TRANSPORTATION IMPACT ANALYSIS

1100 N Mathilda Avenue

(TIA #2017-12)

PREPARED FOR:

CITY OF SUNNYVALE

Sunnyvale

AUGUST 2018 | FINAL DRAFT

Prepared By:

Kimley»Horn

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AUTO TRIP REDUCTION STATEMENT

UPDATED: October 2014

SANTA CLARA Valley Transportation Authority

PROJECT INFORMATION	*Relevant TIA Section:*	Proposed Site Use
Project Name: Sheraton Sunnyvale		
Location: 1100 Mathilda Avenue, Sunnyvale, CA		
Description: Rennovation of an existing 173-room hotel which includes renovating 88 rooms, demolising 85 rooms, and constructing 270 rooms. The project also consists of adding a 8,241-square foot spa.		

Size (net new):	185 rooms	*D.U. Residential*	8,000	*Sq. Ft. Comm.*	*Acres (Gr.)*
Density:		*D.U. / Acre*			*Floor Area Ratio (FAR)*

Located within 2000 feet walking distance of an LRT, BRT, BART or Caltrain station or major bus stop? No

PROJECT AUTO TRIP GENERATION	*Relevant TIA Section:*	Trip Generation			
Auto Trips Generated:	103	*AM Pk Hr*	150	*PM Pk Hr*	2,088 *Total Weekday*
Methodology (check one)	☒ **ITE**		☐ **Other** *(Please describe below)*		

AUTO TRIP REDUCTION APPROACH	*Relevant TIA Section:*		
☐ **Standard** *Complete Table A below*	☐ **Peer/Study-Based** *Complete Table B below*	☐ **Target-Based** *Complete Table C below*	☒ **None Taken**

TRIP REDUCTION REQUIREMENTS	*Relevant TIA Section:*	
Is the project required to meet any trip reduction requirements or targets? No	**If so, specify percent:**	
Reference code or requirement:		

TRIP REDUCTION APPROACHES

A. STANDARD APPROACH	*Relevant TIA Section:*			
Type of Reduction *Specify reduction. See Table 2 in TIA Guidelines*		**% Reduction from ITE Rates**	**Total Trips Reduced (AM/PM/Daily)**	**TOTAL REDUCTION CLAIMED**
				% / **Trips**
Transit				
Mixed-Use				
Financial Incentives				
Shuttle				

B. PEER/STUDY-BASED APPROACH	*Relevant TIA Section:*	
Basis of Reduction	**TOTAL REDUCTION CLAIMED**	
	%	**Trips**

C. TARGET-BASED APPROACH		Relevant TIA Section:	
Type of Reduction (check all that apply)			TOTAL REDUCTION CLAIMED
❒ % Trip Reduction	❒ % SOV mode share	❒ Trip Cap	% / Trips
Description			
Time period for reduction	Peak Hour	Peak Period	Full Day
	❒ AM/PM	❒ AM/PM	❒

OTHER TDM/REDUCTION MEASURES			
Bicycle/Pedestrian	Yes	Relevant TIA Section:	Public Transit, Bicycle, and Pedestrian Facilit
Bicyclists and pedestrians will have direct access to the project site using bicycle and sidewalk facilities on Mathilda Avenue and Bordeaux Drive. The project will also provide bicycle racks and secure bicycle lockers. The project will construct sidewalks along Bordeaux Drive adjacent to the site, filling in the existing gap in the pedestrian facility.			
Parking Management	No	Relevant TIA Section:	
Transit	Yes	Relevant TIA Section:	Public Transit, Bicycle, and Pedestrian Facilit
The site is within walking distance to the Lockheed Martin Transit Center.			
Site Planning and Design	No	Relevant TIA Section:	
TDM Program	No	Relevant TIA Section:	

IMPLEMENTATION		Relevant TIA Section:	
Have the project sponsor and Lead Agency agreed to any of the following measures?			
❒Monitoring			
❒Enforcement			
❒Data Sharing			

EXECUTIVE SUMMARY

The 1100 Mathilda Project ("Project"), is a proposed renovation of an existing 173-room hotel at 1100 Mathilda Avenue. The project would include renovating 88 rooms, demolishing 85 rooms, and constructing 270 rooms, resulting in a net increase of 185-rooms. In addition, an 8,241 square-foot spa is proposed on the northeast corner of the project site.

The Mathilda Avenue Improvements at SR 237 and US 101 is a Santa Clara Valley Transportation Authority (VTA) project that will reconfigure the US 101 and SR 237 interchanges with Mathilda Avenue. The project will include modification to on-ramps, off-ramps, and intersection, as well as modification to bicycle and pedestrian facilities. Designs are being completed and project construction is expected to occur from 2019 to 2020. For this traffic study completion of this project was assumed under Existing Plus Background and Cumulative conditions. It should be noted that this improvement project will close the segment of Moffett Park Drive between Mathilda Avenue and Bordeaux Drive, which borders the southern edge of the project. As a result, the existing project driveway on Moffett Park Drive would be closed and a portion of the traffic using the driveway on Bordeaux Drive would use alternative routes, including the new Innovation Way extension.

This traffic study was prepared to determine potential impacts related to the project based on standards and methodologies set forth by the City of Sunnyvale (City) and the Santa Clara Valley Transportation Authority (VTA). This study includes intersection evaluations during the AM and PM peak hour traffic conditions for 17 intersections and seven (7) freeway ramps. This study also addresses the potential transportation effects of the proposed project to assist the City with project planning and the identification of potential conditions of approval for the project.

PROJECT TRIP ESTIMATES

The number of project trips anticipated to be added to the roadway system surrounding the project was estimated using the fitted curve equation for ITE Land Use 310 (Hotel) and the average rate for ITE Land Use 918 (Hair Salon) from the *Trip Generation Manual, 10th Edition.* Trips associated with the spa were calculated separately because the spa would be open to the general public and would not qualify as a "limited recreational facilities" included in the ITE Land Use 310 data. *Trip Generation, 10th Edition* does not have trip generation data specially for spa land uses, therefore the average rate for a very similar land use description, ITE Land Use 918 (Hair Salon), was used.

The proposed project will generate a net new +103 trips in the AM peak hour and a net new +150 trips in the PM peak.

Two trip assignments were analyzed. The first trip assignment was assumed for Existing conditions. The second trip assignment was assumed for the Existing Plus Background and Cumulative conditions, which accounted for changes to the site access due to the closure of Moffett Park Drive between Mathilda Avenue and Bordeaux Drive as part of the Mathilda Avenue Improvements at SR 237 and US 101 project.

INTERSECTION LEVEL OF SERVICE

This study includes a level of service (LOS) analysis of the AM and PM peak hour traffic conditions for 17 intersections analyzed in the *Traffix* or *Synchro* software packages. Four intersections: Mathilda Avenue / Moffett Park Drive (#5), Mathilda Avenue / SR 237 WB Ramps (#6), Mathilda Avenue / SR 237 EB Ramps

(#7), and Mathilda Avenue / Dross Drive (#8); were analyzed in *Synchro* software and the remaining intersections were analyzed within the *Traffix* software.

EXISTING CONDITIONS

It is evaluated that all study intersections will operate at an acceptable LOS under the Existing and Existing Plus Project conditions (**Table 8** and **12**).

EXISTING PLUS BACKGROUND AND EXISTING PLUS BACKGROUND PLUS PROJECT CONDITIONS

Under the Existing Plus Background Conditions (**Table 15**), it is expected that the following study intersection will operate at an unacceptable level of service:

- #5 – Mathilda Avenue / Moffett Park Drive (PM Peak Hour)

Under the Existing Plus Background Plus Project Conditions (**Table 16**), it is expected that the following intersection will have a significant impact with the addition of the project traffic:

- #5 – Mathilda Avenue / Moffett Park Drive (PM Peak Hour)

Existing Plus Background Plus Project Mitigation

The following mitigation measure is required to mitigate the significant impact:

- #5 – Mathilda Avenue / Moffett Park Drive: pay fair share towards VTA's Mathilda Avenue Improvement at SR 237 and US 101 project

CUMULATIVE AND CUMULATIVE PLUS PROJECT CONDITIONS

Under the Cumulative Conditions (**Table 17**), it is expected that the following intersections will operate at unacceptable levels of service:

- #5 – Mathilda Avenue / Moffett Park Drive (AM and PM Peak Hours)
- #8 – Mathilda Avenue / Ross Drive (PM Peak Hour)
- #11 – Mathilda Avenue / Maude Avenue (PM Peak Hour)

Under the Cumulative Plus Project Conditions (**Table 18**), it is expected that the following intersections will have a significant impact with the addition of the project traffic:

- #5 – Mathilda Avenue / Moffett Park Drive (PM Peak Hour)
- #16 – Bordeaux Drive / East Project Driveway (PM Peak Hour)

Cumulative Plus Project Mitigation

The following mitigation measure is required to mitigate the significant impact:

- #5 – Mathilda Avenue / Moffett Park Drive: pay fair share towards VTA's Mathilda Avenue Improvement at SR 237 and US 101 project

- #16 – Bordeaux Drive / East Project Driveway: Add an eastbound left-turn lane (minimum storage length of 50 feet). This lane is within the project property and the site plan should be modified to accommodate storage.

FREEWAY RAMP ANALYSIS

Impacts on freeway on- and off-ramps were evaluated based on a volume to capacity analysis. For on-ramps with ramp metering, on-ramp queues were also evaluated. The freeway ramp analysis was performed for the Existing and Existing plus Project scenarios.

VOLUME TO CAPACITY

The volume to capacity (V/C) analysis determined that all study freeway on-ramps had a V/C ratio less than 1.00 for both Existing and Existing Plus Project Conditions.

RAMP QUEUE

Under the Existing Condition, the westbound SR 237 Mathilda Avenue diagonal on-ramp queues are contained within the available ramp storage during the AM peak. During the PM peak, the maximum observed queue for the southbound US 101 Mathilda Avenue loop on-ramp exceeds the storage by three (3) vehicles between 5:20 PM and 5:30 PM.

Under the Existing plus Project Conditions, the westbound SR 237 Mathilda Avenue diagonal on-ramp queue will still be within the available ramp storage during the AM peak. For the southbound US 101 Mathilda Avenue loop on ramp during the PM peak, the project will add three (3) vehicles to the maximum queue, which would then exceed the available storage length by six (6) vehicles.

INTERSECTION VEHICLE QUEUING

Vehicle queuing for each study intersection was analyzed using the *Highway Capacity Manual, 2000* (HCM) methodology in the *Synchro* software. The 95th percentile queue length for each scenario was compared to the turn pocket storage length to determine if queues would exceed the storage length.

The City of Sunnyvale does not have a standard for queuing impacts but considers queuing issues as operational deficiencies. Locations which resulted in a queuing deficiency with the addition of the project are listed in **Table 19** of the report.

The analysis showed that a queuing storage deficiency would occur at the following intersection due to the proposed project traffic in the Existing Plus Project at the following intersection:

- #5 – Mathilda Avenue / Moffett Park Drive (eastbound right turn)

This intersection is part of the Mathilda Avenue Improvements at SR 237 and US 101 project, which would reconfigure this intersection along with the interchange. The improvement would adjust the storage length for the eastbound right turn lane and there would no longer be a queuing deficiency. The project applicant shall pay their fair share towards this improvement.

The analysis showed that a queuing storage deficiency would occur at the following intersection due to the proposed project traffic in each of the Existing Plus Background Plus Project, and Cumulative Plus Project scenarios:

- #15 – Bordeaux Drive / Innovation Way (northbound left turn)

However, improvements will be made at this intersection as part of the Mathilda Avenue Improvements at SR 237 and US 101 project. The project applicant shall pay their fair share towards the Mathilda Avenue Improvements project.

SITE ACCESS AND CIRCULATION

The proposed development will be accessible from existing driveways on Mathilda Avenue (Intersection #4) and Bordeaux Drive (Intersection #16). It should be noted that the Mathilda Avenue Improvements at SR 237 and US 101 project will close a segment of Moffett Park Drive between Mathilda Avenue and Bordeaux Drive, which borders the southern edge of the project site. The Moffett Park Drive closure would shift the site access for the driveway on Bordeaux Drive for vehicles coming from the south and west to instead utilize the Innovation Way extension instead of Moffett Park Drive.

The driveway on Mathilda Avenue is a shared driveway with the northern property. The driveway was determined to operate at an acceptable LOS at the completion of the proposed project. There were also no queuing deficiencies identified for the westbound approach. Since this driveway will operate at acceptable LOS and there are no queuing deficiencies, there are no improvements needed.

The driveway on Bordeaux Drive was determined to operate at an acceptable LOS at the completion of the proposed project during the AM peak and at an unacceptable LOS during the PM peak in Cumulative conditions only. The delay for vehicles leaving the site is caused by insufficient gaps to complete a safe turning maneuver due to high volumes on Bordeaux Drive. While the intersection meets peak hour signal warrants, installing a signal may not be appropriate due to the driveway's proximity to the Bordeaux Drive/Moffett Park Drive curve. It is recommended that the project add a left-turn lane at the driveway, which will require reconfiguration of the driveway to allow for proper storage and operation of an additional lane. The left-turn lane will allow the intersection to operate at an acceptable LOS.

PARKING REQUIREMENTS

The City parking requirements are stated in the of Sunnyvale Municipal Code (SMC). For a hotel, a minimum of 0.8 spaces is required per hotel room[1]. The project proposes 358 rooms, which equates to 287 spaces. The proposed project will provide 203 spaces in a below-grade parking garage and 93 surface parking for a total of 296 spaces, which meets the City's requirement for the number of spaces.

PEDESTRIAN ACCESS AND CIRCULATION

There are existing sidewalks adjacent to the project site where pedestrian can access the site from Mathilda Avenue. In the future, as part of VTA's Mathilda Avenue Improvements at SR 237 and US 101 project, a trail will be constructed along Moffett Park Drive. As noted in the existing condition, there currently are no sidewalks adjacent to the project site on Bordeaux Drive. Based on the July 2018 site plan, the project will be constructing sidewalks along Bordeaux Drive adjacent to the site and connect with the sidewalks north of the project site.

Within the project site, there are pedestrian pathways which connect all the buildings on the site. There is also a pathway which connects the hotel to Mathilda Avenue and Bordeaux Drive.

[1] Sunnyvale Municipal Code. Table 19.46.100(a)

BICYCLE ACCESS AND CIRCULATION

From the proposed site, bicyclists can access the City network of bicycle facilities via the bicycle lanes adjacent to the site on Moffett Park Drive and Bordeaux Drive. In the future, bicyclists may use the trail along Moffett Park Drive that will be constructed as part of VTA's Mathilda Avenue Improvements at SR 237 and US 101 project.

The SMC does not require bicycle parking for hotel land use, but VTA *Bicycle Technical Guidelines* recommends that hotel land uses provide at least one (1) Class I (bicycle locker) per 30 rooms and one (1) Class I (bicycle locker) per 30 employees[2]. Based on the number of hotel rooms, this would equate to at least 12 bicycle lockers. Additional bicycle lockers may be needed dependent on the number of employees. The July 2018 site plan indicates two outdoor bicycle racks, as well enclosed long-term bicycle storage lockers. The site plan does not indicate the number of bicycles each of these bicycle storage facilities will hold, but should follow SMC and VTA's guidelines.

TRANSIT, PEDESTRIAN, AND BICYCLE

The proposed project was evaluated to determine if it would likely conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks) or generate pedestrian, bicycle, or transit travel demand that would not be accommodated by existing transit, bicycle, or pedestrian facilities and plans.

TRANSIT

VTA bus routes 26, 54, 120, 121, 122, and 321 and shuttle route 826 operate within the vicinity of the proposed project. For all routes except northbound Route 54, the closest bus stop is located at the Lockheed Martin Transit Center, located near Mathilda Avenue and 5th Avenue. For northbound Route 54, the nearest bus stop for the project is located north of the west project driveway. It is anticipated that the future Rapid Route 523 will operate within the vicinity of the proposed project and will utilized the bus stops north of the west project driveway and Lockheed Martin Transit Center. The project would not conflict with existing or planned VTA transit facilities. Since the project does not conflict with existing or planned VTA transit facilities, the project will have a **less than significant impact** on transit services.

PEDESTRIAN

There are existing sidewalks adjacent to the project site where pedestrians can access the site from Mathilda Avenue. In the future, pedestrians may use the trail along Moffett Park Drive that will be constructed as part of VTA's Mathilda Avenue Improvements at SR 237 and US 101 project. As noted in the existing condition, there are no sidewalks adjacent to the project site on Bordeaux Drive. Based on the July 2018 site plan, the project will construct sidewalks along Bordeaux Drive adjacent to the site and connect with the sidewalks north of the project site.

BICYCLE

Bicyclists will have direct access to the project site using bicycle facilities on Moffett Park Drive and Bordeaux Drive. In the future, bicyclists may use the trail along Moffett Park Drive that will be constructed as part of VTA's Mathilda Avenue Improvements at SR 237 and US 101 project. The proposed project does not appear to impact the safety of bicyclists or have any hazardous design features impeding the use of

[2] Santa Clara Valley Transportation Authority (VTA). *Bicycle Technical Guidelines*. 2012

bicycles. Since the proposed project does not conflict with any adopted policies or plans related to bicycle activity, the propose project will have a **less than significant impact** on bicycle capacity.

1. INTRODUCTION

This report presents the results of the transportation impact analysis (TIA) for a proposed hotel development located in the City of Sunnyvale, California. The proposed project ("Project") will renovate the existing 173-room hotel at 1100 N Mathilda Avenue. The project includes renovating 88 rooms, demolishing 85 rooms, and constructing 270 rooms, with a net increase of 185 rooms. In addition, an 8,241 square-foot spa is proposed on the northeast corner of the project site.

Figure 1 illustrates the location of the project site in relation to the adjacent roadway network. The Project is located on the northeast corner of Mathilda Avenue and W Moffett Park Drive. The site would be accessed by existing unsignalized driveways along Mathilda Avenue and Bordeaux Drive. The driveway along Mathilda Avenue is limited to a right-in, right-out movement and the driveway along Bordeaux Drive is full access.

This traffic study was prepared to determine potential impacts related to the project based on standards and methodologies set forth by the City of Sunnyvale (City) and the Santa Clara Valley Transportation Authority (VTA). This study includes evaluations during the AM and PM peak hour traffic conditions for 17 intersections and seven (7) freeway ramps. This study also addresses the potential transportation effects of the proposed project to assist the City with project planning and the identification of potential conditions of approval for the project.

STUDY AREA

The proposed project will generate new vehicular trips that will increase traffic volumes on the nearby street network. To assess changes in traffic conditions associated with the proposed project, the following intersections in **Table 1** and freeway ramps in **Table 2** were evaluated. Study intersections were selected by following VTA's threshold of whether the project will generate 10 or more net new peak hour trips per lane per movement. **Figure 1** illustrates the location of each intersection relative to the project site.

Table 1 - Study Intersections

#	Intersection	Existing or Future Intersection
1	Mathilda Avenue / Lockheed Martin Way - Java Drive	Existing
2	Mathilda Avenue / 5th Avenue	Existing
3	Mathilda Avenue / Innovation Way	Existing
4	Mathilda Avenue / West Project Driveway	Existing
5	Mathilda Avenue / Moffett Park Drive	Existing
6	Mathilda Avenue / SR 237 WB Ramps	Existing
7	Mathilda Avenue / SR 237 EB Ramps	Existing
8	Mathilda Avenue / Ross Drive	Existing
9	Mathilda Avenue / Ahwanee Avenue – Almanor Avenue	Existing
10	Mathilda Avenue / San Aleso Avenue	Existing
11	Mathilda Avenue / Maude Avenue	Existing
12	Innovation Way / Moffett Park Drive	Existing
13	South Project Driveway / Moffett Park Drive	Existing
14	Bordeaux Drive / Java Drive	Existing
15	Bordeaux Drive / Innovation Way	Future
16	Bordeaux Drive / East Project Driveway	Existing
17	Bordeaux Drive / Moffett Park Drive	Existing

Table 2 - Study Freeway Ramps

Interchange	Freeway Ramp
SR 237 / Crossman Avenue	WB Diagonal On-Ramp
SR 237 / Mathilda Avenue	WB Diagonal On-Ramp
	WB Diagonal Off-Ramp
	EB Diagonal On-Ramp
	EB Diagonal Off-Ramp
US 101 / Mathilda Avenue	NB Diagonal Off-Ramp
	SB Loop On-Ramp

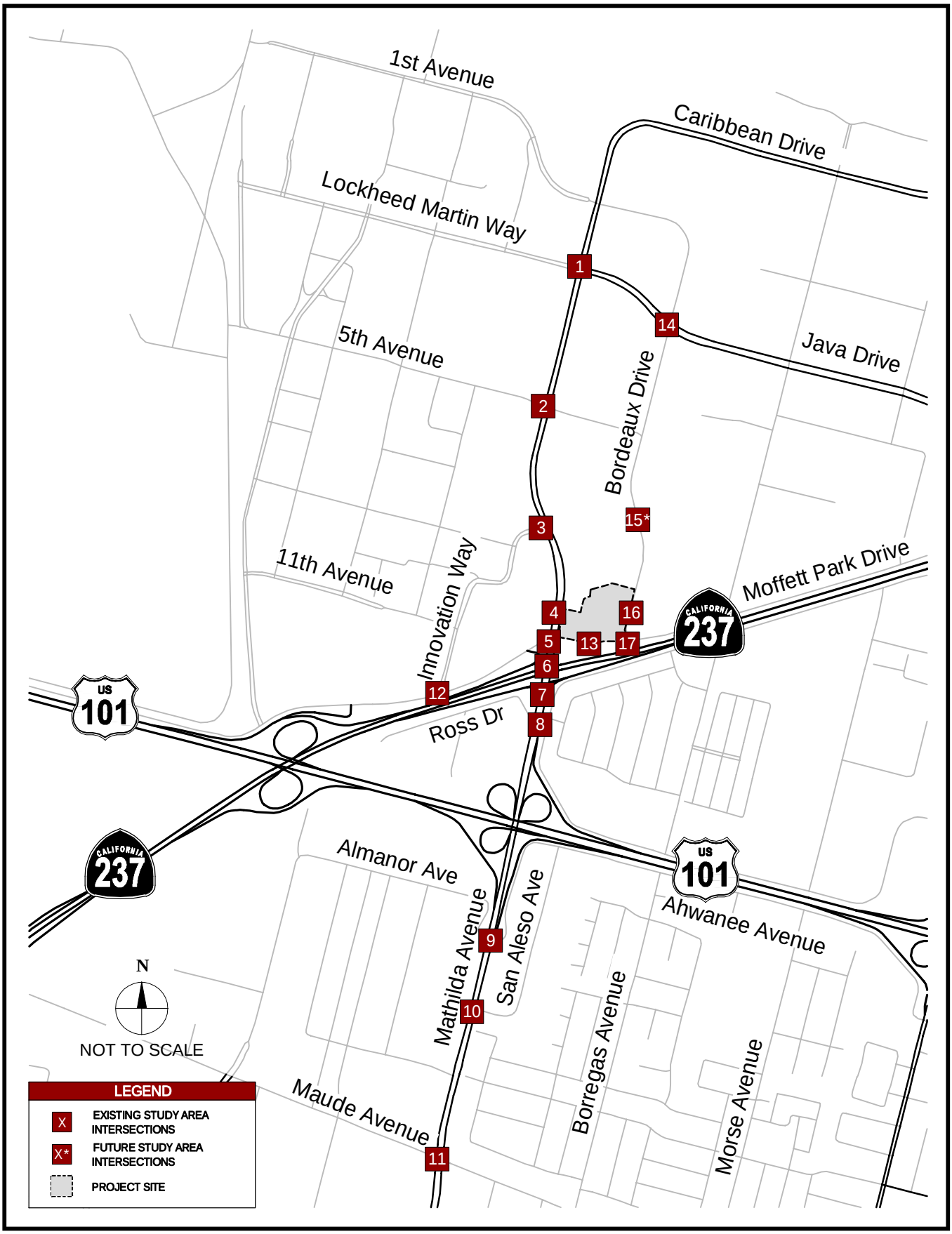

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FIGURE 1

PROJECT LOCATION AND STUDY INTERSECTIONS

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1100 MATHIILDA AVENUE TIA

TRAFFIC CONDITIONS

This TIA evaluates the following traffic scenarios:

- Existing Conditions – Based on traffic counts collected in December 2017 and existing roadway geometry and traffic control.
- Existing Plus Project Conditions – Based on traffic generated by the proposed project added to existing traffic volumes. Existing roadway geometry and traffic controls are assumed for this scenario.
- Existing Plus Background Condition – Based on traffic from approved projects in the study area (provided by City staff and dated February 2018) added to existing traffic volumes. Also assumes full occupation of Google buildings, which are partially occupied in the Existing conditions. The roadway network will include the existing conditions plus programmed (i.e. funded) roadway projects to be in place by the analysis year.
- Existing Plus Background Plus Project Conditions – Based on traffic generated by the proposed project added to the Existing Plus Background traffic volumes. The scenario includes roadway projects programmed to be in place by the analysis year and roadway modifications included in the project description.
- Cumulative (2030) Conditions – Based on future year traffic projections which are generated based on the City's growth rate and background traffic from approved and pending projects in the study area. This scenario assumes roadway geometry and traffic control present in the forecast horizon.
- Cumulative (2030) Plus Project Conditions – Based on traffic generated by the proposed added to the Cumulative traffic volumes. This scenario assumes roadway geometry and traffic control present in the forecast horizon.

STUDY METHODOLOGY

Analysis of significant environmental impacts at intersections and freeway segments was based on the concept of level of service (LOS). The LOS of an intersection is a qualitative measure used to describe operational conditions. LOS ranges from A (best), which represents minimal delay, to F (worst), which represents heavy delay and a facility that is operating at or near its functional capacity. Levels of service for this study were determined using methods defined in the *Highway Capacity Manual, 2000* (HCM) and appropriate traffic analysis software.

INTERSECTION LEVEL OF SERVICE

The HCM includes procedures for analyzing side-street stop-controlled (SSSC), all-way stop-controlled (AWSC), and signalized intersections.

Unsignalized Intersections

The HCM methodology as two different procedures for unsignalized intersections dependent on the type of stop-control for the intersection. For SSSC intersections, LOS is defined as a function of average control delay for the worst minor street movement or major street left-turn. For AWSC intersections, LOS is defined as a function of average control delay for the intersection as a whole. **Table 3** relates the operational characteristics associated with each LOS category for unsignalized intersections[3]. All unsignalized intersections were analyzed in *Traffix* software.

[3] Transportation Research Board, *Highway Capacity Manual 2000*, National Research Council, 2000

Table 3 - Unsignalized Intersection Level of Service Definitions

Level of Service	Description	Unsignalized (Avg. control delay per vehicle sec/veh.)
A	Free flow with no delays. Users are virtually unaffected by others in the traffic stream	≤ 10
B	Stable traffic. Traffic flows smoothly with few delays.	> 10 – 15
C	Stable flow but the operation of individual users becomes affected by other vehicles. Modest delays.	> 15 – 25
D	Approaching unstable flow. Operation of individual users becomes significantly affected by other vehicles. Delays may be more than one cycle during peak hours.	> 25 – 35
E	Unstable flow with operating conditions at or near the capacity level. Long delays and vehicle queuing.	> 35 – 50
F	Forced or breakdown flow that causes reduced capacity. Stop and go traffic conditions. Excessive long delays and vehicle queuing.	> 50

Source: Highway Capacity Manual 2000, 2000

Signalized Intersections

For LOS for signalized intersections, LOS is defined as a function of average control delay for the intersection as a whole. VTA has specific delay threshold values for each LOS that are more specific than that of the HCM. Pluses and minuses are added to the HCM ranges to further break down the LOS. **Table 4** relates the operational characteristics associated with each LOS category for signalized intersections[4].

For this traffic analysis, four signalized intersections; Mathilda Avenue / Moffett Park Drive (#5), Mathilda Avenue / SR 237 WB Ramps (#6), Mathilda Avenue / SR 237 EB Ramps (#7), and Mathilda Avenue / Dross Drive (#8); were analyzed in *Synchro* software and the remaining intersections were analyzed within the *Traffix* software. To be consistent with other traffic study conducted within the Moffett Park Specific Plan area, actual signal timing parameters (i.e., minimum green, yellow, and all red) were assumed.

[4] VTA Congestion Management Program, Traffic Level of Service Analysis Guidelines, June 2003.

