HEXAGON TRANSPORTATION CONSULTANTS, INC.

Concar Passage
Mixed-Use Development

General Plan Conformance Transportation Analysis

Prepared for:

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Executive Summary

This report presents the results of the transportation impact analysis conducted for the proposed mixed-use development located at 640 Concar Drive in San Mateo, California. The project proposes to replace the existing buildings on site and construct 961 residential units with 3,100 square feet of retail space, 7,400 square feet of restaurant space, 7,650 square feet of performance/ballet space, and 4,600 square feet of daycare space. In addition, the existing Trader Joe's and 7-Eleven would be rebuilt with the project. Trader Joe's would increase in size by 2,260 square feet to a total of 13,700 square feet and 7-Eleven would increase by 240 square feet to a total of 3,100 square feet. The project also proposes a 3,800 square-foot leasing center and approximately 11,900 square feet of residential amenities. However, the leasing center and amenities were not included in the project trip generation because they are accessible to residents only. Vehicular access to the project site would be provided by driveways on Delaware Street, Concar Drive, and Grant Street.

The purpose of the transportation study is to identify any potential transportation issues related to the proposed project and to review the proposed site access and circulation. Local intersection operations were evaluated following standards and methodologies set forth by the City of San Mateo. The transportation study includes an analysis of AM (7:00 – 9:00 AM) and PM (4:00 – 6:00 PM) peak hour traffic conditions during weekdays on 27 study intersections, 4 freeway segments and 10 freeway ramps in the vicinity of the project site.

Project Trip Estimates

Vehicle trips generated by the proposed project were estimated using the trip rates published in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 10th Edition* (2017) for "Multifamily Housing Mid-Rise" (Land Use 221), "Shopping Center" (Land Use 820), "Fast Casual Restaurant" (Land Use 930), "Recreational Community Center, General Urban/Suburban" (Land Use 495), and "Day Care Center, General Urban/Suburban" (Land Use 565). Vehicle trips generated by the proposed Trader Joe's and 7-Eleven were estimated using trip rates based on counts conducted on Thursday, April 26, 2018. Using these rates, the proposed project would generate 592 trips (226 inbound and 366 outbound) during the AM peak hour and 1,092 trips (600 inbound and 492 outbound) during the PM peak hour.

Since this project is mixed-use in nature, provides safe pedestrian facilities, and is located near other developments, Hexagon used US EPA's MXD model to determine the applicable trip reduction for the project. Based on the MXD model, a 15% trip reduction during the AM peak hour, a 16.3% trip reduction during the PM peak hour, and a 17.8% daily trip reduction were applied.

In addition, trip generation for retail uses is typically adjusted to account for pass-by-trips. Pass-by-trips are trips that are already on the adjacent roadways (and are therefore already counted in the existing traffic) but would turn into the site while passing by. Pass-by trip reductions are based on the average pass-by trip reduction rates published in the ITE *Trip Generation Handbook, 3rd Edition.* A pass-by trip reduction of 34% was applied to the retail component of the project, 43% was applied to the restaurant component, 36% was applied to Trader Joe's, and 51% was applied to 7-Eleven. Hexagon assumes no pass-by trip reduction during the AM peak hour. After applying the appropriate pass-by trip reductions, it is estimated that the proposed project would generate 528 vehicle trips (206 inbound and 322 outbound trips) during the AM peak hour and 765 vehicle trips (425 inbound and 340 outbound trips) during the PM peak hour.

Existing Trip Credits

Because the project would replace the existing uses on the site, trips associated with the existing buildings were subtracted from the project-generated traffic to derive the net trips. The trips generated by the existing uses on the site were estimated based on driveway counts conducted on April 26th, 2018. Inbound trips generated by Trader Joe's and 7-Eleven were captured by counters stationed at the door who counted each group that arrived together as one inbound trip. People exiting Trader Joe's and 7-Eleven often did not exit in groups and thus outbound trips for the Trader Joe's and 7-Eleven were estimated based on inbound counts and the directional distribution data from ITE *Trip Generation, 10th Edition* for Shopping Center (ITE Code 820). Pass-by trip reductions were also applied to the existing retail trips. Using these rates and the applied trip reductions, the existing uses are estimated to generate 405 trips (216 inbound and 189 outbound) during the AM peak hour and 599 trips (270 inbound and 329 outbound) during the PM peak hour.

