June 9, 2020

Ms. Ellen Wysocki
Shryne Group
575 Anton Boulevard, Suite 800
Costa Mesa, CA 92626

Addendum to the *Traffic Impact Study for the 3175 Range Avenue Project*

Dear Ms. Wysocki;

As requested, the following information is provided to supplement the parking analysis presented in the *Traffic Impact Study for the 3175 Range Avenue Project*, W-Trans, May 27, 2020.

Staff comment: "[P]lease check to be sure that the engineer's statement clearly addresses on-site parking capacity being adequate during the peak hour (not just meeting the City's requirement for a minor parking reduction)." Staff also raised a question about the potential impact of the proposed trash enclosure on circulation within the parking lot and the ability of vehicles to turn around.

Response: All 12 on-site parking spaces will be available for customer parking. Employees, vendors, and delivery vehicles associated with the project would all park at 816 Piner Road, the adjacent parcel that is being purchased in conjunction with development of 3175 Range Avenue. The existing structure at 816 Piner Road will be delivered vacant once a permit has been received to operate the proposed cannabis dispensary. It is understood that this structure would remain vacant, so there would be no other demand for the 23 parking spaces on the 816 Piner Road site. The proposed parking supply accommodates the users identified above, with an anticipated maximum of 10 employees during the peak hour. The trash receptacle would also be located at the 816 Piner Road property, adjacent to the project site, and would therefore not impact on-site circulation.

The proposed parking supply is expected to be adequate, as indicated in the traffic impact study. The project is expected to generate 76 trips during the p.m. peak hour – 38 trips in and 38 trips out. With 38 vehicles during the peak hour and 12 on-site parking spaces, each space would accommodate 3.2 vehicles per hour. The 12 spaces would therefore be able to serve the peak hour demand, assuming customers spend an average of 18.9 minutes or less at the dispensary.

We hope this information adequately addresses staff's questions. Thank you for giving us the opportunity to provide these services.

Sincerely,

Barry Bergman, AICP
Senior Planner

Dalene J. Whitlock, PE, PTOE
Senior Principal

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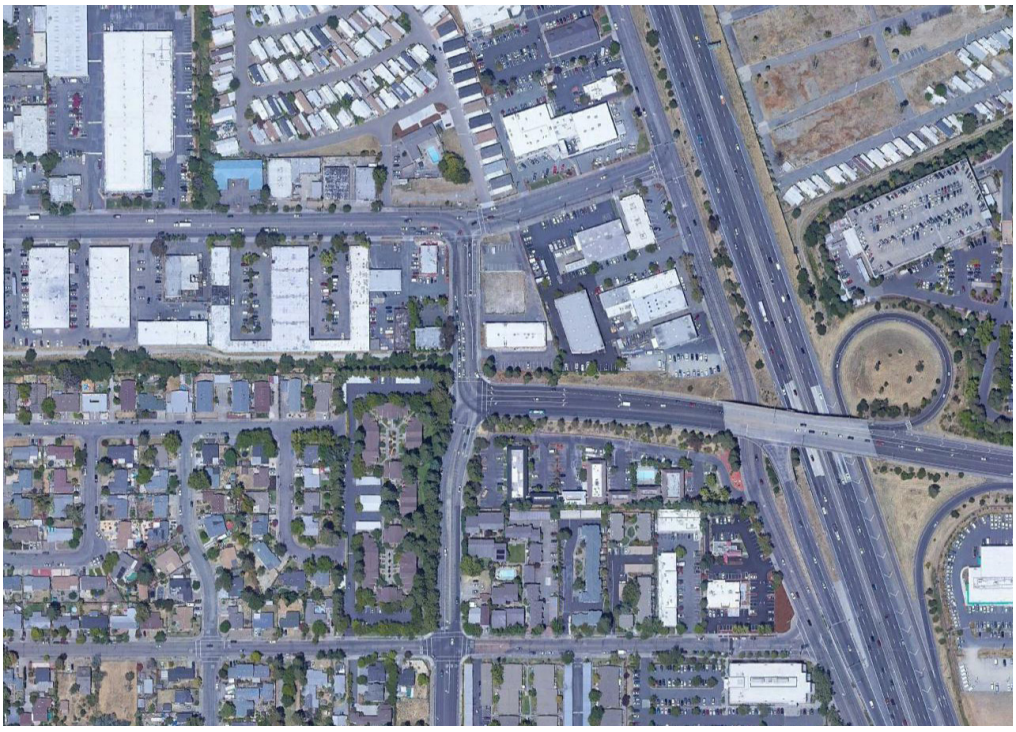
Traffic Impact Study for the 3175 Range Avenue Project



Prepared for the City of Santa Rosa

Submitted by
W-Trans

May 27, 2020

TRAFFIC ENGINEERING
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Executive Summary

The project as proposed is a cannabis dispensary that would be located in an existing 3,500 square foot building at 3175 Range Avenue in Santa Rosa. The site would be accessed by an existing driveway on Range Avenue that is limited to right turns inbound and outbound.

The project is expected to generate an average of 884 daily trips, including p.m. peak hour trips. After accounting for trips associated with the existing land use, the project would result in a net increase of 845 daily trips, including 74 p.m. peak hour trips.

Under Existing Conditions, the two study intersections operate acceptably during the p.m. peak hour and they would be expected to continue to do so upon the addition of project-related traffic.

The site is well-served by Santa Rosa CityBus, Sonoma County Transit, and Golden Gate Transit. The sidewalks in the vicinity of the project are complete and provide adequate pedestrian access to the nearby bus stops and other origins or destinations. There is direct bicycle access to the project via bike lanes along Bicentennial Way, and with the City's planned bicycle facilities near the project, bicycle access would be improved.

Sight distance at the project driveway is adequate.

The proposed project would provide 12 parking spaces, which meets the requirements of the City of Santa Rosa Municipal Code. The project would provide one bicycle rack to meet the City's bicycle parking requirement.

Introduction

This report presents an analysis of the potential traffic impacts that would be associated with development of a proposed cannabis dispensary at 3175 Range Avenue in the City of Santa Rosa. The traffic study was completed in accordance with the criteria established by the City and is consistent with standard traffic engineering techniques.

