



Traffic Impact Study for the Justice Grown Dispensary Project



Prepared for the City of Santa Rosa

Submitted by
W-Trans

April 17, 2019



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Executive Summary

The proposed project includes a 7,045 square foot dispensary, of which 2,675 square feet would be dedicated to retail, and a 2,455 square foot community impact room. The project as proposed would be expected to generate an average of 1,851 trips per day, including 21 trips during the weekday a.m. peak hour and 160 trips during the evening peak hour.

Three intersections near the project site were evaluated to assess potential traffic impacts; of the three, Petaluma Hill Road/Barham Avenue experienced collisions at a rate slight higher than the statewide average rate for similar facilities based on records for a five-year study period. However, since there were so few crashes and no two involved the same movements, no specific concern was identified for further review. All three study intersections are operating acceptably under Existing Conditions and would be expected to continue doing so with project generated traffic added. Additionally, the study intersections would continue to operate acceptably at LOS D or better with the addition of trips from the cannabis dispensary approved for 900 Santa Rosa Avenue as well as the proposed project.

Transit routes and bicycle facilities serving the project site are adequate. Pedestrian facilities are adequate to serve the anticipated demand.

Access to the site is expected to operate adequately, including use of the existing two-way left-turn lane on Petaluma Hill Road for egress toward the north. Sight distance along Petaluma Hill Road is adequate from the project driveway; however, sight lines are limited at the easternmost driveway on Barham Avenue when vehicles park on the shoulder east of the project site. It is recommended that the City allow "No Parking" signage to be posted on the shoulder to improve sight lines and that the red-painted curb markings at the fire hydrant adjacent to the project site be refreshed to deter illegal parking.

The proposed on-site parking supply is inadequate to meet City requirements, but parking occupancy surveys were conducted on streets in the project vicinity and there is adequate existing on-street parking available for the project should it be needed.

Introduction

This report presents an analysis of the potential traffic impacts that would be associated with development of a proposed cannabis dispensary and community impact center to be located at 1111 Petaluma Hill Road in the City of Santa Rosa. The traffic study was completed in accordance with the criteria established by the City of Santa Rosa, is consistent with standard traffic engineering techniques, and reflects a scope of work requested by City staff.

Prelude

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

Project Profile

The project, as proposed, includes a 7,045 square foot dispensary, though only 2,675 square feet would be dedicated to retail, and a 2,455 square foot community impact room. The project would be located in a currently vacant building that was previously occupied by a heating and air conditioning trade contractor. The project site is located on the southwest corner of the intersection of Petaluma Hill Road/Barham Avenue, as shown in Figure 1.



Traffic Impact Study for the Justice Grown Dispensary Project
Figure 1 – Study Area and Existing Lane Configurations

Transportation Setting

Operational Analysis

Study Area and Periods

The study area consists of the following intersections:

1. Santa Rosa Avenue/Petaluma Hill Road
2. Santa Rosa Avenue/Barham Avenue
3. Petaluma Hill Road/Barham Avenue

Operating conditions during the weekday p.m. peak period were evaluated to capture the highest potential impacts for the proposed project as well as the highest volumes on the local transportation network. The evening peak hour occurs between 4:00 and 6:00 p.m. and typically reflects the highest level of congestion during the homeward bound commute.

Study Roadway

Petaluma Hill Road is a two-lane roadway that predominantly runs north-south. The segment along the project frontage has two 12-foot travel lanes with a center two-way left-turn lane and posted speed limit of 35 miles per hour (mph). Based on count data collected in February 2019, the roadway has an average daily traffic (ADT) volume of approximately 8,900.

Study Intersections

Santa Rosa Avenue/Petaluma Hill Road is a signalized tee-intersection with protected left-turn phasing on the southbound approach and right-turn only movements permitted on the westbound Petaluma Hill Road approach that overlap with the southbound left turn. Bike lanes are present on Santa Rosa Avenue and a crosswalk is provided on the east leg.

Santa Rosa Avenue/Barham Avenue is a signalized four-legged intersection with protected left-turn phasing on the northbound and southbound Santa Rosa Avenue approaches. Bike lanes are present in both directions of Santa Rosa Avenue and crosswalks are marked on all four legs.

Petaluma Hill Road/Barham Avenue-Pressley Street is a four-legged, two-way stop-controlled intersection with stop controls on the eastbound Barham Avenue and westbound Pressley Street approaches. There are crosswalks present on all legs except the south leg, with high-visibility striping on the north leg. Bike lanes are striped on Petaluma Hill Road in both directions beginning just south of Barham Avenue.

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

Collision History

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on records available from the California Highway Patrol as published in their Statewide Integrated Traffic Records System (SWITRS) reports. The most current five-year period available is October 1, 2013 through September 30, 2018.

As presented in Table 1, the calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2014 Collision Data on California State Highways*, California Department of Transportation (Caltrans). During the five-year study period the intersection of Petaluma Hill Road/Barham Avenue had a slightly higher collision rate than the statewide average for that type of facility; the remaining intersections had collision rates below the statewide average for similar facilities indicating that they are operating acceptably with regards to safety. The collision rate calculations are provided in Appendix A.

Table 1 – Collision Rates at the Study Intersections

Study Intersection	Number of Collisions (2013-2018)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Santa Rosa Ave/Petaluma Hill Rd	4	0.08	0.21
2. Santa Rosa Ave/Barham Ave	7	0.18	0.27
3. Petaluma Hill Rd/Barham Ave	3	0.16	0.15

Note: c/mve = collisions per million vehicles entering; **Bold** text = collision rates are higher than the statewide average

Because the intersection of Petaluma Hill Road/Barham Avenue had a calculated collision rate slightly above the statewide average, the individual collisions that occurred at this intersection were further reviewed. It was determined that two of the collisions were classified as broadsides, both of which were attributed to right-of-way violations. However, since there were so few crashes and no two involving the same movements, no specific concern was identified for further review.

Alternative Modes

Pedestrian Facilities

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

- **Barham Avenue** – Intermittent sidewalk coverage is provided on Barham Avenue with gaps on both sides of the street between Santa Rosa Avenue and just west of the project site. On-street parking along Barham Avenue west of the project site conflicts with pedestrian use of the shoulder. Lighting is provided by overhead street lights.
- **Petaluma Hill Road** – Continuous sidewalks are provided on both sides of Petaluma Hill Road between Santa Rosa Avenue and Kawana Springs Road.

Bicycle Facilities

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

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

- **Class III Bike Route** – signing only for shared use with motor vehicles within the same travel lane on a street or highway.
- **Class IV Bikeway** – also known as a separated bikeway, a Class IV Bikeway is for the exclusive use of bicycles and includes a separation between the bikeway and the motor vehicle traffic lane. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

In the project area, Class II bike lanes exist on Santa Rosa Avenue between Maple Avenue and East Todd Road, and along Petaluma Hill Road between Barham Avenue and Santa Rosa City Limits south. According to the *Santa Rosa Bicycle and Pedestrian Master Plan*, the existing Class III bicycle route on Petaluma Hill Road between Santa Rosa Avenue and Barham Avenue is planned to be converted to bicycle lanes. Colgan Avenue is also planned to have Class II bike lanes between Santa Rosa Avenue and Petaluma Hill Road. Bicyclists ride in the roadway and/or on sidewalks along all other streets within the project study area. Table 2 summarizes the existing and planned bicycle facilities in the project vicinity, as contained in the *Santa Rosa Bicycle and Pedestrian Master Plan* (2018 update).

Table 2 – Bicycle Facility Summary

Status Facility	Class	Length (miles)	Begin Point	End Point
Existing				
Santa Rosa Ave	II	3.10	Maple Ave	E Todd Rd
Petaluma Hill Rd	II	1.37	Barham Ave	City Limits
Petaluma Hill Rd	III	0.16	Santa Rosa Ave	Barham Ave
Planned				
Colgan Ave	II	0.35	Santa Rosa Ave	Petaluma Hill Rd
Petaluma Hill Rd	II	0.16	Santa Rosa Ave	Barham Ave

Source: *Santa Rosa Bicycle and Pedestrian Master Plan*, City of Santa Rosa, 2018

Transit Facilities

Santa Rosa City Bus

Santa Rosa City Bus provides fixed route transit service throughout the City of Santa Rosa. Routes 3 and 5 provide loop service between the Downtown Transit Mall and the southern Santa Rosa communities. Each route has stops on Santa Rosa Avenue between the Transit Mall and Petaluma Hill Road and operates Monday through Friday with approximately one-half-hour headways between 6:00 a.m. and 7:30 p.m. Saturday service operates with approximately one-hour headways between 6:00 a.m. and 7:00 p.m. and Sunday service operates between 10:00 a.m. and 4:00 p.m. with similar headways.

Sonoma County Transit

Sonoma County Transit (SCT) provides fixed route bus service within the City of Santa Rosa and throughout the County of Sonoma. Route 42 provides service within the City of Santa Rosa between the Transit Mall and Robles Avenue/Standish Avenue, connecting to the project site via a stop on Santa Rosa Avenue. This route provides weekday service with approximately one-half-hour to two-hour headways between 7:30 a.m. and 5:30 p.m.

SCT Route 46 provides service within the City of Santa Rosa and to surrounding communities. This route connects the section of Petaluma Hill Road near the project site to the Downtown Transit Mall, Sonoma State University, and the Cotati SMART station. The route provides service Monday through Friday with approximately two-hour headways between 6:50 a.m. and 9:00 a.m. and then again between 3:55 p.m. and 5:40 p.m.

Routes 44, 48, and 54 provide transit service between the Coddington Mall Transit Center and the Petaluma Fair Grounds, providing connections to Downtown Santa Rosa, Graton Resort and Casino, Sonoma State University, and the Cotati, Petaluma, and Rohnert Park SMART Stations. Route services vary with approximately one-half-hour to one-hour headways during the weekdays between 5:20 a.m. and 10:30 p.m. Weekend service operates with one-hour to two-hour headways between 7:30 a.m. and 10:00 p.m.

Two bicycles can be carried on most SCT and City of Santa Rosa buses. Bike rack space is provided on a first come, first served basis. Additional bicycles may be allowed on SCT and City buses at the discretion of the driver.

Dial-a-ride, also known as paratransit, or door-to-door service, is available for those who are unable to independently use the transit system due to a physical or mental disability. SCT and City Bus Paratransit is designed to serve the needs of individuals with disabilities within the City of Santa Rosa and the greater Sonoma County area.

Capacity Analysis

Intersection Level of Service Methodologies

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

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

The Levels of Service for Petaluma Hill Road/Barham Avenue, which has side-street stop controls, were analyzed using the “Two-Way Stop-Controlled” intersection capacity method from the HCM. This methodology determines a level of service for each minor turning movement by estimating the level of average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall average delay for the intersection.

The study intersections that are currently controlled by a traffic signal were evaluated using the signalized methodology from the HCM. This methodology is based on factors including traffic volumes, green time for each movement, phasing, whether the signals are coordinated or not, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology. Delays were calculated using signal timing provided by City staff.

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

Table 3 – Intersection Level of Service Criteria

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

Reference: *Highway Capacity Manual*, Transportation Research Board, 2010

Traffic Operation Standards

City of Santa Rosa

The City of Santa Rosa's adopted Level of Service (LOS) Standard is contained in *Santa Rosa General Plan 2035*. Standard TD-1 states that the City will try to maintain a Level of Service (LOS) D or better along all major corridors. Exceptions to meeting this standard are allowed where attainment would result in significant environmental degradation; where topography or environmental impacts make the improvement impossible; or where attainment would ensure loss of an area's unique character.

