098		1681	1701	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00
Satd. Flow (perm)	1770	3238		1770	3252	1554	1770	3098		1681	1701	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	150	696	91	91	618	126	113	58	111	398	44	273
RTOR Reduction (vph)	0	9	0	0	0	61	0	102	0	0	0	73
Lane Group Flow (vph)	150	778	0	91	618	65	113	67	0	219	223	200
Confl. Peds. (#/hr)	4		6	6		4			3	3		
Confl. Bikes (#/hr)			8			5			8			3
Heavy Vehicles (%)	2%	10%	2%	2%	11%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	pt+ov
Protected Phases	5	2		1	6		3	3		4	4	4 5
Permitted Phases						6						
Actuated Green, G (s)	13.6	49.1		7.0	42.5	42.5	9.0	9.0		27.1	27.1	45.6
Effective Green, g (s)	13.6	49.1		7.0	42.5	42.5	9.0	9.0		27.1	27.1	45.6
Actuated g/C Ratio	0.12	0.45		0.06	0.39	0.39	0.08	0.08		0.25	0.25	0.41
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	219	1445		113	1256	600	145	253		414	419	656
v/s Ratio Prot	c0.08	c0.24		0.05	0.19		c0.06	0.02		0.13	c0.13	0.13
v/s Ratio Perm						0.04						
v/c Ratio	0.68	0.54		0.81	0.49	0.11	0.78	0.27		0.53	0.53	0.30
Uniform Delay, d1	46.1	22.2		50.8	25.6	21.6	49.5	47.4		35.9	36.0	21.6
Progression Factor	1.00	1.00		1.49	0.25	0.02	1.00	1.00		0.88	0.88	0.75
Incremental Delay, d2	8.6	1.4		25.7	1.1	0.3	21.0	0.2		4.7	4.7	0.3
Delay (s)	54.7	23.6		101.5	7.6	0.8	70.5	47.6		36.4	36.4	16.4
Level of Service	D	C		F	A	A	E	D		D	D	B
Approach Delay (s)		28.6			16.8			56.8			28.7	
Approach LOS		C			B			E			C	

Intersection Summary					
HCM Average Control Delay	28.0	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.57				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		12.9	
Intersection Capacity Utilization	70.8%	ICU Level of Service		C	
Analysis Period (min)	15				

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Lakeville St./Lakeville Hwy. & US-101 SB Ramps

10/25/2011

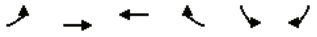
Movement	EBL	EBT	EBR	WBL	WBT	WBR2	SBL	SBR	SBR2	NEL2	NET	NER
Lane Configurations												
Volume (vph)	317	716	3	4	599	326	731	4	104	2	5	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		3.5	5.0	5.0	4.9		4.9		3.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	0.97		0.91		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00		0.98		0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		1.00		1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00		0.85		0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95		1.00		1.00	
Satd. Flow (prot)	3433	3281		1770	3139	1559	3433		1416		1657	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95		1.00		1.00	
Satd. Flow (perm)	3433	3281		1770	3139	1559	3433		1416		1657	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	352	796	3	4	666	362	812	4	116	2	6	13
RTOR Reduction (vph)	0	0	0	0	0	267	1	0	73	0	12	0
Lane Group Flow (vph)	352	799	0	4	666	95	827	0	31	0	9	0
Confl. Peds. (#/hr)	4					4	3		2	2		3
Confl. Bikes (#/hr)								4	4		6	9
Heavy Vehicles (%)	2%	10%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	NA		Perm		NA	
Protected Phases	5	2		1	6		4				3	
Permitted Phases						6			4			
Actuated Green, G (s)	19.1	47.9		1.2	29.0	29.0	32.3		32.3		11.7	
Effective Green, g (s)	19.1	47.9		1.2	29.0	29.0	32.3		32.3		11.7	
Actuated g/C Ratio	0.17	0.44		0.01	0.26	0.26	0.29		0.29		0.11	
Clearance Time (s)	4.5	5.0		3.5	5.0	5.0	4.9		4.9		3.5	
Vehicle Extension (s)	3.0	3.0		2.0	3.0	3.0	3.0		3.0		3.0	
Lane Grp Cap (vph)	596	1429		19	828	411	1008		416		176	
v/s Ratio Prot	0.10	c0.24		0.00	c0.21		c0.24					
v/s Ratio Perm						0.06			0.02		0.01	
v/c Ratio	0.59	0.56		0.21	0.80	0.23	0.82		0.07		0.05	
Uniform Delay, d1	41.8	23.2		53.9	37.8	31.8	36.1		28.0		44.2	
Progression Factor	0.85	0.76		0.81	0.83	2.65	1.00		1.00		1.00	
Incremental Delay, d2	1.3	1.4		1.8	7.5	1.2	5.4		0.1		0.1	
Delay (s)	37.0	18.9		45.7	39.0	85.2	41.6		28.1		44.3	
Level of Service	D	B		D	D	F	D		C		D	
Approach Delay (s)		24.4			55.2		40.1				44.3	
Approach LOS		C			E		D				D	

Intersection Summary					
HCM Average Control Delay	39.3	HCM Level of Service		D	
HCM Volume to Capacity ratio	0.64				
Actuated Cycle Length (s)	110.0	Sum of lost time (s)		13.4	
Intersection Capacity Utilization	80.6%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lakeville Hwy. & US-101 NB Ramps

10/25/2011

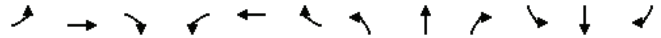


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	82	1362	861	742	335	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	4.4	4.4
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3112	3139	1547	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3112	3139	1547	3433	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	91	1513	957	824	372	101
RTOR Reduction (vph)	0	0	0	301	0	60
Lane Group Flow (vph)	91	1513	957	523	372	41
Confl. Peds. (#/hr)	4			4	4	2
Heavy Vehicles (%)	2%	16%	15%	2%	2%	2%
Turn Type	Prot	NA	NA	Perm	NA	pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	10.4	84.2	69.8	69.8	16.4	31.2
Effective Green, g (s)	10.4	84.2	69.8	69.8	16.4	31.2
Actuated g/C Ratio	0.09	0.77	0.63	0.63	0.15	0.28
Clearance Time (s)	4.0	5.0	5.0	5.0	4.4	
Vehicle Extension (s)	2.0	3.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	167	2382	1992	982	512	449
v/s Ratio Prot	0.05	c0.49	0.30		c0.11	0.03
v/s Ratio Perm				0.34		
v/c Ratio	0.54	0.64	0.48	0.53	0.73	0.09
Uniform Delay, d1	47.5	5.9	10.6	11.1	44.7	29.0
Progression Factor	0.81	1.26	0.51	0.71	1.00	1.00
Incremental Delay, d2	1.6	1.1	0.7	1.7	4.3	0.0
Delay (s)	40.1	8.5	6.1	9.5	49.0	29.0
Level of Service	D	A	A	A	D	C
Approach Delay (s)		10.3	7.7		44.7	
Approach LOS		B	A		D	

Intersection Summary				
HCM Average Control Delay	13.3	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.4	
Intersection Capacity Utilization	60.5%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Hopper St & Caulfield Ln.

11/3/2011



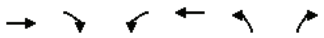
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	66	1	0	0	1	187	0	4	0	190	7	51
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	73	1	0	0	1	208	0	4	0	211	8	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	463	463	36	435	491	4	64			4		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	463	463	36	435	491	4	64			4		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	80	100	100	100	100	81	100			87		
cM capacity (veh/h)	369	431	1036	477	416	1079	1538			1617		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	74	209	4	211	64
Volume Left	73	0	0	211	0
Volume Right	0	208	0	0	57
cSH	370	1085	1538	1617	1700
Volume to Capacity	0.20	0.19	0.00	0.13	0.04
Queue Length 95th (ft)	19	18	0	11	0
Control Delay (s)	17.2	9.2	0.0	7.6	0.0
Lane LOS	C	A		A	
Approach Delay (s)	17.2	9.2	0.0	5.8	
Approach LOS	C	A			

Intersection Summary					
Average Delay	8.5				
Intersection Capacity Utilization	34.2%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
7: Hotel N-S Street & Hopper St

10/25/2011



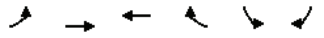
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	74	114	0	138	47	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	74	114	0	138	47	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			188		269	131
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			188		269	131
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		93	100
cM capacity (veh/h)			1386		720	919

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	188	138	47
Volume Left	0	0	47
Volume Right	114	0	0
cSH	1700	1386	720
Volume to Capacity	0.11	0.00	0.07
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.0	0.0	10.3
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.3
Approach LOS			B

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
8: Caulfield Cir & Hopper St

10/25/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	0	2	80	0	37
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	2	80	0	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	82				42	42
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	82				42	42
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	96
cM capacity (veh/h)	1515				969	1029

Direction, Lane #	WB 1	SB 1
Volume Total	82	37
Volume Left	0	0
Volume Right	80	37
cSH	1700	1029
Volume to Capacity	0.05	0.04
Queue Length 95th (ft)	0	3
Control Delay (s)	0.0	8.6
Lane LOS		A
Approach Delay (s)	0.0	8.6
Approach LOS		A

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	15.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
10: Caulfield Cir & Caulfield Ln

10/25/2011

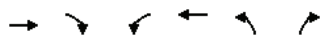
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	6	0	0	35	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	6	0	0	35	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	37	37	39			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	37	37	39			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	975	1035	1571			

Direction, Lane #	EB 1	SB 1
Volume Total	6	39
Volume Left	0	0
Volume Right	6	4
cSH	1035	1700
Volume to Capacity	0.01	0.02
Queue Length 95th (ft)	0	0
Control Delay (s)	8.5	0.0
Lane LOS	A	
Approach Delay (s)	8.5	0.0
Approach LOS	A	

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
11: Caulfield Ln (South) & Caulfield Cir

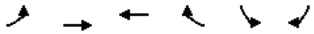
10/25/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	17	24	0	0	0	71
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	17	24	0	0	0	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			41		29	29
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			41		29	29
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	93
cM capacity (veh/h)			1568		986	1046

Direction, Lane #	EB 1	NB 1
Volume Total	41	71
Volume Left	0	0
Volume Right	24	71
cSH	1700	1046
Volume to Capacity	0.02	0.07
Queue Length 95th (ft)	0	5
Control Delay (s)	0.0	8.7
Lane LOS		A
Approach Delay (s)	0.0	8.7
Approach LOS		A

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	14.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	9	0	0	4	2	3
Sign Control		Stop	Stop		Free	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	9	0	0	4	2	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	10	6	7	0	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	10	6	7	0	0	
tC, single (s)	7.1	6.5	6.5	6.2	4.1	
tC, 2 stage (s)						
tF (s)	3.5	4.0	4.0	3.3	2.2	
p0 queue free %	99	100	100	100	100	
cM capacity (veh/h)	1004	889	887	1085	1623	

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	9	4	5
Volume Left	9	0	2
Volume Right	0	4	3
cSH	1004	1085	1623
Volume to Capacity	0.01	0.00	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	8.6	8.3	2.9
Lane LOS	A	A	A
Approach Delay (s)	8.6	8.3	2.9
Approach LOS	A	A	

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	17.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: Washington St. & Lakeville St.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	54	148	43	329	247	148	55	812	233	130	831	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.2		4.0	4.2		4.0	4.2	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.98		1.00	0.97		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.98		1.00	0.94		1.00	0.97		1.00	0.99	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1743		1770	1668		1770	3333		1770	3483	
Flt Permitted		0.99		0.95	1.00		0.14	1.00		0.07	1.00	
Satd. Flow (perm)		1743		1770	1668		256	3333		138	3483	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	60	164	48	366	274	164	61	902	259	144	923	78
RTOR Reduction (vph)	0	6	0	0	15	0	0	17	0	0	4	0
Lane Group Flow (vph)	0	266	0	366	423	0	61	1144	0	144	997	0
Confl. Peds. (#/hr)	28		18	18		28	7		32	32		7
Confl. Bikes (#/hr)			8			13			20			12
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Split	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	7		3	8		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		25.2		37.5	37.3		56.1	50.0		65.1	55.0	
Effective Green, g (s)		25.2		37.5	37.3		56.1	50.0		65.1	55.0	
Actuated g/C Ratio		0.18		0.27	0.27		0.40	0.36		0.46	0.39	
Clearance Time (s)		4.0		4.0	4.2		4.0	4.2		4.0	4.2	
Vehicle Extension (s)		2.5		2.5	2.5		2.0	4.0		2.0	4.0	
Lane Grp Cap (vph)		314		474	444		169	1190		194	1368	
v/s Ratio Prot		c0.15		0.21	c0.25		0.02	c0.34		c0.06	0.29	
v/s Ratio Perm							0.13			0.29		
v/c Ratio		0.85		0.77	0.95		0.36	0.96		0.74	0.73	
Uniform Delay, d1		55.5		47.3	50.5		28.8	44.0		32.1	36.2	
Progression Factor		1.00		0.82	0.82		0.80	0.82		1.00	1.00	
Incremental Delay, d2		18.4		5.5	25.2		0.4	17.2		12.5	3.4	
Delay (s)		74.0		44.2	66.6		23.3	53.3		44.6	39.6	
Level of Service		E		D	E		C	D		D	D	
Approach Delay (s)		74.0			56.4			51.8			40.2	
Approach LOS		E			E			D			D	

Intersection Summary				
HCM Average Control Delay	50.8	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.92			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.4	
Intersection Capacity Utilization	94.9%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: E D St. & Lakeville St.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	491	85	406	616	35	146	122	521	22	126	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5	4.5		4.2	4.2	4.2	4.2	
Lane Util. Factor		0.95		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes		0.98		1.00	1.00	0.91		1.00	1.00	1.00	0.99	
Flpb, ped/bikes		1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.98		1.00	1.00	0.85		1.00	0.85	1.00	0.97	
Flt Protected		1.00		0.95	1.00	1.00		0.97	1.00	0.95	1.00	
Satd. Flow (prot)		3266		1770	1776	1444		1813	1583	1770	1801	
Flt Permitted		0.76		0.95	1.00	1.00		0.97	1.00	0.95	1.00	
Satd. Flow (perm)		2492		1770	1776	1444		1813	1583	1770	1801	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	14	546	94	451	684	39	162	136	579	24	140	32
RTOR Reduction (vph)	0	9	0	0	0	14	0	0	239	0	0	0
Lane Group Flow (vph)	0	645	0	451	684	25	0	298	340	24	172	0
Confl. Peds. (#/hr)	16		32	32		16	2		4	4		2
Confl. Bikes (#/hr)			21			17			1			1
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	
Protected Phases		4		3	8		2	2	2 3	6	6	
Permitted Phases	4					8						
Actuated Green, G (s)		38.8		37.5	80.8	80.8		28.2	70.2	18.1	18.1	
Effective Green, g (s)		38.8		37.5	80.8	80.8		28.2	65.7	18.1	18.1	
Actuated g/C Ratio		0.28		0.27	0.58	0.58		0.20	0.47	0.13	0.13	
Clearance Time (s)		4.5		4.5	4.5	4.5		4.2		4.2	4.2	
Vehicle Extension (s)		4.0		2.0	4.0	4.0		2.5		2.5	2.5	
Lane Grp Cap (vph)		691		474	1025	833		365	743	229	233	
v/s Ratio Prot				c0.25	0.39			c0.16	0.21	0.01	c0.10	
v/s Ratio Perm		c0.26				0.02						
v/c Ratio		0.93		0.95	0.67	0.03		0.82	0.46	0.10	0.74	
Uniform Delay, d1		49.3		50.4	20.4	12.7		53.4	25.1	53.8	58.7	
Progression Factor		0.73		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2		16.6		29.1	3.4	0.1		12.9	0.3	0.1	10.9	
Delay (s)		52.7		79.4	23.8	12.8		66.3	25.4	53.9	69.6	
Level of Service		D		E	C	B		E	C	D	E	
Approach Delay (s)		52.7			44.8			39.3			67.7	
Approach LOS		D			D			D			E	

Intersection Summary				
HCM Average Control Delay	46.5	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.88			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	89.2%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Caulfield Ln. & Lakeville St.

