TECHNICAL MEMORANDUM

Date: April 16, 2019

To: Rob Sprinkle, City of Santa Rosa

From: Janice Spuller
Project Manager

Subject: ***Mercy Wellness Traffic Study Revisions***

TJKM received the emailed comments, dated April 8, 2019, from the City of Santa Rosa regarding the above mentioned project.

The comments were addressed accordingly in the revised Traffic Study dated April 15, 2019.

Comment from the City of Santa Rosa	Response from TJKM
Page 6: 3011 Santa Rosa Ave is referenced in the first sentence. Should be 900 Santa Rosa Ave	Reference revised
Page 6: 1.2.1 Study Intersections – states four intersection studies, then lists 3 locations. Should add the driveway to the list.	Text changed to three study intersections
Page 11: HOV lane hours are 3pm – 6:30pm	Text revised
Page 21 figure 7: Intersection dwy 2 labeled incorrectly as Santa Rosa Ave; should be Rutledge	Text changed to reflect Rutledge Ave.
Page 23 figure 8: Same as above, and does not show cumulative volumes on Rutledge	Text changed to reflect Rutledge Ave. There were no existing count data for the driveway, therefore only the project trips were included
Page 30: City of Mountain View is referenced.	Text changed to reference City of Santa Rosa
Page 33: ADA parking is not being shown as a recommendation. The inclusion of an ADA parking spot is critical at this stage in that It could entirely change the proposed parking layout and number of available onsite parking spots. This should be detailed immediately to	Text included a requirement of one parking ADA parking spaces. Additional comments were included in this section. Site plan was revised and reflected in Figure 2.

Comment from the City of Santa Rosa	Response from TJKM
ensure there is not a negative impact on the current parking count.	
In general, my only concern with this proposal is the parking and the potential impact on the adjacent neighborhood area.	Per the Parking contingency plan, there should be no impact to the adjacent neighborhood area if there is a leased off-site parking area.

Please let me know if there are additional comments. Thank you

Traffic Impact Analysis Report

Mercy Wellness

Cannabis Dispensary Development

900 Santa Rosa Avenue

Santa Rosa, California

April 16, 2019

TJKM

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EXECUTIVE SUMMARY

This report summarizes the results of the Traffic Impact Analysis (TIA) conducted for the proposed Cannabis Dispensary (Dispensary) located at 900 Santa Rosa Avenue in the City of Santa Rosa, California. The project proposes to construct a 3,072 sf cannabis dispensary on a vacant parcel located at the corner of Santa Rosa Avenue, Bennett Valley Road and Rutledge Avenue.

The report also includes evaluations and recommendations concerning project site access and on-site circulation for vehicles, bicycles, and pedestrians; evaluation of on-site vehicle parking supply, passenger and commercial loading spaces, garbage/trash facilities.

To evaluate the impacts on the transportation infrastructure due to the addition of traffic from the proposed project, three study intersections were evaluated during the weekday morning (a.m.) peak hour and evening (p.m.) peak hour under four study scenarios. The study intersections were evaluated under *No Project* and *plus Project* scenarios for Existing and Existing plus Approved and Pending Development. For the purposes of this analysis, potential traffic operational effects from the proposed project are identified based on established traffic operational thresholds for the City of Santa Rosa.

Project Trip Generation

The proposed project is expected to generate approximately 32 weekday a.m. peak hour trips (16 inbound trips, 16 outbound trips), and 68 weekday p.m. peak hour trips (34 inbound trips, 34 outbound trips).

Level of Service (LOS) Standards

The City standard is LOS D or better, except for facilities within downtown where attainment would result in significant environmental degradation, where significant geometric constraints make an improvement infeasible, or where attainment would ensure loss of an area's character.

Existing and Background Conditions

Under these scenarios, all of the study intersections operate within applicable jurisdictional standards of LOS D or better during the a.m., and p.m. peak hours.

Existing and Background plus Project Conditions

Under this scenarios, all of the study intersections operate within applicable jurisdictional standards of LOS D or better during the a.m. and p.m. peak hours.

Based on the City impact criteria the project is expected to have a **less-than-significant** impact at all of the study intersections.

Pedestrian Impacts

The proposed project provides adequate and appropriate facilities for safe non-motorized mobility. There is adequate pedestrian access to the project site from the surrounding area. The proposed project does not conflict with existing and planned pedestrian facilities; therefore, the impact to pedestrian facilities is ***less-than-significant***.

Bicycle Impacts

The project is not expected to generate additional bicycle trips on existing and planned bicycle facilities and does not conflict with existing and planned bicycle facilities; therefore, the impact to bicycle facilities is ***less than significant***.

Transit Impacts

The project site has a Sonoma County Transit and Santa Rosa CityBus bus stops in front of the building in the southbound direction and across the street approximately 200 feet walking distance in the southbound direction. These bus routes operate near the project site with stops located within walking distance of the proposed development. The project site is adequately served by the VTA transit service. Therefore, impacts to transit service are expected to be ***less than significant***.

However, it is recommended that the project applicant coordinate with the jurisdictional staff to accommodate transit amenities near the project site.

Site Access and On-Site Circulation

The existing project driveway on Santa Rosa Avenue is well spaced and properly aligned with opposing and adjacent driveways.

Emergency vehicle access would serve the site through public street frontages and within the parking lot. The line of sight for vehicles exiting the driveways and vehicles travelling on Santa Rosa Avenue is clear and visible.

Parking

The proposed project, per the City of Santa Rosa parking standards, requires 12 parking spaces. The project will provide 10 on-site parking spaces plus one designated loading zone/delivery vehicle parking spaces. The developers has provided a parking incentive, contingency plan for the project located in **Appendix H**.

1.0 INTRODUCTION

This report summarizes the results of the Traffic Impact Analysis (TIA) for the proposed Cannabis Dispensary, Mercy Wellness, located at 900 Santa Rosa Avenue in Santa Rosa, California.

1.1 PROJECT DESCRIPTION

The purpose of this report is to identify potential impacts of the proposed Cannabis Dispensary (Dispensary) on the surrounding transportation system and to recommend mitigation measures (improvements) for significant impacts. For the purposes of this analysis, potential traffic impacts from the proposed project are identified based on established traffic operational thresholds of the City of Santa Rosa. The report also includes evaluations and recommendations concerning project site access and on-site circulation for vehicles, evaluation of on-site vehicle parking supply, queuing analysis at the driveways and at the study intersections. To evaluate the impacts on the transportation infrastructure due to the addition of traffic from the proposed project, the three intersections were evaluated during the weekday a.m. and p.m. peak hours under four study scenarios. The study intersections were evaluated under No Project and Plus Project scenarios for Existing and Existing plus Approved and Pending Projects.

The Mercy Wellness project site, shown in **Figure 1**, is located in southeast Santa Rosa and zoned Commercial in the South Park Neighborhood Revitalization Area. Based on the Cannabis Land Use Policy, Mercy Wellness is permitted to operate pending approval of a Conditional Use Permit.

Mercy Wellness will construct a new 3,072 building for retail use including retail, intake lobby, security, office and inventory/storage. A site plan is shown on **Figure 2**.

1.2. STUDY AREA

The study area generally is bordered by Santa Rosa Avenue, Bennett Valley Road and Rutledge Avenue. It is also across from the Bennett Valley Senior Center. The project site is in close proximity to downtown Santa Rosa. The project vicinity has sidewalks, bicycle facilities and transit stops. The roadway impacts of the proposed project were evaluated for the intersections and roadway segments disused below.

1.2.1 STUDY INTERSECTIONS

TJKM evaluated traffic conditions at three study intersections during the a.m. and p.m. peak hours for a typical weekday. The study intersections were selected in consultation with the City of Santa Rosa Staff. The peak periods observed were between 7:00-9:00 a.m. and 4:00-6:00 p.m. The study intersections and associated traffic controls are as follows:

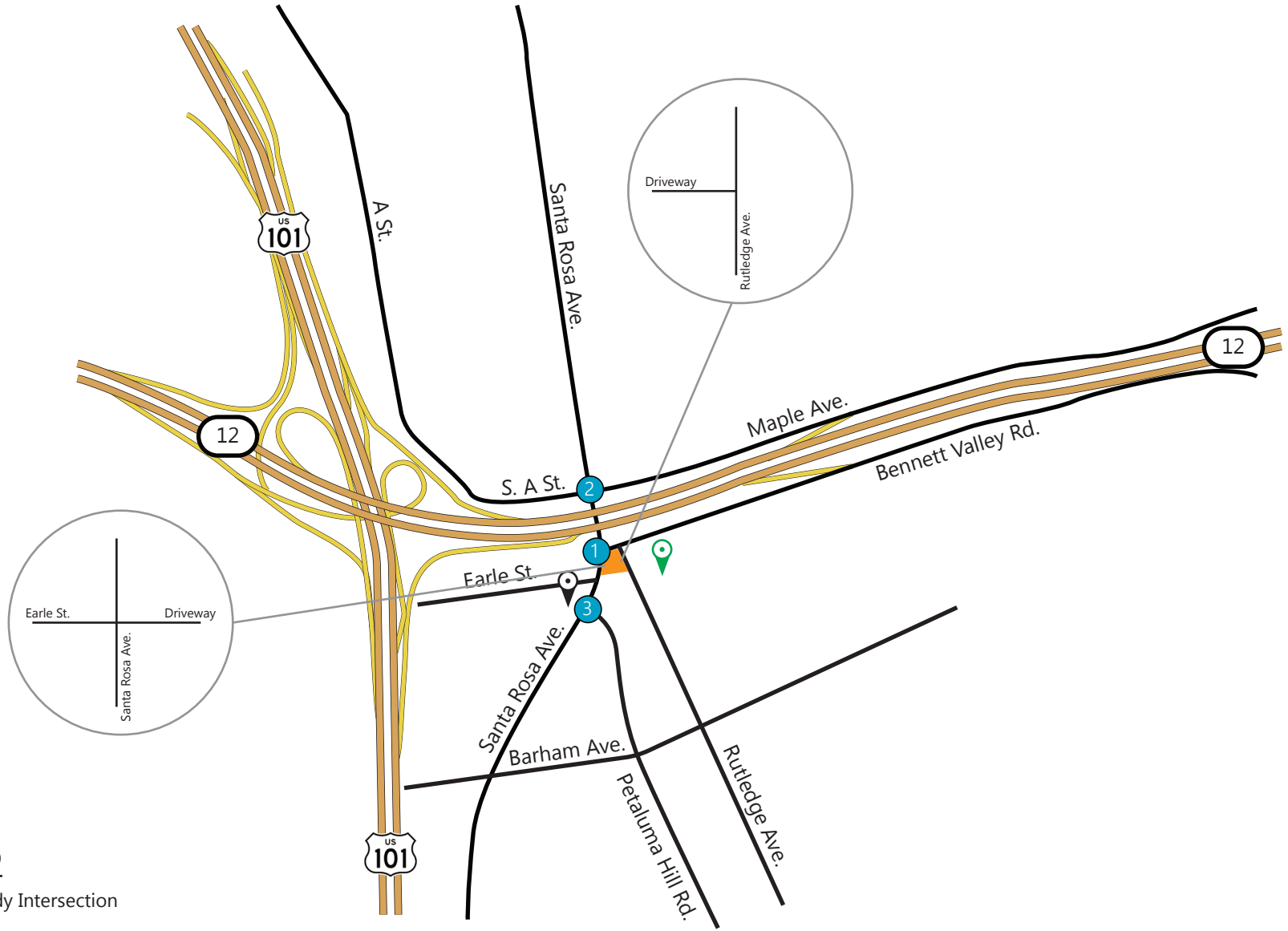
1. Santa Rosa Avenue and Bennett Valley Road (Signal)
2. Santa Rosa Avenue and Maple Avenue (Signal)
3. Santa Rosa Avenue and Petaluma Hill Road (Signal)

1.2 Analysis Scenarios

This study addresses the following four traffic scenarios:

- **Existing Conditions** – This scenario evaluates the study intersections based on existing traffic volumes, lane geometry, and traffic controls.
- **Existing plus Project Conditions** – This scenario is identical to Existing Conditions, but with the addition of traffic from the proposed project.
- **Existing plus Approved Projects Conditions** – This scenario is similar to Existing Conditions, but with the addition of traffic from approved and pending developments within the vicinity of the proposed project.
- **Existing plus Approved plus Project Conditions** – This scenario is identical to Existing plus Approved Conditions, but with the addition of traffic from the proposed project.

Vicinity Map



LEGEND

- Study Intersection
- Project Site
- Bennett Valley Senior Center
- Proposed Employee Parking Site

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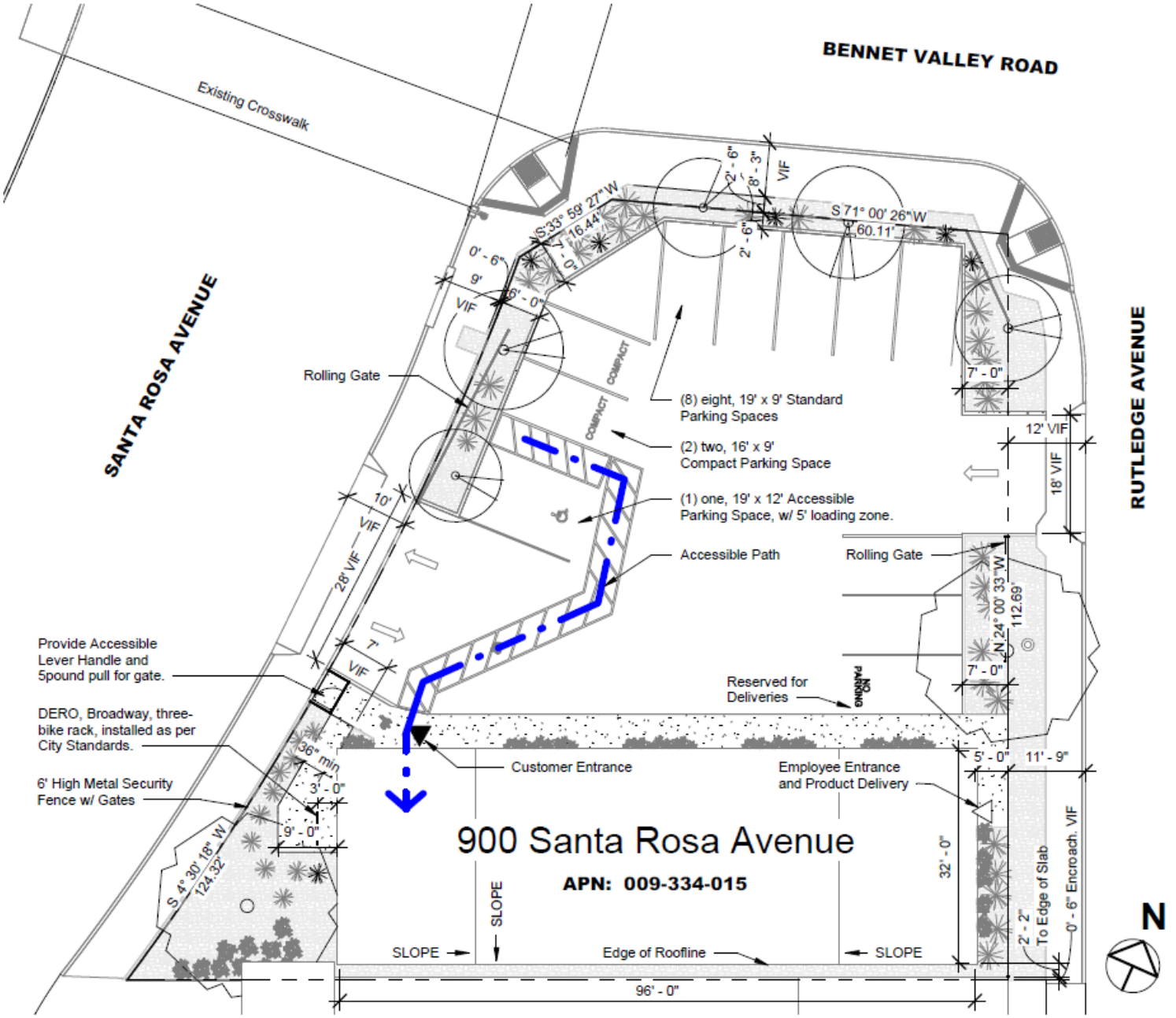
Site Plan



1 Site Parking CUP
1/16" = 1'-0"

SITE PLAN NOTES:

1. Landscaping, Hardscaping, and Parking depicted For Reference Only. For Approved and Permitted site plan, please refer to E. Steve Powers, NISSTECH AUTOMOTIVE Sheet1, Site Plan, dated 1/17/2017.
2. For Approved and Permitted Landscaping, Planting, and Irrigation details, please refer to CARLILE MACY NISSTECH AUTOMOTIVE Planting Plan, Sheet L1, dated December 2017.
3. Standard Parking Spaces are 9'-0" x 19'-0".
4. Compact Parking Spaces are 9'-0" x 16'-0".
5. Accessible Parking Spaces are 12'-0" x 19'-0" with a 5' wide access aisle.
6. Accessible Path, Min. 36" wide, may be reduced to 32" min. for a length of 24" max. MAX SLOPE 1:20 Parallel to Travel. MAX CROSS SLOPE 1:48 perpendicular to travel.

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2.0 STUDY METHODOLOGY

This chapter discusses the level of service analysis methodology for study intersections and roadway segments and criteria used to identify significant impacts.

2.1 Level of Service Analysis Methodology

LOS is a qualitative measure that describes operational conditions as they relate to the traffic stream and perceptions by motorists and passengers. The LOS generally describes these conditions in terms of such factors as speed and travel time, delays, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. The operational LOS are given letter designations from A to F, with A representing the best operating conditions (free-flow) and F the worst (severely-congested flow with high delays). Intersections generally are the capacity-controlling locations with respect to traffic operations on arterial and collector streets.

Signalized Intersections

The study intersections under traffic signal control were analyzed using the 2000 Highway Capacity Manual (HCM) Operations Methodology for signalized intersections described in Chapter 16 (HCM 2000). This methodology determines LOS based on average control delay per vehicle for the overall intersection during peak-hour intersection operating conditions. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average control delay for signalized intersections was calculated using Synchro analysis software and was correlated to a LOS designation as shown in **Appendix A**. The LOS methodology for signalized intersections is described in detail in **Appendix A**.

2.2 Significant Impact Criteria/Level of Service Standards

Roadway Impact Criteria

In general, according to the City LOS standard (minimum acceptable operations) for signalized intersections is LOS D or better along all major corridors. Exceptions to meeting this standard are allowed for facilities within downtown, where attainment would result in significant environmental degradation, where there are significant geometric constrains, or where attainment would result in a loss of an area's character.

The City considers a significant impact to be satisfactorily mitigated when the measure implemented would restore LOS to Existing or Existing plus Approved Projects or better.

3.0 EXISTING CONDITIONS

This section describes existing conditions in the immediate project site vicinity, including roadway facilities, bicycle and pedestrian facilities, and available transit service. In addition, existing traffic volumes and operations are presented for the study intersection, including the results of LOS calculations.

3.1 Existing Setting and Roadway System

Local access to the proposed project is provided via Santa Rosa Avenue, and Petaluma Hill Road. Descriptions of the existing roadways are provided as follows:

US 101 is a north-south, six-lane freeway with three mixed-flow lanes and one High Occupancy Vehicle (HOV) lane in each direction in the vicinity of the project. HOV Lanes, also known as diamond or carpool lanes, are restricted for use by vehicles occupied by two or more persons or motorcycles between 7 - 9 a.m. and between 3-6:30 p.m.. HOV includes carpools, vanpools, and buses. US 101 is located parallel to the project site and provides regional freeway access north through the San Francisco Bay Area and between Northern and Southern California. The closest access from US 101 to the via Santa Rosa Avenue.

Santa Rosa Avenue is a north-south arterial roadway that parallels US 101 from downtown Santa Rosa to Rohnert Park. In the project vicinity, Santa Rosa Avenue is an undivided, four lane roadway and designated a Regional/Arterial Street per the City of Santa Rosa General Plan. The posted speed limit is 35 mph.

SR 12 is an east-west state highway extending between Sebastapol in Sonoma County to SR 29 in Calaveras County. SR 12 is perpendicular to Santa Rosa Avenue and has two-travel lanes in each direction with a merge lane onto and from US 101.

Maple Street is a westbound two-lane, one-way roadway that extends between Santa Rosa Avenue and Brigham Avenue. It serves residential neighborhoods and provides on and off access to SR 12. The posted speed limit is 35 mph.

Bennett Valley Road is a two-lane regional/arterial roadway that extends between Santa Rosa Avenue (a T-intersection) and Sonoma County. In the immediate vicinity, Bennett Valley Road is a one-way eastbound roadway between Santa Rosa Avenue and Brigham Avenue/Gordon Lane.

Petaluma Hill Road is a two-lane regional/arterial that extends between Santa Rosa Avenue and Sonoma County. This is a considered a City Entries and Corridors roadway

3.2 Existing Pedestrian Facilities

Walkability is defined as the ability to travel easily and safely between various origins and destinations without having to rely on automobiles or other motorized travel. The ideal "walkable" community includes wide sidewalks, a mix of land uses such as residential, employment, and shopping opportunities, a limited number of conflict points with vehicle traffic, and easy access to transit facilities and services.

Pedestrian facilities are comprised of crosswalks, sidewalks, pedestrian signals, and off-street paths, which provide safe and convenient routes for pedestrians to access the destinations such as institutions, businesses, public transportation, and recreation facilities.

In the project vicinity, there are sidewalks along Santa Rosa Avenue and adjacent cross streets. Street lights are spaced to provide ample lighting during the evening hours. In the 2018 Draft Bicycle and Pedestrian Master Plan Update (Update) there is a planned Class I Shared-Used Path located south of the project site near between Colgan Avenue and Petaluma Hill Road and also Kawana Springs Road.

In the project vicinity, the study intersections have crosswalks on most legs of the intersection. Most of the study intersections have crosswalks with curb ramps. The roadway segments surrounding project vicinity have sidewalk along the both sides.

There are bus stops within 1,000 feet radius of the project site. One bus stop is located 100 feet from the project site on Bennett Valley Road. All bus stops are accessible via existing sidewalks.

The existing pedestrian facilities in the study area are shown in **Figure 3**.

3.3 Existing Bicycle Facilities

The draft Update describes the four bikeways, which all meet the design guidelines of the Caltrans Highway Design Manual (HDM), Chapter 1000: Bikeway Planning and Design for multi-use trails. These bicycle facility types are described below.

- **Class I Bikeways/Multi-Use Paths**: Class I bikeways are also referred to as multi-use or shared-use paths. They provide completely separated and paved, exclusive right of way for people to walk and bike. There are 13 miles of Class I facilities, with a goal for 30.9 miles in the draft Update.
- **Class II Bikeways/On-Street Bike Lanes**: Class II bikeways are striped lanes on roadways for one-way bicycle travel. Currently there are 46 miles of Class II bikeways, with a goal to increase the mileage to 69.2.
- **Class III Bike Routes**: Class III bikeways signed bike routes where bicyclists share a travel lane with motorists. These are often marked on the roadway with a Sharrow and Shared Roadway sign. There are 18 miles of bicycle routes with a goal to convert the routes to Class II bicycle lanes. However, there is a focus to add 0.3 miles of bicycle boulevards within the City.
- **Class IV Separated Bikeways**: Class IV separated bikeways are on-street bicycle facilities that are physically separated from motor vehicle traffic by a vertical element or barrier, such as a curb, bollards, or vehicle parking. These can allow for one or two-way travel on one or both sides of the roadway. There are no current plans for a separated bikeway.

Within the project vicinity, there are Class II bike lanes along Santa Rosa Avenue south of SR 12, Class III bicycle routes are located north of SR 12. The Update proposes a Class II bike lanes north of SR 12 along Santa Rosa Avenue and on Petaluma Hill Road and Maple Avenue near Santa Rosa Avenue. Class III bike facilities are proposed on Petaluma Road and a Class III bicycle boulevard is located south of the project site on Colgan Avenue.

The existing bicycle facilities in the study area are shown in **Figure 4**.

3.4 Existing Transit Facilities

The existing public transit facilities in the study area are shown in **Figure 5**. The City is served by Sonoma County Transit (SC Transit) which has transit lines that run between Cloverdale and San Rafael and the Santa Rosa CityBus. CityBus is a fixed-service local bus service that loops between the Transit Mall in Downtown Santa Rosa to different parts of the community. The closest transit stop is approximately 100 feet west of the project site served by CityBus Route 18. The following bus routes are summarized in **Table 1.**

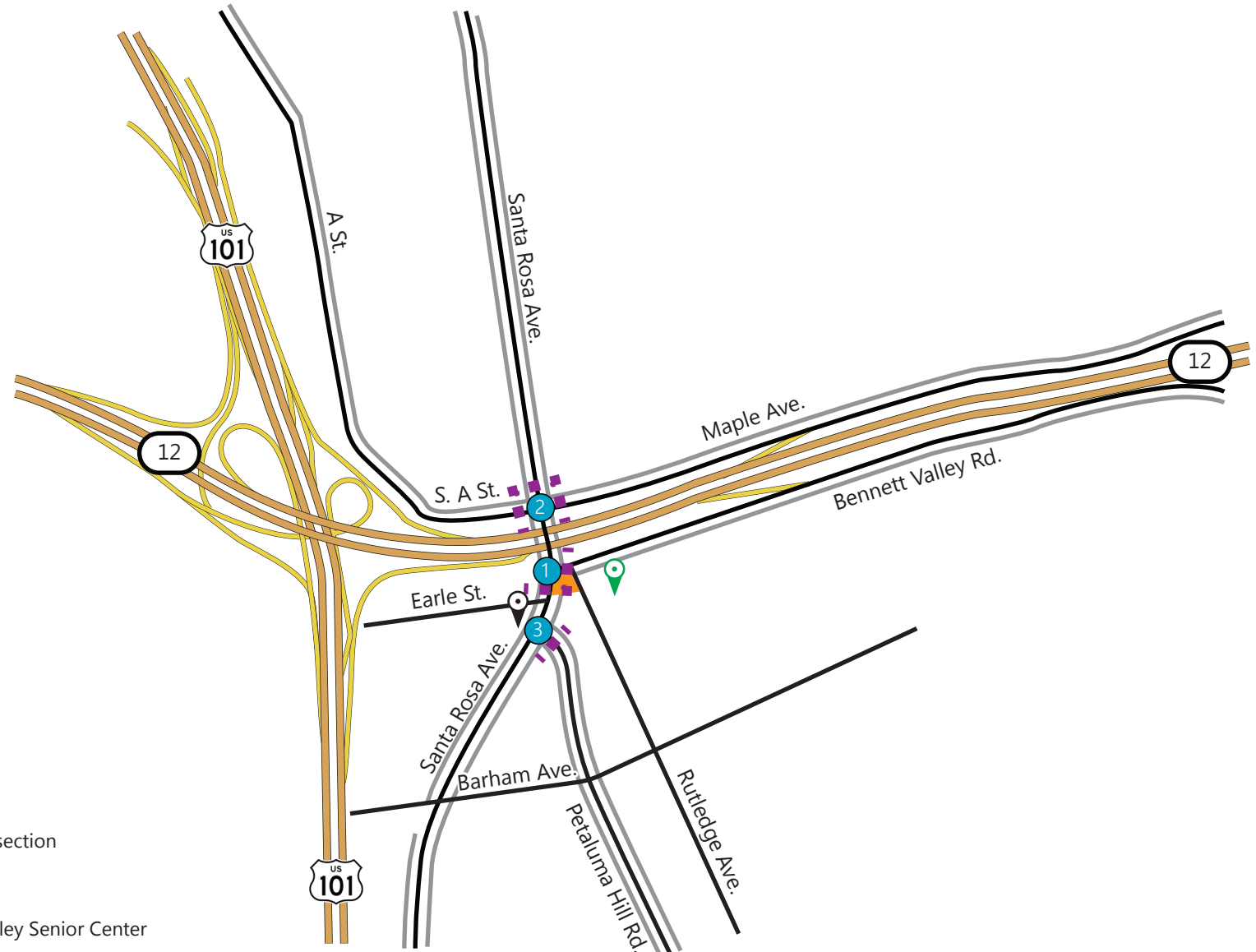
Table 1: Existing CityBus and SC Transit Service

			Weekdays		*Weekends*	
Route	***From***	***To***	***Operating Hours***	***Headway (minutes)***	***Operating Hours***	***Headway (minutes)***
3	Santa Rosa Avenue, Santa Rosa Marketplace and Elsa Drive		6:00 AM- 8:00 PM	30	6:00 AM- 7:00 PM	60
5	Petaluma Hill Road at Barham Ave ,Kawana Springs Rd, and Meadow Way		6L00 AM – 8:15 PM	30	6:00 AM- 8:00 PM	30
18	East Circulator- between E Street at Clark Bennett Valley Road to		7:20 AM- 5:10 PM	60	10:20 AM- 5:20 P	60
42	W. Robles Avenue/Standish Avenue	Santa Rosa Transit Mall	7:35 AM- 5:25 PM	30-120	No Service	N/A
44	Petaluma Transit Mall	Coddington Santa Rosa	5:20 AM – 10:29 PM	37-60	8:36 AM- 10:12 PM	3.5 hours
44x	Petaluma Transit Mall	Coddington Santa Rosa	9:22 AM–4:36 PM	60	No Service	N/A
48	Petaluma Fairgrounds Park & Ride	Coddington Santa Rosa	8:20 AM– 7:30 PM	50	7:00 AM– 9:51 PM	4 hours
54	Petaluma Downtown/Petaluma Transit Mall	Coddington, Santa Rosa	6:30 AM– 7:15 PM	60	No Service	N/A

Notes: Source SC Transit Website

These routes connect to Sonoma-Marin Area Rail Transit (SMART) which provide passenger rails service in Sonoma and Marin Counties at the Petaluma Transit Mall. Route 54 is the South County Connector to SMART.