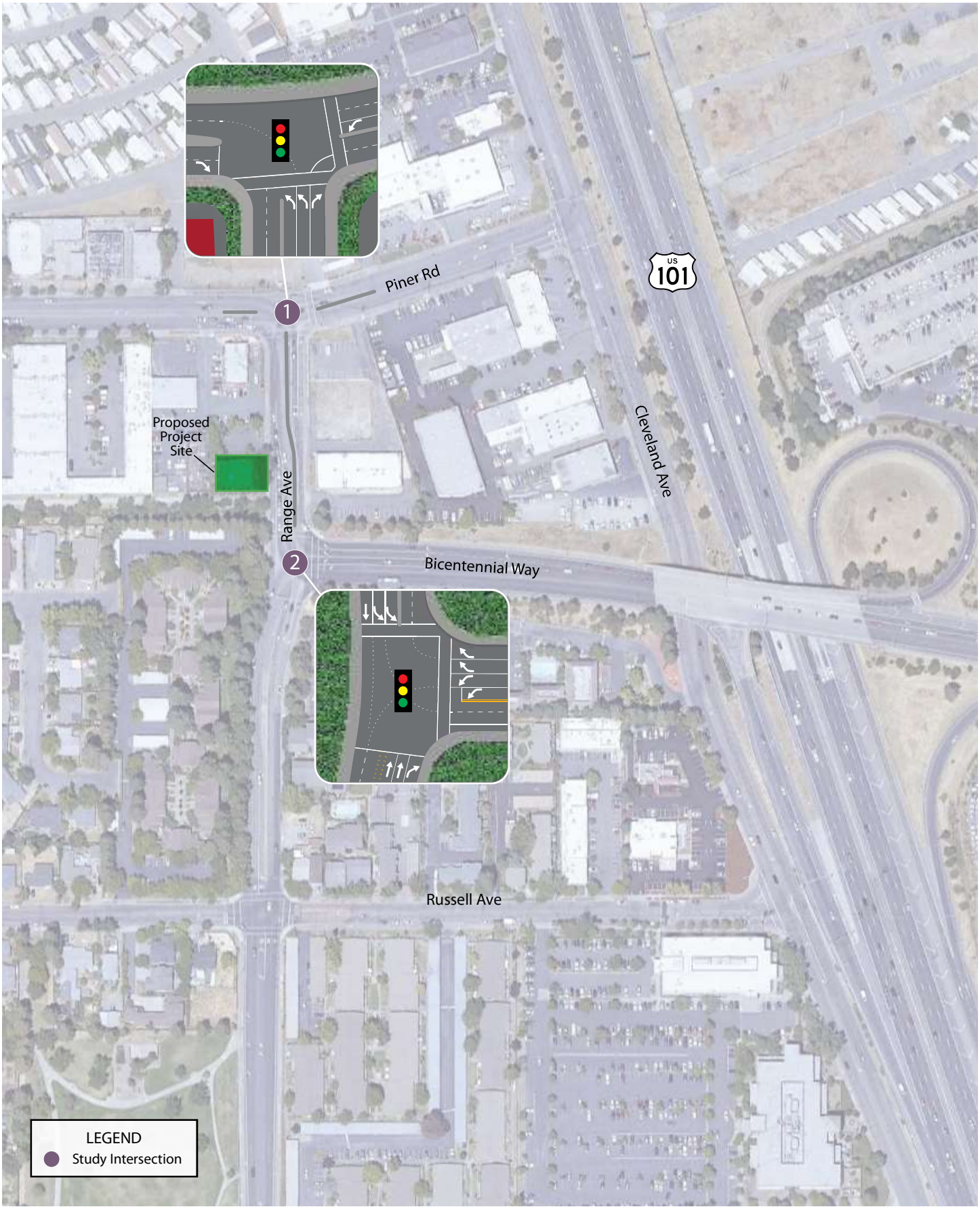
Prelude

The purpose of a traffic impact study is to provide City staff and policy makers with data 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 any adverse impacts to a level of acceptability 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 is a proposed cannabis dispensary to be located in an existing building of approximately 3,500 square feet at 3175 Range Avenue in the City of Santa Rosa. The building is currently in use as a medical lab. The project access is limited to right turns in and out only as Range Avenue has a raised median.

The location of the project site is shown in Figure 1.



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Traffic Impact Study for the 3175 Range Avenue 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 chosen with input from City staff:

1. Range Avenue/Bicentennial Way
2. Range Avenue/Piner Road

Operating conditions during the weekday p.m. peak period were evaluated as this time period reflects the highest traffic volumes areawide and for the proposed project. The evening peak hour occurs between 4:00 and 6:00 p.m. and typically reflects the highest level of congestion of the day during the homeward bound commute. It is noted that the a.m. peak hour was not evaluated as dispensaries are not allowed to open before 9:00 a.m. in Santa Rosa, so generate little traffic during the morning peak period.

Study Intersections

Range Avenue/Piner Road is a signalized tee intersection with a right-turn overlap on the eastbound approach. There are marked crosswalks on the east and south legs.

Range Avenue/Bicentennial Way is a signalized tee intersection with a right-turn overlap on the westbound approach. There are marked crosswalks on the east and north legs.

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

Collision History

The collision history for the 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 September 1, 2014 through August 31, 2019.

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 *2016 Collision Data on California State Highways*, California Department of Transportation (Caltrans). The calculated collision rates for both study intersections were higher than the statewide average for similar facilities so the crash records received additional review. The collision rate calculations are provided in Appendix A.

Table 1 – Collision Rates at the Study Intersections			
Study Intersection	**Number of Collisions (2014-2019)**	**Calculated Collision Rate (c/mve)**	**Statewide Average Collision Rate (c/mve)**
1. Range Ave/Piner Rd	17	**0.40**	0.19
2. Range Ave/Bicentennial Wy	12	**0.24**	0.19

Note: c/mve = collisions per million vehicles entering; **bold text** indicates a collision rate that exceeds the statewide average for similar facilities

Of the 17 total collisions that occurred at Range Avenue/Piner Road during the study period, three occurred at driveways unrelated to the project. Of the remaining collisions, seven were single-vehicle crashes where a fixed object was hit, four were rear-ends, two were broadsides, two involved pedestrians, one was a sideswipe, and one was a head-on. The most common types of collisions that occurred at this location were hit object and rear-end with the primary cause being unsafe speed and improper turning. Rear-end collisions are generally common for busy signalized intersections, but "hit object" crashes are generally unusual at signalized intersections. Given the distribution of different types of collisions, there is no clear trend, but additional enforcement may help to address speeding and reduce the two predominant types of crashes.

At Range Avenue/Bicentennial Way there were 12 collisions, of which four were objects hit, four were rear-ends, two were broadsides, one was a vehicle-pedestrian collision, and one was a head-on collision. The most common collision fact was unsafe speed, so additional enforcement could potentially reduce the number of collisions in the future.

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 adequate access for pedestrians in the vicinity of the project site.

- **Range Avenue** – Full sidewalk connectivity exists along both sides of Range Avenue between Piner Road and Russell Avenue. Pedestrians can cross Range Avenue at the signalized intersections with Piner Road and Bicentennial Way. Curb ramps are present at both intersections, but truncated domes are not present at all curb ramps. Lighting is provided by overhead streetlights along both sides of the street.
- **Piner Road** – There are sidewalks and streetlights along both sides of Piner Road between Coffey Lane and Cleveland Avenue.
- **Bicentennial Way** – Bicentennial Way has continuous sidewalks along both sides between Range Avenue and Mendocino Avenue. There are overhead streetlights along both sides of the street.

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 Bicentennial Way between Range Avenue and Mendocino Avenue and on Range Avenue between Russell Avenue and Guerneville 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 *City of Santa Rosa Bicycle & Pedestrian Master Plan Update 2018*.

Table 2 – Bicycle Facility Summary

Status Facility	Class	Length (miles)	Begin Point	End Point
Existing				
Bicentennial Wy	II	0.50	Range Ave	Mendocino Ave
Range Ave	II	0.70	Russell Ave	Guerneville Rd
Planned				
Russell Creek Trail	I	0.60	Range Ave	Piner Rd/Piner Creek Trail
Piner Rd	II	1.20	Marlow Rd	Cleveland Ave
Range Ave	II	0.20	Piner Rd	Russell Ave
Cleveland Ave	II	2.70	Hopper Ave	W 9th St
Russell Ave	III	0.50	Range Ave	Ditty Ave

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

Transit Facilities

Transit services in the City of Santa Rosa are provided by Santa Rosa "CityBus" and services throughout Sonoma County are provided by Sonoma County Transit (SCT). Transit service between Santa Rosa and San Francisco is provided by Golden Gate Transit (GGT).

CityBus Route 1 provides local service between the Coddingtown Mall and the Transit Mall in downtown Santa Rosa. It stops on Piner Road west of the Range Avenue intersection, approximately 600 feet from the project site. Route 1 operates on weekdays from 6:00 a.m. to 8:00 p.m. with 15-minute headways, on Saturdays from 6:00 a.m. to 8:00 p.m. with 30-minute headways, and on Sundays from 10:00 a.m. to 5:30 p.m. approximately every 45 minutes.

SCT Routes 44, 48, and 54 provide regional service to destinations throughout Santa Rosa and Petaluma. These routes stop at Range Avenue/Russell Avenue and operate on weekdays between 5:30 a.m. and 10:30 p.m. with half-hourly to hourly headways. Routes 44 and 48 operate on weekends with one-hour to one-and-a-half hour headways between 7:00 a.m. and 10:00 p.m.

SCT Route 57 provides service between Santa Rosa Junior College and Guerneville Road Station in the City of Santa Rosa. This route operates on weekdays between 7:15 a.m. and 6:15 p.m. and makes a stop at Range Avenue/Russell Avenue.

GGT Routes 72, 74, and 101 provide service between Santa Rosa and San Francisco. These routes make a stop at Range Avenue/Piner Road and operate on weekdays between 4:00 a.m. and 12:00 a.m. with half-hourly to hourly headways. Route 101 operates on weekends with half-hourly to hourly headways between 6:00 a.m. and 2:30 a.m.

Two to three bicycles can be carried on most CityBus and SCT buses. Bike rack space is available on a first-come, first-served basis. Additional bicycles are allowed on SCT buses at the discretion of the driver.

All Golden Gate Transit 40- and 60-foot buses are equipped with bike racks at the front of the bus and the 45-foot buses are equipped with underbelly bike racks that fit up to two bikes.