10/28/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	267	506	100	104	754	325	136	70	115	233	41	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.9
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.98		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (prot)	1770	3326		1770	3374	1551	1770	3149		1681	1709	1553
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00
Satd. Flow (perm)	1770	3326		1770	3374	1551	1770	3149		1681	1709	1553
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	297	562	111	116	838	361	151	78	128	259	46	206
RTOR Reduction (vph)	0	10	0	0	0	79	0	116	0	0	0	181
Lane Group Flow (vph)	297	663	0	116	838	282	151	90	0	150	155	25
Confl. Peds. (#/hr)	5		2	2		5	1					1
Confl. Bikes (#/hr)			8			5			8			3
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases						6						4
Actuated Green, G (s)	29.0	83.6		8.0	62.6	62.6	13.5	13.5		17.1	17.1	17.1
Effective Green, g (s)	29.0	83.6		8.0	62.6	62.6	13.5	13.5		17.1	17.1	17.1
Actuated g/C Ratio	0.21	0.60		0.06	0.45	0.45	0.10	0.10		0.12	0.12	0.12
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.9
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	367	1986		101	1509	694	171	304		205	209	190
v/s Ratio Prot	c0.17	0.20		c0.07	c0.25		c0.09	0.03		0.09	c0.09	
v/s Ratio Perm						0.18						0.02
v/c Ratio	0.81	0.33		1.15	0.56	0.41	0.88	0.30		0.73	0.74	0.13
Uniform Delay, d1	52.9	14.2		66.0	28.5	26.2	62.5	58.8		59.2	59.3	54.8
Progression Factor	1.00	1.00		0.69	0.33	0.14	1.00	1.00		0.94	0.94	1.15
Incremental Delay, d2	12.4	0.5		123.9	1.1	1.4	36.7	0.2		10.8	11.5	0.1
Delay (s)	65.2	14.6		169.7	10.4	5.0	99.2	59.0		66.2	67.1	63.0
Level of Service	E	B		F	B	A	F	E		E	E	E
Approach Delay (s)		30.1			23.0			76.0			65.2	
Approach LOS		C			C			E			E	

Intersection Summary				
HCM Average Control Delay	38.0	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.73			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	21.8	
Intersection Capacity Utilization	75.2%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Lakeville St./Lakeville Hwy. & US-101 SB Ramps

10/28/2011

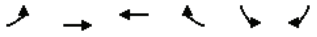
Movement	EBL	EBT	EBR	WBL	WBT	WBR2	SBL	SBR	SBR2	NEL2	NET	NER
Lane Configurations												
Volume (vph)	175	674	5	48	1034	236	651	9	196	6	5	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0	5.0	4.9		4.9		4.4	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	0.97		0.91		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		0.98		0.92	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		1.00		1.00	
Frt	1.00	1.00		1.00	1.00	0.85	0.99		0.85		0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95		1.00		0.99	
Satd. Flow (prot)	3433	3402		1770	3312	1583	3422		1419		1572	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95		1.00		0.99	
Satd. Flow (perm)	3433	3402		1770	3312	1583	3422		1419		1572	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	194	749	6	53	1149	262	723	10	218	7	6	17
RTOR Reduction (vph)	0	1	0	0	0	134	1	0	145	0	17	0
Lane Group Flow (vph)	194	754	0	53	1149	128	754	0	51	0	13	0
Confl. Peds. (#/hr)			2	2			5					5
Confl. Bikes (#/hr)								4	4		6	9
Heavy Vehicles (%)	2%	6%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	NA		Perm	Split	NA	
Protected Phases	5	2		1	6		4			3	3	
Permitted Phases						6			4			
Actuated Green, G (s)	13.2	55.6		26.0	68.4	68.4	36.3		36.3		3.8	
Effective Green, g (s)	13.2	55.6		26.0	68.4	68.4	36.3		36.3		3.8	
Actuated g/C Ratio	0.09	0.40		0.19	0.49	0.49	0.26		0.26		0.03	
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0	4.9		4.9		4.4	
Vehicle Extension (s)	3.0	3.0		2.0	3.0	3.0	3.0		3.0		2.0	
Lane Grp Cap (vph)	324	1351		329	1618	773	887		368		43	
v/s Ratio Prot	0.06	c0.22		0.03	c0.35		c0.22				c0.01	
v/s Ratio Perm						0.08			0.04			
v/c Ratio	0.60	0.56		0.16	0.71	0.17	0.85		0.14		0.31	
Uniform Delay, d1	60.9	32.7		47.8	28.0	19.9	49.3		39.8		66.8	
Progression Factor	1.15	0.63		0.81	0.73	1.29	1.00		1.00		1.00	
Incremental Delay, d2	2.8	1.6		0.1	2.0	0.3	7.7		0.2		1.5	
Delay (s)	72.5	22.2		38.8	22.5	26.0	56.9		40.0		68.3	
Level of Service	E	C		D	C	C	E		D		E	
Approach Delay (s)		32.5			23.7		53.4				68.3	
Approach LOS		C			C		D				E	

Intersection Summary				
HCM Average Control Delay	34.9	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.3	
Intersection Capacity Utilization	73.9%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lakeville Hwy. & US-101 NB Ramps

10/28/2011

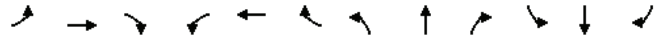


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	135	1177	1132	628	197	263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3374	3312	1550	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3374	3312	1550	3433	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	150	1308	1258	698	219	292
RTOR Reduction (vph)	0	0	0	336	0	1
Lane Group Flow (vph)	150	1308	1258	362	219	291
Confl. Peds. (#/hr)	1			1	3	3
Heavy Vehicles (%)	2%	7%	9%	2%	2%	2%
Turn Type	Prot	NA	NA	Perm	NA	pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	9.9	50.2	36.3	36.3	10.3	24.2
Effective Green, g (s)	9.9	50.2	36.3	36.3	10.3	20.2
Actuated g/C Ratio	0.14	0.72	0.52	0.52	0.15	0.29
Clearance Time (s)	4.0	5.0	5.0	5.0	4.5	
Vehicle Extension (s)	2.0	3.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	250	2420	1718	804	505	457
v/s Ratio Prot	0.08	0.39	c0.38		0.06	c0.18
v/s Ratio Perm				0.23		
v/c Ratio	0.60	0.54	0.73	0.45	0.43	0.64
Uniform Delay, d1	28.2	4.6	13.1	10.6	27.2	21.7
Progression Factor	1.00	1.25	1.41	6.65	1.00	1.00
Incremental Delay, d2	2.2	0.7	2.0	1.3	0.2	2.1
Delay (s)	30.4	6.5	20.4	71.6	27.4	23.9
Level of Service	C	A	C	E	C	C
Approach Delay (s)		8.9	38.7		25.4	
Approach LOS		A	D		C	

Intersection Summary				
HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
6: Hopper St & Caulfield Ln.

11/3/2011



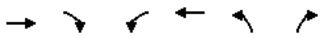
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	45	1	0	0	1	222	0	6	0	214	3	29
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	50	1	0	0	1	247	0	7	0	238	3	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	502	502	19	486	518	7	36			7		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	502	502	19	486	518	7	36			7		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	100	100	100	100	77	100			85		
cM capacity (veh/h)	327	402	1059	435	394	1076	1575			1614		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	51	248	7	238	36
Volume Left	50	0	0	238	0
Volume Right	0	247	0	0	32
cSH	328	1081	1575	1614	1700
Volume to Capacity	0.16	0.23	0.00	0.15	0.02
Queue Length 95th (ft)	14	22	0	13	0
Control Delay (s)	18.0	9.4	0.0	7.6	0.0
Lane LOS	C	A		A	
Approach Delay (s)	18.0	9.4	0.0	6.6	
Approach LOS	C	A			

Intersection Summary				
Average Delay	8.7			
Intersection Capacity Utilization	34.4%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
7: Hotel N-S Street & Hopper St

10/28/2011



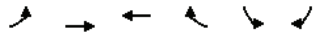
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	151	62	0	124	95	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	151	62	0	124	95	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			213		306	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			213		306	182
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		86	100
cM capacity (veh/h)			1357		686	861

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	213	124	95
Volume Left	0	0	95
Volume Right	62	0	0
cSH	1700	1357	686
Volume to Capacity	0.13	0.00	0.14
Queue Length 95th (ft)	0	0	12
Control Delay (s)	0.0	0.0	11.1
Lane LOS			B
Approach Delay (s)	0.0	0.0	11.1
Approach LOS			B

Intersection Summary				
Average Delay		2.4		
Intersection Capacity Utilization		23.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
8: Caulfield Cir & Hopper St

10/28/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	0	7	78	0	94
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	7	78	0	94
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	85				46	46
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	85				46	46
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	91
cM capacity (veh/h)	1512				964	1023

Direction, Lane #	WB 1	SB 1
Volume Total	85	94
Volume Left	0	0
Volume Right	78	94
cSH	1700	1023
Volume to Capacity	0.05	0.09
Queue Length 95th (ft)	0	8
Control Delay (s)	0.0	8.9
Lane LOS		A
Approach Delay (s)	0.0	8.9
Approach LOS		A

Intersection Summary				
Average Delay		4.7		
Intersection Capacity Utilization		17.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
10: Caulfield Cir & Caulfield Ln

10/28/2011

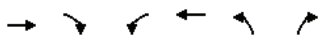
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	15	0	0	93	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	15	0	0	93	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	98	98	102			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	98	98	102			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	100			
cM capacity (veh/h)	902	959	1490			

Direction, Lane #	EB 1	SB 1
Volume Total	15	102
Volume Left	0	0
Volume Right	15	9
cSH	959	1700
Volume to Capacity	0.02	0.06
Queue Length 95th (ft)	1	0
Control Delay (s)	8.8	0.0
Lane LOS	A	
Approach Delay (s)	8.8	0.0
Approach LOS	A	

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	15.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
11: Caulfield Ln (South) & Caulfield Cir

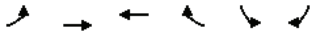
10/28/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	32	76	0	0	0	44
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	32	76	0	0	0	44
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			108		70	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			108		70	70
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	96
cM capacity (veh/h)			1483		934	993

Direction, Lane #	EB 1	NB 1
Volume Total	108	44
Volume Left	0	0
Volume Right	76	44
cSH	1700	993
Volume to Capacity	0.06	0.04
Queue Length 95th (ft)	0	3
Control Delay (s)	0.0	8.8
Lane LOS		A
Approach Delay (s)	0.0	8.8
Approach LOS		A

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	16.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	6	0	0	2	8	10
Sign Control		Stop	Stop		Free	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	6	0	0	2	8	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	23	21	26	0	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	23	21	26	0	0	
tC, single (s)	7.1	6.5	6.5	6.2	4.1	
tC, 2 stage (s)						
tF (s)	3.5	4.0	4.0	3.3	2.2	
p0 queue free %	99	100	100	100	100	
cM capacity (veh/h)	983	868	863	1085	1623	

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	6	2	18
Volume Left	6	0	8
Volume Right	0	2	10
cSH	983	1085	1623
Volume to Capacity	0.01	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	8.7	8.3	3.2
Lane LOS	A	A	A
Approach Delay (s)	8.7	8.3	3.2
Approach LOS	A	A	

Intersection Summary				
Average Delay		4.9		
Intersection Capacity Utilization		15.0%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Signalized Intersection Capacity Analysis
1: Lakeville St. & Washington St.

10/21/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	690	167	67	860	40	206	202	66	50	136	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.2		4.0	4.2		4.0	4.2			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.96			0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1770	3371		1770	3508		1761	1707			1733	
Flt Permitted	0.95	1.00		0.95	1.00		0.43	1.00			0.58	
Satd. Flow (perm)	1770	3371		1770	3508		789	1707			1017	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	690	167	67	860	40	206	202	66	50	136	45
RTOR Reduction (vph)	0	13	0	0	2	0	0	12	0	0	8	0
Lane Group Flow (vph)	15	844	0	67	898	0	206	256	0	0	223	0
Confl. Peds. (#/hr)	7		32	32		7	18		28	28		18
Confl. Bikes (#/hr)			20			12			13			8
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	7%	2%	2%	6%	2%
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	2.7	67.2		7.9	72.4		32.7	32.5			23.4	
Effective Green, g (s)	2.7	67.2		7.9	72.4		32.7	32.5			23.4	
Actuated g/C Ratio	0.02	0.56		0.07	0.60		0.27	0.27			0.19	
Clearance Time (s)	4.0	4.2		4.0	4.2		4.0	4.2			4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.5			2.5	
Lane Grp Cap (vph)	40	1888		117	2116		258	462			198	
v/s Ratio Prot	0.01	c0.25		c0.04	0.26		c0.04	0.15				
v/s Ratio Perm							0.18				c0.22	
v/c Ratio	0.38	0.45		0.57	0.42		0.80	0.55			1.13	
Uniform Delay, d1	57.8	15.5		54.4	12.7		48.8	37.5			48.3	
Progression Factor	1.00	1.00		1.00	1.00		0.58	0.47			1.00	
Incremental Delay, d2	2.1	0.8		4.2	0.6		14.1	1.1			101.9	
Delay (s)	60.0	16.3		58.6	13.3		42.4	18.9			150.2	
Level of Service	E	B		E	B		D	B			F	
Approach Delay (s)		17.0			16.5			29.1			150.2	
Approach LOS		B			B			C			F	

Intersection Summary				
HCM Average Control Delay	31.1	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.61			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.2	
Intersection Capacity Utilization	82.4%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Lakeville St. & E D St.

