HEXAGON TRANSPORTATION CONSULTANTS, INC.

Intuitive Surgical

Final Transportation Impact Analysis

Prepared for:

City of Sunnyvale

December 6, 2016

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Table of Contents

Appendices

List of Tables

List of Figures

AUTO TRIP REDUCTION STATEMENT

UPDATED: October 2014

SANTA CLARA Valley Transportation Authority

PROJECT INFORMATION	*Relevant TIA Section:*	Chapter 1 - Introduction
Project Name: Intuitive Surgical Engineering Campus		
Location: 1016 Kifer Road, Sunnyvale, CA		
Description: The project proposes to demolish three existing buildings totaling 209,708 s.f. and build two four-story buildings totaling 602,000 s.f. over two phases. The existing building at 1020 Kifer Road is part of the campus and will remain.		

Size (net new):	*D.U. Residential*	602,173 *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:*	Chapter 4 - Project Conditions	
Auto Trips Generated:	252 net *AM Pk Hr*	232 net *PM Pk Hr*	2,604 net *Total Weekday*
Methodology (check one)	☒ **ITE**	☐ **Other** *(Please describe below)*	

AUTO TRIP REDUCTION APPROACH	*Relevant TIA Section:*	Chapter 4 - Project Conditions	
☐ **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:*	Chapter 4 - Project Conditions
Is the project required to meet any trip reduction requirements or targets? Yes	**If so, specify percent:** see below	
Reference code or requirement: 20% daily, 35% peak hour. Lawrence Station Area Plan (February 2015)		

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:	Chapter 4 - Project Conditions	
Type of Reduction (check all that apply)			TOTAL REDUCTION CLAIMED	
■ % Trip Reduction	❒ % SOV mode share	❒ Trip Cap	%	Trips
20% daily, 35% peak hour			AM - 35% PM - 35% Daily - 20%	AM - 293 PM - 270 Daily - 1,152
Description	Target reduction based on ITE trip generation estimates. Reduction taken in compliance with Lawrence Station Area Plan (February 2015).			
Time period for reduction	Peak Hour	Peak Period	Full Day	
	■ AM/PM	❒ AM/PM	■	

OTHER TDM/REDUCTION MEASURES			
Bicycle/Pedestrian	Yes	Relevant TIA Section:	Chapter 6 - Other Transportation Issues
Ten-foot attached sidewalks with a four by five foot tree well are required along Kifer Road and Sonora Court project frontages. In addition, a multi-use bike/ped trail will be installed along the western and southern edges of the project site, connecting the western driveway on kifer with the Sonora Court driveway.			
Parking Management	Yes/No	Relevant TIA Section:	
Transit	Yes/No	Relevant TIA Section:	
Site Planning and Design	Yes	Relevant TIA Section:	Chapter 6 - Other Transportation Issues
A multi-use bike/ped trail will be installed along the western and southern edges of the project site, connecting the western driveway on kifer with the Sonora Court driveway. Pedestrian paths within site to connect buildings.			
TDM Program	Yes	Relevant TIA Section:	Chapter 6 - Other Transportation Issues
Applicant is required to meet trip reduction goals for daily and peak hours. Applicant can select any TDM program elements to meet these trip reductions.			

IMPLEMENTATION	Relevant TIA Section:	COAs
Have the project sponsor and Lead Agency agreed to any of the following measures?		
■ Monitoring	Once the project reaches 75% occupancy, annual traffic counts will be conducted to determine if target trip reduction percentages are achieved.	
■ Enforcement	If the project is found to be in non-compliance, the applicant is required to pay a penalty fee based on achieved trip reduction for the project.	
■ Data Sharing	Annual TDM report will be submitted to City to report compliance or non-compliance with trip reduction requirements.	

Executive Summary

This report presents the results of the transportation impact analysis (TIA) conducted for the proposed Intuitive Surgical Engineering Campus at 1016 Kifer Road in Sunnyvale, California. The project site is located on the south side of Kifer Road between Lawrence Expressway and Wolfe Road. The project proposes to demolish three existing buildings (1050/1090 Kifer Road and 1127 Sonora Court) totaling 209,708 square feet (s.f.) and build two four-story buildings totaling 602,000 s.f. over two phases. The existing building at 1020 Kifer Road is part of the campus and will remain. Phase 1 would consist of the demolition of two of the existing buildings (1050 Kifer Road and 1127 Sonora Court) totaling 104,121 s.f. and the construction of one 297,000 s.f. building. The building at 1090 Kifer Road is assumed to be fully occupied prior to construction of Phase 2. Phase 2 would consist of the demolition of the remaining building at 1090 Kifer Road (105,587 s.f.) and the construction of one 305,000 s.f. building. At full buildout, the Intuitive Surgical Engineering Campus would consist of three buildings (two new buildings and the existing 1020 Kifer Road building) totaling 755,144 s.f. of which 602,173 s.f. would be newly constructed. In addition, the project proposes to provide a surface parking lot and two parking garages totaling approximately 1,985 parking spaces at full buildout. Access to the project site would be provided via five driveways on Kifer Road as well as one driveway at the cul-de-sac on Sonora Court. As part of the project, traffic signals would also be installed at the currently unsignalized intersection at Wolfe Road and Maude Avenue.

This study was conducted for the purpose of identifying the potential near-term transportation impacts related to the proposed office and research and development (R&D) project. Because the project is consistent with the proposed Lawrence Station Area Plan, potential long-term traffic impacts have already been studied in the *Lawrence Station Area-Wide Transportation Plan TIA* report dated December 18, 2015, prepared by Hexagon Transportation Consultants, Inc.

Since the project is estimated to generate more than 100 peak hour trips, the potential impacts of the project were evaluated following the standards and methodologies set forth by the City of Sunnyvale and the Santa Clara Valley Transportation Authority (VTA). The VTA administers the County Congestion Management Program (CMP). The traffic study included an analysis of AM and PM peak hour traffic conditions for 23 intersections in the vicinity of the project site. Two of the study intersections are CMP intersections. Two of the study intersections are unsignalized intersections. The study intersections were selected to include locations where the proposed project is expected to generate 10 or more peak-hour trips per lane.

The Santa Clara County VTA CMP guidelines require that freeway segments be evaluated to determine the impact of added traffic for projects that generate trips equal to or greater than one percent of the freeway segment's capacity. Within the project vicinity, four freeway segments were analyzed following the CMP guidelines.

Project Trip Estimates

Daily and peak-hour trip generation estimates for the proposed projects were based on trip rates published in the ITE *Trip Generation Manual, 9th Edition* for general office building and research and development (R&D) center. It is assumed that the proposed development is half office use and half R&D use. Based on ITE trip rates, it is estimated that the project would generate 5,762 gross daily vehicle trips, with 837 gross trips (717 in and 120 out) during the AM peak hour and 770 gross trips (125 in and 645 out) during the PM peak hour.

Traffic volumes under background plus project conditions were estimated by adding to the background traffic volumes the net trips generated by the proposed project. The background scenario assumes that the existing buildings on the project site are fully occupied. Therefore, the project will receive credit for trips associated with the existing buildings. Also, the project would be required to implement a Transportation Demand Management (TDM) plan that would achieve a minimum 20 percent reduction in daily trips and a minimum 35 percent reduction in peak-hour trips. Thus, accounting for the trip credits and the TDM reduction, the project under background plus project conditions is expected to generate a net increase of 252 trips (216 in and 36 out) during the AM peak hour and 232 trips (39 in and 193 out) during the PM peak hour.

Intersection Level of Service

The results of the intersection level of service analysis under background plus project conditions are summarized in Table ES-1. Based upon the impact criteria, the project would not generate a significant impact at any of the study intersections under background plus project conditions:

Under existing plus project conditions, the project would generate a significant impact at the intersection of Lawrence Expressway and Reed Avenue, at Lawrence Expressway and Kifer Road, and at Commercial Street and Kifer Road during the PM peak hour. At the two impacted intersections on Lawrence Expressway, a significant impact is identified under existing plus project conditions but not under background plus project conditions. This is because background conditions assumed the full occupancy of the existing buildings on site and thus the “project traffic” when comparing background plus project conditions to background conditions is less than when comparing existing plus project conditions to existing conditions. At the intersection of Commercial Street and Kifer Road, a significant impact is identified under existing plus project conditions but not under background plus project conditions because under background conditions, it is assumed that the City of Sunnyvale would restripe the two-way-left-turn-lane to provide a refuge area for left turns.

Potential Mitigation Strategies

Lawrence Expressway Intersections

The intersections on Lawrence Expressway at Kifer Road and at Reed Avenue are planned to be grade-separated in the draft County Expressway Plan. The project should pay the Sunnyvale Traffic Impact Fee (TIF), which would constitute its fair-share contribution toward the cost of the grade separations at Kifer Road and Reed Avenue.

Commercial Street & Kifer Road

The City of Sunnyvale plans to restripe the two-way-left-turn-lane to provide a refuge area for left turns. This intersection improvement is assumed under background and background plus project conditions, but not under existing and existing plus project conditions. The study identifies an intersection impact under existing plus project conditions. However, with the City planned improvement, the intersection would operate at an acceptable LOS D under background plus project conditions. Therefore, the intersection impact under existing plus project conditions is only temporary until the City restripes this intersection. The City has identified that this restriping will be complete prior to opening of the project. With the City planned restriping, the traffic impact at this intersection would be *less than significant*.

Freeway Impacts

The results of the CMP freeway analysis show that the project freeway traffic would not exceed 1%, thus the project freeway impacts would be less than significant.

Freeway Ramp Impacts

The ramp analysis shows that the study freeway ramps currently have sufficient capacity to service the existing traffic volumes and that the study freeway ramps would continue to have sufficient capacity to serve the projected traffic volumes under the project conditions.

Project Contribution to Cumulative Significant Intersection Impacts

As documented in the LSAP TIA, the LSAP would generate significant intersection impacts at four intersections, listed below:

- Lawrence Expressway & Cabrillo Avenue – AM & PM Peak Hours
- Lawrence Expressway & Benton Street – AM & PM Peak Hours
- Lawrence Expressway & Homestead Road – AM & PM Peak Hours
- Lawrence Expressway & Pruneridge Avenue – AM Peak Hour

The Intuitive Surgical project would need to contribute its fair share towards the cumulative LSAP intersection impacts.

Project Contribution to Cumulative Significant Freeway Impacts

Intuitive Surgical would contribute to the freeway impacts along the US 101 and SR 237 mixed-flow lanes at the locations listed below.

- SR 237, eastbound from Lawrence Expressway to Great America Parkway – AM Peak Hour
- SR 237, westbound from Great America Parkway to Lawrence Expressway – PM Peak Hour
- US 101, southbound from Mathilda Avenue to Fair Oaks Avenue – AM Peak Hour
- US 101, southbound from Lawrence Expressway to Bowers Avenue/Great America Parkway – PM Peak Hour
- US 101, northbound from Montague Expressway/San Tomas Expressway to Lawrence Expressway – AM Peak Hour

The Intuitive Surgical project would need to contribute its fair share towards the cumulative LSAP freeway impacts.

Bicycle Facilities

Hexagon makes the following recommendations regarding bicycle facility improvements:

- Coordinate with City staff to implement a bike share program.
- Coordinate with City staff to pursue the proposed pedestrian/bicycle rail crossing near the Sonora Court cul-de-sac.
- According to the *Draft Station Plan* for the Lawrence Station Area Plan, the Intuitive Surgical Engineering Campus should provide 126 bicycle parking spaces, including 95 secured bicycle spaces. It is recommended that the bicycle parking be located near the building entrances, in well-lit areas, and adjacent to the pedestrian paths. In addition, the secure bicycle parking spaces need to be "lockable facilities such as individual lockers or enclosed, locked, limited-access areas for parking of bicycles" (Section 19.466.150 (a) (1) of Sunnyvale zoning code).

Pedestrian Facilities

Hexagon makes the following recommendations regarding pedestrian facility improvements:

- At the proposed new traffic signal at the western driveway, it is recommended that high-visibility crosswalks with pedestrian push buttons and signal heads be installed across the south and east legs of this new signalized intersection. The locations where the crosswalks are recommended currently lack ADA-compliant curb ramps. It is recommended that the project applicant install ADA-compliant curb ramps along with the recommended crosswalks. The *Draft Station Plan* for the Lawrence Station Area Plan provides pedestrian crosswalk policies recommending measures to improve pedestrian visibility to drivers and reduce pedestrian exposure to traffic.
- Work with City staff to implement pedestrian accommodation on Sonora Court. The pedestrian accommodation could be done by removing parking from one side of Sonora Court and striping an on-street pedestrian/bicycle shoulder. Alternatively, sidewalks could be retrofitted at greater cost.
- Coordinate with City staff to pursue the proposed pedestrian/bicycle rail crossing near the Sonora Court cul-de-sac.

Transit Facilities

Hexagon makes the following recommendations regarding transit facility improvements:

- Establish a shuttle service to the nearby Sunnyvale Caltrain station to further encourage employees to use public transportation, as part of the project's TDM Plan.

Queuing

Under background conditions, the following left-turn pockets are expected to overflow:

- Lawrence Expressway & Kifer Road – eastbound left-turn pocket – PM Peak Hour
- Wolfe Road & Kifer Road – westbound left-turn pocket – PM Peak Hour

Under background plus project conditions, the project would further lengthen the identified two left-turn queues. There is no room to further extend either of the left-turn pocket. At the intersection of Lawrence Expressway and Kifer Road, it is expected that the proposed Lawrence Expressway Grade Separation project would remove the identified queuing issue. The project applicant through payment of the Sunnyvale Traffic Impact Fee would pay their fair share for this improvement. At the intersection of Wolfe Road and Kifer Road, there is no feasible improvement for the identified queuing issue.

Site Access and Circulation

Hexagon makes the following recommendations regarding site access and circulation:

- The project proposes to install traffic signals at the western project driveway under full build-out conditions. This driveway is directly next to the Pepsi Bottling Group (Pepsi) driveway. There is also a driveway directly on the north side of Kifer Road. The proposed signal would need to bring in the driveway on the north side of Kifer Road as the fourth leg of the intersection. That driveway would also require re-alignment to line up with the project driveway. For traffic operation concerns, it is recommended that the project owner coordinate with City staff and owner of the Pepsi Bottling Group to share one driveway. This would eliminate one of the two driveways entering the signal south of Kifer Road. Alternatively, should both the project driveway and Pepsi driveway stay, it is recommended that the Pepsi driveway be restricted to right-in-right-out access. A raised median should be constructed to prevent left turns into and out of the Pepsi driveway. In this case, the project would be required to construct a cross-easement along the western edge of the project site to allow left-turning vehicles into/out of the Pepsi site to use the project driveway.
- It is recommended that the eastbound left-turn pocket just east of the proposed signalized western driveway be re-striped as a two-way left-turn median to allow for westbound vehicles the option to turn left into driveway B.
- The project should ensure that there is no tall vegetation, landscaping or on-street parking that would obstruct a driver's ability to see on-coming vehicles 300 feet down the road.
- Hexagon recommends the project applicant improve on-site circulation for vehicle access to Garage #2.
- It is recommended that surface parking along the western parking aisle be prohibited for an additional 50 feet for queuing issues.
- It is recommended that parallel parking along the east side of the western parking aisle be removed.

Parking

The City of Sunnyvale Municipal Code and the Lawrence Station Area Plan each specify parking requirements for office and R&D developments. However, the Lawrence Station Area Plan establishes the precedent that within the plan area, the regulatory framework of the Lawrence Station Area Plan supersedes the municipal code. Therefore, the proposed project would need to satisfy the parking requirements for the Lawrence Station Area Plan.

The Lawrence Station Area Plan parking requirement for office and R&D developments is 2.0-2.75 parking spaces per 1,000 square feet.

For Phase 1, the Intuitive Surgical campus would be required to provide a minimum of 1,112 parking spaces and a maximum of 1,529 parking spaces. The proposed on-site parking supply of 1,444 parking spaces would satisfy the Lawrence Station Area Plan parking requirements

For full build out, the campus would be required to provide a minimum of 1,510 parking spaces and a maximum of 2,077 parking spaces. The proposed on-site parking supply of 1,985 parking spaces would satisfy the Lawrence Station Area Plan parking requirements. As discussed above, due to the queuing and operational issues at the western drive aisle, it is recommended that the applicant remove an additional six parking spaces, which would reduce the total proposed project parking from 1,985 to 1,979 parking spaces. A total vehicle parking supply of 1,979 spaces would still satisfy the Lawrence Station Area Plan requirement.

Accessible parking spaces and van-accessible parking spaces are not shown on the current site plans. It is recommended that the project applicant dedicate accessible and van-accessible parking spaces per the California Building Code (CBC) Table 11B-208.2.

Additional City Requirements

The Sunnyvale Zoning Code specifies that developments with office/R&D uses are required to provide one loading space per lot. The project site plan includes an area in the at-grade parking lot on the northwest corner of the project area and an area behind Building 1 that would be used as the loading/service areas.

The Sunnyvale Municipal Code specifies that office/R&D developments are required to provide car share parking spaces. A minimum of 5% of parking spaces required for the office use must be permanently reserved for the exclusive use of car share vehicles. Car Share spaces are defined as “a space for carpool vehicles or a vehicle-sharing provider” (Section 19. 46. 100 (g) (5)) of Sunnyvale zoning code). Based on the Phase 1 proposed parking supply, 73 parking spaces should be designated as car share. Based on the Full Build Out proposed parking supply, 100 parking spaces should be designated as car share. These car-share spaces need to be reserved with lot markings, signs, or other techniques.

The City requires that office use developments with 100 parking spaces or more provide pre-wiring for electric car chargers equal to 3% of the vehicle parking supply. Thus, the project would be required to provide 44 electric vehicle spaces for Phase 1 and 60 electric vehicle spaces for full build out.

Table ES 1
Intersection Level of Service Summary

#	Intersection	Peak Hour	Count Date	LOS Std.	Existing		Modified Existing		Existing plus Project Build-Out				Background		Background Plus Project Build-Out			
					Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Incr. In Crit. Delay (sec)	Incr. In Crit. V/C	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Incr. In Crit. Delay (sec)	Incr. In Crit. V/C
1	Lawrence Expressway & US 101	AM	10/00/14	E	15.6	B	15.8	B	16.2	B	1.0	0.016	16.2	B	16.4	B	0.5	0.008
	Northbound Ramps	PM	10/00/14		25.1	C	25.2	C	25.3	C	0.2	0.004	25.5	C	25.6	C	0.1	0.001
2	Lawrence Expressway & US 101	AM	10/00/14	E	34.3	C-	34.1	C-	33.6	C-	-0.1	0.001	29.1	C	28.9	C	-0.1	0.001
	Southbound Ramps	PM	10/00/14		68.9	E	68.7	E	68.2	E	-2.0	0.005	**81.8**	**F**	**81.3**	**F**	**-1.4**	**0.004**
3	Lawrence Expressway & Oakmead	AM	10/00/14	E	60.9	E	61.0	E	61.3	E	1.0	0.003	**91.0**	**F**	**91.4**	**F**	**1.1**	**0.002**
	Parkway	PM	10/00/14		53.0	D-	53.0	D-	53.1	D-	0.2	0.003	63.4	E	63.6	E	0.7	0.001
4	Lawrence Expressway & Arques	AM	10/00/14	E	45.0	D	45.0	D	45.0	D	0.3	0.003	52.1	D-	52.3	D-	0.5	0.002
	Avenue	PM	10/00/14		60.0	E	60.0	E	60.1	E	0.7	0.003	**80.4**	**F**	**80.6**	**F**	**1.0**	**0.002**
5	Lawrence Expressway & Kifer Road	AM	10/00/15	E	37.7	D+	37.7	D+	38.5	D+	2.3	0.027	52.1	D-	52.4	D-	0.3	0.024
		PM	10/00/15		75.8	E-	77.1	E-	**82.5**	**F**	**18.1**	**0.047**	**99.4**	**F**	**100.3**	**F**	**0.5**	**0.003**
6	Lawrence Expressway & Reed	AM	09/19/13	E	**203.1**	**F**	**204.0**	**F**	**206.6**	**F**	**-1.6**	**0.002**	**138.6**	**F**	**140.2**	**F**	**-1.1**	**-0.001**
	Avenue/Monroe Street	PM	09/10/13		**86.5**	**F**	**87.6**	**F**	**90.9**	**F**	**7.4**	**0.011**	**108.5**	**F**	**110.9**	**F**	**3.7**	**0.005**
7	Semiconductor Drive & Kifer Road	AM	05/27/15	D	8.3	A	8.3	A	8.5	A	0.2	0.043	8.6	A	8.5	A	0.1	0.015
		PM	05/27/15		14.7	B	14.8	B	15.0	B	0.7	0.058	14.8	B	15.0	B	0.4	0.031
8	Project Driveway & Kifer Road	AM	05/17/16	D	3.1	A	6.9	A	-	-	-	-	8.1	A	-	-	-	-
	[Driveway D]	PM	05/17/16		3.9	A	6.5	A	-	-	-	-	7.9	A	-	-	-	-
9	Commercial Street & Kifer Road	AM	05/17/16	D	14.9	B	115.8	C	19.2	C	-	-	12.5	B	13.2	B	-	-
	(unsignalized)	PM	05/17/16		**62.6**	**F**	**82.6**	**F**	**172.1**	**F**	**-**	**-**	25.9	D	34.9	D	-	-
10	Fair Oaks Avenue & US 101	AM	10/00/14	E	16.5	B	16.6	B	16.6	B	0.2	0.007	23.1	C	23.3	C	0.4	0.003
	Northbound Ramps	PM	10/00/14		21.0	C+	21.8	C+	24.4	C	6.1	0.041	48.7	D	53.3	D-	7.8	0.019
11	Fair Oaks Avenue & Duane Avenue	AM	10/00/14	D	26.3	C	26.2	C	26.0	C	0.0	0.004	30.2	C	30.1	C	0.1	0.002
		PM	10/00/14		32.1	C-	32.1	C-	32.1	C-	0.0	0.018	38.4	D+	38.6	D+	0.4	0.008
12	Wolfe Road & Fair Oaks Avenue	AM	10/00/14	D	23.6	C	23.7	C	23.9	C	0.1	0.003	24.7	C	24.8	C	0.0	0.002
		PM	10/00/14		21.8	C+	21.7	C+	21.6	C+	0.0	0.003	22.9	C+	22.8	C+	0.0	0.001
13	Wolfe Road & Maude Avenue [1]	AM	10/00/14	D	19.5	C	19.9	C	11.2	B+	4.9	0.2	33.4	D	11.8	B+	5.0	0.2
		PM	10/00/14		**51.2**	**F**	**52.9**	**F**	14.0	B	10.6	0.4	**122.6**	**F**	14.6	B	11.3	0.5
14	Wolfe Road & Stewart Drive	AM	10/00/14	D	16.1	B	16.3	B	16.8	B	0.9	0.012	15.6	B	15.7	B	-0.1	0.001
		PM	10/00/14		19.1	B-	19.2	B-	19.1	B-	0.0	0.004	17.8	B	17.8	B	0.0	0.002
15	Wolfe Road & Arques Avenue	AM	10/00/14	D	24.8	C	24.8	C	24.8	C	-0.1	0.003	26.4	C	26.3	C	-0.1	0.002
		PM	10/00/14		28.4	C	28.4	C	28.3	C	-0.1	0.003	28.7	C	28.6	C	0.0	0.001
16	Wolfe Road & Central Expressway	AM	10/00/14	E	24.6	C	24.8	C	25.1	C	0.6	0.014	25.8	C	25.9	C	-0.1	0.007
	Westbound Ramps	PM	10/00/14		28.7	C	28.8	C	29.2	C	1.3	0.015	28.1	C	28.4	C	0.5	0.007
17	Wolfe Road & Central Expressway	AM	10/00/14	E	12.5	B	12.9	B	14.1	B	0.3	0.000	15.4	B	15.9	B	0.6	0.002
	Eastbound Ramps	PM	10/00/14		29.6	C	29.6	C	29.7	C	0.1	0.005	30.6	C	30.7	C	0.1	0.003
18	Wolfe Road & Kifer Road	AM	05/00/14	D	21.1	C+	22.4	C+	25.7	C	5.9	0.087	23.1	C	25.3	C	2.8	0.041
		PM	05/00/14		26.8	C	27.5	C	29.3	C	2.2	0.029	28.5	C	30.1	C	1.5	0.018
19	Wolfe Road & Evelyn Avenue	AM	05/00/14	D	26.0	C	26.0	C	26.2	C	0.4	0.016	26.0	C	26.0	C	0.1	0.006
		PM	05/00/14		24.6	C	24.6	C	24.7	C	0.1	0.005	25.4	C	25.4	C	0.0	0.004
20	Wolfe Road & Reed Avenue	AM	05/00/14	D	28.8	C	28.8	C	28.7	C	-0.1	0.007	28.7	C	28.6	C	-0.1	0.003
		PM	05/00/14		28.8	C	28.7	C	28.7	C	0.0	0.006	29.4	C	29.3	C	0.0	0.002
21	Fair Oaks Avenue & Arques Avenue	AM	05/14/15	D	29.7	C	29.7	C	29.7	C	0.0	0.000	29.2	C	29.2	C	0.0	0.000
		PM	05/14/15		34.4	C-	34.4	C-	34.4	C-	0.0	0.000	35.4	D+	35.4	D+	0.0	0.000
22	Fair Oaks Avenue & Kifer Road	AM	-	D	8.4	A	8.5	A	8.5	A	0.1	0.001	8.1	A	8.2	A	0.1	0.001
		PM	-		10.6	B+	10.8	B+	11.4	B+	1.0	0.010	10.3	B+	10.8	B+	0.6	0.006
23	Fair Oaks Avenue & Evelyn Avenue	AM	05/14/15	D	28.1	C	28.1	C	28.2	C	0.2	0.012	28.1	C	28.1	C	0.1	0.006
		PM	05/14/15		26.7	C	26.7	C	26.8	C	0.1	0.008	27.4	C	27.5	C	0.2	0.006
24	Project Driveway (new) & Kifer Road	AM	-	D	-	-	-	-	13.2	B	-	-	-	-	13.3	B	-	-
	[Driveway A]	PM	-		-	-	-	-	16.1	B	-	-	-	-	20.8	C+	-	-

Notes:

Delay and LOS reported for the unsignalized study intersections represent the approach that experiences the worst delay and LOS.

BOLD indicates a substandard level of service. **BOLD and boxed** Indicates a significant impact

The Project Driveway and Kifer Road [Driveway D] would be converted from signalized control to unsignalized control in the Project Build Out scenarios.

The Project Driveway (new) and Kifer Road [Driveway A] would be converted from unsignalized control to signalized control in the Project Build Out scenarios.

1. The project proposes to install traffic signals at the unsignalized Wolfe Road/Maude Avenue intersection under project conditions.

1. Introduction

This report presents the results of the transportation impact analysis (TIA) conducted for the proposed Intuitive Surgical Engineering Campus at 1016 Kifer Road in Sunnyvale, California. The project site is located on the south side of Kifer Road between Lawrence Expressway and Wolfe Road. The project proposes to demolish three existing buildings (1050/1090 Kifer Road and 1127 Sonora Court) totaling 209,708 square feet (s.f.) and build two four-story buildings totaling 602,000 s.f. over two phases. The existing building at 1020 Kifer Road is part of the campus and will remain. Phase 1 would consist of the demolition of two of the existing buildings (1050 Kifer Road and 1127 Sonora Court) totaling 104,121 s.f. and the construction of one 297,000 s.f. building. The building at 1090 Kifer Road is assumed to be fully occupied prior to construction of Phase 2. Phase 2 would consist of the demolition of the remaining building at 1090 Kifer Road (105,587 s.f.) and the construction of one 305,000 s.f. building. At full buildout, the Intuitive Surgical Engineering Campus would consist of three buildings (two new buildings and the existing 1020 Kifer Road building) totaling 755,144 s.f. of which 602,173 s.f. would be newly constructed. In addition, the project proposes to provide a surface parking lot and two parking garages totaling approximately 1,985 parking spaces at full buildout. Access to the project site would be provided via five driveways on Kifer Road as well as one driveway at the cul-de-sac on Sonora Court. As part of the project, traffic signals would also be installed at the currently unsignalized intersection at Wolfe Road and Maude Avenue.

The project site location and the surrounding study area are shown on Figure 1. The proposed project site plan is shown on Figure 2 for Phase 1 and Figure 3 for Phase 2.

Scope of Study

This study was conducted for the purpose of identifying the potential near-term transportation impacts related to the proposed office and research and development (R&D) project. Because the project is consistent with the proposed Lawrence Station Area Plan, potential long-term traffic impacts have already been studied in the *Lawrence Station Area-Wide Transportation Plan TIA* report dated December 18, 2015, prepared by Hexagon Transportation Consultants, Inc.

Since the project is estimated to generate more than 100 peak hour trips, the potential impacts of the project were evaluated following the standards and methodologies set forth by the City of Sunnyvale and the Santa Clara Valley Transportation Authority (VTA). The VTA administers the County Congestion Management Program (CMP). The traffic study included an analysis of AM and PM peak hour traffic conditions for 23 intersections in the vicinity of the project site. Two of the study intersections are CMP intersections. Two of the study intersections are unsignalized intersections. The study intersections were selected to include locations where the proposed project is expected to generate 10 or more peak-hour trips per lane.

The Santa Clara County VTA CMP guidelines require that freeway segments be evaluated to determine the impact of added traffic for projects that generate trips equal to or greater than one percent of the freeway segment's capacity. Within the project vicinity, four freeway segments were analyzed following the CMP guidelines.

LEGEND

- = Project Area
- = 1020 Kifer Road
- = 1050 Kifer Road
- = 1090 Kifer Road
- = 1127 Sonora Court
- = Study Intersection

Figure 1
Site Location and Study Intersections

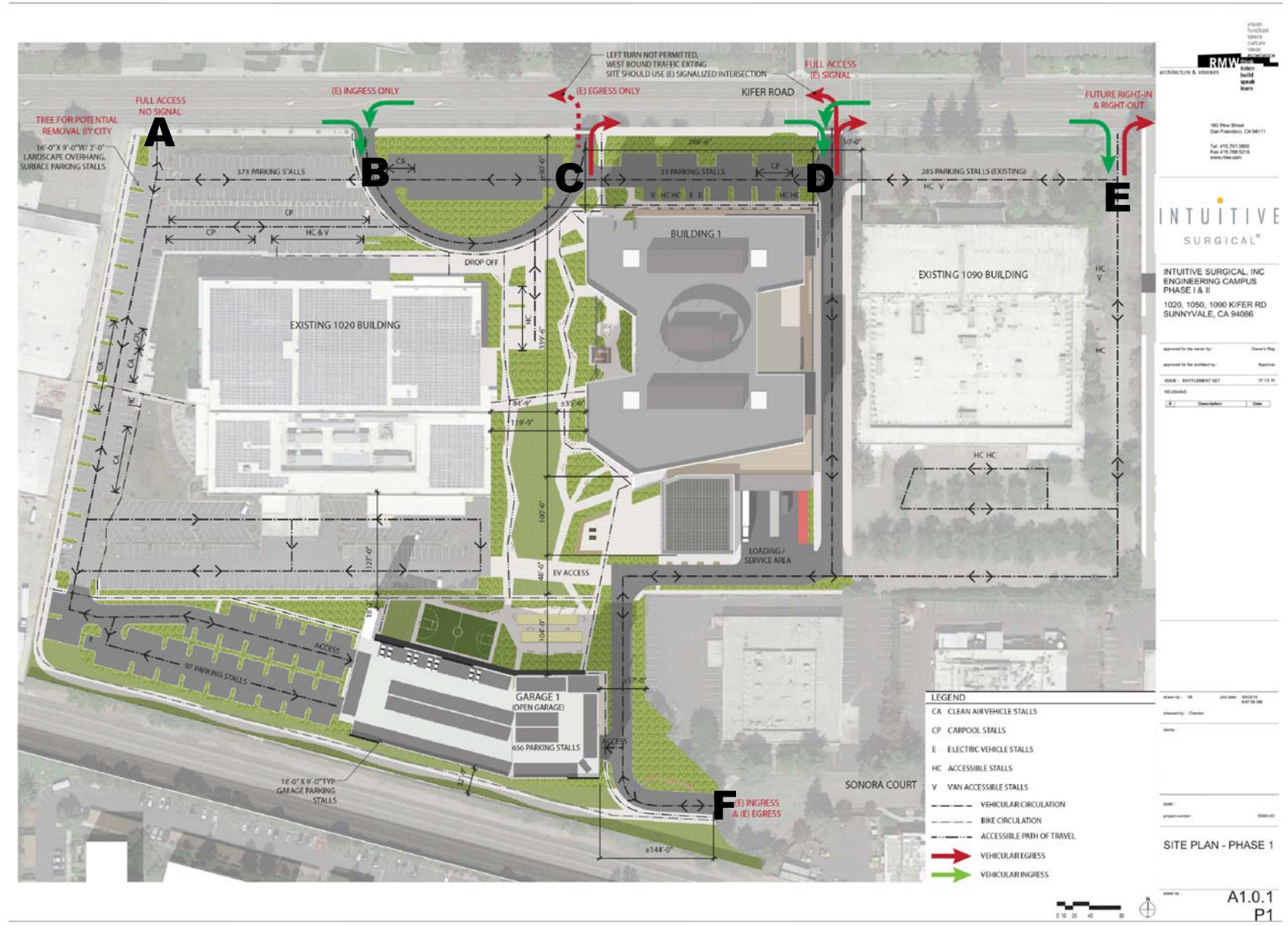


Figure 2
Proposed Project Site Plan - Phase 1

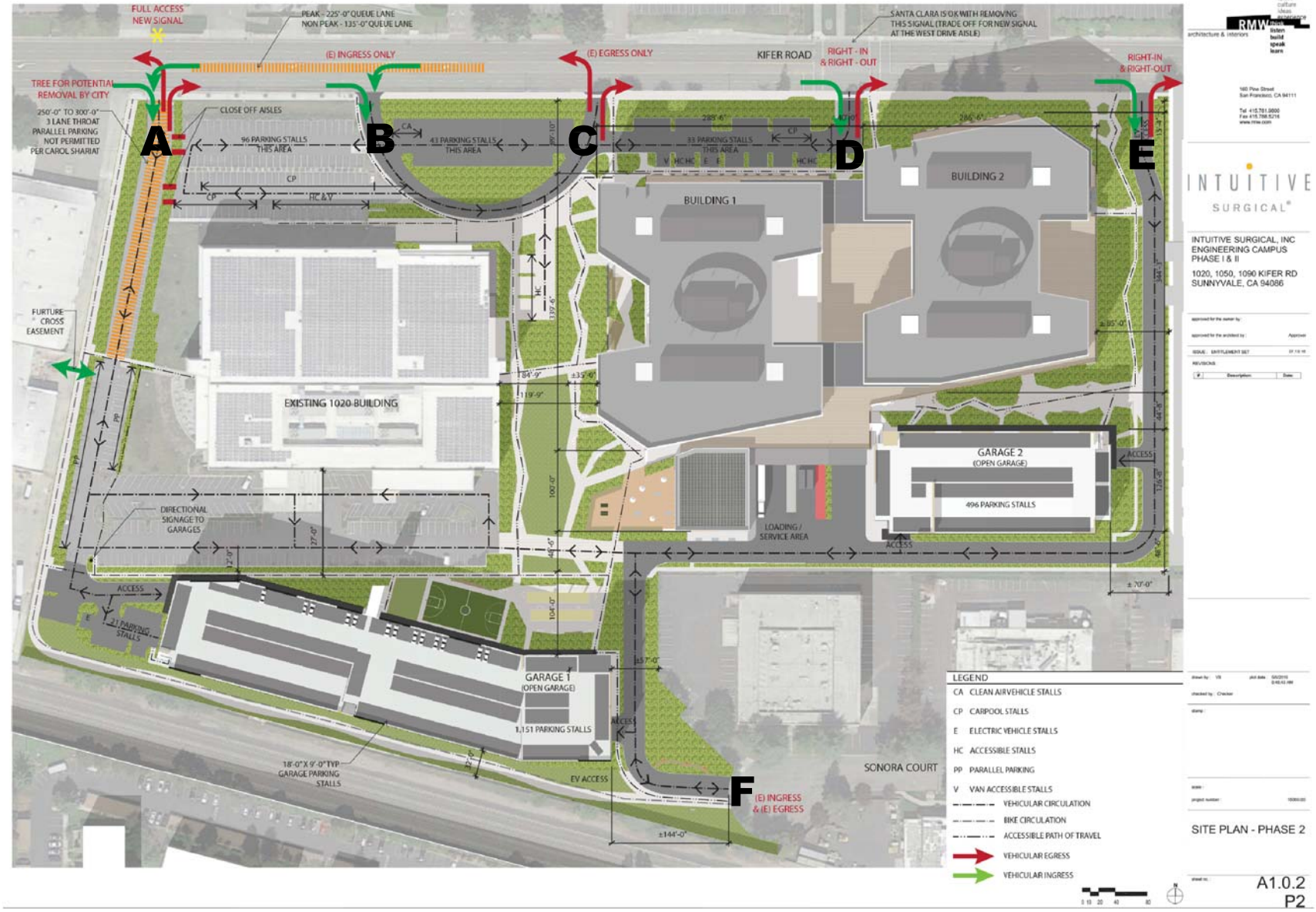


Figure 3
Proposed Project Site Plan - Phase 2

The study intersections and study freeway segments are listed below.

