

**Appendix F:**  
**Transportation Supporting Information**

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**Date:** April 21, 2020  
**To:** General Plan Advisory Committee  
**From:** Parisi Transportation Consulting, M-Group  
**Subject:** Future Circulation Conditions (Task 7.3)

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This report summarizes the projected future transportation and circulation conditions within the City of Sausalito. Specifically, this report covers the following topics:

- **Roadway system:** Describes proposed changes to the City's roadway system, roadway classifications, and key traffic-controlled locations.
- **Traffic circulation:** Summarizes projected future intersection level of service (LOS) and vehicle miles traveled (VMT) estimates.
- **Daily traffic volumes:** Compares future weekday daily traffic levels to existing conditions.
- **Pedestrian and bicycle networks:** Summarizes proposed changes to the pedestrian and bicyclist networks within the City of Sausalito.
- **Bus travel:** Summarizes potential future bus travel opportunities, if applicable.
- **Ferry travel:** Summarizes potential future ferry service options, if applicable.

## ROADWAY SYSTEM

There are no planned changes to Sausalito's roadway system from existing conditions through the year 2040. This includes any updates to the City's roadway classifications, right-of-way width, numbers of vehicle lanes of traffic or capacity improvements at the City's intersection approaches. Future condition analyses, described within this report, assume no changes to the roadway system. Recommended mitigations to address operational impacts to the City's roadway system based on proposed future land uses are described in the Mitigation Measures section.

However, although no changes to the roadway network are expected to be constructed, specific updates to the City's roadway system have been proposed as part of studies and operational analyses that have been conducted over the past several years, including the following:

- Ferry Terminal to Gate 6 Road Path Feasibility Study (2011) – This study proposed design options and a preferred alignment for a pedestrian and bicycle connection between the Sausalito Ferry Landing and the Gate 6 Road/Bridgeway intersection. The study identified opportunities and constraints associated with the proposed alignment, but specific changes to the roadways along this corridor in order to accommodate the pathway were not identified.
- South Gateway Complete Streets study (2016) – Specific roadway improvements were recommended as part of this study to improve multimodal access and safety through the South Gateway corridor in the City of Sausalito, including Alexander Avenue, South Street, Second Street and Richardson Street.
- Bridgeway Corridor Traffic Project (2016) – This study considered various traffic engineering improvements along the Bridgeway corridor, including:
  - Recommendations for a pilot installation of a rectangular rapid flashing beacon;

- Short-term and long-term recommendations to upgrade and improve the City's traffic signals;
- Recommended traffic signal phasing and travel lane modifications at the Bridgeway/Marinship and Bridgeway/Princess intersections.

## TRAFFIC CIRCULATION CHARACTERISTICS

This section summarizes the travel demand forecasting methods used to project future traffic volumes and resulting operations at the city's 12 primary study intersections and five gateway locations identified as part of the Comprehensive Existing Conditions Report; and vehicle miles traveled (VMT) estimates associated with the proposed future land uses. Operations at the City's study intersections are measured by Level of Service analyses.

## TRAVEL DEMAND FORECASTING

Travel demand for General Plan 2040 buildout conditions was forecasted in order to project the number of vehicle trips generated by the proposed General Plan Update land uses and the routes that these vehicle trips will take to access the proposed land uses. The traditional four-step model, which includes the following components: trip generation, trip distribution, mode choice, and trip assignment, was used to forecast vehicle trips so that future roadway impacts resulting from implementation of the City's proposed General Plan land use scenario can be determined.

**Vehicle trip generation** predicts the number of trips generated by land use category and is based on the trip rates published in the Trip Generation manual, a publication of the Institute of Transportation Engineers (ITE). The publication derives average trip rates by land use type for daily travel demand, peak hour travel demand and in/out trip splits. Using this information trip generation was calculated for each of the 19 subsections of the City called Traffic Analysis Zones (TAZ).

**Trip distribution** is the process of estimating the number of trips between one TAZ and all others and locations outside of the City by matching trip makers' origins and destinations based on proposed land use types.

**Mode choice** analysis determines what mode of transportation will be used by residents, workers and visitors associated with each land use type. This step is estimated using Census commute data. Citywide internal trip capture and pass-by trip reduction rates were also applied to trip generation estimates using the methods detailed by the Transportation Research Board (TRB, 2011) and other sources.

The **trip assignment** step assigns one or more paths to each trip link, which connects trips between each TAZ and the five locations that provide vehicular access to and from the City, called "gateways", based on existing trip distribution patterns. Trip assignment assumptions are based on existing counts and estimated travel times between the TAZs and gateways. The model then computes the number of trips on each path and calculates the total number of trips at each movement at each of the City's 12 study intersections and five gateways.

The scenarios considered as part of the operational analyses are:

**Existing Conditions** analysis is based on existing roadway segment vehicle counts that were collected over a seven-day period at four gateway locations from September 12 to September 18, 2017. Vehicle counts on Alexander Avenue were collected from September 20 to September 26, 2017. Additional vehicle counts were collected in 2019 and compared to the 2017 counts. In order to provide a conservative approach, the 2017 traffic volumes were used as part of this analysis because they were generally higher than the 2019 volumes.

The counts were collected under fair-weather conditions when local schools were in session and no special events were taking place. They include both weekday and weekend traffic volume data. Since weekday traffic volume is higher than weekend volume in most locations, analyses were conducted for weekday conditions.

The counts were collected by placing pneumatic tube counters in the travel lanes along the following roadway segments that serve as the primary gateways into and out of Sausalito:

- Bridgeway – between Gate 6 Road and Gate 5 Road;
- Rodeo Avenue – east of the US Highway 101 interchange;
- Monte Mar Avenue – east of the US Highway 101 interchange;
- Spencer Avenue - east of Monte Mar/Spencer Frontage; and,
- Alexander Avenue – north of Edwards Avenue.

Although there are times of the year when the City may experience higher traffic volumes, such as periods of higher tourist activity in the spring and summer and during special events such as the Sausalito Art Festival, the weekday average daily traffic (ADT) volumes were determined after reviewing the mid-week (Tuesday through Thursday) traffic data collected during the count period and are considered representative of annual average motor vehicle traffic volumes when schools are in session.

Traffic volumes were estimated for the Future Conditions Without General Plan Buildout and Future Conditions With General Plan Buildout scenarios.

**Future Conditions Without General Plan Buildout** scenario assumes no land use changes for Sausalito between Existing Conditions and the General Plan buildout year of 2040 and therefore no increase in internal Sausalito trips. However it does assume growth for surrounding communities, including Marin City. To account for an increase in travel from adjacent communities this scenario assumed a 10% increase in traffic of trips traveling to Marin City from the Highway 101 interchange with North Bridge Boulevard and Gate 6 Road. This scenario results in an estimated increase in vehicle volumes at the Bridgeway and Gate 6 Road intersection but would not result in an increase in traffic volumes at the City's Gateway locations. This assumption represents a conservative approach since it assumes some growth in traffic volumes despite that regional volumes in communities throughout Marin County have been flat over the past decade.

**Future Conditions With General Plan Buildout** scenario includes both the trips generated by the proposed General Plan buildout land use changes, as estimated through the Trip Forecasting method, and the increase in trips as described in the Future Conditions Without General Plan Buildout scenario.

The following assumptions were used to estimate the projected number of vehicle trips associated with the General Plan Buildout scenario:

- Trip Generation – Weekday daily and PM peak hour trip rates from the Institute of Transportation Engineers' *Trip Generation Manual* were used to estimate vehicle trips associated with each of the land use categories identified as part of the General Plan Buildout scenario. Some land use categories proposed as part of General Plan Buildout that are not represented in the *Trip Generation Manual* were assumed using an appropriate mix of compatible land uses.
- Mode Choice - Appropriate consideration was taken for non-vehicular trip making (i.e., bicycling, walking and transit) based on Census data for Sausalito, as well as for internal capture and pass-by trip making.
- Trip Distribution – to provide a conservative estimate of the impacts of trips generated under the General Plan Buildout condition, all vehicle trips were assumed to have an origin or destination outside of the City of Sausalito. Thus, for the purposes of the General Plan operational analyses, all General Plan Buildout trips pass through one of the City's gateway locations.

