

## Appendix F: Transportation Supporting Information

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## **F.1 - Additional Rooms Transportation Impacts Memo**

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## TECHNICAL MEMORANDUM

*Date:* April 2, 2019

*To:* John-Paul Harries, Senior Planner, City of Cotati

*From:* Colin Burgett  
Senior Transportation Planner

*Subject:* **Cotati Hotel – Additional Rooms – Transportation Impacts**

As requested, we have assessed the effect on transportation impact findings from adding a total of six hotel rooms to the hotel. We understand that the revisions will not affect the proposed parking supply. With the proposed revision, the project will consist of 153 hotel rooms in addition to the market.

With the additional six rooms, the project would generate 76 a.m. and 108 p.m. peak hour vehicle trips, and 1,467 daily vehicle trips. Thus, the additional rooms would result in an increase of three vehicle trips during the a.m. peak hour (one inbound and two outbound); four additional vehicle trips during the p.m. peak hour (two inbound and two outbound); and 50 additional daily vehicle trips.

The addition of just three additional a.m. and four additional p.m. peak hour vehicle trips would not result in changes to peak-hour traffic level of service (LOS), and therefore the addition of six additional rooms would result in no changes to traffic impact findings. No additional analysis of transportation impacts is warranted.

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## **F.2 - Shared Parking Analysis for Proposed Cotati Hotel with 153 Rooms**

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April 2, 2019

Damien O'Bid  
City Manager  
City of Cotati  
201 West Sierra Avenue  
Cotati, CA 94931

**Subject: Shared Parking Analysis for Proposed Cotati Hotel with 153 Rooms**

Dear Mr. O'Bid:

This letter summarizes the results of the motor vehicle parking analysis conducted for the proposed Cotati Hotel project with the addition of six additional hotel rooms (thus increasing the hotel room count from 147 to 153 rooms). The analysis assesses the adequacy of the proposed shared parking supply to accommodate parking demand generated by the hotel, market and park-and-ride.

#### **Proposed Project**

The project would consist of a 153-room hotel and 3,596-square foot market in two separate buildings. The hotel building would include on-site services including a 2,123-square foot hotel lounge with a 279-square foot kitchen. The project site would also continue to serve as a transit park-and-ride location, given proximity to weekday commuter bus service provided by Golden Gate Transit.

#### **Proposed Parking Supply**

The project would provide 167 off-street motor vehicle parking spaces and 16 on-street parking spaces on St. Joseph Way, thus a total supply of 183 motor vehicle parking spaces, including 30 parking spaces that would be made available for weekday park-and-ride users.

#### **Parking Demand**

Data on parking demand for various land uses, including hotels, is provided by the Institute of Transportation Engineers (ITE) *Parking Generation* (4th Edition, 2010). ITE provides data for several types of hotels including hotels (ITE land use code 310) with an average of 315 occupied rooms that typically include extensive on-site services including restaurants, retail, convention and meeting space; and smaller Business Hotels (ITE land use code 312) that average 142 occupied rooms and generally include more limited on-site services such as breakfast bar or beverage bar. The standard Hotel rate (ITE land use code 310) was utilized to estimate the parking demand applicable to the hotel given the provision of on-site services including a café/lounge and hotel-oriented retail space. Potential additional parking demand generated by the market was estimated based on the ITE parking demand rate for Supermarkets (ITE Land Use Code 850).

Hotel parking demand varies by time of day, with peak parking demand occurring overnight (between midnight and 6:00 a.m.). **Table 1** shows the predicted number of hotel guest and employee vehicles by time of day on a typical weekday.

- ▶ The peak parking demand based on the hotel rate (ITE land use code 312) is 0.89 vehicles per occupied room on weekdays, and 1.20 vehicles per occupied room on weekends, based on ITE data. The ITE data indicates that average hotel room occupancy ranges from 60 to 70 percent, with a high average of 72 percent room during peak months. City of Cotati staff indicated an average hotel room occupancy of 76 percent applicable to Sonoma County hotels<sup>1</sup>. Peak parking demand is generally estimated based on typical conditions (not 100 percent room occupancy).
- ▶ Therefore, peak parking demand generated by the hotel, with the typical Cotati hotel room occupancy of 76 percent, would be 104 vehicles parked at 6:00 a.m. on weekdays, and 140 vehicles at 6:00 a.m. on weekends. At 100 percent room occupancy, the peak parking demand generated by hotel guests and employees would be 140 vehicles on weekday and 185 vehicles on a weekend. Therefore, at 100 percent room occupancy on a weekend: the predicted hotel parking demand of 185 vehicles at 6:00 a.m. would exceed the proposed supply of 183 parking spaces. ***The provision of valet parking procedures is therefore recommended to accommodate the peak, overnight parking demand on weekends that would occur with 100 percent room occupancy.*** By 10 a.m., the parking demand on a weekend with 100 percent room occupancy would be 152 vehicles.
- ▶ During mid-day hours, between 10 a.m. and 8:00 p.m. parking demand generated by the hotel would typically range from just 77 to 85 vehicles on weekdays and 104 to 115 vehicles on weekends. At 100 percent room occupancy, hotel parking demand would range from 97 to 107 on weekdays between 10 a.m. and 8 p.m., and less than 150 vehicles on weekends between 10 a.m. and 8 p.m.

**Table 1: Hotel Parking Demand by Time of Day**

Time	Percent of Daily Peak Parking Demand for Hotel	153-room Hotel Parking Demand (based on 76 percent average room occupancy) – Number of Vehicles		153-room Hotel Parking Demand (based on 100 percent room occupancy) – Number of Vehicles	
		Weekday	Weekend	Weekday	Weekend
6:00 am	100%	103	140	136	184
10:00 am	82%	85	114	112	151
12:00 pm	77%	80	107	105	141
6:00 pm	74%	77	103	101	136
8:00 pm	79%	82	110	108	145
10:00 pm	87%	90	121	118	160

Source: ITE Parking Generation, 4th Edition, 2010 based on parking demand for hotels that include extensive on-site services including restaurants, retail and meeting space. Average room occupancy of 76 percent for Sonoma County cited by Vicki Parker, City of Cotati, during December 4, 2018 conference call.

<sup>1</sup> Vicki Parker, December 4, 2018 phone conversation.



The market hall parking demand was estimated based on ITE parking demand rates for Supermarkets (ITE land use code 850), which indicates a peak parking demand rate of 3.78 vehicles per thousand square feet at suburban sites on weekdays, and 3.92 vehicles per thousand square feet at suburban sites on weekends (Saturdays). ITE also provides data showing the peak parking demand for supermarkets typically occurs at 1 pm.

**Table 2** shows the total shared parking demand for the hotel, market hall and park-and-ride. Potential usage by time-of-day for the 30 park-and-ride spaces was estimated based on the Golden Gate Transit schedule for Routes 72 and 74 that provide weekday commuter service to/from San Francisco, with 43% of morning service before 6 a.m. and 57% between 7 and 8 a.m.; afternoon service is 14% between 5 and 6 p.m. and 86% between 6 and 8 p.m. Based on the service patterns, 30 park-and-ride parkers would thus include approximately 13 vehicles arriving before 6 a.m., with the remainder arriving between 6 and 8 a.m. During the afternoon, 4 park-and-ride users would return to retrieve their vehicles before 6 p.m., while the remainder would return to retrieve their vehicles between 6 and 8 p.m.

Based on typical hotel room occupancies, the peak shared parking demand period for the hotel, market and park & ride would occur mid-day on weekdays, from noon to 2 pm, with 124 vehicles parked including 30 park-and-ride vehicles. The peak weekend parking demand, with typical 72 percent room occupancy, would be 144 vehicles at 6 a.m., dropping to 121 vehicles at noon.

### Conclusion

Based on this comparison: the proposed provision of 183 motor vehicle parking spaces (including 16 on-street spaces) will accommodate peak shared parking demand generated by the proposed Project, including up to 30 park-and-ride vehicles on weekdays. The peak shared parking demand under typical conditions (with 76 percent room occupancy) will be less than 140 vehicles on both weekdays and weekends, including up to 30 park-and-ride vehicles parked on weekdays. With 100 percent hotel room occupancy: the peak shared parking demand would be 153 vehicles on weekdays including park-and-ride vehicles, and 188 vehicles on weekends at 6 a.m. (dropping to less than 160 vehicles between 10 a.m. and 10 p.m.)

**Peak overnight demand of 188 vehicles at 6:00 a.m. on weekends with 100 percent room occupancy would thus exceed the proposed total supply of 183 motor vehicle spaces. The provision of valet parking procedures for hotel guests and/or employees is therefore recommended to accommodate the peak, overnight parking demand on weekends that would occur with 100 percent room occupancy. Valet parking procedures would allow a portion of hotel guest and/or employee vehicles to be stacked in the west-most parking aisle in a manner to avoid affecting hotel access and emergency access, to increase the peak overnight parking supply.**

Please feel free to contact me at (925) 264-5034 or via e-mail at [cburgett@tjkm.com](mailto:cburgett@tjkm.com), if you have any questions regarding this report. Sincerely,

Colin Burgett  
Senior Project Manager, TJKM



**Table 2: Shared Parking Demand (Hotel + Market + Park & Ride) – Number of Vehicles Parked**

Time	Hotel Parking Demand (153 rooms with 72 percent room occupancy)		Hotel Parking Demand (153 rooms with 100 percent room occupancy)		Market Hall Parking Demand (3,596 square feet)		Park & Ride (30 spaces) for weekday public transit commuters		Total Shared Parking Demand (Hotel + Market + Park & Ride) Number of Vehicles Parked			
									Typical Hotel Room Occupancy (76%)		Non-typical Hotel Room Occupancy (100%)	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
6:00 am	103	140	136	184	4	4	13	0	120	<b>144</b>	<b>153</b>	<b>188<sup>2</sup></b>
10:00 am	85	114	1112	151	9	9	30	0	<b>124</b>	123	151	160
12:00 pm	80	107	105	141	14	14	30	0	<b>124</b>	121	149	155
6:00 pm	77	103	101	136	11	11	26	0	118	114	138	147
8:00 pm	82	110	108	141	8	8	0	0	90	118	116	153
10:00 pm	91	121	118	160	4	4	0	0	94	125	122	164

Source: ITE Parking Generation, 4th Edition, 2010 for proposed hotel and market. Usage of up to 30 park-and-ride spaces by time-of-day was estimated based on the Golden Gate Transit schedule for Routes 72 and 74 that provide weekday commuter service to/from San Francisco, with 43% of morning service before 6 a.m. and 57% between 7 and 8 a.m.; afternoon service is 14% between 5 and 6 p.m. and 86% between 6 and 8 p.m. Typical room occupancy of 76 percent based on Sonoma County average hotel room occupancy, cited by Vicki Parker, City of Cotati, during December 4, 2018 conference call.

<sup>2</sup> Peak overnight demand of 188 vehicles at 6:00 a.m. on weekends with 100 percent room occupancy would exceed the proposed total supply of 183 motor vehicle spaces. **The provision of valet parking procedures for the hotel is therefore recommended to accommodate the peak, overnight parking demand on weekends that would occur with 100 percent room occupancy. Valet parking procedures would allow a portion of hotel guest and/or employee vehicles to be stacked in the west-most parking aisle in a manner to avoid affecting hotel access and emergency access, to increase the peak overnight parking supply.**

## **F.3 - Transportation Impact Analysis**

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# **Cotati Hotel Project**

## **Transportation Impact Analysis**

Cotati, CA

February 2019





**Table of Contents**

**1. Introduction.....1**

    Study Purpose.....1

    Report Overview .....1

    Project Location .....1

    Proposed Land Uses & Parking Provisions .....1

    Proposed Site Access.....2

    Egress to the North via U-turn Provisions.....2

    Analysis Scenarios and Study Area.....9

    Level of Service Methodology.....9

    Criteria of Significance ..... 10

**2. Existing Conditions ..... 12**

    Circulation Network..... 12

    Bicycle Circulation ..... 13

    Pedestrian Facilities ..... 13

    Transit Service and Park & Ride Lots..... 13

    Study Intersections & Peak Hour Traffic Volumes..... 14

    Existing Conditions Traffic Level of Service Analysis ..... 17

    Existing Conditions - Collision Data Review ..... 18

**3. Project Trip Generation ..... 19**

    Vehicle Trip Generation ..... 19

**4. Existing plus Project Conditions..... 21**

    Project Vehicle Trip Distribution & Assignment ..... 21

    Existing plus Project Conditions Traffic Analysis..... 23

    Existing plus Project Traffic Impact Findings..... 23

**5. Cumulative Impacts ..... 25**

    Cumulative Traffic Volumes ..... 25

    Planned Roadway Improvements ..... 25

    Cumulative Traffic Impact Findings..... 26

6. Site Access & Egress ..... 30

**Appendices**

- Appendix A – Existing Conditions Intersection Counts (Motor Vehicle, Bicycle & Pedestrian Volumes)
- Appendix B – Existing Conditions LOS Analysis
- Appendix C – Existing plus Project Conditions LOS Analysis
- Appendix D – Cumulative Conditions LOS Analysis
- Appendix E – Cumulative plus Project Conditions LOS Analysis

**Tables**

Table 1: Intersection Level of Service Definitions for Signalized Intersections..... 10

Table 2: Intersection Level of Service Definitions for Stop-sign Controlled Intersections ..... 10

Table 3: Existing Conditions Traffic Level of Service Analysis Results ..... 17

Table 4: Existing Conditions – Collision Data Summary..... 18

Table 5a: Project Vehicle Trip Generation..... 20

Table 5b: Peak Hour Vehicle Trip Distribution..... 21

Table 6: Existing plus Project Conditions Traffic Level of Service Analysis Results ..... 23

Table 7: Cumulative (Year 2040) Conditions Traffic Level of Service Comparison ..... 27

**Figures**

Figure 1a: Vicinity Map..... 3

Figure 1b: Aerial View of Site..... 4

Figure 2a: Project Site Plan ..... 5

Figure 2b: Landscape Plan ..... 6

Figure 2c: Striping Plan ..... 7

Figure 2d: Proposed U-turn Location..... 8

Figure 3: Existing Peak Hour Traffic Volumes..... 15

Figure 4: Existing Intersection Lane Geometry and Controls..... 16

Figure 5: Project Trip Assignment (Existing plus Project Conditions)..... 22

Figure 6: Cumulative No Project Traffic Volumes..... 28

Figure 7: Project Trip Assignment (Cumulative plus Project Conditions) ..... 29

## 1. INTRODUCTION

This report describes results of the Transportation Impact Assessment (TIA) for a proposed 147-room hotel (the “project”) on St. Joseph Way, adjacent to Old Redwood Highway, U.S. Highway 101 and Gravenstein Highway (State Route 116) in the City of Cotati.

### Study Purpose

The purpose of the TIA is to evaluate potential transportation impacts that could result from the proposed project, identify short- and long-term multi-modal circulation needs where relevant to site access and/or project impacts, identify potential mitigation measures for any significant transportation impacts, and evaluate the adequacy of the proposed site plan for accommodating multi-modal site access.

### Report Overview

This report is divided into the following chapters:

- **Chapter 1 Introduction**
- **Chapter 2 Existing Conditions**
- **Chapter 3 Project Trip Generation**
- **Chapter 4 Existing plus Project Conditions**
- **Chapter 5 Cumulative Conditions**
- **Chapter 6 Site Access & Egress**

### Project Location

The location of the project site is shown in **Figure 1a** and an aerial view of the site plication is shown on **Figure 1b**. The project site is located between Old Redwood Highway and U.S. Highway 101, just south of Gravenstein Highway, in the City of Cotati. The site is currently developed with a paved parking lot that serves as a park-and-ride facility for transit riders.

As shown on Figures 1a and 1b, an additional “Future Roadway” south of St. Joseph Way is planned by the City of Cotati, anticipated to ultimately be constructed to include an additional signalized intersection on Old Redwood Highway, but is not part of the Project.

### Proposed Land Uses & Parking Provisions

The project would consist of a 147-room hotel and 3,596-square foot market in two separate buildings. The project would provide a total of 183 motor vehicle parking spaces, including 167 off-street motor vehicle parking spaces within the project site, and 16 on-street parking spaces on the north side of St. Joseph Way immediately bordering the project site. A total of 30 motor vehicle parking spaces would be made available for weekday park-and-ride transit users. The site plan indicates that 12 bicycle racks will be provided, accommodating 24 bicycles.

### Proposed Site Access

Direct motor vehicle access to the site will be via St. Joseph Way, which connects with Old Redwood Highway at an intersection that is currently restricted to right-turn in and right-turn out movements only. Under existing conditions, illegal left-turns from St. Josephs Way to northbound Old Redwood Highway were observed to occur. To prevent such occurrences, the eastbound approach to Old Redwood Highway via St. Joseph Way will be channelized to force motorists to make a right-turn on to southbound Old Redwood Highway, consistent with the current right-turn only restrictions.

In addition: the intersection of St. Joseph Way and Old Redwood Highway will be restriped to allow northbound left-turns from Old Redwood Highway to St. Joseph Way. An emergency vehicle (EV) access driveway would also be provided from Gravenstein Highway, with removable bollards installed to prevent use by non-emergency motor vehicles. The proposed site plan, landscape plan and striping plan are illustrated in **Figure 2A, 2B and 2C**.

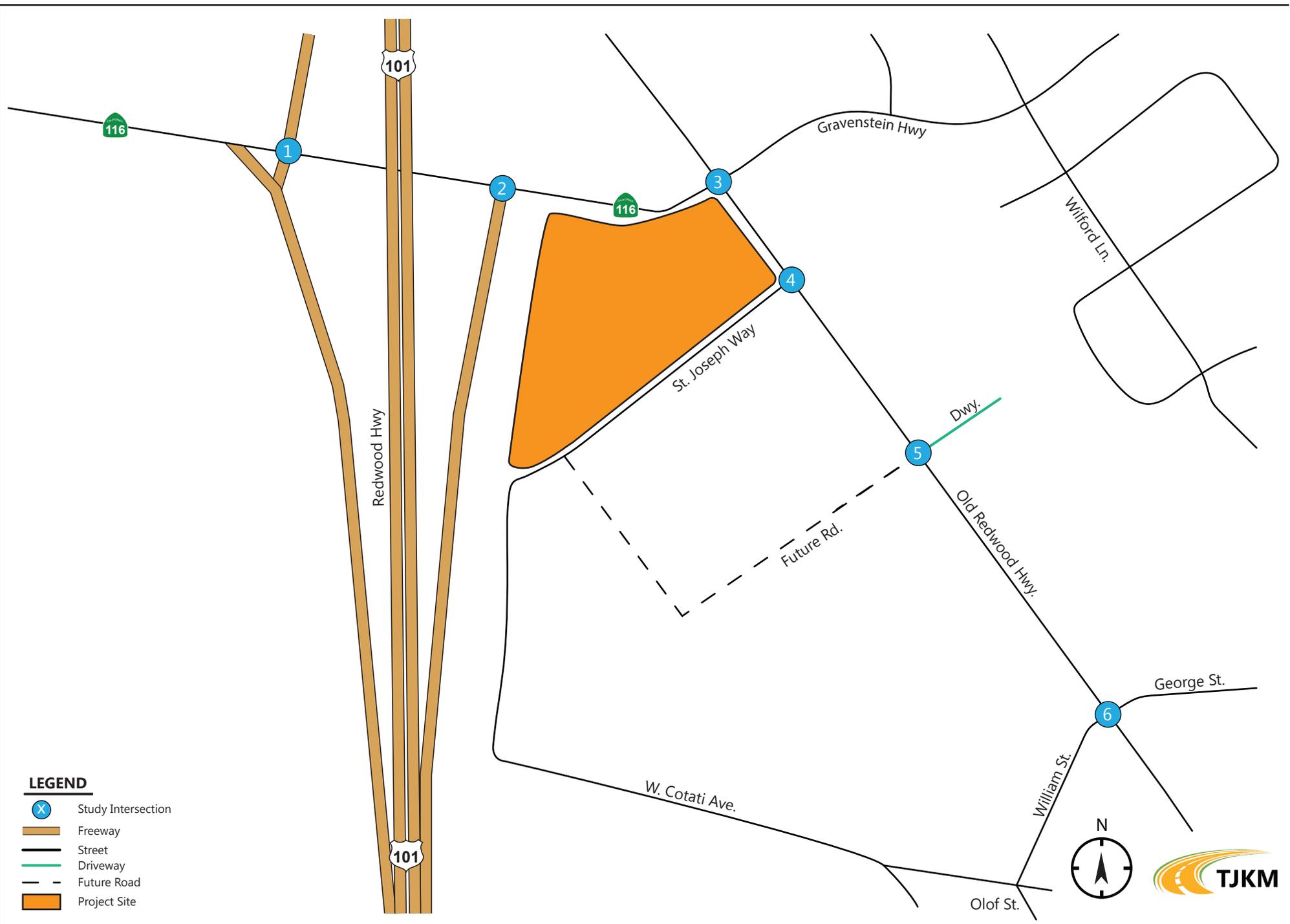
### Egress to the North via U-turn Provisions

As noted above: motorists exiting the project site via St. Joseph Way are required to make a right-turn on to southbound Redwood Highway, even if their destination is north of the site. To accommodate outbound travel to the north: the project would be accompanied by roadway modifications to allow motorists traveling southbound on Old Redwood Highway (south of the project site) to make a U-turn for purposes of traveling northbound on Old Redwood Highway (such as for accessing US 101 northbound or Gravenstein Highway).

The state vehicle code does not allow U-turns in business districts (which would apply to Old Redwood Highway south of Gravenstein Highway) unless expressly permitted by signage. To allow U-turns, the lane configuration will be modified to provide a total of 44 feet (including the width of the travel lane from which the U-turn would occur), measured from the right edge of the southbound left-turn lane to the curb on the northbound side of Old Redwood Highway.

**Figure 2D** illustrates the location identified by City of Cotati staff to accommodate U-turns, adjacent to a planned future signalized intersection where Old Redwood Highway will intersect a planned future local street to the west (south of St. Joseph Way). Under existing conditions, the curb-to-curb width of Old Redwood Highway narrows approaching the location, thus not providing the necessary width to accommodate U-turns. Therefore, in addition to restriping, accommodating U-turns at this location is also anticipated to require relocating a portion of the existing northbound curb on Old Redwood Highway, and the edge of the adjacent driveway, to the east by an estimated two to four feet.