While a corridor level of service is applied by the City in its analysis of the entire City as part of the environmental documentation supporting the General Plan, this type of analysis only provides relevant data when performed on a much longer segment than the one included as the study area for the project. Therefore, although the City's standard does not specify criteria for intersections, for the purposes of this study, as is standard practice for such studies, a minimum operation of LOS D for the overall operation of signalized and unsignalized intersections was applied.

It is noted that because the proposed project is consistent with the land use applied in the analysis supporting the General Plan, per the City's revised traffic study guidelines no Future Conditions analysis is required.

Reporting of Peak Hour Delay

Per the City of Santa Rosa's General Plan policy T-D-1, LOS is calculated based on the average traffic demand over the hour, rather than the peak 15 minutes within the hour; therefore, peak hour factors (PHF's) were not used in the analysis.

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the p.m. peak period. This condition does not include project-generated traffic volumes. Volume data was collected in February 2019 during clear weather and while local schools were in session.

Intersection Levels of Service

Under Existing Conditions, all study intersections are operating acceptably at LOS A overall. The existing traffic volumes are shown in Figure 2. A summary of the intersection level of service calculations is contained in Table 4, and copies of the Level of Service calculations for all evaluated scenarios are provided in Appendix B.

Table 4 – Existing PM Peak Hour Intersection Levels of Service

Study Intersection Approach	PM Peak	
	Delay	LOS
1. Santa Rosa Ave/Petaluma Hill Rd	8.7	A
2. Santa Rosa Ave/Barham Ave	7.1	A
3. Petaluma Hill Rd/Barham Ave	3.3	A
Eastbound Approach	16.8	C
Westbound Approach	22.0	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

Baseline Conditions

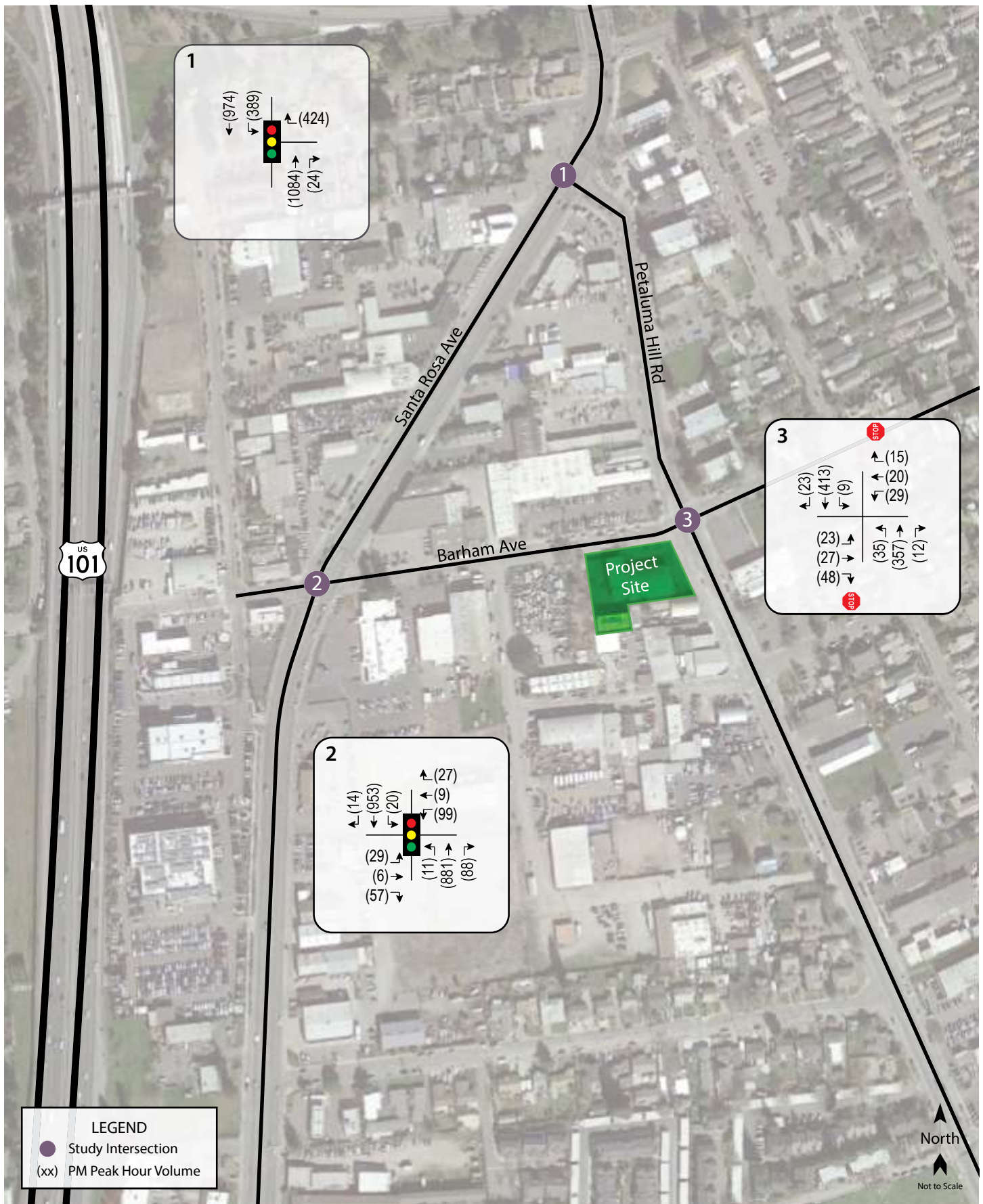
The Baseline Conditions scenario provides an evaluation of operation with traffic from approved or pending projects in the study area that could be operational within the next two to three years. At the request of City staff, a 3,072 square foot cannabis dispensary to be located at 900 Santa Rosa Avenue was included in the Baseline Conditions analysis. The anticipated daily and p.m. peak hour trip generations for the proposed dispensary were estimated using standard rates for a new land use published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 10th Edition, 2017, called "Marijuana Dispensary" (LU #882). The anticipated trip generation potential for the baseline project during the p.m. peak hour is shown in Table 5.

Table 5 – Baseline Trip Generation Summary

Land Use	Units	Daily		PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out
Marijuana Dispensary	3,072 ksf	252.70	776	21.83	67	34	33

Note: ksf = 1,000 square feet

Upon the addition of traffic associated with the approved project to Existing volumes, all the study intersections and approaches would be expected to continue operating acceptably at LOS C or better during both peak hours. These results are summarized in Table 6, and Baseline volumes are shown in Figure 3.



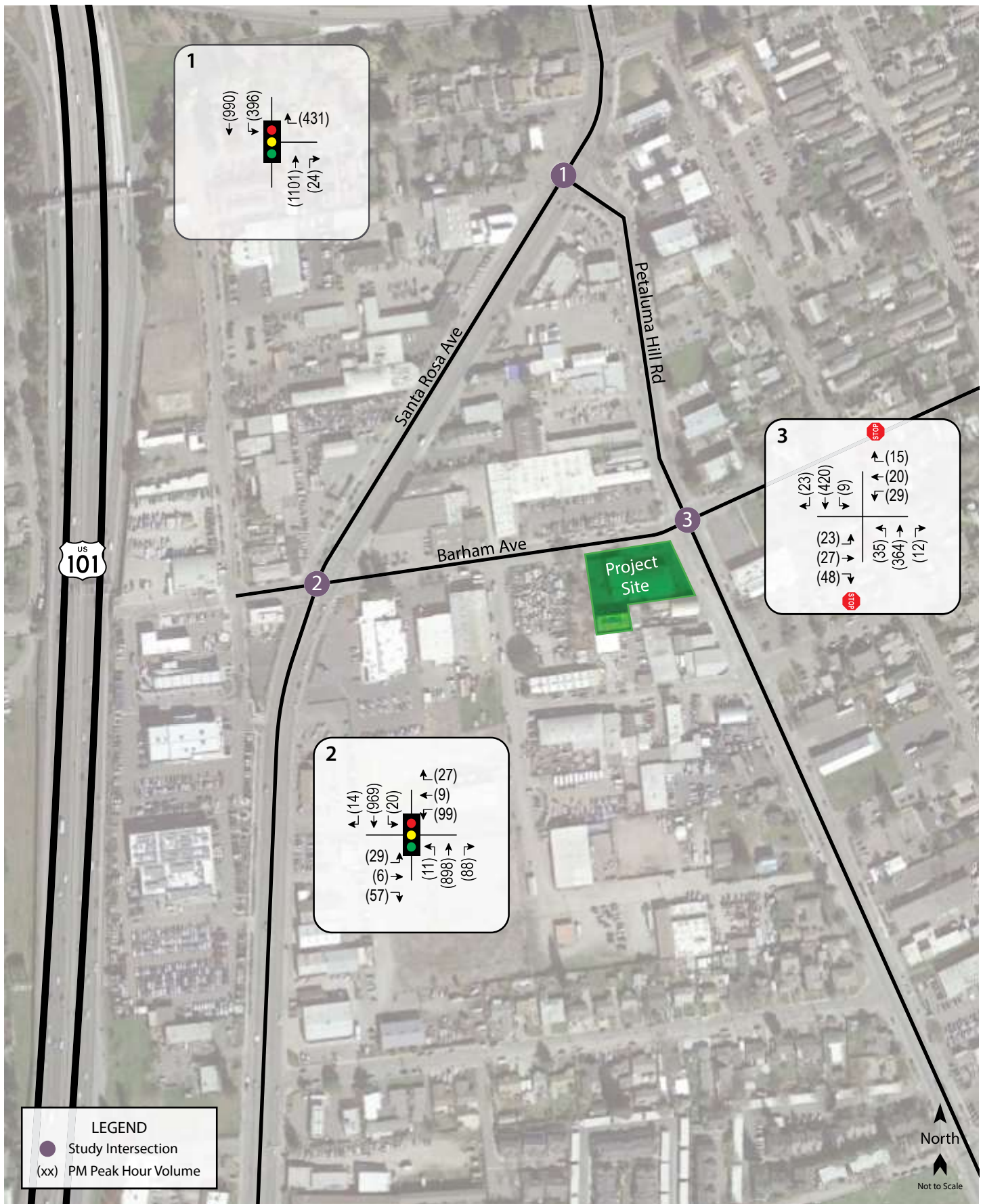


Table 6 – Baseline PM Peak Hour Intersection Levels of Service

Study Intersection Approach	PM Peak	
	Delay	LOS
1. Santa Rosa Ave/Petaluma Hill Rd	8.7	A
2. Santa Rosa Ave/Barham Ave	7.2	A
3. Petaluma Hill Rd/Barham Ave	3.4	A
Eastbound Approach	17.0	C
Westbound Approach	22.5	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

Project Description

The project site has an approximately 9,500 square-foot main building and a 2,650 square-foot warehouse building that are both currently vacant, though they were previously occupied by a heating and air conditioning trade contractor. As proposed, the project would include a cannabis dispensary with 7,045 square feet of total space, though only 2,675 square feet would be dedicated to retail, and a 2,455 square-foot community impact room that would be used for Zumba classes, cooking classes, drug abuse seminars, and other educational events on occasion. The dispensary and community impact room would be located in the main building, while the warehouse building would be used for parking. The proposed operation would be open to the public between the hours of 9:00 a.m. and 9:00 p.m. seven days a week. The project site plan is shown in Figure 4.