Existing Pedestrian Facilities



LEGEND

- Study Intersection
- Project Site
- Bennett Valley Senior Center
- Proposed Employee Parking Site
- Sidewalks
- Crosswalks

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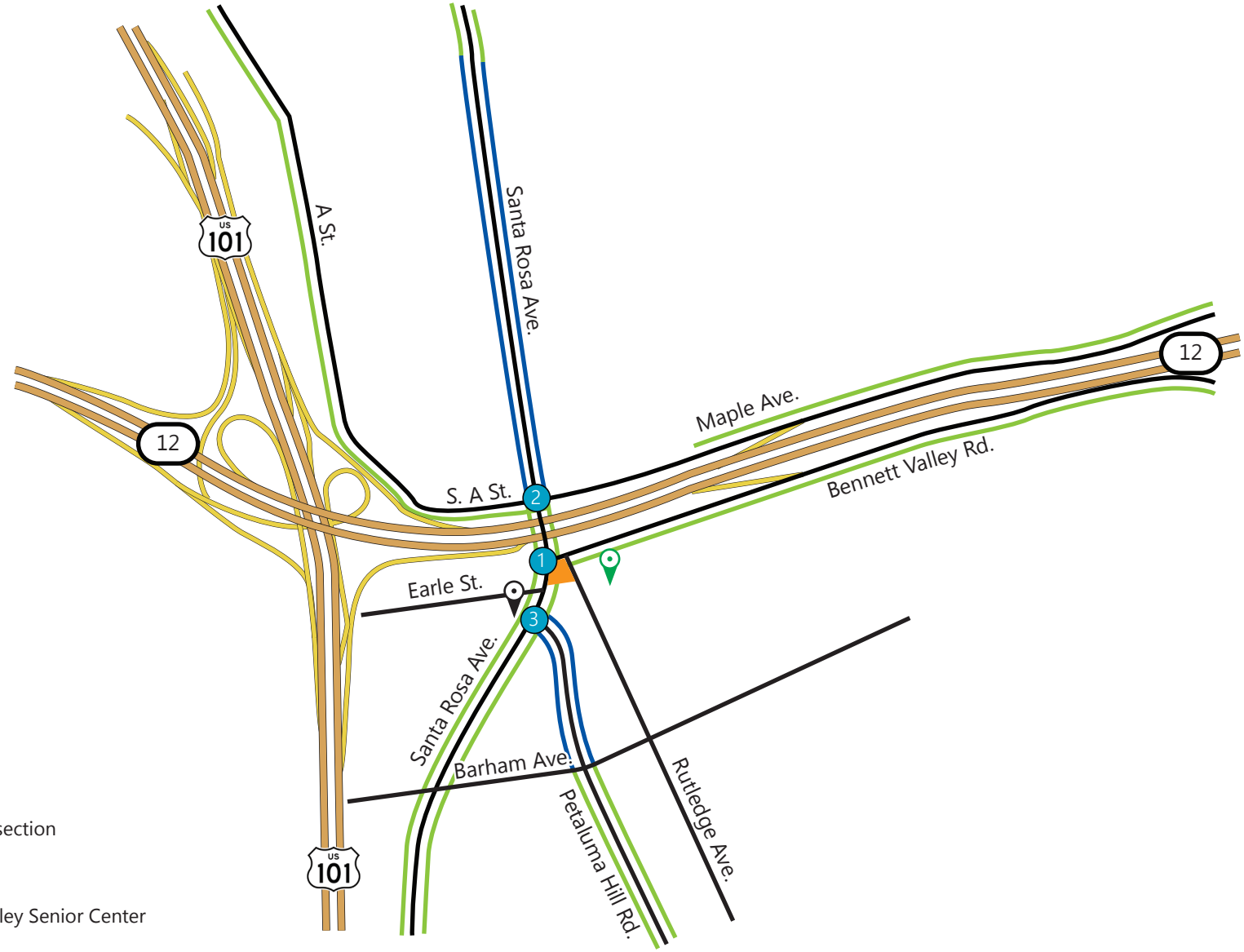
Existing Bicycle Facilities



LEGEND

- Study Intersection
- Project Site
- Bennett Valley Senior Center
- Proposed Employee Parking Site
- Class II Bike Lane
- Class III Bike Lane

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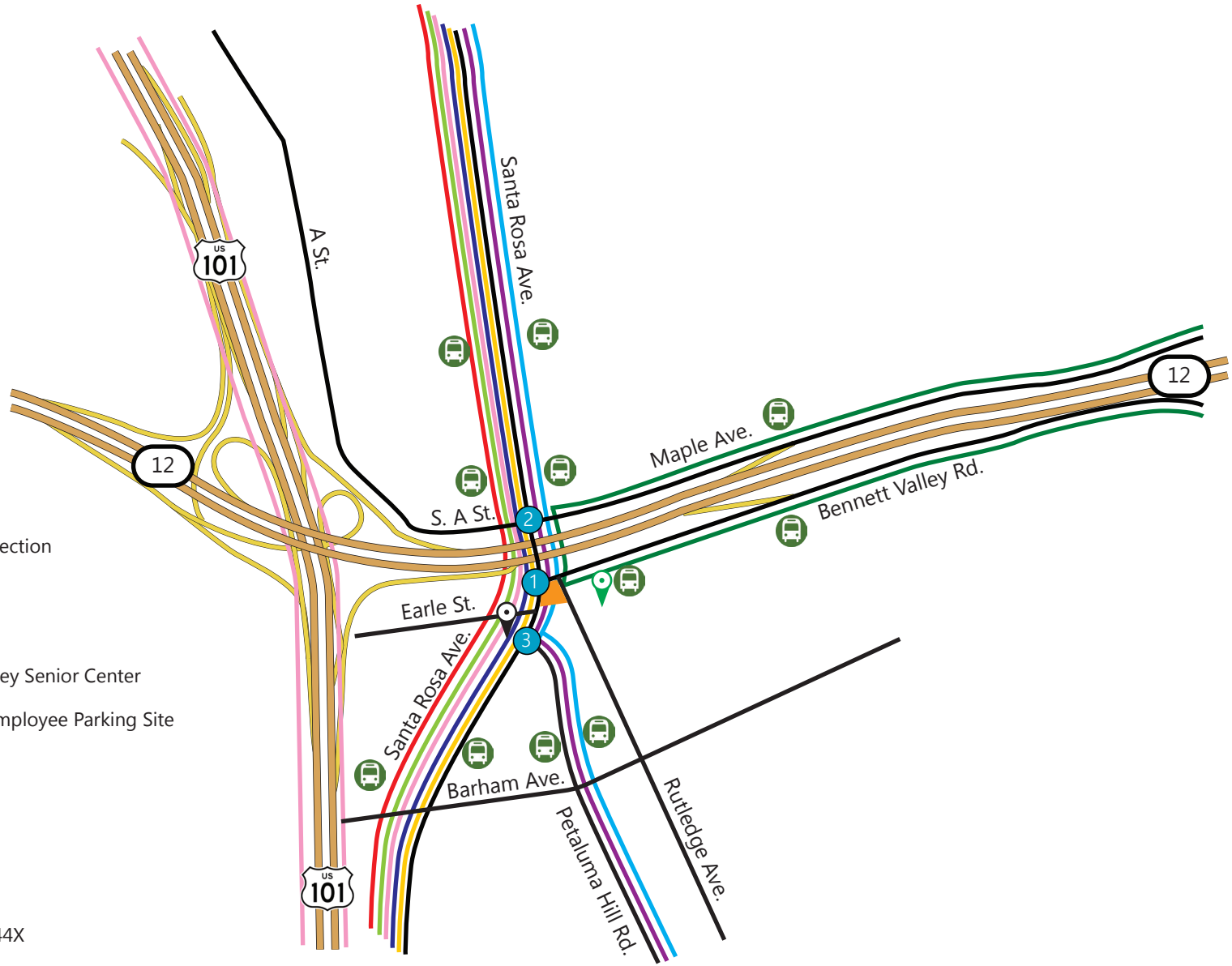
Figure 4

Existing Transit Facilities



LEGEND

- Study Intersection
- Project Site
- Bus Stop
- Bennett Valley Senior Center
- Proposed Employee Parking Site
- Route 3
- Route 5
- Route 18
- Route 42
- Route 44 / 44X
- Route 46
- Route 48
- Route 54

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3.7 Existing Peak Hour Traffic Volumes And Lane Configurations

The existing operations of the study intersections were evaluated for the highest one-hour volumes during weekday morning, and evening peak periods. Recent turning movement counts for vehicles, bicycles, and pedestrians were conducted during the weekday a.m. peak period (7:00-9:00 a.m.) and p.m. peak period (4:00-6:00 p.m.) at the study intersections provided by the City of Santa Rosa. Field verification of existing intersection lane configurations and traffic controls was also conducted and provided the basis for the level of service analysis for Existing Conditions. **Appendix B** includes all data sheets for the collected vehicle, bicycle, and pedestrian counts. **Figures 6** illustrate the existing lane geometry, a.m. and p.m. peak hours' vehicle turning movement volumes at the study intersections.

3.8 Intersection Level of Service Analysis – Existing Conditions

Existing intersection lane configurations, signal timings, and turning movement volumes are used to calculate the level of service for the study intersections during each peak hour. The peak hour factor based on counts was used to all study intersections for the existing analysis. The results of the LOS analysis using the SYNCHRO software program for Existing Conditions are summarized in **Table 2**.

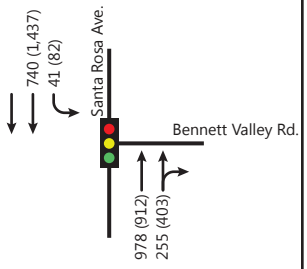
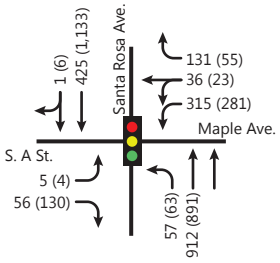
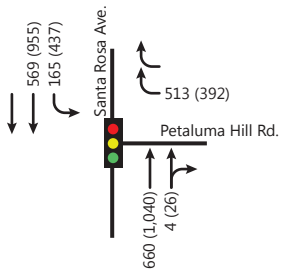
Table 2 below summarizes peak hour LOS at the study intersections under Existing Conditions. Under this scenario, all of the study intersections operate at acceptable service levels LOS D or better during a.m. and p.m. peak hours. LOS worksheets are provided in **Appendix C**.

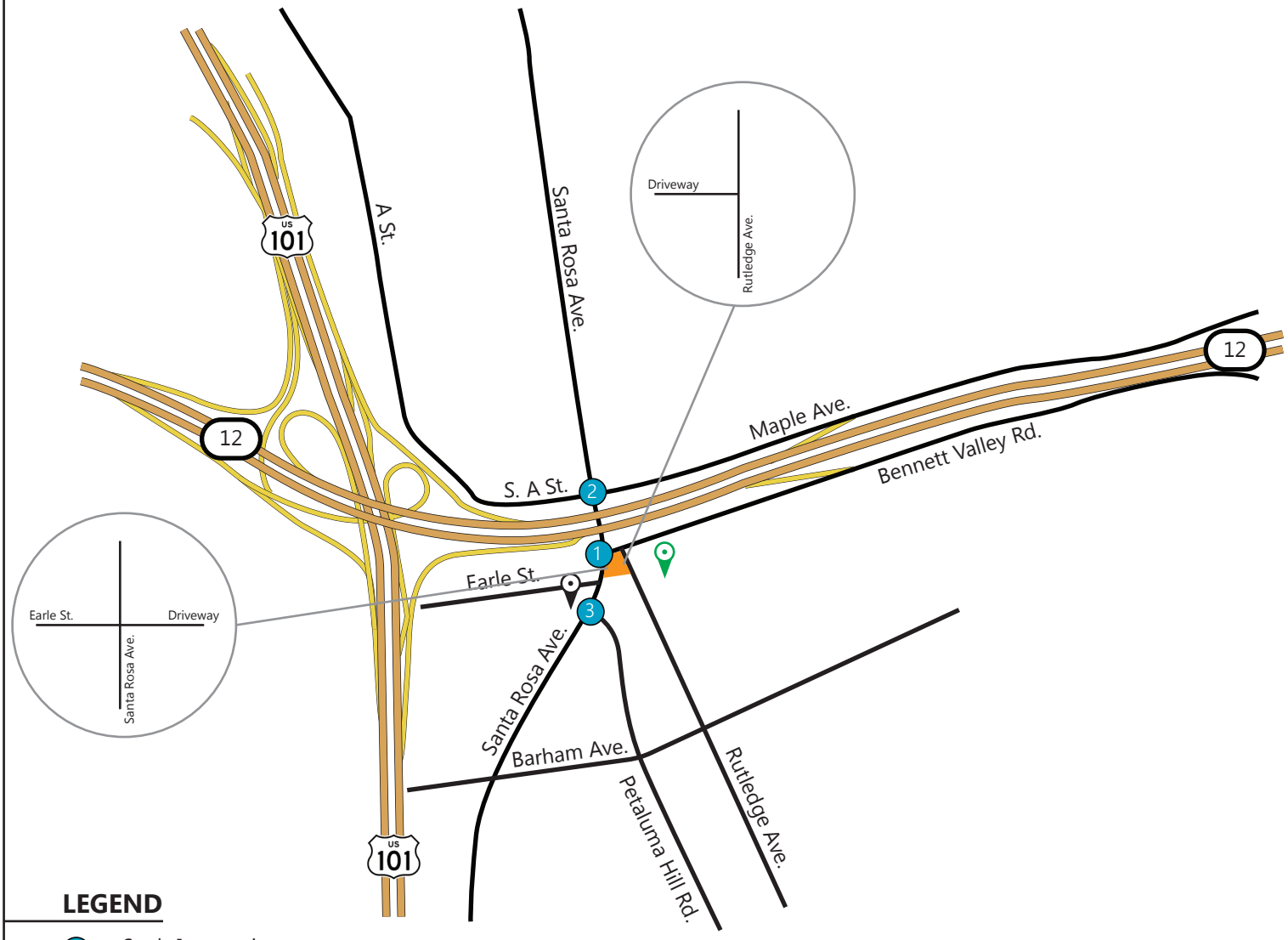
Table 2: Intersection Level of Service Analysis – Existing Conditions

#	Study Intersections	Control	Peak Hour[1]	Existing Conditions	
				Delay[2]	LOS[3]
1	Santa Rosa Avenue/ Bennett Valley Road	Signalized	AM	3.8	A
			PM	4.9	A
2	Santa Rosa Avenue/ Maple Avenue	Signalized	AM	15.4	B
			PM	14.8	B
3	Santa Rosa Avenue/ Petaluma Hill Road	Signalized	AM	4.6	A
			PM	10.4	B

Notes:
1. AM – morning peak hour, PM – evening peak hour
2. Delay – Whole intersection weighted average control delay expressed in seconds per vehicle for signalized and all-way stop controlled intersections. Total control delay for the worst movement is presented for side-street stop – controlled intersections.
3. LOS – Level of Service

Existing Lane Geometry and Volumes

Intersection #1 Bennett Valley Rd. / Santa Rosa Ave.	**Intersection #2** S. A St. & Maple Ave. / Santa Rosa Ave.	**Intersection #3** Petaluma Hill Rd. / Santa Rosa Ave.
		



LEGEND

- X — Study Intersection
- Project Site
- Bennett Valley Senior Center
- Proposed Employee Parking Site
- Traffic Signal
- XX — AM Peak Hour Volume
- (XX) — PM Peak Hour Volume

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4.0 EXISTING PLUS PROJECT CONDITIONS

The impacts of the proposed project on the transportation system are discussed in this chapter. First, the method used to estimate the amount of traffic generated by the project is described. Then, the results of the level of service calculations for Existing plus Project Conditions are presented. (Existing plus Project Conditions are defined as Existing Conditions plus traffic generated by the proposed project). A comparison of intersections under Existing plus Project Conditions and Existing Conditions is presented and the impacts of the project on the study intersections are discussed. Project impacts on roadway segments are also addressed.

To amount of traffic added to the roadway system by the proposed development is estimated using a three-step process.

- Trip Generation – Estimates the amount of traffic added to the roadway network,
- Trip Distribution – Estimates the direction of travel to and from the project site,
- Trip Assignment – The new trips are assigned to specific street segments and intersection turning movements.

4.1 Project Trip Generation

TJKM developed estimated project trip generation for the proposed project based on published trip generation rates from the *Institute of Transportation Engineers' (ITE) publication Trip Generation, 10th Edition*. The Land Use Code 882 for Marijuana Dispensary is new in this ITE edition, however, per the City of Santa Rosa, is close to the existing trips generated by approved facilities.

Table 3 shows the trip generation expected to be generated by the proposed project. The proposed project is expected to generate approximately 32 weekday a.m. peak hour trips (16 inbound trips, 16 outbound trips) and 68 weekday p.m. peak hour trips (34 inbound trips, 34 outbound trips).

Table 3: Project Trip Generation

Land Use (ITE code)	*Size*	*Daily*		*AM Peak*						*PM Peak*					
		Rate	*Trips*	*Rate*	*In %*	*Out %*	*In*	*Out*	*Total*	*Rate*	*In %*	*Out %*	*In*	*Out*	*Total*
Marijuana Dispensary (882) Weekday	3 ksf	252.70	**783**	10.44	50	50	16	16	**32**	21.83	50	50	34	34	**68**

ksf- per thousand square feet

Note: Source-Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition,2017

4.2 Project Trip Distribution and Assignment

Trip distribution is a process that determines in what proportion vehicles would be expected to travel between the project site and various destinations outside the project study area and also determines the various routes that vehicles would take from the project site to each destination using the calculated trip

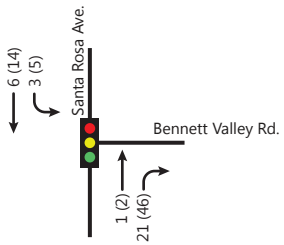
distribution. Trip distribution assumptions for the proposed project were developed based on existing travel patterns and knowledge of the study area.

In assigning project traffic, 40% of trips from Santa Rosa Avenue would be expected to enter/exit from the project during the a.m. and p.m. peak hour. These trips will use Santa Rosa Avenue to enter the project. The project trips exit through driveway on Santa Rosa Avenue, making right-turn at Santa Rosa Avenue/Bennett Valley Road to reach the Santa Rosa Avenue/Maple Avenue. This is due to the one-way traffic on Bennett Valley Road. 30% of the trips from US 101 would be expected to enter the project via Santa Rosa Avenue and exit from the driveway on Santa Rosa Avenue via Bennett Valley Road, Maple Avenue and then merge into Highway 12. 5% of the trips would be expected to enter the project from Petaluma Hill Road and exit via Santa Rosa Avenue, Bennett Valley Road, and Rutledge Avenue.

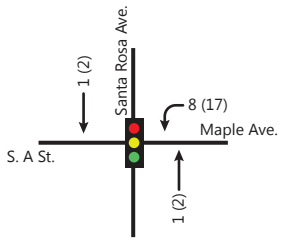
Figure 7 illustrates the trip distribution percentages and trip assignment developed for the proposed project. The assigned project trips were then added to traffic volumes under Existing Conditions to generate Existing plus Project Conditions traffic volumes.

Trip Distribution and Assignment

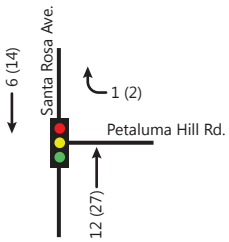
Intersection #1
Santa Rosa Ave. / Bennett Valley Rd.



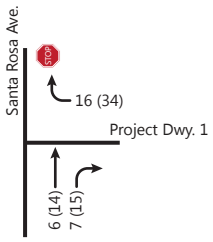
Intersection #2
Santa Rosa Ave. / S. A. St. / Maple Ave.



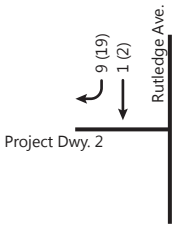
Intersection #3
Santa Rosa Ave. / Petaluma Hill Rd.

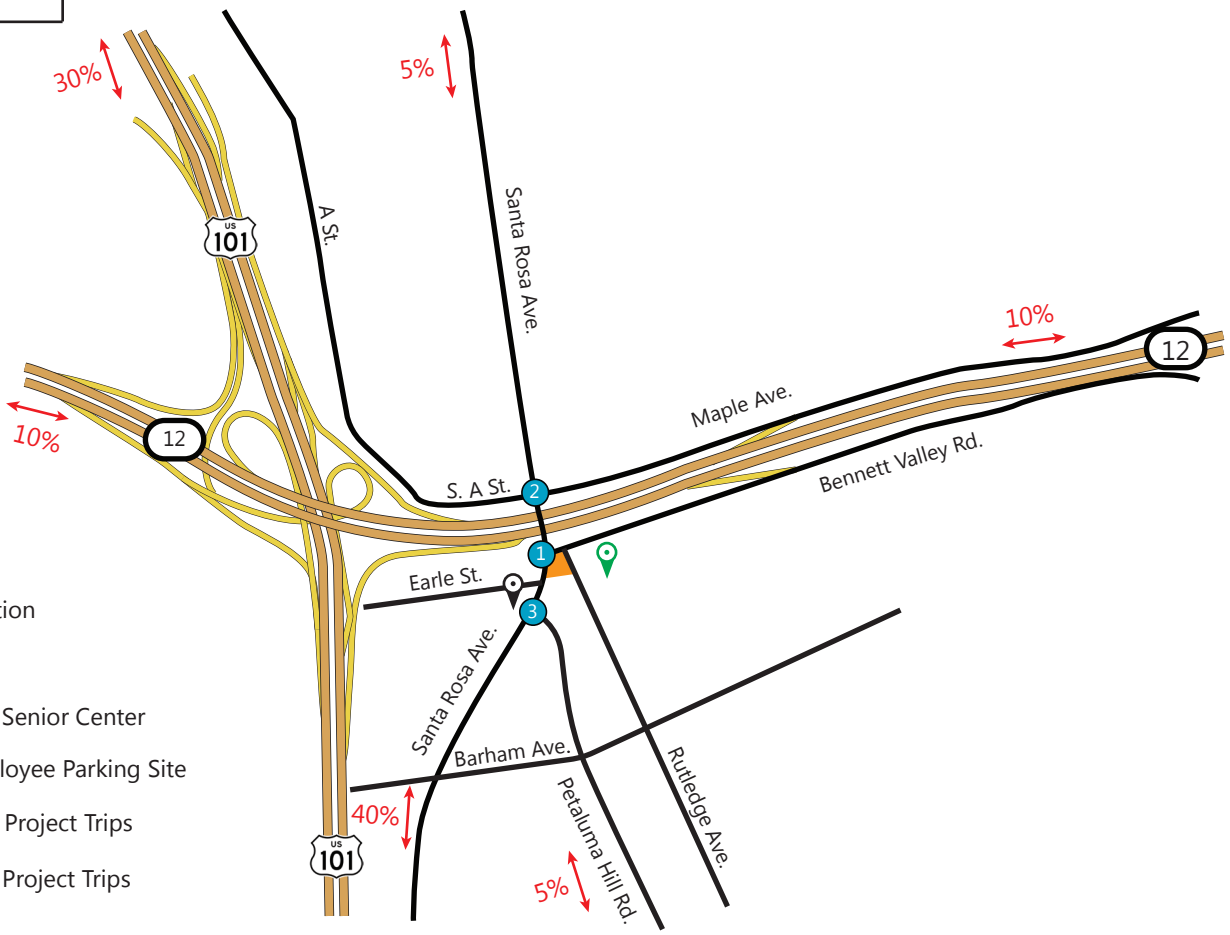


Intersection
Santa Rosa Ave. / Project Dwy. 1



Intersection
Rutledge Ave. / Project Dwy. 2





LEGEND

- Study Intersection
- Project Site
- Bennett Valley Senior Center
- Proposed Employee Parking Site
- XX — AM Peak Hour Project Trips
- (XX) — PM Peak Hour Project Trips
- Traffic Signal
- Stop Sign
- XX% — Trip Distribution Percentages

N

TJKM

4.3 Intersection Level of Service Analysis – Existing plus Project Conditions

The intersection LOS analysis results for Existing plus Project Conditions are summarized in **Table 4**. Detailed calculation sheets for Existing plus Project Conditions are contained in **Appendix D**. All intersections are expected to continue operating within applicable jurisdictional standards of LOS D.

Based on the City of Santa Rosa's impact criteria the project is expected to have a **less-than-significant impact** at all the study intersections evaluated in this TIA.