Table 4 - Signalized Intersection Level of Service Definitions

Level of Service	Description	Signalized (Avg. control delay per vehicle sec/veh.)
A	Free flow with no delays. Users are virtually unaffected by others in the traffic stream	delay ≤ 10.0
B+	Stable traffic. Traffic flows smoothly with few delays.	10.0 < delay ≤ 12.0
B		12.0 < delay ≤ 18.0
B-		18.0 < delay ≤ 20.0
C+	Stable flow but the operation of individual users becomes affected by other vehicles. Modest delays.	20.0 < delay ≤ 23.0
C		23.0 < delay ≤ 32.0
C-		32.0 < delay ≤ 35.0
D+	Approaching unstable flow. Operation of individual users becomes significantly affected by other vehicles. Delays may be more than one cycle during peak hours.	35.0 < delay ≤ 39.0
D		39.0 < delay ≤ 51.0
D-		51.0 < delay ≤ 55.0
E+	Unstable flow with operating conditions at or near the capacity level. Long delays and vehicle queuing.	55.0 < delay ≤ 60.0
E		60.0 < delay ≤ 75.0
E-		75.0 < delay ≤ 80.0
F	Forced or breakdown flow that causes reduced capacity. Stop and go traffic conditions. Excessive long delays and vehicle queuing.	delay > 80

Source: VTA Level of Service Analysis Guidelines, 2003

Consistent with the significance impact criteria documented in the *Transportation Impact Analysis Guidelines*[5], VTA accepts a minimum level of service of LOS E for a County intersection or CMP intersection. The City utilizes the VTA LOS standards for all intersections on the CMP roadway system. Therefore, the following conditions would result in a significant impact at a CMP or County intersection:

1. If the intersection operates at an acceptable LOS (i.e. LOS A, B, C, D, or E) without the project and degrades to an unacceptable LOS (i.e. LOS F) with the project, then it is a significant impact.
2. If the intersection operates at an unacceptable LOS (i.e. LOS F) without the project and the project increases the average control delay for the critical movements by four (4) or more seconds and increases the critical volume to capacity (v/c) by 0.01 or more, then it is a significant impact.
    a. Even if the addition of project traffic reduces the amount of average control delay for a critical movement (i.e. negative change in delay) **but** the project increases the critical v/c by 0.01 or more, then it is a significant impact.

Mitigation for CMP and County intersections with a significant impact must improve the LOS back to without Project conditions or better.

The LOS standard for City of Sunnyvale intersections is LOS D except for City of Sunnyvale intersections on roadways that are designated as regionally significant (i.e. Mathilda Avenue), which

[5] *Transportation Impact Analysis Guidelines*, Santa Clara Valley Transportation Authority Guidelines, October 2014.

allows for a minimum level of service of LOS E. Therefore, the following conditions would result in a significant impact at a City intersection:

1. If the intersection operates at an acceptable LOS (i.e. LOS A, B, C, or D) without the project and degrades to an unacceptable LOS (i.e. LOS E, or F) with the project, then it is a significant impact.
2. If the intersection operates at an unacceptable LOS (i.e. LOS E, or F) without the project and the project increases the critical movement delay of four (4) or more seconds and increased the critical volume to capacity (v/c) by 0.01 or more, then it is a significant impact.

Project impacts at City of Sunnyvale unsignalized intersections would be considered significant if one of the following criteria is met:

1. If the intersection operates at an acceptable LOS (i.e. LOS A, B, C, or D) without the project and degrades to an unacceptable LOS (i.e. LOS E, or F) with the addition of project traffic, then it is a significant impact.
2. If an unsignalized intersection operates at an unacceptable LOS (i.e. LOS E, or F) without the project and the addition of project traffic increases:
    a. the average intersection delay by four (4) seconds or more, and the volume-to capacity (v/c) values by 0.01 or more for all-way stop controlled intersections; or
    b. the worst movement delay by four (4) seconds or more, and the critical volume-to-capacity (v/c) value by 0.01 or more for side-street stop controlled intersections
3. Intersection meets the warrant(s) for installation of a traffic signal as per the latest edition of the California Manual on Uniform Traffic Control Devices (CA MUTCD)

Mitigation for City of Sunnyvale intersections with a significant impact must improve the LOS back to without Project conditions or better.

SIGNAL WARRANTS

Traffic signals may be justified when traffic operations fall below acceptable LOS standards and when one or more signal warrants are satisfied. Traffic volumes at the unsignalized study intersections were compared against the peak hour warrant in the 2014 California Manual on Uniform Traffic Control Devices (CA MUTCD)[6]. *Traffic Signal Warrant #3 – Peak Hour Volume Warrant* is satisfied when traffic volumes on the major and minor approaches exceed thresholds for one hour of the day. The Peak Hour Warrant is generally the first warrant to be satisfied. Other warrants such as those for minimum vehicle volumes, interruption of continuous traffic, and traffic progression were not evaluated because they generally require higher traffic volumes to be satisfied.

QUEUING

The effects of vehicle queuing were analyzed and the 95th percentile queue is reported for all study intersections. The 95th percentile queue length represents a condition where 95 percent of the time during the peak hour, traffic queues will be less than or equal to the queue length determined by the analysis. This is referred to as the "95th percentile queue." Average queuing is less.

Queues that exceed the turn pocket length can create potentially hazardous conditions by blocking or disrupting through traffic in adjacent travel lanes. The City of Sunnyvale does not have standards for

[6] *California Manual on Uniform Traffic Control Devices,* (FHWA's MUTCD 2009 Edition, as amended for use in California), November 7, 2014

queuing and considers queuing deficiencies as operational issues. Thus, for purposes of this analysis, operational deficiencies were considered to occur under conditions where project traffic causes the queue to extend beyond the turn pocket by 25 feet or more (i.e. the length of one vehicle) into adjacent traffic lanes that operate separately from the left or right turn lane. Where the vehicle queue already exceeds that turn pocket length under pre-project conditions, a queuing deficiency would occur if project traffic lengthens the queue by 25 feet or more.

FREEWAY SEGMENTS

Impacts on nearby freeway segments were evaluated in accordance with VTA CMP guidelines. The guidelines dictate that a freeway segment be analyzed if the proposed project adds traffic equivalent to at least one percent of the freeway capacity. The analysis shows that the proposed Project would not add sufficient traffic to freeway segments to cause a potential significant impact; therefore, no further freeway analysis is required. The analysis to determine whether the study freeway segments met the VTA thresholds is shown in the **Appendix**.

FREEWAY RAMP ANALYSIS

Impacts on freeway on- and off-ramps listed were evaluated based on volume to capacity analysis. For on-ramps with ramp metering, on-ramp queues were also evaluated. The freeway ramp analysis was performed for the Existing and Existing Plus Project scenarios. No Background or Cumulative freeway segment analysis was completed since it was not required.

It should be noted that VTA TIA guidelines do not have a significance criteria for freeway ramp impacts, therefore this analysis is stated for informational purposes only.

Volume to Capacity Analysis

The volume to capacity (V/C) analysis evaluated seven (7) ramps listed in **Table 2**. The capacity for each ramp is equal to the sum of the lane capacity for the mixed-flow and HOV lanes. The capacity for an unmetered, mixed-flow lane was obtained from HCM, which is based on the free-flow speed and the number of lanes, as shown in **Table 5**[7]. The capacity for a metered, mixed-flow lane on-ramp was obtained from the *Ramp Management and Control Handbook*[8], which assumes a maximum metering rate of 900 vehicles per hour (vph) for single-lane on-ramp and 1,600 vph for a double-lane on-ramp. Capacity for an HOV lane was assumed to be 900 vph regardless of being metered or not.

Ramp Queuing

There are concerns that the vehicle queue for on-ramps with ramp metering may extend onto the local street with the addition of the project. To evaluate any potential issues, on-ramp queues were evaluated by adding the number of project-related vehicles to the existing on-ramp queues to determine if the queues would exceed the on-ramp storage and extend onto the adjacent arterial.

[7] Transportation Research Board, *Highway Capacity Manual 2000*, National Research Council, 2000

[8] Federal Highway Administration, *Ramp Management and Control Handbook*, January 2006

Table 5 - Ramp Capacity

Free-Flow Speed of Ramp (mph)	Capacity for Single-lane Ramp (vph)	Capacity for Double-lane Ramp (vph)
>50	2,200	4,400
>40-50	2,100	4,100
>30-40	2,000	3,800
>20-30	1,900	3,500
<20	1,800	3,200

Source: Caltrans Ramp Management and Control Handbook, 2006

TRANSIT IMPACTS

Impacts on the transit system were evaluated in accordance with VTA guidelines. The transit analysis evaluated existing VTA bus routes that currently operate within the study area, particularly through a study intersection. The impacts of the project to the transit system, such as a possible increase in demand or vehicle delay was analyzed. It should be noted, that the VTA TIA guidelines do not have significance criteria for transit impacts, therefore the transit analysis is stated for informational purposes only.

REPORT ORGANIZATION

The remainder of the report is divided into the following chapters:

- Chapter 2: Existing Conditions – describes existing conditions on the roadway network, transit system, pedestrian facilities, and bicycle facilities.
- Chapter 3: Existing Plus Project Conditions – describes the proposed project, trip generation, and estimated impact on the transportation system under Existing Plus Project Conditions.
- Chapter 4: Existing Plus Background Traffic Conditions – describes the traffic conditions under Existing Plus Background Conditions with and without the proposed project.
- Chapter 5: Cumulative Traffic Conditions – describes the traffic conditions under Cumulative Conditions with and without the proposed project.
- Chapter 6: Intersection Vehicle Queuing and Site Access and Circulation - describes vehicle queuing analysis at the study intersections, as well as site access and circulation for the project.
- Chapter 7: Public Transit, Bicycle, and Pedestrian Facilities – describes potential effects the proposed project may have on the transit system, pedestrian facilities, and bicycle facilities.
- Chapter 8: Summary of Impacts and Recommended Mitigation – summarizes potential impacts of the proposed project and mitigations, if necessary.
- Chapter 9: Summary of Queuing Deficiencies and Recommended Improvements – summarizes potential queuing deficiencies of the proposed project and recommendations for improvements, if necessary.

2. EXISTING CONDITIONS

This chapter describes the existing conditions of the roadway network, transit service, pedestrian facilities, and bicycle facilities within the vicinity of the project site. The chapter also presents existing turning movement volumes and intersection levels of service.

EXISTING ROADWAY NETWORK

This section provides a description of the specific roadways included in this study.

US-101

US-101 is an eight-lane freeway near the study area with a high occupancy vehicle (HOV) lane in each direction, within the study area. US-101 primarily runs north-south (but runs east-west near the study area) and connects multiple cities in the Bay Area from Santa Rosa in the north to Gilroy in the south. US-101 provides access to Sonoma County, Marin County, San Francisco County, San Mateo County, and Santa Clara County. The posted speed limit on US-101 near the study area is 65 miles per hour.

SR-237

SR-237 is a six-lane freeway near the study area with express lanes in each direction between North First Street and I-880. HOV lanes exist from I-880 to Mathilda Avenue. SR-237 runs east-west and connects multiple cities in the Bay Area from Milpitas in the east to Mountain View in the west. The posted speed limit on SR-237 near the study area is 65 miles per hour.

AHWANEE AVENUE

Ahwanee Avenue is a two-lane, east-west collector roadway within the study area, which serves residential and commercial land uses. Ahwanee Avenue begins in the east, just west of Lawrence Expressway and connects to Mathilda Avenue to the west. Ahwanne Avenue becomes Almanor Avenue on the west side of Mathilda Avenue. The speed limit on Ahwanee Avenue is 35 miles per hour.

ALMANOR AVENUE

Almanor Avenue is a two-lane, east-west commercial collector roadway with bicycle lanes. Almanor Avenue connects Mary Avenue on the west side to Mathilda Avenue on the east side. Almanor Avenue becomes Ahwanne Avenue on the east side of Mathilda Avenue. The speed limit on Almanor Avenue is 30 miles per hour.

BORDEAUX DRIVE

Bordeaux Drive is a north-south collector roadway with one lane in each direction, a two-way left turn lane (TWLTL), and bicycle lanes between Moffett Park Drive and Java Drive. North of Java Drive, Bordeaux Drive has one lane in each direction and no bicycle lane. Bordeaux Drive connects Mathilda Avenue to Moffett Park Drive and provides access to office land uses and the project site. The posted speed limit on Bordeaux Drive is 30 miles per hour.

FIFTH AVENUE

Fifth (5th) Avenue is a two to six-lane, east-west local street, which serves office land uses. 5th Avenue connects Enterprise Way on the west end to Bordeaux Drive on the east end. There is on-street parking east of Mathilda Avenue. 5th Avenue is a private street between Enterprise Way and Bordeaux Drive, except at the intersection of Mathilda Avenue and 5th Avenue. The speed limit on 5th Avenue is 25 miles per hour.

INNOVATION WAY

Innovation Way is a four-lane, north-south local street, which serves office land uses and Foothill College Sunnyvale Center. Innovation Way runs between Mathilda Avenue on the north side and Moffett Park Drive on the south side. Innovation Way is mostly a private street with restricted access. There are planned improvements to extend Innovation Way west and connect with Bordeaux Drive. The speed limit on Innovation Way is 25 miles per hour.

JAVA DRIVE

Java Drive is a four-lane, east-west arterial roadway within the study area, which serves office and commercial land uses. Java Drive connects Mathilda Avenue on the west side to Fair Oaks Avenue on the east side. Java Drive becomes Lockheed Martin Way west of Mathilda Avenue. There are light rail tracks operating along the median of Java Drive. The speed limit on Java Drive is 45 miles per hour.

LOCKHEED MARTIN WAY

Lockheed Martin Way is a six-lane east-west local street within the study area. There is a private gate between C Street and Mathilda Avenue, restricting access to allow Lockheed Martin vehicles. Lockheed Martin Way connects Enterprise Way on the west side to Mathilda Avenue on the east side. Lockheed Martin Way becomes Java Drive east of Mathilda Drive. The speed limit on Lockheed Martin Way is 25 miles per hour.

MATHILDA AVENUE

Mathilda Avenue is a six-lane north-south arterial roadway within the study area. It connects Caribbean Drive on the north side and transitions into Sunnyvale-Saratoga Road on the south side. Mathilda Avenue provides access to US-101 and SR-237. Mathilda Avenue provides access to office, residential, and commercial land uses, as well as the project site. There are bicycle lanes on the east side of Mathilda Avenue between Ahwanee Avenue and Del Rey Avenue and on both sides between Del Rey Avenue and Washington Avenue. Mathilda Avenue is designated as a regionally significant roadway for the City of Sunnyvale and the posted speed limit is 45 miles per hour within the project study area.

MAUDE AVENUE

Maude Avenue is a two-lane local street with a two-way left-turn lane (TWLTL) which runs west of the study area and terminates at Wolfe Road. Maude Avenue provides access to residential land uses. There is on-street parking on Maude Avenue. The posted speed limit within the study area is 30 miles per hour.

MOFFETT PARK DRIVE

Moffett Park Drive is a two-lane, east-west collector roadway within the study area, which serves office land uses. Moffett Park Drive connects Enterprise Way on the west side to Caribbean Drive on the east side.

West of Enterprise, Moffett Park Drive becomes Manila Drive. There are bicycle lanes on Moffett Park Drive between Bordeaux Drive and Caribbean Drive. The speed limit on Moffett Park Drive is 40 miles per hour.

ROSS DRIVE

Ross Drive is a two-lane east-west local street within the study area, which serves residential land uses, commercial land uses, and office land uses. Ross Drive begins just east of Mathilda Avenue and continues west until it ends west of Hamlin Court on the west side. The speed limit on Ross Drive is 25 miles per hour.

SAN ALESO AVENUE

San Aleso Avenue is a two-lane local north-south street with on-street parking. San Aleso Avenue connects Ahwanee Avenue on the north side to Mathilda Avenue near the south side. San Aleso Avenue provides access to residential, commercial, and office land uses. The posted speed limit on San Aleso Avenue is 25 miles per hour.

EXISTING TRANSIT FACILITIES

Santa Clara Valley Transportation Authority (VTA) and Caltrain provide transit services within Sunnyvale and other cities in Santa Clara County. The existing transit services within the study area are shown in **Figure 2** and described in this section. **Table 6** provides of a summary of the existing transit service in the study area.

VTA BUS SERVICES

VTA has multiple bus routes near the project site and throughout Santa Clara County. Many routes (such as Routes 32, 55, 104, etc.) operate within the study area, but do not run near the proposed site; therefore, only routes that service the nearby area of the proposed project are described in this section.

Route 26 is a local bus service that operates between the Sunnyvale/Lockheed Martin Transit Center and the Eastridge Transit Center. In the vicinity of the proposed project, Route 26 begins at the Lockheed Martin Transit Center and operates on 5th Avenue, Mathilda Avenue, and Java Drive before going onto Fair Oaks Avenue. On weekdays, Route 26 operates from 5:14 AM to 11:50 PM on 15-minute to 90-minute headways. On Saturdays, Route 26 operates from 6:16 AM to 10:54 PM on 30-minute to 60-minute headways. On Sundays, Route 26 operates from 6:18 AM to 10:52 AM on 30-minute to 60-minute headways. Near the project site, there is a bus stop along Mathilda Avenue at the Lockheed Martin Transit Center.

Route 54 is a local bus service that operates between De Anza College to the Sunnyvale/Lockheed Martin Transit Center. In the vicinity of the proposed project, Route 54 begins at the Lockheed Martin Transit Center and operates on 5th Avenue, and Mathilda Avenue. On the weekday, Route 54 operates from 6:27 AM to 9:04 PM on 30-minute to 60-minute headways. On Saturdays, Route 54 operates from 8:18 AM to 7:50 PM on 45-minute to 60-minute headways. On Sundays, Route 54 operates from 9:20 AM to 6:49 PM on 45-minute to 60-minute headways. Near the project site, there is a bus stop along Mathilda Avenue approximately 350 north of the west project driveway for those traveling in the northbound direction. The nearest bus stop for southbound passengers is the bust stop at the Lockheed Martin Transit Center. It should be noted that as part of the approved 2018 service plan, Route 54 will be discontinued and will no longer provide service. It is anticipated that the proposed Rapid Route 523 will follow similar route as Route 54 within the study area.

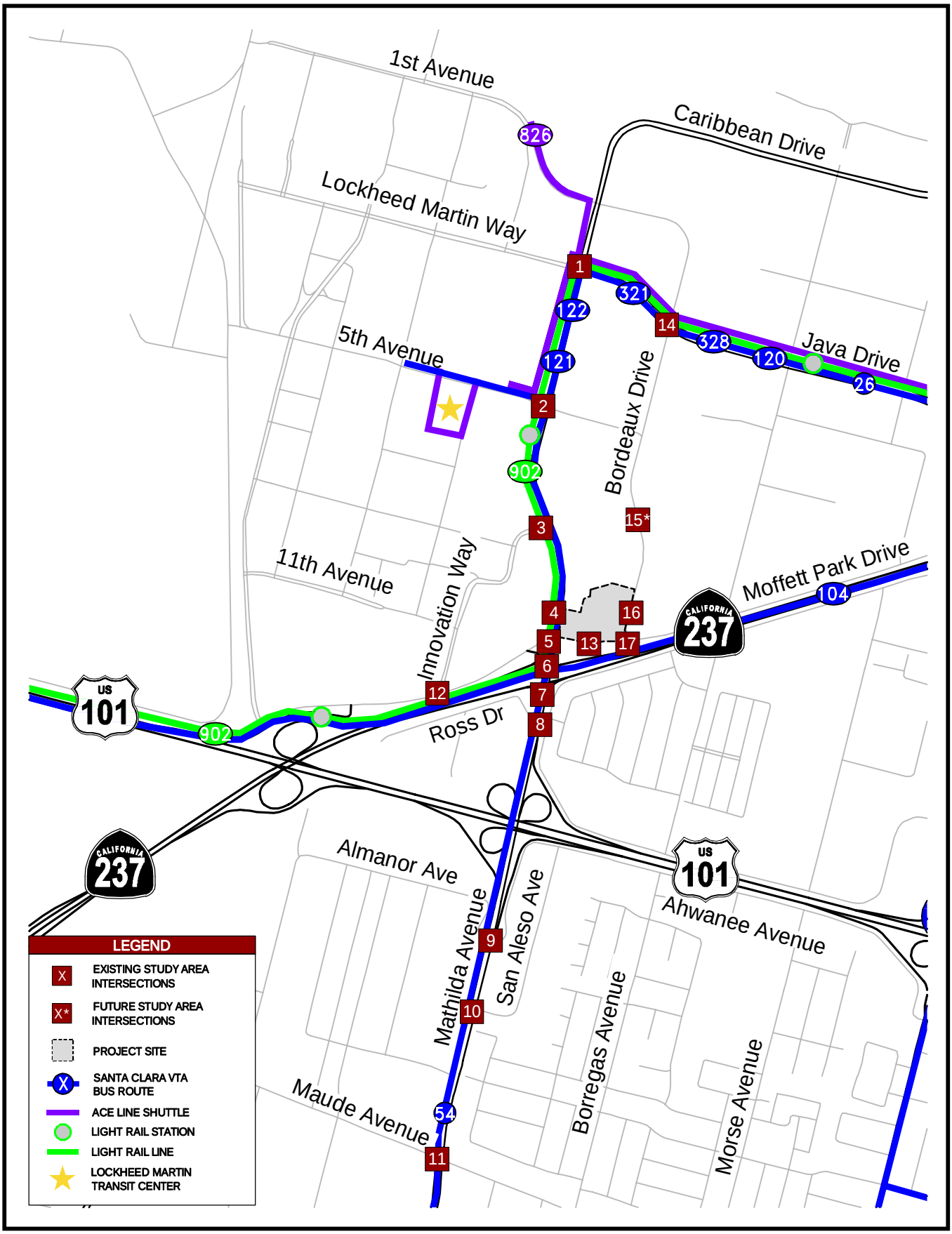

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FIGURE 2

EXISTING TRANSIT FACILITIES

Table 6 - Existing Transit Service

Route	From	To	Weekdays			Weekends	
			Operating Hours[1]	Headway[2] (minutes)		Operating Hours[1]	Headway[2] (minutes)
				Peak	Mid-day		
VTA Bus Services							
26	Lockheed Martin Transit Center	Eastridge Transit Center	5:15 AM to 11:50 PM	15	90	6:15 AM to 10:55 PM[3]	30-60
54	De Anza College	Lockheed Martin Transit Center	6:25 AM to 9:05 PM	30	60	8:15 AM to 7:50 PM[3]	45-60
120	Fremont BART	Lockheed Martin Transit Center	6:15 AM to 9:30 AM & 4:05 PM to 7:15 PM[4]	15	45-60	No weekend service	-
121	Gilroy Transit Center	Lockheed Martin Transit Center	4:30 AM to 9:20 AM & 2:50 PM to 7:35 PM[5]	15	60	No weekend service	-
122	Santa Teresa Light Rail Station	Lockheed Martin Transit Center	5:50 AM to 6:45 AM & 4:50 PM to 6:00 PM[5]	-	-	No weekend service	-
321	Great Mall/Main Transit Center	Lockheed Martin Transit Center	8:10 AM to 8:50 AM & 5:50 PM to 6:40 PM[6]	-	-	No weekend service	-
328	Almaden Expressway	Lockheed Martin Transit Center	5:55 AM to 8:45 AM & 4:55 PM to 7:15 PM[5]	30	60-90	No weekend service	-
826	ACE Great America Station	Lockheed Martin Transit Center	6:15 AM to 9:45 AM & 3:15 PM to 6:40 PM[6]	45-50	70-75	No weekend service	-
VTA Light Rail Service							
902	Mountain View	Winchester Avenue	4:45 AM to 12:45 AM	15	30	6:00 AM to 12:45 AM	30

Notes:
[1] Operating Hours rounded to the nearest 5 minutes for weekdays and weekends.
[2] Headways are defined as the time between transit vehicles on the same route.
[3] Operating hours for Sundays may have different schedule or flexible schedule compared to Saturdays.
[4] Route 120 runs only in the southbound direction during the morning AM period and only in the northbound direction during the evening PM period.
[5] Routes 121,122, and 328 run only in the northbound direction during the morning AM period and only in the southbound direction during the evening PM period.
[6] Routes 321 and 826 runs only in the westbound direction during the morning AM period and only in the eastbound direction during the evening PM period.

Source: VTA, 2017

Route 120 is a commuter bus service that operates between Fremont BART and the Lockheed Martin Transit Center/Moffett Park. Within the vicinity of the project site, Route 120 travels on Java Drive, Mathilda Avenue, and 5th Avenue into the Lockheed Martin Transit Center. On weekdays, Route 120 operates in the southbound direction between 6:16 AM and 9:30 AM at 15-minute to 60-minute headways and in the northbound direction between 4:04 PM and 7:12 PM at 15-minute to 45-minute headways. Route 120 does not operate on Saturdays or Sundays. Near the project site, there is a bus stop along Mathilda Avenue at the Lockheed Martin Transit Center.

Route 121 is a commuter bus service that operates between the Gilroy Transit Center to the Lockheed Martin Transit Center/Moffett Park. Within the vicinity of the project site, Route 121 travels on Java Drive, Mathilda Avenue, and 5th Avenue into the Lockheed Martin Transit Center. On weekdays, Route 121 operates in the northbound direction between 4:30 AM and 9:20 AM at 15-minute to 30-minute headways and in the southbound direction between 2:51 PM and 7:36 PM at 15-minute to 60-minute headways. Route 121 does not operate on Saturdays or Sundays. Near the project site, there is a bus stop along Mathilda Avenue at the Lockheed Martin Transit Center.

Route 122 is a commuter bus service that operates between the Santa Teresa Light Rail Station to the Lockheed Martin Transit Center. Within the vicinity of the project site, Route 122 travels on Java Drive, Mathilda Avenue, and 5th Avenue into the Lockheed Martin Transit Center. On weekdays, Route 122 departs northbound from the Santa Teresa Light Rail Station at 5:52 AM and arrives at the Lockheed Martin Transit Center at 6:45 AM. In the evening, Route 122 travels southbound from the Lockheed Martin Transit Center at 4:48 PM to the Santa Teresa Light Rail Station at 6:02 PM. Route 122 does not operate on Saturdays or Sundays. Near the project site, there is a bus stop along Mathilda Avenue at the Lockheed Martin Transit Center.

Route 321 is a limited stop bus service that operates between the Great Mall/Main Transit Center and the Lockheed Martin Transit Center/Moffett Industrial Park. In the vicinity of the proposed project, Route 321 runs on Java Drive, Mathilda Avenue, and 5th Avenue. On weekdays, Route 321 operates in the eastbound direction between 5:52 PM and 6:38 PM and in the westbound direction between 8:11 AM and 8:50 AM. This route operates only once in each of the eastbound and westbound directions. Route 122 does not operate on Saturdays or Sundays. Near the proposed project site, there is a bus stop for Route 321 at the Lockheed Martin Transit Center, located near the intersection of 5th Avenue and Mathilda Avenue.

Route 328 is a commuter bus service that operates between Almaden Expressway & Camden and Lockheed Martin/Moffett Park. In the vicinity of the project site, Route 328 travels on Java Drive, Mathilda Avenue, and 5th Avenue into the Lockheed Martin Transit Center. On weekdays, Route 328 runs in the northbound direction between 5:57 AM to 8:43 AM at 30- to 90- minute headways and in the southbound direction between 4:53 PM to 7:14 PM at 60-minute headways. Route 328 does not operate on Saturdays or Sundays. Near the project site, there is a bus stop along Mathilda Avenue at the Lockheed Martin Transit Center.

Route 826 is the Altamont Commuter Express (ACE) Red Shuttle which operates between the ACE Great America Station to the Lockheed Martin Transit Center. In the vicinity of the project site, Route 826 runs on Java Drive, Mathilda Avenue, and 5th Avenue into the Lockheed Martin Transit Center. On weekdays, Route 826 runs in the westbound direction between 6:16 AM and 9:44 AM at 45- to 75-minute headways and runs in the eastbound direction between 3:14 PM and 6:39 PM at 50- to 70-minute headways. The ACE Red Shuttle does not operate on Saturdays or Sundays. Near the project site, there are two bus stops: along Java Drive at Crossman Avenue and Mathilda Avenue at 1st Avenue.

VTA LIGHT RAIL TRANSIT (LRT)

Line 902 is the Mountain View–Winchester Avenue light rail train (LRT) which operates between Downtown Mountain View and Winchester Avenue in Campbell. The closest LRT stations to the project site are the Crossman, Borregas, and Lockheed Martin Stations. Both the Crossman and Borregas Stations are within one mile east, whereas the Lockheed Martin Station is on Mathilda Avenue. On weekdays, Line 902 operates between 4:42 AM and 12:44 AM (of the following day) at 15-minute to 30-minute headways. On Saturdays and Sundays, Line 902 operates between 6:01 AM and 12:43 AM (of the following day) at 30-minute headways.

CALTRAIN

Caltrain provides commuter-heavy rail services between San Francisco County and Santa Clara Country.

The nearest Caltrain station to the project site is the Sunnyvale Station located approximately two miles from the project area. The current 2018 schedule shows that during the weekday AM peak (7-10 AM), the Sunnyvale Station is served by one northbound local train, seven northbound limited-stop trains, two northbound Baby Bullet trains, and three southbound limited-stop trains. During the weekday PM peak (4-7 PM), the station is served by three northbound limited-stop trains, one southbound local train, seven southbound limited-stop trains, and two Baby Bullet train. At the Sunnyvale Station, there are connections to VTA bus routes 32, 53, and 55.