## DAILY TRAFFIC VOLUMES

Using the steps described in the Travel Demand Forecasting section, the number of vehicle trips generated by the proposed General Plan Update land uses were calculated. The existing and forecasted additional weekday daily and PM peak hour trips associated with the General Plan Buildout scenario are summarized in Table 1. More specific detail on these estimates and resulting impacts on the City's transportation network follow.

The number of total weekday daily number of vehicle trips forecasted to be generated by the proposed General Plan land use buildout would represent a 26% increase over existing traffic volumes. Similarly, the General Plan Buildout scenario would be expected to increase the number of vehicles in the weekday PM peak hour by 31%, with a corresponding increase of 29% and 33% in the number of vehicles entering and exiting Sausalito, respectively.

TABLE 1 – TRAVEL DEMAND FORECASTING RESULTS – EXISTING AND PROJECT VEHICLE TRIPS

VEHICLE TRIPS	EXISTING CONDITIONS	GP BUILDOUT TRIPS	FUTURE CONDITIONS WITH GP BUILDOUT	% CHANGE
Weekday	39,000	10,100	49,100	+26%
PM Peak Hour	2,900	900	3,800	+31%
PM PEAK HOUR IN	1,400	400	1,750	+25%
PM PEAK HOUR OUT	1,500	500	2,050	+37%

Source: Parisi Transportation Consulting, 2020

Table 2 provides the estimated number of weekday daily and PM peak hour volumes associated with General Plan Buildout conditions from each of the Traffic Analysis Zones in Sausalito. Tables 3 and 4 depict the estimated weekday daily and PM peak hour volumes at the five gateway locations for the Existing and Future Conditions scenarios.

### TRIPS BY TRAFFIC ANALYSIS ZONE

The estimated number of additional weekday daily and PM peak hour trips for each of the City's 19 Traffic Analysis Zones (TAZs) were generated using the four-step method and the proposed quantities of land use categories proposed under the 2040 General Plan Update. The number of estimated trips associated with General Plan Buildout conditions are summarized in Table 2.

Proposed land use changes in TAZ 14 (Old Town area generally bounded by Bridgeway, Napa Street and Johnson Street) are projected to generate the most number of daily and PM peak hour vehicle trips primarily due to the increase in square footage of the Mixed Residential and Commercial land use category.

Collectively, TAZs representing the Marinship properties (TAZs 4-9) would be expected to generate approximately 20% of total daily vehicle trips at General Plan buildout. Given that the proposed land uses in these TAZs, which include Waterfront Commercial, Industrial, Waterfront, and General Commercial, would be expected to result in an increase in workers, these TAZs would generate a disproportionate percentage of weekday PM peak hour trips. Outbound trips from the Marinship TAZs in the PM peak hour would be projected to generate approximately 30% of total new PM peak hour trips and 40% of the total number of new outbound trips in this time period.

The City's Traffic Analysis Zones (TAZs) and estimated number of daily and PM peak hour trips to be generated per TAZ under 2040 General Plan buildout conditions are illustrated in Figure 1.

TABLE 2 – PROJECT TRIPS BY TAZ

TAZ	Proposed Land Uses	Proposed General Plan Land Use Quantities		Weekday (Daily) Project Trips	Weekday PM Peak Hour Project Trips		
		# Residential Units/# ADUs	# S.F. Non-Residential	Total Trips	Total Trips	Inbound	Outbound
TAZ 1	Residential; ADUs	3/1		18	2	1	1
TAZ 2	Waterfront; Central Comm.; Comm. Waterfront	--	52,084	1050	70	37	33
TAZ 3	Waterfront; Comm. Waterfront	--	77,178	719	71	16	55
TAZ 4	Waterfront	--	18,343	57	8	3	5
TAZ 5	Industrial; Waterfront	--	28,793	133	19	4	15
TAZ 6	Industrial	--	6,087	38	6	1	5
TAZ 7	Industrial	--	66,710	411	57	7	50
TAZ 8	Industrial; Waterfront	--	283,301	967	129	41	88
TAZ 9	Industrial	--	25,175	155	22	3	19
TAZ 10	Industrial; Waterfront; General Comm.	--	23,887	243	23	6	17
TAZ 11	Residential; ADUs; Neighborhood Comm.	38/21	7,077	501	39	24	15
TAZ 12	Residential; ADUs; Central Comm.	1/13	21,325	749	47	27	20
TAZ 13	Residential; ADUs; Central Comm.; Mixed Residential & Comm.; Neighborhood Comm.	32/36	32,963	1407	98	58	40
TAZ 14	Residential; ADUs; Mixed Residential & Comm.	27/0	65,020	2228	141	80	61
TAZ 15	Residential; ADUs; Neighborhood Comm.	48/9	3,847	384	32	20	12
TAZ 16	Residential; ADUs	20/10		147	14	9	5
TAZ 17	Residential; ADUs; Neighborhood Comm.	30/2	22,294	876	59	34	25
TAZ 18	Residential; ADUs	11/3	--	85	9	6	3
TAZ 19	N/A	--	--	4	2	1	1

Source: Parisi Transportation Consulting, 2020





LEGEND



Traffic Analysis Zone

# Daily Trips

# PM Peak Hour Trips

## Sausalito General Plan Update

Figure 1: Project Trips Per Traffic Analysis Zones

### DAILY TRAFFIC VOLUMES (ADT)

Under Existing Conditions Sausalito generates approximately 39,000 vehicle trips into and out of the City each average weekday. The number of daily (weekday) vehicle trips into and out of Sausalito would be estimated to increase by 26% to approximately 49,100 under the General Plan Buildout condition. Daily traffic volumes at the Bridgeway/North Bridgeway and Alexander Avenue gateway locations would represent approximately 84% of the total daily volume under the Future Conditions With General Plan Buildout scenario, and volumes at these two gateway locations would increase by 26% and 33%, respectively, from existing volumes. The Rodeo Avenue, Monte Mar Drive, and Spencer Avenue gateway locations collectively represent about 16% of daily traffic volumes, and would increase from existing conditions by 17%, 18%, and 22% respectively.

A summary of the average existing weekday volumes for all inbound and outbound vehicles traveling to and from Sausalito is presented in Figure 2. Figure 3 summarizes the projected weekday volumes for the Future Conditions With General Plan Buildout condition.

TABLE 3 – GATEWAY VOLUMES (TOTAL DAILY ADT)

Total Daily ADT	EXISTING CONDITIONS	FUTURE CONDITIONS WITHOUT GP BUILDOUT	FUTURE CONDITIONS WITH GP BUILDOUT	% CHANGE
<b>Bridgeway/ N. Bridgeway</b>	26,500	26,500	33,400	+26%
<b>Rodeo Ave</b>	1,800	1,800	2,100	+17%
<b>Monte Mar Dr</b>	1,700	1,700	2,000	+18%
<b>Spencer Ave</b>	3,200	3,200	3,900	+22%
<b>Alexander Ave</b>	5,800	5,800	7,700	+33%
<b>Total – Five Gateways</b>	<b>39,000</b>	<b>39,000</b>	<b>49,100</b>	<b>+26%</b>

Source: Parisi Transportation Consulting, 2020



**Figure 2: Existing Conditions - Average Daily Traffic Volumes (Weekday)**  
 City of Sausalito General Plan Update



**Figure 3: Future Conditions With General Plan Buildout - PM Peak Hour Traffic Volumes (Weekday)**  
 City of Sausalito General Plan Update

### PM PEAK TRAFFIC VOLUMES

Based on the collected counts at the five City gateways, the City experiences a total volume of approximately 2,900 vehicles accessing and egressing the City (1,300 inbound and 1,600 outbound) on an average weekday evening between 5:00 and 6:00 PM. The difference in the inbound and outbound volumes shows the average number of people visiting the City either for work or recreation during an average weekday afternoon peak hour.

