Seagate Multifamily Housing

Transportation Impact Analysis Report

REVISED

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City of San Rafael

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EXECUTIVE SUMMARY

This study analyzes the transportation impacts associated with the multifamily housing project proposed by Seagate Properties for 703 3rd Street in San Rafael. The project will construct 120 multi-family dwelling units (i.e., apartments) to replace two buildings with a total of 14,572 square feet of retail and service-related land use.

Fehr & Peers determined that the project will have no significant impacts under baseline with project and cumulative with project conditions. Analysis consisted of:

- Traffic operations at 32 intersections
- Traffic operations on five arterials
- Bicycle, pedestrian, and transit conditions at these locations and adjacent to the project site

INTRODUCTION

This report documents the existing, baseline and cumulative conditions for the Seagate Multifamily Housing project proposed by Seagate Properties for 703 3rd Street in San Rafael, then analyzes the impacts of the proposed project on baseline and cumulative conditions.

PROJECT DESCRIPTION

As proposed, the project will construct 120 multi-family dwelling units (i.e., apartments) to replace two buildings with a total of 14,572 square feet of retail and service-related land use. The project includes 121 parking spaces, replacing 17 existing off-street parking spaces.

This report was developed in 2016 and 2017 based on a project consisting of 138 multi-family dwelling units and 152 parking spaces. Changes were subsequently incorporated into the project to reduce the number of units and parking spaces. Because the current proposed project is smaller than the analyzed project, the impacts of the current project will be equal to or less than the conclusions reported. The report was also updated in late 2018 to include a cumulative 2040 scenario at the request of the City.

As shown in Figure 1, the project site is located at 703 3rd Street in San Rafael, California, and is bounded by 3rd Street to the north, 770 2nd Street to the south, Tamalpais Avenue (West) to the east, and Lincoln Avenue to the west. The project is located in downtown San Rafael, CA, directly west of the C. Paul Bettini Transit Center, the Sonoma-Marin Area Rail Transit (SMART) San Rafael downtown station, and the US 101/2nd Street interchange. Downtown San Rafael is a mixed-use environment containing a variety of retail, restaurant, office, hotel, government, entertainment, and other land uses.

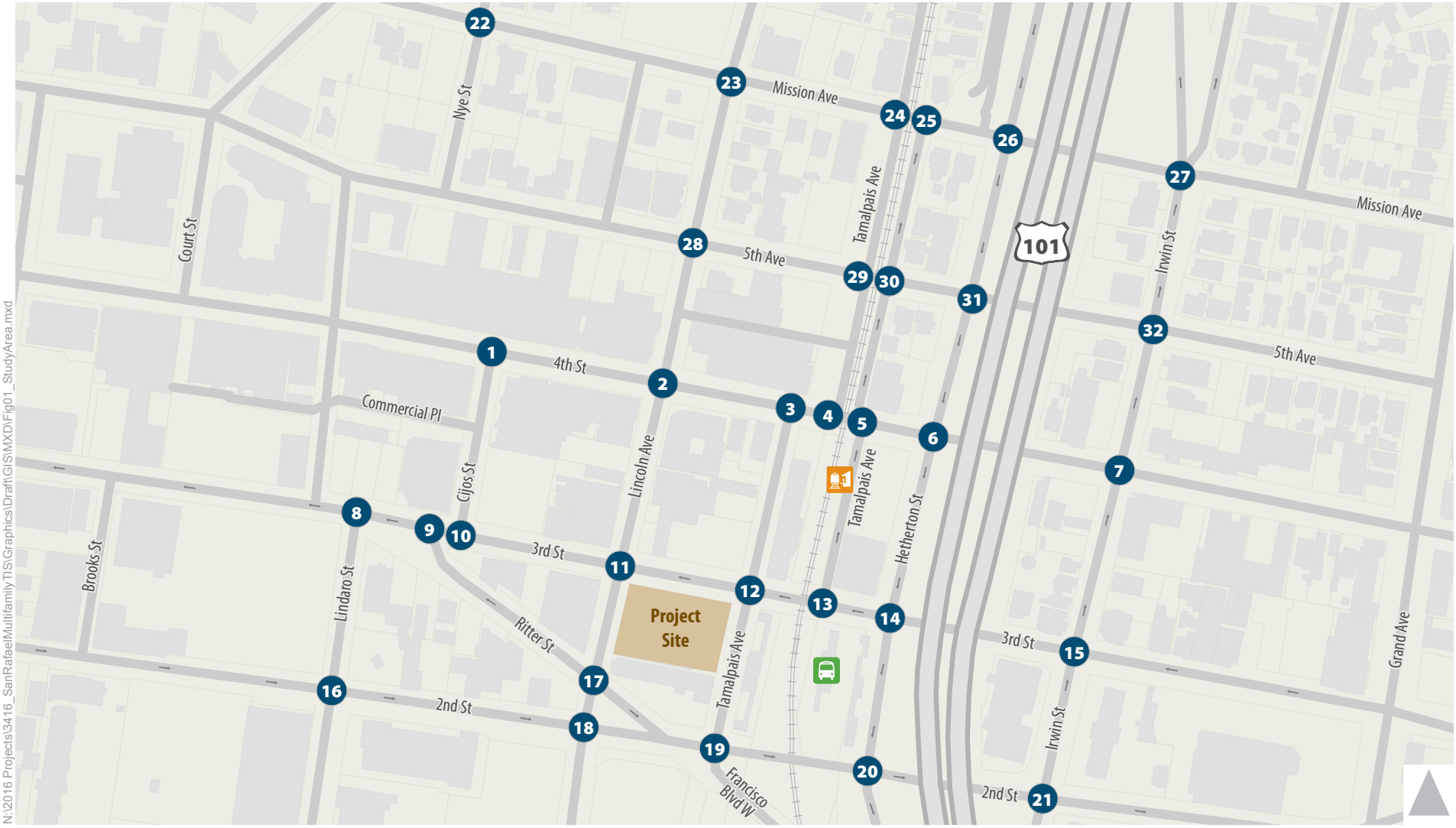


Figure 1

Study Area

STUDY AREA

Intersections are generally the critical nodes of urban roadway networks that control system capacity and driver experience. Therefore, the operations of critical intersections surrounding the project site are used as indicators of the adequacy of the vehicular circulation system. During the scoping of the transportation impact analysis, the City requested analysis of 32 intersections in the area bounded by Mission Avenue to the north; 2nd Street on the south; Irwin Street to the east; and Nye Street, Cijos Street, and Lindaro Street to the west (see Figure 1). These intersections are:

1. 4th Street / Cijos Street
2. 4th Street / Lincoln Avenue
3. 4th Street / Tamalpais Avenue (West) South Leg
4. 4th Street / Tamalpais Avenue (West) North Leg
5. 4th Street / Tamalpais Avenue (East)
6. 4th Street / Hetherton Street
7. 4th Street / Irwin Street
8. 3rd Street / Lindaro Street
9. 3rd Street / Ritter Street
10. 3rd Street / Cijos Street
11. 3rd Street / Lincoln Avenue
12. 3rd Street / Tamalpais Avenue (West)
13. 3rd Street / Tamalpais Avenue (East)
14. 3rd Street / Hetherton Street
15. 3rd Street / Irwin Street
16. 2nd Street / Lindaro Street
17. Lincoln Avenue / Ritter Street
18. 2nd Street / Lincoln Avenue
19. 2nd Street / Francisco Boulevard - Tamalpais Avenue (West)
20. 2nd Street / US 101 Southbound Ramp - Hetherton Street
21. 2nd Street / US 101 Northbound Ramp - Irwin Street
22. Mission Avenue / Nye Street
23. Mission Avenue / Lincoln Avenue
24. Mission Avenue / Tamalpais Avenue (West)
25. Mission Avenue / Tamalpais Avenue (East)
26. Mission Avenue / Hetherton Street
27. Mission Avenue / Irwin Street
28. 5th Avenue / Lincoln Avenue
29. 5th Avenue / Tamalpais Avenue (West)
30. 5th Avenue / Tamalpais Avenue (East)
31. 5th Avenue / Hetherton Street
32. 5th Avenue / Irwin Street

ANALYSIS SCENARIOS

The analysis evaluates transportation conditions during a typical weekday AM peak hour, occurring between 7:00 and 9:00 AM, and PM peak hour, occurring between 4:00 and 6:00 PM, when the surrounding roadway network has the highest traffic volumes.

This report presents analysis of the following scenarios:

- **Existing Conditions** – Existing volumes based on recent traffic counts.
- **Baseline Conditions** – Existing volumes plus traffic volume estimates for approved, but not yet constructed, developments; traffic increases due to regional growth expected prior to the proposed project opening; and approved/funded transportation system improvements expected to be in place when the project opens.
- **Baseline With Project Conditions** – Traffic volumes from baseline conditions plus traffic volume estimates for the proposed project, minus traffic generated by existing land use on the project site.
- **Cumulative Conditions** – Traffic estimates for market-level population and employment growth and expected transportation improvements for year 2040. This scenario includes:
    - Background growth, derived from the Metropolitan Transportation Commission Travel Demand Model
    - Conversion of C Street and D Street between 4th Street and 5th Street from one-way to two-way
    - Conversion of Tamalpais Avenue West between Mission Avenue and 4th Street from two-way to one-way southbound
    - Conversion of Tamalpais Avenue West between 4th Street and 3rd Street from two-way to one-way northbound
    - Changing downtown signal timing from pre-timed to adaptive
- **Cumulative With Project Conditions** – Traffic volumes from cumulative conditions plus traffic volume estimates for the proposed project, minus traffic generated by existing land use on the project site.

STUDY METHODOLOGY

Traffic operations were analyzed for weekday AM and PM peak hour conditions using the Synchro software program. For signalized intersections, the percentile delay method was used except for cumulative conditions. For unsignalized intersections, the percentile delay method was not available, so Highway Capacity Manual (Transportation Research Board, 2010) (HCM 2010) methodology was used. For cumulative conditions analysis of signalized intersections, HCM 2010 methodology was used for consistency with other recent studies in the City. The HCM 2010 methodology in Synchro does not provide delay or LOS when signal timing includes a pedestrian-only phase, non-standard ring-barrier structures, intersections with more than four legs, or clustered intersections. Thus, the results for those intersections are based on HCM 2000 methodology.

The percentile delay method is an extension of the HCM 2000 methodology that Synchro uses for its signal optimization procedure. The intersection volumes are varied according to a Poisson distribution to look at delay over a range of conditions, and a volume weighted average is calculated. In contrast, the HCM 2000 or 2010 methodology uses a single volume set to calculate intersection delay. Compared to HCM 2000, HCM 2010 has changes that improve the accuracy of intersection delay estimates, especially for actuated signals.

Existing and baseline conditions data were provided in Synchro network and data files by the City of San Rafael and then updated with traffic count data collected on June 2, 2016.

The Metropolitan Transportation Commission Travel Demand Model was used to estimate traffic growth in the study area for cumulative conditions. Although this model is the best available forecasting tool for San Rafael, it does not have a network and traffic analysis zone structure sufficient to forecast traffic volume by segment in the study area. Thus the model was used to determine expected annual traffic volume growth in the study area.

Level of service is a qualitative measure of traffic operating conditions whereby a letter grade, from A (the best) to F (the worst), is assigned. These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving. In general, LOS A represents free-flow conditions with no congestion, and LOS F represents severe congestion and delay under stop-and-go conditions. Table 1 displays the average delay ranges associated with each LOS category for intersections from the San Rafael 2020 General Plan.

TABLE 1: INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Average Control Delay (seconds/vehicle)[1]	
	Signalized	Unsignalized
A	0 – 10.0	0 – 10.0
B	10.1 – 20.0	10.1 – 15.0
C	20.1 – 35.0	15.1 – 25.0
D	35.1 – 55.0	25.1 – 35.0
E	55.1 – 80.0	35.1 – 50.0
F	> 80.0	> 50.0

Notes:

1. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and acceleration delay based on Highway Capacity Manual (Transportation Research Board, 2010). Thresholds from San Rafael 2020 General Plan.

For signalized intersections, the LOS is based on the average delay experienced by all vehicles passing through the intersection. For side-street stop controlled intersections, the delay and LOS for the worst movement is reported along with the average delay for the entire intersection.

Table 2 displays the average travel speed ranges associated with each LOS category for arterials. These thresholds are from the San Rafael 2020 General Plan.

TABLE 2: ARTERIAL LEVEL OF SERVICE DEFINITIONS

Level of Service	Speed (mph)[1]
A	> 25.1
B	19.1 - 25.0
C	13.1 – 19.0
D	9.1 – 13.0
E	7.1 – 9.0
F	< 7.0

Notes:
1. Speed thresholds from San Rafael 2020 General Plan.

SIGNIFICANCE CRITERIA

The following thresholds were used to determine if the proposed project would result in a significant transportation impact.

SIGNALIZED INTERSECTIONS[1]

The citywide LOS standard from the San Rafael General Plan 2020 is LOS D except as noted below:

- LOS E
    a. Downtown
    b. Irwin Street and Grand Avenue between 2nd Street and Mission Avenue
    c. Andersen Drive and West Francisco Boulevard
    d. Andersen Drive and Bellam Boulevard
    e. Freitas at Civic Center/Redwood Highway
    f. Merrydale at Civic Center Drive

[1] Signalized intersections at Highway 101 on-ramps and off-ramps are exempt from LOS standards because delay at these intersections is affected by regional traffic and not significantly impacted by local measures.

- LOS F

    a. Mission Avenue and Irwin Street

The San Rafael General Plan 2020 EIR defines the following as significant impacts:

- If a signalized intersection with baseline traffic volumes is operating at an acceptable LOS and deteriorates to an unacceptable operation with the addition of project traffic; or
- If a signalized intersection with baseline traffic volumes is at an unacceptable LOS and project traffic causes an increase in the delay of five seconds or more.

UNSIGNALIZED INTERSECTIONS

Consistent with the San Rafael General Plan 2020 EIR, a significant impact at an unsignalized intersection is identified based on the following:

- If an unsignalized intersection with baseline traffic volumes is operating at an acceptable LOS (LOS A, B, C, D, or E) and deteriorates to an unacceptable operation (LOS F) with the addition of Project traffic; or
- If an unsignalized intersection with baseline traffic volumes is already operating at LOS F and Project traffic causes an increase in the delay of five seconds or more.

ARTERIALS

The citywide LOS standard for arterials, as defined in San Rafael General Plan 2020, is LOS D except as noted below (Congestion Management Segments are west of US-101):

a. Downtown except as noted below — E
    - Congestion Management Segments (Second, Third and Fourth Streets) — D

b. Arterials operating at LOS E outside Downtown, and F — F

W-Trans memorandum dated September 22, 2016, confirmed that, for the arterials in this analysis, LOS standard is D for 2nd Street and 3rd Street and LOS F for all other arterials.

For the purposes of this analysis, a significant impact to an arterial is identified based on the following, consistent with the San Rafael General Plan 2020 EIR and the 2015 Marin County Congestion Management Plan Update:

- If an arterial with baseline traffic volumes is operating at an acceptable LOS and deteriorates to an unacceptable operation with the addition of project traffic.
- If an arterial with baseline traffic volumes is already at an unacceptable LOS and project impact causes a decrease in the calculated average travel speed of five miles per hour or more.

BICYCLE/PEDESTRIAN

The San Rafael General Plan 2020 includes the following goals for pedestrian and bicycle conditions:

Goal 16: Bikeways. It is the goal of San Rafael to have safe, convenient and attractive bikeways and amenities.

Goal 17: Pedestrian Paths. It is the goal of San Rafael to have safe, convenient and pleasurable pedestrian amenities.

Consistent with these goals, bicycle/pedestrian impacts would be significant if the project:

- Caused a substantial inconvenience or substantial reduction in quality of service for users of existing bicycle or pedestrian travel
- Substantially reduced bicycle or pedestrian access
- Substantially reduced safety for bicyclists or pedestrians

TRANSIT

The San Rafael General Plan 2020 includes the following goals related to the transit network:

C-14 Transit Network. Encourage the continued development of a safe, efficient, and reliable regional and local transit network to provide convenient alternatives to driving.

Consistent with this goal, transit impacts would be significant if the project:

- Induced substantial growth or concentration of population beyond the capacity of existing or planned public transit facilities.
- Increased demand for public transit service to such a degree that accepted service standards are not maintained.
- Reduced availability of public transit to users, or interfered with existing transit users.