Net Trip Generation

After applying the appropriate trip generation rates, trip reductions, and the existing trip credits, Table ES 1 shows that the project would generate 2,471 net new daily trips, with 123 net new trips (-10 inbound and 133 outbound) occurring during the AM peak hour and 166 net new trips (155 inbound and 11 outbound) occurring during the PM peak hour.

Table ES 1
Project Trip Generation Summary

Land Use	Size	Unit	Daily Rate	Daily Trips	AM Peak Hour Rate	AM Peak Hour % In	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour Rate	PM Peak Hour % In	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Proposed Uses														
Residential [1]	961	d.u.	5.44	5,228	0.36	26%	90	256	346	0.44	61%	258	165	423
Mixed-Use Reduction [3]				(931)			(14)	(38)	(52)			(42)	(27)	(69)
Residential Trips (Resi)				4,297			76	218	294			216	138	354
General Commercial [2]	3.1	ksf	37.75	117	0.94	62%	2	1	3	3.81	48%	6	6	12
Mixed-Use Reduction [3]				(21)			0	0	0			(1)	(1)	(2)
PM Pass-By Reduction (34%) [4]				(16)			0	0	0			(2)	(2)	(4)
Retail Trips (Com)				80			2	1	3			3	3	6
Restaurant [7]	7.4	ksf	315.17	2,332	2.07	67%	10	5	15	14.13	55%	58	47	105
Mixed-Use Reduction [3]				(415)			(1)	(1)	(2)			(9)	(8)	(17)
PM Pass-By Reduction (43%) [8]				(412)			0	0	0			(21)	(17)	(38)
Restaurant Trips (Rest)				1,505			9	4	13			28	22	50
Ballet / Performance Space [9]	7.65	ksf	28.82	220	1.76	66%	9	4	13	2.31	47%	8	10	18
Mixed-Use Reduction [3]				(39)			(1)	(1)	(2)			(1)	(2)	(3)
Ballet / Performance Trips (BPS)				181			8	3	11			7	8	15
Day Care [10]	4.6	ksf	47.62	219	11.00	53%	27	24	51	11.12	47%	24	27	51
Mixed-Use Reduction [3]				(39)			(4)	(4)	(8)			(4)	(4)	(8)
Day Care Trips (DC)				180			23	20	43			20	23	43
Trader Joe's [13]	13.7	ksf	287.59	3,940	4.55	60%	37	25	62	28.76	51%	201	193	394
PM Pass-By Reduction (36%) [5]				(709)			0	0	0			(72)	(69)	(141)
Trader Joe's Trips (TJ)				3,231			37	25	62			129	124	253
7-Eleven [13]	3.1	ksf	287.10	890	32.87	50%	51	51	102	28.67	51%	45	44	89
PM Pass-By Reduction (51%) [6]				(227)			0	0	0			(23)	(22)	(45)
7-Eleven Trips (7E)				663			51	51	102			22	22	44
Project Trips (P = Resi + Com + Rest + BPS + DC + TJ + 7E)				**10,137**			**206**	**322**	**528**			**425**	**340**	**765**
Existing Use														
Shopping Center [11]				5,250			138	121	259			213	312	525
PM Pass-By Reduction (34%) [4]				(893)			0	0	0			(72)	(106)	(178)
Existing Shopping Center Trips				4,357			138	121	259			141	206	347
Trader Joe's [12]				3,290			31	21	52			168	161	329
PM Pass-By Reduction (36%) [5]				(592)			0	0	0			(60)	(58)	(118)
Existing Trader Joe's Trips				2,698			31	21	52			108	103	211
7-Eleven [12]				820			47	47	94			42	40	82
PM Pass-By Reduction (51%) [6]				(209)			0	0	0			(21)	(20)	(41)
Existing 7-Eleven Trips				611			47	47	94			21	20	41
Existing Trips (E)				**7,666**			**216**	**189**	**405**			**270**	**329**	**599**
Net Project Trip Generation (Net = P - E)				**2,471**			**(10)**	**133**	**123**			**155**	**11**	**166**