10/21/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	330	372	26	280	20	478	354	25	10	290	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2	4.2	4.2	4.2		4.5	4.5	4.5		4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00	0.92		0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.99	
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)		1850	1583	1770	1841		1770	1776	1453		3329	
Flt Permitted		0.99	1.00	0.95	1.00		0.95	1.00	1.00		0.91	
Satd. Flow (perm)		1850	1583	1770	1841		1770	1776	1453		3049	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	55	330	372	26	280	20	478	354	25	10	290	25
RTOR Reduction (vph)	0	0	191	0	0	0	0	0	13	0	5	0
Lane Group Flow (vph)	0	385	181	26	300	0	478	354	12	0	320	0
Confl. Peds. (#/hr)	2		4	4		2	32		16	16		32
Confl. Bikes (#/hr)			1			1			17			21
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	7%	2%	2%	6%	2%
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA	Perm	Perm	NA	
Protected Phases	2	2	2 3	6	6		3	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)		29.0	63.0	22.3	22.3		29.5	55.8	55.8		21.8	
Effective Green, g (s)		29.0	58.5	22.3	22.3		29.5	55.8	55.8		21.8	
Actuated g/C Ratio		0.24	0.49	0.19	0.19		0.25	0.46	0.46		0.18	
Clearance Time (s)		4.2		4.2	4.2		4.5	4.5	4.5		4.5	
Vehicle Extension (s)		2.5		2.5	2.5		2.0	4.0	4.0		4.0	
Lane Grp Cap (vph)		447	772	329	342		435	826	676		554	
v/s Ratio Prot		c0.21	0.11	0.01	c0.16		c0.27	0.20				
v/s Ratio Perm									0.01		c0.10	
v/c Ratio		0.86	0.23	0.08	0.88		1.10	0.43	0.02		0.58	
Uniform Delay, d1		43.6	17.8	40.4	47.5		45.2	21.4	17.3		44.9	
Progression Factor		1.00	1.00	1.00	1.00		0.70	0.35	0.11		1.03	
Incremental Delay, d2		15.4	0.1	0.1	21.3		68.9	1.3	0.0		3.6	
Delay (s)		59.0	17.9	40.4	68.8		100.5	8.8	1.9		49.7	
Level of Service		E	B	D	E		F	A	A		D	
Approach Delay (s)		38.8			66.6			59.7			49.7	
Approach LOS		D			E			E			D	

Intersection Summary				
HCM Average Control Delay	52.3	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	92.6%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Caulfield Ln & Lakeville St.

10/21/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	200	620	46	134	780	70	113	378	262	270	207	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.99	1.00
Satd. Flow (prot)	1770	3372		1770	3374	1552	1770	3293		1681	1757	1570
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.99	1.00
Satd. Flow (perm)	1770	3372		1770	3374	1552	1770	3293		1681	1757	1570
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	620	46	134	780	70	113	378	262	270	207	300
RTOR Reduction (vph)	0	4	0	0	0	24	0	104	0	0	0	150
Lane Group Flow (vph)	200	662	0	134	780	46	113	536	0	235	242	150
Confl. Peds. (#/hr)	5		2	2		5	1					1
Confl. Bikes (#/hr)			8			5			8			3
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	pm+ov
Protected Phases	5	2		1	6		3	3		4	4	5
Permitted Phases						6						4
Actuated Green, G (s)	17.0	46.3		12.8	42.1	42.1	22.5	22.5		20.6	20.6	37.6
Effective Green, g (s)	17.0	46.3		12.8	42.1	42.1	22.5	22.5		20.6	20.6	37.6
Actuated g/C Ratio	0.14	0.39		0.11	0.35	0.35	0.19	0.19		0.17	0.17	0.31
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.0
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	3.0
Lane Grp Cap (vph)	251	1301		189	1184	544	332	617		289	302	544
v/s Ratio Prot	c0.11	0.20		0.08	c0.23		0.06	c0.16		c0.14	0.14	0.04
v/s Ratio Perm						0.03						0.06
v/c Ratio	0.80	0.51		0.71	0.66	0.08	0.34	0.87		0.81	0.80	0.28
Uniform Delay, d1	49.8	28.2		51.8	32.9	26.1	42.3	47.3		47.8	47.7	31.0
Progression Factor	0.80	0.65		0.78	0.78	0.49	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.3	1.4		8.6	2.6	0.3	0.2	12.0		15.1	13.4	0.3
Delay (s)	55.2	19.6		49.3	28.1	13.1	42.5	59.3		63.0	61.1	31.2
Level of Service	E	B		D	C	B	D	E		E	E	C
Approach Delay (s)		27.8			29.9			56.8			50.1	
Approach LOS		C			C			E			D	

Intersection Summary				
HCM Average Control Delay	40.0	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.8	
Intersection Capacity Utilization	88.0%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Lakeville St./Lakeville Hwy. & US 101 South Ramps

10/21/2011

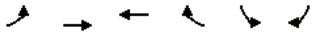
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	289	922	10	5	756	360	5	5	5	700	5	298
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0	5.0		4.4		4.9	4.9	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		0.94		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98		0.95	0.95	1.00
Satd. Flow (prot)	3433	3401		1770	3312	1583		1649		1681	1686	1568
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.98		0.95	0.95	1.00
Satd. Flow (perm)	3433	3401		1770	3312	1583		1649		1681	1686	1568
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	289	922	10	5	756	360	5	5	5	700	5	298
RTOR Reduction (vph)	0	0	0	0	0	198	0	5	0	0	0	101
Lane Group Flow (vph)	289	932	0	5	756	162	0	10	0	350	355	197
Confl. Peds. (#/hr)			2	2					5	5		
Confl. Bikes (#/hr)									9		4	4
Heavy Vehicles (%)	2%	6%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	pm+ov
Protected Phases	5	2		1	6		3	3		4	4	5
Permitted Phases						6						4
Actuated Green, G (s)	14.7	66.8		1.8	53.9	53.9		2.4		30.7	30.7	45.4
Effective Green, g (s)	14.7	66.8		1.8	53.9	53.9		2.4		30.7	30.7	45.4
Actuated g/C Ratio	0.12	0.56		0.02	0.45	0.45		0.02		0.26	0.26	0.38
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0		4.4		4.9	4.9	4.0
Vehicle Extension (s)	3.0	3.0		2.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	421	1893		27	1488	711		33		430	431	593
v/s Ratio Prot	c0.08	0.27		0.00	c0.23			c0.01		0.21	c0.21	0.04
v/s Ratio Perm						0.10						0.08
v/c Ratio	0.69	0.49		0.19	0.51	0.23		0.31		0.81	0.82	0.33
Uniform Delay, d1	50.4	16.2		58.4	23.6	20.3		58.0		42.0	42.1	26.5
Progression Factor	0.88	1.17		0.72	0.56	0.47		1.00		1.00	1.00	1.00
Incremental Delay, d2	3.8	0.7		1.1	1.1	0.7		5.2		11.2	12.1	0.3
Delay (s)	48.3	19.7		43.1	14.4	10.1		63.2		53.2	54.2	26.8
Level of Service	D	B		D	B	B		E		D	D	C
Approach Delay (s)		26.5			13.2			63.2			45.7	
Approach LOS		C			B			E			D	

Intersection Summary				
HCM Average Control Delay	27.9	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.3	
Intersection Capacity Utilization	68.6%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lakeville Hwy. & US-101 NB Ramps

10/21/2011

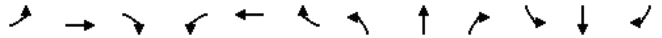


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	132	1450	1085	670	270	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3374	3312	1550	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3374	3312	1550	3433	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	132	1450	1085	670	270	31
RTOR Reduction (vph)	0	0	0	227	0	23
Lane Group Flow (vph)	132	1450	1085	443	270	8
Confl. Peds. (#/hr)	1			1	3	3
Heavy Vehicles (%)	2%	7%	9%	2%	2%	2%
Turn Type	Prot	NA	NA	Perm	NA	pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	13.3	96.7	79.4	79.4	13.8	31.6
Effective Green, g (s)	13.3	96.7	79.4	79.4	13.8	31.6
Actuated g/C Ratio	0.11	0.81	0.66	0.66	0.12	0.26
Clearance Time (s)	4.0	5.0	5.0	5.0	4.5	
Vehicle Extension (s)	2.0	3.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	196	2719	2191	1026	395	417
v/s Ratio Prot	c0.07	c0.43	0.33		c0.08	0.01
v/s Ratio Perm				0.29		
v/c Ratio	0.67	0.53	0.50	0.43	0.68	0.02
Uniform Delay, d1	51.3	4.0	10.2	9.6	51.0	32.7
Progression Factor	1.24	0.24	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.1	0.7	0.8	1.3	3.9	0.0
Delay (s)	69.7	1.6	11.0	10.9	54.9	32.7
Level of Service	E	A	B	B	D	C
Approach Delay (s)		7.3	11.0		52.6	
Approach LOS		A	B		D	

Intersection Summary				
HCM Average Control Delay	12.8	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.5	
Intersection Capacity Utilization	57.7%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Caulfield Ln & Hopper St

11/10/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	59	5	25	5	5	5	64	669	5	5	202	148
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	59	5	25	5	5	5	64	669	5	5	202	148
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)											622	
pX, platoon unblocked	0.91	0.91	0.91	0.91	0.91		0.91					
vC, conflicting volume	1090	1088	276	1039	1160	672	350			674		
vC1, stage 1 conf vol	286	286		800	800							
vC2, stage 2 conf vol	804	802		240	360							
vCu, unblocked vol	1048	1045	148	991	1124	672	230			674		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	82	99	97	99	99	99	95			99		
cM capacity (veh/h)	325	347	814	338	339	456	1212			917		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	89	15	64	674	5	350
Volume Left	59	5	64	0	5	0
Volume Right	25	5	0	5	0	148
cSH	392	370	1212	1700	917	1700
Volume to Capacity	0.23	0.04	0.05	0.40	0.01	0.21
Queue Length 95th (ft)	22	3	4	0	0	0
Control Delay (s)	16.8	15.1	8.1	0.0	8.9	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	16.8	15.1	0.7		0.1	
Approach LOS	C	C				

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	58.3%	ICU Level of Service	B	
Analysis Period (min)	15			

HCM Signalized Intersection Capacity Analysis
1: Lakeville St. & Washington St.

10/26/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	890	247	75	1010	70	264	272	116	60	263	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.2		4.0	4.2		4.0	4.2			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.98			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.96			0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1770	3342		1770	3493		1763	1692			1754	
Flt Permitted	0.95	1.00		0.95	1.00		0.39	1.00			0.62	
Satd. Flow (perm)	1770	3342		1770	3493		720	1692			1098	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	50	890	247	75	1010	70	264	272	116	60	263	45
RTOR Reduction (vph)	0	16	0	0	3	0	0	12	0	0	4	0
Lane Group Flow (vph)	50	1121	0	75	1077	0	264	376	0	0	364	0
Confl. Peds. (#/hr)	7		32	32		7	18		28	28		18
Confl. Bikes (#/hr)			20			12			13			8
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	7%	2%	2%	6%	2%
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	6.6	62.4		9.5	65.3		53.9	53.7			43.3	
Effective Green, g (s)	6.6	62.4		9.5	65.3		53.9	53.7			43.3	
Actuated g/C Ratio	0.05	0.45		0.07	0.47		0.39	0.39			0.31	
Clearance Time (s)	4.0	4.2		4.0	4.2		4.0	4.2			4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.5			2.5	
Lane Grp Cap (vph)	85	1511		122	1653		331	658			345	
v/s Ratio Prot	0.03	c0.34		c0.04	c0.31		c0.04	0.22				
v/s Ratio Perm							0.27				c0.33	
v/c Ratio	0.59	0.74		0.61	0.65		0.80	0.57			1.05	
Uniform Delay, d1	64.4	31.2		62.5	27.7		50.1	33.1			47.4	
Progression Factor	1.00	1.00		1.00	1.00		0.46	0.45			1.00	
Incremental Delay, d2	6.5	3.3		6.3	2.0		6.9	0.5			63.6	
Delay (s)	70.9	34.5		68.8	29.7		30.2	15.4			110.9	
Level of Service	E	C		E	C		C	B			F	
Approach Delay (s)		36.0			32.2			21.4			110.9	
Approach LOS		D			C			C			F	

Intersection Summary				
HCM Average Control Delay	40.1	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.85			
Actuated Cycle Length (s)	138.0	Sum of lost time (s)	16.4	
Intersection Capacity Utilization	97.6%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Lakeville St. & E D St.