Study Intersections

1. Lawrence Expressway & US 101 Northbound Ramps
2. Lawrence Expressway & US 101 Southbound Ramps
3. Lawrence Expressway & Oakmead Parkway
4. Lawrence Expressway & Arques Avenue*
5. Lawrence Expressway & Kifer Road
6. Lawrence Expressway & Reed Avenue/Monroe Road*
7. Semiconductor Drive & Kifer Road
8. Project Driveway & Kifer Road
9. Commercial Street & Kifer Road (unsignalized)
10. Fair Oaks Avenue & US 101 Northbound Ramps
11. Fair Oaks Avenue & Duane Avenue
12. Wolfe Road & Fair Oaks Avenue
13. Wolfe Road & Maude Avenue (unsignalized)
14. Wolfe Road & Stewart Drive
15. Wolfe Road & Arques Avenue
16. Wolfe Road & Central Expressway Westbound Ramps
17. Wolfe Road & Central Expressway Eastbound Ramps
18. Wolfe Road & Kifer Road
19. Wolfe Road & Evelyn Avenue
20. Wolfe Road & Reed Avenue
21. Fair Oaks Avenue & Arques Avenue
22. Fair Oaks Avenue & Kifer Road
23. Fair Oaks Avenue & Evelyn Avenue

* Indicates CMP intersection

Freeway Segments

US 101

1. Between Mathilda Avenue and Fair Oaks Avenue
2. Between Fair Oaks Avenue and Lawrence Expressway
3. Between Lawrence Expressway and Bowers Avenue/Great America Parkway

SR 237

4. Between Lawrence Expressway and Great America Parkway

Study Freeway Ramps

US 101 at Fair Oaks Avenue

1. US 101 Northbound On Ramp from Fair Oaks Avenue
2. US 101 Southbound Off Ramp to Southbound Fair Oaks Avenue

US 101 at Lawrence Expressway

3. US 101 Southbound On Ramp from Northbound Lawrence Expressway
4. US 101 Northbound Off Ramp

SR 237 at Lawrence Expressway

5. SR 237 Eastbound On Ramp from Northbound Lawrence Expressway
6. SR 237 Westbound Off Ramp to Southbound Lawrence Expressway

Traffic conditions at the study intersections and freeway segments were analyzed for the weekday AM and PM peak hours of commute traffic. In the study area, the AM peak hour is typically between 7:00 AM and 9:00 AM, while the PM peak hour is typically between 4:00 PM and 6:00 PM.

Traffic conditions were evaluated for the following scenarios:

Scenario 1: *Existing Conditions.* Existing traffic volumes are based on recent traffic counts conducted between the years of 2014 and 2015, the 2014 CMP TRAFFIX database, and County records for expressways.

Scenario 2: *Background Conditions*. Background traffic volumes were estimated by adding to existing peak-hour volumes the projected volumes from approved but not yet constructed developments in the study area. Approved project trips and approved project information were obtained from the City of Sunnyvale, Santa Clara County, and the City of Cupertino. In addition, existing buildings at the project site are assumed operating at full occupancy under background conditions

Scenario 3: *Background Plus Project Conditions*. Background plus project conditions were estimated by adding to background traffic volumes the traffic generated by the project (Phase 1 and Phase 2). Background plus project conditions were evaluated relative to background conditions in order to determine potential project impacts.

Scenario 4: *Existing Plus Project Conditions*. Existing plus project conditions were estimated by adding to existing traffic volumes the traffic generated by the project (Phase 1 and Phase 2). Trips generated by the existing land uses on the project site were credited. Existing plus project conditions were evaluated relative to existing conditions in order to determine the effects the project would have on the existing roadway network.

Scenario 5: *Background Plus Project Phase 1 Conditions*. Background plus project Phase 1 conditions were estimated by adding to background traffic volumes the traffic generated by Phase 1 of the project. Under background plus project Phase 1 conditions, the building at 1090 Kifer Road would not be demolished and would be fully occupied. Intersection deficiencies associated with the development of Phase 1 of the proposed project were evaluated relative to background conditions for informational purposes only.

Scenario 6: *Existing Plus Project Phase 1 Conditions*. Existing plus project Phase 1 conditions were estimated by adding to existing traffic volumes the traffic generated by Phase 1 of the project. Trips generated by the existing land uses on the project site were credited. Under existing plus project Phase 1 conditions, the building at 1090 Kifer Road would not be demolished and would be fully occupied. Because re-occupying the existing 1090 Kifer Road building would not require City approval, trips associated with 1090 Kifer Road would not be counted towards the project. Instead, trips generated by re-occupying the existing 1090 Kifer Road building would be added to existing conditions to generate a “modified existing” scenario. Intersection deficiencies associated with the development of Phase 1 of the proposed project will be evaluated relative to modified existing conditions for informational purposes only.

According to VTA’s CMP TIA guidelines, a scenario analyzing project impacts under cumulative conditions would also be required. Because the project is consistent with the Lawrence Station Area Plan, the cumulative project impacts are included in the *Lawrence Station Area-Wide Transportation Plan TIA* document dated December 18. 2015, prepared by Hexagon Transportation Consultants, Inc.

Methodology

This section presents the methods used to determine the traffic conditions for each scenario described above. It includes descriptions of the data requirements, the analysis methodologies, and the applicable level of service standards.

Data Requirements

The data required for the analysis were obtained from previous traffic studies, the City of Sunnyvale, the City of Santa Clara, the City of Cupertino, the VTA CMP TRAFFIX database, county records for expressways, and field observations. The following data were collected from these sources:

- existing traffic volumes,
- existing lane configurations,
- signal timing and phasing, and
- list of approved projects.

Level of Service Standards and Analysis Methodologies

Traffic conditions at the study intersections were evaluated using level of service (LOS). *Level of Service* is a qualitative description of operating conditions ranging from LOS A, or free-flow conditions with little or no delay, to LOS F, or jammed conditions with excessive delays. The various analysis methods are described below.

Signalized Study Intersections

The City of Sunnyvale level of service methodology for signalized intersections is the 2000 *Highway Capacity Manual* (HCM) method. This method is applied using the TRAFFIX software. The 2000 HCM operations method evaluates signalized intersection operations on the basis of average control delay time for all vehicles at the intersection. Since TRAFFIX is also the CMP-designated intersection level of service methodology, the City of Sunnyvale methodology employs the CMP default values for the analysis parameters.

The City of Sunnyvale General Plan level of service standard for signalized intersections is LOS D or better, except that intersections on roadways considered “regionally significant” have a standard of LOS E. In the study area, signalized intersections within Sunnyvale along Lawrence Expressway and ramp junctions at Central Expressway and US 101 are considered regionally significant.

The correlation between average control delay and level of service is shown in Table 1.

CMP Intersections

The designated level of service methodology for the CMP also is the 2000 HCM operations method for signalized intersections, using TRAFFIX. The CMP level of service standard for signalized intersections within Sunnyvale is LOS E or better.

Unsignalized Study Intersections

The level of service for the unsignalized intersections was evaluated using the 2000 HCM methodology. Level of service for unsignalized (side-street stop-controlled) intersections is evaluated based on the delay experienced by vehicles on the stop-controlled approaches. For two-way or T-intersections, operations are defined by the average control delay experienced by vehicles entering the intersection from the stop-controlled approaches on minor streets or from left-turn approaches on major streets. For two-way or T-intersections, the level of service is reported based on the average delay for the worst approach.

The correlation between delay and level of service for unsignalized intersections is shown in Table 2.

Table 1
Signalized Intersection Level of Service Definitions Based on Delay

Level of Service	Description	Average Control Delay Per Vehicle (sec)
A	Signal progression is extremely favorable. Most vehicles arrive during the green phase and do not stop at all. Short cycle lengths may also contribute to the very low vehicle delay.	10.0 or less
B+ B B-	Operations characterized by good signal progression and/or short cycle lengths. More vehicles stop than with LOS A, causing higher levels of average vehicle delay.	10.1 to 12.0 12.1 to 18.0 18.1 to 20.0
C+ C C-	Higher delays may result from fair signal progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, though may still pass through the intersection without stopping.	20.1 to 23.0 23.1 to 32.0 32.1 to 35.0
D+ D D-	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable signal progression, long cycle lengths, or high volume-to-capacity (V/C) ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 to 39.0 39.1 to 51.0 51.1 to 55.0
E+ E E-	This is considered to be the limit of acceptable delay. These high delay values generally indicate poor signal progression, long cycle lengths, and high volume-to-capacity (V/C) ratios. Individual cycle failures occur	55.1 to 60.0 60.1 to 75.0 75.1 to 80.0
F	This level of delay is considered unacceptable by most drivers. This condition often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. Poor progression and long cycle lengths may also be major contributing causes of such delay levels.	greater than 80.0

Source: Transportation Research Board, 2000 Highway Capacity Manual (Washington, D.C., 2000) p10-16.
VTA Traffic Level of Service Analysis Guidelines (June 2003), Table 2.

Table 2
Unsignalized Intersection Level of Service Definitions Based on Delay

Level of Service	Description	Average Delay Per Vehicle (sec.)
A	Little or no traffic delay	10.0 or less
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	Extreme traffic delays	greater than 50.0

Source: Transportation Research Board, *2000 Highway Capacity Manual* (Washington, D.C., 2000) p17-2.

Traffic Signal Warrant

An assessment of the need for signalization was conducted for the unsignalized intersections. For this study, the need for signalization is assessed on the basis of the peak-hour volume signal warrant (Warrant #3) described in the 2014 California Manual on Uniform Traffic Control Devices (CA MUTCD). This method provides an indication of whether traffic conditions and peak-hour traffic levels are, or would be, sufficient to justify installation of a traffic signal. It should be noted that it is just one of the factors/warrants used to indicate whether installation of a traffic control signal is justified.

Freeway Segments

As prescribed in the Santa Clara County CMP technical guidelines, the level of service for freeway segments is estimated based on vehicle density. Density is calculated by the following formula:

D = V / (N*S)

Where:

D = density, in vehicles per mile per lane (vpmpl)

V = peak hour volume, in vehicle per hour (vph)

N = number of travel lanes

S = average travel speed, in miles per hour (mph)

The vehicle density on a segment is correlated to level of service as shown in Table 3. The CMP requires that mixed-flow lanes and auxiliary lanes be analyzed separately from high-occupancy vehicle (HOV) lanes (otherwise known as carpool lanes). The CMP specifies that a capacity of 2,300 vehicles per hour per lane (vphpl) be used for segments three lanes or wider in one direction, and a capacity of 2,200 vphpl be used for segments two lanes wide in one direction. HOV lanes are specified as having a capacity of 1,650 vphpl. The CMP defines an acceptable level of service for freeway segments as LOS E or better.

Freeway Ramps

A freeway ramp analysis was performed in order to verify that the freeway ramps would have sufficient capacity to serve the expected traffic volumes with and without the project. This analysis consisted of a volume-to-capacity ratio evaluation of the freeway ramps at the study interchanges. The ramp capacities were obtained from the *Highway Capacity Manual 2000*, and considered the free-flow speed, number of lanes on the ramp, and the ramp metering.

Table 3
Freeway Segment Level of Service Definitions

Level of Service	Description	Density (vehicles/mile/lane)
A	Average operating speeds at the free-flow speed generally prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.	11.0 or less
B	Speeds at the free-flow speed are generally maintained. The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high.	11.0 to 18.0
C	Speeds at or near the free-flow speed of the freeway prevail. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more vigilance on the part of the driver.	18.0 to 26.0
D	Speeds begin to decline slightly with increased flows at this level. Freedom to maneuver within the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort levels.	26.0 to 46.0
E	At this level, the freeway operates at or near capacity. Operations in this level are volatile, because there are virtually no usable gaps in the traffic stream, leaving little room to maneuver within the traffic stream.	46.0 to 58.0
F	Vehicular flow breakdowns occurs. Large queues form behind breakdown points.	greater than 58.0

Source: Santa Clara County Valley Transportation Authority, Transportation Impact Analysis Guidelines, Updated March 2009 (Based on the *Highway Capacity Manual (2000), Washington, D.C.)*

Significant Impact Criteria

Significance criteria are used to establish what constitutes an impact. For this analysis, the criteria used to determine significant impacts on signalized and unsignalized intersections are based on the City of Sunnyvale and VTA's CMP level of service standards.

The effects of the project on other transportation facilities, such as bicycle facilities and transit service, were determined on the basis of engineering judgment.

Definition of Significant Intersection Impacts

The project is said to create a significant adverse impact on traffic conditions at a signalized intersection in the City of Sunnyvale if for either peak hour:

1. The level of service at the intersection drops below its respective level of service standard when project traffic is added, or
2. An intersection that operates below its level of service standard under no project conditions experiences an increase in critical-movement delay of four (4) or more seconds, *and* the critical volume-to-capacity ratio (V/C) is increased by 0.01 or more when project traffic is added.

The exception to this threshold is when the addition of project traffic reduces the amount of average control delay for critical movements, i.e., the change in average control delay for critical movements are negative. In this case, the threshold is when the project increases the critical V/C value by 0.01 or more.

The operation of principal arterials and state highways located within urbanized Santa Clara County is measured by the level of service at CMP Intersections. CMP intersections are select, generally high-volume intersections located along these thoroughfares. The definition of a significant impact at a CMP intersection is the same as for the City of Sunnyvale, except that the standard for acceptable level of service for all CMP and regional intersections is LOS E or better.

A significant impact by the City of Sunnyvale and CMP standards is said to be satisfactorily mitigated when measures are implemented that would restore intersection conditions to its LOS standard *or* to an average delay that eliminates the project impact.

Level of service analysis at unsignalized intersections is generally used to determine the need for modification in type of intersection control (i.e. all-way stop or signalization). As part of this evaluation, traffic volumes, delays, and traffic signal warrants are evaluated to determine if the existing intersection control is appropriate.

Based on previous studies, significant impacts are defined to occur when the addition of project traffic causes the worst movement/approach for side-street stop-controlled intersections to degrade to an unacceptable level (LOS E or F) *and* the intersection satisfies the CA MUTCD peak-hour volume signal warrant. For unsignalized intersections already operating at an unacceptable level, increasing the average control delay for the worst movement/approach constitutes a project impact.

Definition of Significant Freeway Impacts

For this analysis, the criteria used to determine impacts on freeway segments are based on CMP standards. Per CMP requirements, freeway impacts are measured relative to existing conditions (i.e. there is no evaluation of freeways under background conditions). The project is said to create a significant adverse impact on traffic conditions on a freeway segment if for either peak hour:

1. The level of service of the freeway segment is LOS F under existing conditions, and
2. The number of new trips added by the project is more than one percent of the freeway capacity.

Definition of Significant Freeway Ramp Impacts

A freeway ramp analysis was performed in order to verify that the freeway ramps would have sufficient capacity to serve the expected traffic volumes with and without the project. For the purpose of this study, the project is said to create a significant adverse impact on a freeway ramp if its implementation:

1. Causes the volume-to-capacity (V/C) ratio of the freeway ramp to exceed 1.0; or
2. Increases the amount of traffic on a freeway ramp that is already exceeding its capacity by more than one percent (1%) of the ramp's capacity.

Report Organization

This report has a total of seven chapters. Chapter 2 described the existing conditions including the existing roadway network, transit service, bicycle facilities, and pedestrian facilities. Chapter 3 presents the traffic conditions in the study area under background conditions. Chapter 4 describes the methods used to estimate the project traffic on the roadway network and presents the intersection operations under existing plus project and background plus project conditions. Chapter 5 describes the methods used to estimate the project traffic on the roadway network and presents the intersection operations under existing plus project Phase 1 and background plus project Phase 1 conditions. Chapter 6 provides an evaluation of other transportation related issues for the proposed project, such as vehicle queuing, potential project impacts on bicycle, pedestrian, and transit facilities, site access and circulation, and parking. Chapter 7 discusses the proposed project's contribution to the cumulative impacts studied in the *Lawrence Station Area-Wide Transportation Plan (LSAP) TIA* report. Chapter 8 presents the traffic study conclusions including a summary of any proposed mitigation measures and recommended improvements.

2. Existing Conditions

This chapter describes the existing conditions for all of the major transportation facilities near the project site, including the roadway network, transit service, and bicycle and pedestrian facilities.

Existing Roadway Network

Regional access to the study area is provided by US 101.

> *US 101* is an eight-lane freeway (three mixed-flow lanes and one HOV lane in each direction) in the vicinity of the site. US 101 extends northward through San Francisco and southward through Gilroy. Access to and from the project area is provided via full interchanges at Fair Oaks Avenue and Lawrence Expressway.

Major roadways within or near the project area include: Kifer Road, Lawrence Expressway, Wolfe Road, Fair Oaks Avenue, Central Expressway, Reed Avenue/Monroe Street, Arques Avenue, Evelyn Avenue, and Duane Avenue. These roads are described below.

> *Kifer Road* is a four-lane roadway that begins west at Fair Oaks Avenue and extends east towards Bowers Avenue. Kifer Road has a center two-way left-turn median along the entirety of the roadway. Kifer Road provides direct access to the project site.
>
> *Lawrence Expressway* is an eight-lane expressway with a raised median running north-south. It begins at Saratoga Avenue in the south, crosses through Sunnyvale, extends northward and transitions into Caribbean Drive. Lawrence Expressway connects with US 101 via full-access freeway interchanges. Lawrence Expressway provides access to the project site via Kifer Road.
>
> *Wolfe Road* is a four-lane to six-lane, north-south arterial that begins north at N. Fair Oaks Avenue, and extends south into the City of Cupertino, ending at Stevens Creek Boulevard (its transition point into Miller Avenue). Wolfe Road has a raised center median. Wolfe Road has a full-access interchange with Central Expressway. Wolfe Road provides access to the project site via Kifer Road.
>
> *Fair Oaks Avenue* is a four-lane to six-lane, north-south arterial. Fair Oaks Avenue begins at Java Drive north of SR 237 and extends southward, and transitions into Remington Drive at its junction with El Camino Real. Fair Oaks Avenue has a full-access freeway interchange with US 101. North of US 101, Fair Oaks Avenue has a raised center median. North of Tasman Drive, light rail runs within the center median of Fair Oaks Avenue. Fair Oaks Avenue provides access to the project site via Kifer Road.

Central Expressway is a four-lane to six-lane expressway running east-west. In the study area, Central Expressway has two eastbound lanes and two westbound lanes. It begins at Trimble Road in the east, crosses Sunnyvale, extends westward and transitions into Alma Street. Central Expressway connects to Wolfe Road and Lawrence Expressway in the project vicinity.

Reed Avenue/Monroe Street is a two-lane to four-lane roadway that begins west at Fair Oaks Avenue as Reed Avenue, and extends southeast towards its terminal at Tisch Way in the City of San Jose. Reed Avenue is within the City of Sunnyvale, and transitions to Monroe Street in the City of Santa Clara at its intersection with Lawrence Expressway (Sunnyvale-Santa Clara city boundary). Reed Avenue/Monroe Street has a center two-way left-turn lane that runs along the entirety of the roadway.

Arques Avenue is a two-lane to four-lane roadway that begins at Stowell Avenue in the west and extends east past San Tomas Expressway and transitions into Scott Boulevard. Arques Avenue connects with Central Expressway via a westbound on-ramp and an eastbound off-ramp. Arques Avenue connects with Lawrence Expressway via a traffic signal.

Evelyn Avenue is a two-lane to four-lane roadway that begins west at Castro Street in the City of Mountain View and extends east to its terminal at Reed Avenue in the City of Sunnyvale. Within the study area, Evelyn Avenue has a center two-way left-turn median that extends along the entirety of the roadway.

Duane Avenue is a two-lane to four-lane roadway that begins west of Mathilda Avenue and extends east towards Lawrence Expressway at which point it transitions into Oakmead Parkway continuing eastward.

Existing Bicycle Facilities

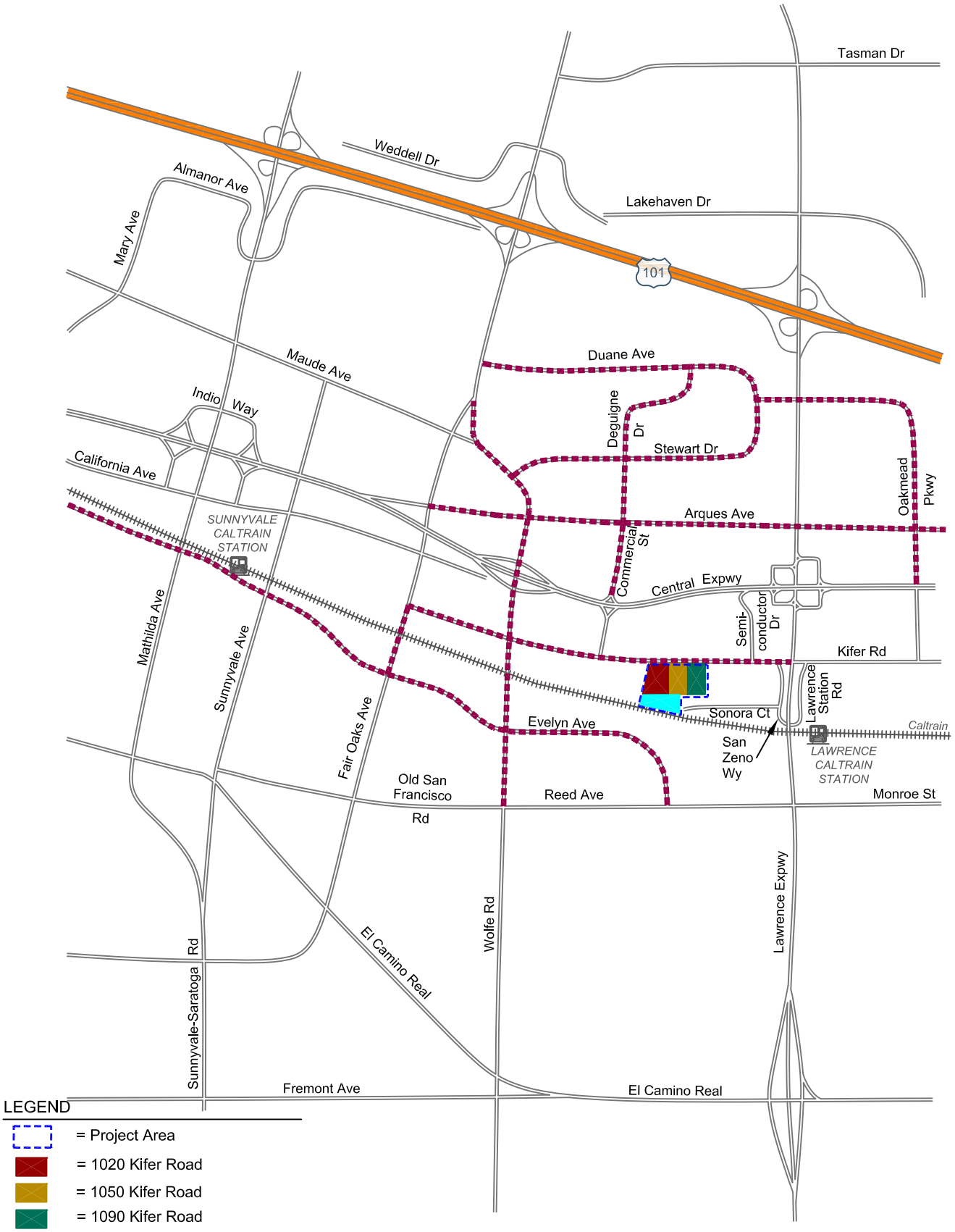
Bicycle facilities include bike paths, bike lanes, and bike routes. Bike paths (Class I facilities) are pathways, separate from roadways that are designated for use by bicycles. Often, these pathways also allow pedestrian access. Bike lanes (Class II facilities) are lanes on roadways designated for use by bicycles with special lane markings, pavement legends, and signage. Bike routes (Class III) are existing right-of-way that accommodate bicycles but are not separate from the existing travel lanes. Routes are typically designated only with signs.

The following bicycle facilities exist within the project site.

Class II Bicycle Lanes:

- Kifer Road between Fair Oaks Avenue and Lawrence Expressway
- Fair Oaks Avenue between Evelyn Avenue and Kifer Road
- Evelyn Avenue between Hope Street and Reed Avenue
- Wolfe Road between Fair Oaks Avenue and Reed Avenue
- Arques Avenue/Scott Boulevard between Central Expressway and Fair Oaks Avenue
- Oakmead Parkway between Duane Avenue and Central Expressway
- Stewart Drive between Duane Avenue and Wolfe Road
- Duane Avenue between Fair Oaks Boulevard and Oakmead Parkway
- DeGuigne Drive/Commercial Street between Duane Avenue and Central Expressway

Existing Bicycle facilities are shown on Figure 4.



LEGEND

- = Project Area
- = 1020 Kifer Road
- = 1050 Kifer Road
- = 1090 Kifer Road
- = 1127 Sonora Court
- = Multi-Use Path (Class I)
- = On-Street Bike Lanes (Class II)
- = Bike Route (Class III)

Figure 4
Existing Bicycle Facilities

NORTH
Not to Scale

Existing Pedestrian Facilities

Sidewalks are present along both sides of most major roadways within the project vicinity. Sidewalks are lacking along eastbound Kifer Road in front of the Pepsi plant at 960 Kifer Road and along Sonora Court. Pedestrian crosswalks and signal heads are present at all the study intersections. At the Wolfe Road/Kifer Road and Lawrence Expressway/Kifer Road intersections there are pedestrian crosswalks and signal heads across all four legs. Kifer Road does not have crosswalks at the intersections with minor streets. There is an existing sidewalk in front of 1020 Kifer Road, but there are no sidewalks in front of 1050 Kifer Road, 1090 Kifer Road, and 1127 Sonora Court.

Existing Transit Service

Existing transit service to the study area is provided by VTA, ACE, and Caltrain. These services are described below and shown on Figure 5.

The nearest VTA bus stop to the project site is located just north of the Lawrence Expressway and Kifer Road intersection, approximately 1,500 feet from the project area. This bus stop is serviced by VTA bus route 328. Route 328 travels between Almaden Expressway and Camden to Lockheed Martin/Moffett Industrial Park with two northbound busses during the weekday AM commute period and two southbound busses during the weekday PM commute period.

The Altamont Commuter Express (ACE) Gray Shuttle (Route 822) also serves the project area. ACE provides commuter rail service between Stockton, Tracy, Pleasanton, and San Jose during commute hours. This free shuttle, funded by the Bay Area Air Quality Management District, transports Sunnyvale passengers to and from the ACE Great America Station in Santa Clara. The Gray Shuttle runs on Arques Avenue, Wolfe Road, and Kifer Road, with four eastbound trips in the morning (between 6:15 AM and 9:55 AM) and four westbound trips in the afternoon/evening (between 3:15 PM and 6:40 PM) with headways averaging 60 minutes. The shuttle stops in front of the project site and across the street.

Caltrain Service

Commuter rail service between San Francisco and Gilroy is provided by Caltrain. Caltrain provides service with approximately 20- to 30-minute headways during the weekday AM and PM commute hours and 60 minute headways midday, at night and on weekends. The Lawrence Caltrain Station provides service for only the Local and Limited trains. Services are provided between 4:40 AM and 1:20 AM (next day). The baby-bullet train does not stop at Lawrence Station. The project site is located approximately 0.4 miles from the Lawrence Caltrain station, which is less than a 10-minute walk. However, continuous pedestrian sidewalks are not provided between the Caltrain station and the project site along Sonora Court.

Existing Intersection Lane Configurations

The existing lane configurations at the study intersections were obtained by observations. The existing intersection lane configurations are shown on Figure 6.

Existing Traffic Volumes

Existing traffic volumes are based on recent traffic counts conducted between the years of 2014 and 2016, the 2014 CMP TRAFFIX database, as well as County records for the expressways. The latest counts available at the intersection at Fair Oaks Avenue and Kifer Road were dated 2012. This set of counts was extrapolated to the year 2015 based on growth at nearby intersections.

The existing AM and PM peak-hour intersection volumes are shown on Figure 7. The traffic count data are included in Appendix A.