Notes:
All rates are from: Institute of Transportation Engineers, *Trip Generation, 10th Edition*
1. Land Use Code 221: Multifamily Housing (Mid-Rise), General Urban/Suburban (average rates, expressed in trips per dwelling unit)
2. Land Use Code 820: Shopping Center, General Urban/Suburban (average rates, expressed in trips per 1,000 s.f.).
3. Trip reduction of 15% in the AM and 16.3% in the PM, daily reduction calculated at 17.8%. Based on MXD model developed by Fehr & Peers for the US EPA to account for internal capture and external walking, biking, and transit trips due to mixed-use development and local area characteristics. (Mixed Use Trip Generation Model v 4.0, 2010)
4. Pass-by trip reduction for Land Use Code 820: Shopping Center is based on the average pass-by trip reduction rate published in the ITE *Trip Generation Handbook, 3rd Edition.* Hexagon assumes no pass-by trip reduction during the AM peak hour and half of the PM peak pass-by reduction for daily trip generation.
5. Pass-by trip reduction for Land Use Code 850: Supermarket is based on the average pass-by trip reduction rate published in the ITE *Trip Generation Handbook, 3rd Edition.* Hexagon assumes no pass-by trip reduction during the AM peak hour and half of the PM peak pass-by reduction for daily trip generation.
6. Pass-by trip reduction for Land Use Code 851: Convenience Market (Open 24 Hours) is based on the average pass-by trip reduction rate published in the ITE *Trip Generation Handbook, 3rd Edition.* Hexagon assumes no pass-by trip reduction during the AM peak hour and half of the PM peak pass-by reduction for daily trip generation.
7. Land Use Code 930: Fast Casual Restaurant, General Urban/Suburban (average rates, expressed in trips per 1,000 s.f.)
8. Pass-by trip reduction for Fast Casual Restaurant is based on the average pass-by trip rate for High-Turnover Restaurant (ITE 932) as published in the ITE *Trip Generation Handbook, 3rd Edition.* Hexagon assumes no pass-by trip reduction during the AM peak hour and half of the PM peak pass-by reduction for daily trip generation.
9. Land Use Code 495: Recreational Community Center, General Urban/Suburban (average rates, expressed in trips per 1,000 s.f.)
10. Land Use Code 565: Day Care Center, General Urban/Suburban (average rates, expresed in trips per 1,000 s.f.)
11. Peak-hour trips from driveway counts conducted on Thursday, April 26th, 2018. Daily trips were estimated by assuming PM peak hour trips to be 10% of daily trips.
12. Peak-hour inbound trips from trip generation counts conducted on Thursday, April 26th, 2018. Outbound trips were estimated using directional distribution percentages provided by ITE's Trip Generation, 10th Edition. Daily trips were estimated by assuming PM peak hour trips to be 10% of daily trips.
13. Peak-hour trip rates based on counts conducted on Thursday, April 26th, 2018. Mixed-Use Reduction was not applied. Daily trips were estimated by assuming PM peak hour trips to be 10% of daily trips.

Intersection Level of Service Results

Under existing plus project conditions, the project would generate substantial increases in intersection delays based on the City's General Plan criteria at the following intersections (see Table ES-2):

- Delaware Street & Concar Drive
- Delaware Street & 19th Avenue
- YMCA Driveway & 19th Avenue

Under background plus project conditions, the project would generate substantial increases in intersection delays based on the City's General Plan criteria at the following intersections:

- SR 92 Westbound Ramps & Concar Drive
- Delaware Street & 19th Avenue
- Delaware Street & Bermuda
- Grant Street & Concar Drive
- Grant Street & 19th Avenue
- YMCA Driveway & 19th Avenue
- US 101 Southbound Ramps & Fashion Island Boulevard