EXISTING PEDESTRIAN FACILITIES

Sidewalks and crosswalks are mostly provided throughout the study area in Sunnyvale to allow pedestrians access to nearby transit stops, residential uses, and commercial uses. There are existing sidewalks present for the area near the project site. However, there are gaps in the pedestrian facilities surrounding the project site, such as along the north side of W Moffett Park Drive and the west side of Bordeaux Drive. In addition, sidewalks are non-existent near the project site on the west side of Mathilda Avenue from Almanor Avenue to Moffett Park Drive.

EXISTING BICYCLE FACILITIES

Figure 3 shows existing bicycle facilities within the study area.

Class I bicycle paths are located throughout the City of Sunnyvale. The following is a list of the Class I bicycle paths near the study area:

- The John W Christian Greenbelt is between Garner Drive and Weddell Drive, parallel and to the north of Lakehaven Drive between Weddell Drive and Stonylake Court, parallel and to the south of Prescott Avenue between Blazingwood Drive and Calabazas Creek. This path connects to the Calabazas Creek Trail. There is also a short bicycle path parallel and to the west of Lakehaven Terrace, that extends off the John W Christian Greenbelt.
- Future bicycle path on Moffett Park Drive from Borregas Avenue to Innovation Way.

Class II bicycle lanes are located throughout the City of Sunnyvale. The following is a list of the Class II bicycle lanes near the study area:

- Almanor Avenue between Mary Avenue and Vaqueros Avenue
- Bordeaux Drive between Java Drive and Moffett Park Drive

- Borregas Avenue between Maude Avenue and Ahwanee Avenue and between Caribbean Drive and Moffett Park Drive
- Caribbean Drive between Mathilda Avenue and SR-237
- 11th Avenue between Enterprise Way and Innovation Way
- D Street between 5th Avenue and 11th Avenue
- Discovery Way between 5th Avenue and 11th Avenue
- Enterprise Way between 5th Avenue and Moffett Park Drive
- 1st Avenue between J Street and Mathilda Avenue
- Mary Avenue between Almanor Avenue and Maude Avenue
- Mathilda Avenue on the east side between Ahwanee Avenue and Del Rey Avenue; on both sides between Del Rey Avenue and Washington Avenue and future bicycle lanes between Ross Drive and Almanor Avenue
- Maude Avenue between SR-237 and Borregas Avenue, future bicycle lanes between Borregas Avenue and Fair Oaks Avenue
- Moffett Park Drive between Enterprise Way and Innovation Way; and between Bordeaux Drive and Caribbean Drive
- Future Bicycle lane on Java Drive between Mathilda Avenue and Crossman Avenue.

Class III bicycle routes are located throughout the City of Sunnyvale. Within the study area, there are no bicycle routes.

EXISTING IMPROVEMENT FUNDING AND ESTABLISHED MITIGATION PROGRAMS

The City of Sunnyvale has a General Plan that sets forth goals, policies, and actions for developing the transportation network in Sunnyvale. Resulting from the goals, policies, and actions from the General Plan are transportation improvement projects that will help mitigate the increased vehicular demand on the network. These roadway projects will be funded from multiple revenue sources, such as the Transportation Impact Fee Ordinance and the City's Transportation Strategic Program.

TRANSPORTATION IMPACT FEE ORDINANCE

The City of Sunnyvale has a transportation impact fee fund in its Municipal Code. Chapter 3.50 details the transportation impact fee and its use of funds. The use of funds is only to complete traffic improvement projects as specified in the Transportation Strategic Program.

The fees are calculated for non-residential uses on a per square foot basis for all new gross floor area. Fees for existing buildings that change in land use are based on the incremental difference between the peak hour trips generated by the prior land use compared to the proposed new use.

The fees are due before any building permits are issued or before any conversion of use to an existing building can be completed.

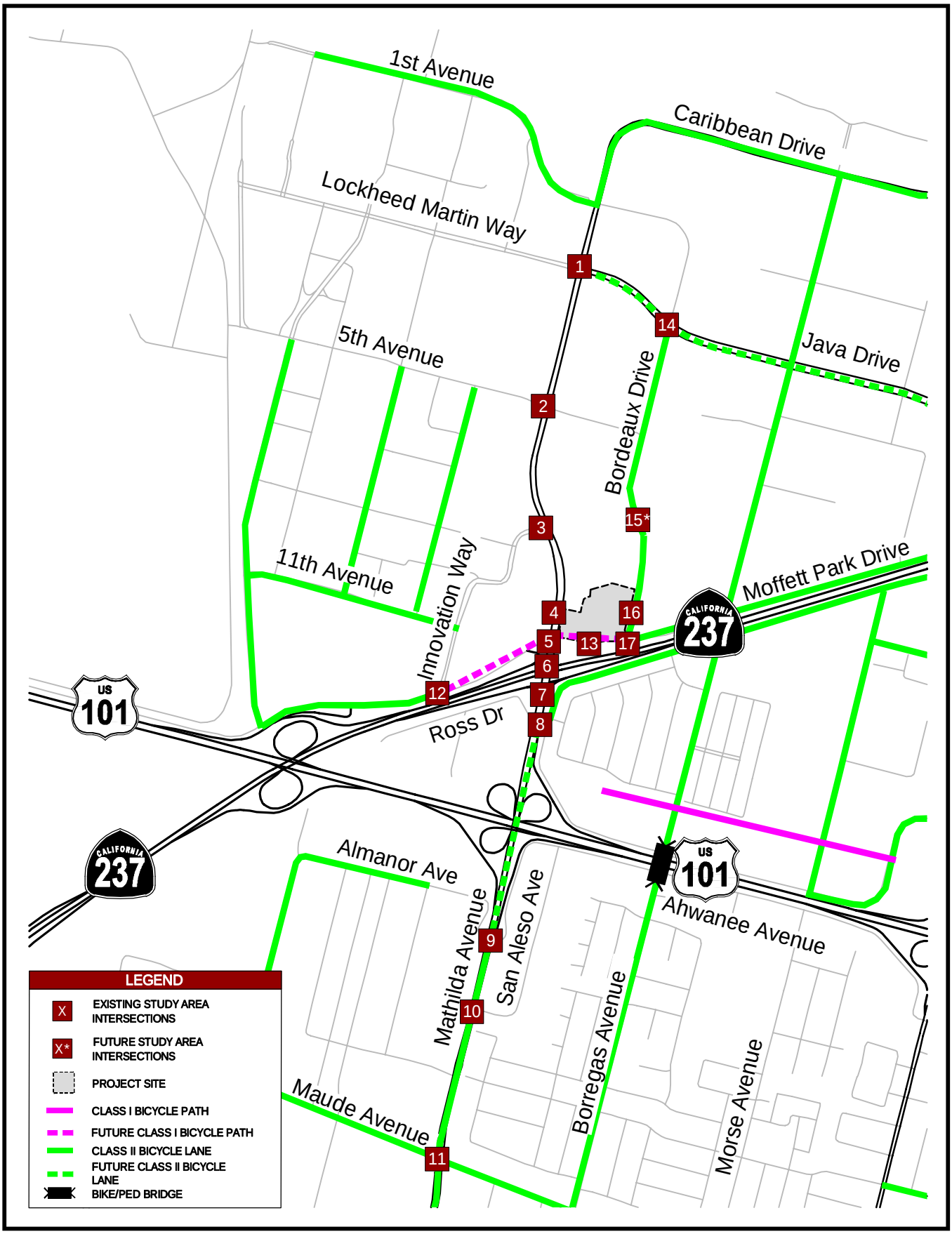

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FIGURE 3

EXISTING BICYCLE FACILITIES

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1100 MATHIILDA AVENUE TIA

CITY'S CAPITAL IMPROVEMENT PROGRAM

The City of Sunnyvale has a Capital Improvement Plan (CIP) to ensure the maintenance and infrastructure replacement of the City's transportation network. The City updates the budget every two years for the 20-year future. The CIP has taken into account Long Range plans such as the Valley Transportation Plan 2040, the Transportation Strategic Program, the Downtown Specific Plan (2003), the Bicycle CIP, the 2007 Pedestrian Safety and Opportunities Study, the Tasman/Fair Oaks Bicycle and Pedestrian Circulation Plan, and the Moffett Park Specific Plan.

The total traffic and transportation amount budgeted for the 2017-2018 fiscal year is $10,706,257[9]. Budgeted transportation projects include the City's share of development related street improvements, traffic signal controllers, and hardware/wiring improvements.

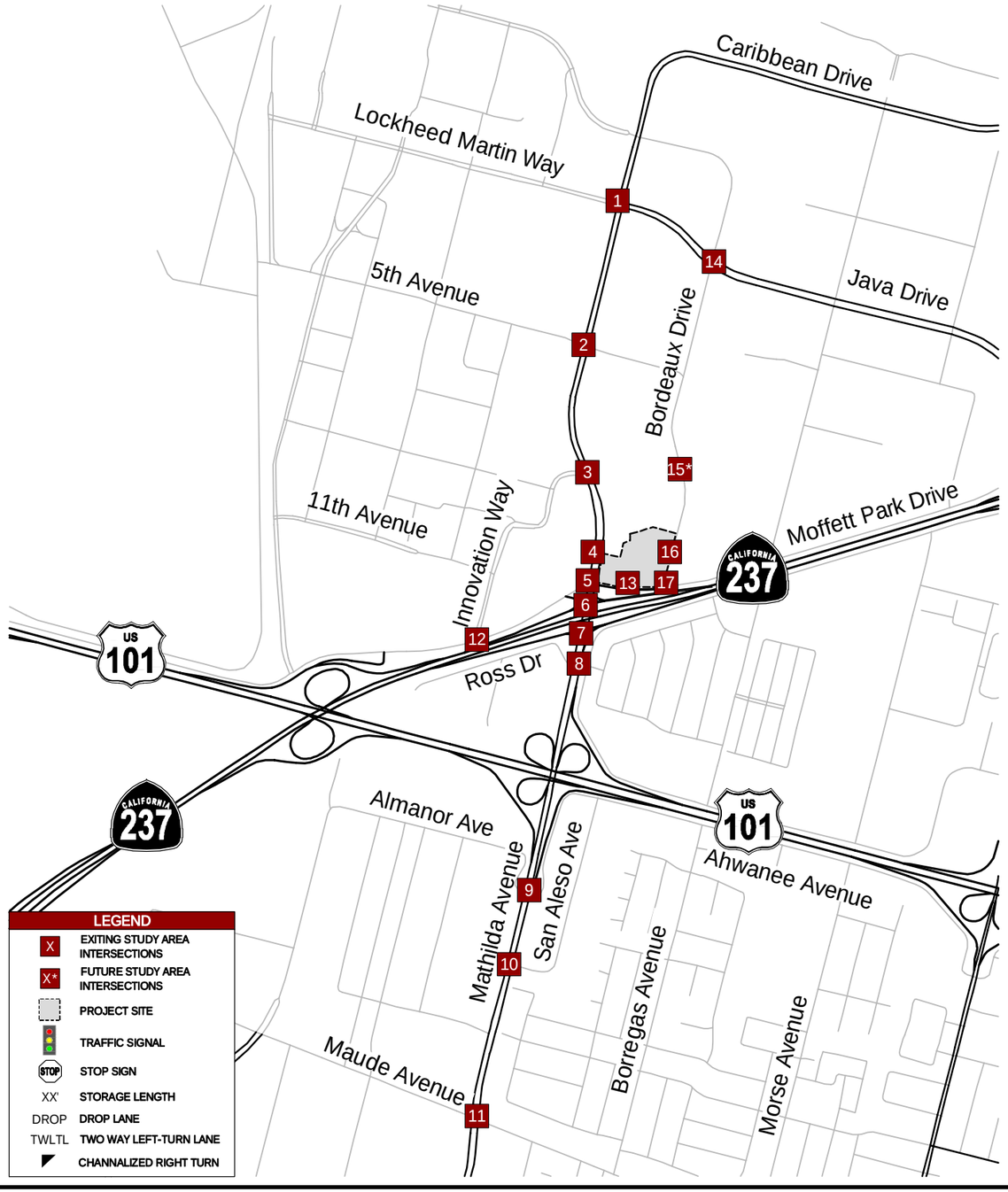
EXISTING LANE CONFIGURATION AND TRAFFIC CONTROL

Existing intersection lane configuration and traffic controls are illustrated in **Figure 4**. **Table 7** lists the existing traffic control for each study intersection.

Table 7 - Study Intersection and Traffic Control

#	Intersection	Existing or Future Intersection	Existing Traffic Control
1	Mathilda Avenue / Lockheed Martin Way - Java Drive	Existing	Signal
2	Mathilda Avenue / 5th Avenue	Existing	Signal
3	Mathilda Avenue / Innovation Way	Existing	Signal
4	Mathilda Avenue / West Project Driveway	Existing	SSSC
5	Mathilda Avenue / Moffett Park Drive	Existing	Signal
6	Mathilda Avenue / SR 237 WB Ramps	Existing	Signal
7	Mathilda Avenue / SR 237 EB Ramps	Existing	Signal
8	Mathilda Avenue / Ross Drive	Existing	Signal
9	Mathilda Avenue / Ahwanee Avenue – Almanor Avenue	Existing	Signal
10	Mathilda Avenue / San Aleso Avenue	Existing	Signal
11	Mathilda Avenue / Maude Avenue	Existing	Signal
12	Innovation Way / Moffett Park Drive	Existing	Signal
13	South Project Driveway / Moffett Park Drive	Existing	SSSC
14	Bordeaux Drive / Java Drive	Existing	Signal
15	Bordeaux Drive / Innovation Way	Future	-
16	Bordeaux Drive / East Project Driveway	Existing	SSSC
17	Bordeaux Drive / Moffett Park Drive	Existing	SSSC
Note: SSSC – Side-Street Stop Control			

[9] *Recommended Budget and Resource Allocation Plan – City of Sunnyvale, California - Fiscal Year 2017/2018,* City of Sunnyvale.



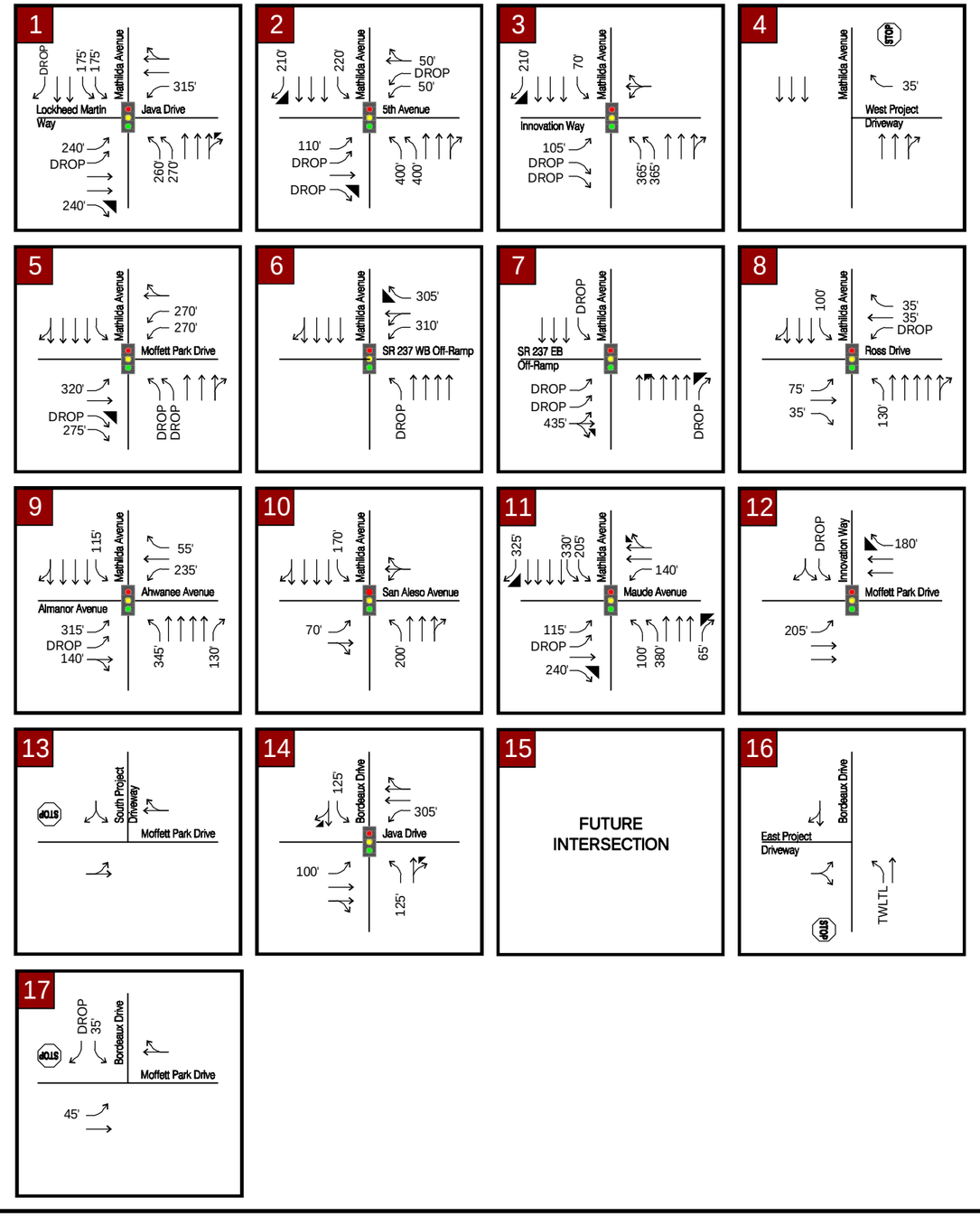


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FIGURE 4
EXISTING LANE GEOMETRY AND TRAFFIC CONTROL

1100 MATHILDA AVENUE TIA

EXISTING PEAK-HOUR TURNING MOVEMENT VOLUMES

Weekday intersection turning movement volumes for study intersections were collected in December 2017. Volumes were collected during the AM (7:00-10:00 AM) peak period and PM (4:00-7:00 PM) peak period on a weekday when local schools were in session.

Volumes at adjacent study intersections with no mid-block driveways were balanced. The volume adjustments from the volume balancing were conservatively completed by increasing the lower volume to match the higher volume. The hand calculations and intersection volume data sheets for all traffic counts are provided in the **Appendix**. Peak hour turning movement volumes are shown in **Figure 5**.

EXISTING INTERSECTION LEVEL OF SERVICE

Traffic operations were evaluated at the study intersections under existing traffic conditions. Results of the analysis are presented in **Table 8**. **Table 8** lists the municipal jurisdiction, LOS criteria, intersection control, and LOS/delay for each intersection. All study intersections function within acceptable LOS standards under this analysis scenario. Analysis sheets are provided in the **Appendix**.

EXISTING SIGNAL WARRANTS

Signal warrants were evaluated at the unsignalized study intersections under Existing Conditions. Below are the results of the signal warrants analysis for the three unsignalized intersections under existing conditions:

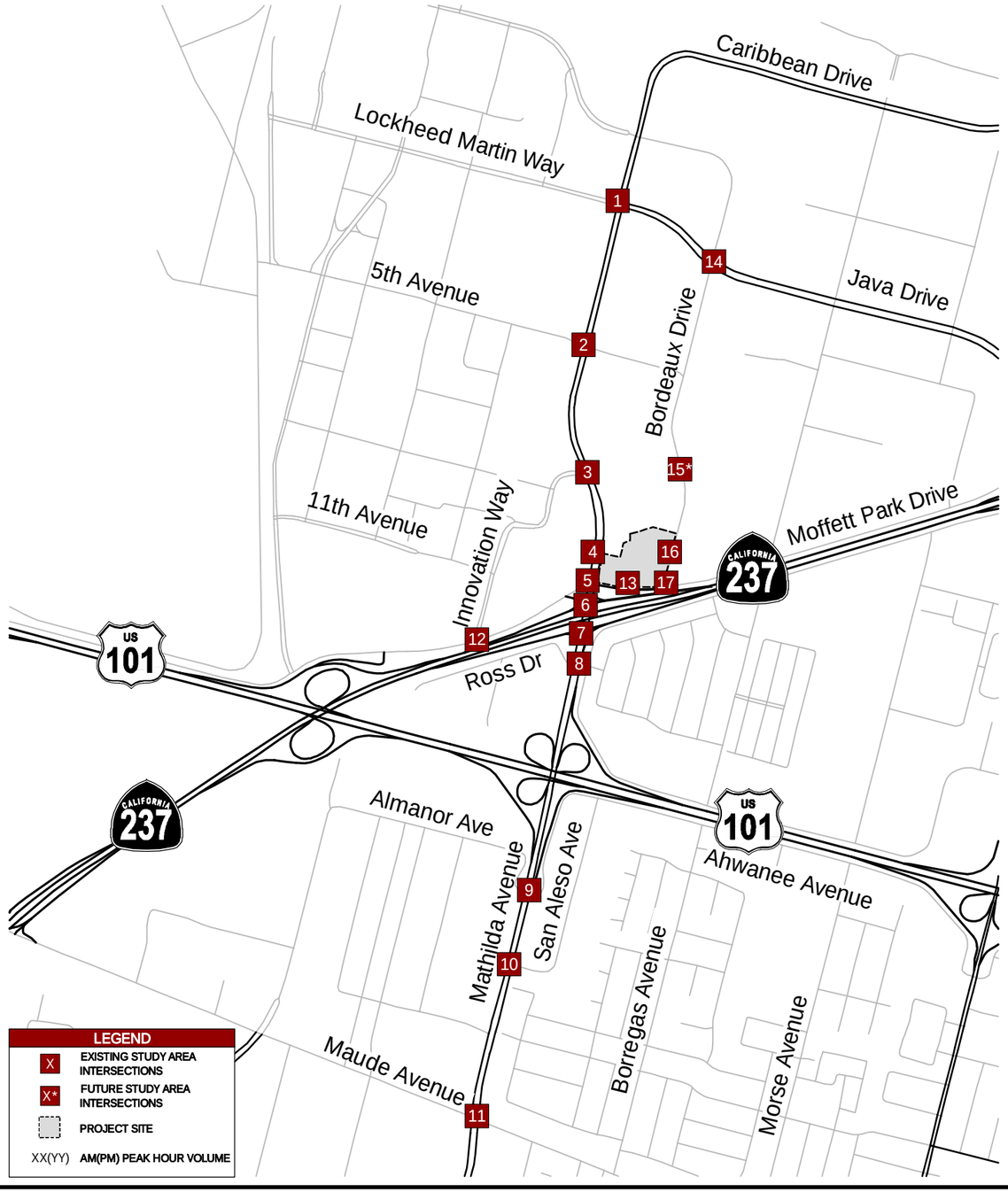
Did not meet peak hour signal warrant:

- #4 – Mathilda Avenue / West Project Driveway
- #16 – Bordeaux Drive / East Project Driveway

Met peak hour signal warrant:

- #17 – Bordeaux Drive / Moffett Park Drive

Analysis sheets are provided in the **Appendix**.



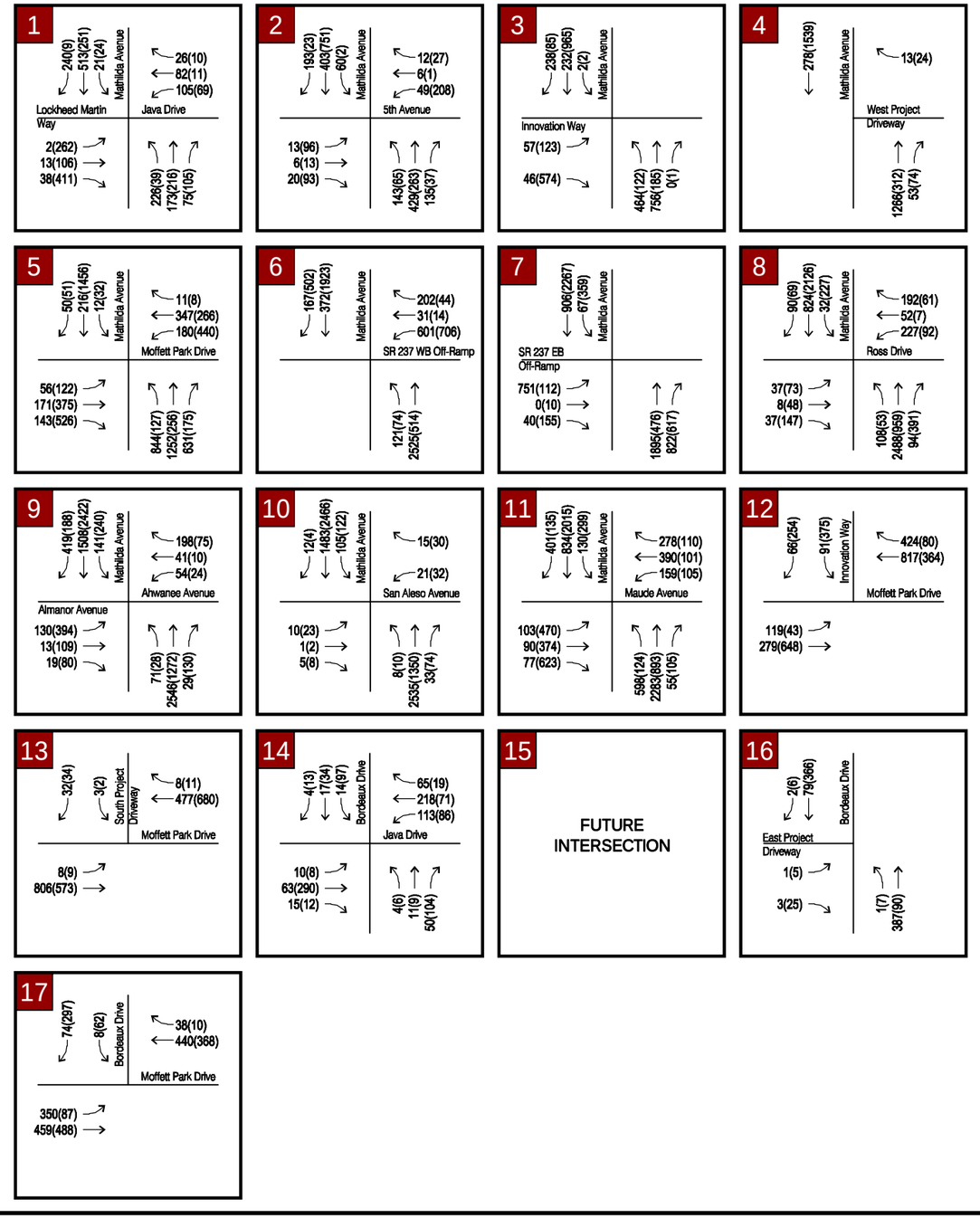


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FIGURE 5
EXISTING PEAK HOUR TURNING MOVEMENT VOLUMES

1100 MATHILDA AVENUE TIA

Table 8 - Existing Intersection Level of Service Summary

#	Intersection	LOS Criteria	Jurisdiction	Control	Existing							
					AM Peak				PM Peak			
					LOS	Delay (sec)[1]	v/c Ratio	Crit. Delay	LOS	Delay (sec)[1]	v/c Ratio	Crit. Delay
1	Mathilda Avenue / Lockheed Martin Way - Java Drive[2,3]	E	City	Signal	C	29.5	0.300	31.4	D+	36.1	0.374	31.4
2	Mathilda Avenue / 5th Avenue[3]	E	City	Signal	C	26.1	0.168	21.6	C-	32.1	0.247	27.1
3	Mathilda Avenue / Innovation Way[3]	E	City	Signal	C	25.2	0.241	27.4	C	26.3	0.386	26.1
4	Mathilda Avenue / West Project Driveway[3]	E	City	SSSC	B	11.5	0.023	0.1	A	9.2	0.027	0.1
5	Mathilda Avenue / Moffett Park Drive[3,4]	E	City	Signal	C	30.1	0.810	27.5	E	63.0	0.830	68.5
6	Mathilda Avenue / SR 237 WB Ramps[3,4]	E	City / Caltrans	Signal	C	28.4	0.700	17.3	D	43.6	0.760	36.7
7	Mathilda Avenue / SR 237 EB Ramps[3,4]	E	City / Caltrans	Signal	C	29.1	0.600	69.5	D	55.0	0.670	19.0
8	Mathilda Avenue / Ross Drive[3,4]	E	City	Signal	B	13.5	0.640	11.4	D	43.4	0.690	44.6
9	Mathilda Avenue / Ahwanee Avenue[3]	E	City	Signal	C	30.3	0.613	33.9	C-	33.5	0.575	27.5
10	Mathilda Avenue / San Aleso Avenue[3]	E	City	Signal	A	8.1	0.569	10.0	A	9.7	0.393	5.4
11	Mathilda Avenue / Maude Avenue[2,3]	E	City	Signal	D	41.8	0.705	38.8	D	46.3	0.736	47.2
12	Innovation Way / Moffett Park Drive	D	City	Signal	C+	21.2	0.396	34.6	D+	35.4	0.447	29.9
13	South Project Driveway / Moffett Park Drive	D	City	SSSC	B	12.9	0.054	0.4	B	14.4	0.075	0.5
14	Bordeaux Drive / Java Drive	D	City	Signal	B	15.1	0.155	14.4	B-	18.4	0.311	19.9
15	Bordeaux Drive / Innovation Way	D	City	-	Future Intersection							
16	Bordeaux Drive / East Project Driveway	D	City	SSSC	A	9.2	0.003	0.1	B	10.6	0.037	0.8
17	Bordeaux Drive / Moffett Park Drive	D	City	SSSC	C	15.6	0.320	3.4	C	16.2	0.438	5.0

Intersections that are operating below acceptable levels are shown in **BOLD**.