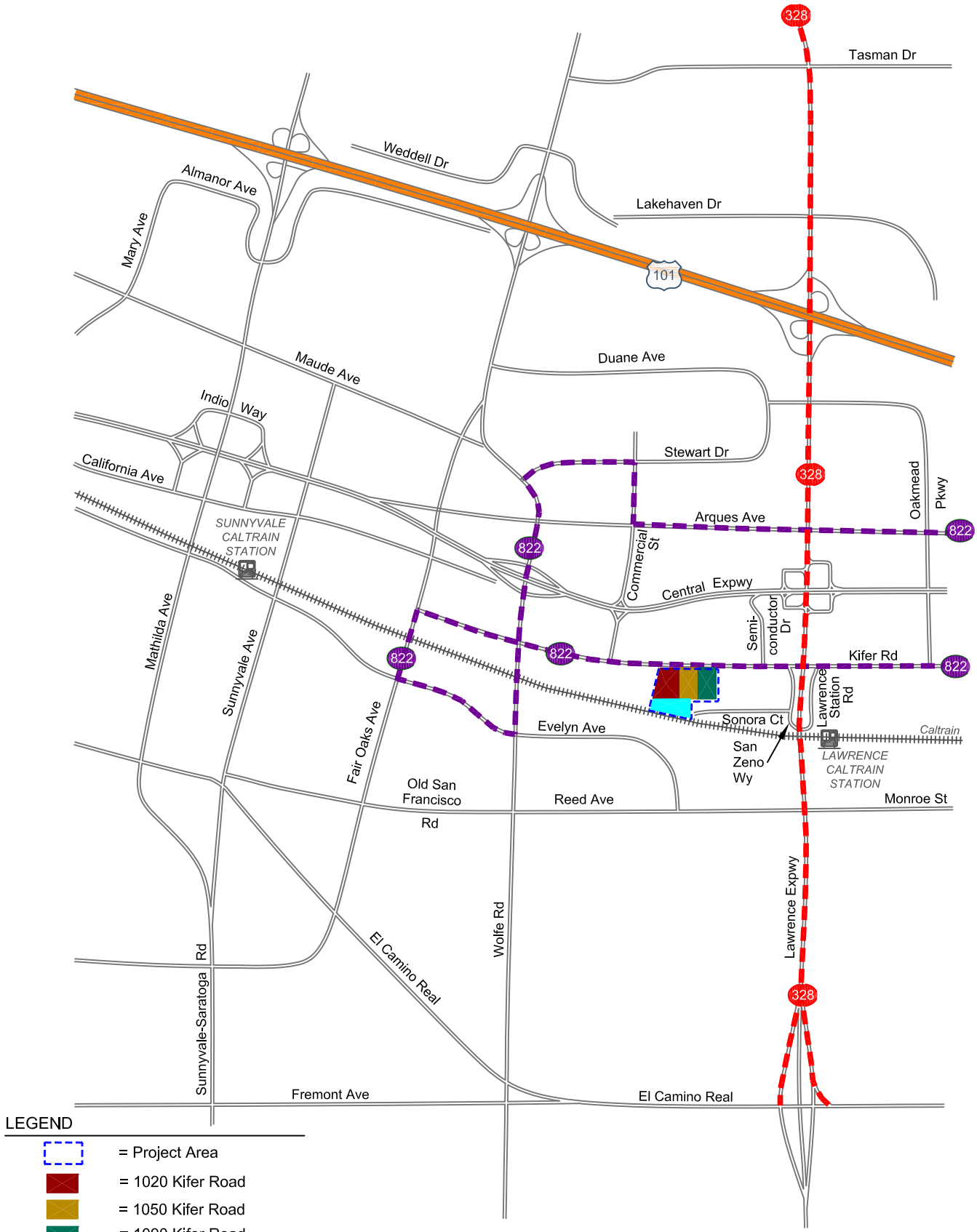


Figure 5
Existing Transit Service

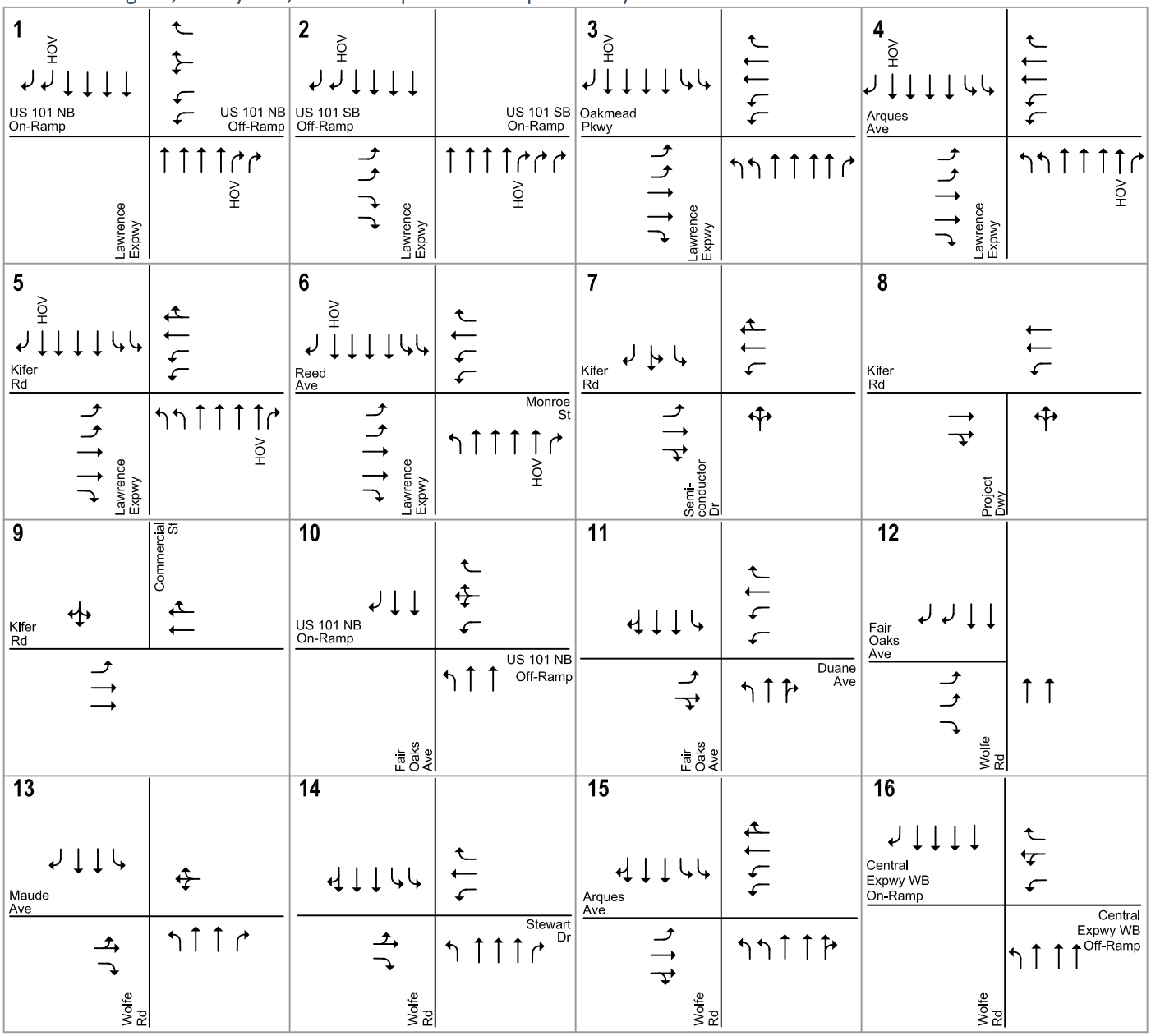


Figure 6
Existing Lane Configurations

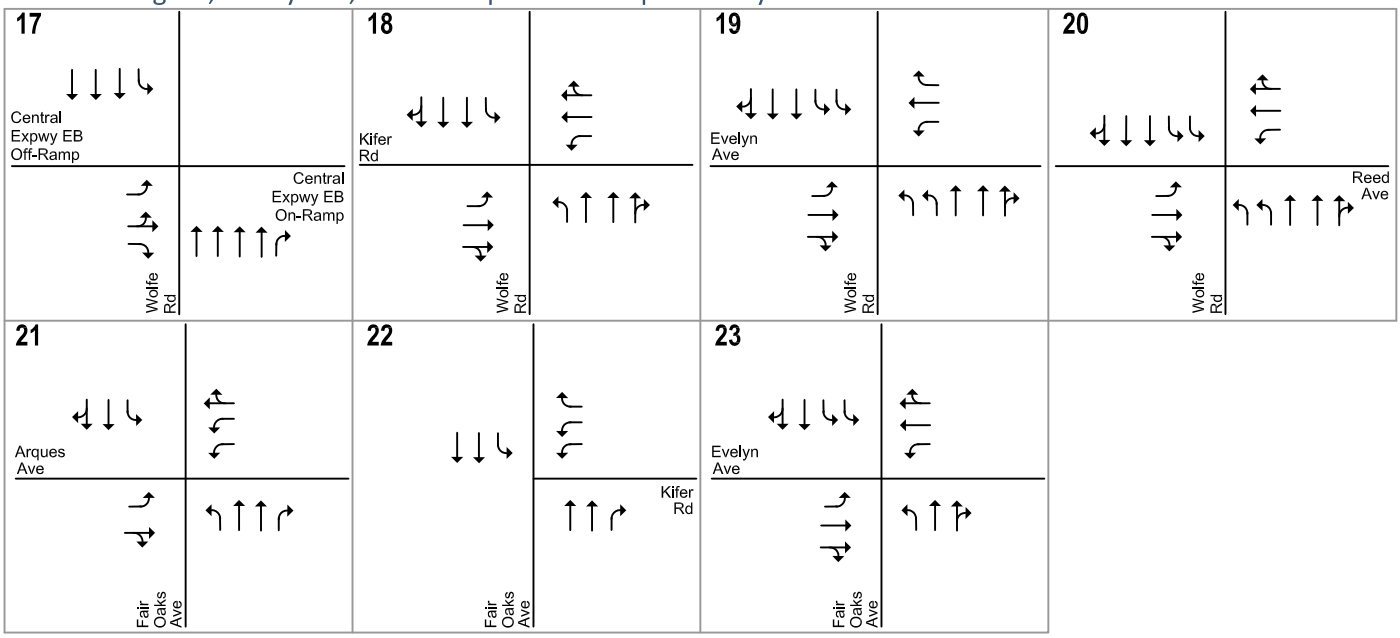
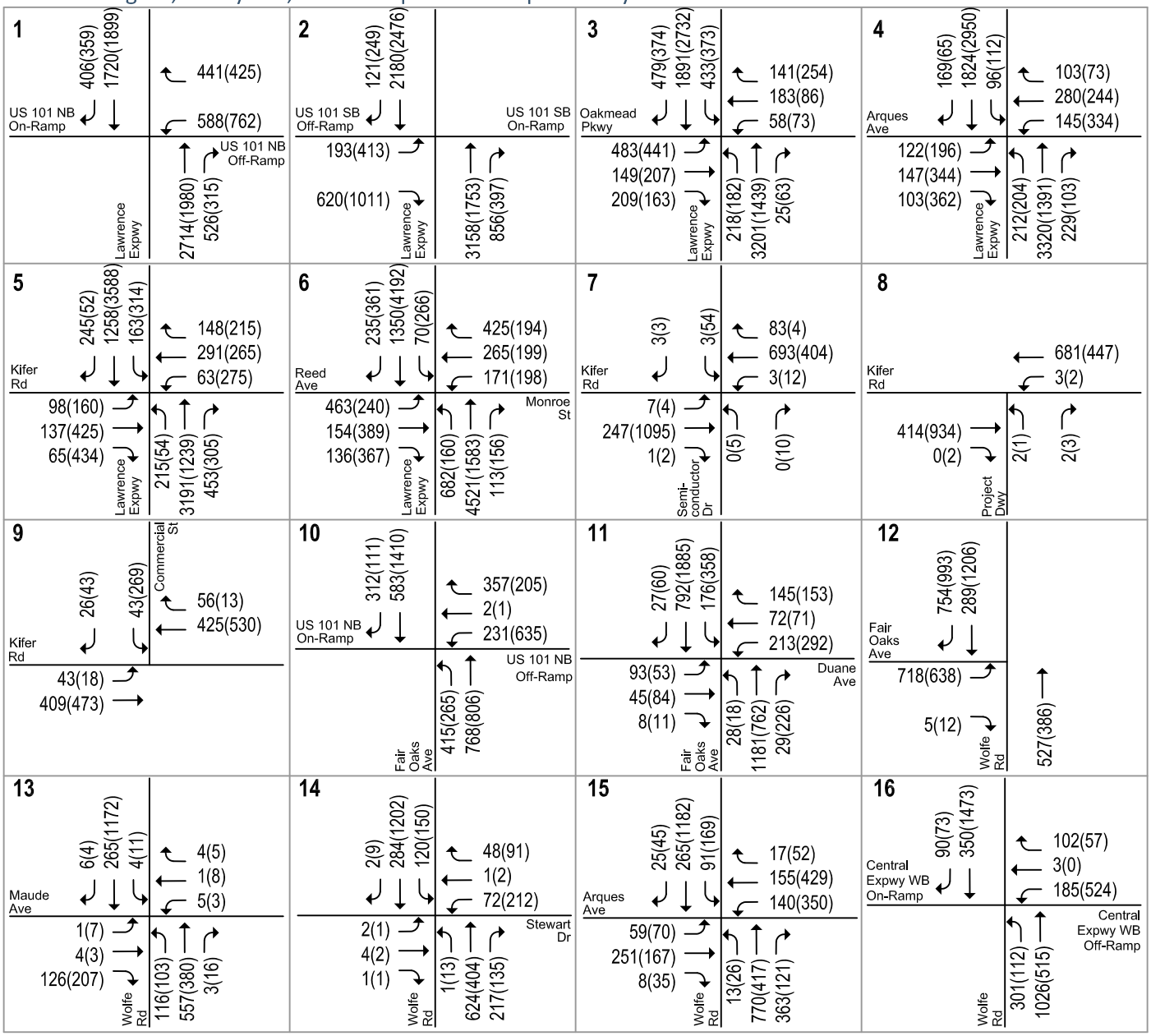


Figure 6
Existing Lane Configurations

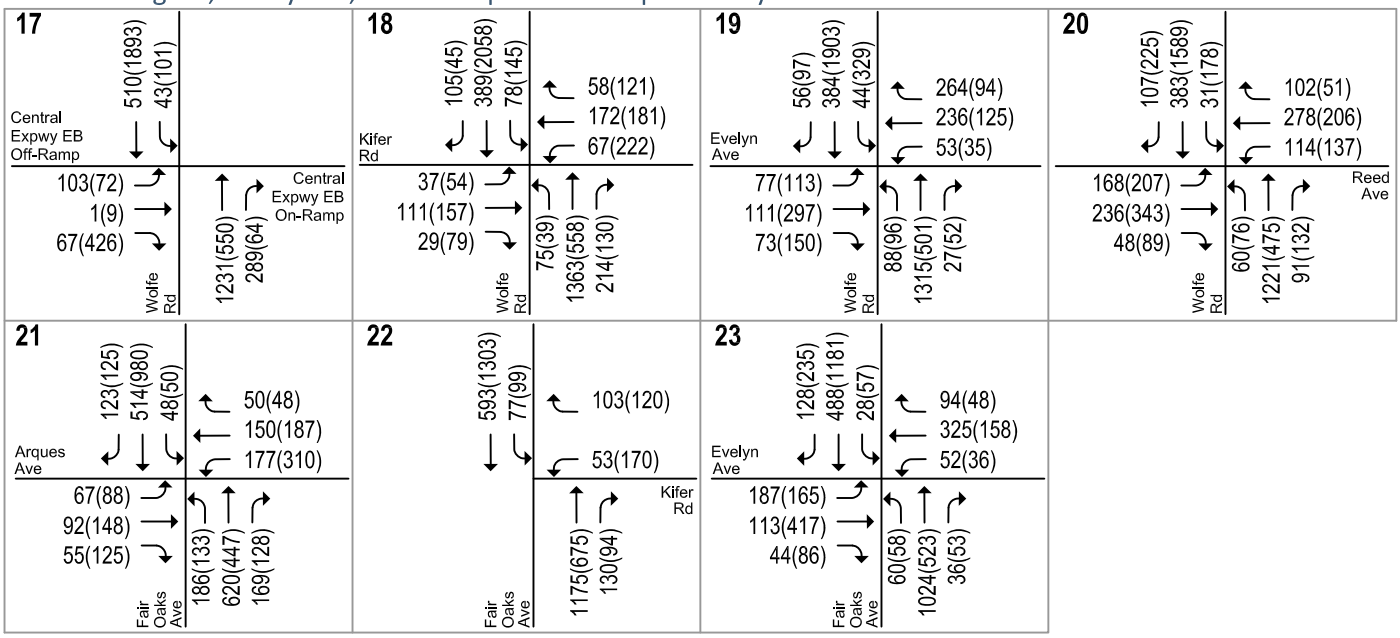


LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 7
Existing Traffic Volumes

NORTH
Not to Scale



LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 7
Existing Traffic Volumes

NORTH
Not to Scale

Existing Intersection Level of Service

Intersection level of service were evaluated against the City of Sunnyvale and CMP standards. The results of the intersection level of service analysis under existing conditions are summarized in Table 4. The results of the analysis show that most of the signalized study intersections currently operate at acceptable levels during both the AM and PM peak hours, with the following three exceptions:

- Lawrence Expressway & Reed Avenue (#6) – AM & PM Peak Hours (LOS F)
- Commercial Street & Kifer Road (#9) – PM Peak Hour (LOS F)
- Wolfe Road & Maude Avenue (#13) – PM Peak Hour (LOS F)

The peak hour signal warrant was checked for the two unsignalized study intersections. Both intersections are warranted for signals during the PM peak hour. The intersection level of service calculation sheets are included in Appendix B. The signal warrant worksheets are included in Appendix E.

Table 4
Existing Intersection Level of Service Summary

#	Intersection	Peak Hour	Count Date	LOS Std.	Existing Avg. Del	Existing LOS
1	Lawrence Expressway & US 101 Northbound Ramps	AM	10/00/14	E	15.6	B
		PM	10/00/14		25.1	C
2	Lawrence Expressway & US 101 Southbound Ramps	AM	10/00/14	E	34.3	C-
		PM	10/00/14		68.9	E
3	Lawrence Expressway & Oakmead Parkway	AM	10/00/14	E	60.9	E
		PM	10/00/14		53.0	D-
4	Lawrence Expressway & Arques Avenue	AM	10/00/14	E	45.0	D
		PM	10/00/14		60.0	E
5	Lawrence Expressway & Kifer Road	AM	10/00/15	E	37.7	D+
		PM	10/00/15		75.8	E-
6	Lawrence Expressway & Reed Avenue/Monroe Street	AM	9/19/2013	E	**203.1**	**F**
		PM	9/10/2013		**86.5**	**F**
7	Semiconductor Drive & Kifer Road	AM	5/27/2015	D	8.3	A
		PM	5/27/2015		14.7	B
8	Project Driveway & Kifer Road [Driveway D]	AM	5/17/2016	D	3.1	A
		PM	5/17/2016		3.9	A
9	Commercial Street & Kifer Road (unsignalized)	AM	5/17/2016	D	14.9	B
		PM	5/17/2016		**62.6**	**F**
10	Fair Oaks Avenue & US 101 Northbound Ramps	AM	10/00/14	E	16.5	B
		PM	10/00/14		21.0	C+
11	Fair Oaks Avenue & Duane Avenue	AM	10/00/14	D	26.3	C
		PM	10/00/14		32.1	C-
12	Wolfe Road & Fair Oaks Avenue	AM	10/00/14	D	23.6	C
		PM	10/00/14		21.8	C+
13	Wolfe Road & Maude Avenue (unsignalized)	AM	10/00/14	D	19.5	C
		PM	10/00/14		**51.2**	**F**
14	Wolfe Road & Stewart Drive	AM	10/00/14	D	16.1	B
		PM	10/00/14		19.1	B-
15	Wolfe Road & Arques Avenue	AM	10/00/14	D	24.8	C
		PM	10/00/14		28.4	C
16	Wolfe Road & Central Expressway Westbound Ramps	AM	10/00/14	E	24.6	C
		PM	10/00/14		28.7	C
17	Wolfe Road & Central Expressway Eastbound Ramps	AM	10/00/14	E	12.5	B
		PM	10/00/14		29.6	C
18	Wolfe Road & Kifer Road	AM	05/00/14	D	21.1	C+
		PM	05/00/14		26.8	C
19	Wolfe Road & Evelyn Avenue	AM	05/00/14	D	26.0	C
		PM	05/00/14		24.6	C
20	Wolfe Road & Reed Avenue	AM	05/00/14	D	28.8	C
		PM	05/00/14		28.8	C
21	Fair Oaks Avenue & Arques Avenue	AM	5/14/2015	D	29.7	C
		PM	5/14/2015		34.4	C-
22	Fair Oaks Avenue & Kifer Road	AM	-	D	8.4	A
		PM	-		10.6	B+
23	Fair Oaks Avenue & Evelyn Avenue	AM	5/14/2015	D	28.1	C
		PM	5/14/2015		26.7	C

Notes:
Delay and LOS reported for the unsignalized intersections represent the approach that experiences the worst delay and LOS.
BOLD indicates a substandard level of service.

Existing Freeway Level of Service

Existing weekday AM and PM peak hour traffic volumes on the study freeway segments were obtained from the 2014 CMP Annual Monitoring Report. The existing freeway level of service during the weekday AM and PM peak hours of traffic are summarized in Table 5. The mixed-flow lanes on the following directional study freeway segments currently operate at LOS F during either the AM or PM peak hour:

- US 101, northbound from Bowers Avenue/Great America Parkway to Mathilda Avenue (AM Peak Hour)
- US 101, southbound from Fair Oaks Avenue to Bowers Avenue/Great America Parkway (PM Peak Hour)
- SR 237, eastbound from Lawrence Expressway to Great America Parkway (PM Peak Hour)

Table 5
Existing Freeway Level of Service Summary

				Existing Conditions				
				Mixed-Flow				
Freeway	Segment	Dir	Peak Hour	Ave. Speed	# of Lanes	Capacity	Volume	LOS
US 101	Bower Ave / Great American Pkwy to Lawrence Expwy	NB	AM	**20**	**3**	**6,900**	**4980**	**F**
			PM	48	3	6,900	6480	D
US 101	Lawrence Expwy to N. Fair Oaks Ave	NB	AM	**17**	**3**	**6,900**	**4590**	**F**
			PM	65	3	6,900	5850	D
US 101	N. Fair Oaks Ave to N. Mathilda Ave	NB	AM	**34**	**3**	**6,900**	**6020**	**F**
			PM	66	3	6,900	5510	D
US 101	N. Mathilda Ave to N. Fair Oaks Ave	SB	AM	63	3	6,900	6430	D
			PM	51	3	6,900	6580	D
US 101	N. Fair Oaks Ave to Lawrence Expwy	SB	AM	58	3	6,900	6620	D
			PM	**26**	**3**	**6,900**	**5540**	**F**
US 101	Lawrence Expwy to Bower Ave / Great American Pkwy	SB	AM	42	3	6,900	6300	E
			PM	**15**	**3**	**6,900**	**4370**	**F**
SR 237	Lawrence Expwy to Great America Pkwy	EB	AM	62	2	4,400	4340	D
			PM	**14**	**2**	**4,400**	**2800**	**F**
SR 237	Great America Pkwy to Lawrence Expwy	WB	AM	55	2	4,400	4400	D
			PM	64	2	4,400	4100	D

Notes:
1. Existing freeway conditions referenced the *Santa Clara Valley Transportation Authority Congestion Management Program Monitoring Study*, 2014.
2. Freeway LOS criteria referenced *Traffic Level of Service Analysis Guidelines*, VTA Congestion Management Program, June 2003.

BOLD indicates a substandard level of service.

Existing Freeway Ramp Capacity Analysis

This analysis consists of a volume-to-capacity ratio evaluation of six freeway ramps at the interchanges of US 101 and Fair Oaks Avenue and US 101 and Lawrence Expressway. The ramp capacities were obtained from the *Highway Capacity Manual 2000*, which considers both the free-flow speed and the number of lanes on the study ramps.

Hexagon conducted field observations at the US 101 study on-ramps in July 2016, and found that ramp meters were not turned on. Therefore, queuing at the US 101 study on-ramps was not analyzed. However, both on-ramps currently have ramp meter equipment installed, and could be metered in the future. As a conservative approach, it is assumed that the northbound on-ramps are metered during the AM peak hour and the southbound on-ramps are metered during the PM peak hour.

Hexagon conducted field observations at the SR 237 eastbound on-ramp from northbound Lawrence Expressway in August 2016, and found that ramp meters were turned on during the PM peak hour. The observed ramp meter rate was approximately six seconds per vehicle on the mixed-flow lane. However, eastbound SR 237 was heavily congested to the point that it took two minutes for ten vehicles on the mixed-flow lane to pass the meter. As a result, queues at the on-ramp extended south past Tasman Drive. Because the actual vehicular flow rate at the on-ramp (approximately 12 seconds per vehicle) is much longer than the ramp meter rate (6 seconds per vehicle), the ramp operates as if there was no meter. The ramp queue is a result of freeway congestion manifested at the on-ramp.

It is assumed that the metered ramps would each have a capacity of 900 vehicles per hour. The peak-hour freeway ramp volumes were obtained from Caltrans. The existing peak-hour ramp volumes and volume-to-capacity (V/C) ratios are shown in Table 6.

The ramp analysis shows that all of the study freeway ramps currently have sufficient capacity to serve the existing traffic volumes. All study ramps have a volume-to-capacity (V/C) ratio that is well below 1.0, which means that the existing traffic demand is lower than the ramp capacity.

Table 6
Existing Freeway Ramp Capacity Summary

				Existing Conditions					
				Lanes				Peak	
Interchange	Ramp	Type	Pk Hr	Mixed	HOV	Meter [3]	Capacity [1]	Volume [2]	V/C
US 101/Fair Oaks Ave	NB On Ramp from Fair Oaks Ave	Diagonal [3]	AM	1	1	ON	1800	608	0.34
			PM	1	1		2000	402	0.20
	SB Off Ramp to SB Fair Oaks Ave	Diagonal	AM	1			2000	246	0.12
			PM	1			2000	686	0.34
US 101/Lawrence Expwy	SB On Ramp from NB Lawrence Expwy	Diagonal [3]	AM	2	1		2000	857	0.43
			PM	2	1	ON	1800	607	0.34
	NB Off Ramp to Lawrence Expwy	Diagonal	AM	2			3800	1188	0.31
			PM	2			3800	1344	0.35
SR 237/Lawrence Expwy	EB On Ramp from NB Lawrence Expwy	Diagonal	AM	1	1		2000	1513	0.76
			PM	1	1	ON	1500	1206	0.80
	WB Off Ramp to SB Lawrence Expwy	Loop	AM	1			1800	709	0.39
			PM	1			1800	732	0.41

Notes:
1. Ramp capacities were obtained from the Highway Capacity Manual 2000 (pg. 25-4), and considered the free-flow speed, the number of lanes on the ramp, and ramp metering.
2. Existing peak hour volumes are obtained through personal communication with Caltrans staff on August 11, 2015.
3. On-ramps were not metered during field observation in July 2016. However, because ramp meter equipment is installed at both on-ramps, this study assumes that the northbound on-ramps are metered during the AM peak hour and the southbound on-ramps are metered during the PM peak hour.

Observed Existing Traffic Conditions

Traffic conditions in the field were observed in order to identify existing operational deficiencies and to confirm the accuracy of calculated intersection level of service. The purpose of this effort was (1) to identify any existing traffic problems that may not be directly related to level of service, and (2) to identify any locations where the level of service analysis does not accurately reflect existing traffic conditions.

During the AM peak period, heavy congestion was observed on Lawrence Expressway and at the intersection of Fair Oaks Avenue and the US 101 northbound ramps. At the intersection of Lawrence Expressway and Reed Avenue/Monroe Street, northbound vehicles constantly queued past the previous intersection at Cabrillo Avenue in Santa Clara. Because of the long green time for the northbound through movement, most vehicles were able to clear within one cycle, but the queue constantly replenished. The westbound left-turn movement on Reed Avenue onto northbound Lawrence Expressway also experienced lengthy delay up to three cycles, queuing out of the turn pocket and past Willow Avenue. The northbound through-movement on Lawrence Expressway at Kifer Road constantly developed an approximately 30 vehicle queue prior to the green phase. Northbound vehicles south of Reed Avenue arrived at the back of the queue before the existing queue could clear. As a result, progression through this corridor was slow. The southbound through-movement on Lawrence Expressway at Oakmead Parkway formed temporary queues at the beginning of the green phases that backed up to the intersection with the US 101 southbound ramps. This queue cleared by the end of each cycle. At the intersection of Fair Oaks Avenue and the US 101 northbound ramps, the northbound left-turn movement occasionally overflowed the turn pocket and required two signal cycles to clear. The northbound through movement constantly queued towards the intersection with the US 101 southbound ramps, but cleared within one cycle.

During the PM peak period, heavy congestion was observed on southbound Lawrence Expressway and at the intersection of Fair Oaks Avenue and the US 101 northbound ramps. Lawrence Expressway southbound at Reed Avenue/Monroe Street queued towards and occasionally past Kifer Road. All vehicles were able to clear the intersection within one cycle, but the queue replenished, and frequently cleared only after the southbound movement at Kifer Road received a green light, furthering the queue onto Kifer Road. Similar queuing issues occurred on Lawrence Expressway southbound at the intersections with Kifer Road, Arques Avenue, Oakmead Parkway, and Tasman Drive. The Kifer Road westbound left-turn movement also experienced lengthy delay, with queues constantly extending out of the turn pocket, blocking one through lane. The queue cleared within three cycles, but replenished. At the intersection of Fair Oaks Avenue and the US 101 northbound ramps, heavy volumes are observed on the southbound through-movement and eastbound left-turn movement. The southbound through movement mostly cleared within one cycle. The eastbound left-turn movement often required two cycles to clear.

3. Background Conditions

This chapter presents background traffic conditions, which are defined as conditions just prior to completion of the proposed project. Traffic volumes for background conditions comprise volumes from existing traffic counts plus traffic generated by other approved developments in the vicinity of the site. Background conditions assume the project site is operating at full occupancy. This chapter describes the procedure used to determine background traffic volumes and the resulting traffic conditions. The background scenario predicts a realistic traffic condition that would occur as approved development projects are built and occupied.

Transportation Network under Background Conditions

It is assumed in this analysis that the transportation network under background conditions, including roadways and intersection lane configurations, would be the same as that described under existing conditions at all study intersections except at the following intersections:

- Lawrence Expressway and Reed Avenue/Monroe Street (#6): The westbound leg of Monroe Street will be widened to provide two through lanes.
- Commercial Street and Kifer Road (#9): The City of Sunnyvale will restripe the two-way-left-turn-lane east of the intersection to provide a refuge area for left turns (see Figure 8). This will allow southbound left-turning vehicles to complete their movement in two phases (first wait for sufficient gap in westbound traffic to turn left into the two-way left-turn lane, then wait for sufficient gap in eastbound traffic to merge onto eastbound Kifer Road.)
- Fair Oaks Avenue and Duane Avenue (#11): The eastbound leg of Duane Avenue will be restriped to have one left turn lane, one through lane, and one right-turn lane.

Background Traffic Volumes

Approved developments are those developments that have been approved by local agencies, are under construction, or are built but not yet occupied. The approved project list was obtained from the City of Sunnyvale, the City of Santa Clara, and the City of Cupertino. Based on a review of traffic studies prepared for these projects, the types and sizes of these developments, and their distances from the project site, a total of 42 approved projects were selected for inclusion in the background scenario. Trip generation for all background projects was based on their respective traffic reports provided by City staff, where available. A list of background trips is provided in Appendix D.

Currently, buildings on the project site are only partially occupied. Background traffic volumes assume the project site is fully occupied. Hexagon conducted driveway counts at all driveways associated with the project site. The driveway counts show that the existing buildings (1050/1090 Kifer Road, and 1127 Sonora Court) currently generate 10 trips (5 in and 5 out) during the AM peak hour and 4 trips (1 in and 3 out) during the PM peak hour. The existing buildings could be fully occupied without the need for discretionary review by the City of Sunnyvale. The trips generated by the existing buildings at full occupancy were estimated based on the trip rates for office as well as research and development (R&D) land uses published in the Institute of Transportation Engineers (ITE) *Trip Generation, Ninth Edition*. The existing buildings are half office and half R&D uses. As shown in Table 7, the existing buildings on the project site at full occupancy would generate an additional 282 trips (245 in and 37 out) during the AM peak hour, and 264 trips (41 in and 223 out) during the PM peak hour.

Table 7
Trip Generation Summary – Full Occupancy of Existing Buildings

Use	Size	Units	Daily Trips	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Existing Entitlement[3]									
1050 Kifer Road									
Office[1]	20,258	s.f.	223	28	4	32	5	25	30
R & D[2]	20,258	s.f.	164	21	4	25	3	19	22
1090 Kifer Road									
Office[1]	52,794	s.f.	582	72	10	82	13	66	79
R & D[2]	52,794	s.f.	428	53	11	64	8	48	56
1127 Sonoma Court									
Office[1]	31,803	s.f.	351	44	6	50	8	39	47
R & D[2]	31,803	s.f.	258	32	7	39	5	29	34
Total Entitlement				**250**	**42**	**292**	**42**	**226**	**268**
Existing Driveway Count[4]									
1050 & 1090 Kifer Road				5	5	10	1	3	4
Background Conditions - Net New Trips at Full Occupancy of Existing Uses									
Full Build-Out				***245***	***37***	***282***	***41***	***223***	***264***

[1] Trip generation rates based on General Office Building (Land Use Code 710) from *ITE Trip Generation Manual*, 9th Edition.
[2] Trip generation rates based on Research and Development Center (Land Use Code 760) from *ITE Trip Generation Manual*, 9th Edition.
[3] Trips associated with the existing entitlement at the project site are estimated using the trip generation rates from General Office Building and Research and Development Center.
[4] Existing site driveway counts are based on driveway counts conducted on May 17, 2016 during both the AM (7-9 AM) and PM (4-6 PM) peak hours of commute traffic.

Trips generated by the approved projects as well as the project site at full occupancy were added to existing traffic volumes to obtain *background traffic volumes.* The AM and PM peak hour intersection traffic volumes under background conditions are shown on Figure 9.

LEGEND

= Proposed Restriping

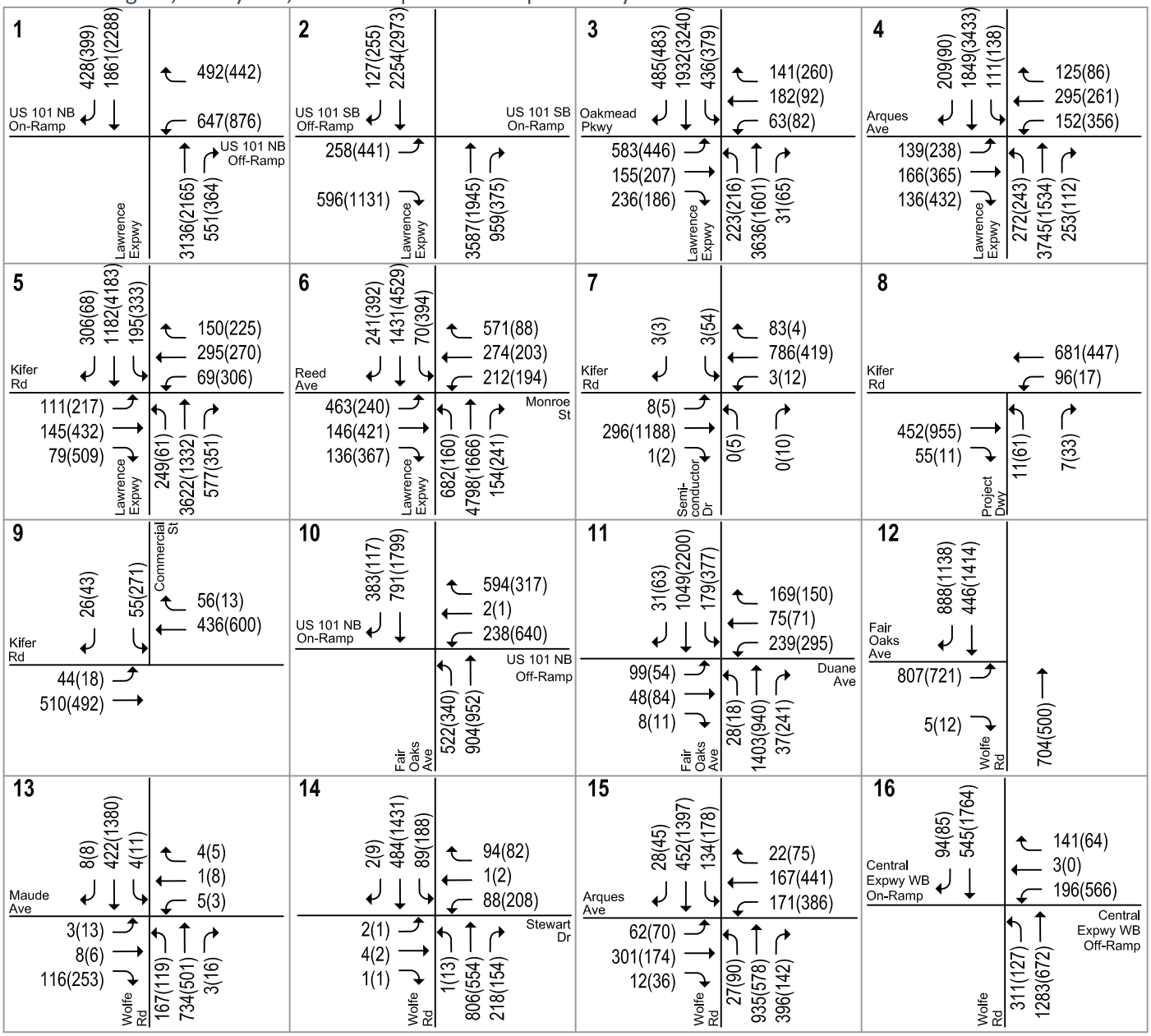
XXXXX = Remove Existing Striping

Figure 8

Proposed Restriping of Two-Way Left-Turn Lane at Commercial Street and Kifer Road

HEXAGON

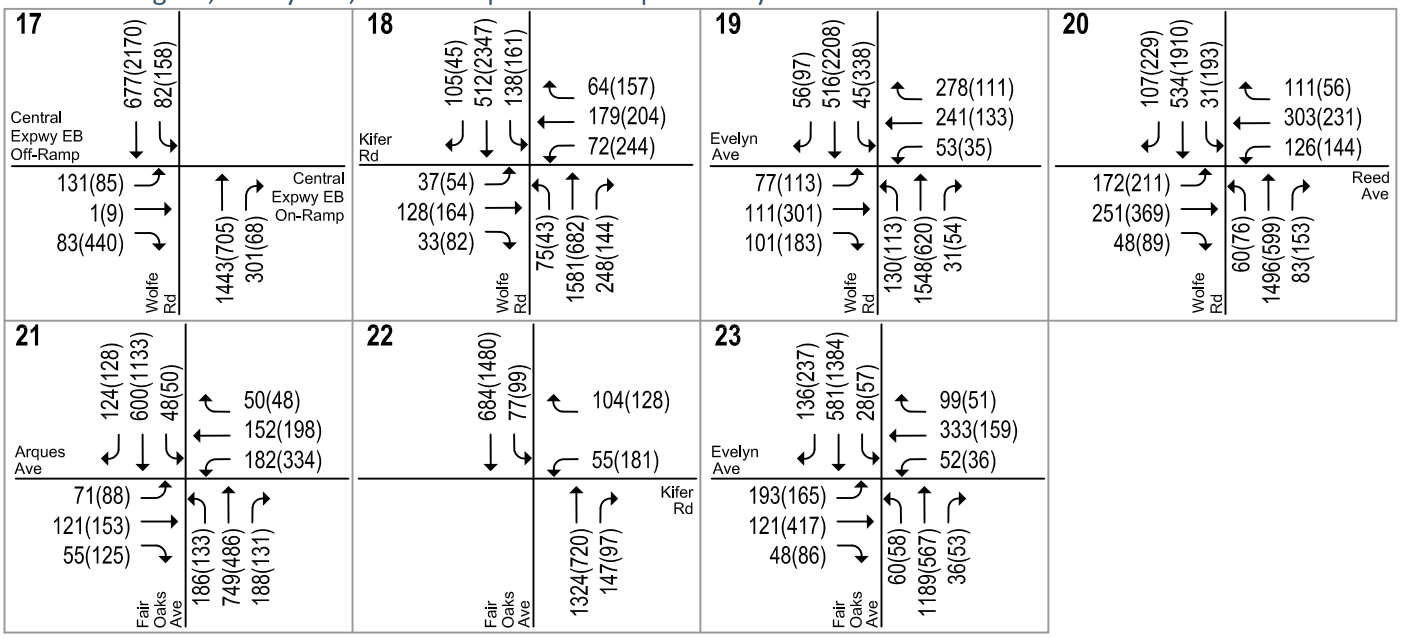
NORTH
Not to Scale



LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 9
Background Traffic Volumes



LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 9
Background Traffic Volumes

Background Intersection Level of Service

Intersection level of service were evaluated against the City of Sunnyvale and CMP Standards. The results of the intersection level of service analysis under Background conditions are summarized in Table 8. The results of the intersection analysis show that with the background traffic volumes seven study intersections would operate below the acceptable level of service during at least one peak hour.