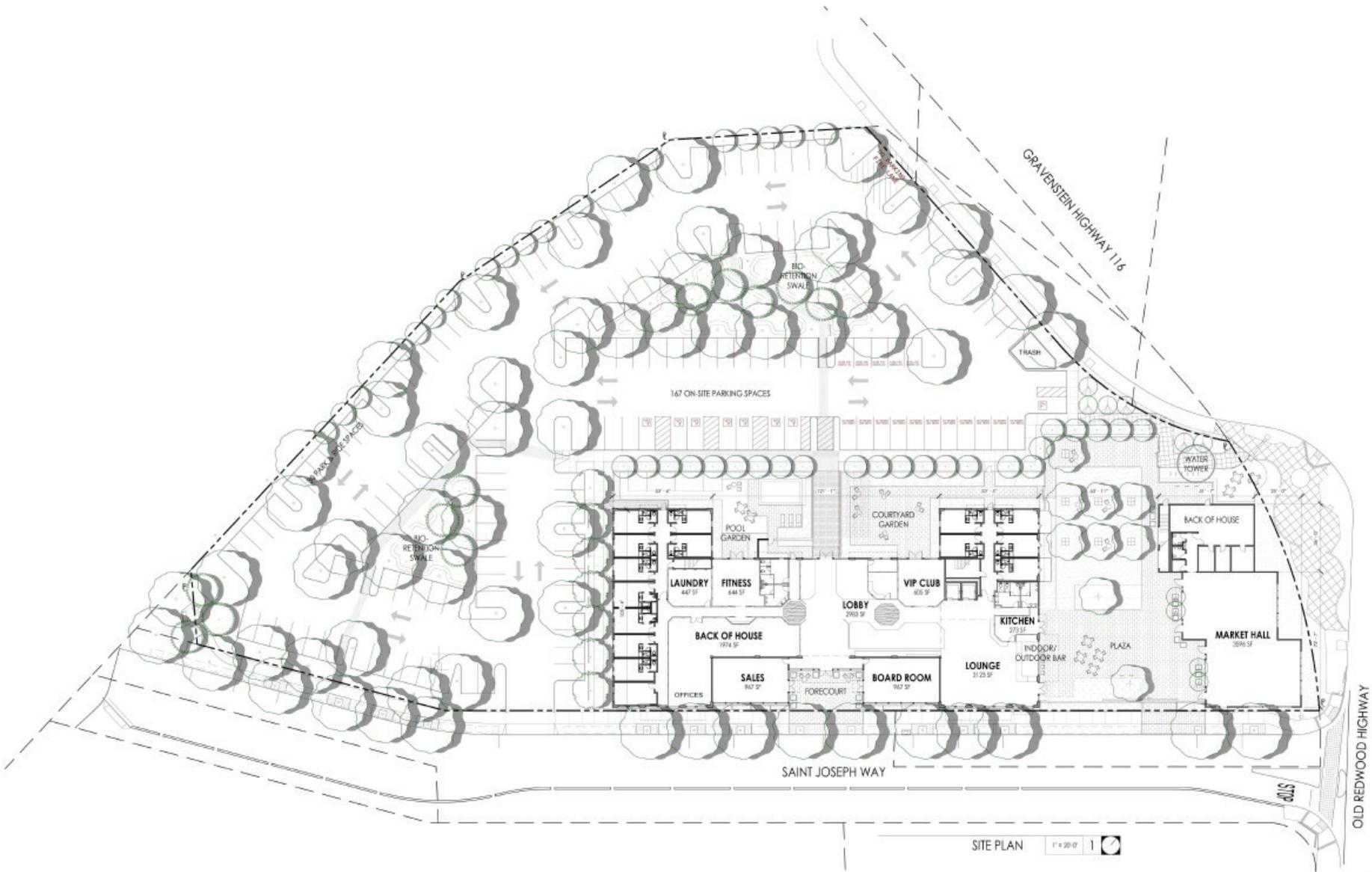
# Vicinity Map



# Aerial Site View

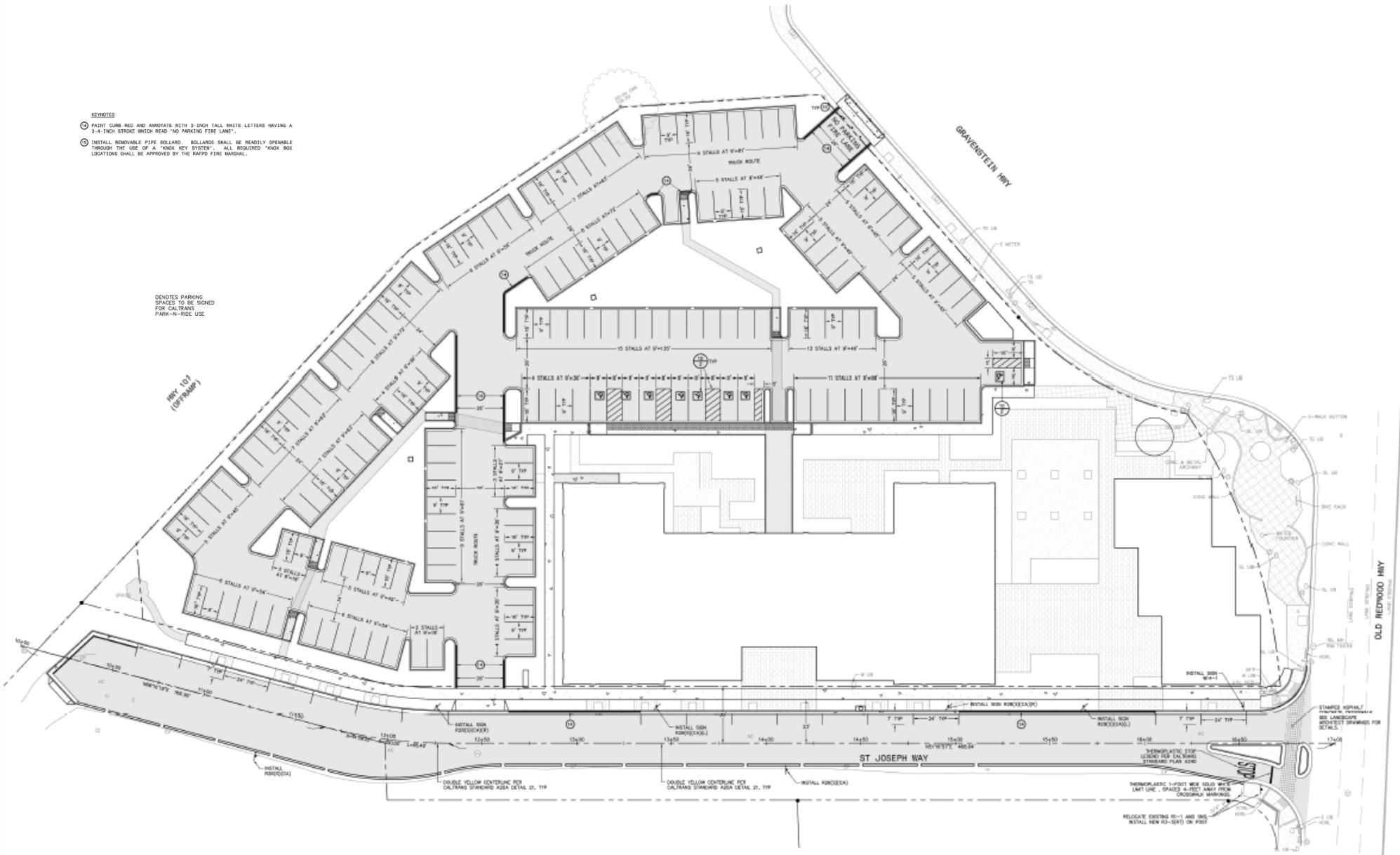


# Site Plan

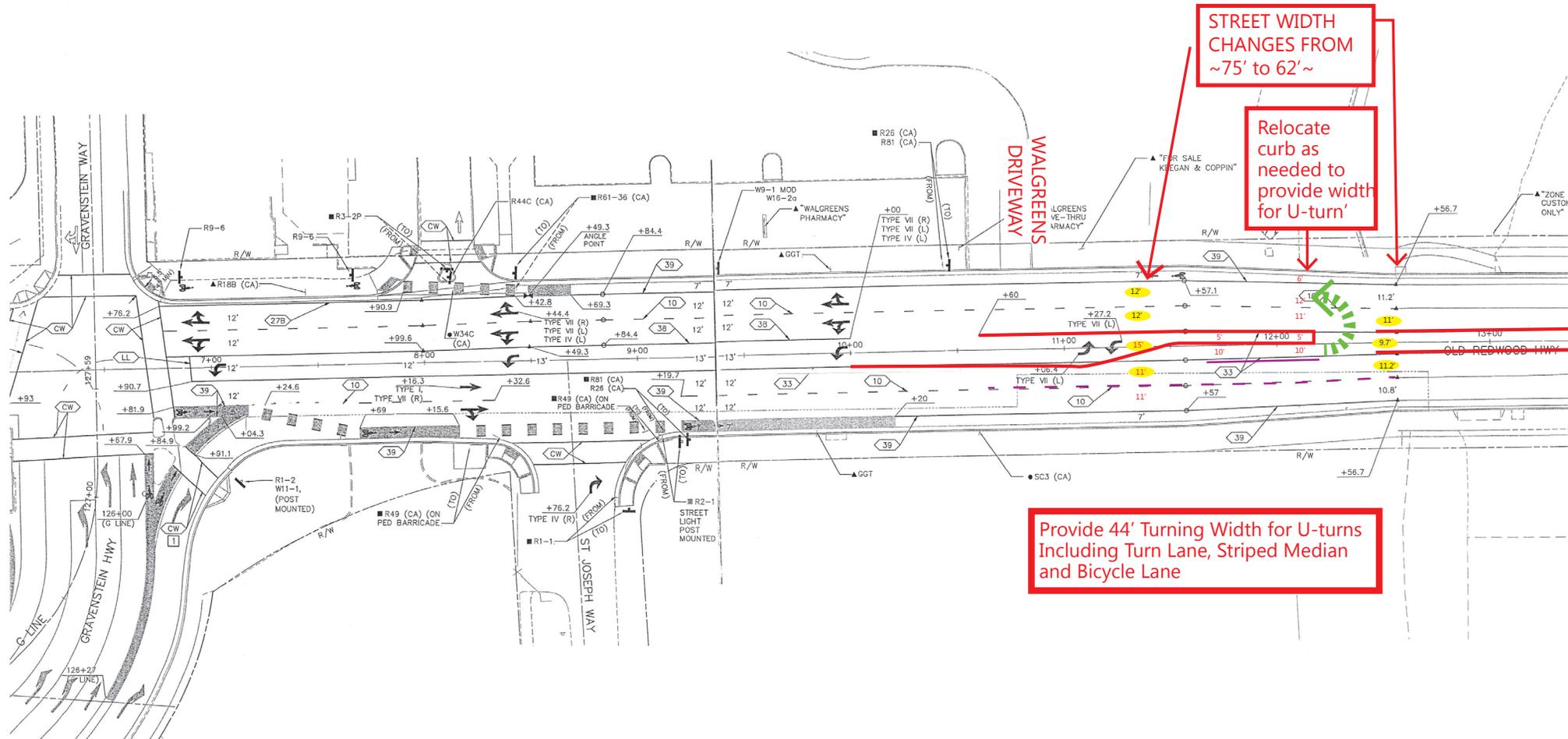




# Striping Plan



# Proposed U-Turn Location



### Analysis Scenarios and Study Area

Potential transportation impacts were assessed based on the following scenarios addressed in this study:

- **Existing Conditions** – This scenario describes existing transportation conditions in the study area based on the current roadway and sidewalk network characteristics, transit service, field observations and intersection counts conducted on November 29, 2017.
- **Existing plus Project Conditions** – This scenario is similar to Existing Conditions but with the proposed site modifications and net new trips that would be generated by the project.
- **Cumulative No Project Conditions** – This scenario evaluates future transportation conditions based on forecasted travel volumes for Year 2040 without the project, derived from the *Cotati General Plan Update Environment Impact Report (EIR)* prepared in September 2014.
- **Cumulative plus Project Conditions** – This scenario is similar to Cumulative Conditions but with the inclusion of vehicle trips that would be generated by the project.

TJKM evaluated transportation conditions at six study intersections during a.m. (7:00 a.m.-9:00 a.m.) and p.m. (4:00 p.m.-6:00 p.m.) peak periods for a typical weekday with clear weather. The volumes of motor vehicles, bicycles and pedestrians were counted on Wednesday, November 29, 2017 at six intersections.

### Level of Service Methodology

Level of service (LOS) is a qualitative index of the performance of an element of the transportation system. LOS is a rating scale running from A to F, with LOS A indicating no congestion, and LOS F indicating unacceptable congestion and delay. For this study, LOS describes the operating conditions for signalized and unsignalized intersections.

The Highway Capacity Manual (HCM) is a standard reference published by the Transportation Research Board (TRB), and contains specific criteria and methods for assessing LOS. Synchro software is used to calculate LOS in this study. LOS definitions for signalized and unsignalized intersections are provided in **Table 1** and **Table 2**, respectively.

**Table 1: Intersection Level of Service Definitions for Signalized Intersections**

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

Source: Highway Capacity Manual (HCM) 2010

**Table 2: Intersection Level of Service Definitions for Stop-sign Controlled Intersections**

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

Source: HCM 2010

**Criteria of Significance**

Based on the criteria identified in the Cotati General Plan Environmental Impact Report, the project would result in a significant impact on transportation if it would:

1. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.

- Intersections: The applied thresholds of significance for intersection impacts are based on those included in Policy CI-3 of the Cotati General Plan. A significant traffic-related impact would occur if implementation of the project would cause intersections to operate below the General Plan's standard of LOS D, or LOS E for intersections within the boundaries of the Downtown Specific Plan. At unsignalized intersections that are side-street stop-sign controlled, controlled movements operating at LOS E or LOS F are allowable if 1) the intersection is projected to operate at LOS C or better overall, and 2) the projected traffic volume on the controlled movement is 30 vehicles or less per hour on approaches with single lanes, or on multi-lane approaches, 30 vehicles or less per hour on lanes serving left turns and through movements.
    - If an intersection currently operates or is projected to operate below the standard, the project's impact is significant and cumulatively considerable if it causes the delay to increase by five seconds or more (average delay for signalized and stop sign controlled intersections) when comparing baseline and project conditions. Therefore, any study intersection exceeding these standards will be considered impacted and subsequently evaluated for mitigation.
  - Freeway facilities: A significant traffic related impact would occur if the project would cause freeway facilities to operate below the LOS E threshold or in cases where the freeway is already projected to operate deficiently at LOS F without the project, failure to maintain the existing measures of effectiveness (MOE). For such instances where the freeway is anticipated to operate at LOS F, the freeway demand---to---capacity ratio (d/c) ratio is calculated and used as the MOE. A Project---attributable increase in the d/c ratio of 0.01 or greater is considered a cumulatively significant impact.
  - Freeway ramps: A significant traffic related impact would occur if the project would create or worsen queuing conditions at freeway interchange intersections in which the projected off---ramp queues cannot be accommodated within the available storage space, and extend onto the mainline freeway.
2. Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.
  3. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.
  4. Substantially increase hazards due to a design feature.
  5. Result in inadequate emergency access.
  6. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

## 2. EXISTING CONDITIONS

### Circulation Network

Key roadways and freeways near the Project site are discussed below.

**US 101** is the primary route connecting the Cotati to the San Francisco Bay Area to the south and Santa Rosa to the north. Within Cotati, US 101 is a six-lane freeway with a full interchange at Gravenstein Highway, and a partial interchange with ramps to and from the south only at West Sierra Avenue. Existing daily traffic on the freeway averages 90,000 vehicles per day.

**Gravenstein Highway (State Route 116)** is a state route connecting US 101 in Cotati to State Route 1 on the Sonoma County coast, and provides access to Sebastopol, Forestville, Guerneville, and other towns along the Russian River. Within Cotati, Gravenstein Highway serves both regional and local traffic, and includes two through lanes in each direction plus left-turn lanes at intersections between Redwood Drive and Old Redwood Highway, with a posted speed limit of 35 miles per hour (mph). To the west of Cotati, the roadway narrows and becomes a two-lane highway. On-street bicycle lanes and sidewalks exist on both sides of the street between Old Redwood Highway and Redwood Drive (west of US 101). Gravenstein Highway carries an approximate Average Daily Traffic (ADT) of 17,100 vehicles between Redwood Drive and West Cotati Avenue.

**Old Redwood Highway** is a five-lane minor arterial street near the Project site, with two lanes in each direction plus a two-way left-turn lane. The posted speed limit is 30 mph near the Project site between William Street/George Street to the south, and Commerce Boulevard to the north. Continuous sidewalks are provided on both sides of Old Redwood Highway near the project site. Striped bicycle lanes are present in both directions along the corridor. Between Gravenstein Highway and William Street/George Street, the segment carries an approximate ADT of 24,000 vehicles.

**St. Joseph Way** is a local street that provides access to the Project site and adjacent properties to the south, from Old Redwood Highway at a side-street stop-sign controlled intersection that is limited to right-in/right-out movements only. The roadway accommodates travel in both directions. Sidewalks are not yet provided on St. Joseph Way.

**Commerce Boulevard** is located north of the Project site (connecting with Redwood Highway) and has one through lane in each direction and a two-way left-turn lane. Strip commercial land uses prevail along the east side of the street, and US 101 parallels the west side. The posted speed limit is 25 mph. The Laguna bicycle path crosses the segment at a mid-block location just south of the City limits. Commerce Boulevard is designated as a minor arterial and carries an approximate ADT of 16,000 vehicles on the segment between Old Redwood Highway and Wilford Lane.

The Cotati Municipal Code designates truck routes on Old Redwood Highway, Gravenstein Highway, and East Cotati Avenue. The Municipal Code allows truck drivers to use other City streets as well, as long as those streets comprise the most direct route between the nearest truck route and the freight origin or destination.

### **Bicycle Circulation**

Bicycle circulation in Cotati is supported by an existing network of multi-use paths, on-street bike lanes, and bicycle routes. Notable facilities include a segment of the Laguna de Santa Rosa bike path between Commerce Boulevard and the southern City limits (with one small gap just south of East Cotati Avenue), and on-street bicycle lanes within the City limits on West Sierra Avenue and East Cotati Avenue. The City's *Bicycle and Pedestrian Master Plan* expands upon the existing network to create a robust bicycle circulation system in Cotati. The Plan includes important bicycle connections such as completion of the Laguna de Santa Rosa path within the entire City, completion of the SMART multi-use path, a completed bicycle circulation system on Old Redwood Highway including bike lanes on portions of the corridor outside the historic downtown, the Valparaiso Avenue-Myrtle Avenue corridor, and the segment of West School Street between the US 101 pedestrian/bicycle tunnel and Thomas Page Elementary School.

### **Pedestrian Facilities**

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal infrastructure, curb ramps, and streetscape amenities. Sidewalks in Cotati generally range from four to ten feet in width. Wide sidewalks and a variety of pedestrian amenities are provided throughout the downtown including accessible pedestrian ramps, pedestrian phasing at traffic signals, decorative paving and crosswalk treatments, curb extensions, pedestrian scale lights, transit shelters, benches, street trees, sidewalk dining, and public art, among others. Sidewalks are also provided in most of Cotati's single-family residential neighborhoods on the east side of US 101, in multi-family residential developments, and in commercial developments in the City's northwest quadrant. Short gaps exist in the sidewalk network existing along undeveloped properties and various frontages on Old Redwood Highway, while sidewalks are not yet provided on St. Joseph Way.

### **Transit Service and Park & Ride Lots**

Cotati has three park and ride lots, including a Caltrans park and ride lot that is located on the Project site. The facility is served by Golden Gate Transit (with a stop on Old Redwood Highway), provides bike racks and a bus shelter, and includes 166 vehicle parking spaces. The City of Cotati has long range plans to remove this facility from the immediate downtown area and/or downsize the lot to fit demand. A second lot is provided on the west side of US 101 on Redwood Drive south of Gravenstein Highway. The facility provides 83 parking spaces and is served by Sonoma County Transit. The City, in conjunction with Sonoma County Transit, has constructed a third 78-space lot at the Cotati SMART Station.

The Sonoma-Marin Area Rail Transit (SMART) has begun initial operations between San Rosa and San Rafael, with a stop in Cotati. SMART is a commuter rail system that will eventually operate from Cloverdale, at the north end of Sonoma County, to Larkspur, where the Golden Gate Ferry connects Marin County with San Francisco. Commuter-oriented passenger train service will be provided by an estimated 14 round-trip trains per day operating at 30-minute intervals in the morning and evening peak commute hours during the week. The Cotati SMART rail station is planned for the southwest corner of the intersection of East Cotati Avenue and the railroad tracks to the east of downtown. The station is an

intermodal transit facility with a depot building and park and ride lot with approximately 25 short-term bicycle parking spaces, 16 bicycle lockers, and two bus bays for transit transfers.

Golden Gate Transit provides regional transit service. Routes 74, 80, and 101 serve Cotati with stops including the existing St. Josephs Park and Ride. Commute service to and from San Francisco is provided weekdays in the morning and evening hours at approximately one hour intervals between 4:00 and 9:00 AM and 6:00 and 10:00 PM, with stops in various communities along the US 101 corridor including Santa Rosa to the north and various cities in Marin County to the south. Weekend service is provided hourly between approximately 4:00 AM and 10:00 PM. No capacity issues were identified on existing service routes.

Sonoma County Transit operates four routes serving Cotati:

- Route 48/48X travels daily between Santa Rosa and Petaluma, and serves Rohnert Park and Cotati (on Old Redwood Highway).
- Route 48X is an express route deviation of Route 48 that bypasses the Rohnert Park and Cotati neighborhoods along Adrian Drive. On weekdays, local Route 26 travels between Sebastopol and Sonoma State University, serving the Cotati Park & Ride lot on the west side of US 101 along the way. Route 10 offers local service between Old Redwood Highway in Cotati and Rohnert Park's shopping areas, Sonoma State University and, on school days, to Rohnert Park primary and secondary schools.
- Route 44 provides daily service between Petaluma, Cotati, Rohnert Park, and Santa Rosa. All routes operate on approximately 45 to 90 minute headways. Sonoma County Transit staff indicated that all service routes in Cotati operate well within maximum capacity levels.

### Study Intersections & Peak Hour Traffic Volumes

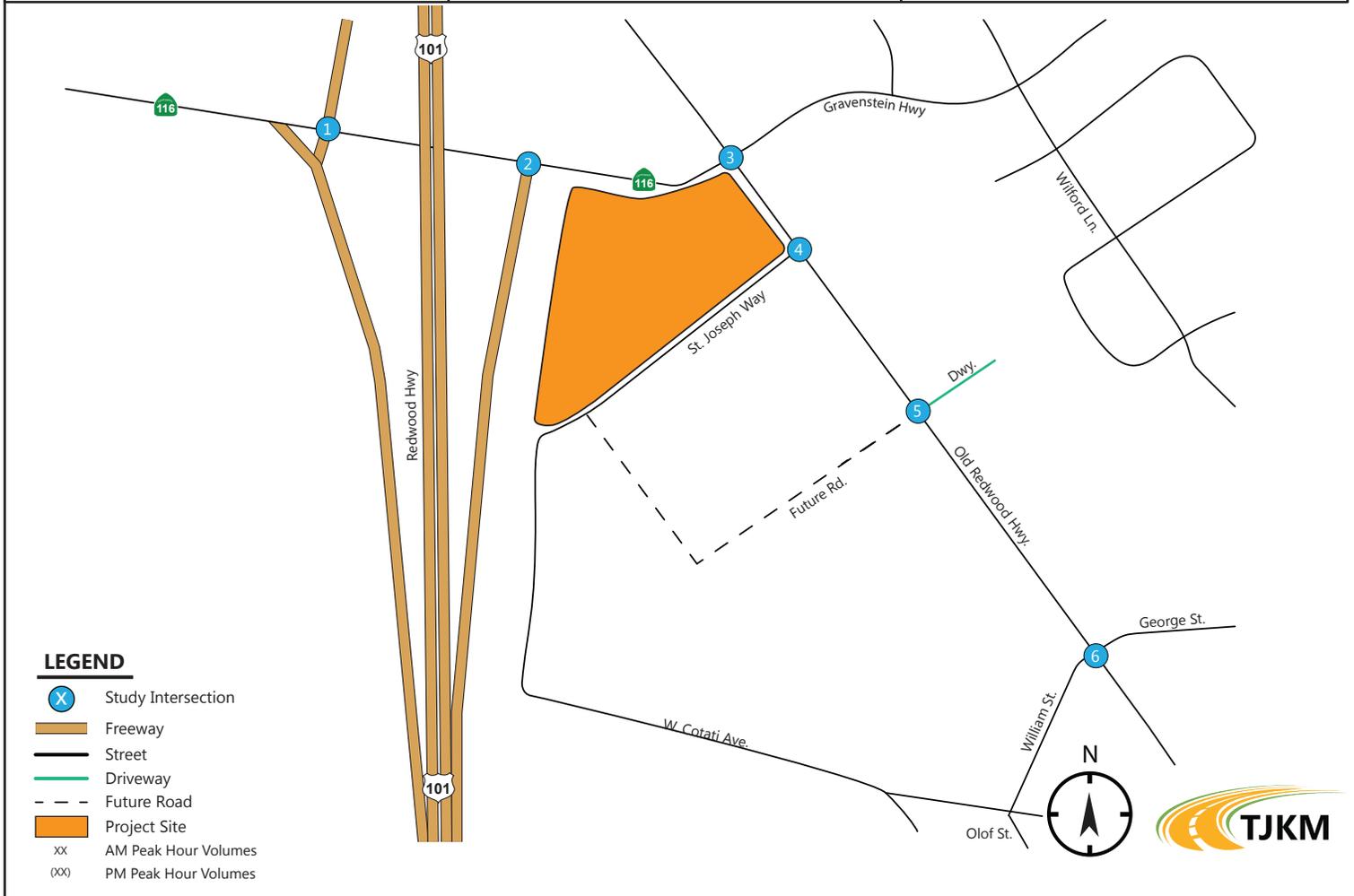
Six study intersections were selected for analysis, based on the anticipated arrival/departure pattern for Project trips:

1. US 101 Southbound On & Off Ramps & Gravenstein Highway (State Route 116)
2. US 101 Northbound Off-Ramp & Gravenstein Highway (State Route 116)
3. Old Redwood Highway & Gravenstein Highway (State Route 116)
4. Old Redwood Highway & St. Joseph Way
5. Old Redwood Highway & Driveway (Future Roadway Location)
6. Old Redwood Highway & William Street/George Street

At each study intersection, turning movement volumes for vehicles, bicycles and pedestrians were collected on Wednesday, November 29, 2017 during the a.m. (7:00 a.m.-9:00 a.m.) and p.m. (4:00 p.m.-6:00 p.m.) peak periods. Weather conditions were clear on the day of the counts. Existing turning movement volumes are illustrated on **Figure 3**, and lane geometry and intersection controls are illustrated in **Figure 4**. Detailed count sheets including bicycle and pedestrian volumes at each intersection is provided in **Appendix A**.

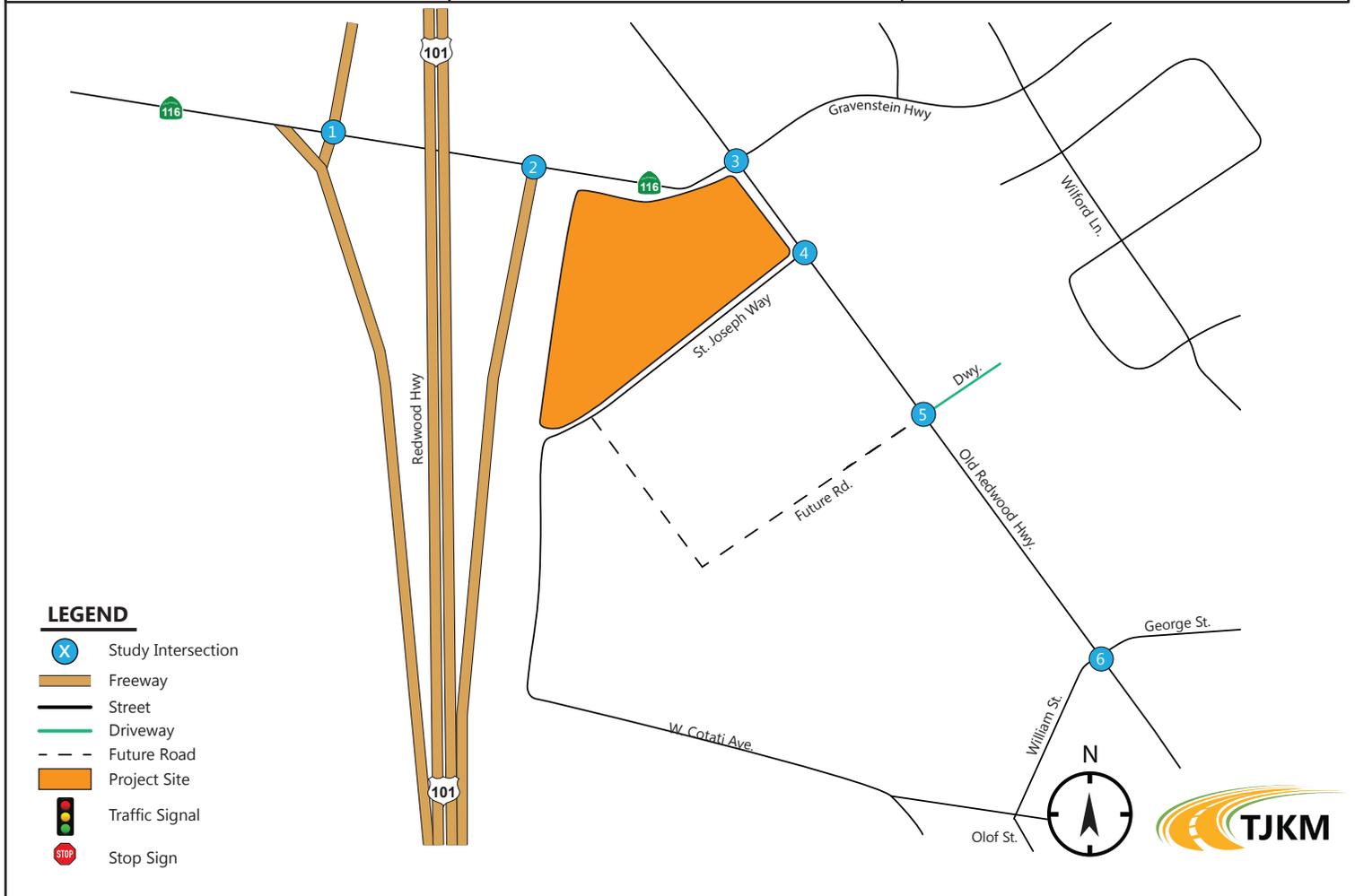
# Existing Traffic Volumes (AM, PM)

<b>Intersection #1</b> 101 SB Ramps / Gravenstein Hwy.	<b>Intersection #2</b> 101 NB Off-Ramp / Gravenstein Hwy.	<b>Intersection #3</b> Old Redwood Hwy. / Gravenstein Hwy.
<p>                         306 (250)                          3 (0)                          406 (620)                          751 (875)                          215 (115)                          594 (814)                          268 (269)                     </p>	<p>                         619 (633)                          1,063 (1,433)                          293 (352)                          109 (286)                     </p>	<p>                         317 (260)                          104 (196)                          18 (28)                          53 (67)                          76 (49)                          64 (63)                          504 (765)                          77 (130)                          527 (807)                          265 (302)                          544 (620)                          15 (36)                     </p>
<b>Intersection #4</b> Old Redwood Hwy. / St. Joseph Way	<b>Intersection #5</b> Old Redwood Hwy. / Parking Lot Dwy.	<b>Intersection #6</b> Old Redwood Hwy. / William St.
<p>                         80 (8)                          673 (1,053)                          2 (1)                          9 (4)                          3 (4)                          0 (5)                          4 (1)                          783 (696)                          31 (19)                     </p>	<p>                         674 (1,058)                          3 (1)                          0 (4)                          0 (4)                          833 (988)                          2 (1)                     </p>	<p>                         22 (44)                          605 (961)                          8 (26)                          18 (13)                          6 (0)                          2 (0)                          69 (58)                          1 (1)                          14 (23)                          26 (20)                          777 (902)                          1 (4)                     </p>



# Existing Lane Control

<b>Intersection #1</b> 101 SB Ramps / Gravenstein Hwy.	<b>Intersection #2</b> 101 NB Off-Ramp / Gravenstein Hwy.	<b>Intersection #3</b> Old Redwood Hwy. / Gravenstein Hwy.
<b>Intersection #4</b> Old Redwood Hwy. / St. Joseph Way	<b>Intersection #5</b> Old Redwood Hwy. / Parking Lot Dwy.	<b>Intersection #6</b> Old Redwood Hwy. / William St.



**Existing Conditions Traffic Level of Service Analysis**

**Table 3** summarizes peak hour levels of service at the six study intersections under Existing Conditions. Detailed LOS worksheets for this scenario are provided in **Appendix B**. Consistent with Cotati General Plan policy, the LOS calculations are based on a peak hour factor of 1.00. City of Cotati standards define LOS D or better as acceptable or LOS E for intersections within the boundaries of the *Downtown Specific Plan*. All study intersections except US 101 Southbound On/Off Ramps & Gravenstein Highway (study intersection #1) are located within the boundaries of the *Downtown Specific Plan*. Therefore, LOS E or better is acceptable at study intersections #2 to #6.