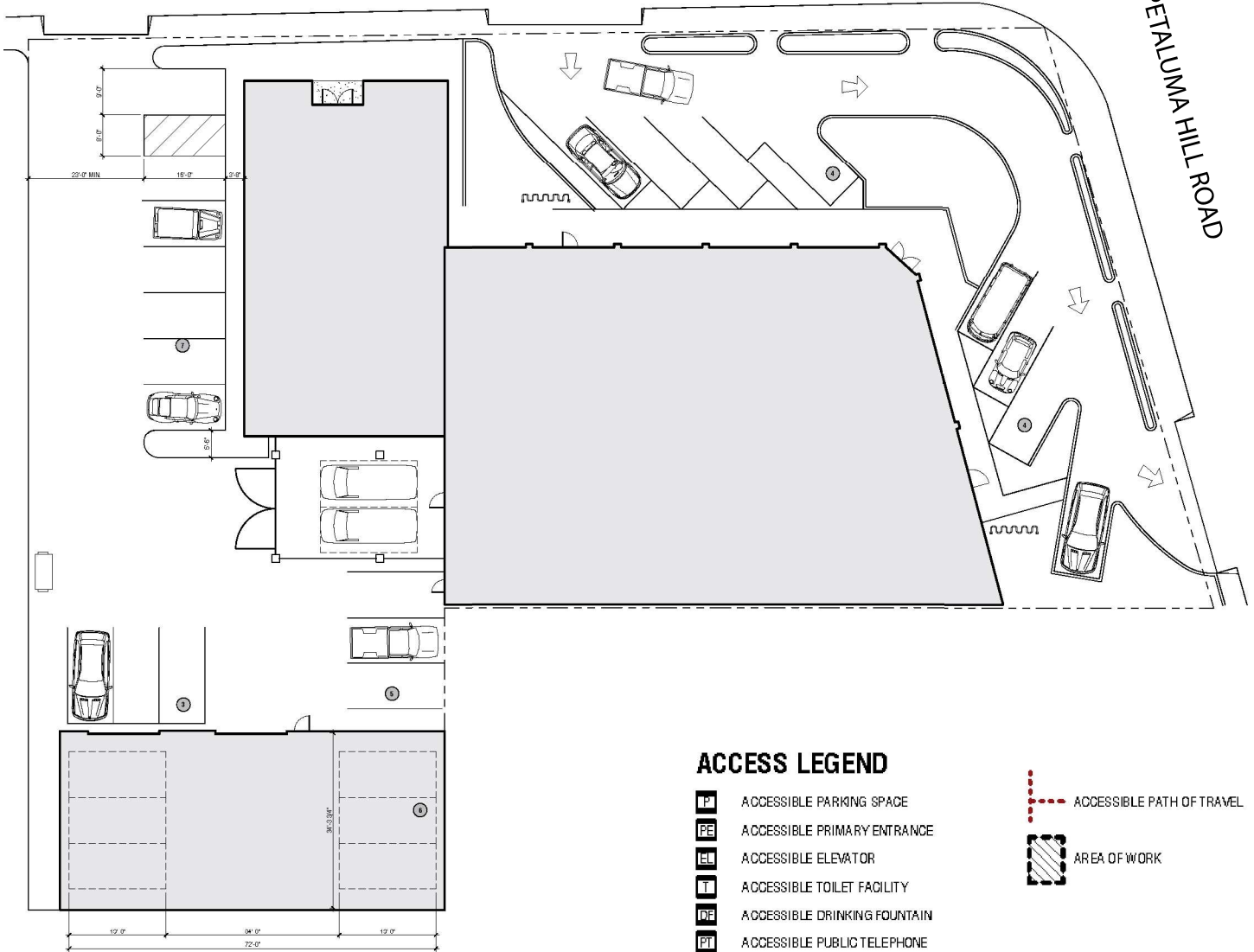
Trip Generation

The anticipated daily and p.m. peak hour trip generations for the proposed dispensary were also estimated using standard rates for the “Marijuana Dispensary” land use from *Trip Generation Manual*. Because ITE rates were developed based on data collected at sites that open for business at 8:00 a.m. and dispensaries in the City of Santa Rosa are not allowed to open for business until 9:00 a.m., custom a.m. peak hour trip generation rates specific to the City of Santa Rosa were developed based on data collected at three existing dispensaries in the City. To estimate the trip generation associated with the community impact center, standard ITE rates for “Recreational Community Center” (LU #495) were applied. Because the site is currently unoccupied, no existing trip credits were given.

Based on application of these rates, the proposed project would be expected to result in 1,851 daily trips on average, including 21 trips during the a.m. peak hour and 160 trips during the p.m. peak hour. The anticipated trip generation potential for the project is shown in Table 7. A spreadsheet summarizing the trip generation data collected in the City of Santa Rosa and derivation of the applied a.m. peak hour rate is contained in Appendix C.

BARHAM AVENUE

PETALUMA HILL ROAD



2 SITE CODE COMPLIANCE PLAN
1/10/18

ACCESS LEGEND

	ACCESSIBLE PARKING SPACE		ACCESSIBLE PATH OF TRAVEL
	ACCESSIBLE PRIMARY ENTRANCE		AREA OF WORK
	ACCESSIBLE ELEVATOR		
	ACCESSIBLE TOILET FACILITY		
	ACCESSIBLE DRINKING FOUNTAIN		
	ACCESSIBLE PUBLIC TELEPHONE		
	ACCESSIBLE REQUIRED EXIT		
	SIGNAGE: TOW-AWAY		
	SIGNAGE: PARKING SPACE, STANDARD		
	SIGNAGE: PARKING SPACE, VAN-ACCESSIBLE		
	SIGNAGE: ENTRY ISA		
	SIGNAGE: DIRECTIONAL ISA		
	SIGNAGE: TOILET ROOM GEOMETRIC		
	SIGNAGE: TOILET ROOM ID PICTOGRAM		
	SIGNAGE: TACTILE ROOM ID		
	SIGNAGE: TACTILE EXIT		

Table 7 – Trip Generation Summary

Land Use	Units	Daily		AM Peak Hour				PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out	Rate	Trips	In	Out
Proposed											
Marijuana Dispensary	7.045 ksf	252.70	1,780	2.40	17	154	1	21.83	154	77	77
Recreational Community Center	2.455 ksf	28.82	71	1.76	4	6	1	2.31	6	3	3
Total Proposed		1,851		21 19 2				160 80 80			

Note: ksf = 1,000 square feet

It should be noted that because the project would be expected to generate fewer than 50 trips during the a.m. peak hour, only the p.m. peak hour was analyzed.

Trip Distribution

The pattern used to allocate new project trips to the street network was determined based on familiarity with the area and surrounding region as well as likely origins and destinations for patrons of the project. The applied distribution assumptions and resulting trips are shown in Table 8.

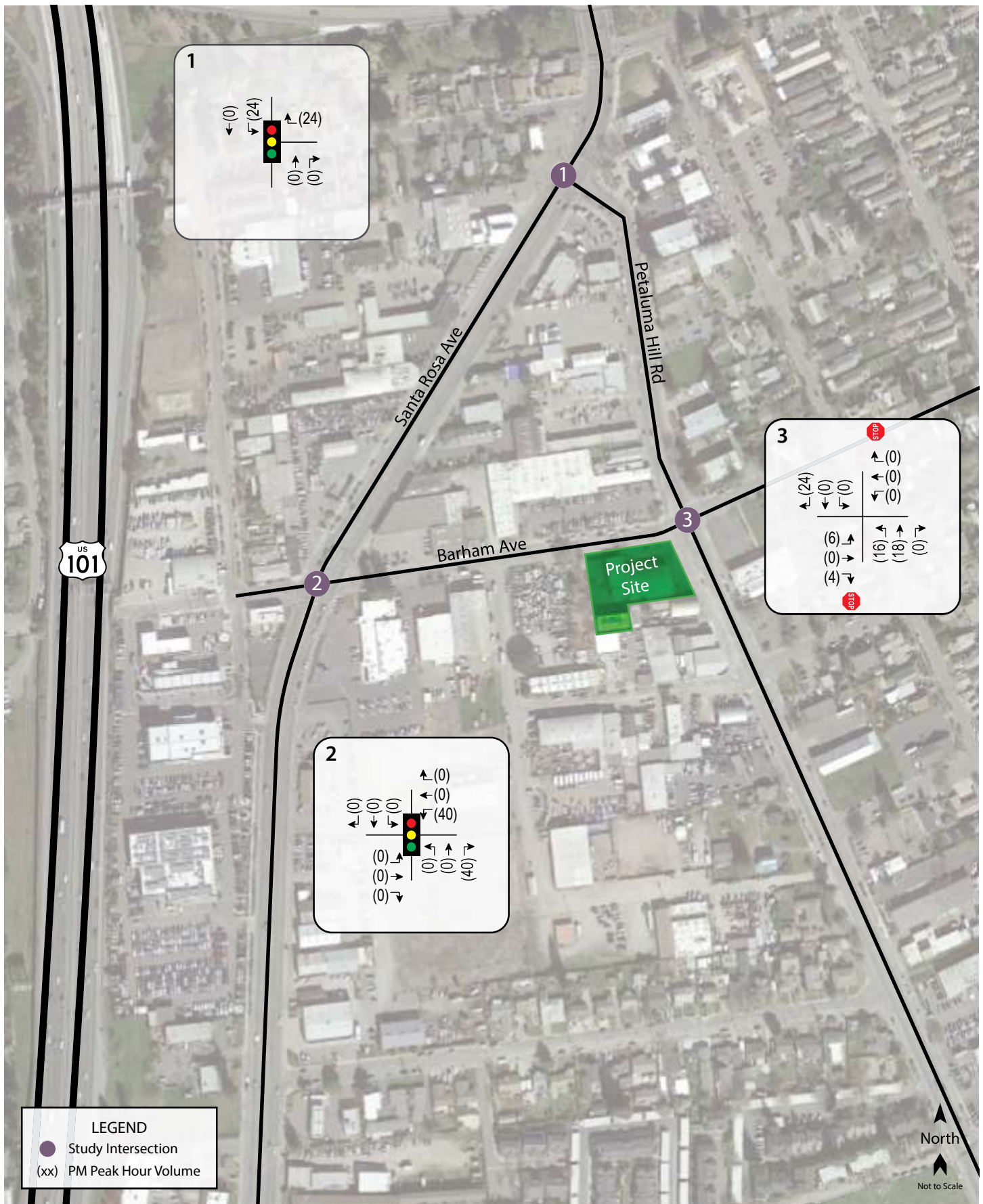
Table 8 – Trip Distribution Assumptions

Route	Percent	Daily Trips	PM Trips
Santa Rosa Ave (North of Petaluma Hill Rd)	30%	555	48
Santa Rosa Ave (South of Barham Ave)	50%	926	80
Petaluma Hill Rd (South of Barham Ave)	20%	370	32
TOTAL	100%	1,851	160

Intersection Operation

Existing plus Project Conditions

Upon the addition of project-related traffic to the Existing volumes, the study intersections are expected to continue operating acceptably. Project traffic volumes are shown in Figure 5. These results are summarized in Table 9.



Traffic Impact Study for the Justice Grown Dispensary Project
Figure 5 – Project Traffic Volumes

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

Study Intersection <i>Approach</i>	Existing Conditions		Existing plus Project	
	Delay	LOS	Delay	LOS
1. Santa Rosa Ave/Petaluma Hill Rd	8.7	A	8.9	A
2. Santa Rosa Ave/Barham Ave	7.1	A	7.9	A
3. Petaluma Hill Rd/Barham Ave	3.3	A	3.8	A
<i>Eastbound Approach</i>	<i>16.8</i>	<i>C</i>	<i>18.7</i>	<i>C</i>
<i>Westbound Approach</i>	<i>22.0</i>	<i>C</i>	<i>24.8</i>	<i>C</i>

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

Finding – Upon the addition of project-generated trips to Existing volumes, the study intersections are expected to continue operating at the same levels of service as without project trips.