EXISTING CONDITIONS

The Existing Conditions scenario includes volumes based on 2016 traffic counts. These conditions are considered to be comparable to 2018 conditions. Bottlenecks such as the US 101 corridor inherently meter traffic into downtown. The City of San Rafael maintains a database of existing traffic volumes and provided Synchro files for use in this traffic study. Additional traffic counts were collected at study intersections on 2nd Street, 3rd Street, and 4th Street on Thursday, June 2, 2016, during the AM (7-9 AM) and PM (4-6 PM) peak periods. Schools were in session at the time of the counts, weather conditions were dry, and no unusual traffic conditions were observed.

This scenario is informative and establishes present-day traffic conditions at the study intersections.

ROADWAY NETWORK

The local circulation system near the project is shown in Figure 1. The project site is located in downtown San Rafael and west of US 101. The following roadways provide local access to the proposed project site. All of these local streets have sidewalks along both sides unless otherwise noted:

3rd Street – 3rd Street is primarily a three-lane one-way street that runs west. 3rd Street widens from two lanes to three lanes at Grand Avenue and then continues under the freeway into downtown. At E Street, 3rd Street reduces to two lanes, and then merges with 2nd Street just west of Hayes Street. On-street parking is prohibited along the north side of 3rd Street and the south side east of Lindaro Street.

2nd Street – 2nd Street is primarily a three-lane one-way street that runs east. 3rd Street separates from 3rd Street and widens to three lanes just east of Miramar Avenue and continues through downtown. At Grand Avenue, 2nd Street reduces to two lanes, and then merges with 3rd Street. On-street parking is prohibited along 2nd Street. There are no sidewalks on the north side of 2nd Street between Lincoln Avenue and Ritter Street and the south side of 2nd Street between Francisco Boulevard and Irwin Street.

Lincoln Avenue – Lincoln Avenue is primarily a two-lane street that runs north-south. During the 4-6 PM peak period, parking is prohibited north of 2nd Street and the street operates with four lanes. Lincoln Avenue is also a Class III bikeway (bike route) south of 4th Street.

Tamalpais Avenue – Tamalpais Avenue is primarily a two-lane street that runs north-south. Francisco Boulevard becomes Tamalpais Avenue north of 2nd Street. Tamalpais Avenue also splits into parallel western and eastern segments on either side of the railroad tracks between Mission Avenue and 3rd

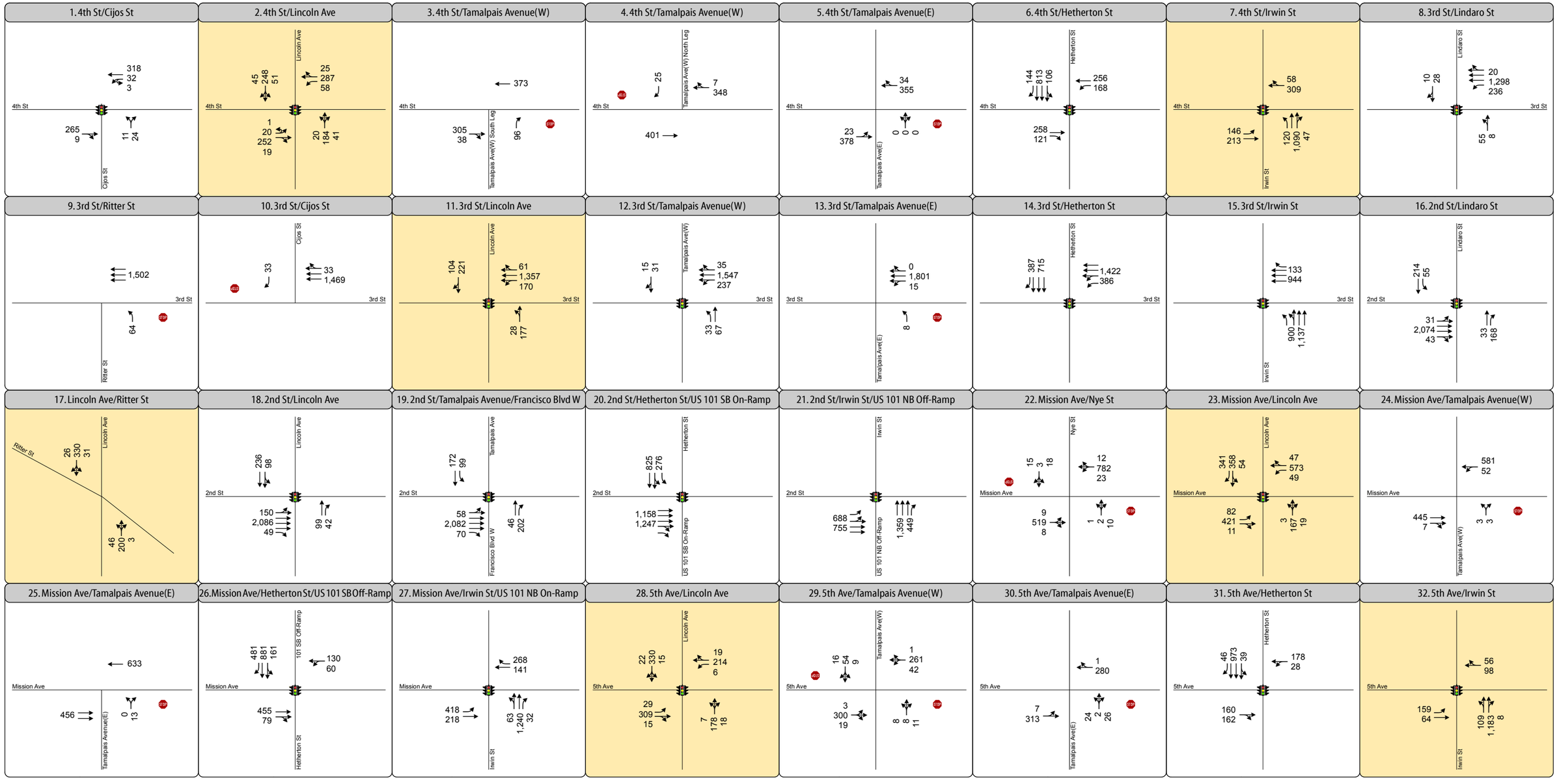
Street. Through traffic is not permitted on the western segment through 4th Street. The eastern segments are one-way northbound.

Ritter Street – Ritter Street is a short one-lane street running one way northwest from Lincoln Avenue to 3rd Street and one way southeast from Lincoln Avenue to 2nd Street. Sidewalks are not present on the south side of Ritter Street between Lincoln Avenue and 2nd Street.

Figure 2 and Figure 3 display the existing peak hour traffic volumes, lane configurations, and traffic controls at each intersection for the AM and PM peak hours, respectively. Peak period hours observed were 7:45-8:45 AM and 4:30-5:30 PM.

INTERSECTION OPERATIONS

Table 3 summarizes the existing levels of service (LOS) at the study intersections. All intersections operate acceptably. At intersection 22, Mission Avenue / Nye Street in the PM peak period, where the stop-controlled southbound movement is delayed to LOS F due to the volume of traffic on Mission Avenue, but the overall intersection operates acceptably. Appendix A presents all LOS calculations.



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Turn Lane

AM (PM) Peak Hour Traffic Volume

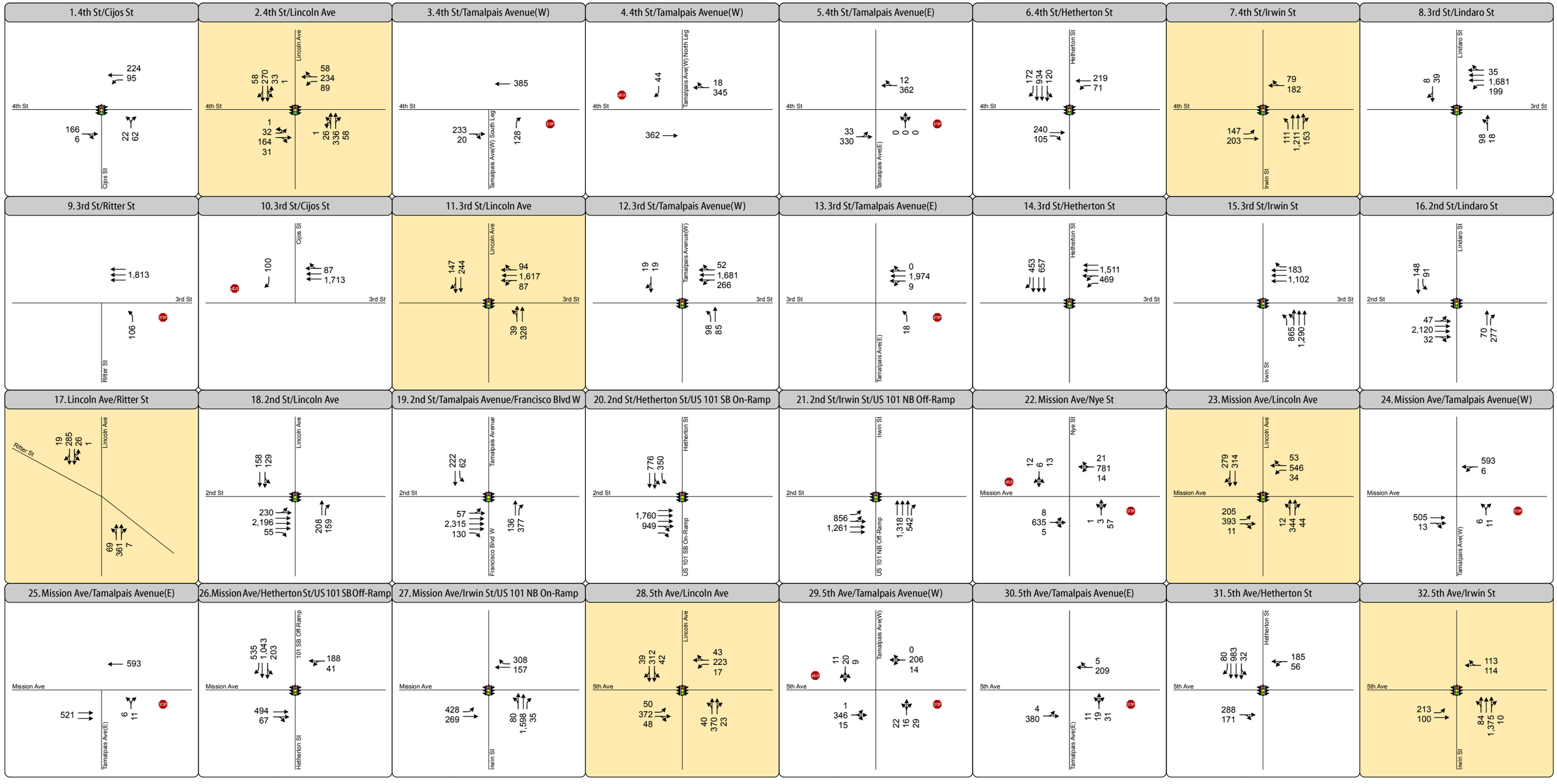
Traffic Signal

Stop Sign

Highlighted intersections represent intersections where lane configurations are different between the AM and PM peak hours.

Figure 2

AM Peak Hour Traffic Volumes and Lane Configurations - Existing Conditions



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Turn Lane

AM (PM) Peak Hour Traffic Volume

Traffic Signal

Stop Sign

Highlighted intersections represent intersections where lane configurations are different between the AM and PM peak hours.

Figure 3

PM Peak Hour Traffic Volumes and Lane Configurations - Existing Conditions

TABLE 3: WEEKDAY PEAK HOUR INTERSECTION OPERATIONS – EXISTING CONDITIONS

Intersection	Control Type	LOS / Average Delay[1,2,3]	
		AM	PM
1. 4th Street / Cijos Street	Signal	A / 9	A / 7
2. 4th Street / Lincoln Avenue	Signal	B / 16	A / 10
3. 4th Street / Tamalpais Avenue (West) South Leg	SSSC	A (B) / 1 (12)	A (B) / 2 (12)
4. 4th Street / Tamalpais Avenue (West) North Leg	SSSC	A (B) / 0 (11)	A (B) / 1 (12)
5. 4th Street / Tamalpais Avenue (East)	SSSC	A (A) / 0 (8)	A (A) / 0 (8)
6. 4th Street / Hetherton Street	Signal	A / 9	A / 10
7. 4th Street / Irwin Street	Signal	B / 15	B / 11
8. 3rd Street / Lindaro Street	Signal	A / 4	A / 6
9. 3rd Street / Ritter Street	SSSC	A (C) / 0 (16)	A (C) / 1 (20)
10. 3rd Street / Cijos Street	SSSC	A (C) / 0 (20)	A (E) / 2 (35)
11. 3rd Street / Lincoln Avenue	Signal	B / 12	B / 13
12. 3rd Street / Tamalpais Avenue (West)	Signal	A / 7	A / 8
13. 3rd Street / Tamalpais Avenue (East)	SSSC	A (C) / 0 (21)	A (C) / 0 (23)
14. 3rd Street / Hetherton Street	Signal	B / 13	C / 31
15. 3rd Street / Irwin Street	Signal	B / 15	C / 25
16. 2nd Street / Lindaro Street	Signal	B / 20	B / 18
17. Lincoln Avenue / Ritter Street	SSSC	A (A) / 1 (8)	A (A) / 1 (8)
18. 2nd Street / Lincoln Avenue	Signal	B / 11	B / 15
19. 2nd Street / Francisco Boulevard - Tamalpais Avenue	Signal	A / 9	B / 17
20. 2nd Street / US 101 Southbound Ramp - Hetherton Street	Signal	C / 23	C / 23
21. 2nd Street / US 101 Northbound Ramp - Irwin Street	Signal	B / 16	C / 26
22. Mission Avenue / Nye Street	SSSC	A (E) / 1 (41)	A (F) / 2 (56)
23. Mission Avenue / Lincoln Avenue	Signal	C / 23	C / 24
24. Mission Avenue / Tamalpais Avenue (West)	SSSC	A (C) / 0 (19)	A (C) / 0 (16)
25. Mission Avenue / Tamalpais Avenue (East)	SSSC	A (A) / 0 (10)	A (C) / 0 (15)
26. Mission Avenue / Hetherton Street - US 101 Southbound Ramp	Signal	C / 26	C / 22
27. Mission Avenue / Irwin Street - US 101 Northbound Ramp	Signal	D / 50	B / 19
28. 5th Avenue / Lincoln Avenue	Signal	B / 15	B / 11
29. 5th Avenue / Tamalpais Avenue (West)	SSSC	A (C) / 3 (16)	A (C) / 3 (15)
30. 5th Avenue / Tamalpais Avenue (East)	SSSC	A (B) / 1 (13)	A (B) / 1 (12)
31. 5th Avenue / Hetherton Street	Signal	A / 7	A / 9
32. 5th Avenue / Irwin Street	Signal	C / 30	B / 16

Notes:
1. LOS = Level of Service. SSSC = Side-Street Stop Control.
2. For signalized and all-way stop controlled intersections, average intersection delay is reported in seconds per vehicle for all approaches. For side-street stop controlled intersections, the delay and LOS is reported for the entire intersection and for the highest delay movement (shown in parentheses).
3. The percentile delay methodology does not provide delay or LOS for unsignalized intersections. Thus, HCM 2010 methodology is used for these intersections.

Source: Fehr & Peers, 2016

ARTERIAL OPERATIONS

Table 4 summarizes the existing levels of service on the arterials in the analysis area. 2nd Street operates unacceptably during the PM peak hour. Appendix A includes arterial LOS calculations.

TABLE 4: WEEKDAY PEAK HOUR ARTERIAL OPERATIONS – EXISTING CONDITIONS

Arterial	LOS Standard[2]	LOS / Speed [3]	
		AM	PM
1. Eastbound 2nd Street from Lindaro Street to US-101 SB Ramp - Hetherton Street	D	D / 10	**E / 9**
2. Westbound 3rd Street from Hetherton Street to Lindaro Street	D	D / 11	D / 11
3. Southbound Hetherton Street from Mission Avenue to 2nd Street	F	D / 10	E / 9
4. Northbound Irwin Street from 2nd Street to Mission Avenue	F	E / 9	D / 10
5. Southbound Lindaro Street from 3rd Street to 2nd Street	F	F / 5	F / 6
6. Northbound Lindaro Street from 2nd Street to 3rd Street	F	E / 7	F / 6
7. Eastbound Mission Avenue from Lincoln Avenue to US-101 NB Ramp - Irwin Street	F	D / 11	D / 12
8. Westbound Mission Avenue US-101 NB Ramp - Irwin Street to Lincoln Avenue	F	F / 7	E / 7

Notes: 1. LOS = Level of Service. **Bold** indicates unacceptable operations.
2. Level of service standards are based on the City of San Rafael 2020 General Plan Circulation Element.
3. Arterial speed is reported in miles per hour.
Source: Fehr & Peers, 2018

BICYCLE NETWORK

The existing bicycle network is limited within the study area.