10/26/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	370	548	15	380	40	547	623	35	10	584	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2	4.2	4.2	4.2		4.5	4.5	4.5		4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00	0.91		0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.99	
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)		1840	1583	1770	1831		1770	1776	1442		3334	
Flt Permitted		0.99	1.00	0.95	1.00		0.95	1.00	1.00		0.94	
Satd. Flow (perm)		1840	1583	1770	1831		1770	1776	1442		3141	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	120	370	548	15	380	40	547	623	35	10	584	45
RTOR Reduction (vph)	0	0	257	0	0	0	0	0	16	0	4	0
Lane Group Flow (vph)	0	490	291	15	420	0	547	623	19	0	635	0
Confl. Peds. (#/hr)	2		4	4		2	32		16	16		32
Confl. Bikes (#/hr)			1			1			17			21
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	7%	2%	2%	6%	2%
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA	Perm	Perm	NA	
Protected Phases	2	2	2 3	6	6		3	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)		33.0	65.5	26.8	26.8		32.5	65.3	65.3		28.3	
Effective Green, g (s)		33.0	65.5	26.8	26.8		32.5	65.3	65.3		28.3	
Actuated g/C Ratio		0.24	0.47	0.19	0.19		0.24	0.47	0.47		0.21	
Clearance Time (s)		4.2		4.2	4.2		4.5	4.5	4.5		4.5	
Vehicle Extension (s)		2.5		2.5	2.5		2.0	4.0	4.0		4.0	
Lane Grp Cap (vph)		440	751	344	356		417	840	682		644	
v/s Ratio Prot		c0.27	0.18	0.01	c0.23		c0.31	0.35				
v/s Ratio Perm									0.01		c0.20	
v/c Ratio		1.11	0.39	0.04	1.18		1.31	0.74	0.03		0.99	
Uniform Delay, d1		52.5	23.3	45.2	55.6		52.8	29.5	19.4		54.7	
Progression Factor		1.00	1.00	1.00	1.00		0.67	0.55	0.14		0.90	
Incremental Delay, d2		77.6	0.2	0.0	106.2		152.0	4.1	0.1		25.0	
Delay (s)		130.1	23.6	45.2	161.8		187.4	20.4	2.8		74.4	
Level of Service		F	C	D	F		F	C	A		E	
Approach Delay (s)		73.8			157.8			95.7			74.4	
Approach LOS		E			F			F			E	

Intersection Summary				
HCM Average Control Delay	92.9	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.15			
Actuated Cycle Length (s)	138.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	114.1%	ICU Level of Service	H	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Caulfield Ln & Lakeville St.

10/26/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	250	780	133	424	980	310	123	409	201	200	332	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	0.98		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3313		1770	3374	1551	1770	3299		1681	1765	1542
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3313		1770	3374	1551	1770	3299		1681	1765	1542
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	250	780	133	424	980	310	123	409	201	200	332	350
RTOR Reduction (vph)	0	10	0	0	0	79	0	44	0	0	0	97
Lane Group Flow (vph)	250	903	0	424	980	231	123	566	0	180	352	253
Confl. Peds. (#/hr)	5		20	2		5	1		20			20
Confl. Bikes (#/hr)			8			5			8			3
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	pm+ov
Protected Phases	5	2		1	6		3	3		4	4	5
Permitted Phases						6						4
Actuated Green, G (s)	20.0	38.5		32.0	50.5	50.5	22.0	22.0		27.7	27.7	47.7
Effective Green, g (s)	20.0	38.5		32.0	50.5	50.5	22.0	22.0		27.7	27.7	47.7
Actuated g/C Ratio	0.14	0.28		0.23	0.37	0.37	0.16	0.16		0.20	0.20	0.35
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.0
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	3.0
Lane Grp Cap (vph)	257	924		410	1235	568	282	526		337	354	533
v/s Ratio Prot	0.14	c0.27		c0.24	0.29		0.07	c0.17		0.11	c0.20	0.07
v/s Ratio Perm						0.15						0.10
v/c Ratio	0.97	0.98		1.03	0.79	0.41	0.44	1.08		0.53	0.99	0.47
Uniform Delay, d1	58.7	49.3		53.0	39.1	32.6	52.4	58.0		49.4	55.1	35.3
Progression Factor	0.57	0.48		0.84	0.93	0.83	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	37.5	18.8		44.8	3.5	1.4	0.4	61.4		0.8	46.0	0.7
Delay (s)	70.9	42.5		89.2	39.7	28.4	52.8	119.4		50.2	101.1	36.0
Level of Service	E	D		F	D	C	D	F		D	F	D
Approach Delay (s)		48.6			49.9			108.3			64.9	
Approach LOS		D			D			F			E	

Intersection Summary					
HCM Average Control Delay	62.0	HCM Level of Service		E	
HCM Volume to Capacity ratio	1.01				
Actuated Cycle Length (s)	138.0	Sum of lost time (s)		17.8	
Intersection Capacity Utilization	102.3%	ICU Level of Service		G	
Analysis Period (min)	15				

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Lakeville St./Lakeville Hwy. & US 101 South Ramps

10/26/2011

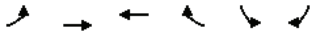
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	136	1096	15	5	1357	270	25	5	10	670	5	377
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0	5.0		4.4		4.9	4.9	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		0.97		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.95	1.00
Satd. Flow (prot)	3433	3400		1770	3312	1583		1700		1681	1687	1566
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.95	1.00
Satd. Flow (perm)	3433	3400		1770	3312	1583		1700		1681	1687	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	136	1096	15	5	1357	270	25	5	10	670	5	377
RTOR Reduction (vph)	0	0	0	0	0	128	0	9	0	0	0	39
Lane Group Flow (vph)	136	1111	0	5	1357	142	0	31	0	335	340	338
Confl. Peds. (#/hr)			2	2					5	5		
Confl. Bikes (#/hr)									9		4	4
Heavy Vehicles (%)	2%	6%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	pm+ov
Protected Phases	5	2		1	6		3	3		4	4	5
Permitted Phases						6						4
Actuated Green, G (s)	10.6	80.5		2.7	72.6	72.6		5.0		31.5	31.5	42.1
Effective Green, g (s)	10.6	80.5		2.7	72.6	72.6		5.0		31.5	31.5	42.1
Actuated g/C Ratio	0.08	0.58		0.02	0.53	0.53		0.04		0.23	0.23	0.31
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0		4.4		4.9	4.9	4.0
Vehicle Extension (s)	3.0	3.0		2.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	264	1983		35	1742	833		62		384	385	478
v/s Ratio Prot	0.04	0.33		0.00	c0.41			c0.02		0.20	c0.20	c0.05
v/s Ratio Perm						0.09						0.16
v/c Ratio	0.52	0.56		0.14	0.78	0.17		0.51		0.87	0.88	0.71
Uniform Delay, d1	61.2	17.8		66.5	26.3	17.0		65.3		51.3	51.5	42.5
Progression Factor	0.84	0.66		0.78	0.74	0.43		1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	0.5		0.5	2.8	0.3		6.3		19.1	20.5	4.7
Delay (s)	52.4	12.3		52.5	22.2	7.6		71.6		70.4	72.0	47.2
Level of Service	D	B		D	C	A		E		E	E	D
Approach Delay (s)		16.7			19.9			71.6			62.6	
Approach LOS		B			B			E			E	

Intersection Summary					
HCM Average Control Delay	30.7	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.79				
Actuated Cycle Length (s)	138.0	Sum of lost time (s)		18.3	
Intersection Capacity Utilization	79.5%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lakeville Hwy. & US-101 NB Ramps

10/26/2011

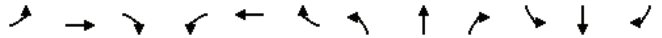


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	159	1587	1485	660	200	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3374	3312	1551	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3374	3312	1551	3433	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	159	1587	1485	660	200	223
RTOR Reduction (vph)	0	0	0	204	0	23
Lane Group Flow (vph)	159	1587	1485	456	200	200
Confl. Peds. (#/hr)	1			1	3	3
Heavy Vehicles (%)	2%	7%	9%	2%	2%	2%
Turn Type	Prot	NA	NA	Perm	NA	pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	16.8	116.1	95.3	95.3	12.4	33.2
Effective Green, g (s)	16.8	116.1	95.3	95.3	12.4	29.2
Actuated g/C Ratio	0.12	0.84	0.69	0.69	0.09	0.21
Clearance Time (s)	4.0	5.0	5.0	5.0	4.5	
Vehicle Extension (s)	2.0	3.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	215	2839	2287	1071	308	335
v/s Ratio Prot	c0.09	0.47	c0.45		c0.06	0.13
v/s Ratio Perm				0.29		
v/c Ratio	0.74	0.56	0.65	0.43	0.65	0.60
Uniform Delay, d1	58.5	3.3	12.0	9.4	60.7	49.1
Progression Factor	1.12	1.11	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.7	0.6	1.4	1.2	3.5	1.9
Delay (s)	73.9	4.3	13.4	10.6	64.2	51.0
Level of Service	E	A	B	B	E	D
Approach Delay (s)		10.6	12.6		57.3	
Approach LOS		B	B		E	

Intersection Summary				
HCM Average Control Delay	16.1	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.66			
Actuated Cycle Length (s)	138.0	Sum of lost time (s)	13.5	
Intersection Capacity Utilization	69.3%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Caulfield Ln & Hopper St

11/10/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	189	5	48	5	5	5	17	514	5	5	774	67
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	189	5	48	5	5	5	17	514	5	5	774	67
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)											622	
pX, platoon unblocked	0.82	0.82	0.82	0.82	0.82		0.82					
vC, conflicting volume	1373	1370	808	1385	1402	516	841			519		
vC1, stage 1 conf vol	818	818		550	550							
vC2, stage 2 conf vol	556	553		834	851							
vCu, unblocked vol	1345	1342	654	1360	1380	516	695			519		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	37	98	87	98	98	99	98			100		
cM capacity (veh/h)	301	312	382	256	293	559	737			1047		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	242	15	17	519	5	841
Volume Left	189	5	17	0	5	0
Volume Right	48	5	0	5	0	67
cSH	314	330	737	1700	1047	1700
Volume to Capacity	0.77	0.05	0.02	0.31	0.00	0.49
Queue Length 95th (ft)	151	4	2	0	0	0
Control Delay (s)	46.2	16.4	10.0	0.0	8.5	0.0
Lane LOS	E	C	A		A	
Approach Delay (s)	46.2	16.4	0.3		0.0	
Approach LOS	E	C				

Intersection Summary				
Average Delay	7.1			
Intersection Capacity Utilization	71.8%	ICU Level of Service	C	
Analysis Period (min)	15			

HCM Signalized Intersection Capacity Analysis
1: Lakeville St. & Washington St.

11/3/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	690	183	70	860	40	217	217	70	50	153	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.2		4.0	4.2		4.0	4.2			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.96			0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1770	3358		1770	3508		1762	1708			1737	
Flt Permitted	0.95	1.00		0.95	1.00		0.42	1.00			0.59	
Satd. Flow (perm)	1770	3358		1770	3508		772	1708			1036	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	690	183	70	860	40	217	217	70	50	153	45
RTOR Reduction (vph)	0	16	0	0	2	0	0	11	0	0	7	0
Lane Group Flow (vph)	15	857	0	70	898	0	217	276	0	0	241	0
Confl. Peds. (#/hr)	7		32	32		7	18		28	28		18
Confl. Bikes (#/hr)			20			12			13			8
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	7%	2%	2%	6%	2%
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	2.7	65.0		8.1	70.4		34.7	34.5			25.1	
Effective Green, g (s)	2.7	65.0		8.1	70.4		34.7	34.5			25.1	
Actuated g/C Ratio	0.02	0.54		0.07	0.59		0.29	0.29			0.21	
Clearance Time (s)	4.0	4.2		4.0	4.2		4.0	4.2			4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.5			2.5	
Lane Grp Cap (vph)	40	1819		119	2058		269	491			217	
v/s Ratio Prot	0.01	c0.26		c0.04	0.26		c0.04	0.16				
v/s Ratio Perm							0.20				c0.23	
v/c Ratio	0.38	0.47		0.59	0.44		0.81	0.56			1.11	
Uniform Delay, d1	57.8	16.9		54.3	13.8		48.1	36.3			47.4	
Progression Factor	1.00	1.00		1.00	1.00		0.57	0.45			1.00	
Incremental Delay, d2	2.1	0.9		4.7	0.7		14.2	1.1			93.7	
Delay (s)	60.0	17.8		59.1	14.5		41.5	17.5			141.2	
Level of Service	E	B		E	B		D	B			F	
Approach Delay (s)		18.5			17.7			27.8			141.2	
Approach LOS		B			B			C			F	

Intersection Summary				
HCM Average Control Delay	31.7	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.64			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.2	
Intersection Capacity Utilization	84.0%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Lakeville St. & E D St.

11/3/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	330	387	30	280	20	488	384	30	10	326	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2	4.2	4.2	4.2		4.5	4.5	4.5		4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00	0.92		0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.99	
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)		1850	1583	1770	1841		1770	1776	1453		3337	
Flt Permitted		0.99	1.00	0.95	1.00		0.95	1.00	1.00		0.88	
Satd. Flow (perm)		1850	1583	1770	1841		1770	1776	1453		2935	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	55	330	387	30	280	20	488	384	30	10	326	25
RTOR Reduction (vph)	0	0	198	0	0	0	0	0	16	0	4	0
Lane Group Flow (vph)	0	385	189	30	300	0	488	384	14	0	357	0
Confl. Peds. (#/hr)	2		4	4		2	32		16	16		32
Confl. Bikes (#/hr)			1			1			17			21
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	7%	2%	2%	6%	2%
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA	Perm	Perm	NA	
Protected Phases	2	2	2 3	6	6		3	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)		29.0	63.0	22.3	22.3		29.5	55.8	55.8		21.8	
Effective Green, g (s)		29.0	58.5	22.3	22.3		29.5	55.8	55.8		21.8	
Actuated g/C Ratio		0.24	0.49	0.19	0.19		0.25	0.46	0.46		0.18	
Clearance Time (s)		4.2		4.2	4.2		4.5	4.5	4.5		4.5	
Vehicle Extension (s)		2.5		2.5	2.5		2.0	4.0	4.0		4.0	
Lane Grp Cap (vph)		447	772	329	342		435	826	676		533	
v/s Ratio Prot		c0.21	0.12	0.02	c0.16		c0.28	0.22				
v/s Ratio Perm									0.01		c0.12	
v/c Ratio		0.86	0.24	0.09	0.88		1.12	0.46	0.02		0.67	
Uniform Delay, d1		43.6	17.9	40.5	47.5		45.2	21.9	17.3		45.7	
Progression Factor		1.00	1.00	1.00	1.00		0.67	0.40	0.16		1.01	
Incremental Delay, d2		15.4	0.1	0.1	21.3		76.0	1.5	0.0		5.3	
Delay (s)		59.0	18.0	40.5	68.8		106.4	10.2	2.8		51.6	
Level of Service		E	B	D	E		F	B	A		D	
Approach Delay (s)		38.4			66.3			62.0			51.6	
Approach LOS		D			E			E			D	