Baseline plus Project Conditions

With project-related traffic added to Baseline volumes, the study intersections are expected to continue operating at the same levels of service overall as without project trips. These results are summarized in Table 10.

Table 10 – Baseline and Baseline plus Project PM Peak Hour Intersection Levels of Service

Study Intersection <i>Approach</i>	Baseline Conditions		Baseline plus Project	
	Delay	LOS	Delay	LOS
1. Santa Rosa Ave/Petaluma Hill Rd	8.7	A	9.0	A
2. Santa Rosa Ave/Barham Ave	7.2	A	7.9	A
3. Petaluma Hill Rd/Barham Ave	3.4	A	3.8	A
<i>Eastbound Approach</i>	<i>17.0</i>	<i>C</i>	<i>19.1</i>	<i>C</i>
<i>Westbound Approach</i>	<i>22.5</i>	<i>C</i>	<i>25.4</i>	<i>D</i>

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics*

Finding – The study intersections are expected to continue operating acceptably at the same levels of service upon the addition of project-generated traffic, except for the westbound approach to Petaluma Hill Road/Barham Avenue which would decrease to LOS D, which would be considered acceptable under the standards applied.

Alternative Modes

Pedestrian Facilities

Given the proximity of residential and commercial uses surrounding the site, it is reasonable to assume that some project patrons and employees will want to walk, bicycle, and/or use transit to reach the project site.

Project Site – Sidewalks exist along the project's frontages on both Petaluma Hill Road and Barham Avenue. While sidewalk connectivity is lacking west of the project site on Barham Avenue, pedestrians are more likely to reach the site via the north, south, and east of the site since Santa Rosa Avenue is a major arterial.

Finding – Pedestrian facilities serving the project site are adequate.

Bicycle Facilities

The project proposes to provide a discount program to customers who bike to the site and an incentive program for employees who commute via bicycle. Existing bicycle facilities, including bike lanes on Santa Rosa Avenue and Petaluma Hill Road, together with shared use of minor streets provide adequate access for bicyclists.

Bicycle Storage

In order to satisfy City requirements, the project would be required to provide a minimum of 2 bicycle parking spaces on-site. According to the *Parking and Transportation Plan* (CUP 18-069) prepared by Mantanzas Alliance LLC dba Justice Grown Cannabis Dispensary, bicycle racks for up to 12 bikes will be provided on-site. A copy of *The Parking and Transportation Plan* is provided in Appendix D.

Finding – Bicycle facilities serving the project site are adequate and the project would provide more bicycle parking on-site than is required.

Transit

Employees that commute via public transit will be reimbursed for the full cost of their ticket. Existing transit routes are adequate to accommodate project-generated transit trips and existing stops are within acceptable walking distance of the site.

Finding – Transit facilities serving the project site are adequate.

Access and Circulation

Site Access

Access to the site is provided via three driveways, including two on Barham Avenue and one on Petaluma Hill Road. The western driveway on Barham Avenue is full-access, while the eastern driveway is the entrance to a one-way drive aisle that provides access to parking in front of the dispensary. The driveway on Petaluma Hill Road is the drive aisle exit.

Sight Distance

Sight distances along Barham Avenue and Petaluma Hill Road at the project driveways were evaluated based on sight distance criteria contained in *Highway Design Manual, 6th Edition* published by Caltrans. These guidelines include recommended based upon approach travel speeds.

Based on a design speed of 25 mph, the minimum stopping sight distance needed at the driveway on Barham Avenue was field measured as 150 feet. Sight lines on Barham Avenue are limited to approximately 125 feet from the critical approach due to parked vehicles west of the driveway. Based on the landscaping at this segment, it seems that this shoulder was not designed for parking. Without vehicles parking on this shoulder, sight lines are adequate. Sight lines of vehicles westbound were adequate; however, there was a vehicle parked next to the fire hydrant which limited sight lines. Existing red paint on the curb next to the fire hydrant is faded and should be refreshed to remind drivers not to park there.

Sight distances at the driveway on Petaluma Hill Road were also field measured. A minimum of 250 feet of stopping sight distance is required on Petaluma Hill Road based on the design speed of 35 mph. Field conditions indicate that sight lines extend more than 300 feet in both directions, which is adequate for speeds greater than 35 mph.

Finding – Sight distance at the driveway at Petaluma Hill Road is adequate in both directions. Sight lines for the critical movement on Barham Avenue can be limited if vehicles are parked in the shoulder. While sight lines are deficient by 25 feet from a point back 15 feet from the edge of the roadway, it is not unusual at driveway approaches to minor streets for vehicles to pull forward into the parking lane to gain adequate sight lines, and drivers could see vehicles at 150 feet away without encroaching on the travel lane.

Recommendation – The curb next to the fire hydrant east of the driveway on Barham Avenue should be repainted to deter illegal parking. This would improve sight lines to the required distance. To further improve sight lines from this driveway approach, the City could consider allowing the applicant to post 'No Parking' signage on the shoulder, though this restriction is not necessary for drivers to achieve adequate sight lines if they can encroach on the parking lane. To maintain adequate sight lines with the project any new signage or landscaping to be located near the driveways should be placed outside the vision triangle of a driver waiting at the driveway.

Parking

The project site, as proposed, would provide a total of 27 parking spaces on-site, including eight in front of the dispensary, seven on the west side of the community impact center, six toward the back of the site, and six covered spaces in the warehouse building to be used by employees. Parking was evaluated to determine if the proposed supply is adequate to satisfy City requirements.

Jurisdiction parking supply requirements are based on the Santa Rosa City Code, Chapter 20.36; Parking and Loading Standards. Rates for the Cannabis Retail land use were applied to the dispensary and rates for the Studio land use were applied to the community impact area. Based on application of these rates, the proposed supply would be 13 spaces short of meeting City requirements, though activities in the community impact room would occur infrequently, so the project would only be one space short of satisfying City requirements most of the time.

It should be noted that the City requires application of standard rates for Cannabis Retail to the entire floor area of a dispensary, regardless of how much space would be dedicated to retail or employee-related uses such as storage, office, and distribution. Compared to other dispensaries in the City, the proposed project would have substantially more floor area dedicated to employee uses (approximately two-thirds of the total size of the dispensary) so application of rates for Cannabis Retail to the entire dispensary will likely overestimate the actual parking supply needed. A summary of the proposed parking supply and City requirements is shown in Table 11.

Table 11 – Parking Analysis

Land Use	Units	Rate	Parking Spaces
City Required Parking			
Cannabis – Retail	7,045 sf	1 space/250 sf	28
Studio: Art, Dance, Martial Arts, Music, etc.	2,455 sf	1 space/200 sf	12
<i>Total City Requirements</i>			<i>40</i>
Proposed Parking Supply			27

Notes: sf = square foot

Because the proposed supply would be insufficient to satisfy City requirements, parking surveys were conducted in the immediate vicinity of the project site to determine if there is adequate on-street parking available to accommodate the difference between the proposed on-site supply and City requirements. Within approximately 250 feet of the project site there are 50 on-street parking spaces on Barham Avenue, Petaluma Hill Road, and Pressley Street, including three spaces along the project frontage on Barham Avenue and two spaces along the frontage on Petaluma Hill Road.

The community impact room would potentially be used any time between the hours of 8:00 a.m. and 8:00 p.m. so parking occupancy counts were conducted on a typical weekday during the morning, afternoon, and evening hours. Based on the counts collected, the peak period for on-street parking in the vicinity occurred in the afternoon when 23 of the 50 spaces were occupied. Since there were 27 parking spaces available during the busiest period in the afternoon, and more spaces available in the morning and evening, it is reasonable to conclude that there is adequate existing on-street parking capacity to accommodate any overflow demand generated by the project. The on-street parking survey data is contained in Appendix E.

Finding – The proposed parking supply is one space short of satisfying City requirements during typical operation and 13 spaces short during activities in the community impact room.

Recommendation – As there is sufficient on-street parking available on Barham Avenue, Petaluma Hill Road, and Pressley Street, the City may wish to consider approving the project with less on-site parking than required based on application of standard City rates.

Conclusions and Recommendations

Conclusions

- The proposed project would be expected to generate an average of 1,851 trips per day, including 21 trips during the weekday a.m. peak hour and 160 trips during the evening peak hour.
- Under Existing Conditions, the study intersections are operating acceptably at LOS C or better overall and on all side-street approaches. With project generated traffic added to Existing volumes, the study intersections would continue operating acceptably at LOS C or better.
- Under Baseline Conditions, the study intersections would be expected to continue operating acceptably at LOS D or better without or with the addition of project generated traffic.
- Existing pedestrian, bicycle, and transit facilities serving the site are adequate for anticipated demand.
- Sight lines along Petaluma Hill Road are adequate, however sight distance at the driveway on Barham Avenue are limited of vehicles eastbound due to vehicles parked in the shoulder. Due to the minor approach and design speed of Barham Avenue, drivers are expected to have enough space to pull out to see vehicles approaching even when vehicles are parked near the driveway.
- The proposed on-site parking supply is insufficient to meet the requirements set forth by City code, but parking occupancy surveys indicate that there is adequate on-street parking available in the project vicinity should demand temporarily exceed supply.

Recommendations

- Red curb markings should be repainted next to the fire hydrant east of the driveway off Barham Avenue to deter illegal parking. This would improve sight lines to the recommended distance. Similarly, the City could consider allowing the applicant to install a “No Parking” sign on the shoulder to initiate on-street parking regulations east of the project site. Additionally, any new signage or landscaping installed as part of the project should be located outside sight lines of drivers exiting the driveway.
- The City may wish to consider approving the project with less on-site parking than required by the City Code as there is sufficient street parking on Barham Avenue, Petaluma Hill Road, and Pressley Street to serve even the peak demand that would occur infrequently when the community impact area is in use.

Study Participants and References

Study Participants

Principal in Charge	Dalene J. Whitlock, PE, PTOE
Assistant Engineer	Cameron Nye, EIT
Assistant Planner	Julia Walker
Graphics	Katia Wolfe
Editing/Formatting	Alex Scrobonia
Quality Control	Dalene J. Whitlock, PE, PTOE

References

2014 Collision Data on California State Highways, California Department of Transportation, 2017
Highway Capacity Manual, Transportation Research Board, 2010
Highway Design Manual, 6th Edition, California Department of Transportation, 2017
Parking and Transportation Plan, Mantanzas Alliance LLC DBA Justice Grown Cannabis Dispensary, 2019
Santa Rosa Bicycle and Pedestrian Master Plan, City of Santa Rosa, 2018
Santa Rosa CityBus, <http://srcity.org/1661/Maps-and-Schedules>
Santa Rosa City Code, Quality Code Publishing, 2018
Santa Rosa General Plan 2035, City of Santa Rosa, 2014
Sonoma County Transit, <http://sctransit.com/>
Statewide Integrated Traffic Record System (SWITRS), California Highway Patrol, 2013-2018
Trip Generation Manual, 10th Edition, Institute of Transportation Engineers, 2017

Communications

Email with direction to not include a Future Conditions scenario; Rob Sprinkle to Cameron Nye, February 27, 2019

Email with direction for project to include in Baseline scenario; Susie Murray to Cameron Nye, March 6, 2019

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Appendix A

Collision Rate Calculations



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Intersection Collision Rate Calculations

Traffic Impact Study for the Justice Grown Dispensary Project

Intersection # 1: Santa Rosa Avenue & Petaluma Hill Road

Date of Count: Tuesday, March 14, 2017

Number of Collisions: 4

Number of Injuries: 2

Number of Fatalities: 0

ADT: 29000

Start Date: October 1, 2013

End Date: September 30, 2018

Number of Years: 5

Intersection Type: Tee

Control Type: Signals

Area: Urban

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

$$\text{collision rate} = \frac{4}{29,000} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.08 c/mve	0.0%	50.0%
Statewide Average*	0.21 c/mve	0.3%	42.4%