- 4th Street is classified as a Class III bikeway (bike route) along its entire length; sections of this bikeway also have sharrow markings.
- Lincoln Avenue is also classified as a Class III bikeway south of 2nd Street.
- The Puerto Suello Hill Pathway (Class I bike path) enters the study area north of Mission Avenue and ends at 4th Street.

The Marin County Bicycle Coalition (MCBC) map identifies Mission Avenue as the primary east-west on-street bikeway route through the study area. Lincoln Avenue and Irwin Street are identified as primary north-south on-street bikeway routes on the MCBC map.

PEDESTRIAN NETWORK

Sidewalks are present along both sides of all roadways near the project site except for the following:

- South side of Ritter Street between Lincoln Avenue and 2nd Street
- North side of 2nd Street between Lincoln Avenue and Ritter Street
- South side of 2nd Street between Francisco Boulevard and Irwin Street
- Sections of Tamalpais Avenue adjacent to the railroad tracks between Mission Avenue and 4th Street

Near the project site, crosswalks are present on all four legs of the 3rd Street/Lincoln Avenue and 3rd Street/Tamalpais Avenue intersections. Crosswalks are not present on the east legs of the nearby 2nd Street/Lincoln Avenue and 2nd Street/Tamalpais Avenue/Francisco Boulevard intersections. Similarly, crosswalks are not present on the north and south legs of the Lincoln Avenue/Ritter Street intersection or any legs of the 2nd Street/Ritter Street intersection.

TRANSIT NETWORK

Existing transit service within the study area is provided by bus at the San Rafael C. Paul Bettini Transit Center on Tamalpais Avenue directly across from the project site. A total of 13 Marin Transit routes, eight Golden Gate Transit routes, and one Sonoma County Transit route currently serve the transit center. Greyhound also serves the center, as do airport bus companies. The transit center is well equipped with shelters and benches. Plans are being developed to build a new transit center that will be better able to accommodate buses and trains.

The Sonoma-Marin Area Rail Transit (SMART) San Rafael downtown station is also located approximately two blocks (950 feet) east of the project site. Service began in 2017, and therefore is not included in existing conditions analysis but is included in other scenarios. The train provides service to cities to the north, including to Novato, Petaluma, Santa Rosa, and the Sonoma County Airport. SMART operates 34 daily weekday trains and 10 daily trains on weekends and holidays. Weekday trains operate every 30

minutes in each direction from about 5:30-10:00 AM and 3:30-9:30 PM, with limited midday service. Construction work is underway on the SMART Larkspur extension.

COLLISION HISTORY

Fehr & Peers reviewed the 2013-2015 collision history at the study intersections. Table 5 presents the results of this review. Notably, the intersection of 3rd Street and Tamalpais Avenue (West), adjacent to the project site, had four vehicle/pedestrian collisions with a primary collision factor of pedestrian right-of-way.

TABLE 5: COLLISION HISTORY AT STUDY INTERSECTIONS

Intersection	Number of Collisions					Most Common Collision Type	Most Common Primary Collision Factor (PCF)[2]	Collision Rate[3]
	3-Year Total[1]	Average Per Year	Total Injury Collisions	Total Fatal Collisions	Total Involving Peds or Bicyclists			
1. 4th Street / Cijos Street	0	0	0	0	0	-	-	-
2. 4th Street / Lincoln Avenue	5	1.67	5	0	2	Rear End	Unsafe Speed, Pedestrian Right-of-Way	0.33
3. 4th Street / Tamalpais Avenue (West) South Leg	3	1.00	3	0	3	Broadside	Pedestrian Right-of-Way	0.36
4. 4th Street / Tamalpais Avenue (West) North Leg	0	0	0	0	0	-	-	-
5. 4th Street / Tamalpais Avenue (East)	0	0	0	0	0	-	-	-
6. 4th Street / Hetherton Street	8	2.67	8	0	3	Sideswipe, Broadside	Traffic Signals and Signs	0.39
7. 4th Street / Irwin Street	0	0	0	0	0	-	-	-
8. 3rd Street / Lindaro Street	3	1.00	3	0	1	Broadside	Various	0.13
9. 3rd Street / Ritter Street	0	0	0	0	0	-	-	-
10. 3rd Street / Cijos Street	1	0.33	1	0	0	Broadside	Improper Turning	0.05
11. 3rd Street / Lincoln Avenue	6	2.00	6	0	1	Broadside	Traffic Signals and Signs	0.21
12. 3rd Street / Tamalpais Avenue (West)	8	2.67	8	0	6	Vehicle/Pedestrian	Pedestrian Right-of-Way	0.33
13. 3rd Street / Tamalpais Avenue (East)	0	0	0	0	0	-	-	-

TABLE 5: COLLISION HISTORY AT STUDY INTERSECTIONS

Intersection	Number of Collisions					Most Common Collision Type	Most Common Primary Collision Factor (PCF)[2]	Collision Rate[3]
	3-Year Total[1]	Average Per Year	Total Injury Collisions	Total Fatal Collisions	Total Involving Peds or Bicyclists			
14. 3rd Street / Hetherton Street	9	3.00	9	0	4	Vehicle/Pedestrian, Broadside	Traffic Signals and Signs	0.27
15. 3rd Street / Irwin Street	3	1.00	2	1	2	Various	Various	0.08
16. 2nd Street / Lindaro Street	8	2.67	8	0	3	Rear End	Unsafe Speed, Traffic Signals and Signs	0.26
17. Lincoln Avenue / Ritter Street	1	0.33	1	0	0	Various	Improper Turning	0.12
18. 2nd Street / Lincoln Avenue	7	2.33	7	0	1	Various	Unsafe Speed	0.20
19. 2nd Street / Francisco Boulevard - Tamalpais Avenue	7	2.33	7	0	1	Broadside	Traffic Signals and Signs	0.19
20. 2nd Street / US 101 Southbound Ramp - Hetherton Street	6	2.00	6	0	1	Broadside, Sideswipe	Traffic Signals and Signs	0.14
21. 2nd Street / US 101 Northbound Ramp - Irwin Street	4	1.33	4	0	1	Various	Various	0.09
22. Mission Avenue / Nye Street	1	0.33	1	0	0	Broadside	Unsafe Speed	0.06
23. Mission Avenue / Lincoln Avenue	7	2.33	7	0	0	Head-On	Automobile Right-of-Way	0.29
24. Mission Avenue / Tamalpais Avenue (West)	1	0.33	1	0	1	Sideswipe	Improper Turning	0.08
25. Mission Avenue / Tamalpais Avenue (East)	1	0.33	1	0	1	Unknown	Vehicle/Pedestrian	0.08
26. Mission Avenue / Hetherton Street - US 101 Southbound Ramp	3	1.00	3	0	2	Various	Various	0.11
27. Mission Avenue / Irwin Street - US 101 Northbound Ramp	2	0.67	2	0	1	Various	Automobile Right-of-Way	0.06
28. 5th Avenue / Lincoln Avenue	5	1.67	5	0	1	Various	Automobile Right-of-Way	0.29
29. 5th Avenue / Tamalpais Avenue (West)	2	0.67	2	0	2	Broadside, Vehicle/Pedestrian	Automobile Right-of-Way, Pedestrian Right-of-Way	0.27

TABLE 5: COLLISION HISTORY AT STUDY INTERSECTIONS

Intersection	Number of Collisions					Most Common Collision Type	Most Common Primary Collision Factor (PCF)[2]	Collision Rate[3]
	3-Year Total[1]	Average Per Year	Total Injury Collisions	Total Fatal Collisions	Total Involving Peds or Bicyclists			
30. 5th Avenue / Tamalpais Avenue (East)	0	0.00	0	0	0	-	-	-
31. 5th Avenue / Hetherton Street	6	2.00	6	0	0	Broadside	Traffic Signals and Signs	0.31
32. 5th Avenue / Irwin Street	2	0.67	2	0	0	Rear End	Unsafe Speed	0.09

Notes:
1. Total number of collisions from January 1, 2013 through December 31, 2015.
2. "Pedestrian Right of Way" indicates failure to yield to pedestrian, "Automobile Right of Way" indicates failure to yield to vehicle.
3. The collision rate is expressed as accidents per million vehicles entering the intersection

Source: Table produced by Fehr & Peers (2016), data from Statewide Integrated Traffic Records System (SWITRS) through Transportation Injury Mapping System

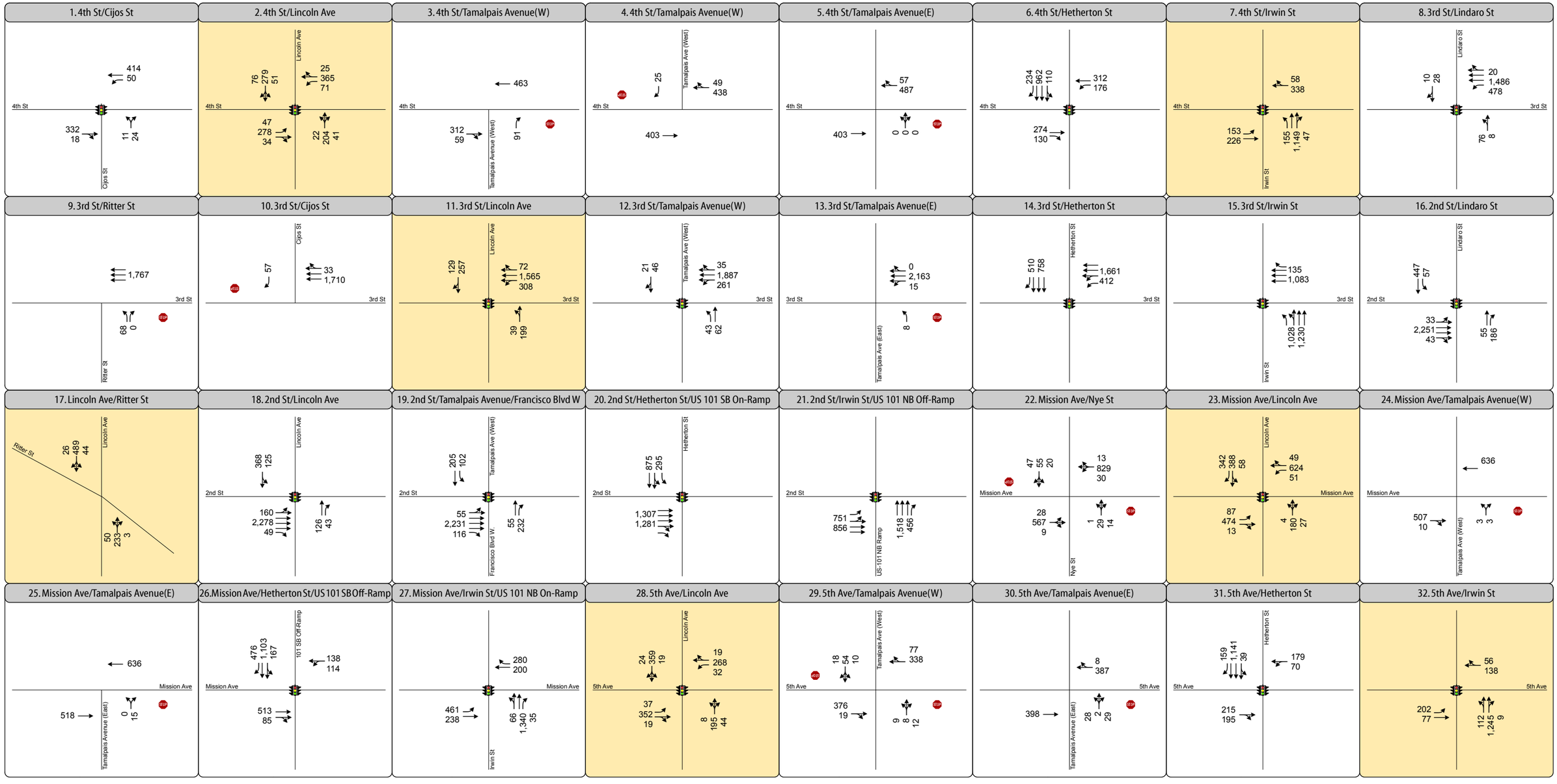
BASELINE CONDITIONS

The baseline scenario includes existing transportation conditions plus traffic generated from approved developments that are under construction. The City of San Rafael maintains a database of baseline traffic volumes and provided baseline conditions Synchro files for use in this traffic study. This data was updated based on existing counts.

Figure 4 and Figure 5 display the baseline peak hour traffic volumes, lane configurations, and traffic controls at each intersection for the AM and PM peak hours, respectively.

INTERSECTION OPERATIONS

Table 6 summarizes the baseline levels of service (LOS) at the study intersections. All intersections would operate acceptably overall. At the stop-controlled Mission Avenue / Nye Street intersection (Intersection 22), the stop-controlled movement is delayed notably longer than under existing conditions due to the increase in traffic on Mission Avenue. At the 3rd Street / Cijos Street intersection (Intersection 10), the stop-controlled right-turn movement would operate at LOS F during the PM peak hour. Delay, which was just over the 35-second threshold under existing conditions, increases to 91 seconds under baseline conditions. This is primarily due to the increase in through traffic on 3rd Street. However, both of these intersections operate acceptably overall. Appendix B presents all LOS calculations.



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Turn Lane

AM (PM) Peak Hour Traffic Volume

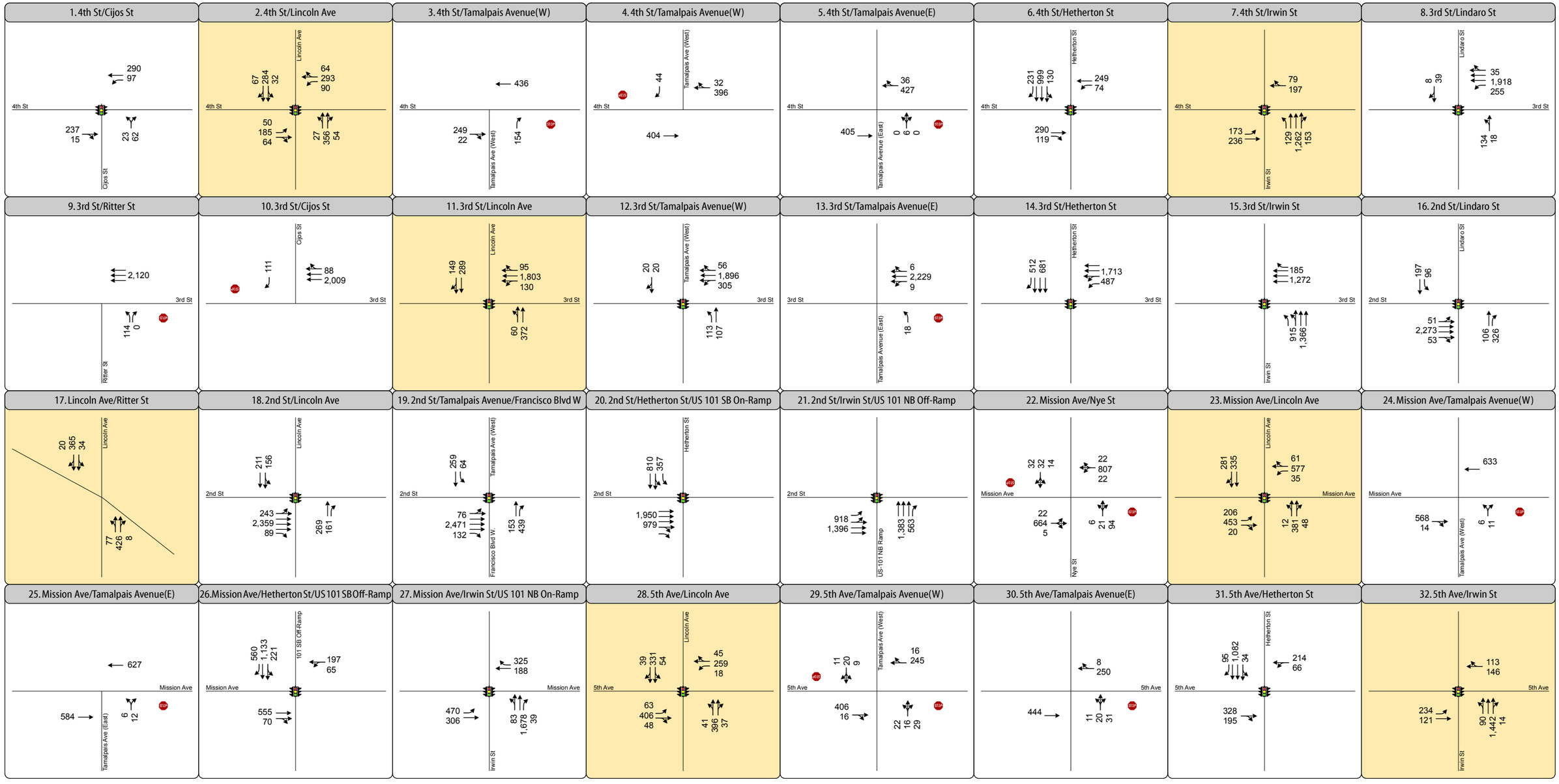
Traffic Signal

Stop Sign

Highlighted intersections represent intersections where lane configurations are different between the AM and PM peak hours.