1 The delay for the worst movement is reported for SSSC intersections.

2 Mathilda Avenue / Lockheed Martin Way - Java Drive (#1) and Mathilda Avenue / Maude Avenue (#11) are CMP intersections with LOS E threshold.

3 Mathilda Avenue is a regionally significant roadway with a LOS E threshold.

4 Mathilda Avenue/Moffett Park Drive (#5), Mathilda Avenue/SR 237 WB Ramps (#6), Mathilda Avenue/SR 237 EB Ramps (#7), and Mathilda Avenue/Ross Drive (#8) were analyzed using HCM 2000 methodology within Synchro software. The remaining intersections were analyzed using HCM 2000 within Traffix software.

EXISTING FREEWAY RAMP EVALUATION

VOLUME TO CAPACITY

Existing freeway ramp volumes were determined from existing turning movement counts and from the *2016 Ramp Volumes on the California State Freeway System District 4* document from the Caltrans web site. **Table 9** presents the V/C for each freeway ramp under existing traffic conditions. All freeway ramps have a V/C below 1.0.

Table 9 - Existing Freeway Ramp V/C Ratios

Interchange	Freeway Ramp	Lanes		Metered?		Capacity		Existing			
								AM Peak		PM Peak	
		HOV	Mixed	AM Peak	PM Peak	AM Peak	PM Peak	Volume	V/C	Volume	V/C
US 101 / Mathilda Avenue	NB Diagonal Diagonal Off-Ramp*		1			1800	1800	277	0.15	303	0.17
	SB Loop On-Ramp*	1	1		ON	2700	1800	651	0.24	710	0.39
SR 237 /Crossman Avenue	WB Diagonal On-Ramp*		1			1800	1800	201	0.11	219	0.12
SR 237 /Mathilda Avenue	EB Diagonal On-Ramp		1			1800	1800	889	0.49	590	0.33
	EB Diagonal Off-Ramp		2			3200	3200	791	0.25	764	0.24
	WB Diagonal On-Ramp		1			1800	1800	319	0.18	986	0.55
	WB Diagonal Off-Ramp		1			1800	1800	834	0.46	277	0.15

* Ramp volumes from Caltrans ramp volumes

RAMP QUEUE

Existing ramp queues for on-ramps with ramp metering were observed in December 2017 during the AM (7:00-10:00 AM) peak period and PM (4:00-7:00 PM) peak period on a typical weekday when local schools were in session. The number of vehicles in queue was recorded at 5-minute intervals, which are included in the **Appendix**.

Table 10 summarizes the existing maximum queues observed during the AM or PM peak period. In addition to the on-ramp queues, the metering rates were also observed. The metering rates are also shown in **Table 10**. In general, metering rates fluctuated depending on the vehicle demand on the mainline adjacent to the on-ramp and there were multiple metering rate tables within a peak period that the metering rates are selected from. Therefore, one cannot just assume one metering rate for a given on-ramp throughout the entire peak period.

During the AM peak, the westbound SR 237 Mathilda Avenue diagonal on-ramp was not metered and there were no observed queues except between 7:35 AM and 8:20 AM where the maximum queue varied between 3 and 12 vehicles, which is less than the available ramp storage of 26 vehicles.

During the PM peak, the southbound US 101 Mathilda Avenue loop on-ramp was metered and the typical observed queue was 4 to 7 vehicles, which is less than the available ramp storage of 19 vehicles and the queue would clear within a 5-minute interval. The maximum observed queue of 22 vehicles occurred between 5:20 PM and 5:30 PM, which exceeded the on-ramp storage by 3 vehicles. These three vehicles would block the outside southbound through lane on Mathilda Avenue between 5:20 PM and 5:30 PM.

Table 10 - Existing Freeway Ramp Queues

Metering Period	Location	Ramp Storage (feet)		Available Ramp Storage[1] (vehicles)		Existing		
						Maximum Queue (vehicles)		Metering Rate During Max Queue (sec/veh)
		HOV	Mixed	HOV	Mixed	HOV	Mixed	
AM Peak	WB SR 237 Mathilda Avenue Diagonal On-Ramp	-	635	-	26	-	12	-
PM Peak	SB US 101 Mathilda Avenue Loop On-Ramp	465	465	19	19	4	**22**	12

Notes

[1] Available ramp storage is based on the distance between the stop bar and end of ramp and a vehicle length of 25 feet per vehicle

FIELD OBSERVATIONS

Field observations were conducted in December 2017 to qualitatively confirm existing intersection LOS results with conditions in the field. Overall, the study intersections were observed to operate similarly to the calculated LOS. Below are existing field observations that should be noted.

Mathilda Avenue / Moffett Park Drive

During the AM peak period, a majority of the traffic through the intersection was observed in the northbound left and northbound through lanes. It was observed that the outermost northbound left-turn lane was utilized more than the inner left-turn lane due to the lane alignment with the downstream intersection. In addition, the short storage lengths caused queuing for northbound lefts to spill into the upstream intersection of Mathilda Avenue / WB SR 237 Ramps and Mathilda Avenue / EB SR 237 Ramps. There were several cyclists that were observed to ride along Moffett Park Drive.

Heavier traffic congestion was observed during the PM peak, where there was queuing observed for the southbound, eastbound and westbound approaches. For the southbound approach, congestion at Mathilda Avenue and Ross Drive would queue back into the intersection of Mathilda Avenue / Moffett Park Drive. For the eastbound approach, a majority of the queuing occurred for the eastbound right movement due to vehicles being unable to turn onto Mathilda Avenue due to southbound through and westbound left turn traffic. It was also observed that eastbound right vehicles would turn right and try to merge over a lane, but due to the short distance between Moffett Park Drive and the adjacent intersection, the vehicle would block two southbound through lanes. For the westbound approach, the queuing occurred for the westbound left movement. It was observed that approximately 15-20 vehicles were able to proceed through the intersection per cycle, but due to the high volume of westbound left turning vehicles, queues would extend past the intersection of Bordeaux Drive / Moffett Park Drive.

Mathilda Avenue / WB SR 237 Ramps

Heavy traffic was observed at this intersection during the AM and PM peak periods. During the AM peak period, due to the short storage length, the northbound queues would often spill into the adjacent intersection.

During the PM peak period, queues in the southbound direction from the downstream intersection of Mathilda Avenue / EB SR 237 Ramps would extend into the intersection of Mathilda Avenue / WB SR 237 Ramps for the southbound through movement. It was also observed that that queue for the off ramp would extend almost to the gore point of the freeway. Most vehicles in queue were trying to make a westbound left and had to wait through multiple cycles before clearing the intersection. It was observed that approximately 25-30 vehicles could make a westbound left per cycle.

Mathilda Avenue / EB SR-237 Ramps

During the AM peak, due to the combination of a short distance between the adjacent intersections and the high northbound volumes, eastbound left vehicles from the off-ramp and northbound left vehicles onto Moffett Park Drive that had to wait through multiple cycles before clearing the intersection. Throughout the AM peak period, there were typically 3-5 vehicles that had to wait through two cycles before making an eastbound left. For vehicles in the Moffett Park Drive lane, the number of unserved vehicles varied depending on the amount of northbound traffic. When there was less northbound traffic before 8:30 AM, there were 1-3 unserved vehicles. As the northbound traffic increased along Mathilda Avenue, the number of unserved vehicles increased to 5-8 vehicles, with a maximum observed queue of 11 vehicles.

During the PM peak period, the short storage lengths cause queuing for the southbound through and southbound left turns and queues would extend past the intersection into the upstream intersection of Mathilda Avenue / Moffett Park Drive.

Mathilda Avenue / Ross Drive

During the AM peak, the intersection of Mathilda Avenue / Ross Drive experiences heavy traffic in the northbound direction. It was observed that the right-most northbound through lane was utilized more heavily due to vehicles destined for EB SR-237. During the PM peak, the intersection experience heavy traffic in the southbound direction.

3. EXISTING PLUS PROJECT CONDITIONS

This chapter presents a description of the proposed site use, trip generation, trip distribution, and trip assignment, as well as potential impacts of the proposed project on the transportation system.

PROPOSED SITE USE

The proposed project will redevelop the existing 173-room hotel at 1100 Mathilda Avenue. The project will renovate 88 rooms, demolish 85 rooms, and construct 270 new rooms with a net increase of 185 rooms. In addition, an 8,241 square-foot spa is proposed on the northeast corner of the project site and its services will be available to the general public. **Figure 6** illustrates the site plan for the proposed project.

The site will be accessible using existing unsignalized driveways at Mathilda Avenue / West Project Driveway and Bordeaux Drive / East Project Driveway. The driveway along Mathilda Avenue is limited to a right-in, right-out movement and the driveway along Bordeaux Drive is full access. In addition, the existing driveway located south of the proposed project, Moffett Park Drive / South Project Driveway, will be removed in the plus project conditions.

TRIP GENERATION

Trip generation for projects is typically calculated based on information contained in the Institute of Transportation Engineer's (ITE) publication, *Trip Generation, 10th Edition*.[10] The manual is a standard reference used by jurisdictions throughout the country for the estimation of trip generation potential of proposed projects.

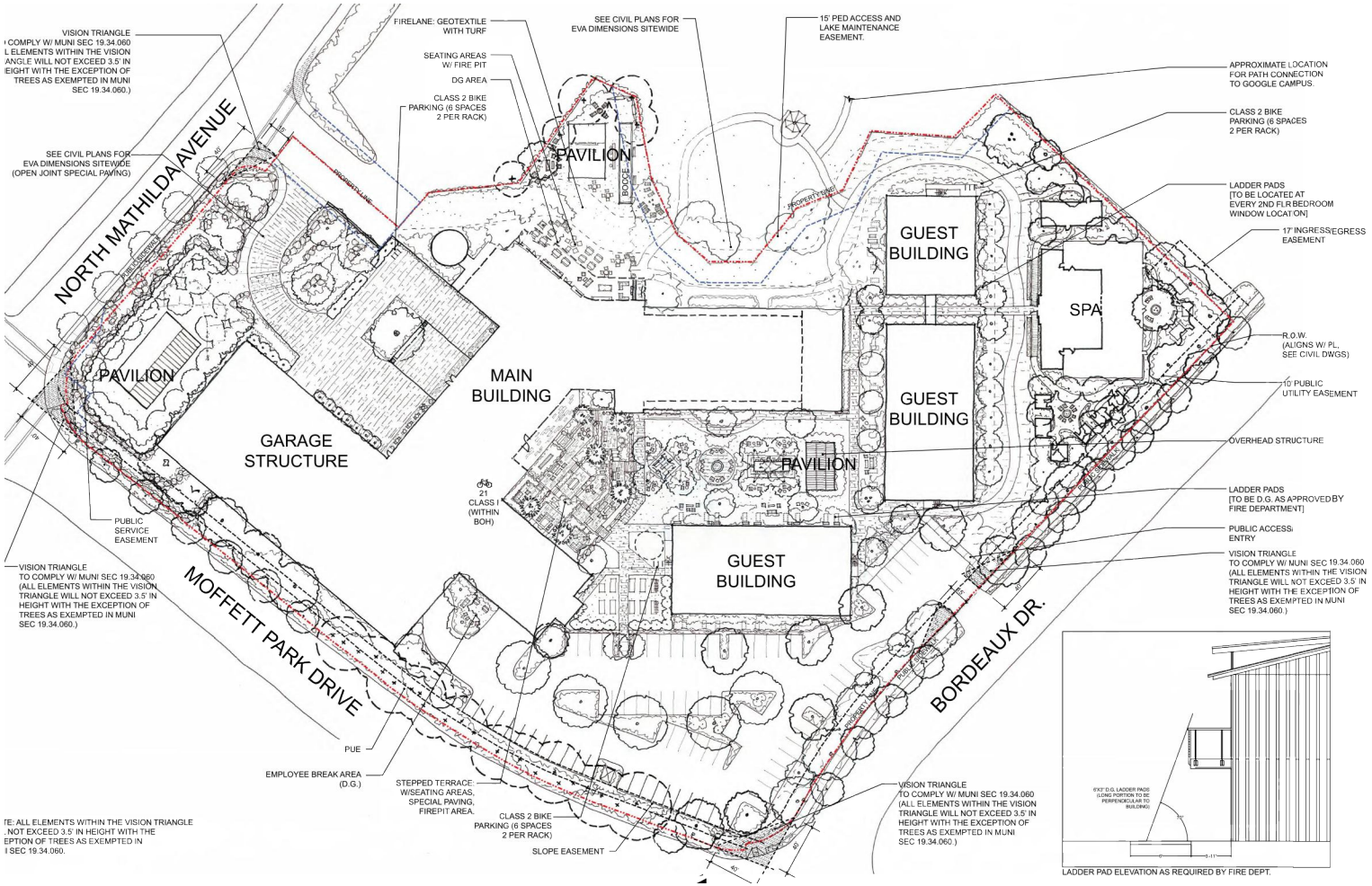
A trip is defined in the *Trip Generation Manual* as a single or one-directional vehicle movement with either the origin or destination at the project site. In other words, a trip can be either "to" or "from" the site and therefore, a single visitor to a site is counted as two trips.

For purposes of determining the worst-case impacts of traffic on the surrounding street network, the trips generated by a proposed project are estimated for the AM peak hour (between the hours of 7:00 AM and 9:00 AM), and for the PM peak hour (between 4:00 PM and 6:00 PM) on a typical weekday.

Trips generated by the hotel portion were based on the fitted curve equation for ITE Land Use 310 (Hotel). Trips associated with the spa were considered separately because the spa would be open to the general public and would not qualify as a "limited recreational facilities" included in the ITE Land Use 310 data. *Trip Generation, 10th Edition* does not have trip generation data specifically for spa land uses, therefore the average rate for a very similar land use description, ITE Land Use 918 (Hair Salon), was used.

Table 11 presents the trip generation for the proposed project. The proposed project will generate a net new +103 trips in the AM peak hour and a net new +150 trips in the PM peak hour. Trip generation calculation sheets are provided in the **Appendix**.

[10] *Trip Generation, 10th Edition*, Institute of Transportation Engineers, 2017.



Source: SB Architects
Roche+Roche Landscape Architecture

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FIGURE 6
SITE PLAN

Table 11 - Project Trip Generation

ITE Land Use	ITE Land Use Code	Land Use	Size	Units	Daily Total	AM Peak Total	AM Peak In	AM Peak Out	PM Peak Total	PM Peak In	PM Peak Out
Existing	310	Hotel	173	Rooms	-1,528	-81	-48	-33	-104	-53	-51
Proposed	310	Hotel	358	Rooms	3,616	174	103	71	242	123	119
	918	Hair Salon	8.241	KSF	*	10	10	0	12	2	10
Net New Trips					**2,088**	**103**	**65**	**38**	**150**	**72**	**78**

Utilized trip generation data from ITE *Trip Generation, 10th Edition*

ITE *Trip Generation, 10th Edition* does not have information on daily trips for Land Use 918 Hair Salon. The AM Peak directional distribution is based on the directional distribution from *Trip Generation, 9th Edition*.

PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

Project trip distribution was based on existing traffic count information and the general orientation of population sources to the site. The distribution was reviewed by the City and approved for use in this TIA. **Figure 7** presents the traffic distribution assumed for this analysis.

Based on the assumed trip distribution, the net new vehicle trips generated by the project were assigned to the street network. **Figure 8** presents the trip assignment for Existing conditions, which includes redistribution of existing traffic to account for the removal of the south project driveway. **Figure 9** presents the trip assignment for Existing Plus Background and Cumulative conditions. The trip assignment for Existing Plus Background and Cumulative conditions accounts for the change in site access due to the closure of Moffett Park Drive between Mathilda Avenue and Bordeaux Drive as part of the Mathilda Avenue Improvements at SR 237 and US 101 project.

EXISTING PLUS PROJECT INTERSECTION LEVEL OF SERVICE

Traffic operations were evaluated at the study intersections under existing conditions plus traffic generated by the project, as seen on **Figure 10**. Results of the analysis are presented in **Table 12**. All study intersections function within acceptable LOS standards under this analysis scenario. Thus, the project has a less than significant impact at all study intersections and no mitigation measures are required. Analysis sheets are provided in the **Appendix**.

EXISTING SIGNAL WARRANTS

Signal warrants were evaluated at the unsignalized study intersections under Existing Plus Project Conditions. Below are the results of the signal warrants analysis for the three unsignalized intersections under existing plus project conditions:

Did not meet peak hour signal warrant:

- #4 – Mathilda Avenue / West Project Driveway
- #16 – Bordeaux Drive / East Project Driveway

Met peak hour signal warrant:

- #17 – Bordeaux Drive / Moffett Park Drive

Analysis sheets are provided in the **Appendix**.

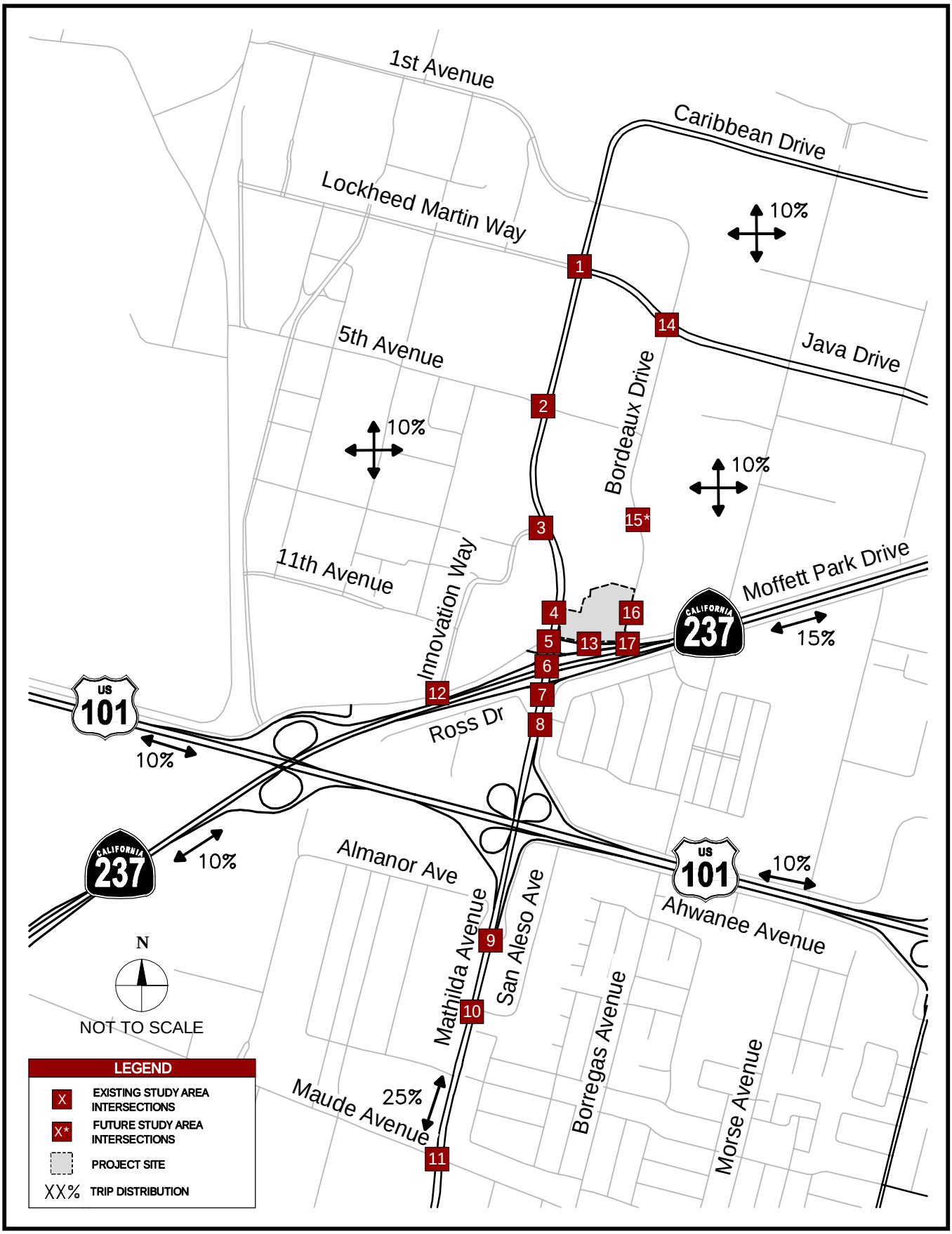

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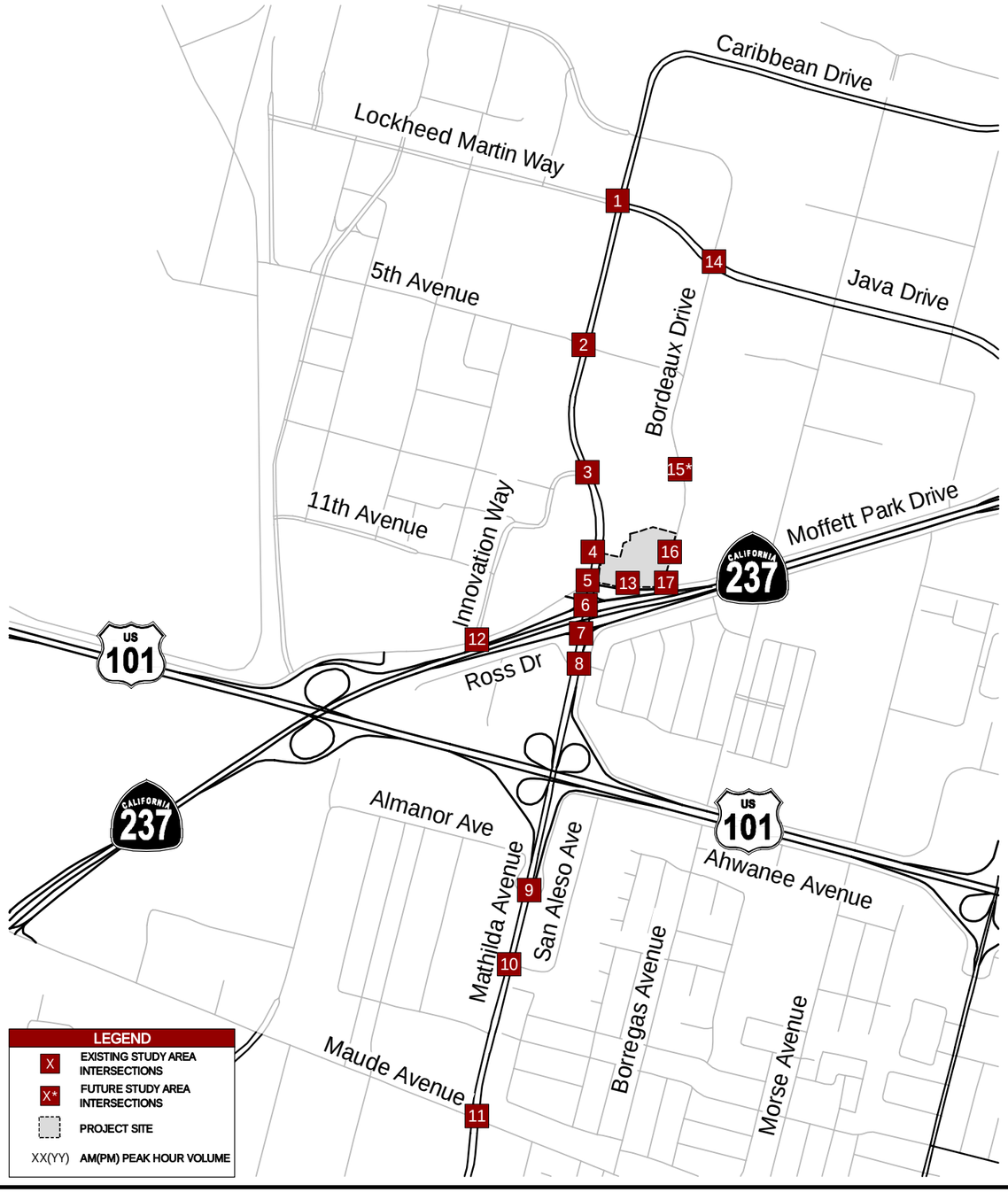
FIGURE 7
PROJECT TRIP DISTRIBUTION



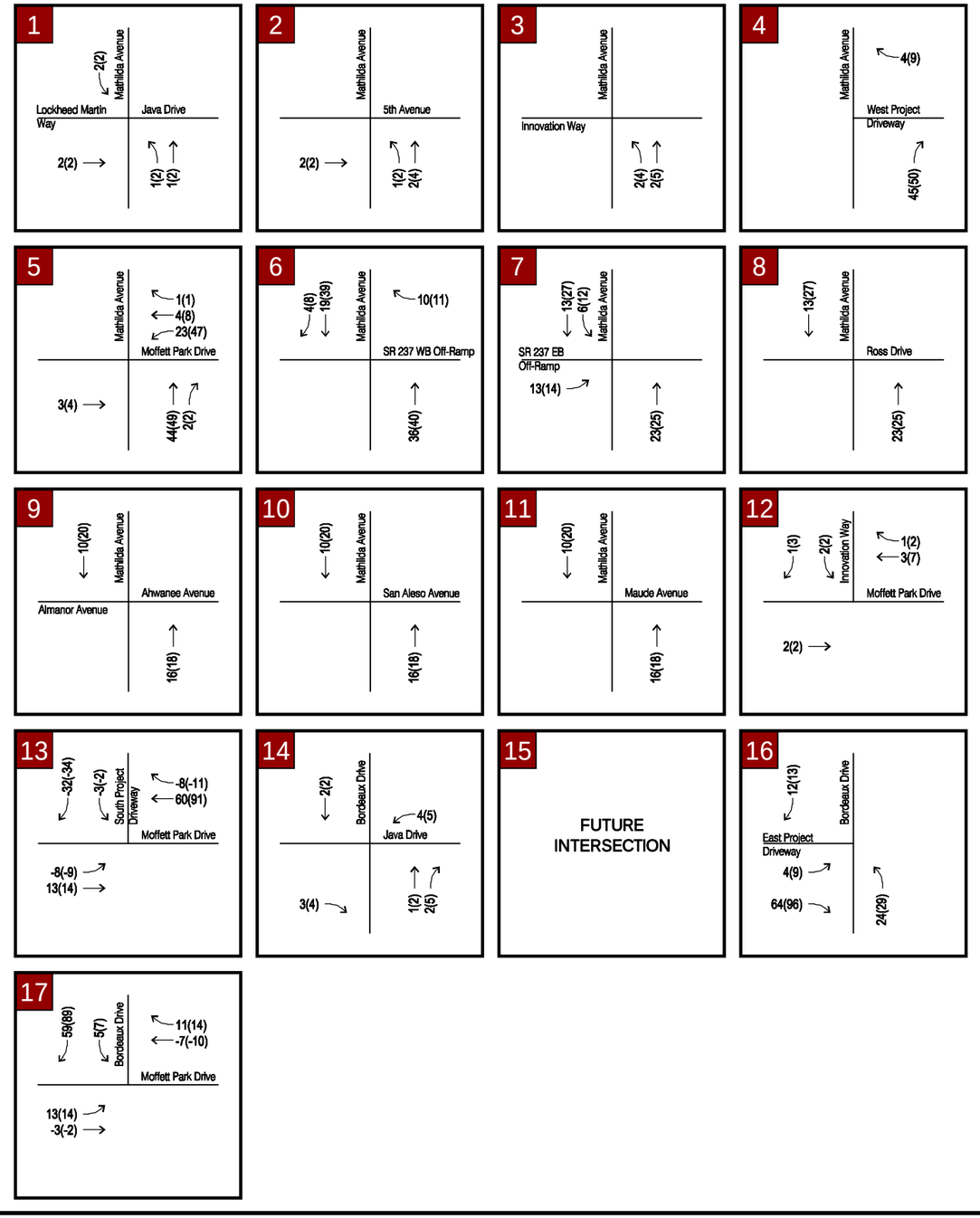


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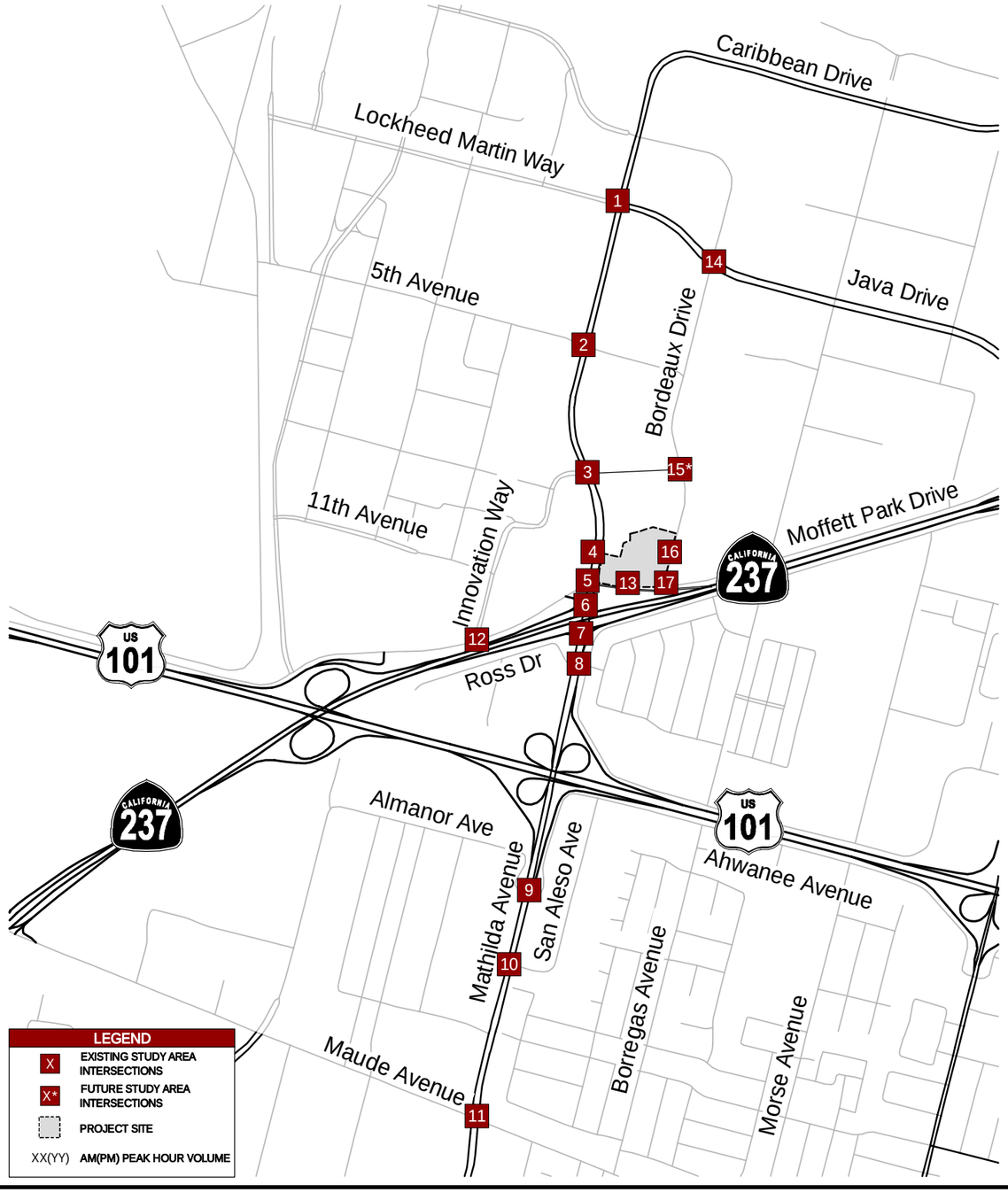
FIGURE 8