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 Paratransit is designed to serve the needs of individuals with disabilities throughout the County, including the City of Santa Rosa.

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 the signalized methodology published in the *Highway Capacity Manual* (HCM), Transportation Research Board, 6th Edition, 2018. 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 signalized 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 obtained from City staff. The ranges of delay associated with the various levels of service are indicated in Table 3.

Table 3 – Signalized Intersection Level of Service Criteria	
LOS A	Delay of 0 to 10 seconds. Most vehicles arrive during the green phase, so do not stop at all.
LOS B	Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop.
LOS C	Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.
LOS D	Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop.
LOS E	Delay of 55 to 80 seconds. Most, if not all, vehicles must stop, and drivers consider the delay excessive.
LOS F	Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

Reference: *Highway Capacity Manual*, 6th Edition, Transportation Research Board, 2018

Traffic Operation Standards

Section 5.8 Transportation Goals & Policy of the City of Santa Rosa General Plan states:

T-D-1 *Maintain a Level of Service (LOS) D or better along all major corridors. Exceptions to meeting the standard include:*

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

The LOS is to be calculated using the average traffic demand over the highest 60-minute period.

Traffic Engineering Division will require a level of service evaluation of arterial and collector corridors if deemed necessary.

T-D-2 *Monitor level of service at intersections to assure that improvements or alterations to improve corridor level of service do not cause severe impacts at any single intersection.*

General interpretation of Policy T-D-2. The impact to an intersection is considered adverse if the project related and/or future trips result in:

1. The level of service (LOS) at an intersection degrading from LOS D or better to LOS E or F, OR
2. An increase in average vehicle delay of greater than 5 seconds at a signalized intersection where the current LOS is either LOS E or F.
3. Queuing impacts based on a comparative analysis between the design queue length and the available queue storage capacity. Impacts include, but are not limited to, spillback queue at project access locations (both ingress and egress), turn lanes at intersections, lane drops, spill back that impacts upstream intersections or interchange ramps.
4. Exceptions may be granted under the following conditions:
   a. Within downtown,
   b. Where attainment would result in significant degradation,
   c. Where topography or impacts makes the improvement impossible; or
   d. Where attainment would ensure loss of an area's unique character.

T-C-3 *Implement traffic calming techniques on streets subject to high speed and/or cut-through traffic, in order to improve neighborhood livability, Techniques Include:*

- *Narrow Streets*
- *On-street parking*
- *Choker or diverters*
- *Decorative crosswalks*
- *Planted islands*

General interpretation of Policy T-C-3. An impact is considered adverse if the project has the potential to alter community character by significantly increasing cut-through traffic, unexpected vehicle maneuvers or commercial vehicle trips in a residential area.

T-H-3 *Require new development to provide transit improvements, where a rough proportionality to demand from the project is established. Transit improvements may include:*

- *Direct and paved pedestrian access to transit stops*
- *Bus turnouts and shelters*
- *Lane width to accommodate buses.*

General interpretation of Policy T-H-3. An impact is considered adverse if the project has the potential to disrupt existing transit operations or establishes transit facilities and equipment such that it creates a sight distance deficiency or vehicle conflict point.

T-J *Provide attractive and safe streets for pedestrian and bicyclists.*

General interpretation of Policy T-J. An impact is considered adverse if the project generates 20 pedestrians in any single hour at an unsignalized intersection, mid-block crossing or where no crossing has been established.

An impact is further considered significant if the project interrupts existing or proposed pedestrian, bicycle and transit facilities, path or travel, direct access resulting in excessive rerouting or creates a vehicle conflict condition which affects the safety of other roadway users.

Existing Conditions

The Existing Conditions scenario provides an evaluation of current operation based on existing traffic volumes during the p.m. peak period. The a.m. peak period was not evaluated because cannabis dispensaries are not permitted to open until 9:00 a.m. This condition does not include project-generated traffic volumes. Volume data was collected by the City of Santa Rosa in May 2018 at both study intersections.

Intersection Levels of Service

Under existing traffic volumes, shown in Figure 2, all intersections operate acceptably at LOS C or better overall during the p.m. peak hour. The levels of service for the study intersections are summarized in Table 4, and copies of the Level of Service calculations are provided in Appendix B.

Table 4 – Existing Peak Hour Intersection Levels of Service

Study Intersection	PM Peak	
	Delay	LOS
1. Range Ave/Piner Rd	9.5	A
2. Range Ave/Bicentennial Wy	11.4	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service

Existing plus Approved Conditions

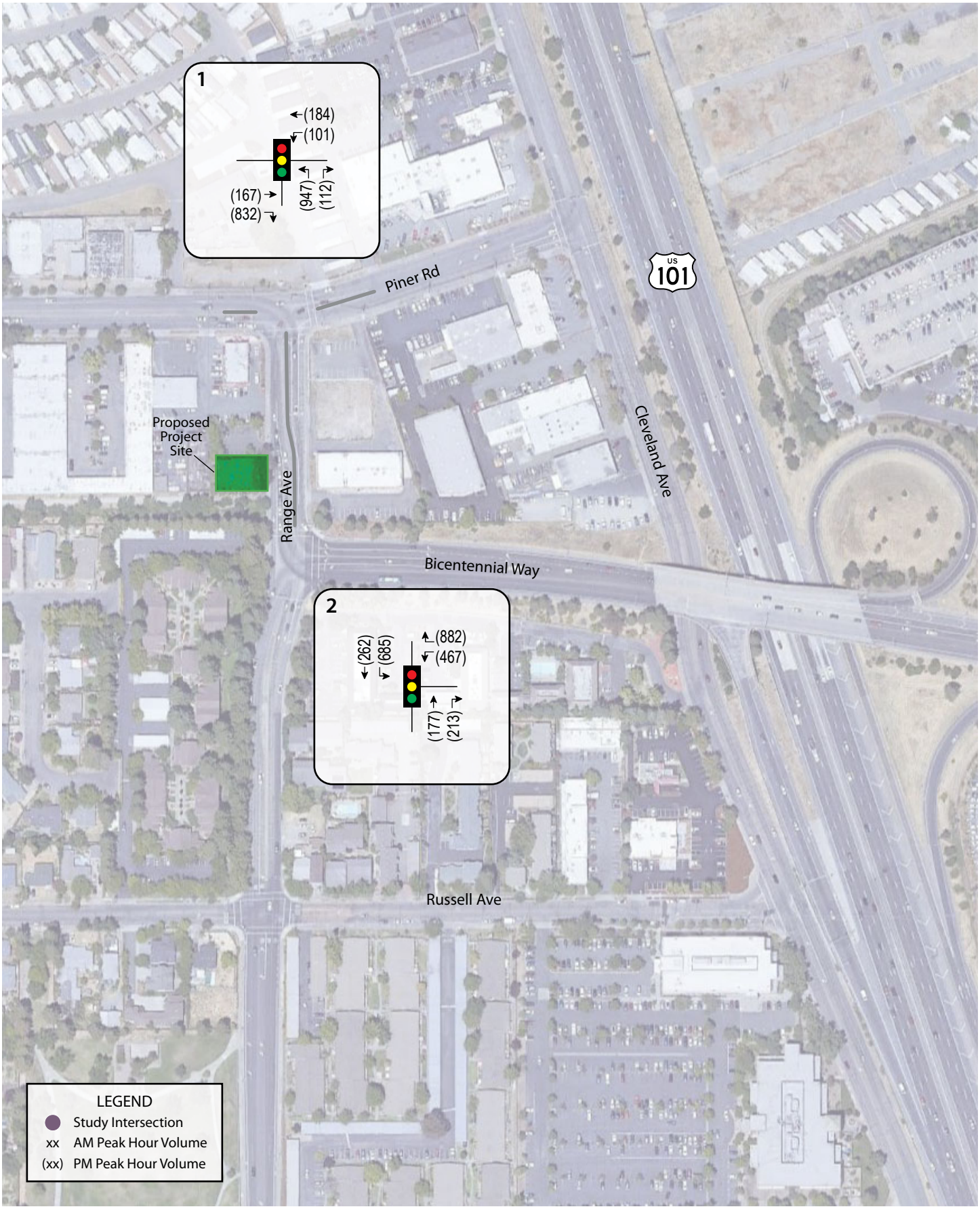
Baseline (Existing plus Approved) conditions reflect operation with traffic from approved projects in and near the study area added to the Existing volumes. As directed by staff, the following six projects contained in the *Citywide Summary of Pending Development* report were considered in the evaluation of Baseline Conditions.

