Traffic Impact Study for the Roseland Village Project Final Report

Prepared for the City of Santa Rosa

Submitted by
W-Trans

June 14, 2018

Memorandum

Date: August 14, 2018

Project: SOX580

To: Mr. Aaron Hollister
City of Santa Rosa

From: Zack Matley
zmatley@w-trans.com

Subject: Roseland Village Parking Evaluation Errata

Following completion of the Traffic *Impact Study for the Roseland Village Project Final Report*, prepared by W-Trans and dated June 14, 2018, minor changes were made that affect the number of residential reserved spaces and the total number of spaces provided on the site. The project proposes to provide 172 reserved residential spaces, in contrast to the 168 reserved residential spaces referred to in the report. Additionally, the site's total parking supply would be 339 spaces instead of the 342 spaces noted in the report. Upon incorporating these revised figures into the shared parking analysis, the project's calculated peak parking demand was found to remain unchanged at 322 spaces. The peak parking demand would still remain within the proposed supply, and no substantive changes to the report's conclusions or recommendations would result.

The affected pages of the report are attached, with deletions noted in red ~~strikeout~~ and additions noted in blue underline.

Memorandum

Date: May 6, 2019

Project: SOX580

To: Mr. Andy Gustavson
City of Santa Rosa

From: Zack Matley
zmatley@w-trans.com

Subject: May 2019 Roseland Village Parking Evaluation Updates

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Following completion of the Traffic *Impact Study for the Roseland Village Project Final Repor*t, prepared by W-Trans and dated June 14, 2018, several changes to the site plan and tentative map have been made that affect the number of residential reserved spaces and the total number of spaces provided on the site. The project proposes to provide 175 reserved residential spaces (one reserved space per unit), in contrast to the 168 reserved residential spaces referred to in the 2018 report. Additionally, the site's total parking supply would be 323 spaces instead of the 342 spaces noted in the 2018 report. Upon incorporating these revised figures into the shared parking analysis, the project's calculated peak hour of parking demand was found to equal the 323-space parking supply. The project's peak parking demand would still met by its proposed supply, and no substantive changes to the report's conclusions or recommendations would result.

This memorandum and its attached revisions supersede those provided to the City of Santa Rosa in a prior memorandum titled *Roseland Village Parking Evaluation Errata*, dated August 2, 2018.

The affected pages of the report are attached, with deletions noted in red ~~strikeout~~ and additions noted in green underline.

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Executive Summary

The Roseland Village project is a proposed mixed-use development that will include a combination of affordable and market rate housing; a "Mercado" envisioned to include food-based businesses; a public plaza; office space; and a new branch of the Sonoma County Library. The project is located in the core commercial area of the Roseland neighborhood in Santa Rosa, near West Avenue and between Sebastopol Road and the Joe Rodota regional trail. The traffic impact study includes an evaluation of the project's potential circulation impacts relating to auto, pedestrian, bicycle, and transit users, as well as parking.

The project's land use context, mix of uses, and orientation to the local Roseland community will result in a lower traffic generation than would be expected in a typical suburban environment. In order to provide a very conservative analysis ensuring that all potential traffic impacts are identified, only limited deductions to trip generation estimates were applied in the analysis, with the primary deduction being related to the "internal capture" of trips onsite due to the proposed mix of uses. In total, the proposed project is conservatively estimated to generate approximately 1,775 daily auto trips, with 109 during the a.m. peak hour and 183 during the p.m. peak hour.

The study area includes the signalized intersections along Sebastopol Road between Stony Point Road and Dutton Avenue, as well as the two new unsignalized intersections that will provide secondary access to the project site. Analysis indicates that the study intersections are currently operating acceptably and are expected to continue operating at an acceptable level of service upon the addition of project-generated trips, both under near-term and long-range conditions. The project as proposed would include modifying the intersection of Sebastopol Road/West Avenue to improve pedestrian circulation and site access by changing lane configurations and adding a new pedestrian crosswalk on the west side of the intersection where none currently exists. Traffic operation is anticipated to remain acceptable with these modifications.

Queuing was analyzed on Sebastopol Road at the West Avenue and Street D intersections, where the project will add turning movements into and out of the site that could potentially affect traffic flow on Sebastopol Road. At the Sebastopol Road/West Avenue intersection, queues are projected to remain within the available storage on most movements. On the two movements where queues would extend into adjacent lanes, the resulting queues on those movements would not extend to adjacent intersections or be expected to create a significant safety or operational impact, though it is recommended that the applicant be responsible for restriping the northbound approach lengthen the left-turn pocket by 50 to 60 feet in order to reduce queuing. The opposing left-turn queues between the West Avenue and Street D intersections are not projected to overlap or adversely affect through traffic flow on Sebastopol Road. During the height of a.m. peak hour school drop-off activity at Roseland Elementary School, the 95th percentile queues in the center left-turn lane on Sebastopol Road between Street D and West Avenue are anticipated to exceed the available storage. The 95th percentile queues created by drivers turning left into Roseland Elementary School are anticipated to spill over into the adjacent westbound through lane. Such queueing will lead to increased congestion during the school drop-off period, though based on an evaluation of the *average* queues during the morning drop-off period, this situation is anticipated to be brief in nature.

The project has been designed with a focus on pedestrian and bicycle circulation and includes effective connections to surrounding neighborhoods and the region, including a connection to the Joe Rodota Trail as well as other existing and planned bike facilities. Residents, employees, and visitors would be able to travel between the site and the downtown SMART commuter rail station by a five- to ten-minute bike ride. The project will include secure bike storage for residents, but in order to further encourage biking, bicycle racks should be provided within the Plaza and near all of the project's nonresidential buildings. With respect to transit, the site is located on a major transit corridor, with planned CityBus headways of between 8 and 12 buses per hour served by two routes, both with connections to the SMART station and downtown transit mall. In order to maximize transit convenience and reduce the potential for project transit users to cross Sebastopol Road at a midblock location, the applicants

[Executive Summary, p. 2]

should be responsible for relocating the eastbound CityBus stop closer to the intersection of Sebastopol Road/West Avenue. The project should also construct or contribute funds toward the installation of pedestrian-scale lighting at the CityBus stops near the project site.

The project would fall ~~approximately 51~~70 spaces short (or about ~~13~~18 percent) of meeting the parking requirements specified in the City's zoning code and State density bonus laws. A shared parking analysis focusing on time-of-day parking demands was conducted, revealing that some efficiencies among the various uses can be achieved. Based on the shared parking analysis, the project is anticipated to experience a peak parking demand on weekday afternoons that ~~is slightly less than~~equals the ~~342~~323-space supply. During overnight periods, the site is anticipated to have a parking surplus of at least ~~48~~29 spaces. Given the anticipated shared parking efficiencies, proximity to high-frequency transit and nearby commuter rail, and strong orientation to biking and walking, the City could consider granting reductions in parking requirements for the project.

Introduction

Introduction

This report presents an analysis of the potential traffic and circulation impacts that would be associated with the proposed Roseland Village project to be located at 665 and 883 Sebastopol Road in the Roseland neighborhood of Santa Rosa. The project site was recently annexed to the City of Santa Rosa. The study was completed in accordance with the criteria established by the City, 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 access for pedestrians, bicyclists, and to transit are also addressed.

Project Profile

The proposed project includes a mix of residential and community-serving uses and is located in the Roseland neighborhood of Santa Rosa, on the north side of Sebastopol Road near West Avenue. Residential uses include 75 affordable and 100 market-rate apartments. A 7,000 square foot "Mercado" is envisioned to be a space for "restaurant and food-based business incubation and enterprise." Community uses include an 11,000 square foot space to be used as a branch of the Sonoma County Library. Approximately 11,000 square feet of office uses would be included on the second floor of the library building. A one-acre community plaza would be located near the center of the site. Existing uses on the site that would be demolished include a Dollar Tree store, as well as space used by the Boys & Girls Club and a small branch of the Sonoma County Library.

Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the following intersections:

1. Sebastopol Road/Stony Point Road
2. Sebastopol Road/Burbank Avenue
3. Sebastopol Road/Street D (existing driveway)
4. Sebastopol Road/West Avenue
5. Sebastopol Road/Street B (future intersection)
6. Sebastopol Road/Dutton Avenue

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

All of the study intersections are located along Sebastopol Road, an approximately 2.75-mile long arterial in west Santa Rosa that generally parallels the south side of SR 12. In the vicinity of the project site, the corridor consists of a three-lane roadway, with one travel lane in each direction, plus a center turn lane and bike lanes. The posted speed limit is 30 miles per hour (mph).

Sebastopol Road/Stony Point Road is a signalized four-legged intersection with protected left-turn phasing on all approaches, plus right-turn overlap phasing on the westbound and southbound approaches. Pedestrian crosswalks and signal phasing exist on all four intersection legs.

Sebastopol Road/Burbank Avenue is a four-legged signalized intersection, with the northern leg being an inbound-only entrance to a mobile home park. Protected left-turn phasing exists on westbound Sebastopol Road while eastbound left-turns into the mobile home park have permitted phasing. Marked crosswalks are present on the west, north, and south legs.

Sebastopol Road/Street D would be a new public "tee" intersection created by the project, located along the project's western boundary, and formalizing an existing driveway. The southbound Street D approach would be a single lane and stop-controlled. Sebastopol Road is striped with a two-way left-turn lane and includes single through lanes in each direction. There are currently no marked crosswalks at this location, but a new crosswalk would be created by the project on the Street D leg.

Sebastopol Road/West Avenue is a signalized intersection with protected left-turn phasing on Sebastopol Road and split phasing on West Avenue. Pedestrian crosswalks and signal phasing exist on the north, south, and east intersection legs.

Sebastopol Road/Street B would be a new public street "tee" intersection on the western boundary of the project site. The street would be stop-controlled on the southbound Street B approach, and movements between Sebastopol Road and Street B restricted to right turns. A marked crosswalk would be provided on the Street B leg.

Sebastopol Road/Dutton Avenue is a signalized four-legged intersection with protected left-turn phasing on the Dutton Avenue approaches, and protected-permitted left-turn phasing on Sebastopol Road. Right-turn overlap phasing is provided on the southbound and eastbound approaches, and pedestrian crosswalks and signal phasing exist on all four intersection legs.

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

Collision History

The collision history for the four existing study intersections was reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on records available from the California Highway Patrol as published in their Statewide Integrated Traffic Records System (SWITRS) reports. The most current five-year period available at the time this report was prepared was June 1, 2011, through May 31, 2016.

As presented in Table 1, the calculated collision rates for the existing study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2013 Collision Data on California State Highways*, California Department of Transportation (Caltrans). Collision rates for three of the four study intersections are below the average collision rates for similar facilities statewide, while the collision rate at Sebastopol Road/Dutton Avenue is higher than the statewide average. Copies of the spreadsheets with the data used to determine the collision rates are provided in Appendix A.

Table 1 - Collision Rates at the Study Intersections

Study Intersection	Number of Collisions (2011-2016)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Sebastopol Rd/Stony Point Rd	14	0.19	0.27
2. Sebastopol Rd/Burbank Ave	1	0.04	0.21
4. Sebastopol Rd/West Ave	4	0.12	0.27
6. Sebastopol Rd/Dutton Ave	25	**0.49**	0.27

Note: c/mve = collisions per million vehicles entering; **Bold** text indicates actual rates that exceed the Statewide Average
Intersections 3 and 5 do not currently exist so are not reported

In reviewing the collision records for Sebastopol Road/Dutton Avenue, it was noted that over half involved eastbound or westbound through vehicles colliding with vehicles making a left-turn on the opposing approach, with most identified as "auto right-of-way violation" as the primary collision factor. These types of collisions may be associated with the protected-permitted left-turn phasing on Sebastopol Road. The City of Santa Rosa has been actively changing conventional five-section protected-permitted signal heads to those using "flashing yellow arrow" (FYA) phasing. This strategy is being used by agencies to reinforce driver awareness of the need to yield to oncoming traffic, and could reduce collision rates when implemented at Sebastopol Road/Dutton Avenue.

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Traffic Impact Study for the Roseland Village Project

Figure 1 – Study Area and Lane Configurations

W-Trans

Non-Auto Modes

Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signals, curb ramps, crosswalk warning devices, and streetscape amenities. The entire Sebastopol Road corridor within the Specific Plan boundaries has a significant amount of pedestrian activity throughout the day, particularly in the commercial area near and fronting the project site. Within this core commercial segment pedestrian-scale street lighting, street trees, 6- to 10-foot wide sidewalks, and ADA-accessible curb ramps exist. At the signalized intersection of Sebastopol Road/West Avenue, which provides primary access to the project site, crosswalks and pedestrian signal timing exist on the north, south, and east intersection legs.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2012, classifies bikeways into three categories:

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

In the project area, the Joe Rodota Trail bounds the northern boundary of the project site. The Joe Rodota Trail is a paved pathway connecting the City of Sebastopol to Railroad Square in Santa Rosa, and to other major regional trails including the West County trail and the Santa Rosa Creek Path. Class II bike lanes exist on Sebastopol Road between Stony Point Road and just west of the SMART rail crossing. The segments of Dutton Avenue to the north of Sebastopol Road, as well as the entire length of Burbank Avenue, are currently designated as Class III bike routes.

Planned Facilities

Future bicycle facilities are identified in several sources, including the 2014 *Sonoma County Bicycle and Pedestrian Master Plan*, the 2014 *Draft SCTA Countywide Bicycle and Pedestrian Master Plan*, and the 2016 *Roseland Area/Sebastopol Road Specific Plan*. Following is a summary of the planned future bike facilities near the project site.

The SMART multi-use pathway will run north-south along the commuter rail corridor approximately 0.4 miles to the east of the project site. Through a combination of off-street and on-street facilities, the SMART path is ultimately planned to run the entire length of the commuter rail system from Cloverdale to Larkspur.

Future bike lanes are planned on the following street segments.

- **Sebastopol Road** – SMART rail corridor to Olive Street
- **Dutton Avenue** – SR 12 to Hearn Avenue
- **Stony Point Road** – SR 12 to Bellevue Ranch Road (the segment from Sebastopol Road to Hearn Avenue is currently under construction)
- **Burbank Avenue** – Sebastopol Road to Hearn Avenue
- **West Avenue** – Joe Rodota Trail to Hearn Avenue

An excerpt of the planned bicycle network map from the *Roseland Area/Sebastopol Road Specific Plan* is shown in Figure 2.

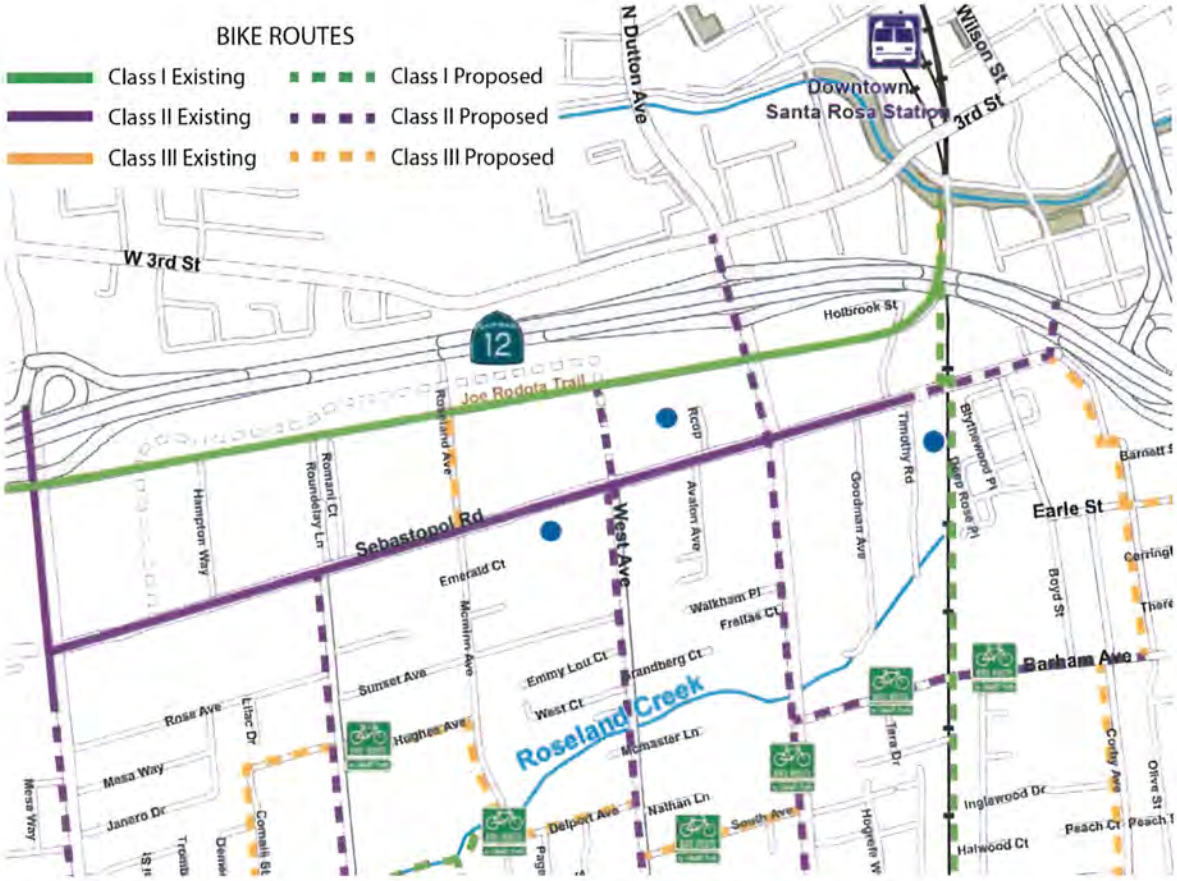


Figure 2 – Existing and Planned Bicycle Facilities (source: *Roseland Area/Sebastopol Road Specific Plan*)

Transit Facilities

Bus service near the project site is provided by Santa Rosa CityBus and Sonoma County Transit, both of which have routes that operate along Sebastopol Road. The bus stop serving westbound routes is located on the northwest corner of the Sebastopol Road/West Avenue intersection, abutting the project site. The eastbound stop is located approximately 300 feet to the east of West Avenue.

Santa Rosa CityBus

Santa Rosa CityBus is the primary transit provider in Santa Rosa and the Roseland area. CityBus provides regularly-scheduled fixed-route service to residential neighborhoods, major activity centers, and transit hubs within the City limits. Fixed routes are operated with wheelchair accessible, low-floor buses which can accommodate up to two bikes on bike racks attached to the front of each bus. CityBus routes are designed around a timed-transfer method where buses serving different routes arrive and depart at designated transfer locations at routine periodic intervals.

CityBus has completed a project called "Reimagining Santa Rosa CityBus" that has resulted in significant changes to transit routes and frequencies in the project area. Following is a summary of the routes that operate near the project site.

- **Route 9** Sebastopol Road – Route 9 operates with 15-minute headways on weekdays and 30- to 45-minute headways on weekends. Route 9N serves the Northpoint Business Park area and Route 9W serves the Wright Road area; both will serve the SMART commuter rail station and Downtown Transit Mall.
- **Route 12** Roseland – Route 12 operates with 30-minute headways on weekdays and 60-minute headways on weekends. The route circulates clockwise through the Roseland community on Corby Avenue, Hearn Avenue, West Avenue, and Sebastopol Road, connecting to the SMART commuter rail station and Downtown Transit Mall.

A map showing transit routes operating in the vicinity of the project site is shown in Figure 3.

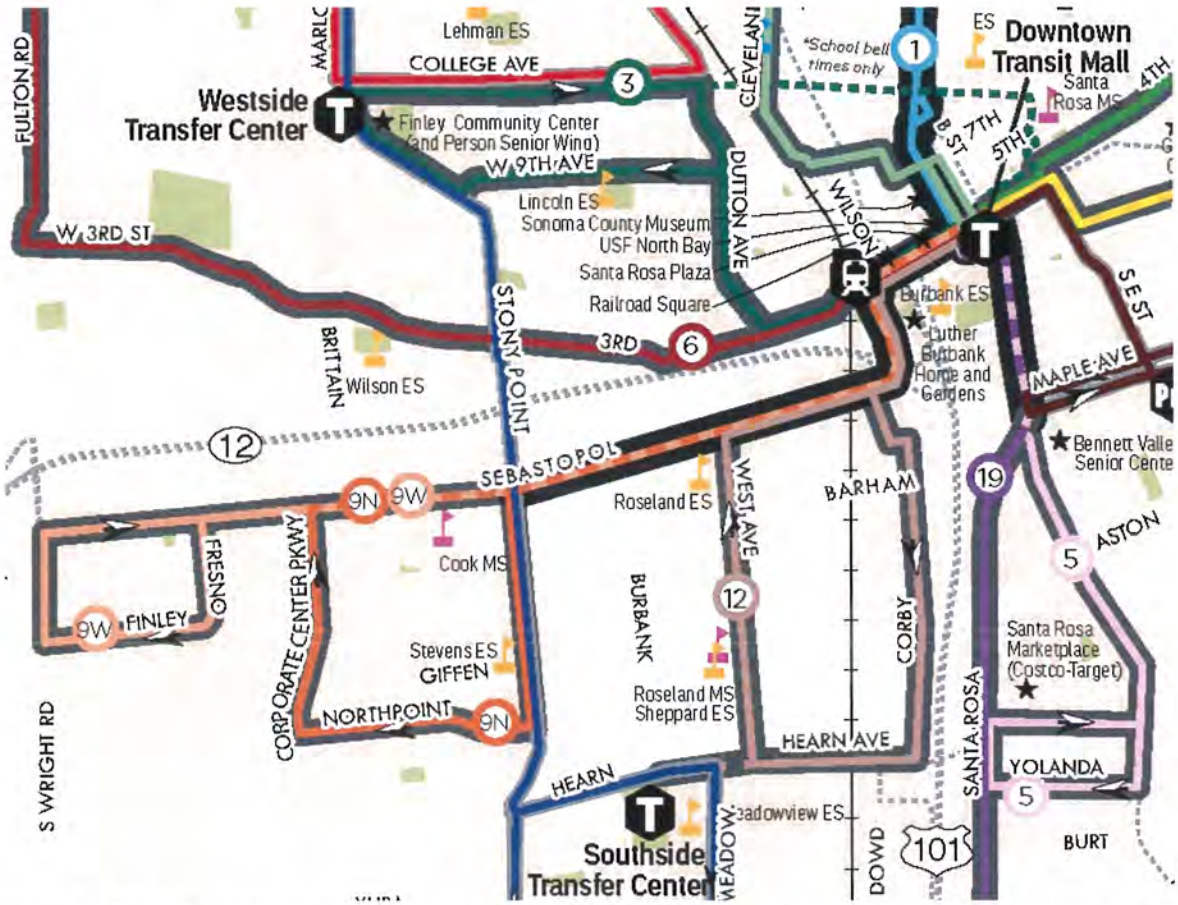


Figure 3 – CityBus Transit Routes (source: *Reimagining CityBus Final Report, Phase I Final Map*, Nelson Nygaard, 2016)

Westbound CityBus routes stop on the northwest corner of Sebastopol Road/West Avenue, directly along the project frontage. The westbound stop has a bus shelter. Eastbound routes stop approximately 300 feet to the east of West Avenue. The eastbound stop includes both a shelter and a bench.

Paratransit, also known as dial-a-ride 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. Individuals must be registered and certified as ADA eligible before using the service. CityBus currently contracts out paratransit service which provides curb-to-curb transportation for disabled riders. Service hours are Monday through Saturday from 6:00 a.m. to 8:00 p.m. and Sunday from 9:00 a.m. to 5:00 p.m. Ride reservations can be scheduled daily.

Sonoma County Transit

Sonoma County Transit (SCT) provides regional transit service throughout the County. The primary SCT transfer location in Santa Rosa is at the downtown transit mall, where transfers to local CityBus routes can take place. SCT Route 22 provides service between Sebastopol and Santa Rosa, traveling along Sebastopol Road along the project site five times per day in each direction (eastbound and westbound) on weekdays.

SMART Rail Transit

The Sonoma-Marin Area Rail Transit (SMART) commuter rail system currently operates between San Rafael and the Sonoma County Airport. SMART includes stations at the major population and job centers of the North Bay including the downtown Santa Rosa station, which is located approximately one-half mile from the project site. Train service is provided by 17 round-trip trains on weekdays. Typical headways during the morning and evening commute periods are 30 minutes, with longer headways during midday, evening, and weekend periods.

Capacity Analysis

Intersection Level of Service Methodologies

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

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

The Levels of Service for the 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 average 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.

The ranges of delay associated with the various levels of service are indicated in Table 2.

Table 2 – 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, 2010

Queuing Methodology

Vehicle queuing was assessed at the Sebastopol Road/West Avenue intersection, which provides primary vehicular access to the project site. Maximum queue lengths were analyzed using traffic simulation as performed in SimTraffic, which uses the same signal timing, phasing, and geometric data included in Synchro for intersection analysis. Ten separate randomly-seeded simulation "runs" were performed, with the 95th percentile queues averaged and presented as the estimated 95th percentile queue lengths.

Traffic Operation Standards

Because the original traffic analysis conducted for the project occurred prior to annexation, the traffic operation standards from both the County of Sonoma and City of Santa Rosa are referenced below.

County of Sonoma

Based on the most recent criteria published by the County of Sonoma in May of 2016, the project would have a significant traffic impact if it results in any of the following conditions.

A. **On-site roads and frontage improvements:** Proposed on-site circulation and street frontage would not meet the County's minimum standards for roadway or driveway design, or potentially result in safety hazards, as determined by the County in consultation with a registered traffic engineer.

B. **Parking:** Proposed on-site parking supply does not meet County standards and does not adequately accommodate parking demand.

C. **Emergency Access:** The project site would have inadequate emergency access.

D. **Alternative Transportation:** The project provides inadequate facilities for alternative transportation modes (e.g., bus turnouts, bicycle racks, pedestrian pathways) and/or the project creates potential conflicts with the County's Complete Streets Policy, or other adopted policies, plans, or programs supporting alternative transportation.

E. **Road Safety:** Road design features that do not meet standards (e.g., sharp curves or skewed intersections) or any perceived incompatible uses (e.g., farm equipment, major bicycle route, rail or pedestrian crossings).

F. **Vehicle Queues:** Project causes or exacerbates 95th percentile turning movement queues exceeding available turn pocket capacity.

G. **Signal Warrants:** The addition of the project's vehicle or pedestrian traffic causes an intersection to meet or exceed current Caltrans and/or CA-MUTCD signal warrant criteria.

H. **Turn Lanes:** The addition of project traffic causes an intersection to meet or exceed criteria for provision of a right or left turn lane on an intersection approach.

I. **Sight Lines:** The project constructs an unsignalized intersection (including driveways) or adds traffic to an existing unsignalized intersection approach that does not have adequate sight lines based upon Caltrans criteria for state highway intersections and AASHTO criteria for County roadway intersections.

J. **County Intersection Operations:** The County Level of Service standard for County intersection operations is to maintain a Level of Service D or better pursuant to General Plan Policy CT-4.2. The project would have a

significant traffic impact if the project's traffic would cause an intersection currently operating at an acceptable level of service (LOS D or better) to operate below the standard (LOS E or F).

If the intersection currently operates or is projected to operate below the County standard (at LOS E or F), the project's impact is significant and cumulatively considerable if it causes the average delay to increase by five seconds or more. The delay will be determined by comparing intersection operation with and without the project's traffic for both the existing baseline and projected future conditions. These criteria apply to all controlled intersections except for driveways and minor side streets that have less than 30 vehicle trips per hour per approach or per exclusive left turn movement.

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

City of Santa Rosa

Policy T-D-1 of the General Plan states that the City will maintain a Level of Service (LOS) D or better along all major corridors. Exceptions to meeting this standard are allowed:

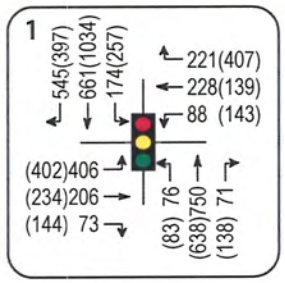
- Within downtown;
- Where attainment would result in significant environmental degradation;
- Where topography or environmental impacts makes the improvement impossible; or
- Where attainment would ensure loss of an area's unique character.