By comparison, on an average weekday evening under Future Conditions With General Plan Buildout conditions, the City is projected to experience a PM peak hour traffic volume of approximately 3,800 vehicles (1,750 inbound and 2,050 outbound) during the PM peak hour at the five City gateways. PM peak hour volumes are expected to increase by 30% at the Bridgeway/North Bridgeway location and at the Alexander Avenue location. Volumes at the Rodeo Avenue and Monte Mar Drive gateway locations are each expected to increase in the PM peak hour by 50%, from approximately 100 to 150 vehicles. The Spencer Avenue location would be expected to experience a 25% increase in PM peak hour traffic volumes, representing an increase of 50 vehicles in the PM peak hour.

Further details of each of the Gateway locations follow.

TABLE 4 – GATEWAY VOLUMES (PM PEAK HOUR)

PM Peak Hour	EXISTING CONDITONS	FUTURE CONDITIONS WITHOUT GP BUILDOUT	FUTURE CONDITIONS WITH GP BUILDOUT	% CHANGE
<b>Bridgeway/ N. Bridgeway</b>	2,000	2,000	2,600	+30%
<b>Rodeo Ave</b>	100	100	150	+50%
<b>Monte Mar Dr</b>	100	100	150	+50%
<b>Spencer Ave</b>	200	200	250	+25%
<b>Alexander Ave</b>	500	500	650	+30%
<b>Total – Five Gateways</b>	<b>2,900</b>	<b>2,900</b>	<b>3,800</b>	<b>+31%</b>

Source: Parisi Transportation Consulting, 2020

### Bridgeway Traffic Volumes

Bridgeway is categorized as a primary arterial street designed to accommodate 20,000 daily vehicle trips in its two-lane segment and 50,000 daily vehicle trips in its four-lane segment. Based on existing traffic patterns approximately 70% of motor vehicle traffic coming into and going out of Sausalito use the Bridgeway/Gate 6 Road intersection. The segment of Bridgeway just south of Gate 6 Road, experiences average daily traffic of 26,500 motor vehicles under existing conditions. Projected Future Conditions With General Plan Buildout would increase the number of motor vehicles to approximately 33,400 average daily vehicle trips (26% increase). Since this section of Bridgeway has been designed for 50,000 vehicles, Bridgeway would still be operating under capacity under the General Plan Buildout scenario.

At this location, the peak hour with the highest traffic volumes generally occurs between 4:00 and 5:00 PM with a total of approximately 2,000 vehicles under Existing Conditions, though congestion can be present from 4:00 PM to 7:00 PM. Under Future Conditions With General Plan

Buildout condition, Bridgeway just south of Gate 6 Road a total of approximately 2,600 vehicles would be projected in the PM peak hour under the General Plan Buildout scenario (30% increase).

### *Alexander Avenue Traffic Volumes*

Alexander Avenue from Second Street to the City Limit is categorized as a Secondary Arterial Street designed to accommodate between 5,000 to 20,000 daily vehicle trips. During an average weekday Alexander Avenue experiences average daily traffic of about 5,800 total motor vehicles. Under the Future Conditions With General Plan Buildout scenario the number of vehicles would increase to approximately 7,700 trips (33% increase).

The weekday evening peak hour occurs between 4:30 and 5:30 PM with an average of 500 vehicles under existing conditions. Under the Future Conditions With General Plan Buildout scenario Alexander Avenue the number of vehicles would be expected to increase to approximately 650 in the evening peak hour (30% increase).

While the anticipated additional vehicle volumes due to the General Plan Buildout scenario are not expected to result in a capacity in excess of Alexander Avenue's existing design capacity, large numbers of bicyclists, particularly in the northbound direction along Alexander Avenue, may slow vehicular speeds at times. Total weekday bicycle volumes in the PM peak hour averages about 200 in the springtime and about 300 in summertime.

To address multimodal conflicts in the South Gateway corridor, the City of Sausalito initiated the City of Sausalito South Gateway Complete Street Study (2016). This study proposed improvement concepts along the Alexander Avenue/South Street/Second Street/Richardson Street corridor intended to reduce conflict and improve safety and comfort for all modes in this area.

### *US Highway 101 Off-Ramp Traffic Volumes*

Average motor vehicle traffic volumes at the three on-ramp/off-ramp locations from US Highway 101 (i.e., Rodeo Avenue from northbound US 101, and Monte Mar Avenue and Spencer Avenue from both northbound and southbound US 101) are much lower than the volume along Bridgeway and Alexander Avenue with a cumulative 6,700 daily vehicle trips. Under the Future Conditions With General Plan Buildout conditions, daily traffic volumes would be expected to increase to approximately 8,000 average daily vehicle trips (19% increase).

The evening peak hour occurs between 5:30 and 6:30 PM with 400 vehicles under existing conditions. Under Future Conditions With General Plan Buildout conditions at the three U.S. Highway 101 interchange locations would have a total of approximately 550 vehicles (38% increase) in the evening peak hour.

The anticipated additional vehicle volumes due to the General Plan Buildout scenario are not expected to result in a capacity in excess of the existing design capacity of Rodeo Avenue, Monte Mar Drive or Spencer Avenue.

Figure 4 provides a summary of the projected numbers of inbound and outbound vehicles traveling to and from Sausalito in the PM peak hour under the Future Conditions With General Plan Buildout scenario.





**Figure 4: Future Conditions With General Plan Buildout - PM Peak Hour Traffic Volumes (Weekday)**  
 City of Sausalito General Plan Update

## LEVEL OF SERVICE DEFINITIONS

Signalized intersection level of service is defined in terms of the average total motor vehicle delay for all movements through an intersection. Vehicle delay is a method of quantifying several intangible factors, including driver discomfort, frustration, and lost travel time. Specifically, level of service criteria is stated in terms of average delay per vehicle during a specified period. Vehicle delay is based on many variables, including signal phasing (i.e., the order of movements through the intersection), signal cycle length, and traffic volumes with respect to intersection capacity.

Unsignalized intersection level of service criteria can be further reduced to three intersection types: all-way stop-controlled, two-way stop-controlled, and one-way stop-controlled. All-way stop-controlled intersection level of service is expressed in terms of the average vehicle delay of all the movements, much like that of a signalized intersection.

Two-way and one-way stop-controlled intersection level of service is defined in terms of the average vehicle delay for individual movement(s). This is because the performance of the stop-controlled approach is more closely reflected in terms of its specific movements, rather than its performance overall. Intersection average vehicle delay (i.e., average delay of all movements) for a one-way and two-way stop-controlled intersection should be viewed with discretion.

Table 5 lists the criteria used to define level of service for signalized and unsignalized intersections.

TABLE 5 - HIGHWAY CAPACITY MANUAL LEVEL OF SERVICE DEFINITIONS FOR INTERSECTION CONTROL DELAY

LEVEL OF SERVICE	LEVEL OF SERVICE DEFINITIONS FOR INTERSECTIONS		
	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)		DESCRIPTION
	SIGNALIZED	UNSIGNALIZED	
<b>A</b>	≤ 10	≤ 10	Free flow
<b>B</b>	> 10 – 20	> 10 – 15	Stable flow (slight delays)
<b>C</b>	> 20 – 35	> 15 – 25	Stable flow (slight delays)
<b>D</b>	> 35 – 55	> 25 – 35	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
<b>E</b>	> 55 – 80	> 35 – 50	Unstable flow (intolerable delay)
<b>F</b>	> 80	> 50	Forced flow (jammed)

Source: Transportation Research Board, 2000.