1. Hampton Inn and Suites
2. Airway Community Care
3. Kerry Ranch
4. Francisco Village
5. Courtney Estates
6. North Village II

Based on a review of the locations of these projects and the anticipated access routes to and from the sites, it was determined that these projects would be expected to generate a nominal number of trips through the study intersections. Given that operation is currently well above the City's LOS D threshold, the impact on service levels at the study intersections was not quantitatively evaluated though it is reasonable to assume that acceptable operation would be maintained

Project Description

The project is a proposed cannabis dispensary to be located in an existing building of approximately 3,500 square feet at 3175 Range Avenue. The building is currently being used as a dental laboratory. The proposed project site plan is shown in Figure 3.



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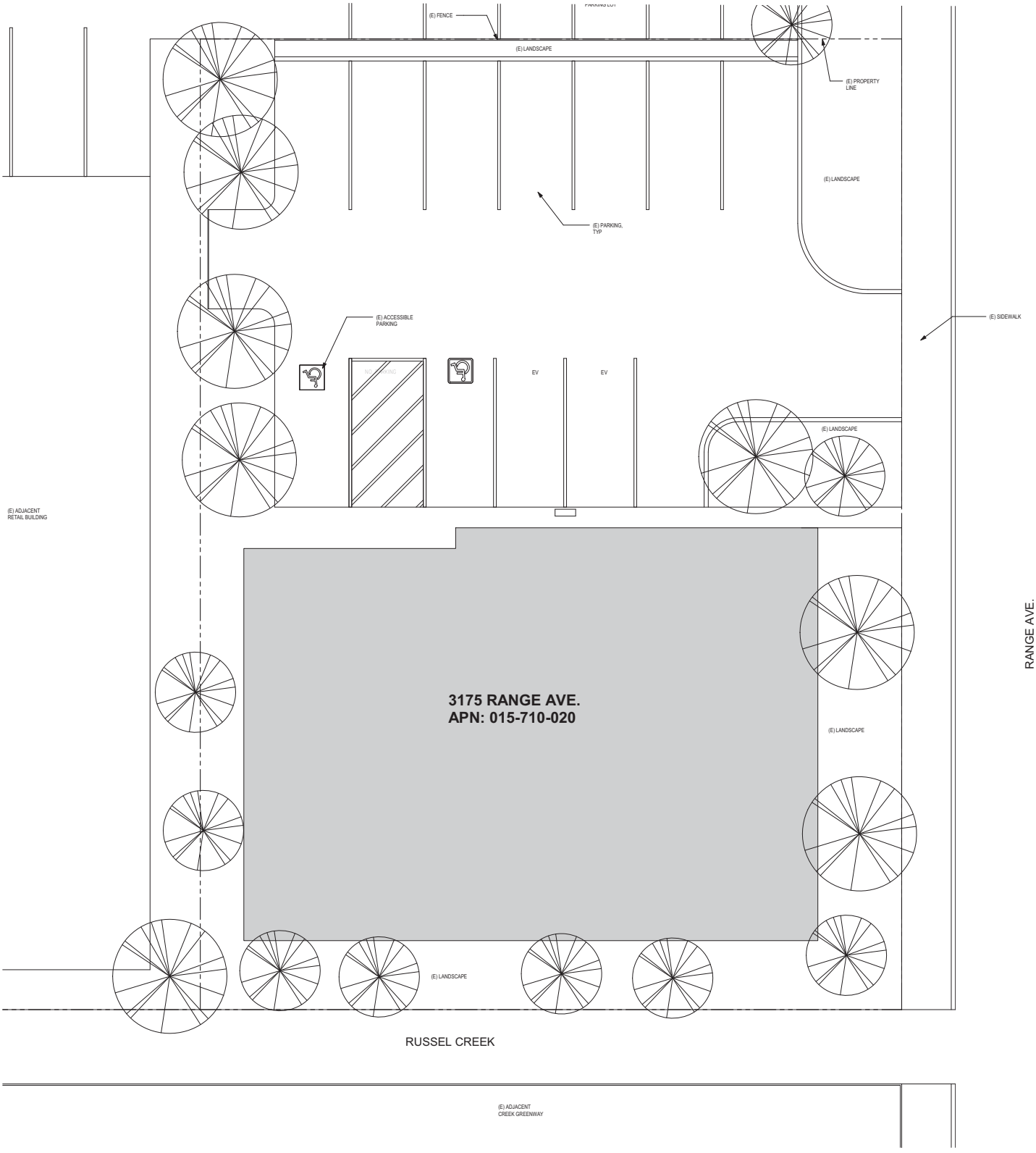
Traffic Impact Study for the 3175 Range Avenue Project

Figure 2 – Existing Traffic Volumes



3175 RANGE AVE.
SANTA ROSA, CA 95403

Source: RMW Architecture and Interiors 6/19

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Traffic Impact Study for the 3175 Range Avenue Project

Figure 3 – Site Plan

Trip Generation

The anticipated daily and p.m. peak hour trip generations for the dispensary were estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 10th Edition, 2017 for "Marijuana Dispensary" (LU #882). The a.m. peak was not evaluated as dispensaries in Santa Rosa are not permitted to open before 9 a.m.

For comparative purposes, and to review short-term impacts, the anticipated trip generation for the existing use was estimated. Trips associated with the existing use were estimated based on standard ITE rates for Research and Development Center (ITE LU#760), as this was determined to be the most similar land use available.

Based on application of these assumptions, the proposed project would be expected to generate an average of 884 trips per day, including 76 trips during the p.m. peak hour. After deducting the trips for the current use of the site, the project would be expected to generate 845 additional trips per day, including 74 trips during the p.m. peak hour. These results are summarized in Table 5.

Table 5 – Trip Generation Summary

Land Use	Units	Daily		PM Peak Hour			
		Rate	Trips	Rate	Trips	In	Out
Existing							
Research and Development Center	3.5 ksf	11.26	39	0.49	2	0	2
Proposed							
Marijuana Dispensary	3.5 ksf	252.70	884	21.83	76	38	38
Total			**845**		**74**	**38**	**36**