Figure 8 shows projected peak hour turning movement volumes at all of the study intersections for Existing plus Project Conditions.

The results for Existing Conditions are included for comparison purposes, along with the projected increases in average delay.

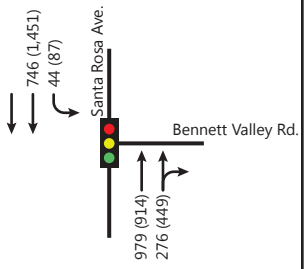
Table 4: Intersection Level of Service Analysis – Existing plus Project Conditions

#	Study Intersections	Control	Peak Hour[1]	Existing Conditions		Existing plus Project Conditions		*Change in*
				Delay[2]	LOS[3]	Delay[2]	LOS[3]	Change in Delay[4]
1	Santa Rosa Avenue/ Bennett Valley Road	Signalized	AM	3.8	A	3.9	A	0.1
			PM	4.9	A	5.1	A	0.2
2	Santa Rosa Avenue/ Maple Avenue	Signalized	AM	15.4	B	15.6	B	0.2
			PM	14.8	B	15.3	B	0.5
3	Santa Rosa Avenue/ Petaluma Hill Road	Signalized	AM	4.6	A	4.6	A	0.0
			PM	10.4	B	10.5	B	0.1

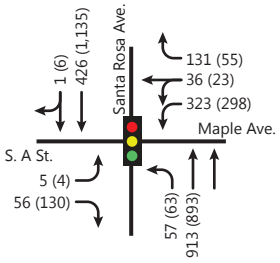
Notes:
1. AM – morning peak hour PM – evening peak hour
2. Delay – Whole intersection weighted average control delay expressed in seconds per vehicle for signalized and all-way stop controlled intersections. Total control delay for the worst movement is presented for side-street stop – controlled intersections.
3. LOS – Level of Service
4. Change in delay between Existing and Existing plus Project Conditions

Existing Plus Project Lane Geometry and Volumes

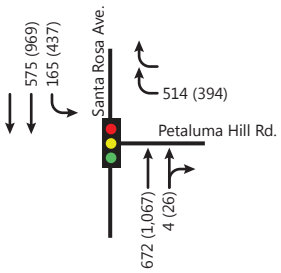
Intersection #1
Bennett Valley Rd. / Santa Rosa Ave.



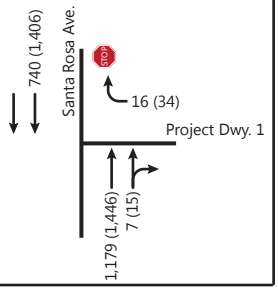
Intersection #2
S. A St. & Maple Ave.
/ Santa Rosa Ave.



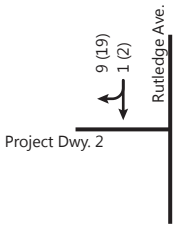
Intersection #3
Petaluma Hill Rd. / Santa Rosa Ave.

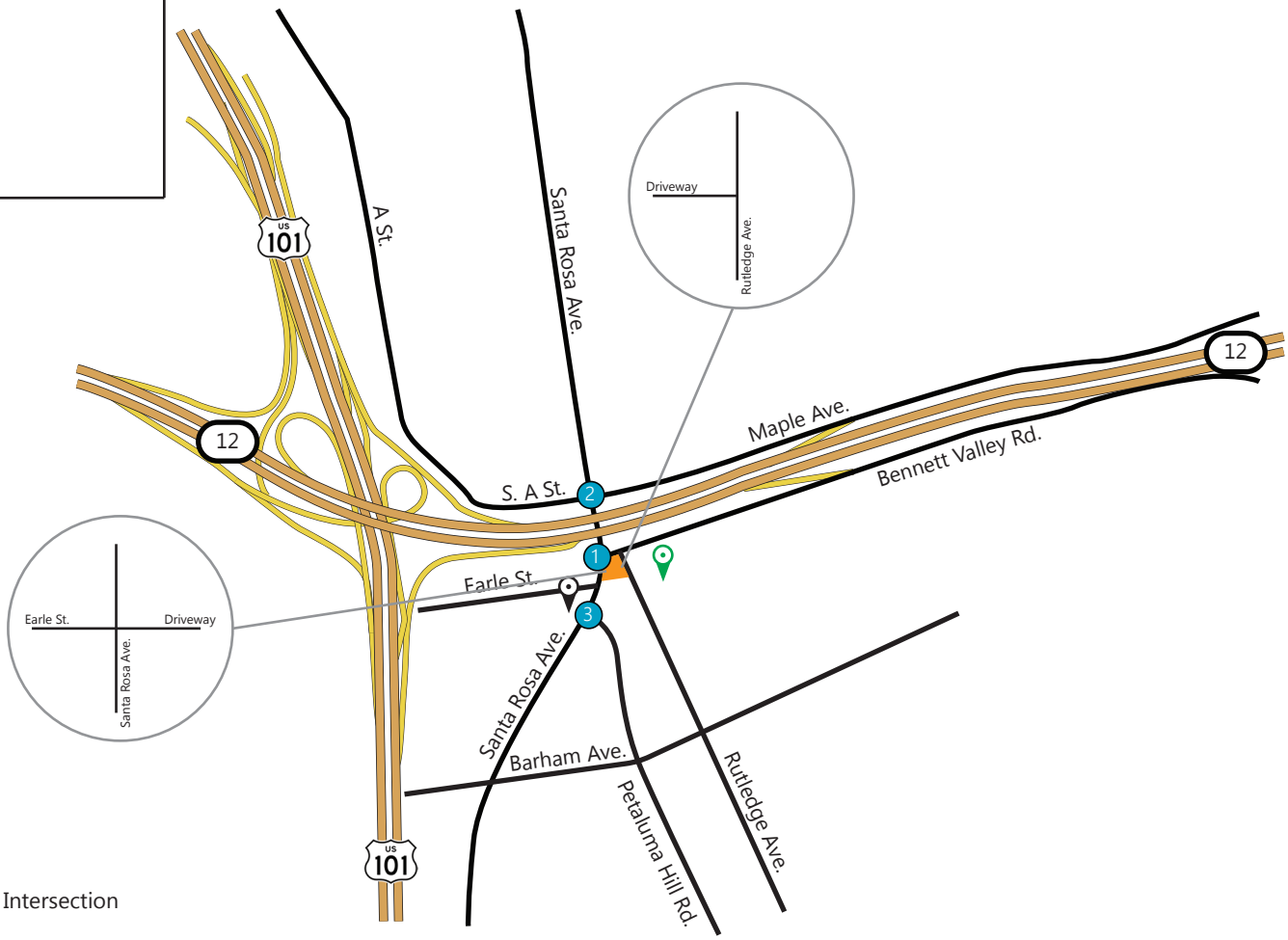


Intersection
Project Dwy. 1 / Santa Rosa Ave.



Intersection
Project Dwy. 2 / Rutledge Ave.





LEGEND

- X — Study Intersection
- Project Site
- Bennett Valley Senior Center
- Proposed Employee Parking Site
- STOP — Stop Sign
- Traffic Signal
- XX — AM Peak Hour Volume
- (XX) — PM Peak Hour Volume

N

TJKM

5.0 EXISTING PLUS APPROVED (BACKGROUND) PROJECTS CONDITIONS

This scenario is similar to Existing Conditions, but with the addition of traffic from approved and pending developments located within the immediate vicinity of the project. The City staff provided the list of approved and pending projects which represents the traffic volumes generated by projects that are approved but not constructed. Trip volumes were determined and added to the Existing Conditions volumes to project the peak hour turning movements at the study intersections under Existing plus Approved and Pending (Background) Conditions. The volumes are included in **Appendix E**.

5.1 Approved Projects and Planned Developments

Approved and pending developments located within the immediate vicinity of the project are:

- 1650 Meda Avenue- 16 residential units
- 1846 Meda Avenue- 101 residential units
- 2604 Petaluma Hill Road- 120 residential units
- 2800 Petaluma Hill Road- 5 residential units
- 368 Yolanda Avenue- 24,000 sf light industrial
- 1111 Petaluma Hill Road, 3,500 Cannabis Dispensary

5.2 Intersections Level of Service Analysis – Background Conditions

The intersection LOS analysis results for Background Conditions are summarized in **Table 5**. Detailed calculation sheets for Background Conditions (Existing plus Approved Projects) are contained in **Appendix E**. All intersections are expected to continue operating within applicable jurisdictional standards of LOS D under this scenario.

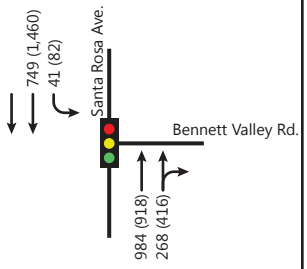
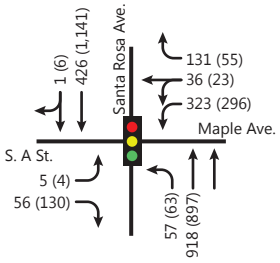
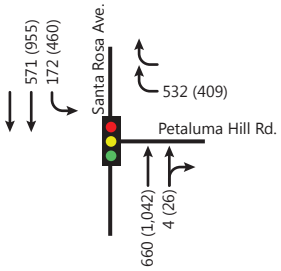
Table 5: Intersection Level of Service Analysis – Background Conditions

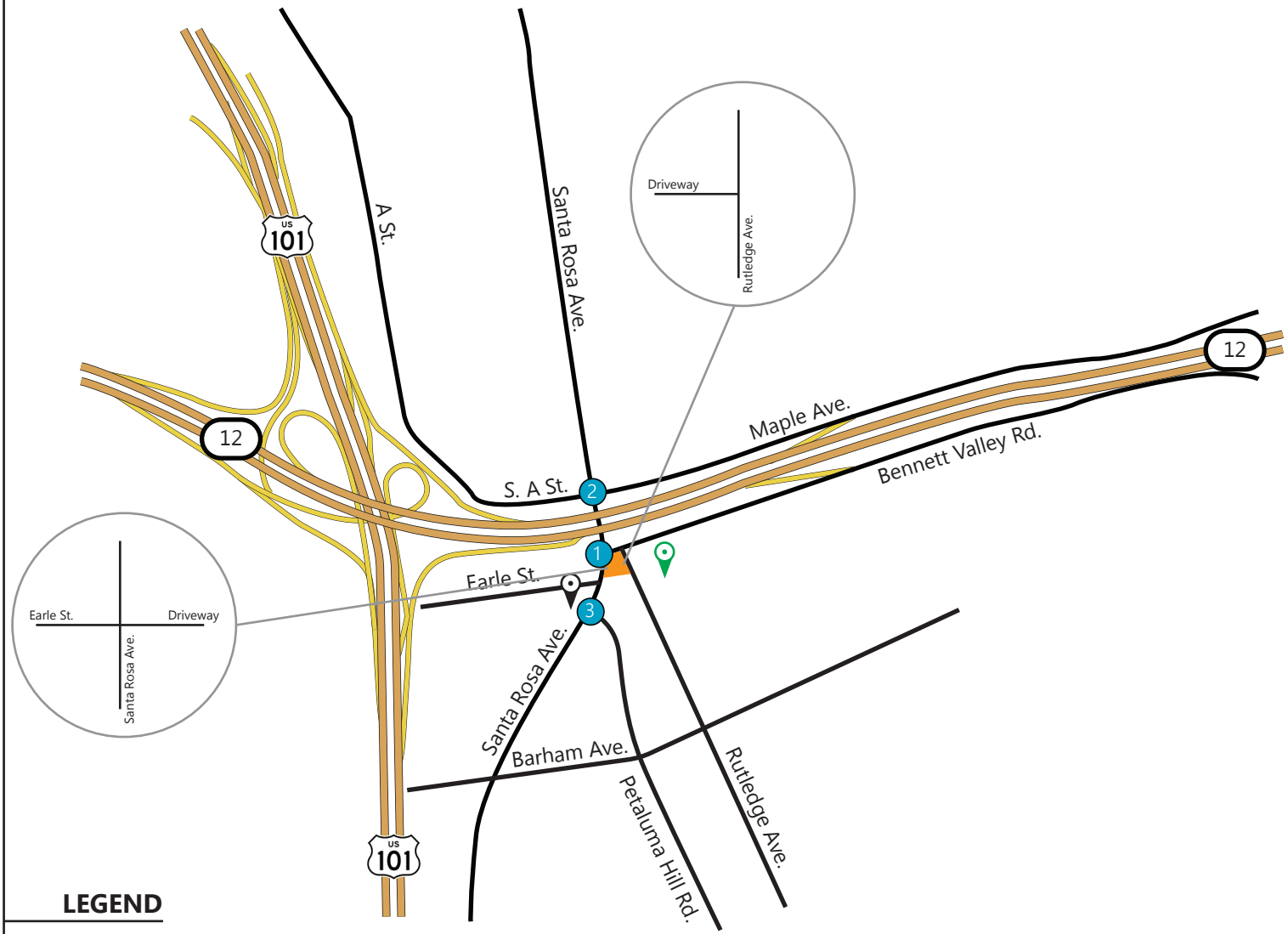
#	Study Intersections	Control	Peak Hour[1]	Background Conditions	
				Delay[2]	LOS[3]
1	Santa Rosa Avenue/ Bennett Valley Road	Signalized	AM	3.8	A
			PM	4.9	A
2	Santa Rosa Avenue/ Maple Avenue	Signalized	AM	15.5	B
			PM	15.3	B
3	Santa Rosa Avenue/ Petaluma Hill Road	Signalized	AM	4.8	A
			PM	10.7	B

Notes:
1. AM – morning peak hour, MD - Midday peak hour, PM – evening peak hour
2. Delay – Whole intersection weighted average control delay expressed in seconds per vehicle for signalized and all-way stop controlled intersections. Total control delay for the worst movement is presented for side-street stop – controlled intersections.
3. LOS – Level of Service

Figure 9 shows projected peak hour turning movement volumes at all of the study intersections for Background Conditions

Background Lane Geometry and Volumes

Intersection #1 Bennett Valley Rd. / Santa Rosa Ave.	**Intersection #2** S. A St. & Maple Ave. / Santa Rosa Ave.	**Intersection #3** Petaluma Hill Rd. / Santa Rosa Ave.
		



LEGEND

- X — Study Intersection
- Project Site
- Bennett Valley Senior Center
- Proposed Employee Parking Site
- Traffic Signal
- XX — AM Peak Hour Volume
- (XX) — PM Peak Hour Volume

N

TJKM

6.0 BACKGROUND PLUS PROJECT CONDITIONS

This scenario is identical to Background Conditions, but with the addition of projected traffic from the proposed mixed-use development project. Trip generation and distribution for the proposed project are identical to that assumed under Existing plus Project Conditions.

6.1 Intersection Level of Service Analysis – Background plus Project Conditions

The intersection LOS analysis results for Background plus Project Conditions are summarized in **Table 6**. Detailed calculation sheets for Background plus Project Conditions are contained in **Appendix F** All intersections are expected to continue operating within applicable jurisdictional standards of LOS D.

Based on the City of Santa Rosa's impact criteria, the project is expected to have a **less-than-significant impact** at all the study intersections evaluated in this TIA.

Figures 10 show projected peak hour turning movement volumes at all of the study intersections for Background plus Project Conditions.

The results for Background Conditions are included for comparison purposes, along with the projected increases in average delay.

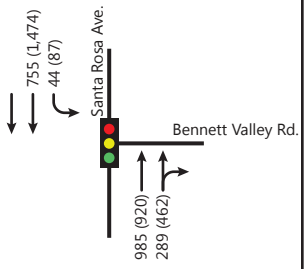
Table 6: Intersection Level of Service Analysis – Background plus Project Conditions

#	Study Intersections	Control	Peak Hour[1]	Background Conditions		Background plus Project Conditions		*Change in* Delay[4]
				Delay[2]	LOS[3]	Delay[2]	LOS[3]	
1	Santa Rosa Avenue/ Bennett Valley Road	Signalized	AM	3.8	A	3.9	A	0.1
			PM	4.9	A	5.2	A	0.3
2	Santa Rosa Avenue/ Maple Avenue	Signalized	AM	15.5	B	15.7	B	0.2
			PM	15.3	B	15.7	B	0.4
3	Santa Rosa Avenue/ Petaluma Hill Road	Signalized	AM	4.8	A	4.7	A	-0.1
			PM	10.7	B	10.8	B	0.1

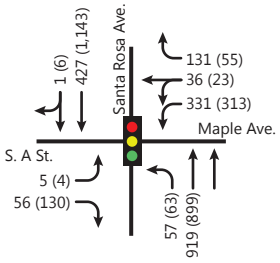
Notes:
1. AM – morning peak hour, PM – evening peak hour
2. Delay – Whole intersection weighted average control delay expressed in seconds per vehicle for signalized and all-way stop controlled intersections. Total control delay for the worst movement is presented for side-street stop – controlled intersections.
3. LOS – Level of Service
4. Change in delay between Background and Background plus Project Conditions

Background plus Project Lane Geometry and Volumes

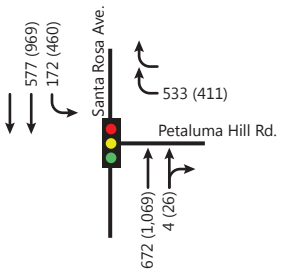
Intersection #1
Bennett Valley Rd. / Santa Rosa Ave.



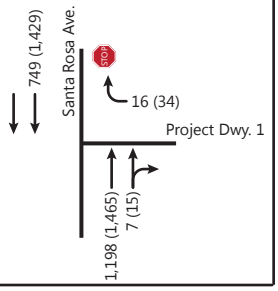
Intersection #2
S. A St. & Maple Ave.
/ Santa Rosa Ave.



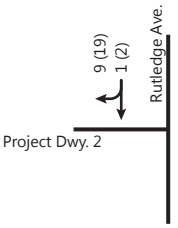
Intersection #3
Petaluma Hill Rd. / Santa Rosa Ave.

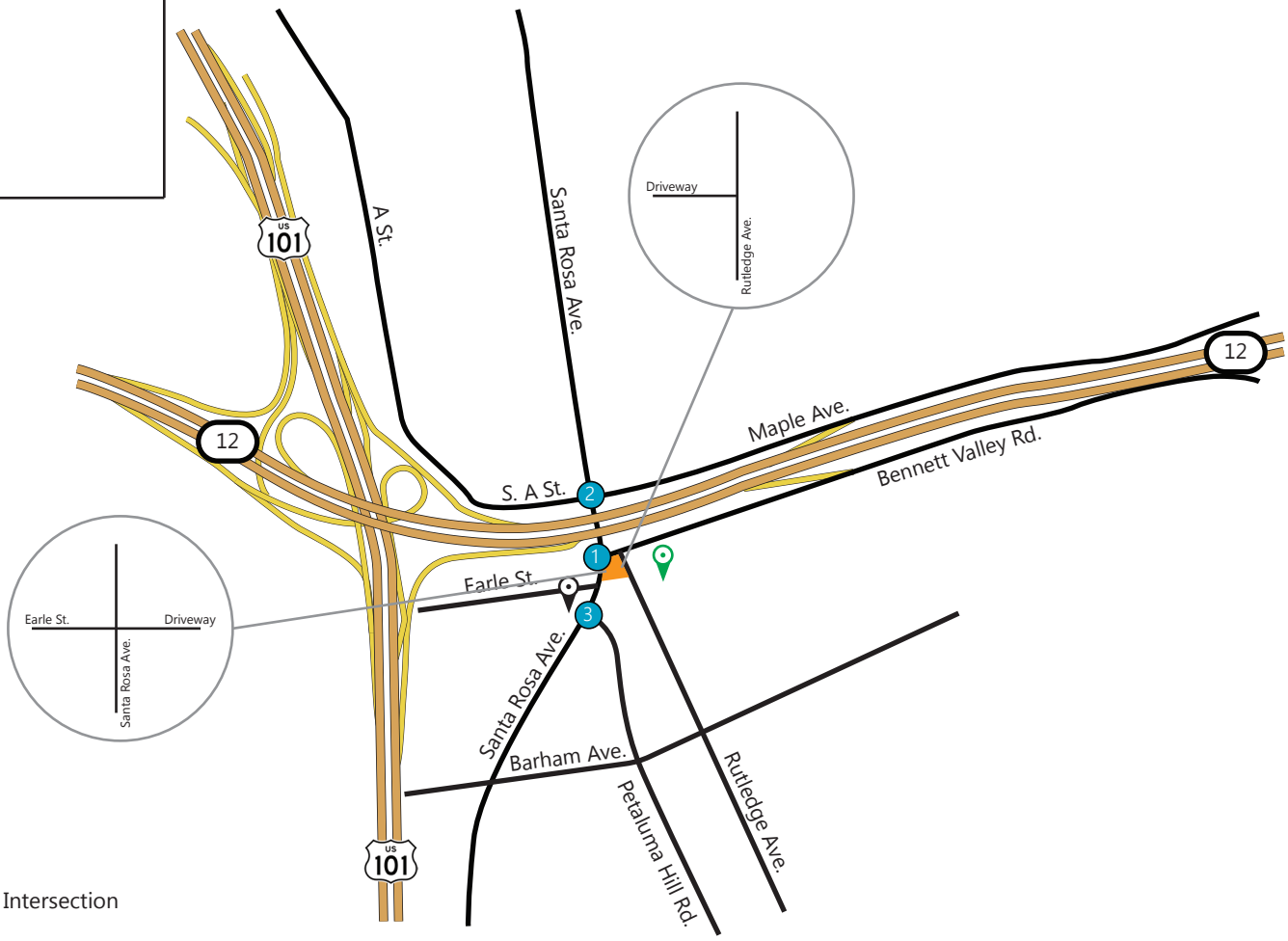


Intersection
Project Dwy. 1 / Santa Rosa Ave.



Intersection
Project Dwy. 2 / Rutledge Ave.





LEGEND

- X — Study Intersection
- Project Site
- Bennett Valley Senior Center
- Proposed Employee Parking Site
- STOP — Stop Sign
- Traffic Signal
- XX — AM Peak Hour Volume
- (XX) — PM Peak Hour Volume

N

TJKM

7.0 ADDITIONAL ANALYSES

The following sections provide additional analyses of other transportation issues associated with the project site, including:

- Site access and onsite circulation;
- Pedestrian, bicycle and transit impacts;
- Parking analysis;
- Collision History

Unlike the LOS impact methodology, which is adopted by the City Council, the analyses in these sections is based on professional judgment in accordance with the standards and methods employed by traffic engineers. Although operational issues are not considered CEQA impacts, they do describe traffic conditions that are relevant to describing the project environment.

7.1 Site Access and On-Site Circulation

This section analyzes site access and internal circulation for vehicles, pedestrians and bicycles based on the site plan presented on **Figure 2**. TJKM reviewed internal and external access for the project site for vehicles, pedestrians, and bicycles.

In terms of external access, the project conceptual plan provided by the applicant shows two driveways to access the site. The driveway on the eastern side of the project site can be accessed on Rutledge Avenue for ingress only. It is approximately 18 feet wide and can accommodate one-way access. The driveway on Santa Rosa Avenue allows for ingress and egress, and approximately 28 feet wide. Based on the conceptual plan, the driveway appears to be approximately 50 feet from the adjacent business' driveway, south of the proposed project site. The driveway is also approximately 60 feet from the signalized intersection of Santa Rosa Avenue and Bennett Valley Road. During the p.m. peak hour, vehicles exiting Mercy Wellness, may experience some delay waiting for traffic to pass to merge into the roadway. Rolling gates will be located at each driveway and will be open during hours of operation.

The internal circulation was reviewed for issues related to queuing, safety, dead-end aisles, and parking spaces with difficult maneuvers. The parking lot allows for two-way travel and emergency and service vehicles are able to access the site as needed. A designated loading zone is located on the southeast portion of the site, so there is less conflict of vehicles entering the parking lot from Santa Rosa Avenue.

Sight distance from the driveways is adequate.

7.3 Pedestrian, Bicycle, and Transit Impacts

Pedestrian Access

An impact to pedestrians occurs if the proposed project disrupts existing pedestrian's facilities; or create inconsistencies with planned pedestrian facilities or adopted pedestrian system plans, guidelines, policies, or standards. The proposed project does not conflict with existing and planned pedestrian facilities; therefore, the impact to pedestrian facilities is ***less than significant***.

Bicycle Access

An impact to bicyclists occurs if the proposed project disrupts existing bicycle facilities; or conflicts or creates inconsistencies with adopted bicycle system plans, guidelines, policies or standards as per the City of Santa Rosa bicycle impact criteria. The project is expected to generate few additional bicycle trips on existing and planned bicycle facilities. The project does not conflict with existing and planned bicycle facilities; therefore, the impact to bicycle facilities is ***less than significant***.

Transit Access

A proposed project is considered to have a significant impact on transit if it conflicts with existing or planned transit facilities, or is expected to generate additional transit trips and does not provide adequate facilities for pedestrians and bicyclists to access transit routes and stops. The transit service within the immediate project site and additional trips generated by the proposed project could be accommodated by existing transit services. Therefore, impacts to transit service are expected to be ***less than significant***.

7.4 Collision History

Collision history was reviewed to determine any trends or patterns that may indicate a safety issues. Collision rates were calculated based on records available from the California Highway Patrol as published in the Statewide Integrated Traffic Records System Reports (SWITRS). The most current and available five-year period available is January 1, 2012 through December 31, 2017.

Table 7 shows the calculated collision rate compared to the statewide average collision rate. Based on the collisions within the past 5 years, the study intersections collision rate below the statewide average.

Table 7: Collision Rate Analysis

Study Intersections	Total # of Collisions (2012-17)	Intersection Collision Rate (ICR)	Statewide Average Collision Rate	Intersection Collision Rate > Statewide Average Collision Rate
Santa Rosa Avenue/ Bennett Valley Road	1	0.02	0.19	No
Santa Rosa Avenue/ Maple Avenue	2	0.05	0.24	No
Santa Rosa Avenue/ Petaluma Hill Road	4	0.09	0.19	No

Source: SWITRS

Notes: ICR = 1000000*A / (365*T*ADT)

ICR= Observed collision rate; Number of accidents/vehicles miles traveled

A = Number of collisions over study period

T = Total number of years over which intersection accidents were collected; 2012 to 2017 = 5 years

ADT = Average Daily Traffic

[1]Obtained from 2015 Collision Data on California State Highways, Basic Average Accident Rate Table for Intersections, Page 89 and 90

7.5 PARKING

Per the City of Santa Rosa Parking Zoning Code Section 20-3.6.040, the parking space facility for the retail use is one space per 250 sf and one bicycle parking space per 5,000 sf. The total amount of planned parking spaces is 10. The following parking requirements are detailed in **Table 8**

Table 8: Parking Requirements at 900 Santa Rosa Avenue

Suite Business Name/ Use	***Leased SF***	***City Required Parking (Space/Square feet)***	***Required Parking Space***
Proposed Retail Cannabis Dispensary/ Retail	3,072	1/250	**12**
		Proposed Spaces on Site	**10**
		Number of deficient spaces	**2**

The City's Zoning Code requires ADA and bicycle parking. The project will provide a bicycle rack for three bicycles, installed per the City's standards, located on the westside of the building adjacent to Santa Rosa Avenue. The City's Zoning Code Section 20-36.060, *Parking Requirements for the Disabled,* requires a minimum of one ADA space for parking lots or garages that have 1-25 spaces. Per the project Site Plan, **Figure 2**, the project will provide one 19' x 12' ADA parking space with a five foot wide accessible path to the building.