Intersection Summary				
HCM Average Control Delay	53.3	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.90			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	93.2%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Caulfield Ln & Lakeville St. 11/3/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	200	620	103	208	780	70	161	410	334	270	244	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3335		1770	3374	1551	1770	3271		1681	1761	1570
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3335		1770	3374	1551	1770	3271		1681	1761	1570
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	200	620	103	208	780	70	161	410	334	270	244	300
RTOR Reduction (vph)	0	11	0	0	0	25	0	118	0	0	0	109
Lane Group Flow (vph)	200	712	0	208	780	45	161	626	0	243	271	191
Confl. Peds. (#/hr)	5		2	2		5	1					1
Confl. Bikes (#/hr)			8			5			8			3
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	pm+ov
Protected Phases	5	2		1	6		3	3		4	4	5
Permitted Phases						6						4
Actuated Green, G (s)	17.0	39.2		15.5	37.7	37.7	25.6	25.6		21.9	21.9	38.9
Effective Green, g (s)	17.0	39.2		15.5	37.7	37.7	25.6	25.6		21.9	21.9	38.9
Actuated g/C Ratio	0.14	0.33		0.13	0.31	0.31	0.21	0.21		0.18	0.18	0.32
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.0
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	3.0
Lane Grp Cap (vph)	251	1089		229	1060	487	378	698		307	321	561
v/s Ratio Prot	c0.11	0.21		c0.12	c0.23		0.09	c0.19		0.14	c0.15	0.05
v/s Ratio Perm						0.03						0.07
v/c Ratio	0.80	0.65		0.91	0.74	0.09	0.43	0.90		0.79	0.84	0.34
Uniform Delay, d1	49.8	34.6		51.5	36.7	29.1	40.8	45.9		46.9	47.4	30.8
Progression Factor	0.79	0.68		0.80	0.76	0.48	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.0	2.9		31.8	4.0	0.3	0.3	13.8		12.2	17.3	0.4
Delay (s)	54.2	26.4		73.2	32.0	14.4	41.1	59.8		59.1	64.7	31.2
Level of Service	D	C		E	C	B	D	E		E	E	C
Approach Delay (s)		32.4			38.9			56.4			50.7	
Approach LOS		C			D			E			D	

Intersection Summary				
HCM Average Control Delay	44.2	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.9	
Intersection Capacity Utilization	92.1%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Lakeville St./Lakeville Hwy. & US 101 South Ramps 11/3/2011

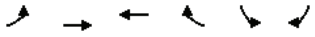
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	304	980	10	5	802	360	5	5	5	700	5	326
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0	5.0		4.4		4.9	4.9	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		0.94		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98		0.95	0.95	1.00
Satd. Flow (prot)	3433	3401		1770	3312	1583		1649		1681	1686	1568
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.98		0.95	0.95	1.00
Satd. Flow (perm)	3433	3401		1770	3312	1583		1649		1681	1686	1568
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	304	980	10	5	802	360	5	5	5	700	5	326
RTOR Reduction (vph)	0	0	0	0	0	199	0	5	0	0	0	96
Lane Group Flow (vph)	304	990	0	5	802	161	0	10	0	350	355	230
Confl. Peds. (#/hr)			2	2					5	5		
Confl. Bikes (#/hr)									9		4	4
Heavy Vehicles (%)	2%	6%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	pm+ov
Protected Phases	5	2		1	6		3	3		4	4	5
Permitted Phases						6						4
Actuated Green, G (s)	15.0	67.2		1.4	53.6	53.6		2.4		30.7	30.7	45.7
Effective Green, g (s)	15.0	67.2		1.4	53.6	53.6		2.4		30.7	30.7	45.7
Actuated g/C Ratio	0.12	0.56		0.01	0.45	0.45		0.02		0.26	0.26	0.38
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0		4.4		4.9	4.9	4.0
Vehicle Extension (s)	3.0	3.0		2.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	429	1905		21	1479	707		33		430	431	597
v/s Ratio Prot	c0.09	0.29		0.00	c0.24			c0.01		0.21	c0.21	0.05
v/s Ratio Perm						0.10						0.10
v/c Ratio	0.71	0.52		0.24	0.54	0.23		0.31		0.81	0.82	0.39
Uniform Delay, d1	50.4	16.4		58.8	24.2	20.4		58.0		42.0	42.1	27.0
Progression Factor	0.87	1.00		0.69	0.54	0.32		1.00		1.00	1.00	1.00
Incremental Delay, d2	3.8	0.7		1.9	1.3	0.7		5.2		11.2	12.1	0.4
Delay (s)	47.5	17.2		42.6	14.5	7.2		63.2		53.2	54.2	27.4
Level of Service	D	B		D	B	A		E		D	D	C
Approach Delay (s)		24.3			12.3			63.2			45.4	
Approach LOS		C			B			E			D	

Intersection Summary				
HCM Average Control Delay	26.7	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.3	
Intersection Capacity Utilization	70.2%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lakeville Hwy. & US-101 NB Ramps

11/3/2011

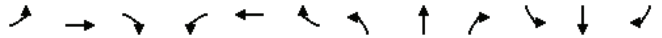


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	160	1480	1114	670	270	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3374	3312	1550	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3374	3312	1550	3433	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	160	1480	1114	670	270	48
RTOR Reduction (vph)	0	0	0	237	0	35
Lane Group Flow (vph)	160	1480	1114	433	270	13
Confl. Peds. (#/hr)	1			1	3	3
Heavy Vehicles (%)	2%	7%	9%	2%	2%	2%
Turn Type	Prot	NA	NA	Perm	NA	pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	15.1	96.7	77.6	77.6	13.8	33.4
Effective Green, g (s)	15.1	96.7	77.6	77.6	13.8	33.4
Actuated g/C Ratio	0.13	0.81	0.65	0.65	0.12	0.28
Clearance Time (s)	4.0	5.0	5.0	5.0	4.5	
Vehicle Extension (s)	2.0	3.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	223	2719	2142	1002	395	441
v/s Ratio Prot	c0.09	c0.44	0.34		c0.08	0.01
v/s Ratio Perm				0.28		
v/c Ratio	0.72	0.54	0.52	0.43	0.68	0.03
Uniform Delay, d1	50.4	4.0	11.3	10.4	51.0	31.5
Progression Factor	1.18	0.29	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.6	0.7	0.9	1.4	3.9	0.0
Delay (s)	66.9	1.8	12.2	11.8	54.9	31.5
Level of Service	E	A	B	B	D	C
Approach Delay (s)		8.2	12.0		51.3	
Approach LOS		A	B		D	

Intersection Summary				
HCM Average Control Delay	13.7	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.57			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.5	
Intersection Capacity Utilization	60.0%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
6: Caulfield Ln & Hopper St

11/10/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	59	5	25	5	5	674	64	153	5	125	251	148
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	59	5	25	5	5	674	64	153	5	125	251	148
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)											622	
pX, platoon unblocked	0.93	0.93	0.93	0.93	0.93		0.93					
vC, conflicting volume	858	861	325	812	932	156	399			158		
vC1, stage 1 conf vol	575	575		284	284							
vC2, stage 2 conf vol	284	286		528	649							
vCu, unblocked vol	807	809	230	756	887	156	310			158		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	1	99	97	99	99	24	94			91		
cM capacity (veh/h)	60	395	749	388	340	890	1157			1422		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	89	684	64	158	125	399
Volume Left	59	5	64	0	125	0
Volume Right	25	674	0	5	0	148
cSH	86	903	1157	1700	1422	1700
Volume to Capacity	1.04	0.76	0.06	0.09	0.09	0.23
Queue Length 95th (ft)	149	184	4	0	7	0
Control Delay (s)	195.0	20.4	8.3	0.0	7.8	0.0
Lane LOS	F	C	A		A	
Approach Delay (s)	195.0	20.4	2.4		1.9	
Approach LOS	F	C				

Intersection Summary				
Average Delay	21.6			
Intersection Capacity Utilization	65.1%	ICU Level of Service	C	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
7: Hotel N-S Street & Hopper St

11/10/2011

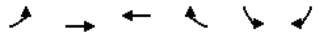
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	54	65	5	640	29	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	54	65	5	640	29	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			119		736	86
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			119		736	86
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		92	99
cM capacity (veh/h)			1469		385	972

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	119	645	34
Volume Left	0	5	29
Volume Right	65	0	5
cSH	1700	1469	422
Volume to Capacity	0.07	0.00	0.08
Queue Length 95th (ft)	0	0	7
Control Delay (s)	0.0	0.1	14.3
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	14.3
Approach LOS			B

Intersection Summary				
Average Delay		0.7		
Intersection Capacity Utilization		47.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
8: Caulfield Cir & Hopper St

11/10/2011



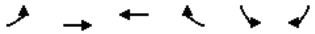
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	0	86	595	0	23
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	86	595	0	23
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	681				384	384
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	681				384	384
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	97
cM capacity (veh/h)	912				619	664

Direction, Lane #	WB 1	SB 1
Volume Total	681	23
Volume Left	0	0
Volume Right	595	23
cSH	1700	664
Volume to Capacity	0.40	0.03
Queue Length 95th (ft)	0	3
Control Delay (s)	0.0	10.6
Lane LOS		B
Approach Delay (s)	0.0	10.6
Approach LOS		B

Intersection Summary				
Average Delay		0.3		
Intersection Capacity Utilization		51.2%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
9: Caulfield Ln & Hotel N-S Street

11/10/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	10	149	97	12	24	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	149	97	12	24	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	109				272	103
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	109				272	103
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	100
cM capacity (veh/h)	1481				713	952

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	159	109	26
Volume Left	10	0	24
Volume Right	0	12	2
cSH	1481	1700	727
Volume to Capacity	0.01	0.06	0.04
Queue Length 95th (ft)	1	0	3
Control Delay (s)	0.5	0.0	10.1
Lane LOS	A		B
Approach Delay (s)	0.5	0.0	10.1
Approach LOS			B

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	25.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
10: Caulfield Cir & Caulfield Ln

11/10/2011

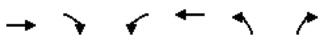
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	102	0	0	22	87
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	102	0	0	22	87
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	66	66	109			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	66	66	109			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	90	100			
cM capacity (veh/h)	940	998	1481			

Direction, Lane #	EB 1	SB 1
Volume Total	102	109
Volume Left	0	0
Volume Right	102	87
cSH	998	1700
Volume to Capacity	0.10	0.06
Queue Length 95th (ft)	9	0
Control Delay (s)	9.0	0.0
Lane LOS	A	
Approach Delay (s)	9.0	0.0
Approach LOS	A	

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	19.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
11: Caulfield Ln (South) & Caulfield Cir

11/10/2011



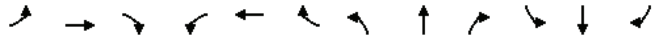
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	20	133	0	0	0	672
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	133	0	0	0	672
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			153		86	86
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			153		86	86
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	31
cM capacity (veh/h)			1428		915	972

Direction, Lane #	EB 1	NB 1
Volume Total	153	672
Volume Left	0	0
Volume Right	133	672
cSH	1700	972
Volume to Capacity	0.09	0.69
Queue Length 95th (ft)	0	145
Control Delay (s)	0.0	16.6
Lane LOS		C
Approach Delay (s)	0.0	16.6
Approach LOS		C

Intersection Summary			
Average Delay	13.5		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
12: Caulfield Ln (South) & River Street

11/10/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	2	11	4	2	4	4	630	1	5	128	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	2	11	4	2	4	4	630	1	5	128	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	783	778	130	790	780	630	131			631		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	783	778	130	790	780	630	131			631		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	99	99	99	99	99	100			99		
cM capacity (veh/h)	305	325	920	301	324	481	1454			951		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	18	10	635	136
Volume Left	5	4	4	5
Volume Right	11	4	1	3
cSH	522	360	1454	951
Volume to Capacity	0.03	0.03	0.00	0.01
Queue Length 95th (ft)	3	2	0	0
Control Delay (s)	12.1	15.3	0.1	0.4
Lane LOS	B	C	A	A
Approach Delay (s)	12.1	15.3	0.1	0.4
Approach LOS	B	C		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: Lakeville St. & Washington St.

10/26/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	890	260	80	1010	70	281	291	120	60	280	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.2		4.0	4.2		4.0	4.2			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.96			0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1770	3334		1770	3493		1764	1694			1756	
Flt Permitted	0.95	1.00		0.95	1.00		0.39	1.00			0.63	
Satd. Flow (perm)	1770	3334		1770	3493		718	1694			1113	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	50	890	260	80	1010	70	281	291	120	60	280	45
RTOR Reduction (vph)	0	18	0	0	3	0	0	12	0	0	3	0
Lane Group Flow (vph)	50	1132	0	80	1077	0	281	399	0	0	382	0
Confl. Peds. (#/hr)	7		32	32		7	18		28	28		18
Confl. Bikes (#/hr)			20			12			13			8
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	7%	2%	2%	6%	2%
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	6.2	59.3		9.6	62.7		56.9	56.7			45.7	
Effective Green, g (s)	6.2	59.3		9.6	62.7		56.9	56.7			45.7	
Actuated g/C Ratio	0.04	0.43		0.07	0.45		0.41	0.41			0.33	
Clearance Time (s)	4.0	4.2		4.0	4.2		4.0	4.2			4.0	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.5	2.5			2.5	
Lane Grp Cap (vph)	80	1433		123	1587		351	696			369	
v/s Ratio Prot	0.03	c0.34		c0.05	c0.31		c0.04	0.24				
v/s Ratio Perm							0.29				c0.34	
v/c Ratio	0.62	0.79		0.65	0.68		0.80	0.57			1.03	
Uniform Delay, d1	64.8	34.0		62.6	29.7		48.5	31.3			46.2	
Progression Factor	1.00	1.00		1.00	1.00		0.50	0.48			1.00	
Incremental Delay, d2	10.5	4.5		9.0	2.4		6.2	0.5			56.0	
Delay (s)	75.2	38.5		71.6	32.1		30.3	15.4			102.1	
Level of Service	E	D		E	C		C	B			F	
Approach Delay (s)		40.0			34.8			21.5			102.1	
Approach LOS		D			C			C			F	

Intersection Summary				
HCM Average Control Delay	41.5	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	138.0	Sum of lost time (s)	16.4	
Intersection Capacity Utilization	99.3%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Lakeville St. & E D St.