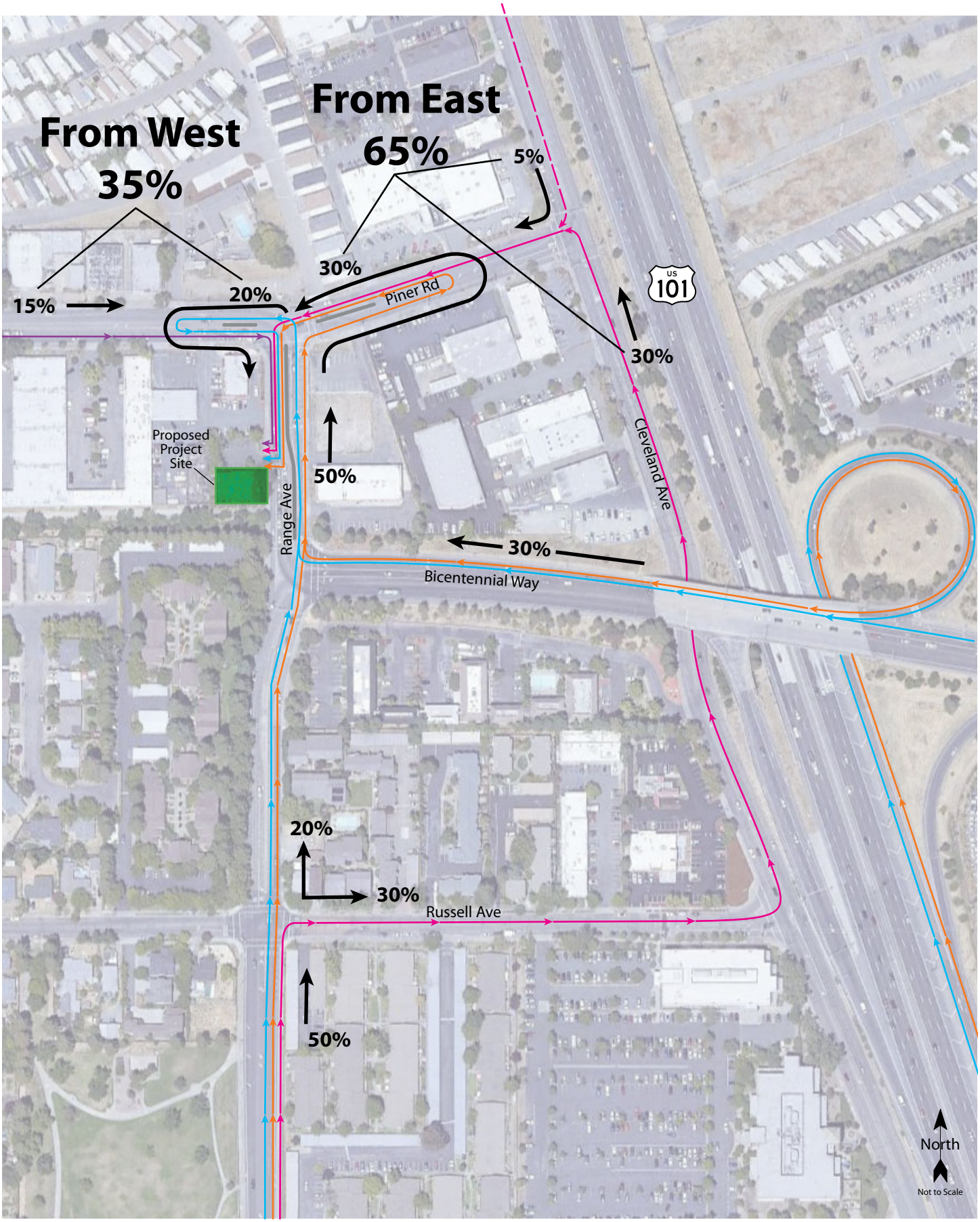
Note: ksf = 1,000 square feet

Trip Distribution

The pattern suggested to allocate new project trips to the street network was determined by reviewing existing turning movements at the study intersections as well as familiarity with travel patterns and traffic in Santa Rosa. The applied distribution assumptions are shown in Table 6. Inbound and outbound trip distribution assumptions differ because of the turn restrictions and are shown in Figure 4 and Figure 5, respectively.

Table 6 – Inbound Trip Distribution Assumptions

Route	Inbound Percent	Outbound Percent
Piner Rd (west of Range Ave)	15	15
Cleveland Ave (north of Piner Rd)	5	5
Range Ave (south of Bicentennial Wy)	20	40
Cleveland Ave (south of Piner Rd)	30	
Bicentennial Wy (east of Range Ave)	30	40
TOTAL	**100**	



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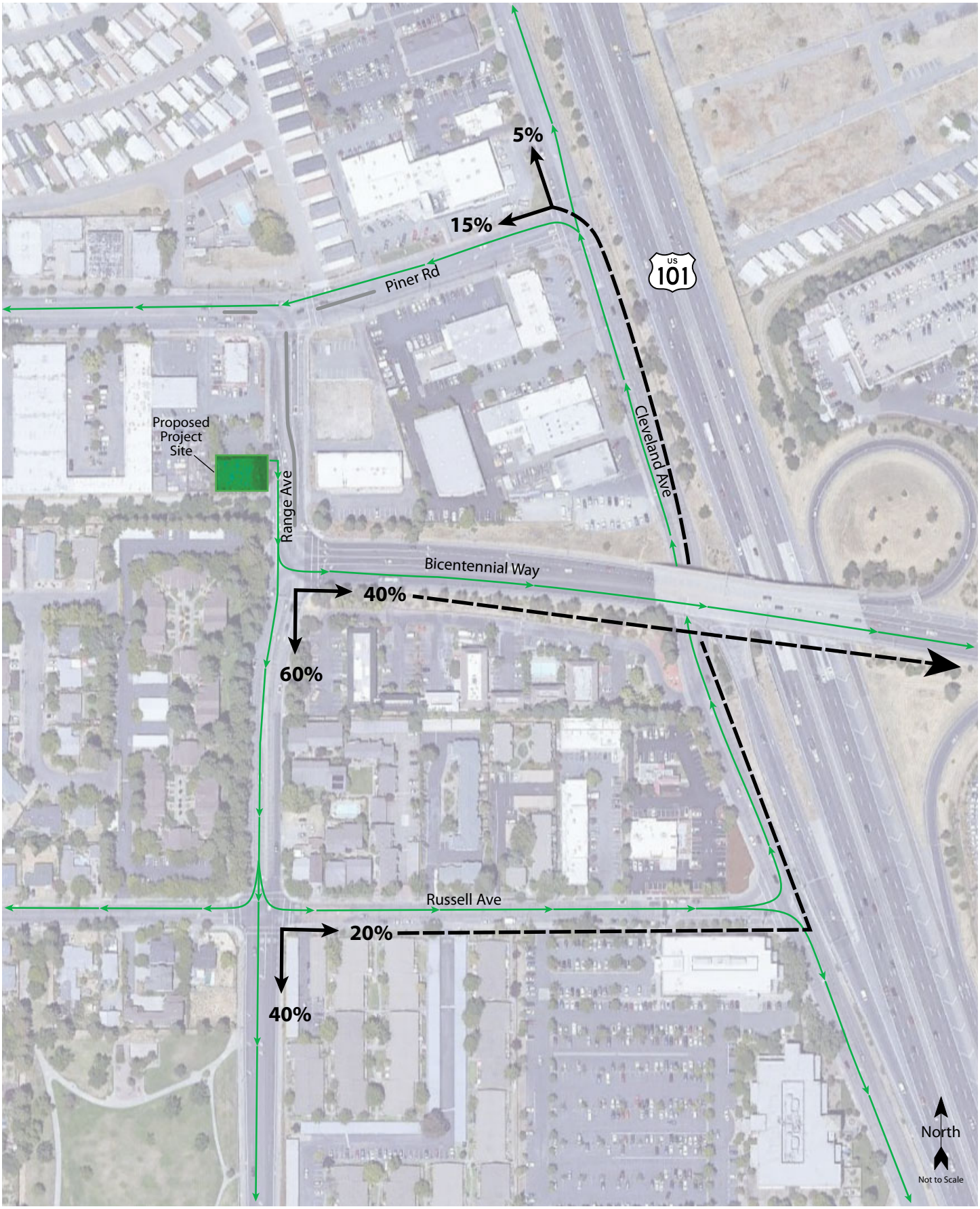
Traffic Impact Study for the 3175 Range Avenue Project

Figure 4 – Inbound Trip Distribution



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Traffic Impact Study for the 3175 Range Avenue Project

Figure 5 – Outbound Trip Distribution

Vehicle Miles Traveled

Consideration was given to the project's potential to increase Vehicle Miles Traveled (VMT), in accordance with SB 743, which establishes a goal of 15 percent reduction in VMT compared with existing development. SB 743 is scheduled to go into effect as of July 1, 2020. As the City of Santa Rosa has not yet adopted thresholds of significance for VMT, guidance developed by the Governor's Office of Planning and Research (OPR) for local agencies was applied for this project. OPR's guidance bases VMT analysis on VMT per resident or VMT per worker, depending on the project's land use. Projects with VMT below the countywide average would be considered likely to have a less than significant transportation impact.

Sonoma County Transportation Authority (SCTA) has developed a model with average trip lengths generated by specific areas of development within the county, known as Traffic Analysis Zones (TAZs). The proposed project would be located in TAZ 681, which has an average VMT per worker of 10.14, which is 21 percent below the countywide average of 12.82.

Finding – The project is anticipated to result in an average worker VMT that is 21 percent lower than countywide average for Sonoma County. This exceeds the target of 15 percent below the regional average, translating to a less-than-significant impact.

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 at LOS A or B during the p.m. peak hour. These results are summarized in Table 7. Project traffic volumes are shown in Figure 6.

Table 7 - Existing and Existing plus Project Peak Hour Intersection Levels of Service

Study Intersection	Existing Conditions PM Peak		Existing plus Project PM Peak	
	Delay	LOS	Delay	LOS
1. Range Ave/Piner Rd	9.5	A	10.3	B
2. Range Ave/Bicentennial Wy	11.4	B	11.5	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service

Finding – The study intersections are expected to continue operating acceptably upon the addition of project-generated traffic.