To accommodate the deficient parking spaces, the Mercy Wellness developer has provided a *Parking Incentive/Contingency Plan*, which is detailed in **Appendix G** and summarized below:

- Provide security to monitor parking
- Designate a loading zone area for deliveries in the southeast portion of the project site.
- Lease privately owned, offsite parking across from the project site to accommodate up to eight vehicles
- Transportation Demand Management (TDM) measures to provide employee incentives for bicycling/walking, and transit such as reimbursement and transit subsidies
- Provide parking passes to employees for use at the closest City public parking garage located at 555 First Street.

If the leased offsite parking is located across from Mercy Wellness, near Santa Rosa Avenue and Earle Street, staff should be instructed to use the marked crosswalks instead of midblock crossing. It is pertinent to have these measures in place in order to accommodate the parking deficiency as well as limit any potential impacts by occupying on-street parking in the residential neighborhood areas.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Project Trip Generation

The proposed project is expected to generate approximately 32 weekday a.m. peak hour trips (16 inbound trips, 16 outbound trips) and 68 weekday p.m. peak hour trips (34 inbound trips, 34 outbound trips).

Existing and Background Conditions

Under these scenarios, all of the study intersections operate within applicable jurisdictional standards of LOS D or better during the a.m. and p.m. peak hours.

Existing, and Background plus Project Conditions

Under this scenarios, all of the study intersections operate within applicable jurisdictional standards of LOS D or better during the a.m., and p.m. peak hours.

Based on the City impact criteria the project is expected to have a **less-than-significant** impact at all of the study intersections.

Pedestrian Impacts

The proposed project does not conflict with existing and planned pedestrian facilities; therefore, the impact to pedestrian facilities is ***less-than-significant***.

Bicycle Impacts

The project is expected to generate additional bicycle trips on existing and planned bicycle facilities and does not conflict with existing and planned bicycle facilities; therefore, the impact to bicycle facilities is ***less than significant***.

Transit Impacts

The project site is in close proximity to transit which operate with 30 to 60 minute headways. The project site is adequately served by the SC transit service. Therefore, impacts to transit service are expected to be ***less than significant***.

Site Access and On-Site Circulation

The conceptual project site plan shows two driveways- a two-directional driveway on Santa Rosa Avenue an ingress only driveway on Rutledge Avenue. The internal circulation and sight distances from the proposed project driveways are adequate.

Parking

The proposed parking for Mercy Wellness is ten spaces including one ADA space. Three bicycle parking spaces are provided on site. The project is deficient two parking spaces. To accommodate the deficiency, the developer has provided a *Parking Incentive/Contingency Plan*. If implemented, the project is able to accommodate the two parking spaces through a leased off-site parking lot and employee incentives to use alternate modes of transportation or to park at a public parking garage.

Appendix A – Level of Service Methodology

LEVEL OF SERVICE METHODOLOGY

LEVEL OF SERVICE

The description and procedures for calculating capacity and level of service are found in Transportation Research Board, *Highway Capacity Manual 2000*. *Highway Capacity Manual 2000* represents the latest research on capacity and quality of service for transportation facilities.

Quality of service requires quantitative measures to characterize operational conditions within a traffic stream. Level of service is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six levels of service are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with level-of-service A representing the best operating conditions and level-of-service F the worst. Each level of service represents a range of operating conditions and the driver's perception of these conditions. Safety is not included in the measures that establish service levels.

A general description of service levels for various types of facilities is shown in Table A-I.

Table A-I

Level of Service Description

Facility Type	**Uninterrupted Flow**	**Interrupted Flow**
	Freeways Multi-lane Highways Two-lane Highways Urban Streets	Signalized Intersections Unsignalized Intersections Two-way Stop Control All-way Stop Control
LOS		
A	Free-flow	Very low delay.
B	Stable flow. Presence of other users noticeable.	Low delay.
C	Stable flow. Comfort and convenience starts to decline.	Acceptable delay.
D	High density stable flow.	Tolerable delay.
E	Unstable flow.	Limit of acceptable delay.
F	Forced or breakdown flow.	Unacceptable delay

Source: *Highway Capacity Manual 2000*

Urban Streets

The term "urban streets" refers to urban arterials and collectors, including those in downtown areas.

Arterial streets are roads that primarily serve longer through trips. However, providing access to abutting commercial and residential land uses is also an important function of arterials.

Collector streets provide both land access and traffic circulation within residential, commercial and industrial areas. Their access function is more important than that of arterials, and unlike arterials their operation is not always dominated by traffic signals.

Downtown streets are signalized facilities that often resemble arterials. They not only move through traffic but also provide access to local businesses for passenger cars, transit buses, and trucks. Pedestrian conflicts and lane obstructions created by stopping or standing buses, trucks and parking vehicles that cause turbulence in the traffic flow are typical of downtown streets.

The speed of vehicles on urban streets is influenced by three main factors, street environment, interaction among vehicles and traffic control. As a result, these factors also affect quality of service.

The street environment includes the geometric characteristics of the facility, the character of roadside activity and adjacent land uses. Thus, the environment reflects the number and width of lanes, type of median, driveway density, spacing between signalized intersections, existence of parking, level of pedestrian activity and speed limit.

The interaction among vehicles is determined by traffic density, the proportion of trucks and buses, and turning movements. This interaction affects the operation of vehicles at intersections and, to a lesser extent, between signals.

Traffic control (including signals and signs) forces a portion of all vehicles to slow or stop. The delays and speed changes caused by traffic control devices reduce vehicle speeds, however, such controls are needed to establish right-of-way.

The average travel speed for through vehicles along an urban street is the determinant of the operating level of service. The travel speed along a segment, section or entire length of an urban street is dependent on the running speed between signalized intersections and the amount of control delay incurred at signalized intersections.

Level-of-service A describes primarily free-flow operations. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Control delay at signalized intersections is minimal.

Level-of-service B describes reasonably unimpeded operations. The ability to maneuver within the traffic stream is only slightly restricted, and control delays at signalized intersections are not significant.

Level-of-service C describes stable operations, however, ability to maneuver and change lanes in midblock location may be more restricted than at level-of-service B. Longer queues, adverse signal coordination, or both may contribute to lower travel speeds.

Level-of-service D borders on a range in which in which small increases in flow may cause substantial increases in delay and decreases in travel speed. Level-of-service D may be due to adverse signal progression, inappropriate signal timing, high volumes, or a combination of these factors.

Level-of-service E is characterized by significant delays and lower travel speeds. Such operations are caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

Level-of-service F is characterized by urban street flow at extremely low speeds. Intersection congestion is likely at critical signalized locations, with high delays, high volumes, and extensive queuing.

The methodology to determine level of service stratifies urban streets into four classifications. The classifications are complex, and are related to functional and design categories. Table A-II describes the functional and design categories, while Table A-III relates these to the urban street classification.

Once classified, the urban street is divided into segments for analysis. An urban street segment is a one-way section of street encompassing a series of blocks or links terminating at a signalized intersection. Adjacent segments of urban streets may be combined to form larger street sections, provided that the segments have similar demand flows and characteristics.

Levels of service are related to the average travel speed of vehicles along the urban street segment or section.

Travel times for existing conditions are obtained by field measurements. The maximum-car technique is used. The vehicle is driven at the posted speed limit unless impeded by actual traffic conditions. In the maximum-car technique, a safe level of vehicular operation is maintained by observing proper following distances and by changing speeds at reasonable rates of acceleration and deceleration. The maximum-car technique provides the best base for measuring traffic performance.

An observer records the travel time and locations and duration of delay. The beginning and ending points are the centers of intersections. Delays include times waiting in queues at signalized intersections. The travel speed is determined by dividing the length of the segment by the travel time. Once the travel speed on the arterial is determined, the level of service is found by comparing the speed to the criteria in Table A-IV. Level-of-service criteria vary for the different classifications of urban street, reflecting differences in driver expectations.

Table A-II

Functional and Design Categories for Urban Streets

Criterion	Functional Category	
	Principal Arterial	**Minor Arterial**
Mobility function	Very important	Important
Access function	Very minor	Substantial
Points connected	Freeways, important activity centers, major traffic generators	Principal arterials
Predominant trips served	Relatively long trips between major points and through trips entering, leaving, and passing through city	Trips of moderate length within relatively small geographical areas

Criterion	Design Category			
	High-Speed	**Suburban**	**Intermediate**	**Urban**
Driveway access density	Very low density	Low density	Moderate density	High density
Arterial type	Multilane divided; undivided or two-lane with shoulders	Multilane divided: undivided or two-lane with shoulders	Multilane divided or undivided; one way, two lane	Undivided one way; two way, two or more lanes
Parking	No	No	Some	Usually
Separate left-turn lanes	Yes	Yes	Usually	Some
Signals per mile	0.5 to 2	1 to 5	4 to 10	6 to 12
Speed limits	45 to 55 mph	40 to 45 mph	30 to 40 mph	25 to 35 mph
Pedestrian activity	Very little	Little	Some	Usually
Roadside development	Low density	Low to medium density	Medium to moderate density	High density

Source: *Highway Capacity Manual 2000*

Table A-III

Urban Street Class based on Function and Design Categories

Design Category	Functional Category	
	Principal Arterial	**Minor Arterial**
High-Speed	I	Not applicable
Suburban	II	II
Intermediate	II	III or IV
Urban	III or IV	IV

Source: *Highway Capacity Manual 2000*

Table A-IV

Urban Street Levels of Service by Class

Urban Street Class	I	II	III	IV
Range of Free Flow Speeds (mph)	45 to 55	35 to 45	30 to 35	25 to 35
Typical Free Flow Speed (mph)	50	40	33	30
Level of Service	**Average Travel Speed (mph)**			
A	>42	>35	>30	>25
B	>34	>28	>24	>19
C	>27	>22	>18	>13
D	>21	>17	>14	>9
E	>16	>13	>10	>7
F	≤16	≤13	≤10	≤7

Source: *Highway Capacity Manual 2000*

Interrupted Flow

One of the more important elements limiting, and often interrupting the flow of traffic on a highway is the intersection. Flow on an interrupted facility is usually dominated by points of fixed operation such as traffic signals, stop and yield signs. These all operate quite differently and have differing impacts on overall flow.

Signalized Intersections

The capacity of a highway is related primarily to the geometric characteristics of the facility, as well as to the composition of the traffic stream on the facility. Geometrics are a fixed, or non-varying, characteristic of a facility.

At the signalized intersection, an additional element is introduced into the concept of capacity: time allocation. A traffic signal essentially allocates time among conflicting traffic movements seeking use of the same physical space. The way in which time is allocated has a significant impact on the operation of the intersection and on the capacity of the intersection and its approaches.

Level of service for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, traffic and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions, *i. e.,* in the absence of traffic control, geometric delay, any incidents, and any other vehicles. Specifically, level of service criteria for traffic signals are stated in terms of average control delay per vehicle, typically for a 15-minute analysis period. Delay is a complex measure and depends on a number of variables, including the quality of progression, the cycle length, the ratio of green time to cycle length and the volume to capacity ratio for the lane group.

For each intersection analyzed the average control delay per vehicle per approach is determined for the peak hour. A weighted average of control delay per vehicle is then determined for the intersection. A level of service designation is given to the control delay to better describe the level of operation. A

description of levels of service for signalized intersections can be found in Table A-V.

Table A-V

Description of Level of Service for Signalized Intersections

Level of Service	Description
A	Very low control delay, up to 10 seconds per vehicle. Progression is extremely favorable, and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.
B	Control delay greater than 10 and up to 20 seconds per vehicle. There is good progression or short cycle lengths or both. More vehicles stop causing higher levels of delay.
C	Control delay greater than 20 and up to 35 seconds per vehicle. Higher delays are caused by fair progression or longer cycle lengths or both. Individual cycle failures may begin to appear. Cycle failure occurs when a given green phase doe not serve queued vehicles, and overflow occurs. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.
D	Control delay greater than 35 and up to 55 seconds per vehicle. The influence of congestions becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volumes. Many vehicles stop, the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Control delay greater than 55 and up to 80 seconds per vehicle. The limit of acceptable delay. High delays usually indicate poor progression, long cycle lengths, and high volumes. Individual cycle failures are frequent.
F	Control delay in excess of 80 seconds per vehicle. Unacceptable to most drivers. Oversaturation, arrival flow rates exceed the capacity of the intersection. Many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to higher delay.

Source: *Highway Capacity Manual 2000*

The use of control delay, which may also be referred to as signal delay, was introduced in the 1997 update to the *Highway Capacity Manual*, and represents a departure from previous updates. In the third edition, published in 1985 and the 1994 update to the third edition, delay only included stopped delay. Thus, the level of service criteria listed in Table A-V differs from earlier criteria.

Unsignalized Intersections

The current procedures on unsignalized intersections were first introduced in the 1997 update to the *Highway Capacity Manual* and represent a revision of the methodology published in the 1994 update to the 1985 *Highway Capacity Manual*. The revised procedures use control delay as a measure of effectiveness to determine level of service. Delay is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, traffic and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions, *i. e.,* in the absence of traffic control, geometric delay, any incidents, and any other vehicles. Control delay is the increased time of travel for a vehicle approaching and passing through an unsignalized intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection.

Two-Way Stop Controlled Intersections

Two-way stop controlled intersections in which stop signs are used to assign the right-of-way, are the most prevalent type of intersection in the United States. At two-way stop-controlled intersections the stop-controlled approaches are referred as the minor street approaches and can be either public streets or private driveways. The approaches that are not controlled by stop signs are referred to as the major street approaches.

The capacity of movements subject to delay are determined using the "critical gap" method of capacity analysis. Expected average control delay based on movement volume and movement capacity is calculated. A level of service designation is given to the expected control delay for each minor movement. Level of service is not defined for the intersection as a whole. Control delay is the increased time of travel for a vehicle approaching and passing through a stop-controlled intersection, compared with a free-flow vehicle if it were not required to slow or stop at the intersection. A description of levels of service for two-way stop-controlled intersections is found in Table A-VI.

Table A-VI

Description of Level of Service for Two-Way Stop Controlled Intersections

Level of Service	Description
A	Very low control delay less than 10 seconds per vehicle for each movement subject to delay.
B	Low control delay greater than 10 and up to 15 seconds per vehicle for each movement subject to delay.
C	Acceptable control delay greater than 15 and up to 25 seconds per vehicle for each movement subject to delay.
D	Tolerable control delay greater than 25 and up to 35 seconds per vehicle for each movement subject to delay.
E	Limit of tolerable control delay greater than 35 and up to 50 seconds per vehicle for each movement subject to delay.
F	Unacceptable control delay in excess of 50 seconds per vehicle for each movement subject to delay.

Source: *Highway Capacity Manual 2000*

Appendix B – Existing Traffic Counts

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE:	LOCATION:	SANTA ROSA	PROJECT #:	2016-05
5/10/16	NORTH & SOUTH:	SANTA ROSA	LOCATION #:	8
TUESDAY	EAST & WEST:	BENNETT VALLEY	CONTROL:	SIGNAL

NOTES:

AM / PM / MD / OTHER / OTHER

▲ N ◄ W E ► S ▼

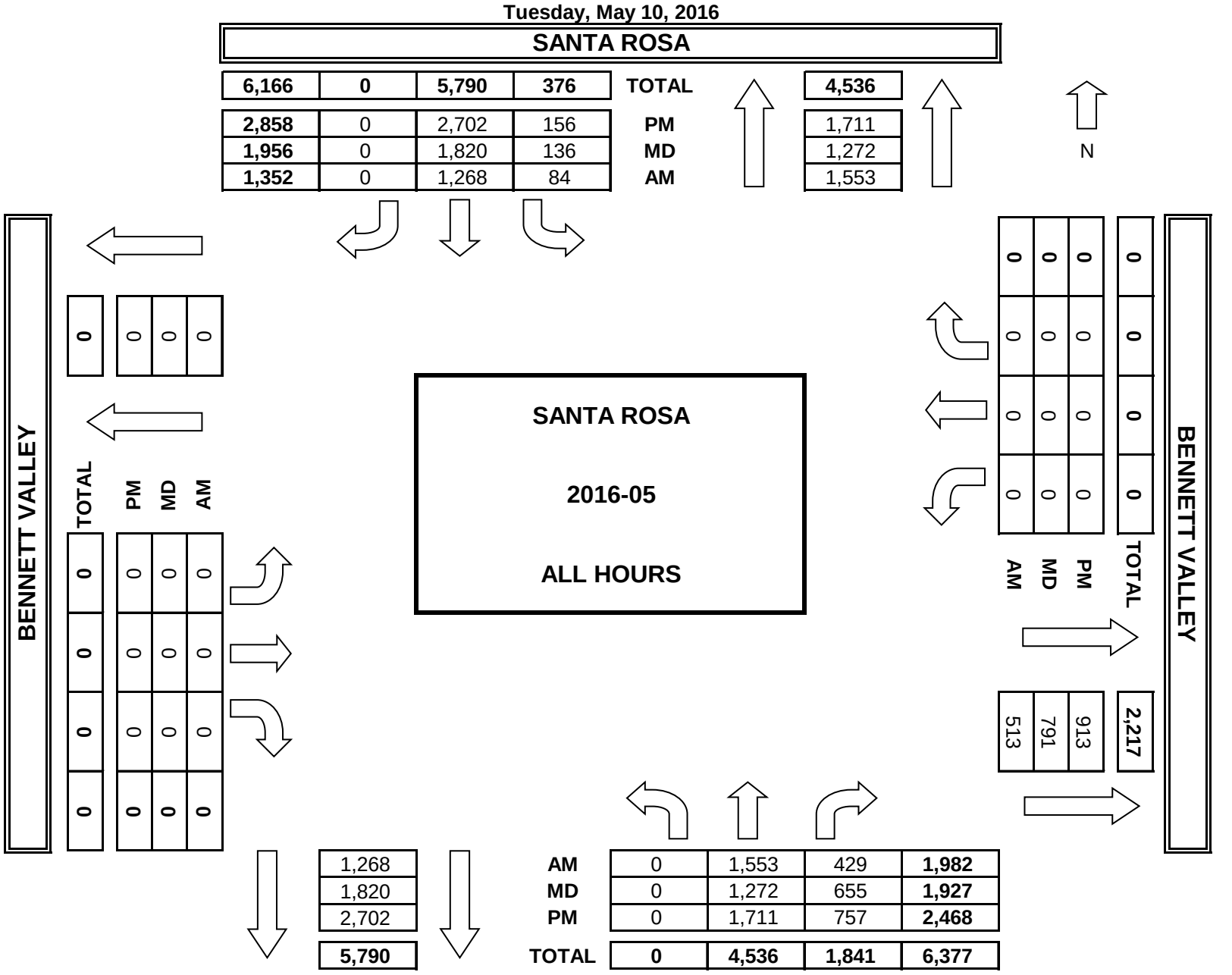
	NORTHBOUND SANTA ROSA			SOUTHBOUND SANTA ROSA			EASTBOUND BENNETT VALLEY			WESTBOUND BENNETT VALLEY			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	X	2	0	1	2	X	X	X	X	X	X	X	
AM													
6:30 AM													0
6:45 AM													0
7:00 AM		73	22	4	67								166
7:15 AM		111	36	4	130								281
7:30 AM		180	55	9	157								401
7:45 AM		295	68	14	188								565
8:00 AM		206	59	11	215								491
8:15 AM		244	68	7	168								487
8:30 AM		233	60	9	169								471
8:45 AM		211	61	26	174								472
9:00 AM													0
9:15 AM													0
VOLUMES	0	1,553	429	84	1,268	0	0	0	0	0	0	0	3,334
APPROACH %	0%	78%	22%	6%	94%	0%	0%	0%	0%	0%	0%	0%	
APP/DEPART	1,982	/	1,553	1,352	/	1,268	0	/	513	0	/	0	0
BEGIN PEAK HR		7:45 AM											
VOLUMES	0	978	255	41	740	0	0	0	0	0	0	0	2,014
APPROACH %	0%	79%	21%	5%	95%	0%	0%	0%	0%	0%	0%	0%	
PEAK HR FACTOR		0.849			0.864			0.000			0.000		0.891
APP/DEPART	1,233	/	978	781	/	740	0	/	296	0	/	0	0
MIDDAY													
11:00 AM													0
11:15 AM													0
11:30 AM		158	71	11	224								464
11:45 AM		153	81	16	230								480
12:00 PM		151	68	31	228								478
12:15 PM		172	75	15	237								499
12:30 PM		165	70	13	224								472
12:45 PM		160	88	21	223								492
1:00 PM		158	101	16	232								507
1:15 PM		155	101	13	222								491
1:30 PM													0
1:45 PM													0
VOLUMES	0	1,272	655	136	1,820	0	0	0	0	0	0	0	3,883
APPROACH %	0%	66%	34%	7%	93%	0%	0%	0%	0%	0%	0%	0%	
APP/DEPART	1,927	/	1,272	1,956	/	1,820	0	/	791	0	/	0	0
BEGIN PEAK HR		12:15 PM											
VOLUMES	0	655	334	65	916	0	0	0	0	0	0	0	1,970
APPROACH %	0%	66%	34%	7%	93%	0%	0%	0%	0%	0%	0%	0%	
PEAK HR FACTOR		0.955			0.973			0.000			0.000		0.971
APP/DEPART	989	/	655	981	/	916	0	/	399	0	/	0	0
PM													
3:30 PM													0
3:45 PM													0
4:00 PM		191	85	14	303								593
4:15 PM		203	98	17	311								629
4:30 PM		211	82	19	334								646
4:45 PM		213	103	23	375								714
5:00 PM		234	102	24	364								724
5:15 PM		236	100	15	355								706
5:30 PM		229	98	20	343								690
5:45 PM		194	89	24	317								624
6:00 PM													0
6:15 PM													0
VOLUMES	0	1,711	757	156	2,702	0	0	0	0	0	0	0	5,326
APPROACH %	0%	69%	31%	5%	95%	0%	0%	0%	0%	0%	0%	0%	
APP/DEPART	2,468	/	1,711	2,858	/	2,702	0	/	913	0	/	0	0
BEGIN PEAK HR		4:45 PM											
VOLUMES	0	912	403	82	1,437	0	0	0	0	0	0	0	2,834
APPROACH %	0%	69%	31%	5%	95%	0%	0%	0%	0%	0%	0%	0%	
PEAK HR FACTOR		0.978			0.954			0.000			0.000		0.979
APP/DEPART	1,315	/	912	1,519	/	1,437	0	/	485	0	/	0	0

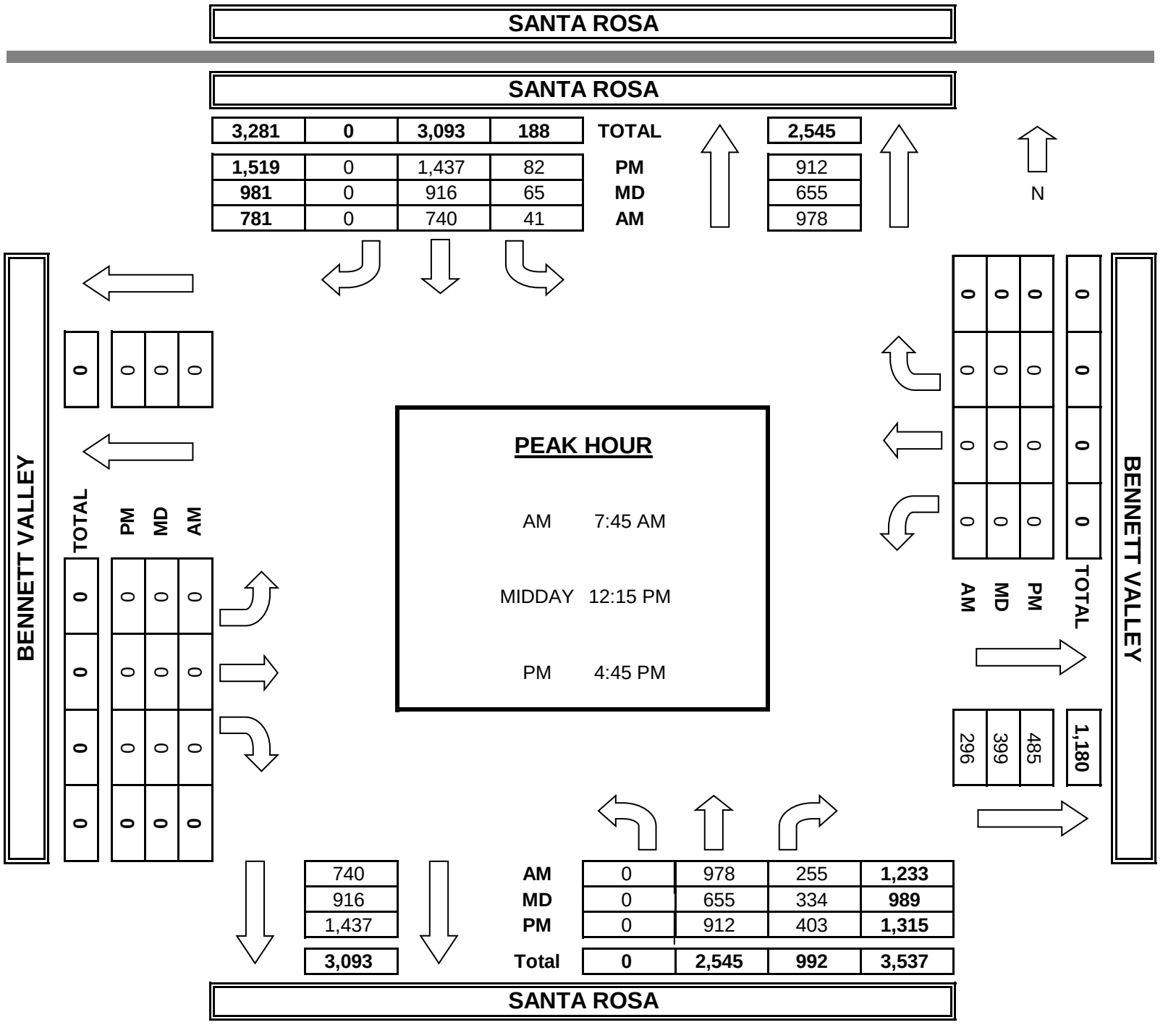
	U-TURNS					PED + BIKE CROSS (LEG OF INTER)					PED CROSSING (LEG OF INTER)					BIKE CROSSING (LEG OF INTER)				
	NB	SB	EB	WB	TTL	N	S	E	W	TTL	N	S	E	W	TTL	N	S	E	W	TTL
LANES:	X	X	X	X																
AM																				
6:30 AM					0	0	0	0	0	0					0					0
6:45 AM					0	0	0	0	0	0					0					0
7:00 AM	0	0	0	0	0	0	0	4	0	4	0	0	2		2	0	0	2		2
7:15 AM	0	0	0	0	0	0	1	6	0	7	0	1	6		7	0	0	0		0
7:30 AM	0	0	0	0	0	0	1	2	0	3	0	1	2		3	0	0	0		0
7:45 AM	0	0	0	0	0	0	2	4	0	6	0	2	4		6	0	0	0		0
8:00 AM	0	0	0	0	0	0	0	7	0	7	0	0	6		6	0	0	1		1
8:15 AM	0	0	0	0	0	0	0	6	0	6	0	0	3		3	0	0	3		3
8:30 AM	0	0	0	0	0	0	1	6	0	7	0	1	2		3	0	0	4		4
8:45 AM	0	0	0	0	0	0	3	6	0	9	0	2	5		7	0	1	1		2
9:00 AM					0	0	0	0	0	0					0					0
9:15 AM					0	0	0	0	0	0					0					0
VOLUMES	0	0	0	0	0	0	8	41	0	49	0	7	30	0	37	0	1	11	0	12
MIDDAY																				
11:00 AM					0	0	0	0	0	0					0					0
11:15 AM					0	0	0	0	0	0					0					0
11:30 AM	0	0	0	0	0	1	1	8	0	10	1	1	4		6	0	0	4		4
11:45 AM	0	0	0	0	0	0	3	2	0	5	0	1	2		3	0	2	0		2
12:00 PM	0	0	0	0	0	0	0	10	0	10	0	0	9		9	0	0	1		1
12:15 PM	0	0	0	0	0	0	1	6	0	7	0	1	5		6	0	0	1		1
12:30 PM	0	0	0	0	0	0	1	6	0	7	0	1	6		7	0	0	0		0
12:45 PM	0	0	0	0	0	0	1	5	0	6	0	1	3		4	0	0	2		2
1:00 PM	0	0	0	0	0	0	1	3	0	4	0	0	3		3	0	1	0		1
1:15 PM	0	0	0	0	0	0	3	7	0	10	0	2	4		6	0	1	3		4
1:30 PM					0	0	0	0	0	0					0					0
1:45 PM					0	0	0	0	0	0					0					0
VOLUMES	0	0	0	0	0	1	11	47	0	59	1	7	36	0	44	0	4	11	0	15
PM																				
3:30 PM					0	0	0	0	0	0					0					0
3:45 PM					0	0	0	0	0	0					0					0
4:00 PM	0	0	0	0	0	0	1	6	0	7	0	1	0		1	0	0	6		6
4:15 PM	0	0	0	0	0	0	4	6	0	10	0	4	4		8	0	0	2		2
4:30 PM	0	0	0	0	0	0	1	9	0	10	0	1	7		8	0	0	2		2
4:45 PM	0	0	0	0	0	0	4	3	0	7	0	3	2		5	0	1	1		2
5:00 PM	0	0	0	0	0	0	12	2	0	14	0	12	0		12	0	0	2		2
5:15 PM	0	0	0	0	0	0	0	7	0	7	0	0	4		4	0	0	3		3
5:30 PM	0	0	0	0	0	0	16	11	0	27	0	15	6		21	0	1	5		6
5:45 PM	0	0	0	0	0	0	2	6	0	8	0	1	3		4	0	1	3		4
6:00 PM					0	0	0	0	0	0					0					0
6:15 PM					0	0	0	0	0	0					0					0
VOLUMES	0	0	0	0	0	0	40	50	0	90	0	37	26	0	63	0	3	24	0	27