## Intersection Level of Service

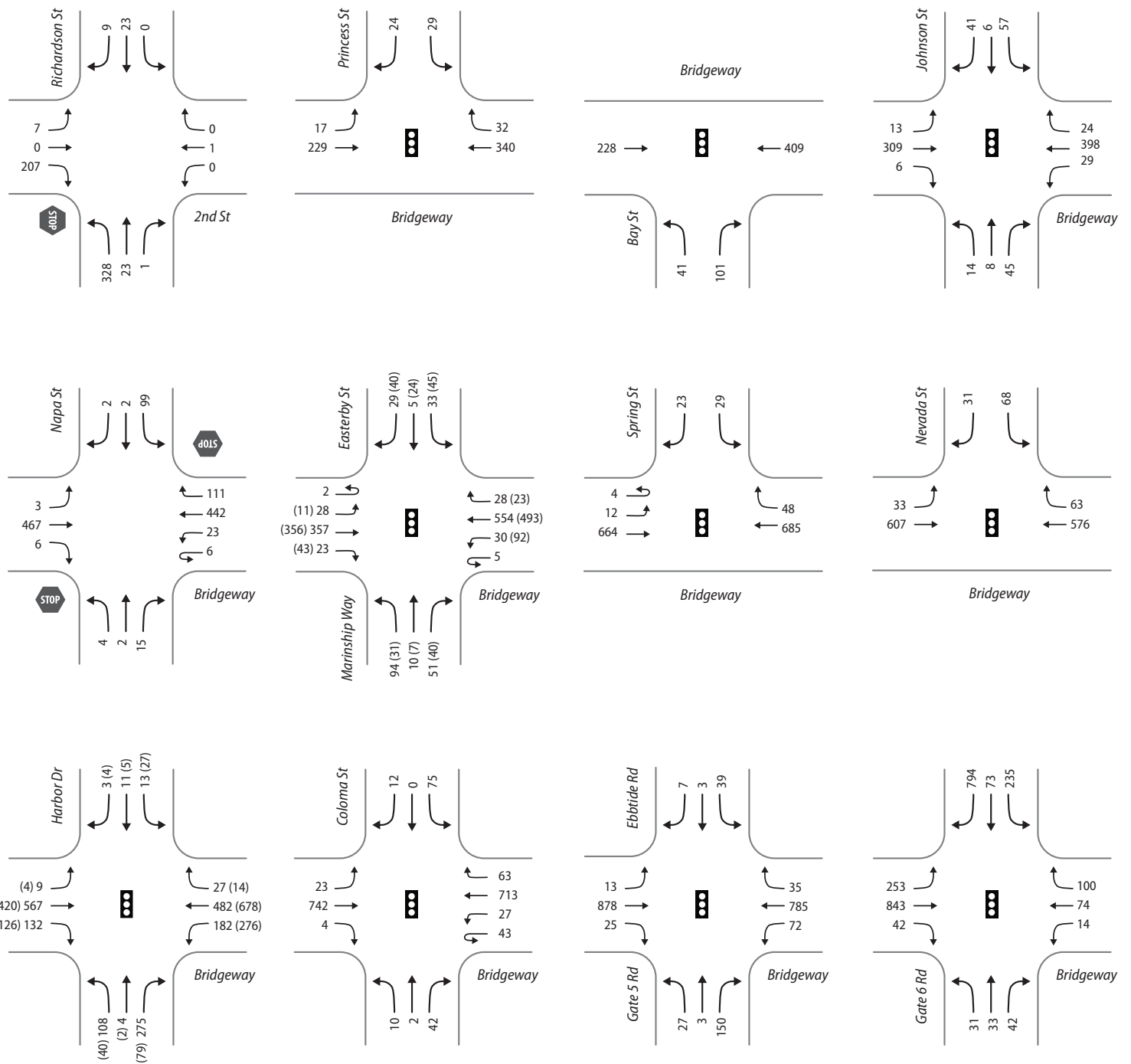
Level of service (LOS) was analyzed under the three different scenarios, and summarized in Table 6: Existing Conditions, Future Conditions Without General Plan Buildout, and Future Conditions With General Plan Buildout (see page 22 for Table 6).



### Existing Conditions

Intersection level of service analysis was conducted at the 12 study intersections within Sausalito using motor vehicle turning movement counts that were conducted at the intersections during the evening peak period (4:00 PM to 6:00 PM) and during the morning peak period (7:00 AM to 9:00 AM) at two study intersections (Bridgeway/Harbor Drive and Bridgeway/Easterby Street/Marinship Way). These intersections were included to evaluate delays and left-turn queuing from Bridgeway into the Marinship properties that occurs in the AM peak hour at these intersections.

The counts captured school-related motor vehicle traffic as well as tourist-related motor vehicle traffic. The peak hour volumes could be considered representative of the highest intersection volumes experienced at each intersection on an average weekday. The study intersections and existing peak hour turning movement counts are summarized in Figure 5.