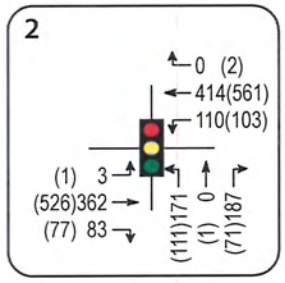
Existing Conditions

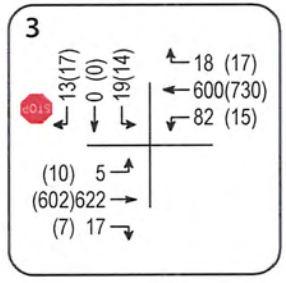
Intersection traffic volume data was obtained for most signalized study intersections in the Specific Plan area (and all signals along the study corridors) as well as at key unsignalized intersections. All traffic data was collected between April 2014 and January 2017. Based on a review of 24-hour traffic volume data obtained on Sebastopol Road to the east and west of West Avenue in 2016 by the City of Santa Rosa, it was determined that volumes have changed very little since 2014, and no adjustment of the 2014 or 2015 data is warranted. The existing a.m. and p.m. peak hour traffic volumes are shown in Figure 4.

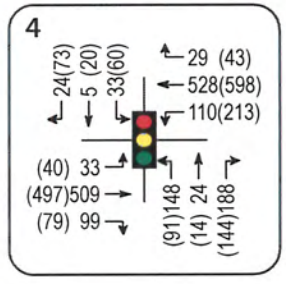
Intersection Levels of Service

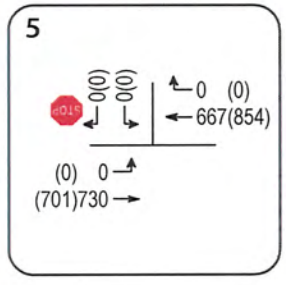
Under existing conditions, all existing study intersections are operating acceptably at LOS D or better overall. A summary of the existing intersection Level of Service calculations is contained in Table 3, and copies of the Level of Service calculations are provided in Appendix B.

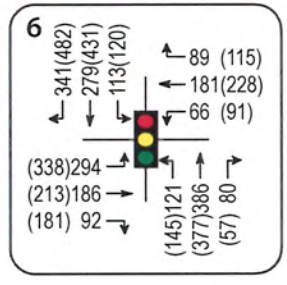












LEGEND

- Study Intersection
- xx AM Peak Hour Volume
- (xx) PM Peak Hour Volume

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Traffic Impact Study for the Roseland Village Project

Figure 4 – Existing Traffic Volumes

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Table 3 - Existing Peak Hour Intersection Levels of Service

Study Intersection *Approach*	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. Sebastopol Rd/Stony Point Rd	40.4	D	38.8	D
2. Sebastopol Rd/Burbank Ave	11.7	B	7.7	A
3. Sebastopol Rd/Street D	1.1	A	0.6	A
Southbound Approach	*19.9*	*C*	*17.1*	*C*
4. Sebastopol Rd/West Ave	21.2	C	20.1	C
5. Sebastopol Rd/Street B	*	*	*	*
Southbound Approach	*	*	*	*
6. Sebastopol Rd/Dutton Ave	29.9	C	30.6	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*; * = future intersection

Future Conditions

Future (No Project) Traffic Projections

Future traffic volume projections were based on data contained in the *Roseland Area/Sebastopol Road Specific Plan and Roseland Area Annexation Draft Environmental Impact Report*, Michael Baker International, May 2016. The traffic analysis contained in this EIR presented an evaluation of year 2040 traffic conditions, including buildout of the City of Santa Rosa and County of Sonoma General Plans, in addition to the land use and circulation changes proposed in the Roseland Area/Sebastopol Road Specific Plan. Traffic modeling for the EIR analysis was completed using the Sonoma County Transportation Authority's (SCTA) SCTM\10 travel demand model.

The *Roseland Area/Sebastopol Road Specific Plan* includes a "Retail/Medium Residential" land use designation for the project site. The Specific Plan envisions land uses and community functions that are similar to the proposed Roseland Village project, as well as an extension of West Avenue through the project site as proposed. The "Retail/Medium Residential" land use designation assumes an average mix of 7.8 single-family residential units per acre, 4.2 multifamily residential units per acre, and a 0.25 floor area ratio (FAR) for retail uses (translating to 10,890 square feet of retail per acre). When applied to the 7.21-acre Roseland Village project site, this results in a total of 56 single family homes, 30 multifamily units, and 78,520 square feet of retail.

In order to evaluate a "Future" scenario without the proposed Roseland Village Project, it is necessary to remove the trips associated with the Specific Plan's assumed land use mix for the site from the year 2040 traffic projections contained in the Specific Plan EIR. Using the land use projections for the site described above, the Specific Plan's assumed trips for the site can be calculated as indicated in Table 4. The resulting trip generation assumed for the site includes 4,213 trips per day, including 132 trips during the a.m. peak hour and 288 trips during the p.m. peak hour.

Table 4 – Site Trip Generation Assumptions Applied in Specific Plan EIR

Land Use	Units	Daily		AM Peak Hour		PM Peak Hour	
		Rate	Trips	Rate	Trips	Rate	Trips
Single Family Housing (ITE LU#210)	56 units	9.52	533	0.75	42	1.00	56
Multifamily Housing (ITE LU #220)	30 units	6.65	200	0.51	15	0.62	19
Retail (ITE LU #826)	78.52 ksf	44.32	3,480	0.96*	75	2.71	213
Specific Plan Trips Assumed for Site			**4,213**		**132**		**288**

Notes: ITE LU# refers to the land use codes used in *Trip Generation Manual*, 9th Edition, Institute of Transportation Engineers, 2012; * a.m. peak hour rates for this land use are not available so rates for "Shopping Center" (ITE LU#820) were applied; ksf=1,000 square feet

Removing these trips from the projections contained in the Specific Plan EIR effectively creates a "no project" scenario that assumes year 2040 buildout occurs everywhere except the project site, which is assumed to be vacant. The trips associated with the Roseland Village project can then be added to these "Future" volumes in order to establish a "Future plus Project" scenario. Note that while this scenario assumes the project site to be vacant, West Avenue is still assumed to be extended north of Sebastopol Road, carrying traffic associated with future development on parcels to the north of the project site. The projected a.m. and p.m. peak hour future volumes are shown on Figure 5.

Specific Plan Roadway Changes

The Specific Plan includes several changes to the Roseland area roadway network, though most are in the southern portion of the Specific Plan area well beyond this project's study area. The only Specific Plan improvement affecting the Roseland Village project's traffic analysis is modification of the Sebastopol Road/ Burbank Avenue intersection, which includes reducing the number of westbound through lanes from two to one, and converting the eastbound approach from its current lane configuration of separate left-turn, though, and right-turn lanes (L-T-R) to a left-turn and through/right-turn (L-TR) lane configuration. This revised lane configuration is assumed to be in place in the Future and Future plus Project traffic analysis scenarios.

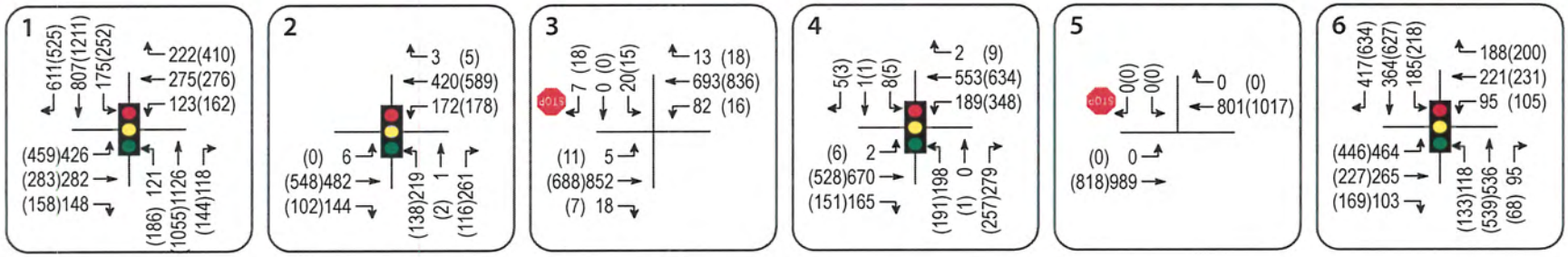
Future Operating Conditions

Under the projected future volumes and with no development on the project site, the study intersections are expected to operate acceptably at LOS D or better. Future operating conditions are summarized in Table 5.

Table 5 – Future (No Project) Peak Hour Intersection Levels of Service

Study Intersection *Approach*	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. Sebastopol Rd/Stony Point Rd	42.4	D	50.2	D
2. Sebastopol Rd/Burbank Ave	21.5	C	13.0	B
3. Sebastopol Rd/Street D	0.9	A	0.6	A
Southbound Approach	*24.0*	*C*	*19.4*	*C*
4. Sebastopol Rd/West Ave	32.5	C	34.8	C
5. Sebastopol Rd/Street B	*	*	*	*
Southbound Approach	*	*	*	*
6. Sebastopol Rd/Dutton Ave	39.3	D	43.5	D

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*; * = future intersection



North

Not to Scale

LEGEND

- Study Intersection
- xx AM Peak Hour Volume
- (xx) PM Peak Hour Volume

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Traffic Impact Study for the Roseland Village Project

Figure 5 – Future Traffic Volumes

W-Trans

Project Description

Land Uses

The proposed project is comprised of a mix of residential, commercial, community, and office functions. Residential uses include 75 affordable and 100 market-rate apartments within two four-story buildings. A 1,000 square foot retail space would be included on the ground floor of the market rate apartment building. A 7,000 square foot "Mercado" is envisioned to be a space for "restaurant and food-based business incubation and enterprise" that includes "food, beverage, supportive retail, and recreational amenities." Community uses include an 11,000 square foot space anticipated to be used as a branch of the Sonoma County Library. Above the library would be an additional 11,000 square feet of office uses. A one-acre community plaza would be located near the center of the site. The proposed site plan is shown in Figure 6.

Several uses currently exist on the project site, though all would be demolished as part of the project. Existing uses include a Dollar Tree store, as well as space used by the Roseland Village Community Center, a branch of the Sonoma County Library, and the Boys & Girls Club. For the purposes of the traffic analysis, all existing traffic volumes entering and exiting the project site via the Sebastopol Road/West Avenue intersection were "zeroed out" in the project scenarios, as they are associated with existing onsite uses that would be demolished. All traffic associated with the project is then considered to be new.

Access

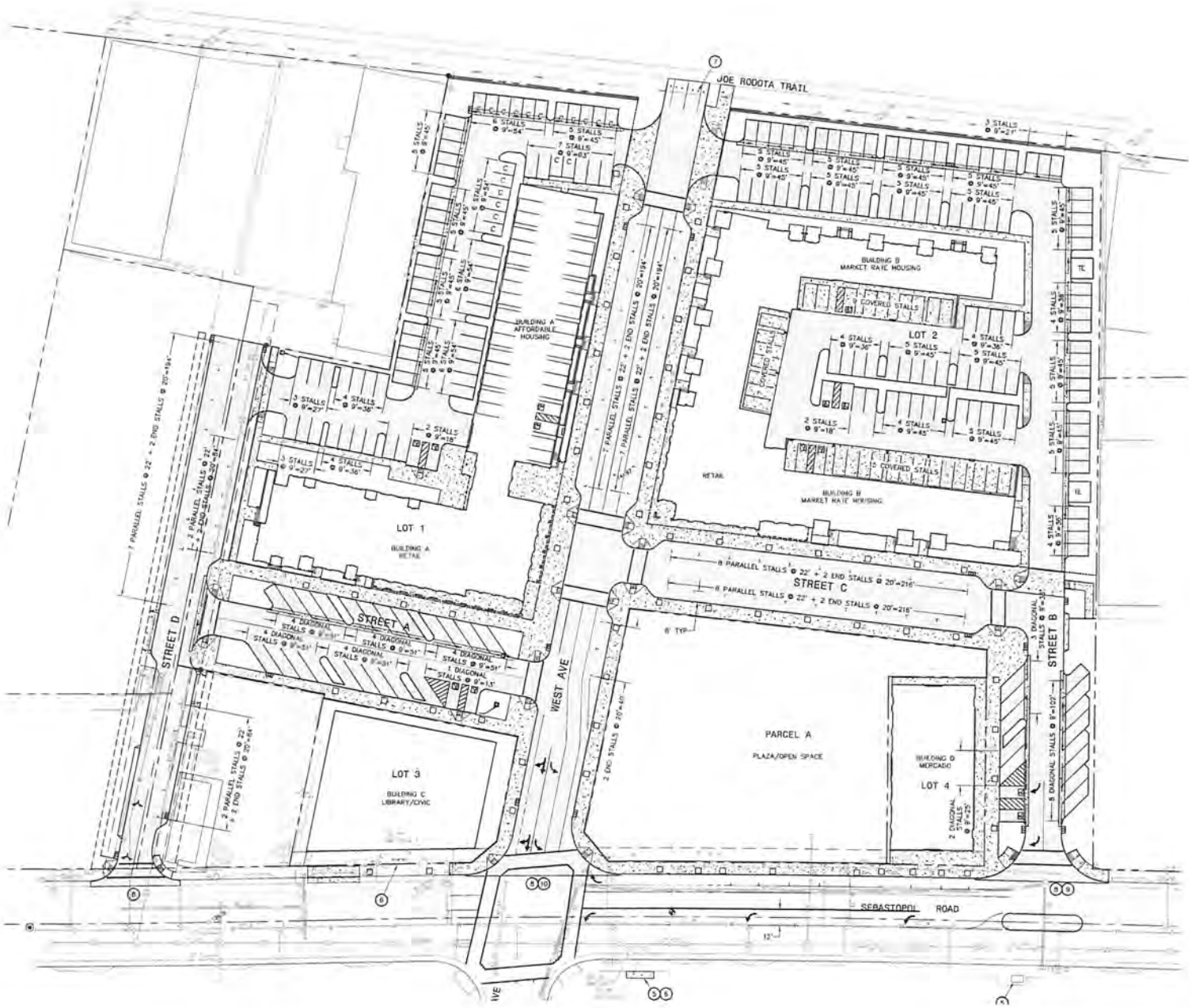
The project site is located on the north side of Sebastopol Road near the Sebastopol Road/West Avenue intersection. As part of the site development, West Avenue would be extended through the site to the northern property line, providing primary access while allowing for future extension to the north consistent with the *Roseland Area/Sebastopol Road Specific Plan*. Secondary site access to Sebastopol Road would be provided by "Street D" on the western periphery of the site and by "Street B" on the eastern periphery.

A private driveway serving several parcels exists where Street D would be located. Given the need to maintain full access to these non-project parcels, it is assumed that the street would have full access at Sebastopol Road. Street B, however, would be a newly-created street. Given its proximity to Avalon Avenue (approximately 100 feet east) and the potential need to increase left-turn storage for the Sebastopol Road/West Avenue intersection to the west, it is assumed that Street B would be restricted to right-turns in and right-turns out.

Modification of Sebastopol Road/West Avenue Intersection

The traffic signal lane configurations and phasing at the Sebastopol Road/West Avenue intersection would be modified as part of the Roseland Village project. Following is a summary of the proposed modifications, which are reflected in the "plus project" analysis scenarios in this report.

- Modify the southbound West Avenue approach to include a 100-foot long left-turn lane and 100-foot long shared through/right-turn lane
- Shorten the existing right-turn lane on the westbound Sebastopol Road approach to include approximately 50 feet of storage, adding on-street parking spaces in the remainder of the existing turn pocket
- Add a pedestrian crosswalk and associated pedestrian phasing on the west leg of the intersection
- Modify the signal phasing to provide protected left-turn operation on both West Avenue approaches



Source: BFK 5/18

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Traffic Impact Study for the Roseland Village Project

Figure 6 – Site Plan

W-Trans

Trip Generation

Trip Generation Rates

The anticipated trip generation for the proposed project was primarily estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 9th Edition, 2012. The ITE "Mid-Rise Apartment" (#223) land use was used to determine residential trip generation. Rates for "Specialty Retail" (#826) were applied to the 1,000 square foot retail space in Building B. Trips associated with the 11,000 square foot office space above the library were determined using "Office" (#710) rates. "Library" (#590) rates were applied for the anticipated Sonoma County Library branch use. Trips associated with the one-acre plaza were determined using "City Park" trip generation rates developed by the San Diego Association of Governments (SANDAG) since the ITE *Trip Generation Manual* contains limited data for this type of use.

The project's Mercado use is unique and not readily classified by standard trip generation rates. The Mercado would include food production and sales as well as small-scale restaurant-type uses. In order to capture the potential effects of both retail- and restaurant-type use, ITE rates for "Specialty Retail" (#826) and "High-Turnover (Sit-Down) Restaurant (#932) were averaged and a set of custom rates applied. It is noted that because the Mercado is intended to be a community catalyst focused on serving the surrounding Roseland community, application of a custom rate based partly on high-turnover restaurant trip generation rates (which are more typically found in auto-oriented suburban locations) should be considered very conservative. Because of the unique nature of the Mercado and inherent flexibility in the types of businesses it may contain, however, the approach was maintained.

Internal Capture Trips

Some portion of trips associated with the Mercado are likely to be "captured" from drivers who were already passing by the site on Sebastopol Road. These are referred to as pass-by trips. While ITE data indicates that an average of 43 percent of trips associated with a high-turnover restaurant use are pass-by, to maintain a conservative analysis a lower pass-by assumption of 10 percent was applied to the Mercado use. This translates to a total of four trips (two inbound and two outbound) during both peak hours.

Internal trips occur at mixed-use developments, and in the case of the Roseland Village project would consist of residents patronizing the Mercado and library, as well as non-residential use interactions among the office, library, plaza, and Mercado. Such trips would be made by walking rather than driving. The number of internal trips was calculated based upon data from the publication NCHRP Report 684: *Enhancing Internal Capture Estimation for Mixed-Use Developments*, Transportation Research Board (TRB), 2011. The methodologies have also since been incorporated into the *Trip Generation Manual*. The methodology uses the standard ITE trip generation estimates for each land use, determines the potential internal trips captured onsite, and produces an estimate of the adjusted number of external vehicle trips. For the proposed project, the methodology estimates that approximately 16 percent of a.m. and p.m. peak hour trips would be internally captured. Copies of the NCHRP 684 methodology worksheets are contained in Appendix C.

Total Trip Generation

The expected trip generation potential for the proposed project is indicated in Table 6, with deductions taken for Mercado pass-by trips as well as trips captured internally to the project site. The project would be expected to generate an average of 1,775 trips on a daily basis, including 109 trips during the morning peak hour and 183 trips during the evening peak hour.

Table 6 – Trip Generation Summary

Land Use	Units	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Mid-Rise Apartments (#223)	175 units	4.18[1]	732	0.30	53	16	37	0.39	68	40	28
Mercado[2]	7.0 ksf	85.74	600	5.89	41	24	17	6.28	44	23	21
Pass-by	*10%*		*-60*		*-4*	*-2*	*-2*		*-4*	*-2*	*-2*
Retail (#826)	1.0 ksf	44.32	44	0.96[3]	1	1	0	2.71	3	1	2
Office (#710)	11.0 ksf	11.03	121	1.56	17	15	2	1.49	16	3	13
Library (#590)	11.0 ksf	56.24	619	1.04	11	8	3	7.30	80	39	41
Plaza[4]	1.0 ac	50.0	50	6.50	7	4	3	4.50	5	2	3
Sub-Total			2,106		126	66	60		212	106	106
Internal Capture Trips			*-331*[5]		*-17*	*-9*	*-8*		*-29*	*-14*	*-15*
Net New Trips			**1,775**		**109**	**57**	**52**		**183**	**92**	**91**

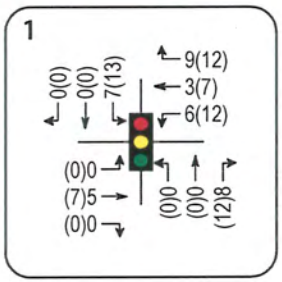
Notes: [1] Daily rates not available so the proportion of daily to PM peak hour rates from the "Apartment" land use was applied;
[2] Custom rate reflects average of "Specialty Retail" and "High Turnover (Sit-Down) rates;
[3] AM peak hour rates not available so rate from "Shopping Center" land use applied;
[4] SANDAG rates applied;
[5] Daily internal trips estimated using the averages percentage of a.m. and p.m. peak hour internal trips;
ksf=1,000 square feet; ac=acre

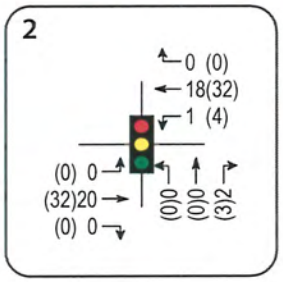
Trip Distribution

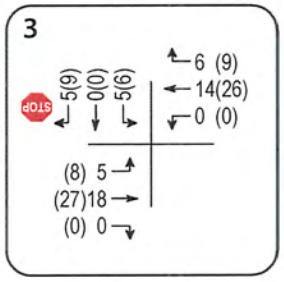
The pattern used to allocate new project trips to the street network was based on 2014 data obtained from the US Census Bureau for "home to work" and "work to home" travel patterns, as well as local circulation patterns in the project area. While residential trips are heavily influenced by regional employment locations, the community-focused non-residential trips associated with this project are anticipated to be focused primarily within central and southwest Santa Rosa. The applied distribution assumptions are summarized in Table 7. The trip distribution percentages and project turning movement volumes at the study intersections are shown in Figure 7.

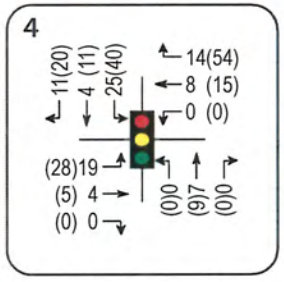
Table 7 – Trip Distribution Assumptions

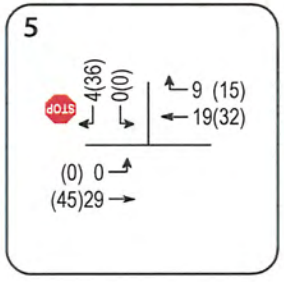
Route	Residential	Non-Residential
Dutton Ave – north of Sebastopol Rd	36%	15%
Stony Point Rd – north of Sebastopol Rd	20%	10%
Sebastopol Rd – east of Dutton Ave	12%	15%
Dutton Ave – south of Sebastopol Rd	12%	15%
Stony Point Rd – south of Sebastopol Rd	10%	15%
West Ave – south of Sebastopol Rd	4%	15%
Sebastopol Rd – west of Stony Point Rd	4%	10%
Burbank Ave – south of Sebastopol Rd	2%	5%
TOTAL	**100%**	**100%**

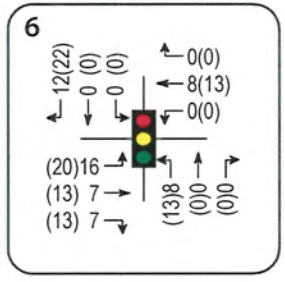












North

Not to Scale

LEGEND

Study Intersection

xx AM Peak Hour Volume xx% Residential Trip Distribution %

(xx) PM Peak Hour Volume (xx%) Non-Residential Trip Distribution %

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Traffic Impact Study for the Roseland Village Project

Figure 7 – Project Traffic Volumes and Trip Distribution

W-Trans

Parking Circulation Movements

The site plan configuration is such that drivers searching for on-street parking may travel along Street C, and then turn right onto Street B. If they do not find a space on Street B, they will need to exit onto Sebastopol Road and then turn back into the site at West Avenue. Based on the parking analysis conducted for the project (which appears later in this report), there is expected to be a substantial availability of parking spaces during the a.m. peak hour. During the p.m. peak hour, however, onsite parking is projected to be heavily utilized, and the possibility exists that some drivers searching for parking will circulate back onto Sebastopol Road as noted. For the purposes of the traffic analysis, an additional 30 p.m. peak hour vehicle trips associated with parking circulation were added to the southbound right-turn movements at Sebastopol Road/Street B, and to the westbound right-turn movement at Sebastopol Road/West Avenue.

Intersection Operation

Existing plus Project Conditions

Upon the addition of project-related traffic to Existing volumes, the study intersections are expected to operate acceptably at LOS D or better overall, at the same levels of service as without project-added traffic. At the Sebastopol Road/West Avenue intersection, changes to the signal phasing and lane configurations that would be completed by the project would have a less-than-significant effect on operation. Existing plus Project traffic volumes are shown in Figure 8, and Project level of service results are summarized in Table 8.

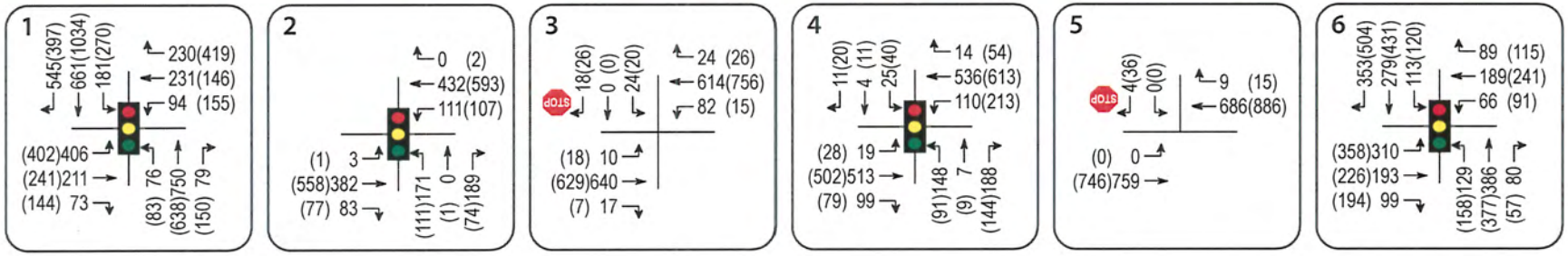
Table 8 – Existing and Existing plus Project Peak Hour Intersection Levels of Service

Study Intersection *Approach*	Existing Conditions				Existing plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Sebastopol Rd/Stony Point Rd	40.4	D	38.8	D	40.4	D	39.2	D
2. Sebastopol Rd/Burbank Ave	11.7	B	7.7	A	11.8	B	7.8	A
3. Sebastopol Rd/Street D	1.1	A	0.6	A	1.2	A	0.8	A
Southbound Approach	*19.9*	*C*	*17.1*	*C*	*21.1*	*C*	*18.6*	*C*
4. Sebastopol Rd/West Ave	21.2	C	20.1	C	25.1	C	24.2	C
5. Sebastopol Rd/Street B	*	*	*	*	0.1	A	0.4	A
Southbound Approach	*	*	*	*	*13.6*	*B*	*17.8*	*C*
6. Sebastopol Rd/Dutton Ave	29.9	C	30.6	C	30.1	C	31.5	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*; * = future intersection; [1]plus project conditions reflect changes to signal phasing and lane configuration to be constructed as part of the project

Finding – The study intersections would be expected to continue operating acceptably overall at LOS D or better upon the addition of project-generated traffic and assuming improvements at Sebastopol Road/West Avenue that are proposed as part of the project. This is considered a less-than-significant impact.

Recommendation – The applicant should be responsible for funding and constructing the signal modification at Sebastopol Road/West Avenue as shown on the project site plan, coordinating with the City of Santa Rosa as appropriate to maintain consistency with design standards.



North

Not to Scale

LEGEND

- Study Intersection
- xx AM Peak Hour Volume
- (xx) PM Peak Hour Volume

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Traffic Impact Study for the Roseland Village Project

Figure 8– Existing plus Project Traffic Volumes

W-Trans

Future plus Project Conditions

Upon the addition of project-generated traffic to the anticipated Future volumes, the study intersections are expected to operate acceptably at LOS D or better overall. As under Existing plus Project conditions, the project-constructed changes at the Sebastopol Road/West Avenue intersection would result in less-than-significant impacts to operation at this location. The Future plus Project volumes are shown in Figure 9, and resulting operating conditions are summarized in Table 9.