ADT = average daily total vehicles entering intersection

c/mve = collisions per million vehicles entering intersection

* 2013 Collision Data on California State Highways, Caltrans

Intersection # 2: Santa Rosa Avenue & Barham Avenue

Date of Count: Thursday, February 7, 2019

Number of Collisions: 7

Number of Injuries: 4

Number of Fatalities: 0

ADT: 21900

Start Date: October 1, 2013

End Date: September 30, 2018

Number of Years: 5

Intersection Type: Four-Legged

Control Type: Signals

Area: Urban

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

$$\text{collision rate} = \frac{7}{21,900} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.18 c/mve	0.0%	57.1%
Statewide Average*	0.27 c/mve	0.4%	41.9%

ADT = average daily total vehicles entering intersection

c/mve = collisions per million vehicles entering intersection

* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculations

Traffic Impact Study for the Justice Grown Dispensary Project

Intersection # 3: Petaluma Hill Road & Barham Avenue

Date of Count: Thursday, February 7, 2019

Number of Collisions: 3

Number of Injuries: 2

Number of Fatalities: 0

ADT: 10100

Start Date: October 1, 2013

End Date: September 30, 2018

Number of Years: 5

Intersection Type: Four-Legged

Control Type: Stop & Yield Controls

Area: Urban

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

$$\text{collision rate} = \frac{3}{10,100} \times \frac{1,000,000}{365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	0.16 c/mve	0.0%	66.7%
Statewide Average*	0.15 c/mve	1.0%	41.9%

ADT = average daily total vehicles entering intersection

c/mve = collisions per million vehicles entering intersection

* 2013 Collision Data on California State Highways, Caltrans

Appendix B

Intersection Level of Service Calculations






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Intersection Level Of Service Report

Intersection 1: Santa Rosa Ave/Petaluma Hill Rd

Control Type:	Signalized	Delay (sec / veh):	8.7
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.519

Intersection Setup

Name	Santa Rosa Ave		Santa Rosa Ave		Petaluma Hill Rd	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	1
Pocket Length [ft]	100.00	100.00	150.00	100.00	100.00	80.00
Speed [mph]	35.00		30.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name	Santa Rosa Ave		Santa Rosa Ave		Petaluma Hill Rd	
Base Volume Input [veh/h]	1084	24	389	974	0	424
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	1	0	0	0	97
Total Hourly Volume [veh/h]	1084	23	389	974	0	327
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	271	6	97	244	0	82
Total Analysis Volume [veh/h]	1084	23	389	974	0	327
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	4
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	12		13		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	34.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Overlap
Signal group	8	0	7	4	0	7
Auxiliary Signal Groups						7
Lead / Lag	-	-	Lead	-	-	-
Minimum Green [s]	5	0	5	60	0	5
Maximum Green [s]	45	0	35	80	0	35
Amber [s]	3.6	0.0	3.6	3.6	0.0	3.6
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	58	0	22	80	0	22
Vehicle Extension [s]	3.0	0.0	4.0	0.0	0.0	4.0
Walk [s]	7	0	0	0	0	0
Pedestrian Clearance [s]	15	0	0	0	0	0
Rest In Walk	No			No		No
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	0.0	2.0
I2, Clearance Lost Time [s]	1.6	0.0	1.6	1.6	0.0	1.6
Minimum Recall	No		No	No		No
Maximum Recall	No		No	No		No
Pedestrian Recall	No		No	No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

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

Lane Group Calculations

Lane Group	C	C	L	C	R
C, Cycle Length [s]	64	64	64	64	64
L, Total Lost Time per Cycle [s]	3.60	3.60	3.60	3.60	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	1.60	1.60	1.60	1.60
g_i, Effective Green Time [s]	38	38	18	60	18
g / C, Green / Cycle	0.60	0.60	0.28	0.94	0.28
(v / s)_i Volume / Saturation Flow Rate	0.30	0.30	0.22	0.27	0.12
s, saturation flow rate [veh/h]	1863	1847	1774	3547	2780
c, Capacity [veh/h]	1122	1112	506	3346	792
d1, Uniform Delay [s]	7.18	7.21	20.88	0.14	18.48
k, delay calibration	0.11	0.11	0.15	0.04	0.15
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.34	0.35	3.53	0.02	0.49
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.49	0.50	0.77	0.29	0.41
d, Delay for Lane Group [s/veh]	7.52	7.56	24.41	0.16	18.97
Lane Group LOS	A	A	C	A	B
Critical Lane Group	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	3.19	3.20	5.37	0.01	1.82
50th-Percentile Queue Length [ft/ln]	79.69	80.02	134.27	0.21	45.62
95th-Percentile Queue Length [veh/ln]	5.74	5.76	9.17	0.01	3.28
95th-Percentile Queue Length [ft/ln]	143.45	144.04	229.29	0.37	82.11

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	7.54	7.56	24.41	0.16	0.00	18.97
Movement LOS	A	A	C	A		B
d_A, Approach Delay [s/veh]	7.54		7.08		18.97	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	8.65					
Intersection LOS	A					
Intersection V/C	0.519					

Sequence

Ring 1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SG: 4 80s

SG: 7 22s

SG: 8 58s

SG: 108 22s


Intersection Level Of Service Report

Intersection 2: Santa Rosa Ave/Barham Ave

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

Delay (sec / veh): 7.1
 Level Of Service: A
 Volume to Capacity (v/c): 0.482

Intersection Setup

Name	Santa Rosa Ave			Santa Rosa Ave			Barham Ave			Barham Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	120.00	100.00	100.00	105.00	100.00	100.00	100.00	100.00	85.00	100.00	100.00	100.00
Speed [mph]	35.00			35.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Santa Rosa Ave			Santa Rosa Ave			Barham Ave			Barham Ave		
Base Volume Input [veh/h]	11	881	88	20	953	14	29	6	57	99	9	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	11	881	88	20	953	14	29	6	57	99	9	27
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	220	22	5	238	4	7	2	14	25	2	7
Total Analysis Volume [veh/h]	11	881	88	20	953	14	29	6	57	99	9	27
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	100.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protect	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal group	3	8	0	7	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	5	5	0	5	5	0	0	5	0	0	5	0
Maximum Green [s]	20	66	0	20	66	0	0	34	0	0	34	0
Amber [s]	3.0	3.6	0.0	3.0	3.6	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	47	38	0	47	38	0	0	35	0	0	35	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	17	0	0	12	0	0	27	0	0	26	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	1.6	0.0	1.0	1.6	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

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

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	R	C
C, Cycle Length [s]	24	24	24	24	24	24	24	24	24
L, Total Lost Time per Cycle [s]	3.00	3.60	3.60	3.00	3.60	3.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	1.00	1.60	1.60	1.00	1.60	1.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	0	10	10	1	10	10	4	4	4
g / C, Green / Cycle	0.02	0.40	0.40	0.03	0.41	0.41	0.17	0.17	0.17
(v / s)_i Volume / Saturation Flow Rate	0.01	0.26	0.26	0.01	0.26	0.26	0.02	0.04	0.21
s, saturation flow rate [veh/h]	1774	1863	1804	1774	1863	1853	1587	1583	652
c, Capacity [veh/h]	28	755	731	49	777	773	540	266	369
d1, Uniform Delay [s]	11.71	5.78	5.78	11.49	5.52	5.52	8.48	8.64	11.19
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	8.61	0.96	0.99	5.37	0.83	0.83	0.05	0.40	0.61
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.39	0.65	0.65	0.41	0.62	0.62	0.06	0.21	0.37
d, Delay for Lane Group [s/veh]	20.33	6.74	6.77	16.86	6.35	6.35	8.53	9.03	11.80
Lane Group LOS	C	A	A	B	A	A	A	A	B
Critical Lane Group	No	No	Yes	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.11	0.78	0.76	0.14	0.69	0.69	0.11	0.20	0.58
50th-Percentile Queue Length [ft/ln]	2.63	19.44	18.99	3.53	17.32	17.25	2.75	4.98	14.54
95th-Percentile Queue Length [veh/ln]	0.19	1.40	1.37	0.25	1.25	1.24	0.20	0.36	1.05
95th-Percentile Queue Length [ft/ln]	4.74	35.00	34.18	6.35	31.17	31.05	4.95	8.97	26.17

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.33	6.75	6.77	16.86	6.35	6.35	8.53	8.53	9.03	11.80	11.80	11.80
Movement LOS	C	A	A	B	A	A	A	A	A	B	B	B
d_A, Approach Delay [s/veh]	6.91			6.56			8.84			11.80		
Approach LOS	A			A			A			B		
d_I, Intersection Delay [s/veh]	7.13											
Intersection LOS	A											
Intersection V/C	0.482											

Sequence

Ring 1	2	-	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-







Intersection Level Of Service Report

Intersection 3: Petaluma Hill Rd/Barham Ave

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

Delay (sec / veh): 26.0
 Level Of Service: D
 Volume to Capacity (v/c): 0.138

Intersection Setup

Name	Petaluma Hill Rd			Petaluma Hill Rd			Barham Ave			Pressley St		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Pocket Length [ft]	75.00	100.00	100.00	65.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			35.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			Yes			Yes		

Volumes

Name	Petaluma Hill Rd			Petaluma Hill Rd			Barham Ave			Pressley St		
Base Volume Input [veh/h]	35	357	12	9	413	23	23	27	48	29	20	15
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	35	357	12	9	413	23	23	27	48	29	20	15
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	89	3	2	103	6	6	7	12	7	5	4
Total Analysis Volume [veh/h]	35	357	12	9	413	23	23	27	48	29	20	15
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			Yes	No
Storage Area [veh]	0	0	2	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results




V/C, Movement V/C Ratio	0.03	0.00	0.00	0.01	0.00	0.00	0.10	0.10	0.08	0.14	0.07	0.02
d_M, Delay for Movement [s/veh]	8.31	0.00	0.00	8.05	0.00	0.00	22.07	19.88	12.47	26.01	22.16	14.22
Movement LOS	A	A	A	A	A	A	C	C	B	D	C	B
95th-Percentile Queue Length [veh/ln]	0.10	0.00	0.00	0.02	0.00	0.00	0.72	0.72	0.72	0.88	0.88	0.88
95th-Percentile Queue Length [ft/ln]	2.41	0.00	0.00	0.57	0.00	0.00	18.06	18.06	18.06	22.04	22.04	22.04
d_A, Approach Delay [s/veh]	0.72			0.16			16.76			22.04		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	3.38											
Intersection LOS	D											

Intersection Level Of Service Report

Intersection 1: Santa Rosa Ave/Petaluma Hill Rd

Control Type:	Signalized	Delay (sec / veh):	8.7
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.528