During the a.m. peak hour, each of the study intersections operate at an acceptable LOS under Existing Conditions. During the p.m. peak hour, all study intersections operate acceptably with the exception of the all-way stop-controlled intersection of Old Redwood Highway & William Street/George Street that operates at LOS F. The Cotati General Plan identifies signalization of this intersection as a planned improvement to occur by 2040, which would improve the LOS to acceptable conditions (as shown in the cumulative analysis section).

**Table 3: Existing Conditions Traffic Level of Service Analysis Results**

ID	Intersection	Control Type	A.M. Peak Hour		P.M. Peak Hour	
			Average Delay <sup>2</sup>	LOS <sup>1</sup>	Average Delay	LOS
1	US 101 Southbound On & Off Ramps & Gravenstein Highway (State Route 116)	Signalized	15.8	B	15.8	B
2	US 101 Northbound Off-Ramp & Gravenstein Highway (State Route 116)	Signalized	14.2	B	13.4	B
3	Old Redwood Highway & Gravenstein Highway (State Route 116)	Signalized	25.6	C	33.9	C
4	Old Redwood Highway & St. Joseph Way	Side-street stop	12.2	B	13.3	B
5	Old Redwood Highway & Driveway (Future Roadway Location)	Side-street stop	0.0	A	25.9	D
					0.1 <sup>3</sup>	A <sup>3</sup>
6	Old Redwood Highway & William Street/George Street	All-way stop	20.1	C	<b>54.0</b>	<b>F</b>

Notes: <sup>1</sup> LOS = Level of Service

<sup>2</sup> Average intersection delay expressed in seconds per vehicle for signalized and all-way stop-controlled intersections. Worst approach delay is presented for side-street stop controlled intersections (except where both the worst case and average delay for all approaches is indicated).

<sup>3</sup> Indicates LOS and average delay for all approaches at the side-street stop-controlled intersection of Old Redwood Highway with the existing driveway.

**Bold** indicates intersections that operate at deficient LOS. City of Cotati standards define LOS D or better as acceptable (or LOS E for intersections within the boundaries of the Downtown Specific Plan). All study intersections except #1 (US 101 Southbound On/Off Ramps & Gravenstein Highway) are located within the boundaries of the Downtown Specific Plan.

**Existing Conditions - Collision Data Review**

Collision data at each study intersection was reviewed for a 5-year period. Table 4 summarizes the collision data. As shown:

- The total number of reported collisions is highest at the signalized intersection of Old Redwood Highway and Gravenstein Highway (State Route 116), which is the study intersection with the highest volume of traffic.
- The rate of reported collisions (relative to traffic volume) is highest at the all-way stop-controlled intersection of Old Redwood Highway & William Street/George Street.

**Table 4: Existing Conditions – Collision Data Summary**

ID	Intersection	Estimated volume (5-year period)	Reported Collisions (5-year period)			Collision rate per million vehicles	
			Total	Injury	Pedestrian Involved	Total	Pedestrian involved
1	US 101 Southbound On & Off Ramps & Gravenstein Highway (State Route 116)	50,059,750	9	5	0	0.100	0
2	US 101 Northbound Off-Ramp & Gravenstein Highway (State Route 116)	43,690,500	8	5	0	0.114	0
3	Old Redwood Highway & Gravenstein Highway (State Route 116)	53,718,875	<b>16</b>	<b>8</b>	<b>1</b>	0.149	<b>0.019</b>
4	Old Redwood Highway & St. Joseph Way	33,297,125	0	0	0	0.000	0
5	Old Redwood Highway & Driveway (Future Roadway Location)	32,558,000	1	1	0	0.031	0
6	Old Redwood Highway & William Street/George Street	32,859,125	7	6	0	<b>0.183</b>	0

Source: Statewide Integrated Traffic Records System (SWITRS) database of Reported Collisions

### 3. PROJECT TRIP GENERATION

#### Vehicle Trip Generation

The project vehicle trip generation rates were obtained from the reference *Trip Generation, 10<sup>th</sup> Edition*, published by the Institute of Transportation Engineers (ITE). The project would consist of:

- **Hotel:** 147-room hotel to include a 2,123-square foot hotel café/lounge with a 273-square foot kitchen (thus a combined total of 2,396 square feet for the hotel café/lounge and kitchen)
- **Market Hall:** 3,596-square market within a separate building.

ITE provides vehicle trip data for several types of hotels including standard Hotels (ITE land use code 310) that typically include extensive on-site services – similar to the proposed project - including restaurants, retail, convention and meeting space; and Business Hotels (ITE land use code 312) that generally include more limited on-site services such as breakfast bar or beverage bar. Given the provision of an on-site Cafe/Lounge and guest services within the hotel building, the trip generation rate for standard Hotels (ITE land use code 310) was utilized. ITE data indicates that such hotels generate an average of 8.36 daily vehicle trips per hotel room, including 0.47 vehicle trips per hotel room during the a.m. peak hour and 0.60 vehicle trips during the p.m. peak hour.

The trip generation forecast for the Market Hall was based on the ITE vehicle trip generation rate for supermarkets (ITE land use code 850),

The Project is forecasted to generate 1,417 daily vehicle trips, 76 weekday a.m. peak hour vehicle trips and 104 weekday p.m. peak hour vehicle trips as summarized in **Table 5a**.

Table 5a: Project Vehicle Trip Generation

Land Use (ITE Code)	ITE Land Use Category (ITE Code)	Size	Daily		AM Peak Hour				PM Peak Hour					
			Rate <sup>1</sup>	Trips	Rate <sup>1</sup>	In %	In	Out	Total	Rate <sup>1</sup>	In %	In	Out	Total
Hotel	Hotel (310)	147 hotel rooms	8.36	1,229	0.47	59%	41	28	69	0.60	51%	45	43	88
Market Hall	Supermarket (850)	3,596 square feet	106.78	384	3.82	62%	8	6	14	9.48	51%	17	16	33
<i>Internal Trips between Hotel and Market Hall <sup>2</sup></i>			-15%	-58	-15%		-1	-1	-2	-15%		-3	-2	-5
Subtotal (including Pass-by Trips)				1,555			48	33	81			59	57	116
<i>Pass-by trips to Market Hall</i>			-36%	-138	-36%		-3	-2	-5	-36%		-6	-6	-12
<b>Total Net Vehicle Trip Generation</b>			-	<b>1,417</b>	-	-	45	31	<b>76</b>	-	-	53	51	<b>104</b>

Note: <sup>1</sup> Rate represents number of vehicle trips per hotel room, and per 1,000 square feet of Market Hall space.

<sup>2</sup> Internal trip reduction applied to market hall trips.

Source: ITE Trip Generation Manual, 10<sup>th</sup> Edition, 2017

**4. EXISTING PLUS PROJECT CONDITIONS**

This chapter evaluates the effect of the project with the addition of Project trips based on Existing Conditions.

**Project Vehicle Trip Distribution & Assignment**

Trip distribution refers to the origin/destination pattern for trips to and from the project site. The anticipated distribution of project trips is summarized in **Table 5b**.

**Table 5b: Peak Hour Vehicle Trip Distribution**

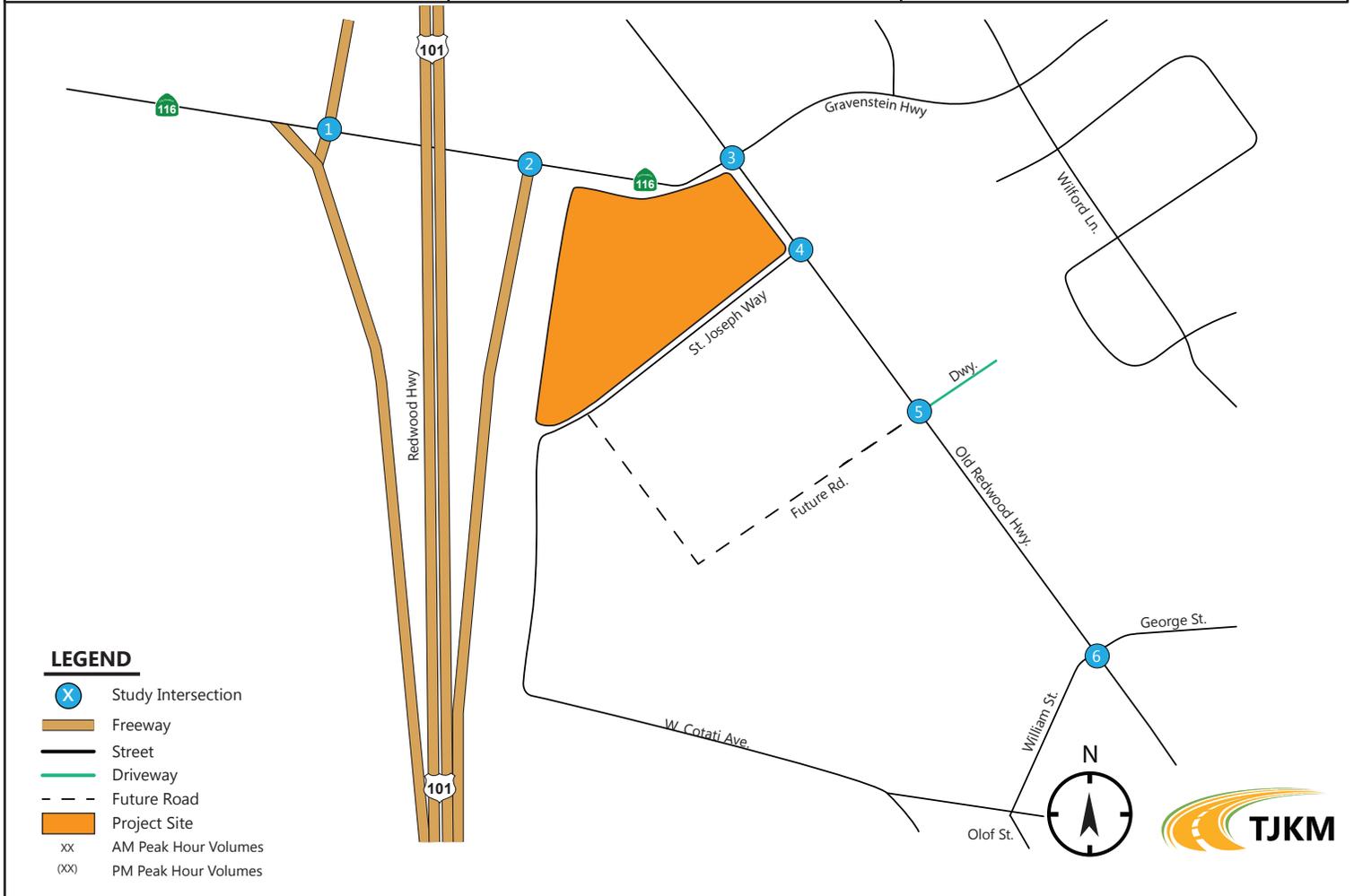
<i><b>Origin/Destination</b></i>	<i><b>Share of Project Trips</b></i>	<i><b>AM Peak Hour Trips</b></i>	<i><b>PM Peak Hour Trips</b></i>
US 101 – North of Gravenstein Highway	33%	25	34
US 101 – South of Gravenstein Highway	33%	25	34
Gravenstein Highway to/from West of US 101	5%	4	5
Rohnert Park – North of Project Site	10%	8	10
Cotati – East of Old Redwood Highway	4%	3	5
Cotati – South of Project Site	15%	11	16
<b>Total</b>	<b>100%</b>	<b>76</b>	<b>104</b>

Source: TJKM 2018

**Figure 5** illustrates the project vehicle trip assignment to/from each study intersection under Existing plus Project Conditions, based on the current roadway network and right-in/right-out access to Old Redwood Highway via St. Joseph Way.

# Existing Plus Project Conditions - Project Trips

<b>Intersection #1</b> 101 SB Ramps / Gravenstein Hwy.	<b>Intersection #2</b> 101 NB Off-Ramp / Gravenstein Hwy.	<b>Intersection #3</b> Old Redwood Hwy. / Gravenstein Hwy.
<b>Intersection #4</b> Old Redwood Hwy. / St. Joseph Way	<b>Intersection #5</b> Old Redwood Hwy. / Parking Lot Dwy.	<b>Intersection #6</b> Old Redwood Hwy. / William St.



**Existing plus Project Conditions Traffic Analysis**

**Table 6** summarizes peak hour levels of service at the study intersections under Existing plus Project Conditions. Detailed LOS worksheets for this scenario are provided in **Appendix C**.

**Table 6: Existing plus Project Conditions Traffic Level of Service Analysis Results**

ID	Intersection	Control	Peak Hour	Existing Conditions		Existing plus Project Conditions		
				Average Delay	LOS	Average Delay	LOS	Significant LOS Impact?
1	US 101 Southbound On & Off Ramps & Gravenstein Highway (State Route 116)	Signalized	A.M.	15.8	B	15.8	B	No
			P.M.	15.8	B	15.8	B	No
2	US 101 Northbound Off-Ramp & Gravenstein Highway (State Route 116)	Signalized	A.M.	14.2	B	14.3	B	No
			P.M.	13.4	B	13.7	B	No
3	Old Redwood Highway & Gravenstein Highway (State Route 116)	Signalized	A.M.	25.6	C	25.9	C	No
			P.M.	33.9	C	35.8	D	No
4	Old Redwood Highway & St. Joseph Way	Side-street stop	A.M.	12.2	B	12.3	B	No
			P.M.	13.3	B	13.8	B	No
5	Old Redwood Highway & Driveway (Future Roadway Location)	Side-street stop	A.M.	0.0	A	13.4	B	No
			P.M.	25.9	D	29.8	D	No
6	Old Redwood Highway & William Street/George Street	All-way stop	A.M.	20.1	C	20.7	C	No
			P.M.	<b>54.0</b>	<b>F</b>	<b>58.5</b>	<b>F</b>	No <sup>4</sup>

Notes: <sup>1</sup> LOS = Level of Service

<sup>2</sup> Average intersection delay expressed in seconds per vehicle for signalized and all-way stop-controlled intersections. Worst approach delay is presented for side-street stop controlled intersections (except where both the worst case and average delay for all approaches is indicated).

<sup>3</sup> Indicates LOS and average delay for all approaches at the side-street stop-controlled intersection of Old Redwood Highway with the existing driveway.

<sup>4</sup> Project impact is considered less than significant because average vehicle delay would increase by less than five seconds with the addition of project traffic.

**Bold** indicates intersections that operate at deficient LOS. City of Cotati standards define LOS D or better as acceptable (or LOS E for intersections within the boundaries of the Downtown Specific Plan). All study intersections except #1 and #2 (US 101 Off & On-Ramp intersections with Gravenstein Highway) are located within the boundaries of the Downtown Specific Plan.

**Existing plus Project Traffic Impact Findings**

During the a.m. peak hour, each of the study intersections would continue to operate at an acceptable LOS under Existing plus Project Conditions. During the p.m. peak hour under Existing plus Project Conditions, all study intersections would continue to operate acceptably with the exception of the all-way stop-controlled intersection of Old Redwood Highway & William Street/George Street that operates at LOS F under Existing Conditions (without the Project). The project does not result in a degradation of LOS at US 101 ramps intersections, nor would the Project result in ramp queues extending on to the freeway, while the volume of Project traffic is not anticipated to significantly increase freeway demand-to-capacity (d/C) ratios by more than 0.01. Allowing left-turns inbound to St. Joseph Way is not anticipated

to affect intersection LOS since usage of the left-most northbound lane is relatively limited, with most vehicles using the adjacent center lane to make a downstream left-turn on to Gravenstein Highway.

The addition of 25 southbound Project trips during the p.m. peak hour would increase average p.m. peak hour delay at the Old Redwood Highway & William Street/George Street intersection from 54.0 to 58.5 seconds – thus an increase of less than five seconds -- which is therefore considered a ***less than significant impact*** based on the impact criteria identified by the town. ***Traffic impacts under Existing plus Project Conditions are therefore anticipated to be less than significant.***

The *Cotati General Plan* identifies signalization of the Old Redwood Highway & William Street/George Street intersection as a planned improvement to occur by 2040, which would improve the LOS to acceptable conditions (as shown in the cumulative analysis section). Signalization prior to 2040 would be funded through traffic impact fee payments from development projects, including the Project.

### 5. CUMULATIVE IMPACTS

This scenario evaluates the project impact on Cumulative (Year 2040) Conditions.

#### **Cumulative Traffic Volumes**

Future traffic volumes for the year 2040 were derived from the Cotati General Plan EIR, based on General Plan buildout to SOI/UGB, which forecasted volumes using the SCTA regional travel demand model to determine future traffic associated with regional growth and travel patterns, along with a citywide TRAFFIX model manually assigned traffic growth to streets in Cotati associated with the land uses contained in Cotati's updated General Plan.

Forecasted traffic volumes at each study intersection under Cumulative No Project Conditions are shown on **Figure 6**.

#### **Planned Roadway Improvements**

The General Plan identified the following planned improvements under Action CI 1b "Complete the following roadway improvements on City streets to improve the safety and efficiency of the current circulation system, and to support buildout of the General Plan":

- Install a traffic signal on Madrone Avenue at the intersection of Gravenstein Highway, establishing the north leg as the primary roadway connection to Derby Lane and Locust Avenue.
- Eliminate the current skewed intersection at Gravenstein Highway/Derby Lane.
- Realign the eastern portion of Derby Lane so that it extends as an east---west collector street to Alder Avenue.
- Construct a new north---south collector street in the western portion of the City, intersecting Gravenstein Highway approximately midway between Locust Avenue and Alder Avenue. Extend the street northward to Helman Lane and southward to intersect with an eastward extension of Isabel Drive.
- Install a traffic signal on the new north-south collector street at the intersection of Gravenstein Highway.
- Eliminate the intersection at Gravenstein Highway/Alder Avenue once a connection between Alder Avenue and the new north---south collector street is established.
- Construct a minor realignment of West Cotati Avenue to intersect Gravenstein Highway at an improved angle, and install a traffic signal at the intersection.
- Restrict direct access between private parcels and Gravenstein Highway once alternative access is established (i.e., parallel roadways and new intersections as described above).
- Add a southbound right-turn pocket on Redwood Drive at the Gravenstein Highway intersection.
- Widen Helman Avenue to include a center turn lane in areas with abutting Commercial and/or Industrial uses.

- Eliminate the northbound left-turn pocket at Old Redwood Highway/Commerce Avenue/ US 101 North Onramp and convert to a through lane.
- Eliminate the southbound left-turn movement at Gravenstein Highway/Old Redwood Highway (modification is only needed with buildout to SOI/UGB).
- Install a traffic signal at Old Redwood Highway & William Street/George Street.
- Reassign lanes at the Old Redwood Highway & East Cotati Avenue/West Sierra Avenue intersection to better serve traffic demands. One possible modification includes restriping the southbound approach to include dual left---turn lanes and a combined through/right---turn lane; restriping the westbound approach to include separate through and right---turn lanes; restriping East Cotati Avenue to include dual eastbound through lanes through the La Plaza intersection before merging to a single lane, and eliminating the westbound left---turn lane and movements (except buses).
- Install a traffic signal at East Cotati Avenue & Charles Street.
- Install a traffic signal at East Cotati Avenue & La Salle Avenue.
- Install a traffic signal at East Cotati Avenue & Santero Way and add a northbound right-turn pocket.
- Install all-way stop-controls at the intersection of West Sierra Avenue & US 101 South Onramp-/West School Street

In addition, the Future Roadway shown on Figure 1 would include a planned signalized intersection with Old Redwood Highway at study intersection #5.

### Cumulative Traffic Impact Findings

Under Cumulative (Year 2040) conditions, the vehicle trip assignment will differ given provision of Future Roadway to connect with Old Redwood Highway with a signalized intersection (study intersection #5). Provision of the future roadway would allow outbound Project trips to the north to access Old Redwood Highway via the Future Roadway, making a left-turn on to northbound Old Redwood Highway. Similarly, inbound Project trips from the south would be able to access the Project site via a left-turn from Old Redwood Highway to the Future Roadway at study intersection #5, thus no longer requiring the allowance of northbound left-turns from Old Redwood Highway to St. Joseph Way as would occur under Existing plus Project Conditions. The distribution of Project vehicle trips at each study intersection under Cumulative (Year 2040) Conditions is shown on **Figure 7**.

**Table 7** summarizes peak hour levels of service at the study intersections under Cumulative Conditions, with and without the Project. Detailed LOS worksheets for this scenario are provided in **Appendix D and E**. Each of the study intersections would operate acceptably under Cumulative Conditions, with or without the proposed Project. The project does not result in a degradation of LOS at US 101 ramps intersections, nor would the Project result in ramp queues extending on to the freeway, while the volume of Project traffic is not anticipated to significantly increase freeway demand-to-capacity (d/C) ratios by

more than 0.01. **Traffic impacts under Cumulative Conditions are anticipated to be less than significant.**

**Table 7: Cumulative (Year 2040) Conditions Traffic Level of Service Comparison**

ID	Intersection	Control	Peak Hour	Cumulative No Project Conditions		Cumulative plus Project Conditions		
				Average Delay	LOS	Average Delay	LOS	Significant LOS Impact?
1	US 101 Southbound On & Off Ramps & Gravenstein Highway (State Route 116)	Signalized	A.M.	46.3	D	47.0	D	No
			P.M.	30.4	C	31.4	C	No
2	US 101 Northbound Off-Ramp & Gravenstein Highway (State Route 116)	Signalized	A.M.	32.2	C	32.2	C	No
			P.M.	34.2	C	36.8	D	No
3	Old Redwood Highway & Gravenstein Highway (State Route 116)	Signalized	A.M.	27.2	C	27.7	C	No
			P.M.	55.2	E	57.7	E	No
4	Old Redwood Highway & St. Joseph Way	Side-street stop	A.M.	15.3	C	15.5	B	No
			P.M.	17.5	C	18.6	C	No
5	Old Redwood Highway & Future Roadway	Signalized	A.M.	5.6	A	5.7	A	No
			P.M.	9.0	A	11.3	B	No
6	Old Redwood Highway & William Street/George Street	Signalized	A.M.	5.7	A	5.7	A	No
			P.M.	5.4	A	5.4	A	No

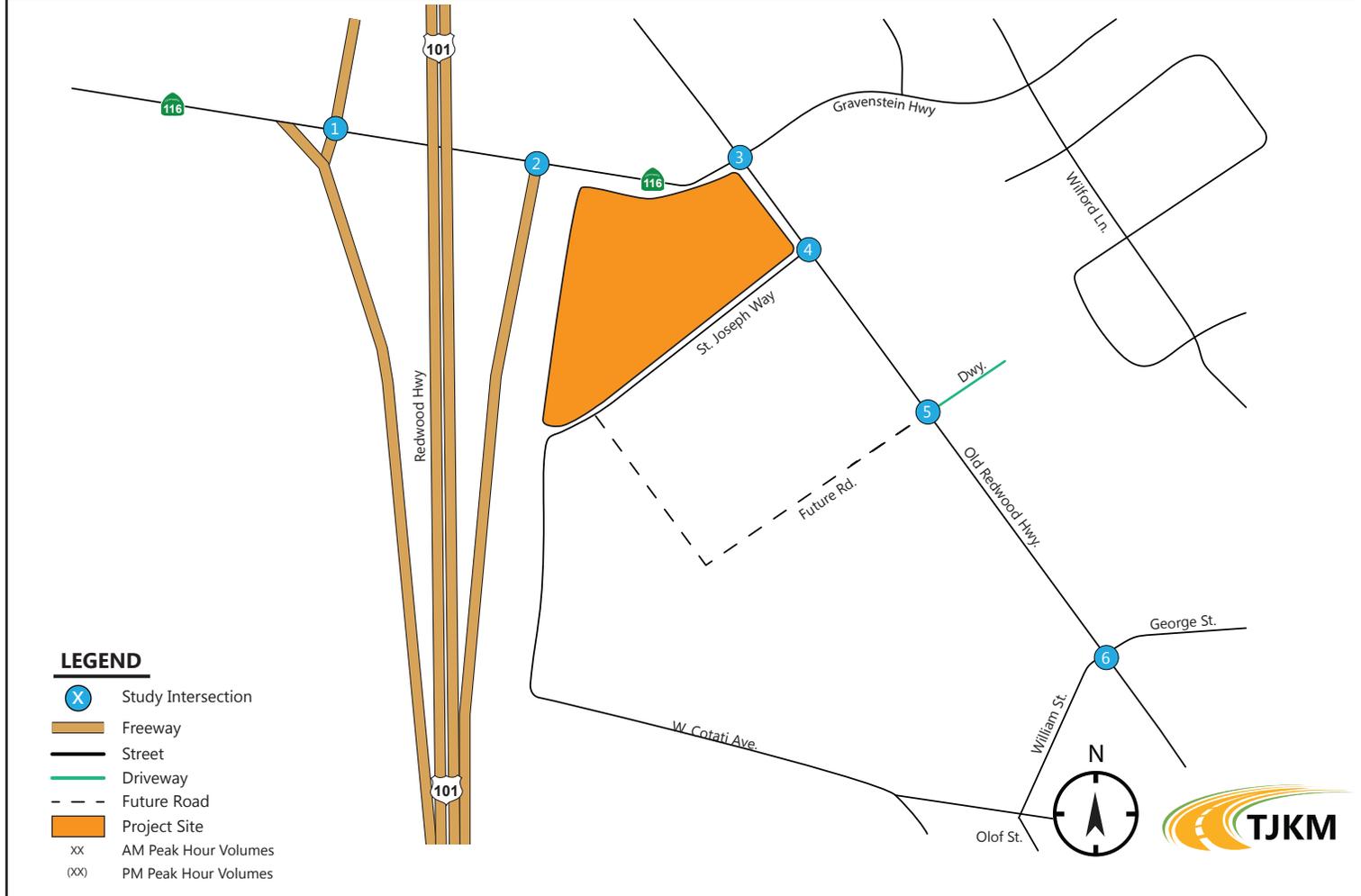
Notes: <sup>1</sup> LOS = Level of Service

<sup>2</sup> Average intersection delay expressed in seconds per vehicle for signalized intersections. Worst approach delay for is presented for stop controlled intersections.

**Bold** indicates intersections that operate at deficient LOS. City of Cotati standards define LOS D or better as acceptable (or LOS E for intersections within the boundaries of the Downtown Specific Plan). All study intersections except #1 and #2 (US 101 Off & On-Ramp intersections with Gravenstein Highway) are located within the boundaries of the Downtown Specific Plan. Therefore LOS E is acceptable at intersections #3 to #6.