PACIFIC TRAFFIC DATA SERVICES

TURNING MOVEMENT COUNTS

Tuesday, May 10, 2016





INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE:	LOCATION:	SANTA ROSA	PROJECT #:	2016-05
3/17/16	NORTH & SOUTH:	SANTA ROSA	LOCATION #:	49
THURSDAY	EAST & WEST:	MAPLE	CONTROL:	SIGNAL

NOTES:

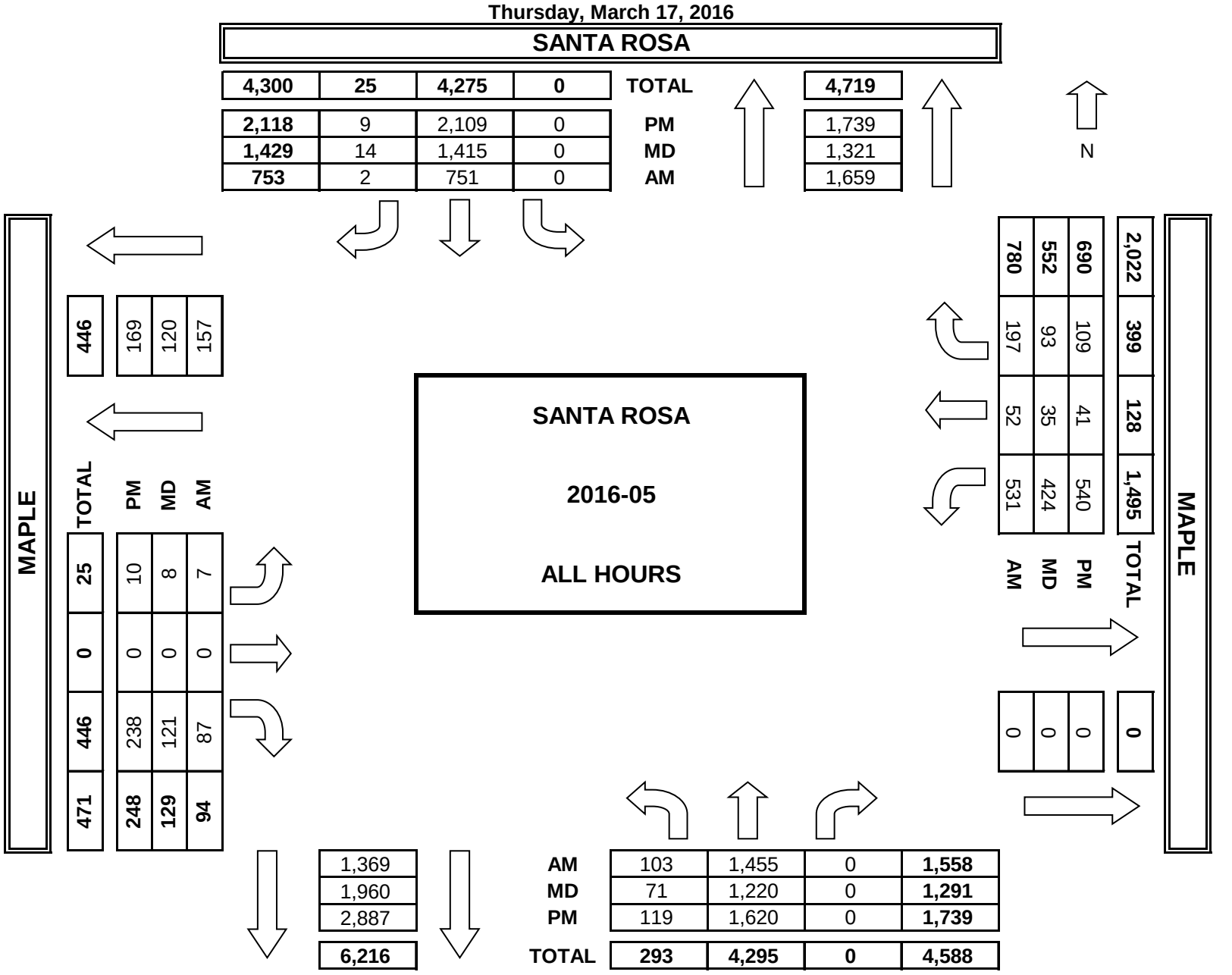
AM / PM / MD / OTHER / OTHER — ▲ N / ◄ W / E ► / S ▼

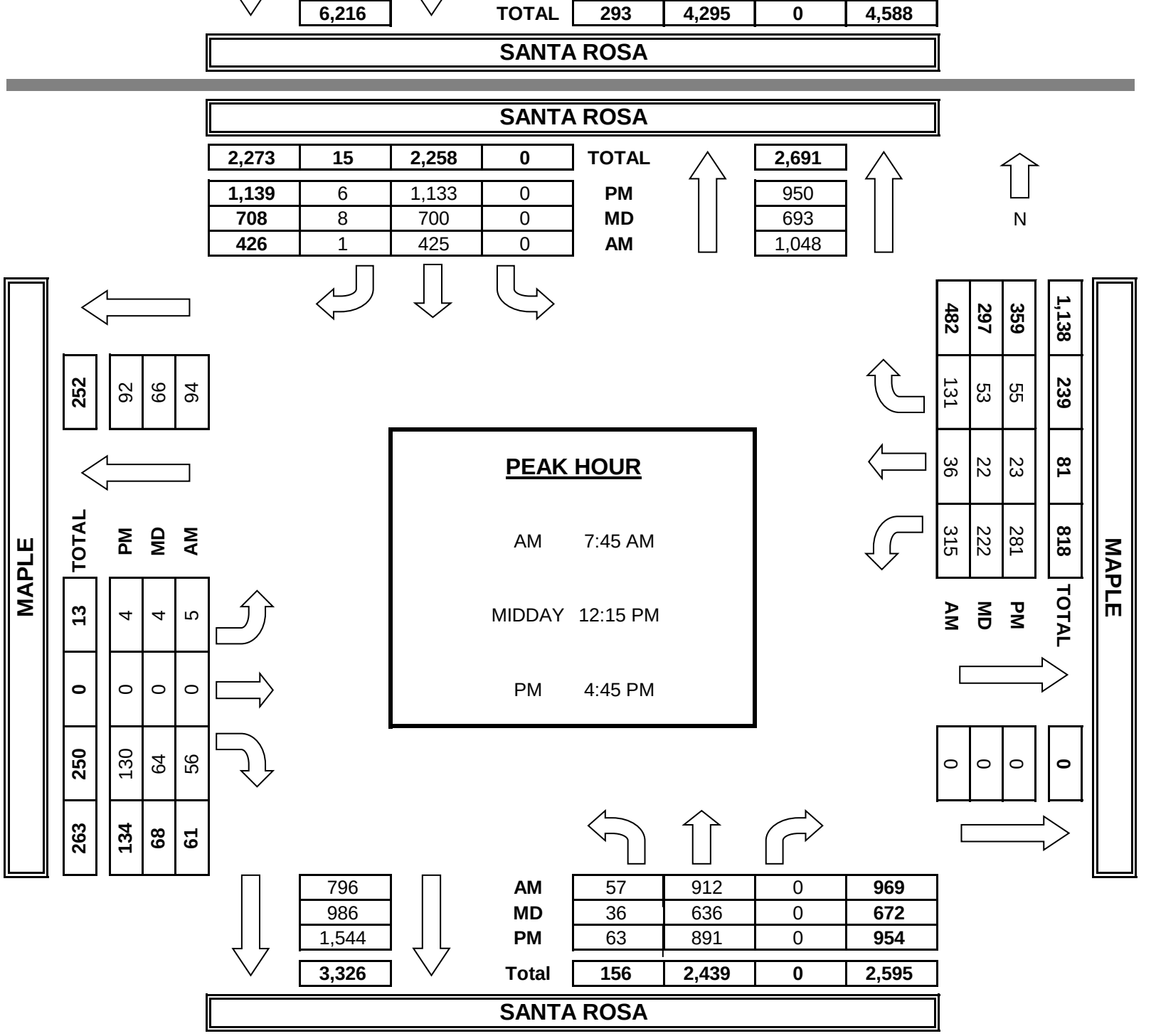
		NORTHBOUND SANTA ROSA			SOUTHBOUND SANTA ROSA			EASTBOUND MAPLE			WESTBOUND MAPLE				U-TURNS					PED + BIKE CROSS					PED CROSSING					BIKE CROSSING				
																				LEG OF INTER					LEG OF INTER					LEG OF INTER				
	LANES:	NL 1	NT 2	NR X	SL X	ST 2	SR 0	EL 1	ET X	ER 1	WL 1.5	WT 0.5	WR 1	TOTAL	NB X	SB X	EB X	WB X	TTL	N	S	E	W	TTL	N	S	E	W	TTL	N	S	E	W	TTL
AM	6:30 AM													0					0	0	0	0	0	0					0					0
	6:45 AM													0					0	0	0	0	0	0					0					0
	7:00 AM	11	65			46	0	0		4	24	2	5	157	0	0	0	0	0	1	0	6	2	9	0	0	4	1	5	1	0	2	1	4
	7:15 AM	9	105			68	0	0		5	48	1	10	246	0	0	0	0	0	3	0	4	2	9	2	0	4	0	6	1	0	0	2	3
	7:30 AM	17	166			99	0	2		9	76	7	28	404	0	0	0	0	0	1	0	3	7	11	1	0	2	6	9	0	0	1	1	2
	7:45 AM	27	236			110	1	4		19	92	10	35	534	0	0	0	0	0	0	0	2	5	7	0	0	1	2	3	0	0	1	3	4
	8:00 AM	11	211			130	0	1		26	82	10	34	505	0	0	0	0	0	1	0	3	4	8	0	0	2	1	3	1	0	1	3	5
	8:15 AM	13	238			96	0	0		6	70	4	34	461	0	0	0	0	0	1	0	3	1	5	1	0	3	0	4	0	0	0	1	1
	8:30 AM	6	227			89	0	0		5	71	12	28	438	0	0	0	0	0	0	0	5	3	8	0	0	1	2	3	0	0	4	1	5
	8:45 AM	9	207			113	1	0		13	68	6	23	440	0	0	0	0	0	2	0	3	2	7	0	0	1	0	1	2	0	2	2	6
	9:00 AM													0					0	0	0	0	0	0					0					0
	9:15 AM													0					0	0	0	0	0	0					0					0
	VOLUMES	103	1,455	0	0	751	2	7	0	87	531	52	197	3,185	0	0	0	0	0	9	0	29	26	64	4	0	18	12	34	5	0	11	14	30
	APPROACH %	7%	93%	0%	0%	100%	0%	7%	0%	93%	68%	7%	25%																					
	APP/DEPART	1,558	/	1,659	753	/	1,369	94	/	0	780	/	157	0																				
	BEGIN PEAK HR		7:45 AM																															
	VOLUMES	57	912	0	0	425	1	5	0	56	315	36	131	1,938																				
	APPROACH %	6%	94%	0%	0%	100%	0%	8%	0%	92%	65%	7%	27%																					
	PEAK HR FACTOR		0.921			0.819			0.565			0.880		0.907																				
	APP/DEPART	969	/	1,048	426	/	796	61	/	0	482	/	94	0																				
MIDDAY	11:00 AM													0					0	0	0	0	0	0					0					0
	11:15 AM													0					0	0	0	0	0	0					0					0
	11:30 AM	8	145			180	2	3		12	48	4	10	412	0	0	0	0	0	1	0	7	8	16	0	0	3	2	5	1	0	4	6	11
	11:45 AM	6	150			168	2	0		11	60	6	9	412	0	0	0	0	0	1	0	6	2	9	1	0	1	1	3	0	0	5	1	6
	12:00 PM	5	149			196	1	1		20	49	2	17	440	0	0	0	0	0	1	0	13	7	21	1	0	12	5	18	0	0	1	2	3
	12:15 PM	8	169			171	1	1		23	52	2	14	441	0	0	0	0	0	1	0	4	3	8	1	0	4	0	5	0	0	0	3	3
	12:30 PM	11	151			178	3	1		12	54	4	18	432	0	0	0	0	0	1	0	3	2	6	1	0	2	2	5	0	0	1	0	1
	12:45 PM	9	161			163	3	0		15	62	8	9	430	0	0	0	0	0	0	0	5	5	10	0	0	4	2	6	0	0	1	3	4
	1:00 PM	8	155			188	1	2		14	54	8	12	442	0	0	0	0	0	0	0	5	4	9	0	0	5	2	7	0	0	0	2	2
	1:15 PM	16	140			171	1	0		14	45	1	4	392	0	0	0	0	0	0	0	3	2	5	0	0	2	0	2	0	0	1	2	3
	1:30 PM													0					0	0	0	0	0	0					0					0
	1:45 PM													0					0	0	0	0	0	0					0					0
	VOLUMES	71	1,220	0	0	1,415	14	8	0	121	424	35	93	3,401	0	0	0	0	0	5	0	46	33	84	4	0	33	14	51	1	0	13	19	33
	APPROACH %	5%	95%	0%	0%	99%	1%	6%	0%	94%	77%	6%	17%																					
	APP/DEPART	1,291	/	1,321	1,429	/	1,960	129	/	0	552	/	120	0																				
	BEGIN PEAK HR		12:15 PM																															
	VOLUMES	36	636	0	0	700	8	4	0	64	222	22	53	1,745																				
	APPROACH %	5%	95%	0%	0%	99%	1%	6%	0%	94%	75%	7%	18%																					
	PEAK HR FACTOR		0.949			0.937			0.708			0.940		0.987																				
	APP/DEPART	672	/	693	708	/	986	68	/	0	297	/	66	0																				
PM	3:30 PM													0					0	0	0	0	0	0					0					0
	3:45 PM													0					0	0	0	0	0	0					0					0
	4:00 PM	17	171			247	2	0		29	68	5	14	553	0	0	0	0	0	2	0	9	3	14	1	0	6	1	8	1	0	3	2	6
	4:15 PM	11	203			221	0	1		25	59	6	10	536	0	0	0	0	0	0	0	3	3	6	0	0	2	1	3	0	0	1	2	3
	4:30 PM	14	173			285	0	3		28	62	2	11	578	0	0	0	0	0	2	0	4	7	13	1	0	3	5	9	1	0	1	2	4
	4:45 PM	19	224			278	0	2		30	78	6	17	654	0	0	0	0	0	0	0	5	2	7	0	0	3	0	3	0	0	2	2	4
	5:00 PM	17	225			305	2	1		38	81	2	10	681	0	0	0	0	0	1	0	8	9	18	1	0	5	5	11	0	0	3	4	7
	5:15 PM	14	208			283	2	1		30	62	9	10	619	0	0	0	0	0	1	0	2	6	9	0	0	1	3	4	1	0	1	3	5
	5:30 PM	13	234			267	2	0		32	60	6	18	632	0	0	0	0	0	0	0	11	4	15	0	0	7	4	11	0	0	4	0	4
	5:45 PM	14	182			223	1	2		26	70	5	19	542	0	0	0	0	0	1	0	4	9	14	0	0	4	7	11	1	0	0	2	3
	6:00 PM													0					0	0	0	0	0	0					0					0
	6:15 PM													0					0	0	0	0	0	0					0					0
	VOLUMES	119	1,620	0	0	2,109	9	10	0	238	540	41	109	4,795	0	0	0	0	0	7	0	46	43	96	3	0	31	26	60	4	0	15	17	36
	APPROACH %	7%	93%	0%	0%	100%	0%	4%	0%	96%	78%	6%	16%																					
	APP/DEPART	1,739	/	1,739	2,118	/	2,887	248	/	0	690	/	169	0																				
	BEGIN PEAK HR		4:45 PM																															
	VOLUMES	63	891	0	0	1,133	6	4	0	130	281	23	55	2,586																				
	APPROACH %	7%	93%	0%	0%	99%	1%	3%	0%	97%	78%	6%	15%																					
	PEAK HR FACTOR		0.966			0.928			0.859			0.889		0.949																				
	APP/DEPART	954	/	950	1,139	/	1,544	134	/	0	359	/	92	0																				

PACIFIC TRAFFIC DATA SERVICES

TURNING MOVEMENT COUNTS

Thursday, March 17, 2016





INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE:	LOCATION:	SANTA ROSA	PROJECT #:	0328-02-AP16
3/15/16	NORTH & SOUTH:	SANTA ROSA	LOCATION #:	62
TUESDAY	EAST & WEST:	PETALUMA	CONTROL:	SIGNAL

NOTES:

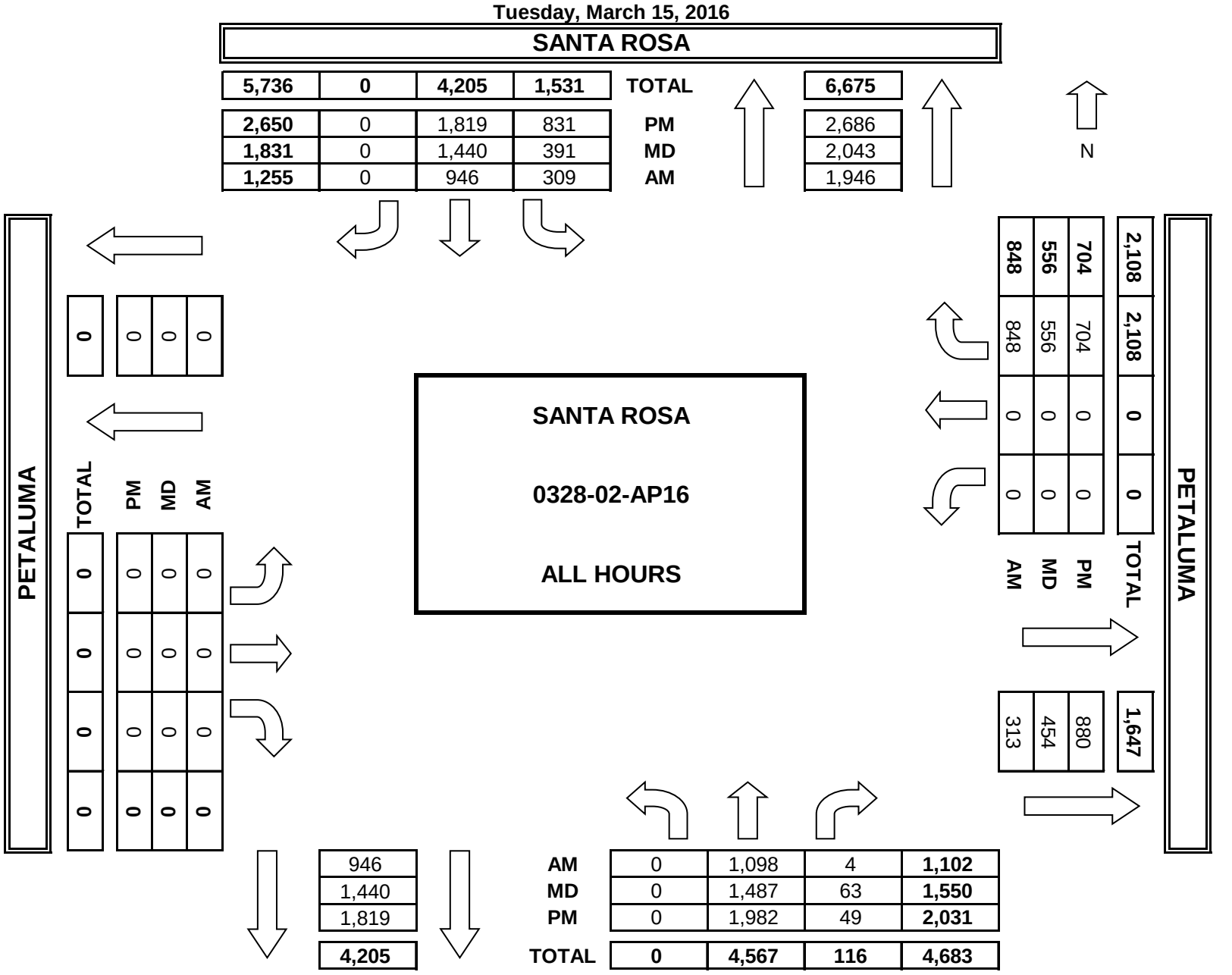
AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