Figure 4

AM Peak Hour Traffic Volumes and Lane Configurations - Baseline Conditions



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Turn Lane

AM (PM) Peak Hour Traffic Volume

Traffic Signal

Stop Sign

Highlighted intersections represent intersections where lane configurations are different between the AM and PM peak hours.

Figure 5

PM Peak Hour Traffic Volumes and Lane Configurations - Baseline Conditions

TABLE 6: WEEKDAY PEAK HOUR INTERSECTION OPERATIONS – BASELINE CONDITIONS

Intersection	Control Type	LOS / Average Delay[1,2,3]	
		AM	PM
1. 4th Street / Cijos Street	Signal	B / 11	A / 8
2. 4th Street / Lincoln Avenue	Signal	C / 24	B / 11
3. 4th Street / Tamalpais Avenue (West) South Leg	SSSC	A (B) / 1 (13)	A (B) / 3 (15)
4. 4th Street / Tamalpais Avenue (West) North Leg	Signal	A / 7	A / 4
5. 4th Street / Tamalpais Avenue (East)	Signal	B / 19	A / 12
6. 4th Street / Hetherton Street	Signal	B / 18	B / 18
7. 4th Street / Irwin Street	Signal	B / 20	B / 12
8. 3rd Street / Lindaro Street	Signal	A / 5	A / 7
9. 3rd Street / Ritter Street	SSSC	A (C) / 1 (16)	A (C) / 1 (21)
10. 3rd Street / Cijos Street	SSSC	A (D) / 1 (29)	A (F) / 5 (91)
11. 3rd Street / Lincoln Avenue	Signal	E / 68	E / 56
12. 3rd Street / Tamalpais Avenue (West)	Signal	E / 73	E / 72
13. 3rd Street / Tamalpais Avenue (East)	SSSC	A (D) / 0 (28)	A (D) / 0 (33)
14. 3rd Street / Hetherton Street	Signal	C / 31	D / 50
15. 3rd Street / Irwin Street	Signal	B / 20	D / 35
16. 2nd Street / Lindaro Street	Signal	C / 31	C / 24
17. Lincoln Avenue / Ritter Street	SSSC	A (A) / 1 (9)	A (A) / 1 (9)
18. 2nd Street / Lincoln Avenue	Signal	E / 73	D / 50
19. 2nd Street / Francisco Boulevard - Tamalpais Avenue	Signal	B / 17	D / 53
20. 2nd Street / US 101 Southbound Ramp - Hetherton Street	Signal	E / 55	D / 49
21. 2nd Street / US 101 Northbound Ramp - Irwin Street	Signal	C / 22	D / 46
22. Mission Avenue / Nye Street	SSSC	C (F) / 21 (251)	B (F) / 12 (165)
23. Mission Avenue / Lincoln Avenue	Signal	D / 49	C / 32
24. Mission Avenue / Tamalpais Avenue (West)	Signal	B / 19	B / 14
25. Mission Avenue / Tamalpais Avenue (East)	Signal	D / 49	D / 44
26. Mission Avenue / Hetherton Street - US 101 Southbound Ramp	Signal	D / 42	D / 37
27. Mission Avenue / Irwin Street - US 101 Northbound Ramp	Signal	E / 57	C / 29
28. 5th Avenue / Lincoln Avenue	Signal	B / 18	B / 11
29. 5th Avenue / Tamalpais Avenue (West)	Signal	A / 9	A / 8
30. 5th Avenue / Tamalpais Avenue (East)	Signal	A / 9	A / 5
31. 5th Avenue / Hetherton Street	Signal	A / 9	B / 10
32. 5th Avenue / Irwin Street	Signal	D / 53	C / 23

Notes:
1. LOS = Level of Service. SSSC = Side-Street Stop Control.
2. For signalized and all-way stop controlled intersections, average intersection delay is reported in seconds per vehicle for all approaches. For side-street stop controlled intersections, the delay and LOS is reported for the entire intersection and for the highest delay movement (shown in parentheses).
3. The percentile delay methodology does not provide delay or LOS for unsignalized intersections. Thus, HCM 2010 methodology is used for these intersections.

Source: Fehr & Peers, 2019

ARTERIAL OPERATIONS

Table 7 summarizes the baseline levels of service on the arterials in the analysis area. 2nd Street and 3rd Street operate unacceptably during the AM and PM peak hours. Appendix B includes arterial LOS calculations.

TABLE 7: WEEKDAY PEAK HOUR ARTERIAL OPERATIONS – BASELINE CONDITIONS

Arterial	LOS Standard[2]	LOS / Speed [3]	
		AM	PM
1. Eastbound 2nd Street from Lindaro Street to US-101 SB Ramp - Hetherton Street	D	**E / 8**	**F / 6**
2. Westbound 3rd Street from Hetherton Street to Lindaro Street	D	**F / 7**	**F / 6**
3. Southbound Hetherton Street from Mission Avenue to 2nd Street	F	E / 8	E / 8
4. Northbound Irwin Street from 2nd Street to Mission Avenue	F	F / 6	D / 9
5. Southbound Lindaro Street from 3rd Street to 2nd Street	F	F / 4	F / 6
6. Northbound Lindaro Street from 2nd Street to 3rd Street	F	F / 7	F / 5
7. Eastbound Mission Avenue from Lincoln Avenue to US-101 NB Ramp - Irwin Street	F	E / 9	E / 9
8. Westbound Mission Avenue US-101 NB Ramp - Irwin Street to Lincoln Avenue	F	F / 4	F / 5

Notes: 1. LOS = Level of Service. **Bold** indicates unacceptable operations.
2. Level of service standards are based on the City of San Rafael 2020 General Plan Circulation Element.
3. Arterial speed is reported in miles per hour.

Source: Fehr & Peers, 2019

BASELINE WITH PROJECT CONDITIONS

The baseline with project scenario includes baseline transportation conditions, plus trips generated from the Seagate project, minus existing traffic from existing land use on the project site.

TRIP GENERATION

Downtown San Rafael is a mixed-use environment containing a variety of retail, restaurant, office, hotel, government, entertainment, and other land uses. The proposed project will locate residents close to jobs and services, which will allow trips to be "internally captured" within downtown San Rafael (i.e. begin and end in downtown) and accomplished via walking, biking, or transit, reducing vehicle travel. This section identifies the trip reduction associated with internal capture related to constructing the proposed apartments in downtown San Rafael.

Table 8 shows trip generation of the proposed apartments based on the fitted curve equation from the Institute of Transportation Engineers' (ITE) *Trip General Manual* (9th Edition), before adjustment for internal capture.

TABLE 8: TRIP GENERATION ESTIMATE

Land Use	Size[1]	Trip Rate			Trips[2]		
		Daily	Peak Hour		Daily	Peak Hour	
			AM	PM		AM	PM
Apartments	138 du	6.96	0.52	0.68	960	71	94

Notes:
1. du = dwelling units
2. ITE land use code 220 (Apartment) fitted curve equation used to calculate trips

Source: Fehr & Peers, 2016

As shown in the table, if the apartments were built as a stand-alone project (i.e. not incorporated into a mixed-use environment) they would generate 960 daily, 71 AM peak hour, and 94 PM peak hour trips.

INTERNAL CAPTURE TRIP REDUCTIONS

Traditionally, traffic engineers and transportation planners have estimated internalization of project trips using one of two methods. First, they would estimate it based on their professional judgment. Alternatively, professionals relied on the Institute of Transportation Engineers' (ITE) internalization methodology presented in the ITE Trip Generation Handbook. Although this methodology has been applied in thousands of studies in California, the methodology was limited as it was based on only six

surveys in Florida. Additionally, the ITE internalization methodology only accounts for the land use types on the mixed-use site. Given the limited input information (land use amount and type) and the limited range of data (six surveys), the accuracy of the internalization estimates has been found to generally under-estimate internalization of trips from mixed-use development.

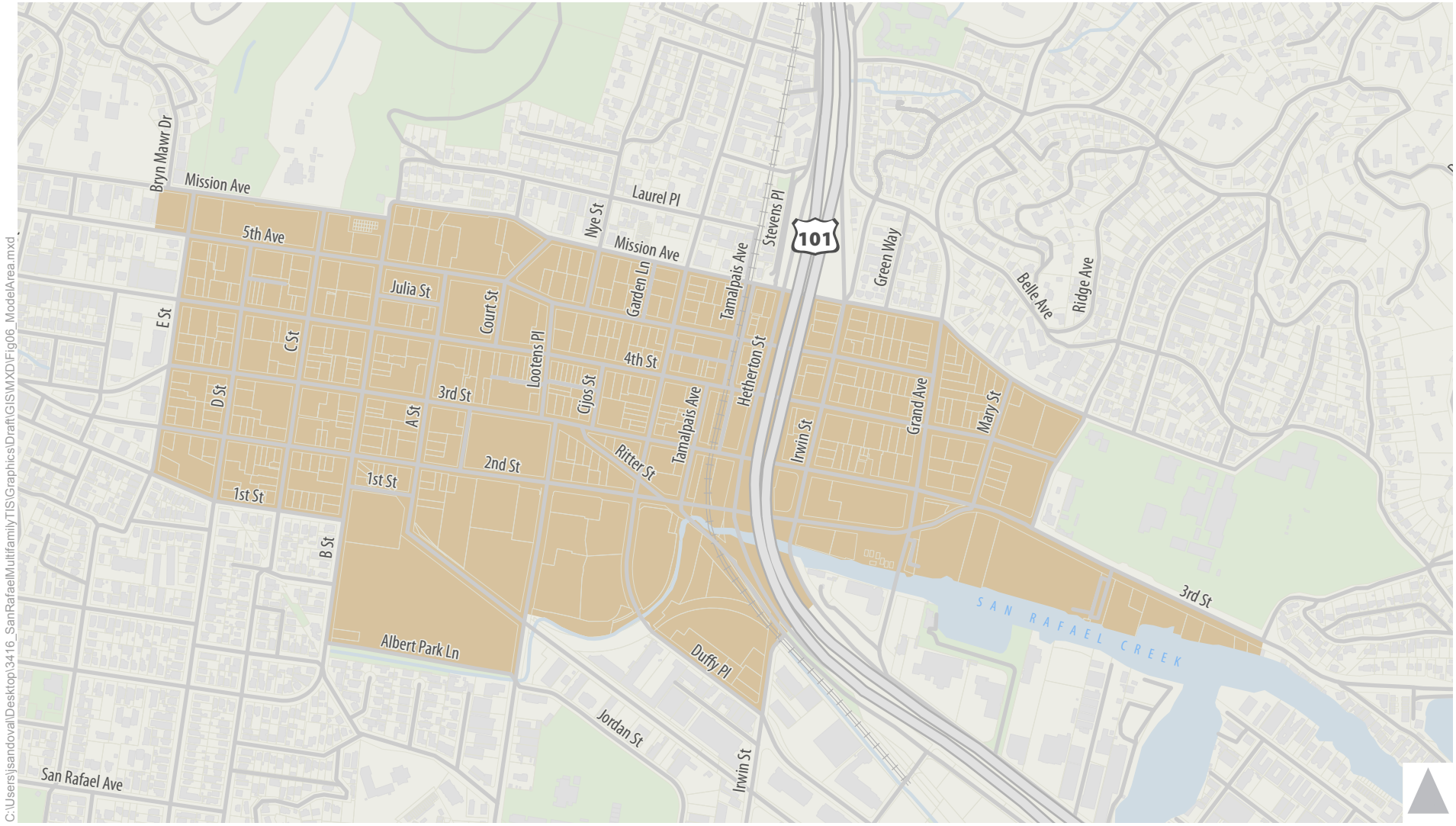
Seeing the limited data set and simplified methodology applied in the ITE handbook, the United States Environmental Protection Agency (EPA) commissioned a study to develop a more substantial, statistically superior methodology. This methodology, identified as MXD (or mixed-use development trip generation), begins with ITE rates and develops trip internalization estimates based on a series of factors tied to numerous site attributes. The MXD methodology is described in greater detail below.

MXD TRIP INTERNALIZATION METHODOLOGY

The MXD model was developed through collaboration between consultants, the U.S. EPA, and an academic research team. The MXD model estimates trip generation and internal capture by adjusting trip generation rates to account for the influence of built environment variables such as the size of the mixed use analysis area, the number of intersections within the mixed use analysis area, the distance to transit, employment within a 30 minute transit trip, employment within one mile, average household size near the site, and average number of vehicles per household near the site. A variety of research studies have demonstrated that these variables influence vehicle trip generation.

MXD MODEL INPUTS AND TRIP GENERATION ESTIMATES

We applied MXD+, Fehr & Peers's implementation of the MXD methodology, to determine the reduction in automobile trips from the Seagate apartments site as a result of the proposed apartments being constructed in a downtown, mixed-use environment. The model was based on an analysis area as shown in Figure 6, incorporating San Rafael model traffic analysis zones that are likely to be accessed by pedestrians, bicyclists, and transit users traveling to and from the project site. The analysis area includes significant multimodal destinations within a reasonable walking distance (less than ½ mile) of the project site.



MXD+ Model Area

Figure 6

MXD+ Model Area

The MXD+ analysis estimates two factors:

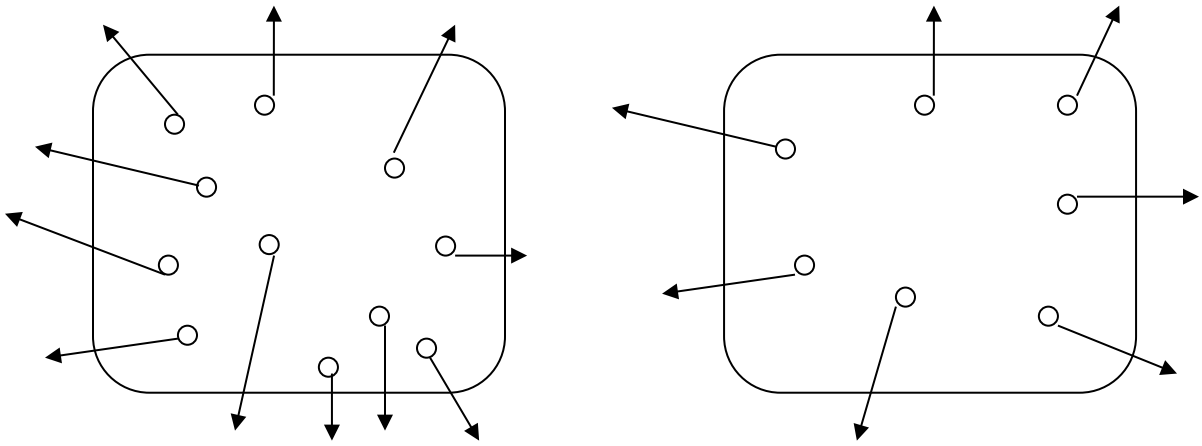
- Trips internal to the analysis area: the analysis first estimates the "gross" trip generation of all of the land uses in the analysis area based on ITE trip generation rates. It then incorporates the MXD methodology for "matching" trips to estimate the amount of internalization within the analysis area. Though non-automotive mode share internal to the analysis area will be high, especially during peak hour, some trips will still be made by automobile within the analysis area, Therefore, to be conservative, this number was reduce by 20% to obtain the number of internal trips via walk, bike, and transit.
- The number of walk, bike, and transit trips to destinations outside of the analysis area. The MXD+ analysis incorporates data from the EPA Smart Location database, the US Census American Community Survey, and the Metropolitan Transportation Commission travel model to estimate the number of trips to and from destinations outside of the analysis area via walking, biking, and transit.