Under cumulative plus project conditions, the project would generate substantial increases in intersection delays based on the City's General Plan criteria at the following intersections:

- Delaware Street & 19th Avenue
- Grant Street & 19th Avenue
- YMCA Driveway & 19th Avenue
- US 101 Southbound Ramps & Fashion Island Boulevard

It should be noted that all of the above identified intersections are a result of corridor congestion along 19th Avenue/Fashion Island Boulevard, and were analyzed using the micro-simulation analysis. The micro-simulation analysis showed that these intersections were either the bottlenecks causing the corridor congestion, or intersections affected by the feedback queues at the bottlenecks. Therefore, while the analysis indicates that these particular intersections would experience substantial intersection delay increases, improvements would still need to address the broader congestion issue along the whole corridor. Potential improvement measures are discussed below.

At the time of this report, the City of San Mateo is studying potential alternatives to alleviate congestion along the 19th Avenue/Fashion Island Boulevard corridor. Preliminary analysis from the corridor study efforts have identified numerous improvement measures, listed below:

- Convert 19th Avenue between Delaware Street and Grant Street from the existing one-way eastbound operation to two-way operations with one lane in each direction.
- Construct intersection improvements at the Delaware Street and 19th Avenue intersection and the Grant Street and 19th Avenue intersection to accommodate the 19th Avenue two-way conversion. The following improvements are preliminarily identified:
    - Restripe southbound Delaware Street at 19th Avenue to include two left-turn lanes and one through lane. The northbound/southbound operations would be converted from split phasing to protected phasing.
    - Westbound 19th Avenue at Delaware Street would consist of one left-turn lane. Eastbound/westbound operations would be split phase
    - Westbound 19th Avenue at Grant Street would consist of one shared left-through lane and one right-turn lane.
- Widen the US 101 southbound on-ramp from Fashion Island Boulevard to include a second mixed-flow lane.
- Widen westbound Fashion Island Boulevard to include a right-turn pocket at the US 101 northbound on-ramp intersection
- Lengthen the eastbound left-turn pocket at the Norfolk Street and Fashion Island Boulevard intersection.
- Implement reversible lanes on the bridge between Norfolk Street and Harbor Seal Court. The AM peak period operations will be the same as existing conditions. The PM peak period operations will allow for two eastbound through lanes from west of Norfolk Street to just west of Harbor Seal Court where Fashion Island Boulevard opens up to two eastbound lanes. At the intersection of Norfolk Street and Fashion Island Boulevard, the eastbound approach will consist of one left-turn lane, one through lane and one shared through-right lane. The westbound approach will consist of one left-turn lane and one shared through-right lane.
- Implement signal coordination at all signalized intersections on 19th Avenue/Fashion Island Boulevard between Delaware Street and Norfolk Street

In addition to the improvements identified in the preliminary analysis from the corridor study efforts, the following improvements would also be needed to eliminate the project-generated substantial increases in intersection delays (see Table ES-2 below):

- Restripe eastbound 19th Avenue at the Grant Street intersection to include one shared left-through lane and one shared through-right lane.
- Restripe eastbound Fashion Island Boulevard at the US 101 southbound ramps intersection to include one through lane and one shared through-right lane.

As shown under background conditions, the identified deficiencies along the 19th Avenue/Fashion Island Boulevard corridor would not be caused solely by the Concar Passage project. Improvement measures have been identified that will eliminate the project's substantial increases in intersection delays. The project will be required to pay its fair share of the improvements. However, the identified improvements are not currently on the City's Capital Improvement Program and funding is not currently available to ensure implementation. Therefore, the intersection delays at the identified intersections would remain substantial.