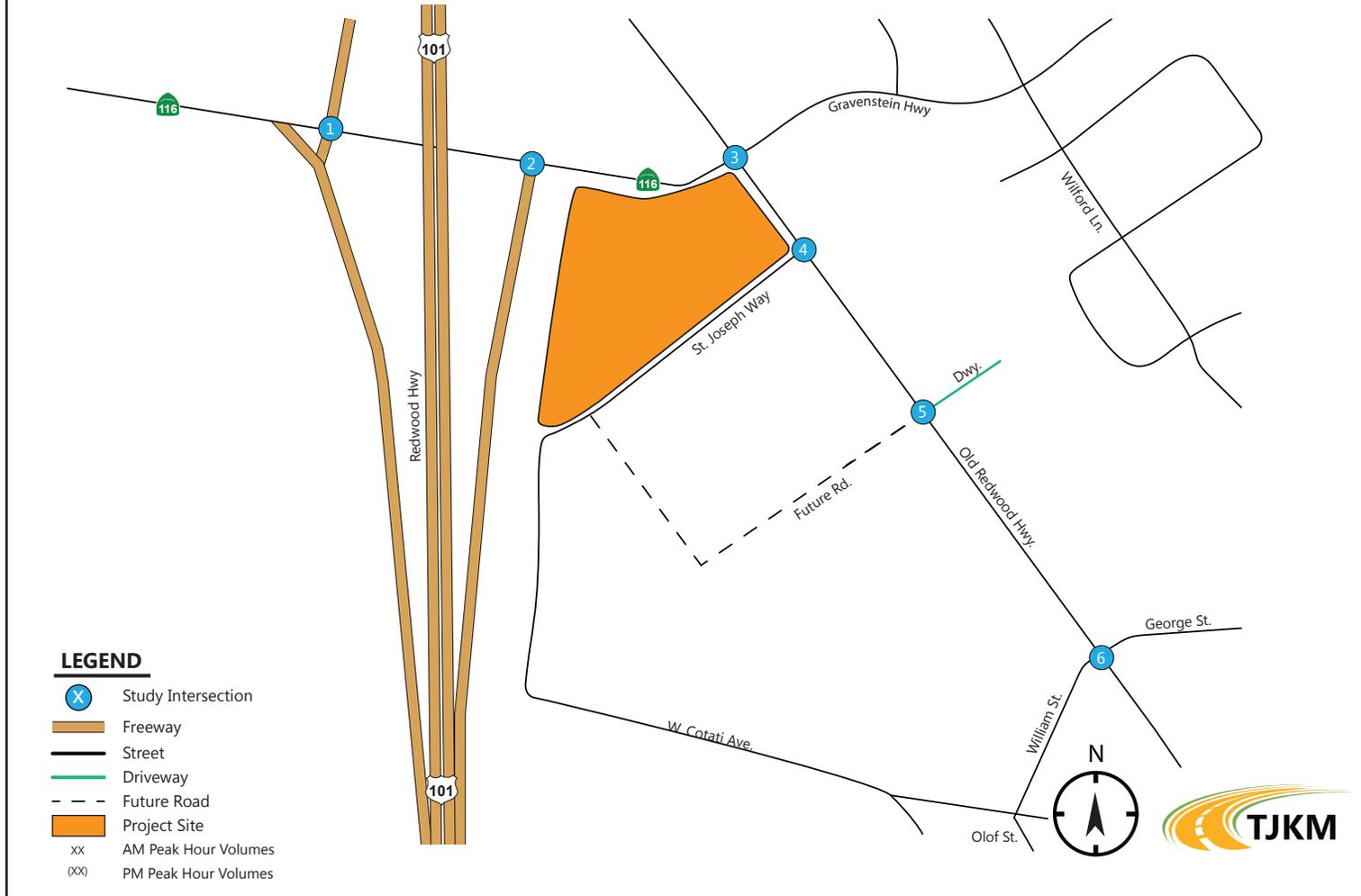
# Cumulative No Project Traffic Volumes (AM, PM)

<b>Intersection #1</b> 101 SB Ramps / Gravenstein Hwy.	<b>Intersection #2</b> 101 NB Off-Ramp / Gravenstein Hwy.	<b>Intersection #3</b> Old Redwood Hwy. / Gravenstein Hwy.
<p>                         926 (574)                          1 (1)                          555 (585)                          1,447 (1,392)                          231 (147)                          978 (1,935)                          714 (1,098)                     </p>	<p>                         871 (972)                          1,533 (2,520)                          609 (567)                          195 (366)                     </p>	<p>                         213 (291)                          131 (232)                          3 (10)                          28 (52)                          55 (63)                          30 (38)                          721 (1,382)                          39 (109)                          957 (1,394)                          617 (616)                          628 (885)                          9 (43)                     </p>
<b>Intersection #4</b> Old Redwood Hwy. / St. Joseph Way	<b>Intersection #5</b> Old Redwood Hwy. / Parking Lot Dwy.	<b>Intersection #6</b> Old Redwood Hwy. / William St.
<p>                         80 (132)                          1,038 (1,433)                          9 (4)                          0 (5)                          1,123 (1,400)                          31 (19)                     </p>	<p>                         25 (75)                          1,010 (1,495)                          3 (1)                          0 (4)                          0 (4)                          105 (150)                          30 (50)                          25 (75)                          1,171 (1,305)                          2 (1)                     </p>	<p>                         45 (69)                          1,004 (1,300)                          14 (42)                          31 (42)                          2 (1)                          18 (11)                          89 (71)                          2 (1)                          28 (14)                          15 (13)                          1,078 (1,250)                          11 (4)                     </p>



# Cumulative Plus Project Conditions - Project Trips

<b>Intersection #1</b> 101 SB Ramps / Gravenstein Hwy.	<b>Intersection #2</b> 101 NB Off-Ramp / Gravenstein Hwy.	<b>Intersection #3</b> Old Redwood Hwy. / Gravenstein Hwy.
<b>Intersection #4</b> Old Redwood Hwy. / St. Joseph Way	<b>Intersection #5</b> Old Redwood Hwy. / Parking Lot Dwy.	<b>Intersection #6</b> Old Redwood Hwy. / William St.



### 6. SITE ACCESS & EGRESS

Based on review of the Project site plan (as shown on Figures 2A, 2B and 2C), the proposed driveway and parking lot configuration appears adequate to accommodate motor vehicle, bicycle and pedestrian access. The project would not substantially increase hazards due to a design feature, and the project would not result in inadequate emergency access. Therefore the proposed project design would not result in significant transportation impacts. The following site plan and operational recommendations are provided concerning site access:

- The site plan indicates that 24 short-term bicycle parking spaces will be provided, via 12 outbound bike racks shown on the site plan. The proposed provision of short-term bicycle parking will be adequate for market customers. The proposed provision of parking could be further augmented by providing secure, long-term daily bicycle parking for hotel employees. (Long-term bicycle parking is typically provided indoors or within secure storage facilities such as bicycle lockers).
- Consider providing preferential carpool/vanpool parking and electric vehicle (EV) charging stations for hotel employees and guests.
- Consider providing shuttle service to/from SMART trains, as an amenity for employees and guests.

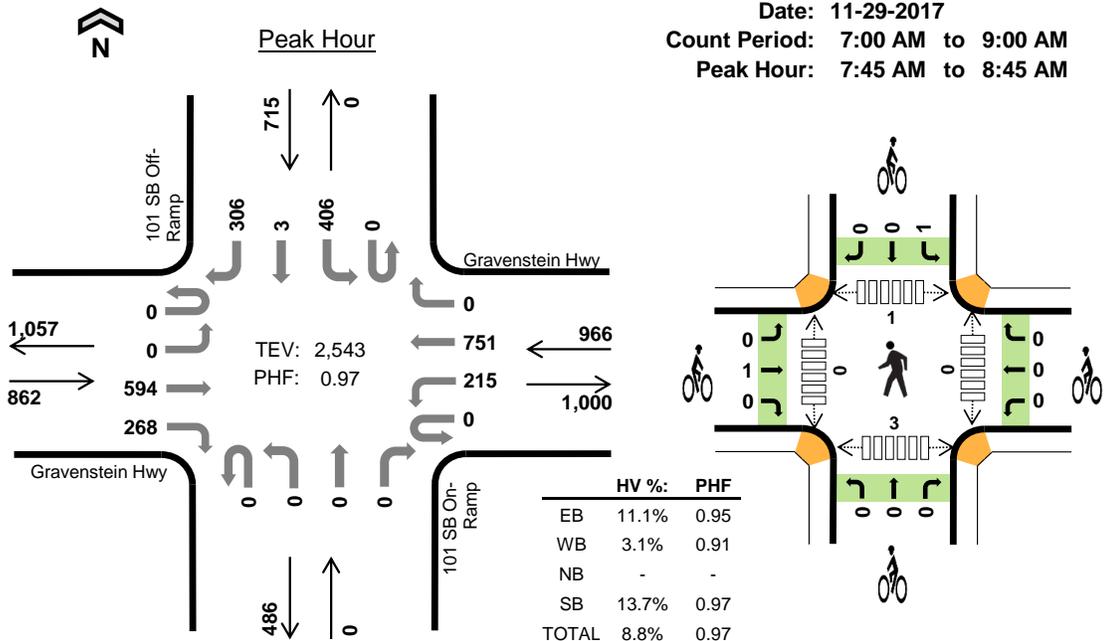
# Appendix A

## Existing Conditions Turning Movement Volumes

# 101 SB On-Ramp Gravenstein Hwy



Date: 11-29-2017  
 Count Period: 7:00 AM to 9:00 AM  
 Peak Hour: 7:45 AM to 8:45 AM



### Two-Hour Count Summaries

Interval Start	Gravenstein Hwy Eastbound				Gravenstein Hwy Westbound				101 SB On-Ramp Northbound				101 SB Off-Ramp Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00 AM	0	0	85	32	0	54	112	0	0	0	0	0	0	86	2	57	428	0	
7:15 AM	0	0	134	46	0	58	135	0	0	0	0	0	0	77	2	49	501	0	
7:30 AM	0	0	112	78	0	57	169	0	0	0	0	0	0	99	0	73	588	0	
<b>7:45 AM</b>	<b>0</b>	<b>0</b>	<b>135</b>	<b>78</b>	<b>0</b>	<b>64</b>	<b>202</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>92</b>	<b>0</b>	<b>83</b>	<b>654</b>	2,171	
8:00 AM	0	0	144	67	0	69	183	0	0	0	0	0	0	99	1	74	637	2,380	
8:15 AM	0	0	174	53	0	30	189	0	0	0	0	0	0	102	1	79	628	2,507	
8:30 AM	0	0	141	70	0	52	177	0	0	0	0	0	0	113	1	70	624	2,543	
8:45 AM	0	0	152	58	0	41	179	0	0	0	0	0	0	126	0	79	635	2,524	
Count Total	0	0	1,077	482	0	425	1,346	0	0	0	0	0	0	794	7	564	4,695	0	
Peak Hour	All	0	0	594	268	0	215	751	0	0	0	0	0	0	406	3	306	2,543	0
	HV	0	0	83	13	0	2	28	0	0	0	0	0	0	16	0	82	224	0
	HV%	-	-	14%	5%	-	1%	4%	-	-	-	-	-	-	4%	0%	27%	9%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	11	2	0	13	26	0	0	0	0	0	0	0	0	0	0
7:15 AM	19	12	0	7	38	0	0	0	0	0	0	0	0	0	0
7:30 AM	29	8	0	12	49	0	0	0	0	0	0	0	1	0	1
<b>7:45 AM</b>	<b>26</b>	<b>4</b>	<b>0</b>	<b>20</b>	<b>50</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
8:00 AM	28	11	0	20	59	0	0	0	0	0	0	0	1	2	3
8:15 AM	24	5	0	26	55	1	0	0	0	1	0	0	0	0	0
8:30 AM	18	10	0	32	60	0	0	0	1	1	0	0	0	0	0
8:45 AM	18	13	0	35	66	0	2	0	0	2	0	0	1	0	1
Count Total	173	65	0	165	403	1	2	0	1	4	0	0	3	3	6
Peak Hour	96	30	0	98	224	1	0	0	1	2	0	0	1	3	4

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	Gravenstein Hwy				Gravenstein Hwy				101 SB On-Ramp				101 SB Off-Ramp				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	9	2	0	1	1	0	0	0	0	0	0	6	0	7	26	0
7:15 AM	0	0	17	2	0	0	12	0	0	0	0	0	0	1	1	5	38	0
7:30 AM	0	0	24	5	0	1	7	0	0	0	0	0	0	1	0	11	49	0
<b>7:45 AM</b>	<b>0</b>	<b>0</b>	<b>24</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>13</b>	<b>50</b>	163
8:00 AM	0	0	24	4	0	2	9	0	0	0	0	0	0	4	0	16	59	196
8:15 AM	0	0	19	5	0	0	5	0	0	0	0	0	0	2	0	24	55	213
8:30 AM	0	0	16	2	0	0	10	0	0	0	0	0	0	3	0	29	60	224
8:45 AM	0	0	11	7	0	2	11	0	0	0	0	0	0	2	0	33	66	240
Count Total	0	0	144	29	0	6	59	0	0	0	0	0	0	26	1	138	403	0
Peak Hour	0	0	83	13	0	2	28	0	0	0	0	0	0	16	0	82	224	0

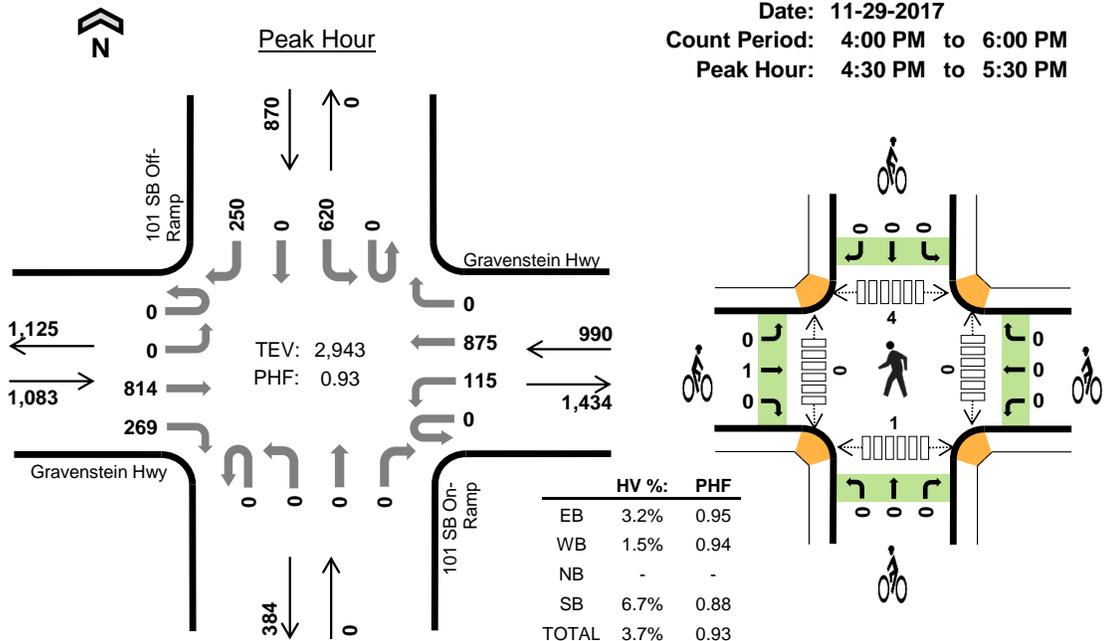
<b>Two-Hour Count Summaries - Bikes</b>																		
Interval Start	Gravenstein Hwy			Gravenstein Hwy			101 SB On-Ramp			101 SB Off-Ramp			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>7:45 AM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	2	2
8:45 AM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	2	4
Count Total	0	1	0	0	0	2	0	0	0	0	0	1	0	0	4	4	0	0
Peak Hour	0	1	0	0	0	0	0	0	0	0	0	1	0	0	2	2	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

# 101 SB On-Ramp Gravenstein Hwy



Date: 11-29-2017  
 Count Period: 4:00 PM to 6:00 PM  
 Peak Hour: 4:30 PM to 5:30 PM



### Two-Hour Count Summaries

Interval Start	Gravenstein Hwy Eastbound				Gravenstein Hwy Westbound				101 SB On-Ramp Northbound				101 SB Off-Ramp Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	0	182	62	0	32	214	0	0	0	0	0	0	150	2	60	702	0	
4:15 PM	0	0	208	61	0	16	235	0	0	0	0	0	0	142	1	67	730	0	
4:30 PM	0	0	202	53	0	36	219	0	0	0	0	0	0	135	0	69	714	0	
4:45 PM	0	0	222	64	0	25	224	0	0	0	0	0	0	156	0	60	751	2,897	
5:00 PM	0	0	192	68	0	23	199	0	0	0	0	0	0	153	0	51	686	2,881	
5:15 PM	0	0	198	84	0	31	233	0	0	0	0	0	0	176	0	70	792	2,943	
5:30 PM	0	0	182	58	0	27	208	0	0	0	0	0	0	160	0	64	699	2,928	
5:45 PM	0	0	202	79	0	26	180	0	0	0	0	0	0	159	0	67	713	2,890	
Count Total	0	0	1,588	529	0	216	1,712	0	0	0	0	0	0	1,231	3	508	5,787	0	
Peak Hour	All	0	0	814	269	0	115	875	0	0	0	0	0	0	620	0	250	2,943	0
	HV	0	0	27	8	0	2	13	0	0	0	0	0	0	6	0	52	108	0
	HV%	-	-	3%	3%	-	2%	1%	-	-	-	-	-	-	1%	-	21%	4%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	16	4	0	21	41	0	0	0	0	0	0	0	2	0	2
4:15 PM	15	6	0	15	36	0	0	0	0	0	0	0	0	0	0
4:30 PM	11	5	0	27	43	0	0	0	0	0	0	0	0	0	0
4:45 PM	6	3	0	11	20	0	0	0	0	0	0	0	0	0	0
5:00 PM	10	5	0	10	25	1	0	0	0	1	0	0	3	1	4
5:15 PM	8	2	0	10	20	0	0	0	0	0	0	0	1	0	1
5:30 PM	10	2	0	11	23	0	1	0	0	1	0	0	3	0	3
5:45 PM	9	1	0	5	15	1	0	0	0	1	0	0	0	1	1
Count Total	85	28	0	110	223	2	1	0	0	3	0	0	9	2	11
Peak Hour	35	15	0	58	108	1	0	0	0	1	0	0	4	1	5

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	Gravenstein Hwy				Gravenstein Hwy				101 SB On-Ramp				101 SB Off-Ramp				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	12	4	0	0	4	0	0	0	0	0	0	2	0	19	41	0
4:15 PM	0	0	12	3	0	0	6	0	0	0	0	0	0	1	0	14	36	0
4:30 PM	0	0	6	5	0	2	3	0	0	0	0	0	0	2	0	25	43	0
4:45 PM	0	0	5	1	0	0	3	0	0	0	0	0	0	3	0	8	20	140
5:00 PM	0	0	10	0	0	0	5	0	0	0	0	0	0	0	0	10	25	124
5:15 PM	0	0	6	2	0	0	2	0	0	0	0	0	0	1	0	9	20	108
5:30 PM	0	0	6	4	0	1	1	0	0	0	0	0	0	2	0	9	23	88
5:45 PM	0	0	6	3	0	0	1	0	0	0	0	0	0	2	0	3	15	83
Count Total	0	0	63	22	0	3	25	0	0	0	0	0	0	13	0	97	223	0
Peak Hour	0	0	27	8	0	2	13	0	0	0	0	0	0	6	0	52	108	0

<b>Two-Hour Count Summaries - Bikes</b>																	
Interval Start	Gravenstein Hwy			Gravenstein Hwy			101 SB On-Ramp			101 SB Off-Ramp			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	2
5:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
Count Total	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0
Peak Hour	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

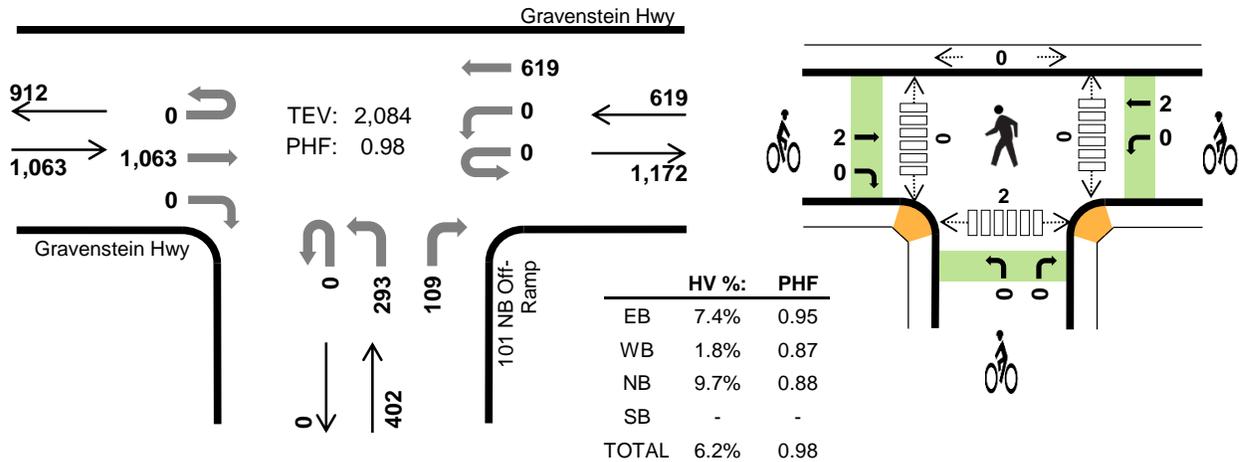
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

# 101 NB Off-Ramp Gravenstein Hwy



Peak Hour

Date: 11-29-2017  
 Count Period: 7:00 AM to 9:00 AM  
 Peak Hour: 8:00 AM to 9:00 AM



## Two-Hour Count Summaries

Interval Start	Gravenstein Hwy Eastbound				Gravenstein Hwy Westbound				101 NB Off-Ramp Northbound				0 Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00 AM	0	0	170	0	0	0	135	0	0	26	0	12	0	0	0	0	343	0	
7:15 AM	0	0	215	0	0	0	162	0	0	37	0	19	0	0	0	0	433	0	
7:30 AM	0	0	221	0	0	0	153	0	0	66	0	25	0	0	0	0	465	0	
7:45 AM	0	0	233	0	0	0	200	0	0	64	0	23	0	0	0	0	520	1,761	
8:00 AM	0	0	246	0	0	0	178	0	0	70	0	27	0	0	0	0	521	1,939	
8:15 AM	0	0	273	0	0	0	140	0	0	79	0	17	0	0	0	0	509	2,015	
8:30 AM	0	0	264	0	0	0	151	0	0	75	0	39	0	0	0	0	529	2,079	
8:45 AM	0	0	280	0	0	0	150	0	0	69	0	26	0	0	0	0	525	2,084	
Count Total	0	0	1,902	0	0	0	1,269	0	0	486	0	188	0	0	0	0	3,845	0	
Peak Hour	All	0	0	1,063	0	0	0	619	0	0	293	0	109	0	0	0	0	2,084	0
	HV	0	0	79	0	0	0	11	0	0	28	0	11	0	0	0	0	129	0
	HV%	-	-	7%	-	-	-	2%	-	-	10%	-	10%	-	-	-	-	6%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	14	1	1	0	16	0	0	0	0	0	0	0	0	0	0
7:15 AM	18	5	6	0	29	0	0	0	0	0	0	0	0	0	0
7:30 AM	26	2	6	0	34	0	0	0	0	0	0	0	0	0	0
7:45 AM	31	2	2	0	35	0	0	0	0	0	0	0	0	1	1
8:00 AM	27	3	13	0	43	0	0	0	0	0	0	0	0	1	1
8:15 AM	20	2	5	0	27	1	0	0	0	1	0	0	0	1	1
8:30 AM	19	2	10	0	31	1	0	0	0	1	0	0	0	0	0
8:45 AM	13	4	11	0	28	0	2	0	0	2	0	0	0	0	0
Count Total	168	21	54	0	243	2	2	0	0	4	0	0	0	3	3
Peak Hr	79	11	39	0	129	2	2	0	0	4	0	0	0	2	2

**Two-Hour Count Summaries - Heavy Vehicles**

Interval Start	Gravenstein Hwy				Gravenstein Hwy				101 NB Off-Ramp				0				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	14	0	0	0	1	0	0	1	0	0	0	0	0	0	16	0
7:15 AM	0	0	18	0	0	0	5	0	0	6	0	0	0	0	0	0	29	0
7:30 AM	0	0	26	0	0	0	2	0	0	6	0	0	0	0	0	0	34	0
7:45 AM	0	0	31	0	0	0	2	0	0	2	0	0	0	0	0	0	35	114
8:00 AM	0	0	27	0	0	0	3	0	0	8	0	5	0	0	0	0	43	141
8:15 AM	0	0	20	0	0	0	2	0	0	4	0	1	0	0	0	0	27	139
8:30 AM	0	0	19	0	0	0	2	0	0	7	0	3	0	0	0	0	31	136
8:45 AM	0	0	13	0	0	0	4	0	0	9	0	2	0	0	0	0	28	129
Count Total	0	0	168	0	0	0	21	0	0	43	0	11	0	0	0	0	243	0
Peak Hour	0	0	79	0	0	0	11	0	0	28	0	11	0	0	0	0	129	0

**Two-Hour Count Summaries - Bikes**

Interval Start	Gravenstein Hwy			Gravenstein Hwy			101 NB Off-Ramp			0			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	2
Count Total	0	2	0	0	2	0	0	0	0	0	0	0	0	4
Peak Hour	0	2	0	0	2	0	0	0	0	0	0	0	0	4

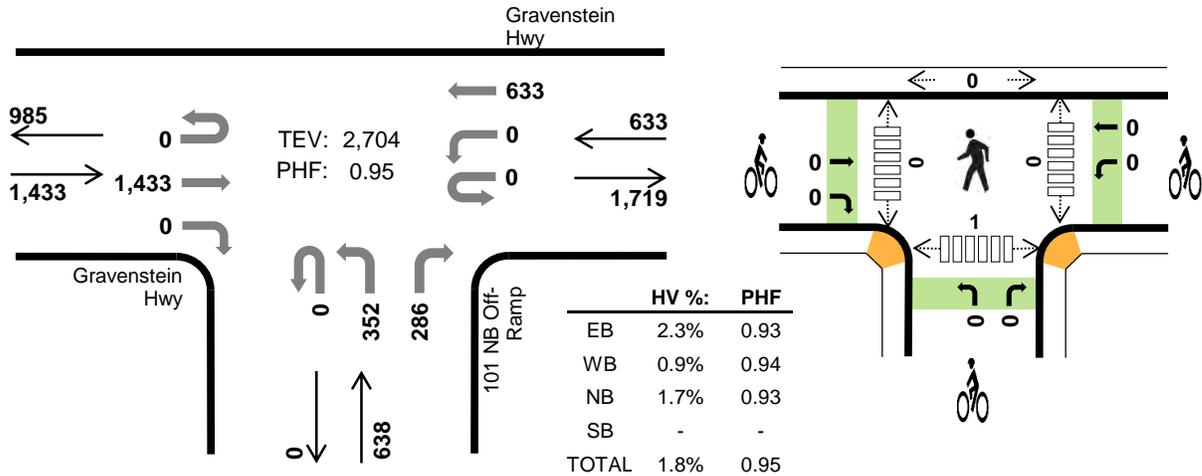
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

# 101 NB Off-Ramp Gravenstein Hwy



Peak Hour

Date: 11-29-2017  
 Count Period: 4:00 PM to 6:00 PM  
 Peak Hour: 4:30 PM to 5:30 PM



## Two-Hour Count Summaries

Interval Start	Gravenstein Hwy Eastbound				Gravenstein Hwy Westbound				101 NB Off-Ramp Northbound				0 Southbound				15-min Total	Rolling One Hour	
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	0	338	0	0	0	159	0	0	82	0	46	0	0	0	0	625	0	
4:15 PM	0	0	348	0	0	0	164	0	0	89	0	62	0	0	0	0	663	0	
4:30 PM	0	0	332	0	0	0	168	0	0	81	0	85	0	0	0	0	666	0	
4:45 PM	0	0	384	0	0	0	163	0	0	86	0	66	0	0	0	0	699	2,653	
5:00 PM	0	0	343	0	0	0	136	0	0	87	0	62	0	0	0	0	628	2,656	
5:15 PM	0	0	374	0	0	0	166	0	0	98	0	73	0	0	0	0	711	2,704	
5:30 PM	0	0	347	0	0	0	156	0	0	85	0	74	0	0	0	0	662	2,700	
5:45 PM	0	0	368	0	0	0	131	0	0	75	0	65	0	0	0	0	639	2,640	
Count Total	0	0	2,834	0	0	0	1,243	0	0	683	0	533	0	0	0	0	5,293	0	
Peak Hour	All	0	0	1,433	0	0	0	633	0	0	352	0	286	0	0	0	0	2,704	0
	HV	0	0	33	0	0	0	6	0	0	8	0	3	0	0	0	0	50	0
	HV%	-	-	2%	-	-	-	1%	-	-	2%	-	1%	-	-	-	-	2%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	16	1	3	0	20	0	0	0	0	0	0	0	0	0	0
4:15 PM	14	1	5	0	20	0	0	0	0	0	2	0	0	0	2
4:30 PM	8	3	3	0	14	0	0	0	0	0	0	0	0	0	0
4:45 PM	5	2	1	0	8	0	0	0	0	0	0	0	0	0	0
5:00 PM	14	1	3	0	18	0	0	0	0	0	0	0	0	1	1
5:15 PM	6	0	4	0	10	0	0	0	0	0	0	0	0	0	0
5:30 PM	7	4	0	0	11	2	1	0	0	3	0	0	0	0	0
5:45 PM	7	0	2	0	9	1	0	0	0	1	0	0	0	1	1
Count Total	77	12	21	0	110	3	1	0	0	4	2	0	0	2	4
Peak Hr	33	6	11	0	50	0	0	0	0	0	0	0	0	1	1

**Two-Hour Count Summaries - Heavy Vehicles**

Interval Start	Gravenstein Hwy				Gravenstein Hwy				101 NB Off-Ramp				0				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	16	0	0	0	1	0	0	3	0	0	0	0	0	0	20	0
4:15 PM	0	0	14	0	0	0	1	0	0	4	0	1	0	0	0	0	20	0
4:30 PM	0	0	8	0	0	0	3	0	0	2	0	1	0	0	0	0	14	0
4:45 PM	0	0	5	0	0	0	2	0	0	1	0	0	0	0	0	0	8	62
5:00 PM	0	0	14	0	0	0	1	0	0	3	0	0	0	0	0	0	18	60
5:15 PM	0	0	6	0	0	0	0	0	0	2	0	2	0	0	0	0	10	50
5:30 PM	0	0	7	0	0	0	4	0	0	0	0	0	0	0	0	0	11	47
5:45 PM	0	0	7	0	0	0	0	0	0	1	0	1	0	0	0	0	9	48
Count Total	0	0	77	0	0	0	12	0	0	16	0	5	0	0	0	0	110	0
Peak Hour	0	0	33	0	0	0	6	0	0	8	0	3	0	0	0	0	50	0

**Two-Hour Count Summaries - Bikes**

Interval Start	Gravenstein Hwy			Gravenstein Hwy			101 NB Off-Ramp			0			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	2	0	0	1	0	0	0	0	0	0	0	3	3
5:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	1	4
Count Total	0	3	0	0	1	0	0	0	0	0	0	0	4	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.