NET NEW PROJECT GENERATED AND REDISTRIBUTION OF EXISTING SOUTH DRIVEWAY PEAK HOUR TURNING MOVEMENT VOLUMES (EXISTING CONDITION)

1100 MATHILDA AVENUE TIA



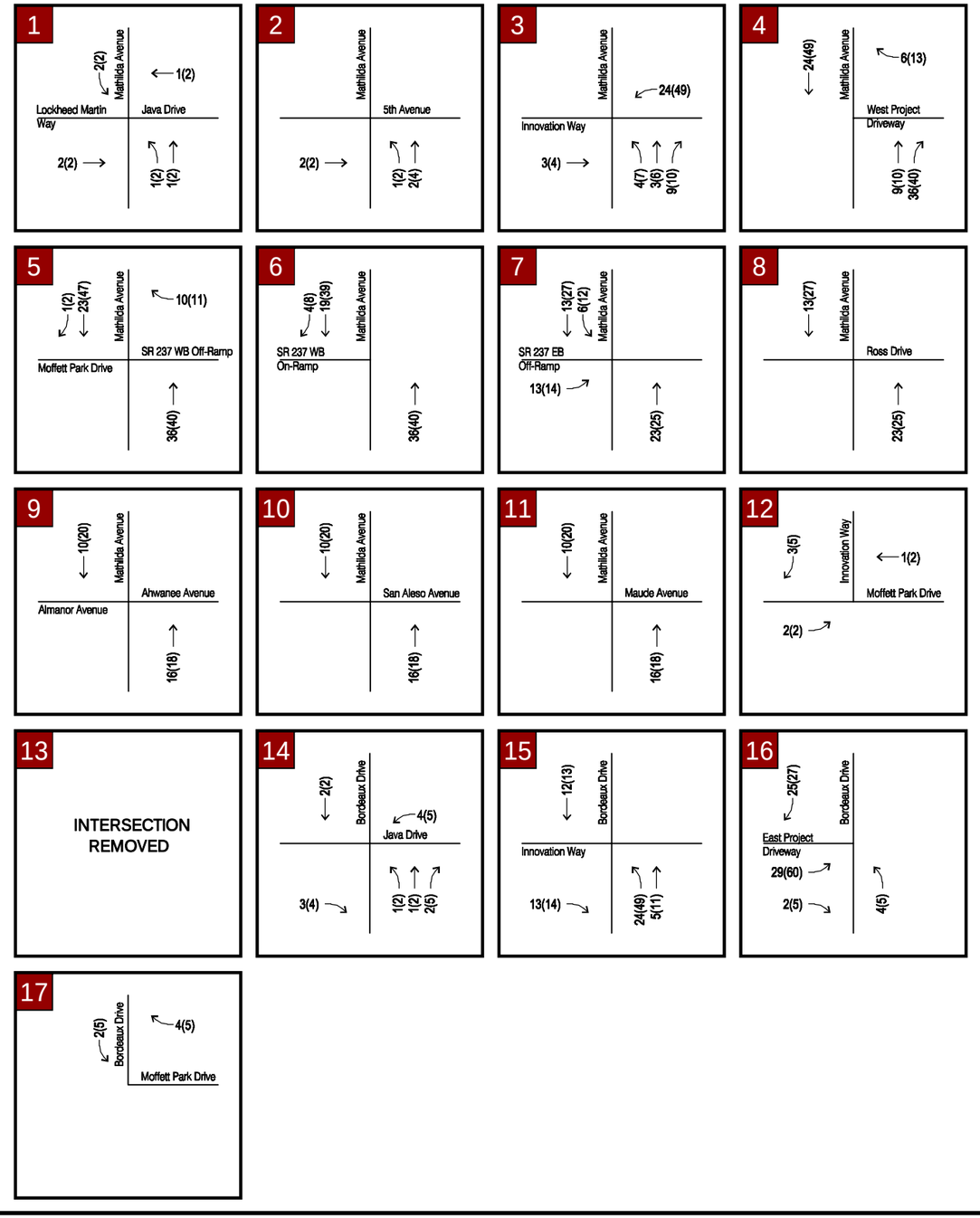


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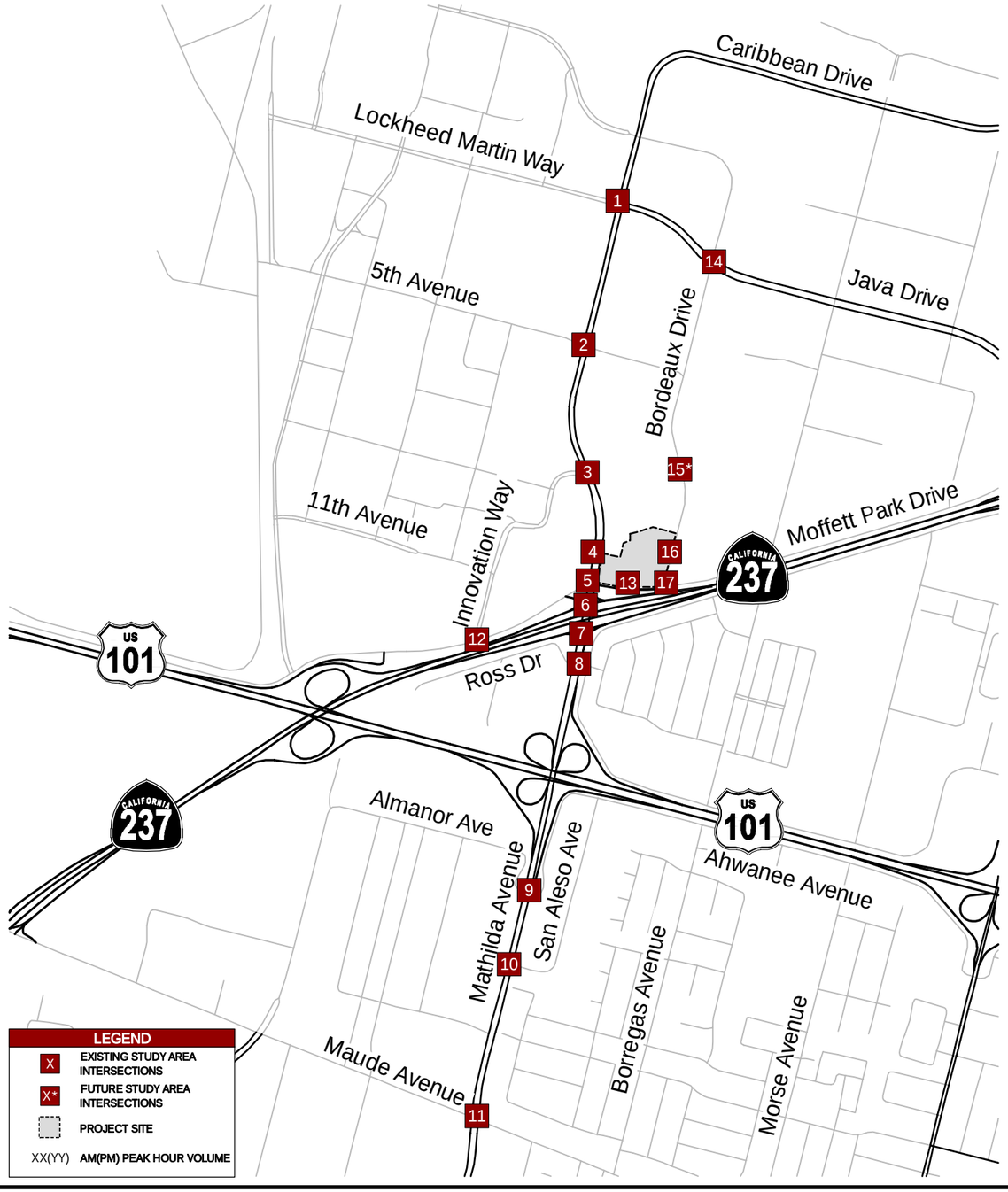
FIGURE 9
NET NEW PROJECT GENERATED PEAK HOUR TURNING MOVEMENT VOLUMES (EXISTING PLUS BACKGROUND AND CUMULATIVE CONDITIONS)

1100 MATHILDA AVENUE TIA



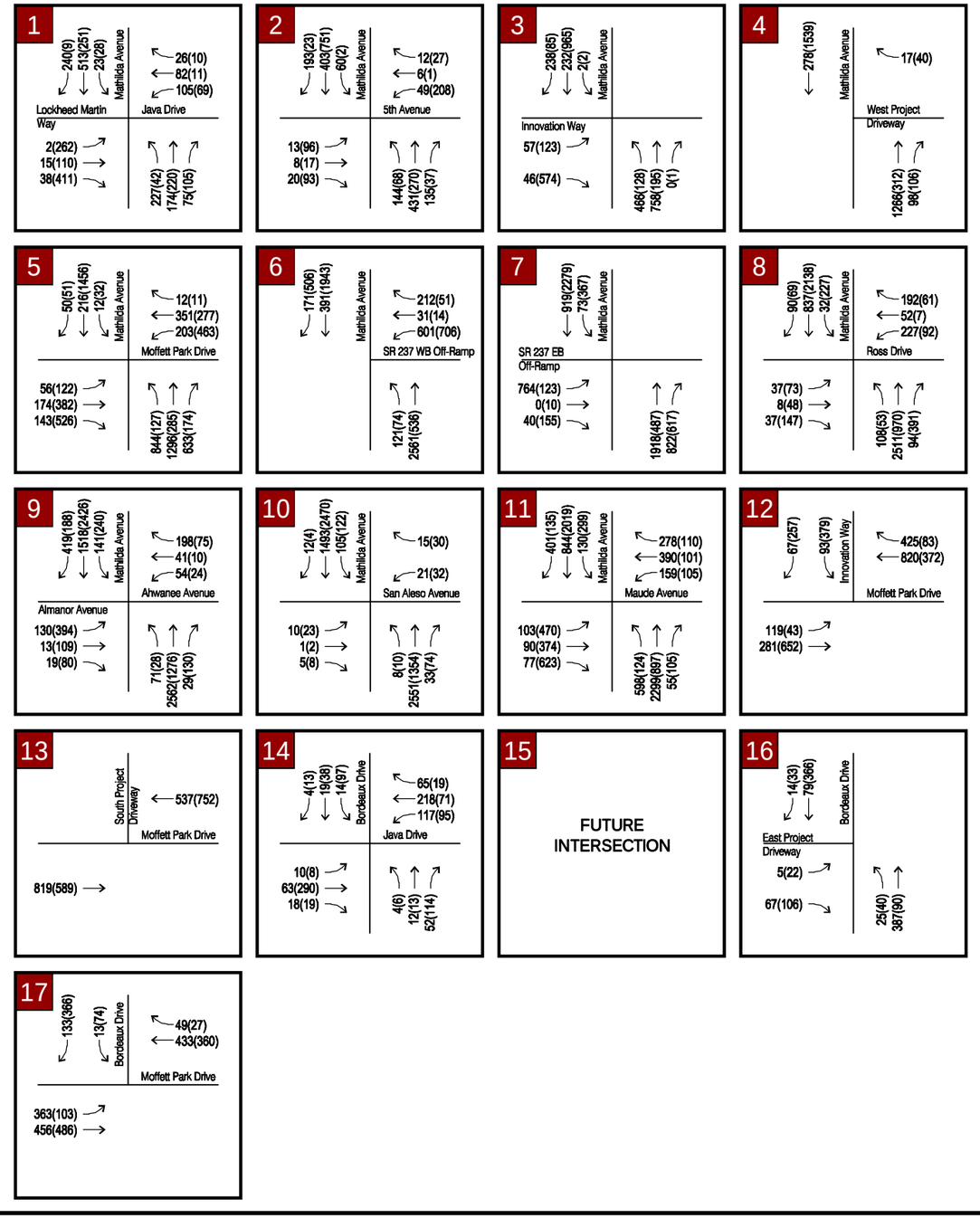


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FIGURE 10
EXISTING PLUS PROJECT PEAK HOUR TURNING MOVEMENT VOLUMES

1100 MATHILDA AVENUE TIA

Table 12 - Existing Plus Project Intersection Level of Service Summary

#	Intersection	LOS Criteria	Jurisdiction	Control	Existing								Existing Plus Project									
					AM Peak				PM Peak				AM Peak						PM Peak					
					LOS	Delay (sec)[1]	v/c Ratio	Crit. Delay	LOS	Delay (sec)[1]	v/c Ratio	Crit. Delay	LOS	Delay (sec)[1]	v/c Ratio	v/c Var.	Crit. Delay	Crit. Delay Var.[2]	LOS	Delay (sec)[1]	v/c Ratio	v/c Var.	Crit. Delay	Crit. Delay Var.[2]
1	Mathilda Avenue / Lockheed Martin Way - Java Drive[3,4]	E	City	Signal	C	29.5	0.300	31.4	D+	36.1	0.374	31.4	C	29.5	0.301	0.001	31.5	-	D+	36.1	0.374	0.000	31.5	-
2	Mathilda Avenue / 5th Avenue4	E	City	Signal	C	26.1	0.168	21.6	C-	32.1	0.247	27.1	C	26.2	0.170	0.002	21.7	-	C-	32.2	0.249	0.002	27.2	-
3	Mathilda Avenue / Innovation Way[4]	E	City	Signal	C	25.2	0.241	27.4	C	26.3	0.386	26.1	C	25.1	0.242	0.001	27.4	-	C	26.4	0.386	0.000	26.2	-
4	Mathilda Avenue / West Project Driveway[4]	E	City	SSSC	B	11.5	0.023	0.1	A	9.2	0.027	0.1	B	11.8	0.031	0.008	0.1	-	A	9.4	0.039	0.012	0.2	-
5	Mathilda Avenue / Moffett Park Drive[4,5]	E	City	Signal	C	30.1	0.810	27.5	E	63.0	0.830	68.5	C	30.6	0.830	0.020	28.0	-	E	62.7	0.840	0.010	68.6	-
6	Mathilda Avenue / SR 237 WB Ramps[4,5]	E	City / Caltrans	Signal	C	28.4	0.700	17.3	D	43.6	0.760	36.7	C	28.3	0.710	0.010	17.2	-	D	43.6	0.770	0.010	37.1	-
7	Mathilda Avenue / SR 237 EB Ramps[4,5]	E	City / Caltrans	Signal	C	29.1	0.600	69.5	D	55.0	0.670	19.0	C	29.3	0.610	0.010	69.7	-	D	53.9	0.680	0.010	19.2	-
8	Mathilda Avenue / Ross Drive[4,5]	E	City	Signal	B	13.5	0.640	11.4	D	43.4	0.690	44.6	B	13.5	0.640	0.000	11.5	-	D	43.6	0.690	0.000	44.8	-
9	Mathilda Avenue / Ahwanee Avenue[4]	E	City	Signal	C	30.3	0.613	33.9	C-	33.5	0.575	27.5	C	30.2	0.616	0.003	33.8	-	C-	33.4	0.578	0.003	27.4	-
10	Mathilda Avenue / San Aleso Avenue[4]	E	City	Signal	A	8.1	0.569	10.0	A	9.7	0.393	5.4	A	8.1	0.572	0.003	10.0	-	A	9.6	0.395	0.002	5.4	-
11	Mathilda Avenue / Maude Avenue[3,4]	E	City	Signal	D	41.8	0.705	38.8	D	46.3	0.736	47.2	D	41.8	0.708	0.003	38.7	-	D	46.3	0.739	0.003	47.2	-
12	Innovation Way / Moffett Park Drive	D	City	Signal	C+	21.2	0.396	34.6	D+	35.4	0.447	29.9	C+	21.4	0.397	0.001	34.7	-	D+	35.5	0.450	0.003	29.9	-
13	South Project Driveway / Moffett Park Drive	D	City	SSSC	B	12.9	0.054	0.4	B	14.4	0.075	0.5	Intersection removed with Project											
14	Bordeaux Drive / Java Drive	D	City	Signal	B	15.1	0.155	14.4	B-	18.4	0.311	19.9	B	15.3	0.157	0.002	14.6	-	B-	18.4	0.321	0.010	20.0	-
15	Bordeaux Drive / Innovation Way	D	City	-	Future Intersection																			
16	Bordeaux Drive / East Project Driveway	D	City	SSSC	A	9.2	0.003	0.1	B	10.6	0.037	0.8	A	9.2	0.068	0.065	1.5	1.4	B	11.7	0.179	0.142	3.0	2.2
17	Bordeaux Drive / Moffett Park Drive	D	City	SSSC	C	15.6	0.320	3.4	C	16.2	0.438	5.0	C	16.5	0.333	0.013	4.2	-	C	18.5	0.6	0.1	6.5	1.5

Intersections that are operating below acceptable levels are shown in **BOLD** and significant impacts are highlighted.

1 The average control delay is reported for signalized and AWSC intersections. The delay for the worst movement is reported for SSSC intersections.

2 Only increases in delay exceeding one second are shown.

3 Mathilda Avenue / Lockheed Martin Way - Java Drive (#1) and Mathilda Avenue / Maude Avenue (#11) are CMP intersections with LOS E threshold.

4 Mathilda Avenue is a regionally significant roadway with a LOS E threshold.

5 Mathilda Avenue/Moffett Park Drive (#5), Mathilda Avenue/SR 237 WB Ramps (#6), Mathilda Avenue/SR 237 EB Ramps (#7), and Mathilda Avenue/Ross Drive (#8) were analyzed using HCM 2000 methodology within Synchro software. The remaining intersections were analyzed using HCM 2000 within Traffix software.

EXISTING PLUS PROJECT FREEWAY RAMP EVALUATION

VOLUME TO CAPACITY

Table 13 presents the V/C for each freeway ramp under Existing Plus Project traffic conditions. All freeway ramps have a V/C below 1.0.

Table 13 - Existing Plus Project Freeway Ramp V/C Ratio

Interchange	Freeway Ramp	Lanes		Metered?		Capacity		Existing				Existing Plus Project			
								AM Peak		PM Peak		AM Peak		PM Peak	
		HOV	Mixed	AM Peak	PM Peak	AM Peak	PM Peak	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C
US 101 / Mathilda Avenue	NB Diagonal Diagonal Off-Ramp*		1			1800	1800	277	0.15	303	0.17	283	0.16	310	0.17
	SB Loop On-Ramp*	1	1		ON	2700	1800	651	0.24	710	0.39	655	0.24	718	0.40
SR 237 /Crossman Avenue	WB Diagonal On-Ramp*		1			1800	1800	201	0.11	219	0.12	201	0.11	219	0.12
SR 237 /Mathilda Avenue	EB Diagonal On-Ramp		1			1800	1800	889	0.49	590	0.33	892	0.50	598	0.33
	EB Diagonal Off-Ramp		2			3200	3200	791	0.25	764	0.24	797	0.25	775	0.24
	WB Diagonal On-Ramp		1			1800	1800	319	0.18	986	0.55	326	0.18	998	0.55
	WB Diagonal Off-Ramp		1			1800	1800	834	0.46	277	0.15	846	0.47	291	0.16

* Ramp volumes from Caltrans ramp volumes

RAMP QUEUE

Table 14 summarizes the anticipated maximum queue during the AM or PM peak period under the Existing Plus Project Condition. The Existing Plus Project on-ramp queue for each on-ramp was calculated using the number of project trips added to each on-ramp within a 5-minute interval based on the existing temporal distribution of the existing hotel.

During the AM peak, at most one (1) project trip would arrive at the westbound SR 237 Mathilda Avenue diagonal on-ramp during a 5-minute interval. For time intervals where there was no existing queue, it was assumed that the vehicle was able to get onto the freeway without stopping. For time intervals with an existing queue, it was assumed that any arriving project trips would be added to the queue. Overall, the project will increase the maximum queue by one (1) vehicle. This will result in a maximum queue of 13 vehicles, which is less than the available ramp storage of 26 vehicles.

During the PM peak, at most one (1) project trip would arrive at the southbound US 101 Mathilda Avenue loop on-ramp during a 5-minute interval. For time intervals, where the ramp queue was less than the available storage, it was assumed that any arriving project trips would be added to the existing queue length. For time intervals where the ramp queue exceeded the available ramp storage, it was assumed that any arriving project trip would be unable to clear the ramp within the 5-minute and will spill into the next 5-minute interval until the ramp queue was less than the available ramp storage and would be able to clear. Since the existing queue exceeded the ramp storage for three consecutive 5-minute intervals, the project would add three (3) vehicles to the maximum queue, for a total queue of 25 vehicles, which exceeds the available storage length of 19 vehicles by six (6) vehicles.

Analysis sheets are provided in the **Appendix**.

Table 14 - Existing Plus Project Freeway Ramp Queue

Metering Period	Location	Ramp Storage (feet)		Available Ramp Storage[1] (vehicles)		Existing			Existing Plus Project			
						Maximum Queue (vehicles)		Metering Rate During Max Queue (sec/veh)	Peak Hour Project Trips	Increase to Existing Queue	Maximum Queue (vehicles)	
		HOV	Mixed	HOV	Mixed	HOV	Mixed				HOV	Mixed
AM Peak	WB SR 237 Mathilda Avenue Diagonal On-Ramp	-	635	-	26	-	12	-	7	1	-	13
PM Peak	SB US 101 Mathilda Avenue Loop On-Ramp	465	465	19	19	4	**22**	12	8	3	4	**25**

Notes

[1] Available ramp storage is based on the distance between the stop bar and end of ramp and a vehicle length of 25 feet per vehicle

4. EXISTING PLUS BACKGROUND TRAFFIC CONDITIONS

This chapter will discuss the traffic conditions under the Existing Plus Background and Existing Plus Background Plus Proposed Project scenarios.

EXISTING PLUS BACKGROUND TRANSPORTATION IMPROVEMENTS

As documented in the City's Capital Improvement Program (CIP)[11], there are programmed network improvements in the project area that have an identified funding source at the following study intersections:

- Intersection #3 - Mathilda Avenue / Innovation Way: Add a westbound left-turn lane, convert the existing eastbound left-turn lane to a shared left-through lane, and convert the existing northbound shared through-right lane to an exclusive right-turn lane.

In addition, improvements associated with VTA's Mathilda Avenue improvements at SR 237 and US 101 were included and consist of the following changes:

- Intersection #5 – Mathilda Avenue / Moffett Park Drive: The east leg becomes the new realigned SR-237 WB off-ramp which consists of one left-turn lane, one shared left-through lane, and one shared through-right lane and the removal of the southbound left-turn lane, eastbound through lanes and northbound right turn lane. The west leg is reconfigured to be one right-turn lane and one shared left-right lane.
- Intersection #6 – Mathilda Avenue / WB SR 237 Ramps: Removal of east leg. The northbound left-turn lane is reconfigured to be a through lane and a southbound through lane is removed. This intersection is excluded from the analysis due to no conflicting movements.
- Intersection #7 – Mathilda Avenue / EB SR 237 Ramps: Reconfigure eastbound approach to consist of two left-turn and one right-turn lane.
- Intersection #8 – Mathilda Avenue / Ross Drive: Add a northbound through lane.
- Intersection #9 – Mathilda Avenue / Ahwanee Avenue: Remove existing northbound right-turn lane and convert through northbound through lane to a shared through-right turn lane.
- Intersection #13 – South Project Driveway / Moffett Park Drive: Removal of intersection
- Intersection #15 – Bordeaux Drive / Innovation Way: New signalized intersection
- Intersection #17 – Bordeaux Drive / Moffett Park Drive: Removal of west leg

Figure 11 presents the intersection lane geometry and traffic controlled in the Existing Plus Background analysis.

EXISTING PLUS BACKGROUND TRAFFIC VOLUMES

At the time of the analysis, the most recent version of the Development Update spreadsheet (dated February 2018) was received from the City and used to determine which projects would be included in this scenario. This source lists development projects in the vicinity of the project site that are undergoing planning, approval, or development. **Figure 12** shows the locations of the approved projects.

[11] *Adopted Budget and Resource Allocation Plan – Fiscal Year 2014/2015,* City of Sunnyvale.

To achieve Existing Plus Background traffic conditions, traffic volumes from approved, but not yet constructed projects were incorporated according to the information provided by the City.

EXISTING PLUS BACKGROUND INTERSECTIONS LEVEL OF SERVICE

Existing Plus Background volumes were evaluated at the study intersections and are presented in **Figure 13**. Results are presented in **Table 15**. All study intersections function within acceptable LOS standards under this analysis scenario, except for the following intersection:

- #5 – Mathilda Avenue / Moffett Park Drive (PM Peak Hour)

Analysis sheets are provided in the **Appendix**.