LEGEND: (xx) AM Peak xx PM Peak



Signal Controlled Intersection

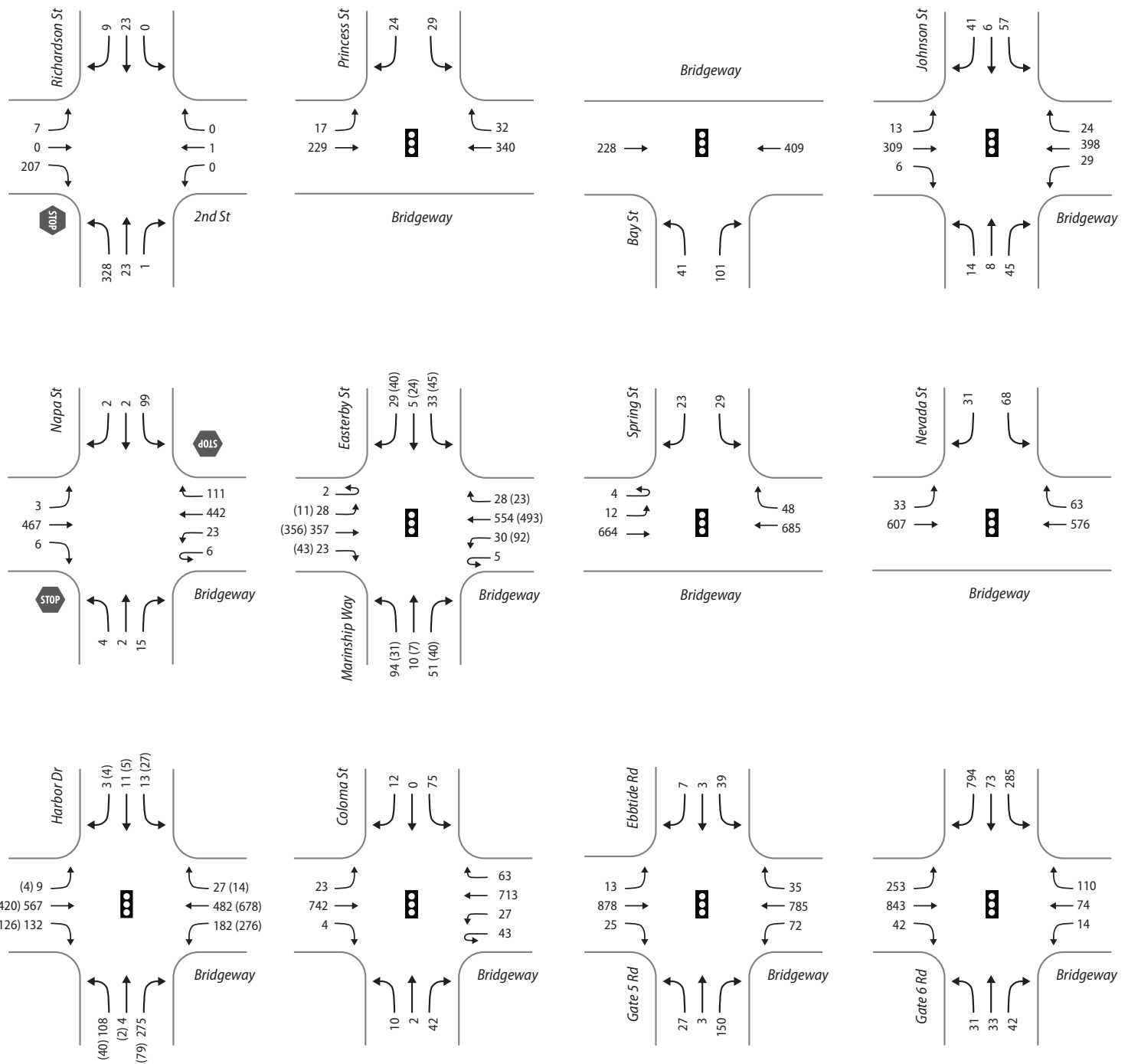


Stop Controlled Intersection

City of Sausalito General Plan Update  
 Figure 5: Existing Conditions – Vehicle Trips

### Future Conditions Without General Plan Buildout

Estimated traffic volumes were estimated for the 2040 General Plan buildout year without the land use changes proposed as part of the General Plan update. The projected future additional volumes from adjacent communities were added to the existing counts to obtain future conditions. The study intersections and peak hour turning movement counts for the Future Conditions Without General Plan Buildout scenario are summarized in Figure 6.



LEGEND: (xx) AM Peak xx PM Peak



Signal Controlled Intersection



Stop Controlled Intersection

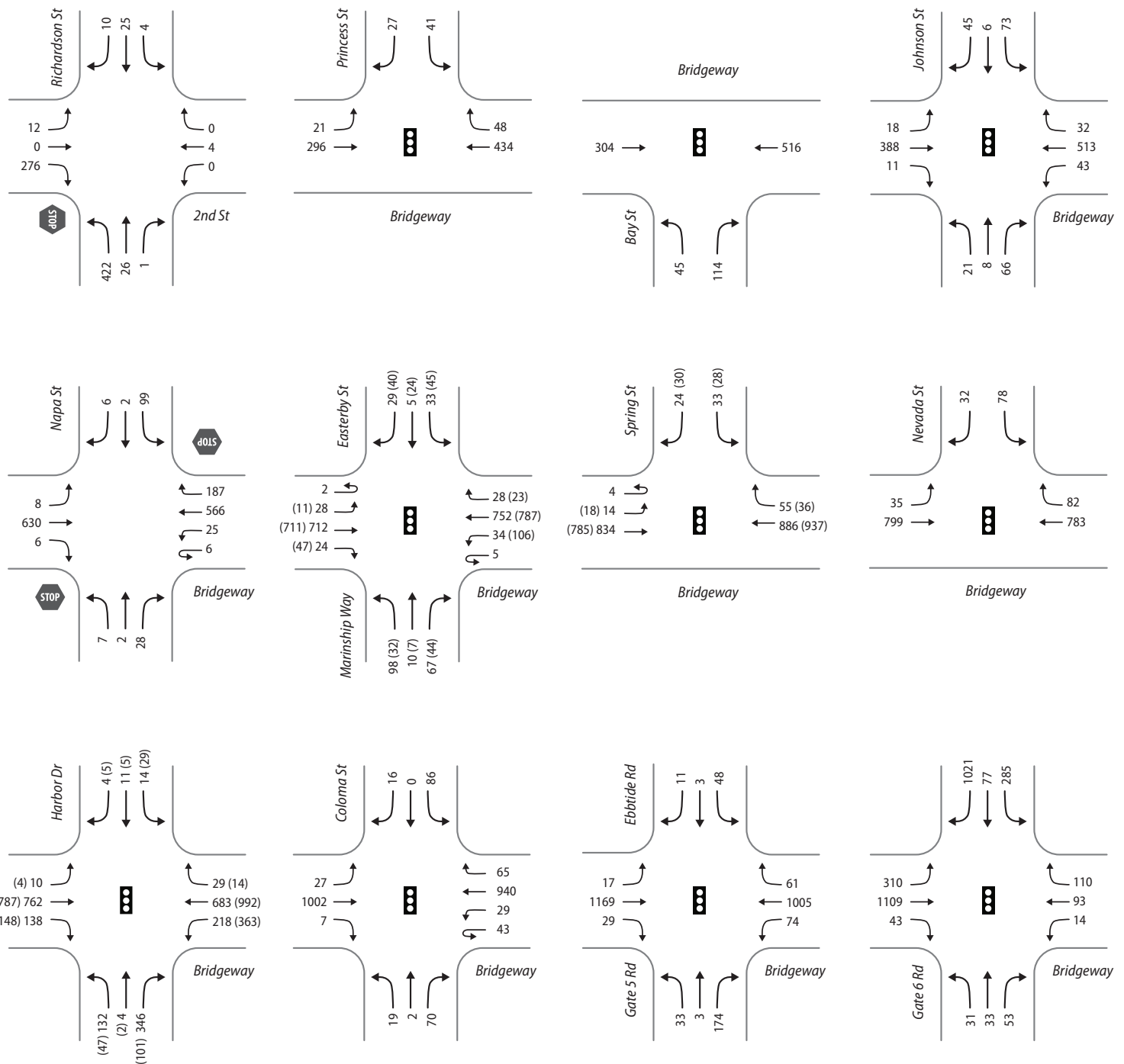
## City of Sausalito General Plan Update

### Figure 6: Future Conditions

### Without General Plan Buildout – Vehicle Trips

### Future Conditions With General Plan Buildout

Estimated future conditions traffic volumes were estimated for the 2040 General Plan buildout year with the land use changes proposed as part of the General Plan update. The projected project volumes were added to the Future Conditions Without General Plan Buildout volumes to obtain projected Future Conditions With General Plan Buildout conditions. The study intersections and peak hour turning movement counts for this scenario are summarized in Figure 7.



**City of Sausalito General Plan Update**  
**Figure 7: Future Conditions**  
**With General Plan Buildout – Vehicle Trips**

Intersection performance was evaluated for the study intersections for the existing and the two future condition scenarios. The evaluations estimate motorist delay experienced at each intersection for the three scenarios described above. The evaluation provides a LOS grade for each intersection in accordance with the *Highway Capacity Manual* LOS Methodology and analyzed using Trafficware *Synchro 10* software. The *Highway Capacity Manual* LOS methodology, developed by the Transportation Research Board, is currently the most widely used and accepted technique for analyzing traffic operations. The methodology is best-suited for analyzing the performance of isolated facilities with relatively moderate congestion problems such as the Sausalito roadways which have no more than two lanes in each direction.

The level of service at each of these intersections in the weekday PM peak hour for the Existing, Future Conditions Without General Plan Buildout and Future Conditions With General Plan Buildout scenarios is summarized in Table 6. In addition to the PM peak hour analysis, two intersections were evaluated in the AM peak hour due to concerns about queueing and vehicle capacity during this time period.

PM Peak Hour Level of Service at each of the 12 study intersections remains constant between Existing Conditions to Future Conditions With General Plan Buildout, indicating that the additional volume projected to be generated by the additional land uses proposed as part of the General Plan buildout scenario are expected to be accommodated by existing geometry and signal timing at each intersection. Average motorist delay would increase slightly at each intersection.