Table ES 2
Intersection Level of Service Summary

#	Intersection	Control	Peak Hour	Count Date	Note	Existing Avg. Delay (sec)	Existing LOS	Existing plus Project Avg. Delay (sec)	Existing plus Project LOS	Incr. in Avg. Delay	Improved Existing plus Project Avg. Delay (sec)	Improved Existing plus Project LOS	Incr. in Avg. Delay	Background Avg. Delay (sec)	Background LOS	Background plus Project Avg. Delay (sec)	Background plus Project LOS	Δ Avg. Delay	Improved Background plus Project Avg. Delay (sec)	Improved Background plus Project LOS	Δ Avg. Delay	Year 2030 no Project Conditions (4) Avg. Delay (sec)	Year 2030 no Project Conditions (4) LOS	Year 2030 GP Conditions (4) Avg. Delay (sec)	Year 2030 GP Conditions (4) LOS	Δ Avg. Delay	Improved Year 2030 GP Conditions (4) Avg. Delay (sec)	Improved Year 2030 GP Conditions (4) LOS	Δ Avg. Delay
1	El Camino Real & 17th Ave	Signal	AM	05/22/18		23.4	C	23.3	C	-0.1	23.3	C	-0.1	24.2	C	24.1	C	-0.1	24.1	C	-0.1	26.9	C	26.7	C	-0.2	26.7	C	-0.2
			PM	05/22/18		23.6	C	23.5	C	-0.1	23.5	C	-0.1	24.4	C	24.3	C	-0.1	24.3	C	-0.1	27.6	C	27.5	C	-0.1	27.5	C	-0.1
2	El Camino Real & SR 92 WB Ramps	Signal	AM	01/29/18		16.0	B	16.0	B	0.0	16.0	B	0.0	16.1	B	16.1	B	0.0	16.1	B	0.0	17.6	B	17.5	B	-0.1	17.5	B	-0.1
			PM	01/29/18		18.3	B	18.0	B	-0.3	18.0	B	-0.3	18.4	B	18.1	B	-0.3	18.1	B	-0.3	20.7	C	20.4	C	-0.3	20.4	C	-0.3
3	El Camino Real & SR 92 EB Ramps	Signal	AM	01/29/19		10.1	B	10.1	B	0.0	10.1	B	0.0	10.0	A	10.0	A	0.0	10.0	A	0.0	10.6	B	10.6	B	0.0	10.6	B	0.0
			PM	01/29/19		10.7	B	10.7	B	0.0	10.7	B	0.0	10.7	B	10.7	B	0.0	10.7	B	0.0	11.3	B	11.3	B	0.0	11.3	B	0.0
4	El Camino Real & 20th Avenue	Signal	AM	01/29/19		29.0	C	29.2	C	0.2	29.2	C	0.2	30.8	C	30.9	C	0.1	30.9	C	0.1	32.1	C	32.2	C	0.1	32.2	C	0.1
			PM	01/29/19		36.7	D	36.7	D	0.0	36.7	D	0.0	39.4	D	39.4	D	0.0	39.4	D	0.0	**46.1**	**D**	**46.2**	**D**	**0.1**	**46.2**	**D**	**0.1**
5	El Camino Real & 25th Avenue	Signal	AM	01/29/19		33.8	C	34.0	C	0.2	34.0	C	0.2	39.0	D	39.0	D	0.0	39.0	D	0.0	42.8	D	42.9	D	0.1	42.9	D	0.1
			PM	01/29/19		40.4	D	40.7	D	0.3	40.7	D	0.3	44.6	D	44.7	D	0.1	44.7	D	0.1	**46.3**	**D**	**46.5**	**D**	**0.2**	**46.5**	**D**	**0.2**
6	Delaware Street & Sunnybrae Avenue	TWSC	AM	02/27/18	(1)	19.0	C	18.9	C	-	18.9	C	-	20.8	C	20.6	C	-	20.6	C	-	24.0	C	23.7	C	-	23.7	C	-