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

Study Intersection *Approach*	Future Conditions				Future plus Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Sebastopol Rd/Stony Point Rd	42.4	D	50.2	D	42.7	D	51.8	D
2. Sebastopol Rd/Burbank Ave	21.5	C	13.0	B	22.6	C	13.9	B
3. Sebastopol Rd/Street D	0.9	A	0.6	A	1.1	A	0.8	A
Southbound Approach	*24.0*	*C*	*19.4*	*C*	*25.1*	*D*	*21.1*	*C*
4. Sebastopol Rd/West Ave	32.5	C	34.8	C	37.8	D	41.2	D
5. Sebastopol Rd/Street B	*	*	*	*	0.1	A	0.4	A
Southbound Approach	*	*	*	*	*15.2*	*C*	*21.3*	*C*
6. Sebastopol Rd/Dutton Ave	39.3	D	43.5	D	41.3	D	45.1	D

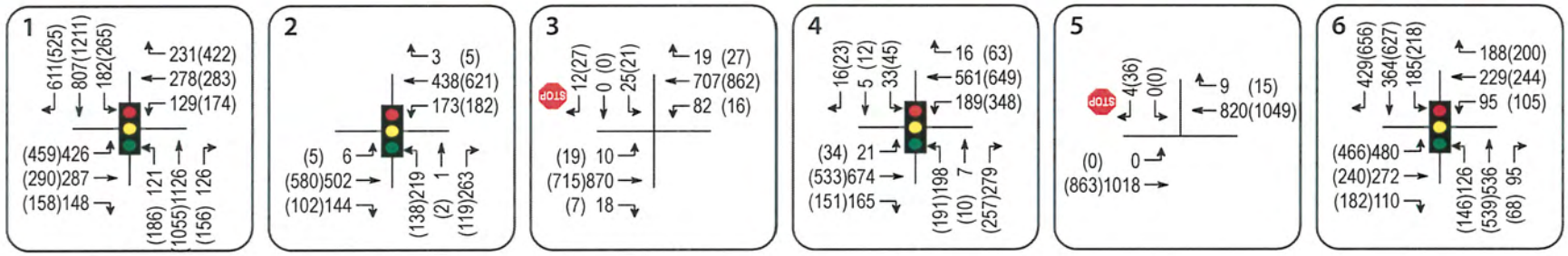
Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*; * = future intersection; [1]plus project conditions reflect changes to signal phasing and lane configuration to be constructed as part of the project

Finding - The study intersections are expected to continue operating acceptably upon the addition of project-generated traffic to Future volumes. This is considered a less-than-significant impact.

Queuing

The project would have three access points on Sebastopol Road, though the eastern access would be restricted to right-turns only, essentially negating queuing concerns. Queues at the other two access points (Street D and West Avenue) were evaluated under each scenario using the SIMTRAFFIC application of Synchro. Queues were calculated based on the averaged 95th percentile queues from ten simulation runs.

A summary of 95th percentile queues at the controlled intersection turning movements is provided in Table 10, and copies of the calculations are included in Appendix D. Results are shown for both the a.m. and p.m. peak hours, under existing and future conditions both without and with the project.



North

Not to Scale

LEGEND

- Study Intersection
- xx AM Peak Hour Volume
- (xx) PM Peak Hour Volume

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Traffic Impact Study for the Roseland Village Project

Figure 9 – Future plus Project Traffic Volumes

W-Trans

Table 10 – 95th Percentile Queues

Intersection Lane	Avail. Storage	95th Percentile Queues							
		AM Peak Hour				PM Peak Hour			
		E	E+P	F	F+P	E	E+P	F	F+P
Sebastopol Rd/West Ave									
Northbound L	745	107	155	206	376	92	126	180	306
Northbound TR	80	**86**	**134**	**164**	**166**	**105**	**101**	**147**	**175**
Eastbound L	210[1]	61	45	19	78	109	98	26	153
Eastbound T	950	285	414	513	648	320	514	369	525
Eastbound R	155	81	**167**	**255**	**249**	55	**188**	**203**	**252**
Westbound L	470[2]	96	195	208	215	167	236	275	285
Westbound T	990	219	301	246	338	269	335	239	642
Southbound L[3]	100	63	69	28	67	87	76	17	84
Southbound R[4]	100	35	40	20	38	60	46	12	54
Sebastopol Rd/Street D									
Eastbound L	480[5]	20	31	20	25	24	39	26	46
Westbound L	110	61	26	62	81	25	26	33	28

Notes: 95th Percentile Queue based on the average of ten SIMTRAFFIC runs; all distances are measured in feet;
E = Existing Conditions; E+P = Existing + Project; F = Future Conditions; F+P = Future + Project;
L = left; T = through; R = right; TR=through/right; **Bold**=95th percentile queue exceeds storage
[1] Distance between West Ave and Street D within existing two-way left-turn lane and turn pocket
[2] Distance between West Ave and Avalon Ave within existing two-way left-turn lane and turn pocket
[3] Shared through-left lane without project, and left-turn pocket with project
[4] Right-turn pocket without project, and shared through-right lane with project
[5] Distance within two-way left-turn lane to upstream left-turn pocket at Roseland Ave

Sebastopol Road/West Avenue

At the Sebastopol Road/West Avenue intersection, both the eastbound and westbound turn pockets transition to two-way left-turn lane striping, facilitating longer queues when they occur while also allowing movements into and out of nearby driveways. The projected left-turn queues would remain within the available storage and without extending into upstream intersections (in this case, Street D and Avalon Avenue). On the westbound approach, the project's shortening of the existing right-turn lane is reflected in the "plus project" queuing results. Shortening of the right-turn lane is not anticipated to result in an adverse effect such as through lane queues extending through the upstream Avalon Avenue intersection. On the southbound approach exiting the project site, queues are projected to remain within the available storage, without extending through intersections on the interior of the site.

The projected 95th percentile queues in the northbound through/right-turn lane pocket as well as the eastbound right-turn pocket are anticipated to exceed the available storage in several scenarios both without and with the project. When this condition occurs, queues will spill over into the adjacent lane. On eastbound Sebastopol Road, when queues fill the 155-foot long right-turn pocket, they will spill over into the adjacent through lane. In the case of northbound West Avenue, when queues fill the 80-foot long through/right-turn pocket, they will spill over into the adjacent left-turn lane (which in this case is striped such that it transitions directly to a through lane without bay tapers, creating a lane that essentially extends 745 feet to Sunset Avenue). This queuing could be partially alleviated by restriping the northbound approach to extend the length of the left-turn lane by 50 to 60

feet. This modification could be made within the existing curb-to-curb width, and should be completed by the applicant as part of the modification of the Sebastopol Road/West Avenue signalized intersection.

In both of these cases where right-turn queues exceed the available storage, the resulting queues in adjacent lanes are not projected to extend into nearby intersections; as a result the condition is not anticipated to create a significant safety or operational impact.

It is important to note that the "plus project" queuing results reflect the modifications to intersection signal phasing (conversion of the existing split phasing on West Avenue to protected left-turn phasing) and lane configurations that would be made by the project. The primary purpose of these modifications is to improve pedestrian circulation by adding a new crosswalk across Sebastopol Road on the west intersection leg. This improvement slightly reduces the vehicular capacity of the intersection and affects queuing. Because the resulting queues are not projected to extend to adjacent intersections or adversely affect safety, however, and because the improvement would actually result in *improvements* to pedestrian circulation, the implications to intersection queues are considered to be less-than-significant.

Sebastopol Road/Street D

At the Sebastopol Road/Street D intersection, eastbound left-turn queues (resulting primarily from project-generated trips) are projected to remain within the available storage. The 95th percentile queue for the westbound left-turn into the Roseland Elementary School parking lot is projected to nearly reach the 95th percentile eastbound left-turn queue at the Sebastopol Road/West Avenue intersection during the a.m. peak hour (60-minute period) under Future plus Project conditions, though these opposing queues are not projected to overlap and potentially block through traffic on Sebastopol Road. Queues on the southbound Street D approach to Sebastopol Road are anticipated to remain within the available storage, and not extend to internal intersections on the project site.

Queuing During AM School Drop-off Peak

Roseland Elementary School has an inbound-only driveway on the south leg of the Sebastopol Road/Street D intersection that accommodates a portion of the school's drop-off activity. The a.m. peak hour volumes associated with school drop-offs are included in the queuing results shown in Table 10, but averaged over a one-hour period. In order to assess the potential queuing activity associated with a shorter school drop-off peak, a second set of simulation runs and calculations was prepared that assumes approximately 80 percent of the school's traffic arrives in a single 15-minute period. These results are shown in Table 11 for a.m. peak hour Existing plus Project and Future plus Project scenarios.

Table 11 – Queuing During 15-Minute AM School Peak

Intersection Lane	Available Storage	AM Existing plus Project		AM Future plus Project	
		95th Percentile Queue	Average Queue	95th Percentile Queue	Average Queue
Sebastopol Rd/West Ave					
Eastbound Left	210[1]	100	27	109	24
Sebastopol Rd/Street D					
Westbound Left	110	**156**	85	**151**	101
Westbound Through	220	132	23	**252**	78
EB Left plus WB Left[2]	220	**256**	112	**260**	125

Notes: 95th Percentile Queue based on the average of ten SIMTRAFFIC runs; all distances are measured in feet
Bold=95th percentile queue exceeds storage
[1] Distance between West Ave and Street D within existing two-way left-turn lane and turn pocket
[2] Combined 95th % queues including eastbound left-turn at West Avenue and westbound left-turn at Street D

The school peak queuing analysis indicates that the combined 95th percentile queues associated with eastbound left turns at Sebastopol Road/West Avenue and westbound left turns at Sebastopol Road/Street D may not be accommodated within the 220 feet of available center turn-lane storage between these intersections. As a result, left-turn queues created by drivers turning left into the school can be expected to spill over into the adjacent westbound through lane on Sebastopol Road during the peak morning drop-off period, extending through the West Avenue signal. Based on a review of traffic simulation runs, these queue backups through West Avenue would fully clear during a typical signal cycle approximately 90 percent of the time.

In addition to the 95th percentile queuing projections, estimates of the *average* queues during the peak 15-minute school drop-off period were also analyzed in order to gauge whether the queuing spillover would be short-lived or extend through multiple signal cycles. It was determined that, on average, the combined left-turn queues would be approximately 125 feet under Future plus Project conditions, and as a result would be contained within the available 220-feet of storage. Queue spillover is therefore expected to be short in duration during the height of school drop-off activity, and not long enough to create more widespread street network issues.

School area congestion and queuing is a common occurrence at many schools, and is typically difficult to alleviate without substantial modifications to onsite circulation within the school campuses. Roseland Elementary School is a more constrained site than modern school campuses and already appears to make full use of its parking lot resources to accommodate drop-off activity. While there is likely to be school-related congestion and queuing during the morning drop-off period, the relatively brief duration along with presence of low vehicle speeds on surrounding streets should limit the potential for collisions to occur.

Finding – Shortening of the existing westbound right-turn lane at Sebastopol Road/West Avenue is not anticipated to result in adverse queuing impacts.

Finding – At the Sebastopol Road/West Avenue intersection, 95th percentile queues in the northbound through/right-turn pocket and in the eastbound right-turn pocket are projected to spill over into adjacent lanes, though would not cause any queuing to extend into adjacent intersections; 95th percentile queues on other controlled movements at this intersection and at Sebastopol Road/Street D are projected to remain within the available storage. As a result, the projected queuing conditions are considered to be acceptable.

Finding – During the peak of morning school drop-off activity at Roseland Elementary School, the 95th percentile queues in the center left-turn lane on Sebastopol Road between Street D and West Avenue are anticipated to exceed available storage, spilling over into adjacent through traffic lanes. When such queuing conditions occur,

they will lead to increased congestion during the school drop-off period. Based on a review of traffic simulation runs, queue backups through the West Avenue signal would still fully clear during the signal cycle approximately 90 percent of the time.

Recommendation – The applicant should be responsible for restriping the northbound approach of the Sebastopol Road/West Avenue intersection to extend the length of the left-turn pocket by 50 to 60 feet, concurrent with the modification of the traffic signal that will be completed as part of the project.

Alternative Modes

The project site is located in the center of Roseland's commercial district on Sebastopol Road, an area where pedestrian, bicycle, and transit use is already high. Through prior planning efforts the County of Sonoma and City of Santa Rosa have identified the project site as a location for housing, local-serving commercial, community services, and a public plaza, all with a focus on encouraging travel by non-auto modes and a reduced reliance on auto ownership. The proposed project is consistent with this vision from a land use perspective; an evaluation of the project's support of non-auto modes is provided below.

Pedestrian Facilities

The proposed project's site plan includes a small "grid" system of streets that help to minimize walking distances and create a walkable street network. All streets include sidewalks, as well as connections to Sebastopol Road and the Joe Rodota Trail on the south and north sides of the site, respectively. Residents, visitors, and employees associated with the project would have a mostly off-street connection to the Downtown SMART Station at Railroad Square. Intersections within the project site include bulbouts on most corners. Bulbouts benefit pedestrians by minimizing crossing distances, improving pedestrian visibility to drivers, and slowing the speeds of right-turning vehicles.

The project would modify the Sebastopol Road/West Avenue signalized intersection, adding a crosswalk with associated pedestrian signal phasing to the west leg of the intersection where none currently exists. This improvement would be expected to improve pedestrian circulation and safety in the area, including access to transit stops.

Finding – The proposed project would include onsite pedestrian facilities that support walking, and would effectively tie into the surrounding sidewalk and pedestrian network, including connections to both bus and rail transit.

Bicycle Facilities

As with pedestrian circulation, the project's proximity and connectivity to the Joe Rodota Trail facilitates longer-distance travel by bicycle. Residents, employees, and visitors would be able to travel between the site and the downtown SMART commuter rail station by a five- to ten-minute bike ride. The Rodota Trail also connects westward to Sebastopol in addition to other off-street bike facilities including the West County Trail and Santa Rosa Creek Path.

The project would maintain consistency with the Roseland Area/Sebastopol Road Specific Plan by establishing on-street bicycle lanes on West Avenue through the site between Sebastopol Road and the Joe Rodota Trail. The project would also provide direct access onto the existing bike lanes that run along Sebastopol Road, as well as future bike lanes along West Avenue.

Finding – The project would effectively tie into the existing and planned on- and off-street bicycle network, and is consistent with the bicycle network identified in the *Roseland Area/Sebastopol Road Specific Plan*.

Bicycle Storage

Both the affordable and market-rate residential buildings are proposed to have indoor bicycle storage for residents. Per City of Santa Rosa Zoning Regulations (Section 20-36.040), retail and office uses are required to provide 1 bike parking space per 5,000 square feet, and libraries are required to provide 1 bike parking space per

6,000 square feet. This translates to six required bike spaces for the project's non-residential uses. Because there is a high potential for the Plaza, Mercado, and Library functions on the site to generate bicycle trips by employees, students, and visitors, it is recommended that racks be provided throughout the site to ensure that bicycle travel is both accommodated and encouraged.

Recommendation – Bicycle racks should be provided within the Plaza and near all of the project's non-residential buildings.

Transit

CityBus Routes 9 and 12 operate along the Sebastopol Road corridor near the project site with a combined frequency of up to six buses per hour in each direction on weekdays and three buses per hour each direction on weekends, creating one of the most transit-accessible corridors in Santa Rosa. Both routes will serve the SMART commuter rail station and the Downtown Transit Mall, providing connections to commuter rail as well as transfers to additional CityBus routes, plus routes operated by Sonoma County Transit, Golden Gate Transit, and Mendocino Transit.

The westbound CityBus stop serving the project site is located directly on the project frontage, on the northwest corner of the Sebastopol Road/West Avenue intersection. The eastbound CityBus stop is currently located on the south side of Sebastopol Road, approximately 300 feet to the east of West Avenue. This location is also on the opposite side of the Sebastopol Road from "Street B," which would be created by the project. During preliminary review of the project site plan, CityBus representatives noted potential concerns associated with transit users attempting to cross Sebastopol Road between Street B and the eastbound bus stop in a location that will not have marked crosswalks. As a result, it was determined that a superior location for the eastbound CityBus stop would be near the Sebastopol Road/West Avenue intersection, which is signalized and includes pedestrian phasing. It is recommended that the project applicants coordinate with CityBus and be responsible for relocating the existing bus stop (including shelter). CityBus has indicated that a bus pull-out would be unnecessary at the relocated transit stop.

The *Roseland Area/Sebastopol Road Specific Plan* calls for transit-related improvements including bus shelters and lighting at transit stops, as well as pedestrian network enhancements near bus stops and along transit corridors. The project would include continuous sidewalks linking all onsite uses to bus stops. It is recommended that the applicants be responsible for constructing or funding the installation of pedestrian-scale lighting at both the eastbound and westbound bus stops, rather than relying solely on the intersection lighting at Sebastopol Road/West Avenue.

Finding – The project site is well-served by transit, making transit a convenient and appealing option for project residents, employees, and visitors.

Recommendation – The project applicants should coordinate with Santa Rosa CityBus to relocate the existing eastbound bus stop on Sebastopol Road to the intersection of Sebastopol Road/West Avenue.

Recommendation – The project applicants should be responsible for constructing or contributing funds toward the installation of pedestrian-scale lighting at the eastbound and westbound CityBus bus stops near the project site.

Access and Circulation

Site Access

The project would access Sebastopol Road at Street B, West Avenue, and Street D. The intersection at Sebastopol Road/Street B near the eastern project boundary would be restricted to right-turns in and out in order to eliminate the potential for conflicts with the adjacent intersection at Avalon Avenue. In order to reinforce the left-turn prohibitions it is recommended that a raised median be installed on Sebastopol Road within the existing center turn lane area. Based on the queuing calculations summarized above, the median would need to be relatively short (approximately 50 to 75 feet long) in order to preserve space for the Sebastopol Road/West Avenue intersection's westbound left-turn pocket. The median would result in restricted access (right turns in and out only) at the eastern driveway to a business on the south side of Sebastopol Road (Rancho Mendoza Supermercado), though full access to the business would still be maintained at its western driveway. With installation of the median and restriction of Street B to right turns in and out, the intersection would be expected to operate effectively.

The intersection on the western boundary of the site at Sebastopol Road/Street D would remain full-access in order to continue serving properties to the east of the project site, and would also serve project traffic. The operational analysis indicates that the intersection would operate acceptably at A or better overall, with LOS D or better operation on the southbound stop-controlled Street D approach. The queuing analysis indicates that queues can be expected to remain within the available storage without affecting adjacent intersections.

The signalized intersection at Sebastopol Road/West Avenue would be modified as part of the project to improve pedestrian circulation and accommodate anticipated traffic patterns. With these changes, which are reflected in the "plus project" calculations summarized above, the intersection is anticipated to operate acceptably at LOS D or better, and queuing is projected to function acceptably.

Sight Distance

Sight distances along Sebastopol Road at the proposed new project streets were evaluated based on sight distance criteria contained in *A Policy on Geometric Design on Highways and Streets* published by American Association of State Highway and Transportation Officials (AASHTO). These guidelines include recommended sight distances at intersections, including stopping sight distances for drivers traveling along the major approaches and for drivers of stopped vehicles at the minor street approaches and driveways. These recommendations are based upon approach travel speeds, and take into account which direction a vehicle would turn onto the major approach, with greater sight distance needed for the more time-consuming task of turning left as compared to turning right. Sight distance should be measured from a 3.5-foot height at the location of the driver on the minor road to a 4.25-foot object height in the center of the approaching lane of the major road. Set-back for the driver on the crossroad shall be a minimum of 15 feet, measured from the edge of the traveled way.

Sebastopol Road is straight and flat near the project site, with a posted speed limit of 30 mph. Based on AASHTO criteria, the minimum corner sight distance needed is 330 feet, and sight lines along Sebastopol Road for a following driver exceeds this amount. Sight distance from all three project access points on Sebastopol Road looking to the east and west are unimpeded; however, it would be necessary for landscaping and/or monument signs at the project intersections to be less than three feet in height (or above seven feet for tree limbs) in order to for these sight lines to be preserved.

Finding – Access to the project at the three proposed locations is anticipated to function acceptably. Sight distances at the project street intersections are adequate to meet the applied criteria from *A Policy on Geometric Design of Highways and Streets* for both entering and exiting movements.

Recommendation - A short raised median should be installed on Sebastopol Road within the existing center turn lane area at the Street B intersection in order to reinforce the intersection's limitations to right-turn only in and out movements.

Recommendation - Any new landscaping and monument signs at the project intersections along Sebastopol Road should be less than three feet in height (or above seven feet for tree limbs) to maximize clear sight lines.

Onsite Circulation

The project site would have a roadway "grid" that includes a combination of public and private streets, allowing all users (drivers, pedestrians, bicyclists, emergency responders) to access different parts of the site as well as the surrounding street network by multiple routes. This type of configuration helps to disperse traffic, improve parking circulation, and make walking and biking more convenient.

Along West Avenue, the centerlines of Street A and Street C are offset by approximately 90 feet. The potential for this offset to result in adverse operational or safety conditions was evaluated. Unlike "tee" intersection that are offset to the right of one another, tee intersections offset to the left (like Streets A and C) can work well operationally since there are no conflicting left-turn movements on the major street, particularly in a low-speed environment such as this. The primary conflicts to consider in this case are left turns off the minor streets and pedestrian conflicts. With respect to left turns, the site plan has been configured to include no on-street parking along the west side of West Avenue between Streets A and C in order to create clear lines of sight between the two intersections and reduce the potential for parking maneuver-related conflicts in this area. With respect to pedestrian circulation, crosswalks crossing West Avenue would only be striped at Street C. Clear sight lines to these crosswalks would exist, and excluding crosswalks from the Street A intersection would help to reduce the number of potential conflict points while resulting in minimal inconvenience to pedestrians. Given the availability of clear sight lines, low vehicle speeds, and minimization of potential conflict points, the offset between Street A and Street C is anticipated to function acceptably.

The centerline offset between Street A and Sebastopol Road would be approximately 170 feet. As with the offset described above, the absence of crosswalks at Street A would help to minimize the potential for conflicts to occur in this area. The queuing analysis indicates that southbound queues at the Sebastopol Road/West Avenue intersection are not projected to extend through the Street A intersection, allowing northbound drivers on West Avenue to turn left onto Street A with minimal impact to traffic flow. There would be no on-street parking on West Avenue between the two streets, resulting in clear lines of sight for drivers turning left or right from Street A. Given these conditions, the distance between Street A and Sebastopol Road is not anticipated to result in adverse operating conditions.

Finding - On West Avenue, the offsets between the Street C and Street A intersections, as well as between the Street A and Sebastopol Road intersections, are anticipated to function acceptably.

Parking

Parking Supply

The proposed project would include a total of ~~342~~323 parking spaces. These would be comprised of ~~103~~86 public on-street spaces within the site and along Sebastopol Road as well as ~~239~~237 spaces on the site's two residential parcels. Of these residential parcel parking spaces, ~~168~~175 would be reserved for the exclusive use of residents, and ~~71~~62 would be "shared" and available to accommodate any of the parking demand generated from within the entire project site.

Parking Requirements

The project's proposed parking supply was assessed using the parking requirements contained in Chapter 20-36 of the City of Santa Rosa zoning code, in addition to State of California density bonus laws that apply to the site's residential units. The density bonus laws are complex, but essentially allow infill projects that have a minimum proportion of affordable units to apply parking ratios that are often lower than those required by local jurisdictions. For the Roseland Village project, the lowered parking ratios would apply to all residential units on the site (both affordable and market rate), at one space per one-bedroom unit and two spaces per two- or three-bedroom unit. A summary of the parking requirements is shown in Table 12.

Table 12 – Parking Requirements

Category	Quantity	Unit	Ratio	Required
Residential				
1 space per 1BD	70	1-BD units	1.0 per BD	70
2 spaces per 2BD or 3BD	105	2-3BD units	2.0 per BD	210
Residential Total				280
Retail				
Retail	1,000	square feet	1 per 250 sf	4
Mercado	7,000	square feet	1 per 250 sf	28
Retail Total				32
Office				
Office	11,000	square feet	1 per 250 sf	44
Office Total				44
Library				
1 space per 300 sf	11,000	square feet	1 per 300 sf	37
Library Total				37
TOTAL SPACES REQUIRED				**393**
Proposed Spaces				~~342~~323
Parking Reduction Needed				~~51~~70 spaces (-~~13~~18%)

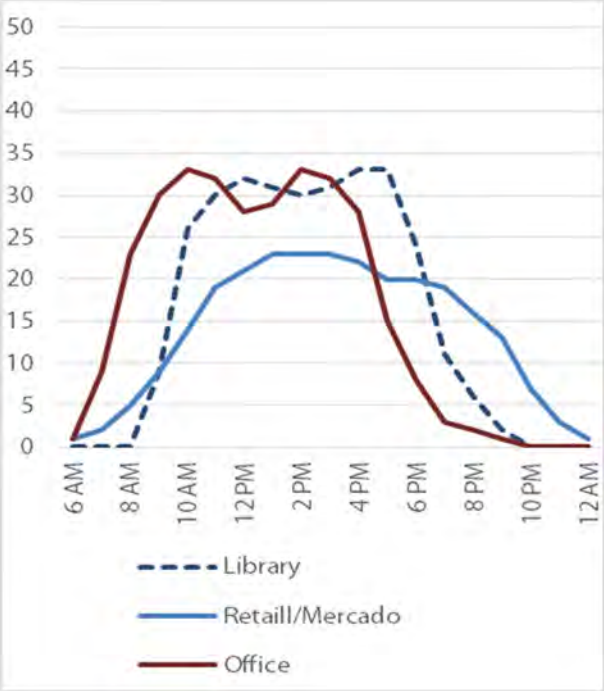
Notes: BD=bedroom; sf=square feet

Shared Parking

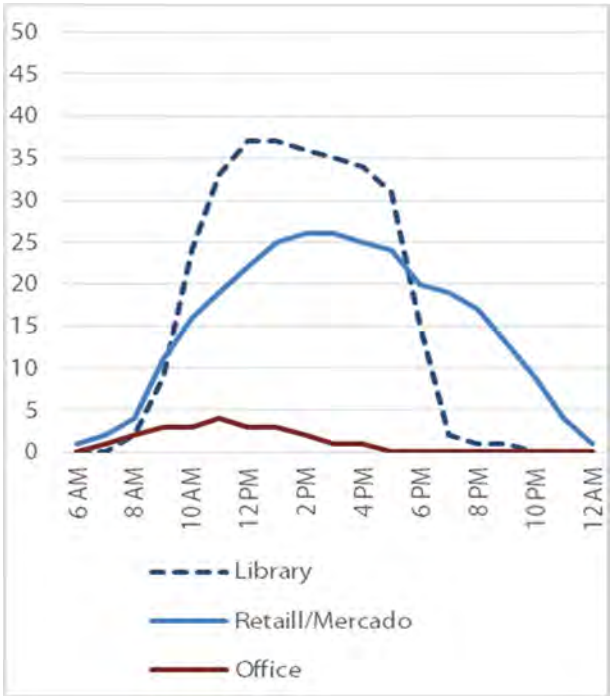
In addition to the analysis of the parking requirements specified by City code, a shared-use analysis was performed. A parking demand methodology that considers shared parking principles can significantly improve the accuracy of determining actual parking demand. The ULI publication *Shared Parking*, 2nd Edition, 2005, includes methodologies for determining parking demand based on the various components of a specific project. The ULI shared parking methodology focuses on temporal data, determining when the overall peak demand for various land uses occurs, including what time of day, whether it is a weekday or weekend, and what month of the year. The recommended parking supply is then tied to that maximum demand period. The ULI model considers the proposed mix of land uses, including quantities of each type of use.