- Lawrence Expressway & US 101 Southbound Ramps (#2) –PM Peak Hour (LOS F)
- Lawrence Expressway & Oakmead Parkway (#3) – AM Peak Hour (LOS F)
- Lawrence Expressway & Arques Avenue (#4) –PM Peak Hour (LOS F)
- Lawrence Expressway & Kifer Road (#5) – PM Peak Hour (LOS F)
- Lawrence Expressway & Reed Avenue (#6) – AM & PM Peak Hour (LOS F)
- Wolfe Road & Maude Avenue (#13) – PM Peak Hour (LOS F)

Peak hour signal warrants were checked for both unsignalized intersections at Wolfe Road and Maude Avenue, and at Commercial Street and Kifer Road under background conditions. Both intersections would be warranted for a signal during the PM peak hour. The intersection at Commercial Street and Kifer Road with the City planned restriping would operate at an acceptable level of service (LOS D) under background conditions. It is not recommended traffic signals be installed at this intersection.

Table 8
Background Level of Service Summary

#	Intersection	Peak Hour	LOS Std.	Existing Avg. Del (sec)	Existing LOS	Background Avg. Del (sec)	Background LOS
1	Lawrence Expressway & US 101 Northbound Ramps	AM	E	15.6	B	16.2	B
		PM		25.1	C	25.5	C
2	Lawrence Expressway & US 101 Southbound Ramps	AM	E	34.3	C-	29.1	C
		PM		68.9	E	**81.8**	**F**
3	Lawrence Expressway & Oakmead Parkway	AM	E	60.9	E	**91.0**	**F**
		PM		53.0	D-	63.4	E
4	Lawrence Expressway & Arques Avenue	AM	E	45.0	D	52.1	D-
		PM		60.0	E	**80.4**	**F**
5	Lawrence Expressway & Kifer Road	AM	E	37.7	D+	52.1	D-
		PM		75.8	E-	**99.4**	**F**
6	Lawrence Expressway & Reed Avenue/Monroe Street	AM	E	**203.1**	**F**	**138.6**	**F**
		PM		**86.5**	**F**	**108.5**	**F**
7	Semiconductor Drive & Kifer Road	AM	D	8.3	A	8.6	A
		PM		14.7	B	14.8	B
8	Project Driveway & Kifer Road [Driveway D]	AM	D	3.1	A	8.1	A
		PM		3.9	A	7.9	A
9	Commercial Street & Kifer Road (unsignalized)	AM	D	14.9	B	12.5	B
		PM		**62.6**	**F**	25.9	D
10	Fair Oaks Avenue & US 101 Northbound Ramps	AM	E	16.5	B	23.1	C
		PM		21.0	C+	48.7	D
11	Fair Oaks Avenue & Duane Avenue	AM	D	26.3	C	30.2	C
		PM		32.1	C-	38.4	D+
12	Wolfe Road & Fair Oaks Avenue	AM	D	23.6	C	24.7	C
		PM		21.8	C+	22.9	C+
13	Wolfe Road & Maude Avenue (unsignalized)	AM	D	19.5	C	33.4	D
		PM		**51.2**	**F**	**122.6**	**F**
14	Wolfe Road & Stewart Drive	AM	D	16.1	B	15.6	B
		PM		19.1	B-	17.8	B
15	Wolfe Road & Arques Avenue	AM	D	24.8	C	26.4	C
		PM		28.4	C	28.7	C
16	Wolfe Road & Central Expressway Westbound Ramps	AM	E	24.6	C	25.8	C
		PM		28.7	C	28.1	C
17	Wolfe Road & Central Expressway Eastbound Ramps	AM	E	12.5	B	15.4	B
		PM		29.6	C	30.6	C
18	Wolfe Road & Kifer Road	AM	D	21.1	C+	23.1	C
		PM		26.8	C	28.5	C
19	Wolfe Road & Evelyn Avenue	AM	D	26.0	C	26.0	C
		PM		24.6	C	25.4	C
20	Wolfe Road & Reed Avenue	AM	D	28.8	C	28.7	C
		PM		28.8	C	29.4	C
21	Fair Oaks Avenue & Arques Avenue	AM	D	29.7	C	29.2	C
		PM		34.4	C-	35.4	D+
22	Fair Oaks Avenue & Kifer Road	AM	D	8.4	A	8.1	A
		PM		10.6	B+	10.3	B+
23	Fair Oaks Avenue & Evelyn Avenue	AM	D	28.1	C	28.1	C
		PM		26.7	C	27.4	C

Notes:
Delay and LOS reported for the unsignalized intersections represent the approach that experiences the worst delay and LOS.
BOLD indicates a substandard level of service.

4. Project Conditions

This chapter describes the roadway traffic operations under background plus project conditions and existing plus project conditions, the method by which project traffic is estimated, and any impacts caused by the project (full build-out conditions). The background plus project scenario is analyzed according to the VTA's CMP guidelines. The existing plus project scenario is presented for information purposes only. Existing plus project traffic conditions could potentially occur if the project were to be occupied prior to the other approved projects in the area. However, it is unlikely that this traffic condition would occur, since some of the other approved projects expected to add traffic to the study area would likely be built and occupied during the time this project is going through the development review process.

Project Description

Located at 1016 Kifer Road, the project site currently has three existing buildings (1050/1090 Kifer Road and 1127 Sonora Court) totaling 209,708 square feet (s.f.). The proposed development would demolish the existing buildings and construct two 4-story buildings totaling 602,000 s.f. over two phases. The existing buildings and the proposed buildings are all office and research and development (R&D) land uses. Under project conditions, the full build-out of the project (602,000 s.f.) is analyzed. Access to the project site would be provided via five driveways on Kifer Road well as one driveway at the cul-de-sac on Sonora Court. The surface parking lot directly north of the buildings would only be accessed by driveways B, C and D (discussed below). The project driveways are briefly described below. The driveway locations are labeled on Figure 3 in Chapter 1. As part of the project, traffic signals would also be installed at the currently unsignalized intersection at Wolfe Road and Maude Avenue.

Driveway A – full-access, inbound/outbound, signalized. Located along Kifer Road in the northwest corner of the project area and is the western most driveway. Driveway A would provide access to and from the surface parking lot in the southwest corner of the project site, Garage #1 and Garage #2.

Driveway B – right-in/left-in, inbound, unsignalized. Located along Kifer Road and is the second driveway from the west. Driveway B would provide access to only the surface parking lot directly north of the buildings and the loading zone loop.

Driveway C – right-out/left-out, outbound, unsignalized. Located along Kifer Road and is the center driveway. Driveway C would serve as an exit from only the surface parking lot directly north of the buildings and the loading zone loop.

Driveway D – right-in/right-out, inbound/outbound, unsignalized. Located along Kifer Road and is the second driveway from the east. Driveway D would serve as an entrance and exit for only the surface parking lot directly north of the buildings.

Driveway E – right-in/right-out, inbound/outbound, unsignalized. Located along Kifer Road in the northeast corner of the project area and is the eastern most driveway. Driveway E would provide access to and from Garage #1 and Garage #2 as well as the surface parking lot in the southwest corner of the project site.

Driveway F – full access, inbound/outbound, unsignalized. Located on Sonora Court. Driveway F would provide direct access to and from Garage #1 and Garage #2 as well as the surface parking lot in the southwest corner of the project site.

Project Trip Estimates

The magnitude of traffic produced by a new development and the locations where that traffic would appear are estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. In determining project trip generation, the magnitude of traffic entering and exiting the site is estimated for the AM and PM peak hours. As part of the project trip distribution, an estimate is made of the directions to and from which the project trips would travel. In the project trip assignment, the project trips are assigned to specific streets and intersections. These procedures are described below.

Trip Generation

Daily and peak-hour trip generation estimates for the proposed projects were based on trip rates published in the ITE *Trip Generation Manual, 9th Edition* for general office building and research and development (R&D) center. It is assumed that the proposed development is half office use and half R&D use. Based on ITE trip rates, it is estimated that the project would generate 5,762 gross daily vehicle trips, with 837 gross trips (717 in and 120 out) during the AM peak hour and 770 gross trips (125 in and 645 out) during the PM peak hour. The trip generation estimates for the proposed project are shown in Table 9.

Background plus Project Conditions

Traffic volumes under background plus project conditions were estimated by adding to the background traffic volumes (discussed in Chapter 3) the net trips generated by the proposed project. The background scenario assumes that the existing buildings on the project site are fully occupied. Therefore, the project will receive credit for trips associated with the existing buildings. Trip generation estimates for the existing buildings at full occupancy are discussed in Chapter 3. Also, the project would be required to implement a Transportation Demand Management (TDM) plan that would achieve a minimum 20 percent reduction in daily trips and a minimum 35 percent reduction in peak-hour trips. Thus, accounting for the trip credits and the TDM reduction, the project under background plus project conditions is expected to generate a net increase of 252 trips (216 in and 36 out) during the AM peak hour and 232 trips (39 in and 193 out) during the PM peak hour (see Table 9).

Table 9
Trip Generation Summary – Project Full Build-Out Crediting Existing Entitlement

Use	Size	Units	Daily Trips	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Proposed Project									
Phase I									
Office[1]	148,500	s.f.	1,638	204	28	232	38	183	221
R & D[2]	148,500	s.f.	1,204	150	31	181	24	135	159
Subtotal			*2,842*	*354*	*59*	*413*	*62*	*318*	*380*
Phase II									
Office[1]	152,587	s.f.	1,683	209	29	238	39	188	227
R & D[2]	152,586	s.f.	1,237	154	32	186	24	139	163
Subtotal			*2,920*	*363*	*61*	*424*	*63*	*327*	*390*
Gross Project Trips			5,762	717	120	837	125	645	770
TDM Reduction [3]			(1,152)	(251)	(42)	(293)	(44)	(226)	(270)
Total Project Trips			**4,610**	**466**	**78**	**544**	**81**	**419**	**500**
Existing Entitlement[4]									
1050 Kifer Road									
Office[1]	20,258	s.f.	223	28	4	32	5	25	30
R & D[2]	20,257	s.f.	164	21	4	25	3	19	22
1090 Kifer Road									
Office[1]	52,794	s.f.	582	72	10	82	13	66	79
R & D[2]	52,793	s.f.	428	53	11	64	8	48	56
1127 Sonoma Court									
Office[1]	31,803	s.f.	351	44	6	50	8	39	47
R & D[2]	31,803	s.f.	258	32	7	39	5	29	34
Total Entitlement				**250**	**42**	**292**	**42**	**226**	**268**
Background Plus Project Conditions									
Full Build-Out - Project Trips Net Entitlement				***216***	***36***	***252***	***39***	***193***	***232***

[1] Trip generation rates based on General Office Building (Land Use Code 710) from *ITE Trip Generation Manual*, 9th Edition.
[2] Trip generation rates based on Research and Development Center (Land Use Code 760) from *ITE Trip Generation Manual*, 9th Edition.
[3] The project would be required to implement a TDM plan that would reduce daily trips by 20% and peak-hour trips by 35%.
[4] Trips associated with the existing entitlement at the project site are estimated using the trip generation rates from General Office Building and Research and Development Center.

Existing plus Project Conditions

Traffic volumes under existing plus project conditions were estimated by adding to the existing traffic volumes the net trips generated by the proposed project. The net project trips under the existing plus project conditions are calculated by crediting the trips currently generated at the project site and applying the TDM reduction. Hexagon conducted driveway counts at all driveways associated with the project site. The driveway counts show that the existing buildings currently generate 10 trips (5 in and 5 out) during the AM peak hour and 4 trips (1 in and 3 out) during the PM peak hour. Under existing plus project conditions, the project is expected to generate a net increase of 534 trips (461 in and 73 out) during the AM peak hour, and 496 trips (80 in and 416 out) during the PM peak hour (see Table 10).

Table 10
Trip Generation Summary – Project Full Build-Out Crediting Existing Driveway Counts

Use	Size	Units	Daily Trips	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Proposed Project									
Phase I									
Office[1]	148,500	s.f.	1,638	204	28	232	38	183	221
R & D[2]	148,500	s.f.	1,204	150	31	181	24	135	159
SubTotal			*2,842*	*354*	*59*	*413*	*62*	*318*	*380*
Phase II									
Office[1]	152,587	s.f.	1,683	209	29	238	39	188	227
R & D[2]	152,586	s.f.	1,237	154	32	186	24	139	163
SubTotal			*2,920*	*363*	*61*	*424*	*63*	*327*	*390*
TDM Reduction [3]			(1,152)	(251)	(42)	(293)	(44)	(226)	(270)
Total Project Trips			**4,610**	**466**	**78**	**544**	**81**	**419**	**500**
Existing Driveway Count[4]									
1050 Kifer Road				2	1	3	0	1	1
1090 Kifer Road				3	4	7	1	2	3
1172 Sonoma Court				0	0	0	0	0	0
Total Driveway Trips				**5**	**5**	**10**	**1**	**3**	**4**
Existing Plus Project Conditions									
Full Build-Out - Project Trips Net Driveway Counts				***461***	***73***	***534***	***80***	***416***	***496***

[1] Trip generation rates based on General Office Building (Land Use Code 710) from *ITE Trip Generation Manual*, 9th Edition.
[2] Trip generation rates based on Research and Development Center (Land Use Code 760) from *ITE Trip Generation Manual*, 9th Edition.
[3] The project would be required to implement a TDM plan that would reduce daily trips by 20% and peak-hour trips by 35%.
[4] Existing site driveway counts are based on driveway counts conducted on May 17, 2016 during both the AM (7-9 AM) and PM (4-6 PM) peak hours of commute traffic.

Trip Distribution and Assignment

Trips generated by the existing land use as well as by the proposed projects were distributed to the study network based on the existing travel patterns on the surrounding roadway system and the locations of complementary land uses. The office use and R&D uses generate mostly inbound trips in the morning from residential areas, and outbound trips in the evening to residential areas. It is assumed that the office and R&D land uses have the same trip distribution pattern. The trip distribution pattern for the office and R&D land uses is shown on Figure 10. The net project trips at each study intersection under background plus project conditions and existing plus project conditions are shown on Figure 11 and Figure 12, respectively. The full build out trip distribution and assignment are described in more detail below.

The project trips were assigned to the roadway network based on the directions of approach and departure, the roadway network connections, and the location of project driveways. The proposed project would not retain the existing signalized full-access driveway on Kifer Road. This driveway would become unsignalized and only allow right-in/right-out movements. The western driveway, which is currently an inbound-only driveway, would be converted to a full-access signalized intersection under project conditions. In addition, the driveway at the Sonora Court cul-de-sac would remain. Based on the locations and accessibility of the project driveways and project parking garages as well as the local roadway network, the following assumptions were made when assigning traffic to project driveways:

Inbound Trips

- 66% of all inbound project trips originating from west of the project site would turn right into the project site via the western driveway, Driveway A on Kifer Road. 25% of the inbound trips originating west of the project site would turn right into the project site via the eastern driveway, Driveway E on Kifer Road. 9% of the inbound trips originating west of the project site would turn right into the project site via the middle driveways.
- Project trips originating from east of the project site would only turn into the project site via Driveway A and Driveway B on Kifer Road because the other three driveways on Kifer Road would not permit inbound left turns. Since the surface parking lot directly north of the buildings can only be accessed via Driveway B, it is assumed that 9% of all inbound vehicles originating east of the project site would turn into Driveway B. The remaining 91% would use Driveway A.
- The Sonora Court driveway, given the limited roadway network connections, could only be accessed by vehicles on Lawrence Expressway (either direction) turning onto eastbound Kifer Road then immediately turning right onto Lawrence Station Road. Because of this circuitous route, it is assumed that 50% of all project trips originating from south of the project site that use Lawrence Expressway would turn right at the Kifer Road intersection then loop around Lawrence Station Road to use the Sonora Court driveway. The remaining 50% of all project trips originating from south of the project site that would use Lawrence Expressway would turn left at Kifer Road and then turn left at the western driveway, Driveway A.
- 50% of all project trips originating from north of the project site that would use Lawrence Expressway would turn left at the Kifer Road intersection then loop around Lawrence Station Road to use the Sonora Court driveway. The remaining 50% of all project trips originating from north of the project site that would use Lawrence Expressway would turn right at Kifer Road and then turn left at the western driveway, Driveway A.

Outbound Trips

- 63% of all outbound project trips exiting onto eastbound Kifer Road would turn right out of the eastern driveway, Driveway E, and 28% would turn right out of the western driveway, Driveway A. The remaining 9% would use the middle driveways, Driveway C and Driveway D.
- 91% of all outbound project trips exiting onto westbound Kifer Road would turn left out of Driveway A. The remaining 9% would turn left out of Driveway C.
- Given the limited and circuitous roadway connectivity of Sonora Court as discussed above, it is assumed that 50% of outbound project trips using southbound Lawrence Expressway would exit via the Sonora Court driveway, follow northbound San Zeno Way to eastbound Kifer Road and then turn right onto southbound Lawrence Expressway.

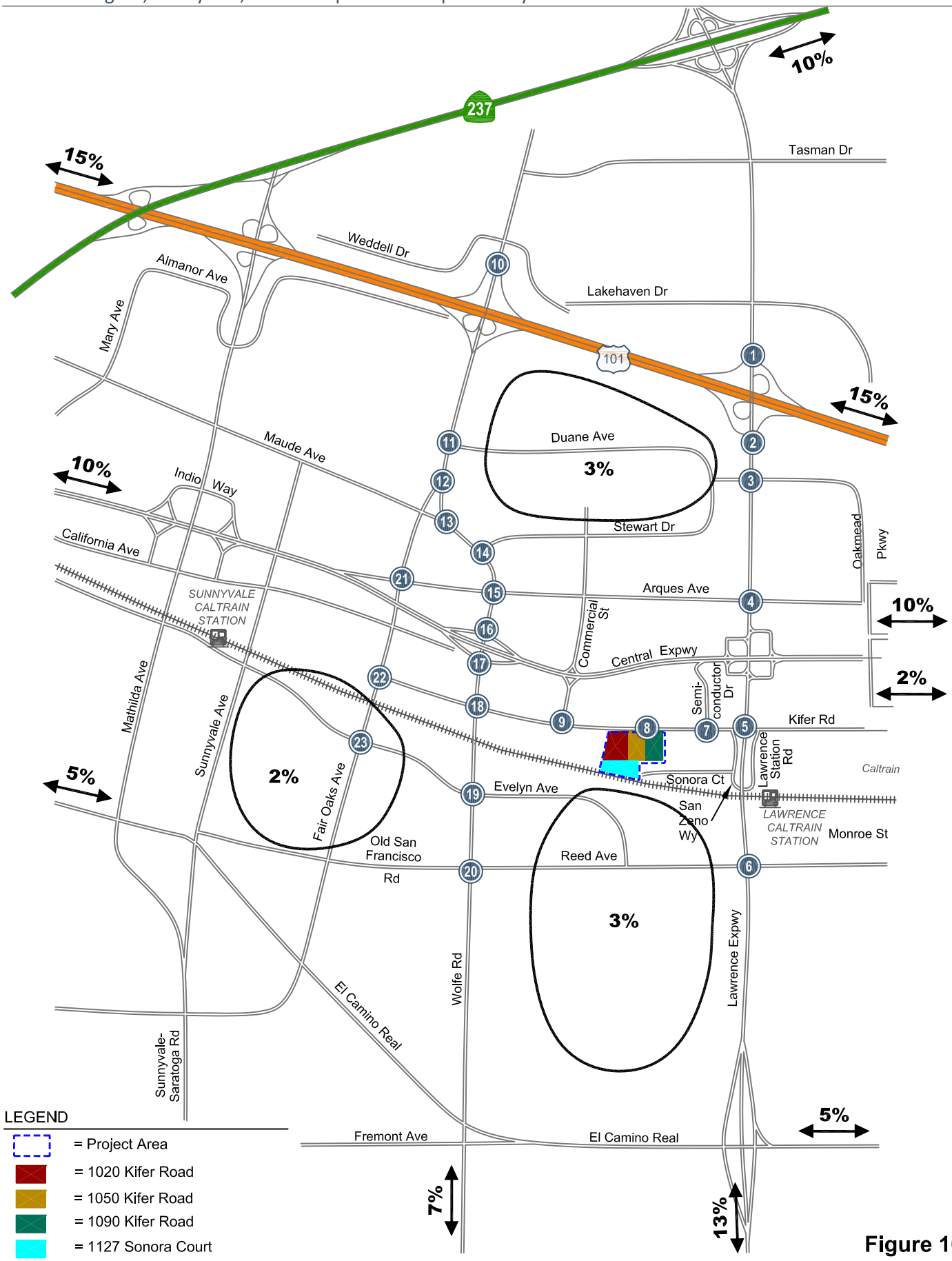
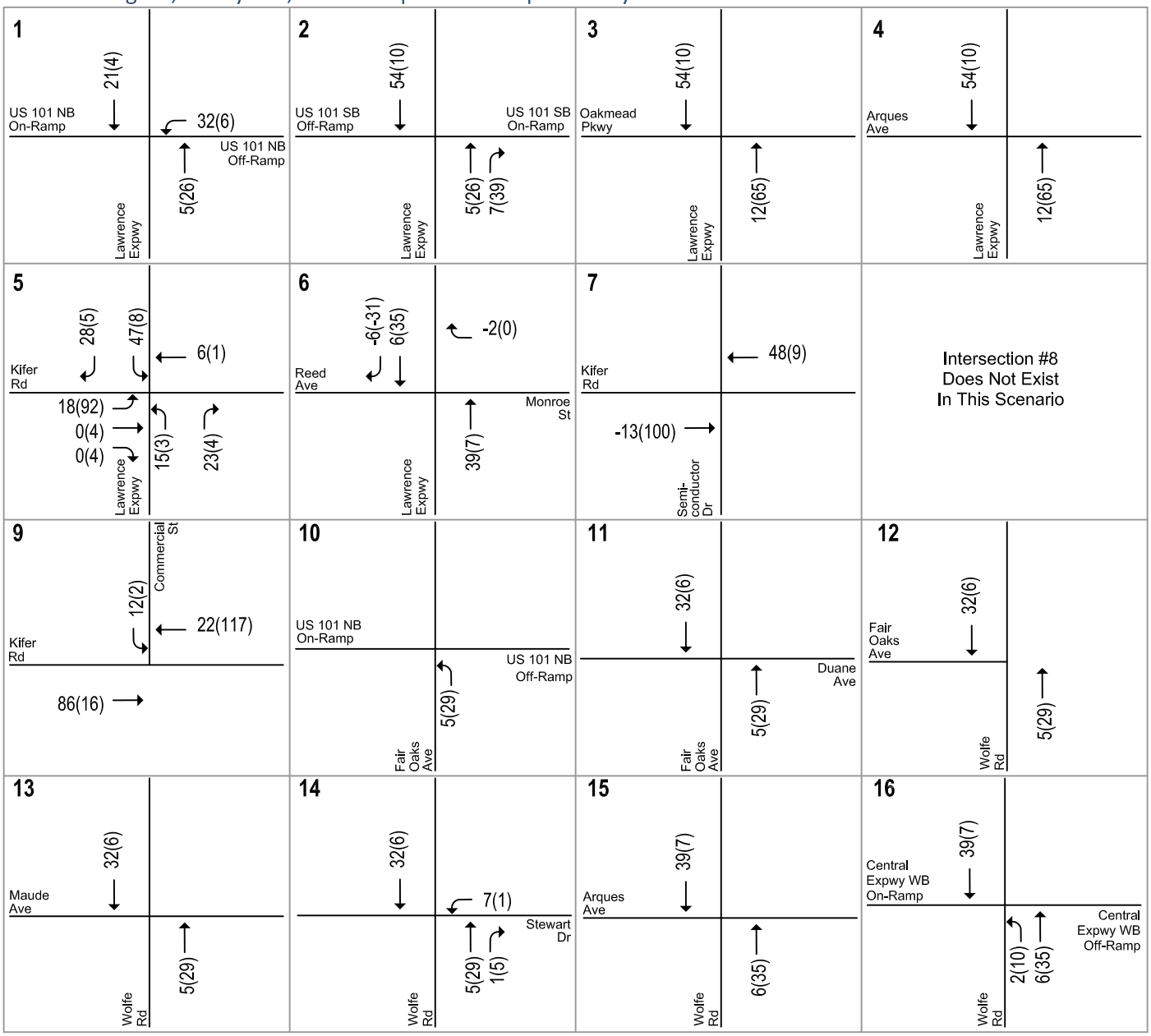


Figure 10
Project Trip Distribution

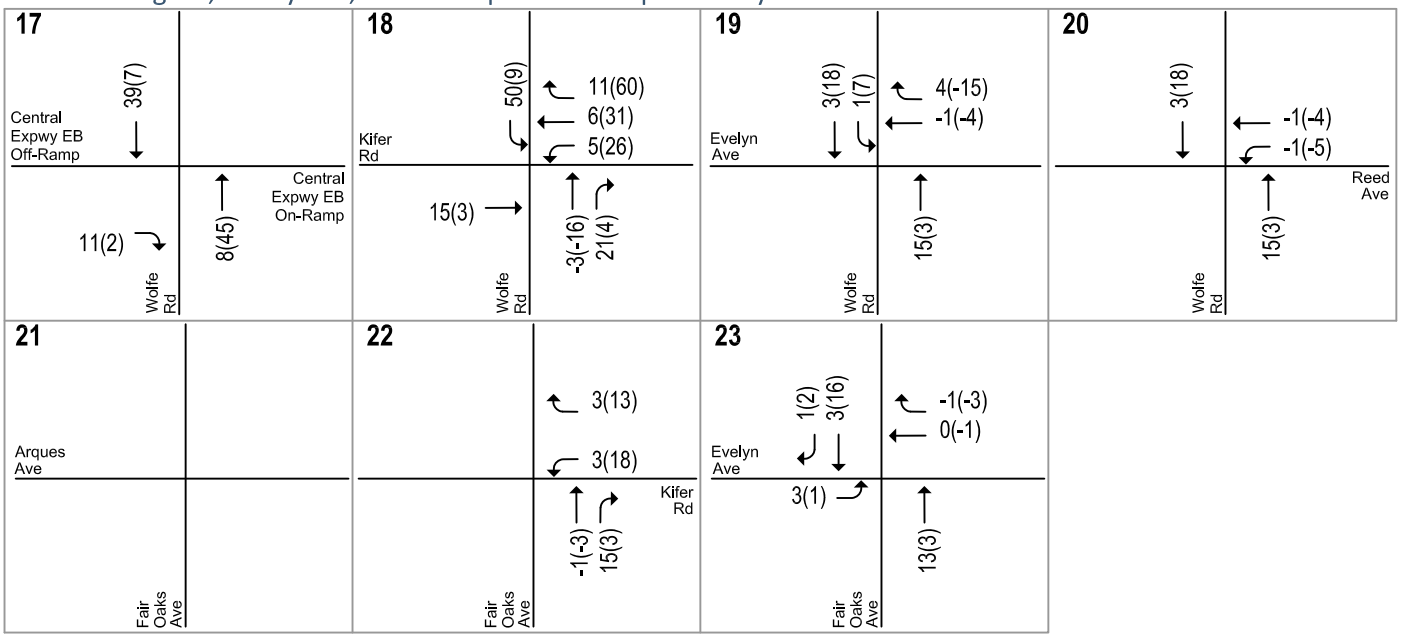


LEGEND

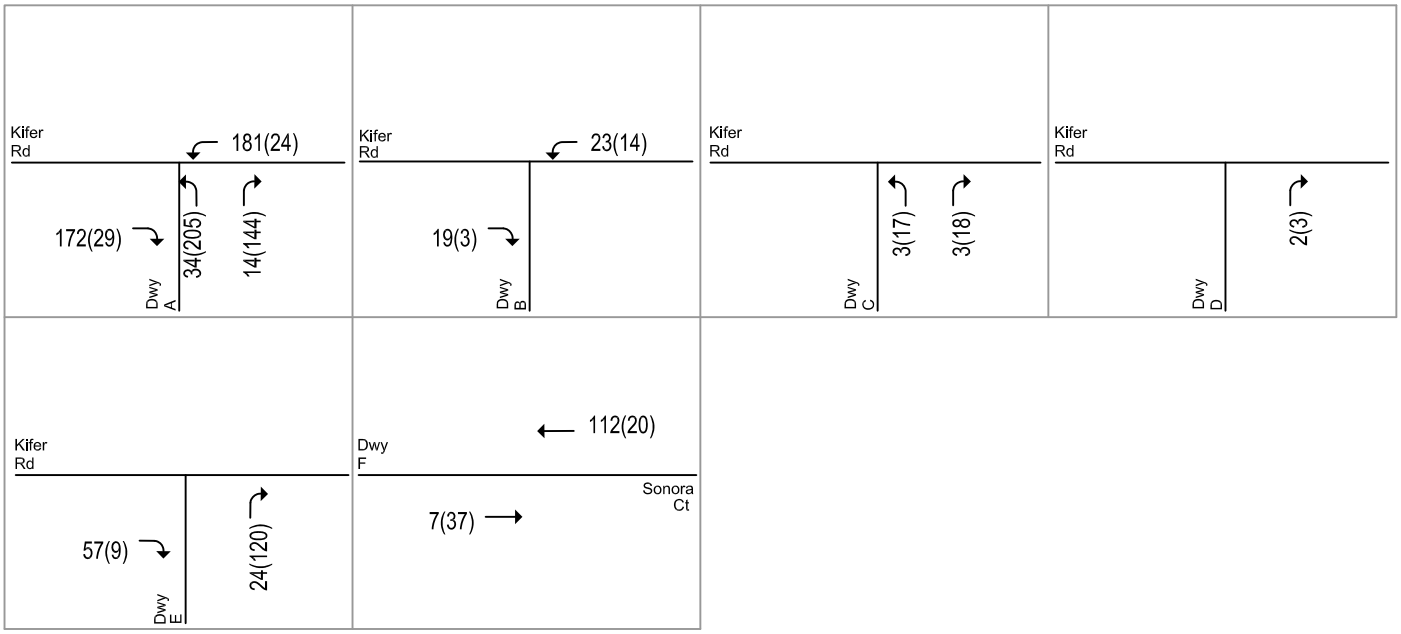
XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 11
Background Project Trip Assignment

NORTH
Not to Scale



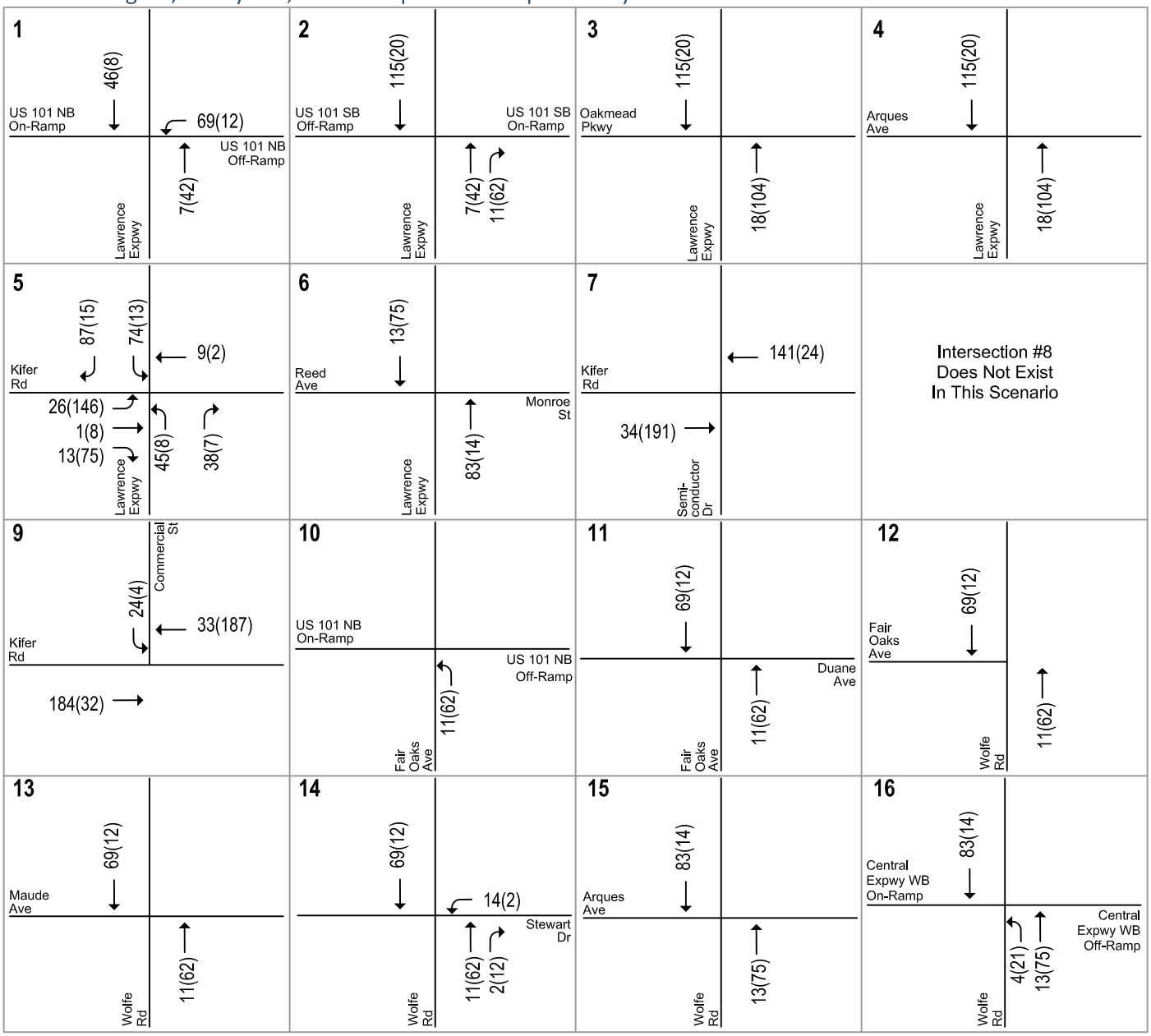
Driveway Trips Under Project Full Build-Out Conditions



LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

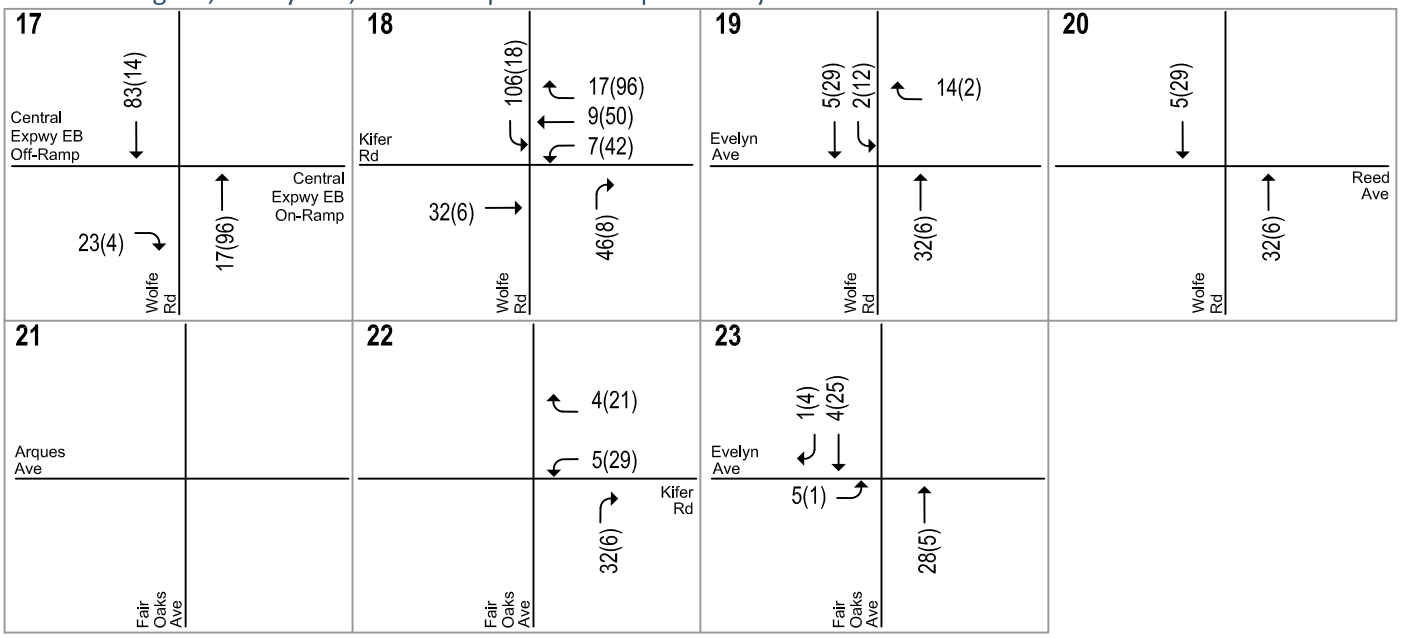
Figure 11
Background Project Trip Assignment



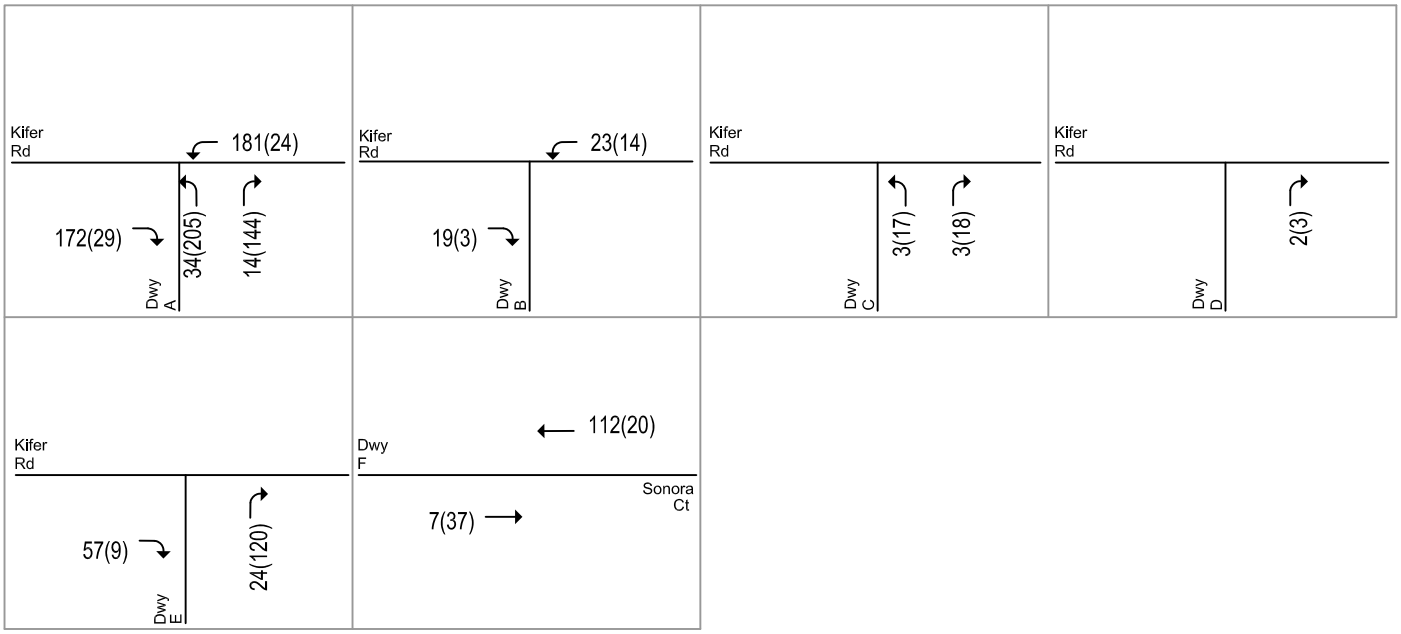
LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 12
Existing Project Trip Assignment



Driveway Trips Under Project Full Build-Out Conditions



LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 12
Existing Project Trip Assignment

Intersection Traffic Volumes

Project impacts were evaluated relative to both (1) background traffic volumes and (2) existing traffic volumes. For the background plus project scenario, the net new trips generated by the project assuming the site operating at full-occupancy were added to the background traffic volumes to derive the background plus project traffic volumes. For the existing plus project scenario, the net new trips generated by the project were added to the existing traffic volumes to derive the existing plus project traffic volumes. Under the project full buildout scenario, it is assumed that all existing traffic generated by 1020 Kifer Road would use the signalized driveway (Driveway A). Hexagon conducted trip generation counts of 1020 Kifer Road in May 2016 and determined that the 1020 Kifer Road building currently generates 107 trips (98 in and 9 out) during the AM peak hour and 133 trips (8 in and 125 out) during the PM peak hour.

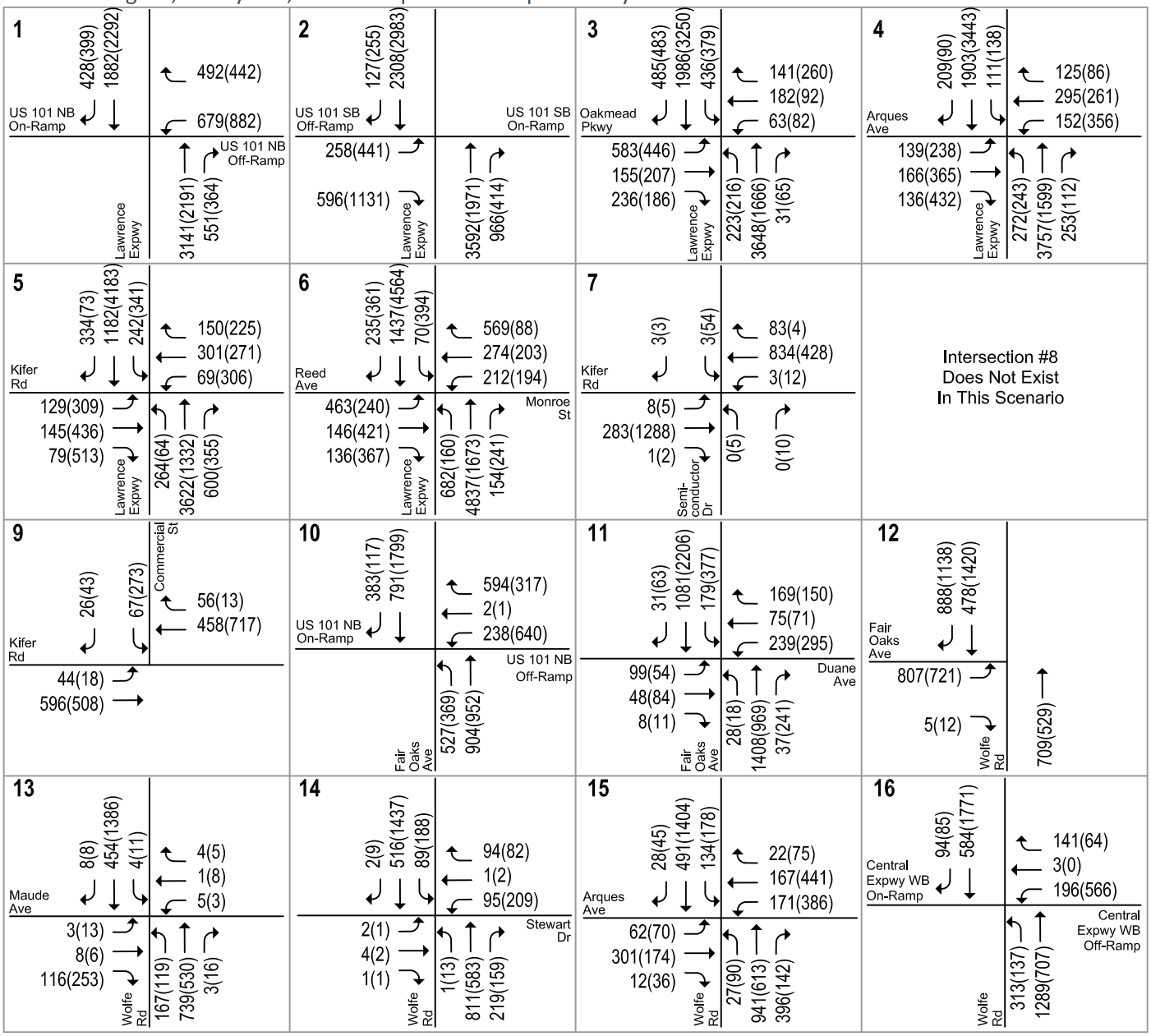
Figure 13 shows the intersection turning-movement volumes under background plus project conditions. Figure 14 shows the intersection turning-movement volumes under existing plus project conditions.

Transportation Network

It is assumed in this analysis that the transportation network under existing plus project and background plus project conditions, including roadways and intersection lane configurations, would be the same as that described under existing and background conditions, respectively, at all study intersections except at the signalized project driveway on Kifer Road and at the unsignalized intersection of Wolfe Road and Maude Avenue.

The proposed Lawrence Station Area Plan includes a road diet along Kifer Road between the western edge of the project site and Uranium Drive. The Kifer road diet would reduce the travel lanes from the current five lanes to three lanes (one through lane in each direction and a two-way left-turn median). The freed space along Kifer Road would be used to enhance the pedestrian and bicycle facilities. Since the project is consistent with the Lawrence Station Area Plan, it is assumed that the project applicant would coordinate with City staff to implement the Kifer Road diet along the project frontage. As shown on Figure 3 in Chapter 1, under project conditions, the project proposes to install a traffic signal at the western project driveway (Driveway A) and remove the existing signal at the eastern project driveway (Driveway D). Therefore, under background plus project and existing plus project conditions, the signalized driveway A is analyzed instead of the existing signalized driveway D.

The project proposes to install traffic signals at the unsignalized intersection of Wolfe Road and Maude Avenue. It is assumed that the intersection lane geometry would not be changed.

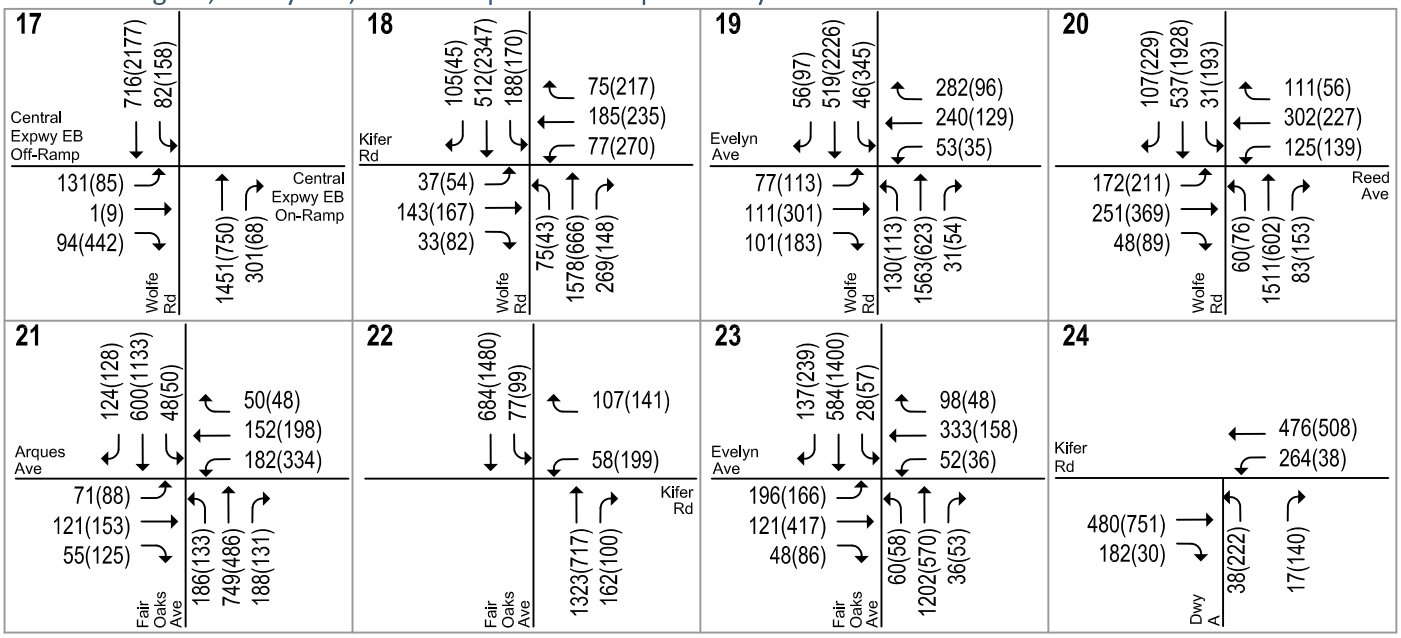


LEGEND

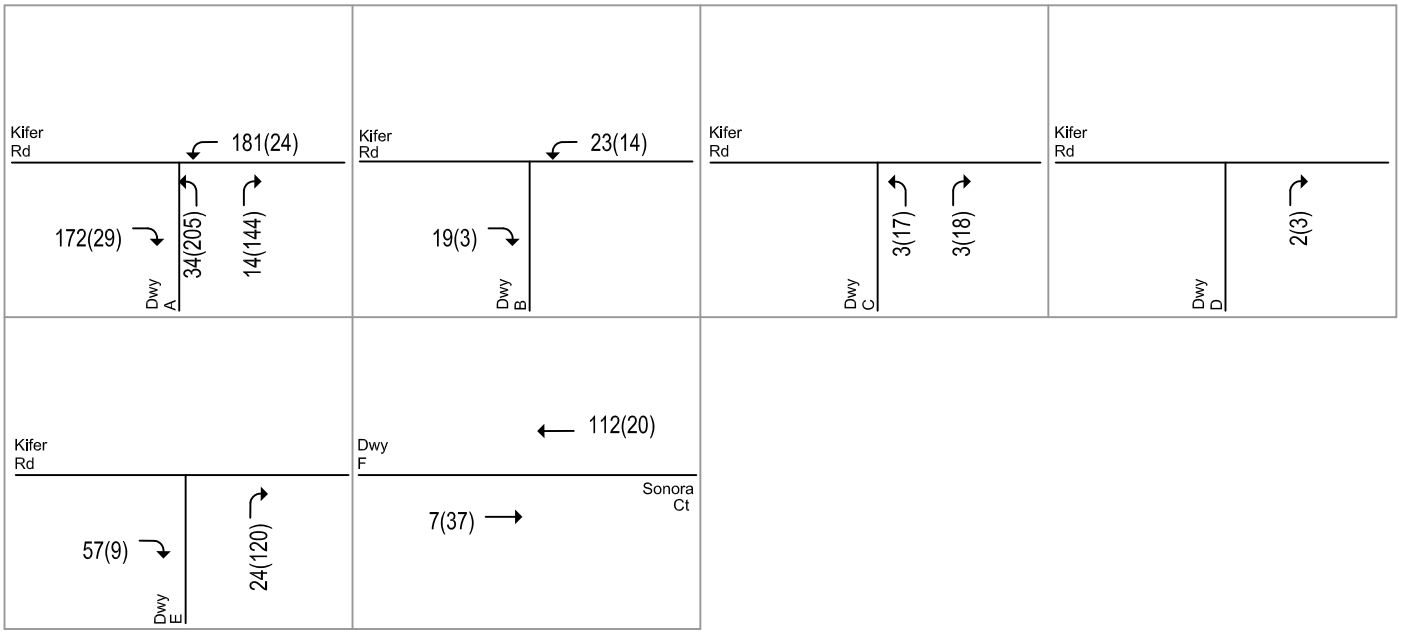
XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 13
Background Plus Project Traffic Volumes

NORTH
Not to Scale



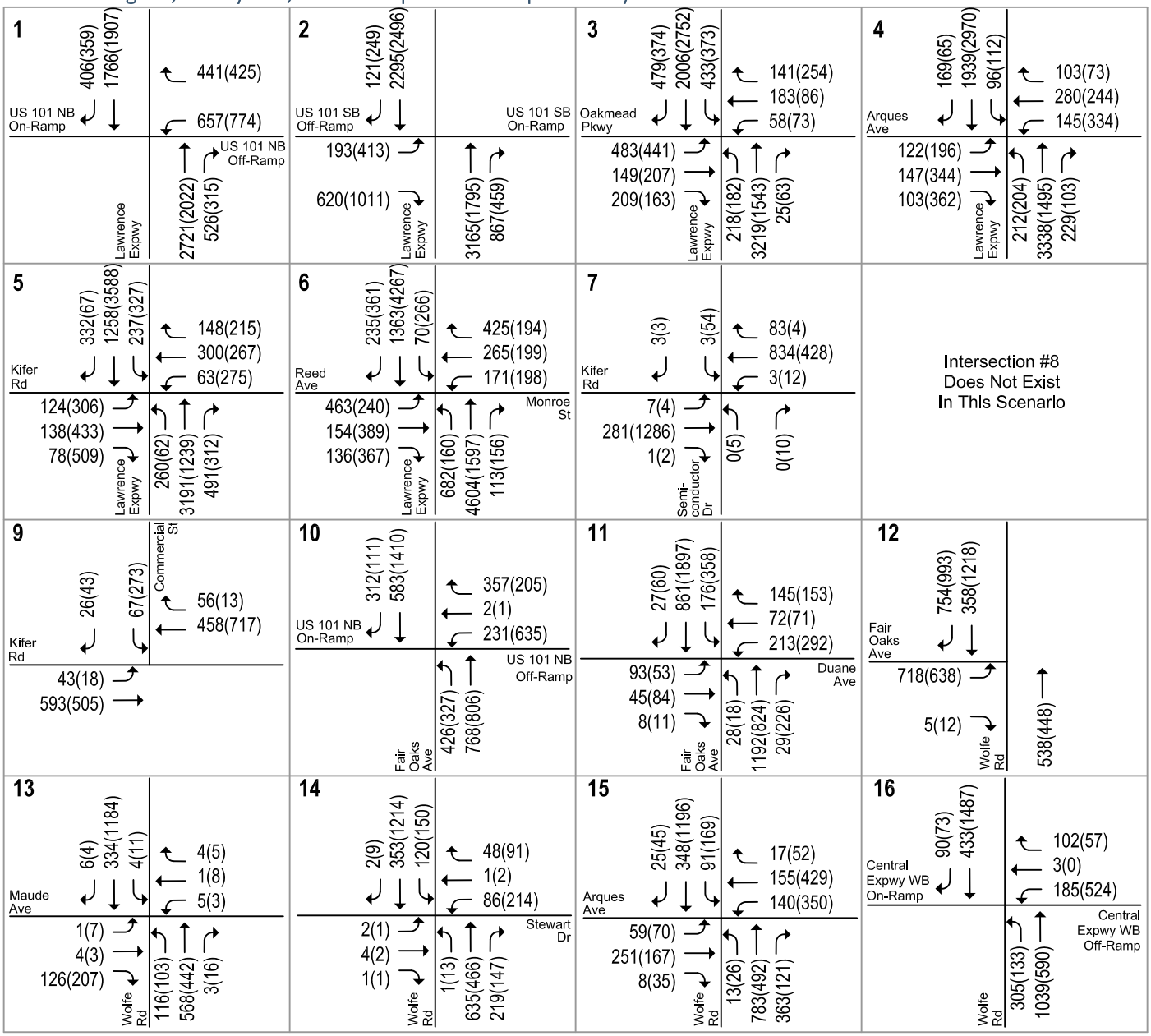
Driveway Trips Under Project Full Build-Out Conditions



LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 13
Background Plus Project Traffic Volumes

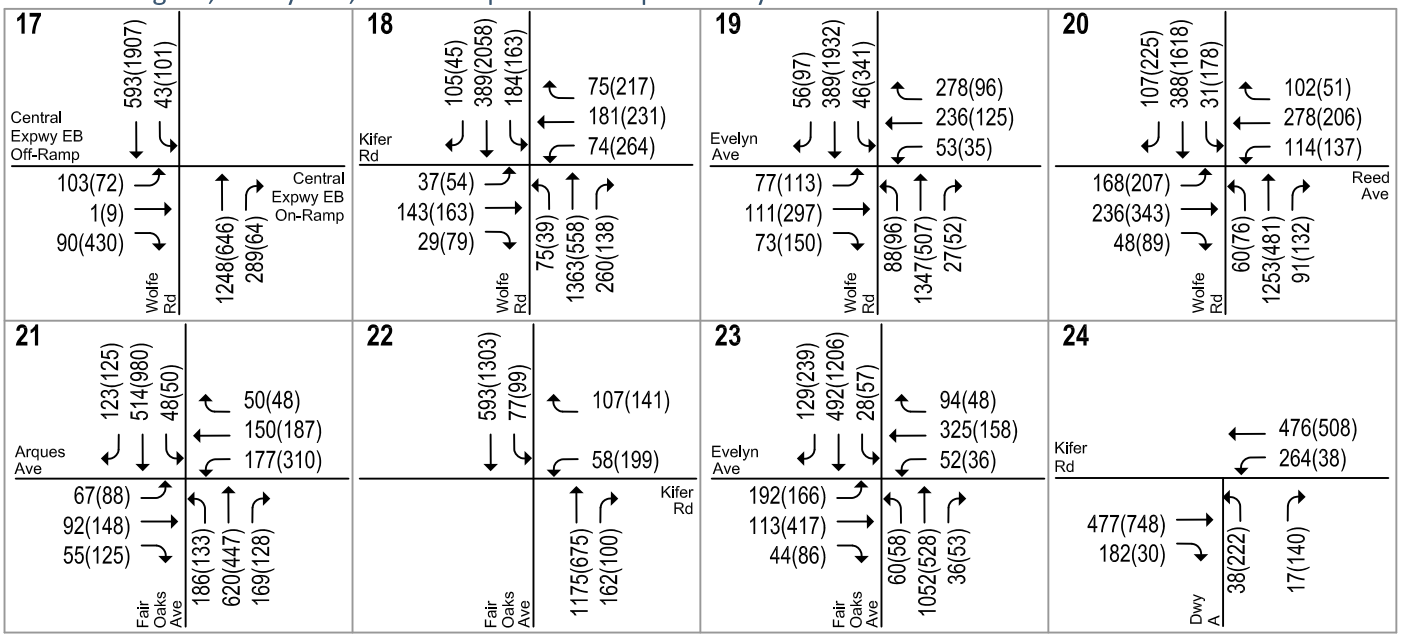


LEGEND

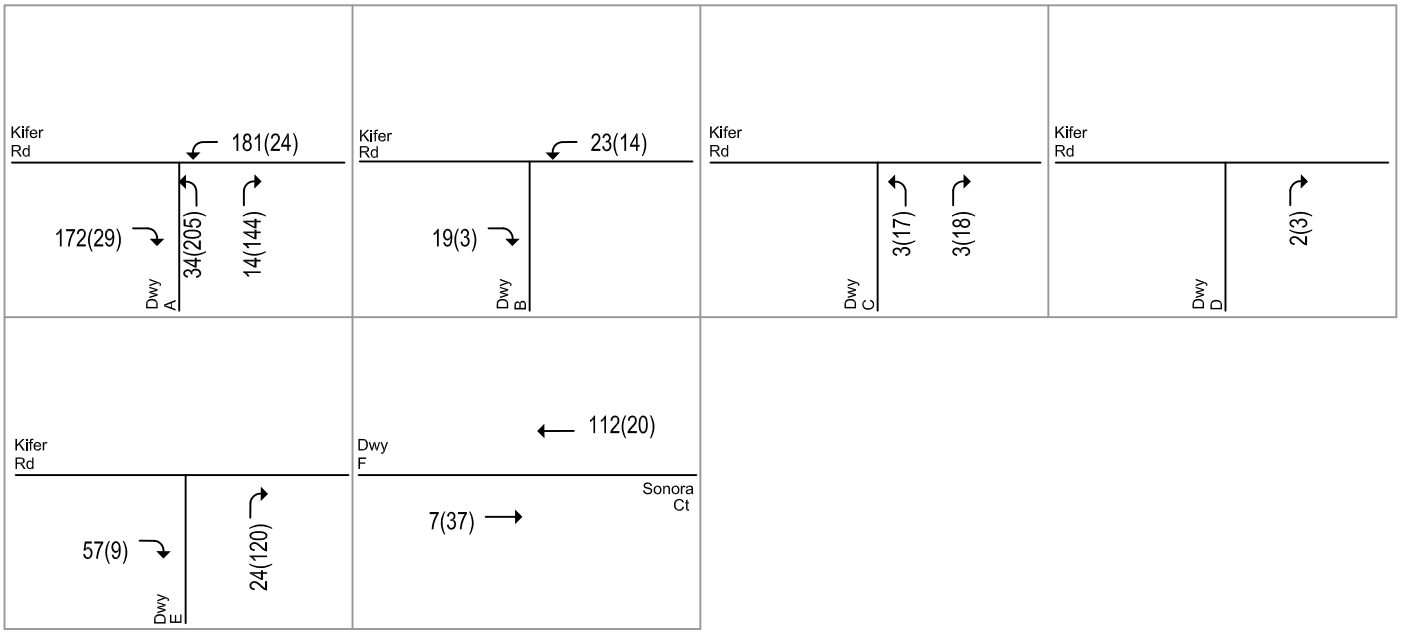
XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 14
Existing Plus Project Traffic Volumes

NORTH
Not to Scale



Driveway Trips Under Project Full Build-Out Conditions



LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 14
Existing Plus Project Traffic Volumes

Background plus Project Intersection Level of Service

The results of the intersection level of service analysis under background plus project conditions are summarized in Table 11. The results of the analysis show that the five study intersections listed below would operate at an unacceptable level of service during at least one peak hour under background plus project conditions.

- Lawrence Expressway & US 101 Southbound Ramps (#2) – PM Peak Hour (LOS F)
- Lawrence Expressway & Oakmead Parkway (#3) – AM Peak Hour (LOS F)
- Lawrence Expressway & Arques Avenue (#4) – PM Peak Hour (LOS F)
- Lawrence Expressway & Kifer Road (#5) – PM Peak Hour (LOS F)
- Lawrence Expressway & Reed Avenue (#6) – AM & PM Peak Hour (LOS F)

Based upon the impact criteria, the project would not generate a significant impact at any of the study intersections. The unsignalized intersection at Wolfe Road and Maude Avenue, which would operate at an unacceptable LOS F under background conditions, would operate at an acceptable LOS B under background plus project conditions because of the signalization of the intersection proposed by the project.

The significant impact criteria would not be met at the intersections on Lawrence Expressway at US 101 southbound ramps, at Oakmead Parkway, at Arques Avenue, at Kifer Road as well as at Reed Avenue. Therefore, the project impacts at these intersections are considered less than significant.

Table 11
Background Plus Project Level of Service Summary

#	Intersection	Peak Hour	LOS Std.	Background		Background Plus Project Build-Out			
				Avg. Del (sec)	LOS	Avg. Del (sec)	LOS	Incr. in Crit. Del. (sec)	Incr. in Crit. V/C
1	Lawrence Expressway & US 101 Northbound Ramps	AM	E	16.2	B	16.4	B	0.5	0.008
		PM		25.5	C	25.6	C	0.1	0.001
2	Lawrence Expressway & US 101 Southbound Ramps	AM	E	29.1	C	28.9	C	-0.1	0.001
		PM		**81.8**	**F**	**81.3**	**F**	**-1.4**	**0.004**
3	Lawrence Expressway & Oakmead Parkway	AM	E	**91.0**	**F**	**91.4**	**F**	**1.1**	**0.002**
		PM		63.4	E	63.6	E	0.7	0.001
4	Lawrence Expressway & Arques Avenue	AM	E	52.1	D-	52.3	D-	0.5	0.002
		PM		**80.4**	**F**	**80.6**	**F**	**1.0**	**0.002**
5	Lawrence Expressway & Kifer Road	AM	E	52.1	D-	52.4	D-	0.3	0.024
		PM		**99.4**	**F**	**100.3**	**F**	**0.5**	**0.003**
6	Lawrence Expressway & Reed Avenue/Monroe Street	AM	E	**138.6**	**F**	**140.2**	**F**	**-1.1**	**-0.001**
		PM		**108.5**	**F**	**110.9**	**F**	**3.7**	**0.005**
7	Semiconductor Drive & Kifer Road	AM	D	8.6	A	8.5	A	0.1	0.015
		PM		14.8	B	15.0	B	0.4	0.031
8	Project Driveway & Kifer Road [Driveway D]	AM	D	8.1	A	-	-	-	-
		PM		7.9	A	-	-	-	-
9	Commercial Street & Kifer Road (unsignalized)	AM	D	12.5	B	13.2	B	-	-
		PM		25.9	D	34.9	D	-	-
10	Fair Oaks Avenue & US 101 Northbound Ramps	AM	E	23.1	C	23.3	C	0.4	0.003
		PM		48.7	D	53.3	D-	7.8	0.019
11	Fair Oaks Avenue & Duane Avenue	AM	D	30.2	C	30.1	C	0.1	0.002
		PM		38.4	D+	38.6	D+	0.4	0.008
12	Wolfe Road & Fair Oaks Avenue	AM	D	24.7	C	24.8	C	0.0	0.002
		PM		22.9	C+	22.8	C+	0.0	0.001
13	Wolfe Road & Maude Avenue [1]	AM	D	33.4	D	11.8	B+	5.0	0.230
		PM		**122.6**	**F**	14.6	B	11.3	0.487
14	Wolfe Road & Stewart Drive	AM	D	15.6	B	15.7	B	-0.1	0.001
		PM		17.8	B	17.8	B	0.0	0.002
15	Wolfe Road & Arques Avenue	AM	D	26.4	C	26.3	C	-0.1	0.002
		PM		28.7	C	28.6	C	0.0	0.001
16	Wolfe Road & Central Expressway Westbound Ramps	AM	E	25.8	C	25.9	C	-0.1	0.007
		PM		28.1	C	28.4	C	0.5	0.007
17	Wolfe Road & Central Expressway Eastbound Ramps	AM	E	15.4	B	15.9	B	0.6	0.002
		PM		30.6	C	30.7	C	0.1	0.003
18	Wolfe Road & Kifer Road	AM	D	23.1	C	25.3	C	2.8	0.041
		PM		28.5	C	30.1	C	1.5	0.018
19	Wolfe Road & Evelyn Avenue	AM	D	26.0	C	26.0	C	0.1	0.006
		PM		25.4	C	25.4	C	0.0	0.004
20	Wolfe Road & Reed Avenue	AM	D	28.7	C	28.6	C	-0.1	0.003
		PM		29.4	C	29.3	C	0.0	0.002
21	Fair Oaks Avenue & Arques Avenue	AM	D	29.2	C	29.2	C	0.0	0.000
		PM		35.4	D+	35.4	D+	0.0	0.000
22	Fair Oaks Avenue & Kifer Road	AM	D	8.1	A	8.2	A	0.1	0.001
		PM		10.3	B+	10.8	B+	0.6	0.006
23	Fair Oaks Avenue & Evelyn Avenue	AM	D	28.1	C	28.1	C	0.1	0.006
		PM		27.4	C	27.5	C	0.2	0.006
24	Project Driveway (new) & Kifer Road [Driveway A]	AM	D	-	-	13.3	B	-	-
		PM		-	-	20.8	C+	-	-

Notes:

Delay and LOS reported for the unsignalized intersections represent the approach that experiences the worst delay
BOLD indicates a substandard level of service. **BOLD and boxed** indicates a significant project impact.

The Project Driveway and Kifer Road [Driveway D] would be converted from signalized control to unsignalized control in the Project Build Out scenarios.

The Project Driveway (new) and Kifer Road [Driveway A] would be converted from unsignalized control to signalized control in the Project Build Out scenarios.

1. The project proposes to install traffic signals at the unsignalized Wolfe Road/Maude Avenue intersection under project conditions.

Existing plus Project Intersection Level of Service

The results of the intersection level of service analysis under existing plus project conditions are summarized in Table 12. The results of the analysis show that the three study intersections listed below would operate at an unacceptable level of service during at least one peak hour under existing plus project conditions.

- Lawrence Expressway & Kifer Road (#5) – PM Peak Hour (LOS F)
- Lawrence Expressway & Reed Avenue (#6) – AM & PM Peak Hour (LOS F)
- Commercial Street & Kifer Road (#9) – PM Peak Hour (LOS F)

Based upon the impact criteria, the project would generate significant impacts at the following two signalized intersections:

- Lawrence Expressway & Kifer Road (#5) – PM Peak Hour
- Lawrence Expressway & Reed Avenue (#6) – PM Peak Hour

Because the unsignalized study intersection at Commercial Street and Kifer Road would operate at an unacceptable LOS F during the PM peak hour under existing conditions and meet signal warrants, by Sunnyvale's significant impact criteria, the project would create a significant impact at this intersection.