10/26/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	370	560	20	380	40	563	662	40	10	619	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.2	4.2	4.2	4.2		4.5	4.5	4.5		4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00	0.91		0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Frt		1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.99	
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00		1.00	
Satd. Flow (prot)		1840	1583	1770	1831		1770	1776	1442		3338	
Flt Permitted		0.99	1.00	0.95	1.00		0.95	1.00	1.00		0.94	
Satd. Flow (perm)		1840	1583	1770	1831		1770	1776	1442		3144	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	120	370	560	20	380	40	563	662	40	10	619	45
RTOR Reduction (vph)	0	0	247	0	0	0	0	0	17	0	4	0
Lane Group Flow (vph)	0	490	313	20	420	0	563	662	23	0	670	0
Confl. Peds. (#/hr)	2		4	4		2	32		16	16		32
Confl. Bikes (#/hr)			1			1			17			21
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	7%	2%	2%	6%	2%
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA	Perm	Perm	NA	
Protected Phases	2	2	2 3	6	6		3	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)		33.0	65.5	26.8	26.8		32.5	65.3	65.3		28.3	
Effective Green, g (s)		33.0	65.5	26.8	26.8		32.5	65.3	65.3		28.3	
Actuated g/C Ratio		0.24	0.47	0.19	0.19		0.24	0.47	0.47		0.21	
Clearance Time (s)		4.2		4.2	4.2		4.5	4.5	4.5		4.5	
Vehicle Extension (s)		2.5		2.5	2.5		2.0	4.0	4.0		4.0	
Lane Grp Cap (vph)		440	751	344	356		417	840	682		645	
v/s Ratio Prot		c0.27	0.20	0.01	c0.23		c0.32	0.37				
v/s Ratio Perm									0.02		c0.21	
v/c Ratio		1.11	0.42	0.06	1.18		1.35	0.79	0.03		1.04	
Uniform Delay, d1		52.5	23.7	45.3	55.6		52.8	30.5	19.5		54.8	
Progression Factor		1.00	1.00	1.00	1.00		0.69	0.66	0.29		0.89	
Incremental Delay, d2		77.6	0.3	0.1	106.2		168.0	5.1	0.1		37.5	
Delay (s)		130.1	24.0	45.4	161.8		204.5	25.1	5.7		86.2	
Level of Service		F	C	D	F		F	C	A		F	
Approach Delay (s)		73.5			156.5			104.3			86.2	
Approach LOS		E			F			F			F	

Intersection Summary				
HCM Average Control Delay	98.0	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.18			
Actuated Cycle Length (s)	138.0	Sum of lost time (s)	17.4	
Intersection Capacity Utilization	117.1%	ICU Level of Service	H	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Caulfield Ln & Lakeville St.

10/26/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	250	780	189	507	980	310	186	451	286	200	369	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	0.98		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3282		1770	3374	1551	1770	3256		1681	1765	1542
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3282		1770	3374	1551	1770	3256		1681	1765	1542
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	250	780	189	507	980	310	186	451	286	200	369	350
RTOR Reduction (vph)	0	15	0	0	0	79	0	73	0	0	0	62
Lane Group Flow (vph)	250	954	0	507	980	231	186	664	0	180	389	288
Confl. Peds. (#/hr)	5		20	2		5	1		20			20
Confl. Bikes (#/hr)			8			5			8			3
Heavy Vehicles (%)	2%	6%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	pm+ov
Protected Phases	5	2		1	6		3	3		4	4	5
Permitted Phases						6						4
Actuated Green, G (s)	20.0	38.5		32.0	50.5	50.5	22.0	22.0		27.7	27.7	47.7
Effective Green, g (s)	20.0	38.5		32.0	50.5	50.5	22.0	22.0		27.7	27.7	47.7
Actuated g/C Ratio	0.14	0.28		0.23	0.37	0.37	0.16	0.16		0.20	0.20	0.35
Clearance Time (s)	4.0	4.9		4.0	4.9	4.9	4.0	4.0		4.9	4.9	4.0
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	3.0
Lane Grp Cap (vph)	257	916		410	1235	568	282	519		337	354	533
v/s Ratio Prot	0.14	c0.29		c0.29	0.29		0.11	c0.20		0.11	c0.22	0.08
v/s Ratio Perm						0.15						0.11
v/c Ratio	0.97	1.04		1.24	0.79	0.41	0.66	1.28		0.53	1.10	0.54
Uniform Delay, d1	58.7	49.8		53.0	39.1	32.6	54.5	58.0		49.4	55.2	36.3
Progression Factor	0.57	0.48		0.83	0.92	0.79	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	35.9	34.5		118.7	3.2	1.3	4.2	139.9		0.8	77.1	1.1
Delay (s)	69.4	58.4		162.9	39.2	27.1	58.7	197.9		50.2	132.3	37.4
Level of Service	E	E		F	D	C	E	F		D	F	D
Approach Delay (s)		60.7			72.0			169.8			80.1	
Approach LOS		E			E			F			F	

Intersection Summary					
HCM Average Control Delay	89.3	HCM Level of Service		F	
HCM Volume to Capacity ratio	1.15				
Actuated Cycle Length (s)	138.0	Sum of lost time (s)		17.8	
Intersection Capacity Utilization	113.8%	ICU Level of Service		H	
Analysis Period (min)	15				

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Lakeville St./Lakeville Hwy. & US 101 South Ramps

10/26/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	154	1163	15	5	1408	270	25	5	10	670	5	409
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0	5.0		4.4		4.9	4.9	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		0.97		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.95	1.00
Satd. Flow (prot)	3433	3400		1770	3312	1583		1698		1681	1687	1566
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.97		0.95	0.95	1.00
Satd. Flow (perm)	3433	3400		1770	3312	1583		1698		1681	1687	1566
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	154	1163	15	5	1408	270	25	5	10	670	5	409
RTOR Reduction (vph)	0	0	0	0	0	129	0	9	0	0	0	37
Lane Group Flow (vph)	154	1178	0	5	1408	141	0	31	0	335	340	372
Confl. Peds. (#/hr)			2	2					5	5		
Confl. Bikes (#/hr)									9		4	4
Heavy Vehicles (%)	2%	6%	2%	2%	9%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	pm+ov
Protected Phases	5	2		1	6		3	3		4	4	5
Permitted Phases						6						4
Actuated Green, G (s)	11.1	81.2		2.2	72.3	72.3		4.8		31.5	31.5	42.6
Effective Green, g (s)	11.1	81.2		2.2	72.3	72.3		4.8		31.5	31.5	42.6
Actuated g/C Ratio	0.08	0.59		0.02	0.52	0.52		0.03		0.23	0.23	0.31
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0		4.4		4.9	4.9	4.0
Vehicle Extension (s)	3.0	3.0		2.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	276	2001		28	1735	829		59		384	385	483
v/s Ratio Prot	0.04	0.35		0.00	c0.43			c0.02		0.20	c0.20	c0.06
v/s Ratio Perm						0.09						0.18
v/c Ratio	0.56	0.59		0.18	0.81	0.17		0.53		0.87	0.88	0.77
Uniform Delay, d1	61.1	17.9		67.0	27.2	17.2		65.5		51.3	51.5	43.3
Progression Factor	0.87	0.69		0.79	0.72	0.31		1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.4		0.9	3.3	0.3		8.9		19.1	20.5	7.5
Delay (s)	53.9	12.8		53.7	22.9	5.7		74.4		70.4	72.0	50.7
Level of Service	D	B		D	C	A		E		E	E	D
Approach Delay (s)		17.5			20.3			74.4			63.5	
Approach LOS		B			C			E			E	

Intersection Summary					
HCM Average Control Delay	31.2	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.82				
Actuated Cycle Length (s)	138.0	Sum of lost time (s)		18.3	
Intersection Capacity Utilization	80.9%	ICU Level of Service		D	
Analysis Period (min)	15				

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Lakeville Hwy. & US-101 NB Ramps

10/26/2011

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	192	1621	1519	660	200	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3374	3312	1551	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3374	3312	1551	3433	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	192	1621	1519	660	200	239
RTOR Reduction (vph)	0	0	0	212	0	20
Lane Group Flow (vph)	192	1621	1519	448	200	219
Confl. Peds. (#/hr)	1			1	3	3
Heavy Vehicles (%)	2%	7%	9%	2%	2%	2%
Turn Type	Prot	NA	NA	Perm	NA	pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	18.4	116.1	93.7	93.7	12.4	34.8
Effective Green, g (s)	18.4	116.1	93.7	93.7	12.4	30.8
Actuated g/C Ratio	0.13	0.84	0.68	0.68	0.09	0.22
Clearance Time (s)	4.0	5.0	5.0	5.0	4.5	
Vehicle Extension (s)	2.0	3.0	3.0	3.0	2.0	
Lane Grp Cap (vph)	236	2839	2249	1053	308	353
v/s Ratio Prot	c0.11	0.48	c0.46		c0.06	0.14
v/s Ratio Perm				0.29		
v/c Ratio	0.81	0.57	0.68	0.43	0.65	0.62
Uniform Delay, d1	58.1	3.3	13.1	10.0	60.7	48.3
Progression Factor	1.12	1.21	1.00	1.00	1.00	1.00
Incremental Delay, d2	14.4	0.6	1.6	1.3	3.5	2.3
Delay (s)	79.6	4.7	14.8	11.3	64.2	50.6
Level of Service	E	A	B	B	E	D
Approach Delay (s)		12.6	13.7		56.8	
Approach LOS		B	B		E	

Intersection Summary				
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	138.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
6: Caulfield Ln & Hopper St

11/10/2011

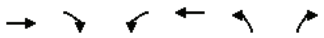
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	189	5	48	5	5	460	17	248	5	185	770	67
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	189	5	48	5	5	460	17	248	5	185	770	67
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						2						
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)											626	
pX, platoon unblocked	0.83	0.83	0.83	0.83	0.83		0.83					
vC, conflicting volume	1458	1460	804	1475	1492	250	837			253		
vC1, stage 1 conf vol	1174	1174		284	284							
vC2, stage 2 conf vol	284	287		1190	1207							
vCu, unblocked vol	1449	1452	657	1470	1490	250	697			253		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	97	87	96	97	41	98			86		
cM capacity (veh/h)	91	190	381	128	170	783	735			1301		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	242	470	17	253	185	837
Volume Left	189	5	17	0	185	0
Volume Right	48	460	0	5	0	67
cSH	108	800	735	1700	1301	1700
Volume to Capacity	2.24	0.59	0.02	0.15	0.14	0.49
Queue Length 95th (ft)	526	97	2	0	12	0
Control Delay (s)	649.3	16.2	10.0	0.0	8.2	0.0
Lane LOS	F	C	B		A	
Approach Delay (s)	649.3	16.2	0.6		1.5	
Approach LOS	F	C				

Intersection Summary				
Average Delay	83.1			
Intersection Capacity Utilization	78.2%	ICU Level of Service		D
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
7: Hotel N-S Street & Hopper St

11/10/2011



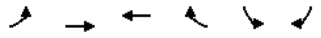
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	152	28	10	401	54	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	152	28	10	401	54	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			180		587	166
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			180		587	166
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		88	98
cM capacity (veh/h)			1396		469	878

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	180	411	69
Volume Left	0	10	54
Volume Right	28	0	15
cSH	1700	1396	522
Volume to Capacity	0.11	0.01	0.13
Queue Length 95th (ft)	0	1	11
Control Delay (s)	0.0	0.3	13.0
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	13.0
Approach LOS			B

Intersection Summary				
Average Delay			1.5	
Intersection Capacity Utilization			39.7%	ICU Level of Service A
Analysis Period (min)			15	

HCM Unsignalized Intersection Capacity Analysis
8: Caulfield Cir & Hopper St

11/10/2011



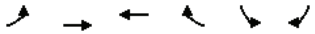
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	0	72	364	0	100
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	72	364	0	100
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	436				254	254
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	436				254	254
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	87
cM capacity (veh/h)	1124				735	785

Direction, Lane #	WB 1	SB 1
Volume Total	436	100
Volume Left	0	0
Volume Right	364	100
cSH	1700	785
Volume to Capacity	0.26	0.13
Queue Length 95th (ft)	0	11
Control Delay (s)	0.0	10.3
Lane LOS		B
Approach Delay (s)	0.0	10.3
Approach LOS		B

Intersection Summary				
Average Delay			1.9	
Intersection Capacity Utilization			39.1%	ICU Level of Service A
Analysis Period (min)			15	

HCM Unsignalized Intersection Capacity Analysis
9: Caulfield Ln & Hotel N-S Street

11/10/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	9	701	91	21	10	8
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	9	701	91	21	10	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	112				820	102
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	112				820	102
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	99
cM capacity (veh/h)	1478				342	954

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	710	112	18
Volume Left	9	0	10
Volume Right	0	21	8
cSH	1478	1700	479
Volume to Capacity	0.01	0.07	0.04
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.2	0.0	12.8
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	12.8
Approach LOS			B

Intersection Summary				
Average Delay		0.4		
Intersection Capacity Utilization		54.1%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
10: Caulfield Cir & Caulfield Ln

11/10/2011

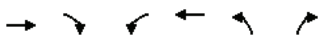
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	696	0	0	104	67
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	696	0	0	104	67
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	138	138	171			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	138	138	171			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	24	100			
cM capacity (veh/h)	856	911	1406			

Direction, Lane #	EB 1	SB 1
Volume Total	696	171
Volume Left	0	0
Volume Right	696	67
cSH	911	1700
Volume to Capacity	0.76	0.10
Queue Length 95th (ft)	189	0
Control Delay (s)	20.5	0.0
Lane LOS	C	
Approach Delay (s)	20.5	0.0
Approach LOS	C	

Intersection Summary				
Average Delay		16.5		
Intersection Capacity Utilization		59.3%	ICU Level of Service	B
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
11: Caulfield Ln (South) & Caulfield Cir

11/10/2011



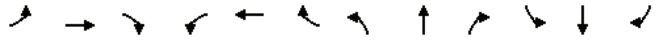
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	38	773	0	0	0	399
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	38	773	0	0	0	399
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			811		424	424
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			811		424	424
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	37
cM capacity (veh/h)			815		586	630

Direction, Lane #	EB 1	NB 1
Volume Total	811	399
Volume Left	0	0
Volume Right	773	399
cSH	1700	630
Volume to Capacity	0.48	0.63
Queue Length 95th (ft)	0	112
Control Delay (s)	0.0	20.1
Lane LOS		C
Approach Delay (s)	0.0	20.1
Approach LOS		C

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
12: Caulfield Ln (South) & River Street