Intersection Setup

Name	Santa Rosa Ave		Santa Rosa Ave		Petaluma Hill Rd	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	1
Pocket Length [ft]	100.00	100.00	150.00	100.00	100.00	80.00
Speed [mph]	35.00		30.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name	Santa Rosa Ave		Santa Rosa Ave		Petaluma Hill Rd	
Base Volume Input [veh/h]	1084	24	389	974	0	424
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	17	0	7	16	0	7
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	1	0	0	0	97
Total Hourly Volume [veh/h]	1101	23	396	990	0	334
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	275	6	99	248	0	84
Total Analysis Volume [veh/h]	1101	23	396	990	0	334
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	4
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	12		13		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	34.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Overlap
Signal group	8	0	7	4	0	7
Auxiliary Signal Groups						7
Lead / Lag	-	-	Lead	-	-	-
Minimum Green [s]	5	0	5	60	0	5
Maximum Green [s]	45	0	35	80	0	35
Amber [s]	3.6	0.0	3.6	3.6	0.0	3.6
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	58	0	22	80	0	22
Vehicle Extension [s]	3.0	0.0	4.0	0.0	0.0	4.0
Walk [s]	7	0	0	0	0	0
Pedestrian Clearance [s]	15	0	0	0	0	0
Rest In Walk	No			No		No
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	0.0	2.0
I2, Clearance Lost Time [s]	1.6	0.0	1.6	1.6	0.0	1.6
Minimum Recall	No		No	No		No
Maximum Recall	No		No	No		No
Pedestrian Recall	No		No	No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

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

Lane Group Calculations

Lane Group	C	C	L	C	R
C, Cycle Length [s]	64	64	64	64	64
L, Total Lost Time per Cycle [s]	3.60	3.60	3.60	3.60	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	1.60	1.60	1.60	1.60
g_i, Effective Green Time [s]	38	38	18	60	18
g / C, Green / Cycle	0.60	0.60	0.29	0.94	0.29
(v / s)_i Volume / Saturation Flow Rate	0.30	0.30	0.22	0.28	0.12
s, saturation flow rate [veh/h]	1863	1847	1774	3547	2780
c, Capacity [veh/h]	1113	1104	514	3346	805
d1, Uniform Delay [s]	7.39	7.42	20.73	0.14	18.30
k, delay calibration	0.11	0.11	0.15	0.04	0.15
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.36	0.36	3.51	0.02	0.49
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.50	0.51	0.77	0.30	0.41
d, Delay for Lane Group [s/veh]	7.75	7.79	24.24	0.16	18.79
Lane Group LOS	A	A	C	A	B
Critical Lane Group	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	3.32	3.34	5.45	0.01	1.85
50th-Percentile Queue Length [ft/ln]	83.10	83.45	136.21	0.21	46.33
95th-Percentile Queue Length [veh/ln]	5.98	6.01	9.28	0.02	3.34
95th-Percentile Queue Length [ft/ln]	149.58	150.20	231.91	0.38	83.40

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	7.77	7.79	24.24	0.16	0.00	18.79
Movement LOS	A	A	C	A		B
d_A, Approach Delay [s/veh]	7.77		7.04		18.79	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	8.71					
Intersection LOS	A					
Intersection V/C	0.528					

Sequence

Ring 1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SG: 4 80s

SG: 7 22s

SG: 8 58s

SG: 108 22s

Intersection Level Of Service Report

Intersection 2: Santa Rosa Ave/Barham Ave

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

Delay (sec / veh): 7.2
 Level Of Service: A
 Volume to Capacity (v/c): 0.484

Intersection Setup

Name	Santa Rosa Ave			Santa Rosa Ave			Barham Ave			Barham Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	120.00	100.00	100.00	105.00	100.00	100.00	100.00	100.00	85.00	100.00	100.00	100.00
Speed [mph]	35.00			35.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Santa Rosa Ave			Santa Rosa Ave			Barham Ave			Barham Ave		
Base Volume Input [veh/h]	11	881	88	20	953	14	29	6	57	99	9	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	17	0	0	16	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	11	898	88	20	969	14	29	6	57	99	9	27
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	225	22	5	242	4	7	2	14	25	2	7
Total Analysis Volume [veh/h]	11	898	88	20	969	14	29	6	57	99	9	27
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	100.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protect	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal group	3	8	0	7	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	5	5	0	5	5	0	0	5	0	0	5	0
Maximum Green [s]	20	66	0	20	66	0	0	34	0	0	34	0
Amber [s]	3.0	3.6	0.0	3.0	3.6	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	47	38	0	47	38	0	0	35	0	0	35	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	17	0	0	12	0	0	27	0	0	26	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	1.6	0.0	1.0	1.6	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

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

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	R	C
C, Cycle Length [s]	24	24	24	24	24	24	24	24	24
L, Total Lost Time per Cycle [s]	3.00	3.60	3.60	3.00	3.60	3.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	1.00	1.60	1.60	1.00	1.60	1.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	0	10	10	1	10	10	4	4	4
g / C, Green / Cycle	0.02	0.41	0.41	0.03	0.42	0.42	0.17	0.17	0.17
(v / s)_i Volume / Saturation Flow Rate	0.01	0.27	0.27	0.01	0.26	0.26	0.02	0.04	0.20
s, saturation flow rate [veh/h]	1774	1863	1805	1774	1863	1853	1584	1583	663
c, Capacity [veh/h]	28	763	739	49	784	780	537	265	368
d1, Uniform Delay [s]	11.83	5.79	5.79	11.61	5.53	5.53	8.57	8.72	11.27
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	8.63	0.97	1.00	5.38	0.83	0.84	0.05	0.40	0.61
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.39	0.66	0.66	0.41	0.63	0.63	0.07	0.21	0.37
d, Delay for Lane Group [s/veh]	20.46	6.76	6.79	16.99	6.36	6.37	8.62	9.12	11.88
Lane Group LOS	C	A	A	B	A	A	A	A	B
Critical Lane Group	No	No	Yes	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.11	0.80	0.78	0.14	0.71	0.71	0.11	0.20	0.59
50th-Percentile Queue Length [ft/ln]	2.65	20.09	19.62	3.56	17.87	17.80	2.80	5.07	14.75
95th-Percentile Queue Length [veh/ln]	0.19	1.45	1.41	0.26	1.29	1.28	0.20	0.36	1.06
95th-Percentile Queue Length [ft/ln]	4.78	36.16	35.32	6.42	32.16	32.04	5.04	9.12	26.54

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.46	6.78	6.79	16.99	6.37	6.37	8.62	8.62	9.12	11.88	11.88	11.88
Movement LOS	C	A	A	B	A	A	A	A	A	B	B	B
d_A, Approach Delay [s/veh]	6.93			6.58			8.93			11.88		
Approach LOS	A			A			A			B		
d_I, Intersection Delay [s/veh]	7.15											
Intersection LOS	A											
Intersection V/C	0.484											

Sequence

Ring 1	2	-	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-







Intersection Level Of Service Report

Intersection 3: Petaluma Hill Rd/Barham Ave

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

Delay (sec / veh): 26.6
 Level Of Service: D
 Volume to Capacity (v/c): 0.141

Intersection Setup

Name	Petaluma Hill Rd			Petaluma Hill Rd			Barham Ave			Pressley St		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Pocket Length [ft]	75.00	100.00	100.00	65.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			35.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			Yes			Yes		

Volumes

Name	Petaluma Hill Rd			Petaluma Hill Rd			Barham Ave			Pressley St		
Base Volume Input [veh/h]	35	357	12	9	413	23	23	27	48	29	20	15
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	7	0	0	7	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	35	364	12	9	420	23	23	27	48	29	20	15
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	91	3	2	105	6	6	7	12	7	5	4
Total Analysis Volume [veh/h]	35	364	12	9	420	23	23	27	48	29	20	15
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			Yes	No
Storage Area [veh]	0	0	2	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results




V/C, Movement V/C Ratio	0.03	0.00	0.00	0.01	0.00	0.00	0.10	0.10	0.08	0.14	0.07	0.02
d_M, Delay for Movement [s/veh]	8.33	0.00	0.00	8.07	0.00	0.00	22.51	20.22	12.61	26.62	22.61	14.46
Movement LOS	A	A	A	A	A	A	C	C	B	D	C	B
95th-Percentile Queue Length [veh/ln]	0.10	0.00	0.00	0.02	0.00	0.00	0.74	0.74	0.74	0.91	0.91	0.91
95th-Percentile Queue Length [ft/ln]	2.42	0.00	0.00	0.58	0.00	0.00	18.53	18.53	18.53	22.63	22.63	22.63
d_A, Approach Delay [s/veh]	0.71			0.16			17.03			22.52		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	3.39											
Intersection LOS	D											

Intersection Level Of Service Report

Intersection 1: Santa Rosa Ave/Petaluma Hill Rd

Control Type:	Signalized	Delay (sec / veh):	8.9
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.533

Intersection Setup

Name	Santa Rosa Ave		Santa Rosa Ave		Petaluma Hill Rd	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	1
Pocket Length [ft]	100.00	100.00	150.00	100.00	100.00	80.00
Speed [mph]	35.00		30.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name	Santa Rosa Ave		Santa Rosa Ave		Petaluma Hill Rd	
Base Volume Input [veh/h]	1084	24	389	974	0	424
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	24	0	0	24
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	1	0	0	0	97
Total Hourly Volume [veh/h]	1084	23	413	974	0	351
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	271	6	103	244	0	88
Total Analysis Volume [veh/h]	1084	23	413	974	0	351
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	4
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	12		13		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	34.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Overlap
Signal group	8	0	7	4	0	7
Auxiliary Signal Groups						7
Lead / Lag	-	-	Lead	-	-	-
Minimum Green [s]	5	0	5	60	0	5
Maximum Green [s]	45	0	35	80	0	35
Amber [s]	3.6	0.0	3.6	3.6	0.0	3.6
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	58	0	22	80	0	22
Vehicle Extension [s]	3.0	0.0	4.0	0.0	0.0	4.0
Walk [s]	7	0	0	0	0	0
Pedestrian Clearance [s]	15	0	0	0	0	0
Rest In Walk	No			No		No
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	0.0	2.0
I2, Clearance Lost Time [s]	1.6	0.0	1.6	1.6	0.0	1.6
Minimum Recall	No		No	No		No
Maximum Recall	No		No	No		No
Pedestrian Recall	No		No	No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

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

Lane Group Calculations

Lane Group	C	C	L	C	R
C, Cycle Length [s]	64	64	64	64	64
L, Total Lost Time per Cycle [s]	3.60	3.60	3.60	3.60	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	1.60	1.60	1.60	1.60
g_i, Effective Green Time [s]	37	37	19	60	19
g / C, Green / Cycle	0.59	0.59	0.30	0.94	0.30
(v / s)_i Volume / Saturation Flow Rate	0.30	0.30	0.23	0.27	0.13
s, saturation flow rate [veh/h]	1863	1847	1774	3547	2780
c, Capacity [veh/h]	1093	1084	533	3346	835
d1, Uniform Delay [s]	7.75	7.77	20.35	0.14	17.87
k, delay calibration	0.11	0.11	0.15	0.04	0.15
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.36	0.37	3.47	0.02	0.48
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.51	0.51	0.78	0.29	0.42
d, Delay for Lane Group [s/veh]	8.11	8.15	23.82	0.16	18.35
Lane Group LOS	A	A	C	A	B
Critical Lane Group	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	3.41	3.42	5.63	0.01	1.92
50th-Percentile Queue Length [ft/ln]	85.15	85.50	140.86	0.21	48.02
95th-Percentile Queue Length [veh/ln]	6.13	6.16	9.53	0.01	3.46
95th-Percentile Queue Length [ft/ln]	153.27	153.91	238.18	0.37	86.44

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	8.13	8.15	23.82	0.16	0.00	18.35
Movement LOS	A	A	C	A		B
d_A, Approach Delay [s/veh]	8.13		7.20		18.35	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	8.94					
Intersection LOS	A					
Intersection V/C	0.533					