Existing plus Project Potential Intersection Mitigation Strategies

Lawrence Expressway & Kifer Road (#5)

At the intersection of Lawrence Expressway and Kifer Road, a significant impact is identified under existing plus project conditions but not under background plus project conditions. This is because background conditions assumed the full occupancy of the existing buildings on site and thus the "project traffic" when comparing background plus project conditions to background conditions is less than when comparing existing plus project conditions to existing conditions.

The Lawrence Expressway and Kifer Road intersection is planned to be grade-separated in the draft County Expressway Plan. The project should pay the Sunnyvale Traffic Impact Fee (TIF), which would constitute its fair-share contribution toward the cost of the grade separation at Kifer Road.

Although no design of the grade separation is available, it is assumed to allow the intersection to operate at an acceptable LOS D. Under the City of Sunnyvale's standards, the proposed mitigation would eliminate the significant impact. With the proposed mitigation, the traffic impact at this intersection would be *less than significant*.

Lawrence Expressway & Reed Avenue (#6)

At the intersection of Lawrence Expressway and Reed Avenue, a significant impact is identified under existing plus project conditions but not under background plus project conditions. This is because background conditions assumed the full occupancy of the existing buildings on site and thus the "project traffic" when comparing background plus project conditions to background conditions is less than when comparing existing plus project conditions to existing conditions.

The Lawrence Expressway and Reed Avenue intersection is planned to be grade-separated in the draft County Expressway Plan. The project should pay the Sunnyvale Traffic Impact Fee (TIF), which would constitute its fair-share contribution toward the cost of the grade separation at Reed Avenue.

Although no design of the grade separation is available, it is assumed to allow the intersection to operate at an acceptable LOS D. Under the City of Sunnyvale's standards, the proposed mitigation would eliminate the significant impact. With the proposed mitigation, the traffic impact at this intersection would be *less than significant*.

Commercial Street & Kifer Road (#9)

At the unsignalized intersection of Commercial Street and Kifer Road, a significant impact is identified under existing plus project conditions but not under background plus project conditions. This is because under background conditions the City of Sunnyvale is assumed to restripe the two-way-left-turn-lane east of the intersection to provide a refuge area for left turns (see Figure 8 in Chapter 3). With this improvement, the intersection would operate at an acceptable LOS D under background plus project conditions. Therefore, this intersection impact under existing plus project conditions is only temporary until the City restripes this intersection. The City has identified that this restriping will be complete prior to opening of the project. With the City planned restriping, the traffic impact at this intersection would be *less than significant*.

Table 12
Existing Plus Project Level of Service Summary

#	Intersection	Peak Hour	LOS Std.	Existing		Existing Plus Project Build-Out			
				Avg. Del (sec)	LOS	Avg. Del (sec)	LOS	Incr. in Crit. Del. (sec)	Incr. in Crit. V/C
1	Lawrence Expressway & US 101 Northbound Ramps	AM	E	15.6	B	16.2	B	1.0	0.016
		PM		25.1	C	25.3	C	0.2	0.004
2	Lawrence Expressway & US 101 Southbound Ramps	AM	E	34.3	C-	33.6	C-	-0.1	0.001
		PM		68.9	E	68.2	E	-2.0	0.005
3	Lawrence Expressway & Oakmead Parkway	AM	E	60.9	E	61.3	E	1.0	0.003
		PM		53.0	D-	53.1	D-	0.2	0.003
4	Lawrence Expressway & Arques Avenue	AM	E	45.0	D	45.0	D	0.3	0.003
		PM		60.0	E	60.1	E	0.7	0.003
5	Lawrence Expressway & Kifer Road	AM	E	37.7	D+	38.5	D+	2.3	0.027
		PM		75.8	E-	**82.5**	**F**	**18.1**	**0.047**
6	Lawrence Expressway & Reed Avenue/Monroe Street	AM	E	**203.1**	**F**	**206.6**	**F**	**-1.6**	**0.002**
		PM		**86.5**	**F**	**90.9**	**F**	**7.4**	**0.011**
7	Semiconductor Drive & Kifer Road	AM	D	8.3	A	8.5	A	0.2	0.043
		PM		14.7	B	15.0	B	0.7	0.058
8	Project Driveway & Kifer Road [Driveway D]	AM	D	3.1	A	-	-	-	-
		PM		3.9	A	-	-	-	-
9	Commercial Street & Kifer Road (unsignalized)	AM	D	14.9	B	19.2	C	-	-
		PM		**62.6**	**F**	**172.1**	**F**	-	-
10	Fair Oaks Avenue & US 101 Northbound Ramps	AM	E	16.5	B	16.6	B	0.2	0.007
		PM		21.0	C+	24.4	C	6.1	0.041
11	Fair Oaks Avenue & Duane Avenue	AM	D	26.3	C	26.0	C	0.0	0.004
		PM		32.1	C-	32.1	C-	0.0	0.018
12	Wolfe Road & Fair Oaks Avenue	AM	D	23.6	C	23.9	C	0.1	0.003
		PM		21.8	C+	21.6	C+	0.0	0.003
13	Wolfe Road & Maude Avenue [1]	AM	D	19.5	C	11.2	B+	4.9	0.178
		PM		**51.2**	**F**	14.0	B	10.6	0.417
14	Wolfe Road & Stewart Drive	AM	D	16.1	B	16.8	B	0.9	0.012
		PM		19.1	B-	19.1	B-	0.0	0.004
15	Wolfe Road & Arques Avenue	AM	D	24.8	C	24.8	C	-0.1	0.003
		PM		28.4	C	28.3	C	-0.1	0.003
16	Wolfe Road & Central Expressway Westbound Ramps	AM	E	24.6	C	25.1	C	0.6	0.014
		PM		28.7	C	29.2	C	1.3	0.015
17	Wolfe Road & Central Expressway Eastbound Ramps	AM	E	12.5	B	14.1	B	0.3	0.000
		PM		29.6	C	29.7	C	0.1	0.005
18	Wolfe Road & Kifer Road	AM	D	21.1	C+	25.7	C	5.9	0.087
		PM		26.8	C	29.3	C	2.2	0.029
19	Wolfe Road & Evelyn Avenue	AM	D	26.0	C	26.2	C	0.4	0.016
		PM		24.6	C	24.7	C	0.1	0.005
20	Wolfe Road & Reed Avenue	AM	D	28.8	C	28.7	C	-0.1	0.007
		PM		28.8	C	28.7	C	0.0	0.006
21	Fair Oaks Avenue & Arques Avenue	AM	D	29.7	C	29.7	C	0.0	0.000
		PM		34.4	C-	34.4	C-	0.0	0.000
22	Fair Oaks Avenue & Kifer Road	AM	D	8.4	A	8.5	A	0.1	0.001
		PM		10.6	B+	11.4	B+	1.0	0.010
23	Fair Oaks Avenue & Evelyn Avenue	AM	D	28.1	C	28.2	C	0.2	0.012
		PM		26.7	C	26.8	C	0.1	0.008
24	Project Driveway (new) & Kifer Road [Driveway A]	AM	D	-	-	13.2	B	-	-
		PM		-	-	16.1	B	-	-

Notes:

Delay and LOS reported for the unsignalized intersections represent the approach that experiences the worst delay
BOLD indicates a substandard level of service. **BOLD and boxed** indicates a significant project impact.

The Project Driveway and Kifer Road [Driveway D] would be converted from signalized control to unsignalized control in the Project Build Out scenarios.

The Project Driveway (new) and Kifer Road [Driveway A] would be converted from unsignalized control to signalized control in the Project Build Out scenarios.

1. The project proposes to install traffic signals at the unsignalized Wolfe Road/Maude Avenue intersection under project conditions.

Project Conditions Freeway Analysis

The results of the CMP freeway analysis show that the project freeway traffic would not exceed 1%, thus the project freeway impacts would be less than significant (see Table 13).

Table 13
Project Freeway Level of Service

				Existing Conditions					Intuitive Surgical Project Trips	
				Mixed-Flow					Mixed-Flow	
Freeway	Segment	Dir	Peak Hour	Ave. Speed	# of Lanes	Capacity	Volume	LOS	Project Trips	% Capacity
US 101	Bower Ave / Great American Pkwy to Lawrence Expwy	NB	AM	**20**	**3**	**6900**	**4980**	**F**	32	0.5%
			PM	48	3	6900	6480	D	6	0.1%
US 101	Lawrence Expwy to N. Fair Oaks Ave	NB	AM	**17**	**3**	**6900**	**4590**	**F**	0	0.0%
			PM	65	3	6900	5850	D	0	0.0%
US 101	N. Fair Oaks Ave to N. Mathilda Ave	NB	AM	**34**	**3**	**6900**	**6020**	**F**	5	0.1%
			PM	66	3	6900	5510	D	29	0.4%
US 101	N. Mathilda Ave to N. Fair Oaks Ave	SB	AM	63	3	6900	6430	D	32	0.5%
			PM	51	3	6900	6580	D	6	0.1%
US 101	N. Fair Oaks Ave to Lawrence Expwy	SB	AM	58	3	6900	6620	D	0	0.0%
			PM	**26**	**3**	**6900**	**5540**	**F**	0	0.0%
US 101	Lawrence Expwy to Bower Ave / Great American Pkwy	SB	AM	42	3	6900	6300	E	7	0.1%
			PM	**15**	**3**	**6900**	**4370**	**F**	39	0.6%
SR 237	Lawrence Expwy to Great America Pkwy	EB	AM	62	2	4400	4340	D	5	0.1%
			PM	**14**	**2**	**4400**	**2800**	**F**	26	0.6%
SR 237	Great America Pkwy to Lawrence Expwy	WB	AM	55	2	4400	4400	D	21	0.5%
			PM	64	2	4400	4100	D	4	0.1%

Notes:
1. Existing freeway conditions referenced the *Santa Clara Valley Transportation Authority Congestion Management Program Monitoring Study* , 2014.
2. Intuitive Surgical project trips are estimated via manual trip assignment.
3. Freeway LOS criteria referenced *Traffic Level of Service Analysis Guidelines* , VTA Congestion Management Program, June 2003.
BOLD indicates a substandard level of service.

Project Conditions Freeway Ramp Analysis

Freeway ramp volumes under project conditions were estimated by adding project trips to the existing volumes obtained from Caltrans. The peak-hour ramp volumes under project conditions is shown in Table 14.

The ramp analysis shows that the study freeway ramps currently have sufficient capacity to service the existing traffic volumes and that the study freeway ramps would continue to have sufficient capacity to serve the projected traffic volumes under the project conditions.

Table 14
Project Conditions Ramp Capacity Summary

				Existing Conditions			Intuitive Surgical		
Interchange	Ramp	Type	Pk Hr	Capacity [1]	Peak Volume [2]	V/C	Project Trips	Peak Volume	V/C
US 101/Fair Oaks Ave	NB On Ramp from Fair Oaks Ave	Diagonal [3]	AM	1800	608	0.34	5	613	0.34
			PM	2000	402	0.20	29	431	0.22
	SB Off Ramp to SB Fair Oaks Ave	Diagonal	AM	2000	246	0.12	32	278	0.14
			PM	2000	686	0.34	6	692	0.35
US 101/Lawrence Expwy	SB On Ramp from NB Lawrence Expwy	Diagonal [3]	AM	2000	857	0.43	7	864	0.43
			PM	1800	607	0.34	39	646	0.36
	NB Off Ramp to Lawrence Expwy	Diagonal	AM	3800	1188	0.31	32	1220	0.32
			PM	3800	1344	0.35	6	1350	0.36
SR 237/Lawrence Expwy	EB On Ramp from NB Lawrence Expwy	Diagonal	AM	2000	1513	0.76	5	1518	0.76
			PM	1500	1206	0.80	26	1232	0.82
	WB Off Ramp to SB Lawrence Expwy	Loop	AM	1800	709	0.39	21	730	0.41
			PM	1800	732	0.41	4	736	0.41

Notes:
1. Ramp capacities were obtained from the Highway Capacity Manual 2000 (pg. 25-4), and considered the free-flow speed, the number of lanes on the ramp, and ramp metering.
2. Existing peak hour volumes are obtained through personal communication with Caltrans staff on August 11, 2015.
3. On-ramps were not metered during field observation in July 2016. However, because ramp meter equipment is installed at both on-ramps, this study assumes that the northbound on-ramps are metered during the AM peak hour and the southbound on-ramps are metered during the PM peak hour.

5. Project Phase 1 Conditions

This chapter describes the roadway traffic operations under background plus project Phase 1 conditions and existing plus project Phase 1 conditions, the method by which project traffic is estimated, and any deficiencies caused by Phase 1 of the project. Project Phase 1 conditions are presented for information purposes only.

Project Description

Phase 1 of the project would consist of the demolition of two of the existing buildings (1050 Kifer Road and 1127 Sonora Court) and the construction of one 297,000 s.f. building. The existing building at 1090 Kifer Road is assumed to be fully occupied during Phase 1 conditions. Access to the project site would be provided via five driveways on Kifer Road as well as one driveway at the cul-de-sac on Sonora Court. Under Phase 1 conditions, the surface parking lot directly north of the buildings can be accessed via all driveways. Most of the project driveways are the same as described under the full build-out conditions, except for driveways A, C and D, which are briefly described below. As part of the project, traffic signals would also be installed at the currently unsignalized intersection at Wolfe Road and Maude Avenue.

Driveway A – full-access, inbound/outbound, unsignalized. Located along Kifer Road in the northwest corner of the project area and is the western most driveway. Driveway A would provide direct access to and from the surface parking lot and Garage #1.

Driveway C - right-out, outbound, unsignalized. Located along Kifer Road and is the center driveway. Driveway C would serve as an exit from the loading zone loop.

Driveway D – full-access, inbound/outbound, signalized. Located along Kifer Road and is the second driveway from the east. Driveway D would provide direct access to and from the surface parking lot and Garage #1.

The driveway locations are labeled on Figure 2 in Chapter 1.

Project Trip Estimates

The project trip generation, distribution, and assignment procedure is the same as discussed in Chapter 4, except the trip generation studied in this chapter includes only Phase 1 development. The trip generation estimates for project Phase 1 conditions are discussed below.

Trip Generation

Daily and peak-hour trip generation estimates for the proposed project were based on trip rates published in the ITE *Trip Generation Manual, 9th Edition* for general office building and research and development (R&D) center. It is assumed that the proposed development is half office use and half R&D use. Based on ITE trip rates, it is estimated that the project Phase 1 development would generate 2,842 gross daily vehicle trips, with 413 gross trips (354 in and 59 out) during the AM peak hour and 380 gross trips (62 in and 318 out) during the PM peak hour (see Table 15).

Background plus Project Phase 1 Conditions

Traffic volumes under background plus project Phase 1 conditions were estimated by adding to the background traffic volumes (discussed in Chapter 3) the net trips generated by the proposed project Phase 1 development. The project would be required to implement a Transportation Demand Management (TDM) plan that would achieve a minimum 20 percent reduction in daily trips and a minimum 35 percent reduction in peak-hour trips for the new building.

The background scenario assumes that the existing buildings on the project site are fully occupied and would not be subject to any TDM plans. Therefore, the project will receive credit for trips associated with the existing buildings to be demolished in Phase 1 (1050 Kifer Road and 1127 Sonora Court). Trip generation estimates for the existing buildings at full occupancy are discussed in Chapter 3.

After accounting for the trip credits and trip reduction, the project under background plus project Phase 1 conditions is expected to generate a net increase of 122 trips (105 in and 17 out) during the AM peak hour and 114 trips (19 in and 95 out) during the PM peak hour (see Table 15).

Table 15
Background Plus Project Phase 1 Trip Generation Summary

Use	Size	Units	Daily Trips	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Proposed Project									
Phase I									
Office[1]	148,500	s.f.	1,638	204	28	232	38	183	221
R & D[2]	148,500	s.f.	1,204	150	31	181	24	135	159
Subtotal			*2,842*	*354*	*59*	*413*	*62*	*318*	*380*
TDM Reduction [3]			(568)	(124)	(21)	(145)	(22)	(111)	(133)
Total Project Trips			**2,274**	**230**	**38**	**268**	**40**	**207**	**247**
Existing Entitlement[4]									
1050 Kifer Road									
Office[1]	20,258	s.f.	223	28	4	32	5	25	30
R & D[2]	20,257	s.f.	164	21	4	25	3	19	22
1127 Sonoma Court									
Office[1]	31,803	s.f.	351	44	6	50	8	39	47
R & D[2]	31,803	s.f.	258	32	7	39	5	29	34
Total Entitlement				**125**	**21**	**146**	**21**	**112**	**133**
Background Plus Project Conditions									
Phase I - Project Trips Net Entitlement				***105***	***17***	***122***	***19***	***95***	***114***

[1] Trip generation rates based on General Office Building (Land Use Code 710) from *ITE Trip Generation Manual*, 9th Edition.
[2] Trip generation rates based on Research and Development Center (Land Use Code 760) from *ITE Trip Generation Manual*, 9th Edition.
[3] The project would be required to implement a TDM plan that would reduce daily trips by 20% and peak-hour trips by 35%. It is assumed that under Phase I conditions, the TDM plan would apply to both the new building and the re-occupied 1090 Kifer Road building.
[4] Trips associated with the existing entitlement at the project site are estimated using the trip generation rates from General Office Building and Research and Development Center.
[5] Under Phase I conditions, the building at 1090 Kifer Rd could be re-occupied without City permits.

Existing plus Project Phase 1 Conditions

Traffic volumes under existing plus project conditions were estimated by adding to the existing traffic volumes the net trips generated by the proposed project Phase 1 development. The net project trips under the existing plus project conditions are calculated by crediting the trips currently generated by the buildings to be demolished in Phase 1 (1050 Kifer Road and 1127 Sonora Court) and by applying the TDM trip reduction discussed above.

Under existing plus project Phase 1 conditions, the building at 1090 Kifer Road would not be demolished and would be fully occupied. Because re-occupying the existing 1090 Kifer Road building would not require City approval, trips associated with 1090 Kifer Road would not be counted towards the project. Instead, trips generated by re-occupying the existing 1090 Kifer Road building would be added to existing conditions to generate a "modified existing" scenario (further discussed below.)

Under existing plus Phase 1 conditions, the project is expected to generate a net increase of 265 trips (228 in and 37 out) during the AM peak hour, and 246 trips (40 in and 206 out) during the PM peak hour (see Table 16).

Table 16
Existing Plus Project Phase 1 Trip Generation Summary

Use	Size	Units	Daily Trips	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Proposed Project									
Phase I									
Office[1]	148,500	s.f.	1,638	204	28	232	38	183	221
R & D[2]	148,500	s.f.	1,204	150	31	181	24	135	159
Subtotal			*2,842*	*354*	*59*	*413*	*62*	*318*	*380*
TDM Reduction [3]			(568)	(124)	(21)	(145)	(22)	(111)	(133)
Total Project Trips			**2,274**	**230**	**38**	**268**	**40**	**207**	**247**
Existing Driveway Count[4]									
1050 Kifer Road				2	1	3	0	1	1
1127 Sonoma Court				0	0	0	0	0	0
Total Driveway Trips				**2**	**1**	**3**	**0**	**1**	**1**
Existing plus Project Conditions									
Phase I - Project Trips Net Driveway Counts				***228***	***37***	***265***	***40***	***206***	***246***

Notes:

[1] Trip generation rates based on General Office Building (Land Use Code 710) from *ITE Trip Generation Manual*, 9th Edition.

[2] Trip generation rates based on Research and Development Center (Land Use Code 760) from *ITE Trip Generation Manual*, 9th Edition.

[3] The project would be required to implement a TDM plan that would reduce daily trips by 20% and peak-hour trips by 35%. It is assumed that under Phase I conditions, the TDM plan would apply to both the new building and the re-occupied 1090 Kifer Road building.

[4] Existing site driveway counts are based on driveway counts conducted on May 17, 2016 during both the AM (7-9 AM) and PM (4-6 PM) peak hours of commute traffic.

[5] Under Phase I conditions, the building at 1090 Kifer Rd could be re-occupied without City permits. Trips associated with the existing entitlement at the 1090 Kifer Rd building are estimated using the trip generation rates from General Office Building and Research and Development Center.

Intersection Traffic Volumes

For the background plus project Phase 1 scenario, the net new trips generated by the project Phase 1 development assuming the site operating at full-occupancy were added to the background traffic volumes to derive the background plus project Phase 1 traffic volumes (see Figure 15). For the existing plus project Phase 1 scenario, the net new trips generated by the project Phase 1 development crediting the driveway counts were added to the existing traffic volumes to derive the existing plus project Phase 1 traffic volumes (see Figure 16).

Modified Existing Conditions Traffic Volumes

Under existing plus project Phase 1 conditions, the building at 1090 Kifer Road would not be demolished and would be fully occupied. Because re-occupying the existing 1090 Kifer Road building would not require City approval, trips associated with 1090 Kifer Road would not be counted towards the project. Instead, trips generated by re-occupying the existing 1090 Kifer Road building would be added to existing conditions to generate a "modified existing" scenario. Trip generation for the full occupancy of the existing 1090 Kifer Road building is shown in Table 17. As shown in Table 17, the full occupancy of the existing 1090 Kifer Road building would generate 139 trips (122 in and 17 out) during the AM peak hour and 132 trips (20 in and 112 out) during the PM peak hour. Figure 17 presents the intersection volumes under the modified existing scenario.

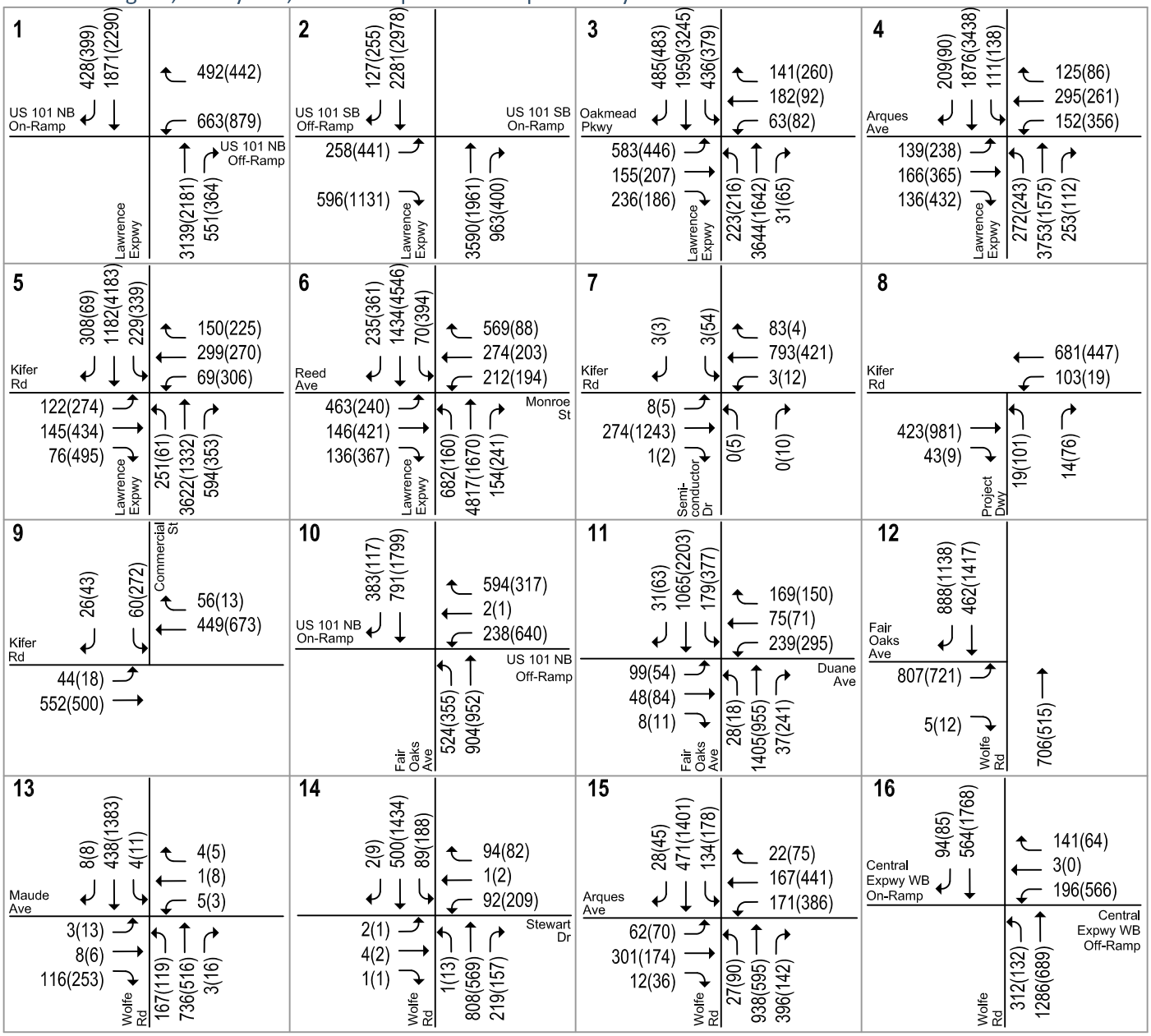
Table 17
Trip Generation for Full Occupancy of Existing 1090 Kifer Road Building

Use	Size	Units	Daily Trips	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Existing Entitlement[3]									
1090 Kifer Road									
Office[1]	52,794	s.f.	582	72	10	82	13	66	79
R & D[2]	52,793	s.f.	428	53	11	64	8	48	56
Total Entitlement				**125**	**21**	**146**	**21**	**114**	**135**
Existing Driveway Count[4]									
1090 Kifer Road				3	4	7	1	2	3
Existing Modified Conditions - Net New Trips at Full Occupancy of 1090 Kifer Rd									
Full Build-Out				***122***	***17***	***139***	***20***	***112***	***132***

[1] Trip generation rates based on General Office Building (Land Use Code 710) from *ITE Trip Generation Manual*, 9th Edition.
[2] Trip generation rates based on Research and Development Center (Land Use Code 760) from *ITE Trip Generation Manual*, 9th Edition.
[3] Trips associated with the existing entitlement at the project site are estimated using the trip generation rates from General Office Building and Research and Development Center.
[4] Existing site driveway counts are based on driveway counts conducted on May 17, 2016 during both the AM (7-9 AM) and PM (4-6 PM) peak hours of commute traffic.

Transportation Network

It is assumed in this analysis that the transportation network under existing plus project Phase 1 and background plus project Phase 1 conditions, including roadways and intersection lane configurations, would be the same as that described under existing plus project and background plus project conditions, respectively. As shown on Figure 2 in Chapter 1, the traffic signal proposed at the western project driveway under full build-out conditions would not be implemented under Phase 1 conditions. Therefore, the west-most driveway is not analyzed for intersection level of service, but rather for potential queuing issues in Chapter 6.

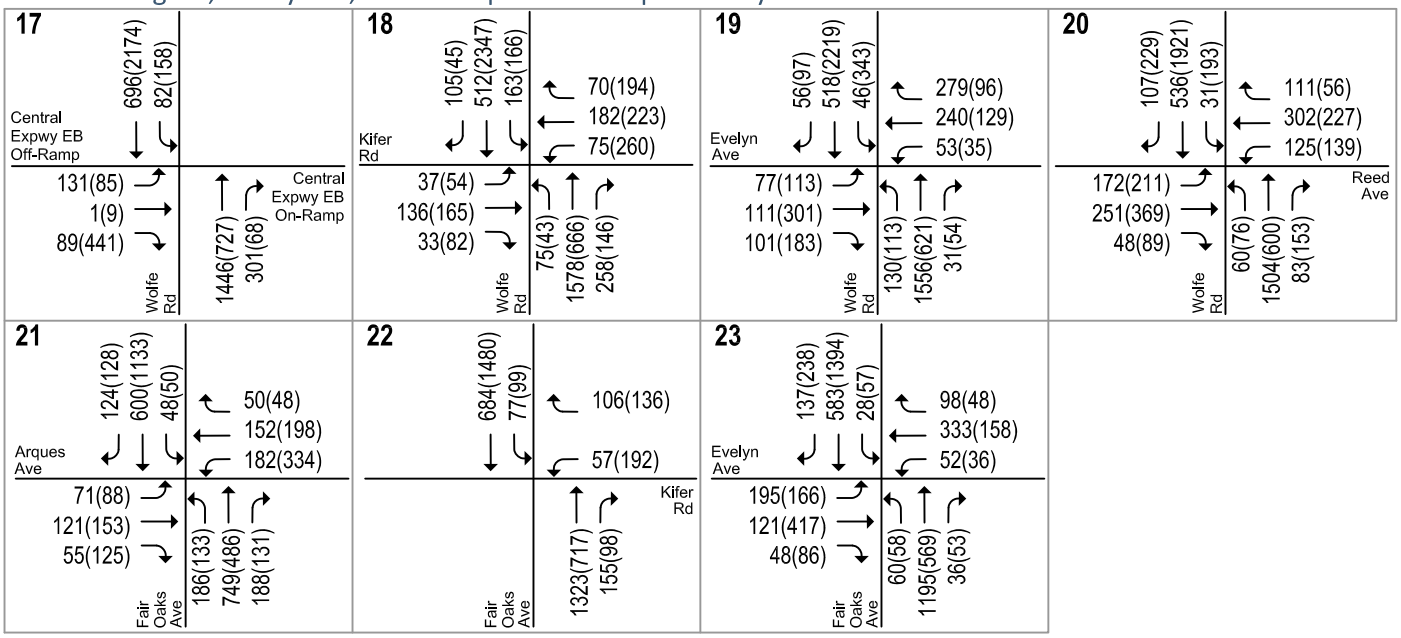


LEGEND

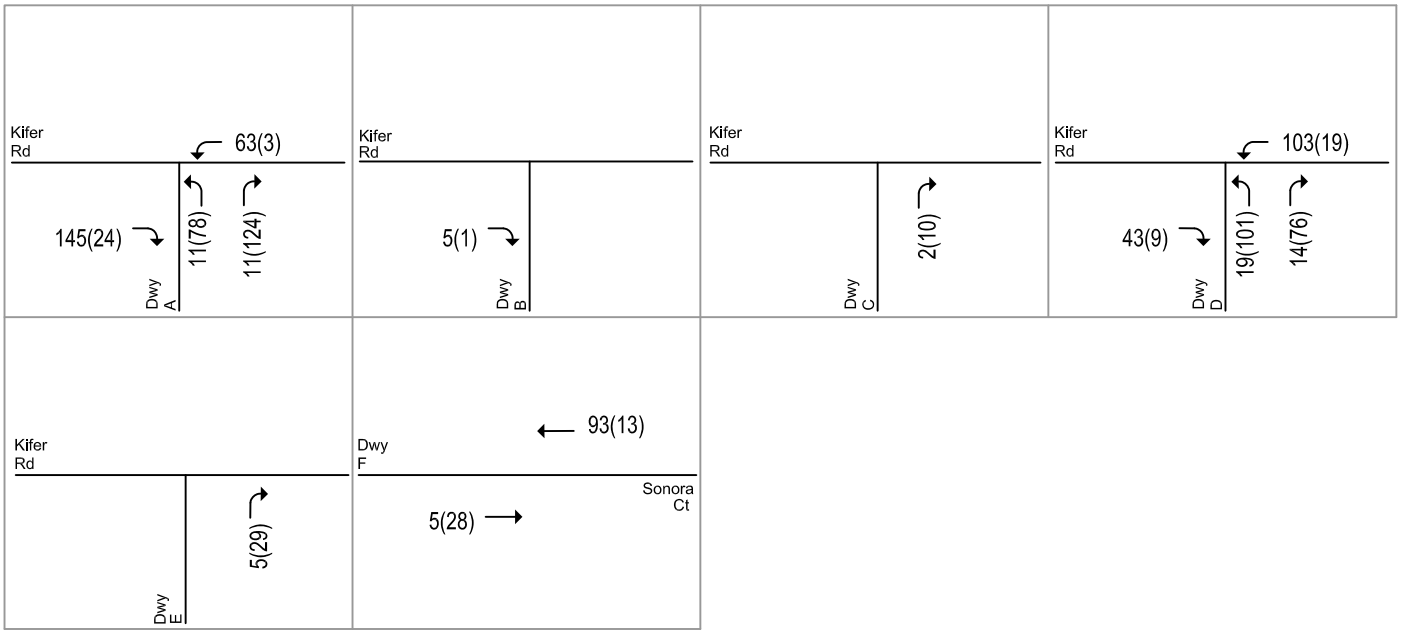
XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 15
Background Plus Project Phase 1 Traffic Volumes

NORTH
Not to Scale



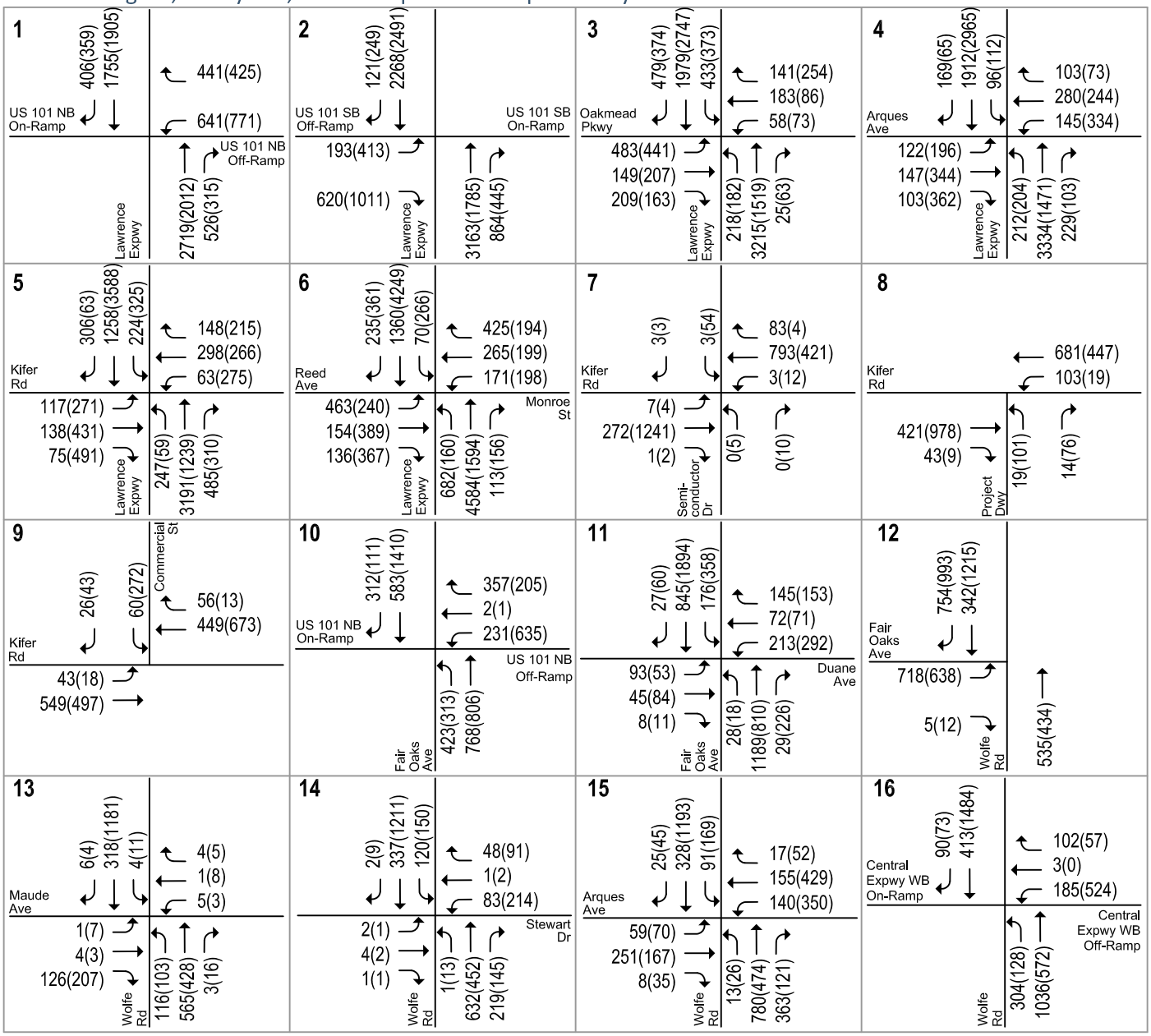
Driveway Volumes Under Project Phase 1 Conditions



LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 15
Background Plus Project Phase 1 Traffic Volumes

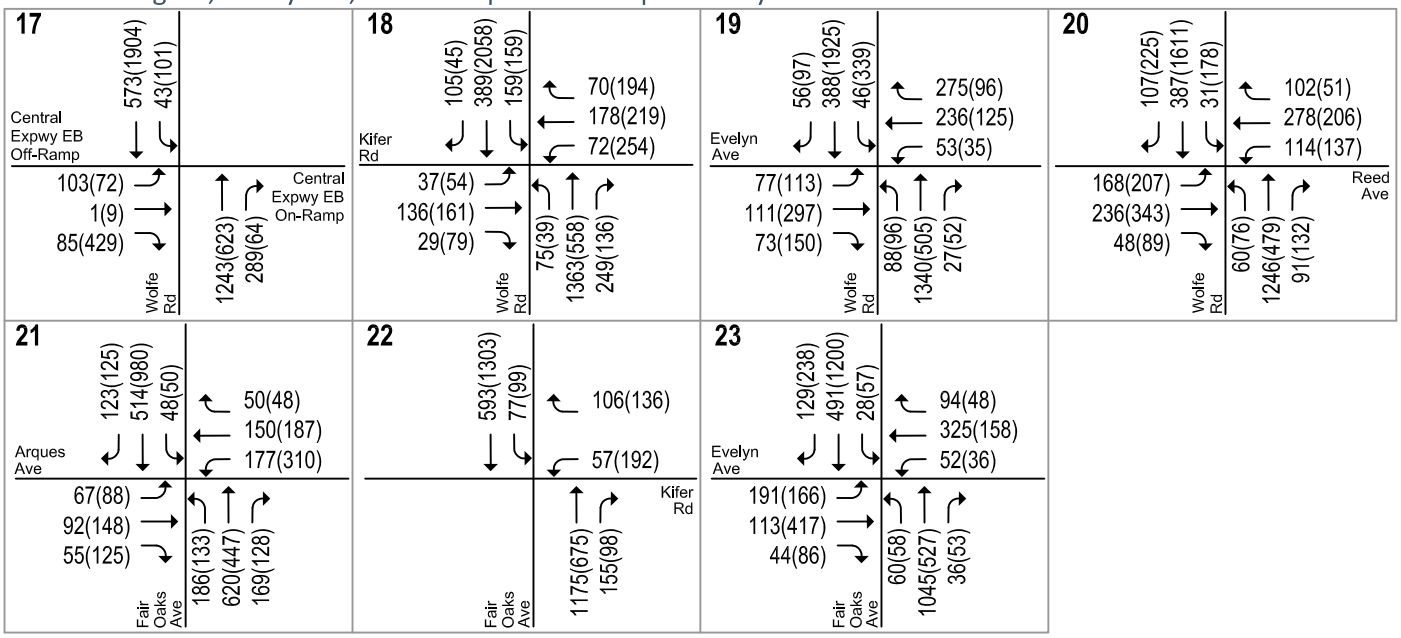


LEGEND

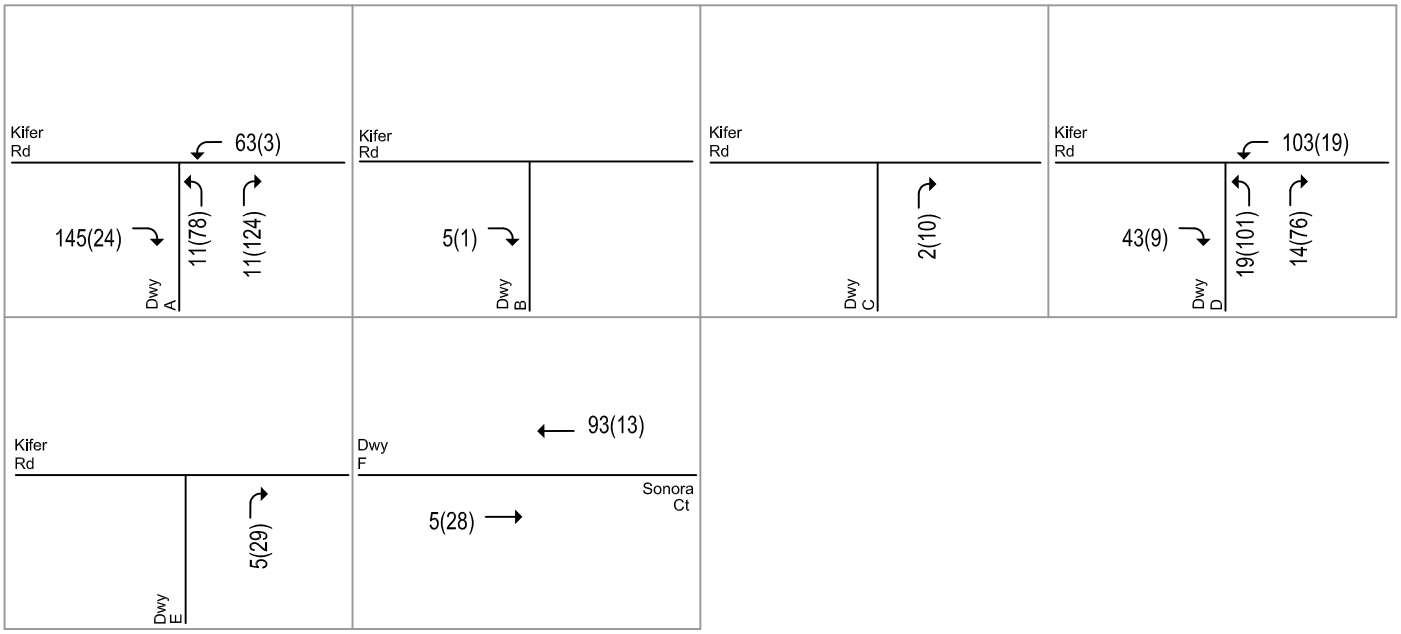
XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 16
Existing Plus Project Phase 1 Traffic Volumes

NORTH
Not to Scale



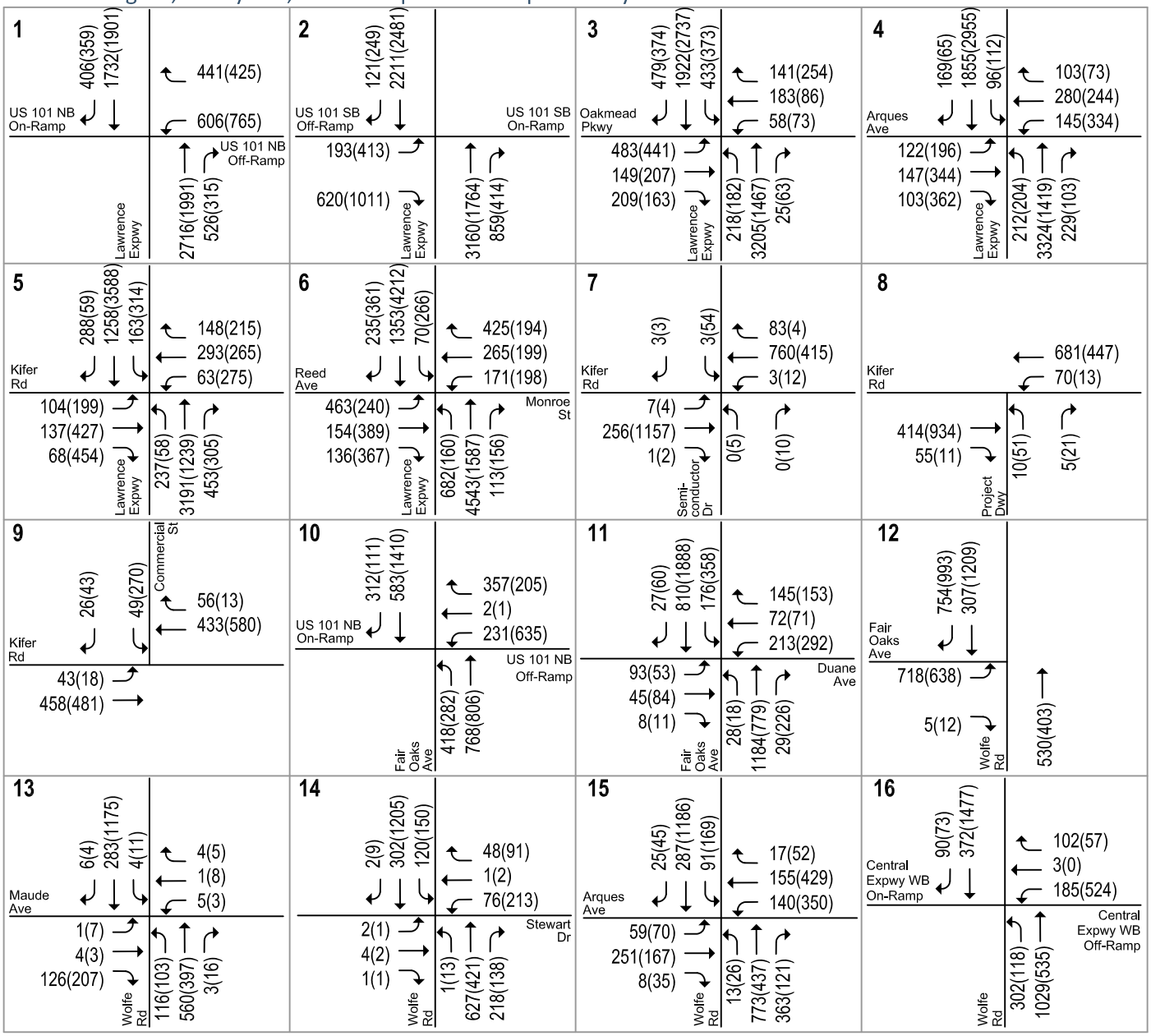
Driveway Volumes Under Project Phase 1 Conditions



LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

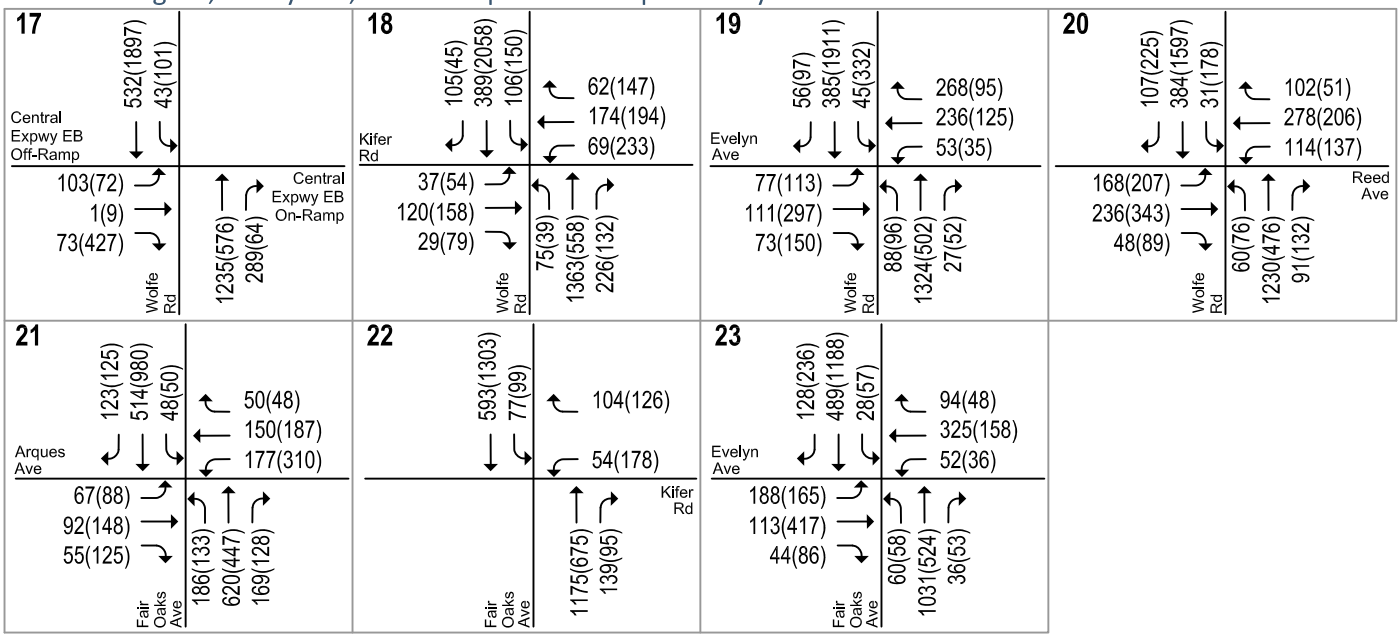
Figure 16
Existing Plus Project Phase 1 Traffic Volumes



LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 17
Modified Existing Traffic Volumes



LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 17
Modified Existing Traffic Volumes

Background plus Project Phase 1 Intersection Level of Service

Background plus project Phase 1 conditions were compared to background conditions to determine intersection deficiencies generated by Phase 1 of the project under background conditions. The results of the intersection level of service analysis under background plus project Phase 1 conditions are summarized in Table 18.

The Phase 1 project would not generate a traffic impact at any of the study intersections.

Existing plus Project Phase 1 Intersection Level of Service

Existing plus project phase 1 conditions were compared to modified existing conditions to determine intersection deficiencies generated by Phase 1 of the project under existing conditions. The results of the intersection level of service analysis under existing plus project Phase 1 conditions are summarized in Table 19.

The Phase 1 project would generate traffic impacts at the following three intersections:

- Lawrence Expressway & Kifer Road (#5) – PM Peak Hour (LOS F)
- Commercial Street & Kifer Road (#9) – PM Peak Hour (LOS F)

At the intersection of Lawrence Expressway and Kifer Road, an intersection deficiency is identified under existing plus project Phase 1 conditions but not under background plus project phase 1 conditions. This is because background conditions assumed the full occupancy of the existing buildings on site and thus the “project traffic” when comparing background plus project phase 1 conditions to background conditions is less than when comparing existing plus project phase 1 conditions to existing conditions.

At the intersection of Commercial Street and Kifer Road, an intersection deficiency is identified under existing plus project Phase 1 conditions but not under background plus project Phase 1 conditions. This is because under background conditions, the City of Sunnyvale would restripe the two-way-left-turn-lane east of the intersection to provide a refuge area for left turns (see Figure 8 in Chapter 3).

The proposed mitigation measures discussed in Chapter 4 under existing plus project conditions for these two deficient intersections would improve the intersection operations under existing plus project Phase 1 conditions to an acceptable level of service at each of the deficient intersections.

Table 18
Background Plus Project Phase 1 Level of Service Summary

#	Intersection	Peak Hour	LOS Std.	Background		Background Plus Project Phase 1			
				Avg. Del (sec)	LOS	Avg. Del (sec)	LOS	Incr. in Crit. Del. (sec)	Incr. in Crit. V/C
1	Lawrence Expressway & US 101 Northbound Ramps	AM	E	16.2	B	16.3	B	0.2	0.004
		PM		25.5	C	25.5	C	0.1	0.001
2	Lawrence Expressway & US 101 Southbound Ramps	AM	E	29.1	C	29	C	-0.1	0.000
		PM		**81.8**	**F**	**81.5**	**F**	**-0.9**	**0.000**
3	Lawrence Expressway & Oakmead Parkway	AM	E	**91.0**	**F**	**91.3**	**F**	**0.7**	**0.001**
		PM		63.4	E	63.5	E	0.3	0.001
4	Lawrence Expressway & Arques Avenue	AM	E	52.1	D-	52.3	D-	0.3	0.001
		PM		**80.4**	**F**	**80.5**	**F**	**0.5**	**0.001**
5	Lawrence Expressway & Kifer Road	AM	E	52.1	D-	52.3	D-	0.2	0.016
		PM		**99.4**	**F**	**98.5**	**F**	**-1.8**	**-0.008**
6	Lawrence Expressway & Reed Avenue/Monroe Street	AM	E	**138.6**	**F**	**139.2**	**F**	**-0.9**	**-0.001**
		PM		**108.5**	**F**	**109.8**	**F**	**1.8**	**0.002**
7	Semiconductor Drive & Kifer Road	AM	D	8.6	A	8.5	A	0.0	0.002
		PM		14.8	B	14.9	B	0.2	0.017
8	Project Driveway & Kifer Road [Driveway D]	AM	D	8.1	A	9	A	-9.7	0.193
		PM		7.9	A	15.2	B	9.8	0.370
9	Commercial Street & Kifer Road (unsignalized)	AM	D	12.5	B	12.8	B	-	-
		PM		25.9	D	30.9	D	-	-
10	Fair Oaks Avenue & US 101 Northbound Ramps	AM	E	23.1	C	23.2	C	0.2	0.001
		PM		48.7	D	51	D-	4.0	0.010
11	Fair Oaks Avenue & Duane Avenue	AM	D	30.2	C	30.1	C	0.0	0.001
		PM		38.4	D+	38.5	D+	0.2	0.004
12	Wolfe Road & Fair Oaks Avenue	AM	D	24.7	C	24.7	C	0.0	0.001
		PM		22.9	C+	22.8	C+	0.0	0.001
13	Wolfe Road & Maude Avenue [1]	AM	D	33.4	D	11.7	B+	5.0	0.229
		PM		**122.6**	**F**	14.7	B	11.3	0.486
14	Wolfe Road & Stewart Drive	AM	D	15.6	B	15.6	B	-0.1	0.001
		PM		17.8	B	17.8	B	0.1	0.002
15	Wolfe Road & Arques Avenue	AM	D	26.4	C	26.4	C	0.0	0.001
		PM		28.7	C	28.7	C	0.0	0.001
16	Wolfe Road & Central Expressway Westbound Ramps	AM	E	25.8	C	25.9	C	0.0	0.003
		PM		28.1	C	28.2	C	0.3	0.003
17	Wolfe Road & Central Expressway Eastbound Ramps	AM	E	15.4	B	15.7	B	0.4	0.001
		PM		30.6	C	30.6	C	0.1	0.002
18	Wolfe Road & Kifer Road	AM	D	23.1	C	24.3	C	1.5	0.020
		PM		28.5	C	29.5	C	0.9	0.011
19	Wolfe Road & Evelyn Avenue	AM	D	26.0	C	26	C	0.0	0.003
		PM		25.4	C	25.4	C	0.0	0.002
20	Wolfe Road & Reed Avenue	AM	D	28.7	C	28.6	C	0.0	0.002
		PM		29.4	C	29.3	C	-0.1	0.001
21	Fair Oaks Avenue & Arques Avenue	AM	D	29.2	C	29.2	C	0.0	0.000
		PM		35.4	D+	35.4	D+	0.0	0.000
22	Fair Oaks Avenue & Kifer Road	AM	D	8.1	A	8.2	A	0.0	0.001
		PM		10.3	B+	10.6	B+	0.3	0.004
23	Fair Oaks Avenue & Evelyn Avenue	AM	D	28.1	C	28.1	C	0.1	0.003
		PM		27.4	C	27.5	C	0.1	0.004

Notes:

Delay and LOS reported for the unsignalized intersections represent the approach that experiences the worst delay
BOLD indicates a substandard level of service. **BOLD and boxed** indicates a significant project impact.

1. The project proposes to install traffic signals at the unsignalized Wolfe Road/Maude Avenue intersection under project

Table 19
Existing Plus Project Phase 1 Level of Service Summary

#	Intersection	Peak Hour	LOS Std.	Modified Existing		Existing Plus Project Phase 1			
				Avg. Del (sec)	LOS	Avg. Del (sec)	LOS	Incr. in Crit. Del. (sec)	Incr. in Crit. V/C
1	Lawrence Expressway & US 101 Northbound Ramps	AM	E	15.8	B	16.1	B	0.5	0.009
		PM		25.2	C	25.3	C	0.1	0.002
2	Lawrence Expressway & US 101 Southbound Ramps	AM	E	34.1	C-	33.8	C-	0.0	0.000
		PM		68.7	E	68.3	E	-0.9	0.003
3	Lawrence Expressway & Oakmead Parkway	AM	E	61.0	E	61.2	E	0.5	0.001
		PM		53.0	D-	53.1	D-	0.2	0.002
4	Lawrence Expressway & Arques Avenue	AM	E	45.0	D	45	D	0.1	0.001
		PM		60.0	E	60	E	0.3	0.001
5	Lawrence Expressway & Kifer Road	AM	E	37.7	D+	38.3	D+	0.8	0.010
		PM		77.1	E-	**80.5**	**F**	**9.2**	**0.026**
6	Lawrence Expressway & Reed Avenue/Monroe Street	AM	E	**204.0**	**F**	**205.7**	**F**	**-0.8**	**0.001**
		PM		**87.6**	**F**	**89.8**	**F**	**3.6**	**0.005**
7	Semiconductor Drive & Kifer Road	AM	D	8.3	A	8.4	A	0.0	0.011
		PM		14.8	B	14.9	B	0.3	0.026
8	Project Driveway & Kifer Road [Driveway D]	AM	D	6.9	A	9	A	-7.8	0.222
		PM		6.5	A	15.1	B	11.3	0.392
9	Commercial Street & Kifer Road (unsignalized)	AM	D	115.8	C	17.8	C	-	-
		PM		**82.6**	**F**	**137.8**	**F**	-	-
10	Fair Oaks Avenue & US 101 Northbound Ramps	AM	E	16.6	B	16.6	B	0.1	0.003
		PM		21.8	C+	23.5	C	3.1	0.021
11	Fair Oaks Avenue & Duane Avenue	AM	D	26.2	C	26.1	C	0.0	0.002
		PM		32.1	C-	32.1	C-	0.0	0.009
12	Wolfe Road & Fair Oaks Avenue	AM	D	23.7	C	23.9	C	0.1	0.001
		PM		21.7	C+	21.7	C+	0.0	0.002
13	Wolfe Road & Maude Avenue [1]	AM	D	19.9	C	11.2	B+	4.9	0.177
		PM		**52.9**	**F**	14.1	B	10.6	0.416
14	Wolfe Road & Stewart Drive	AM	D	16.3	B	16.7	B	0.4	0.006
		PM		19.2	B-	19.1	B-	0.1	0.002
15	Wolfe Road & Arques Avenue	AM	D	24.8	C	24.8	C	0.0	0.001
		PM		28.4	C	28.4	C	-0.1	0.001
16	Wolfe Road & Central Expressway Westbound Ramps	AM	E	24.8	C	25	C	0.3	0.007
		PM		28.8	C	29.1	C	0.6	0.007
17	Wolfe Road & Central Expressway Eastbound Ramps	AM	E	12.9	B	13.8	B	0.1	0.000
		PM		29.6	C	29.7	C	0.1	0.002
18	Wolfe Road & Kifer Road	AM	D	22.4	C+	24.7	C	2.9	0.043
		PM		27.5	C	28.7	C	1.1	0.015
19	Wolfe Road & Evelyn Avenue	AM	D	26.0	C	26.1	C	0.2	0.009
		PM		24.6	C	24.7	C	0.0	0.003
20	Wolfe Road & Reed Avenue	AM	D	28.8	C	28.7	C	0.0	0.003
		PM		28.7	C	28.7	C	0.0	0.002
21	Fair Oaks Avenue & Arques Avenue	AM	D	29.7	C	29.7	C	0.0	0.000
		PM		34.4	C-	34.4	C-	0.0	0.000
22	Fair Oaks Avenue & Kifer Road	AM	D	8.5	A	8.5	A	0.1	0.001
		PM		10.8	B+	11.2	B+	0.5	0.005
23	Fair Oaks Avenue & Evelyn Avenue	AM	D	28.1	C	28.2	C	0.1	0.006
		PM		26.7	C	26.8	C	0.1	0.004

Notes:

Delay and LOS reported for the unsignalized intersections represent the approach that experiences the worst delay and **BOLD** indicates a substandard level of service. **BOLD and boxed** indicates a significant project impact.

1. The project proposes to install traffic signals at the unsignalized Wolfe Road/Maude Avenue intersection under project

6. Other Transportation Issues

This chapter presents an analysis of other transportation issues associated with the proposed project, including:

- Vehicle queuing,
- Potential impacts to bicycle, pedestrian, and transit facilities,
- Site access and circulation, and
- Parking.

Unlike the level of service impact methodology, which is adopted by the City Council, the analyses in this chapter are based on professional judgment in accordance with the standards and methods employed by the traffic engineering community. Operational issues are not considered CEQA impacts.

Queuing Analysis

Vehicle queues were estimated using a Poisson probability distribution, which estimates the probability of "n" vehicles for a vehicle movement using the following formula:

$$P(x = n) = \frac{\lambda^n e^{-(\lambda)}}{n!}$$

Where:

$P(x = n)$ = probability of "n" vehicles in queue per lane

n = number of vehicles in the queue per lane

λ = Average number of vehicles in the queue per lane (vehicles per hour per lane/signal cycles per hour)

The operations analysis is based on vehicle queuing for high-demand left-turn movements at intersections where 10 or more project trips were added. Vehicle queues were estimated using a Poisson probability distribution. The basis of the analysis is as follows: (1) the Poisson probability distribution is used to estimate the 95th percentile maximum number of queued vehicles for a particular movement; (2) the estimated maximum number of vehicles in the queue is translated into a queue length, assuming 25 feet per vehicle; and (3) the estimated maximum queue length is compared to the existing or planned available storage capacity for the movement to determine if adequate storage is available to accommodate the 95th percentile queues. This analysis thus provides a basis for estimating future storage requirements at intersections.

Left-turn pockets are analyzed at four intersections during the AM peak hour:

- Lawrence Expressway & US 101 Northbound Ramps – westbound left-turn pocket
- Lawrence Expressway & Kifer Road – northbound, southbound and eastbound left-turn pockets
- Commercial Street & Kifer Road – southbound left-turn pocket
- Wolfe Road & Kifer Road – southbound left-turn pocket

Left-turn pockets are analyzed at five intersections during the PM peak hour:

- Lawrence Expressway & Kifer Road – eastbound left-turn pocket
- Fair Oaks Avenue & US 101 Northbound Ramps – northbound left-turn pocket
- Wolfe Road & Central Expressway Westbound Ramps – northbound left-turn pocket
- Wolfe Road & Kifer Road – westbound left-turn pocket
- Fair Oaks Avenue & Kifer Road – westbound left-turn pocket

Hexagon conducted field observations during both the AM and PM peak commute periods and calibrated the queuing results to match existing conditions observed in the field. The vehicle queuing estimates at these locations during the AM and PM peak hours are provided in Table 20. The queuing results for the background plus project scenario are compared to the background scenario to determine whether the project would cause extensive queuing issues.

Under background plus project conditions, left-turn traffic is expected to overflow the pocket at the following locations:

- Lawrence Expressway & Kifer Road – eastbound left-turn pocket – PM Peak Hour
- Wolfe Road & Kifer Road – westbound left-turn pocket – PM Peak Hour

Below is a detailed discussion of the overflowing left-turn pockets under background plus project conditions.

Lawrence Expressway & Kifer Road – eastbound left-turn pocket

This left-turn pocket has two left-turn lanes with a total queue storage of approximately 360 feet. Under background conditions during the PM peak hour, the 95th percentile queue length would be 425 feet, with the back-of-queue extending out of the turn pocket. Under background plus project conditions, the proposed project would add 92 eastbound left-turn vehicles during the PM peak hour. The 95th percentile queue length would be extended by 150 feet to 575 feet.

There is no room to further extend the eastbound left-turn pocket. It is expected that the proposed Lawrence Expressway Grade Separation project at this intersection would remove the identified queuing issue. The project applicant through payment of the Sunnyvale Traffic Impact Fee would pay their fair share for this improvement.

Wolfe Road & Kifer Road – westbound left-turn pocket

This left-turn pocket has one left-turn lane with approximately 185 feet of queue storage. Under background conditions during the PM peak hour, the 95th percentile queue length would be 300 feet, with the back-of-queue extending out of the turn pocket. Under background plus project conditions, the proposed project would add 26 westbound left-turn vehicles during the PM peak hour. The 95th percentile queue length would be extended by 25 feet to 325 feet under background plus project conditions.

There is no room to further extend the westbound left-turn pocket. There is no feasible improvement for the identified queuing issue.

Table 20
Queuing Analysis Summary – AM Peak Hour

Measurement	Lawrence Expwy & US 101 NB Ramps	Lawrence Expwy & Kifer Rd			Commercial St & Kifer Rd	Wolfe Rd & Kifer Rd
	WBL	NBL	SBL	EBL	SB	SBL [3]
Existing						
Cycle/Delay[1] (sec)	193	171	171	171	14.9	110
Volume (vphpl)	588	215	163	98	69	78
Avg. Queue (veh/ln.)	31.5	10.2	7.7	4.7	0.3	2.4
Avg. Queue[2] (ft./ln)	788	255	194	116	7	60
95th %. Queue (veh/ln.)	41	16	13	8	1	5
95th %. Queue (ft./ln)	1025	400	325	200	25	125
Storage (ft./ ln.)	1700	700	700	360	155	365
Adequate (Y/N)	Y	Y	Y	Y	Y	Y
Background						
Cycle/Delay[1] (sec)	193	171	171	171	12.5	110
Volume (vphpl)	647	249	195	111	81	138
Avg. Queue (veh/ln.)	34.7	11.8	9.3	5.3	0.3	4.2
Avg. Queue[2] (ft./ln)	867	296	232	132	7	105
95th %. Queue (veh/ln.)	45	18	15	9	1	8
95th %. Queue (ft./ln)	1125	450	375	225	25	200
Storage (ft./ ln.)	1700	700	700	360	155	365
Adequate (Y/N)	Y	Y	Y	Y	Y	Y
Background plus Project						
Cycle/Delay[1] (sec)	193	171	171	171	13.2	110
Volume (vphpl)	679	264	242	129	93	188
Avg. Queue (veh/ln.)	36.4	12.5	11.5	6.1	0.3	5.7
Avg. Queue[2] (ft./ln)	910	314	287	153	9	144
95th %. Queue (veh/ln.)	47	19	17	10	1	10
95th %. Queue (ft./ln)	1175	475	425	250	25	250
Storage (ft./ ln.)	1700	700	700	360	155	365
Adequate (Y/N)	Y	Y	Y	Y	Y	Y

1. Vehicle queue calculations based on cycle length for signalized intersections, and movement delay for unsignalized intersections.
2. Assumes 25 Feet Per Vehicle Queued
3. Cycle length caliberated so calculated average queue length match conditions observed in the field.

Table 20
Queuing Analysis Summary (continued) – PM Peak Hour

Measurement	Lawrence Expwy & Kifer Rd EBL	Fair Oaks Ave & US 101 NB Ramps NBL	Wolfe Rd & Central Expwy WB Ramps NBL	Wolfe Rd & Kifer Rd WBL [3]	Fair Oaks Ave & Kifer Rd WBL
Existing					
Cycle/Delay[1] (sec)	190	60	150	110	100
Volume (vphpl)	160	265	112	222	170
Avg. Queue (veh/ln.)	8.4	4.4	4.7	6.8	4.7
Avg. Queue[2] (ft./ln)	211	110	117	170	118
95th %. Queue (veh/ln.)	13	8	8	11	9
95th %. Queue (ft./ln)	325	200	200	**275**	225
Storage (ft./ ln.)	360	275	300	**185**	830
Adequate (Y/N)	Y	Y	Y	**N**	Y
Background					
Cycle/Delay[1] (sec)	190	60	150	110	100
Volume (vphpl)	217	340	127	244	181
Avg. Queue (veh/ln.)	11.5	5.7	5.3	7.5	5.0
Avg. Queue[2] (ft./ln)	286	142	132	186	126
95th %. Queue (veh/ln.)	17	10	9	12	9
95th %. Queue (ft./ln)	**425**	250	225	**300**	225
Storage (ft./ ln.)	**360**	275	300	**185**	830
Adequate (Y/N)	**N**	Y	Y	**N**	Y
Background plus Project					
Cycle/Delay[1] (sec)	190	60	150	110	100
Volume (vphpl)	309	369	137	270	199
Avg. Queue (veh/ln.)	16.3	6.2	5.7	8.3	5.5
Avg. Queue[2] (ft./ln)	408	154	143	206	138
95th %. Queue (veh/ln.)	23	10	10	13	10
95th %. Queue (ft./ln)	**575**	250	250	**325**	250
Storage (ft./ ln.)	**360**	275	300	**185**	830
Adequate (Y/N)	**N**	Y	Y	**N**	Y

1. Vehicle queue calculations based on cycle length for signalized intersections, and movement delay for unsignalized intersections.
2. Assumes 25 Feet Per Vehicle Queued
3. Cycle length caliberated so calculated average queue length match conditions observed in the field.

Potential Impacts to Bicycle Facilities

The following bicycle facilities exist near the project site.

Class II Bicycle Lanes:

- Kifer Road between Fair Oaks Avenue and Lawrence Expressway
- Fair Oaks Avenue between Evelyn Avenue and Kifer Road
- Evelyn Avenue between Hope Street and Reed Avenue
- Wolfe Road between Fair Oaks Avenue and Reed Avenue
- Arques Avenue/Scotts Boulevard between Central Expressway and Fair Oaks Avenue
- Oakmead Parkway between Duane Avenue and Central Expressway
- Stewart Drive between Duane Avenue and Wolfe Road
- Duane Avenue between Fair Oaks Boulevard and Oakmead Parkway
- DeGuigne Drive/Commercial Street between Duane Avenue and Central Expressway

Project Proposed Bicycle Facility Improvements

Since the project is consistent with the proposed Lawrence Station Area Plan, it is assumed that the project applicant would coordinate with City staff to implement the Kifer Road diet along the project frontage. The Kifer road diet would reduce the travel lanes on Kifer Road from the existing five lanes to three lanes. The freed right-of-way would be used to enhance bicycle and pedestrian facilities. Therefore, implementation of the project would help improve bicycle facilities.

The applicant proposes a new multi-use trail for bicycles and pedestrians along the south and west edges of the project site, extending between the Sonora Court driveway and the western driveway A on Kifer Road. The applicant proposes the width of the trail to be 12.5 feet wide during Phase 1 and expanded to 25 feet wide during Phase 2. The proposed multi-use trail would provide pedestrians and bicyclists an alternative route to access the Lawrence Caltrain station.