11/10/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	0	7	2	0	2	11	382	4	16	730	8
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	3	0	7	2	0	2	11	382	4	16	730	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1174	1174	734	1179	1176	384	738			386		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1174	1174	734	1179	1176	384	738			386		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	98	99	100	100	99			99		
cM capacity (veh/h)	165	187	420	161	186	664	868			1172		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	10	4	397	754
Volume Left	3	2	11	16
Volume Right	7	2	4	8
cSH	287	260	868	1172
Volume to Capacity	0.03	0.02	0.01	0.01
Queue Length 95th (ft)	3	1	1	1
Control Delay (s)	18.0	19.1	0.4	0.4
Lane LOS	C	C	A	A
Approach Delay (s)	18.0	19.1	0.4	0.4
Approach LOS	C	C		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
6: Caulfield Ln & Hopper St 11/10/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	59	5	25	5	5	674	64	153	5	125	251	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	6.0	4.0	4.0		6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	1.00		1.00	0.94	
Flt Protected		0.97			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1735			1817	1583	1770	1854		1770	1759	
Flt Permitted		0.97			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1735			1817	1583	1770	1854		1770	1759	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	59	5	25	5	5	674	64	153	5	125	251	148
RTOR Reduction (vph)	0	23	0	0	0	483	0	1	0	0	27	0
Lane Group Flow (vph)	0	66	0	0	10	191	64	157	0	125	372	0
Turn Type	Split	NA		Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)		4.1			0.5	10.9	2.9	12.8		10.4	20.3	
Effective Green, g (s)		4.1			0.5	10.9	2.9	12.8		10.4	20.3	
Actuated g/C Ratio		0.09			0.01	0.24	0.06	0.28		0.23	0.44	
Clearance Time (s)		4.0			4.0	6.0	4.0	4.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		155			20	377	112	518		402	780	
v/s Ratio Prot		c0.04			0.01	c0.12	0.04	0.08		0.07	c0.21	
v/s Ratio Perm						0.01						
v/c Ratio		0.43			0.50	0.51	0.57	0.30		0.31	0.48	
Uniform Delay, d1		19.7			22.5	15.1	20.8	13.0		14.7	9.0	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.9			18.3	1.1	6.9	0.3		0.4	0.5	
Delay (s)		21.6			40.8	16.2	27.7	13.3		15.2	9.5	
Level of Service		C			D	B	C	B		B	A	
Approach Delay (s)		21.6			16.6			17.5			10.8	
Approach LOS		C			B			B			B	

Intersection Summary				
HCM Average Control Delay	15.0	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.59			
Actuated Cycle Length (s)	45.8	Sum of lost time (s)	22.0	
Intersection Capacity Utilization	66.8%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
6: Caulfield Ln & Hopper St 11/10/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	189	5	48	5	5	460	17	248	5	185	770	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	5.0	4.0	4.0		5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected		0.96			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1745			1817	1583	1770	1857		1770	1840	
Flt Permitted		0.96			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1745			1817	1583	1770	1857		1770	1840	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	189	5	48	5	5	460	17	248	5	185	770	67
RTOR Reduction (vph)	0	11	0	0	0	302	0	1	0	0	4	0
Lane Group Flow (vph)	0	231	0	0	10	158	17	252	0	185	833	0
Turn Type	Split	NA		Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)		12.9			0.6	12.5	0.6	22.1		11.9	33.4	
Effective Green, g (s)		12.9			0.6	12.5	0.6	22.1		11.9	33.4	
Actuated g/C Ratio		0.20			0.01	0.19	0.01	0.34		0.18	0.52	
Clearance Time (s)		4.0			4.0	5.0	4.0	4.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		349			17	307	16	636		327	953	
v/s Ratio Prot		c0.13			c0.01	0.10	0.01	0.14		c0.10	c0.45	
v/s Ratio Perm						0.00						
v/c Ratio		0.66			0.59	0.52	1.06	0.40		0.57	0.87	
Uniform Delay, d1		23.8			31.8	23.3	32.0	16.1		23.9	13.7	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		4.7			42.8	1.5	246.4	0.4		2.2	9.0	
Delay (s)		28.4			74.6	24.8	278.4	16.5		26.2	22.7	
Level of Service		C			E	C	F	B		C	C	
Approach Delay (s)		28.4			25.8			33.0			23.3	
Approach LOS		C			C			C			C	

Intersection Summary				
HCM Average Control Delay	25.8	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	64.5	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	79.1%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Appendix B

Study Area Traffic Analysis Zone (TAZ) Boundaries

N

Not to Scale

Traffic Impact Study for Petaluma Riverfront Project

City of Petaluma

Traffic Analysis Zone (TAZ) Boundaries

Appendix C

Trip Reduction Calculations

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	PET175 - Riverfront TIS	**Organization:**	W-Trans
Project Location:	500 Hopper Street, Petaluma	**Performed By:**	JSA
Scenario Description:		**Date:**	8/5/2011
Analysis Year:		**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

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

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	60,000	SF	93	82	11
Retail	814	30,000	sf	20	8	12
Restaurant				0		
Cinema/Entertainment				0		
Residential	210, 220, 230	266	du	166	37	129
Hotel	310	120	rooms	67	41	26
All Other Land Uses[2]		6	acres	40	20	20
Total				386	188	198

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office	1.09	5%	4%	1.09	5%	4%
Retail	1.30	5%	4%	1.30	5%	4%
Restaurant	1.30	5%	4%	1.30	5%	4%
Cinema/Entertainment	1.30	5%	4%	1.30	5%	4%
Residential	1.39	5%	4%	1.39	5%	4%
Hotel	1.18	5%	4%	1.18	5%	4%
All Other Land Uses[2]	1.39	5%	4%	1.39	5%	4%

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

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

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

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		3	0	0	0	0
Retail	4		0	0	1	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	3	2	0	0		0
Hotel	3	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	492	226	266
Internal Capture Percentage	7%	7%	6%
External Vehicle-Trips[3]	329	158	171
External Transit-Trips[4]	22	10	12
External Non-Motorized Trips[4]	16	8	8

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

Land Use	Entering Trips	Exiting Trips
Office	11%	25%
Retail	50%	31%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	3%
Hotel	0%	10%

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

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

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

[4]Person-Trips

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

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	PET175 - Riverfront TIS
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.09	82	89	1.09	11	12
Retail	1.30	8	10	1.30	12	16
Restaurant	1.30	0	0	1.30	0	0
Cinema/Entertainment	1.30	0	0	1.30	0	0
Residential	1.39	37	51	1.39	129	179
Hotel	1.18	41	48	1.18	26	31

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		3	8	0	0	0
Retail	5		2	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	2	36	0		0
Hotel	23	4	3	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		3	0	0	0	0
Retail	4		0	0	1	0
Restaurant	12	1		0	3	2
Cinema/Entertainment	0	0	0		0	0
Residential	3	2	0	0		0
Hotel	3	0	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	10	79	89	66	4	3
Retail	5	5	10	4	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	50	51	32	3	2
Hotel	0	48	48	37	2	2
All Other Land Uses[3]	0	28	28	19	1	1

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	3	9	12	8	0	0
Retail	5	11	16	8	1	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	5	174	179	114	9	6
Hotel	3	28	31	22	1	1
All Other Land Uses[3]	0	28	28	19	1	1

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

[2]Person-Trips

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

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

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	PET175 - Riverfront TIS	**Organization:**	W-Trans
Project Location:	500 Hopper Street, Petaluma	**Performed By:**	JSA
Scenario Description:		**Date:**	8/5/2011
Analysis Year:		**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

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

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	60,000	SF	89	15	74
Retail	814	30,000	sf	81	36	45
Restaurant				0		
Cinema/Entertainment				0		
Residential	210, 220, 230	266	du	214	137	77
Hotel	310	120	rooms	71	38	33
All Other Land Uses[2]		6	acres	28	14	14
Total				483	240	243

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office	1.09	5%	4%	1.09	5%	4%
Retail	1.30	5%	4%	1.30	5%	4%
Restaurant	1.30	5%	4%	1.30	5%	4%
Cinema/Entertainment	1.30	5%	4%	1.30	5%	4%
Residential	1.39	5%	4%	1.39	5%	4%
Hotel	1.18	5%	4%	1.18	5%	4%
All Other Land Uses[2]	1.39	5%	4%	1.39	5%	4%

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

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		500			800	
Retail					800	
Restaurant						
Cinema/Entertainment						
Residential		800				
Hotel					800	

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

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		3	0	0	2	0
Retail	1		0	0	15	3
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	4	0	0		3
Hotel	0	1	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	622	317	305
Internal Capture Percentage	12%	11%	12%
External Vehicle-Trips[3]	390	194	196
External Transit-Trips[4]	29	15	14
External Non-Motorized Trips[4]	18	9	9

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

Land Use	Entering Trips	Exiting Trips
Office	31%	6%
Retail	17%	32%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	9%	10%
Hotel	13%	3%

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

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

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

[4]Person-Trips

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

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	PET175 - Riverfront TIS
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.09	15	16	1.09	74	81
Retail	1.30	36	47	1.30	45	59
Restaurant	1.30	0	0	1.30	0	0
Cinema/Entertainment	1.30	0	0	1.30	0	0
Residential	1.39	137	190	1.39	77	107
Hotel	1.18	38	45	1.18	33	39

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		15	3	0	2	0
Retail	1		17	2	15	3
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	37	22	0		3
Hotel	0	6	27	0	1	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		3	0	0	8	0
Retail	5		0	0	87	8
Restaurant	5	24		0	30	32
Cinema/Entertainment	1	2	0		8	0
Residential	9	4	0	0		5
Hotel	0	1	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	5	11	16	9	1	0
Retail	8	39	47	28	2	1
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	17	173	190	114	9	6
Hotel	6	39	45	31	2	1
All Other Land Uses[3]	0	19	19	12	1	1

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	5	76	81	63	4	3
Retail	19	40	59	28	2	1
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	11	96	107	63	5	3
Hotel	1	38	39	30	2	1
All Other Land Uses[3]	0	19	19	12	1	1

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

[2]Person-Trips

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

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

Appendix D

Freeway Level of Service Calculations

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Existing (no project)
Freeway/Direction:	US 101 Northbound
From/To:	Petaluma Blvd South to SR 116
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	3840	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1011	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2090	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	63.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2090	pc/h/ln
Free-flow speed, FFS	63.0	mi/h
Average passenger-car speed, S	58.4	mi/h
Number of lanes, N	2	
Density, D	35.8	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Existing (no project)
Freeway/Direction:	US 101 Southbound
From/To:	SR 116 to Petaluma Blvd South
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	2360	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	621	v
Trucks and buses	6	%
Recreational vehicles	4	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.963	
Driver population factor, fp	1.00	
Flow rate, vp	1289	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	63.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1289	pc/h/ln
Free-flow speed, FFS	63.0	mi/h
Average passenger-car speed, S	63.0	mi/h
Number of lanes, N	2	
Density, D	20.5	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Existing (no project)
Freeway/Direction:	US 101 Northbound
From/To:	SR 116 to East Washington
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	4340	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1142	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2362	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	63.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2362	pc/h/ln
Free-flow speed, FFS	63.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Existing (no project)
Freeway/Direction:	US 101 Southbound
From/To:	E Washington to SR 116
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	2860	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	753	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	1556	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1556	pc/h/ln
Free-flow speed, FFS	65.5	mi/h
Average passenger-car speed, S	65.4	mi/h
Number of lanes, N	2	
Density, D	23.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Existing plus Project
Freeway/Direction:	US 101 Northbound
From/To:	Petaluma Blvd South to SR 116
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	3861	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1016	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2101	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	63.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2101	pc/h/ln
Free-flow speed, FFS	63.0	mi/h
Average passenger-car speed, S	58.2	mi/h
Number of lanes, N	2	
Density, D	36.1	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Existing plus Project
Freeway/Direction:	US 101 Southbound
From/To:	SR 116 to Petaluma Blvd South
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	2382	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	627	v
Trucks and buses	6	%
Recreational vehicles	4	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.963	
Driver population factor, fp	1.00	
Flow rate, vp	1301	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	63.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1301	pc/h/ln
Free-flow speed, FFS	63.0	mi/h
Average passenger-car speed, S	63.0	mi/h
Number of lanes, N	2	
Density, D	20.7	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Existing plus Project
Freeway/Direction:	US 101 Northbound
From/To:	SR 116 to East Washington
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	4372	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1151	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2379	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	63.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2379	pc/h/ln
Free-flow speed, FFS	63.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Existing plus Project
Freeway/Direction:	US 101 Southbound
From/To:	E Washington to SR 116
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	2893	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	761	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	1574	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1574	pc/h/ln
Free-flow speed, FFS	65.5	mi/h
Average passenger-car speed, S	65.4	mi/h
Number of lanes, N	2	
Density, D	24.1	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Baseline (no Project)
Freeway/Direction:	US 101 Northbound
From/To:	Petaluma Blvd South to SR 116
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	3923	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1032	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2135	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	1.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	3.2	mi/h
Free-flow speed, FFS	72.2	mi/h

LOS and Performance Measures

Flow rate, vp	2135	pc/h/ln
Free-flow speed, FFS	72.2	mi/h
Average passenger-car speed, S	59.9	mi/h
Number of lanes, N	2	
Density, D	35.7	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.2

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	Baseline (no project)
Freeway/Direction:	US 101 Southbound
From/To:	SR 116 to Petaluma Blvd South
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	2470	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	650	v
Trucks and buses	6	%
Recreational vehicles	4	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.963	
Driver population factor, fp	1.00	
Flow rate, vp	1349	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	1.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	3.2	mi/h
Free-flow speed, FFS	72.2	mi/h

LOS and Performance Measures

Flow rate, vp	1349	pc/h/ln
Free-flow speed, FFS	72.2	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	2	
Density, D	19.3	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	Baseline (no project)
Freeway/Direction:	US 101 Northbound
From/To:	SR 116 to East Washington
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	4426	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1165	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2409	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	1.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	3.2	mi/h
Free-flow speed, FFS	72.2	mi/h

LOS and Performance Measures

Flow rate, vp	2409	pc/h/ln
Free-flow speed, FFS	72.2	mi/h
Average passenger-car speed, S	53.0	mi/h
Number of lanes, N	2	
Density, D	45.4	pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	Baseline (no project)
Freeway/Direction:	US 101 Southbound
From/To:	E Washington to SR 116
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	2977	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	783	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	1620	pc/h/ln

Speed Inputs and Adjustments

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

LOS and Performance Measures

Flow rate, vp	1620	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	70.7	mi/h
Number of lanes, N	2	
Density, D	22.9	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Baseline plus Project
Freeway/Direction:	US 101 Northbound
From/To:	Petaluma Blvd South to SR 116
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	3944	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1038	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2146	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	1.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	3.2	mi/h
Free-flow speed, FFS	72.2	mi/h