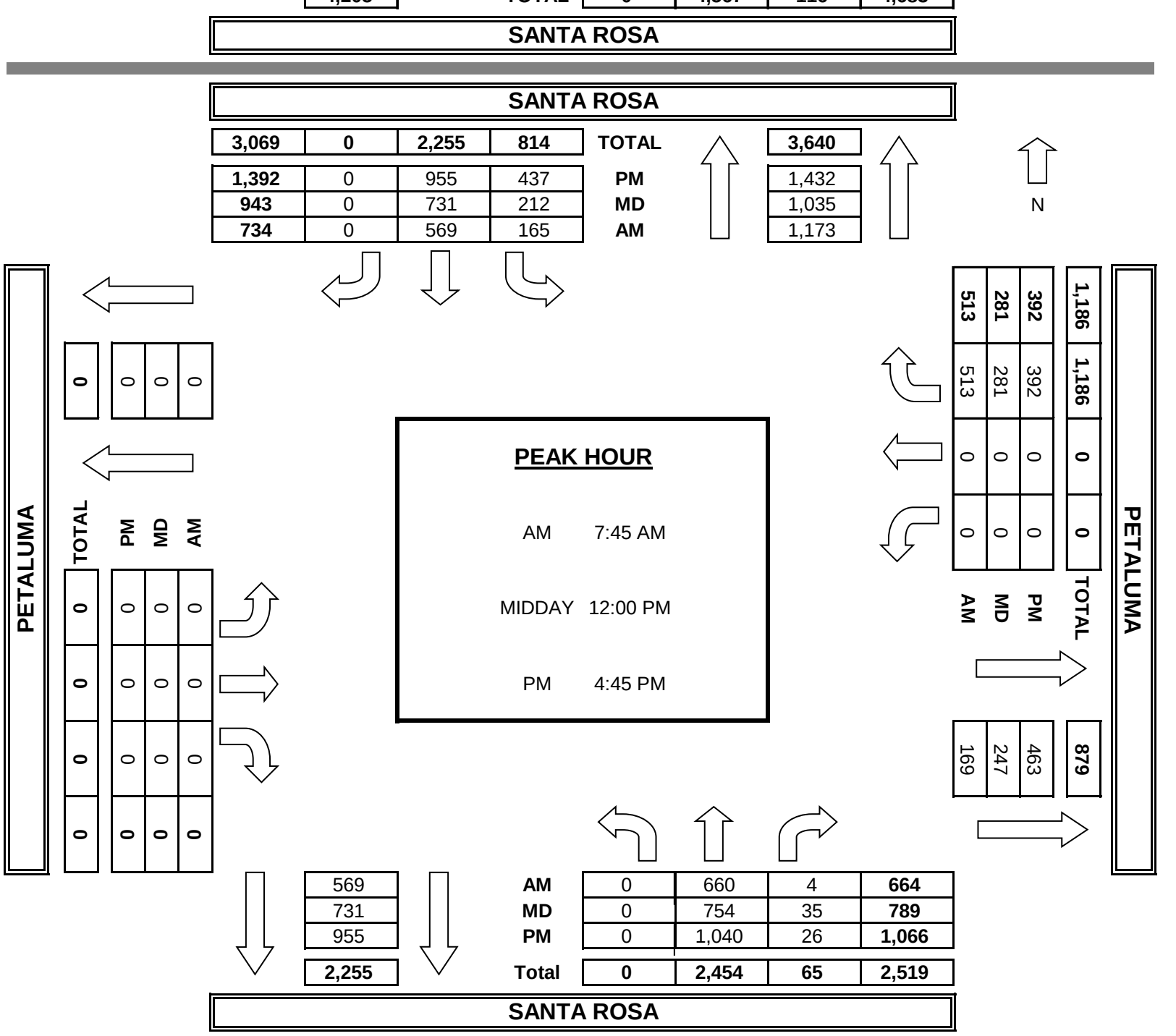
		NORTHBOUND SANTA ROSA			SOUTHBOUND SANTA ROSA			EASTBOUND PETALUMA			WESTBOUND PETALUMA				U-TURNS					PED + BIKE CROSS					PED CROSSING					BIKE CROSSING				
																				LEG OF INTER					LEG OF INTER					LEG OF INTER				
	LANES:	NL X	NT 2	NR 0	SL 1	ST 2	SR X	EL X	ET X	ER X	WL X	WT X	WR 2	TOTAL	NB X	SB X	EB X	WB X	TTL	N	S	E	W	TTL	N	S	E	W	TTL	N	S	E	W	TTL
AM	6:30 AM													0					0	0	0	0	0	0					0					0
	6:45 AM													0					0	0	0	0	0	0					0					0
	7:00 AM		46	0	26	39							50	161	0	0	0	0	0	0	0	2	1	3	0	0	0	0	0	0	0	2	1	3
	7:15 AM		76	0	27	93							74	270	0	0	0	0	0	2	0	1	2	5	1	0	1	1	3	1	0	0	1	2
	7:30 AM		151	0	53	117							102	423	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	1	0	0	1	2
	7:45 AM		199	0	52	158							168	577	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:00 AM		146	1	36	157							97	437	0	0	0	0	0	0	1	3	0	4	0	1	2	0	3	0	0	1	0	1
	8:15 AM		176	2	38	125							123	464	0	0	0	0	0	0	0	2	2	4	0	0	0	1	1	0	0	2	1	3
	8:30 AM		139	1	39	129							125	433	0	0	0	0	0	0	0	1	1	2	0	0	1	0	1	0	0	0	1	1
	8:45 AM		165	0	38	128							109	440	0	0	0	0	0	0	0	1	1	2	0	0	1	0	1	0	0	0	1	1
	9:00 AM													0					0	0	0	0	0	0					0					0
	9:15 AM													0					0	0	0	0	0	0					0					0
	VOLUMES	0	1,098	4	309	946	0	0	0	0	0	0	848	3,205	0	0	0	0	0	3	1	10	8	22	1	1	5	2	9	2	0	5	6	13
	APPROACH %	0%	100%	0%	25%	75%	0%	0%	0%	0%	0%	0%	100%																					
	APP/DEPART	1,102	/	1,946	1,255	/	946	0	/	313	848	/	0	0																				
	BEGIN PEAK HR		7:45 AM																															
	VOLUMES	0	660	4	165	569	0	0	0	0	0	0	513	1,911																				
	APPROACH %	0%	99%	1%	22%	78%	0%	0%	0%	0%	0%	0%	100%																					
	PEAK HR FACTOR		0.834			0.874			0.000			0.763		0.828																				
	APP/DEPART	664	/	1,173	734	/	569	0	/	169	513	/	0	0																				
MIDDAY	11:00 AM													0					0	0	0	0	0	0					0					0
	11:15 AM													0					0	0	0	0	0	0					0					0
	11:30 AM		180	5	45	160							73	463	0	0	0	0	0	1	0	3	1	5	1	0	1	0	2	0	0	2	1	3
	11:45 AM		169	5	52	179							62	467	0	0	0	0	0	0	0	3	0	3	0	0	1	0	1	0	0	2	0	2
	12:00 PM		174	5	65	208							74	526	0	0	0	0	0	1	1	2	3	7	1	1	1	3	6	0	0	1	0	1
	12:15 PM		179	13	50	166							73	481	0	0	0	0	0	1	0	3	2	6	1	0	2	2	5	0	0	1	0	1
	12:30 PM		206	8	46	187							68	515	0	0	0	0	0	2	1	2	1	6	2	1	1	1	5	0	0	1	0	1
	12:45 PM		195	9	51	170							66	491	0	0	0	0	0	0	0	5	1	6	0	0	1	0	1	0	0	4	1	5
	1:00 PM		193	7	36	191							71	498	0	0	0	0	0	1	0	2	2	5	1	0	2	1	4	0	0	0	1	1
	1:15 PM		191	11	46	179							69	496	0	0	0	0	0	0	0	1	2	3	0	0	0	1	1	0	0	1	1	2
	1:30 PM													0					0	0	0	0	0	0					0					0
	1:45 PM													0					0	0	0	0	0	0					0					0
	VOLUMES	0	1,487	63	391	1,440	0	0	0	0	0	0	556	3,937	0	0	0	0	0	6	2	21	12	41	6	2	9	8	25	0	0	12	4	16
	APPROACH %	0%	96%	4%	21%	79%	0%	0%	0%	0%	0%	0%	100%																					
	APP/DEPART	1,550	/	2,043	1,831	/	1,440	0	/	454	556	/	0	0																				
	BEGIN PEAK HR		12:00 PM																															
	VOLUMES	0	754	35	212	731	0	0	0	0	0	0	281	2,013																				
	APPROACH %	0%	96%	4%	22%	78%	0%	0%	0%	0%	0%	0%	100%																					
	PEAK HR FACTOR		0.922			0.864			0.000			0.949		0.957																				
	APP/DEPART	789	/	1,035	943	/	731	0	/	247	281	/	0	0																				
PM	3:30 PM													0					0	0	0	0	0	0					0					0
	3:45 PM													0					0	0	0	0	0	0					0					0
	4:00 PM		235	5	84	228							64	616	0	0	0	0	0	1	0	2	1	4	1	0	1	0	2	0	0	1	1	2
	4:15 PM		260	9	84	204							85	642	0	0	0	0	0	1	0	2	1	4	0	0	0	0	0	1	0	2	1	4
	4:30 PM		217	7	109	239							81	653	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0
	4:45 PM		274	4	103	216							106	703	0	0	0	0	0	4	0	0	0	4	1	0	0	0	1	3	0	0	0	3
	5:00 PM		260	6	125	252							89	732	0	0	0	0	0	0	0	4	2	6	0	0	0	2	2	0	0	4	0	4
	5:15 PM		260	9	116	244							97	726	0	0	0	0	0	0	0	2	0	2	0	0	1	0	1	0	0	1	0	1
	5:30 PM		246	7	93	243							100	689	0	0	0	0	0	1	0	3	0	4	1	0	2	0	3	0	0	1	0	1
	5:45 PM		230	2	117	193							82	624	0	0	0	0	0	0	0	1	2	3	0	0	1	0	1	0	0	0	2	2
	6:00 PM													0					0	0	0	0	0	0					0					0
	6:15 PM													0					0	0	0	0	0	0					0					0
	VOLUMES	0	1,982	49	831	1,819	0	0	0	0	0	0	704	5,385	0	0	0	0	0	8	0	14	6	28	4	0	5	2	11	4	0	9	4	17
	APPROACH %	0%	98%	2%	31%	69%	0%	0%	0%	0%	0%	0%	100%																					
	APP/DEPART	2,031	/	2,686	2,650	/	1,819	0	/	880	704	/	0	0																				
	BEGIN PEAK HR		4:45 PM																															
	VOLUMES	0	1,040	26	437	955	0	0	0	0	0	0	392	2,850																				
	APPROACH %	0%	98%	2%	31%	69%	0%	0%	0%	0%	0%	0%	100%																					
	PEAK HR FACTOR		0.959			0.923			0.000			0.925		0.973																				
	APP/DEPART	1,066	/	1,432	1,392	/	955	0	/	463	392	/	0	0																				

PACIFIC TRAFFIC DATA SERVICES

TURNING MOVEMENT COUNTS

Tuesday, March 15, 2016

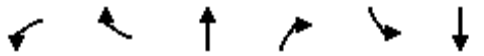




Appendix C – Existing Conditions Intersections Level of Service Worksheets

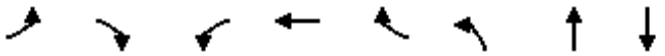
Lane Group	NBT	SBL	SBT
Lane Group Flow (vph)	1451	48	860
v/c Ratio	0.50	0.32	0.28
Control Delay	5.6	47.4	0.8
Queue Delay	0.1	0.0	0.0
Total Delay	5.7	47.4	0.8
Queue Length 50th (ft)	23	28	0
Queue Length 95th (ft)	392	49	35
Internal Link Dist (ft)	208		257
Turn Bay Length (ft)		125	
Base Capacity (vph)	2892	238	3127
Starvation Cap Reductn	311	0	302
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.56	0.20	0.30

Intersection Summary



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	978	255	41	740
Future Volume (vph)	0	0	978	255	41	740
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10
Total Lost time (s)			3.6		3.0	3.6
Lane Util. Factor			0.95		1.00	0.95
Frpb, ped/bikes			0.99		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			0.97		1.00	1.00
Flt Protected			1.00		0.95	1.00
Satd. Flow (prot)			3399		1652	3303
Flt Permitted			1.00		0.95	1.00
Satd. Flow (perm)			3399		1652	3303
Peak-hour factor, PHF	0.25	0.25	0.85	0.85	0.86	0.86
Adj. Flow (vph)	0	0	1151	300	48	860
RTOR Reduction (vph)	0	0	12	0	0	0
Lane Group Flow (vph)	0	0	1439	0	48	860
Confl. Peds. (#/hr)				15		
Confl. Bikes (#/hr)		8				
Turn Type			NA		Prot	NA
Protected Phases			8		7	4
Permitted Phases						
Actuated Green, G (s)			71.3		5.6	79.9
Effective Green, g (s)			71.3		5.6	79.9
Actuated g/C Ratio			0.79		0.06	0.89
Clearance Time (s)			3.6		3.0	3.6
Vehicle Extension (s)			3.0		3.0	3.0
Lane Grp Cap (vph)			2692		102	2932
v/s Ratio Prot			c0.42		c0.03	0.26
v/s Ratio Perm						
v/c Ratio			0.53		0.47	0.29
Uniform Delay, d1			3.4		40.8	0.8
Progression Factor			1.05		1.11	0.47
Incremental Delay, d2			0.7		3.3	0.2
Delay (s)			4.3		48.5	0.6
Level of Service			A		D	A
Approach Delay (s)	0.0		4.3			3.1
Approach LOS	A		A			A

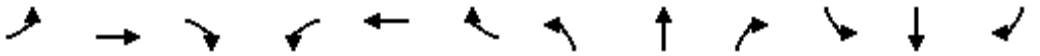
Intersection Summary			
HCM 2000 Control Delay	3.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	9	98	197	202	149	62	991	519
v/c Ratio	0.07	0.50	0.68	0.69	0.38	0.11	0.42	0.26
Control Delay	39.2	17.7	46.0	46.4	8.0	2.8	4.6	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Total Delay	39.2	17.7	46.0	46.4	8.0	2.8	4.7	12.2
Queue Length 50th (ft)	5	0	112	115	0	7	141	73
Queue Length 95th (ft)	12	9	165	168	43	m2	13	129
Internal Link Dist (ft)				394			257	404
Turn Bay Length (ft)	95				115	50		
Base Capacity (vph)	204	264	485	491	555	590	2347	1992
Starvation Cap Reductn	0	0	0	0	0	0	471	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.37	0.41	0.41	0.27	0.11	0.53	0.26

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	56	315	36	131	57	912	0	0	425	1
Future Volume (vph)	5	0	56	315	36	131	57	912	0	0	425	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	11	12
Total Lost time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00	1.00	0.95			0.95	
Frpb, ped/bikes	1.00		0.96	1.00	1.00	0.98	1.00	1.00			1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00		0.85	1.00	1.00	0.85	1.00	1.00			1.00	
Flt Protected	0.95		1.00	0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (prot)	1770		1516	1681	1702	1550	1770	3539			3420	
Flt Permitted	0.95		1.00	0.95	0.96	1.00	0.41	1.00			1.00	
Satd. Flow (perm)	1770		1516	1681	1702	1550	757	3539			3420	
Peak-hour factor, PHF	0.57	0.25	0.57	0.88	0.88	0.88	0.92	0.92	0.25	0.25	0.82	0.82
Adj. Flow (vph)	9	0	98	358	41	149	62	991	0	0	518	1
RTOR Reduction (vph)	0	0	92	0	0	123	0	0	0	0	0	0
Lane Group Flow (vph)	9	0	6	197	202	26	62	991	0	0	519	0
Confl. Peds. (#/hr)						1			7			5
Confl. Bikes (#/hr)			8			6						1
Turn Type	Prot		Perm	Split	NA	Perm	pm+pt	NA			NA	
Protected Phases	2			1	1		3	8			4	
Permitted Phases			2			1	8					
Actuated Green, G (s)	5.2		5.2	15.5	15.5	15.5	59.1	59.1			51.2	
Effective Green, g (s)	5.2		5.2	15.5	15.5	15.5	59.1	59.1			51.2	
Actuated g/C Ratio	0.06		0.06	0.17	0.17	0.17	0.66	0.66			0.57	
Clearance Time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0	3.0			3.0	
Lane Grp Cap (vph)	102		87	289	293	266	552	2323			1945	
v/s Ratio Prot	c0.01			0.12	c0.12		0.01	c0.28			0.15	
v/s Ratio Perm			0.00			0.02	0.07					
v/c Ratio	0.09		0.07	0.68	0.69	0.10	0.11	0.43			0.27	
Uniform Delay, d1	40.2		40.1	34.9	35.0	31.4	5.7	7.4			9.9	
Progression Factor	1.00		1.00	1.00	1.00	1.00	0.32	0.47			1.00	
Incremental Delay, d2	0.1		0.1	5.2	5.3	0.1	0.0	0.5			0.3	
Delay (s)	40.3		40.2	40.1	40.3	31.4	1.9	3.9			10.2	
Level of Service	D		D	D	D	C	A	A			B	
Approach Delay (s)		40.2			37.8			3.8			10.2	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	675	800	190	654
v/c Ratio	0.26	0.31	0.55	0.18
Control Delay	0.3	5.4	38.1	0.1
Queue Delay	0.0	0.0	0.1	0.0
Total Delay	0.3	5.5	38.2	0.1
Queue Length 50th (ft)	0	71	106	0
Queue Length 95th (ft)	0	116	168	0
Internal Link Dist (ft)		1979		208
Turn Bay Length (ft)	80		150	
Base Capacity (vph)	2640	2560	656	3539
Starvation Cap Reductn	0	0	64	0
Spillback Cap Reductn	237	308	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.28	0.36	0.32	0.18

Intersection Summary

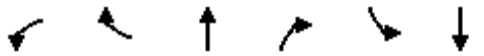
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	513	660	4	165	569
Future Volume (vph)	0	513	660	4	165	569
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12
Total Lost time (s)		3.6	3.6		3.6	3.6
Lane Util. Factor		0.88	0.95		1.00	0.95
Frpb, ped/bikes		0.98	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		0.85	1.00		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2740	3535		1770	3539
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2740	3535		1770	3539
Peak-hour factor, PHF	0.25	0.76	0.83	0.83	0.87	0.87
Adj. Flow (vph)	0	675	795	5	190	654
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	675	800	0	190	654
Confl. Peds. (#/hr)				3		
Confl. Bikes (#/hr)		3				
Turn Type		pm+ov	NA		Prot	NA
Protected Phases		7	8		7	4
Permitted Phases		4				
Actuated Green, G (s)		86.4	65.2		17.6	90.0
Effective Green, g (s)		86.4	65.2		17.6	90.0
Actuated g/C Ratio		0.96	0.72		0.20	1.00
Clearance Time (s)		3.6	3.6		3.6	3.6
Vehicle Extension (s)		4.0	3.0		4.0	0.2
Lane Grp Cap (vph)		2740	2560		346	3539
v/s Ratio Prot		0.05	c0.23		c0.11	0.18
v/s Ratio Perm		0.20				
v/c Ratio		0.25	0.31		0.55	0.18
Uniform Delay, d1		0.1	4.4		32.6	0.0
Progression Factor		1.00	1.00		1.02	1.00
Incremental Delay, d2		0.1	0.3		2.2	0.1
Delay (s)		0.2	4.7		35.6	0.1
Level of Service		A	A		D	A
Approach Delay (s)	0.2		4.7			8.1
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	4.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	NBT	SBL	SBT
Lane Group Flow (vph)	1342	86	1513
v/c Ratio	0.58	0.44	0.56
Control Delay	4.6	37.4	5.3
Queue Delay	0.0	0.0	0.1
Total Delay	4.6	37.4	5.4
Queue Length 50th (ft)	54	40	126
Queue Length 95th (ft)	72	m64	264
Internal Link Dist (ft)	241		247
Turn Bay Length (ft)		125	
Base Capacity (vph)	2304	268	2708
Starvation Cap Reductn	5	0	289
Spillback Cap Reductn	0	0	212
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.58	0.32	0.63

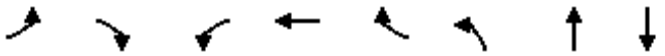
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	912	403	82	1437
Future Volume (vph)	0	0	912	403	82	1437
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10
Total Lost time (s)			3.6		3.0	3.6
Lane Util. Factor			0.95		1.00	0.95
Frpb, ped/bikes			0.99		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			0.95		1.00	1.00
Flt Protected			1.00		0.95	1.00
Satd. Flow (prot)			3341		1652	3303
Flt Permitted			1.00		0.95	1.00
Satd. Flow (perm)			3341		1652	3303
Peak-hour factor, PHF	0.25	0.25	0.98	0.98	0.95	0.95
Adj. Flow (vph)	0	0	931	411	86	1513
RTOR Reduction (vph)	0	0	44	0	0	0
Lane Group Flow (vph)	0	0	1298	0	86	1513
Confl. Peds. (#/hr)				12		
Confl. Bikes (#/hr)		8		2		
Turn Type			NA		Prot	NA
Protected Phases			8		7	4
Permitted Phases						
Actuated Green, G (s)			51.7		8.3	63.0
Effective Green, g (s)			51.7		8.3	63.0
Actuated g/C Ratio			0.65		0.10	0.79
Clearance Time (s)			3.6		3.0	3.6
Vehicle Extension (s)			3.0		3.0	3.0
Lane Grp Cap (vph)			2159		171	2601
v/s Ratio Prot			0.39		0.05	c0.46
v/s Ratio Perm						
v/c Ratio			0.60		0.50	0.58
Uniform Delay, d1			8.2		33.9	3.3
Progression Factor			0.35		0.99	0.95
Incremental Delay, d2			1.1		1.9	0.8
Delay (s)			4.0		35.3	3.9
Level of Service			A		D	A
Approach Delay (s)	0.0		4.0			5.6
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	4.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	5	151	171	171	62	65	919	1224
v/c Ratio	0.04	0.58	0.62	0.62	0.19	0.25	0.41	0.67
Control Delay	32.5	15.4	40.0	39.6	4.1	6.2	3.2	19.2
Queue Delay	0.0	0.1	0.7	0.7	0.0	0.0	0.2	0.0
Total Delay	32.5	15.5	40.7	40.3	4.1	6.2	3.4	19.2
Queue Length 50th (ft)	2	0	85	85	0	3	24	210
Queue Length 95th (ft)	12	45	130	129	16	m6	38	#481
Internal Link Dist (ft)				394			247	404
Turn Bay Length (ft)	95				115	50		
Base Capacity (vph)	230	331	441	445	472	329	2220	1832
Starvation Cap Reductn	0	0	0	0	0	0	478	0
Spillback Cap Reductn	0	8	90	91	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.47	0.49	0.48	0.13	0.20	0.53	0.67

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	0	130	281	23	55	63	891	0	0	1133	6
Future Volume (vph)	4	0	130	281	23	55	63	891	0	0	1133	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	11	12
Total Lost time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00	1.00	0.95			0.95	
Frpb, ped/bikes	1.00		0.96	1.00	1.00	0.97	1.00	1.00			1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00		0.85	1.00	1.00	0.85	1.00	1.00			1.00	
Flt Protected	0.95		1.00	0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (prot)	1770		1525	1681	1698	1539	1770	3539			3418	
Flt Permitted	0.95		1.00	0.95	0.96	1.00	0.13	1.00			1.00	
Satd. Flow (perm)	1770		1525	1681	1698	1539	234	3539			3418	
Peak-hour factor, PHF	0.86	0.25	0.86	0.89	0.89	0.89	0.97	0.97	0.25	0.25	0.93	0.93
Adj. Flow (vph)	5	0	151	316	26	62	65	919	0	0	1218	6
RTOR Reduction (vph)	0	0	139	0	0	52	0	0	0	0	0	0
Lane Group Flow (vph)	5	0	12	171	171	10	65	919	0	0	1224	0
Confl. Peds. (#/hr)						1			16			12
Confl. Bikes (#/hr)			9			11						1
Turn Type	Prot		Perm	Split	NA	Perm	pm+pt	NA			NA	
Protected Phases	2			1	1		3	8			4	
Permitted Phases			2			1	8					
Actuated Green, G (s)	6.5		6.5	13.1	13.1	13.1	50.2	50.2			42.3	
Effective Green, g (s)	6.5		6.5	13.1	13.1	13.1	50.2	50.2			42.3	
Actuated g/C Ratio	0.08		0.08	0.16	0.16	0.16	0.63	0.63			0.53	
Clearance Time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0	3.0			3.0	
Lane Grp Cap (vph)	143		123	275	278	252	240	2220			1807	
v/s Ratio Prot	0.00			c0.10	0.10		0.02	c0.26			c0.36	
v/s Ratio Perm			c0.01			0.01	0.15					
v/c Ratio	0.03		0.10	0.62	0.62	0.04	0.27	0.41			0.68	
Uniform Delay, d1	33.9		34.0	31.1	31.1	28.2	8.8	7.5			13.8	
Progression Factor	1.00		1.00	1.00	1.00	1.00	0.55	0.31			1.00	
Incremental Delay, d2	0.0		0.1	3.1	2.8	0.0	0.2	0.5			2.1	
Delay (s)	33.9		34.2	34.3	33.9	28.2	5.1	2.8			15.9	
Level of Service	C		C	C	C	C	A	A			B	
Approach Delay (s)		34.2			33.2			2.9			15.9	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	422	1110	475	1038
v/c Ratio	0.16	0.55	0.79	0.29
Control Delay	0.2	12.9	40.6	0.2
Queue Delay	0.0	0.0	16.7	0.0
Total Delay	0.2	12.9	57.3	0.2
Queue Length 50th (ft)	0	176	249	0
Queue Length 95th (ft)	0	253	320	0
Internal Link Dist (ft)		526		241
Turn Bay Length (ft)	80		150	
Base Capacity (vph)	2625	2012	694	3539
Starvation Cap Reductn	0	0	210	0
Spillback Cap Reductn	29	38	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.16	0.56	0.98	0.29

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	392	1040	26	437	955
Future Volume (vph)	0	392	1040	26	437	955
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12
Total Lost time (s)		3.6	3.6		3.6	3.6
Lane Util. Factor		0.88	0.95		1.00	0.95
Frpb, ped/bikes		0.98	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		0.85	1.00		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2745	3524		1770	3539
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2745	3524		1770	3539
Peak-hour factor, PHF	0.25	0.93	0.96	0.96	0.92	0.92
Adj. Flow (vph)	0	422	1083	27	475	1038
RTOR Reduction (vph)	0	0	2	0	0	0
Lane Group Flow (vph)	0	422	1108	0	475	1038
Confl. Peds. (#/hr)		2		2		
Confl. Bikes (#/hr)		6				
Turn Type		pm+ov	NA		Prot	NA
Protected Phases		7	8		7	4
Permitted Phases		4				
Actuated Green, G (s)		76.4	45.7		27.1	80.0
Effective Green, g (s)		76.4	45.7		27.1	80.0
Actuated g/C Ratio		0.96	0.57		0.34	1.00
Clearance Time (s)		3.6	3.6		3.6	3.6
Vehicle Extension (s)		4.0	3.0		4.0	0.2
Lane Grp Cap (vph)		2745	2013		599	3539
v/s Ratio Prot		0.05	c0.31		c0.27	0.29
v/s Ratio Perm		0.10				
v/c Ratio		0.15	0.55		0.79	0.29
Uniform Delay, d1		0.1	10.7		23.9	0.0
Progression Factor		1.00	1.00		1.36	1.00
Incremental Delay, d2		0.0	1.1		6.4	0.2
Delay (s)		0.1	11.8		38.8	0.2
Level of Service		A	B		D	A
Approach Delay (s)	0.1		11.8			12.3
Approach LOS	A		B			B

Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

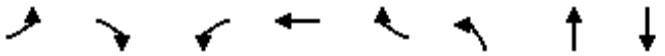
Appendix D – Existing plus Project Conditions Intersections Level of Service Worksheets

Lane Group	NBT	SBL	SBT
Lane Group Flow (vph)	1477	51	867
v/c Ratio	0.51	0.34	0.28
Control Delay	5.6	47.3	0.8
Queue Delay	0.1	0.0	0.0
Total Delay	5.7	47.3	0.8
Queue Length 50th (ft)	28	30	0
Queue Length 95th (ft)	394	51	35
Internal Link Dist (ft)	109		247
Turn Bay Length (ft)		125	
Base Capacity (vph)	2880	238	3127
Starvation Cap Reductn	301	0	309
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.57	0.21	0.31

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	979	276	44	746
Future Volume (vph)	0	0	979	276	44	746
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10
Total Lost time (s)			3.6		3.0	3.6
Lane Util. Factor			0.95		1.00	0.95
Frpb, ped/bikes			0.99		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			0.97		1.00	1.00
Flt Protected			1.00		0.95	1.00
Satd. Flow (prot)			3390		1652	3303
Flt Permitted			1.00		0.95	1.00
Satd. Flow (perm)			3390		1652	3303
Peak-hour factor, PHF	0.25	0.25	0.85	0.85	0.86	0.86
Adj. Flow (vph)	0	0	1152	325	51	867
RTOR Reduction (vph)	0	0	14	0	0	0
Lane Group Flow (vph)	0	0	1463	0	51	867
Confl. Peds. (#/hr)				15		
Confl. Bikes (#/hr)		8				
Turn Type			NA		Prot	NA
Protected Phases			8		7	4
Permitted Phases						
Actuated Green, G (s)			71.2		5.7	79.9
Effective Green, g (s)			71.2		5.7	79.9
Actuated g/C Ratio			0.79		0.06	0.89
Clearance Time (s)			3.6		3.0	3.6
Vehicle Extension (s)			3.0		3.0	3.0
Lane Grp Cap (vph)			2681		104	2932
v/s Ratio Prot			c0.43		c0.03	0.26
v/s Ratio Perm						
v/c Ratio			0.55		0.49	0.30
Uniform Delay, d1			3.5		40.7	0.8
Progression Factor			1.02		1.10	0.47
Incremental Delay, d2			0.8		3.5	0.2
Delay (s)			4.3		48.4	0.6
Level of Service			A		D	A
Approach Delay (s)	0.0		4.3			3.3
Approach LOS	A		A			A

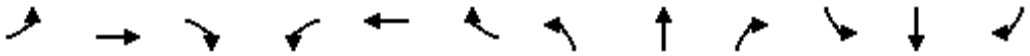
Intersection Summary			
HCM 2000 Control Delay	3.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	9	98	202	206	149	62	992	521
v/c Ratio	0.07	0.50	0.69	0.69	0.38	0.11	0.42	0.26
Control Delay	39.2	17.7	46.1	46.3	7.9	2.9	4.7	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Total Delay	39.2	17.7	46.1	46.3	7.9	2.9	4.8	12.4
Queue Length 50th (ft)	5	0	115	117	0	7	138	74
Queue Length 95th (ft)	12	9	168	170	43	m3	15	131
Internal Link Dist (ft)				394			247	404
Turn Bay Length (ft)	95				115	50		
Base Capacity (vph)	204	264	485	491	555	586	2337	1982
Starvation Cap Reductn	0	0	0	0	0	0	513	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.37	0.42	0.42	0.27	0.11	0.54	0.26