These two factors were combined to determine the overall reduction in trips generated by the proposed apartments.

INTERNALIZATION DISCUSSION

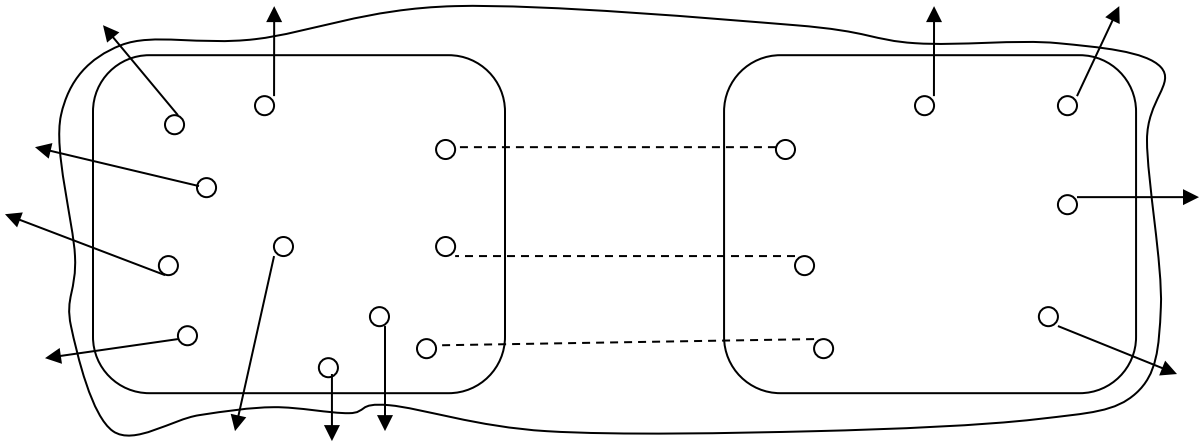
An example of trip internalization is shown in the figures below. The figure on the right represents the proposed apartments. The figure on the left represents the other land uses in downtown San Rafael. As shown in the figures, if the apartments were built in isolation from other land uses, all trips generated would add new traffic to the adjacent roadway network.

Downtown San Rafael Land Uses **Proposed Apartments**



The figure below shows the interaction between the land uses when the apartments are located in Downtown San Rafael.

Downtown San Rafael Land Uses **Proposed Apartments**



As shown in the figure, the number of trips external to downtown generated by the apartments is reduced.

The proposed apartments are expected to generate 94 "raw" PM peak hour trips. Based on calculations from the MXD analysis, 18% of these trips will be made by walk, bike, or transit to locations internal to the analysis area and an additional 8% will be made by walk, bike, or transit to locations outside of the

analysis area. Therefore, the overall reduction in PM peak hour trips generated by the Seagate apartments due to their location in downtown San Rafael would be 26% or 24.

To validate this number, we reviewed the 2010-2014 American Community Survey data for Means of Transportation to Work for the census block group containing the site of the proposed project and most of downtown San Rafael. Based on this data, 27% of workers 16 years and over are estimated to travel to work via modes other than driving. The MXD+ result is very close to this number.

Table 9 shows the vehicle trip reduction of the Seagate apartments resulting from their construction in the mixed-use environment of downtown San Rafael.

TABLE 9: TRIP REDUCTION ESTIMATES

		Trips		
		Daily	**AM**	**PM**
Gross project trip generation (ITE)		960	71	94
Walk, bike, and transit trip reductions	Remaining in downtown	*-115*	*-13*	*-17*
	External to downtown	*-50*	*-6*	*-7*
	Total vehicle trip reduction	*-165*	*-19*	*-24*
Gross project vehicle trip generation		795	52	70
Percent reduction		*-17%*	*-26%*	*-26%*

Source: Fehr & Peers, 2016

EXISTING AND NET LAND USE TRIP GENERATION

National Data & Surveying Services conducted driveway counts on August 23, 2016, during AM and PM peak periods to measure the trip generation of the current land use on the site. Fehr & Peers then subtracted these counts from the gross project vehicle trip generation from Table 9 to determine net trip generation of the project. Results are presented in Table 10.

TABLE 10: NET TRIP GENERATION ESTIMATES

	AM Peak Hour			PM Peak Hour		
	Total	**Enter**	**Exit**	**Total**	**Enter**	**Exit**
Gross project vehicle trip generation[1]	52	10 (20%)	42 (80%)	70	46 (65%)	24 (35%)
Existing land use vehicle trip generation	19	13 (68%)	6 (32%)	44	20 (45%)	24 (55%)
Net project vehicle trip generation	33	-3	36	26	26	0

Notes:
1. ITE land use code 220 (Apartment) used to calculate enter/exit splits

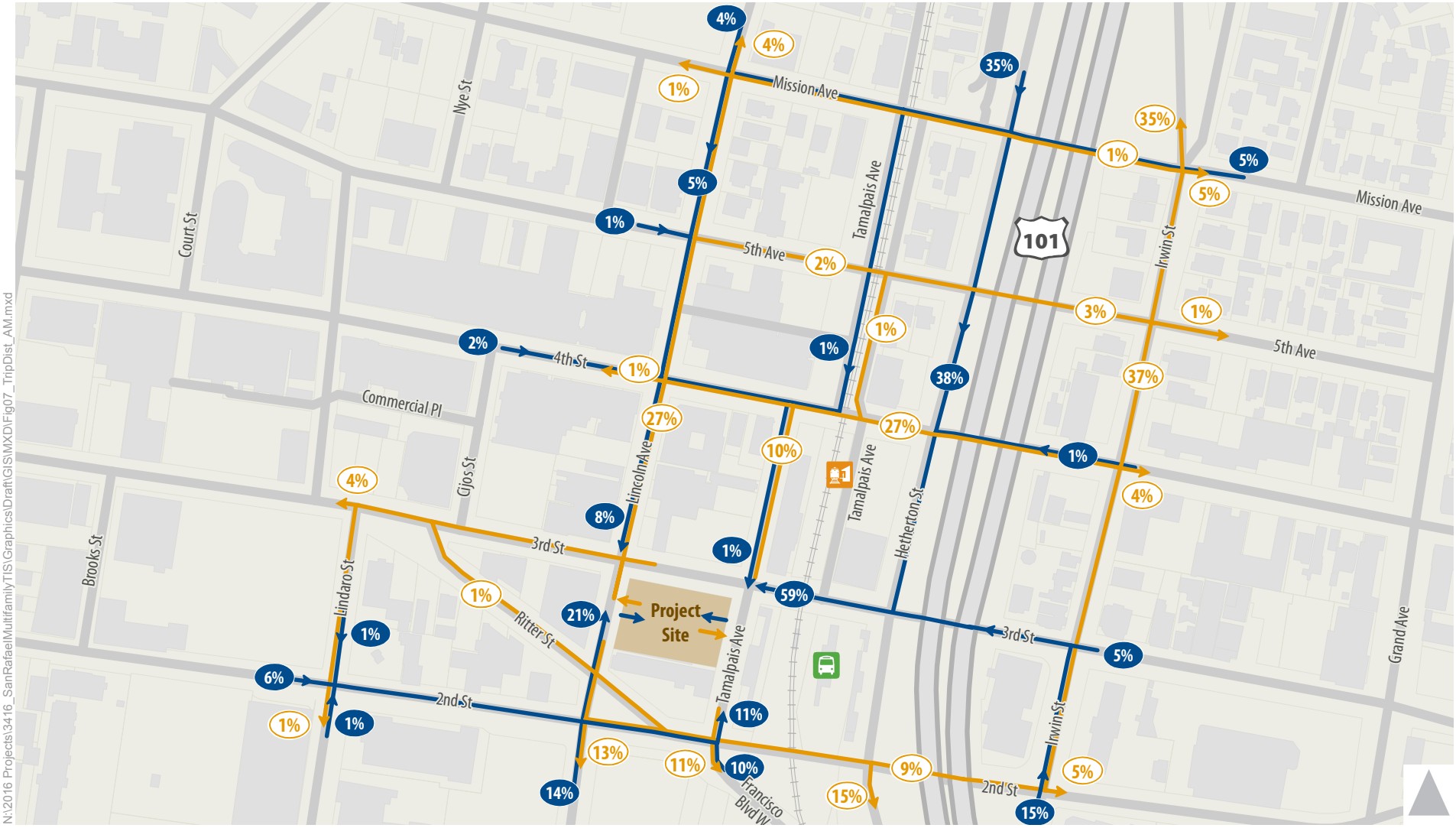
Source: Fehr & Peers, 2016

The proposed development is expected to generate more trips in both the AM and PM peak hours compared to the existing land uses; however, the directional split of the trip is expected to change. During

the AM peak hour, entering trips are expected to decrease somewhat while exiting trips are expected to increase. During the PM peak hour, exiting trips are expected to remain flat while entering trips are expected to increase.

TRIP DISTRIBUTION

Fehr & Peers created trip distributions for AM and PM peak hours for both inbound and outbound trips. These distributions were based on analysis of movements in the Synchro files as well as input from the City. The trip distributions are presented in Figure 7 and Figure 8.



Inbound Trip Distribution

Outbound Trip Distribution

Project Site

Downtown SMART Station

San Rafael Transit Center

Figure 7

AM Peak Hour Trip Distribution

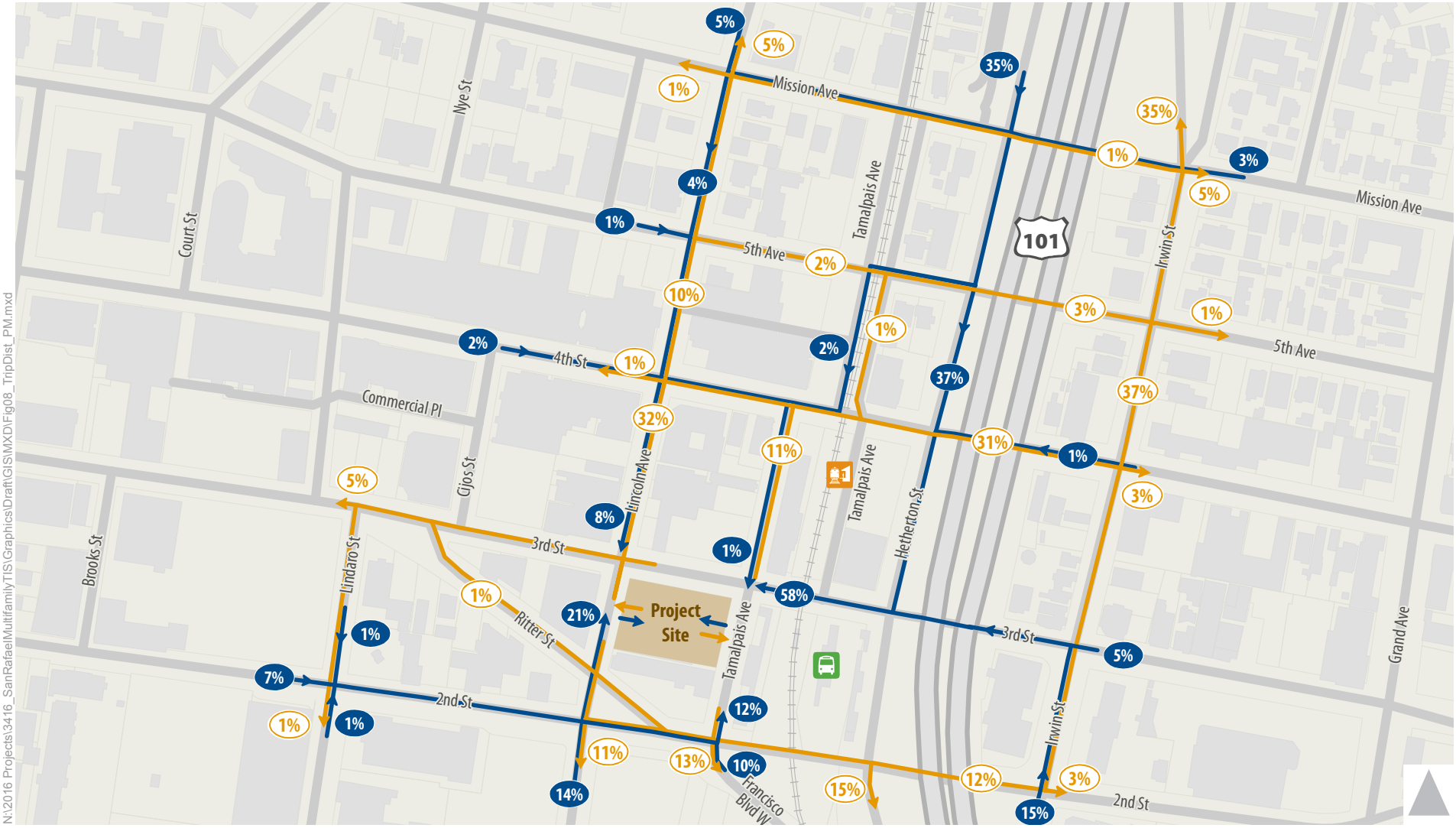


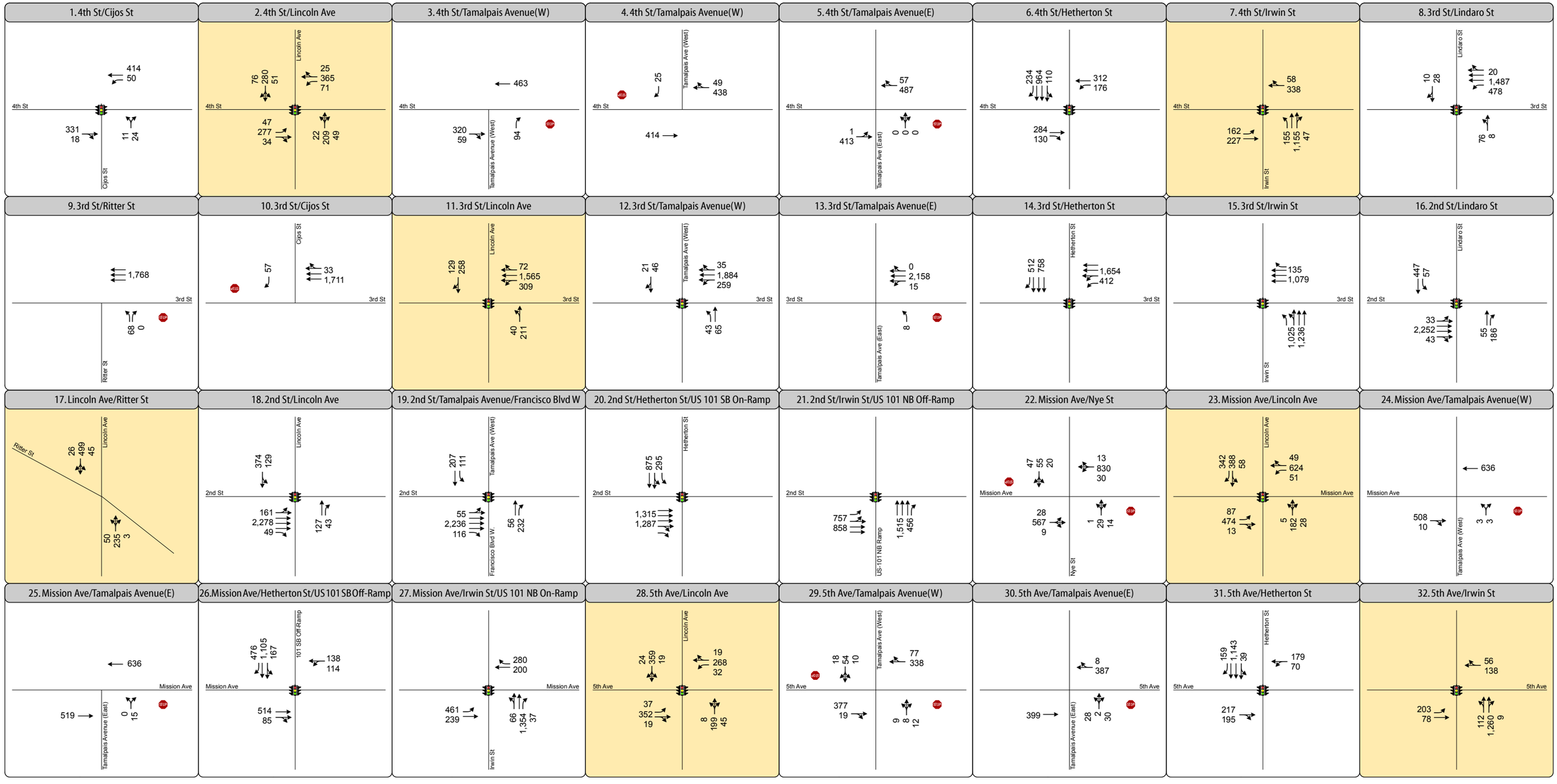
Figure 8

PM Peak Hour Trip Distribution

INTERSECTION OPERATIONS

Figure 9 and Figure 10 display the baseline with project peak hour traffic volumes, lane configurations, and traffic controls at each intersection for the AM and PM peak hours, respectively.