			PM	02/27/18	(1)	19.4	C	19.3	C	-	19.3	C	-	21.1	C	21.0	C	-	21.0	C	-	27.8	D	27.6	D	-	27.6	D	-
7	Delaware Street & 16th Avenue	AWSC	AM	02/27/18		31.2	D	30.4	D	-	30.4	D	-	41.6	E	40.2	E	-	40.2	E	-	62.5	F	61.7	F	-	61.7	F	-
			PM	02/27/18		38.1	E	35.8	E	-	35.8	E	-	48.8	E	45.6	E	-	45.6	E	-	109.7	F	105.7	F	-	105.7	F	-
8	Delaware Street & Charles Lane	Signal	AM	01/29/19		8.4	A	8.4	A	0.0	8.4	A	0.0	11.8	B	11.8	B	0.0	11.8	B	0.0	11.6	B	11.6	B	0.0	11.6	B	0.0
			PM	01/29/19		6.1	A	6.1	A	0.0	6.1	A	0.0	7.4	A	7.4	A	0.0	7.4	A	0.0	8.1	A	8.1	A	0.0	8.1	A	0.0
9	SR 92 WB Ramps & Concar Drive	Signal	AM	02/27/18	(2)	9.9	A	9.8	A	-0.1	7.9	A	-2.0	**46.3**	**D**	**OVERSAT**	**F**	**34+**	35.8	D	-10.5	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.7**	**OVERSAT**	**F**	**0.7**
			PM	02/27/18	(2)	7.5	A	11.2	B	3.7	7.2	A	-0.3	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.0**	9.4	A	-71.0	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.0**	**OVERSAT**	**F**	**0.0**
10	Delaware Street & Concar Drive	Signal	AM	02/27/18	(2)	29.8	C	30.8	C	1.0	35.4	D	5.6	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.4**	**OVERSAT**	**F**	**-0.3**	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.6**	**OVERSAT**	**F**	**1.6**
			PM	02/27/18	(2)	31.9	C	**49.8**	**D**	**17.9**	38.8	D	6.9	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.6**	42.6	D	-38.0	**OVERSAT**	**F**	**OVERSAT**	**F**	**3.5**	**OVERSAT**	**F**	**3.5**
11	Delaware Street & 19th Avenue	Signal	AM	02/06/18	(2)	31.8	C	**46.0**	**D**	**14.2**	41.6	D	9.8	**OVERSAT**	**F**	**OVERSAT**	**F**	**15.9**	**OVERSAT**	**F**	**-17.8**	**OVERSAT**	**F**	**OVERSAT**	**F**	**16.3**	**OVERSAT**	**F**	**-37.9**
			PM	02/06/18	(2)	**71.4**	**E**	**OVERSAT**	**F**	**14.2**	**63.0**	**E**	**-8.4**	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.0**	**OVERSAT**	**F**	**-21.0**	**OVERSAT**	**F**	**OVERSAT**	**F**	**8.4**	**OVERSAT**	**F**	**-9.9**
12	Delaware Street & Bermuda Drive	Signal	AM	01/29/19	(2)	15.9	B	18.9	B	3.0	15.6	B	-0.3	21.7	C	**OVERSAT**	**F**	**59+**	18.0	B	-3.7	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.4**	**OVERSAT**	**F**	**-5.6**
			PM	01/29/19	(2)	25.1	C	41.7	D	16.6	25.5	C	0.4	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.7**	**OVERSAT**	**F**	**-2.4**	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.8**	**OVERSAT**	**F**	**-0.3**