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	56	323	36	131	57	913	0	0	426	1
Future Volume (vph)	5	0	56	323	36	131	57	913	0	0	426	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	11	12
Total Lost time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00	1.00	0.95			0.95	
Frpb, ped/bikes	1.00		0.96	1.00	1.00	0.98	1.00	1.00			1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00		0.85	1.00	1.00	0.85	1.00	1.00			1.00	
Flt Protected	0.95		1.00	0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (prot)	1770		1516	1681	1701	1550	1770	3539			3420	
Flt Permitted	0.95		1.00	0.95	0.96	1.00	0.40	1.00			1.00	
Satd. Flow (perm)	1770		1516	1681	1701	1550	753	3539			3420	
Peak-hour factor, PHF	0.57	0.25	0.57	0.88	0.88	0.88	0.92	0.92	0.25	0.25	0.82	0.82
Adj. Flow (vph)	9	0	98	367	41	149	62	992	0	0	520	1
RTOR Reduction (vph)	0	0	92	0	0	123	0	0	0	0	0	0
Lane Group Flow (vph)	9	0	6	202	206	26	62	992	0	0	521	0
Confl. Peds. (#/hr)						1			7			5
Confl. Bikes (#/hr)			8			6						1
Turn Type	Prot		Perm	Split	NA	Perm	pm+pt	NA			NA	
Protected Phases	2			1	1		3	8			4	
Permitted Phases			2			1	8					
Actuated Green, G (s)	5.2		5.2	15.8	15.8	15.8	58.8	58.8			50.9	
Effective Green, g (s)	5.2		5.2	15.8	15.8	15.8	58.8	58.8			50.9	
Actuated g/C Ratio	0.06		0.06	0.18	0.18	0.18	0.65	0.65			0.57	
Clearance Time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0	3.0			3.0	
Lane Grp Cap (vph)	102		87	295	298	272	547	2312			1934	
v/s Ratio Prot	c0.01			0.12	c0.12		0.01	c0.28			0.15	
v/s Ratio Perm			0.00			0.02	0.07					
v/c Ratio	0.09		0.07	0.68	0.69	0.10	0.11	0.43			0.27	
Uniform Delay, d1	40.2		40.1	34.8	34.8	31.1	5.9	7.5			10.0	
Progression Factor	1.00		1.00	1.00	1.00	1.00	0.33	0.47			1.00	
Incremental Delay, d2	0.1		0.1	5.2	5.5	0.1	0.0	0.5			0.3	
Delay (s)	40.3		40.2	39.9	40.3	31.2	2.0	4.0			10.4	
Level of Service	D		D	D	D	C	A	A			B	
Approach Delay (s)		40.2			37.7			3.9			10.4	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	676	815	190	661
v/c Ratio	0.26	0.32	0.55	0.19
Control Delay	0.3	5.5	37.8	0.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	0.4	5.5	37.8	0.1
Queue Length 50th (ft)	0	73	106	0
Queue Length 95th (ft)	0	118	166	0
Internal Link Dist (ft)		526		54
Turn Bay Length (ft)	80		150	
Base Capacity (vph)	2640	2560	656	3539
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	237	308	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.28	0.36	0.29	0.19

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	514	672	4	165	575
Future Volume (vph)	0	514	672	4	165	575
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12
Total Lost time (s)		3.6	3.6		3.6	3.6
Lane Util. Factor		0.88	0.95		1.00	0.95
Frpb, ped/bikes		0.98	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		0.85	1.00		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2740	3535		1770	3539
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2740	3535		1770	3539
Peak-hour factor, PHF	0.25	0.76	0.83	0.83	0.87	0.87
Adj. Flow (vph)	0	676	810	5	190	661
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	676	815	0	190	661
Confl. Peds. (#/hr)				3		
Confl. Bikes (#/hr)		3				
Turn Type		pm+ov	NA		Prot	NA
Protected Phases		7	8		7	4
Permitted Phases		4				
Actuated Green, G (s)		86.4	65.2		17.6	90.0
Effective Green, g (s)		86.4	65.2		17.6	90.0
Actuated g/C Ratio		0.96	0.72		0.20	1.00
Clearance Time (s)		3.6	3.6		3.6	3.6
Vehicle Extension (s)		4.0	3.0		4.0	0.2
Lane Grp Cap (vph)		2740	2560		346	3539
v/s Ratio Prot		0.05	c0.23		c0.11	0.19
v/s Ratio Perm		0.20				
v/c Ratio		0.25	0.32		0.55	0.19
Uniform Delay, d1		0.1	4.4		32.6	0.0
Progression Factor		1.00	1.00		1.01	1.00
Incremental Delay, d2		0.1	0.3		2.2	0.1
Delay (s)		0.2	4.8		35.2	0.1
Level of Service		A	A		D	A
Approach Delay (s)	0.2		4.8			8.0
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	4.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	16	1179	7	0	740
Future Volume (Veh/h)	0	16	1179	7	0	740
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	17	1282	8	0	804
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			134			189
pX, platoon unblocked	0.94	0.92			0.92	
vC, conflicting volume	1688	645			1290	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1451	449			1148	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	114	514			558	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	17	855	435	402	402
Volume Left	0	0	0	0	0
Volume Right	17	0	8	0	0
cSH	514	1700	1700	1700	1700
Volume to Capacity	0.03	0.50	0.26	0.24	0.24
Queue Length 95th (ft)	3	0	0	0	0
Control Delay (s)	12.2	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	12.2	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

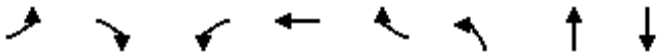
Lane Group	NBT	SBL	SBT
Lane Group Flow (vph)	1391	92	1527
v/c Ratio	0.61	0.46	0.56
Control Delay	5.0	37.7	5.3
Queue Delay	0.0	0.0	0.1
Total Delay	5.0	37.7	5.4
Queue Length 50th (ft)	60	42	131
Queue Length 95th (ft)	80	m69	269
Internal Link Dist (ft)	109		247
Turn Bay Length (ft)		125	
Base Capacity (vph)	2295	268	2708
Starvation Cap Reductn	2	0	305
Spillback Cap Reductn	0	0	216
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.61	0.34	0.64

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	914	449	87	1451
Future Volume (vph)	0	0	914	449	87	1451
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10
Total Lost time (s)			3.6		3.0	3.6
Lane Util. Factor			0.95		1.00	0.95
Frpb, ped/bikes			0.99		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			0.95		1.00	1.00
Flt Protected			1.00		0.95	1.00
Satd. Flow (prot)			3326		1652	3303
Flt Permitted			1.00		0.95	1.00
Satd. Flow (perm)			3326		1652	3303
Peak-hour factor, PHF	0.25	0.25	0.98	0.98	0.95	0.95
Adj. Flow (vph)	0	0	933	458	92	1527
RTOR Reduction (vph)	0	0	53	0	0	0
Lane Group Flow (vph)	0	0	1338	0	92	1527
Confl. Peds. (#/hr)				12		
Confl. Bikes (#/hr)		8		2		
Turn Type			NA		Prot	NA
Protected Phases			8		7	4
Permitted Phases						
Actuated Green, G (s)			51.5		8.5	63.0
Effective Green, g (s)			51.5		8.5	63.0
Actuated g/C Ratio			0.64		0.11	0.79
Clearance Time (s)			3.6		3.0	3.6
Vehicle Extension (s)			3.0		3.0	3.0
Lane Grp Cap (vph)			2141		175	2601
v/s Ratio Prot			c0.40		0.06	c0.46
v/s Ratio Perm						
v/c Ratio			0.62		0.53	0.59
Uniform Delay, d1			8.5		33.8	3.4
Progression Factor			0.37		0.99	0.94
Incremental Delay, d2			1.3		2.3	0.8
Delay (s)			4.4		35.7	3.9
Level of Service			A		D	A
Approach Delay (s)	0.0		4.4			5.7
Approach LOS	A		A			A

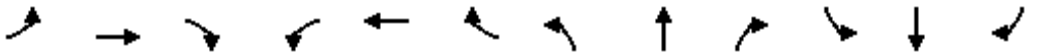
Intersection Summary			
HCM 2000 Control Delay	5.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	5	151	181	180	62	65	921	1226
v/c Ratio	0.04	0.58	0.64	0.63	0.19	0.25	0.42	0.67
Control Delay	32.5	15.4	40.5	40.0	4.0	6.6	3.7	19.6
Queue Delay	0.0	0.1	0.8	0.7	0.0	0.0	0.2	0.0
Total Delay	32.5	15.5	41.3	40.7	4.0	6.6	3.9	19.6
Queue Length 50th (ft)	2	0	90	89	0	3	25	214
Queue Length 95th (ft)	12	45	137	136	16	m8	48	#482
Internal Link Dist (ft)				394			247	404
Turn Bay Length (ft)	95				115	50		
Base Capacity (vph)	230	331	441	445	472	325	2205	1818
Starvation Cap Reductn	0	0	0	0	0	0	501	0
Spillback Cap Reductn	0	8	89	90	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.47	0.51	0.51	0.13	0.20	0.54	0.67

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	0	130	298	23	55	63	893	0	0	1135	6
Future Volume (vph)	4	0	130	298	23	55	63	893	0	0	1135	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	11	12
Total Lost time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00	1.00	0.95			0.95	
Frpb, ped/bikes	1.00		0.96	1.00	1.00	0.97	1.00	1.00			1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00		0.85	1.00	1.00	0.85	1.00	1.00			1.00	
Flt Protected	0.95		1.00	0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (prot)	1770		1525	1681	1697	1540	1770	3539			3418	
Flt Permitted	0.95		1.00	0.95	0.96	1.00	0.12	1.00			1.00	
Satd. Flow (perm)	1770		1525	1681	1697	1540	230	3539			3418	
Peak-hour factor, PHF	0.86	0.25	0.86	0.89	0.89	0.89	0.97	0.97	0.25	0.25	0.93	0.93
Adj. Flow (vph)	5	0	151	335	26	62	65	921	0	0	1220	6
RTOR Reduction (vph)	0	0	139	0	0	52	0	0	0	0	0	0
Lane Group Flow (vph)	5	0	12	181	180	10	65	921	0	0	1226	0
Confl. Peds. (#/hr)						1			16			12
Confl. Bikes (#/hr)			9			11						1
Turn Type	Prot		Perm	Split	NA	Perm	pm+pt	NA			NA	
Protected Phases	2			1	1		3	8			4	
Permitted Phases			2			1	8					
Actuated Green, G (s)	6.5		6.5	13.5	13.5	13.5	49.8	49.8			41.9	
Effective Green, g (s)	6.5		6.5	13.5	13.5	13.5	49.8	49.8			41.9	
Actuated g/C Ratio	0.08		0.08	0.17	0.17	0.17	0.62	0.62			0.52	
Clearance Time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0	3.0			3.0	
Lane Grp Cap (vph)	143		123	283	286	259	237	2203			1790	
v/s Ratio Prot	0.00			c0.11	0.11		0.02	c0.26			c0.36	
v/s Ratio Perm			c0.01			0.01	0.15					
v/c Ratio	0.03		0.10	0.64	0.63	0.04	0.27	0.42			0.68	
Uniform Delay, d1	33.9		34.0	31.0	30.9	27.8	9.1	7.7			14.1	
Progression Factor	1.00		1.00	1.00	1.00	1.00	0.58	0.35			1.00	
Incremental Delay, d2	0.0		0.1	3.5	3.1	0.0	0.2	0.5			2.2	
Delay (s)	33.9		34.2	34.5	34.0	27.9	5.5	3.2			16.3	
Level of Service	C		C	C	C	C	A	A			B	
Approach Delay (s)		34.2			33.3			3.3			16.3	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	424	1138	475	1053
v/c Ratio	0.16	0.57	0.79	0.30
Control Delay	0.2	13.1	40.6	0.2
Queue Delay	0.0	0.0	16.7	0.0
Total Delay	0.2	13.1	57.3	0.2
Queue Length 50th (ft)	0	183	250	0
Queue Length 95th (ft)	0	263	320	0
Internal Link Dist (ft)		526		54
Turn Bay Length (ft)	80		150	
Base Capacity (vph)	2625	2012	694	3539
Starvation Cap Reductn	0	0	210	0
Spillback Cap Reductn	47	61	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.16	0.58	0.98	0.30

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	394	1067	26	437	969
Future Volume (vph)	0	394	1067	26	437	969
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12
Total Lost time (s)		3.6	3.6		3.6	3.6
Lane Util. Factor		0.88	0.95		1.00	0.95
Frpb, ped/bikes		0.98	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		0.85	1.00		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2745	3525		1770	3539
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2745	3525		1770	3539
Peak-hour factor, PHF	0.25	0.93	0.96	0.96	0.92	0.92
Adj. Flow (vph)	0	424	1111	27	475	1053
RTOR Reduction (vph)	0	0	2	0	0	0
Lane Group Flow (vph)	0	424	1136	0	475	1053
Confl. Peds. (#/hr)		2		2		
Confl. Bikes (#/hr)		6				
Turn Type		pm+ov	NA		Prot	NA
Protected Phases		7	8		7	4
Permitted Phases		4				
Actuated Green, G (s)		76.4	45.7		27.1	80.0
Effective Green, g (s)		76.4	45.7		27.1	80.0
Actuated g/C Ratio		0.96	0.57		0.34	1.00
Clearance Time (s)		3.6	3.6		3.6	3.6
Vehicle Extension (s)		4.0	3.0		4.0	0.2
Lane Grp Cap (vph)		2745	2013		599	3539
v/s Ratio Prot		0.05	c0.32		c0.27	0.30
v/s Ratio Perm		0.10				
v/c Ratio		0.15	0.56		0.79	0.30
Uniform Delay, d1		0.1	10.9		23.9	0.0
Progression Factor		1.00	1.00		1.36	1.00
Incremental Delay, d2		0.0	1.2		6.3	0.2
Delay (s)		0.1	12.0		38.8	0.2
Level of Service		A	B		D	A
Approach Delay (s)	0.1		12.0			12.2
Approach LOS	A		B			B

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	34	1446	15	0	1406
Future Volume (Veh/h)	0	34	1446	15	0	1406
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	37	1572	16	0	1528
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			134			189
pX, platoon unblocked	0.89	0.79			0.79	
vC, conflicting volume	2344	794			1588	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1302	222			1222	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			100	
cM capacity (veh/h)	135	621			450	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	37	1048	540	764	764
Volume Left	0	0	0	0	0
Volume Right	37	0	16	0	0
cSH	621	1700	1700	1700	1700
Volume to Capacity	0.06	0.62	0.32	0.45	0.45
Queue Length 95th (ft)	5	0	0	0	0
Control Delay (s)	11.2	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.2	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix E

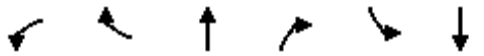
Existing plus Approved/Pending Projects (Background) plus Project Conditions Intersections Level of Service Worksheets

Approved Projects_AM PEAK														
#	**Study Intersection**	**Project Nos**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**
1	Santa Rosa Avenue/Bennett Valley Road	1650	0	0	1	0	1	0	0	0	0	0	0	0
		1846	0	3	6	0	3	0	0	0	0	0	0	0
		2604	0	2	3	0	1	0	0	0	0	0	0	0
		2800	0	0	1	0	0	0	0	0	0	0	0	0
		368	0	0	0	0	2	0	0	0	0	0	0	0
		1111	0	1	2	0	2	0	0	0	0	0	0	0
		Total	**0**	**6**	**13**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2	Santa Rosa Avenue/Maple Avenue	1650	0	0	0	0	0	0	0	0	0	1	0	0
		1846	0	3	0	0	1	0	0	0	0	2	0	0
		2604	0	2	0	0	0	0	0	0	0	1	0	0
		2800	0	0	0	0	0	0	0	0	0	0	0	0
		368	0	0	0	0	0	0	0	0	0	2	0	0
		1111	0	1	0	0	0	0	0	0	0	2	0	0
		Total	**0**	**6**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**8**	**0**	**0**
3	Santa Rosa Avenue/Petaluma Hill Road	1650	0	0	0	1	0	0	0	0	0	0	0	1
		1846	0	0	0	3	0	0	0	0	0	0	0	9
		2604	0	0	0	1	0	0	0	0	0	0	0	5
		2800	0	0	0	0	0	0	0	0	0	0	0	1
		368	0	0	0	0	2	0	0	0	0	0	0	0
		1111	0	0	0	2	0	0	0	0	0	0	0	3
		Total	**0**	**0**	**0**	**7**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**19**

Approved Projects_PM PEAK														
#	**Study Intersection**	**Projects**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**
1	Santa Rosa Avenue/Bennett Valley Road	1650	0	1	1	0	2	0	0	0	0	0	0	0
		1846	0	2	4	0	10	0	0	0	0	0	0	0
		2604	0	1	2	0	4	0	0	0	0	0	0	0
		2800	0	0	0	0	1	0	0	0	0	0	0	0
		368	0	0	2	0	0	0	0	0	0	0	0	0
		1111	0	2	4	0	6	0	0	0	0	0	0	0
		Total	**0**	**6**	**13**	**0**	**23**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2	Santa Rosa Avenue/Maple Avenue	1650	0	1	0	0	1	0	0	0	0	1	0	0
		1846	0	2	0	0	4	0	0	0	0	6	0	0
		2604	0	1	0	0	1	0	0	0	0	3	0	0
		2800	0	0	0	0	0	0	0	0	0	1	0	0
		368	0	0	0	0	0	0	0	0	0	0	0	0
		1111	0	2	0	0	2	0	0	0	0	4	0	0
		Total	**0**	**6**	**0**	**0**	**8**	**0**	**0**	**0**	**0**	**15**	**0**	**0**
3	Santa Rosa Avenue/Petaluma Hill Road	1650	0	0	0	2	0	0	0	0	0	0	0	2
		1846	0	0	0	10	0	0	0	0	0	0	0	6
		2604	0	0	0	4	0	0	0	0	0	0	0	3
		2800	0	0	0	1	0	0	0	0	0	0	0	0
		368	0	2	0	0	0	0	0	0	0	0	0	0
		1111	0	0	0	6	0	0	0	0	0	0	0	6
		Total	**0**	**2**	**0**	**23**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**17**

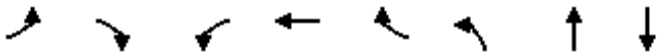
Lane Group	NBT	SBL	SBT
Lane Group Flow (vph)	1473	48	871
v/c Ratio	0.51	0.32	0.28
Control Delay	5.6	47.5	0.8
Queue Delay	0.1	0.0	0.0
Total Delay	5.6	47.5	0.8
Queue Length 50th (ft)	24	28	0
Queue Length 95th (ft)	400	49	35
Internal Link Dist (ft)	208		257
Turn Bay Length (ft)		125	
Base Capacity (vph)	2889	238	3127
Starvation Cap Reductn	307	0	299
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.57	0.20	0.31

Intersection Summary



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	984	268	41	749
Future Volume (vph)	0	0	984	268	41	749
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10
Total Lost time (s)			3.6		3.0	3.6
Lane Util. Factor			0.95		1.00	0.95
Frpb, ped/bikes			0.99		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			0.97		1.00	1.00
Flt Protected			1.00		0.95	1.00
Satd. Flow (prot)			3395		1652	3303
Flt Permitted			1.00		0.95	1.00
Satd. Flow (perm)			3395		1652	3303
Peak-hour factor, PHF	0.25	0.25	0.85	0.85	0.86	0.86
Adj. Flow (vph)	0	0	1158	315	48	871
RTOR Reduction (vph)	0	0	13	0	0	0
Lane Group Flow (vph)	0	0	1460	0	48	871
Confl. Peds. (#/hr)				15		
Confl. Bikes (#/hr)		8				
Turn Type			NA		Prot	NA
Protected Phases			8		7	4
Permitted Phases						
Actuated Green, G (s)			71.3		5.6	79.9
Effective Green, g (s)			71.3		5.6	79.9
Actuated g/C Ratio			0.79		0.06	0.89
Clearance Time (s)			3.6		3.0	3.6
Vehicle Extension (s)			3.0		3.0	3.0
Lane Grp Cap (vph)			2689		102	2932
v/s Ratio Prot			c0.43		c0.03	0.26
v/s Ratio Perm						
v/c Ratio			0.54		0.47	0.30
Uniform Delay, d1			3.4		40.8	0.8
Progression Factor			1.03		1.11	0.47
Incremental Delay, d2			0.8		3.3	0.2
Delay (s)			4.3		48.5	0.6
Level of Service			A		D	A
Approach Delay (s)	0.0		4.3			3.1
Approach LOS	A		A			A

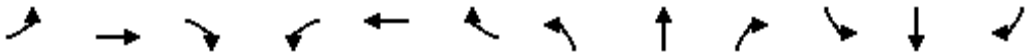
Intersection Summary			
HCM 2000 Control Delay	3.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	39.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	9	98	202	206	149	62	998	521
v/c Ratio	0.07	0.50	0.69	0.69	0.38	0.11	0.43	0.26
Control Delay	39.2	17.7	46.1	46.3	7.9	2.8	4.6	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Total Delay	39.2	17.7	46.1	46.3	7.9	2.8	4.8	12.4
Queue Length 50th (ft)	5	0	115	117	0	7	142	74
Queue Length 95th (ft)	12	9	168	170	43	m3	14	131
Internal Link Dist (ft)				394			257	404
Turn Bay Length (ft)	95				115	50		
Base Capacity (vph)	204	264	485	491	555	586	2337	1982
Starvation Cap Reductn	0	0	0	0	0	0	476	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.37	0.42	0.42	0.27	0.11	0.54	0.26

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	56	323	36	131	57	918	0	0	426	1
Future Volume (vph)	5	0	56	323	36	131	57	918	0	0	426	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	11	12
Total Lost time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00	1.00	0.95			0.95	
Frpb, ped/bikes	1.00		0.96	1.00	1.00	0.98	1.00	1.00			1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00		0.85	1.00	1.00	0.85	1.00	1.00			1.00	
Flt Protected	0.95		1.00	0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (prot)	1770		1516	1681	1701	1550	1770	3539			3420	
Flt Permitted	0.95		1.00	0.95	0.96	1.00	0.40	1.00			1.00	
Satd. Flow (perm)	1770		1516	1681	1701	1550	753	3539			3420	
Peak-hour factor, PHF	0.57	0.25	0.57	0.88	0.88	0.88	0.92	0.92	0.25	0.25	0.82	0.82
Adj. Flow (vph)	9	0	98	367	41	149	62	998	0	0	520	1
RTOR Reduction (vph)	0	0	92	0	0	123	0	0	0	0	0	0
Lane Group Flow (vph)	9	0	6	202	206	26	62	998	0	0	521	0
Confl. Peds. (#/hr)						1			7			5
Confl. Bikes (#/hr)			8			6						1
Turn Type	Prot		Perm	Split	NA	Perm	pm+pt	NA			NA	
Protected Phases	2			1	1		3	8			4	
Permitted Phases			2			1	8					
Actuated Green, G (s)	5.2		5.2	15.8	15.8	15.8	58.8	58.8			50.9	
Effective Green, g (s)	5.2		5.2	15.8	15.8	15.8	58.8	58.8			50.9	
Actuated g/C Ratio	0.06		0.06	0.18	0.18	0.18	0.65	0.65			0.57	
Clearance Time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0	3.0			3.0	
Lane Grp Cap (vph)	102		87	295	298	272	547	2312			1934	
v/s Ratio Prot	c0.01			0.12	c0.12		0.01	c0.28			0.15	
v/s Ratio Perm			0.00			0.02	0.07					
v/c Ratio	0.09		0.07	0.68	0.69	0.10	0.11	0.43			0.27	
Uniform Delay, d1	40.2		40.1	34.8	34.8	31.1	5.9	7.5			10.0	
Progression Factor	1.00		1.00	1.00	1.00	1.00	0.32	0.47			1.00	
Incremental Delay, d2	0.1		0.1	5.2	5.5	0.1	0.0	0.5			0.3	
Delay (s)	40.3		40.2	39.9	40.3	31.2	1.9	4.0			10.4	
Level of Service	D		D	D	D	C	A	A			B	
Approach Delay (s)		40.2			37.7			3.9			10.4	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	700	800	198	656
v/c Ratio	0.27	0.32	0.55	0.19
Control Delay	0.3	5.7	38.0	0.1
Queue Delay	0.0	0.0	0.1	0.0
Total Delay	0.4	5.8	38.1	0.1
Queue Length 50th (ft)	0	72	111	0
Queue Length 95th (ft)	0	122	174	0
Internal Link Dist (ft)		1979		208
Turn Bay Length (ft)	80		150	
Base Capacity (vph)	2640	2530	656	3539
Starvation Cap Reductn	0	0	76	0
Spillback Cap Reductn	229	298	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.29	0.36	0.34	0.19

Intersection Summary

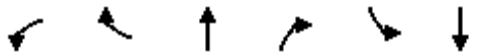
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	532	660	4	172	571
Future Volume (vph)	0	532	660	4	172	571
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12
Total Lost time (s)		3.6	3.6		3.6	3.6
Lane Util. Factor		0.88	0.95		1.00	0.95
Frpb, ped/bikes		0.98	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		0.85	1.00		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2740	3535		1770	3539
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2740	3535		1770	3539
Peak-hour factor, PHF	0.25	0.76	0.83	0.83	0.87	0.87
Adj. Flow (vph)	0	700	795	5	198	656
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	700	800	0	198	656
Confl. Peds. (#/hr)				3		
Confl. Bikes (#/hr)		3				
Turn Type		pm+ov	NA		Prot	NA
Protected Phases		7	8		7	4
Permitted Phases		4				
Actuated Green, G (s)		86.4	64.4		18.4	90.0
Effective Green, g (s)		86.4	64.4		18.4	90.0
Actuated g/C Ratio		0.96	0.72		0.20	1.00
Clearance Time (s)		3.6	3.6		3.6	3.6
Vehicle Extension (s)		4.0	3.0		4.0	0.2
Lane Grp Cap (vph)		2740	2529		361	3539
v/s Ratio Prot		0.05	c0.23		c0.11	0.19
v/s Ratio Perm		0.20				
v/c Ratio		0.26	0.32		0.55	0.19
Uniform Delay, d1		0.1	4.7		32.1	0.0
Progression Factor		1.00	1.00		1.04	1.00
Incremental Delay, d2		0.1	0.3		2.1	0.1
Delay (s)		0.2	5.0		35.5	0.1
Level of Service		A	A		D	A
Approach Delay (s)	0.2		5.0			8.3
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	4.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	NBT	SBL	SBT
Lane Group Flow (vph)	1361	86	1537
v/c Ratio	0.59	0.44	0.57
Control Delay	4.6	37.2	5.4
Queue Delay	0.0	0.0	0.2
Total Delay	4.6	37.2	5.6
Queue Length 50th (ft)	53	39	132
Queue Length 95th (ft)	71	m64	275
Internal Link Dist (ft)	208		257
Turn Bay Length (ft)		125	
Base Capacity (vph)	2303	268	2708
Starvation Cap Reductn	6	0	248
Spillback Cap Reductn	0	0	327
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.59	0.32	0.65