<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	Gravenstein Hwy				Gravenstein Hwy				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	8	1	4	0	0	0	0	0	0	3	0	0	0	1	1	18	0
7:15 AM	0	14	1	3	0	0	1	0	0	4	3	0	0	0	0	1	27	0
7:30 AM	0	22	0	4	0	0	0	0	0	0	1	0	0	0	2	1	30	0
7:45 AM	0	25	2	4	0	0	0	1	0	1	5	0	0	0	1	1	40	115
8:00 AM	0	20	2	9	0	0	0	0	0	3	4	0	0	0	2	0	40	137
8:15 AM	0	17	1	2	0	0	1	0	0	2	3	0	0	0	2	0	28	138
8:30 AM	0	21	1	3	0	0	0	1	0	2	2	0	0	0	0	0	30	138
8:45 AM	0	9	0	2	0	1	0	0	0	2	3	0	0	0	1	2	20	118
Count Total	0	136	8	31	0	1	2	2	0	14	24	0	0	0	9	6	233	0
Peak Hour	0	83	6	18	0	0	1	2	0	8	14	0	0	0	5	1	138	0

<b>Two-Hour Count Summaries - Bikes</b>																		
Interval Start	Gravenstein Hwy			Gravenstein Hwy			Old Redwood Hwy			Old Redwood Hwy			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT															
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2	2	2
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Count Total	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2	2	0
Peak Hour	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2	2	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.



<b>Two-Hour Count Summaries - Heavy Vehicles</b>																			
Interval Start	Gravenstein Hwy				Gravenstein Hwy				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour	
	Eastbound				Westbound				Northbound				Southbound						
	UT	LT	TH	RT															
4:00 PM	0	12	0	4	0	0	0	0	0	1	5	0	0	0	0	0	22	0	
4:15 PM	0	10	0	2	0	0	0	0	0	0	2	2	0	0	0	1	0	17	0
4:30 PM	0	8	1	3	0	0	0	0	0	0	1	2	0	0	0	0	1	16	0
4:45 PM	0	4	0	1	0	0	0	0	0	0	1	2	0	0	0	2	1	11	66
5:00 PM	0	8	0	4	0	0	0	0	0	0	1	1	0	0	0	0	0	14	58
5:15 PM	0	7	1	2	0	0	0	0	0	0	0	0	0	0	0	2	0	12	53
5:30 PM	0	6	0	0	0	0	0	0	0	0	2	3	0	0	0	0	2	13	50
5:45 PM	0	8	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	9	48
Count Total	0	63	2	16	0	0	0	0	0	0	8	16	0	0	0	5	4	114	0
Peak Hour	0	25	1	7	0	0	0	0	0	0	4	6	0	0	0	4	3	50	0

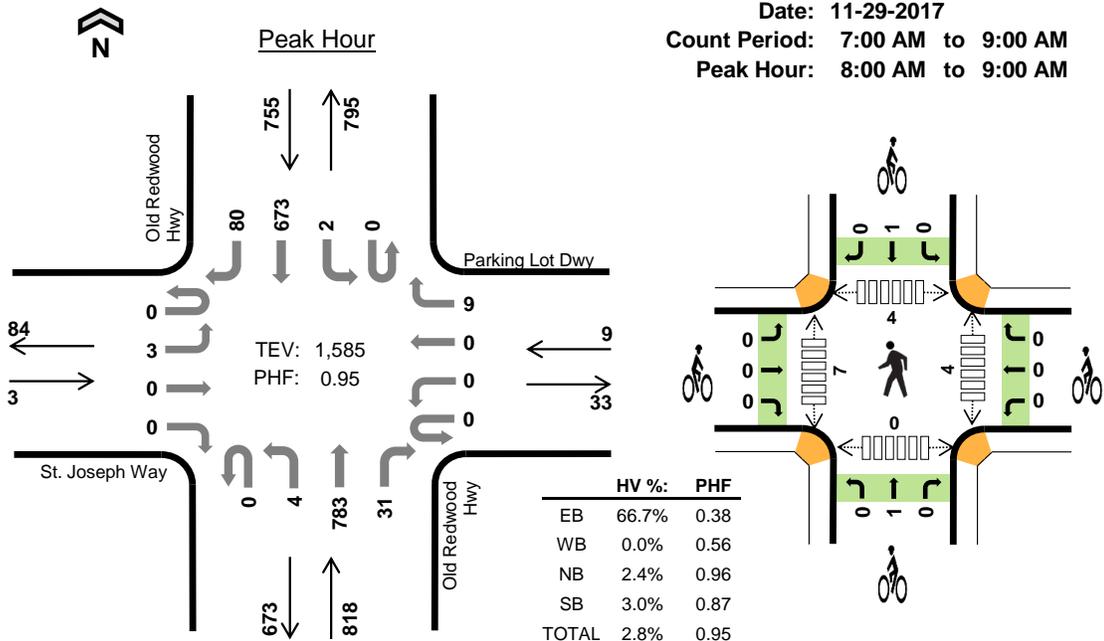
<b>Two-Hour Count Summaries - Bikes</b>																			
Interval Start	Gravenstein Hwy			Gravenstein Hwy			Old Redwood Hwy			Old Redwood Hwy			15-min Total	Rolling One Hour					
	Eastbound			Westbound			Northbound			Southbound									
	LT	TH	RT																
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	3	3
5:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	4
Count Total	1	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0
Peak Hour	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

# Old Redwood Hwy St. Joseph Way



Date: 11-29-2017  
 Count Period: 7:00 AM to 9:00 AM  
 Peak Hour: 8:00 AM to 9:00 AM



### Two-Hour Count Summaries

Interval Start	St. Joseph Way				Parking Lot Dwy				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour	
	Eastbound		Westbound		Westbound		Northbound		Northbound		Southbound		Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00 AM	0	0	0	0	0	0	0	1	0	0	192	4	0	0	126	0	323	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	213	2	1	1	147	0	364	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	194	7	0	0	160	3	364	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	216	8	0	0	156	2	382	1,433	
8:00 AM	0	0	0	0	0	0	0	4	0	0	194	7	0	1	158	6	370	1,480	
8:15 AM	0	2	0	0	0	0	0	1	0	1	204	9	0	0	169	11	397	1,513	
8:30 AM	0	1	0	0	0	0	0	1	0	1	200	7	0	0	166	27	403	1,552	
8:45 AM	0	0	0	0	0	0	0	3	0	2	185	8	0	1	180	36	415	1,585	
Count Total	0	3	0	0	0	0	0	10	0	4	1,598	52	1	3	1,262	85	3,018	0	
Peak Hour	All	0	3	0	0	0	0	0	9	0	4	783	31	0	2	673	80	1,585	0
	HV	0	2	0	0	0	0	0	0	0	0	20	0	0	0	21	2	45	0
	HV%	-	67%	-	-	-	-	-	0%	-	0%	3%	0%	-	0%	3%	3%	3%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	4	5	9	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	6	3	9	0	0	0	0	0	1	2	0	0	3
7:30 AM	0	0	2	6	8	0	0	0	0	0	1	0	0	0	1
7:45 AM	0	0	5	5	10	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	8	10	18	0	0	0	0	0	2	1	2	0	5
8:15 AM	2	0	3	5	10	0	0	0	1	1	0	1	2	0	3
8:30 AM	0	0	4	3	7	0	0	1	0	1	1	0	0	0	1
8:45 AM	0	0	5	5	10	0	0	0	0	0	1	5	0	0	6
Count Total	2	0	37	42	81	0	0	1	1	2	6	9	4	0	19
Peak Hour	2	0	20	23	45	0	0	1	1	2	4	7	4	0	15

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	St. Joseph Way				Parking Lot Dwy				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0	9	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	3	0	9	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	8	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	0	10	36
8:00 AM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	8	2	18	45
8:15 AM	0	2	0	0	0	0	0	0	0	0	3	0	0	0	5	0	10	46
8:30 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	3	0	7	45
8:45 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	0	10	45
Count Total	0	2	0	0	0	0	0	0	0	0	37	0	0	0	40	2	81	0
Peak Hour	0	2	0	0	0	0	0	0	0	0	20	0	0	0	21	2	45	0

<b>Two-Hour Count Summaries - Bikes</b>																	
Interval Start	St. Joseph Way			Parking Lot Dwy			Old Redwood Hwy			Old Redwood Hwy			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
8:30 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Count Total	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	2	0
Peak Hour	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	2	0

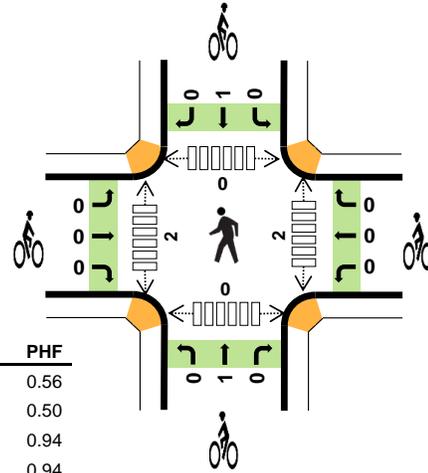
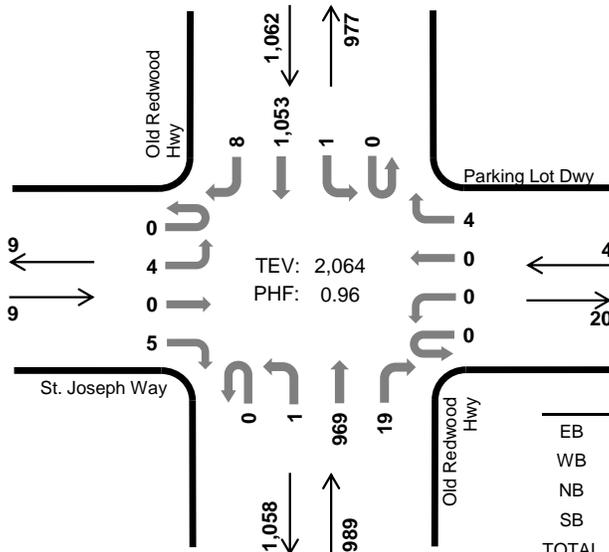
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

### Old Redwood Hwy St. Joseph Way



Peak Hour

Date: 11-29-2017  
Count Period: 4:00 PM to 6:00 PM  
Peak Hour: 5:00 PM to 6:00 PM



	HV %:	PHF
EB	0.0%	0.56
WB	0.0%	0.50
NB	0.8%	0.94
SB	0.7%	0.94
TOTAL	0.7%	0.96

#### Two-Hour Count Summaries

Interval Start	St. Joseph Way				Parking Lot Dwy				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour	
	Eastbound		Westbound		Westbound		Northbound		Northbound		Southbound		Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	1	0	1	0	0	0	2	0	0	262	5	0	0	254	2	527	0	
4:15 PM	0	0	0	5	0	0	0	1	0	1	272	8	0	0	257	2	546	0	
4:30 PM	0	0	0	3	0	0	0	4	0	0	218	3	0	0	221	3	452	0	
4:45 PM	0	4	0	0	0	0	0	2	0	0	220	7	0	0	279	5	517	2,042	
5:00 PM	0	1	0	2	0	0	0	1	0	0	248	2	0	0	249	4	507	2,022	
5:15 PM	0	2	0	2	0	0	0	2	0	0	255	7	0	0	269	2	539	2,015	
5:30 PM	0	0	0	1	0	0	0	1	0	1	227	4	0	0	256	1	491	2,054	
5:45 PM	0	1	0	0	0	0	0	0	0	0	239	6	0	1	279	1	527	2,064	
Count Total	0	9	0	14	0	0	0	13	0	2	1,941	42	0	1	2,064	20	4,106	0	
Peak Hour	All	0	4	0	5	0	0	0	4	0	1	969	19	0	1	1,053	8	2,064	0
	HV	0	0	0	0	0	0	0	0	0	0	8	0	0	0	7	0	15	0
	HV%	-	0%	-	0%	-	-	-	0%	-	0%	1%	0%	-	0%	1%	0%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	6	4	10	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	4	3	7	0	0	0	0	0	0	0	3	0	3
4:30 PM	0	0	5	3	8	0	0	0	0	0	5	0	0	0	5
4:45 PM	0	0	1	4	5	0	0	0	0	0	2	0	0	0	2
5:00 PM	0	0	2	3	5	0	0	0	1	1	1	1	0	0	2
5:15 PM	0	0	0	4	4	0	0	0	0	0	1	0	0	0	1
5:30 PM	0	0	5	0	5	0	0	1	0	1	0	1	0	0	1
5:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	24	21	45	0	0	1	1	2	9	5	0	0	14
Peak Hour	0	0	8	7	15	0	0	1	1	2	2	2	0	0	4

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	St. Joseph Way				Parking Lot Dwy				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	4	0	10	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	3	0	7	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	3	0	8	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0	5	30
<b>5:00 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>5</b>	<b>25</b>
<b>5:15 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>22</b>
5:30 PM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	5	19
5:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	15
Count Total	0	0	0	0	0	0	0	0	0	0	24	0	0	0	21	0	45	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	8	0	0	0	7	0	15	0

<b>Two-Hour Count Summaries - Bikes</b>																		
Interval Start	St. Joseph Way			Parking Lot Dwy			Old Redwood Hwy			Old Redwood Hwy			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>5:00 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>
<b>5:15 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
5:30 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Count Total	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	2	0
Peak Hour	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	2	0

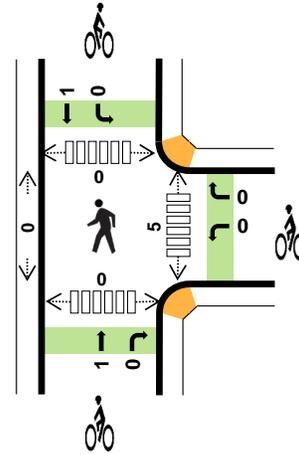
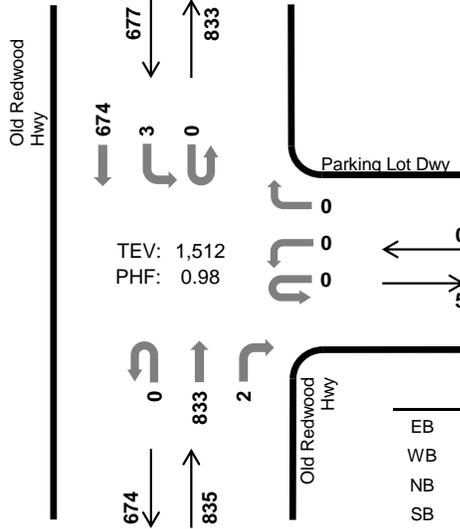
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

# Old Redwood Hwy Parking Lot Dwy



Peak Hour

Date: 11-29-2017  
Count Period: 7:00 AM to 9:00 AM  
Peak Hour: 8:00 AM to 9:00 AM



	HV %:	PHF
EB	-	-
WB	-	-
NB	2.6%	0.97
SB	3.0%	0.92
TOTAL	2.8%	0.98

## Two-Hour Count Summaries

Interval Start	0			Parking Lot Dwy				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour		
	Eastbound			Westbound				Northbound				Southbound							
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00 AM	0	0	0	0	0	0	0	0	0	0	192	0	0	0	121	0	313	0	
7:15 AM	0	0	0	0	0	0	0	1	0	0	225	0	0	1	142	0	369	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	196	0	0	0	158	0	354	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	229	0	0	1	148	0	378	1,414	
8:00 AM	0	0	0	0	0	0	0	0	0	0	203	0	0	0	170	0	373	1,474	
8:15 AM	0	0	0	0	0	0	0	0	0	0	215	1	0	1	157	0	374	1,479	
8:30 AM	0	0	0	0	0	0	0	0	0	0	214	0	0	0	165	0	379	1,504	
8:45 AM	0	0	0	0	0	0	0	0	0	0	201	1	0	2	182	0	386	1,512	
Count Total	0	0	0	0	0	0	0	1	0	0	1,675	2	0	5	1,243	0	2,926	0	
Peak Hour	All	0	0	0	0	0	0	0	0	0	0	833	2	0	3	674	0	1,512	0
	HV	0	0	0	0	0	0	0	0	0	0	22	0	0	0	20	0	42	0
	HV%	-	-	-	-	-	-	-	-	-	-	3%	0%	-	0%	3%	-	3%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	3	5	8	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	7	3	10	0	0	0	0	0	1	0	0	0	1
7:30 AM	0	0	2	7	9	0	0	0	0	0	1	0	0	0	1
7:45 AM	0	0	4	5	9	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	8	9	17	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	4	5	9	0	0	0	1	1	2	0	0	0	2
8:30 AM	0	0	4	2	6	0	0	1	0	1	2	0	0	0	2
8:45 AM	0	0	6	4	10	0	0	0	0	0	1	0	0	0	1
Count Total	0	0	38	40	78	0	0	1	1	2	7	0	0	0	7
Peak Hr	0	0	22	20	42	0	0	1	1	2	5	0	0	0	5

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	0				Parking Lot Dwy				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0	8	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	7	0	0	0	3	0	10	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	7	0	9	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0	9	36
8:00 AM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	9	0	17	45
8:15 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	5	0	9	44
8:30 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	6	41
8:45 AM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	4	0	10	42
Count Total	0	0	0	0	0	0	0	0	0	0	38	0	0	0	40	0	78	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	22	0	0	0	20	0	42	0

<b>Two-Hour Count Summaries - Bikes</b>																	
Interval Start	0			Parking Lot Dwy			Old Redwood Hwy			Old Redwood Hwy			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
8:30 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Count Total	0	0	0	0	0	0	0	0	1	0	0	1	0	2	0	2	0
Peak Hour	0	0	0	0	0	0	0	0	1	0	0	1	0	2	0	2	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.



<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	0				Parking Lot Dwy				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	3	0	9	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	3	0	8	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	6	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0	5	28
5:00 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	0	6	25
5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0	5	22
5:30 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	1	0	5	21
5:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	17
Count Total	0	0	0	0	0	0	0	0	0	0	24	0	0	0	21	0	45	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	8	0	0	0	9	0	17	0

<b>Two-Hour Count Summaries - Bikes</b>																	
Interval Start	0			Parking Lot Dwy			Old Redwood Hwy			Old Redwood Hwy			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Count Total	0	0	0	0	0	0	0	0	1	0	0	1	0	2	0	2	0
Peak Hour	0	0	0	0	0	0	0	0	1	0	0	1	0	2	0	2	0

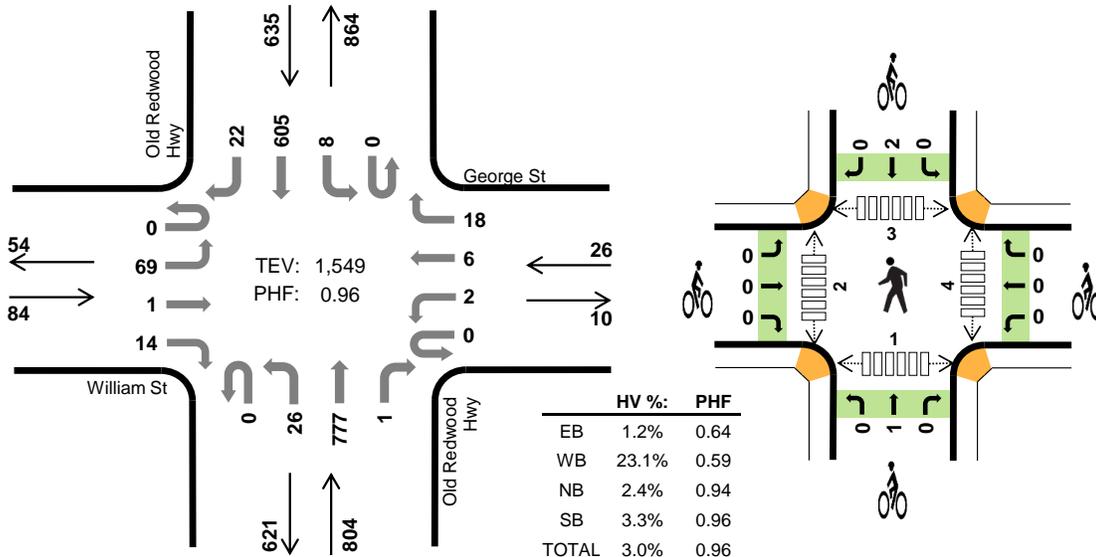
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

## Old Redwood Hwy William St



Peak Hour

Date: 11-29-2017  
Count Period: 7:00 AM to 9:00 AM  
Peak Hour: 7:45 AM to 8:45 AM



### Two-Hour Count Summaries

Interval Start	William St				George St				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour	
	Eastbound		Westbound		Westbound		Northbound		Northbound		Southbound		Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
7:00 AM	0	12	0	0	0	0	0	2	0	3	176	0	0	1	116	4	314	0	
7:15 AM	0	6	0	1	0	0	0	4	0	1	215	0	0	3	132	4	366	0	
7:30 AM	0	19	0	3	0	0	0	8	0	4	170	0	0	0	156	3	363	0	
7:45 AM	0	13	0	2	0	2	3	6	0	5	209	0	0	1	145	1	387	1,430	
8:00 AM	0	15	0	3	0	0	0	2	0	5	179	1	0	1	160	4	370	1,486	
8:15 AM	0	15	1	2	0	0	3	8	0	8	206	0	0	2	147	11	403	1,523	
8:30 AM	0	26	0	7	0	0	0	2	0	8	183	0	0	4	153	6	389	1,549	
8:45 AM	0	20	0	7	0	0	0	1	0	3	176	0	0	4	163	10	384	1,546	
Count Total	0	126	1	25	0	2	6	33	0	37	1,514	1	0	16	1,172	43	2,976	0	
Peak Hour	All	0	69	1	14	0	2	6	18	0	26	777	1	0	8	605	22	1,549	0
	HV	0	1	0	0	0	0	6	0	0	0	19	0	0	0	21	0	47	0
	HV%	-	1%	0%	0%	-	0%	100%	0%	-	0%	2%	0%	-	0%	3%	0%	3%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	3	7	10	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	7	3	10	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	2	7	9	0	0	0	0	0	2	0	0	0	2
7:45 AM	0	3	6	5	14	0	0	0	0	0	0	0	0	0	0
8:00 AM	1	0	6	8	15	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	3	3	6	12	0	0	0	2	2	3	1	3	1	8
8:30 AM	0	0	4	2	6	0	0	1	0	1	1	1	0	0	2
8:45 AM	0	0	5	4	9	0	0	0	0	0	0	4	1	1	6
Count Total	1	6	36	42	85	0	0	1	2	3	6	6	4	2	18
Peak Hour	1	6	19	21	47	0	0	1	2	3	4	2	3	1	10

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	William St				George St				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	7	0	10	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	7	0	0	1	2	0	10	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	7	0	9	0
7:45 AM	0	0	0	0	0	0	3	0	0	0	6	0	0	0	5	0	14	43
8:00 AM	0	1	0	0	0	0	0	0	0	0	6	0	0	0	8	0	15	48
8:15 AM	0	0	0	0	0	0	3	0	0	0	3	0	0	0	6	0	12	50
8:30 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	6	47
8:45 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	4	0	9	42
Count Total	0	1	0	0	0	0	6	0	0	0	36	0	0	1	41	0	85	0
Peak Hour	0	1	0	0	0	0	6	0	0	0	19	0	0	0	21	0	47	0

<b>Two-Hour Count Summaries - Bikes</b>																	
Interval Start	William St			George St			Old Redwood Hwy			Old Redwood Hwy			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
8:30 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	3
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Count Total	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	3	0
Peak Hour	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	3	0

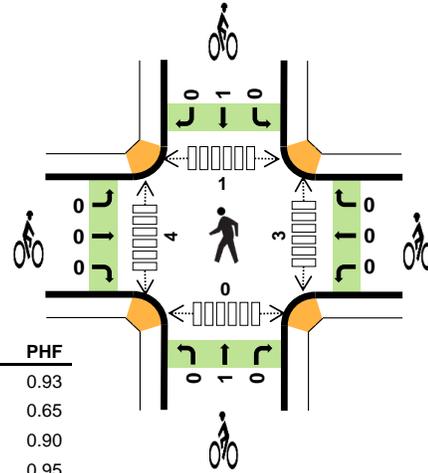
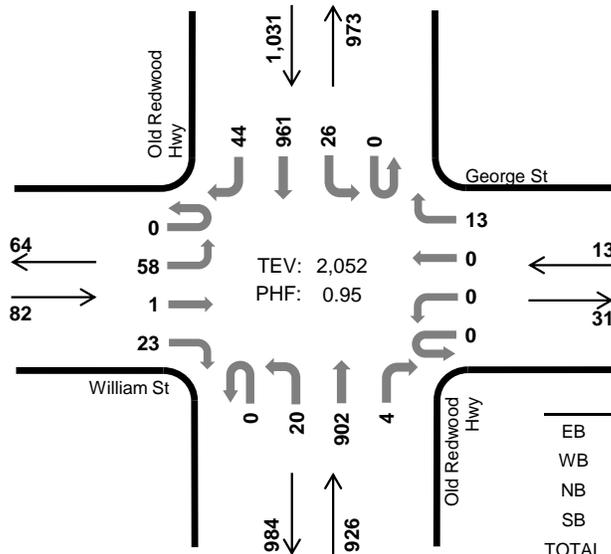
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

## Old Redwood Hwy William St



Peak Hour

Date: 11-29-2017  
Count Period: 4:00 PM to 6:00 PM  
Peak Hour: 5:00 PM to 6:00 PM