Table 11 summarizes the baseline with project levels of service (LOS) at the study intersections. There are no notable differences between baseline conditions and baseline with project conditions. Some movements show small improvements due to differences in directionality between the existing and proposed project site land use. Appendix C presents all LOS calculations.



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Turn Lane

AM (PM) Peak Hour Traffic Volume

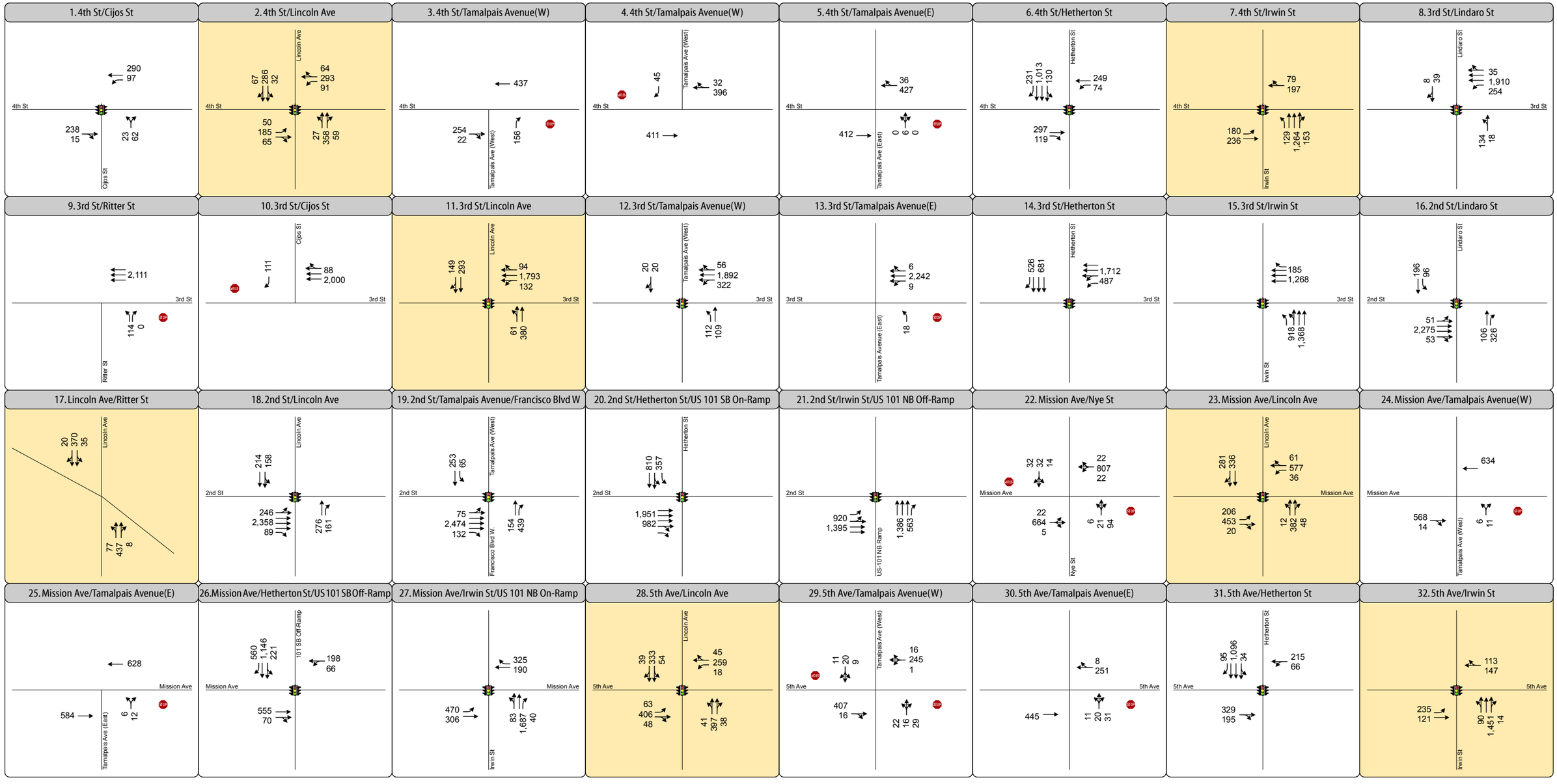
Traffic Signal

Stop Sign

Highlighted intersections represent intersections where lane configurations are different between the AM and PM peak hours.

Figure 9

AM Peak Hour Traffic Volumes and Lane Configurations - Baseline With Project Conditions



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Turn Lane

AM (PM) Peak Hour Traffic Volume

Traffic Signal

Stop Sign

Highlighted intersections represent intersections where lane configurations are different between the AM and PM peak hours.

Figure 10

PM Peak Hour Traffic Volumes and Lane Configurations - Baseline With Project Conditions

TABLE 11: WEEKDAY PEAK HOUR INTERSECTION OPERATIONS – BASELINE WITH PROJECT CONDITIONS

Intersection	Control Type	Baseline LOS / Average Delay[1,2,3]		Baseline With Project LOS / Average Delay[1,2,3]	
		AM	PM	AM	PM
1. 4th Street / Cijos Street	Signal	B / 11	A / 8	B / 11	A / 8
2. 4th Street / Lincoln Avenue	Signal	C / 24	B / 11	C / 24	B / 11
3. 4th Street / Tamalpais Avenue (West) South Leg	SSSC	A (B) / 1 (13)	A (B) / 3 (15)	A (B) / 1 (13)	A (B) / 3 (15)
4. 4th Street / Tamalpais Avenue (West) North Leg	Signal	A / 7	A / 4	A / 7	A / 4
5. 4th Street / Tamalpais Avenue (East)	Signal	B / 19	A / 12	B / 19	A / 12
6. 4th Street / Hetherton Street	Signal	B / 18	B / 18	B / 18	B / 18
7. 4th Street / Irwin Street	Signal	B / 20	B / 12	B / 21	B / 13
8. 3rd Street / Lindaro Street	Signal	A / 5	A / 7	A / 5	A / 7
9. 3rd Street / Ritter Street	SSSC	A (C) / 1 (16)	A (C) / 1 (21)	A (C) / 1 (16)	A (C) / 1 (21)
10. 3rd Street / Cijos Street	SSSC	A (D) / 1 (29)	A (F) / 5 (91)	A (D) / 1 (29)	A (F) / 5 (89)
11. 3rd Street / Lincoln Avenue	Signal	E / 68	E / 56	E / 69	E / 56
12. 3rd Street / Tamalpais Avenue (West)	Signal	E / 73	E / 72	E / 73	E / 71
13. 3rd Street / Tamalpais Avenue (East)	SSSC	A (D) / 0 (28)	A (D) / 0 (33)	A (D) / 0 (28)	A (D) / 0 (34)
14. 3rd Street / Hetherton Street	Signal	C / 31	D / 50	C / 31	D / 53
15. 3rd Street / Irwin Street	Signal	B / 20	D / 35	B / 20	D / 36
16. 2nd Street / Lindaro Street	Signal	C / 31	C / 24	C / 31	C / 24
17. Lincoln Avenue / Ritter Street	SSSC	A (A) / 1 (9)	A (A) / 1 (9)	A (A) / 1 (9)	A (A) / 1 (9)
18. 2nd Street / Lincoln Avenue	Signal	E / 73	D / 50	E / 75	D / 50
19. 2nd Street / Francisco Boulevard - Tamalpais Avenue	Signal	B / 17	D / 53	B / 18	D / 53
20. 2nd Street / US 101 Southbound Ramp - Hetherton Street	Signal	E / 55	D / 49	E / 56	D / 50
21. 2nd Street / US 101 Northbound Ramp - Irwin Street	Signal	C / 22	D / 46	C / 22	D / 46
22. Mission Avenue / Nye Street	SSSC	C (F) / 21 (251)	B (F) / 12 (165)	C (F) / 21 (251)	B (F) / 12 (165)
23. Mission Avenue / Lincoln Avenue	Signal	D / 49	C / 32	D / 49	C / 32
24. Mission Avenue / Tamalpais Avenue (West)	Signal	B / 19	B / 14	B / 19	B / 14
25. Mission Avenue / Tamalpais Avenue (East)	Signal	D / 49	D / 44	D / 49	D / 44
26. Mission Avenue / Hetherton Street - US 101 Southbound Ramp	Signal	D / 42	D / 37	D / 42	D / 37
27. Mission Avenue / Irwin Street - US 101 Northbound Ramp	Signal	E / 57	C / 29	E / 58	C / 30
28. 5th Avenue / Lincoln Avenue	Signal	B / 18	B / 11	B / 18	B / 11
29. 5th Avenue / Tamalpais Avenue (West)	Signal	A / 9	A / 8	A / 9	A / 8
30. 5th Avenue / Tamalpais Avenue (East)	Signal	A / 9	A / 5	A / 9	A / 5
31. 5th Avenue / Hetherton Street	Signal	A / 9	B / 10	A / 9	B / 11
32. 5th Avenue / Irwin Street	Signal	D / 53	C / 23	D / 54	C / 24

Notes:
1. LOS = Level of Service. SSSC = Side-Street Stop Control.
2. For signalized and all-way stop controlled intersections, average intersection delay is reported in seconds per vehicle for all approaches. For side-street stop controlled intersections, the delay and LOS is reported for the entire intersection and for the highest delay movement (shown in parentheses).
3. The percentile delay methodology does not provide delay or LOS for unsignalized intersections. Thus, HCM 2010 methodology is used for these intersections.

Source: Fehr & Peers, 2019

ARTERIAL OPERATIONS

Table 12 summarizes the baseline with project levels of service on the arterials in the analysis area. 2nd Street and 3rd Street operate unacceptably during the AM and PM peak hours. However, speed on these arterials decreases by less than one mile per hour compared to no-project conditions. Appendix C includes arterial LOS calculations.

TABLE 12: WEEKDAY PEAK HOUR ARTERIAL OPERATIONS – BASELINE WITH PROJECT CONDITIONS

Arterial	LOS Standard[2]	Baseline LOS / Speed [3]		Baseline With Project LOS / Speed [3]	
		AM	PM	AM	PM
1. Eastbound 2nd Street from Lindaro Street to US-101 SB Ramp - Hetherton Street	D	**E / 8**	**F / 6**	**E / 8**	**F / 6**
2. Westbound 3rd Street from Hetherton Street to Lindaro Street	D	**F / 7**	**F / 6**	**F / 7**	**F / 6**
3. Southbound Hetherton Street from Mission Avenue to 2nd Street	F	E / 8	E / 8	E / 8	E / 8
4. Northbound Irwin Street from 2nd Street to Mission Avenue	F	F / 6	D / 9	F / 6	E / 9
5. Southbound Lindaro Street from 3rd Street to 2nd Street	F	F / 4	F / 6	F / 4	F / 6
6. Northbound Lindaro Street from 2nd Street to 3rd Street	F	F / 7	F / 5	F / 7	F / 5
7. Eastbound Mission Avenue from Lincoln Avenue to US-101 NB Ramp - Irwin Street	F	E / 9	E / 9	E / 9	E / 9
8. Westbound Mission Avenue US-101 NB Ramp - Irwin Street to Lincoln Avenue	F	F / 4	F / 5	F / 4	F / 5

Notes: 1. LOS = Level of Service. **Bold** indicates unacceptable operations.
2. Level of service standards are based on the City of San Rafael 2020 General Plan Circulation Element.
3. Arterial speed is reported in miles per hour.

Source: Fehr & Peers, 2019

CUMULATIVE CONDITIONS

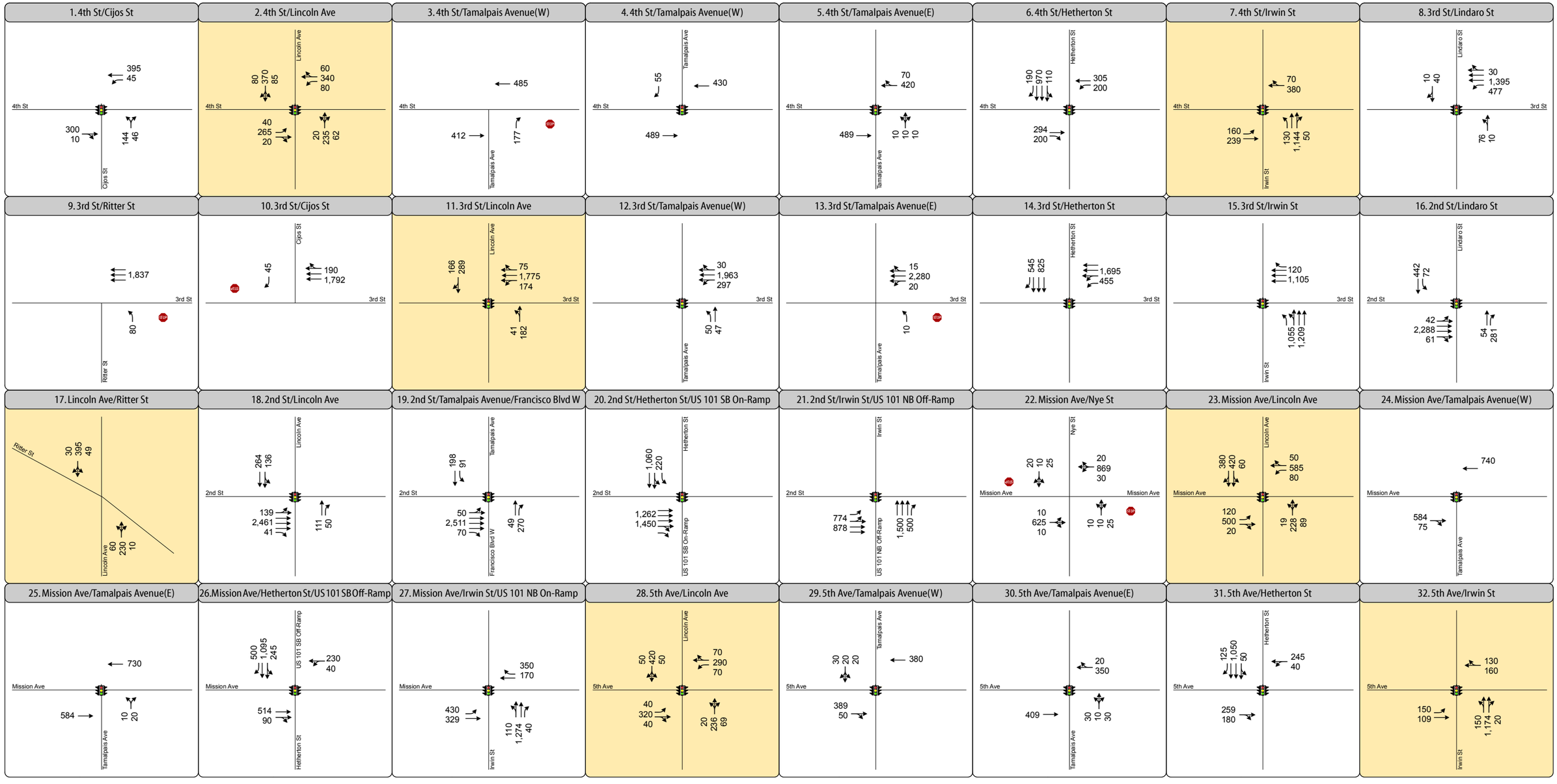
The cumulative scenario includes market-level population and employment growth and expected transportation improvements for year 2040. The cumulative scenarios were added to the report in December 2018. As discussed in the Introduction, analysis of these scenarios uses HCM 2010 methodology, consistent with other recent studies in the City.