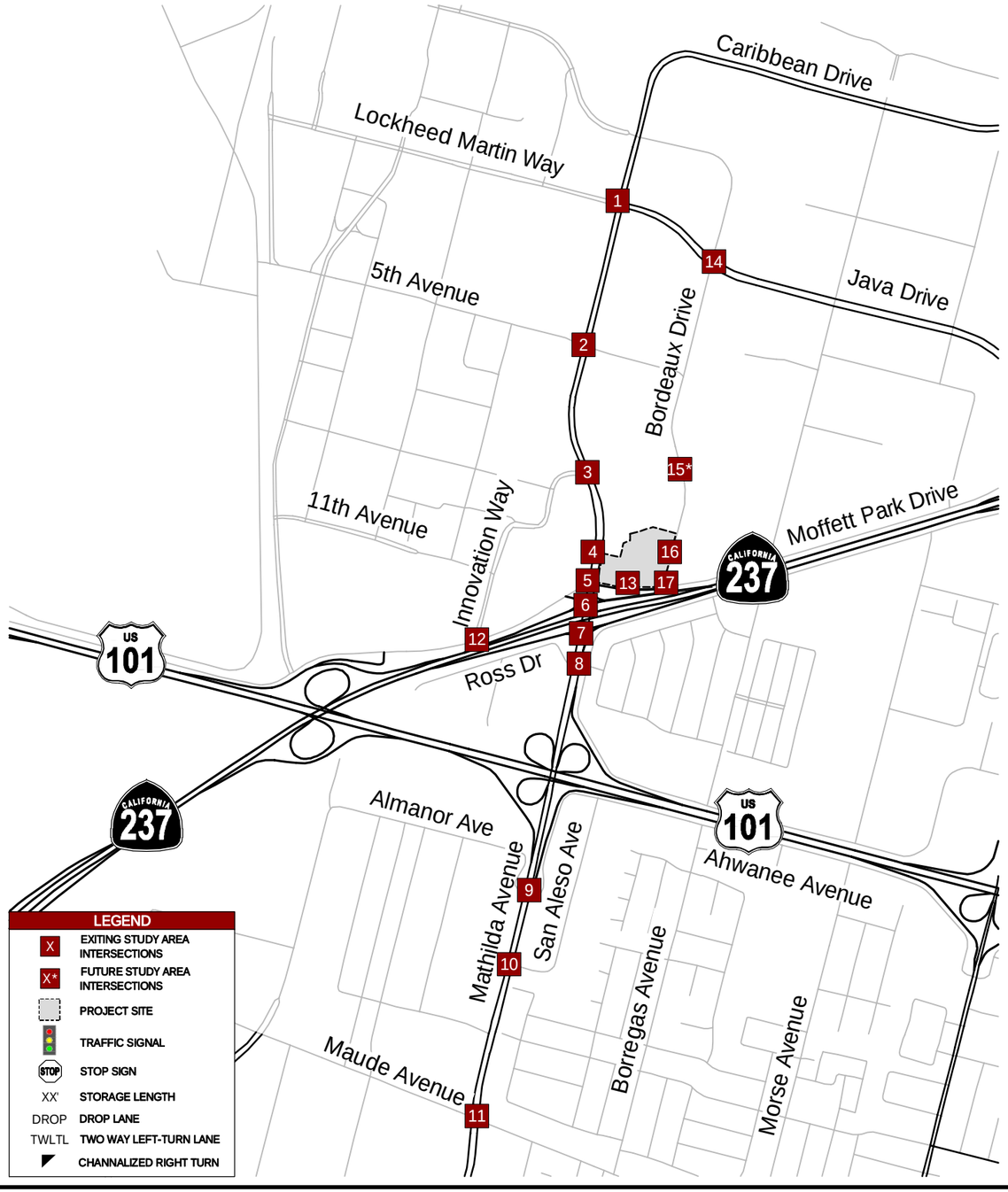
EXISTING PLUS BACKGROUND SIGNAL WARRANTS

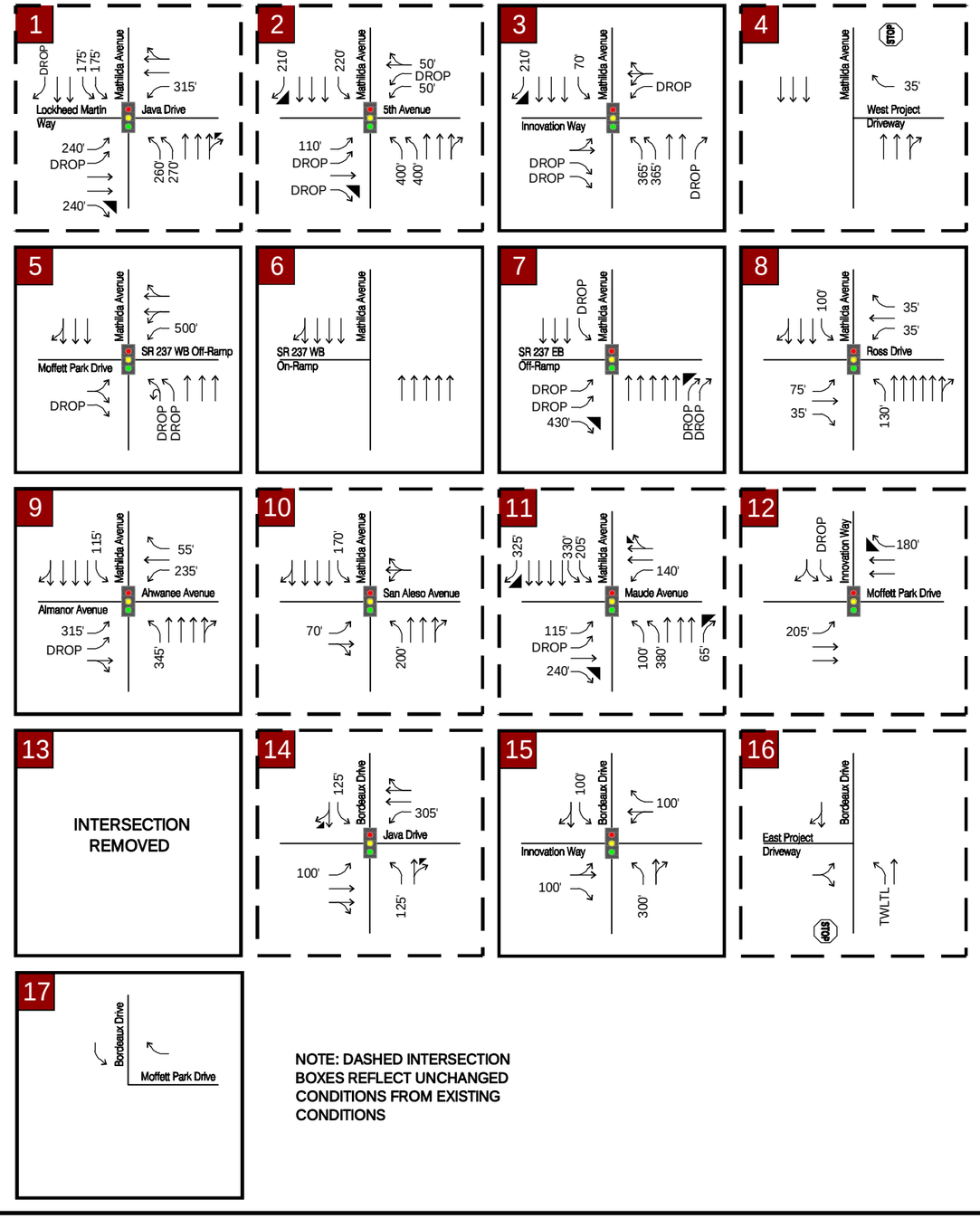
Signal warrants were evaluated at the unsignalized study intersections under Existing Plus Background Conditions. Below are the results of the signal warrants analysis for the two unsignalized intersections under existing plus background conditions:

Did not meet peak hour signal warrant:

- #4 – Mathilda Avenue / West Project Driveway
- #16 – Bordeaux Drive / East Project Driveway

Analysis sheets are provided in the **Appendix**.





NOTE: DASHED INTERSECTION BOXES REFLECT UNCHANGED CONDITIONS FROM EXISTING CONDITIONS

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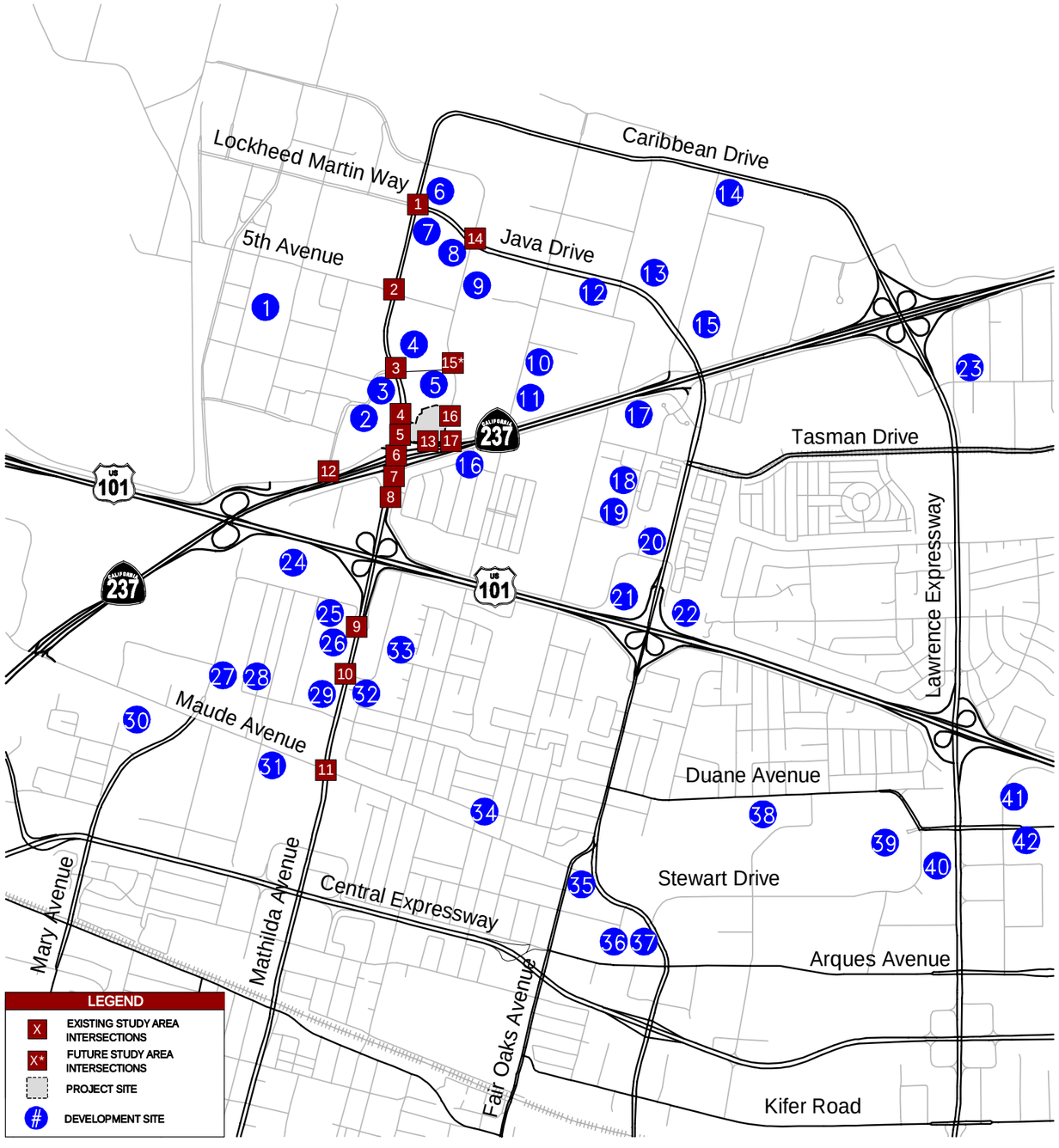
FIGURE 11
EXISTING PLUS BACKGROUND LANE GEOMETRY AND TRAFFIC CONTROL

1100 MATHILDA AVENUE TIA



APPROVED AND PENDING DEVELOPMENTS

1. 1111 LOCKHEED MARTIN WAY
2. 1081 INNOVATION WAY
3. 1120 INNOVATION WAY*
4. 1184 N MATHILDA AVENUE
5. 1152 BORDEAUX DRIVE
6. 589 W JAVA DRIVE
7. 1260 MATHILDA AVENUE
8. 1235 BORDEAUX DRIVE
9. 1212 BORDEAUX DRIVE
10. 1190 BORREGAS AVENUE*
11. 215 MOFFETT PARK DRIVE
12. 250 E JAVA DRIVE*
13. 495 E JAVA DRIVE
14. 549 BALTIC WAY
15. 1240 CROSSMAN AVENUE*
16. 160 PERSIAN DRIVE*
17. 460 PERSIAN DRIVE
18. 1139 KARLSTAD DRIVE
19. 1111 KARLSTAD DRIVE
20. 1023 N FAIR OAKS
21. 520 E WEDDELL DRIVE
22. 610 E WEDDELL DRIVE
23. 1101 ELKO DRIVE
24. 675 ALMANOR AVENUE
25. 520 ALMANOR AVENUE
26. 767 MATHILDA AVENUE
27. 610 N MARY AVENUE
28. 623 N PASTORIA AVENUE*
29. 615 N MATHILDA AVENUE
30. 445 N MARY AVENUE*
31. 684 W MAUDE AVENUE
32. 696 N MATHILDA AVENUE
33. 728, 740, 750, 760, & 814 SAN ALESO AVENUE*
34. 423 E MAUDE AVENUE
35. 625 E TAYLOR AVENUE
36. 680 E TAYLOR AVENUE
37. 698 E TAYLOR AVENUE
38. 915 DEGUIGNE DRIVE
39. 1 AMD PLACE*
40. 1080 STEWART DRIVE
41. 1250 LAKESIDE DRIVE
42. 1230 OAKMEAD PARKWAY*

* PENDING PROJECTS ONLY INCLUDED IN CUMULATIVE CONDITIONS SCENARIO

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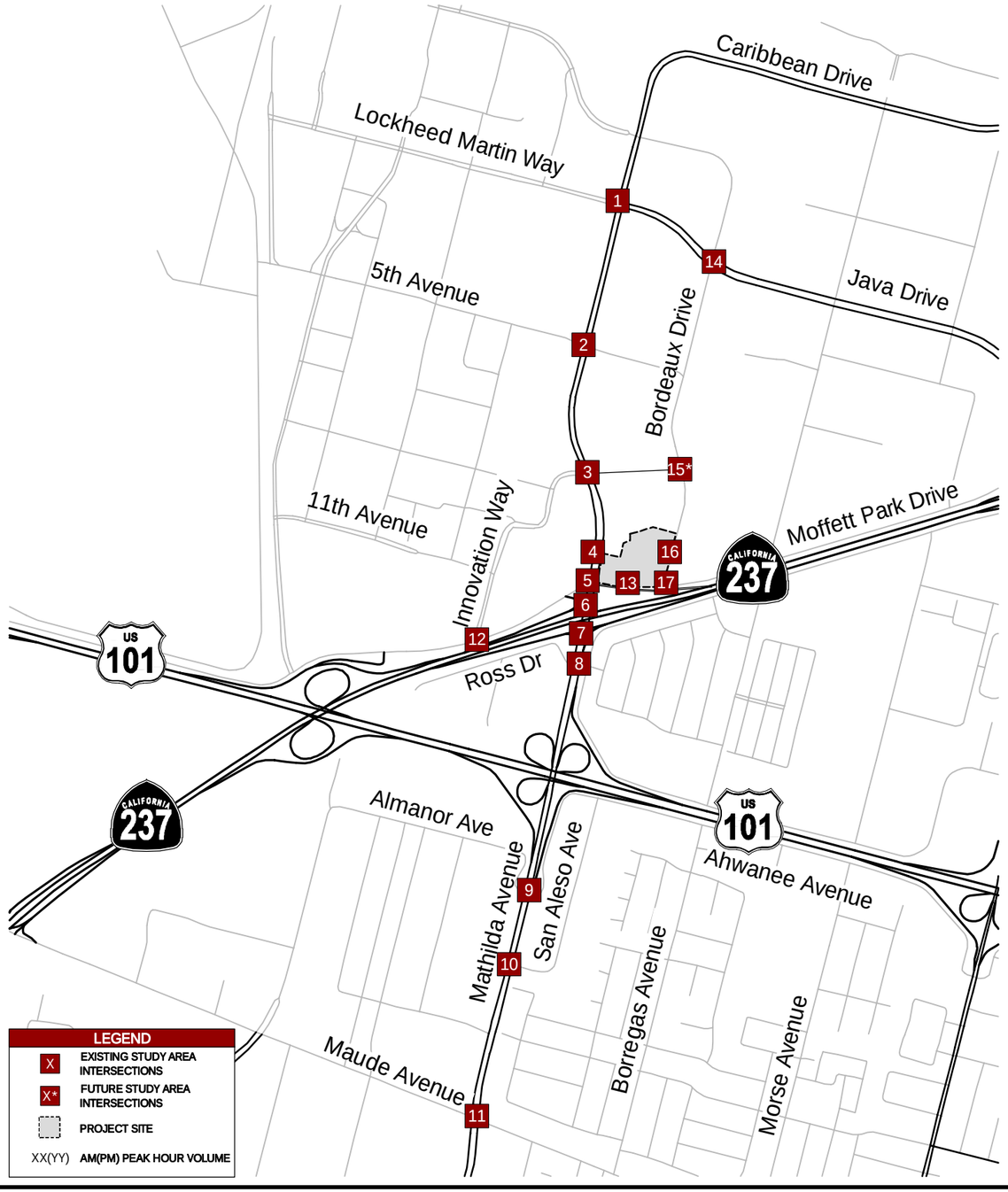
FIGURE 12
APPROVED AND PENDING PROJECT LOCATIONS

1100 MATHILDA AVENUE TIA



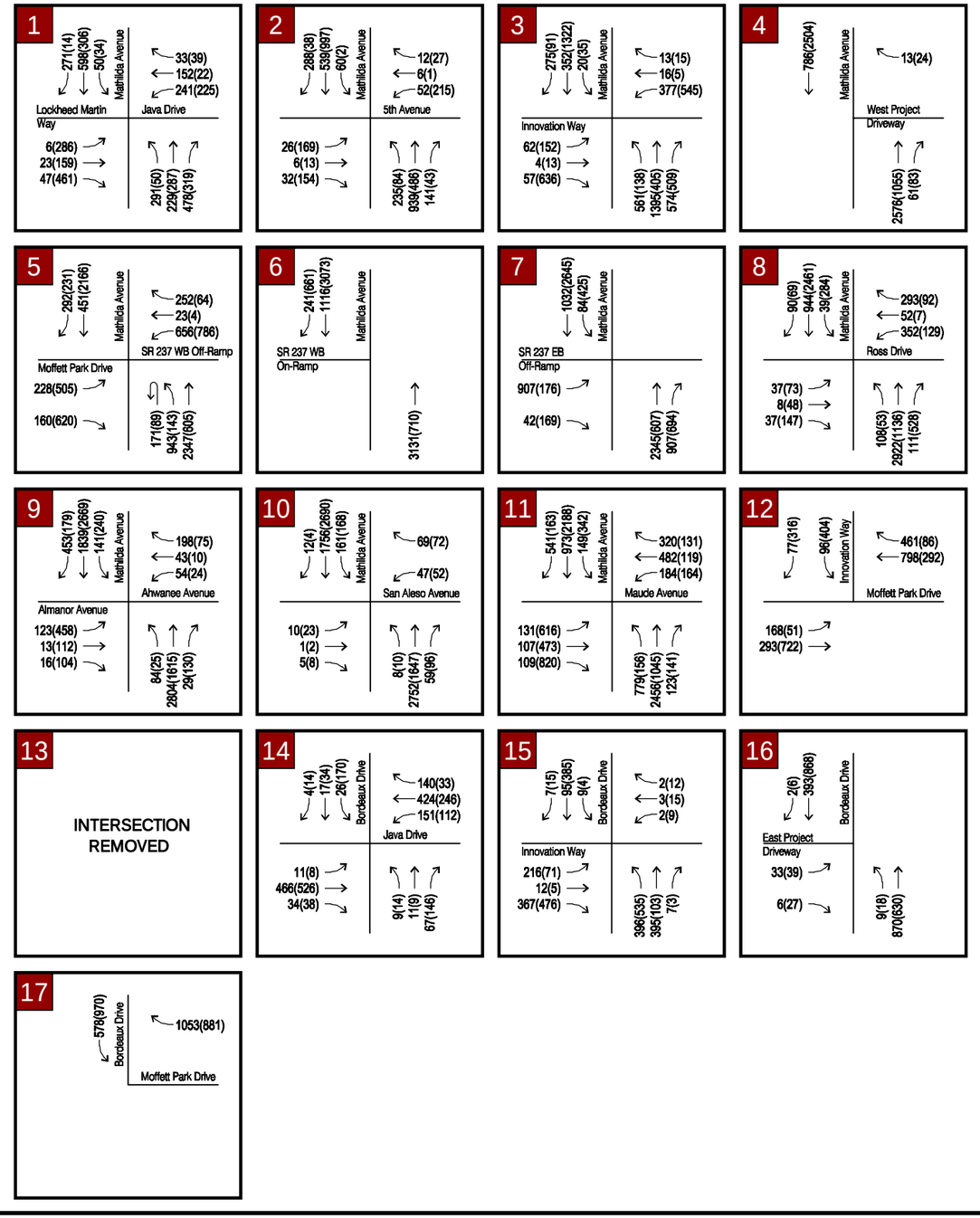


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FIGURE 13
EXISTING PLUS BACKGROUND PEAK HOUR TURNING MOVEMENT VOLUMES

1100 MATHILDA AVENUE TIA

Table 15 - Existing Plus Background Intersection Level of Service Summary

#	Intersection	LOS Criteria	Jurisdiction	Control	Existing Plus Background							
					AM Peak				PM Peak			
					LOS	Delay (sec)[1]	v/c Ratio	Crit. Delay	LOS	Delay (sec)[1]	v/c Ratio	Crit. Delay
1	Mathilda Avenue / Lockheed Martin Way - Java Drive[2,3]	E	City	Signal	C	31.1	0.481	30.5	D+	37.9	0.625	35.8
2	Mathilda Avenue / 5th Avenue[3]	E	City	Signal	C	25.1	0.264	17.6	D	39.5	0.296	31.2
3	Mathilda Avenue / Innovation Way[3]	E	City	Signal	C-	33.9	0.578	35.6	D	49.7	0.682	54.7
4	Mathilda Avenue / West Project Driveway[3]	E	City	SSSC	C	18.0	0.045	0.1	B	11.1	0.039	0.1
5	Mathilda Avenue / Moffett Park Drive[3,4]	E	City	Signal	E	67.1	0.980	69.4	**F**	**228.7**	**1.320**	**204.0**
6	Mathilda Avenue / SR 237 WB Ramps[3,4]	E	City / Caltrans	-	Intersection with no conflicting movements							
7	Mathilda Avenue / SR 237 EB Ramps[3,4]	E	City / Caltrans	Signal	C	20.3	0.720	20.8	D	38.3	0.710	11.4
8	Mathilda Avenue / Ross Drive[3,4]	E	City	Signal	C	31.4	0.820	29.4	C	34.2	0.770	32.7
9	Mathilda Avenue / Ahwanee Avenue[3]	E	City	Signal	C	25.0	0.668	27.8	C-	33.1	0.633	28.4
10	Mathilda Avenue / San Aleso Avenue[3]	E	City	Signal	B	15.1	0.697	20.1	B	14.5	0.509	22.5
11	Mathilda Avenue / Maude Avenue[2,3]	E	City	Signal	D	47.0	0.832	65.1	D-	53.5	0.924	60.6
12	Innovation Way / Moffett Park Drive	D	City	Signal	C+	21.1	0.537	27.5	C-	33.3	0.514	31.1
13	South Project Driveway / Moffett Park Drive	D	City	-	Removed intersection							
14	Bordeaux Drive / Java Drive	D	City	Signal	B	17.6	0.350	18.4	B-	18.9	0.500	20.3
15	Bordeaux Drive / Innovation Way	D	City	Signal	B	16.7	0.458	23.6	C+	22.5	0.648	27.0
16	Bordeaux Drive / East Project Driveway	D	City	SSSC	C	15.4	0.092	0.5	C	18.3	0.120	0.9
17	Bordeaux Drive / Moffett Park Drive	D	City	-	Intersection with no conflicting movements							

Intersections that are operating below acceptable levels are shown in **BOLD**.

1 The delay for the worst movement is reported for SSSC intersections.

2 Mathilda Avenue / Lockheed Martin Way - Java Drive (#1) and Mathilda Avenue / Maude Avenue (#11) are CMP intersections with LOS E threshold.

3 Mathilda Avenue is a regionally significant roadway with a LOS E threshold.

4 Mathilda Avenue/Moffett Park Drive (#5), Mathilda Avenue/SR 237 EB Ramps (#7), and Mathilda Avenue/Ross Drive (#8) were analyzed using HCM 2000 methodology within Synchro software. The remaining intersections were analyzed using HCM 2000 within Traffix software.

EXISTING PLUS BACKGROUND PLUS PROPOSED PROJECT INTERSECTION LEVEL OF SERVICE

Existing Plus Background Plus Project traffic conditions were evaluated at the study intersections and are shown in **Figure 14**. Results are presented in **Table 16**. The following intersection would operate at an unacceptable level of service in the Existing Plus Background Plus Project:

- #5 – Mathilda Avenue / Moffett Park Drive (PM Peak Hour)
  - Intersection operating unacceptably without the project with an increase in critical delay by more than four (4) seconds – **Significant impact**

Analysis sheets are provided in the **Appendix**.

EXISTING PLUS BACKGROUND PLUS PROJECT SIGNAL WARRANTS

Signal warrants were evaluated at the unsignalized study intersections under Existing Plus Background Plus Project Conditions. Below are the results of the signal warrants analysis for the two unsignalized intersections under Existing Plus Background Plus Project Conditions:

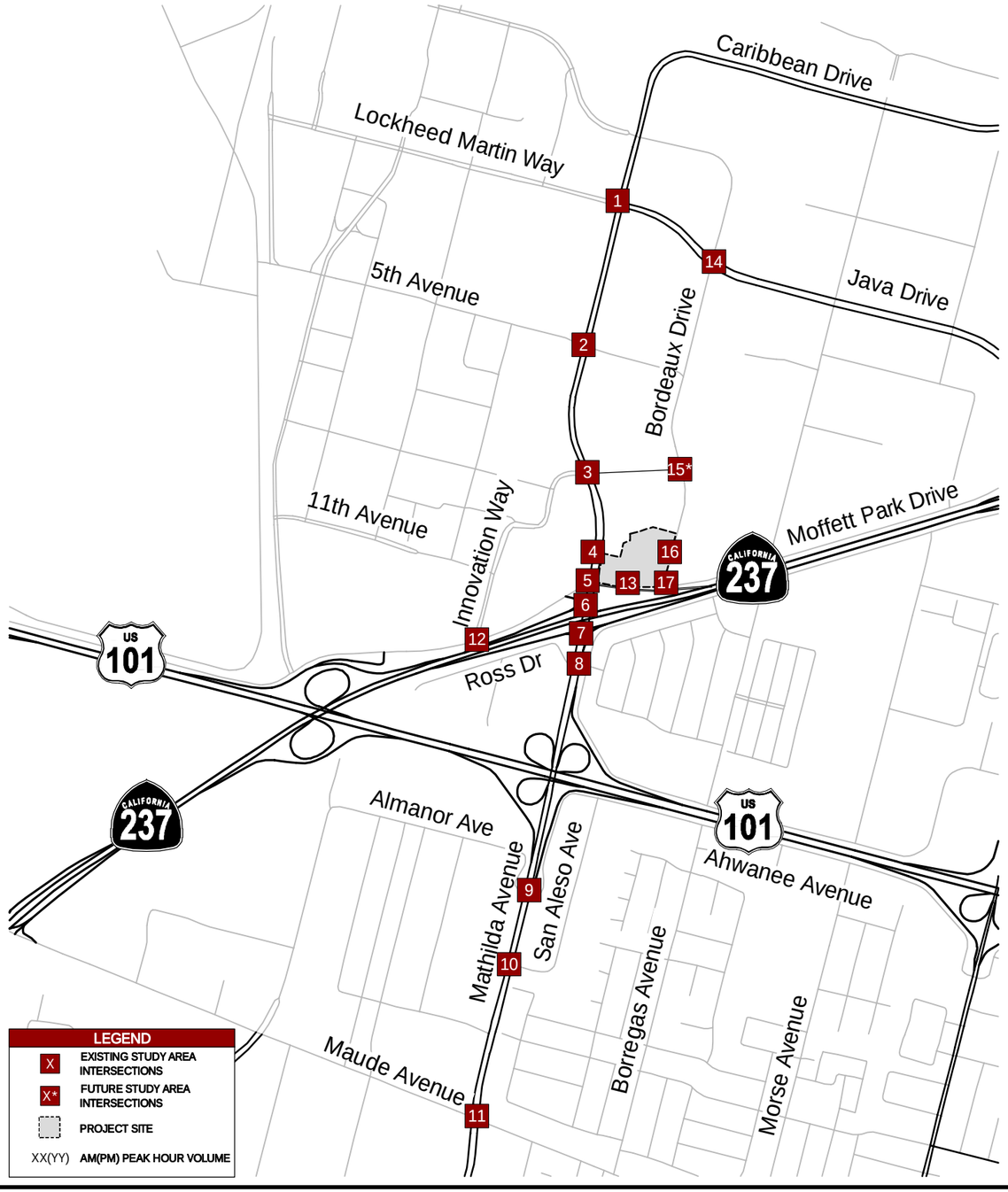
Did not meet peak hour signal warrant:

- #4 – Mathilda Avenue / West Project Driveway

Met peak hour signal warrant:

- #16 – Bordeaux Drive / East Project Driveway

Analysis sheets are provided in the **Appendix**.