The ULI shared parking model includes the hourly parking demand created by residential, retail, and office uses. The methodology includes an average residential parking demand of 1.65 spaces per unit. Custom time-of-day parking demand profiles for the library were developed based on the typical operating hours and usage at other library facilities in Santa Rosa, assuming that the maximum parking demand would be equal to the City's parking requirements for libraries (1 space per 300 square feet, or 37 spaces). For reference, the applied hourly parking demands generated by each of the non-residential project components are shown in Graph 1 and Graph 2.

Graph 1 – Weekday Parking Demand by Non-Residential Use



Graph 2 – Weekend Parking Demand by Non-Residential Use

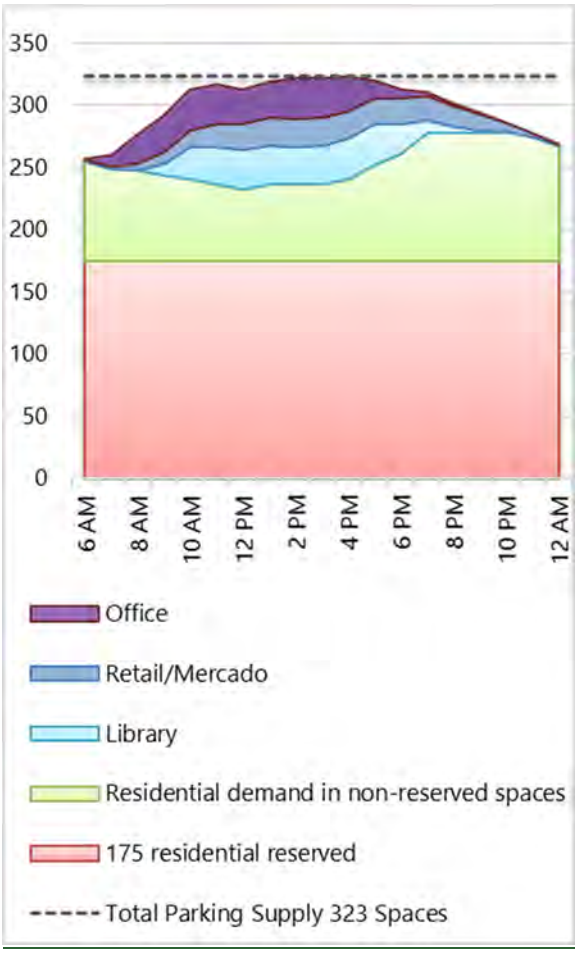


Cumulative Parking Demand

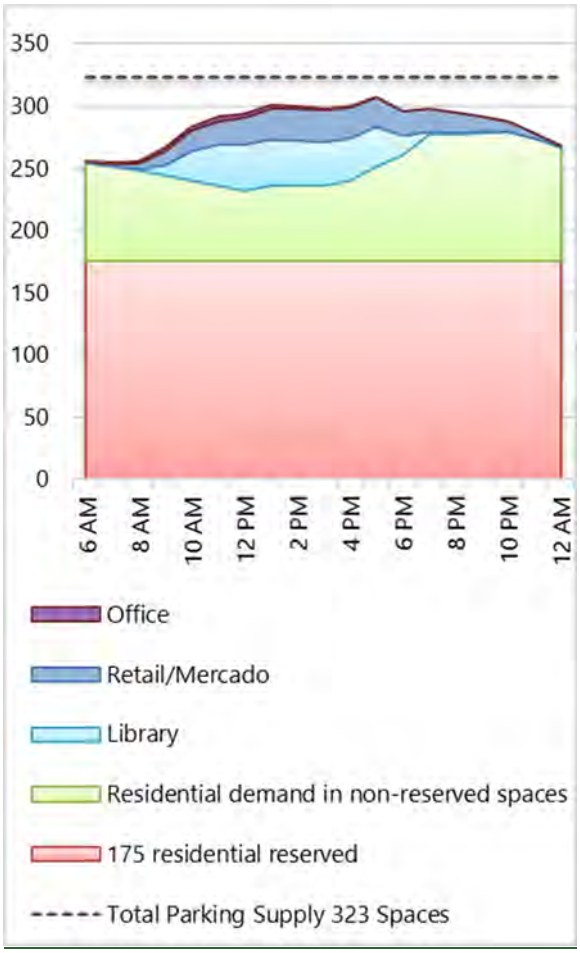
The parking demand profile for the project was assessed by summing the hourly demands of each project component. The methodology considers the number of shared versus non-shared spaces, which for the proposed project includes ~~168~~175 reserved residential parking spaces (one reserved space per unit) that

would not be available to other site wide uses. From this cumulative parking demand profile, it is possible to determine the hour or hours of the day when the site as a whole would likely experience its peak parking demand. Based on the assessment, the site-wide peak parking demand would occur on weekdays between approximately ~~2~~4:00 and ~~6~~5:00 p.m. with a total peak parking demand of ~~319 to 322~~323 spaces among the various uses. On weekends, the cumulative parking demand peaks at 5:00 p.m. with a demand of ~~306~~307 spaces. The cumulative weekday parking demands for weekdays and weekends are shown in Graph 3 and Graph 4.

Graph 3 – Weekday Cumulative Parking Demand



Graph 4 – Weekend Cumulative Parking Demand



Parking Findings

As shown in Table ~~11~~12, based on the parking requirements contained in the City's zoning code and including density bonus provisions, the project would need to provide 393 parking spaces. The proposed supply of ~~342~~323 spaces is ~~51~~70 spaces short of meeting parking requirements, which translates to an ~~13~~18 percent reduction.

The shared parking analysis completed for the project indicates that some parking efficiencies may be gained, since different onsite uses would encounter peak parking demands at different times of day. An example of this is the interaction between residential and office uses; the office uses generate peak parking

demand during the same periods that residential demand is at its lowest. Application of the shared parking methodology indicates that the project's peak hour parking demand of ~~321~~323 spaces is anticipated to ~~be less than~~equal the proposed ~~342~~323-space supply. The site's highest parking demand would occur during late afternoon periods on weekdays, though during overnight periods between 9:00 p.m. and 9:00 a.m., ~~48~~29 or more vacant shared parking spaces are projected to be available.

Zoning Code Provisions for Reductions to Parking Requirements

With respect to the City's ability to grant reductions to parking requirements, section 20-36-050 (A) of the zoning code indicates that:

> *In a mixed use project, parking may be shared by the different uses. A mixed use project composed of residential and retail uses may reduce the required vehicle parking up to 50 percent of the required parking for either the residential or retail use, whichever is smaller. A mixed use project composed of residential and office or institutional uses may reduce the required vehicle parking up to 75 percent of the required parking for either the residential or office/institutional use, whichever is smaller.*

The Roseland Village project includes residential, office/institutional, and retail uses. Application of the above provision to the office/institutional (library) parking requirements would reduce the required supply by 60 spaces, to a total of 333 spaces required. The proposed ~~342~~323-space supply would ~~exceed~~ fall short of this by ~~nine~~ten spaces. ~~Additionally, t~~The zoning code's shared parking provision is unclear whether deductions can be taken to account for *three* different uses at the site (residential, office, and retail). If the City allows 50 percent of the retail demand (16 spaces) to be counted as part of the shared parking provisions *in addition to* 75 percent of the office/ institutional demand, the total resulting required parking would be 317 spaces, which the project's ~~342~~323-space supply would satisfy~~ies~~.

Section 20-36-050 (C) describes additional mechanisms that the City can employ at a discretionary level to adjust the number of required parking spaces. A deduction of up to 25 percent can be applied by the City in cases where it is determined that the proposed use will generate a parking demand that differs from the standards contained in the zoning code, and the number of parking spaces approved will be sufficient for its safe, convenient, and efficient operation. If the City is able to make these findings and allow an ~~13~~18 percent reduction in the project's parking requirements, the project's parking requirements would be satisfied.

The City could consider allowing the project to apply an ~~13~~18 percent reduction to parking requirements, based on the project's strong orientation to local community uses, provision of robust bicycle and pedestrian facilities and connectivity to the surrounding bicycle and pedestrian networks, and transit-accessible location. The site's transit orientation may provide an especially compelling justification for parking reductions, given the location of transit stops directly in front of the site with two bidirectional CityBus routes that result in a frequency of up to 12 buses per hour on weekdays and six buses per hour on weekends (with all routes connecting to the SMART rail station and downtown bus transfer center). In addition to using bus connections to SMART, the site is also within a one-mile walking or bicycling distance to the SMART station, with a large portion of that distance on off-street paths including the Joe Rodota Trail and SMART multi-use path. Finally, the shared parking analysis indicates that the project's actual parking demand is anticipated to be contained within the proposed number of spaces, with the highest parking demand periods occurring outside of overnight periods when spillover parking could adversely affect nearby residential neighborhoods.

AB 744 Parking Provisions

Additional provisions relating to parking requirements at sites incorporating affordable housing near transit were adopted by the State of California in Assembly Bill 744 (AB 744), which became effective in January 2016. AB 744 allows qualifying projects to apply reduced parking ratios of 0.5 spaces per bedroom, which is substantially lower than the state density bonus law rates that are currently being applied to the Roseland Village project. AB 744 requires that a project be located within one-half mile of a major transit stop. The downtown SMART commuter rail station qualifies as a major transit stop, but is located 0.53 to 0.60 miles from the Roseland Village site (depending on the points measured), just beyond the half-mile criteria. The intersection of two major bus routes with service intervals of 15 minutes or less during peak hours also qualifies as a major transit stop under AB 744. Along the project frontage on Sebastopol Road, Santa Rosa CityBus Route 9 runs at 15-minute intervals in each direction (8 buses per hour total), and Route 12 runs at 30-minute intervals in each direction (4 buses per hour total). The routes run in *parallel* along Sebastopol Road, however, and do not *intersect* as indicated in AB 744. As a result, the Roseland Village project falls just short of meeting two different methods of qualifying for the lowered parking ratios afforded by AB 744. While the AB 744 parking requirements may not available to the project by right, the City may wish to consider the project's near-qualification for AB 744 provisions as evidence to support parking reductions associated with a combination of housing affordability and transit accessibility.

Parking Easement with Adjacent Property

On July 25, 1956 Roseland Village, a California Corporation, and Codding Enterprises executed a Reciprocal Parking and Driveway Easement ("Easement") Recorded in Book 1467 Page 415 of the Official Records. The Easement benefits and encumbers Sonoma County Assessor Parcel Number 125-111-37 ("Commission Property") and a portion of Sonoma County Assessor Parcel Number 125-111-45, 46, 47 and 48 ("Paulsen Property"). Page 3 of the Easement clarifies that the Easement was created so that each property would Grant each other "reciprocal easements over that portion of said real property which has been, and will be in the future, set aside for vehicular parking lots and drive-ways."

The Easement does not describe a specific location for vehicular parking and/or driveway uses on either the Commission or Paulsen Properties. Rather, Roseland Village and Codding Enterprises granted each other a "non-exclusive easement to use and to allow the use of vehicular parking lots and drive-ways which presently exist or will be developed hereafter" (Easement Page 3). Nowhere in the Grant of the Easement does it restrict the development of either property bound by the Easement. In fact, as evidenced by the above language, the Easement contemplates further development by both parties. Any questions regarding the Easement is a private party matter that is currently being addressed by the owners of the properties bound by the Easement.

As indicated in the parking evaluation above, the Roseland Village project is anticipated to generate a peak parking demand that can be accommodated within the available parking supply. In other words, the project would not rely upon the availability of parking spaces on the adjacent Paulsen property. While during the busiest peak periods the Roseland Village project is anticipated to have ~~only a~~ few unused parking spaces available, during many times of the day and overnight the project is projected to have 30 or more available parking spaces. Any open parking spaces on the Roseland Village project site would remain available for use by occupants of the Paulsen property, per the terms of the parking easement.

Finding – The project would fall ~~51~~70 parking spaces short of meeting the requirements set forth in the City of Santa Rosa zoning code and provisions allowed by State density bonus laws.

Finding – The City's zoning code allows reductions in parking requirements if supported by findings made by the Director or decision-making body.

Finding – The project site is well-served by transit, includes onsite pedestrian and bicycle amenities, and would effectively tie into the surrounding transit, pedestrian, and bicycle networks, thereby reducing automobile reliance and potentially reducing parking demand.

Finding – With shared parking principles applied, the project would be expected to experience a peak hour demand of ~~318 to 321~~ 323 parking spaces on weekdays between approximately ~~2~~4:00 and ~~6~~5:00 p.m., which ~~is less than~~equals the proposed ~~342~~323-space supply.

Finding – Peak parking demand is projected to occur during the afternoon periods, rather than overnight periods when potential impacts to adjacent neighborhoods would be of greater concern.

Finding – The project nearly qualifies for AB 744 parking provisions that would reduce parking requirements to 0.5 spaces per bedroom, given the proximity of major transit services and the site's inclusion of affordable housing.

Finding – The project is anticipated to accommodate all of its parking demand within the available parking supply with no reliance on parking spaces at the adjacent Paulsen property; the Roseland Village project is projected to have available parking spaces that could be used by entities on the Paulsen property under the terms of the existing parking easement.

Recommendation – The City of Santa Rosa could consider granting an ~~13~~18-percent reduction in parking requirements based on the site's land use mix and context, transit accessibility, and efficiencies associated with provision of shared parking.

Conclusions and Recommendations

Conclusions

- The project has an expected trip generation of 1,775 weekday trips, which includes 109 new trips during the a.m. peak hour, and 183 p.m. peak hour vehicle trips.
- The study intersections are expected to continue operating acceptably at LOS D or better overall upon the addition of project-generated traffic to existing volumes. This is considered a less-than-significant impact.
- The study intersections are expected to continue operating acceptably upon the addition of project-generated traffic to Future volumes. This is considered a less-than-significant impact.
- Shortening of the existing westbound right-turn lane at Sebastopol Road/West Avenue is anticipated to result in less-than-significant queuing impacts.
- At the Sebastopol Road/West Avenue intersection, 95th percentile queues in the northbound through/right-turn pocket and in the eastbound right-turn pocket are projected to spill over into adjacent lanes, though would not cause any queuing to extend into adjacent intersections; 95th percentile queues on other controlled movements at this intersection and at Sebastopol Road/Street D are projected to remain within the available storage. As a result the projected queuing conditions are considered to be acceptable.
- During the peak of morning school drop-off activity at Roseland Elementary School, the 95th percentile queues in the center left-turn lane on Sebastopol Road between Street D and West Avenue are anticipated to exceed available storage, spilling over into adjacent through traffic lanes. When such queuing conditions occur, they will lead to increased congestion during the school drop-off period. Based on a review of traffic simulation runs, queue backups through the West Avenue signal would still fully clear during the signal cycle approximately 90 percent of the time.
- The proposed project would include onsite pedestrian facilities that support walking, and would effectively tie into the surrounding sidewalk and pedestrian network, including connections to both bus and rail transit.
- The project effectively ties into the existing and planned on- and off-street bicycle network, and is consistent with the bicycle network identified in the *Roseland Area/Sebastopol Road Specific Plan*.
- The project site is well-served by transit, located along one of the highest-frequency bus corridors in Santa Rosa and just over a half-mile from a SMART commuter rail stop, making transit a convenient and appealing option for project residents, employees, and visitors.
- The closest eastbound CityBus stop to the site is located on the opposite side of the Sebastopol Road from "Street B," potentially encouraging transit users to cross Sebastopol Road in a location that does not have marked crosswalks.

- Access to the project at the three proposed locations is anticipated to function acceptably. Sight distances at the project street intersections are adequate to meet the applied criteria from *A Policy on Geometric Design of Highways and Streets* for both entering and exiting movements.

- On West Avenue, the offsets between the Street C and Street A intersections, as well as between the Street A and Sebastopol Road intersections, are anticipated to function acceptably.

- The project would fall ~~51~~70 parking spaces short of meeting the requirements set forth in the City of Santa Rosa zoning code and provisions allowed by State density bonus laws.

- The City's zoning code allows reductions in parking requirements if supported by findings made by the Director or decision-making body.

- The project site is located on a major transit corridor, includes onsite pedestrian and bicycle amenities, and would effectively tie into the surrounding transit, pedestrian, and bicycle networks, thereby reducing automobile reliance and potentially reducing parking demand.

- With shared parking principles applied, the project would be expected to experience a peak hour demand of ~~319 to 322~~323 parking spaces on weekdays between approximately ~~2~~4:00 and ~~6~~5:00 p.m., which ~~is less than~~equals the proposed ~~342~~323-space supply.

- Peak parking demand is projected to occur during the afternoon periods, rather than overnight periods when potential impacts to adjacent neighborhoods would be of greater concern.

- The project nearly qualifies for AB 744 parking provisions that would reduce parking requirements to 0.5 spaces per bedroom, given the proximity of major transit services and the site's inclusion of affordable housing.

- The project is anticipated to accommodate all of its parking demand within the available parking supply with no reliance on parking spaces at the adjacent Paulsen property; the Roseland Village project is projected to have available parking spaces that could be used by entities on the Paulsen property under the terms of the existing parking easement.

Recommendations

- The applicant should be responsible for funding and constructing the signal modification at Sebastopol Road/West Avenue as shown on the project site plan, coordinating with the City of Santa Rosa as appropriate to maintain consistency with design standards.

- The applicant should be responsible for restriping the northbound approach of the Sebastopol Road/West Avenue intersection to extend the length of the left-turn pocket by 50 to 60 feet, concurrent with the modification of the traffic signal that will be completed as part of the project.

- Bicycle racks should be provided within the Plaza and near all of the project's non-residential buildings.

- The project applicants should coordinate with Santa Rosa CityBus to relocate the existing eastbound bus stop on Sebastopol Road to the intersection of Sebastopol Road/West Avenue, including all amenities such as benches and shelters.

- The project applicants should be responsible for constructing or contributing funds toward the installation of pedestrian-scale lighting at the eastbound and westbound CityBus bus stops near the project site.

- A short raised median should be installed on Sebastopol Road within the existing center turn lane area at the Street B intersection in order to reinforce the intersection's limitations to right-turn only in and out movements.

- Any new landscaping and monument signs at the project intersections along Sebastopol Road should be less than three feet in height (or above seven feet for tree limbs) to maximize clear sight lines.

- The City of Santa Rosa could consider granting an ~~13~~18-percent reduction in parking requirements based on the site's land use mix and context, as well as the efficiencies associated with provision of shared parking.

Study Participants and References

Study Participants

Principal in Charge	Zachary Matley, AICP
Report Review	Dalene J. Whitlock, PE, PTOE
Project Manager	Zachary Matley, AICP
Editing/Formatting	Angela McCoy, Alex Scrobonia
Graphics	Hannah Yung

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SOX580

Appendix A

Collision Data

Intersection Collision Rate Calculations

Roseland Village TIS

Intersection # 1: Sebastopol Road & Stony Point Road
Date of Count: Wednesday, April 29, 2015

Number of Collisions: 14
Number of Injuries: 8
Number of Fatalities: 0
ADT: 40200
Start Date: June 1, 2016
End Date: May 30, 2011
Number of Years: 5

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

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

$$\text{collision rate} = \frac{14 \times 1{,}000{,}000}{40{,}200 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.19 c/mve	0.0%	57.1%
Statewide Average*	0.27 c/mve	0.4%	41.9%

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

Intersection # 2: Sebastopol Road & Burbank Avenue
Date of Count: Thursday, January 15, 2015

Number of Collisions: 1
Number of Injuries: 3
Number of Fatalities: 0
ADT: 14500
Start Date: June 1, 2016
End Date: May 30, 2011
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Urban

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

$$\text{collision rate} = \frac{1 \times 1{,}000{,}000}{14{,}500 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.04 c/mve	0.0%	300.0%
Statewide Average*	0.21 c/mve	0.3%	42.4%

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

Intersection Collision Rate Calculaions

Roseland Village TIS

Intersection # 4: Sebastopol Road & West Avenue
Date of Count: Thursday, January 15, 2015

Number of Collisions: 4
Number of Injuries: 1
Number of Fatalities: 0
ADT: 18700
Start Date: June 1, 2016
End Date: May 30, 2011
Number of Years: 5

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

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

$$\text{collision rate} = \frac{4 \times 1{,}000{,}000}{18{,}700 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.12 c/mve**	**0.0%**	**25.0%**
Statewide Average*	**0.27 c/mve**	**0.4%**	**41.9%**

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

Intersection # 6: Sebastopol Road & Dutton Avenue
Date of Count: Saturday, April 05, 2014

Number of Collisions: 25
Number of Injuries: 29
Number of Fatalities: 0
ADT: 27800
Start Date: June 1, 2016
End Date: May 30, 2011
Number of Years: 5

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

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

$$\text{collision rate} = \frac{25 \times 1{,}000{,}000}{27{,}800 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.49 c/mve**	**0.0%**	**116.0%**
Statewide Average*	**0.27 c/mve**	**0.4%**	**41.9%**

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

Appendix B

Intersection Level of Service Calculations

HCM 2010 Signalized Intersection Summary
1: Stony Point Rd #1 & Sebastopol Rd

02/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	406	206	73	88	228	221	76	750	71	174	661	545
Future Volume (veh/h)	406	206	73	88	228	221	76	750	71	174	661	545
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	5	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	441	224	75	96	248	228	83	815	76	189	718	563
Adj No. of Lanes	2	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	410	422	359	122	313	678	106	946	88	461	1764	978
Arrive On Green	0.12	0.23	0.23	0.07	0.17	0.17	0.06	0.29	0.29	0.26	0.50	0.50
Sat Flow, veh/h	3442	1863	1583	1774	1863	1583	1774	3273	305	1774	3539	1583
Grp Volume(v), veh/h	441	224	75	96	248	228	83	441	450	189	718	563
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	1583	1774	1770	1809	1774	1770	1583
Q Serve(g_s), s	11.9	10.6	3.8	5.3	12.8	0.0	4.6	23.6	23.6	8.8	12.8	4.9
Cycle Q Clear(g_c), s	11.9	10.6	3.8	5.3	12.8	0.0	4.6	23.6	23.6	8.8	12.8	4.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.17	1.00		1.00
Lane Grp Cap(c), veh/h	410	422	359	122	313	678	106	511	523	461	1764	978
V/C Ratio(X)	1.08	0.53	0.21	0.79	0.79	0.34	0.79	0.86	0.86	0.41	0.41	0.58
Avail Cap(c_a), veh/h	410	572	486	216	577	903	124	591	604	461	1764	978
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.0	34.0	31.4	45.9	39.9	19.1	46.4	33.7	33.7	31.1	15.8	4.1
Incr Delay (d2), s/veh	66.5	1.0	0.3	4.1	4.4	0.3	20.1	17.2	16.9	0.2	0.7	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.4	5.5	1.7	2.8	6.9	4.2	2.8	13.9	14.2	5.1	6.4	5.7
LnGrp Delay(d),s/veh	110.6	35.0	31.7	50.0	44.3	19.4	66.5	50.8	50.5	32.8	16.5	6.5
LnGrp LOS	F	D	C	D	D	B	E	D	D	C	B	A
Approach Vol, veh/h		740			572			974			1470	
Approach Delay, s/veh		79.7			35.3			52.0			14.8	
Approach LOS		E			D			D			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	29.9	32.8	10.4	26.9	9.0	53.7	16.2	21.1
Change Period (Y+Rc), s	3.9	* 3.9	3.5	4.3	3.0	3.9	4.3	* 4.3
Max Green Setting (Gmax), s	9.0	* 33	12.2	30.7	7.0	35.4	11.9	* 31
Max Q Clear Time (g_c+I1), s	10.8	25.6	7.3	12.6	6.6	14.8	13.9	14.8
Green Ext Time (p_c), s	0.0	3.3	0.0	2.2	0.0	7.5	0.0	2.0

Intersection Summary	
HCM 2010 Ctrl Delay	40.4
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Burbank Avenue & Sebastopol Rd

02/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	362	83	110	414	0	171	0	187	0	0	0
Future Volume (veh/h)	3	362	83	110	414	0	171	0	187	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	0.99		0.95	1.00		1.00	1.00		0.97			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900			
Adj Flow Rate, veh/h	3	416	95	126	476	0	197	0	215			
Adj No. of Lanes	1	2	0	1	2	0	0	1	0			
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87			
Percent Heavy Veh, %	2	2	2	2	2	2	0	2	0			
Cap, veh/h	450	877	198	163	1752	0	258	0	282			
Arrive On Green	0.31	0.31	0.31	0.09	0.50	0.00	0.33	0.00	0.33			
Sat Flow, veh/h	907	2838	641	1774	3632	0	785	0	857			
Grp Volume(v), veh/h	3	258	253	126	476	0	412	0	0			
Grp Sat Flow(s),veh/h/ln	907	1770	1709	1774	1770	0	1642	0	0			
Q Serve(g_s), s	0.1	5.0	5.1	3.0	3.3	0.0	9.6	0.0	0.0			
Cycle Q Clear(g_c), s	0.1	5.0	5.1	3.0	3.3	0.0	9.6	0.0	0.0			
Prop In Lane	1.00		0.37	1.00		0.00	0.48		0.52			
Lane Grp Cap(c), veh/h	450	547	528	163	1752	0	540	0	0			
V/C Ratio(X)	0.01	0.47	0.48	0.77	0.27	0.00	0.76	0.00	0.00			
Avail Cap(c_a), veh/h	627	894	863	584	3285	0	1273	0	0			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	10.2	11.9	11.9	18.9	6.3	0.0	12.8	0.0	0.0			
Incr Delay (d2), s/veh	0.0	0.6	0.7	2.9	0.1	0.0	0.9	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	2.5	2.5	1.6	1.6	0.0	4.4	0.0	0.0			
LnGrp Delay(d),s/veh	10.2	12.5	12.6	21.8	6.4	0.0	13.7	0.0	0.0			
LnGrp LOS	B	B	B	C	A		B					
Approach Vol, veh/h		514			602			412				
Approach Delay, s/veh		12.5			9.6			13.7				
Approach LOS		B			A			B				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		18.0	7.9	16.7				24.6
Change Period (Y+Rc), s		4.0	4.0	3.5				3.5
Max Green Setting (Gmax), s		33.0	14.0	21.5				39.5
Max Q Clear Time (g_c+I1), s		11.6	5.0	7.1				5.3
Green Ext Time (p_c), s		2.0	0.1	5.5				7.6

Intersection Summary	
HCM 2010 Ctrl Delay	11.7
HCM 2010 LOS	B

HCM 2010 TWSC
3: Sebastopol Rd & Street D 02/21/2017

Intersection												
Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	622	17	82	600	18	0	0	0	19	0	13
Future Vol, veh/h	5	622	17	82	600	18	0	0	0	19	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	25	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	699	19	92	674	20	0	0	0	21	0	15

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	694	0	0	718	0	0				1589	1598	684
Stage 1	-	-	-	-	-	-				869	869	-
Stage 2	-	-	-	-	-	-				720	729	-
Critical Hdwy	4.12	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	901	-	-	883	-	-				119	106	449
Stage 1	-	-	-	-	-	-				410	369	-
Stage 2	-	-	-	-	-	-				482	428	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	901	-	-	883	-	-				106	0	449
Mov Cap-2 Maneuver	-	-	-	-	-	-				220	0	-
Stage 1	-	-	-	-	-	-				367	0	-
Stage 2	-	-	-	-	-	-				479	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	1.1	19.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	901	-	-	883	-	-	277
HCM Lane V/C Ratio	0.006	-	-	0.104	-	-	0.13
HCM Control Delay (s)	9	-	-	9.6	-	-	19.9
HCM Lane LOS	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	0.3	-	-	0.4