LOS and Performance Measures

Flow rate, vp	2146	pc/h/ln
Free-flow speed, FFS	72.2	mi/h
Average passenger-car speed, S	59.6	mi/h
Number of lanes, N	2	
Density, D	36.0	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	Baseline plus Project
Freeway/Direction:	US 101 Southbound
From/To:	SR 116 to Petaluma Blvd South
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	2492	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	656	v
Trucks and buses	6	%
Recreational vehicles	4	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.963	
Driver population factor, fp	1.00	
Flow rate, vp	1361	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	1.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	3.2	mi/h
Free-flow speed, FFS	72.2	mi/h

LOS and Performance Measures

Flow rate, vp	1361	pc/h/ln
Free-flow speed, FFS	72.2	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	2	
Density, D	19.5	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	Baseline plus Project
Freeway/Direction:	US 101 Northbound
From/To:	SR 116 to East Washington
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	4459	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1173	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2427	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	1.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	3.2	mi/h
Free-flow speed, FFS	72.2	mi/h

LOS and Performance Measures

Flow rate, vp	2427	pc/h/ln
Free-flow speed, FFS	72.2	mi/h
Average passenger-car speed, S	52.5	mi/h
Number of lanes, N	2	
Density, D	46.2	pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	Baseline plus Project
Freeway/Direction:	US 101 Southbound
From/To:	E Washington to SR 116
Jurisdiction:	Caltrans
Analysis Year:	2011
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	3009	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	792	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	1638	pc/h/ln

Speed Inputs and Adjustments

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

LOS and Performance Measures

Flow rate, vp	1638	pc/h/ln
Free-flow speed, FFS	73.6	mi/h
Average passenger-car speed, S	70.5	mi/h
Number of lanes, N	2	
Density, D	23.2	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Future (no project)
Freeway/Direction:	US 101 Northbound
From/To:	Petaluma Blvd South to SR 116
Jurisdiction:	Caltrans
Analysis Year:	2035
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	4179	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1100	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2274	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	63.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2274	pc/h/ln
Free-flow speed, FFS	63.0	mi/h
Average passenger-car speed, S	53.7	mi/h
Number of lanes, N	2	
Density, D	42.4	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Future (no project)
Freeway/Direction:	US 101 Southbound
From/To:	SR 116 to Petaluma Blvd South
Jurisdiction:	Caltrans
Analysis Year:	2035
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	3233	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	851	v
Trucks and buses	6	%
Recreational vehicles	4	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.963	
Driver population factor, fp	1.00	
Flow rate, vp	1766	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	63.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1766	pc/h/ln
Free-flow speed, FFS	63.0	mi/h
Average passenger-car speed, S	62.5	mi/h
Number of lanes, N	2	
Density, D	28.3	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Future (no project)
Freeway/Direction:	US 101 Northbound
From/To:	SR 116 to East Washington
Jurisdiction:	Caltrans
Analysis Year:	2035
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	4695	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1236	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2555	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	63.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2555	pc/h/ln
Free-flow speed, FFS	63.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Future (no project)
Freeway/Direction:	US 101 Southbound
From/To:	E Washington to SR 116
Jurisdiction:	Caltrans
Analysis Year:	2035
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	3954	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1041	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2152	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density		interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2152	pc/h/ln
Free-flow speed, FFS	65.5	mi/h
Average passenger-car speed, S	58.6	mi/h
Number of lanes, N	2	
Density, D	36.7	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Future plus Project
Freeway/Direction:	US 101 Northbound
From/To:	Petaluma Blvd South to SR 116
Jurisdiction:	Caltrans
Analysis Year:	2035
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	4200	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1105	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2286	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	63.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2286	pc/h/ln
Free-flow speed, FFS	63.0	mi/h
Average passenger-car speed, S	53.3	mi/h
Number of lanes, N	2	
Density, D	42.9	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Future plus Project
Freeway/Direction:	US 101 Southbound
From/To:	SR 116 to Petaluma Blvd South
Jurisdiction:	Caltrans
Analysis Year:	2035
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	3255	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	857	v
Trucks and buses	6	%
Recreational vehicles	4	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.963	
Driver population factor, fp	1.00	
Flow rate, vp	1778	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	63.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1778	pc/h/ln
Free-flow speed, FFS	63.0	mi/h
Average passenger-car speed, S	62.4	mi/h
Number of lanes, N	2	
Density, D	28.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Future plus Project
Freeway/Direction:	US 101 Northbound
From/To:	SR 116 to East Washington
Jurisdiction:	Caltrans
Analysis Year:	2035
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	4727	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1244	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2572	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	63.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2572	pc/h/ln
Free-flow speed, FFS	63.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	2	
Density, D		pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.5

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	zm
Agency or Company:	
Date Performed:	8/30/2011
Analysis Time Period:	PM Future plus Project
Freeway/Direction:	US 101 Southbound
From/To:	E Washington to SR 116
Jurisdiction:	Caltrans
Analysis Year:	2035
Description:	Riverfront TIS

Flow Inputs and Adjustments

Volume, V	3987	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1049	v
Trucks and buses	6	%
Recreational vehicles	2	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.967	
Driver population factor, fp	1.00	
Flow rate, vp	2170	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.5	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2170	pc/h/ln
Free-flow speed, FFS	65.5	mi/h
Average passenger-car speed, S	58.2	mi/h
Number of lanes, N	2	
Density, D	37.3	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Appendix E

Queuing Calculations

Queuing and Blocking Report
Existing AM Peak Hour
10/27/2011

Intersection: 3: Caulfield Ln. & Lakeville St.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	LT
Maximum Queue (ft)	127	182	200	5	164	170	32	54	29	40	99	162
Average Queue (ft)	89	121	122	2	56	59	18	28	11	23	80	107
95th Queue (ft)	147	209	224	7	178	190	43	66	34	46	117	183
Link Distance (ft)					530	530			317	317		166
Upstream Blk Time (%)												1
Queuing Penalty (veh)												4
Storage Bay Dist (ft)	130			200			100	110			75	
Storage Blk Time (%)	1	5			1	4					13	11
Queuing Penalty (veh)	4	6			0	4					23	19

Intersection: 3: Caulfield Ln. & Lakeville St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	146
Average Queue (ft)	84
95th Queue (ft)	163
Link Distance (ft)	166
Upstream Blk Time (%)	2
Queuing Penalty (veh)	4
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
Existing PM Peak Hour
10/27/2011

Intersection: 3: Caulfield Ln. & Lakeville St.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	LT
Maximum Queue (ft)	154	424	270	17	102	118	97	75	36	60	89	118
Average Queue (ft)	147	310	123	5	36	49	32	50	15	35	63	73
95th Queue (ft)	176	596	312	18	116	126	105	98	40	70	109	142
Link Distance (ft)					540	540			317	317		166
Upstream Blk Time (%)												2
Queuing Penalty (veh)												4
Storage Bay Dist (ft)	130			200			100	120			75	
Storage Blk Time (%)	45	4			0	2	0	0			14	8
Queuing Penalty (veh)	113	10			0	7	1	0			14	8

Intersection: 3: Caulfield Ln. & Lakeville St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	38
Average Queue (ft)	21
95th Queue (ft)	48
Link Distance (ft)	166
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
AM Existing plus Project 10/27/2011

Intersection: 3: Caulfield Ln. & Lakeville St.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	LT
Maximum Queue (ft)	126	287	228	120	156	134	74	117	53	99	99	171
Average Queue (ft)	88	181	173	65	59	64	27	81	26	62	80	101
95th Queue (ft)	152	306	256	134	157	154	97	147	64	111	117	188
Link Distance (ft)					541	541			317	317		166
Upstream Blk Time (%)												5
Queuing Penalty (veh)												15
Storage Bay Dist (ft)	130			200			100	110			75	
Storage Blk Time (%)	4	16			0	2		7			23	12
Queuing Penalty (veh)	12	19			0	2		2			50	21

Intersection: 3: Caulfield Ln. & Lakeville St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	130
Average Queue (ft)	77
95th Queue (ft)	149
Link Distance (ft)	166
Upstream Blk Time (%)	1
Queuing Penalty (veh)	4
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
PM Existing plus Project 10/27/2011

Intersection: 3: Caulfield Ln. & Lakeville St.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	LT
Maximum Queue (ft)	154	571	406	120	79	89	75	141	84	155	98	175
Average Queue (ft)	151	443	188	75	30	44	28	114	41	78	77	109
95th Queue (ft)	160	709	493	164	104	126	95	173	138	171	114	186
Link Distance (ft)					530	530			317	317		166
Upstream Blk Time (%)												7
Queuing Penalty (veh)												12
Storage Bay Dist (ft)	130			200			100	120			75	
Storage Blk Time (%)	65	5			0	4		16			25	19
Queuing Penalty (veh)	163	12			0	12		5			34	18

Intersection: 3: Caulfield Ln. & Lakeville St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	47
Average Queue (ft)	19
95th Queue (ft)	55
Link Distance (ft)	166
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
AM Baseline 10/27/2011

Intersection: 3: Caulfield Ln. & Lakeville St.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	LT
Maximum Queue (ft)	143	216	209	6	156	152	36	67	17	57	95	132
Average Queue (ft)	91	146	132	1	57	67	18	36	8	32	77	87
95th Queue (ft)	148	236	234	6	160	167	43	81	26	64	108	147
Link Distance (ft)					530	530			317	317		166
Upstream Blk Time (%)												0
Queuing Penalty (veh)												0
Storage Bay Dist (ft)	130			200			100	110			75	
Storage Blk Time (%)	4	7			0	4		0			14	10
Queuing Penalty (veh)	11	9			0	5		0			25	18

Intersection: 3: Caulfield Ln. & Lakeville St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	156
Average Queue (ft)	99
95th Queue (ft)	173
Link Distance (ft)	166
Upstream Blk Time (%)	2
Queuing Penalty (veh)	5
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
AM Baseline plus Project 10/27/2011

Intersection: 3: Caulfield Ln. & Lakeville St.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	LT
Maximum Queue (ft)	138	272	272	67	133	129	46	142	45	113	99	160
Average Queue (ft)	106	171	166	41	45	43	15	93	23	69	87	126
95th Queue (ft)	162	277	277	78	131	122	50	155	55	128	119	195
Link Distance (ft)					530	530			317	317		166
Upstream Blk Time (%)												7
Queuing Penalty (veh)												19
Storage Bay Dist (ft)	130			200			100	110			75	
Storage Blk Time (%)	6	9				2		7			30	18
Queuing Penalty (veh)	17	12				2		2			66	32

Intersection: 3: Caulfield Ln. & Lakeville St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	155
Average Queue (ft)	94
95th Queue (ft)	176
Link Distance (ft)	166
Upstream Blk Time (%)	3
Queuing Penalty (veh)	8
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
AM Future

10/26/2011

Intersection: 3: Caulfield Ln & Lakeville St.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	LT
Maximum Queue (ft)	147	282	244	167	268	264	113	119	316	343	99	362
Average Queue (ft)	119	202	180	72	171	173	40	81	236	276	89	268
95th Queue (ft)	177	333	277	167	311	304	132	147	381	419	120	437
Link Distance (ft)		1551	1551		534	534			542	542		487
Upstream Blk Time (%)												1
Queuing Penalty (veh)												0
Storage Bay Dist (ft)	130			200			100	120			75	
Storage Blk Time (%)	18	15			4	15		2	33		20	50
Queuing Penalty (veh)	55	30			5	11		4	38		67	67

Intersection: 3: Caulfield Ln & Lakeville St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	128
Average Queue (ft)	68
95th Queue (ft)	135
Link Distance (ft)	487
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
PM Future

10/26/2011

Intersection: 3: Caulfield Ln & Lakeville St.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	LT
Maximum Queue (ft)	154	644	658	224	544	551	189	160	475	495	90	505
Average Queue (ft)	127	472	455	223	505	468	98	82	324	373	63	495
95th Queue (ft)	201	745	740	228	631	678	215	162	536	569	124	546
Link Distance (ft)		1551	1551		534	534			542	542		487
Upstream Blk Time (%)					13	7			2	2		60
Queuing Penalty (veh)					117	59			6	8		0
Storage Bay Dist (ft)	130			200			100	120			75	
Storage Blk Time (%)	28	52		43	10	25	5	1	55		6	77
Queuing Penalty (veh)	111	130		211	43	77	24	2	67		25	77

Intersection: 3: Caulfield Ln & Lakeville St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	490
Average Queue (ft)	249
95th Queue (ft)	500
Link Distance (ft)	487
Upstream Blk Time (%)	18
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
AM Future plus Project 10/26/2011

Intersection: 3: Caulfield Ln & Lakeville St.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	LT
Maximum Queue (ft)	154	306	275	202	385	377	180	171	331	389	98	477
Average Queue (ft)	125	213	199	162	281	269	55	105	243	294	82	409
95th Queue (ft)	187	337	302	262	520	475	177	194	394	460	116	553
Link Distance (ft)		1551	1551		534	534			542	542		487
Upstream Blk Time (%)						0						18
Queuing Penalty (veh)						0						0
Storage Bay Dist (ft)	130			200			100	120			75	
Storage Blk Time (%)	24	23		21	7	24	0	9	37		30	71
Queuing Penalty (veh)	74	46		81	14	17	0	18	60		113	96

Intersection: 3: Caulfield Ln & Lakeville St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	229
Average Queue (ft)	114
95th Queue (ft)	316
Link Distance (ft)	487
Upstream Blk Time (%)	3
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
PM Future plus Project 10/26/2011

Intersection: 3: Caulfield Ln & Lakeville St.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	LT
Maximum Queue (ft)	154	528	524	224	548	538	217	179	522	542	99	510
Average Queue (ft)	126	383	374	223	529	440	128	135	390	414	51	485
95th Queue (ft)	189	637	607	227	591	641	250	225	567	578	121	561
Link Distance (ft)		1549	1549		534	534			545	545		487
Upstream Blk Time (%)					17	3			2	4		61
Queuing Penalty (veh)					161	31			10	16		0
Storage Bay Dist (ft)	130			200			100	120			75	
Storage Blk Time (%)	15	48		55	2	27	4	16	64		3	77
Queuing Penalty (veh)	58	120		270	11	84	18	36	120		15	77

Intersection: 3: Caulfield Ln & Lakeville St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	285
Average Queue (ft)	149
95th Queue (ft)	339
Link Distance (ft)	487
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	