Recurring congestion on US-101, particularly in the northbound direction, typically does not impact the Level of Service at the intersections along Bridgeway Avenue close to the northbound on-ramp. However, on occasion, incidents on the highway that restrict traffic capacity can occasionally result in impacts at these City intersections due to backups on the highway.

In response to congestion concerns along US-101 in Marin County the Transportation Authority of Marin (TAM) and Caltrans are managing three projects intended to improve conditions and reduce congestion on US-101:

- Northbound US-101 to Eastbound I-580 Direct Connector Project – TAM has begun the planning and environmental phase of a potential direct highway connection between northbound US-101 to eastbound I-580. If completed, this project could relieve congestion and delays on northbound US-101.
- Ramp Metering – Caltrans is installing ramp metering along US-101 in Marin County, starting with the northbound direction from Spencer Avenue to Sir Francis Drake Boulevard. Ramp metering is expected to reduce congestion by regulating the flow of traffic entering the freeway, increasing speeds of traffic by breaking up platoons of cars.
- Richmond-San Rafael Bridge Improvement Project – a PM peak hour (2:00 – 7:00pm) auxiliary lane in the eastbound direction on the Richmond-San Rafael Bridge and associated upstream improvements were recently constructed to improve peak hour traffic flow and reduce delays on the eastbound approach to the bridge.

TABLE 6 – INTERSECTION LEVEL OF SERVICE SUMMARY – EXISTING CONDITIONS AND FUTURE CONDITIONS (PM PEAK HOUR)

INTERSECTION	CONTROL	EXISTING CONDITIONS		FUTURE CONDITIONS WITHOUT GP BUILDOUT		FUTURE CONDITIONS WITH GP BUILDOUT	
		PM PEAK HOUR		PM PEAK HOUR		PM PEAK HOUR	
		LOS	Delay	LOS	Delay	LOS	DELAY
BRIDGEWAY / GATE 6 RD	Signal	C	24.5	C	25.8	C	30.5
BRIDGEWAY / GATE 5 RD / EBBTIDE RD	Signal	A	9.9	A	9.9	B	11.1
BRIDGEWAY / COLOMA ST	Signal	B	10.8	B	10.8	B	11.9
BRIDGEWAY / HARBOR DR	Signal	C	21.3	C	21.3	C	24.6
BRIDGEWAY / NEVADA ST	Signal	A	6.9	A	6.9	A	7.3
BRIDGEWAY / SPRING ST	Signal	A	9.6	A	9.6	B	10.0
BRIDGEWAY / EASTERBY ST / MARINSHIP WAY	Signal	B	14.0	B	14.0	B	13.4
BRIDGEWAY / NAPA ST	TWSC	A	8.0	A	8.0	A	32.7
BRIDGEWAY / JOHNSON ST	Signal	C	21.5	C	21.5	C	25.9
BRIDGEWAY / BAY ST	Signal	A	6.7	A	6.7	A	6.8
BRIDGEWAY / PRINCESS ST	Signal	B	17.7	B	17.7	B	19.9
RICHARDSON / 2 <sup>ND</sup> ST	OWSC	A	< 5.0	A	< 5.0	A	< 5.0

Notes: TWSC = Two-Way Stop-Controlled, OWSC=One-Way Stop-Controlled. Delay is measured in seconds per vehicle.

Source: Parisi Transportation Consulting, 2017, 2020

### AM Peak Hour Level of Service

Two key intersections were evaluated for weekday AM peak hour operations: Bridgeway/Harbor Drive and Bridgeway/Easterby Street/Marinship Way. These intersections were evaluated because they are key entry points to Marinship and currently experience southbound left-turning volumes that are close to or can exceed the turning lane's storage capacity during the weekday AM peak hour.

During the AM peak hour these intersections function at LOS C and B, respectively, as detailed in Table 7. Based on the analysis the level of service at these intersections under Future Conditions With General Plan Buildout conditions remains the same as in Existing Conditions, with only slight increases in overall intersection delay.



TABLE 7 – INTERSECTION LEVEL OF SERVICE SUMMARY – EXISTING CONDITIONS AND FUTURE CONDITIONS (AM PEAK HOUR)

INTERSECTION	CONTROL	EXISTING CONDITIONS		FUTURE CONDITIONS WITH GP BUILDOUT		FUTURE CONDITIONS WITH GP BUILDOUT	
		AM PEAK HOUR		AM PEAK HOUR		AM PEAK HOUR	
		LOS	Delay	LOS	Delay	LOS	DELAY
BRIDGEWAY / HARBOR DR	Signal	C	21.2	C	21.2	C	27.1
BRIDGEWAY / EASTERBY ST / MARINSHIP WAY	Signal	B	16.9	B	16.9	B	17.0

Table 8 provides a comparison of level of service, average vehicle delay and 95% queue lengths in the AM peak period between Existing and Future Conditions With General Plan Buildout conditions for the southbound-to-eastbound movement that has been identified as a concern. Also provided is the approximate length of the southbound to eastbound left-turn pocket at each of the intersections that provide access for vehicles from the north into the Marinship properties.

### Level of Service

Under Existing Conditions the southbound to eastbound left-turn movements at the Bridgeway/Harbor and Bridgeway/Easterby/Marinship intersections operate at LOS D and E, respectively. Levels of service remain at these levels under the Future Conditions Without General Plan Buildout and Future Conditions With General Plan Buildout scenarios.

### Average Delay

Under Future Conditions With General Plan Buildout conditions, average delay for left-turning vehicles increases at the two intersections as compared to Existing Conditions. In particular, average delay for the left-turn movement at the Bridgeway/Harbor Drive intersection increases from 35.3 seconds under Existing Conditions to 48.3 seconds under Future Conditions With General Plan Buildout. Average left-turn delay at the Bridgeway/Easterby/Marinship intersection increases from 68.3 to 69.4 seconds.

### Queue Lengths

Under Existing Conditions the 95% queue lengths (i.e., the vehicle queue that may be exceeded five percent of the time, which is considered the “design queue”) for the southbound left-turn movement at Bridgeway/Easterby/Marinship (120 feet) are longer than the length of the left-turn pocket (approximately 60 feet), indicating that queued left-turning vehicles can block one of the through lanes on southbound Bridgeway during the AM peak hour. At the Bridgeway/Harbor Drive intersection, the 95% vehicle queue length for the southbound left-turn movement is 170 feet which can be accommodated within the existing 300-foot left-turn pocket length.

However, queuing at the intersections would increase with the additional volume under the Future Conditions With General Plan Buildout scenario. At the Bridgeway/Harbor Drive intersection, the 95% queue in the AM peak period would increase from 170 feet today to 440 feet in the Future Conditions Plus Project scenario. Similarly, at the Bridgeway/Easterby/Marinship Way intersection 95% queues would extend from 120 feet today to 130 feet under Future Conditions With General Plan Buildout. This would indicate that in the AM peak hour vehicles making left-turn movements

into the Marinship properties at both intersections may exceed the length of the left-turn pocket and spill into the adjacent southbound through travel lanes, potentially resulting in safety-related impacts.

TABLE 8 – LEFT-TURN LEVEL OF SERVICE AND QUEUEING SUMMARY – EXISTING CONDITIONS AND FUTURE CONDITIONS (AM PEAK HOUR)

INTERSECTION	CONTROL		EXISTING CONDITIONS				FUTURE CONDITIONS WITH GP BUILDOUT			
			AM PEAK HOUR				AM PEAK HOUR			
		Left Turn Pocket Length (ft)	Left-Turn Volume	LOS	Delay	95% Queue (ft)	Left-Turn Volume	LOS	DELAY	95% Queue (ft)
BRIDGEWAY/ HARBOR DR	SB Left Turn	300	276	D	35.3	170	363	D	48.3	440
BRIDGEWAY/ EASTERBY ST/ MARINSHIP WAY	SB Left Turn	60	92	E	68.3	120	106	E	69.4	130

## RECOMMENDATIONS

### Bridgeway/Marinship Way and Bridgeway/Harbor Street Intersections

In order to accommodate estimated weekday AM peak hour left-turn vehicular queuing from southbound Bridgeway into Harbor Street, the left-turn lane could be extended to 440 feet by removing a portion of the center median, which includes street lights and landscaping.