HCM 2010 Signalized Intersection Summary
4: West Avenue & Sebastopol Rd 02/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	509	99	110	528	29	148	24	188	33	5	24
Future Volume (veh/h)	33	509	99	110	528	29	148	24	188	33	5	24
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.95	0.95		0.91	0.96		0.91
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	39	606	118	131	629	35	176	29	224	39	6	29
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	0	1	1
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	54	763	615	166	881	713	312	55	427	281	37	470
Arrive On Green	0.03	0.41	0.41	0.09	0.47	0.47	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	1774	1863	1502	1774	1863	1508	1301	170	1310	569	112	1441
Grp Volume(v), veh/h	39	606	118	131	629	35	176	0	253	45	0	29
Grp Sat Flow(s),veh/h/ln	1774	1863	1502	1774	1863	1508	1301	0	1480	681	0	1441
Q Serve(g_s), s	1.5	20.0	3.5	5.1	18.9	0.9	9.2	0.0	9.8	1.8	0.0	1.0
Cycle Q Clear(g_c), s	1.5	20.0	3.5	5.1	18.9	0.9	20.8	0.0	9.8	11.6	0.0	1.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.89	0.87		1.00
Lane Grp Cap(c), veh/h	54	763	615	166	881	713	312	0	483	318	0	470
V/C Ratio(X)	0.72	0.79	0.19	0.79	0.71	0.05	0.56	0.00	0.52	0.14	0.00	0.06
Avail Cap(c_a), veh/h	101	900	726	277	1086	879	313	0	484	319	0	471
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.8	18.2	13.3	31.2	14.8	10.0	28.6	0.0	19.3	22.1	0.0	16.3
Incr Delay (d2), s/veh	6.7	4.2	0.2	3.1	1.7	0.0	1.4	0.0	0.5	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	11.2	1.5	2.6	10.0	0.4	3.4	0.0	4.0	0.7	0.0	0.4
LnGrp Delay(d),s/veh	40.5	22.4	13.5	34.3	16.5	10.0	30.0	0.0	19.8	22.1	0.0	16.3
LnGrp LOS	D	C	B	C	B	B	C		B	C		B
Approach Vol, veh/h		763			795			429			74	
Approach Delay, s/veh		22.0			19.1			24.0			19.9	
Approach LOS		C			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.6	32.8		26.9	6.1	37.3		26.9
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	11.0	34.0		23.0	4.0	41.0		23.0
Max Q Clear Time (g_c+I1), s	7.1	22.0		13.6	3.5	20.9		22.8
Green Ext Time (p_c), s	0.1	6.8		1.3	0.0	9.3		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	21.2
HCM 2010 LOS	C

HCM 2010 TWSC
5: Sebastopol Rd & Street B

02/21/2017

Intersection							
Int Delay, s/veh	0						
Movement	EBL	EBT		WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Vol, veh/h	0	730		667	0	0	0
Future Vol, veh/h	0	730		667	0	0	0
Conflicting Peds, #/hr	0	0		0	0	0	0
Sign Control	Free	Free		Free	Free	Stop	Stop
RT Channelized	-	None		-	None	-	None
Storage Length	25	-		-	-	0	-
Veh in Median Storage, #	-	0		0	-	0	-
Grade, %	-	0		0	-	0	-
Peak Hour Factor	95	95		95	95	95	95
Heavy Vehicles, %	2	2		2	2	2	2
Mvmt Flow	0	768		702	0	0	0

Major/Minor	Major1			Major2		Minor2	
Conflicting Flow All	702	0		-	0	1470	702
Stage 1	-	-		-	-	702	-
Stage 2	-	-		-	-	768	-
Critical Hdwy	4.12	-		-	-	6.42	6.22
Critical Hdwy Stg 1	-	-		-	-	5.42	-
Critical Hdwy Stg 2	-	-		-	-	5.42	-
Follow-up Hdwy	2.218	-		-	-	3.518	3.318
Pot Cap-1 Maneuver	895	-		-	-	140	438
Stage 1	-	-		-	-	491	-
Stage 2	-	-		-	-	458	-
Platoon blocked, %		-		-	-		
Mov Cap-1 Maneuver	895	-		-	-	140	438
Mov Cap-2 Maneuver	-	-		-	-	280	-
Stage 1	-	-		-	-	491	-
Stage 2	-	-		-	-	458	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	895	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

HCM 2010 Signalized Intersection Summary
6: Dutton Ave #3 & Sebastopol Rd

02/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	294	186	92	66	181	89	121	386	80	113	279	341
Future Volume (veh/h)	294	186	92	66	181	89	121	386	80	113	279	341
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.91	0.93		0.93	1.00		0.95	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1845	1863	1900	1845	1956	1881	1881	1976	1900	1881	1863
Adj Flow Rate, veh/h	320	202	95	72	197	73	132	420	64	123	303	353
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	2	0	3	1	1	1	0	0	1	2
Cap, veh/h	484	616	620	374	408	341	166	492	416	431	778	878
Arrive On Green	0.16	0.33	0.33	0.04	0.22	0.22	0.09	0.26	0.26	0.24	0.41	0.41
Sat Flow, veh/h	1774	1845	1439	1810	1845	1541	1792	1881	1588	1810	1881	1541
Grp Volume(v), veh/h	320	202	95	72	197	73	132	420	64	123	303	353
Grp Sat Flow(s),veh/h/ln	1774	1845	1439	1810	1845	1541	1792	1881	1588	1810	1881	1541
Q Serve(g_s), s	13.3	8.2	4.1	3.1	9.3	2.3	7.2	21.2	2.6	5.6	11.3	12.9
Cycle Q Clear(g_c), s	13.3	8.2	4.1	3.1	9.3	2.3	7.2	21.2	2.6	5.6	11.3	12.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	484	616	620	374	408	341	166	492	416	431	778	878
V/C Ratio(X)	0.66	0.33	0.15	0.19	0.48	0.21	0.80	0.85	0.15	0.29	0.39	0.40
Avail Cap(c_a), veh/h	523	703	688	393	472	394	265	617	521	431	778	878
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.3	24.9	17.9	28.4	34.0	11.5	44.4	35.1	20.1	31.1	20.5	12.3
Incr Delay (d2), s/veh	2.8	0.1	0.0	0.2	0.3	0.1	8.4	16.9	0.8	0.4	1.5	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	4.2	1.6	1.5	4.8	1.0	3.9	13.3	1.2	2.8	6.1	5.8
LnGrp Delay(d),s/veh	26.1	25.0	17.9	28.7	34.3	11.6	52.8	52.0	20.9	31.5	22.0	13.6
LnGrp LOS	C	C	B	C	C	B	D	D	C	C	C	B
Approach Vol, veh/h		617			342			616			779	
Approach Delay, s/veh		24.5			28.3			48.9			19.7	
Approach LOS		C			C			D			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.5	36.0	12.3	44.3	18.8	24.7	27.3	29.2
Change Period (Y+Rc), s	3.1	3.2	3.1	3.6	3.1	3.2	3.6	* 3.6
Max Green Setting (Gmax), s	5.4	37.5	14.7	29.4	17.9	25.0	11.9	* 32
Max Q Clear Time (g_c+I1), s	5.1	10.2	9.2	14.9	15.3	11.3	7.6	23.2
Green Ext Time (p_c), s	0.0	1.3	0.2	1.9	0.3	1.2	1.1	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	29.9
HCM 2010 LOS	C

Notes

HCM 2010 Signalized Intersection Summary
1: Stony Point Rd #1 & Sebastopol Rd

02/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	402	234	144	143	139	407	83	638	138	257	1034	397
Future Volume (veh/h)	402	234	144	143	139	407	83	638	138	257	1034	397
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	428	249	146	152	148	411	88	679	142	273	1100	399
Adj No. of Lanes	2	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	489	298	253	179	209	718	111	780	163	606	1961	1102
Arrive On Green	0.14	0.16	0.16	0.10	0.11	0.11	0.06	0.27	0.27	0.34	0.55	0.55
Sat Flow, veh/h	3442	1863	1583	1774	1863	1583	1774	2916	609	1774	3539	1583
Grp Volume(v), veh/h	428	249	146	152	148	411	88	412	409	273	1100	399
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	1583	1774	1770	1755	1774	1770	1583
Q Serve(g_s), s	14.6	15.6	10.2	10.1	9.2	0.0	5.9	26.7	26.7	14.4	24.1	3.5
Cycle Q Clear(g_c), s	14.6	15.6	10.2	10.1	9.2	0.0	5.9	26.7	26.7	14.4	24.1	3.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.35	1.00		1.00
Lane Grp Cap(c), veh/h	489	298	253	179	209	718	111	474	470	606	1961	1102
V/C Ratio(X)	0.87	0.84	0.58	0.85	0.71	0.57	0.80	0.87	0.87	0.45	0.56	0.36
Avail Cap(c_a), veh/h	489	453	385	271	481	949	163	557	553	606	1961	1102
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.4	48.9	46.6	53.0	51.4	24.2	55.5	42.0	42.0	30.9	17.3	2.4
Incr Delay (d2), s/veh	15.5	8.1	2.1	9.3	4.2	0.7	9.0	19.1	19.4	0.2	1.2	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.0	8.7	4.6	5.4	5.0	10.1	3.2	15.6	15.5	7.2	12.1	2.7
LnGrp Delay(d),s/veh	66.0	57.0	48.7	62.3	55.6	24.9	64.5	61.1	61.4	31.1	18.5	3.3
LnGrp LOS	E	E	D	E	E	C	E	E	E	C	B	A
Approach Vol, veh/h		823			711			909			1772	
Approach Delay, s/veh		60.2			39.3			61.6			17.0	
Approach LOS		E			D			E			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	44.9	36.0	15.6	23.5	10.5	70.4	21.4	17.8
Change Period (Y+Rc), s	3.9	* 3.9	3.5	4.3	3.0	3.9	4.3	* 4.3
Max Green Setting (Gmax), s	20.0	* 38	18.3	29.2	11.0	46.8	16.5	* 31
Max Q Clear Time (g_c+I1), s	16.4	28.7	12.1	17.6	7.9	26.1	16.6	11.2
Green Ext Time (p_c), s	2.7	3.4	0.1	1.6	0.0	10.0	0.0	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	38.8
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Burbank Avenue & Sebastopol Rd

02/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	526	77	103	561	2	111	1	71	0	0	0
Future Volume (veh/h)	1	526	77	103	561	2	111	1	71	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	0.99		0.96	1.00		0.97	1.00		0.96			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900			
Adj Flow Rate, veh/h	1	548	80	107	584	2	116	1	74			
Adj No. of Lanes	1	2	0	1	2	0	0	1	0			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	2	2	2	2	2	2	0	2	0			
Cap, veh/h	546	1273	185	136	2186	7	183	2	117			
Arrive On Green	0.41	0.41	0.41	0.08	0.60	0.60	0.18	0.18	0.18			
Sat Flow, veh/h	822	3081	448	1774	3617	12	1010	9	645			
Grp Volume(v), veh/h	1	314	314	107	286	300	191	0	0			
Grp Sat Flow(s),veh/h/ln	822	1770	1760	1774	1770	1860	1664	0	0			
Q Serve(g_s), s	0.0	4.4	4.5	2.1	2.7	2.7	3.7	0.0	0.0			
Cycle Q Clear(g_c), s	0.0	4.4	4.5	2.1	2.7	2.7	3.7	0.0	0.0			
Prop In Lane	1.00		0.25	1.00		0.01	0.61		0.39			
Lane Grp Cap(c), veh/h	546	731	727	136	1069	1124	301	0	0			
V/C Ratio(X)	0.00	0.43	0.43	0.79	0.27	0.27	0.63	0.00	0.00			
Avail Cap(c_a), veh/h	829	1342	1334	609	2152	2262	1428	0	0			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	6.0	7.3	7.3	15.9	3.3	3.3	13.2	0.0	0.0			
Incr Delay (d2), s/veh	0.0	0.4	0.4	3.8	0.1	0.1	0.8	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	2.2	2.2	1.2	1.3	1.4	1.8	0.0	0.0			
LnGrp Delay(d),s/veh	6.0	7.7	7.7	19.7	3.4	3.4	14.1	0.0	0.0			
LnGrp LOS	A	A	A	B	A	A	B					
Approach Vol, veh/h		629			693			191				
Approach Delay, s/veh		7.7			5.9			14.1				
Approach LOS		A			A			B				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		10.3	6.7	17.9				24.6
Change Period (Y+Rc), s		4.0	4.0	3.5				3.5
Max Green Setting (Gmax), s		30.0	12.0	26.5				42.5
Max Q Clear Time (g_c+I1), s		5.7	4.1	6.5				4.7
Green Ext Time (p_c), s		0.8	0.1	7.7				9.5

Intersection Summary	
HCM 2010 Ctrl Delay	7.7
HCM 2010 LOS	A

HCM 2010 TWSC
3: Sebastopol Rd & Street D

02/21/2017

Intersection													
Int Delay, s/veh	0.6												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	602	7	15	730	17	0	0	0	14	0	17
Future Vol, veh/h	10	602	7	15	730	17	0	0	0	14	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	25	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	634	7	16	768	18	0	0	0	15	0	18

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	786	0	0	641	0	0	1467	1471	777
Stage 1	-	-	-	-	-	-	809	809	-
Stage 2	-	-	-	-	-	-	658	662	-
Critical Hdwy	4.12	-	-	4.12	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	833	-	-	943	-	-	141	127	397
Stage 1	-	-	-	-	-	-	438	394	-
Stage 2	-	-	-	-	-	-	515	459	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	833	-	-	943	-	-	137	0	397
Mov Cap-2 Maneuver	-	-	-	-	-	-	272	0	-
Stage 1	-	-	-	-	-	-	431	0	-
Stage 2	-	-	-	-	-	-	508	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0.2	17.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	833	-	-	943	-	-	329
HCM Lane V/C Ratio	0.013	-	-	0.017	-	-	0.099
HCM Control Delay (s)	9.4	-	-	8.9	-	-	17.1
HCM Lane LOS	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	0.1	-	-	0.3

HCM 2010 Signalized Intersection Summary
4: West Avenue & Sebastopol Rd

02/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	497	79	213	598	43	91	14	144	60	20	73
Future Volume (veh/h)	40	497	79	213	598	43	91	14	144	60	20	73
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.95	0.95		0.90	0.95		0.90
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	42	518	82	222	623	45	95	15	150	62	21	76
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	58	683	549	268	904	733	322	40	401	298	88	432
Arrive On Green	0.03	0.37	0.37	0.15	0.49	0.49	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	1774	1863	1496	1774	1863	1509	1227	133	1330	673	291	1432
Grp Volume(v), veh/h	42	518	82	222	623	45	95	0	165	83	0	76
Grp Sat Flow(s),veh/h/ln	1774	1863	1496	1774	1863	1509	1227	0	1463	964	0	1432
Q Serve(g_s), s	1.6	16.2	2.4	8.1	17.2	1.1	4.6	0.0	5.9	2.6	0.0	2.6
Cycle Q Clear(g_c), s	1.6	16.2	2.4	8.1	17.2	1.1	13.1	0.0	5.9	8.5	0.0	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.91	0.75		1.00
Lane Grp Cap(c), veh/h	58	683	549	268	904	733	322	0	441	385	0	432
V/C Ratio(X)	0.73	0.76	0.15	0.83	0.69	0.06	0.30	0.00	0.37	0.22	0.00	0.18
Avail Cap(c_a), veh/h	160	841	675	401	1093	886	376	0	506	442	0	496
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.9	18.5	14.1	27.4	13.2	9.1	24.6	0.0	18.3	20.0	0.0	17.1
Incr Delay (d2), s/veh	6.4	3.2	0.1	5.4	1.4	0.0	0.2	0.0	0.2	0.1	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	8.8	1.0	4.4	9.0	0.4	1.6	0.0	2.4	1.3	0.0	1.0
LnGrp Delay(d),s/veh	38.3	21.6	14.2	32.8	14.6	9.1	24.8	0.0	18.5	20.1	0.0	17.2
LnGrp LOS	D	C	B	C	B	A	C		B	C		B
Approach Vol, veh/h		642			890			260			159	
Approach Delay, s/veh		21.8			18.9			20.8			18.7	
Approach LOS		C			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.0	28.4		24.0	6.2	36.3		24.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	15.0	30.0		23.0	6.0	39.0		23.0
Max Q Clear Time (g_c+I1), s	10.1	18.2		10.5	3.6	19.2		15.1
Green Ext Time (p_c), s	0.1	6.2		1.2	0.0	8.3		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	20.1
HCM 2010 LOS	C

HCM 2010 TWSC
5: Sebastopol Rd & Street B

02/21/2017

Intersection								
Int Delay, s/veh	0							
Movement	EBL	EBT			WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Vol, veh/h	0	701			854	0	0	0
Future Vol, veh/h	0	701			854	0	0	0
Conflicting Peds, #/hr	0	0			0	0	0	0
Sign Control	Free	Free			Free	Free	Stop	Stop
RT Channelized	-	None			-	None	-	None
Storage Length	25	-			-	-	0	-
Veh in Median Storage, #	-	0			0	-	0	-
Grade, %	-	0			0	-	0	-
Peak Hour Factor	95	95			95	95	95	95
Heavy Vehicles, %	2	2			2	2	2	2
Mvmt Flow	0	738			899	0	0	0

Major/Minor	Major1			Major2		Minor2	
Conflicting Flow All	899	0		-	0	1637	899
Stage 1	-	-		-	-	899	-
Stage 2	-	-		-	-	738	-
Critical Hdwy	4.12	-		-	-	6.42	6.22
Critical Hdwy Stg 1	-	-		-	-	5.42	-
Critical Hdwy Stg 2	-	-		-	-	5.42	-
Follow-up Hdwy	2.218	-		-	-	3.518	3.318
Pot Cap-1 Maneuver	756	-		-	-	111	338
Stage 1	-	-		-	-	397	-
Stage 2	-	-		-	-	473	-
Platoon blocked, %		-		-	-		
Mov Cap-1 Maneuver	756	-		-	-	111	338
Mov Cap-2 Maneuver	-	-		-	-	247	-
Stage 1	-	-		-	-	397	-
Stage 2	-	-		-	-	473	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	756	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

HCM 2010 Signalized Intersection Summary
6: Dutton Ave #3 & Sebastopol Rd

02/21/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	338	213	181	91	228	115	145	377	57	120	431	482
Future Volume (veh/h)	338	213	181	91	228	115	145	377	57	120	431	482
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.91	0.94		0.93	1.00		0.94	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1845	1863	1900	1845	1956	1881	1881	1976	1900	1881	1863
Adj Flow Rate, veh/h	352	222	170	95	238	90	151	393	44	125	449	477
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	3	2	0	3	1	1	1	0	0	1	2
Cap, veh/h	482	627	646	386	420	352	184	475	400	416	725	851
Arrive On Green	0.17	0.34	0.34	0.06	0.23	0.23	0.10	0.25	0.25	0.23	0.39	0.38
Sat Flow, veh/h	1774	1845	1441	1810	1845	1544	1792	1881	1586	1810	1881	1539
Grp Volume(v), veh/h	352	222	170	95	238	90	151	393	44	125	449	477
Grp Sat Flow(s),veh/h/ln	1774	1845	1441	1810	1845	1544	1792	1881	1586	1810	1881	1539
Q Serve(g_s), s	14.6	9.0	7.5	4.0	11.4	2.9	8.3	19.7	1.8	5.7	19.3	20.3
Cycle Q Clear(g_c), s	14.6	9.0	7.5	4.0	11.4	2.9	8.3	19.7	1.8	5.7	19.3	20.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	482	627	646	386	420	352	184	475	400	416	725	851
V/C Ratio(X)	0.73	0.35	0.26	0.25	0.57	0.26	0.82	0.83	0.11	0.30	0.62	0.56
Avail Cap(c_a), veh/h	502	695	699	390	472	395	215	649	547	416	725	851
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.0	24.8	17.9	27.4	34.2	11.7	44.0	35.3	19.7	31.9	24.8	14.8
Incr Delay (d2), s/veh	5.1	0.1	0.1	0.3	0.5	0.1	19.2	15.2	0.6	0.4	3.9	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	4.6	3.0	2.0	5.9	1.2	5.1	12.3	0.8	2.9	10.8	9.1
LnGrp Delay(d),s/veh	28.1	24.9	18.0	27.7	34.7	11.8	63.1	50.5	20.2	32.3	28.7	17.4
LnGrp LOS	C	C	B	C	C	B	E	D	C	C	C	B
Approach Vol, veh/h		744			423			588			1051	
Approach Delay, s/veh		24.8			28.3			51.5			24.0	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.7	36.6	13.3	41.4	19.9	25.4	26.5	28.3
Change Period (Y+Rc), s	3.1	3.2	3.1	3.6	3.1	3.2	3.6	* 3.6
Max Green Setting (Gmax), s	5.8	37.1	11.9	32.2	17.9	25.0	10.2	* 34
Max Q Clear Time (g_c+I1), s	6.0	11.0	10.3	22.3	16.6	13.4	7.7	21.7
Green Ext Time (p_c), s	0.0	1.8	0.1	2.3	0.2	1.5	0.9	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	30.6
HCM 2010 LOS	C

Notes

HCM 2010 Signalized Intersection Summary
1: Stony Point Rd #1 & Sebastopol Rd

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	406	211	73	94	231	230	76	750	79	181	661	545
Future Volume (veh/h)	406	211	73	94	231	230	76	750	79	181	661	545
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	5	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	441	229	75	102	251	238	83	815	85	197	718	563
Adj No. of Lanes	2	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	410	418	355	129	317	674	106	943	98	454	1757	974
Arrive On Green	0.12	0.22	0.22	0.07	0.17	0.17	0.06	0.29	0.29	0.26	0.50	0.50
Sat Flow, veh/h	3442	1863	1583	1774	1863	1583	1774	3235	337	1774	3539	1583
Grp Volume(v), veh/h	441	229	75	102	251	238	83	446	454	197	718	563
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	1583	1774	1770	1803	1774	1770	1583
Q Serve(g_s), s	11.9	10.9	3.9	5.7	12.9	0.0	4.6	23.9	23.9	9.3	12.8	4.9
Cycle Q Clear(g_c), s	11.9	10.9	3.9	5.7	12.9	0.0	4.6	23.9	23.9	9.3	12.8	4.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.19	1.00		1.00
Lane Grp Cap(c), veh/h	410	418	355	129	317	674	106	516	525	454	1757	974
V/C Ratio(X)	1.08	0.55	0.21	0.79	0.79	0.35	0.79	0.86	0.86	0.43	0.41	0.58
Avail Cap(c_a), veh/h	410	572	486	216	577	896	124	591	602	454	1757	974
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.0	34.3	31.6	45.6	39.8	19.4	46.4	33.6	33.6	31.6	15.9	4.1
Incr Delay (d2), s/veh	66.5	1.1	0.3	4.0	4.3	0.3	20.1	17.3	17.1	0.2	0.7	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.4	5.7	1.7	2.9	7.0	4.5	2.8	14.1	14.4	5.4	6.4	5.7
LnGrp Delay(d),s/veh	110.6	35.4	31.9	49.6	44.2	19.7	66.5	50.9	50.6	33.4	16.6	6.6
LnGrp LOS	F	D	C	D	D	B	E	D	D	C	B	A
Approach Vol, veh/h		745			591			983			1478	
Approach Delay, s/veh		79.6			35.3			52.1			15.1	
Approach LOS		E			D			D			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	29.5	33.0	10.7	26.7	9.0	53.5	16.2	21.3
Change Period (Y+Rc), s	3.9	* 3.9	3.5	4.3	3.0	3.9	4.3	* 4.3
Max Green Setting (Gmax), s	9.0	* 33	12.2	30.7	7.0	35.4	11.9	* 31
Max Q Clear Time (g_c+I1), s	11.3	25.9	7.7	12.9	6.6	14.8	13.9	14.9
Green Ext Time (p_c), s	0.0	3.3	0.0	2.2	0.0	7.5	0.0	2.1

Intersection Summary	
HCM 2010 Ctrl Delay	40.4
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Burbank Avenue & Sebastopol Rd

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	382	83	111	432	0	171	0	189	0	0	0
Future Volume (veh/h)	3	382	83	111	432	0	171	0	189	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	0.99		0.95	1.00		1.00	1.00		0.97			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900			
Adj Flow Rate, veh/h	3	439	95	128	497	0	197	0	217			
Adj No. of Lanes	1	2	0	1	2	0	0	1	0			
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87			
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	0			
Cap, veh/h	445	900	193	166	1766	0	256	0	283			
Arrive On Green	0.31	0.31	0.31	0.09	0.50	0.00	0.33	0.00	0.33			
Sat Flow, veh/h	890	2870	615	1774	3632	0	781	0	860			
Grp Volume(v), veh/h	3	269	265	128	497	0	414	0	0			
Grp Sat Flow(s),veh/h/ln	890	1770	1716	1774	1770	0	1641	0	0			
Q Serve(g_s), s	0.1	5.3	5.5	3.1	3.6	0.0	9.8	0.0	0.0			
Cycle Q Clear(g_c), s	0.1	5.3	5.5	3.1	3.6	0.0	9.8	0.0	0.0			
Prop In Lane	1.00		0.36	1.00		0.00	0.48		0.52			
Lane Grp Cap(c), veh/h	445	555	538	166	1766	0	539	0	0			
V/C Ratio(X)	0.01	0.48	0.49	0.77	0.28	0.00	0.77	0.00	0.00			
Avail Cap(c_a), veh/h	606	876	849	572	3217	0	1246	0	0			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	10.3	12.1	12.1	19.2	6.3	0.0	13.1	0.0	0.0			
Incr Delay (d2), s/veh	0.0	0.7	0.7	2.9	0.1	0.0	0.9	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	2.7	2.7	1.6	1.7	0.0	4.5	0.0	0.0			
LnGrp Delay(d),s/veh	10.3	12.7	12.8	22.1	6.4	0.0	14.0	0.0	0.0			
LnGrp LOS	B	B	B	C	A		B					
Approach Vol, veh/h		537			625			414				
Approach Delay, s/veh		12.8			9.6			14.0				
Approach LOS		B			A			B				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		18.3	8.1	17.1				25.2
Change Period (Y+Rc), s		4.0	4.0	3.5				3.5
Max Green Setting (Gmax), s		33.0	14.0	21.5				39.5
Max Q Clear Time (g_c+I1), s		11.8	5.1	7.5				5.6
Green Ext Time (p_c), s		2.0	0.1	5.7				8.0

Intersection Summary	
HCM 2010 Ctrl Delay	11.8
HCM 2010 LOS	B

HCM 2010 TWSC
3: Sebastopol Rd & Street D

02/05/2018

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	640	17	82	614	24	0	0	0	24	0	18
Future Vol, veh/h	10	640	17	82	614	24	0	0	0	24	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	25	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	719	19	92	690	27	0	0	0	27	0	20

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	717	0	0	738	0	0	1639	1649	703
Stage 1	-	-	-	-	-	-	888	888	-
Stage 2	-	-	-	-	-	-	751	761	-
Critical Hdwy	4.12	-	-	4.12	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	884	-	-	868	-	-	110	99	438
Stage 1	-	-	-	-	-	-	402	362	-
Stage 2	-	-	-	-	-	-	466	414	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	884	-	-	868	-	-	97	0	438
Mov Cap-2 Maneuver	-	-	-	-	-	-	210	0	-
Stage 1	-	-	-	-	-	-	359	0	-
Stage 2	-	-	-	-	-	-	460	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	1.1	21.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	884	-	-	868	-	-	270
HCM Lane V/C Ratio	0.013	-	-	0.106	-	-	0.175
HCM Control Delay (s)	9.1	-	-	9.6	-	-	21.1
HCM Lane LOS	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	0.4	-	-	0.6