	HV %:	PHF
EB	0.0%	0.93
WB	0.0%	0.65
NB	1.0%	0.90
SB	0.9%	0.95
TOTAL	0.9%	0.95

### Two-Hour Count Summaries

Interval Start	William St				George St				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour	
	Eastbound		Westbound		Westbound		Northbound		Northbound		Southbound		Southbound						
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT			
4:00 PM	0	21	0	5	0	0	0	4	0	3	240	2	0	3	225	16	519	0	
4:15 PM	0	19	0	5	0	1	0	2	0	4	240	0	0	3	246	7	527	0	
4:30 PM	0	9	0	6	0	0	0	2	0	1	216	1	0	6	206	12	459	0	
4:45 PM	0	11	0	4	0	0	0	2	0	8	212	0	0	7	255	16	515	2,020	
5:00 PM	0	14	0	6	0	0	0	4	0	5	215	1	0	6	233	12	496	1,997	
5:15 PM	0	15	0	5	0	0	0	2	0	4	252	2	0	8	249	5	542	2,012	
5:30 PM	0	14	0	8	0	0	0	2	0	6	214	0	0	5	231	12	492	2,045	
5:45 PM	0	15	1	4	0	0	0	5	0	5	221	1	0	7	248	15	522	2,052	
Count Total	0	118	1	43	0	1	0	23	0	36	1,810	7	0	45	1,893	95	4,072	0	
Peak Hour	All	0	58	1	23	0	0	0	13	0	20	902	4	0	26	961	44	2,052	0
	HV	0	0	0	0	0	0	0	0	0	0	9	0	0	0	9	0	18	0
	HV%	-	0%	0%	0%	-	-	-	0%	-	0%	1%	0%	-	0%	1%	0%	1%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	1	5	2	8	0	0	0	0	0	3	0	0	0	3
4:15 PM	2	0	3	4	9	0	0	0	0	0	0	2	1	0	3
4:30 PM	0	0	4	2	6	0	0	0	0	0	3	1	0	0	4
4:45 PM	0	1	2	4	7	0	0	0	0	0	2	0	1	0	3
5:00 PM	0	0	2	4	6	0	0	0	1	1	1	2	1	0	4
5:15 PM	0	0	1	4	5	0	0	0	0	0	2	0	0	0	2
5:30 PM	0	0	5	1	6	0	0	1	0	1	0	2	0	0	2
5:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Count Total	2	2	23	21	48	0	0	1	1	2	11	7	3	0	21
Peak Hour	0	0	9	9	18	0	0	1	1	2	3	4	1	0	8

<b>Two-Hour Count Summaries - Heavy Vehicles</b>																		
Interval Start	William St				George St				Old Redwood Hwy				Old Redwood Hwy				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	1	0	0	5	0	0	0	2	0	8	0
4:15 PM	0	2	0	0	0	0	0	0	0	0	3	0	0	0	4	0	9	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	6	0
4:45 PM	0	0	0	0	0	0	0	1	0	0	2	0	0	0	4	0	7	30
<b>5:00 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>6</b>	<b>28</b>
<b>5:15 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>5</b>	<b>24</b>
5:30 PM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0	6	24
5:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	18
Count Total	0	2	0	0	0	0	0	2	0	0	23	0	0	0	21	0	48	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	9	0	0	0	9	0	18	0
<b>Two-Hour Count Summaries - Bikes</b>																		
Interval Start	William St			George St			Old Redwood Hwy			Old Redwood Hwy			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>5:00 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>
<b>5:15 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
5:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Count Total	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	2	0
Peak Hour	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	2	0
<i>Note: U-Turn volumes for bikes are included in Left-Turn, if any.</i>																		

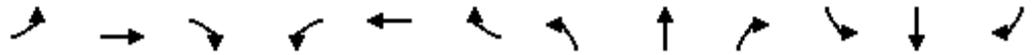


## Appendix B

### Existing Conditions LOS Analysis

HCM Signalized Intersection Capacity Analysis  
 1: US 101 SB Ramps & Grevenstein Hwy

Existing AM  
 5/21/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗	↘	↑↑					↖	↘	
Traffic Volume (vph)	0	594	268	215	751	0	0	0	0	406	3	306
Future Volume (vph)	0	594	268	215	751	0	0	0	0	406	3	306
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5					4.5	4.5	
Lane Util. Factor		0.95	1.00	1.00	0.95					0.97	1.00	
Frt		1.00	0.85	1.00	1.00					1.00	0.85	
Flt Protected		1.00	1.00	0.95	1.00					0.95	1.00	
Satd. Flow (prot)		3539	1583	1770	3539					3433	1586	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	1.00	
Satd. Flow (perm)		3539	1583	1770	3539					3433	1586	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	594	268	215	751	0	0	0	0	406	3	306
RTOR Reduction (vph)	0	0	195	0	0	0	0	0	0	0	124	0
Lane Group Flow (vph)	0	594	73	215	751	0	0	0	0	406	185	0
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		4		3	8					6	6	
Permitted Phases			4									
Actuated Green, G (s)		15.5	15.5	9.9	29.9					18.1	18.1	
Effective Green, g (s)		15.5	15.5	9.9	29.9					18.1	18.1	
Actuated g/C Ratio		0.27	0.27	0.17	0.52					0.32	0.32	
Clearance Time (s)		4.5	4.5	4.5	4.5					4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	
Lane Grp Cap (vph)		962	430	307	1856					1090	503	
v/s Ratio Prot		c0.17		c0.12	0.21					c0.12	0.12	
v/s Ratio Perm			0.05									
v/c Ratio		0.62	0.17	0.70	0.40					0.37	0.37	
Uniform Delay, d1		18.2	15.8	22.2	8.2					15.1	15.0	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.2	0.2	7.0	0.1					1.0	2.1	
Delay (s)		19.3	16.0	29.2	8.3					16.0	17.1	
Level of Service		B	B	C	A					B	B	
Approach Delay (s)		18.3			13.0			0.0			16.5	
Approach LOS		B			B			A			B	

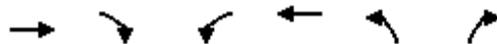
Intersection Summary		
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio	0.53	
Actuated Cycle Length (s)	57.0	Sum of lost time (s) 13.5
Intersection Capacity Utilization	58.9%	ICU Level of Service B
Analysis Period (min)	15	

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 2: US-101 NB Off-ramp & Grevenstein Hwy

Existing AM  
5/21/2018



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑	↑
Traffic Volume (vph)	1063	0	0	619	293	109
Future Volume (vph)	1063	0	0	619	293	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	4.5
Lane Util. Factor	0.95			0.91	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			5085	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			5085	3433	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1063	0	0	619	293	109
RTOR Reduction (vph)	0	0	0	0	0	21
Lane Group Flow (vph)	1063	0	0	619	293	88
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	23.1			23.1	25.6	25.6
Effective Green, g (s)	23.1			23.1	25.6	25.6
Actuated g/C Ratio	0.40			0.40	0.44	0.44
Clearance Time (s)	4.5			4.5	4.5	4.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1416			2035	1523	702
v/s Ratio Prot	c0.30			0.12	c0.09	
v/s Ratio Perm						0.06
v/c Ratio	0.75			0.30	0.19	0.13
Uniform Delay, d1	14.8			11.8	9.8	9.5
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	2.3			0.1	0.3	0.4
Delay (s)	17.1			11.9	10.0	9.8
Level of Service	B			B	B	A
Approach Delay (s)	17.1			11.9	10.0	
Approach LOS	B			B	A	

### Intersection Summary

HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	57.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
3: Old Redwood Hwy & Grevenstein Hwy

Existing AM  
5/21/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							 				
Traffic Volume (vph)	504	77	527	64	76	53	265	544	15	18	104	317
Future Volume (vph)	504	77	527	64	76	53	265	544	15	18	104	317
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00		0.91	0.91		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	1748		1610	3369		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	1748		1610	3369		1770	1863	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	504	77	527	64	76	53	265	544	15	18	104	317
RTOR Reduction (vph)	0	0	389	0	25	0	0	2	0	0	0	174
Lane Group Flow (vph)	504	77	138	64	104	0	238	584	0	18	104	143
Turn Type	Split	NA	Perm	Split	NA		Split	NA		Split	NA	pt+ov
Protected Phases	4	4		8	8		2	2		6	6	6 4
Permitted Phases			4									
Actuated Green, G (s)	20.5	20.5	20.5	10.0	10.0		19.5	19.5		10.3	10.3	35.3
Effective Green, g (s)	20.5	20.5	20.5	10.0	10.0		19.5	19.5		10.3	10.3	35.3
Actuated g/C Ratio	0.26	0.26	0.26	0.13	0.13		0.25	0.25		0.13	0.13	0.45
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	898	487	414	226	223		400	839		232	245	713
v/s Ratio Prot	c0.15	0.04		0.04	c0.06		0.15	c0.17		0.01	c0.06	0.09
v/s Ratio Perm			0.09									
v/c Ratio	0.56	0.16	0.33	0.28	0.47		0.59	0.70		0.08	0.42	0.20
Uniform Delay, d1	25.0	22.3	23.4	30.9	31.7		25.9	26.7		29.8	31.3	13.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	0.2	0.5	0.7	1.5		2.4	2.5		0.1	1.2	0.1
Delay (s)	25.8	22.4	23.9	31.6	33.2		28.3	29.2		30.0	32.5	13.1
Level of Service	C	C	C	C	C		C	C		C	C	B
Approach Delay (s)		24.6			32.7			29.0			18.4	
Approach LOS		C			C			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			25.6				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			78.3				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			53.6%				ICU Level of Service			A		
Analysis Period (min)			15									

c Critical Lane Group

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗	↕↕↕				↕↕	
Traffic Vol, veh/h	3	0	0	0	0	9	4	783	31	0	673	80
Future Vol, veh/h	3	0	0	0	0	9	4	783	31	0	673	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	0	-	-	0	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	0	0	0	0	9	4	783	31	0	673	80

Major/Minor	Minor2	Minor1		Major1		Major2						
Conflicting Flow All	1034	-	377	-	-	407	753	0	0	-	-	0
Stage 1	713	-	-	-	-	-	-	-	-	-	-	-
Stage 2	321	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	6.99	-	6.94	-	-	7.14	4.14	-	-	-	-	-
Critical Hdwy Stg 1	6.54	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.74	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.67	-	3.32	-	-	3.92	2.22	-	-	-	-	-
Pot Cap-1 Maneuver	213	0	621	0	0	507	853	-	-	0	-	-
Stage 1	378	0	-	0	0	-	-	-	-	0	-	-
Stage 2	631	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	208	-	621	-	-	507	853	-	-	-	-	-
Mov Cap-2 Maneuver	208	-	-	-	-	-	-	-	-	-	-	-
Stage 1	375	-	-	-	-	-	-	-	-	-	-	-
Stage 2	614	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	12.2	0	0
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBT	SBR
Capacity (veh/h)	853	-	-	-	507	-
HCM Lane V/C Ratio	0.005	-	-	-	0.018	-
HCM Control Delay (s)	9.2	-	-	0	12.2	-
HCM Lane LOS	A	-	-	A	B	-
HCM 95th %tile Q(veh)	0	-	-	-	0.1	-

HCM Unsignalized Intersection Capacity Analysis  
5: Old Redwood Hwy & Driveway

Existing AM  
5/21/2018

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	0	0	833	2	3	674
Future Volume (Veh/h)	0	0	833	2	3	674
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	833	2	3	674
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						722
pX, platoon unblocked						
vC, conflicting volume	1177	418			835	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1177	418			835	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	183	584			794	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	0	555	280	3	337	337
Volume Left	0	0	0	3	0	0
Volume Right	0	0	2	0	0	0
cSH	1700	1700	1700	794	1700	1700
Volume to Capacity	0.00	0.33	0.16	0.00	0.20	0.20
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	9.5	0.0	0.0
Lane LOS	A			A		
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			26.4%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection	
Intersection Delay, s/veh	20.1
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	69	1	14	2	6	18	26	777	1	8	605	22
Future Vol, veh/h	69	1	14	2	6	18	26	777	1	8	605	22
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	69	1	14	2	6	18	26	777	1	8	605	22
Number of Lanes	0	1	0	0	1	0	1	2	0	1	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	1	1
HCM Control Delay	12.4	10.5	23.7	16.9
HCM LOS	B	B	C	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	0%	82%	8%	100%	0%	0%
Vol Thru, %	0%	100%	100%	1%	23%	0%	100%	90%
Vol Right, %	0%	0%	0%	17%	69%	0%	0%	10%
Sign Control	Stop							
Traffic Vol by Lane	26	518	260	84	26	8	403	224
LT Vol	26	0	0	69	2	8	0	0
Through Vol	0	518	259	1	6	0	403	202
RT Vol	0	0	1	14	18	0	0	22
Lane Flow Rate	26	518	260	84	26	8	403	224
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.045	0.827	0.415	0.183	0.053	0.014	0.665	0.364
Departure Headway (Hd)	6.25	5.745	5.742	7.851	7.327	6.44	5.935	5.866
Convergence, Y/N	Yes							
Cap	573	632	627	456	488	555	609	613
Service Time	3.988	3.484	3.481	5.609	5.092	4.184	3.679	3.61
HCM Lane V/C Ratio	0.045	0.82	0.415	0.184	0.053	0.014	0.662	0.365
HCM Control Delay	9.3	30.1	12.5	12.4	10.5	9.3	19.7	12
HCM Lane LOS	A	D	B	B	B	A	C	B
HCM 95th-tile Q	0.1	8.7	2	0.7	0.2	0	5	1.7



# HCM Signalized Intersection Capacity Analysis

## 1: US 101 SB Ramps & Grevenstein Hwy

Existing PM  
Timing Plan: PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗	↖	↑↑					↖	↗	
Traffic Volume (vph)	0	814	269	115	875	0	0	0	0	620	0	250
Future Volume (vph)	0	814	269	115	875	0	0	0	0	620	0	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5					4.5	4.5	
Lane Util. Factor		0.95	1.00	1.00	0.95					0.97	1.00	
Frt		1.00	0.85	1.00	1.00					1.00	0.85	
Flt Protected		1.00	1.00	0.95	1.00					0.95	1.00	
Satd. Flow (prot)		3539	1583	1770	3539					3433	1583	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	1.00	
Satd. Flow (perm)		3539	1583	1770	3539					3433	1583	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	814	269	115	875	0	0	0	0	620	0	250
RTOR Reduction (vph)	0	0	184	0	0	0	0	0	0	0	78	0
Lane Group Flow (vph)	0	814	85	115	875	0	0	0	0	620	172	0
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		4		3	8					6	6	
Permitted Phases			4									
Actuated Green, G (s)		18.1	18.1	5.6	28.2					19.9	19.9	
Effective Green, g (s)		18.1	18.1	5.6	28.2					19.9	19.9	
Actuated g/C Ratio		0.32	0.32	0.10	0.49					0.35	0.35	
Clearance Time (s)		4.5	4.5	4.5	4.5					4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	
Lane Grp Cap (vph)		1121	501	173	1747					1196	551	
v/s Ratio Prot		c0.23		0.06	c0.25					c0.18	0.11	
v/s Ratio Perm			0.05									
v/c Ratio		0.73	0.17	0.66	0.50					0.52	0.31	
Uniform Delay, d1		17.3	14.1	24.8	9.7					14.8	13.6	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		2.4	0.2	9.3	0.2					1.6	1.5	
Delay (s)		19.7	14.2	34.1	9.9					16.4	15.1	
Level of Service		B	B	C	A					B	B	
Approach Delay (s)		18.3			12.8			0.0			16.0	
Approach LOS		B			B			A			B	

### Intersection Summary

HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	57.1	Sum of lost time (s)	13.5
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 2: US-101 NB Off-ramp & Grevenstein Hwy

Existing PM  
Timing Plan: PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑	↑
Traffic Volume (vph)	1433	0	0	633	352	286
Future Volume (vph)	1433	0	0	633	352	286
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	4.5
Lane Util. Factor	0.95			0.91	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			5085	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			5085	3433	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1433	0	0	633	352	286
RTOR Reduction (vph)	0	0	0	0	0	18
Lane Group Flow (vph)	1433	0	0	633	352	268
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	29.8			29.8	19.6	19.6
Effective Green, g (s)	29.8			29.8	19.6	19.6
Actuated g/C Ratio	0.51			0.51	0.34	0.34
Clearance Time (s)	4.5			4.5	4.5	4.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1805			2594	1152	531
v/s Ratio Prot	c0.40			0.12	0.10	
v/s Ratio Perm						c0.17
v/c Ratio	0.79			0.24	0.31	0.50
Uniform Delay, d1	11.8			8.0	14.4	15.5
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	2.5			0.0	0.7	3.4
Delay (s)	14.3			8.0	15.0	18.9
Level of Service	B			A	B	B
Approach Delay (s)	14.3			8.0	16.8	
Approach LOS	B			A	B	

### Intersection Summary

HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	58.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 3: Old Redwood Hwy & Grevenstein Hwy

Existing PM  
Timing Plan: PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑	↖	↖	↗		↖	↖↗		↖	↑	↖
Traffic Volume (vph)	765	130	807	63	49	67	302	620	36	28	196	260
Future Volume (vph)	765	130	807	63	49	67	302	620	36	28	196	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00		0.91	0.91		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.91		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	1701		1610	3356		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	1701		1610	3356		1770	1863	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	765	130	807	63	49	67	302	620	36	28	196	260
RTOR Reduction (vph)	0	0	512	0	46	0	0	3	0	0	0	131
Lane Group Flow (vph)	765	130	295	63	70	0	272	683	0	28	196	129
Turn Type	Split	NA	Perm	Split	NA		Split	NA		Split	NA	pt+ov
Protected Phases	4	4		8	8		2	2		6	6	6 4
Permitted Phases			4									
Actuated Green, G (s)	26.7	26.7	26.7	9.4	9.4		24.9	24.9		15.9	15.9	47.1
Effective Green, g (s)	26.7	26.7	26.7	9.4	9.4		24.9	24.9		15.9	15.9	47.1
Actuated g/C Ratio	0.28	0.28	0.28	0.10	0.10		0.26	0.26		0.17	0.17	0.50
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	965	524	445	175	168		422	880		296	312	785
v/s Ratio Prot	c0.22	0.07		0.04	c0.04		0.17	c0.20		0.02	c0.11	0.08
v/s Ratio Perm			0.19									
v/c Ratio	0.79	0.25	0.66	0.36	0.42		0.64	0.78		0.09	0.63	0.16
Uniform Delay, d1	31.5	26.3	30.1	39.9	40.2		31.1	32.4		33.4	36.8	13.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.5	0.2	3.7	1.3	1.7		3.4	4.3		0.1	3.9	0.1
Delay (s)	36.1	26.6	33.8	41.2	41.8		34.4	36.8		33.6	40.7	13.2
Level of Service	D	C	C	D	D		C	D		C	D	B
Approach Delay (s)		34.3			41.6			36.1			25.5	
Approach LOS		C			D			D			C	

### Intersection Summary

HCM 2000 Control Delay	33.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	94.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 TWSC  
 4: Old Redwood Hwy & St Joseph Way

Existing PM  
 Timing Plan: PM Peak Hour

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↕↕↕			↕↕	
Traffic Vol, veh/h	4	0	5	0	0	4	0	998	19	0	1053	8
Future Vol, veh/h	4	0	5	0	0	4	0	998	19	0	1053	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	0	-	-	0	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	5	0	0	4	0	998	19	0	1053	8

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1456	-	531	-	-	509	-	0	0	-	-	0
Stage 1	1057	-	-	-	-	-	-	-	-	-	-	-
Stage 2	399	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	6.99	-	6.94	-	-	7.14	-	-	-	-	-	-
Critical Hdwy Stg 1	6.54	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.74	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.67	-	3.32	-	-	3.92	-	-	-	-	-	-
Pot Cap-1 Maneuver	111	0	493	0	0	436	0	-	-	0	-	-
Stage 1	235	0	-	0	0	-	0	-	-	0	-	-
Stage 2	566	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	110	-	493	-	-	436	-	-	-	-	-	-
Mov Cap-2 Maneuver	110	-	-	-	-	-	-	-	-	-	-	-
Stage 1	235	-	-	-	-	-	-	-	-	-	-	-
Stage 2	561	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB			SB		
HCM Control Delay, s	12.4		13.3		0			0		
HCM LOS	B		B							

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	493	436	-	-
HCM Lane V/C Ratio	-	-	0.01	0.009	-	-
HCM Control Delay (s)	-	-	12.4	13.3	-	-
HCM Lane LOS	-	-	B	B	-	-
HCM 95th %tile Q(veh)	-	-	0	0	-	-

HCM 2010 TWSC  
5: Old Redwood Hwy & Driveway

Existing PM  
Timing Plan: PM Peak Hour

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘↗		↑↑		↘↗	↑↑
Traffic Vol, veh/h	4	4	988	1	1	1058
Future Vol, veh/h	4	4	988	1	1	1058
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	25	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	4	988	1	1	1058

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1520	495	0	0	989
Stage 1	989	-	-	-	-
Stage 2	531	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14
Critical Hdwy Stg 1	5.84	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22
Pot Cap-1 Maneuver	109	520	-	-	695
Stage 1	321	-	-	-	-
Stage 2	554	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	109	520	-	-	695
Mov Cap-2 Maneuver	109	-	-	-	-
Stage 1	321	-	-	-	-
Stage 2	554	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25.9	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	180	695
HCM Lane V/C Ratio	-	-	0.044	0.001
HCM Control Delay (s)	-	-	25.9	10.2
HCM Lane LOS	-	-	D	B
HCM 95th %tile Q(veh)	-	-	0.1	0

Intersection	
Intersection Delay, s/veh	54
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	58	1	23	0	0	13	24	902	4	26	961	44
Future Vol, veh/h	58	1	23	0	0	13	24	902	4	26	961	44
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	58	1	23	0	0	13	24	902	4	26	961	44
Number of Lanes	0	1	0	0	1	0	1	2	0	1	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	1	1
HCM Control Delay	13.3	10.9	51.2	60.4
HCM LOS	B	B	F	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	0%	71%	0%	100%	0%	0%
Vol Thru, %	0%	100%	99%	1%	0%	0%	100%	88%
Vol Right, %	0%	0%	1%	28%	100%	0%	0%	12%
Sign Control	Stop							
Traffic Vol by Lane	24	601	305	82	13	26	641	364
LT Vol	24	0	0	58	0	26	0	0
Through Vol	0	601	301	1	0	0	641	320
RT Vol	0	0	4	23	13	0	0	44
Lane Flow Rate	24	601	305	82	13	26	641	364
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.045	1.032	0.522	0.19	0.028	0.048	1.086	0.609
Departure Headway (Hd)	6.839	6.334	6.324	8.555	7.984	6.708	6.203	6.117
Convergence, Y/N	Yes							
Cap	527	577	573	422	451	537	589	594
Service Time	4.539	4.034	4.024	6.255	5.684	4.408	3.903	3.817
HCM Lane V/C Ratio	0.046	1.042	0.532	0.194	0.029	0.048	1.088	0.613
HCM Control Delay	9.9	70.9	15.7	13.3	10.9	9.7	86.6	17.9
HCM Lane LOS	A	F	C	B	B	A	F	C
HCM 95th-tile Q	0.1	16	3	0.7	0.1	0.2	18.8	4.1

## Appendix C

### Existing plus Project Conditions LOS Analysis

HCM Signalized Intersection Capacity Analysis  
 1: US 101 SB Ramps & Grevenstein Hwy

Existing plus Project AM

10/25/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗	↖	↑↑					↖↗	↗	
Traffic Volume (vph)	0	596	268	215	753	0	0	0	0	421	3	306
Future Volume (vph)	0	596	268	215	753	0	0	0	0	421	3	306
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5					4.5	4.5	
Lane Util. Factor		0.95	1.00	1.00	0.95					0.97	1.00	
Frt		1.00	0.85	1.00	1.00					1.00	0.85	
Flt Protected		1.00	1.00	0.95	1.00					0.95	1.00	
Satd. Flow (prot)		3539	1583	1770	3539					3433	1586	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	1.00	
Satd. Flow (perm)		3539	1583	1770	3539					3433	1586	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	596	268	215	753	0	0	0	0	421	3	306
RTOR Reduction (vph)	0	0	195	0	0	0	0	0	0	0	124	0
Lane Group Flow (vph)	0	596	73	215	753	0	0	0	0	421	185	0
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		4		3	8					6	6	
Permitted Phases			4									
Actuated Green, G (s)		15.5	15.5	9.9	29.9					18.1	18.1	
Effective Green, g (s)		15.5	15.5	9.9	29.9					18.1	18.1	
Actuated g/C Ratio		0.27	0.27	0.17	0.52					0.32	0.32	
Clearance Time (s)		4.5	4.5	4.5	4.5					4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	
Lane Grp Cap (vph)		962	430	307	1856					1090	503	
v/s Ratio Prot		c0.17		c0.12	0.21					c0.12	0.12	
v/s Ratio Perm			0.05									
v/c Ratio		0.62	0.17	0.70	0.41					0.39	0.37	
Uniform Delay, d1		18.2	15.8	22.2	8.2					15.1	15.0	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.2	0.2	7.0	0.1					1.0	2.1	
Delay (s)		19.4	16.0	29.2	8.3					16.2	17.1	
Level of Service		B	B	C	A					B	B	
Approach Delay (s)		18.3			13.0			0.0			16.6	
Approach LOS		B			B			A			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			15.8			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			57.0			Sum of lost time (s)				13.5		
Intersection Capacity Utilization			58.9%			ICU Level of Service				B		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
2: US-101 NB Off-ramp & Grevenstein Hwy

Existing plus Project AM  
10/25/2018



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑	↑
Traffic Volume (vph)	1080	0	0	621	293	109
Future Volume (vph)	1080	0	0	621	293	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	4.5
Lane Util. Factor	0.95			0.91	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			5085	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			5085	3433	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1080	0	0	621	293	109
RTOR Reduction (vph)	0	0	0	0	0	20
Lane Group Flow (vph)	1080	0	0	621	293	89
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	23.3			23.3	25.6	25.6
Effective Green, g (s)	23.3			23.3	25.6	25.6
Actuated g/C Ratio	0.40			0.40	0.44	0.44
Clearance Time (s)	4.5			4.5	4.5	4.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1424			2046	1517	699
v/s Ratio Prot	c0.31			0.12	c0.09	
v/s Ratio Perm						0.06
v/c Ratio	0.76			0.30	0.19	0.13
Uniform Delay, d1	14.9			11.8	9.9	9.5
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	2.4			0.1	0.3	0.4
Delay (s)	17.2			11.9	10.1	9.9
Level of Service	B			B	B	A
Approach Delay (s)	17.2			11.9	10.1	
Approach LOS	B			B	B	

Intersection Summary

HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	57.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
3: Old Redwood Hwy & Grevenstein Hwy

Existing plus Project AM  
10/25/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							 				
Traffic Volume (vph)	504	77	559	66	76	53	267	558	16	18	108	317
Future Volume (vph)	504	77	559	66	76	53	267	558	16	18	108	317
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00		0.91	0.91		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	1748		1610	3369		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	1748		1610	3369		1770	1863	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	504	77	559	66	76	53	267	558	16	18	108	317
RTOR Reduction (vph)	0	0	414	0	25	0	0	1	0	0	0	175
Lane Group Flow (vph)	504	77	145	66	104	0	240	600	0	18	108	142
Turn Type	Split	NA	Perm	Split	NA		Split	NA		Split	NA	pt+ov
Protected Phases	4	4		8	8		2	2		6	6	6 4
Permitted Phases			4									
Actuated Green, G (s)	20.5	20.5	20.5	10.0	10.0		20.0	20.0		10.5	10.5	35.5
Effective Green, g (s)	20.5	20.5	20.5	10.0	10.0		20.0	20.0		10.5	10.5	35.5
Actuated g/C Ratio	0.26	0.26	0.26	0.13	0.13		0.25	0.25		0.13	0.13	0.45
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	890	483	410	224	221		407	852		235	247	711
v/s Ratio Prot	c0.15	0.04		0.04	c0.06		0.15	c0.18		0.01	c0.06	0.09
v/s Ratio Perm			0.09									
v/c Ratio	0.57	0.16	0.35	0.29	0.47		0.59	0.70		0.08	0.44	0.20
Uniform Delay, d1	25.4	22.6	23.8	31.3	32.0		25.9	26.8		30.0	31.5	13.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	0.2	0.5	0.7	1.6		2.2	2.7		0.1	1.2	0.1
Delay (s)	26.2	22.7	24.4	32.0	33.6		28.1	29.4		30.1	32.8	13.3
Level of Service	C	C	C	C	C		C	C		C	C	B
Approach Delay (s)		25.1			33.1			29.1			18.7	
Approach LOS		C			C			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			25.9				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			79.0				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			55.7%				ICU Level of Service			B		
Analysis Period (min)			15									

c Critical Lane Group

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗	↔↔↔				↕↔	
Traffic Vol, veh/h	0	0	37	0	0	9	11	800	31	0	670	121
Future Vol, veh/h	0	0	37	0	0	9	11	800	31	0	670	121
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	0	-	-	0	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	37	0	0	9	11	800	31	0	670	121