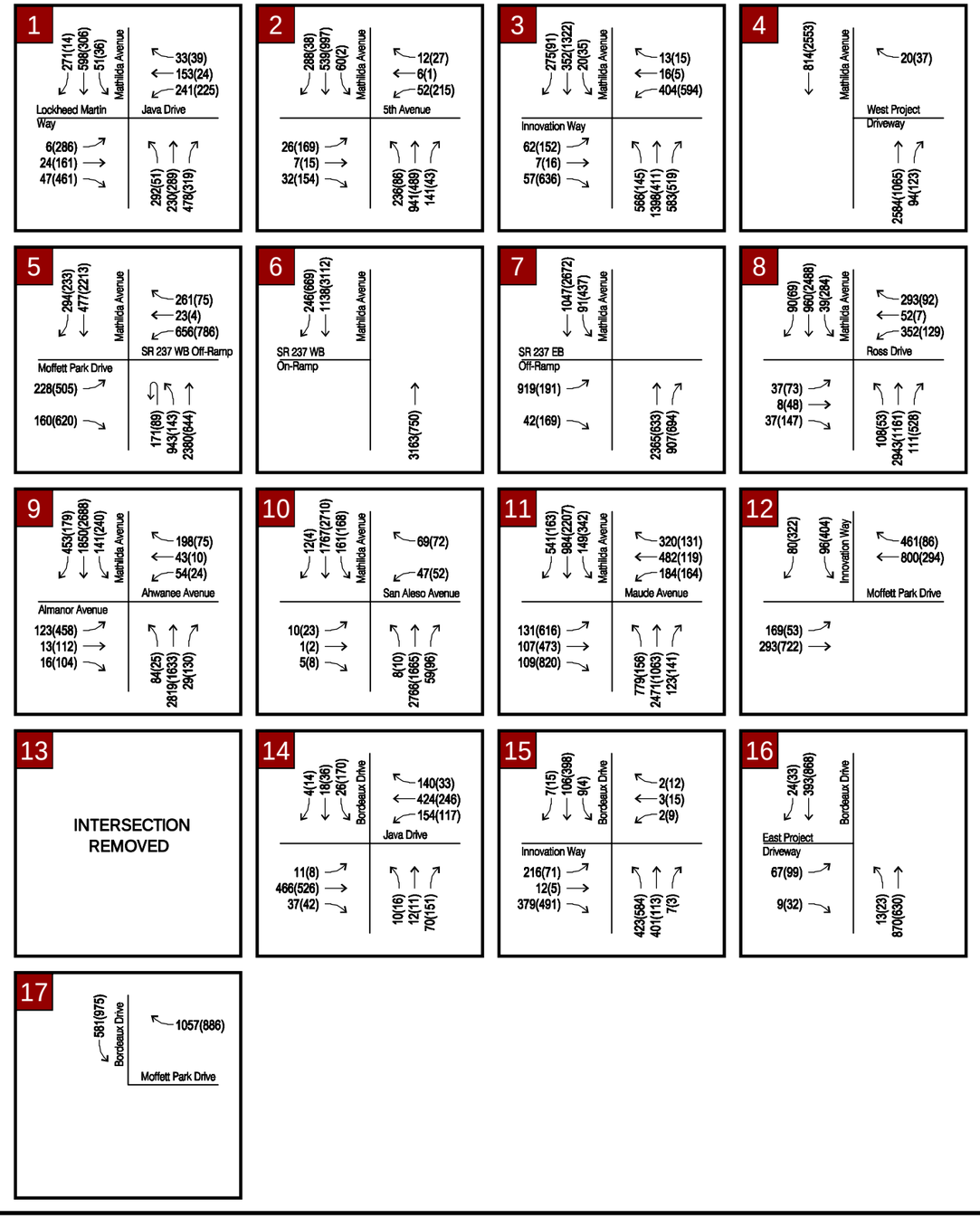


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FIGURE 14
EXISTING PLUS BACKGROUND PLUS PROJECT PEAK HOUR TURNING MOVEMENT VOLUMES

1100 MATHILDA AVENUE TIA

Table 16 - Existing Plus Background Plus Proposed Project Intersection Level of Service Summary

#	Intersection	LOS Criteria	Jurisdiction	Control	Existing Plus Background								Existing Plus Background Plus Project									
					AM Peak				PM Peak				AM Peak						PM Peak					
					LOS	Delay (sec)[1]	v/c Ratio	Crit. Delay	LOS	Delay (sec)[1]	v/c Ratio	Crit. Delay	LOS	Delay (sec)[1]	v/c Ratio	v/c Var.	Crit. Delay	Crit. Delay Var.[2]	LOS	Delay (sec)[1]	v/c Ratio	v/c Var.	Crit. Delay	Crit. Delay Var.[2]
1	Mathilda Avenue / Lockheed Martin Way - Java Drive[3,4]	E	City	Signal	C	31.1	0.481	30.5	D+	37.9	0.625	35.8	C	31.1	0.482	0.001	30.6	-	D+	37.9	0.625	0.000	35.8	-
2	Mathilda Avenue / 5th Avenue4	E	City	Signal	C	25.1	0.264	17.6	D	39.5	0.296	31.2	C	25.1	0.266	0.002	17.7	-	D	39.6	0.298	0.002	31.4	-
3	Mathilda Avenue / Innovation Way[4]	E	City	Signal	C-	33.9	0.578	35.6	D	49.7	0.682	54.7	C-	34.5	0.588	0.010	36.6	-	D	50.7	0.700	0.018	55.6	-
4	Mathilda Avenue / West Project Driveway[4]	E	City	SSSC	C	18.0	0.045	0.1	B	11.1	0.039	0.1	C	18.7	0.068	0.023	0.1	-	B	11.5	0.063	0.024	0.1	-
5	Mathilda Avenue / Moffett Park Drive[4,5]	E	City	Signal	E	67.1	0.980	69.4	**F**	**228.7**	**1.320**	**204.0**	E	68.8	0.990	0.010	71.4	2.0	**F**	**230.2**	**1.330**	**0.010**	**209.2**	**5.2**
6	Mathilda Avenue / SR 237 WB Ramps[4,5]	E	City / Caltrans	-	Intersection with no conflicting movements																			
7	Mathilda Avenue / SR 237 EB Ramps[4,5]	E	City / Caltrans	Signal	C	20.3	0.720	20.8	D	38.3	0.710	11.4	C	20.6	0.740	0.020	21.4	-	D	39.2	0.720	0.010	11.6	-
8	Mathilda Avenue / Ross Drive[4,5]	E	City	Signal	C	31.4	0.820	29.4	C	34.2	0.770	32.7	C	31.5	0.820	0.000	29.4	-	C	34.7	0.780	0.010	33.3	-
9	Mathilda Avenue / Ahwanee Avenue[4]	E	City	Signal	C	25.0	0.668	27.8	C-	33.1	0.633	28.4	C	25.0	0.670	0.002	27.8	-	C-	33.1	0.636	0.003	28.3	-
10	Mathilda Avenue / San Aleso Avenue[4]	E	City	Signal	B	15.1	0.697	20.1	B	14.5	0.509	22.5	B	15.1	0.700	0.003	20.1	-	B	14.4	0.512	0.003	22.4	-
11	Mathilda Avenue / Maude Avenue[3,4]	E	City	Signal	D	47.0	0.832	65.1	D-	53.5	0.924	60.6	D	47.0	0.832	0.000	65.1	-	D-	53.7	0.927	0.003	60.8	-
12	Innovation Way / Moffett Park Drive	D	City	Signal	C+	21.1	0.537	27.5	C-	33.3	0.514	31.1	C+	21.3	0.540	0.003	27.7	-	C-	33.4	0.518	0.004	31.2	-
13	South Project Driveway / Moffett Park Drive	D	City	-	Removed intersection																			
14	Bordeaux Drive / Java Drive	D	City	Signal	B	17.6	0.350	18.4	B-	18.9	0.500	20.3	B	17.7	0.356	0.006	18.5	-	B-	19.1	0.509	0.009	20.5	-
15	Bordeaux Drive / Innovation Way	D	City	Signal	B	16.7	0.458	23.6	C+	22.5	0.648	27.0	B	16.8	0.481	0.023	23.9	-	C	23.2	0.687	0.039	28.3	1.3
16	Bordeaux Drive / East Project Driveway	D	City	SSSC	C	15.4	0.092	0.5	C	18.3	0.120	0.9	C	16.9	0.176	0.084	0.9	-	C	23.3	0.311	0.191	1.9	-
17	Bordeaux Drive / Moffett Park Drive	D	City	-	Intersection with no conflicting movements																			

Intersections that are operating below acceptable levels are shown in **BOLD** and significant impacts are highlighted.

1 The average control delay is reported for signalized and AWSC intersections. The delay for the worst movement is reported for SSSC intersections.

2 Only increases in delay exceeding one second are shown.

3 Mathilda Avenue / Lockheed Martin Way - Java Drive (#1) and Mathilda Avenue / Maude Avenue (#11) are CMP intersections with LOS E threshold.

4 Mathilda Avenue is a regionally significant roadway with a LOS E threshold.

5 Mathilda Avenue/Moffett Park Drive (#5), Mathilda Avenue/SR 237 WB Ramps (#6), Mathilda Avenue/SR 237 EB Ramps (#7), and Mathilda Avenue/Ross Drive (#8) were analyzed using HCM 2000 methodology within Synchro software. The remaining intersections were analyzed using HCM 2000 within Traffix software.

5. CUMULATIVE TRAFFIC CONDITIONS

This chapter will discuss the traffic conditions under the Cumulative and Cumulative Plus Project Conditions. Cumulative conditions for this analysis were established as occurring in year 2030.

CUMULATIVE TRANSPORTATION IMPROVEMENTS

Under Cumulative conditions, there are no new lane geometry improvements; therefore, Existing Plus Background lane geometry was assumed in Cumulative conditions. The Existing Plus Background lane geometry in **Figure 10** illustrates the intersection geometry and traffic control in the Cumulative analysis.

CUMULATIVE TRAFFIC VOLUME

To achieve Cumulative traffic conditions, thirteen years of background traffic growth and traffic volumes from approved and pending projects, shown in **Figure 11**, were incorporated according to the information provided by the City. An annual growth rate of 1.5 percent was applied to traffic volumes in the study area to grow Existing volumes to reflect Cumulative volumes.

CUMULATIVE INTERSECTIONS LEVEL OF SERVICE

Cumulative volumes were evaluated at the study intersections and are presented in **Figure 15**. Results are presented in **Table 17.** The following intersections would operate at unacceptable levels of service in the Cumulative Condition:

- #5 – Mathilda Avenue / Moffett Park Drive (AM and PM Peak Hours)
- #8 – Mathilda Avenue / Ross Drive (PM Peak Hour)
- #11 – Mathilda Avenue / Maude Avenue (PM Peak Hour)

Analysis sheets are provided in the **Appendix**.

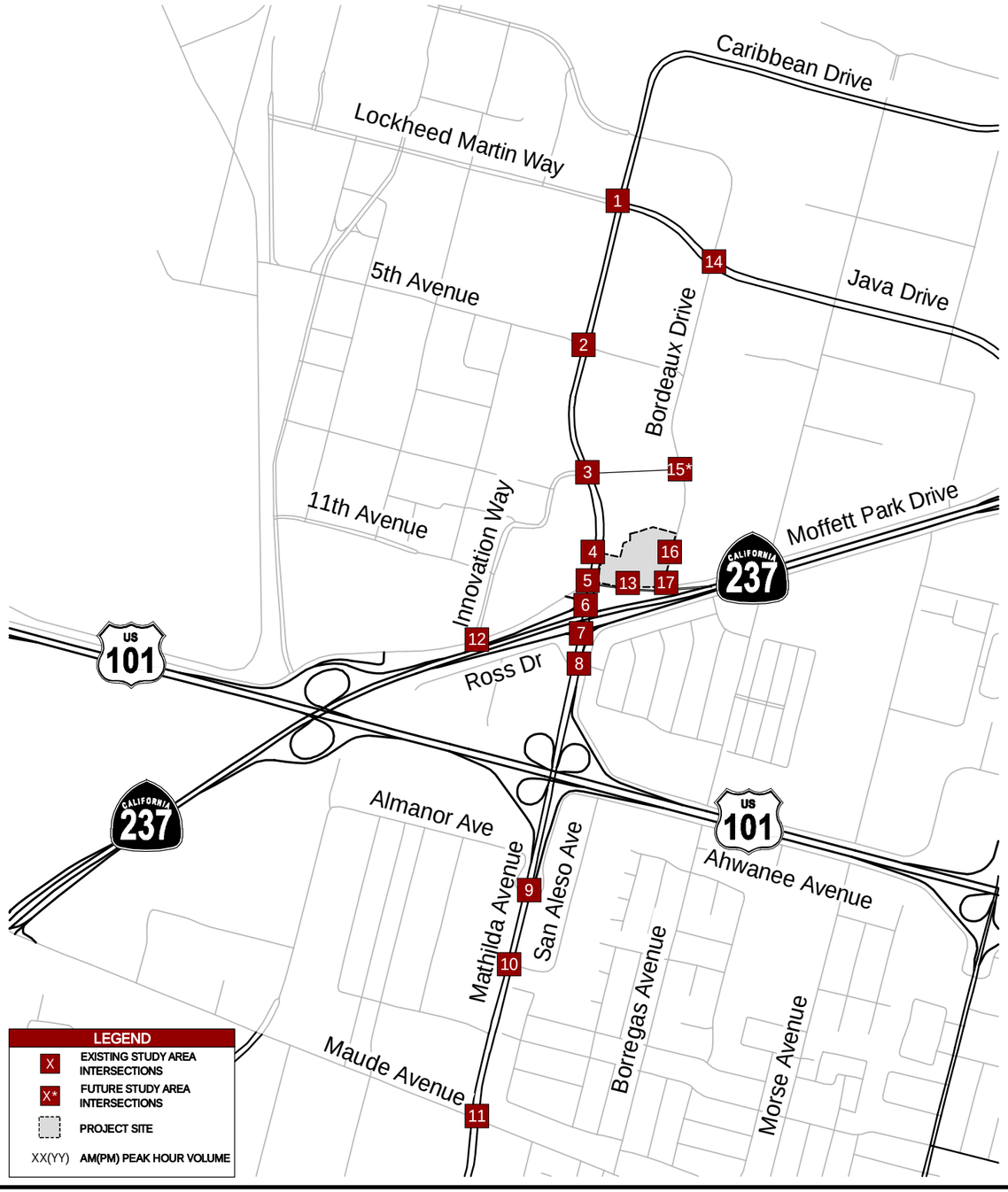
CUMULATIVE SIGNAL WARRANTS

Signal warrants were evaluated at the unsignalized study intersections under Cumulative Conditions. Below are the results of the signal warrants analysis for the two unsignalized intersections under Cumulative Conditions:

Did not meet peak hour signal warrant:

- #4 – Mathilda Avenue / West Project Driveway
- #16 – Bordeaux Drive / East Project Driveway

Analysis sheets are provided in the **Appendix**.



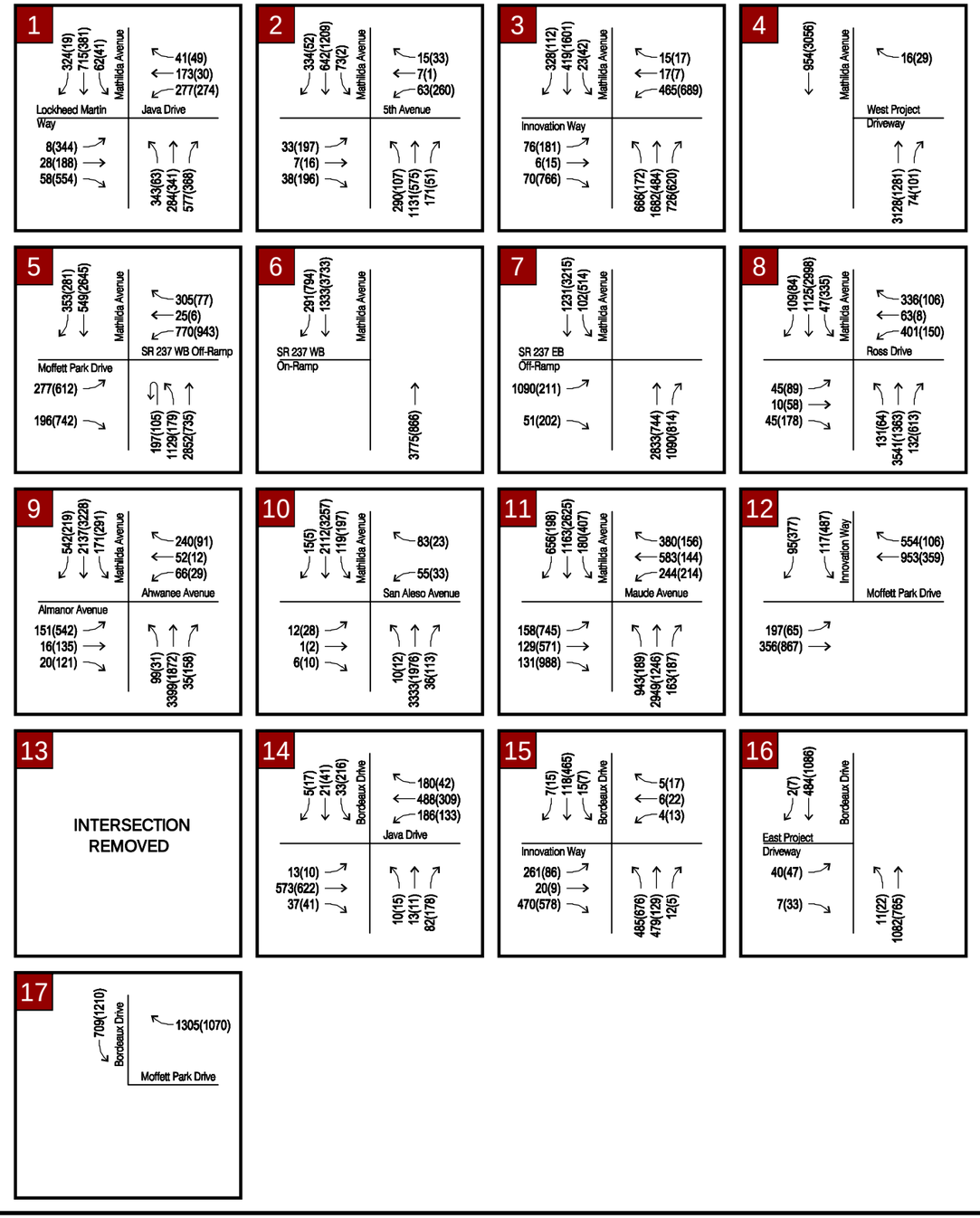


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FIGURE 15
CUMULATIVE PEAK HOUR TURNING MOVEMENT VOLUMES

1100 MATHILDA AVENUE TIA

Table 17 - Cumulative Intersection Level of Service Summary

#	Intersection	LOS Criteria	Jurisdiction	Control	Cumulative							
					AM Peak				PM Peak			
					LOS	Delay (sec)[1]	v/c Ratio	Crit. Delay	LOS	Delay (sec)[1]	v/c Ratio	Crit. Delay
1	Mathilda Avenue / Lockheed Martin Way - Java Drive[2,3]	E	City	Signal	C	31.1	0.527	31.4	D	39.2	0.684	38.2
2	Mathilda Avenue / 5th Avenue[3]	E	City	Signal	C	25.0	0.317	17.7	D	38.8	0.365	30.3
3	Mathilda Avenue / Innovation Way[3]	E	City	Signal	D	35.4	0.708	39.6	D	54.2	0.776	60.3
4	Mathilda Avenue / West Project Driveway[3]	E	City	SSSC	C	22.9	0.073	0.1	B	12.1	0.054	0.1
5	Mathilda Avenue / Moffett Park Drive[3,4]	E	City	Signal	**F**	**105.7**	**1.190**	**114.1**	**F**	**363.3**	**1.620**	**356.2**
6	Mathilda Avenue / SR 237 WB Ramps[3,4]	E	City / Caltrans	-	Intersection with no conflicting movements							
7	Mathilda Avenue / SR 237 EB Ramps[3,4]	E	City / Caltrans	Signal	C	27.2	0.870	33.1	C	30.1	0.830	4.6
8	Mathilda Avenue / Ross Drive[3,4]	E	City	Signal	D	37.7	0.970	36.4	**F**	**83.0**	**0.930**	**88.0**
9	Mathilda Avenue / Ahwanee Avenue[3]	E	City	Signal	C	27.0	0.812	31.4	C	34.4	0.759	30.5
10	Mathilda Avenue / San Aleso Avenue[3]	E	City	Signal	B	13.8	0.789	18.3	A	9.2	0.528	4.4
11	Mathilda Avenue / Maude Avenue[2,3]	E	City	Signal	E	58.9	0.983	64.4	**F**	**80.1**	**1.101**	**107.8**
12	Innovation Way / Moffett Park Drive	D	City	Signal	C	21.8	0.615	28.7	C	33.8	0.600	32.9
13	South Project Driveway / Moffett Park Drive	D	City	-	Removed intersection							
14	Bordeaux Drive / Java Drive	D	City	Signal	B	16.4	0.313	15.0	B	19.8	0.572	21.5
15	Bordeaux Drive / Innovation Way	D	City	Signal	B	17.5	0.527	24.9	C	25.4	0.752	31.3
16	Bordeaux Drive / East Project Driveway	D	City	SSSC	C	18.9	0.142	0.6	D	25.1	0.186	1.1
17	Bordeaux Drive / Moffett Park Drive	D	City	-	Intersection with no conflicting movements							

Intersections that are operating below acceptable levels are shown in **BOLD**.

1 The delay for the worst movement is reported for SSSC intersections.

2 Mathilda Avenue / Lockheed Martin Way - Java Drive (#1) and Mathilda Avenue / Maude Avenue (#11) are CMP intersections with LOS E threshold.

3 Mathilda Avenue is a regionally significant roadway with a LOS E threshold.

4 Mathilda Avenue/Moffett Park Drive (#5), Mathilda Avenue/SR 237 EB Ramps (#7), and Mathilda Avenue/Ross Drive (#8) were analyzed using HCM 2000 methodology within Synchro software. The remaining intersections were analyzed using HCM 2000 within Traffix software.

CUMULATIVE PLUS PROJECT INTERSECTION LEVEL OF SERVICE

Cumulative Plus Project traffic conditions were evaluated at the study intersections and are shown in **Figure 16**. Results of the analysis are presented in **Table 18**. The following intersections would operate at unacceptable levels of service in the Cumulative Plus Project Condition:

- #5 – Mathilda Avenue / Moffett Park Drive (AM and PM Peak Hours)
  - AM Peak: Intersection operating unacceptably without the project with an increase in critical delay by less than four (4) seconds – **Not a significant Impact**
  - PM Peak: Intersection operating unacceptably without the project with an increase in critical delay by more than four (4) seconds – **Significant impact**
- #8 – Mathilda Avenue / Ross Drive (PM Peak Hour)
  - Intersection operating unacceptably without the project with an increase in critical delay by less than four (4) seconds – **Not a significant Impact**
- #11 – Mathilda Avenue / Maude Avenue (PM Peak Hour)
  - Intersection operating unacceptably without the project with an increase in critical delay by less than four (4) seconds – **Not a significant Impact**
- #16 – Bordeaux Drive / East Project Driveway (PM Peak Hour)
  - Intersection operating acceptably without project and project causes intersection to operate at an unacceptable LOS – **Significant impact**

Analysis sheets are provided in the **Appendix**.

CUMULATIVE PLUS PROJECT SIGNAL WARRANTS

Signal warrants were evaluated at the unsignalized study intersections under Cumulative Plus Project Conditions. Below are the results of the signal warrants analysis for the two unsignalized intersections under Cumulative Plus Project Conditions:

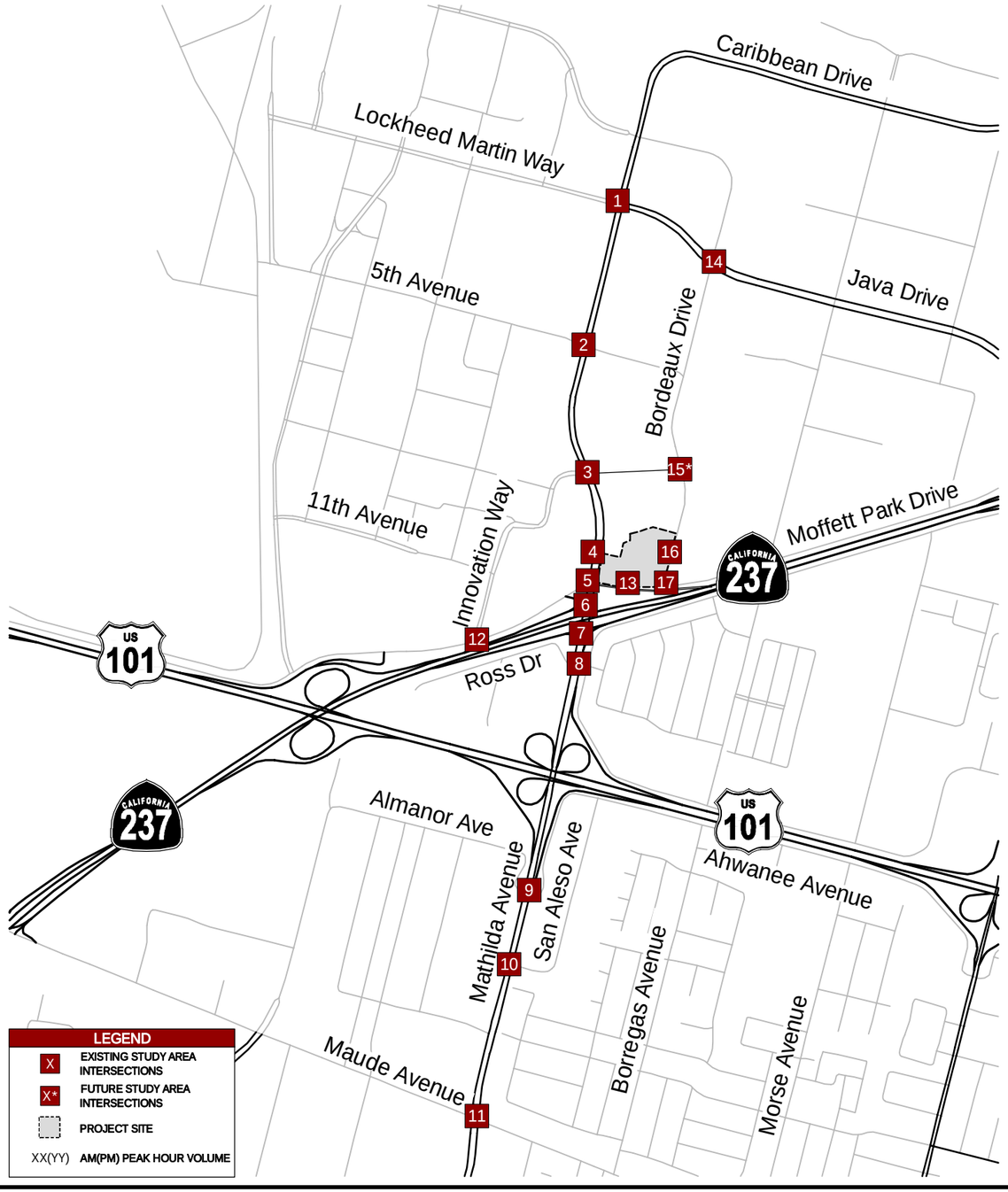
Did not meet peak hour signal warrant:

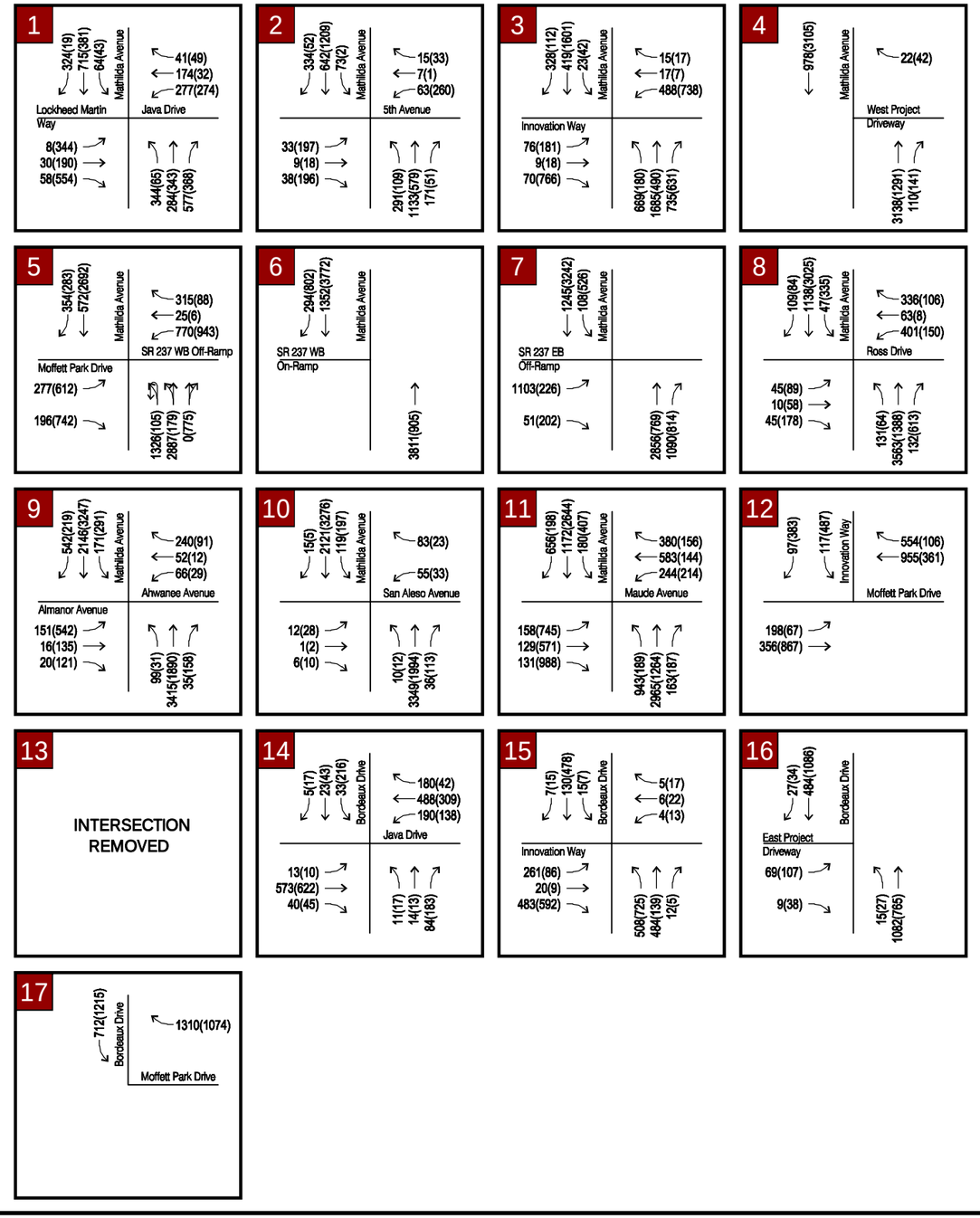
- #4 – Mathilda Avenue / West Project Driveway

Met peak hour signal warrant:

- #16 – Bordeaux Drive / East Project Driveway

Analysis sheets are provided in the **Appendix**.