13	Delaware Street & Saratoga Drive	Signal	AM	01/29/19	(2)	19.7	B	19.6	B	-0.1	19.5	B	-0.2	21.9	C	28.0	C	6.1	21.3	C	-0.6	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.4**	**OVERSAT**	**F**	**0.4**
			PM	01/29/19	(2)	20.3	C	29.9	C	9.6	28.8	C	8.5	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.3**	**OVERSAT**	**F**	**-0.6**	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.3**	**OVERSAT**	**F**	**0.3**
14	Delaware Street & 25th Avenue	Signal	AM	01/29/19		12.7	B	12.7	B	0.0	12.7	B	0.0	17.3	B	17.4	B	0.1	17.4	B	0.1	21.4	C	21.6	C	0.2	21.6	C	0.2
			PM	01/29/19		12.4	B	12.4	B	0.0	12.4	B	0.0	16.4	B	16.5	B	0.1	16.5	B	0.1	28.3	C	28.5	C	0.2	28.5	C	0.2
15	Grant Street & Concar Drive	Signal	AM	01/29/19	(2)	28.0	C	30.0	C	2.0	34.2	C	6.2	27.1	C	**OVERSAT**	**F**	**53+**	35.9	D	8.8	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.4**	**OVERSAT**	**F**	**0.4**
			PM	01/29/19	(2)	24.6	C	28.4	C	3.8	26.6	C	2.0	26.7	C	**OVERSAT**	**F**	**54+**	27.1	C	0.4	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.4**	**OVERSAT**	**F**	**0.4**
16	Grant Street & 19th Avenue	Signal	AM	02/06/18	(2 3)	27.0	C	42.6	D	15.6	26.9	C	-0.1	**46.8**	**D**	**OVERSAT**	**F**	**34+**	32.2	C	-14.6	**OVERSAT**	**F**	**OVERSAT**	**F**	**10.7**	**OVERSAT**	**F**	**-36.2**
			PM	02/06/18	(2 3)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-2.2**	29.8	C	-51.0	**OVERSAT**	**F**	**OVERSAT**	**F**	**-1.8**	**OVERSAT**	**F**	**-3.3**	**OVERSAT**	**F**	**OVERSAT**	**F**	**-3.0**	**OVERSAT**	**F**	**-12.6**
17	Ginnever Street & Bermuda Drive	AWSC	AM	01/29/19	(2)	12.3	B	13.9	B	-	9.0	A	-	11.8	B	12.8	B	-	9.2	A	-	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-
			PM	01/29/19	(2)	9.2	A	9.9	A	-	6.4	A	-	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-
18	YMCA Driveway & 19th Avenue	Signal	AM	01/29/19	(2)	25.8	C	43.2	D	17.4	15.7	B	-10.1	**OVERSAT**	**F**	**OVERSAT**	**F**	**7.9**	27.0	C	-53.0	**OVERSAT**	**F**	**OVERSAT**	**F**	**7.6**	**OVERSAT**	**F**	**3.3**
			PM	01/29/19	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**4.7**	14.2	B	-66.0	**OVERSAT**	**F**	**OVERSAT**	**F**	**5.7**	**OVERSAT**	**F**	**-30.9**	**OVERSAT**	**F**	**OVERSAT**	**F**	**5.6**	**OVERSAT**	**F**	**-13.8**