Existing plus Approved plus Project Conditions

Given that LOS A or B operation is anticipated with project traffic added to existing volumes, it is reasonable to conclude that traffic from projects far-removed from the study area would have a similarly nominal effect on operation and result in acceptable conditions.

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Traffic Impact Study for the 3175 Range Avenue Project

Figure 6 – Existing plus Project Traffic Volumes

Alternative Modes

Given that the site is located near a residential neighborhood and in close proximity to a restaurant and numerous other commercial land uses, it is reasonable to assume that some customers and employees will want to walk, bicycle, and/or use transit to reach the project site.

Pedestrian Facilities

As there are complete sidewalks in the vicinity of the project site, employees and customers would be able to use the existing sidewalks to access the site.

Finding – Pedestrian facilities serving the project site are adequate.

Bicycle Facilities

Existing bike lanes on Range Avenue and Bicentennial Way along with planned future bicycle facilities along Piner Road, the extension of the Range Avenue bike lanes, and the development of other planned bicycle facilities in the vicinity would provide adequate access for bicyclists.

Finding – Bicycle facilities serving the project site are adequate and would be improved with the completion of the planned bicycle facilities in the vicinity of the project.

Transit

Existing transit routes are adequate to accommodate project-generated transit trips and can be accessed from bus stops within an acceptable walking distance of the site. Transit users would have access to the Santa Rosa CityBus, Sonoma County Transit and Golden Gate Transit networks using existing sidewalks.

Finding – Transit facilities serving the project site are adequate.

Access and Circulation

Site Access

The proposed development would be accessed via the driveway at Range Avenue. Left turns into the project site are not permitted due to the presence of a median on Range Avenue, so the site can only be accessed by southbound traffic turning right into the project driveway. Vehicle exiting the project site must turn right onto southbound Range Avenue.

Sight Distance

Sight distance along Range Avenue at the project driveway was evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distance for a driveway is based on stopping sight distance with the approach travel speed used as the basis for determining the recommended sight distance.

Based on a design speed of 30 mph, the minimum stopping sight distance needed is 200 feet, and the sight distance to the north of the project driveway was field measured and determined to exceed this requirement. Sight distance was not evaluated to the south of the driveway since left turns are not permitted either into or out of the driveway.

Finding – Based on field observations, adequate stopping sight distance is available at the project driveway.

On-Site Circulation

The driveway on Range Avenue connects to a drive aisle that provides adequate space to access the site. Surface parking stalls can be accessed directly from the drive aisle.

Finding – On-site circulation would be expected to operate acceptably.

Parking

The project was analyzed to determine whether the proposed parking supply would be sufficient for the anticipated parking demand. The project site as proposed would provide a total of 12 standard parking spaces for the marijuana dispensary. The site plan shows that out of the 12 spaces proposed for the marijuana dispensary, there are two accessible stalls and two EV charging stations.

Santa Rosa City Code Chapter 20-36.040 indicates parking requirements for development projects in accordance with land use. The standard requirement for a cannabis dispensary is to provide one parking space for each 250 square feet of floor area, which amounts to 14 spaces. However, the Code indicates that when a building's use changes without enlarging the space in which the use is located that no additional parking shall be required, "provided that any deficiency in parking is no more than 10 spaces, or a 25 percent overall reduction from standard parking requirements, whichever is greater." Since the deficiency is two spaces, or 14 percent of the number of parking spaces generally required for cannabis dispensaries, the proposed project meets the City requirements.

Finding – The proposed parking supply for the project would meet City requirements.

Bicycle Parking

Santa Rosa City Code Chapter 20-36.040 also stipulates the City's bicycle parking requirements for new developments. While no additional parking is required for the project, as noted above, the project would provide a bike rack that would accommodate two bicycles.

Finding – The bicycle parking to be provided for the project would be adequate.

Conclusions

Conclusions

- The proposed project is expected to generate an average of 884 trips per day, including 76 trips during the p.m. peak hour. After deducting the trips for the current use of the site, the project is expected to generate an increase of 845 trips per day, including 74 trips during the p.m. peak hour. The a.m. peak period was not evaluated as the proposed cannabis dispensary would not be able to open until 9:00 a.m., or after the end of the morning peak period.

- Under Existing Conditions, the study intersections operate acceptably at LOS A or B during the p.m. peak hour and they are expected to continue to operate acceptably with the addition of project-related traffic.

- Access to the project site form the local street network may not be obvious to patrons of the project due to the presence of a median on Range Avenue in front of the project driveway and u-turn prohibitions at several nearby intersections. It is recommended that the tenant provide recommended directions to the site on its web site and make maps available to patrons.

- Vehicle miles traveled per employee are estimated to be 21 percent below the countywide average.

- Pedestrian facilities serving the project site are adequate.

- Bicycle access to the site is adequate and would be improved upon completion of facilities identified in the City's bicycle and pedestrian plan.

- Access to the project via transit is adequate as numerous routes in proximity to the site provide connections to destinations within Santa Rosa and throughout the region. The sidewalk network in the area is complete and provides access to these bus stops.

- Adequate sight distance is available at the project driveway to accommodate all turning movements into and out of the project site.

- On-site circulation is expected to operate acceptably for the dispensary.

- The proposed parking supply, including bicycle parking, would meet City requirements.

Study Participants and References

Study Participants

Principal in Charge	Dalene J. Whitlock, PE, PTOE
Transportation Planner	Barry Bergman, AICP
Assistant Engineer	Kimberly Tellez
Graphics	Katia Wolfe
Editing/Formatting	Alex Scrobonia
Quality Control	Dalene J. Whitlock, PE, PTOE

References

2016 Collision Data on California State Highways, California Department of Transportation, 2018
California Manual on Uniform Traffic Control Devices for Streets and Highways, California Department of Transportation, 2014
City of Santa Rosa Bicycle & Pedestrian Master Plan Update 2018, City of Santa Rosa, 2018
Citywide Summary of Pending Development: June 2017, City of Santa Rosa Department of Planning and Economic Development, https://srcity.org/354/Planning-Division
Golden Gate Transit, http://goldengatetransit.org/schedules/current/
Highway Capacity Manual, 6th Edition, Transportation Research Board, 2018
Highway Design Manual, 6th Edition, California Department of Transportation, 2017
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Communications

Email directing the approved projects to include in Baseline scenario; Andrew Trippel to Cameron Nye; February 10, 2020

SRO528

Appendix A

Collision Rate Calculations

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Intersection Collision Rate Calculations

SRO528

Intersection # 1: Range Avenue & Piner Road

Date of Count: Friday, May 18, 2018

Number of Collisions: 17
Number of Injuries: 11
Number of Fatalities: 0
ADT: 23400
Start Date: September 1, 2014
End Date: August 31, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Urban

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

$$\text{collision rate} = \frac{17 \times 1{,}000{,}000}{23{,}400 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.40 c/mve**	**0.0%**	**64.7%**
Statewide Average*	**0.19 c/mve**	**0.4%**	**46.8%**

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: Range Avenue & Bicentennial Way

Date of Count: Friday, May 18, 2018

Number of Collisions: 12
Number of Injuries: 8
Number of Fatalities: 0
ADT: 26900
Start Date: September 1, 2014
End Date: August 31, 2019
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Urban

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

$$\text{collision rate} = \frac{12 \times 1{,}000{,}000}{26{,}900 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.24 c/mve**	**0.0%**	**66.7%**
Statewide Average*	**0.19 c/mve**	**0.4%**	**46.8%**

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

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Appendix B

Intersection Level of Service Calculations

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3175 Range Avenue Project

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Report File: N:\...\1_PM Existing.pdf

Scenario 1 PM Existing
3/13/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Range Avenue/Piner Road	Signalized	HCM 6th Edition	WB Left	0.596	9.5	A
2	Range Avenue/Bicentennial Way	Signalized	HCM 6th Edition	NB Thru	0.500	11.4	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

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Version 7.00-06

Intersection Level Of Service Report
Intersection 1: Range Avenue/Piner Road

Control Type:	Signalized	Delay (sec / veh):	9.5
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.596

Intersection Setup

Name	Range Avenue		Piner Road		Piner Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0	0	1	0
Pocket Length [ft]	100.00	145.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		Yes	