Figure 11 and Figure 12 display the cumulative peak hour traffic volumes, lane configurations, and traffic controls at each intersection for the AM and PM peak hours, respectively.

INTERSECTION OPERATIONS

Table 13 summarizes the cumulative levels of service (LOS) at the study intersections. Most intersections are expected to operate acceptably except for the signalized 3rd Street / Tamalpais Avenue (West) intersection (Intersection 12) during the AM and PM peak hours and the 2nd Street / US 101 Southbound Ramp – Hetherton Street intersection (Intersection 20) during the AM peak hour. At the stop-controlled Mission Avenue / Nye Street intersection (Intersection 22) during the AM and PM peak hours and the 3rd Street / Cijos Street intersection (Intersection 10) during the PM peak hour only, side-street movements operate at LOS F, but the intersections operate acceptably overall. Appendix D presents all LOS calculations.

Some intersections have reduced delay under cumulative conditions as compared to baseline conditions. These improvements are due to several reasons, including changes in traffic flow due to reconfiguration of some streets, differences in demand between baseline and cumulative conditions, improvements in signal operations due to conversion from pre-timed to adaptive signals, and differences between the percentile-delay methodology used to analyze baseline conditions and the HCM methodology used to analyze cumulative conditions.



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Turn Lane

AM (PM) Peak Hour Traffic Volume

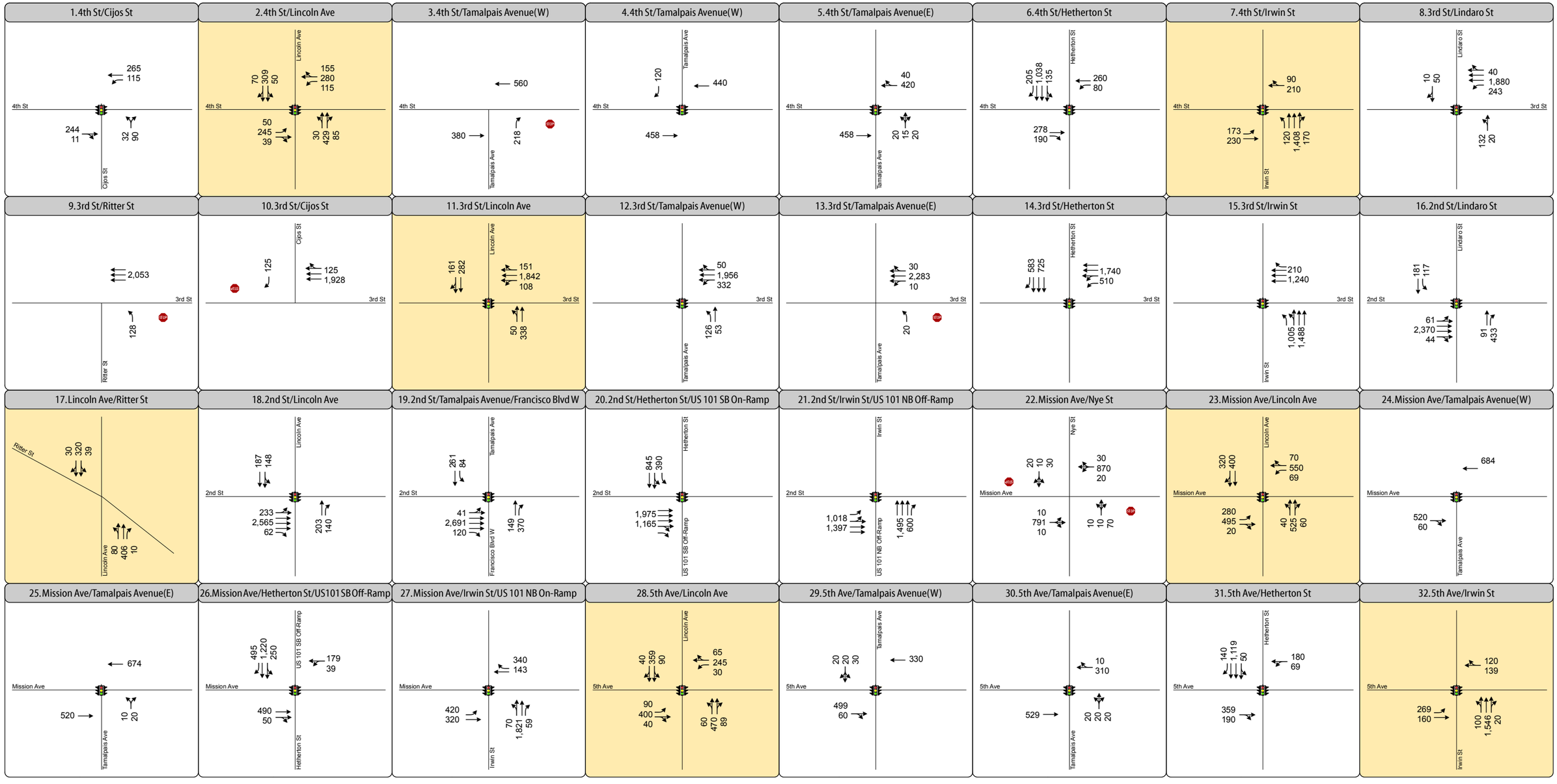
Traffic Signal

Stop Sign

Highlighted intersections represent intersections where lane configurations are different between the AM and PM peak hours.

Figure 11

AM Peak Hour Traffic Volumes and Lane Configurations - Cumulative Conditions



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Turn Lane

AM (PM) Peak Hour Traffic Volume

Traffic Signal

Stop Sign

Highlighted intersections represent intersections where lane configurations are different between the AM and PM peak hours.

Figure 12

PM Peak Hour Traffic Volumes and Lane Configurations - Cumulative Conditions

TABLE 13: WEEKDAY PEAK HOUR INTERSECTION OPERATIONS – CUMULATIVE CONDITIONS

Intersection	Control Type	LOS / Average Delay[1,2,3]	
		AM	PM
1. 4th Street / Cijos Street	Signal	B / 10	A / 6
2. 4th Street / Lincoln Avenue	Signal	C / 28	C / 22
3. 4th Street / Tamalpais Avenue (West) South Leg	SSSC	A (C) / 3 (15)	A (B) / 3 (16)
4. 4th Street / Tamalpais Avenue (West) North Leg	Signal	A / 7	A / 6
5. 4th Street / Tamalpais Avenue (East)	Signal	B / 16	A / 10
6. 4th Street / Hetherton Street	Signal	A / 10	A / 10
7. 4th Street / Irwin Street	Signal	D / 39	C / 30
8. 3rd Street / Lindaro Street	Signal	C / 25	B / 19
9. 3rd Street / Ritter Street	SSSC	A (C) / 1 (17)	A (C) / 1 (20)
10. 3rd Street / Cijos Street	SSSC	A (D) / 1 (34)	A (F) / 5 (93)
11. 3rd Street / Lincoln Avenue	Signal	D / 49	B / 19
12. 3rd Street / Tamalpais Avenue (West)	Signal	**F / 98**	**F / 91**
13. 3rd Street / Tamalpais Avenue (East)	SSSC	A (C) / 0 (19)	A (C) / 0 (20)
14. 3rd Street / Hetherton Street	Signal	D / 47	D / 47
15. 3rd Street / Irwin Street	Signal	C / 29	D / 39
16. 2nd Street / Lindaro Street	Signal	D / 38	D / 42
17. Lincoln Avenue / Ritter Street	SSSC	A (B) / 1 (15)	A (B) / 1 (12)
18. 2nd Street / Lincoln Avenue	Signal	D / 36	D / 45
19. 2nd Street / Francisco Boulevard - Tamalpais Avenue	Signal	D / 36	E / 62
20. 2nd Street / US 101 Southbound Ramp - Hetherton Street	Signal	**F / 97**	D / 36
21. 2nd Street / US 101 Northbound Ramp - Irwin Street	Signal	E / 58	E / 58
22. Mission Avenue / Nye Street	SSSC	A (F) / 6 (135)	B (F) / 12 (277)
23. Mission Avenue / Lincoln Avenue	Signal	C / 28	C / 32
24. Mission Avenue / Tamalpais Avenue (West)	Signal	C / 27	B / 13
25. Mission Avenue / Tamalpais Avenue (East)	Signal	D / 46	C / 27
26. Mission Avenue / Hetherton Street - US 101 Southbound Ramp	Signal	C / 25	B / 18
27. Mission Avenue / Irwin Street - US 101 Northbound Ramp	Signal	C / 27	C / 31
28. 5th Avenue / Lincoln Avenue	Signal	C / 25	A / 10
29. 5th Avenue / Tamalpais Avenue (West)	Signal	A / 7	A / 9
30. 5th Avenue / Tamalpais Avenue (East)	Signal	A / 7	A / 6
31. 5th Avenue / Hetherton Street	Signal	B / 13	B / 14
32. 5th Avenue / Irwin Street	Signal	C / 33	C / 31

Notes:
1. LOS = Level of Service. SSSC = Side-Street Stop Control.
2. For signalized and all-way stop controlled intersections, average intersection delay is reported in seconds per vehicle for all approaches. For side-street stop controlled intersections, the delay and LOS is reported for the entire intersection and for the highest delay movement (shown in parentheses).
3. The HCM 2010 methodology in Synchro does not provide delay or LOS when signal timing includes a pedestrian-only phase, non-standard ring-barrier structures, intersections with more than four legs, clustered intersections, or red phases greater than 6 seconds. Thus, the results for intersections 4-6, 12, 13, 24-27, and 29-31 are based on HCM 2000 methodology.

Source: Fehr & Peers, 2019

ARTERIAL OPERATIONS

Table 14 summarizes the cumulative levels of service on the arterials in the analysis area. 2nd Street and 3rd Street operate unacceptably during the AM and PM peak hours. Appendix D includes arterial LOS calculations.

TABLE 14: WEEKDAY PEAK HOUR ARTERIAL OPERATIONS – CUMULATIVE CONDITIONS

Arterial	LOS Standard[2]	LOS / Speed [3]	
		AM	PM
1. Eastbound 2nd Street from Lindaro Street to US-101 SB Ramp - Hetherton Street	D	**F / 4**	**F / 3**
2. Westbound 3rd Street from Hetherton Street to Lindaro Street	D	**F / 3**	**F / 3**
3. Southbound Hetherton Street from Mission Avenue to 2nd Street	F	F / 4	E / 7
4. Northbound Irwin Street from 2nd Street to Mission Avenue	F	F / 6	E / 9
5. Southbound Lindaro Street from 3rd Street to 2nd Street	F	F / 3	F / 5
6. Northbound Lindaro Street from 2nd Street to 3rd Street	F	F / 5	F / 4
7. Eastbound Mission Avenue from Lincoln Avenue to US-101 NB Ramp - Irwin Street	F	F / 6	E / 8
8. Westbound Mission Avenue US-101 NB Ramp - Irwin Street to Lincoln Avenue	F	F / 3	F / 4

Notes: 1. LOS = Level of Service. **Bold** indicates unacceptable operations.
2. Level of service standards are based on the City of San Rafael 2020 General Plan Circulation Element.
3. Arterial speed is reported in miles per hour.

Source: Fehr & Peers, 2019

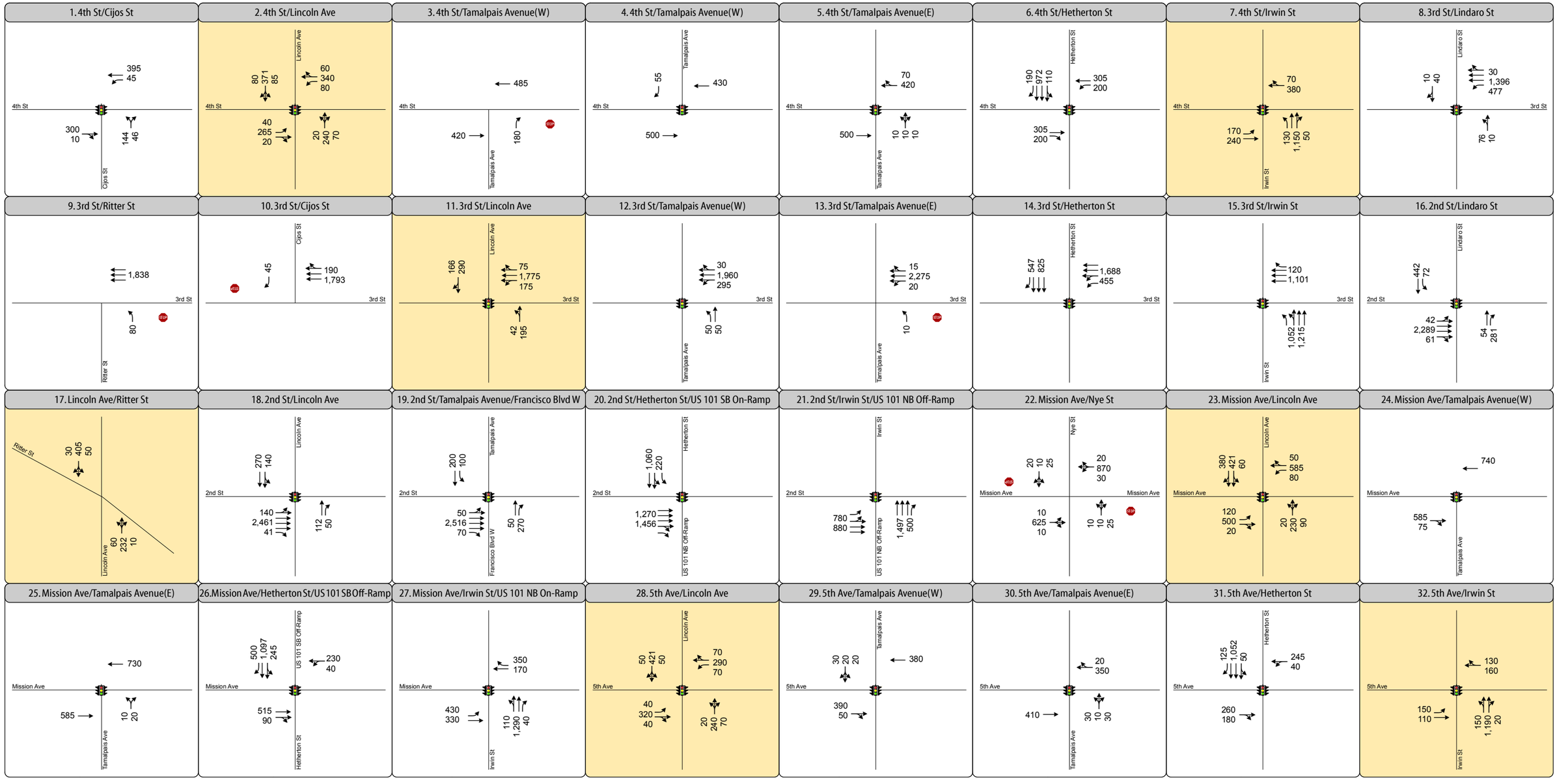
CUMULATIVE WITH PROJECT CONDITIONS

The cumulative with project scenario includes cumulative transportation conditions, plus traffic generated from the Seagate project, minus existing traffic from existing land use on the project site.

Figure 13 and Figure 14 display the cumulative with project peak hour traffic volumes, lane configurations, and traffic controls at each intersection for the AM and PM peak hours, respectively.

INTERSECTION OPERATIONS

Table 15 summarizes the cumulative with project levels of service (LOS) at the study intersections. Intersection 12, 3rd Street and Tamalpais Avenue (West), which operates at LOS F under cumulative conditions, would experience an increase in delay of three seconds during the PM peak hour, which is acceptable. Intersection 20, 2nd Street / US 101 Southbound Ramp – Hetherton Street, would also experience an increase in delay of one second during the AM peak hour, which is acceptable. Otherwise, there are no notable differences between cumulative conditions and cumulative with project conditions. Appendix E presents all LOS calculations.