To enable predicted left-turn queues into Marinship Way, the median island between Marinship Way/Easterby Street and Spring Street could be removed. The median has minimal landscaping and includes two street lights.

### Bridgeway Corridor

In order to address multimodal conflicts and aging infrastructure as well as encourage mode shift on the Bridgeway corridor, the City should implement the recommendations from two studies:

The 2018 **Marin County Systemic Safety Analysis** was developed to provide a collision analysis of Marin County's arterial and collector road networks and a list of systemic low-cost and longer-term countermeasures. The report considered conditions in each of the county's jurisdiction, including Sausalito, and provided potential countermeasures along each city's high injury corridors and intersections. These mitigations proposed for Sausalito address some of the City's aging infrastructure as well as address some of the key multimodal conflict points. Some of the potential improvements identified in the report for Bridgeway include:

- Pedestrian crossing improvements – installing high visibility crosswalks, curb extensions, advanced stop bars, tightening of curb radii, leading pedestrian intervals, center pedestrian refuge islands, and pedestrian scale lighting.
- Signal improvements – upgrading of traffic signal hardware to provide signal phasing, coordinating signals at multiple locations, installing larger heads, prohibiting right turns on red, and adding video detection.
- Bicycle facility improvements – providing greater separation between bicycles and vehicles, installing green paint through conflict zones and adding bicycle signals at key locations.

The **Bridgeway Corridor Traffic Project** (2016) resulted in a study of the Bridgeway corridor to develop engineering recommendations for:

- Enhanced Pedestrian Crossings – recommendation for an enhanced pedestrian crossing at the Bridgeway/Napa Street intersection;
- Signal Network Upgrades – A physical and operational inventory and analysis of the City-controlled signalized intersections on Bridgeway resulted in a series of short- and long-term recommendations to upgrade the signal network to improve safety and vehicle flow along the corridor;
- Improvements at Bridgeway/Marinship and Bridgeway/Princess intersections – the study reviewed traffic operations at both intersections and recommended traffic signal phasing and travel lane modifications to improve traffic operations.

## VEHICLE MILES TRAVELED

Vehicle Miles Traveled (VMT) is a performance measure that relates motor vehicle trip mobility to the performance of traffic facilities within a predefined location. While VMT only includes vehicle trip counts, the metric inherently accounts for the benefits of transit and active transportation trips that reduce motor vehicle travel.

Consideration of VMT as a threshold for traffic impact studies as an alternative to Level of Service (LOS) is required by California state law (Senate Bill 743). In response to SB 743 the state's Office of Planning and Research (OPR) updated the existing methods for evaluating transportation impacts under the California Environmental Quality Act (CEQA). OPR established a Vehicle-Miles-Traveled (VMT) metric to assess traffic impacts instead of the prevailing Level of Service standard. However, although auto delay must no longer be considered a significant impact under CEQA, SB 743 does not prevent local jurisdictions from establishing locally appropriate metrics as a standard outside of the CEQA process.

The use of VMT as a performance measure allows for the evaluation of traffic impacts associated with greenhouse gas emissions. It can be measured as a total or on a *per-capita* basis and can be used to estimate fuel consumption by motor vehicles for distances traveled. Increase in VMT for gasoline-powered vehicles would cause an increase in the GHG emissions from vehicles making these trips.

Guidance from OPR states that using a travel forecasting model is preferred because a travel model would account for both 'project generated VMT' and the 'project effect on VMT' which would include the effect of the project on operating speeds that will further influence VMT.

### TAM Model

The Transportation Authority of Marin (TAM) developed the Transportation Authority of Marin Demand Model (TAMDM), a tour-based assessment of travel behavior that produces VMT estimates for cities through Marin County, including Sausalito. While both Caltrans and MTC have also produced VMT estimates for the region, including Sausalito, these regional models may not contain a level of accuracy and sensitivity for local area applications and should include a sub-area validation process, to calibrate and validate the model within the study area. This process was conducted for Marin County as part of the TAMDM development process.

The TAMDM presents VMT as per resident, per worker and per service population.

- **VMT per resident** includes all home-based trips which include discretionary trips, eating out, maintenance, school, shopping, university and visiting trip types. This VMT type would not include work-based trips such as going out to lunch or running an errand where work location is the origin of the trip.
- **VMT per worker** includes all work-related trip purposes including home-base work, and work based but not other home-based trip types.
- **VMT per service population** better measures the full VMT effects of the general plan by including all vehicle trip types, including trips taken by residents, people employed in Sausalito, students and visitors.

Existing and projected future VMT for Sausalito per service population is presented below in Table 9.

TABLE 9 – EXISTING AND PROJECTED FUTURE VMT PER SERVICE POPULATION

SAUSALITO	Total VMT	SERVICE POPULATION (POPULATION + EMPLOYMENT)	TOTAL VMT PER SERVICE POPULATION
EXISTING VMT	623,781	21,460	29.1
FUTURE VMT	785,940	27,008	29.1

Source: Existing VMT from TAMDM, Source: Parisi Transportation Consulting, 2020

The VMT analysis make a conservative assumption that adding similar land uses to existing areas would create similar VMT outcomes. Proposed land uses that incorporate similar features to existing areas will tend to exhibit similar VMT as existing conditions, as travel behavior is largely affected by location-based characteristics that will largely be similar in both existing and future conditions, such as transit accessibility, proximity to job centers, roadway design, roadway connectivity, density, regional accessibility and housing and jobs mix (Victoria Transportation Policy Institute, 2020)<sup>1</sup>. Thus, this analysis assumes that future trips associated with existing and future land uses proposed as part of the 2040 General Plan Update will exhibit a similar VMT as estimated in Existing Conditions by the Transportation Authority of Marin Demand Model. However, this is likely to over-estimate VMT and the impacts from the proposed increases in land

<sup>1</sup> Litman, Todd. (2020. March). Land Use Impacts on Transportation: How Land Use Factors Affect Travel Behavior. Victoria Transportation Policy Institute, retrieved from <https://www.vtpi.org/landtravel.pdf>

uses in Sausalito given that increased infill development combined with measures to mitigate VMT would be expected to result in a decrease in VMT.

The City of Sausalito has not set significance thresholds for acceptable versus unacceptable levels of VMT for CEQA analysis. These thresholds would define what constitutes an acceptable level of VMT and what requires mitigation measures to reduce VMT. At the project level OPR recommends setting land use project VMT thresholds at fifteen percent below baseline VMT per capita for the City. Another approach is for the lead agency to develop their own jurisdiction-specific VMT thresholds. Thresholds should be consistent with key transportation planning documents such as Plan Bay Area which contains regional and local projections of VMT growth associated with expected changes in population, employment and the regional transportation network. Additional VMT reduction may be achieved at the project level through TDM strategies and active transportation network expansion which are not fully accounted for in regional level travel forecasting models. Examples of these strategies are described below.

### VM T REDUCTION MEASURES

Measures can be implemented that can avoid or substantially reduce the impacts of increased vehicle miles traveled as a result of Sausalito's General Plan buildout scenario. Several examples identified by the California Office of Planning and Research (OPR) of potential mitigation measures and alternatives to reduce VMT are described below. It is important to note that the selection of mitigation measures and alternatives are left to the discretion of the lead agency and may vary, depending on the details of the proposed project and its significant impacts.