Sequence

Ring 1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SG: 4 80s

SG: 7 22s

SG: 8 58s

SG: 108 22s



Intersection Level Of Service Report

Intersection 2: Santa Rosa Ave/Barham Ave

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

Delay (sec / veh): 7.9
 Level Of Service: A
 Volume to Capacity (v/c): 0.476

Intersection Setup

Name	Santa Rosa Ave			Santa Rosa Ave			Barham Ave			Barham Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	120.00	100.00	100.00	105.00	100.00	100.00	100.00	100.00	85.00	100.00	100.00	100.00
Speed [mph]	35.00			35.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Santa Rosa Ave			Santa Rosa Ave			Barham Ave			Barham Ave		
Base Volume Input [veh/h]	11	881	88	20	953	14	29	6	57	99	9	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	40	0	0	0	0	0	0	40	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	11	881	128	20	953	14	29	6	57	139	9	27
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	220	32	5	238	4	7	2	14	35	2	7
Total Analysis Volume [veh/h]	11	881	128	20	953	14	29	6	57	139	9	27
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	100.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protect	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal group	3	8	0	7	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	5	5	0	5	5	0	0	5	0	0	5	0
Maximum Green [s]	20	66	0	20	66	0	0	34	0	0	34	0
Amber [s]	3.0	3.6	0.0	3.0	3.6	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	47	38	0	47	38	0	0	35	0	0	35	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	17	0	0	12	0	0	27	0	0	26	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	1.6	0.0	1.0	1.6	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

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

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	R	C
C, Cycle Length [s]	27	27	27	27	27	27	27	27	27
L, Total Lost Time per Cycle [s]	3.00	3.60	3.60	3.00	3.60	3.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	1.00	1.60	1.60	1.00	1.60	1.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	0	11	11	1	11	11	6	6	6
g / C, Green / Cycle	0.02	0.40	0.40	0.03	0.41	0.41	0.21	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.01	0.28	0.28	0.01	0.26	0.26	0.02	0.04	0.19
s, saturation flow rate [veh/h]	1774	1863	1781	1774	1863	1853	1578	1583	930
c, Capacity [veh/h]	28	755	722	48	777	773	575	330	435
d1, Uniform Delay [s]	13.04	6.54	6.54	12.80	6.15	6.15	8.54	8.69	11.16
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	8.85	1.10	1.15	5.55	0.83	0.83	0.04	0.25	0.60
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.40	0.68	0.68	0.41	0.62	0.62	0.06	0.17	0.40
d, Delay for Lane Group [s/veh]	21.89	7.64	7.69	18.36	6.97	6.98	8.58	8.94	11.76
Lane Group LOS	C	A	A	B	A	A	A	A	B
Critical Lane Group	No	No	Yes	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.11	1.18	1.13	0.16	0.99	0.99	0.12	0.21	0.82
50th-Percentile Queue Length [ft/ln]	2.87	29.38	28.35	3.95	24.77	24.66	3.03	5.29	20.49
95th-Percentile Queue Length [veh/ln]	0.21	2.12	2.04	0.28	1.78	1.78	0.22	0.38	1.48
95th-Percentile Queue Length [ft/ln]	5.17	52.89	51.03	7.11	44.58	44.39	5.45	9.53	36.88

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	21.89	7.66	7.69	18.36	6.98	6.98	8.58	8.58	8.94	11.76	11.76	11.76
Movement LOS	C	A	A	B	A	A	A	A	A	B	B	B
d_A, Approach Delay [s/veh]	7.82			7.21			8.80			11.76		
Approach LOS	A			A			A			B		
d_I, Intersection Delay [s/veh]	7.90											
Intersection LOS	A											
Intersection V/C	0.476											

Sequence

Ring 1	2	-	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-







Intersection Level Of Service Report

Intersection 3: Petaluma Hill Rd/Barham Ave

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

Delay (sec / veh): 29.5
 Level Of Service: D
 Volume to Capacity (v/c): 0.156

Intersection Setup

Name	Petaluma Hill Rd			Petaluma Hill Rd			Barham Ave			Pressley St		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Pocket Length [ft]	75.00	100.00	100.00	65.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			35.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			Yes			Yes		

Volumes

Name	Petaluma Hill Rd			Petaluma Hill Rd			Barham Ave			Pressley St		
Base Volume Input [veh/h]	35	357	12	9	413	23	23	27	48	29	20	15
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	16	18	0	0	0	24	6	0	4	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	51	375	12	9	413	47	29	27	52	29	20	15
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	94	3	2	103	12	7	7	13	7	5	4
Total Analysis Volume [veh/h]	51	375	12	9	413	47	29	27	52	29	20	15
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			Yes	No
Storage Area [veh]	0	0	2	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results




V/C, Movement V/C Ratio	0.05	0.00	0.00	0.01	0.00	0.00	0.14	0.11	0.08	0.16	0.08	0.02
d_M, Delay for Movement [s/veh]	8.43	0.00	0.00	8.10	0.00	0.00	24.90	22.19	13.50	29.54	24.97	15.53
Movement LOS	A	A	A	A	A	A	C	C	B	D	C	C
95th-Percentile Queue Length [veh/ln]	0.15	0.00	0.00	0.02	0.00	0.00	0.96	0.96	0.96	1.02	1.02	1.02
95th-Percentile Queue Length [ft/ln]	3.64	0.00	0.00	0.58	0.00	0.00	24.08	24.08	24.08	25.40	25.40	25.40
d_A, Approach Delay [s/veh]	0.98			0.16			18.73			24.83		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	3.81											
Intersection LOS	D											

Intersection Level Of Service Report

Intersection 1: Santa Rosa Ave/Petaluma Hill Rd

Control Type:	Signalized	Delay (sec / veh):	9.0
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.541

Intersection Setup

Name	Santa Rosa Ave		Santa Rosa Ave		Petaluma Hill Rd	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	1	0	0	1
Pocket Length [ft]	100.00	100.00	150.00	100.00	100.00	80.00
Speed [mph]	35.00		30.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name	Santa Rosa Ave		Santa Rosa Ave		Petaluma Hill Rd	
Base Volume Input [veh/h]	1084	24	389	974	0	424
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	17	0	31	16	0	31
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	1	0	0	0	97
Total Hourly Volume [veh/h]	1101	23	420	990	0	358
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	275	6	105	248	0	90
Total Analysis Volume [veh/h]	1101	23	420	990	0	358
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	4
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	12		13		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	80
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	34.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	Protected	Permissive	Permissive	Overlap
Signal group	8	0	7	4	0	7
Auxiliary Signal Groups						7
Lead / Lag	-	-	Lead	-	-	-
Minimum Green [s]	5	0	5	60	0	5
Maximum Green [s]	45	0	35	80	0	35
Amber [s]	3.6	0.0	3.6	3.6	0.0	3.6
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	58	0	22	80	0	22
Vehicle Extension [s]	3.0	0.0	4.0	0.0	0.0	4.0
Walk [s]	7	0	0	0	0	0
Pedestrian Clearance [s]	15	0	0	0	0	0
Rest In Walk	No			No		No
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	0.0	2.0
I2, Clearance Lost Time [s]	1.6	0.0	1.6	1.6	0.0	1.6
Minimum Recall	No		No	No		No
Maximum Recall	No		No	No		No
Pedestrian Recall	No		No	No		No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

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

Lane Group Calculations

Lane Group	C	C	L	C	R
C, Cycle Length [s]	64	64	64	64	64
L, Total Lost Time per Cycle [s]	3.60	3.60	3.60	3.60	3.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	1.60	1.60	1.60	1.60	1.60
g_i, Effective Green Time [s]	37	37	19	60	19
g / C, Green / Cycle	0.58	0.58	0.30	0.94	0.30
(v / s)_i Volume / Saturation Flow Rate	0.30	0.30	0.24	0.28	0.13
s, saturation flow rate [veh/h]	1863	1847	1774	3547	2780
c, Capacity [veh/h]	1085	1076	541	3346	847
d1, Uniform Delay [s]	7.96	7.99	20.20	0.14	17.70
k, delay calibration	0.11	0.11	0.15	0.04	0.15
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.38	0.39	3.45	0.02	0.48
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

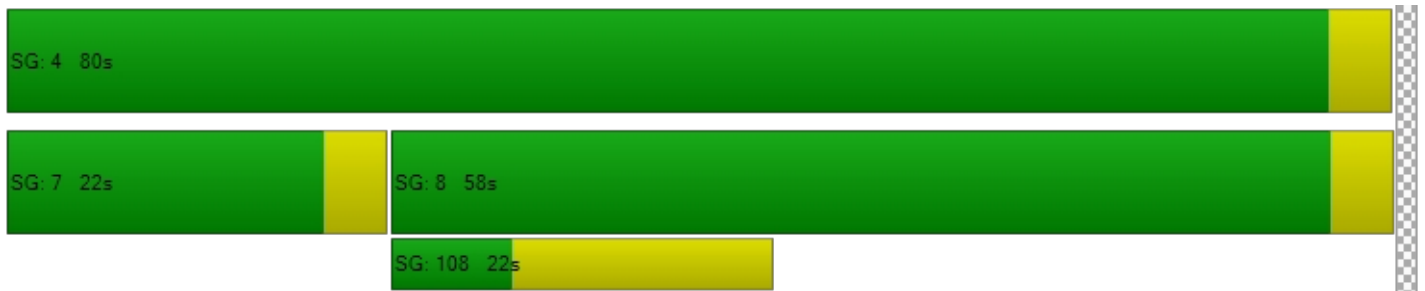
X, volume / capacity	0.52	0.52	0.78	0.30	0.42
d, Delay for Lane Group [s/veh]	8.35	8.39	23.65	0.16	18.17
Lane Group LOS	A	A	C	A	B
Critical Lane Group	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	3.55	3.56	5.71	0.01	1.95
50th-Percentile Queue Length [ft/ln]	88.67	89.04	142.75	0.21	48.70
95th-Percentile Queue Length [veh/ln]	6.38	6.41	9.63	0.02	3.51
95th-Percentile Queue Length [ft/ln]	159.60	160.27	240.73	0.38	87.66

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	8.37	8.39	23.65	0.16	0.00	18.17
Movement LOS	A	A	C	A		B
d_A, Approach Delay [s/veh]	8.37		7.16		18.17	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	8.99					
Intersection LOS	A					
Intersection V/C	0.541					

Sequence

Ring 1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-





Intersection Level Of Service Report

Intersection 2: Santa Rosa Ave/Barham Ave

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

Delay (sec / veh): 7.9
 Level Of Service: A
 Volume to Capacity (v/c): 0.480

Intersection Setup

Name	Santa Rosa Ave			Santa Rosa Ave			Barham Ave			Barham Ave		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	1	0	0	0
Pocket Length [ft]	120.00	100.00	100.00	105.00	100.00	100.00	100.00	100.00	85.00	100.00	100.00	100.00
Speed [mph]	35.00			35.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Santa Rosa Ave			Santa Rosa Ave			Barham Ave			Barham Ave		
Base Volume Input [veh/h]	11	881	88	20	953	14	29	6	57	99	9	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	17	40	0	16	0	0	0	0	40	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	11	898	128	20	969	14	29	6	57	139	9	27
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	225	32	5	242	4	7	2	14	35	2	7
Total Analysis Volume [veh/h]	11	898	128	20	969	14	29	6	57	139	9	27
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	100.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protect	Permis	Permis	Protect	Permis	Permis	Permis	Permis	Permis	Permis	Permis	Permis
Signal group	3	8	0	7	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	5	5	0	5	5	0	0	5	0	0	5	0
Maximum Green [s]	20	66	0	20	66	0	0	34	0	0	34	0
Amber [s]	3.0	3.6	0.0	3.0	3.6	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Split [s]	47	38	0	47	38	0	0	35	0	0	35	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	17	0	0	12	0	0	27	0	0	26	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	1.0	1.6	0.0	1.0	1.6	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