HCM 2010 Signalized Intersection Summary
4: West Avenue & Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	513	99	110	536	14	148	7	188	25	4	11
Future Volume (veh/h)	19	513	99	110	536	14	148	7	188	25	4	11
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.95	1.00		0.89	1.00		0.86
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	23	611	118	131	638	17	176	8	224	30	5	13
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	35	777	627	164	912	739	216	13	363	84	77	201
Arrive On Green	0.02	0.42	0.42	0.09	0.49	0.49	0.12	0.26	0.26	0.05	0.19	0.19
Sat Flow, veh/h	1774	1863	1502	1774	1863	1510	1774	49	1378	1774	409	1063
Grp Volume(v), veh/h	23	611	118	131	638	17	176	0	232	30	0	18
Grp Sat Flow(s),veh/h/ln	1774	1863	1502	1774	1863	1510	1774	0	1427	1774	0	1471
Q Serve(g_s), s	1.1	23.8	4.2	6.0	22.2	0.5	8.1	0.0	12.0	1.4	0.0	0.8
Cycle Q Clear(g_c), s	1.1	23.8	4.2	6.0	22.2	0.5	8.1	0.0	12.0	1.4	0.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.97	1.00		0.72
Lane Grp Cap(c), veh/h	35	777	627	164	912	739	216	0	376	84	0	278
V/C Ratio(X)	0.65	0.79	0.19	0.80	0.70	0.02	0.81	0.00	0.62	0.36	0.00	0.06
Avail Cap(c_a), veh/h	108	1000	807	265	1165	945	331	0	485	195	0	387
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.7	21.1	15.4	37.2	16.6	11.0	35.8	0.0	27.1	38.6	0.0	27.8
Incr Delay (d2), s/veh	7.4	3.2	0.1	3.4	1.3	0.0	4.7	0.0	0.6	0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	12.9	1.8	3.1	11.7	0.2	4.2	0.0	4.8	0.7	0.0	0.3
LnGrp Delay(d),s/veh	48.1	24.3	15.6	40.6	17.9	11.0	40.5	0.0	27.7	39.5	0.0	27.9
LnGrp LOS	D	C	B	D	B	B	D		C	D		C
Approach Vol, veh/h		752			786			408			48	
Approach Delay, s/veh		23.7			21.5			33.2			35.1	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	38.9	13.7	19.8	5.2	44.9	7.5	26.0
Change Period (Y+Rc), s	3.5	4.0	3.5	4.0	3.5	4.0	3.5	4.0
Max Green Setting (Gmax), s	12.5	44.9	15.6	22.0	5.1	52.3	9.2	28.4
Max Q Clear Time (g_c+I1), s	8.0	25.8	10.1	2.8	3.1	24.2	3.4	14.0
Green Ext Time (p_c), s	0.1	9.1	0.1	1.2	0.0	10.9	0.0	1.0

Intersection Summary	
HCM 2010 Ctrl Delay	25.1
HCM 2010 LOS	C

HCM 2010 TWSC
5: Sebastopol Rd & Street B

02/05/2018

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑↑			↱
Traffic Vol, veh/h	0	759	686	9	0	4
Future Vol, veh/h	0	759	686	9	0	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized		None		None		None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	799	722	9	0	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	727
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	424
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	424
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	13.6
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	424
HCM Lane V/C Ratio	-	-	-	0.01
HCM Control Delay (s)	-	-	-	13.6
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0

HCM 2010 Signalized Intersection Summary
6: Dutton Ave #3 & Sebastopol Rd

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Traffic Volume (veh/h)	310	193	99	66	189	89	129	386	80	113	279	353
Future Volume (veh/h)	310	193	99	66	189	89	129	386	80	113	279	353
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.91	0.93		0.93	1.00		0.95	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1845	1863	1900	1845	1956	1881	1881	1976	1900	1881	1863
Adj Flow Rate, veh/h	337	210	103	72	205	73	140	420	64	123	303	366
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	2	0	3	1	1	1	0	0	1	2
Cap, veh/h	491	630	640	373	410	343	174	492	416	418	755	868
Arrive On Green	0.16	0.34	0.34	0.04	0.22	0.22	0.10	0.26	0.26	0.23	0.40	0.40
Sat Flow, veh/h	1774	1845	1441	1810	1845	1541	1792	1881	1588	1810	1881	1540
Grp Volume(v), veh/h	337	210	103	72	205	73	140	420	64	123	303	366
Grp Sat Flow(s),veh/h/ln	1774	1845	1441	1810	1845	1541	1792	1881	1588	1810	1881	1540
Q Serve(g_s), s	14.0	8.5	4.4	3.1	9.7	2.4	7.7	21.2	2.6	5.6	11.5	13.7
Cycle Q Clear(g_c), s	14.0	8.5	4.4	3.1	9.7	2.4	7.7	21.2	2.6	5.6	11.5	13.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	491	630	640	373	410	343	174	492	416	418	755	868
V/C Ratio(X)	0.69	0.33	0.16	0.19	0.50	0.21	0.80	0.85	0.15	0.29	0.40	0.42
Avail Cap(c_a), veh/h	519	703	696	391	472	395	265	617	521	418	755	868
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.1	24.5	17.2	28.3	34.0	11.8	44.2	35.1	20.1	31.7	21.4	12.7
Incr Delay (d2), s/veh	3.5	0.1	0.0	0.2	0.4	0.1	9.8	16.9	0.8	0.4	1.6	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.3	4.3	1.7	1.5	5.0	1.0	4.2	13.3	1.2	2.8	6.3	6.2
LnGrp Delay(d),s/veh	26.6	24.6	17.3	28.6	34.4	11.9	54.0	52.0	20.9	32.1	23.0	14.2
LnGrp LOS	C	C	B	C	C	B	D	D	C	C	C	B
Approach Vol, veh/h		650			350			624			792	
Approach Delay, s/veh		24.5			28.5			49.3			20.4	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.5	36.8	12.7	43.0	19.4	24.8	26.6	29.2
Change Period (Y+Rc), s	3.1	3.2	3.1	3.6	3.1	3.2	3.6	* 3.6
Max Green Setting (Gmax), s	5.4	37.5	14.7	29.4	17.9	25.0	11.9	* 32
Max Q Clear Time (g_c+I1), s	5.1	10.5	9.7	15.7	16.0	11.7	7.6	23.2
Green Ext Time (p_c), s	0.0	1.4	0.2	1.9	0.3	1.2	1.1	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	30.1
HCM 2010 LOS	C

Notes

HCM 2010 Signalized Intersection Summary
1: Stony Point Rd #1 & Sebastopol Rd

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	402	241	144	155	146	419	83	638	150	270	1034	397
Future Volume (veh/h)	402	241	144	155	146	419	83	638	150	270	1034	397
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	428	256	146	165	155	424	88	679	155	287	1100	399
Adj No. of Lanes	2	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	501	299	254	192	217	707	111	777	177	585	1933	1096
Arrive On Green	0.15	0.16	0.16	0.11	0.12	0.12	0.06	0.27	0.27	0.33	0.55	0.55
Sat Flow, veh/h	3442	1863	1583	1774	1863	1583	1774	2864	653	1774	3539	1583
Grp Volume(v), veh/h	428	256	146	165	155	424	88	419	415	287	1100	399
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	1583	1774	1770	1747	1774	1770	1583
Q Serve(g_s), s	14.6	16.1	10.2	11.0	9.6	0.0	5.9	27.2	27.2	15.5	24.6	3.5
Cycle Q Clear(g_c), s	14.6	16.1	10.2	11.0	9.6	0.0	5.9	27.2	27.2	15.5	24.6	3.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.37	1.00		1.00
Lane Grp Cap(c), veh/h	501	299	254	192	217	707	111	480	474	585	1933	1096
V/C Ratio(X)	0.85	0.86	0.57	0.86	0.71	0.60	0.80	0.87	0.87	0.49	0.57	0.36
Avail Cap(c_a), veh/h	501	453	385	271	481	931	163	557	550	585	1933	1096
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.97	0.97	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.0	49.0	46.6	52.6	51.1	25.1	55.5	41.8	41.8	32.3	17.9	2.5
Incr Delay (d2), s/veh	12.8	9.9	2.0	12.8	4.2	0.8	9.0	19.4	19.7	0.2	1.2	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.8	9.1	4.6	6.0	5.2	10.8	3.2	15.9	15.7	7.8	12.2	2.8
LnGrp Delay(d),s/veh	62.8	58.9	48.6	65.4	55.3	25.9	64.5	61.1	61.5	32.5	19.1	3.4
LnGrp LOS	E	E	D	E	E	C	E	E	E	C	B	A
Approach Vol, veh/h		830			744			922			1786	
Approach Delay, s/veh		59.1			40.8			61.6			17.8	
Approach LOS		E			D			E			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	43.5	36.4	16.5	23.6	10.5	69.5	21.8	18.3
Change Period (Y+Rc), s	3.9	* 3.9	3.5	4.3	3.0	3.9	4.3	* 4.3
Max Green Setting (Gmax), s	20.0	* 38	18.3	29.2	11.0	46.8	16.5	* 31
Max Q Clear Time (g_c+I1), s	17.5	29.2	13.0	18.1	7.9	26.6	16.6	11.6
Green Ext Time (p_c), s	1.9	3.3	0.1	1.2	0.0	10.0	0.0	2.4

Intersection Summary	
HCM 2010 Ctrl Delay	39.2
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Burbank Avenue & Sebastopol Rd

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	558	77	107	593	2	111	1	74	0	0	0
Future Volume (veh/h)	1	558	77	107	593	2	111	1	74	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	0.99		0.96	1.00		0.97	1.00		0.96			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900			
Adj Flow Rate, veh/h	1	581	80	111	618	2	116	1	77			
Adj No. of Lanes	1	2	0	1	2	0	0	1	0			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	2	2	2	2	2	2	0	2	0			
Cap, veh/h	533	1303	179	142	2206	7	182	2	121			
Arrive On Green	0.42	0.42	0.42	0.08	0.61	0.61	0.18	0.18	0.18			
Sat Flow, veh/h	796	3108	427	1774	3618	12	993	9	659			
Grp Volume(v), veh/h	1	330	331	111	302	318	194	0	0			
Grp Sat Flow(s),veh/h/ln	796	1770	1765	1774	1770	1860	1661	0	0			
Q Serve(g_s), s	0.0	4.8	4.8	2.2	2.9	2.9	3.9	0.0	0.0			
Cycle Q Clear(g_c), s	0.0	4.8	4.8	2.2	2.9	2.9	3.9	0.0	0.0			
Prop In Lane	1.00		0.24	1.00		0.01	0.60		0.40			
Lane Grp Cap(c), veh/h	533	742	740	142	1079	1134	304	0	0			
V/C Ratio(X)	0.00	0.44	0.45	0.78	0.28	0.28	0.64	0.00	0.00			
Avail Cap(c_a), veh/h	782	1296	1292	588	2078	2185	1377	0	0			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	6.1	7.5	7.5	16.3	3.3	3.3	13.7	0.0	0.0			
Incr Delay (d2), s/veh	0.0	0.4	0.4	3.6	0.1	0.1	0.8	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	2.4	2.4	1.2	1.4	1.5	1.8	0.0	0.0			
LnGrp Delay(d),s/veh	6.1	7.9	7.9	19.9	3.5	3.5	14.5	0.0	0.0			
LnGrp LOS	A	A	A	B	A	A	B					
Approach Vol, veh/h		662			731			194				
Approach Delay, s/veh		7.9			6.0			14.5				
Approach LOS		A			A			B				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		10.6	6.9	18.7				25.6
Change Period (Y+Rc), s		4.0	4.0	3.5				3.5
Max Green Setting (Gmax), s		30.0	12.0	26.5				42.5
Max Q Clear Time (g_c+I1), s		5.9	4.2	6.8				4.9
Green Ext Time (p_c), s		0.8	0.1	8.1				10.2

Intersection Summary	
HCM 2010 Ctrl Delay	7.8
HCM 2010 LOS	A

HCM 2010 TWSC
3: Sebastopol Rd & Street D

02/05/2018

Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	629	7	15	756	26	0	0	0	20	0	26
Future Vol, veh/h	18	629	7	15	756	26	0	0	0	20	0	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	25	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	662	7	16	796	27	0	0	0	21	0	27

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	823	0	0	669	0	0			1545	1548	809
Stage 1	-	-	-	-	-	-			841	841	-
Stage 2	-	-	-	-	-	-			704	707	-
Critical Hdwy	4.12	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	807	-	-	921	-	-			126	114	380
Stage 1	-	-	-	-	-	-			423	380	-
Stage 2	-	-	-	-	-	-			490	438	-
Platoon blocked, %		-	-		-	-					
Mov Cap-1 Maneuver	807	-	-	921	-	-			121	0	380
Mov Cap-2 Maneuver	-	-	-	-	-	-			255	0	-
Stage 1	-	-	-	-	-	-			416	0	-
Stage 2	-	-	-	-	-	-			478	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0.2	18.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	807	-	-	921	-	-	313
HCM Lane V/C Ratio	0.023	-	-	0.017	-	-	0.155
HCM Control Delay (s)	9.6	-	-	9	-	-	18.6
HCM Lane LOS	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-	-	0.5

HCM 2010 Signalized Intersection Summary
4: West Avenue & Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	502	79	213	613	54	91	9	144	40	11	20
Future Volume (veh/h)	28	502	79	213	613	54	91	9	144	40	11	20
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.95	1.00		0.89	1.00		0.88
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	29	523	82	222	639	56	95	9	150	42	11	21
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	42	672	540	265	906	734	139	20	335	88	115	220
Arrive On Green	0.02	0.36	0.36	0.15	0.49	0.49	0.08	0.25	0.25	0.05	0.22	0.22
Sat Flow, veh/h	1774	1863	1495	1774	1863	1509	1774	81	1346	1774	523	999
Grp Volume(v), veh/h	29	523	82	222	639	56	95	0	159	42	0	32
Grp Sat Flow(s),veh/h/ln	1774	1863	1495	1774	1863	1509	1774	0	1427	1774	0	1522
Q Serve(g_s), s	1.3	19.6	2.9	9.6	21.1	1.6	4.1	0.0	7.4	1.8	0.0	1.3
Cycle Q Clear(g_c), s	1.3	19.6	2.9	9.6	21.1	1.6	4.1	0.0	7.4	1.8	0.0	1.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.94	1.00		0.66
Lane Grp Cap(c), veh/h	42	672	540	265	906	734	139	0	355	88	0	335
V/C Ratio(X)	0.68	0.78	0.15	0.84	0.71	0.08	0.68	0.00	0.45	0.48	0.00	0.10
Avail Cap(c_a), veh/h	111	823	661	554	1289	1044	312	0	476	217	0	426
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.0	22.3	17.0	32.5	15.8	10.8	35.2	0.0	24.9	36.3	0.0	24.4
Incr Delay (d2), s/veh	7.0	3.9	0.1	2.7	1.0	0.0	2.2	0.0	0.3	1.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	10.7	1.2	4.9	10.9	0.7	2.1	0.0	2.9	0.9	0.0	0.6
LnGrp Delay(d),s/veh	45.1	26.1	17.1	35.2	16.8	10.8	37.4	0.0	25.2	37.8	0.0	24.4
LnGrp LOS	D	C	B	D	B	B	D		C	D		C
Approach Vol, veh/h		634			917			254			74	
Approach Delay, s/veh		25.8			20.9			29.8			32.0	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.2	32.3	9.6	21.3	5.4	42.2	7.4	23.5
Change Period (Y+Rc), s	3.5	4.0	3.5	4.0	3.5	4.0	3.5	4.0
Max Green Setting (Gmax), s	24.5	34.7	13.8	22.0	4.9	54.3	9.6	26.2
Max Q Clear Time (g_c+I1), s	11.6	21.6	6.1	3.3	3.3	23.1	3.8	9.4
Green Ext Time (p_c), s	0.3	6.8	0.1	0.8	0.0	10.3	0.0	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	24.2
HCM 2010 LOS	C

HCM 2010 TWSC
5: Sebastopol Rd & Street B 02/05/2018

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑			↱
Traffic Vol, veh/h	0	746	886	15	0	36
Future Vol, veh/h	0	746	886	15	0	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	785	933	16	0	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	941
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	319
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	319
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	17.8
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	319
HCM Lane V/C Ratio	-	-	-	0.119
HCM Control Delay (s)	-	-	-	17.8
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.4

HCM 2010 Signalized Intersection Summary
6: Dutton Ave #3 & Sebastopol Rd 02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Traffic Volume (veh/h)	358	226	194	91	241	115	158	377	57	120	431	504
Future Volume (veh/h)	358	226	194	91	241	115	158	377	57	120	431	504
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.91	0.94		0.93	1.00		0.94	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1845	1863	1900	1845	1956	1881	1881	1976	1900	1881	1863
Adj Flow Rate, veh/h	373	235	183	95	251	90	165	393	44	125	449	500
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	3	2	0	3	1	1	1	0	0	1	2
Cap, veh/h	489	645	673	383	424	355	198	475	400	399	693	836
Arrive On Green	0.18	0.35	0.34	0.06	0.23	0.23	0.11	0.25	0.25	0.22	0.37	0.36
Sat Flow, veh/h	1774	1845	1444	1810	1845	1544	1792	1881	1586	1810	1881	1538
Grp Volume(v), veh/h	373	235	183	95	251	90	165	393	44	125	449	500
Grp Sat Flow(s),veh/h/ln	1774	1845	1444	1810	1845	1544	1792	1881	1586	1810	1881	1538
Q Serve(g_s), s	15.4	9.5	7.9	4.0	12.1	2.9	9.0	19.7	1.8	5.8	19.8	22.2
Cycle Q Clear(g_c), s	15.4	9.5	7.9	4.0	12.1	2.9	9.0	19.7	1.8	5.8	19.8	22.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	489	645	673	383	424	355	198	475	400	399	693	836
V/C Ratio(X)	0.76	0.36	0.27	0.25	0.59	0.25	0.83	0.83	0.11	0.31	0.65	0.60
Avail Cap(c_a), veh/h	496	695	712	388	472	395	215	649	547	399	693	836
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.8	24.2	17.0	27.2	34.3	12.1	43.6	35.3	19.7	32.6	26.2	15.8
Incr Delay (d2), s/veh	6.8	0.1	0.1	0.3	0.8	0.1	22.2	15.2	0.6	0.4	4.6	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	4.9	3.1	2.0	6.2	1.3	5.7	12.3	0.8	2.9	11.1	10.1
LnGrp Delay(d),s/veh	29.6	24.4	17.1	27.6	35.2	12.2	65.8	50.5	20.3	33.1	30.8	18.9
LnGrp LOS	C	C	B	C	D	B	E	D	C	C	C	B
Approach Vol, veh/h		791			436			602			1074	
Approach Delay, s/veh		25.1			28.8			52.5			25.6	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.7	37.6	14.1	39.7	20.6	25.6	25.5	28.3
Change Period (Y+Rc), s	3.1	3.2	3.1	3.6	3.1	3.2	3.6	* 3.6
Max Green Setting (Gmax), s	5.8	37.1	11.9	32.2	17.9	25.0	10.2	* 34
Max Q Clear Time (g_c+I1), s	6.0	11.5	11.0	24.2	17.4	14.1	7.8	21.7
Green Ext Time (p_c), s	0.0	1.9	0.0	2.2	0.1	1.6	0.9	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	31.5
HCM 2010 LOS	C

Notes

HCM 2010 Signalized Intersection Summary
1: Stony Point Rd #1 & Sebastopol Rd/Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	426	282	148	123	275	222	121	1126	118	175	807	611
Future Volume (veh/h)	426	282	148	123	275	222	121	1126	118	175	807	611
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	426	282	118	123	275	147	121	1126	98	175	807	531
Adj No. of Lanes	2	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	473	435	370	149	323	560	147	1227	107	319	1688	973
Arrive On Green	0.14	0.23	0.23	0.08	0.17	0.17	0.08	0.37	0.37	0.18	0.48	0.48
Sat Flow, veh/h	3442	1863	1583	1774	1863	1583	1774	3295	287	1774	3539	1583
Grp Volume(v), veh/h	426	282	118	123	275	147	121	604	620	175	807	531
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	1583	1774	1770	1812	1774	1770	1583
Q Serve(g_s), s	14.6	16.4	7.4	8.2	17.2	0.0	8.1	39.1	39.2	10.8	18.5	6.5
Cycle Q Clear(g_c), s	14.6	16.4	7.4	8.2	17.2	0.0	8.1	39.1	39.2	10.8	18.5	6.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.16	1.00		1.00
Lane Grp Cap(c), veh/h	473	435	370	149	323	560	147	659	675	319	1688	973
V/C Ratio(X)	0.90	0.65	0.32	0.82	0.85	0.26	0.82	0.92	0.92	0.55	0.48	0.55
Avail Cap(c_a), veh/h	473	483	410	242	481	694	222	690	707	319	1688	973
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.91	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.9	41.5	38.1	54.1	48.1	27.6	54.2	35.9	35.9	44.9	21.3	5.0
Incr Delay (d2), s/veh	19.5	2.6	0.5	4.5	8.4	0.2	8.5	19.8	19.6	1.1	1.0	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	8.8	3.3	4.2	9.6	3.5	4.3	22.6	23.3	5.6	9.3	5.9
LnGrp Delay(d),s/veh	70.5	44.1	38.6	58.6	56.5	27.9	62.7	55.7	55.6	46.2	22.2	7.2
LnGrp LOS	E	D	D	E	E	C	E	E	E	D	C	A
Approach Vol, veh/h		826			545			1345			1513	
Approach Delay, s/veh		56.9			49.2			56.3			19.7	
Approach LOS		E			D			E			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.5	48.6	13.6	32.3	12.9	61.1	20.8	25.1
Change Period (Y+Rc), s	3.9	* 3.9	3.5	4.3	3.0	3.9	4.3	* 4.3
Max Green Setting (Gmax), s	11.0	* 47	16.4	31.1	15.0	42.8	16.5	* 31
Max Q Clear Time (g_c+I1), s	12.8	41.2	10.2	18.4	10.1	20.5	16.6	19.2
Green Ext Time (p_c), s	0.0	3.5	0.1	2.4	0.1	8.3	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	42.4
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Burbank Avenue & Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	482	144	172	420	3	219	1	261	0	0	0
Future Volume (veh/h)	6	482	144	172	420	3	219	1	261	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	0.99		0.95	1.00		0.97	1.00		0.95			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1900			
Adj Flow Rate, veh/h	6	502	150	179	438	3	228	1	272			
Adj No. of Lanes	1	1	1	1	1	0	0	1	0			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	2	2	2	2	2	2	0	2	0			
Cap, veh/h	435	642	520	222	982	7	260	1	310			
Arrive On Green	0.34	0.34	0.34	0.12	0.53	0.53	0.35	0.35	0.35			
Sat Flow, veh/h	937	1863	1507	1774	1847	13	737	3	879			
Grp Volume(v), veh/h	6	502	150	179	0	441	501	0	0			
Grp Sat Flow(s),veh/h/ln	937	1863	1507	1774	0	1860	1619	0	0			
Q Serve(g_s), s	0.3	15.6	4.7	6.3	0.0	9.4	18.7	0.0	0.0			
Cycle Q Clear(g_c), s	0.3	15.6	4.7	6.3	0.0	9.4	18.7	0.0	0.0			
Prop In Lane	1.00		1.00	1.00		0.01	0.46		0.54			
Lane Grp Cap(c), veh/h	435	642	520	222	0	989	570	0	0			
V/C Ratio(X)	0.01	0.78	0.29	0.81	0.00	0.45	0.88	0.00	0.00			
Avail Cap(c_a), veh/h	511	794	642	302	0	1225	753	0	0			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	13.9	19.0	15.4	27.5	0.0	9.3	19.6	0.0	0.0			
Incr Delay (d2), s/veh	0.0	4.1	0.3	7.8	0.0	0.3	7.7	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.1	8.7	2.0	3.6	0.0	4.9	9.6	0.0	0.0			
LnGrp Delay(d),s/veh	14.0	23.1	15.7	35.3	0.0	9.6	27.3	0.0	0.0			
LnGrp LOS	B	C	B	D		A	C					
Approach Vol, veh/h		658			620			501				
Approach Delay, s/veh		21.3			17.0			27.3				
Approach LOS		C			B			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		26.7	12.1	25.8				37.8
Change Period (Y+Rc), s		4.0	4.0	3.5				3.5
Max Green Setting (Gmax), s		30.0	11.0	27.5				42.5
Max Q Clear Time (g_c+I1), s		20.7	8.3	17.6				11.4
Green Ext Time (p_c), s		1.8	0.1	4.6				7.8

Intersection Summary	
HCM 2010 Ctrl Delay	21.5
HCM 2010 LOS	C

HCM 2010 TWSC
3: Sebastopol Rd #2 & Street D

02/05/2018

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	852	18	82	693	13	0	0	0	20	0	7
Future Vol, veh/h	5	852	18	82	693	13	0	0	0	20	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	25	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	888	19	85	722	14	0	0	0	21	0	7

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	735	0	0	906	0	0	1806	1816	729
Stage 1	-	-	-	-	-	-	899	899	-
Stage 2	-	-	-	-	-	-	907	917	-
Critical Hdwy	4.12	-	-	4.12	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	870	-	-	751	-	-	87	78	423
Stage 1	-	-	-	-	-	-	397	358	-
Stage 2	-	-	-	-	-	-	394	351	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	870	-	-	751	-	-	77	0	423
Mov Cap-2 Maneuver	-	-	-	-	-	-	185	0	-
Stage 1	-	-	-	-	-	-	352	0	-
Stage 2	-	-	-	-	-	-	392	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	1.1	24
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	870	-	-	751	-	-	217
HCM Lane V/C Ratio	0.006	-	-	0.114	-	-	0.13
HCM Control Delay (s)	9.2	-	-	10.4	-	-	24
HCM Lane LOS	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0	-	-	0.4	-	-	0.4

HCM 2010 Signalized Intersection Summary
4: West Avenue & Sebastopol Rd

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	670	165	189	553	2	198	0	279	8	1	5
Future Volume (veh/h)	2	670	165	189	553	2	198	0	279	8	1	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.96	0.95		0.91	0.97		0.91
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	2	698	172	197	576	2	206	0	291	8	1	5
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	4	736	592	224	967	785	299	0	472	240	25	472
Arrive On Green	0.00	0.40	0.40	0.13	0.52	0.52	0.33	0.00	0.33	0.33	0.33	0.33
Sat Flow, veh/h	1774	1863	1500	1774	1863	1512	1334	0	1442	471	77	1442
Grp Volume(v), veh/h	2	698	172	197	576	2	206	0	291	9	0	5
Grp Sat Flow(s),veh/h/ln	1774	1863	1500	1774	1863	1512	1334	0	1442	547	0	1442
Q Serve(g_s), s	0.1	28.8	6.2	8.7	17.1	0.1	12.2	0.0	13.5	0.1	0.0	0.2
Cycle Q Clear(g_c), s	0.1	28.8	6.2	8.7	17.1	0.1	25.8	0.0	13.5	13.6	0.0	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	0.89		1.00
Lane Grp Cap(c), veh/h	4	736	592	224	967	785	299	0	472	265	0	472
V/C Ratio(X)	0.52	0.95	0.29	0.88	0.60	0.00	0.69	0.00	0.62	0.03	0.00	0.01
Avail Cap(c_a), veh/h	89	751	605	224	967	785	299	0	472	265	0	472
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.5	23.2	16.4	34.1	13.3	9.2	33.4	0.0	22.5	19.4	0.0	18.0
Incr Delay (d2), s/veh	34.8	21.0	0.3	29.9	1.0	0.0	5.5	0.0	1.8	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	19.0	2.6	6.1	8.9	0.0	4.9	0.0	5.6	0.2	0.0	0.1
LnGrp Delay(d),s/veh	74.3	44.2	16.7	64.0	14.3	9.2	38.9	0.0	24.2	19.5	0.0	18.0
LnGrp LOS	E	D	B	E	B	A	D		C	B		B
Approach Vol, veh/h		872			775			497			14	
Approach Delay, s/veh		38.9			26.9			30.3			18.9	
Approach LOS		D			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.0	35.3		30.0	4.2	45.2		30.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	10.0	32.0		26.0	4.0	38.0		26.0
Max Q Clear Time (g_c+I1), s	10.7	30.8		15.6	2.1	19.1		27.8
Green Ext Time (p_c), s	0.0	0.6		1.4	0.0	9.4		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	32.5
HCM 2010 LOS	C

HCM 2010 TWSC
5: Sebastopol Rd #2 & Street B

02/05/2018

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑			↱
Traffic Vol, veh/h	0	989	801	0	0	0
Future Vol, veh/h	0	989	801	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1030	834	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	834
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	368
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	368
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	0
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	-