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Turn Lane

AM (PM) Peak Hour Traffic Volume

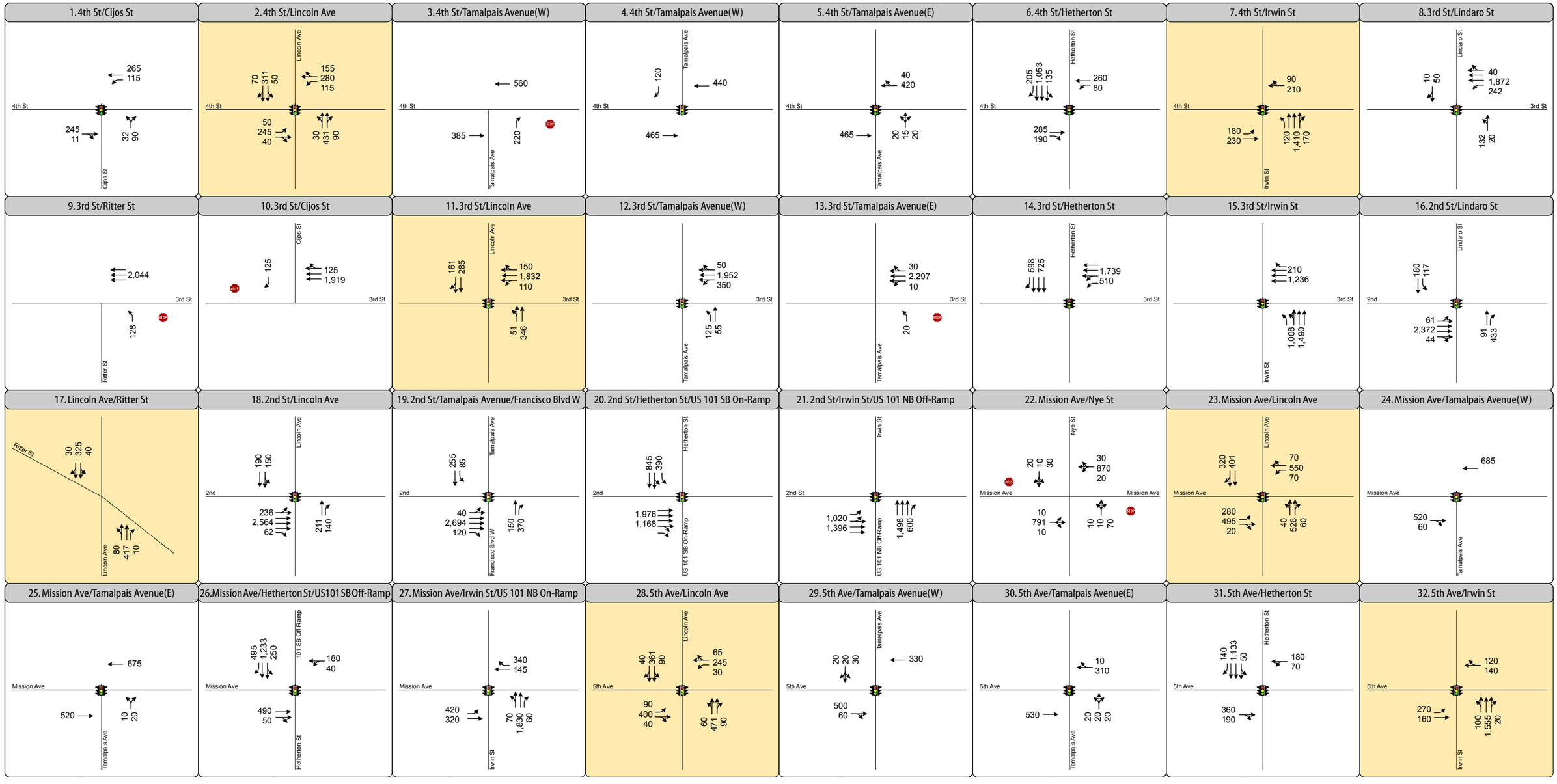
Traffic Signal

Stop Sign

Highlighted intersections represent intersections where lane configurations are different between the AM and PM peak hours.

Figure 13

AM Peak Hour Traffic Volumes and Lane Configurations - Cumulative With Project Conditions



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Turn Lane

AM (PM) Peak Hour Traffic Volume

Traffic Signal

Stop Sign

Highlighted intersections represent intersections where lane configurations are different between the AM and PM peak hours.

Figure 14

PM Peak Hour Traffic Volumes and Lane Configurations - Cumulative With Project Conditions

TABLE 15: WEEKDAY PEAK HOUR INTERSECTION OPERATIONS – CUMULATIVE WITH PROJECT CONDITIONS

Intersection	Control Type	Cumulative LOS / Average Delay[1,2,3]		Cumulative With Project LOS / Average Delay[1,2,3]	
		AM	PM	AM	PM
1. 4th Street / Cijos Street	Signal	B / 10	A / 6	B / 10	A / 7
2. 4th Street / Lincoln Avenue	Signal	C / 28	C / 22	C / 28	C / 22
3. 4th Street / Tamalpais Avenue (West) South Leg	SSSC	A (C) / 3 (15)	A (B) / 3 (16)	A (C) / 3 (15)	A (B) / 3 (16)
4. 4th Street / Tamalpais Avenue (West) North Leg	Signal	A / 7	A / 6	A / 7	A / 6
5. 4th Street / Tamalpais Avenue (East)	Signal	B / 16	A / 10	B / 16	A / 10
6. 4th Street / Hetherton Street	Signal	A / 10	A / 10	A / 10	A / 10
7. 4th Street / Irwin Street	Signal	D / 39	C / 30	D / 42	C / 30
8. 3rd Street / Lindaro Street	Signal	C / 25	B / 19	C / 25	B / 19
9. 3rd Street / Ritter Street	SSSC	A (C) / 1 (17)	A (C) / 1 (20)	A (C) / 1 (17)	A (C) / 1 (20)
10. 3rd Street / Cijos Street	SSSC	A (D) / 1 (34)	A (F) / 5 (93)	A (D) / 1 (34)	A (F) / 5 (91)
11. 3rd Street / Lincoln Avenue	Signal	D / 49	B / 19	D / 50	B / 19
12. 3rd Street / Tamalpais Avenue (West)	Signal	**F / 98**	**F / 91**	**F / 97**	**F / 94**
13. 3rd Street / Tamalpais Avenue (East)	SSSC	A (C) / 0 (19)	A (C) / 0 (20)	A (C) / 0 (19)	A (C) / 0 (20)
14. 3rd Street / Hetherton Street	Signal	D / 47	D / 47	D / 47	D / 49
15. 3rd Street / Irwin Street	Signal	C / 29	D / 39	C / 29	D / 39
16. 2nd Street / Lindaro Street	Signal	D / 38	D / 42	D / 38	D / 42
17. Lincoln Avenue / Ritter Street	SSSC	A (B) / 1 (15)	A (B) / 1 (12)	A (C) / 1 (15)	A (B) / 1 (12)
18. 2nd Street / Lincoln Avenue	Signal	D / 36	D / 45	D / 37	D / 46
19. 2nd Street / Francisco Boulevard - Tamalpais Avenue	Signal	D / 36	E / 62	D / 36	E / 62
20. 2nd Street / US 101 Southbound Ramp - Hetherton Street	Signal	**F / 97**	D / 36	**F / 98**	D / 36
21. 2nd Street / US 101 Northbound Ramp - Irwin Street	Signal	E / 58	E / 58	E / 58	E / 58
22. Mission Avenue / Nye Street	SSSC	A (F) / 6 (135)	B (F) / 12 (277)	A (F) / 6 (135)	B (F) / 12 (277)
23. Mission Avenue / Lincoln Avenue	Signal	C / 28	C / 32	C / 28	C / 32
24. Mission Avenue / Tamalpais Avenue (West)	Signal	C / 27	B / 13	C / 27	B / 13
25. Mission Avenue / Tamalpais Avenue (East)	Signal	D / 46	C / 27	D / 46	C / 27
26. Mission Avenue / Hetherton Street - US 101 Southbound Ramp	Signal	C / 25	B / 18	C / 25	B / 19
27. Mission Avenue / Irwin Street - US 101 Northbound Ramp	Signal	C / 27	C / 31	C / 27	C / 32
28. 5th Avenue / Lincoln Avenue	Signal	C / 25	A / 10	C / 25	A / 10
29. 5th Avenue / Tamalpais Avenue (West)	Signal	A / 7	A / 9	A / 7	A / 9
30. 5th Avenue / Tamalpais Avenue (East)	Signal	A / 7	A / 6	A / 7	A / 6
31. 5th Avenue / Hetherton Street	Signal	B / 13	B / 14	B / 13	B / 14
32. 5th Avenue / Irwin Street	Signal	C / 33	C / 31	C / 34	C / 32

Notes:

1. LOS = Level of Service. SSSC = Side-Street Stop Control. **Bold** indicates unacceptable operations.
2. For signalized and all-way stop controlled intersections, average intersection delay is reported in seconds per vehicle for all approaches. For side-street stop controlled intersections, the delay and LOS is reported for the entire intersection and for the highest delay movement (shown in parentheses).
3. The HCM 2010 methodology in Synchro does not provide delay or LOS when signal timing includes a pedestrian-only phase, non-standard ring-barrier structures, intersections with more than four legs, clustered intersections, or red phases greater than 6 seconds. Thus, the results for intersections 4-6, 12, 13, 24-27, and 29-31 are based on HCM 2000 methodology.

Source: Fehr & Peers, 2019

ARTERIAL OPERATIONS

Table 16 summarizes the cumulative with project levels of service on the arterials in the analysis area. 2nd Street and 3rd Street operate unacceptably during the AM and PM peak hours. However, speed on these arterials decreases by less than one mile per hour compared to no-project conditions. Appendix E includes arterial LOS calculations.

TABLE 16: WEEKDAY PEAK HOUR ARTERIAL OPERATIONS – CUMULATIVE WITH PROJECT CONDITIONS

Arterial	LOS Standard[2]	Cumulative (2040) LOS / Speed [3]		Cumulative (2040) With Project LOS / Speed [3]	
		AM	PM	AM	PM
1. Eastbound 2nd Street from Lindaro Street to US-101 SB Ramp - Hetherton Street	D	**F / 4**	**F / 3**	**F / 4**	**F / 3**
2. Westbound 3rd Street from Hetherton Street to Lindaro Street	D	**F / 3**	**F / 3**	**F / 3**	**F / 3**
3. Southbound Hetherton Street from Mission Avenue to 2nd Street	F	F / 4	E / 7	F / 4	E / 7
4. Northbound Irwin Street from 2nd Street to Mission Avenue	F	F / 6	E / 9	F / 6	E / 9
5. Southbound Lindaro Street from 3rd Street to 2nd Street	F	F / 3	F / 5	F / 3	F / 6
6. Northbound Lindaro Street from 2nd Street to 3rd Street	F	F / 5	F / 4	F / 5	F / 4
7. Eastbound Mission Avenue from Lincoln Avenue to US-101 NB Ramp - Irwin Street	F	F / 6	E / 8	F / 6	E / 8
8. Westbound Mission Avenue US-101 NB Ramp - Irwin Street to Lincoln Avenue	F	F / 3	F / 4	F / 3	F / 4

Notes: 1. LOS = Level of Service. **Bold** indicates unacceptable operations.
2. Level of service standards are based on the City of San Rafael 2020 General Plan Circulation Element.
3. Arterial speed is reported in miles per hour.

Source: Fehr & Peers, 2019

IMPACTS AND MITIGATION MEASURES

This section evaluates the significance of project impacts using the criteria described in the Introduction.

SIGNALIZED INTERSECTIONS

As shown in Table 11, Table 13, and Table 15, Fehr & Peers does not calculate that project traffic will result in any signalized intersection performance deteriorating from an acceptable LOS to an unacceptable LOS based on the significance criteria established by the City of San Rafael. For signalized intersections operating with an unacceptable LOS under no-project conditions, Fehr & Peers does not calculate that project traffic at any signalized intersection will result in additional delay of five seconds or more. Therefore, project impacts to signalized intersections are considered **less than significant** and mitigations are not required.

UNSIGNALIZED INTERSECTIONS

As shown in Table 11, Table 13, and Table 15, Fehr & Peers does not calculate that project traffic will result in any unsignalized intersection performance deteriorating from an acceptable LOS to an unacceptable LOS based on the significance criteria established by the City of San Rafael. For unsignalized intersections operating with an unacceptable LOS under no-project conditions, Fehr & Peers does not calculate that project traffic at any unsignalized intersection will result in additional delay of five seconds or more. Therefore, project impacts to unsignalized intersections are considered **less than significant** and mitigations are not required.

ARTERIALS

As shown in Table 12, Table 14, and Table 16, Fehr & Peers does not calculate that project traffic will result in any arterial performance deteriorating from an acceptable LOS to an unacceptable LOS based on established significance criteria. For arterials operating with an unacceptable LOS under no project conditions, Fehr & Peers calculates that project traffic will result in speed reductions of less than one mile per hour. Therefore, project impacts to arterials are considered **less than significant** and mitigations are not required.

BICYCLE/PEDESTRIAN

As shown in Table 9, Fehr & Peers estimated the project will create 19 AM peak hour and 24 PM peak hour non-automotive trips. These trips will have no foreseeable impacts to bicycle and pedestrian operations, and thus the proposed project will:

- Not cause a substantial inconvenience or substantial reduction in quality of service for users of existing bicycle or pedestrian travel
- Not substantially reduce bicycle or pedestrian access
- Not substantially reduce safety for bicyclists or pedestrians

Therefore, proposed project impacts to bicycle and pedestrian facilities are considered **less than significant** and mitigations are not required.

To accommodate bicyclists, the project will include both short-term and long-term bicycle parking. Short-term bicycle parking will be provided by bike racks on the sidewalks serving eight bicycles. Long-term bicycle parking will be provided in a 612 square-foot bike lounge located on the first floor of the building.

The 2018 San Rafael Bicycle & Pedestrian Master Plan proposes a Class IV protected bikeway for Tamalpais Avenue West from Mission Avenue to 2nd Street. A feasibility study for an east-west bikeway through downtown along 4th Street is also proposed. New north-south bicycle connections are proposed along D Street and C Street (Class IV protected bikeway couplet or Class III bicycle boulevard). The plan additionally proposes US 101 undercrossing improvements at 3rd Street, 4th Street, 5th Avenue, and Mission Avenue that would benefit bicyclists and pedestrians. The master plan also recommends pedestrian improvements on 2nd Street at and between the US 101 ramps.

Construction of the facilities proposed in the 2018 San Rafael Bicycle & Pedestrian Master Plan would support bicyclists and pedestrians accessing this project. In particular, the Class IV protected bikeway proposed for Tamalpais Avenue West from Mission Avenue to 2nd Street is along the project frontage. The east-west bikeway through downtown, conceptually shown as along 4th Street, would create improved bicycle connections that would also serve the project. For pedestrians, the planned improvements at and between the US 101 ramp intersections on 2nd Street would be beneficial. The proposed US 101 undercrossing improvements would also benefit both pedestrians and bicyclists.

A leading pedestrian interval was recently implemented at the intersection of 3rd Street and Tamalpais Avenue (West). This improvement is expected to reduce vehicle/pedestrian collisions at this intersection.

Additionally, high visibility crosswalk markings, to make crosswalks more visible to drivers, may be considered at this location.

The locations noted in the Existing Conditions section where sidewalks or crosswalks are missing would provide little connectivity benefit if sidewalks or crosswalks are added. Therefore, improvements are not recommended in these locations.

TRANSIT

As shown in Table 9, Fehr & Peers estimated the project will create 19 AM peak hour and 24 PM peak hour non-automotive trips, which could be new transit trips. These trips will have no foreseeable impacts to transit operations, and thus the proposed project will:

- Not induce substantial growth or concentration of population beyond the capacity of existing or planned public transit facilities.
- Not increase demand for public transit service to such a degree that accepted service standards are not maintained.
- Not reduce availability of public transit to users, or interfere with existing transit users

Therefore, proposed project impacts to transit facilities are considered **less than significant** and mitigations are not required.

Additionally, extension of SMART train service to Larkspur will improve connectivity for transit users.