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NOT TO SCALE

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FIGURE 16
CUMULATIVE PLUS PROJECT PEAK HOUR TURNING MOVEMENT VOLUMES

1100 MATHILDA AVENUE TIA

Table 18 - Cumulative Plus Project Intersection Level of Service Summary

#	Intersection	LOS Criteria	Jurisdiction	Control	Cumulative								Cumulative Plus Project									
					AM Peak				PM Peak				AM Peak						PM Peak					
					LOS	Delay (sec)[1]	v/c Ratio	Crit. Delay	LOS	Delay (sec)[1]	v/c Ratio	Crit. Delay	LOS	Delay (sec)[1]	v/c Ratio	v/c Var.	Crit. Delay	Crit. Delay Var.[2]	LOS	Delay (sec)[1]	v/c Ratio	v/c Var.	Crit. Delay	Crit. Delay Var.[2]
1	Mathilda Avenue / Lockheed Martin Way - Java Drive[3,4]	E	City	Signal	C	31.1	0.527	31.4	D	39.2	0.684	38.2	C	31.2	0.528	0.001	31.4	-	D	39.2	0.684	0.000	38.3	-
2	Mathilda Avenue / 5th Avenue4	E	City	Signal	C	25.0	0.317	17.7	D	38.8	0.365	30.3	C	25.1	0.318	0.001	17.8	-	D	38.8	0.367	0.002	30.5	-
3	Mathilda Avenue / Innovation Way[4]	E	City	Signal	D	35.4	0.708	39.6	D	54.2	0.776	60.3	D	36.0	0.717	0.009	40.6	-	E	55.2	0.794	0.018	61.5	1.2
4	Mathilda Avenue / West Project Driveway[4]	E	City	SSSC	C	22.9	0.073	0.1	B	12.1	0.054	0.1	C	24.1	0.104	0.031	0.1	-	B	12.5	0.081	0.027	0.1	-
5	Mathilda Avenue / Moffett Park Drive[4,5]	E	City	Signal	**F**	**105.7**	**1.190**	**114.1**	**F**	**363.3**	**1.620**	**356.2**	**F**	**109.2**	**1.190**	**0.000**	**116.9**	**2.8**	**F**	**365.2**	**1.630**	**0.010**	**362.8**	**6.6**
6	Mathilda Avenue / SR 237 WB Ramps[4,5]	E	City / Caltrans	-	Intersection with no conflicting movements																			
7	Mathilda Avenue / SR 237 EB Ramps[4,5]	E	City / Caltrans	Signal	C	27.2	0.870	33.1	C	30.1	0.830	4.6	C	27.9	0.880	0.010	34.2	1.1	C	31.1	0.840	0.010	4.9	-
8	Mathilda Avenue / Ross Drive[4,5]	E	City	Signal	D	37.7	0.970	36.4	**F**	**83.0**	**0.930**	**88.0**	D	38.6	0.970	0.000	37.3	-	**F**	**85.3**	**0.930**	**0.000**	**90.3**	**2.3**
9	Mathilda Avenue / Ahwanee Avenue[4]	E	City	Signal	C	27.0	0.812	31.4	C	34.4	0.759	30.5	C	27.0	0.814	0.002	31.4	-	C	34.4	0.762	0.003	30.6	-
10	Mathilda Avenue / San Aleso Avenue[4]	E	City	Signal	B	13.8	0.789	18.3	A	9.2	0.528	4.4	B	13.8	0.792	0.003	18.3	-	A	9.2	0.531	0.003	4.4	-
11	Mathilda Avenue / Maude Avenue[3,4]	E	City	Signal	E	58.9	0.983	64.4	**F**	**80.1**	**1.101**	**107.8**	E	59.2	0.986	0.003	65.1	-	**F**	**80.8**	**1.104**	**0.003**	**108.9**	**1.1**
12	Innovation Way / Moffett Park Drive	D	City	Signal	C	21.8	0.615	28.7	C	33.8	0.600	32.9	C	22.0	0.617	0.002	28.9	-	C	33.9	0.603	0.003	33.0	-
13	South Project Driveway / Moffett Park Drive	D	City	-	Removed intersection																			
14	Bordeaux Drive / Java Drive	D	City	Signal	B	16.4	0.313	15.0	B	19.8	0.572	21.5	B	16.4	0.315	0.002	15.0	-	B	20.0	0.581	0.009	21.7	-
15	Bordeaux Drive / Innovation Way	D	City	Signal	B	17.5	0.527	24.9	C	25.4	0.752	31.3	B	17.7	0.547	0.02	25.4	-	C	26.6	0.788	0.036	33.4	2.1
16	Bordeaux Drive / East Project Driveway	D	City	SSSC	C	18.9	0.142	0.6	D	25.1	0.186	1.1	C	21.5	0.248	0.106	1.1	-	**E**	**36.9**	**0.429**	**0.243**	**2.7**	**1.6**
17	Bordeaux Drive / Moffett Park Drive	D	City	-	Intersection with no conflicting movements																			

Intersections that are operating below acceptable levels are shown in **BOLD** and significant impacts are highlighted.

1 The average control delay is reported for signalized and AWSC intersections. The delay for the worst movement is reported for SSSC intersections.
2 Only increases in delay exceeding one second are shown.
3 Mathilda Avenue / Lockheed Martin Way - Java Drive (#1) and Mathilda Avenue / Maude Avenue (#11) are CMP intersections with LOS E threshold.
4 Mathilda Avenue is a regionally significant roadway with a LOS E threshold.
5 Mathilda Avenue/Moffett Park Drive (#5), Mathilda Avenue/SR 237 WB Ramps (#6), Mathilda Avenue/SR 237 EB Ramps (#7), and Mathilda Avenue/Ross Drive (#8) were analyzed using HCM 2000 methodology within Synchro software. The remaining intersections were analyzed using HCM 2000 within Traffix software.

6. INTERSECTION VEHICLE QUEUING AND SITE ACCESS AND CIRCULATION

This chapter presents the results from the vehicle queuing analysis completed for each of the study intersections, as well as discussion on the site access and circulation.

VEHICLE QUEUING

As congestion increases, it is common for traffic at intersections to form lines of stopped (or queued) vehicles. Queue lengths were determined for each turn lane and measured the distance that vehicles will back up in each direction approaching an intersection. *Traffix* and *Synchro* software calculates the 95th percentile queues based on *HCM 2000* methodology. The 95th percentile queue is used to account for fluctuations in traffic and represents a condition where 95 percent of the time during the peak period, traffic volumes will be less than or equal to the queue determined by the analysis. It is used as a benchmark for determining deficiencies as a standard transportation engineering practice. A typical vehicle length of 25 feet was used in the queuing analysis. An operational deficiency was assumed to occur if the queue increases by one or more vehicles and the vehicle queue exceeds the turn pocket length. A summary of the queuing results is included in the **Appendix**.

The analysis showed that several existing turn bay storage lengths are exceeded by future traffic volumes. In all cases, the exceeded queue lengths are not solely due to the project, but are a result of pre-existing deficiencies. For example, the 95th percentile eastbound left turn queue length at the intersection of Mathilda Avenue / Ahwanee Avenue is 496 feet during the PM peak in the Existing Conditions and 498 feet during the PM peak in the Existing Plus Project Conditions. The turn pocket length is 315 feet long and the queue spills out of the turn pocket, the result is a pre-existing deficiency. At locations affected by the project traffic, the increase in vehicle queuing is typically less than one vehicle for a turn lane except at the following intersections listed in **Table 19**.

Table 19 - Intersection with Queuing Deficiencies

#	Intersection	Scenario	Peak Period	Turning Movement	Storage Length (feet)	Queue Length (feet)		Variance
						Without Project	With Project	
5	Mathilda Avenue / Moffett Park Drive	Existing	PM Peak	EBR	275	353	381	28 feet (1 veh)
15	Bordeaux Drive / Innovation Way	Existing + Background	AM Peak	NBL	240	387	412	25 feet (1 veh)
			PM Peak			591	654	63 feet (3 veh)
		Cumulative	AM Peak			456	481	25 feet (1 veh)
			PM Peak			740	814	74 feet (3 veh)

It should be noted that even though the project does not add any traffic to the eastbound right movement at Intersection #5 – Mathilda Avenue / Moffett Park Drive, there is still a queuing deficiency with the addition of the project under the Existing Plus Project PM Peak. While conducting field work, it was observed that queuing for the eastbound right turn was due to vehicles being unable to turn onto Mathilda Avenue due to heavy southbound through and westbound left turn traffic. The project will add traffic to the westbound left movement, which may result in a higher delay and longer queue length for the eastbound right turn movement.

SITE ACCESS AND CIRCULATION

SITE ACCESS

As shown in **Figure 6**, the proposed development will be accessible from two existing driveways on Mathilda Avenue (Intersection #4) and Bordeaux Drive (Intersection #16). It should be noted that the Mathilda Avenue Improvements at SR 237 and US 101 project will close a segment of Moffett Park Drive between Mathilda Avenue and Bordeaux Drive, which is adjacent to the southern edge of the project site. The Moffett Park Drive closure would shift the site access for the driveway on Bordeaux Drive for vehicles coming from the south and west to the Innovation Way extension instead of Moffett Park Drive.

The driveway on Mathilda Avenue is a shared driveway with the northern property. The driveway was determined to operate at an acceptable LOS at the completion of the proposed project (see Intersection #4 in **Tables 12**, **16**, and **18** for LOS results). There were also no queuing deficiencies identified for the westbound approach. Since this driveway will operate at acceptable LOS and there are no queuing deficiencies, there are no improvements needed.

The driveway on Bordeaux was determined to operate at an acceptable LOS at the completion of the proposed project during the AM peak and at an unacceptable LOS during the PM peak in the Cumulative Condition. The delay for vehicles leaving the site is caused by insufficient gaps to complete a safe turning maneuver due to high volumes on Bordeaux Drive. While the intersection meets the peak hour signal warrants, installing a signal may not be appropriate due to the driveway's proximity to the Bordeaux Drive/Moffett Park Drive curve. It is recommended that the project add a left-turn lane at the driveway, which will require reconfiguration of the driveway to allow for proper storage and operation of an additional lane. The left-turn lane will allow the intersection to operate at an acceptable LOS.

PARKING REQUIREMENTS

The City parking requirements are stated in the of Sunnyvale Municipal Code (SMC). For a hotel, a minimum of 0.8 spaces is required per hotel room[12]. The project proposes 358 rooms, which equates to 287 spaces. The proposed project will provide 203 spaces in a below-grade parking garage and 93 surface parking for a total of 296 spaces, which meets the City's requirement for the number of spaces.

PEDESTRIAN ACCESS AND CIRCULATION

There are existing sidewalks adjacent to the project site where pedestrians can access the site from Mathilda Avenue. In the future, as part of VTA's Mathilda Avenue Improvements at SR 237 and US 101 project, a trail will be construction along Moffett Park Drive. As noted in the existing condition, there currently are no sidewalks adjacent to the project site on Bordeaux Drive. Based on the July 2018 site plan, **Figure 6**, the project will be constructing sidewalks along Bordeaux Drive adjacent to the site and connect with the sidewalks north of the project site.

Within the project site, there are pedestrian pathways which connect all the buildings on the site. There is also a pathway which connects the hotel to Mathilda Avenue and Bordeaux Drive.

[12] Sunnyvale Municipal Code. Table 19.46.100(a)

BICYCLE ACCESS AND CIRCULATION

From the proposed site, bicyclists can access the City network of bicycle facilities via the bicycle lanes adjacent to the site on Moffett Park Drive and Bordeaux Drive. In the future, bicyclists may use the trail along Moffett Park Drive that will be constructed as part of VTA's Mathilda Avenue Improvements at SR 237 and US 101 project.

The SMC does not require bicycle parking for hotel land uses, but the VTA *Bicycle Technical Guidelines* recommend that hotel land uses provide at least one (1) Class I (bicycle locker) per 30 hotel rooms and one (1) Class I (bicycle locker) per 30 employees[13]. Based on the number of hotel rooms, this would equate to at least 12 bicycle lockers. Additional bicycle lockers may be necessary depending on the number of employees. The July 2018 site plan indicates two outdoor bicycle racks, as well enclosed long-term bicycle storage lockers. The site plan does not indicate the number of bicycles each of these bicycle storage facilities will hold, but should follow SMC and VTA's guidelines.

[13] Santa Clara Valley Transportation Authority (VTA). *Bicycle Technical Guidelines*. 2012

7. PUBLIC TRANSIT, BICYCLE, AND PEDESTRIAN FACILITIES

The proposed project was evaluated to determine if it would potentially conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks) or generate pedestrian, bicycle, or transit travel demand that would not be accommodated by existing transit, bicycle, or pedestrian facilities and plans.

Employees and guests traveling to and from the hotel will have the option of driving, taking transit, walking, or bicycling to and from the proposed project.

TRANSIT

For those taking transit, VTA bus routes 26, 54, 120, 121, 122, 321, 328 or shuttle route 826 operate within the vicinity of the proposed project. For all routes except northbound Route 54, the nearest bus stop for the project site is at the Lockheed Martin Transit Center, near Mathilda Avenue and 5th Avenue. For northbound Route 54, the nearest bus stop for the project site is located north of the west project driveway. It is anticipated that the future Rapid Route 523 will operate within the vicinity of the proposed project and will utilized the bus stops north of the west project driveway and Lockheed Martin Transit Center. The project would not conflict with existing or planned VTA transit facilities.

Since the project does not conflict with existing or planned VTA transit, the project will have a **less than significant impact** on transit services.

TRANSIT DELAY

Transit vehicle delay was also considered for VTA bus routes that operate within the study area. Transit vehicles for the transit routes in the study area are expected to use the shared right-of-way with other motorists. Since the proposed project is anticipated to increase the vehicle delay at study intersections, transit vehicle delay may increase. The increase in transit vehicle delay was calculated from the intersection level of service outputs from the *Traffix* software. For each transit route, the study intersections and specific movements along the route were identified. The vehicle delay for each movement for each study intersection along the route was summed to determine the transit vehicle delay in the study area. **Table 20** summaries the transit delay for the VTA bus routes within our study area.

Table 20 - Transit Delay Summary

Route	Direction[1]		Change in Delay (sec)											
			Existing Plus Project				Existing Plus Background				Cumulative Plus Project			
			AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2
26	WB	EB	0.3	0.1	0.0	0.2	0.0	0.2	0.0	0.4	0.0	0.0	0.0	0.2
54	NB	SB	1.3	0.0	0.6	0.8	1.8	1.2	0.0	3.1	3.2	2.3	0.7	4.1
120	NB	SB	0.3	0.1	0.0	0.2	0.0	0.2	0.0	0.4	0.0	0.0	0.0	0.2
121	NB	SB	0.3	0.1	0.0	0.2	0.0	0.2	0.0	0.4	0.0	0.0	0.0	0.2
122	NB	SB	0.3	0.1	0.0	0.2	0.0	0.2	0.0	0.4	0.0	0.0	0.0	0.2
321	WB	EB	0.3	0.1	0.0	0.2	0.0	0.2	0.0	0.4	0.0	0.0	0.0	0.2
328	NB	SB	0.3	0.1	0.0	0.2	0.0	0.2	0.0	0.4	0.0	0.0	0.0	0.2
826	WB	EB	0.3	0.1	0.0	0.2	0.0	0.2	0.0	0.4	0.0	0.0	0.0	0.2

Notes:

[1] NB - Northbound, SB - Southbound

Changes in delay are compared to each condition's respective without project condition.

In the Existing Plus Project condition, the increase in transit vehicle delay is less than 1.3 seconds for all routes. In the Existing Plus Background Plus Project condition, the maximum increase in transit delay is 3.1 seconds. In the Cumulative Plus Project condition, the maximum increase in transit delay is 4.1 seconds. These increases in transit vehicle delay should not significantly affect the overall schedule for the transit routes.

PEDESTRIAN

There are existing sidewalks adjacent to the project site where pedestrians can access the site from Mathilda Avenue. In the future, pedestrians may use the trail along Moffett Park Drive that will be constructed as part of VTA's Mathilda Avenue Improvements at SR 237 and US 101 project. As noted in the existing condition, there are no sidewalks adjacent to the project site on Bordeaux Drive. Based on the July 2018 site plan, **Figure 6**, the project will construct sidewalks along Bordeaux Drive adjacent to the site and connect with the sidewalks north of the project site

BICYCLE

Bicyclists will have direct access to the project site using bicycle facilities on Moffett Park Drive and Bordeaux Drive. In the future, bicyclists may use the trail along Moffett Park Drive that will be constructed as part of VTA's Mathilda Avenue Improvements at SR 237 and US 101 project. The proposed project does not appear to impact the safety of bicyclists or have any design features impeding the use of bicycles. Since the proposed project does not conflict with any adopted policies or plans related to bicycle activity, the proposed project will have a **less than significant impact** on bicycle circulation.

8. SUMMARY OF IMPACTS AND RECOMMENDED MITIGATIONS

Based on the results of the traffic analysis and evaluation of the proposed site plan, the following intersection level of service impacts are noted in **Table 21**. The impacts are identified as being significant unless mitigated.

Table 21 - Intersection Impact Summary

#	Intersection	Scenarios
5	Mathilda Avenue / Moffett Park Drive-WB SR 237 Off-Ramp	Existing Plus Background Plus Project PM Peak Hour Cumulative Plus Project PM Peak Hour
16	Bordeaux Drive / East Project Driveway	Cumulative Plus Project PM Peak Hour

SIGNIFICANT UNLESS MITIGATED

The following significant impacts are listed by study intersection:

IMPACT TRANS – 1: MATHILDA AVENUE / MOFFETT PARK DRIVE-WB SR 237 OFF-RAMP (INTERSECTION #5)

The intersection of Mathilda Avenue / Moffett Park Drive-WB SR 237 Off-Ramp will have an LOS impact in the following scenarios due to the proposed project:

- Existing Plus Background Plus Project PM Peak Hour
- Cumulative Plus Project PM Peak Hour

Existing Plus Background Plus Project

In the Existing Plus Background Plus Project scenario, the intersection of Mathilda Avenue / Moffett Park Drive-WB SR 237 Off-Ramp will operate at an unacceptable LOS F with a delay of 230.1 seconds in the PM peak hour. Although the intersection operates at an unacceptable LOS F with a delay of 228.7 seconds without the project, the project increases the critical delay by more than four (4) seconds and the critical v/c by more than 0.01. This is a significant impact.

To mitigate the impact, the westbound approach would need to be reconfigured to consist of two left-turn lanes, one through lane, and one shared through/right lane. This configuration differs from what is currently proposed for the Mathilda Avenue Improvements at SR 237 and US 101 project. With the proposed improvement, the intersection would operate at LOS F, with 230.5 seconds of delay, and the critical v/c ratio and critical delay improves to better than pre-project conditions.

Given the current advanced stage of the Mathilda Avenue Improvement project, it is not feasible at this time to implement the proposed mitigation. However, it should be noted that the Mathilda Avenue Improvement project includes improvements and widening at this intersection. The project applicant shall pay their fair share towards this project. Since the Mathilda Avenue Improvements at SR 237 and 101 project will improve operations at the intersection, the impact will be **less than significant.**

Cumulative Plus Project

In the Cumulative Plus Project scenario, the intersection of Mathilda Avenue / Moffett Park Drive-WB SR 237 Off-Ramp will operate at an unacceptable LOS F with a delay of 365.2 seconds in the PM peak hour. Although the intersection operates at an unacceptable LOS F with a delay of 363.3 seconds without the project, the project increases the critical delay by more than four (4) seconds and the critical v/c by more than 0.01. This is a significant impact.

As stated for Existing Plus Background Plus Project conditions, to mitigate the impact, modification to the westbound approach would be needed, which is not possible at this time. However, since the intersection will be improved as part of VTA's Mathilda Avenue Improvements at SR 237 and US 101 project, the project applicant shall pay its fair share towards the project. Since the VTA's improvement project will improve operations at the intersection, the impact will be **less than significant**.

IMPACT TRANS – 2: BORDEAUX DRIVE / EAST PROJECT DRIVEWAY (INTERSECTION #16)

The intersection of Bordeaux Drive / East Project Driveway will have an LOS impact in the following scenario due to the proposed project:

- Cumulative Plus Project PM Peak Hour

Cumulative Plus Project

In the Cumulative scenario, the intersection of Bordeaux Drive / East Project Driveway will operate at an acceptable LOS D in the PM peak hour. Since the addition of the project trips causes the intersection to operate at an unacceptable LOS E, this is a significant impact.

The intersection meets the peak hour signal warrants, however installing a signal may not be appropriate due to the driveway's proximity to the curve located immediately south of the intersection where Bordeaux Drive transitions into Moffett Park Drive. It is recommended that to mitigate this impact, the project should add a left-turn lane for the project driveway, which will require reconfiguration of the driveway to allow for proper storage and operation of the extra additional lane. The left-turn lane should be at least 50-feet to provide adequate queue storage length. With this lane geometry, the intersection will operate at an acceptable LOS and the impact will be **less than significant**.

9. SUMMARY OF QUEUING DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

Based on the results of the queuing analysis, the follow deficiencies are noted in **Table 22**.

Table 22 - Queuing Deficiencies Summary

#	Intersection	Scenarios
5	Mathilda Avenue / Moffett Park Drive	Existing Plus Project PM Peak Hour
15	Bordeaux Drive / Innovation Way	Existing Plus Background Plus Project AM Peak Hour Existing Plus Background Plus Project PM Peak Hour Cumulative Plus Project AM Peak Hour Cumulative Plus Project PM Peak Hour

RECOMMENDED IMPROVEMENTS

The following queuing deficiencies are listed by study intersection:

DEFICIENCY QUEUING-1 – MATHILDA AVENUE / MOFFETT PARK DRIVE (INTERSECTION #5)

The intersection of Mathilda Avenue / Moffett Park Drive will have a queuing deficiency in the following scenario due to the proposed project:

- Existing Plus Project – PM Peak Hour

Existing Plus Project

In the Existing Plus Project scenario, the queue for the eastbound right turn movement is 381 feet in the PM peak hour, which exceeds the 275-foot turn pocket. Without the project, the eastbound right turn queue is 353 feet, which is exceeds the storage length. The proposed project adds 28 feet, or approximately one (1) vehicle to the total queue. Since the queue exceeds the right-turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

This intersection is part of the Mathilda Avenue Improvement at SR 237 and US 101 project, which would reconfigure this intersection along with the interchange. The improvement would adjust the storage length for the eastbound right turn lane and there would no longer be a queuing deficiency. The project should pay a fair share towards this improvement.

DEFICIENCY QUEUING-2 – BORDEAUX DRIVE / INNOVATION WAY (INTERSECTION #15)

The intersection of Bordeaux Drive / Innovation Way will have a queuing deficiency in the following scenarios due to the proposed project:

- Existing Plus Background Plus Project – AM Peak Hour
- Existing Plus Background Plus Project – PM Peak Hour

- Cumulative Plus Project – AM Peak Hour
- Cumulative Plus Project – PM Peak Hour

Existing Plus Background Plus Project

In the Existing Plus Background Plus Project scenario, the queue for the northbound left turn movement is 412 feet in the AM peak hour, which exceeds the 240-foot turn pocket. Without the project, the northbound left turn queue is 387 feet, which exceeds the storage length. The proposed project adds 25 feet, or approximately one (1) vehicle to the total queue. Since the queue exceeds the left-turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

In addition, during the PM peak hour, the queue for the northbound left turn movement is 654 feet in the Existing Plus Background Plus Project scenario. Without the project, the queue length is 591 feet, which also exceeds the storage length. The proposed project adds 63 feet, or approximately three (3) vehicles to the total queue. Since the queue exceeds the left-turn pocket and the proposed project increases the queue length by at least one vehicle length, this is a queuing deficiency.

Extending the storage length would be needed, but cannot be added due to right-of-way constraints. However, improvements will be made at this intersection as part of the Mathilda Avenue Improvements at SR 237 and US 101 project. The Project shall pay its fair share towards the Mathilda Avenue Improvements project.

Cumulative Plus Project

In the Cumulative Plus Project scenario, the queue for the northbound left turn movement is 481 feet in the AM peak hour, which exceeds the 240-foot turn pocket. Without the project, the northbound left turn queue is 456 feet, which exceeds the storage length. The proposed project adds 25 feet, or approximately one (1) vehicle to the total queue. Since the queue exceeds the left-turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

In addition, during the PM peak hour, the queue for the northbound left turn movement is 814 feet in the Cumulative Plus Project scenario. Without the project, the queue length is 740 feet, which also exceeds the turn pocket. The proposed project adds 74 feet, or approximately three (3) vehicles to the total queue. Since the queue exceeds the left-turn pocket and the proposed project increases the queue length by at least one vehicle length, this is a queuing deficiency.

Similar to Existing Plus Background Plus Project scenario, extending the northbound left-turn lane would be needed, but cannot be added due to right-of-way constraints. However, improvements will be made at this intersection as part of the Mathilda Avenue Improvements at SR 237 and US 101 project. The Project shall pay its fair share towards Mathilda Avenue Improvements project.

APPENDIX

A - FREEWAY SEGMENT THRESHOLD ANALYSIS

B - TURNING MOVEMENT COUNTS

C - VOLUME BALANCE CALCULATION

D - EXISTING TRAFFIC CONDITIONS

E - TRIP GENERATION

F - EXISTING PLUS PROJECT TRAFFIC CONDITIONS

G - EXISTING PLUS BACKGROUND TRAFFIC CONDITIONS

H - EXISTING PLUS BACKGROUND PLUS PROJECT TRAFFIC CONDITIONS

I - CUMULATIVE TRAFFIC CONDITIONS

J - CUMULATIVE PLUS PROJECT TRAFFIC CONDITION

K - FREEWAY RAMP QUEUE ANALYSIS

L - QUEUING SUMMARY

M - SIGNAL WARRANTS

N - MITIGATION OUTPUTS