HCM 2010 Signalized Intersection Summary
6: Dutton Ave #3 & Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Traffic Volume (veh/h)	464	265	103	95	221	188	118	536	95	185	364	417
Future Volume (veh/h)	464	265	103	95	221	188	118	536	95	185	364	417
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.94		0.91	0.95		0.93	1.00		0.95	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1845	1863	1900	1845	1956	1881	1881	1976	1900	1881	1863
Adj Flow Rate, veh/h	464	265	73	95	221	138	118	536	70	185	364	362
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	3	2	0	3	1	1	1	0	0	1	2
Cap, veh/h	485	651	634	215	438	367	148	574	487	291	732	867
Arrive On Green	0.17	0.35	0.35	0.06	0.24	0.24	0.08	0.31	0.31	0.16	0.39	0.38
Sat Flow, veh/h	1774	1845	1445	1810	1845	1547	1792	1881	1596	1810	1881	1539
Grp Volume(v), veh/h	464	265	73	95	221	138	118	536	70	185	364	362
Grp Sat Flow(s),veh/h/ln	1774	1845	1445	1810	1845	1547	1792	1881	1596	1810	1881	1539
Q Serve(g_s), s	15.9	10.9	3.0	4.3	10.4	7.5	6.5	27.7	2.6	9.6	14.7	3.4
Cycle Q Clear(g_c), s	15.9	10.9	3.0	4.3	10.4	7.5	6.5	27.7	2.6	9.6	14.7	3.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	485	651	634	215	438	367	148	574	487	291	732	867
V/C Ratio(X)	0.96	0.41	0.12	0.44	0.50	0.38	0.80	0.93	0.14	0.64	0.50	0.42
Avail Cap(c_a), veh/h	485	662	642	272	509	427	165	589	500	291	732	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.4	24.4	17.1	32.8	33.0	31.9	45.0	33.8	16.6	39.2	23.1	5.3
Incr Delay (d2), s/veh	30.1	0.2	0.0	1.4	0.3	0.2	21.4	24.4	0.6	4.5	2.4	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.7	5.5	1.2	2.2	5.3	3.2	4.1	18.2	1.2	5.1	8.1	3.7
LnGrp Delay(d),s/veh	66.5	24.6	17.1	34.3	33.4	32.2	66.4	58.1	17.2	43.8	25.5	6.8
LnGrp LOS	E	C	B	C	C	C	E	E	B	D	C	A
Approach Vol, veh/h		802			454			724			911	
Approach Delay, s/veh		48.2			33.2			55.5			21.8	
Approach LOS		D			C			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	37.9	11.3	41.8	20.6	26.3	19.6	33.5
Change Period (Y+Rc), s	3.1	3.2	3.1	3.6	3.2	* 3.2	3.6	* 3.6
Max Green Setting (Gmax), s	9.1	35.3	9.1	33.5	17.4	* 27	11.9	* 31
Max Q Clear Time (g_c+I1), s	6.3	12.9	8.5	16.7	17.9	12.4	11.6	29.7
Green Ext Time (p_c), s	0.1	2.9	0.0	2.4	0.0	0.8	0.0	0.2

Intersection Summary	
HCM 2010 Ctrl Delay	39.3
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
1: Stony Point Rd #1 & Sebastopol Rd/Sebastopol Rd #2

02/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	459	283	158	162	276	410	186	1055	144	252	1211	525
Future Volume (veh/h)	459	283	158	162	276	410	186	1055	144	252	1211	525
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	459	283	143	162	276	345	186	1055	129	252	1211	470
Adj No. of Lanes	2	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	473	403	343	189	333	494	319	1337	163	237	1300	799
Arrive On Green	0.14	0.22	0.22	0.11	0.18	0.18	0.18	0.42	0.42	0.13	0.37	0.37
Sat Flow, veh/h	3442	1863	1583	1774	1863	1583	1774	3176	388	1774	3539	1583
Grp Volume(v), veh/h	459	283	143	162	276	345	186	587	597	252	1211	470
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	1583	1774	1770	1794	1774	1770	1583
Q Serve(g_s), s	15.9	16.8	6.4	10.8	17.1	15.2	11.5	34.5	34.6	16.0	39.5	8.6
Cycle Q Clear(g_c), s	15.9	16.8	6.4	10.8	17.1	15.2	11.5	34.5	34.6	16.0	39.5	8.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.22	1.00		1.00
Lane Grp Cap(c), veh/h	473	403	343	189	333	494	319	745	756	237	1300	799
V/C Ratio(X)	0.97	0.70	0.42	0.86	0.83	0.70	0.58	0.79	0.79	1.07	0.93	0.59
Avail Cap(c_a), veh/h	473	484	412	241	481	620	319	745	756	237	1321	809
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.82	0.82	0.82	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.5	43.4	18.9	52.7	47.5	18.1	45.1	30.1	30.1	52.0	36.5	20.9
Incr Delay (d2), s/veh	33.4	3.6	0.8	15.1	6.5	2.1	1.8	8.3	8.2	76.9	13.2	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.2	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.8	9.0	2.9	6.1	9.4	6.8	5.8	18.5	18.8	13.9	21.7	4.4
LnGrp Delay(d),s/veh	84.9	47.0	19.7	67.8	54.0	20.2	47.0	38.4	38.4	143.0	49.7	24.1
LnGrp LOS	F	D	B	E	D	C	D	D	D	F	D	C
Approach Vol, veh/h		885			783			1370			1933	
Approach Delay, s/veh		62.3			41.9			39.5			55.6	
Approach LOS		E			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	54.4	16.3	30.3	25.4	48.0	20.8	25.8
Change Period (Y+Rc), s	3.0	3.9	3.5	4.3	3.9	* 3.9	4.3	* 4.3
Max Green Setting (Gmax), s	16.0	41.8	16.3	31.2	13.0	* 45	16.5	* 31
Max Q Clear Time (g_c+I1), s	18.0	36.6	12.8	18.8	13.5	41.5	17.9	19.1
Green Ext Time (p_c), s	0.0	3.3	0.1	2.5	0.0	2.6	0.0	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	50.2
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Burbank Avenue & Sebastopol Rd #2

02/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	548	102	178	589	5	138	2	116	0	0	0
Future Volume (veh/h)	5	548	102	178	589	5	138	2	116	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.94			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1900			
Adj Flow Rate, veh/h	5	571	106	185	614	5	144	2	121			
Adj No. of Lanes	1	1	1	1	1	0	0	1	0			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	2	2	2	2	2	2	0	2	0			
Cap, veh/h	478	804	654	233	1175	10	197	3	165			
Arrive On Green	0.43	0.43	0.43	0.13	0.64	0.64	0.22	0.22	0.22			
Sat Flow, veh/h	797	1863	1516	1774	1844	15	879	12	739			
Grp Volume(v), veh/h	5	571	106	185	0	619	267	0	0			
Grp Sat Flow(s),veh/h/ln	797	1863	1516	1774	0	1860	1630	0	0			
Q Serve(g_s), s	0.2	13.5	2.3	5.4	0.0	9.8	8.2	0.0	0.0			
Cycle Q Clear(g_c), s	0.2	13.5	2.3	5.4	0.0	9.8	8.2	0.0	0.0			
Prop In Lane	1.00		1.00	1.00		0.01	0.54		0.45			
Lane Grp Cap(c), veh/h	478	804	654	233	0	1184	365	0	0			
V/C Ratio(X)	0.01	0.71	0.16	0.80	0.00	0.52	0.73	0.00	0.00			
Avail Cap(c_a), veh/h	600	1089	887	362	0	1605	787	0	0			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	8.8	12.5	9.4	22.7	0.0	5.3	19.4	0.0	0.0			
Incr Delay (d2), s/veh	0.0	1.4	0.1	2.9	0.0	0.4	1.1	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	7.1	1.0	2.9	0.0	4.9	3.7	0.0	0.0			
LnGrp Delay(d),s/veh	8.8	13.9	9.5	25.6	0.0	5.7	20.5	0.0	0.0			
LnGrp LOS	A	B	A	C		A	C					
Approach Vol, veh/h		682			804			267				
Approach Delay, s/veh		13.2			10.3			20.5				
Approach LOS		B			B			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		16.1	11.1	26.8				37.8
Change Period (Y+Rc), s		4.0	4.0	3.5				3.5
Max Green Setting (Gmax), s		26.0	11.0	31.5				46.5
Max Q Clear Time (g_c+I1), s		10.2	7.4	15.5				11.8
Green Ext Time (p_c), s		1.0	0.1	7.7				10.8

Intersection Summary	
HCM 2010 Ctrl Delay	13.0
HCM 2010 LOS	B

HCM 2010 TWSC
3: Sebastopol Rd #2 & Street D

02/22/2017

Intersection													
Int Delay, s/veh	0.6												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	688	7	16	836	18	0	0	0	15	0	18
Future Vol, veh/h	11	688	7	16	836	18	0	0	0	15	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	25	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	717	7	17	871	19	0	0	0	16	0	19

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	890	0	0	724	0	0				1657	1661	880
Stage 1	-	-	-	-	-	-				914	914	-
Stage 2	-	-	-	-	-	-				743	747	-
Critical Hdwy	4.12	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	761	-	-	879	-	-				108	97	346
Stage 1	-	-	-	-	-	-				391	352	-
Stage 2	-	-	-	-	-	-				470	420	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	761	-	-	879	-	-				104	0	346
Mov Cap-2 Maneuver	-	-	-	-	-	-				235	0	-
Stage 1	-	-	-	-	-	-				383	0	-
Stage 2	-	-	-	-	-	-				463	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0.2	19.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	761	-	-	879	-	-	285
HCM Lane V/C Ratio	0.015	-	-	0.019	-	-	0.121
HCM Control Delay (s)	9.8	-	-	9.2	-	-	19.4
HCM Lane LOS	A	-	-	A	-	-	C
HCM 95th %ile Q(veh)	0	-	-	0.1	-	-	0.4

HCM 2010 Signalized Intersection Summary
4: West Avenue & Sebastopol Rd

02/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	528	151	348	634	9	191	1	257	5	1	3
Future Volume (veh/h)	6	528	151	348	634	9	191	1	257	5	1	3
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.96	0.95		0.90	0.96		0.90
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	6	550	157	362	660	9	199	1	268	5	1	3
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	0	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	11	637	510	350	993	807	282	2	433	222	37	434
Arrive On Green	0.01	0.34	0.34	0.20	0.53	0.53	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	1774	1863	1492	1774	1863	1513	1330	5	1429	447	122	1433
Grp Volume(v), veh/h	6	550	157	362	660	9	199	0	269	6	0	3
Grp Sat Flow(s),veh/h/ln	1774	1863	1492	1774	1863	1513	1330	0	1434	569	0	1433
Q Serve(g_s), s	0.3	20.9	5.9	15.0	19.5	0.2	10.7	0.0	12.2	0.1	0.0	0.1
Cycle Q Clear(g_c), s	0.3	20.9	5.9	15.0	19.5	0.2	23.0	0.0	12.2	12.3	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	0.83		1.00
Lane Grp Cap(c), veh/h	11	637	510	350	993	807	282	0	434	259	0	434
V/C Ratio(X)	0.54	0.86	0.31	1.03	0.66	0.01	0.71	0.00	0.62	0.02	0.00	0.01
Avail Cap(c_a), veh/h	140	736	589	350	993	807	282	0	434	259	0	434
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.6	23.3	18.4	30.5	12.8	8.3	32.9	0.0	22.7	19.5	0.0	18.5
Incr Delay (d2), s/veh	14.3	9.4	0.3	57.0	1.7	0.0	6.6	0.0	2.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	12.4	2.4	12.8	10.4	0.1	4.7	0.0	5.1	0.1	0.0	0.0
LnGrp Delay(d),s/veh	51.9	32.7	18.7	87.5	14.5	8.3	39.6	0.0	24.7	19.5	0.0	18.5
LnGrp LOS	D	C	B	F	B	A	D		C	B		B
Approach Vol, veh/h		713			1031			468			9	
Approach Delay, s/veh		29.8			40.1			31.0			19.1	
Approach LOS		C			D			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	19.0	30.0		27.0	4.5	44.5		27.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	15.0	30.0		23.0	6.0	39.0		23.0
Max Q Clear Time (g_c+I1), s	17.0	22.9		14.3	2.3	21.5		25.0
Green Ext Time (p_c), s	0.0	3.0		1.2	0.0	8.5		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		34.8
HCM 2010 LOS		C

HCM 2010 TWSC
5: Sebastopol Rd #2 & Street B

02/22/2017

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	818	1017	0	0	0
Future Vol, veh/h	0	818	1017	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	852	1059	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1059
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	273
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	273
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	0
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	-

HCM 2010 Signalized Intersection Summary
6: Dutton Ave #3 & Sebastopol Rd #2

02/22/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	446	227	169	105	231	200	133	539	68	218	627	634
Future Volume (veh/h)	446	227	169	105	231	200	133	539	68	218	627	634
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.94		0.91	0.95		0.93	1.00		0.95	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1845	1863	1900	1845	1956	1881	1881	1976	1900	1881	1863
Adj Flow Rate, veh/h	446	227	139	105	231	150	133	539	43	218	627	584
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	3	2	0	3	1	1	1	0	0	1	2
Cap, veh/h	476	649	691	233	441	370	215	568	482	306	662	806
Arrive On Green	0.17	0.35	0.35	0.06	0.24	0.24	0.12	0.30	0.30	0.17	0.35	0.35
Sat Flow, veh/h	1774	1845	1445	1810	1845	1548	1792	1881	1596	1810	1881	1537
Grp Volume(v), veh/h	446	227	139	105	231	150	133	539	43	218	627	584
Grp Sat Flow(s),veh/h/ln	1774	1845	1445	1810	1845	1548	1792	1881	1596	1810	1881	1537
Q Serve(g_s), s	15.0	9.1	1.0	4.8	10.9	8.2	7.1	28.0	1.6	11.4	32.4	11.3
Cycle Q Clear(g_c), s	15.0	9.1	1.0	4.8	10.9	8.2	7.1	28.0	1.6	11.4	32.4	11.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	476	649	691	233	441	370	215	568	482	306	662	806
V/C Ratio(X)	0.94	0.35	0.20	0.45	0.52	0.41	0.62	0.95	0.09	0.71	0.95	0.72
Avail Cap(c_a), veh/h	482	721	748	233	509	427	215	568	482	306	664	807
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.4	23.9	8.4	32.7	33.1	32.1	41.8	34.1	16.4	39.2	31.5	18.4
Incr Delay (d2), s/veh	25.8	0.1	0.1	1.4	0.4	0.3	5.3	27.0	0.4	7.6	24.1	5.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.4	4.6	1.6	2.5	5.6	3.5	3.8	18.8	0.7	6.3	21.2	5.9
LnGrp Delay(d),s/veh	62.2	24.1	8.4	34.0	33.5	32.3	47.1	61.2	16.8	46.8	55.6	24.0
LnGrp LOS	E	C	A	C	C	C	D	E	B	D	E	C
Approach Vol, veh/h		812			486			715			1429	
Approach Delay, s/veh		42.3			33.2			55.9			41.4	
Approach LOS		D			C			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.1	37.8	15.0	38.1	20.4	26.5	19.9	33.2
Change Period (Y+Rc), s	3.1	3.2	3.1	3.6	3.2	* 3.2	3.1	3.6
Max Green Setting (Gmax), s	6.0	38.5	7.9	34.6	17.5	* 27	12.9	29.6
Max Q Clear Time (g_c+I1), s	6.8	11.1	9.1	34.4	17.0	12.9	13.4	30.0
Green Ext Time (p_c), s	0.0	3.0	0.0	0.1	0.2	0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	43.5
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
1: Stony Point Rd #1 & Sebastopol Rd/Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	426	287	148	129	278	231	121	1126	126	182	807	611
Future Volume (veh/h)	426	287	148	129	278	231	121	1126	126	182	807	611
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	426	287	118	129	278	156	121	1126	106	182	807	531
Adj No. of Lanes	2	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	473	432	367	155	327	557	147	1223	115	313	1682	970
Arrive On Green	0.14	0.23	0.23	0.09	0.18	0.18	0.08	0.37	0.37	0.18	0.48	0.48
Sat Flow, veh/h	3442	1863	1583	1774	1863	1583	1774	3271	308	1774	3539	1583
Grp Volume(v), veh/h	426	287	118	129	278	156	121	609	623	182	807	531
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	1583	1774	1770	1808	1774	1770	1583
Q Serve(g_s), s	14.6	16.8	7.4	8.6	17.4	0.0	8.1	39.4	39.5	11.3	18.6	6.5
Cycle Q Clear(g_c), s	14.6	16.8	7.4	8.6	17.4	0.0	8.1	39.4	39.5	11.3	18.6	6.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.17	1.00		1.00
Lane Grp Cap(c), veh/h	473	432	367	155	327	557	147	662	676	313	1682	970
V/C Ratio(X)	0.90	0.66	0.32	0.83	0.85	0.28	0.82	0.92	0.92	0.58	0.48	0.55
Avail Cap(c_a), veh/h	473	483	410	242	481	689	222	690	705	313	1682	970
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.9	41.8	38.3	53.9	48.0	27.9	54.2	35.9	35.9	45.5	21.4	5.1
Incr Delay (d2), s/veh	19.5	2.9	0.5	6.5	8.5	0.2	8.5	20.1	20.0	1.8	1.0	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	9.0	3.3	4.5	9.7	3.7	4.3	23.0	23.5	5.9	9.3	5.9
LnGrp Delay(d),s/veh	70.5	44.8	38.8	60.4	56.4	28.2	62.7	55.9	55.9	47.4	22.4	7.3
LnGrp LOS	E	D	D	E	E	C	E	E	E	D	C	A
Approach Vol, veh/h		831			563			1353			1520	
Approach Delay, s/veh		57.1			49.5			56.5			20.1	
Approach LOS		E			D			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.1	48.8	14.0	32.1	12.9	60.9	20.8	25.3
Change Period (Y+Rc), s	3.9	* 3.9	3.5	4.3	3.0	3.9	4.3	* 4.3
Max Green Setting (Gmax), s	11.0	* 47	16.4	31.1	15.0	42.8	16.5	* 31
Max Q Clear Time (g_c+I1), s	13.3	41.5	10.6	18.8	10.1	20.6	16.6	19.4
Green Ext Time (p_c), s	0.0	3.3	0.1	2.4	0.1	8.3	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	42.7
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Burbank Avenue & Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	502	144	173	438	3	219	1	263	0	0	0
Future Volume (veh/h)	6	502	144	173	438	3	219	1	263	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	0.99		0.95	1.00		0.97	1.00		0.95			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1900			
Adj Flow Rate, veh/h	6	523	150	180	456	3	228	1	274			
Adj No. of Lanes	1	1	1	1	1	0	0	1	0			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	2	2	2	2	2	2	0	2	0			
Cap, veh/h	432	653	528	222	990	7	258	1	310			
Arrive On Green	0.35	0.35	0.35	0.13	0.54	0.54	0.35	0.35	0.35			
Sat Flow, veh/h	922	1863	1508	1774	1848	12	734	3	882			
Grp Volume(v), veh/h	6	523	150	180	0	459	503	0	0			
Grp Sat Flow(s),veh/h/ln	922	1863	1508	1774	0	1860	1619	0	0			
Q Serve(g_s), s	0.3	16.8	4.8	6.6	0.0	10.1	19.4	0.0	0.0			
Cycle Q Clear(g_c), s	0.3	16.8	4.8	6.6	0.0	10.1	19.4	0.0	0.0			
Prop In Lane	1.00		1.00	1.00		0.01	0.45		0.54			
Lane Grp Cap(c), veh/h	432	653	528	222	0	997	568	0	0			
V/C Ratio(X)	0.01	0.80	0.28	0.81	0.00	0.46	0.89	0.00	0.00			
Avail Cap(c_a), veh/h	491	773	625	294	0	1192	732	0	0			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	14.1	19.5	15.5	28.2	0.0	9.5	20.3	0.0	0.0			
Incr Delay (d2), s/veh	0.0	5.2	0.3	9.0	0.0	0.3	8.8	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.1	9.5	2.0	3.8	0.0	5.2	10.1	0.0	0.0			
LnGrp Delay(d),s/veh	14.1	24.7	15.8	37.2	0.0	9.8	29.1	0.0	0.0			
LnGrp LOS	B	C	B	D		A	C					
Approach Vol, veh/h		679			639			503				
Approach Delay, s/veh		22.6			17.5			29.1				
Approach LOS		C			B			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		27.3	12.3	26.7				39.0
Change Period (Y+Rc), s		4.0	4.0	3.5				3.5
Max Green Setting (Gmax), s		30.0	11.0	27.5				42.5
Max Q Clear Time (g_c+I1), s		21.4	8.6	18.8				12.1
Green Ext Time (p_c), s		1.7	0.1	4.4				8.2

Intersection Summary	
HCM 2010 Ctrl Delay	22.6
HCM 2010 LOS	C

HCM 2010 TWSC
3: Sebastopol Rd #2 & Street D

02/05/2018

Intersection												
Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	870	18	82	707	19	0	0	0	25	0	12
Future Vol, veh/h	10	870	18	82	707	19	0	0	0	25	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	25	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	906	19	85	736	20	0	0	0	26	0	13

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	756	0	0	925	0	0			1853	1863	746
Stage 1	-	-	-	-	-	-			917	917	-
Stage 2	-	-	-	-	-	-			936	946	-
Critical Hdwy	4.12	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	855	-	-	739	-	-			81	73	413
Stage 1	-	-	-	-	-	-			390	351	-
Stage 2	-	-	-	-	-	-			382	340	-
Platoon blocked, %		-	-		-	-					
Mov Cap-1 Maneuver	855	-	-	739	-	-			71	0	413
Mov Cap-2 Maneuver	-	-	-	-	-	-			177	0	-
Stage 1	-	-	-	-	-	-			345	0	-
Stage 2	-	-	-	-	-	-			378	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	1.1	25.1
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	855	-	-	739	-	-	217
HCM Lane V/C Ratio	0.012	-	-	0.116	-	-	0.178
HCM Control Delay (s)	9.3	-	-	10.5	-	-	25.1
HCM Lane LOS	A	-	-	B	-	-	D
HCM 95th %tile Q(veh)	0	-	-	0.4	-	-	0.6

HCM 2010 Signalized Intersection Summary
4: West Avenue & Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	674	165	189	561	16	198	7	279	33	5	16
Future Volume (veh/h)	21	674	165	189	561	16	198	7	279	33	5	16
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.96	1.00		0.89	1.00		0.85
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	22	702	172	197	584	17	206	7	291	34	5	17
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	32	781	630	221	980	795	238	9	371	71	56	190
Arrive On Green	0.02	0.42	0.42	0.12	0.53	0.53	0.13	0.27	0.27	0.04	0.17	0.17
Sat Flow, veh/h	1774	1863	1503	1774	1863	1513	1774	33	1391	1774	326	1108
Grp Volume(v), veh/h	22	702	172	197	584	17	206	0	298	34	0	22
Grp Sat Flow(s),veh/h/ln	1774	1863	1503	1774	1863	1513	1774	0	1425	1774	0	1434
Q Serve(g_s), s	1.2	35.2	7.5	11.0	21.7	0.5	11.4	0.0	19.5	1.9	0.0	1.3
Cycle Q Clear(g_c), s	1.2	35.2	7.5	11.0	21.7	0.5	11.4	0.0	19.5	1.9	0.0	1.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.98	1.00		0.77
Lane Grp Cap(c), veh/h	32	781	630	221	980	795	238	0	379	71	0	246
V/C Ratio(X)	0.68	0.90	0.27	0.89	0.60	0.02	0.86	0.00	0.79	0.48	0.00	0.09
Avail Cap(c_a), veh/h	90	834	673	221	980	795	276	0	404	163	0	315
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	48.9	27.1	19.1	43.2	16.4	11.4	42.5	0.0	34.1	47.1	0.0	34.9
Incr Delay (d2), s/veh	8.9	12.1	0.2	32.0	1.0	0.0	19.4	0.0	8.3	1.9	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	20.6	3.2	7.3	11.3	0.2	6.9	0.0	8.5	1.0	0.0	0.5
LnGrp Delay(d),s/veh	57.8	39.2	19.3	75.2	17.4	11.4	61.9	0.0	42.4	49.0	0.0	35.0
LnGrp LOS	E	D	B	E	B	B	E		D	D		C
Approach Vol, veh/h		896			798			504			56	
Approach Delay, s/veh		35.9			31.5			50.4			43.5	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.0	46.0	17.0	21.2	5.3	56.7	7.5	30.7
Change Period (Y+Rc), s	3.5	4.0	3.5	4.0	3.5	4.0	3.5	4.0
Max Green Setting (Gmax), s	12.5	44.9	15.6	22.0	5.1	52.3	9.2	28.4
Max Q Clear Time (g_c+I1), s	13.0	37.2	13.4	3.3	3.2	23.7	3.9	21.5
Green Ext Time (p_c), s	0.0	4.8	0.1	1.6	0.0	11.7	0.0	0.9

Intersection Summary	
HCM 2010 Ctrl Delay	37.8
HCM 2010 LOS	D

HCM 2010 TWSC
5: Sebastopol Rd #2 & Street B

02/05/2018

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑			↱
Traffic Vol, veh/h	0	1018	820	9	0	4
Future Vol, veh/h	0	1018	820	9	0	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1060	854	9	0	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	859
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	356
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	356
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	15.2
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	356
HCM Lane V/C Ratio	-	-	-	0.012
HCM Control Delay (s)	-	-	-	15.2
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0

HCM 2010 Signalized Intersection Summary
6: Dutton Ave #3 & Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Traffic Volume (veh/h)	480	272	110	95	229	188	126	536	95	185	364	429
Future Volume (veh/h)	480	272	110	95	229	188	126	536	95	185	364	429
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.94		0.91	0.95		0.93	1.00		0.95	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1845	1863	1900	1845	1956	1881	1881	1976	1900	1881	1863
Adj Flow Rate, veh/h	480	272	80	95	229	138	126	536	70	185	364	374
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	3	2	0	3	1	1	1	0	0	1	2
Cap, veh/h	482	654	643	212	440	369	157	574	487	289	721	857
Arrive On Green	0.18	0.35	0.35	0.06	0.24	0.24	0.09	0.31	0.31	0.16	0.38	0.38
Sat Flow, veh/h	1774	1845	1445	1810	1845	1548	1792	1881	1596	1810	1881	1539
Grp Volume(v), veh/h	480	272	80	95	229	138	126	536	70	185	364	374
Grp Sat Flow(s),veh/h/ln	1774	1845	1445	1810	1845	1548	1792	1881	1596	1810	1881	1539
Q Serve(g_s), s	17.4	11.2	3.3	4.3	10.8	7.5	6.9	27.7	2.6	9.6	14.8	3.7
Cycle Q Clear(g_c), s	17.4	11.2	3.3	4.3	10.8	7.5	6.9	27.7	2.6	9.6	14.8	3.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	482	654	643	212	440	369	157	574	487	289	721	857
V/C Ratio(X)	1.00	0.42	0.12	0.45	0.52	0.37	0.80	0.93	0.14	0.64	0.51	0.44
Avail Cap(c_a), veh/h	482	662	650	270	509	427	165	589	500	289	721	857
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.0	24.4	16.8	32.8	33.1	31.8	44.8	33.8	16.6	39.3	23.6	5.4
Incr Delay (d2), s/veh	40.1	0.2	0.0	1.5	0.4	0.2	23.5	24.4	0.6	4.7	2.5	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.6	5.7	1.3	2.2	5.5	3.2	4.5	18.2	1.2	5.2	8.2	3.8
LnGrp Delay(d),s/veh	77.1	24.6	16.8	34.3	33.5	32.1	68.3	58.1	17.2	44.1	26.1	7.1
LnGrp LOS	E	C	B	C	C	C	E	E	B	D	C	A
Approach Vol, veh/h		832			462			732			923	
Approach Delay, s/veh		54.2			33.2			56.0			22.0	
Approach LOS		D			C			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	38.0	11.7	41.2	20.6	26.4	19.4	33.5
Change Period (Y+Rc), s	3.1	3.2	3.1	3.6	3.2	* 3.2	3.6	* 3.6
Max Green Setting (Gmax), s	9.1	35.3	9.1	33.5	17.4	* 27	11.9	* 31
Max Q Clear Time (g_c+I1), s	6.3	13.2	8.9	16.8	19.4	12.8	11.6	29.7
Green Ext Time (p_c), s	0.1	3.0	0.0	2.4	0.0	0.8	0.1	0.2