Programmatic measures that have been identified to reduce vehicle miles traveled include, but are not limited to:

- Establish a Parking and Transportation Demand Management Ordinance that provides a framework for assessing VMT impacts and planning VMT mitigation strategies as part of the review and permitting process for both new residential and commercial developments. The framework should support and align with the City's General Plan and be compliant with SB 743.
- Develop a Vision Zero/Local Road Safety Plan that is focused on improving pedestrian and bicycle safety by providing a framework to help local agencies identify safety projects.
- Ensure that projects are located near transit.
- Increase connectivity and/or intersection density on the project site.
- Increase project density.
- Increase the mix of uses within the project or within the project's surroundings.
- Establish a Transportation Impact Fee as a mechanism for funding multimodal infrastructure and other transportation improvements. Nexus studies can be conducted to establish impact fees to mitigate development level VMT. Impact fees can be used to fund corridor-level and active transportation projects in addition to intersection-level improvements.

The OPR does recognize that VMT is largely a regional impact and thus regional VMT-reduction programs may be an appropriate form of mitigation. Additionally, in lieu fees have been found to be valid mitigation where there is both a commitment to pay fees and evidence that mitigation will occur. Fee programs are particularly useful to address cumulative impacts, though the mitigation program must undergo a CEQA evaluation, either on the program as a whole, or the

in-lieu fees or other mitigation must be evaluated on a project-specific basis. The CEQA evaluation could be part of a larger program analyzed in a Program EIR.

Examples of project level mitigation measures that may contribute towards a reduction in VMT may include:

- Work with local transit agencies to encourage services changes that address expected future demand based on land use changes.
- Improve or increase access to transit.
- Increase access to common goods and services, such as groceries, schools and daycare.
- Incorporate affordable housing into the project.
- Orient the project toward transit, bicycle and/or pedestrian facilities.
- Improve pedestrian and bicycle networks, or transit service.
- Provide traffic calming.
- Provide bicycle parking.
- Limit or eliminate parking supply.
- Unbundle parking costs.
- Provide parking cash-out programs.
- Implement roadway pricing.
- Implement or provide access to a commute reduction program.
- Provide car-sharing, bike sharing and ride-sharing programs.
- Provide transit passes.
- Providing telework options.
- Providing incentives or subsidies that increase the modes other than single-occupancy vehicle.
- Providing on-site amenities at places of work, such as priority parking for carpools and vanpools, secure bike parking, and showers and locker rooms.
- Providing a guaranteed ride home service to users of non-auto modes.

## PEDESTRIAN AND BICYCLE CONDITIONS

In 2018 the City of Sausalito updated its Bicycle and Pedestrian Master Plan in order to document the current state of walking and bicycling in the City, review the policies, programs, and priorities that relate to the maintenance and improvement of bicycle and pedestrian access within the City, and inform the update to the City's General Plan.

As outlined in the Pedestrian/Bicycle Plan, the following goals have been established to set a long-term vision for the pedestrian and bicycle networks and serve as the foundation to the plan:

- Plan and implement improvements in Sausalito.
- Involve the community in the planning and implementation of the pedestrian and bicycle network by encouraging public participation through local coordination with City staff.
- Build upon and enhance the existing pedestrian and bicycle network, program and resources in Sausalito.
- Maximize multi-modal connections to the pedestrian and bicycle networks.
- Improve pedestrian and bicyclist safety conditions in Sausalito.
- Develop and prioritize detailed improvements in the Plan.



- Identify walking and bicycling as a significant mode of transportation and develop coordinated strategies to support pedestrian and bicycle infrastructure and programs.
- Maximize the amount of state and federal funding for non-motorized improvements that can be received by Sausalito.
- Continue to implement the proposed pedestrian and bicycle network and provide comprehensive maintenance to the existing network.
- Continue to develop a downtown pedestrian and bicycle corridor and promote downtown Sausalito as a walk- and bicycle-friendly tourist destination.

Several improvement projects are documented in the draft plan. These projects incorporate recommendations from previous studies and plans on facilities in the City. Below is a summary of some of the key improvements that have been proposed as part of various programs and projects that have been developed in recent years:

- **Ferry Terminal to Gate 6 Road Path Feasibility Study (2011)** – This study considered alignment and design options for a pedestrian and bicycle connection between the Sausalito Ferry Landing and the Bridgeway/Gate 6 intersection. While the study identified opportunities and constraints associated with the proposed alignment, specific changes to the roadways along this corridor in order to accommodate the pathway were not identified. It is recommended that the City proceed with planning and detailed design on this project in advance of General Plan Buildout in order to identify and plan for impacts on the roadways.
- **City of Sausalito South Gateway Complete Street Project (2016)** – The South Gateway Complete Streets Project was conducted to evaluate existing circulation conditions and to develop conceptual designs that would improve multimodal access and safety through the South Gateway corridor in the City of Sausalito. The corridor consists of Alexander Avenue, South Street, Second Street, and Richardson Street and it provides a transportation route of regional importance between San Francisco and Sausalito as well as other areas in southern Marin County. Roughly one-third of traffic along the corridor is bicycle traffic and 2-3% consists of pedestrian traffic. The existing right-of-way along the corridor is generally perceived to be too narrow to accommodate these levels of multimodal traffic concurrently and safely.

A number of measures have been proposed as part of this project in order to heighten the visibility of pedestrians and bicyclists, reconstruct and regrade driveway crossings to make a more comfortable pedestrian experience, and install bulb-outs and other measures intended to slow vehicle speeds. Initial improvement concepts were developed in consultation with the City of Sausalito Public Works staff based on crash concentration and the observed conditions at each location.

- **SausalitoPlus Ambassador Program** – the SausalitoPlus bicycle ambassador program is an effort to improve bicycle safety and help mitigate the impacts of large volumes of bicyclists in the City's downtown area. The seasonal program (March through October) relies on volunteers located throughout the south end of the City near the Ferry Terminal.
- **Bicycle Parking** – in order to help meet demand for bicycle parking and to address concerns expressed by merchants, a large quantity of short-term bicycle parking has been installed along Bridgeway, near shops on Caledonia Street and around the downtown area.

In addition, a bicycle corral near the ferry terminal is provided to help manage demand during peak summer months.

## TRANSIT CONDITIONS

### BUS TRANSIT TRAVEL

In 2018 Marin County voters approved Measure AA, the Marin County Transportation Sales Tax Renewal Expenditure Plan, which extended the ½ cent transportation sales tax for an additional 20 years, through 2039. Fifty-five percent of Measure AA funding is distributed towards funding four categories of service, which includes the provision of efficient and effective local bus service to reduce congestion and meet community needs, including services to schools and specialized services for seniors and people with disabilities.

The Marin County Transit District (Marin Transit) has released its 2020-2029 Short Range Transit Plan which uses current information, financial resources and performance targets to prepare a ten-year vision of local public transit service, including the bus and shuttle services that are provided by Marin Transit. The Plan articulated the preservation of existing transit service in Sausalito and the rest of Marin County with little growth in the District's fixed route services.

### FERRY TRAVEL

The Sausalito Ferry connects downtown Sausalito with the San Francisco Ferry Building. The route currently provides 18 crossings on weekdays and 12 crossings on weekends and holidays. Supplemental service is provided during select summer weekend afternoons to alleviate overcrowding.

In the agency's Short-Range Transit Plan that covers fiscal years 2018/19 to 2027-28 the Golden Gate Bridge, Highway and Transportation District does not propose changes to ferry service or bus routes that provide access to the Sausalito Ferry. However, the Sausalito Ferry Terminal is expected to receive an upgrade in its passenger boarding system as part of the Sausalito Ferry Terminal Improvements Project. The project proposes a wider, modern boarding facility that is ADA-compliant and will allow for easier boarding and unloading of passengers, including those with bicycles. This project would not result in increased capacity of the facility or any added frequency of service.