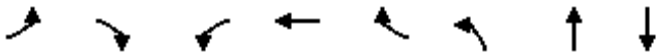
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	918	416	82	1460
Future Volume (vph)	0	0	918	416	82	1460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10
Total Lost time (s)			3.6		3.0	3.6
Lane Util. Factor			0.95		1.00	0.95
Frpb, ped/bikes			0.99		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			0.95		1.00	1.00
Flt Protected			1.00		0.95	1.00
Satd. Flow (prot)			3338		1652	3303
Flt Permitted			1.00		0.95	1.00
Satd. Flow (perm)			3338		1652	3303
Peak-hour factor, PHF	0.25	0.25	0.98	0.98	0.95	0.95
Adj. Flow (vph)	0	0	937	424	86	1537
RTOR Reduction (vph)	0	0	46	0	0	0
Lane Group Flow (vph)	0	0	1315	0	86	1537
Confl. Peds. (#/hr)				12		
Confl. Bikes (#/hr)		8		2		
Turn Type			NA		Prot	NA
Protected Phases			8		7	4
Permitted Phases						
Actuated Green, G (s)			51.7		8.3	63.0
Effective Green, g (s)			51.7		8.3	63.0
Actuated g/C Ratio			0.65		0.10	0.79
Clearance Time (s)			3.6		3.0	3.6
Vehicle Extension (s)			3.0		3.0	3.0
Lane Grp Cap (vph)			2157		171	2601
v/s Ratio Prot			0.39		0.05	c0.47
v/s Ratio Perm						
v/c Ratio			0.61		0.50	0.59
Uniform Delay, d1			8.3		33.9	3.4
Progression Factor			0.35		0.98	0.95
Incremental Delay, d2			1.2		1.9	0.8
Delay (s)			4.0		35.1	4.0
Level of Service			A		D	A
Approach Delay (s)	0.0		4.0			5.7
Approach LOS	A		A			A

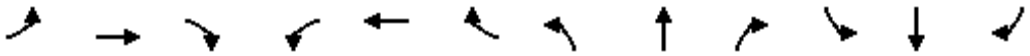
Intersection Summary			
HCM 2000 Control Delay	4.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	5	151	180	179	62	65	925	1233
v/c Ratio	0.04	0.58	0.64	0.63	0.19	0.25	0.42	0.68
Control Delay	32.5	15.4	40.5	39.9	4.1	6.9	3.5	19.6
Queue Delay	0.0	0.1	0.7	0.7	0.0	0.0	0.2	0.0
Total Delay	32.5	15.5	41.2	40.6	4.1	6.9	3.7	19.6
Queue Length 50th (ft)	2	0	90	89	0	3	25	215
Queue Length 95th (ft)	12	45	136	135	16	m7	44	#486
Internal Link Dist (ft)				394			257	404
Turn Bay Length (ft)	95				115	50		
Base Capacity (vph)	230	331	441	445	472	324	2207	1820
Starvation Cap Reductn	0	0	0	0	0	0	447	0
Spillback Cap Reductn	0	7	86	86	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.47	0.51	0.50	0.13	0.20	0.53	0.68

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	0	130	296	23	55	63	897	0	0	1141	6
Future Volume (vph)	4	0	130	296	23	55	63	897	0	0	1141	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	11	12
Total Lost time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00	1.00	0.95			0.95	
Frpb, ped/bikes	1.00		0.96	1.00	1.00	0.97	1.00	1.00			1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00		0.85	1.00	1.00	0.85	1.00	1.00			1.00	
Flt Protected	0.95		1.00	0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (prot)	1770		1525	1681	1697	1540	1770	3539			3418	
Flt Permitted	0.95		1.00	0.95	0.96	1.00	0.12	1.00			1.00	
Satd. Flow (perm)	1770		1525	1681	1697	1540	227	3539			3418	
Peak-hour factor, PHF	0.86	0.25	0.86	0.89	0.89	0.89	0.97	0.97	0.25	0.25	0.93	0.93
Adj. Flow (vph)	5	0	151	333	26	62	65	925	0	0	1227	6
RTOR Reduction (vph)	0	0	139	0	0	52	0	0	0	0	0	0
Lane Group Flow (vph)	5	0	12	180	179	10	65	925	0	0	1233	0
Confl. Peds. (#/hr)						1			16			12
Confl. Bikes (#/hr)			9			11						1
Turn Type	Prot		Perm	Split	NA	Perm	pm+pt	NA			NA	
Protected Phases	2			1	1		3	8			4	
Permitted Phases			2			1	8					
Actuated Green, G (s)	6.5		6.5	13.4	13.4	13.4	49.9	49.9			42.0	
Effective Green, g (s)	6.5		6.5	13.4	13.4	13.4	49.9	49.9			42.0	
Actuated g/C Ratio	0.08		0.08	0.17	0.17	0.17	0.62	0.62			0.52	
Clearance Time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0	3.0			3.0	
Lane Grp Cap (vph)	143		123	281	284	257	236	2207			1794	
v/s Ratio Prot	0.00			c0.11	0.11		0.02	c0.26			c0.36	
v/s Ratio Perm			c0.01			0.01	0.15					
v/c Ratio	0.03		0.10	0.64	0.63	0.04	0.28	0.42			0.69	
Uniform Delay, d1	33.9		34.0	31.1	31.0	27.9	9.1	7.7			14.1	
Progression Factor	1.00		1.00	1.00	1.00	1.00	0.63	0.33			1.00	
Incremental Delay, d2	0.0		0.1	3.7	3.3	0.0	0.2	0.5			2.2	
Delay (s)	33.9		34.2	34.8	34.3	27.9	5.9	3.0			16.3	
Level of Service	C		C	C	C	C	A	A			B	
Approach Delay (s)		34.2			33.6			3.2			16.3	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	440	1112	500	1038
v/c Ratio	0.17	0.56	0.81	0.29
Control Delay	0.2	13.4	40.1	0.2
Queue Delay	0.0	0.0	53.8	0.0
Total Delay	0.2	13.4	93.8	0.2
Queue Length 50th (ft)	0	182	250	0
Queue Length 95th (ft)	0	254	329	0
Internal Link Dist (ft)		1979		208
Turn Bay Length (ft)	80		150	
Base Capacity (vph)	2625	1974	694	3539
Starvation Cap Reductn	0	0	248	0
Spillback Cap Reductn	36	46	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.17	0.58	1.12	0.29

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	409	1042	26	460	955
Future Volume (vph)	0	409	1042	26	460	955
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12
Total Lost time (s)		3.6	3.6		3.6	3.6
Lane Util. Factor		0.88	0.95		1.00	0.95
Frpb, ped/bikes		0.99	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		0.85	1.00		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2745	3524		1770	3539
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2745	3524		1770	3539
Peak-hour factor, PHF	0.25	0.93	0.96	0.96	0.92	0.92
Adj. Flow (vph)	0	440	1085	27	500	1038
RTOR Reduction (vph)	0	0	2	0	0	0
Lane Group Flow (vph)	0	440	1110	0	500	1038
Confl. Peds. (#/hr)		2		2		
Confl. Bikes (#/hr)		6				
Turn Type		pm+ov	NA		Prot	NA
Protected Phases		7	8		7	4
Permitted Phases		4				
Actuated Green, G (s)		76.4	44.8		28.0	80.0
Effective Green, g (s)		76.4	44.8		28.0	80.0
Actuated g/C Ratio		0.96	0.56		0.35	1.00
Clearance Time (s)		3.6	3.6		3.6	3.6
Vehicle Extension (s)		4.0	3.0		4.0	0.2
Lane Grp Cap (vph)		2745	1973		619	3539
v/s Ratio Prot		0.06	c0.31		c0.28	0.29
v/s Ratio Perm		0.10				
v/c Ratio		0.16	0.56		0.81	0.29
Uniform Delay, d1		0.1	11.3		23.6	0.0
Progression Factor		1.00	1.00		1.32	1.00
Incremental Delay, d2		0.0	1.2		6.8	0.2
Delay (s)		0.1	12.5		38.0	0.2
Level of Service		A	B		D	A
Approach Delay (s)	0.1		12.5			12.5
Approach LOS	A		B			B

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

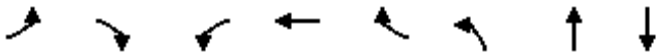
Appendix F – (Background) plus Project Conditions Intersections Level of Service Worksheets

Lane Group	NBT	SBL	SBT
Lane Group Flow (vph)	1499	51	878
v/c Ratio	0.52	0.34	0.28
Control Delay	5.6	47.5	0.8
Queue Delay	0.1	0.0	0.0
Total Delay	5.7	47.5	0.8
Queue Length 50th (ft)	30	30	0
Queue Length 95th (ft)	403	51	35
Internal Link Dist (ft)	109		247
Turn Bay Length (ft)		125	
Base Capacity (vph)	2878	238	3127
Starvation Cap Reductn	279	0	307
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.58	0.21	0.31

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	985	289	44	755
Future Volume (vph)	0	0	985	289	44	755
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10
Total Lost time (s)			3.6		3.0	3.6
Lane Util. Factor			0.95		1.00	0.95
Frpb, ped/bikes			0.99		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			0.97		1.00	1.00
Flt Protected			1.00		0.95	1.00
Satd. Flow (prot)			3386		1652	3303
Flt Permitted			1.00		0.95	1.00
Satd. Flow (perm)			3386		1652	3303
Peak-hour factor, PHF	0.25	0.25	0.85	0.85	0.86	0.86
Adj. Flow (vph)	0	0	1159	340	51	878
RTOR Reduction (vph)	0	0	14	0	0	0
Lane Group Flow (vph)	0	0	1485	0	51	878
Confl. Peds. (#/hr)				15		
Confl. Bikes (#/hr)		8				
Turn Type			NA		Prot	NA
Protected Phases			8		7	4
Permitted Phases						
Actuated Green, G (s)			71.2		5.7	79.9
Effective Green, g (s)			71.2		5.7	79.9
Actuated g/C Ratio			0.79		0.06	0.89
Clearance Time (s)			3.6		3.0	3.6
Vehicle Extension (s)			3.0		3.0	3.0
Lane Grp Cap (vph)			2678		104	2932
v/s Ratio Prot			c0.44		c0.03	0.27
v/s Ratio Perm						
v/c Ratio			0.55		0.49	0.30
Uniform Delay, d1			3.5		40.7	0.8
Progression Factor			1.00		1.11	0.46
Incremental Delay, d2			0.8		3.5	0.3
Delay (s)			4.3		48.6	0.6
Level of Service			A		D	A
Approach Delay (s)	0.0		4.3			3.2
Approach LOS	A		A			A

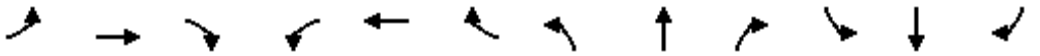
Intersection Summary			
HCM 2000 Control Delay	3.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	9	98	207	210	149	62	999	522
v/c Ratio	0.07	0.50	0.69	0.70	0.37	0.11	0.43	0.26
Control Delay	39.2	17.7	46.3	46.3	7.8	2.9	4.7	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Total Delay	39.2	17.7	46.3	46.3	7.8	2.9	4.9	12.5
Queue Length 50th (ft)	5	0	117	120	0	7	140	74
Queue Length 95th (ft)	12	9	171	173	42	m3	15	132
Internal Link Dist (ft)				394			247	404
Turn Bay Length (ft)	95				115	50		
Base Capacity (vph)	204	264	485	491	555	583	2330	1974
Starvation Cap Reductn	0	0	0	0	0	0	517	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.37	0.43	0.43	0.27	0.11	0.55	0.26

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	56	331	36	131	57	919	0	0	427	1
Future Volume (vph)	5	0	56	331	36	131	57	919	0	0	427	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	11	12
Total Lost time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00	1.00	0.95			0.95	
Frpb, ped/bikes	1.00		0.96	1.00	1.00	0.98	1.00	1.00			1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00		0.85	1.00	1.00	0.85	1.00	1.00			1.00	
Flt Protected	0.95		1.00	0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (prot)	1770		1516	1681	1701	1551	1770	3539			3420	
Flt Permitted	0.95		1.00	0.95	0.96	1.00	0.40	1.00			1.00	
Satd. Flow (perm)	1770		1516	1681	1701	1551	751	3539			3420	
Peak-hour factor, PHF	0.57	0.25	0.57	0.88	0.88	0.88	0.92	0.92	0.25	0.25	0.82	0.82
Adj. Flow (vph)	9	0	98	376	41	149	62	999	0	0	521	1
RTOR Reduction (vph)	0	0	92	0	0	123	0	0	0	0	0	0
Lane Group Flow (vph)	9	0	6	207	210	26	62	999	0	0	522	0
Confl. Peds. (#/hr)						1			7			5
Confl. Bikes (#/hr)			8			6						1
Turn Type	Prot		Perm	Split	NA	Perm	pm+pt	NA			NA	
Protected Phases	2			1	1		3	8			4	
Permitted Phases			2			1	8					
Actuated Green, G (s)	5.2		5.2	16.0	16.0	16.0	58.6	58.6			50.7	
Effective Green, g (s)	5.2		5.2	16.0	16.0	16.0	58.6	58.6			50.7	
Actuated g/C Ratio	0.06		0.06	0.18	0.18	0.18	0.65	0.65			0.56	
Clearance Time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0	3.0			3.0	
Lane Grp Cap (vph)	102		87	298	302	275	544	2304			1926	
v/s Ratio Prot	c0.01			0.12	c0.12		0.01	c0.28			0.15	
v/s Ratio Perm			0.00			0.02	0.07					
v/c Ratio	0.09		0.07	0.69	0.70	0.10	0.11	0.43			0.27	
Uniform Delay, d1	40.2		40.1	34.7	34.7	31.0	5.9	7.6			10.1	
Progression Factor	1.00		1.00	1.00	1.00	1.00	0.33	0.47			1.00	
Incremental Delay, d2	0.1		0.1	5.6	5.5	0.1	0.0	0.5			0.3	
Delay (s)	40.3		40.2	40.3	40.2	31.0	2.0	4.1			10.5	
Level of Service	D		D	D	D	C	A	A			B	
Approach Delay (s)		40.2			37.8			4.0			10.5	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	701	815	198	663
v/c Ratio	0.27	0.32	0.55	0.19
Control Delay	0.3	5.8	37.6	0.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	0.4	5.8	37.6	0.1
Queue Length 50th (ft)	0	74	111	0
Queue Length 95th (ft)	0	124	171	0
Internal Link Dist (ft)		526		54
Turn Bay Length (ft)	80		150	
Base Capacity (vph)	2640	2530	656	3539
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	230	298	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.29	0.37	0.30	0.19

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	533	672	4	172	577
Future Volume (vph)	0	533	672	4	172	577
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12
Total Lost time (s)		3.6	3.6		3.6	3.6
Lane Util. Factor		0.88	0.95		1.00	0.95
Frpb, ped/bikes		0.98	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		0.85	1.00		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2740	3535		1770	3539
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2740	3535		1770	3539
Peak-hour factor, PHF	0.25	0.76	0.83	0.83	0.87	0.87
Adj. Flow (vph)	0	701	810	5	198	663
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	701	815	0	198	663
Confl. Peds. (#/hr)				3		
Confl. Bikes (#/hr)		3				
Turn Type		pm+ov	NA		Prot	NA
Protected Phases		7	8		7	4
Permitted Phases		4				
Actuated Green, G (s)		86.4	64.4		18.4	90.0
Effective Green, g (s)		86.4	64.4		18.4	90.0
Actuated g/C Ratio		0.96	0.72		0.20	1.00
Clearance Time (s)		3.6	3.6		3.6	3.6
Vehicle Extension (s)		4.0	3.0		4.0	0.2
Lane Grp Cap (vph)		2740	2529		361	3539
v/s Ratio Prot		0.05	c0.23		c0.11	0.19
v/s Ratio Perm		0.20				
v/c Ratio		0.26	0.32		0.55	0.19
Uniform Delay, d1		0.1	4.7		32.1	0.0
Progression Factor		1.00	1.00		1.03	1.00
Incremental Delay, d2		0.1	0.3		2.1	0.1
Delay (s)		0.2	5.1		35.1	0.1
Level of Service		A	A		D	A
Approach Delay (s)	0.2		5.1			8.2
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

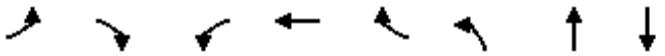
Lane Group	NBT	SBL	SBT
Lane Group Flow (vph)	1410	92	1552
v/c Ratio	0.61	0.46	0.57
Control Delay	5.1	37.6	5.4
Queue Delay	0.0	0.0	0.1
Total Delay	5.1	37.6	5.5
Queue Length 50th (ft)	61	42	135
Queue Length 95th (ft)	82	m68	277
Internal Link Dist (ft)	109		247
Turn Bay Length (ft)		125	
Base Capacity (vph)	2294	268	2708
Starvation Cap Reductn	3	0	312
Spillback Cap Reductn	0	0	249
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.62	0.34	0.65

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	920	462	87	1474
Future Volume (vph)	0	0	920	462	87	1474
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10
Total Lost time (s)			3.6		3.0	3.6
Lane Util. Factor			0.95		1.00	0.95
Frpb, ped/bikes			0.99		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			0.95		1.00	1.00
Flt Protected			1.00		0.95	1.00
Satd. Flow (prot)			3323		1652	3303
Flt Permitted			1.00		0.95	1.00
Satd. Flow (perm)			3323		1652	3303
Peak-hour factor, PHF	0.25	0.25	0.98	0.98	0.95	0.95
Adj. Flow (vph)	0	0	939	471	92	1552
RTOR Reduction (vph)	0	0	56	0	0	0
Lane Group Flow (vph)	0	0	1354	0	92	1552
Confl. Peds. (#/hr)				12		
Confl. Bikes (#/hr)		8		2		
Turn Type			NA		Prot	NA
Protected Phases			8		7	4
Permitted Phases						
Actuated Green, G (s)			51.5		8.5	63.0
Effective Green, g (s)			51.5		8.5	63.0
Actuated g/C Ratio			0.64		0.11	0.79
Clearance Time (s)			3.6		3.0	3.6
Vehicle Extension (s)			3.0		3.0	3.0
Lane Grp Cap (vph)			2139		175	2601
v/s Ratio Prot			c0.41		0.06	c0.47
v/s Ratio Perm						
v/c Ratio			0.63		0.53	0.60
Uniform Delay, d1			8.6		33.8	3.4
Progression Factor			0.38		0.98	0.94
Incremental Delay, d2			1.3		2.3	0.8
Delay (s)			4.5		35.5	4.0
Level of Service			A		D	A
Approach Delay (s)	0.0		4.5			5.8
Approach LOS	A		A			A

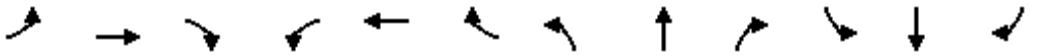
Intersection Summary			
HCM 2000 Control Delay	5.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	5	151	190	188	62	65	927	1235
v/c Ratio	0.04	0.58	0.66	0.64	0.18	0.26	0.42	0.68
Control Delay	32.5	15.4	40.9	40.1	4.0	7.1	3.8	20.0
Queue Delay	0.0	0.1	0.9	0.9	0.0	0.0	0.2	0.0
Total Delay	32.5	15.5	41.8	41.0	4.0	7.1	4.0	20.0
Queue Length 50th (ft)	2	0	94	93	0	3	25	220
Queue Length 95th (ft)	12	45	144	142	16	m8	53	#488
Internal Link Dist (ft)				394			247	404
Turn Bay Length (ft)	95				115	50		
Base Capacity (vph)	230	331	441	445	472	321	2191	1804
Starvation Cap Reductn	0	0	0	0	0	0	502	0
Spillback Cap Reductn	0	8	92	93	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.47	0.54	0.53	0.13	0.20	0.55	0.68

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	0	130	313	23	55	63	899	0	0	1143	6
Future Volume (vph)	4	0	130	313	23	55	63	899	0	0	1143	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	11	12
Total Lost time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00	1.00	0.95			0.95	
Frpb, ped/bikes	1.00		0.96	1.00	1.00	0.97	1.00	1.00			1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00		0.85	1.00	1.00	0.85	1.00	1.00			1.00	
Flt Protected	0.95		1.00	0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (prot)	1770		1525	1681	1697	1540	1770	3539			3418	
Flt Permitted	0.95		1.00	0.95	0.96	1.00	0.12	1.00			1.00	
Satd. Flow (perm)	1770		1525	1681	1697	1540	222	3539			3418	
Peak-hour factor, PHF	0.86	0.25	0.86	0.89	0.89	0.89	0.97	0.97	0.25	0.25	0.93	0.93
Adj. Flow (vph)	5	0	151	352	26	62	65	927	0	0	1229	6
RTOR Reduction (vph)	0	0	139	0	0	51	0	0	0	0	0	0
Lane Group Flow (vph)	5	0	12	190	188	11	65	927	0	0	1235	0
Confl. Peds. (#/hr)						1			16			12
Confl. Bikes (#/hr)			9			11						1
Turn Type	Prot		Perm	Split	NA	Perm	pm+pt	NA			NA	
Protected Phases	2			1	1		3	8			4	
Permitted Phases			2			1	8					
Actuated Green, G (s)	6.5		6.5	13.8	13.8	13.8	49.5	49.5			41.6	
Effective Green, g (s)	6.5		6.5	13.8	13.8	13.8	49.5	49.5			41.6	
Actuated g/C Ratio	0.08		0.08	0.17	0.17	0.17	0.62	0.62			0.52	
Clearance Time (s)	3.0		3.0	3.6	3.6	3.6	3.0	3.6			3.6	
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	2.0	3.0			3.0	
Lane Grp Cap (vph)	143		123	289	292	265	232	2189			1777	
v/s Ratio Prot	0.00			c0.11	0.11		0.02	c0.26			c0.36	
v/s Ratio Perm			c0.01			0.01	0.16					
v/c Ratio	0.03		0.10	0.66	0.64	0.04	0.28	0.42			0.69	
Uniform Delay, d1	33.9		34.0	30.9	30.8	27.6	9.3	7.9			14.4	
Progression Factor	1.00		1.00	1.00	1.00	1.00	0.64	0.36			1.00	
Incremental Delay, d2	0.0		0.1	4.1	3.6	0.0	0.2	0.5			2.3	
Delay (s)	33.9		34.2	35.0	34.4	27.6	6.1	3.3			16.7	
Level of Service	C		C	C	C	C	A	A			B	
Approach Delay (s)		34.2			33.7			3.5			16.7	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	442	1141	500	1053
v/c Ratio	0.17	0.58	0.81	0.30
Control Delay	0.2	13.6	40.5	0.2
Queue Delay	0.0	0.0	32.9	0.0
Total Delay	0.2	13.6	73.4	0.2
Queue Length 50th (ft)	0	190	255	0
Queue Length 95th (ft)	0	264	335	0
Internal Link Dist (ft)		526		54
Turn Bay Length (ft)	80		150	
Base Capacity (vph)	2625	1973	694	3539
Starvation Cap Reductn	0	0	215	0
Spillback Cap Reductn	39	51	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.17	0.59	1.04	0.30

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	411	1069	26	460	969
Future Volume (vph)	0	411	1069	26	460	969
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12
Total Lost time (s)		3.6	3.6		3.6	3.6
Lane Util. Factor		0.88	0.95		1.00	0.95
Frpb, ped/bikes		0.99	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		0.85	1.00		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		2745	3525		1770	3539
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		2745	3525		1770	3539
Peak-hour factor, PHF	0.25	0.93	0.96	0.96	0.92	0.92
Adj. Flow (vph)	0	442	1114	27	500	1053
RTOR Reduction (vph)	0	0	2	0	0	0
Lane Group Flow (vph)	0	442	1139	0	500	1053
Confl. Peds. (#/hr)		2		2		
Confl. Bikes (#/hr)		6				
Turn Type		pm+ov	NA		Prot	NA
Protected Phases		7	8		7	4
Permitted Phases		4				
Actuated Green, G (s)		76.4	44.8		28.0	80.0
Effective Green, g (s)		76.4	44.8		28.0	80.0
Actuated g/C Ratio		0.96	0.56		0.35	1.00
Clearance Time (s)		3.6	3.6		3.6	3.6
Vehicle Extension (s)		4.0	3.0		4.0	0.2
Lane Grp Cap (vph)		2745	1974		619	3539
v/s Ratio Prot		0.06	c0.32		c0.28	0.30
v/s Ratio Perm		0.10				
v/c Ratio		0.16	0.58		0.81	0.30
Uniform Delay, d1		0.1	11.4		23.6	0.0
Progression Factor		1.00	1.00		1.35	1.00
Incremental Delay, d2		0.0	1.2		6.7	0.2
Delay (s)		0.1	12.7		38.4	0.2
Level of Service		A	B		D	A
Approach Delay (s)	0.1		12.7			12.5
Approach LOS	A		B			B

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Appendix G – Parking Incentive/Contingency Plan

Parking Incentive/Contingency Plan
For
900 Santa Rosa Avenue

A Conditional Use Permit has been submitted to the City of Santa Rosa for a Retail Cannabis Dispensary use. The proposed use will operate out of a new 3,072 square foot single use building. Although the retail space is less than the total building square footage, the parking requirements for this use and size of building, per the Cannabis FAQ Parking Requirements Memo, states 1 parking space per 250 square foot of building area. This would equate to 12 parking spaces. This equation also incorporates employee parking.

R&B Dispensary offers a novel approach to meeting parking needs now and into the future by the following measures:

1. There will be 10 on-site parking spaces plus one designated "delivery vehicle" parking space for a total of 11 on-site parking spaces. Two (2) of the 10 parking spaces will be designated for employee parking and will be monitored by the on-site security personnel, providing eight (8) parking spaces, including a van accessible handicap space. Bike parking will also be made available in front of the building.

2. Wholesale deliveries: Deliveries will be made from 3rd party companies as well as Mercy Wellness's off site distribution facility. Vehicles will typically be a small to large sized passenger vehicles (*ex. Ford transit, Ford transit connect).* The parking space nearest the back door, shown striped on the site plan, will be marked and be reserved for delivery vehicles.

Ince

3. R&B Dispensary has leased privately owned, off-site parking across Santa Rosa Avenue for up-to 8 vehicles. There are pedestrian cross walks available for persons to safely cross to the Dispensary. This parking area can also be used for any intermittent customer parking if all spaces are not filled, should the need arise.

4. R&B Dispensary will provide an employee reimbursement program for public transportation, as a great city bus access is available located near the project site and via routes SR3, SR5, SR18, SCT44, SCT46, SCT48, SCT54.

5. R&B Dispensary will offer an employee compensation incentives program to all employees as an incentive to bike/walk/scooter/unicycle to work. Bike locks will be available on site.

6. The closes public garage is Garage #12 at 555 First St Santa Rosa, CA 95401, located just .5 miles from the project site. Employees will be incentivized via parking passes, to park at the garage; and or skateboard, scooter, or walk to work from there.