Intersection Summary	
HCM 2010 Ctrl Delay	41.3
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
1: Stony Point Rd #1 & Sebastopol Rd/Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	459	290	158	174	283	422	186	1055	156	265	1211	525
Future Volume (veh/h)	459	290	158	174	283	422	186	1055	156	265	1211	525
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	1	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	459	290	143	174	283	357	186	1055	141	265	1211	470
Adj No. of Lanes	2	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	473	398	338	201	341	501	312	1310	175	237	1300	799
Arrive On Green	0.14	0.21	0.21	0.11	0.18	0.18	0.18	0.42	0.42	0.13	0.37	0.37
Sat Flow, veh/h	3442	1863	1583	1774	1863	1583	1774	3139	419	1774	3539	1583
Grp Volume(v), veh/h	459	290	143	174	283	357	186	594	602	265	1211	470
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	1583	1774	1770	1789	1774	1770	1583
Q Serve(g_s), s	15.9	17.4	6.5	11.6	17.6	15.7	11.6	35.4	35.5	16.0	39.5	8.6
Cycle Q Clear(g_c), s	15.9	17.4	6.5	11.6	17.6	15.7	11.6	35.4	35.5	16.0	39.5	8.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.23	1.00		1.00
Lane Grp Cap(c), veh/h	473	398	338	201	341	501	312	738	746	237	1300	799
V/C Ratio(X)	0.97	0.73	0.42	0.87	0.83	0.71	0.60	0.80	0.81	1.12	0.93	0.59
Avail Cap(c_a), veh/h	473	484	412	241	481	620	312	738	746	237	1321	809
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.80	0.80	0.80	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.5	43.9	19.4	52.3	47.2	18.0	45.5	30.7	30.7	52.0	36.5	20.9
Incr Delay (d2), s/veh	33.4	4.3	0.8	17.5	6.8	2.3	2.2	9.1	9.1	94.7	13.2	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.8	9.4	2.9	6.6	9.7	7.2	5.9	19.0	19.3	15.0	21.7	4.4
LnGrp Delay(d),s/veh	84.9	48.3	20.2	69.8	54.0	20.3	47.7	39.8	39.8	160.1	49.7	24.1
LnGrp LOS	F	D	C	E	D	C	D	D	D	F	D	C
Approach Vol, veh/h		892			814			1382			1946	
Approach Delay, s/veh		62.6			42.6			40.9			58.5	
Approach LOS		E			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	54.0	17.1	29.9	25.0	48.0	20.8	26.2
Change Period (Y+Rc), s	3.0	3.9	3.5	4.3	3.9	* 3.9	4.3	* 4.3
Max Green Setting (Gmax), s	16.0	41.8	16.3	31.2	13.0	* 45	16.5	* 31
Max Q Clear Time (g_c+I1), s	18.0	37.5	13.6	19.4	13.6	41.5	17.9	19.6
Green Ext Time (p_c), s	0.0	2.9	0.1	2.5	0.0	2.6	0.0	2.4

Intersection Summary	
HCM 2010 Ctrl Delay	51.8
HCM 2010 LOS	D

Notes

HCM 2010 Signalized Intersection Summary
2: Burbank Avenue & Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	580	102	182	621	5	138	2	119	0	0	0
Future Volume (veh/h)	5	580	102	182	621	5	138	2	119	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.94			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1900			
Adj Flow Rate, veh/h	5	604	106	190	647	5	144	2	124			
Adj No. of Lanes	1	1	1	1	1	0	0	1	0			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	2	2	2	2	2	2	0	2	0			
Cap, veh/h	467	819	667	237	1188	9	194	3	167			
Arrive On Green	0.44	0.44	0.44	0.13	0.64	0.64	0.22	0.22	0.22			
Sat Flow, veh/h	773	1863	1517	1774	1845	14	868	12	748			
Grp Volume(v), veh/h	5	604	106	190	0	652	270	0	0			
Grp Sat Flow(s),veh/h/ln	773	1863	1517	1774	0	1860	1628	0	0			
Q Serve(g_s), s	0.2	15.2	2.4	5.9	0.0	10.9	8.7	0.0	0.0			
Cycle Q Clear(g_c), s	0.2	15.2	2.4	5.9	0.0	10.9	8.7	0.0	0.0			
Prop In Lane	1.00		1.00	1.00		0.01	0.53		0.46			
Lane Grp Cap(c), veh/h	467	819	667	237	0	1197	364	0	0			
V/C Ratio(X)	0.01	0.74	0.16	0.80	0.00	0.54	0.74	0.00	0.00			
Avail Cap(c_a), veh/h	558	1038	845	345	0	1529	749	0	0			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	8.9	13.1	9.5	23.8	0.0	5.5	20.4	0.0	0.0			
Incr Delay (d2), s/veh	0.0	2.1	0.1	5.0	0.0	0.4	1.1	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	8.2	1.0	3.2	0.0	5.6	4.0	0.0	0.0			
LnGrp Delay(d),s/veh	8.9	15.2	9.7	28.8	0.0	5.9	21.6	0.0	0.0			
LnGrp LOS	A	B	A	C		A	C					
Approach Vol, veh/h		715			842			270				
Approach Delay, s/veh		14.4			11.1			21.6				
Approach LOS		B			B			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		16.6	11.6	28.3				39.9
Change Period (Y+Rc), s		4.0	4.0	3.5				3.5
Max Green Setting (Gmax), s		26.0	11.0	31.5				46.5
Max Q Clear Time (g_c+I1), s		10.7	7.9	17.2				12.9
Green Ext Time (p_c), s		1.0	0.1	7.6				11.6

Intersection Summary	
HCM 2010 Ctrl Delay	13.9
HCM 2010 LOS	B

HCM 2010 TWSC
3: Sebastopol Rd #2 & Street D

02/05/2018

Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	715	7	16	862	27	0	0	0	21	0	27
Future Vol, veh/h	19	715	7	16	862	27	0	0	0	21	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	25	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	20	745	7	17	898	28	0	0	0	22	0	28

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	926	0	0	752	0	0			1733	1737	912
Stage 1	-	-	-	-	-	-			945	945	-
Stage 2	-	-	-	-	-	-			788	792	-
Critical Hdwy	4.12	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	738	-	-	858	-	-			97	87	332
Stage 1	-	-	-	-	-	-			378	340	-
Stage 2	-	-	-	-	-	-			448	401	-
Platoon blocked, %		-	-		-	-					
Mov Cap-1 Maneuver	738	-	-	858	-	-			93	0	332
Mov Cap-2 Maneuver	-	-	-	-	-	-			222	0	-
Stage 1	-	-	-	-	-	-			371	0	-
Stage 2	-	-	-	-	-	-			436	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0.2	21.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	738	-	-	858	-	-	273
HCM Lane V/C Ratio	0.027	-	-	0.019	-	-	0.183
HCM Control Delay (s)	10	-	-	9.3	-	-	21.1
HCM Lane LOS	B	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-	-	0.7

HCM 2010 Signalized Intersection Summary
4: West Avenue & Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	533	151	348	649	63	191	10	257	45	12	23
Future Volume (veh/h)	34	533	151	348	649	63	191	10	257	45	12	23
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.96	1.00		0.89	1.00		0.85
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	35	555	157	362	676	66	199	10	268	47	12	24
Adj No. of Lanes	1	1	1	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	44	615	492	392	981	796	230	13	351	81	85	170
Arrive On Green	0.02	0.33	0.33	0.22	0.53	0.53	0.13	0.26	0.26	0.05	0.17	0.17
Sat Flow, veh/h	1774	1863	1490	1774	1863	1513	1774	51	1372	1774	493	987
Grp Volume(v), veh/h	35	555	157	362	676	66	199	0	278	47	0	36
Grp Sat Flow(s),veh/h/ln	1774	1863	1490	1774	1863	1513	1774	0	1424	1774	0	1480
Q Serve(g_s), s	2.0	29.0	8.0	20.4	27.5	2.2	11.2	0.0	18.4	2.6	0.0	2.1
Cycle Q Clear(g_c), s	2.0	29.0	8.0	20.4	27.5	2.2	11.2	0.0	18.4	2.6	0.0	2.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.96	1.00		0.67
Lane Grp Cap(c), veh/h	44	615	492	392	981	796	230	0	364	81	0	255
V/C Ratio(X)	0.80	0.90	0.32	0.92	0.69	0.08	0.86	0.00	0.76	0.58	0.00	0.14
Avail Cap(c_a), veh/h	85	634	507	426	992	806	240	0	366	167	0	319
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	49.5	32.6	25.6	38.9	17.9	12.0	43.5	0.0	35.1	47.7	0.0	35.8
Incr Delay (d2), s/veh	11.6	15.9	0.4	23.8	2.0	0.0	24.4	0.0	8.2	2.4	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	17.5	3.3	12.5	14.6	0.9	7.0	0.0	8.1	1.3	0.0	0.9
LnGrp Delay(d),s/veh	61.1	48.5	25.9	62.7	19.9	12.0	67.9	0.0	43.3	50.1	0.0	35.9
LnGrp LOS	E	D	C	E	B	B	E		D	D		D
Approach Vol, veh/h		747			1104			477			83	
Approach Delay, s/veh		44.3			33.5			53.6			44.0	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.0	37.7	16.7	21.5	6.0	57.7	8.2	30.1
Change Period (Y+Rc), s	3.5	4.0	3.5	4.0	3.5	4.0	3.5	4.0
Max Green Setting (Gmax), s	24.5	34.7	13.8	22.0	4.9	54.3	9.6	26.2
Max Q Clear Time (g_c+I1), s	22.4	31.0	13.2	4.1	4.0	29.5	4.6	20.4
Green Ext Time (p_c), s	0.2	2.7	0.0	1.5	0.0	10.6	0.0	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	41.2
HCM 2010 LOS	D

HCM 2010 TWSC
5: Sebastopol Rd #2 & Street B

02/05/2018

Intersection						
Int Delay, s/veh	0.4					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑↱			↱
Traffic Vol, veh/h	0	863	1049	15	0	36
Future Vol, veh/h	0	863	1049	15	0	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	899	1093	16	0	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1101
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	258
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	258
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	21.3
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	258
HCM Lane V/C Ratio	-	-	-	0.145
HCM Control Delay (s)	-	-	-	21.3
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.5

HCM 2010 Signalized Intersection Summary
6: Dutton Ave #3 & Sebastopol Rd #2

02/05/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑			↑			↑			↑	
Traffic Volume (veh/h)	466	240	182	105	244	200	146	539	68	218	627	656
Future Volume (veh/h)	466	240	182	105	244	200	146	539	68	218	627	656
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.94		0.91	0.95		0.93	1.00		0.95	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1845	1863	1900	1845	1956	1881	1881	1976	1900	1881	1863
Adj Flow Rate, veh/h	466	240	152	105	244	150	146	539	43	218	627	606
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	3	2	0	3	1	1	1	0	0	1	2
Cap, veh/h	476	658	691	229	444	373	206	568	482	297	662	810
Arrive On Green	0.18	0.36	0.35	0.06	0.24	0.24	0.12	0.30	0.30	0.16	0.35	0.35
Sat Flow, veh/h	1774	1845	1446	1810	1845	1549	1792	1881	1596	1810	1881	1537
Grp Volume(v), veh/h	466	240	152	105	244	150	146	539	43	218	627	606
Grp Sat Flow(s),veh/h/ln	1774	1845	1446	1810	1845	1549	1792	1881	1596	1810	1881	1537
Q Serve(g_s), s	16.8	9.6	1.1	4.8	11.6	8.1	7.8	28.0	1.6	11.4	32.4	12.6
Cycle Q Clear(g_c), s	16.8	9.6	1.1	4.8	11.6	8.1	7.8	28.0	1.6	11.4	32.4	12.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	476	658	691	229	444	373	206	568	482	297	662	810
V/C Ratio(X)	0.98	0.36	0.22	0.46	0.55	0.40	0.71	0.95	0.09	0.73	0.95	0.75
Avail Cap(c_a), veh/h	476	721	741	229	509	427	206	568	482	297	664	812
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.9	23.8	8.4	32.6	33.2	31.9	42.6	34.1	16.4	39.7	31.5	18.6
Incr Delay (d2), s/veh	35.5	0.1	0.1	1.4	0.4	0.3	10.6	27.0	0.4	9.0	24.1	6.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.4	4.9	1.7	2.5	5.9	3.5	4.5	18.8	0.7	6.4	21.2	6.5
LnGrp Delay(d),s/veh	72.4	23.9	8.5	34.0	33.6	32.2	53.2	61.2	16.8	48.7	55.6	24.8
LnGrp LOS	E	C	A	C	C	C	D	E	B	D	E	C
Approach Vol, veh/h		858			499			728			1451	
Approach Delay, s/veh		47.5			33.3			56.9			41.7	
Approach LOS		D			C			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.1	38.3	14.5	38.1	20.7	26.7	19.4	33.2
Change Period (Y+Rc), s	3.1	3.2	3.1	3.6	3.2	* 3.2	3.1	3.6
Max Green Setting (Gmax), s	6.0	38.5	7.9	34.6	17.5	* 27	12.9	29.6
Max Q Clear Time (g_c+I1), s	6.8	11.6	9.8	34.4	18.8	13.6	13.4	30.0
Green Ext Time (p_c), s	0.0	3.1	0.0	0.1	0.0	0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	45.1
HCM 2010 LOS	D

Notes

Appendix C

NCHRP Internal Capture Worksheets

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	Roseland Village TIS	**Organization:**	
Project Location:	Sebastopol Road	**Performed By:**	
Scenario Description:		**Date:**	
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	11,000	sf	17	15	2
Retail	826	1,000	sf	1	1	0
Restaurant	932	7,000	sf	37	22	15
Cinema/Entertainment	Park	1	acre	8	4	4
Residential	223	175	units	53	16	37
Hotel				0		
All Other Land Uses[2]	Library	11,000	sf	11	8	3
Total				127	66	61

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	1.10	0%	0%	1.10	0%	0%
Retail	1.16	0%	0%	1.16	0%	0%
Restaurant	1.33	0%	0%	1.33	0%	0%
Cinema/Entertainment	1.33	0%	0%	1.33	0%	0%
Residential	1.11	0%	0%	1.11	0%	0%
Hotel		0%	0%		0%	0%
All Other Land Uses[2]	1.30	0%	5%	1.30	0%	5%

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

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

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

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	1	0	0	0
Retail	0		0	0	0	0
Restaurant	2	0		0	1	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	0	6	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	152	80	72
Internal Capture Percentage	14%	14%	15%
External Vehicle-Trips[3]	109	57	52
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	1	1	0

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

Land Use	Entering Trips	Exiting Trips
Office	18%	50%
Retail	0%	N/A
Restaurant	24%	15%
Cinema/Entertainment	0%	0%
Residential	6%	17%
Hotel	N/A	N/A

[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

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	Roseland Village TIS	**Organization:**	
Project Location:	Sebastopol Road	**Performed By:**	
Scenario Description:		**Date:**	
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	11,000	sf	16	3	13
Retail	826	1,000	sf	3	1	2
Restaurant	932	7,000	sf	40	21	19
Cinema/Entertainment	Park	1	acre	6	3	3
Residential	223	175	units	68	40	28
Hotel				0		
All Other Land Uses[2]	Library	11,000	sf	80	39	41
Total				213	107	106

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	1.10	0%	0%	1.10	0%	0%
Retail	1.20	0%	0%	1.20	0%	0%
Restaurant	1.33	0%	0%	1.33	0%	0%
Cinema/Entertainment	1.33	0%	0%	1.33	0%	0%
Residential	1.18	0%	0%	1.18	0%	0%
Hotel		0%	0%		0%	0%
All Other Land Uses[2]	1.30	0%	10%	1.30	0%	10%

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

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		350	350		350	
Retail					350	
Restaurant					350	
Cinema/Entertainment					350	
Residential		350	350			
Hotel						

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

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	1	0	0	0
Retail	0		0	0	0	0
Restaurant	1	0		1	5	0
Cinema/Entertainment	0	0	1		0	0
Residential	1	0	4	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	265	134	131
Internal Capture Percentage	11%	10%	11%
External Vehicle-Trips[3]	183	92	91
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	10	5	5

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

Land Use	Entering Trips	Exiting Trips
Office	67%	7%
Retail	0%	0%
Restaurant	21%	28%
Cinema/Entertainment	25%	25%
Residential	11%	15%
Hotel	N/A	N/A

[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

Appendix D

Queuing Calculations

Queuing and Blocking Report
Existing AM Peak Hour 03/02/2017

Intersection: 3: Sebastopol Rd & Street D

Movement	EB	EB	WB	SB
Directions Served	L	TR	L	LTR
Maximum Queue (ft)	15	30	52	30
Average Queue (ft)	4	6	31	18
95th Queue (ft)	20	48	61	39
Link Distance (ft)		600		331
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	480		210	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: West Avenue & Sebastopol Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	LT	R
Maximum Queue (ft)	53	224	58	84	182	48	95	72	56	29
Average Queue (ft)	25	151	28	58	130	15	58	47	29	10
95th Queue (ft)	61	237	81	96	219	74	107	86	63	35
Link Distance (ft)		231			971		724		295	
Upstream Blk Time (%)		1	0							
Queuing Penalty (veh)		6	0							
Storage Bay Dist (ft)	210		180	470		188		80		127
Storage Blk Time (%)		5			1		4	1		
Queuing Penalty (veh)		6			2		9	2		

Network Summary

Network wide Queuing Penalty: 25

Queuing and Blocking Report
Existing PM Peak Hour 03/02/2017

Intersection: 3: Sebastopol Rd & Street D

Movement	EB	EB	WB	SB
Directions Served	L	TR	L	LTR
Maximum Queue (ft)	15	43	23	37
Average Queue (ft)	5	10	6	19
95th Queue (ft)	24	49	25	45
Link Distance (ft)		600		331
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	480		210	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: West Avenue & Sebastopol Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	LT	R
Maximum Queue (ft)	88	237	47	143	240	69	84	92	75	51
Average Queue (ft)	38	183	28	101	147	22	46	52	49	30
95th Queue (ft)	109	271	55	167	269	99	92	105	87	60
Link Distance (ft)		228			970		724		295	
Upstream Blk Time (%)	0	2								
Queuing Penalty (veh)	0	14								
Storage Bay Dist (ft)	210		180	470		188		80		127
Storage Blk Time (%)		8			4		1	4		
Queuing Penalty (veh)		10			9		2	3		

Network Summary

Network wide Queuing Penalty: 38

Queuing and Blocking Report
Existing plus Project AM Peak Hour

02/05/2018

Intersection: 3: Sebastopol Rd & Street D

Movement	EB	EB	WB	SB
Directions Served	L	TR	L	LTR
Maximum Queue (ft)	24	114	45	50
Average Queue (ft)	6	40	26	27
95th Queue (ft)	31	134	53	55
Link Distance (ft)		1314		314
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	25		110	
Storage Blk Time (%)	2	6		
Queuing Penalty (veh)	10	1		

Intersection: 4: West Avenue & Sebastopol Rd #2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	35	244	132	156	269	16	127	112	54	30
Average Queue (ft)	15	199	53	91	179	5	84	71	29	10
95th Queue (ft)	45	280	167	195	301	30	155	134	69	40
Link Distance (ft)		221			1234		723		297	
Upstream Blk Time (%)		7	0							
Queuing Penalty (veh)		50	0							
Storage Bay Dist (ft)	210		180	188		30		80		50
Storage Blk Time (%)		15			37	0	11	2	5	0
Queuing Penalty (veh)		18			46	2	21	3	1	0

Network Summary

Network wide Queuing Penalty: 152

Queuing and Blocking Report
Existing plus Project AM Peak Hour (15-min school peak)

02/05/2018

Intersection: 3: Sebastopol Rd & Street D

Movement	EB	EB	WB	WB	SB
Directions Served	L	TR	L	TR	LTR
Maximum Queue (ft)	27	219	146	118	74
Average Queue (ft)	6	70	85	23	39
95th Queue (ft)	28	187	156	132	104
Link Distance (ft)		1314		221	314
Upstream Blk Time (%)				1	
Queuing Penalty (veh)				5	
Storage Bay Dist (ft)	25		110		
Storage Blk Time (%)	2	11	5	0	
Queuing Penalty (veh)	12	1	33	1	

Intersection: 4: West Avenue & Sebastopol Rd #2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	92	245	176	204	368	46	261	132	62	34
Average Queue (ft)	27	220	63	99	221	10	129	92	26	14
95th Queue (ft)	100	277	179	194	355	44	297	159	62	39
Link Distance (ft)		221			1234		723		297	
Upstream Blk Time (%)	0	13	0							
Queuing Penalty (veh)	0	84	0							
Storage Bay Dist (ft)	210		180	188		30		80		50
Storage Blk Time (%)	0	22			40	1	20	10	7	2
Queuing Penalty (veh)	0	31			59	6	47	17	1	0

Network Summary

Network wide Queuing Penalty: 299

Intersection: 3: Sebastopol Rd & Street D

Movement	EB	EB	WB	WB	SB
Directions Served	L	TR	L	TR	LTR
Maximum Queue (ft)	33	156	23	2	57
Average Queue (ft)	10	62	6	0	29
95th Queue (ft)	37	200	25	5	65
Link Distance (ft)		1222		221	314
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	25		110		
Storage Blk Time (%)	4	9			
Queuing Penalty (veh)	26	2			

Intersection: 4: West Avenue & Sebastopol Rd #2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	120	245	154	229	361	47	104	96	68	47
Average Queue (ft)	43	214	60	153	244	18	66	60	37	22
95th Queue (ft)	140	281	174	252	398	58	126	115	79	56
Link Distance (ft)		221			1163		723		296	
Upstream Blk Time (%)	0	12	0							
Queuing Penalty (veh)	0	78	0							
Storage Bay Dist (ft)	210		180	188		30		80		50
Storage Blk Time (%)	0	21		1	40	1	5	4	13	2
Queuing Penalty (veh)	0	25		9	111	12	8	4	5	1

Network Summary

Network wide Queuing Penalty: 281

Queuing and Blocking Report
Future AM Peak Hour

03/02/2017

Intersection: 3: Sebastopol Rd & Street D

Movement	EB	EB	WB	SB
Directions Served	L	TR	L	LTR
Maximum Queue (ft)	15	171	51	44
Average Queue (ft)	4	75	28	20
95th Queue (ft)	20	236	62	52
Link Distance (ft)		600		331
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	480		210	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: West Avenue & Sebastopol Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	LT	R
Maximum Queue (ft)	14	251	214	167	213	4	174	133	20	18
Average Queue (ft)	4	219	106	112	146	1	107	93	7	4
95th Queue (ft)	19	277	255	208	246	8	206	164	28	20
Link Distance (ft)		233			971		724		263	
Upstream Blk Time (%)		10	0							
Queuing Penalty (veh)		89	0							
Storage Bay Dist (ft)	210		180	470		188		80		127
Storage Blk Time (%)		22			2		11	11		
Queuing Penalty (veh)		38			4		30	22		

Network Summary

Network wide Queuing Penalty: 182

Queuing and Blocking Report
Future PM Peak Hour

03/02/2017

Intersection: 3: Sebastopol Rd & Street D

Movement	EB	EB	WB	SB
Directions Served	L	TR	L	LTR
Maximum Queue (ft)	21	84	26	30
Average Queue (ft)	6	24	11	18
95th Queue (ft)	26	104	33	39
Link Distance (ft)		600		331
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	480		210	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: West Avenue & Sebastopol Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	LT	R
Maximum Queue (ft)	19	236	200	246	208	2	153	129	11	8
Average Queue (ft)	6	180	80	176	146	0	98	79	3	2
95th Queue (ft)	26	265	203	275	239	6	180	147	17	12
Link Distance (ft)		233			971		724		263	
Upstream Blk Time (%)		3	0							
Queuing Penalty (veh)		21	0							
Storage Bay Dist (ft)	210		180	470		188		80		127
Storage Blk Time (%)		11	0		2		11	7		
Queuing Penalty (veh)		17	0		7		29	13		

Network Summary

Network wide Queuing Penalty: 87

Queuing and Blocking Report
Future plus Project AM Peak Hour 02/05/2018

Intersection: 3: Sebastopol Rd #2 & Street D

Movement	EB	EB	WB	WB	SB
Directions Served	L	TR	L	TR	LTR
Maximum Queue (ft)	18	293	59	18	53
Average Queue (ft)	5	161	31	4	35
95th Queue (ft)	25	371	81	50	80
Link Distance (ft)		1493		223	267
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	25		110		
Storage Blk Time (%)	1	19	1		
Queuing Penalty (veh)	12	2	9		

Intersection: 4: West Avenue & Sebastopol Rd #2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	44	246	187	189	285	16	285	140	56	30
Average Queue (ft)	18	235	104	125	187	4	213	122	32	13
95th Queue (ft)	78	277	249	215	338	24	376	166	67	38
Link Distance (ft)		223			1406		722		263	
Upstream Blk Time (%)		20	0							
Queuing Penalty (veh)		176	0							
Storage Bay Dist (ft)	210		180	188		30		80		50
Storage Blk Time (%)		30		0	36	0	39	19	10	1
Queuing Penalty (veh)		55		1	74	3	112	37	2	0

Network Summary

Network wide Queuing Penalty: 483

Queuing and Blocking Report
Future plus Project AM Peak Hour (15-min school peak) 02/05/2018

Intersection: 3: Sebastopol Rd #2 & Street D

Movement	EB	EB	WB	WB	SB
Directions Served	L	TR	L	TR	LTR
Maximum Queue (ft)	31	622	133	216	171
Average Queue (ft)	6	282	101	78	95
95th Queue (ft)	29	733	151	252	221
Link Distance (ft)		1493		223	267
Upstream Blk Time (%)				4	3
Queuing Penalty (veh)				32	0
Storage Bay Dist (ft)	25		110		
Storage Blk Time (%)	1	22	18	0	
Queuing Penalty (veh)	14	2	131	1	

Intersection: 4: West Avenue & Sebastopol Rd #2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	94	248	221	229	322	37	446	140	64	36
Average Queue (ft)	24	232	108	140	215	7	241	114	32	13
95th Queue (ft)	109	272	245	243	357	37	534	179	71	39
Link Distance (ft)		223			1406		722		263	
Upstream Blk Time (%)	0	21	0				2			
Queuing Penalty (veh)	0	185	0				0			
Storage Bay Dist (ft)	210		180	188		30		80		50
Storage Blk Time (%)	0	32		4	39	1	41	14	11	1
Queuing Penalty (veh)	0	59		23	80	4	118	28	2	0

Network Summary

Network wide Queuing Penalty: 681

Intersection: 3: Sebastopol Rd #2 & Street D

Movement	EB	EB	WB	WB	SB
Directions Served	L	TR	L	TR	LTR
Maximum Queue (ft)	36	174	18	2	76
Average Queue (ft)	12	101	6	1	46
95th Queue (ft)	46	242	24	6	106
Link Distance (ft)		2153		223	268
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	25		110		
Storage Blk Time (%)	3	14			
Queuing Penalty (veh)	21	3			

Intersection: 4: West Avenue & Sebastopol Rd #2

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	119	245	204	246	488	57	236	140	60	38
Average Queue (ft)	46	223	106	212	345	28	168	121	38	24
95th Queue (ft)	153	283	252	285	642	73	306	175	84	54
Link Distance (ft)		223			1990		723		263	
Upstream Blk Time (%)	0	16	1							
Queuing Penalty (veh)	0	121	0							
Storage Bay Dist (ft)	210		180	188		30		80		50
Storage Blk Time (%)	0	27		17	39	2	30	13	15	6
Queuing Penalty (veh)	0	50		120	162	16	80	25	5	3

Network Summary

Network wide Queuing Penalty: 607