Volumes

Name	Range Avenue		Piner Road		Piner Road	
Base Volume Input [veh/h]	947	112	167	832	101	184
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 Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
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	0	0	0	0	0
Total Hourly Volume [veh/h]	947	112	167	832	101	184
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]	237	28	42	208	25	46
Total Analysis Volume [veh/h]	947	112	167	832	101	184
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	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	85
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	1.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Overlap	Protected	Permissive
Signal Group	8	1	2	8	1	6
Auxiliary Signal Groups		1,8		2,8		
Lead / Lag	Lag	-	-	-	Lead	-
Minimum Green [s]	4	4	4	4	4	4
Maximum Green [s]	40	20	35	40	20	35
Amber [s]	3.6	3.0	3.6	3.6	3.0	3.6
All red [s]	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	42	43	13	42	43	43
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	5	0	5	5	0	5
Pedestrian Clearance [s]	17	0	17	17	0	17
Rest In Walk	No		No			No
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.6	2.0	2.6	2.6	2.0	2.6
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
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

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Lane Group Calculations

Lane Group	L	R	C	R	L	C
C, Cycle Length [s]	48	48	48	48	48	48
L, Total Lost Time per Cycle [s]	4.60	4.00	4.60	4.60	4.00	4.60
I1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
I2, Clearance Lost Time [s]	2.60	0.00	2.60	0.00	2.00	2.60
g_i, Effective Green Time [s]	22	30	9	35	4	17
g / C, Green / Cycle	0.45	0.63	0.19	0.74	0.08	0.36
(v / s)_i Volume / Saturation Flow Rate	0.27	0.07	0.09	0.52	0.06	0.05
s, saturation flow rate [veh/h]	3459	1589	1870	1589	1781	3560
c, Capacity [veh/h]	1559	996	364	1178	142	1273
d1, Uniform Delay [s]	9.97	3.61	17.10	3.38	21.55	10.45
k, delay calibration	0.11	0.11	0.11	0.24	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.39	0.05	0.90	1.74	6.43	0.05
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.61	0.11	0.46	0.71	0.71	0.14
d, Delay for Lane Group [s/veh]	10.36	3.66	18.00	5.12	27.99	10.50
Lane Group LOS	B	A	B	A	C	B
Critical Lane Group	Yes	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	2.97	0.27	1.48	1.15	1.23	0.54
50th-Percentile Queue Length [ft/ln]	74.15	6.64	37.10	28.74	30.77	13.40
95th-Percentile Queue Length [veh/ln]	5.34	0.48	2.67	2.07	2.22	0.96
95th-Percentile Queue Length [ft/ln]	133.48	11.94	66.79	51.73	55.39	24.12

Movement, Approach, & Intersection Results

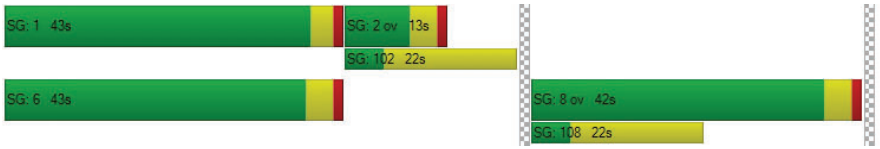
d_M, Delay for Movement [s/veh]	10.36	3.66	18.00	5.12	27.99	10.50
Movement LOS	B	A	B	A	C	B
d_A, Approach Delay [s/veh]	9.65		7.27		16.70	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	9.49					
Intersection LOS	A					
Intersection V/C	0.596					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	33.98	0.00	33.98
l_p,int, Pedestrian LOS Score for Intersection	2.687	0.000	2.290
Crosswalk LOS	B	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	42.50	42.50	42.50
l_b,int, Bicycle LOS Score for Intersection	4.132	5.781	4.368
Bicycle LOS	D	F	E

Sequence

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



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Intersection Level Of Service Report
Intersection 2: Range Avenue/Bicentennial Way

Control Type:	Signalized	Delay (sec / veh):	11.4
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.500

Intersection Setup

Name	Range Avenue		Range Avenue		Bicentennial Way	
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	1	0	1	1	1
Pocket Length [ft]	100.00	80.00	100.00	150.00	330.00	330.00
Speed [mph]	30.00		30.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		Yes		Yes	

Volumes

Name	Range Avenue		Range Avenue		Bicentennial Way	
Base Volume Input [veh/h]	177	213	685	262	467	882
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 Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
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	0	0	0	0	0
Total Hourly Volume [veh/h]	177	213	685	262	467	882
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]	44	53	171	66	117	221
Total Analysis Volume [veh/h]	177	213	685	262	467	882
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	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	85
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	32.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Overlap	Protected	Permissive	Permissive	Overlap
Signal Group	8	6	7	4	6	7
Auxiliary Signal Groups		6,8				6,7
Lead / Lag	-	-	Lead	-	Lag	-
Minimum Green [s]	8	6	7	7	6	7
Maximum Green [s]	30	30	30	30	30	30
Amber [s]	3.9	4.3	3.9	3.9	4.3	3.9
All red [s]	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	26	32	27	27	32	27
Vehicle Extension [s]	3.0	3.0	2.0	3.0	3.0	2.0
Walk [s]	5	5	0	5	5	0
Pedestrian Clearance [s]	23	19	0	23	19	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.9	3.3	2.9	2.9	3.3	2.9
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
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

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Lane Group Calculations

Lane Group	C	R	L	C	L	R
C, Cycle Length [s]	54	54	54	54	54	54
L, Total Lost Time per Cycle [s]	4.90	5.30	4.90	4.90	5.30	4.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
I2, Clearance Lost Time [s]	2.90	0.00	2.90	2.90	3.30	0.00
g_i, Effective Green Time [s]	8	28	16	29	16	37
g / C, Green / Cycle	0.15	0.52	0.29	0.53	0.29	0.67
(v / s)_i Volume / Saturation Flow Rate	0.05	0.13	0.20	0.14	0.14	0.31
s, saturation flow rate [veh/h]	3560	1589	3459	1870	3459	2813
c, Capacity [veh/h]	522	830	1006	986	989	1896
d1, Uniform Delay [s]	20.92	7.19	17.12	7.10	16.08	4.23
k, delay calibration	0.11	0.11	0.04	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.38	0.16	0.31	0.14	0.35	0.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.34	0.26	0.68	0.27	0.47	0.47
d, Delay for Lane Group [s/veh]	21.30	7.35	17.43	7.24	16.44	4.41
Lane Group LOS	C	A	B	A	B	A
Critical Lane Group	No	Yes	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.96	1.10	3.40	1.34	2.06	1.08
50th-Percentile Queue Length [ft/ln]	24.02	27.59	84.93	33.53	51.57	26.93
95th-Percentile Queue Length [veh/ln]	1.73	1.99	6.11	2.41	3.71	1.94
95th-Percentile Queue Length [ft/ln]	43.24	49.67	152.87	60.35	92.83	48.48

Movement, Approach, & Intersection Results

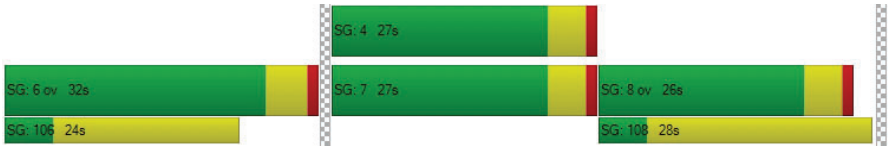
d_M, Delay for Movement [s/veh]	21.30	7.35	17.43	7.24	16.44	4.41
Movement LOS	C	A	B	A	B	A
d_A, Approach Delay [s/veh]	13.68		14.61		8.57	
Approach LOS	B		B		A	
d_I, Intersection Delay [s/veh]	11.44					
Intersection LOS	B					
Intersection V/C	0.500					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	33.98	33.98
l_p,int, Pedestrian LOS Score for Intersection	0.000	2.690	2.938
Crosswalk LOS	F	B	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	42.50	42.50	42.50
l_b,int, Bicycle LOS Score for Intersection	4.454	5.695	4.132
Bicycle LOS	E	F	D