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	396	-	-	416	791	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	7.14	4.14	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.92	2.22	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	603	0	0	500	825	-	-	0	-	-
Stage 1	0	0	-	0	0	-	-	-	-	0	-	-
Stage 2	0	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	603	-	-	500	825	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB				
HCM Control Delay, s	11.4		12.3		0.2		0				
HCM LOS	B		B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	825	-	-	603	500	-	-
HCM Lane V/C Ratio	0.013	-	-	0.061	0.018	-	-
HCM Control Delay (s)	9.4	0.1	-	11.4	12.3	-	-
HCM Lane LOS	A	A	-	B	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	-	-

Intersection							
Int Delay, s/veh	0.2						
Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations	↔		↑↓			↔	↑↑
Traffic Vol, veh/h	0	0	840	2	17	3	688
Future Vol, veh/h	0	0	840	2	17	3	688
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	0	-	-	-	-	25	-
Veh in Median Storage, #	0	-	0	-	-	-	0
Grade, %	0	-	0	-	-	-	0
Peak Hour Factor	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	0	840	2	17	3	688

Major/Minor	Minor1	Major1	Major2				
Conflicting Flow All	1225	421	0	0	842	842	0
Stage 1	841	-	-	-	-	-	-
Stage 2	384	-	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	6.44	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.52	2.22	-
Pot Cap-1 Maneuver	171	581	-	-	419	789	-
Stage 1	383	-	-	-	-	-	-
Stage 2	658	-	-	-	-	-	-
Platoon blocked, %			-	-			-
Mov Cap-1 Maneuver	163	581	-	-	451	451	-
Mov Cap-2 Maneuver	163	-	-	-	-	-	-
Stage 1	366	-	-	-	-	-	-
Stage 2	658	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	451	-
HCM Lane V/C Ratio	-	-	0.044	-
HCM Control Delay (s)	-	-	0	13.4
HCM Lane LOS	-	-	A	B
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	20.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	69	1	14	2	6	18	26	784	1	8	619	22
Future Vol, veh/h	69	1	14	2	6	18	26	784	1	8	619	22
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	69	1	14	2	6	18	26	784	1	8	619	22
Number of Lanes	0	1	0	0	1	0	1	2	0	1	2	0

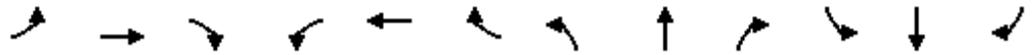
Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	1	1
HCM Control Delay	12.4	10.5	24.5	17.5
HCM LOS	B	B	C	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	0%	82%	8%	100%	0%	0%
Vol Thru, %	0%	100%	100%	1%	23%	0%	100%	90%
Vol Right, %	0%	0%	0%	17%	69%	0%	0%	10%
Sign Control	Stop							
Traffic Vol by Lane	26	523	262	84	26	8	413	228
LT Vol	26	0	0	69	2	8	0	0
Through Vol	0	523	261	1	6	0	413	206
RT Vol	0	0	1	14	18	0	0	22
Lane Flow Rate	26	523	262	84	26	8	413	228
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.045	0.837	0.42	0.184	0.053	0.014	0.682	0.373
Departure Headway (Hd)	6.272	5.767	5.764	7.886	7.365	6.454	5.949	5.881
Convergence, Y/N	Yes							
Cap	571	627	624	454	485	554	607	612
Service Time	4.012	3.507	3.505	5.646	5.132	4.199	3.694	3.626
HCM Lane V/C Ratio	0.046	0.834	0.42	0.185	0.054	0.014	0.68	0.373
HCM Control Delay	9.3	31.3	12.6	12.4	10.5	9.3	20.6	12.1
HCM Lane LOS	A	D	B	B	B	A	C	B
HCM 95th-tile Q	0.1	9	2.1	0.7	0.2	0	5.3	1.7



HCM Signalized Intersection Capacity Analysis  
 1: US 101 SB Ramps & Grevenstein Hwy

Existing plus Project PM  
 Timing Plan: PM Peak Hour



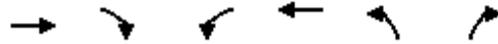
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗	↘	↑↑					↖	↓	↘
Traffic Volume (vph)	0	817	269	115	877	0	0	0	0	637	0	250
Future Volume (vph)	0	817	269	115	877	0	0	0	0	637	0	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5					4.5	4.5	
Lane Util. Factor		0.95	1.00	1.00	0.95					0.97	1.00	
Frt		1.00	0.85	1.00	1.00					1.00	0.85	
Flt Protected		1.00	1.00	0.95	1.00					0.95	1.00	
Satd. Flow (prot)		3539	1583	1770	3539					3433	1583	
Flt Permitted		1.00	1.00	0.95	1.00					0.95	1.00	
Satd. Flow (perm)		3539	1583	1770	3539					3433	1583	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	817	269	115	877	0	0	0	0	637	0	250
RTOR Reduction (vph)	0	0	184	0	0	0	0	0	0	0	78	0
Lane Group Flow (vph)	0	817	85	115	877	0	0	0	0	637	172	0
Turn Type		NA	Perm	Prot	NA					Split	NA	
Protected Phases		4		3	8					6	6	
Permitted Phases			4									
Actuated Green, G (s)		18.1	18.1	5.6	28.2					19.9	19.9	
Effective Green, g (s)		18.1	18.1	5.6	28.2					19.9	19.9	
Actuated g/C Ratio		0.32	0.32	0.10	0.49					0.35	0.35	
Clearance Time (s)		4.5	4.5	4.5	4.5					4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	
Lane Grp Cap (vph)		1121	501	173	1747					1196	551	
v/s Ratio Prot		c0.23		0.06	c0.25					c0.19	0.11	
v/s Ratio Perm			0.05									
v/c Ratio		0.73	0.17	0.66	0.50					0.53	0.31	
Uniform Delay, d1		17.3	14.1	24.8	9.7					14.9	13.6	
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	
Incremental Delay, d2		2.4	0.2	9.3	0.2					1.7	1.5	
Delay (s)		19.7	14.2	34.1	10.0					16.6	15.1	
Level of Service		B	B	C	A					B	B	
Approach Delay (s)		18.4			12.8			0.0			16.2	
Approach LOS		B			B			A			B	

Intersection Summary		
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio	0.63	
Actuated Cycle Length (s)	57.1	Sum of lost time (s) 13.5
Intersection Capacity Utilization	66.4%	ICU Level of Service C
Analysis Period (min)	15	

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
2: US-101 NB Off-ramp & Grevenstein Hwy

Existing plus Project PM  
Timing Plan: PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑	↑
Traffic Volume (vph)	1453	0	0	635	352	303
Future Volume (vph)	1453	0	0	635	352	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	4.5
Lane Util. Factor	0.95			0.91	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			5085	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			5085	3433	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1453	0	0	635	352	303
RTOR Reduction (vph)	0	0	0	0	0	17
Lane Group Flow (vph)	1453	0	0	635	352	286
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	29.9			29.9	19.6	19.6
Effective Green, g (s)	29.9			29.9	19.6	19.6
Actuated g/C Ratio	0.51			0.51	0.34	0.34
Clearance Time (s)	4.5			4.5	4.5	4.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1808			2599	1150	530
v/s Ratio Prot	c0.41			0.12	0.10	
v/s Ratio Perm						c0.18
v/c Ratio	0.80			0.24	0.31	0.54
Uniform Delay, d1	11.9			8.0	14.4	15.8
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	2.7			0.0	0.7	3.9
Delay (s)	14.6			8.0	15.1	19.7
Level of Service	B			A	B	B
Approach Delay (s)	14.6			8.0	17.2	
Approach LOS	B			A	B	

Intersection Summary

HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	58.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
3: Old Redwood Hwy & Grevenstein Hwy

Existing plus Project PM  
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 		 	 				 		 		 
Traffic Volume (vph)	765	130	844	65	49	67	302	642	39	28	201	260
Future Volume (vph)	765	130	844	65	49	67	302	642	39	28	201	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00		0.91	0.91		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.91		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	1701		1610	3355		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	1701		1610	3355		1770	1863	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	765	130	844	65	49	67	302	642	39	28	201	260
RTOR Reduction (vph)	0	0	511	0	46	0	0	3	0	0	0	132
Lane Group Flow (vph)	765	130	333	65	70	0	272	708	0	28	201	128
Turn Type	Split	NA	Perm	Split	NA		Split	NA		Split	NA	pt+ov
Protected Phases	4	4		8	8		2	2		6	6	6 4
Permitted Phases			4									
Actuated Green, G (s)	26.7	26.7	26.7	9.5	9.5		25.7	25.7		16.2	16.2	47.4
Effective Green, g (s)	26.7	26.7	26.7	9.5	9.5		25.7	25.7		16.2	16.2	47.4
Actuated g/C Ratio	0.28	0.28	0.28	0.10	0.10		0.27	0.27		0.17	0.17	0.49
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	953	517	439	174	168		430	897		298	314	780
v/s Ratio Prot	c0.22	0.07		0.04	c0.04		0.17	c0.21		0.02	c0.11	0.08
v/s Ratio Perm			0.21									
v/c Ratio	0.80	0.25	0.76	0.37	0.42		0.63	0.79		0.09	0.64	0.16
Uniform Delay, d1	32.3	26.9	31.8	40.5	40.7		31.0	32.7		33.8	37.2	13.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.0	0.3	7.4	1.4	1.7		3.0	4.7		0.1	4.4	0.1
Delay (s)	37.2	27.2	39.2	41.9	42.4		34.1	37.3		33.9	41.6	13.5
Level of Service	D	C	D	D	D		C	D		C	D	B
Approach Delay (s)		37.4			42.2			36.4			26.2	
Approach LOS		D			D			D			C	

Intersection Summary

HCM 2000 Control Delay	35.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	96.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗	↔↔↔				↕↔	
Traffic Vol, veh/h	0	0	67	0	0	4	8	1025	19	0	1047	58
Future Vol, veh/h	0	0	67	0	0	4	8	1025	19	0	1047	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	0	-	-	0	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	67	0	0	4	8	1025	19	0	1047	58

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	553	-	-	522	1105	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	7.14	4.14	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.92	2.22	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	477	0	0	428	628	-	-	0	-	-
Stage 1	0	0	-	0	0	-	-	-	-	0	-	-
Stage 2	0	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	477	-	-	428	628	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB				
HCM Control Delay, s	13.8		13.5		0.2		0				
HCM LOS	B		B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	628	-	-	477	428	-	-
HCM Lane V/C Ratio	0.013	-	-	0.14	0.009	-	-
HCM Control Delay (s)	10.8	0.1	-	13.8	13.5	-	-
HCM Lane LOS	B	A	-	B	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0	-	-

HCM 2010 TWSC  
5: Old Redwood Hwy & Driveway

Existing plus Project PM  
Timing Plan: PM Peak Hour

Intersection							
Int Delay, s/veh	0.3						
Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations	↘↗		↑↑			↘↗	↑↑
Traffic Vol, veh/h	4	4	996	1	27	1	1083
Future Vol, veh/h	4	4	996	1	27	1	1083
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	-	None
Storage Length	0	-	-	-	-	25	-
Veh in Median Storage, #	0	-	0	-	-	-	0
Grade, %	0	-	0	-	-	-	0
Peak Hour Factor	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	4	4	996	1	27	1	1083

Major/Minor	Minor1	Major1	Major2				
Conflicting Flow All	1595	499	0	0	997	997	0
Stage 1	997	-	-	-	-	-	-
Stage 2	598	-	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	6.44	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.52	2.22	-
Pot Cap-1 Maneuver	98	517	-	-	334	690	-
Stage 1	318	-	-	-	-	-	-
Stage 2	512	-	-	-	-	-	-
Platoon blocked, %			-	-			-
Mov Cap-1 Maneuver	90	517	-	-	337	337	-
Mov Cap-2 Maneuver	90	-	-	-	-	-	-
Stage 1	292	-	-	-	-	-	-
Stage 2	512	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	29.8	0	0.4
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	153	337
HCM Lane V/C Ratio	-	-	0.052	0.083
HCM Control Delay (s)	-	-	29.8	16.6
HCM Lane LOS	-	-	D	C
HCM 95th %tile Q(veh)	-	-	0.2	0.3

Intersection	
Intersection Delay, s/veh	58.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	58	1	23	0	0	13	24	910	4	26	986	44
Future Vol, veh/h	58	1	23	0	0	13	24	910	4	26	986	44
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	58	1	23	0	0	13	24	910	4	26	986	44
Number of Lanes	0	1	0	0	1	0	1	2	0	1	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	1	1
HCM Control Delay	13.3	11	53.7	66.8
HCM LOS	B	B	F	F

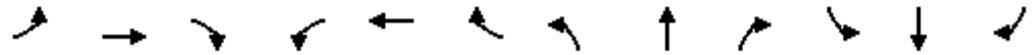
Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	0%	71%	0%	100%	0%	0%
Vol Thru, %	0%	100%	99%	1%	0%	0%	100%	88%
Vol Right, %	0%	0%	1%	28%	100%	0%	0%	12%
Sign Control	Stop							
Traffic Vol by Lane	24	607	307	82	13	26	657	373
LT Vol	24	0	0	58	0	26	0	0
Through Vol	0	607	303	1	0	0	657	329
RT Vol	0	0	4	23	13	0	0	44
Lane Flow Rate	24	607	307	82	13	26	657	373
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.045	1.044	0.528	0.191	0.028	0.048	1.115	0.624
Departure Headway (Hd)	6.88	6.375	6.366	8.604	8.034	6.726	6.221	6.137
Convergence, Y/N	Yes							
Cap	524	576	572	420	448	536	592	593
Service Time	4.58	4.075	4.066	6.304	5.734	4.426	3.921	3.837
HCM Lane V/C Ratio	0.046	1.054	0.537	0.195	0.029	0.049	1.11	0.629
HCM Control Delay	9.9	74.6	16	13.3	11	9.8	96.4	18.5
HCM Lane LOS	A	F	C	B	B	A	F	C
HCM 95th-tile Q	0.1	16.5	3.1	0.7	0.1	0.2	20.3	4.3

## Appendix D

### Cumulative Conditions LOS Analysis

HCM Signalized Intersection Capacity Analysis  
 1: US 101 SB Ramps & Gravenstein Hwy

Cumulative No Project AM  
 Year 2040



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗	↘	↑↑					↖	↘	↗
Traffic Volume (vph)	0	978	714	231	1447	0	0	0	0	555	1	926
Future Volume (vph)	0	978	714	231	1447	0	0	0	0	555	1	926
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.97	0.95	0.95
Frt		1.00	0.85	1.00	1.00					1.00	0.85	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	3539					3433	1505	1504
Flt Permitted		1.00	1.00	0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	3539					3433	1505	1504
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	978	714	231	1447	0	0	0	0	555	1	926
RTOR Reduction (vph)	0	0	449	0	0	0	0	0	0	0	6	28
Lane Group Flow (vph)	0	978	265	231	1447	0	0	0	0	555	458	435
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		4		3	8					6	6	
Permitted Phases			4									6
Actuated Green, G (s)		25.0	25.0	14.0	43.0					49.0	49.0	49.0
Effective Green, g (s)		25.0	25.0	14.0	43.0					49.0	49.0	49.0
Actuated g/C Ratio		0.25	0.25	0.14	0.43					0.49	0.49	0.49
Clearance Time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		884	395	247	1521					1682	737	736
v/s Ratio Prot		c0.28		0.13	c0.41					0.16	c0.30	
v/s Ratio Perm			0.17									0.29
v/c Ratio		1.11	0.67	0.94	0.95					0.33	0.62	0.59
Uniform Delay, d1		37.5	33.8	42.6	27.5					15.5	18.7	18.3
Progression Factor		1.00	1.00	1.07	0.78					1.00	1.00	1.00
Incremental Delay, d2		63.8	4.4	38.6	12.9					0.5	3.9	3.5
Delay (s)		101.3	38.2	84.0	34.2					16.0	22.6	21.8
Level of Service		F	D	F	C					B	C	C
Approach Delay (s)		74.6			41.1			0.0			19.9	
Approach LOS		E			D			A			B	

Intersection Summary		
HCM 2000 Control Delay	46.3	HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio	0.83	
Actuated Cycle Length (s)	100.0	Sum of lost time (s) 12.0
Intersection Capacity Utilization	86.2%	ICU Level of Service E
Analysis Period (min)	15	

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
2: US-101 NB Off-ramp & Gravenstein Hwy

Cumulative No Project AM  
Year 2040



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑	↑
Traffic Volume (vph)	1533	0	0	871	609	195
Future Volume (vph)	1533	0	0	871	609	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.95			0.91	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			5085	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			5085	3433	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1533	0	0	871	609	195
RTOR Reduction (vph)	0	0	0	0	0	22
Lane Group Flow (vph)	1533	0	0	871	609	173
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	56.1			56.1	35.9	35.9
Effective Green, g (s)	56.1			56.1	35.9	35.9
Actuated g/C Ratio	0.56			0.56	0.36	0.36
Clearance Time (s)	4.0			4.0	4.0	4.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1985			2852	1232	568
v/s Ratio Prot	c0.43			0.17	c0.18	
v/s Ratio Perm						0.11
v/c Ratio	0.77			0.31	0.49	0.30
Uniform Delay, d1	17.0			11.6	25.0	23.1
Progression Factor	2.19			2.34	1.00	1.00
Incremental Delay, d2	1.0			0.0	1.4	1.4
Delay (s)	38.2			27.3	26.4	24.4
Level of Service	D			C	C	C
Approach Delay (s)	38.2			27.3	25.9	
Approach LOS	D			C	C	

Intersection Summary

HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 3: Old Redwood Hwy & Gravenstein Hwy

Cumulative No Project AM  
Year 2040

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 						 					
Traffic Volume (vph)	721	39	957	30	55	28	617	628	9	3	131	213
Future Volume (vph)	721	39	957	30	55	28	617	628	9	3	131	213
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00		0.97	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	0.98		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	1732		3433	1859		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	1732		3433	1859		1770	1863	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	721	39	957	30	55	28	617	628	9	3	131	213
RTOR Reduction (vph)	0	0	0	0	22	0	0	1	0	0	0	94
Lane Group Flow (vph)	721	39	957	30	61	0	617	636	0	3	131	119
Confl. Peds. (#/hr)				63		38						
Turn Type	Prot	NA	Free	Prot	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	7	4		3	8		5	2		1	6	6 7
Permitted Phases			Free									
Actuated Green, G (s)	23.0	28.1	100.0	3.6	8.7		23.3	46.5		5.8	29.0	56.0
Effective Green, g (s)	23.0	28.1	100.0	3.6	8.7		23.3	46.5		5.8	29.0	56.0
Actuated g/C Ratio	0.23	0.28	1.00	0.04	0.09		0.23	0.46		0.06	0.29	0.56
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	789	523	1583	63	150		799	864		102	540	886
v/s Ratio Prot	c0.21	0.02		0.02	0.04		c0.18	c0.34		0.00	0.07	0.08
v/s Ratio Perm			c0.60									
v/c Ratio	0.91	0.07	0.60	0.48	0.41		0.77	0.74		0.03	0.24	0.13
Uniform Delay, d1	37.5	26.4	0.0	47.3	43.2		35.9	21.8		44.4	27.1	10.5
Progression Factor	1.08	0.77	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.6	0.0	1.3	5.6	1.8		4.7	5.6		0.1	0.2	0.1
Delay (s)	52.1	20.4	1.3	52.9	45.0		40.5	27.3		44.6	27.3	10.5
Level of Service	D	C	A	D	D		D	C		D	C	B
Approach Delay (s)		23.0			47.1			33.8			17.2	
Approach LOS		C			D			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			27.2				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			100.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			74.2%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↑↑↑			↑↑	
Traffic Vol, veh/h	0	0	0	0	0	9	0	1245	31	0	1038	80
Future Vol, veh/h	0	0	0	0	0	9	0	1245	31	0	1038	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	0	-	-	0	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	9	0	1245	31	0	1038	80

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	-	-	559	-	-	638	-	0
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	7.14	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.92	-	-
Pot Cap-1 Maneuver	0	0	472	0	0	359	0	-
Stage 1	0	0	-	0	0	-	0	-
Stage 2	0	0	-	0	0	-	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	472	-	-	359	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	15.3	0	0
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1WBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	359	-
HCM Lane V/C Ratio	-	-	-	0.025	-
HCM Control Delay (s)	-	-	0	15.3	-
HCM Lane LOS	-	-	A	C	-
HCM 95th %tile Q(veh)	-	-	-	0.1	-

# HCM Signalized Intersection Capacity Analysis

## 5: Old Redwood Hwy & Future Road/Driveway

Cumulative No Project AM  
Year 2040



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕↔		↕	↕↔	
Traffic Volume (vph)	105	0	30	0	0	0	25	1171	2	3	1010	25
Future Volume (vph)	105	0	30	0	0	0	25	1171	2	3	1010	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0					4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95	
Frt		0.97					1.00	1.00		1.00	1.00	
Flt Protected		0.96					0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1739					1770	3538		1770	3526	
Flt Permitted		0.77					0.24	1.00		0.20	1.00	
Satd. Flow (perm)		1398					453	3538		371	3526	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	105	0	30	0	0	0	25	1171	2	3	1010	25
RTOR Reduction (vph)	0	24	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	111	0	0	0	0	25	1173	0	3	1033	0
Turn Type	Perm	NA					Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		9.4					29.2	29.2		29.2	29.2	
Effective Green, g (s)		9.4					29.2	29.2		29.2	29.2	
Actuated g/C Ratio		0.20					0.63	0.63		0.63	0.63	
Clearance Time (s)		4.0					4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0					3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		282					283	2216		232	2209	
v/s Ratio Prot								c0.33			0.29	
v/s Ratio Perm		c0.08					0.06			0.01		
v/c Ratio		0.39					0.09	0.53		0.01	0.47	
Uniform Delay, d1		16.1					3.4	4.9		3.3	4.6	
Progression Factor		1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.9					0.1	0.2		0.0	0.2	
Delay (s)		17.0					3.6	5.1		3.3	4.8	
Level of Service		B					A	A		A	A	
Approach Delay (s)		17.0			0.0			5.1			4.7	
Approach LOS		B			A			A			A	

### Intersection Summary

HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	46.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: Old Redwood Hwy & William St/George St

Cumulative No Project AM  
Year 2040



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕↔		↕	↕↔	
Traffic Volume (vph)	89	2	28	18	2	31	15	1078	4	14	1042	45
Future Volume (vph)	89	2	28	18	2	31	15	1078	4	14	1042	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.92		1.00	1.00		1.00	0.99	
Flt Protected		0.96			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1739			1680		1770	3537		1770	3517	
Flt Permitted		0.75			0.88		0.22	1.00		0.23	1.00	
Satd. Flow (perm)		1348			1504		418	3537		421	3517	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	89	2	28	18	2	31	15	1078	4	14	1042	45
RTOR Reduction (vph)	0	22	0	0	24	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	97	0	0	27	0	15	1082	0	14	1083	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		8.9			8.9		26.5	26.5		26.5	26.5	
Effective Green, g (s)		8.9			8.9		26.5	26.5		26.5	26.5	
Actuated g/C Ratio		0.21			0.21		0.61	0.61		0.61	0.61	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		276			308		255	2159		257	2147	
v/s Ratio Prot								0.31			c0.31	
v/s Ratio Perm		c0.07			0.02		0.04			0.03		
v/c Ratio		0.35			0.09		0.06	0.50		0.05	0.50	
Uniform Delay, d1		14.8			14.0		3.4	4.7		3.4	4.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			0.1		0.1	0.2		0.1	0.2	
Delay (s)		15.5			14.1		3.5	4.9		3.5	4.9	
Level of Service		B			B		A	A		A	A	
Approach Delay (s)		15.5			14.1			4.9			4.9	
Approach LOS		B			B			A			A	

Intersection Summary

HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	43.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



HCM Signalized Intersection Capacity Analysis  
 1: US 101 SB Ramps & Grevenstein Hwy

Cumulative No Project PM  
 Year 2040



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗	↘	↑↑					↖	↘	↗
Traffic Volume (vph)	0	1935	1098	147	1392	0	0	0	0	585	1	574
Future Volume (vph)	0	1935	1098	147	1392	0	0	0	0	585	1	574
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.97	0.95	0.95
Frt		1.00	0.85	1.00	1.00					1.00	0.85	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	3539					3433	1505	1504
Flt Permitted		1.00	1.00	0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	3539					3433	1505	1504
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1935	1098	147	1392	0	0	0	0	585	1	574
RTOR Reduction (vph)	0	0	288	0	0	0	0	0	0	0	67	67
Lane Group Flow (vph)	0	1935	810	147	1392	0	0	0	0	585	221	220
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		4		3	8					6	6	
Permitted Phases			4									6
Actuated Green, G (s)		70.5	70.5	12.5	87.0					25.0	25.0	25.0
Effective Green, g (s)		70.5	70.5	12.5	87.0					25.0	25.0	25.0
Actuated g/C Ratio		0.59	0.59	0.10	0.72					0.21	0.21	0.21
Clearance Time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		2079	930	184	2565					715	313	313
v/s Ratio Prot		c0.55		c0.08	0.39					c0.17	0.15	
v/s Ratio Perm			0.51									0.15
v/c Ratio		0.93	0.87	0.80	0.54					0.82	0.71	0.70
Uniform Delay, d1		22.5	20.9	52.5	7.5					45.3	44.1	44.0
Progression Factor		1.00	1.00	1.15	0.47					1.00	1.00	1.00
Incremental Delay, d2		8.2	8.9	19.5	0.2					10.1	12.6	12.4
Delay (s)		30.7	29.8	80.1	3.7					55.4	56.6	56.4
Level of Service		C	C	F	A					E	E	E
Approach Delay (s)		30.4			11.0			0.0			56.0	
Approach LOS		C			B			A			E	

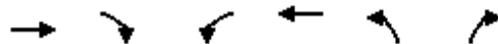
Intersection Summary		
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.89	
Actuated Cycle Length (s)	120.0	Sum of lost time (s) 12.0
Intersection Capacity Utilization	102.8%	ICU Level of Service G
Analysis Period (min)	15	

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 2: US-101 NB Off-ramp & Grevenstein Hwy

Cumulative No Project PM  
Year 2040



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑	↑
Traffic Volume (vph)	2520	0	0	972	567	366
Future Volume (vph)	2520	0	0	972	567	366
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.95			0.91	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			5085	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			5085	3433	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2520	0	0	972	567	366
RTOR Reduction (vph)	0	0	0	0	0	6
Lane Group Flow (vph)	2520	0	0	972	567	360
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	84.0			84.0	28.0	28.0
Effective Green, g (s)	84.0			84.0	28.0	28.0
Actuated g/C Ratio	0.70			0.70	0.23	0.23
Clearance Time (s)	4.0			4.0	4.0	4.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2477			3559	801	369
v/s Ratio Prot	c0.71			0.19	0.17	
v/s Ratio Perm						c0.23
v/c Ratio	1.02			0.27	0.71	0.98
Uniform Delay, d1	18.0			6.7	42.2	45.7
Progression Factor	0.88			1.88	1.00	1.00
Incremental Delay, d2	16.2			0.0	5.2	41.0
Delay (s)	32.0			12.6	47.5	86.7
Level of Service	C			B	D	F
Approach Delay (s)	32.0			12.6	62.9	
Approach LOS	C			B	E	