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

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	R	C
C, Cycle Length [s]	27	27	27	27	27	27	27	27	27
L, Total Lost Time per Cycle [s]	3.00	3.60	3.60	3.00	3.60	3.60	3.00	3.00	3.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
l2, Clearance Lost Time [s]	1.00	1.60	1.60	1.00	1.60	1.60	1.00	1.00	1.00
g_i, Effective Green Time [s]	0	11	11	1	11	11	6	6	6
g / C, Green / Cycle	0.02	0.41	0.41	0.03	0.42	0.42	0.21	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.01	0.28	0.28	0.01	0.26	0.26	0.02	0.04	0.19
s, saturation flow rate [veh/h]	1774	1863	1782	1774	1863	1853	1577	1583	935
c, Capacity [veh/h]	28	763	730	48	784	780	572	329	434
d1, Uniform Delay [s]	13.18	6.56	6.56	12.93	6.16	6.16	8.64	8.79	11.27
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	8.86	1.11	1.16	5.56	0.83	0.84	0.04	0.25	0.61
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.40	0.69	0.69	0.41	0.63	0.63	0.06	0.17	0.40
d, Delay for Lane Group [s/veh]	22.03	7.67	7.72	18.50	6.99	7.00	8.68	9.04	11.87
Lane Group LOS	C	A	A	B	A	A	A	A	B
Critical Lane Group	No	No	Yes	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.12	1.21	1.17	0.16	1.02	1.02	0.12	0.22	0.83
50th-Percentile Queue Length [ft/ln]	2.89	30.30	29.25	3.99	25.53	25.42	3.09	5.39	20.81
95th-Percentile Queue Length [veh/ln]	0.21	2.18	2.11	0.29	1.84	1.83	0.22	0.39	1.50
95th-Percentile Queue Length [ft/ln]	5.21	54.53	52.66	7.18	45.95	45.76	5.55	9.70	37.46

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	22.03	7.69	7.72	18.50	6.99	7.00	8.68	8.68	9.04	11.87	11.87	11.87
Movement LOS	C	A	A	B	A	A	A	A	A	B	B	B
d_A, Approach Delay [s/veh]	7.85			7.22			8.90			11.87		
Approach LOS	A			A			A			B		
d_I, Intersection Delay [s/veh]	7.92											
Intersection LOS	A											
Intersection V/C	0.480											

Sequence

Ring 1	2	-	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-







Intersection Level Of Service Report

Intersection 3: Petaluma Hill Rd/Barham Ave

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

Delay (sec / veh): 30.3
 Level Of Service: D
 Volume to Capacity (v/c): 0.160

Intersection Setup

Name	Petaluma Hill Rd			Petaluma Hill Rd			Barham Ave			Pressley St		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Pocket Length [ft]	75.00	100.00	100.00	65.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	35.00			35.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			Yes			Yes			Yes		

Volumes

Name	Petaluma Hill Rd			Petaluma Hill Rd			Barham Ave			Pressley St		
Base Volume Input [veh/h]	35	357	12	9	413	23	23	27	48	29	20	15
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	16	25	0	0	7	24	6	0	4	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	51	382	12	9	420	47	29	27	52	29	20	15
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	96	3	2	105	12	7	7	13	7	5	4
Total Analysis Volume [veh/h]	51	382	12	9	420	47	29	27	52	29	20	15
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			Yes	No
Storage Area [veh]	0	0	2	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.00	0.00	0.01	0.00	0.00	0.14	0.11	0.08	0.16	0.08	0.02
d_M, Delay for Movement [s/veh]	8.45	0.00	0.00	8.12	0.00	0.00	25.45	22.61	13.69	30.29	25.52	15.84
Movement LOS	A	A	A	A	A	A	D	C	B	D	D	C
95th-Percentile Queue Length [veh/ln]	0.15	0.00	0.00	0.02	0.00	0.00	0.99	0.99	0.99	1.04	1.04	1.04
95th-Percentile Queue Length [ft/ln]	3.66	0.00	0.00	0.58	0.00	0.00	24.76	24.76	24.76	26.10	26.10	26.10
d_A, Approach Delay [s/veh]	0.97			0.15			19.07			25.42		
Approach LOS	A			A			C			D		
d_I, Intersection Delay [s/veh]	3.83											
Intersection LOS	D											

Appendix C

Santa Rosa Cannabis Dispensary Trip Generation Data





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City of Santa Rosa Dispensary Rates

City of Santa Rosa Dispensary Rates														
LOCATION	No. of Units	Units	Land Use Number	Land Use No./Type	DATE	Setting/Location	Trip Rate per Unit	Number of Trips	In (%)	In (Rate)	In (Trips)	Out (%)	Out (Rate)	Out (Trips)
SPARC Santa Rosa	3.8	ksf	882	Marijuana Dispensary	12/18/2018	General Urban/Suburban	4.47	17	88%	3.95	15	12%	0.53	2
SPARC Santa Rosa	3.8	ksf	882	Marijuana Dispensary	12/19/2018	General Urban/Suburban	4.21	16	94%	3.95	15	6%	0.26	1
AVERAGE							4.34		91%	3.95		9%	0.39	
Sonoma Patient Group	1.17	ksf	882	Marijuana Dispensary	12/12/2018	General Urban/Suburban	1.71	2	100%	1.71	2	0%	0.00	0
Sonoma Patient Group	1.17	ksf	882	Marijuana Dispensary	12/17/2018	General Urban/Suburban	1.71	2	100%	1.71	2	0%	0.00	0
AVERAGE							1.71		100%	1.71		0%	0.00	
Alternatives	4.8	ksf	882	Marijuana Dispensary	12/18/2018	General Urban/Suburban	1.46	7	86%	1.25	6	14%	0.21	1
Alternatives	4.8	ksf	882	Marijuana Dispensary	12/19/2018	General Urban/Suburban	0.83	4	100%	0.83	4	0%	0.00	0
AVERAGE							1.15		93%	1.04		7%	0.10	
3 LOCATION AVERAGE							2.40		95%	2.23		5%	0.17	
ITE RATES							10.44		56%	5.85		44%	4.59	



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Appendix D

Parking and Transportation Plan



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Matanzas Alliance LLC dba Justice Grown
Cannabis Dispensary
1111 Petaluma Hill Rd.
CUP 18 – 069

Parking & Transportation Plan

Our building has all the necessary attributes to serve clients in the greater Santa Rosa area. Because of the size of the property, we will have dedicated parking for clients and staff, as well as dedicated handicap space for clients driving to the facility. Our property will have more than 8 dedicated parking space near the main entrance, 7 overflow parking spaces toward the rear of the property and 3 parking spaces behind the gate for staff and 1 additional space for a standard size sprinter van in addition to 4 covered spaces in the 75' x 35' metal storage building in the rear (see Exhibit 1).

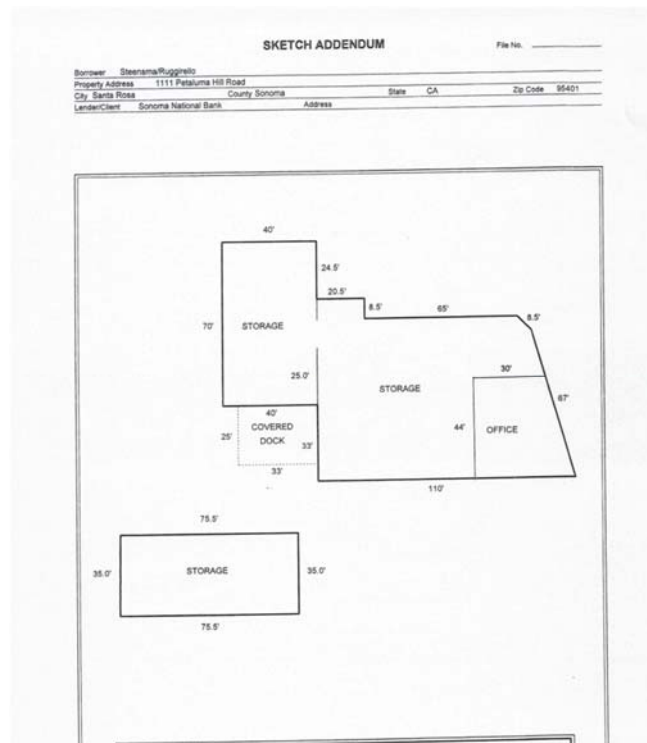
Along with our automobile parking spaces we will have 2 bicycle racks that can store up to 6 bicycles per rack. We will encourage local clients visiting our dispensary to travel to and from using their bicycles. The City of Santa Rosa has dedicated bike lanes running north and south on Petaluma Hill Road making it easy for clients to use their bicycles to travel to our dispensary. We will offer a discount program to encourage clients to cycle to our dispensary. Our lobby will have bicycle locks available on loan if our members seek to borrow one during their visit.

We will also offer an employee incentive program to encourage staff to cycle to and from work. Employees that choose to cycle to work more than 3 shifts per week will be eligible for a complimentary Sonoma County Regional Annual Park Pass and two overnight camping passes. Our local parks are very important to us and in offering a complimentary park pass we are encouraging staff to get outside and connect with the natural environment while supporting our regional parks.

For clients who do not drive, the property has a dedicated stop on a bus route that runs 7 days a week and makes frequent stops on the corner of Petaluma Hill Rd. and Barham Ave. Our dispensary is less than 120 feet from the "Petaluma Hill at Barham Ave." bus stop #5, traveling northbound and southbound on Petaluma Hill Rd. According to the Santa Rosa City Bus website (www.srcity.org/CityBus), the #5 bus makes 28 stops from 6:19am to 7:49pm on weekdays, 14 stops from 6:34am to 7:34pm on Saturdays and 7 stops from 10:34am to 4:4pm on Sundays. This allows seamless public transportation access to and from for clients without mobile transportation.

For staff who are otherwise unable to cycle into work we will incentivize public transportation use by reimbursing staff for their bus or train ticket to work, upon showing their ticket to the manager on duty. Reimbursements for public transportation will be made through the bi-weekly payroll system and the date and time must correspond with the employee's scheduled shift. Carpooling will also be encouraged, employees who choose to carpool to and from work will be reimbursed for 75% of their Sonoma County Regional Annual Park Pass.

Exhibit 1



Sketch Addendum is from the property appraisal report for 1111 Petaluma Hill Rd, the metal storage building is 75.5 feet long and 35 feet wide.

SUBJECT PROPERTY AND NEIGHBORHOOD PHOTOGRAPHS



North elevation, metal storage building

Picture of metal storage building to be used for on-site employee parking.

Appendix E

On-Street Parking Survey Data



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JUSTICE GROWN DISPENSARY ON-STREET PARKING SURVEY DATA

LOCATION	SUPPLY	MORNING		AFTERNOON		EVENING	
		VEHICLES	SPACES AVAILABLE	VEHICLES	SPACES AVAILABLE	VEHICLES	SPACES AVAILABLE
North Side of Barham	12	7	5	9	3	6	6
South Side of Barham Along Frontage	3	0	3	1	2	0	3
West Side of Petaluma Along Frontage	2	0	2	0	2	0	2
West Side of Petaluma South of Dwy	2	1	1	1	1	2	0
East Side of Petaluma	13	8	5	4	9	1	12
Both Sides of Pressley	9	3	6	4	5	4	5
Both Sides of Petaluma North of Bus Stops	7	1	6	3	4	2	5
North Side of Barham West of Project Site	2	1	1	1	1	1	1
TOTALS:		21	29	23	27	16	34
OCCUPANCY RATE:		42%		46%		32%	

Notes: Morning counts were conducted at 9:15 AM
Afternoon counts were conducted at 1:30 PM
Evening Counts were conducted at 6:00 PM
Each vehicle was assumed to need 22 feet of linear curb space



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