Sequence

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



3175 Range Avenue Project

Vistro File: N:\...\SRO528 PM Existing.vistro — Scenario 2 PM Existing Plus Project
Report File: N:\...\2_PM Existing Plus Project.pdf — 3/13/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Range Avenue/Piner Road	Signalized	HCM 6th Edition	WB Left	0.621	10.2	B
2	Range Avenue/Bicentennial Way	Signalized	HCM 6th Edition	NB Thru	0.505	11.5	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Range Avenue/Piner Road

Control Type:	Signalized	Delay (sec / veh):	10.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.621

Intersection Setup

Name	Range Avenue		Piner Road		Piner Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0	0	1	0
Pocket Length [ft]	100.00	145.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		Yes	

Volumes

Name	Range Avenue		Piner Road		Piner Road	
Base Volume Input [veh/h]	947	112	167	832	101	184
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 Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	8	11	0	14	24	5
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	0	0	0	0	0
Total Hourly Volume [veh/h]	955	123	167	846	125	189
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]	239	31	42	212	31	47
Total Analysis Volume [veh/h]	955	123	167	846	125	189
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	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	85
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	1.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Overlap	Permissive	Overlap	Protected	Permissive
Signal Group	8	1	2	8	1	6
Auxiliary Signal Groups		1,8		2,8		
Lead / Lag	Lag	-	-	-	Lead	-
Minimum Green [s]	4	4	4	4	4	4
Maximum Green [s]	40	20	35	40	20	35
Amber [s]	3.6	3.0	3.6	3.6	3.0	3.6
All red [s]	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	42	43	13	42	43	43
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	5	0	5	5	0	5
Pedestrian Clearance [s]	17	0	17	17	0	17
Rest In Walk	No		No			No
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.6	2.0	2.6	2.6	2.0	2.6
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
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	L	R	C	R	L	C
C, Cycle Length [s]	49	49	49	49	49	49
L, Total Lost Time per Cycle [s]	4.60	4.00	4.60	4.60	4.00	4.60
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.60	0.00	2.60	0.00	2.00	2.60
g_i, Effective Green Time [s]	22	31	10	36	5	18
g / C, Green / Cycle	0.44	0.63	0.19	0.73	0.10	0.37
(v / s)_i Volume / Saturation Flow Rate	0.28	0.08	0.09	0.53	0.07	0.05
s, saturation flow rate [veh/h]	3459	1589	1870	1589	1781	3560
c, Capacity [veh/h]	1532	1008	360	1157	175	1323
d1, Uniform Delay [s]	10.63	3.60	17.76	3.92	21.68	10.35
k, delay calibration	0.11	0.11	0.11	0.27	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.42	0.05	0.93	2.21	5.29	0.05
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.62	0.12	0.46	0.73	0.71	0.14
d, Delay for Lane Group [s/veh]	11.05	3.65	18.70	6.13	26.97	10.40
Lane Group LOS	B	A	B	A	C	B
Critical Lane Group	Yes	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	3.24	0.30	1.56	1.85	1.51	0.56
50th-Percentile Queue Length [ft/ln]	80.96	7.53	38.96	46.13	37.64	14.02
95th-Percentile Queue Length [veh/ln]	5.83	0.54	2.81	3.32	2.71	1.01
95th-Percentile Queue Length [ft/ln]	145.74	13.56	70.13	83.03	67.76	25.24

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Movement, Approach, & Intersection Results

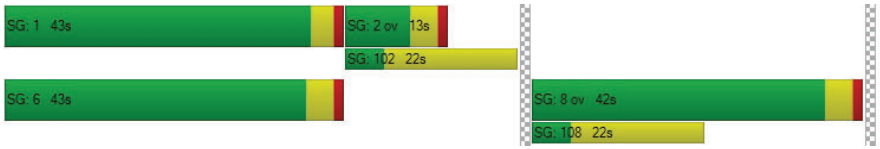
d_M, Delay for Movement [s/veh]	11.05	3.65	18.70	6.13	26.97	10.40
Movement LOS	B	A	B	A	C	B
d_A, Approach Delay [s/veh]	10.20		8.20		16.99	
Approach LOS	B		A		B	
d_I, Intersection Delay [s/veh]	10.25					
Intersection LOS	B					
Intersection V/C	0.621					

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	0.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	33.98	0.00	33.98
I_p,int, Pedestrian LOS Score for Intersection	2.698	0.000	2.436
Crosswalk LOS	B	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	42.50	42.50	42.50
I_b,int, Bicycle LOS Score for Intersection	4.132	5.804	4.391
Bicycle LOS	D	F	E

Sequence

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



Intersection Level Of Service Report
Intersection 2: Range Avenue/Bicentennial Way

Control Type:	Signalized	Delay (sec / veh):	11.5
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.505

Intersection Setup

Name	Range Avenue		Range Avenue		Bicentennial Way	
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	1	0	1	1	1
Pocket Length [ft]	100.00	80.00	100.00	150.00	330.00	330.00
Speed [mph]	30.00		30.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	No		Yes		Yes	

Volumes

Name	Range Avenue		Range Avenue		Bicentennial Way	
Base Volume Input [veh/h]	177	213	685	262	467	882
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 Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	8	0	14	22	0	11
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	0	0	0	0	0
Total Hourly Volume [veh/h]	185	213	699	284	467	893
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]	46	53	175	71	117	223
Total Analysis Volume [veh/h]	185	213	699	284	467	893
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	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	85
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	32.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Overlap	Protected	Permissive	Permissive	Overlap
Signal Group	8	6	7	4	6	7
Auxiliary Signal Groups		6,8				6,7
Lead / Lag	-	-	Lead	-	Lag	-
Minimum Green [s]	8	6	7	7	6	7
Maximum Green [s]	30	30	30	30	30	30
Amber [s]	3.9	4.3	3.9	3.9	4.3	3.9
All red [s]	1.0	1.0	1.0	1.0	1.0	1.0
Split [s]	26	32	27	27	32	27
Vehicle Extension [s]	3.0	3.0	2.0	3.0	3.0	2.0
Walk [s]	5	5	0	5	5	0
Pedestrian Clearance [s]	23	19	0	23	19	0
Rest In Walk	No			No	No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.9	3.3	2.9	2.9	3.3	2.9
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
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	R	L	C	L	R
C, Cycle Length [s]	55	55	55	55	55	55
L, Total Lost Time per Cycle [s]	4.90	5.30	4.90	4.90	5.30	4.90
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.90	0.00	2.90	2.90	3.30	0.00
g_i, Effective Green Time [s]	8	29	16	29	16	37
g / C, Green / Cycle	0.15	0.52	0.29	0.53	0.29	0.68
(v / s)_i Volume / Saturation Flow Rate	0.05	0.13	0.20	0.15	0.14	0.32
s, saturation flow rate [veh/h]	3560	1589	3459	1870	3459	2813
c, Capacity [veh/h]	517	828	1019	988	992	1906
d1, Uniform Delay [s]	21.27	7.32	17.21	7.24	16.23	4.21
k, delay calibration	0.11	0.11	0.04	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.42	0.16	0.31	0.16	0.35	0.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.36	0.26	0.69	0.29	0.47	0.47
d, Delay for Lane Group [s/veh]	21.69	7.48	17.52	7.39	16.57	4.39
Lane Group LOS	C	A	B	A	B	A
Critical Lane Group	No	Yes	Yes	No	No	Yes
50th-Percentile Queue Length [veh/ln]	1.02	1.13	3.51	1.49	2.09	1.10
50th-Percentile Queue Length [ft/ln]	25.60	28.25	87.75	37.35	52.29	27.44
95th-Percentile Queue Length [veh/ln]	1.84	2.03	6.32	2.69	3.76	1.98
95th-Percentile Queue Length [ft/ln]	46.07	50.84	157.95	67.23	94.11	49.39

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	21.69	7.48	17.52	7.39	16.57	4.39
Movement LOS	C	A	B	A	B	A
d_A, Approach Delay [s/veh]	14.09		14.59		8.57	
Approach LOS	B		B		A	
d_I, Intersection Delay [s/veh]	11.53					
Intersection LOS	B					
Intersection V/C	0.505					

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	33.98	33.98
I_p,int, Pedestrian LOS Score for Intersection	0.000	2.700	2.944
Crosswalk LOS	F	B	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	0
d_b, Bicycle Delay [s]	42.50	42.50	42.50
I_b,int, Bicycle LOS Score for Intersection	4.461	5.754	4.132
Bicycle LOS	E	F	D

Sequence

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