Updated project drawings with the bicycle and pedestrian trail have not been provided.

Bicycle Connectivity to Transit Services

The *Draft Station Plan* for the Lawrence Station Area Plan proposes implementing a bike share program. The project is located approximately 0.4 mile west of the Lawrence Caltrain Station. Employees who take Caltrain to/from work could benefit from a bike share program by biking between the Caltrain station and the project site using Sonora Court. It is recommended that the project applicant coordinate with City staff to discuss implementation of a bike share program.

Also, bicycles are allowed on Caltrain. Employees could bring their own bikes and ride from the Caltrain station to the project site using Sonora Court.

Bicycle Connectivity North-South of the Rail Tracks

The *Draft Station Plan* for the Lawrence Station Area Plan proposes a new pedestrian/bicycle rail crossing near the Sonora Court cul-de-sac. The proposed rail crossing would enhance bicycle connectivity north-south across the rail tracks. This proposed rail crossing would encourage employees living south of the project site to bike to work. It is recommended that the project applicant coordinate with City staff to pursue the proposed pedestrian/bicycle rail crossing.

The proposed Lawrence Expressway grade separations at the intersections with Reed Avenue, Kifer Road and Arques Avenue would provide bike lanes separated from vehicle traffic. The proposed bike lanes on Lawrence Expressway would improve the north-south bicycle connectivity.

Bicycle Parking Requirements

According to the *Draft Station Plan* for the Lawrence Station Area Plan, office and R&D developments must provide bicycle parking at one space per 6,000 s.f. with a 75-25 percent split between secured (Class I) bicycle lockers and bicycle racks (Class II).

For Phase 1, the Intuitive Surgical campus (new building, 1020 Kifer Rd, and full occupancy of 1090 Kifer Rd) would be required to provide 93 bicycle parking spaces, including 70 secured bicycle spaces. For Full Build Out, the Intuitive Surgical campus (two new buildings and 1020 Kifer Rd) would be required to provide 126 bicycle parking spaces, including 95 secured bicycle spaces. The applicant proposes 78 Class I and 26 Class II bicycle parking spaces. It is recommended that the applicant provide an additional 18 Class I and 5 Class II bicycle parking spaces. It is recommended that the bicycle parking be located near the building entrances, in well-lit areas, and adjacent to the pedestrian paths. In addition, the secure bicycle parking spaces need to be "lockable facilities such as individual lockers or enclosed, locked, limited-access areas for parking of bicycles" (Section 19.466.150 (a) (1) of Sunnyvale zoning code).

Updated project drawings with the bicycle parking locations have not been provided.

The bicycle parking requirements are shown on Table 21.

Table 21
Bicycle Parking Requirements

Scenario	Type	Size[1]	Rate	Spaces	
Phase 1					
	Bicycle Parking				
	Office/R&D[1]	555,558 s.f.	1 per 6,000 s.f.	**Total**	**93**
				Secured	*70*
				Racks	*23*
Full Build Out					
	Bicycle Parking				
	Office/R&D[1]	754,971 s.f.	1 per 6,000 s.f.	**Total**	**126**
				Secured	*95*
				Racks	*31*

Notes
[1] Size of Phase 1 and Full Build Out include the proposed and existing buildings.
[2] For office/R&D uses, Lawrence Station Area Plan (LSAP) bicycle parking is 1 space per 6,000 square feet (s.f.), with 75% Class I (secured) and 25% Class II (racks).

Potential Impacts to Pedestrian Facilities

Sidewalks are present along both sides of most roadways within the project vicinity. Sidewalks are lacking along eastbound Kifer Road in front of the Pepsi plant at 960 Kifer Road, in front of 1050-1090 Kifer Road and along Sonora Court. Ten-foot attached sidewalks with a four by five foot tree well are required along the Kifer Road and Sonora Court project frontages, except adjacent to existing trees where a six-foot minimum sidewalk is required. Pedestrian crosswalks and signal heads are present at all the study intersections. At the Wolfe Road/Kifer Road and Lawrence Expressway/Kifer Road intersections there are pedestrian crosswalks and signal heads across all four legs. Kifer Road does not have crosswalks at the intersections with minor streets.

Crosswalks at Proposed Signalized Driveway

As shown on Figure 3 in Chapter 1, the project proposes to install a new traffic signal at the western driveway. It is recommended that high-visibility crosswalks with pedestrian push buttons and signal heads be installed across the south and east legs of this new signalized intersection. The locations where the crosswalks are recommended currently lack ADA-compliant curb ramps. It is recommended that the project applicant install ADA-compliant curb ramps along with the recommended crosswalks. The *Draft Station Plan* for the Lawrence Station Area Plan provides pedestrian crosswalk policies recommending measures to improve pedestrian visibility to drivers and reduce pedestrian exposure to traffic.

Pedestrian Connectivity to Transit Services

The project proposes a multi-use bike/pedestrian trail along the western and southern edges of the project site, connecting the western driveway on Kifer Road with the Sonora Court driveway. However, this trail would not directly connect to the Caltrain station.

To encourage employees at the project site to utilize public transportation by taking advantage of the site's proximity to the Caltrain station, it is recommended that the project applicant work with City staff to implement pedestrian accommodation on Sonora Court. The pedestrian accommodation could be done by removing parking from one side of Sonora Court and striping an on-street pedestrian/bicycle shoulder. Alternatively, sidewalks could be retrofitted to Sonora Court by removing parking. Greater cost would be involved because the street would need to be regraded.

As discussed above, the project applicant is recommended to coordinate with City staff to pursue the proposed pedestrian/bicycle rail crossing near the Sonora Court cul-de-sac that is proposed in the Lawrence Station Area Plan. The new rail crossing would enhance pedestrian connectivity of the project site to surrounding land uses and transit facilities.

Potential Impacts to Transit Facilities

Transit Facility Impacts

Within the project vicinity, VTA bus route 32 travels on Evelyn Avenue and Reed Avenue and VTA bus route 328 travels on Lawrence Expressway. The closest route 32 bus stop is located at the intersection of Lawrence Expressway and Reed Avenue, approximately one mile southeast of the project site. As discussed above, the project applicant is recommended to coordinate with City staff to pursue the proposed pedestrian/bicycle rail crossing near the Sonora Court cul-de-sac that is proposed in the Lawrence Station Area Plan. The new rail crossing would reduce the walking distance between the bus route 32 stop (at Evelyn Avenue and Reed Avenue) and the project site to approximately 2,000 feet. The nearest route 328 bus stop to the project site is located just north of the Lawrence Expressway and Kifer Road intersection, approximately 1,500 feet from the project area.

The Altamont Commuter Express (ACE) Gray Shuttle (Route 822) stops in front of the project site and across the street. This shuttle provides limited service transporting nearby residents to/from work in the Lawrence Station area and in the Great America Station area. It is expected that the project would result in a minor increase to the shuttle bus usage.

The proposed Lawrence Station Area Plan would require the project to implement a TDM program with a 20-35% trip reduction target. The TDM program could increase transit ridership for transit routes that serve the project site within walking distance.

Impacts to Caltrain Services

The project site is located approximately 0.4 miles from the Lawrence Caltrain station. However, the Lawrence Caltrain station provides service for only the Local and Limited trains. According to the *Caltrain 2015 Annual Passenger Count Key Findings* document, on average less than 1,000 people alight at the Lawrence Caltrain station on a daily basis. Compared to other Caltrain stations that provides service for baby bullet trains, passenger activity (boarding and alighting) at the Lawrence Caltrain station is approximately 20% of the activity at other major Caltrain stations. The project would increase usage of the Lawrence Caltrain Station, which could eventually lead to increased service when combined with other development under the *Draft Station Plan.*

The nearby Sunnyvale Caltrain Station provides baby bullet train services, which have shorter travel times compared to the local and limited train services but stops at only the major Caltrain stations. It is recommended that the project applicant establish a shuttle service to the nearby Sunnyvale Caltrain station to further encourage employees to use public transportation, as part of their TDM Plan.

Transit Travel Time Impacts

Currently, VTA bus route 32 travels on Reed Avenue through Lawrence Expressway, bus route 55 travels along Lawrence Expressway and Fair Oaks Avenue, bus route 26 travels on Fair Oaks Avenue through the US 101 northbound ramps intersection, bus route 328 travels on Lawrence Expressway, and bus route 822 (ACE Gray Shuttle) travels along Kifer Road, Arques Avenue, and Wolfe Road. To assess the transit travel time impacts, the delay experienced by each route in the study area under background plus project conditions was compared to the background conditions. VTA does not have criteria to determine impact to transit services. Therefore, this analysis is presented for information purposes only.

The results shown that there would be minimal changes in transit delay in the study area under the project scenario. The proposed project is consistent with the LSAP TIA report, and the cumulative transit impacts related to the LSAP build out are disclosed in the *Lawrence Station Area-Wide Transportation Plan (LSAP) TIA* report dated December 18, 2015, prepared by Hexagon Transportation Consultants, Inc. The transit routes would not turn left at locations where the project would worsen the left-turn queuing issues, except at the westbound left-turn pocket at Wolfe Road and Kifer Road during the PM peak hour, where bus route 822 would use the turn pocket to turn left onto southbound Wolfe Road. However, because bus route 822 has a headway of approximately one hour, it is not expected that bus route 822 travel times would be significantly affected by the left-turn queuing issue caused by the project. The results of the transit travel time comparison are summarized in Table 22.

Table 22
Transit Travel Time Comparison Summary

	Existing		Background	Background + Project		
Route	Travel Time min / sec	Delay in the Study Area (sec)	Delay in the Study Area (sec)	Delay in the Study Area (sec)	Change in Delay (sec)	% Change
Route 32						
Eastbound AM	59 / 3,540	176.0	186.6	186.8	0.2	0.005%
Eastbound PM	64 / 3,840	187.7	199.2	199.8	0.6	0.015%
Westbound AM	65 / 3,900	199.6	189.2	189.8	0.6	0.015%
Westbound PM	57 / 3,420	209.9	210.5	210.9	0.4	0.011%
Route 55						
Northbound AM	59 / 3,540	225.1	335.7	335.9	0.2	0.005%
Northbound PM	64 / 3,840	173.3	184.9	185.3	0.4	0.010%
Southbound AM	59 / 3,540	69.2	78	78.2	0.2	0.006%
Southbound PM	61 / 3,660	87.0	97.2	98.6	1.4	0.037%
Route 26						
Eastbound AM	107 / 6,420	125.0	133.8	134.1	0.3	0.005%
Eastbound PM	122 / 7,320	131.7	194.3	202.4	8.1	0.108%
Westbound AM	120 / 7,200	122.1	132.7	133.0	0.3	0.004%
Westbound PM	119 / 7,140	183.8	190.9	191.4	0.5	0.007%
Route 328						
Northbound AM	84 / 5,040	274.2	338.7	345.3	6.6	0.123%
Southbound PM	87 / 5,220	324.9	467.7	474.6	6.9	0.121%
Route 822						
Northbound PM	31 / 1,860	417.0	417.8	414.7	-3.1	-0.136%
Southbound AM	32 / 1,920	398.0	405.2	395.3	-9.9	-0.426%

Site Access and Circulation

This section describes the site access and circulation of the proposed project. This review is based on the project full build-out site plan prepared by RMW Architecture & Interiors, dated March 8, 2016 (see Figure 3 in Chapter 1).

Site Access

Site access was evaluated to determine the adequacy of the site driveways with regard to corner sight distance and traffic volumes. The western driveway, which is currently an inbound-only driveway, would be converted to a full-access signalized intersection under project conditions. The existing signalized driveway would become unsignalized and only allow for right-in/right-out movements. The loading zone loop would have one inbound only driveway and one outbound only driveway. The eastern driveway would remain a right-in-right-out only driveway. In addition, the driveway at the Sonora Court cul-de-sac would remain. The *Draft Station Plan* for the LSAP identifies a road diet on Kifer Road, which would be narrowed to one travel lane each direction with a center turn lane. It is assumed that there would be a left-turn pocket into the project site at the future signalized driveway (western driveway).

Signalized Intersection Configurations

The project proposes to install traffic signals at the western project driveway under full build-out conditions. This driveway is directly next to the Pepsi Bottling Group (Pepsi) driveway. There is also a driveway directly on the north side of Kifer Road. The proposed signal would need to bring in the driveway on the north side of Kifer Road as the fourth leg of the intersection. That driveway would also require re-alignment to line up with the project driveway. For traffic operation concerns, it is recommended that the project owner coordinate with City staff and owner of the Pepsi Bottling Group to share one driveway. This would eliminate one of the two driveways entering the signal south of Kifer Road. Alternatively, should both the project driveway and Pepsi driveway stay, it is recommended that the Pepsi driveway be restricted to right-in-right-out access. A raised median should be constructed to prevent left turns into and out of the Pepsi driveway. In this case, the project would be required to construct a cross-easement along the western edge of the project site to allow left-turning vehicles into/out of the Pepsi site to use the project driveway.

Site Access Queuing

A detailed queuing analysis was performed for the westbound left-turn pocket at the proposed signalized driveway to determine whether vehicle queues entering the project site would extend out of the turn pocket and block through traffic. As discussed in Chapter 4, 91% of the traffic on westbound Kifer Road is assumed to enter into the project site via the western signalized driveway. There is approximately 225 feet of queue storage space between the two western project driveways (driveways A and B). The queuing results (shown on Table 23) indicate that inbound project trips would not overflow the westbound left-turn pocket at the western signalized driveway.

As discussed in Chapter 4, 9% of the traffic on westbound Kifer Road is assumed to enter into the project site via driveway B. At the location of driveway B, Kifer Road currently has an eastbound left-turn pocket striped. This would not allow westbound vehicles to turn left into driveway B. It is recommended that the eastbound left-turn pocket on Kifer Road in front of driveway B be re-striped as a two-way left-turn median to allow for westbound vehicles the option to turn left into driveway B. Eastbound left-turn access to the property north of Kifer Road is provided via a driveway approximately 350 feet east of the signalized project driveway. The proposed two-way left-turn median improvement is shown on Figure 18. It is estimated that 23 vehicles would turn left into the project site via driveway B, which averages to approximately one vehicle per three minutes. Therefore, it is not expected that considerable queuing issues would occur at driveway B.

During the PM peak hour, it is estimated that 17 vehicles would turn left out of driveway C onto westbound Kifer Road. Since this averages to approximately one vehicle per three to four minutes, it is not expected that considerable queuing issues would occur at driveway C.

Table 23
Queuing Analysis – Westbound Left-Turn into the Project Site

Measurement	West Project Driveway & Kifer Road WBL AM	West Project Driveway & Kifer Road WBL PM
Background plus Project		
Cycle/Delay[1] (sec)	100	100
Volume (vphpl)	181	24
Avg. Queue (veh/ln.)	5.0	0.7
Avg. Queue[2] (ft./ln)	126	17
95th %. Queue (veh/ln.)	9	2
95th %. Queue (ft./ln)	225	50
Storage (ft./ ln.)	225	225
Adequate (Y/N)	Y	Y

1. Vehicle queue calculations based on cycle length for signalized intersections, and movement delay for unsignalized intersections.
2. Assumes 25 Feet Per Vehicle Queued

Corner Sight Distance

The project access points should be free and clear of any obstructions to optimize sight distance, thereby ensuring that exiting vehicles can see pedestrians on the sidewalk and other vehicles traveling on adjacent roadways. Landscaping and parking should not conflict with a driver's ability to locate a gap in traffic and see oncoming pedestrians and bicyclists. Adequate corner sight distance (sight distance triangles) should be provided at all site access points in accordance with the City's standards. Sight distance triangles should be measured approximately 15 feet back from the traveled way.

Sight distance requirements vary depending on the roadway speeds. The speed limit on Kifer Road is 40 mph, and could potentially decrease with the Kifer road diet. The Caltrans recommended stopping sight distance for this roadway is 300 feet. The project should ensure that there is no tall vegetation, landscaping or on-street parking that would obstruct a driver's ability to see on-coming vehicles 300 feet down the road. The existing driveways currently meet this requirement.

Figure 18
Proposed Two-Way Left-Turn Median Concept on Kifer Rd

On-Site Circulation

The project proposes two parking garages, both located along the south edge of the project site. As shown on Figure 3 in Chapter 1, access to Garage #1 would be provided by the western signalized driveway as well as via Sonora Court. Access to Garage #2 would be provided by the eastern driveway for vehicles on eastbound Kifer Road, as well as via Sonora Court. Vehicles on westbound Kifer Road would have to turn left into the project site via the western driveway, then drive through a bypass road within Garage #1 to arrive at Garage #2. Vehicle circulation to Garage #2 from westbound Kifer Road is circuitous. Vehicles on westbound Kifer Road would not be able to turn into San Zeno Way/Lawrence Station Road to access the project site via Sonora Court because of existing raised medians on Kifer Road. Hexagon recommends the project applicant improve on-site circulation for vehicle access to Garage #2.

As shown on Figure 3 in Chapter 1, parallel parking spaces are proposed on both sides of the western drive aisle. Access to the parallel parking spaces on the east of this drive aisle would require either looping around the surface parking lot to the south or performing a three-point turn, which could create potential operational issues. Furthermore, City of Sunnyvale's parking lot design guidelines (municipal code section 19.46.120) did not specify design specifications for parallel parking spaces on both sides of a two-way drive aisle. It is recommended that the project applicant coordinate with City staff to determine whether parallel parking is allowed along a two-way drive aisle, and if allowed, it is recommended that the applicant remove the parallel parking spaces on the east side of the drive aisle for operational concerns.

The provided site plan does not show dimensions for parking stalls or parking aisles. Prior to final design, it is recommended that the project applicant ensure that all dimensions comply with the City design standards for driveways, parking stalls, parking garages, and emergency vehicle access. Loading zones and garbage truck access also should be provided in accordance with City requirements.

Queuing Within Project Site

As shown on Figure 3, surface parking is proposed directly south of the western signalized driveway. Vehicles queued at the driveway could potentially block driver's ability to turn out of the parking spaces located just south of the signal. A queuing analysis (shown on Table 24) indicates that the 95th percentile queue for the northbound movement at this signalized driveway would be 250 feet during the PM peak hour. To be conservative, it is recommended that surface parking along the western parking aisle be prohibited within 350 feet of the signalized intersection. The site plan as shown on Figure 3 proposes no parking within 300 feet of the intersection. It is recommended that parking be restricted for another 50 feet (approximately 4 parking spaces).

Table 24
Queuing Analysis – Western Signalized Driveway

	West Project Driveway & Kifer Road	
	NBL	
Measurement	**AM**	**PM**
Background plus Project		
Cycle/Delay[1] (sec)	100	100
Volume (vphpl)	34	205
Avg. Queue (veh/ln.)	0.9	5.7
Avg. Queue[2] (ft./ln)	24	142
95th %. Queue (veh/ln.)	3	10
95th %. Queue (ft./ln)	75	250

1. Vehicle queue calculations based on cycle length for signalized intersections, and movement delay for unsignalized intersections.
2. Assumes 25 Feet Per Vehicle Queued

Parking Supply and Requirements

Proposed Parking Supply

Parking for the proposed Intuitive Surgical campus would be provided via at-grade parking lots and above ground parking garages. For Phase 1, the campus would retain 658 parking spaces in the existing surface lots and proposes 130 parking spaces in two at-grade parking lots and a 656 parking space garage, for a total of 1,444 parking spaces (see Table 25). For full build out, the campus would retain 338 parking spaces in the existing surfaces lots, propose a second garage with 496 parking spaces, and propose to expand the Phase 1 garage from 656 parking spaces to 1,151 parking spaces for a total of 1,985 parking spaces.

Table 25
Proposed Project Parking

Scenario	Parking Type	# of Spaces
Phase 1		
	Existing Surface	658
	Proposed Surface	130
	Proposed Garage 1	656
	Total	*1,444*
Full Build Out		
	Existing Surface	284
	Proposed Surface	54
	Proposed Garage 1	1,151
	Proposed Garage 2	496
	Total	*1,985*

Vehicle Parking Requirements

The City of Sunnyvale Municipal Code and the Lawrence Station Area Plan each specify parking requirements for office and R&D developments. However, the Lawrence Station Area Plan establishes the precedent that within the plan area, the regulatory framework of the Lawrence Station Area Plan supersedes the municipal code. Therefore, the proposed project would need to satisfy the parking requirements for the Lawrence Station Area Plan.

The Lawrence Station Area Plan parking requirement for office and R&D developments is 2.0-2.75 parking spaces per 1,000 square feet.

For Phase 1, the Intuitive Surgical campus would be required to provide a minimum of 1,112 parking spaces and a maximum of 1,529 parking spaces. The proposed on-site parking supply of 1,444 parking spaces would satisfy the Lawrence Station Area Plan parking requirements

For full build out, the campus would be required to provide a minimum of 1,510 parking spaces and a maximum of 2,077 parking spaces. The proposed on-site parking supply of 1,985 parking spaces would satisfy the Lawrence Station Area Plan parking requirements. As discussed above, due to the queuing and operational issues at the western drive aisle, it is recommended that the applicant remove an additional six parking spaces, which would reduce the total proposed project parking from 1,985 to 1,979 parking spaces. A total vehicle parking supply of 1,979 spaces would still satisfy the Lawrence Station Area Plan requirement.

The vehicle parking requirements are shown on Table 26.

Accessible parking spaces and van-accessible parking spaces are not shown on the current site plans. It is recommended that the project applicant dedicate accessible and van-accessible parking spaces per the California Building Code (CBC) Table 11B-208.2.

Additional City Requirements

The Sunnyvale Zoning Code specifies that developments with office/R&D uses are required to provide one loading space per lot. The project site plan includes an area in the at-grade parking lot on the northwest corner of the project area and an area behind Building 1 that would be used as the loading/service areas.

The Sunnyvale Municipal Code specifies that office/R&D developments are required to provide car share parking spaces. A minimum of 5% of parking spaces required for the office use must be permanently reserved for the exclusive use of car share vehicles. Car Share spaces are defined as "a space for carpool vehicles or a vehicle-sharing provider" (Section 19. 46. 100 (g) (5)) of Sunnyvale zoning code). Based on the Phase 1 proposed parking supply, 73 parking spaces should be designated as car share. Based on the Full Build Out proposed parking supply, 100 parking spaces should be designated as car share. These car-share spaces need to be reserved with lot markings, signs, or other techniques.

The City requires that office use developments with 100 parking spaces or more provide pre-wiring for electric car chargers equal to 3% of the vehicle parking supply. Thus, the project would be required to provide 44 electric vehicle spaces for Phase 1 and 60 electric vehicle spaces for full build out.

The additional City requirements are shown on Table 26.

Table 26
Project Parking Requirements

Scenario	Parking Type[1]	Size	Spaces	
Phase 1				
	Vehicle Parking			
	Existing 1020 & 1090 Kifer Rd[2]	258,558 s.f.	Minimum: 518	Maximum: 712
	Proposed Office/R&D[2]	297,000 s.f.	Minimum: 594	Maximum: 817
	Total Vehicle Parking Required		*Minimum: 1,112*	*Maximum: 1,529*
	Car Share[3]		Total: 73	
	Electric Vehicle[4]		Total: 44	
Full Build Out				
	Vehicle Parking			
	Existing 1020 Kifer Rd[2]	152,971 s.f.	Minimum: 306	Maximum: 421
	Proposed Office/R&D[2]	602,000 s.f.	Minimum: 1,204	Maximum: 1,656
	Total Vehicle Parking Required		*Minimum: 1,510*	*Maximum: 2,077*
	Car Share[3]		Total: 100	
	Electric Vehicle[4]		Total: 60	

Notes
[1] Parking requirements from Lawrence Station Area Plan (LSAP) and Sunnyvale Municipal Code (19.46.100 and 19.46.150)
[2] For office/R&D uses, LSAP vehicle parking is 2 spaces (minimum) to 2.75 spaces (maximum) per 1,000 square feet (s.f.).
[3] Car share parking required to be provided at a minimum of 5% of the vehicle parking supply.
[4] Electric Vehicle parking required to be provided at a minimum of 3% of the vehicle parking supply.

7. Cumulative Conditions

Because the project is consistent with the proposed Lawrence Station Area Plan, potential long-term traffic impacts have already been studied in the *Lawrence Station Area-Wide Transportation Plan (LSAP) TIA* report dated December 18, 2015, prepared by Hexagon Transportation Consultants, Inc. The LSAP TIA analyzed the cumulative conditions with a horizon year of year 2035, and assumed the full build-out of the LSAP, Peery Park Specific Plan, and the 2035 Proposed General Plan.

Project Contribution to Cumulative Significant Intersection Impacts

As documented in the LSAP TIA, the LSAP would generate significant intersection impacts at four intersections, listed below:

- Lawrence Expressway & Cabrillo Avenue – AM & PM Peak Hours
- Lawrence Expressway & Benton Street – AM & PM Peak Hours
- Lawrence Expressway & Homestead Road – AM & PM Peak Hours
- Lawrence Expressway & Pruneridge Avenue – AM Peak Hour

The Intuitive Surgical project would need to contribute its fair share towards the cumulative LSAP intersection impacts.

Project Contribution to Cumulative Significant Freeway Impacts

As documented in the LSAP TIA, the LSAP would generate significant freeway impacts at the following freeway mixed-flow segments:

- SR 237, eastbound from Lawrence Expressway to Great America Parkway – AM Peak Hour
- SR 237, westbound from Great America Parkway to Lawrence Expressway – PM Peak Hour
- US 101, southbound from Mathilda Avenue to Fair Oaks Avenue – AM Peak Hour
- US 101, southbound from Lawrence Expressway to Bowers Avenue/Great America Parkway – PM Peak Hour
- US 101, northbound from Montague Expressway/San Tomas Expressway to Lawrence Expressway – AM Peak Hour
- US 101, northbound from Mathilda Avenue to SR 237 – AM Peak Hour

Intuitive Surgical would contribute to the freeway impacts along the US 101 and SR 237 mixed-flow lanes at the locations listed below. Also listed are the approximate percentage of contribution.

- SR 237, eastbound from Lawrence Expressway to Great America Parkway – AM Peak Hour
- SR 237, westbound from Great America Parkway to Lawrence Expressway – PM Peak Hour
- US 101, southbound from Mathilda Avenue to Fair Oaks Avenue – AM Peak Hour
- US 101, southbound from Lawrence Expressway to Bowers Avenue/Great America Parkway – PM Peak Hour
- US 101, northbound from Montague Expressway/San Tomas Expressway to Lawrence Expressway – AM Peak Hour

The Intuitive Surgical project would need to contribute its fair share towards the cumulative LSAP freeway impacts.

8. Conclusions

This study was conducted for the purpose of identifying the potential near-term transportation impacts related to the proposed office and research and development (R&D) project. Hexagon analyzed potential project impacts to intersection operations, freeway segments, freeway ramps as well as bicycle, pedestrian, and transit facilities. Hexagon also analyzed project effects on queuing at select locations, and evaluated the project site plan in terms of site access, circulation and parking. Based on our analysis, Hexagon makes the following recommendations.

Intersection Level of Service

Based upon the impact criteria, the project would not generate a significant impact at any of the study intersections under background plus project conditions.

Under existing plus project conditions, the project would generate a significant impact at the intersection of Lawrence Expressway and Reed Avenue, at Lawrence Expressway and Kifer Road, and at Commercial Street and Kifer Road during the PM peak hour. At the two impacted intersections on Lawrence Expressway, a significant impact is identified under existing plus project conditions but not under background plus project conditions. This is because background conditions assumed the full occupancy of the existing buildings on site and thus the "project traffic" when comparing background plus project conditions to background conditions is less than when comparing existing plus project conditions to existing conditions. At the intersection of Commercial Street and Kifer Road, a significant impact is identified under existing plus project conditions but not under background plus project conditions. This is because under background conditions it is assumed that the City of Sunnyvale would restripe the two-way-left-turn-lane east of the intersection to provide a refuge area for left turns.

Potential Mitigation Strategies

Lawrence Expressway Intersections

The intersections on Lawrence Expressway at Kifer Road and at Reed Avenue are planned to be grade-separated in the draft County Expressway Plan. The project should pay the Sunnyvale Traffic Impact Fee (TIF), which would constitute its fair-share contribution toward the cost of the grade separations at Kifer Road and Reed Avenue.

Commercial Street & Kifer Road

The City of Sunnyvale plans to restripe the two-way-left-turn-lane to provide a refuge area for left turns. This intersection improvement is assumed under background and background plus project conditions, but not under existing and existing plus project conditions. The study identifies an intersection impact under existing plus project conditions. However, with the City planned improvement, the intersection would operate at an acceptable LOS D under background plus project conditions. Therefore, the intersection impact under existing plus project conditions is only temporary until the City restripes this intersection. The City has identified that this restriping will be complete prior to opening of the project. With the City planned restriping, the traffic impact at this intersection would be *less than significant*.

Freeway Impacts

The results of the CMP freeway analysis show that the project freeway traffic would not exceed 1%, thus the project freeway impacts would be less than significant.

Freeway Ramp Impacts

The ramp analysis shows that the study freeway ramps currently have sufficient capacity to service the existing traffic volumes and that the study freeway ramps would continue to have sufficient capacity to serve the projected traffic volumes under the project conditions.

Bicycle Facilities

Hexagon makes the following recommendations regarding bicycle facility improvements:

- Coordinate with City staff to implement a bike share program.
- Coordinate with City staff to pursue the proposed pedestrian/bicycle rail crossing near the Sonora Court cul-de-sac.
- According to the *Draft Station Plan* for the Lawrence Station Area Plan, the Intuitive Surgical Engineering Campus should provide 126 bicycle parking spaces, including 95 secured bicycle spaces. It is recommended that the bicycle parking be located near the building entrances, in well-lit areas, and adjacent to the pedestrian paths. In addition, the secure bicycle parking spaces need to be "lockable facilities such as individual lockers or enclosed, locked, limited-access areas for parking of bicycles" (Section 19.466.150 (a) (1) of Sunnyvale zoning code).

Pedestrian Facilities

Hexagon makes the following recommendations regarding pedestrian facility improvements:

- At the proposed new traffic signal at the western driveway, it is recommended that high-visibility crosswalks with pedestrian push buttons and signal heads be installed across the south and east legs of this new signalized intersection. The locations where the crosswalks are recommended currently lack ADA-compliant curb ramps. It is recommended that the project applicant install ADA-compliant curb ramps along with the recommended crosswalks. The *Draft Station Plan* for the Lawrence Station Area Plan provides pedestrian crosswalk policies recommending measures to improve pedestrian visibility to drivers and reduce pedestrian exposure to traffic.
- Work with City staff to implement pedestrian accommodation on Sonora Court. The pedestrian accommodation could be done by removing parking from one side of Sonora Court and striping an on-street pedestrian/bicycle shoulder. Alternatively, sidewalks could be retrofitted at greater cost.
- Coordinate with City staff to pursue the proposed pedestrian/bicycle rail crossing near the Sonora Court cul-de-sac.

Transit Facilities

Hexagon makes the following recommendations regarding transit facility improvements:

- Establish a shuttle service to the nearby Sunnyvale Caltrain station to further encourage employees to use public transportation, as part of the project's TDM Plan.

Queuing

Under background conditions, the following left-turn pockets are expected to overflow:

- Lawrence Expressway & Kifer Road – eastbound left-turn pocket – PM Peak Hour
- Wolfe Road & Kifer Road – westbound left-turn pocket – PM Peak Hour

Under background plus project conditions, the project would further lengthen the identified two left-turn queues. There is no room to further extend either of the left-turn pocket. At the intersection of Lawrence Expressway and Kifer Road, it is expected that the proposed Lawrence Expressway Grade Separation project would remove the identified queuing issue. The project applicant through payment of the Sunnyvale Traffic Impact Fee would pay their fair share for this improvement. At the intersection of Wolfe Road and Kifer Road, there is no feasible improvement for the identified queuing issue.

Site Access and Circulation

Hexagon makes the following recommendations regarding site access and circulation:

- The project proposes to install traffic signals at the western project driveway under full build-out conditions. This driveway is directly next to the Pepsi Bottling Group (Pepsi) driveway. There is also a driveway directly on the north side of Kifer Road. The proposed signal would need to bring in the driveway on the north side of Kifer Road as the fourth leg of the intersection. That driveway would also require re-alignment to line up with the project driveway. For traffic operation concerns, it is recommended that the project owner coordinate with City staff and owner of the Pepsi Bottling Group to share one driveway. This would eliminate one of the two driveways entering the signal south of Kifer Road. Alternatively, should both the project driveway and Pepsi driveway stay, it is recommended that the Pepsi driveway be restricted to right-in-right-out access. A raised median should be constructed to prevent left turns into and out of the Pepsi driveway. In this case, the project would be required to construct a cross-easement along the western edge of the project site to allow left-turning vehicles into/out of the Pepsi site to use the project driveway.
- It is recommended that the eastbound left-turn pocket just east of the proposed signalized western driveway be re-striped as a two-way left-turn median to allow for westbound vehicles to turn left into driveway B.
- The project should ensure that there is no tall vegetation, landscaping or on-street parking that would obstruct a driver's ability to see on-coming vehicles 300 feet down the road.
- Hexagon recommends the project applicant improve on-site circulation for vehicle access to Garage #2.
- It is recommended that surface parking along the western parking aisle be prohibited for an additional 50 feet for queuing issues.
- It is recommended that parallel parking along the east side of the western parking aisle be removed.

Parking

The City of Sunnyvale Municipal Code and the Lawrence Station Area Plan each specify parking requirements for office and R&D developments. However, the Lawrence Station Area Plan establishes the precedent that within the plan area, the regulatory framework of the Lawrence Station Area Plan supersedes the municipal code. Therefore, the proposed project would need to satisfy the parking requirements for the Lawrence Station Area Plan.

The Lawrence Station Area Plan parking requirement for office and R&D developments is 2.0-2.75 parking spaces per 1,000 square feet.

For Phase 1, the Intuitive Surgical campus would be required to provide a minimum of 1,112 parking spaces and a maximum of 1,529 parking spaces. The proposed on-site parking supply of 1,444 parking spaces would satisfy the Lawrence Station Area Plan parking requirements

For full build out, the campus would be required to provide a minimum of 1,510 parking spaces and a maximum of 2,077 parking spaces. The proposed on-site parking supply of 1,985 parking spaces would satisfy the Lawrence Station Area Plan parking requirements. As discussed above, due to the queuing and operational issues at the western drive aisle, it is recommended that the applicant remove an additional six parking spaces, which would reduce the total proposed project parking from 1,985 to 1,979 parking spaces. A total vehicle parking supply of 1,979 spaces would still satisfy the Lawrence Station Area Plan requirement.

Accessible parking spaces and van-accessible parking spaces are not shown on the current site plans. It is recommended that the project applicant dedicate accessible and van-accessible parking spaces per the California Building Code (CBC) Table 11B-208.2.

Intuitive Surgical Transportation Impact Analysis
Technical Appendices

Appendix A

Intersection Counts

Appendix B

Background Developments List

Appendix C

Volume Spreadsheets

Appendix D

Intersection Level of Service Calculation Sheets

Appendix E

Peak-Hour Signal Warrant Calculations