### Intersection Summary

HCM 2000 Control Delay	34.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	102.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
3: Old Redwood Hwy & Grevenstein Hwy

Cumulative No Project PM  
Year 2040

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 						 					
Traffic Volume (vph)	1382	109	1394	38	63	52	616	805	43	0	291	232
Future Volume (vph)	1382	109	1394	38	63	52	616	805	43	0	291	232
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00		0.97	1.00			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	0.90		1.00	1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93		1.00	0.99			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	1567		3433	1849			1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	1567		3433	1849			1863	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1382	109	1394	38	63	52	616	805	43	0	291	232
RTOR Reduction (vph)	0	0	0	0	25	0	0	2	0	0	0	29
Lane Group Flow (vph)	1382	109	1394	38	90	0	616	846	0	0	291	203
Confl. Peds. (#/hr)				63		38						
Turn Type	Prot	NA	Free	Prot	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	7	4		3	8		5	2		1	6	6 7
Permitted Phases			Free									
Actuated Green, G (s)	44.0	47.0	120.0	3.6	6.6		23.6	49.4			29.8	77.8
Effective Green, g (s)	44.0	47.0	120.0	3.6	6.6		23.6	49.4			29.8	77.8
Actuated g/C Ratio	0.37	0.39	1.00	0.03	0.05		0.20	0.41			0.25	0.65
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	1258	729	1583	53	86		675	761			462	1026
v/s Ratio Prot	c0.40	0.06		0.02	0.06		0.18	c0.46			0.16	0.13
v/s Ratio Perm			c0.88									
v/c Ratio	1.10	0.15	0.88	0.72	1.05		0.91	1.11			0.63	0.20
Uniform Delay, d1	38.0	23.6	0.0	57.7	56.7		47.2	35.3			40.2	8.5
Progression Factor	0.89	0.80	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	45.7	0.0	0.7	36.9	111.8		16.7	67.8			2.7	0.1
Delay (s)	79.5	18.8	0.7	94.6	168.5		63.9	103.1			42.9	8.6
Level of Service	E	B	A	F	F		E	F			D	A
Approach Delay (s)		39.1			150.1			86.6			27.7	
Approach LOS		D			F			F			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			55.2				HCM 2000 Level of Service				E	
HCM 2000 Volume to Capacity ratio			1.16									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			104.4%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↕↕↕			↕↕	
Traffic Vol, veh/h	0	0	5	0	0	4	0	1445	19	0	1616	132
Future Vol, veh/h	0	0	5	0	0	4	0	1445	19	0	1616	132
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	0	-	-	0	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	5	0	0	4	0	1445	19	0	1616	132

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	874	-	-	732	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	7.14	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.92	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	293	0	0	312	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	293	-	-	312	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB				
HCM Control Delay, s	17.5		16.7		0		0				
HCM LOS	C		C								

Minor Lane/Major Mvmt	NBT	NBR	EBLn1WBLn1	SBT	SBR
Capacity (veh/h)	-	-	293	312	-
HCM Lane V/C Ratio	-	-	0.017	0.013	-
HCM Control Delay (s)	-	-	17.5	16.7	-
HCM Lane LOS	-	-	C	C	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

# HCM Signalized Intersection Capacity Analysis

## 5: Old Redwood Hwy & Future Road/Driveway

Cumulative No Project PM  
Year 2040



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Traffic Volume (vph)	150	0	50	4	0	4	75	1305	1	1	1495	125
Future Volume (vph)	150	0	50	4	0	4	75	1305	1	1	1495	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.93		1.00	1.00		1.00	0.99	
Flt Protected		0.96			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1735			1695		1770	3539		1770	3498	
Flt Permitted		0.78			0.89		0.10	1.00		0.17	1.00	
Satd. Flow (perm)		1395			1552		190	3539		312	3498	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	150	0	50	4	0	4	75	1305	1	1	1495	125
RTOR Reduction (vph)	0	10	0	0	6	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	190	0	0	2	0	75	1306	0	1	1615	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		16.6			16.6		54.3	54.3		54.3	54.3	
Effective Green, g (s)		16.6			16.6		54.3	54.3		54.3	54.3	
Actuated g/C Ratio		0.21			0.21		0.69	0.69		0.69	0.69	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		293			326		130	2435		214	2407	
v/s Ratio Prot								0.37			c0.46	
v/s Ratio Perm		c0.14			0.00		0.39			0.00		
v/c Ratio		0.65			0.01		0.58	0.54		0.00	0.67	
Uniform Delay, d1		28.5			24.6		6.4	6.1		3.8	7.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		4.9			0.0		6.1	0.2		0.0	0.7	
Delay (s)		33.3			24.6		12.4	6.3		3.9	7.9	
Level of Service		C			C		B	A		A	A	
Approach Delay (s)		33.3			24.6			6.6			7.9	
Approach LOS		C			C			A			A	

### Intersection Summary

HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	78.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 6: Old Redwood Hwy & William St/George St

Cumulative No Project PM  
Year 2040



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕↔		↗	↕↔	
Traffic Volume (vph)	71	1	14	11	1	42	13	1250	14	42	1438	69
Future Volume (vph)	71	1	14	11	1	42	13	1250	14	42	1438	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.98			0.90		1.00	1.00		1.00	0.99	
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1749			1634		1769	3532		1768	3511	
Flt Permitted		0.73			0.94		0.13	1.00		0.19	1.00	
Satd. Flow (perm)		1322			1544		244	3532		348	3511	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	71	1	14	11	1	42	13	1250	14	42	1438	69
RTOR Reduction (vph)	0	12	0	0	35	0	0	1	0	0	3	0
Lane Group Flow (vph)	0	74	0	0	19	0	13	1263	0	42	1504	0
Confl. Peds. (#/hr)	1					1	4		3	3		4
Confl. Bikes (#/hr)									1			1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		9.0			9.0		39.5	39.5		39.5	39.5	
Effective Green, g (s)		9.0			9.0		39.5	39.5		39.5	39.5	
Actuated g/C Ratio		0.16			0.16		0.70	0.70		0.70	0.70	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		210			245		170	2469		243	2454	
v/s Ratio Prot								0.36			c0.43	
v/s Ratio Perm		c0.06			0.01		0.05			0.12		
v/c Ratio		0.35			0.08		0.08	0.51		0.17	0.61	
Uniform Delay, d1		21.2			20.2		2.7	4.0		2.9	4.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.0			0.1		0.2	0.2		0.3	0.5	
Delay (s)		22.2			20.3		2.9	4.2		3.2	4.9	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		22.2			20.3			4.1			4.9	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			5.4								HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			56.5								Sum of lost time (s)	8.0
Intersection Capacity Utilization			60.1%								ICU Level of Service	B
Analysis Period (min)			15									

c Critical Lane Group

## Appendix E

### Cumulative plus Project Conditions LOS Analysis

HCM Signalized Intersection Capacity Analysis  
1: US 101 SB Ramps & Gravenstein Hwy

Cumullative Plus Project AM  
Year 2040

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗	↖	↑↑					↖↗	↗	↖
Traffic Volume (vph)	0	980	714	241	1449	0	0	0	0	570	1	926
Future Volume (vph)	0	980	714	241	1449	0	0	0	0	570	1	926
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.97	0.95	0.95
Frt		1.00	0.85	1.00	1.00					1.00	0.85	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	3539					3433	1505	1504
Flt Permitted		1.00	1.00	0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	3539					3433	1505	1504
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	980	714	241	1449	0	0	0	0	570	1	926
RTOR Reduction (vph)	0	0	449	0	0	0	0	0	0	0	6	28
Lane Group Flow (vph)	0	980	266	241	1449	0	0	0	0	570	458	435
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		4		3	8					6	6	
Permitted Phases			4									6
Actuated Green, G (s)		25.0	25.0	14.0	43.0					49.0	49.0	49.0
Effective Green, g (s)		25.0	25.0	14.0	43.0					49.0	49.0	49.0
Actuated g/C Ratio		0.25	0.25	0.14	0.43					0.49	0.49	0.49
Clearance Time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		884	395	247	1521					1682	737	736
v/s Ratio Prot		c0.28		0.14	c0.41					0.17	c0.30	
v/s Ratio Perm			0.17									0.29
v/c Ratio		1.11	0.67	0.98	0.95					0.34	0.62	0.59
Uniform Delay, d1		37.5	33.8	42.8	27.5					15.6	18.7	18.3
Progression Factor		1.00	1.00	1.07	0.77					1.00	1.00	1.00
Incremental Delay, d2		64.6	4.5	48.9	13.0					0.5	3.9	3.5
Delay (s)		102.1	38.3	94.7	34.1					16.1	22.6	21.8
Level of Service		F	D	F	C					B	C	C
Approach Delay (s)		75.2			42.8			0.0			19.9	
Approach LOS		E			D			A			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			47.0			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)				12.0		
Intersection Capacity Utilization			86.7%			ICU Level of Service				E		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
2: US-101 NB Off-ramp & Gravenstein Hwy

Cumulative Plus Project AM  
Year 2040



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑	↑
Traffic Volume (vph)	1550	0	0	883	609	210
Future Volume (vph)	1550	0	0	883	609	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.95			0.91	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			5085	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			5085	3433	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1550	0	0	883	609	210
RTOR Reduction (vph)	0	0	0	0	0	21
Lane Group Flow (vph)	1550	0	0	883	609	189
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	56.5			56.5	35.5	35.5
Effective Green, g (s)	56.5			56.5	35.5	35.5
Actuated g/C Ratio	0.56			0.56	0.36	0.36
Clearance Time (s)	4.0			4.0	4.0	4.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1999			2873	1218	561
v/s Ratio Prot	c0.44			0.17	c0.18	
v/s Ratio Perm						0.12
v/c Ratio	0.78			0.31	0.50	0.34
Uniform Delay, d1	16.8			11.4	25.3	23.6
Progression Factor	2.20			2.36	1.00	1.00
Incremental Delay, d2	1.1			0.0	1.5	1.6
Delay (s)	38.1			27.1	26.8	25.2
Level of Service	D			C	C	C
Approach Delay (s)	38.1			27.1	26.4	
Approach LOS	D			C	C	

Intersection Summary

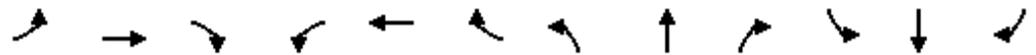
HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 3: Old Redwood Hwy & Gravenstein Hwy

Cumulative Plus Project AM  
Year 2040



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	721	39	989	32	55	28	629	642	10	3	135	213
Future Volume (vph)	721	39	989	32	55	28	629	642	10	3	135	213
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00		0.97	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	0.98		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	1732		3433	1858		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	1732		3433	1858		1770	1863	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	721	39	989	32	55	28	629	642	10	3	135	213
RTOR Reduction (vph)	0	0	0	0	22	0	0	1	0	0	0	95
Lane Group Flow (vph)	721	39	989	32	61	0	629	651	0	3	135	118
Confl. Peds. (#/hr)				63		38						
Turn Type	Prot	NA	Free	Prot	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	7	4		3	8		5	2		1	6	6 7
Permitted Phases			Free									
Actuated Green, G (s)	22.4	27.5	100.0	3.6	8.7		23.8	47.1		5.8	29.1	55.5
Effective Green, g (s)	22.4	27.5	100.0	3.6	8.7		23.8	47.1		5.8	29.1	55.5
Actuated g/C Ratio	0.22	0.28	1.00	0.04	0.09		0.24	0.47		0.06	0.29	0.56
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	768	512	1583	63	150		817	875		102	542	878
v/s Ratio Prot	c0.21	0.02		0.02	0.04		c0.18	c0.35		0.00	0.07	0.07
v/s Ratio Perm			c0.62									
v/c Ratio	0.94	0.08	0.62	0.51	0.41		0.77	0.74		0.03	0.25	0.13
Uniform Delay, d1	38.1	26.8	0.0	47.3	43.2		35.5	21.5		44.4	27.1	10.7
Progression Factor	1.07	0.79	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	14.9	0.0	1.3	6.3	1.8		4.4	5.7		0.1	0.2	0.1
Delay (s)	55.8	21.2	1.3	53.6	45.0		40.0	27.3		44.6	27.3	10.8
Level of Service	E	C	A	D	D		D	C		D	C	B
Approach Delay (s)		24.2			47.4			33.5			17.4	
Approach LOS		C			D			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			27.7				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			100.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			75.0%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↕↕↕			↕↕	
Traffic Vol, veh/h	0	0	7	0	0	9	0	1272	31	0	1035	121
Future Vol, veh/h	0	0	7	0	0	9	0	1272	31	0	1035	121
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	0	-	-	0	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	7	0	0	9	0	1272	31	0	1035	121

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	-	-	578	-	-	652	-	0
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	7.14	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.92	-	-
Pot Cap-1 Maneuver	0	0	459	0	0	352	0	-
Stage 1	0	0	-	0	0	-	0	-
Stage 2	0	0	-	0	0	-	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	459	-	-	352	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13	15.5	0	0
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1WBLn1	SBT	SBR
Capacity (veh/h)	-	-	459	352	-
HCM Lane V/C Ratio	-	-	0.015	0.026	-
HCM Control Delay (s)	-	-	13	15.5	-
HCM Lane LOS	-	-	B	C	-
HCM 95th %tile Q(veh)	-	-	0	0.1	-

# HCM Signalized Intersection Capacity Analysis

## 5: Old Redwood Hwy & Future Road/Driveway

Cumullative Plus Project AM  
Year 2040

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	132	0	30	0	0	0	32	1171	2	3	1014	25	
Future Volume (vph)	132	0	30	0	0	0	32	1171	2	3	1014	25	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0					4.0	4.0		4.0	4.0		
Lane Util. Factor		1.00					1.00	0.95		1.00	0.95		
Frt		0.97					1.00	1.00		1.00	1.00		
Flt Protected		0.96					0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1745					1770	3538		1770	3526		
Flt Permitted		0.77					0.24	1.00		0.19	1.00		
Satd. Flow (perm)		1390					443	3538		362	3526		
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	132	0	30	0	0	0	32	1171	2	3	1014	25	
RTOR Reduction (vph)	0	20	0	0	0	0	0	0	0	0	2	0	
Lane Group Flow (vph)	0	142	0	0	0	0	32	1173	0	3	1037	0	
Turn Type	Perm	NA					Perm	NA		Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4			8			2			6			
Actuated Green, G (s)		9.9					27.6	27.6		27.6	27.6		
Effective Green, g (s)		9.9					27.6	27.6		27.6	27.6		
Actuated g/C Ratio		0.22					0.61	0.61		0.61	0.61		
Clearance Time (s)		4.0					4.0	4.0		4.0	4.0		
Vehicle Extension (s)		3.0					3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)		302					268	2146		219	2138		
v/s Ratio Prot								c0.33			0.29		
v/s Ratio Perm		c0.10					0.07			0.01			
v/c Ratio		0.47					0.12	0.55		0.01	0.49		
Uniform Delay, d1		15.5					3.8	5.3		3.6	5.0		
Progression Factor		1.00					1.00	1.00		1.00	1.00		
Incremental Delay, d2		1.2					0.2	0.3		0.0	0.2		
Delay (s)		16.7					4.0	5.6		3.6	5.2		
Level of Service		B					A	A		A	A		
Approach Delay (s)		16.7			0.0			5.5			5.2		
Approach LOS		B			A			A			A		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			6.1									HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.53										
Actuated Cycle Length (s)			45.5									Sum of lost time (s)	8.0
Intersection Capacity Utilization			48.2%									ICU Level of Service	A
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: Old Redwood Hwy & William St/George St

Cumulative Plus Project AM  
Year 2040



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕↔		↕	↕↔	
Traffic Volume (vph)	89	2	28	18	2	31	15	1085	4	14	1046	45
Future Volume (vph)	89	2	28	18	2	31	15	1085	4	14	1046	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.92		1.00	1.00		1.00	0.99	
Flt Protected		0.96			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1739			1680		1770	3537		1770	3517	
Flt Permitted		0.75			0.88		0.22	1.00		0.22	1.00	
Satd. Flow (perm)		1348			1504		416	3537		417	3517	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	89	2	28	18	2	31	15	1085	4	14	1046	45
RTOR Reduction (vph)	0	22	0	0	23	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	97	0	0	28	0	15	1089	0	14	1087	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		8.9			8.9		26.5	26.5		26.5	26.5	
Effective Green, g (s)		8.9			8.9		26.5	26.5		26.5	26.5	
Actuated g/C Ratio		0.21			0.21		0.61	0.61		0.61	0.61	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		276			308		254	2159		254	2147	
v/s Ratio Prot								0.31			c0.31	
v/s Ratio Perm		c0.07			0.02		0.04			0.03		
v/c Ratio		0.35			0.09		0.06	0.50		0.06	0.51	
Uniform Delay, d1		14.8			14.0		3.4	4.8		3.4	4.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			0.1		0.1	0.2		0.1	0.2	
Delay (s)		15.5			14.1		3.5	4.9		3.5	5.0	
Level of Service		B			B		A	A		A	A	
Approach Delay (s)		15.5			14.1			4.9			4.9	
Approach LOS		B			B			A			A	

Intersection Summary

HCM 2000 Control Delay	5.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	43.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



HCM Signalized Intersection Capacity Analysis  
 1: US 101 SB Ramps & Grevenstein Hwy

Cumulative Plus Project PM  
 Year 2040

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗	↖	↑↑					↖↗	↗	↖
Traffic Volume (vph)	0	1938	1098	164	1394	0	0	0	0	602	1	574
Future Volume (vph)	0	1938	1098	164	1394	0	0	0	0	602	1	574
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.97	0.95	0.95
Frt		1.00	0.85	1.00	1.00					1.00	0.85	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	3539					3433	1505	1504
Flt Permitted		1.00	1.00	0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	3539					3433	1505	1504
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1938	1098	164	1394	0	0	0	0	602	1	574
RTOR Reduction (vph)	0	0	290	0	0	0	0	0	0	0	67	67
Lane Group Flow (vph)	0	1938	808	164	1394	0	0	0	0	602	221	220
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		4		3	8					6	6	
Permitted Phases			4									6
Actuated Green, G (s)		70.2	70.2	12.8	87.0					25.0	25.0	25.0
Effective Green, g (s)		70.2	70.2	12.8	87.0					25.0	25.0	25.0
Actuated g/C Ratio		0.59	0.59	0.11	0.72					0.21	0.21	0.21
Clearance Time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		2070	926	188	2565					715	313	313
v/s Ratio Prot		c0.55		c0.09	0.39					c0.18	0.15	
v/s Ratio Perm			0.51									0.15
v/c Ratio		0.94	0.87	0.87	0.54					0.84	0.71	0.70
Uniform Delay, d1		22.8	21.1	52.8	7.5					45.6	44.1	44.0
Progression Factor		1.00	1.00	1.15	0.46					1.00	1.00	1.00
Incremental Delay, d2		8.7	9.1	30.9	0.2					11.5	12.6	12.4
Delay (s)		31.5	30.2	91.7	3.6					57.1	56.6	56.4
Level of Service		C	C	F	A					E	E	E
Approach Delay (s)		31.1			12.9			0.0			56.8	
Approach LOS		C			B			A			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			31.4			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)				12.0		
Intersection Capacity Utilization			104.2%			ICU Level of Service				G		
Analysis Period (min)			15									

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 2: US-101 NB Off-ramp & Grevenstein Hwy

Cumulative Plus Project PM  
Year 2040



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↑↑	↑
Traffic Volume (vph)	2540	0	0	991	567	383
Future Volume (vph)	2540	0	0	991	567	383
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.95			0.91	0.97	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3539			5085	3433	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3539			5085	3433	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2540	0	0	991	567	383
RTOR Reduction (vph)	0	0	0	0	0	5
Lane Group Flow (vph)	2540	0	0	991	567	378
Turn Type	NA			NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	84.0			84.0	28.0	28.0
Effective Green, g (s)	84.0			84.0	28.0	28.0
Actuated g/C Ratio	0.70			0.70	0.23	0.23
Clearance Time (s)	4.0			4.0	4.0	4.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2477			3559	801	369
v/s Ratio Prot	c0.72			0.19	0.17	
v/s Ratio Perm						c0.24
v/c Ratio	1.03			0.28	0.71	1.02
Uniform Delay, d1	18.0			6.7	42.2	46.0
Progression Factor	0.88			1.90	1.00	1.00
Incremental Delay, d2	18.5			0.0	5.2	53.0
Delay (s)	34.4			12.8	47.5	99.0
Level of Service	C			B	D	F
Approach Delay (s)	34.4			12.8	68.2	
Approach LOS	C			B	E	

### Intersection Summary

HCM 2000 Control Delay	36.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	104.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 3: Old Redwood Hwy & Grevenstein Hwy

Cumulative Plus Project PM  
Year 2040



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1382	109	1431	38	65	52	635	827	43	0	296	232
Future Volume (vph)	1382	109	1431	38	65	52	635	827	43	0	296	232
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00		0.97	1.00			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	0.90		1.00	1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93		1.00	0.99			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	3433	1863	1583	1770	1572		3433	1849			1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1770	1572		3433	1849			1863	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1382	109	1431	38	65	52	635	827	43	0	296	232
RTOR Reduction (vph)	0	0	0	0	24	0	0	2	0	0	0	29
Lane Group Flow (vph)	1382	109	1431	38	93	0	635	868	0	0	296	203
Confl. Peds. (#/hr)				63		38						
Turn Type	Prot	NA	Free	Prot	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	7	4		3	8		5	2		1	6	6 7
Permitted Phases			Free									
Actuated Green, G (s)	44.0	47.0	120.0	3.6	6.6		23.8	49.4			29.6	77.6
Effective Green, g (s)	44.0	47.0	120.0	3.6	6.6		23.8	49.4			29.6	77.6
Actuated g/C Ratio	0.37	0.39	1.00	0.03	0.05		0.20	0.41			0.25	0.65
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	1258	729	1583	53	86		680	761			459	1023
v/s Ratio Prot	c0.40	0.06		0.02	0.06		0.18	c0.47			0.16	0.13
v/s Ratio Perm			c0.90									
v/c Ratio	1.10	0.15	0.90	0.72	1.09		0.93	1.14			0.64	0.20
Uniform Delay, d1	38.0	23.6	0.0	57.7	56.7		47.3	35.3			40.5	8.6
Progression Factor	0.90	0.80	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	45.7	0.0	0.9	36.9	122.2		19.9	78.8			3.1	0.1
Delay (s)	79.8	18.9	0.9	94.6	178.9		67.2	114.1			43.6	8.7
Level of Service	E	B	A	F	F		E	F			D	A
Approach Delay (s)		38.9			158.3			94.3			28.3	
Approach LOS		D			F			F			C	

Intersection Summary		
HCM 2000 Control Delay	57.7	HCM 2000 Level of Service E
HCM 2000 Volume to Capacity ratio	1.18	
Actuated Cycle Length (s)	120.0	Sum of lost time (s) 16.0
Intersection Capacity Utilization	105.6%	ICU Level of Service G
Analysis Period (min)	15	
c Critical Lane Group		

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↑↑↑			↑↑	
Traffic Vol, veh/h	0	0	19	0	0	4	0	1489	19	0	1610	182
Future Vol, veh/h	0	0	19	0	0	4	0	1489	19	0	1610	182
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	0	-	-	0	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	19	0	0	4	0	1489	19	0	1610	182

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	-	-	896	-	-	754	-	0
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	7.14	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.92	-	-
Pot Cap-1 Maneuver	0	0	283	0	0	302	0	-
Stage 1	0	0	-	0	0	-	0	-
Stage 2	0	0	-	0	0	-	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	283	-	-	302	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	18.6		17.1		0		0	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBT	NBR	EBLn1WBLn1	SBT	SBR
Capacity (veh/h)	-	-	283	302	-
HCM Lane V/C Ratio	-	-	0.067	0.013	-
HCM Control Delay (s)	-	-	18.6	17.1	-
HCM Lane LOS	-	-	C	C	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

# HCM Signalized Intersection Capacity Analysis

## 5: Old Redwood Hwy & Future Road/Driveway

Cumulative Plus Project PM  
Year 2040



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕↔		↕	↕↔	
Traffic Volume (vph)	194	0	50	4	0	4	83	1305	1	1	1503	125
Future Volume (vph)	194	0	50	4	0	4	83	1305	1	1	1503	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.93		1.00	1.00		1.00	0.99	
Flt Protected		0.96			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1742			1695		1770	3539		1770	3498	
Flt Permitted		0.76			0.89		0.10	1.00		0.16	1.00	
Satd. Flow (perm)		1385			1554		178	3539		302	3498	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	194	0	50	4	0	4	83	1305	1	1	1503	125
RTOR Reduction (vph)	0	8	0	0	6	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	236	0	0	2	0	83	1306	0	1	1622	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		20.1			20.1		57.9	57.9		57.9	57.9	
Effective Green, g (s)		20.1			20.1		57.9	57.9		57.9	57.9	
Actuated g/C Ratio		0.23			0.23		0.67	0.67		0.67	0.67	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		323			363		119	2382		203	2355	
v/s Ratio Prot								0.37			0.46	
v/s Ratio Perm		c0.17			0.00		c0.47			0.00		
v/c Ratio		0.73			0.01		0.70	0.55		0.00	0.69	
Uniform Delay, d1		30.5			25.3		8.7	7.3		4.6	8.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.3			0.0		16.3	0.3		0.0	0.9	
Delay (s)		38.7			25.3		25.0	7.5		4.6	9.4	
Level of Service		D			C		C	A		A	A	
Approach Delay (s)		38.7			25.3			8.6			9.4	
Approach LOS		D			C			A			A	

### Intersection Summary

HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	86.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: Old Redwood Hwy & William St/George St

Cumulative Plus Project PM  
Year 2040



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕			↕		↗	↕↔		↗	↕↔		
Traffic Volume (vph)	71	1	14	11	1	42	13	1258	14	42	1446	69	
Future Volume (vph)	71	1	14	11	1	42	13	1258	14	42	1446	69	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0		
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95		
Frbp, ped/bikes		1.00			0.99		1.00	1.00		1.00	1.00		
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00		
Frt		0.98			0.90		1.00	1.00		1.00	0.99		
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1749			1634		1769	3532		1768	3511		
Flt Permitted		0.73			0.94		0.13	1.00		0.18	1.00		
Satd. Flow (perm)		1322			1544		241	3532		344	3511		
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	71	1	14	11	1	42	13	1258	14	42	1446	69	
RTOR Reduction (vph)	0	12	0	0	35	0	0	1	0	0	3	0	
Lane Group Flow (vph)	0	74	0	0	19	0	13	1271	0	42	1512	0	
Confl. Peds. (#/hr)	1					1	4		3	3		4	
Confl. Bikes (#/hr)									1			1	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4			8			2			6			
Actuated Green, G (s)		9.0			9.0		39.6	39.6		39.6	39.6		
Effective Green, g (s)		9.0			9.0		39.6	39.6		39.6	39.6		
Actuated g/C Ratio		0.16			0.16		0.70	0.70		0.70	0.70		
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0		
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)		210			245		168	2471		240	2456		
v/s Ratio Prot								0.36			c0.43		
v/s Ratio Perm		c0.06			0.01		0.05			0.12			
v/c Ratio		0.35			0.08		0.08	0.51		0.17	0.62		
Uniform Delay, d1		21.2			20.3		2.7	4.0		2.9	4.5		
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00		
Incremental Delay, d2		1.0			0.1		0.2	0.2		0.3	0.5		
Delay (s)		22.2			20.4		2.9	4.2		3.3	4.9		
Level of Service		C			C		A	A		A	A		
Approach Delay (s)		22.2			20.4			4.2			4.9		
Approach LOS		C			C			A			A		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			5.4									HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.57										
Actuated Cycle Length (s)			56.6									Sum of lost time (s)	8.0
Intersection Capacity Utilization			60.4%									ICU Level of Service	B
Analysis Period (min)			15										
c Critical Lane Group													





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