Notes:
AWSC = All-Way Stop Control ; TWSC = Two-Way Stop Control
"OVERSAT" indicates that the SimTraffic microsimulation model indicates that the intersection would experience capacity issues where the demand cannot be served by the intersection. Oversaturated intersections would operate at LOS F.

(1) Delays and LOS reported for side-street and two-way stop controlled intersections are for the worst approach.
(2) The intersection level of service is calculated using the SimTraffic microsimulation model.
(3) The intersection level of service is calculated using the HCM 2000 module with the Synchro software. These intersections have unusual signal operations that cannot be supported by the Synchro HCM 2010 module.
(4) Year 2030 conditions intersection level of service results are based on volumes published in the City of San Mateo General Plan Update - Revised Draft Environmental Report.

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

Table ES-2 (continued)
Intersection Level of Service Summary

#	Intersection	Control	Peak Hour	Count Date	Note	Existing Avg. Delay (sec)	Existing LOS	Existing plus Project Avg. Delay (sec)	Existing plus Project LOS	Existing plus Project Incr. in Avg. Delay	Mitigated Existing plus Project Avg. Delay (sec)	Mitigated Existing plus Project LOS	Mitigated Existing plus Project Incr. in Avg. Delay	Background Avg. Delay (sec)	Background LOS	Background plus Project Avg. Delay (sec)	Background plus Project LOS	Background plus Project Δ Avg. Delay	Mitigated Background plus Project Avg. Delay (sec)	Mitigated Background plus Project LOS	Mitigated Background plus Project Δ Avg. Delay	Year 2030 no Project Conditions (4) Avg. Delay (sec)	Year 2030 no Project Conditions (4) LOS	Year 2030 GP Conditions (4) Avg. Delay (sec)	Year 2030 GP Conditions (4) LOS	Year 2030 GP Conditions (4) Δ Avg. Delay	Mitigated Year 2030 GP Conditions (4) Avg. Delay (sec)	Mitigated Year 2030 GP Conditions (4) LOS	Mitigated Year 2030 GP Conditions (4) Δ Avg. Delay
19	US 101 SB Ramps & Fashion Island	Signal	AM	02/06/18	(2)	**79.9**	**E**	**OVERSAT**	**F**	**2.7**	26.6	C	-53.3	**OVERSAT**	**F**	**OVERSAT**	**F**	**6.2**	28.2	C	-52.0	**OVERSAT**	**F**	**OVERSAT**	**F**	**5.4**	**OVERSAT**	**F**	**-12.3**
			PM	02/06/18	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-0.1**	26.0	C	-54.0	**OVERSAT**	**F**	**OVERSAT**	**F**	**-0.2**	25.2	C	-55.0	**OVERSAT**	**F**	**OVERSAT**	**F**	**-0.2**	**OVERSAT**	**F**	**-66.5**
20	US 101 NB On-Ramp & Fashion Island	Side-Street Stop	AM	01/29/19	(1 2 3)	OVERSAT	F	OVERSAT	F	-	33.5	D	-	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-
			PM	01/29/19	(1 2 3)	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-
21	Norfolk Street & Fashion Island Boulevard	Signal	AM	02/06/18	(2)	**83.7**	**F**	**OVERSAT**	**F**	**-0.8**	**55.4**	**E**	**-28.3**	**96.9**	**F**	**94.8**	**F**	**-2.1**	**48.1**	**D**	**-48.8**	**OVERSAT**	**F**	**OVERSAT**	**F**	**-0.8**	**OVERSAT**	**F**	**-39.3**
			PM	02/06/18	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-0.7**	**81.5**	**F**	**-27.5**	**OVERSAT**	**F**	**OVERSAT**	**F**	**-0.6**	**82.5**	**F**	**-23.9**	**OVERSAT**	**F**	**OVERSAT**	**F**	**-1.0**	**OVERSAT**	**F**	**-30.8**
22	Delaware Street & Depot Way/Shopping Center Dwy	TWSC	AM	01/29/19	(1)	Project Driveway		25.0	C	-	25.0	C	-	Project Driveway		34.5	D	-	34.5	D	-	Project Driveway		39.3	E	-	39.3	E	-
			PM	01/29/19	(1)			28.8	D	-	28.8	D	-			40.8	E	-	40.8	E	-			67.7	F	-	67.7	F	-
23	Depot Way/Park Crosswalk & Concar	Future Signal	AM	01/29/19		Project Driveway		4.9	A	-	4.9	A	-	Project Driveway		4.9	A	-	4.9	A	-	Project Driveway		4.8	A	-	4.8	A	-
			PM	01/29/19				4.7	A	-	4.7	A	-			4.7	A	-	4.7	A	-			4.5	A	-	4.5	A	-
24	El Camino Real SB Ramps & Hillsdale Boulevard	Signal	AM	02/06/18	(3)	27.9	C	28.0	C	0.1	28.0	C	0.1	31.1	C	31.3	C	0.2	31.3	C	0.2	31.2	C	31.3	C	0.1	31.3	C	0.1
			PM	02/06/18	(3)	28.2	C	28.3	C	0.1	28.3	C	0.1	29.7	C	29.8	C	0.1	29.8	C	0.1	30.2	C	30.3	C	0.1	30.3	C	0.1
25	El Camino Real NB Ramps & Hillsdale Boulevard	Signal	AM	02/06/18	(3)	29.7	C	29.8	C	0.1	29.8	C	0.1	28.6	C	28.6	C	0.0	28.6	C	0.0	31.4	C	31.4	C	0.0	31.4	C	0.0
			PM	02/06/18	(3)	26.1	C	26.1	C	0.0	26.1	C	0.0	26.5	C	26.5	C	0.0	26.5	C	0.0	28.3	C	28.2	C	-0.1	28.2	C	-0.1
26	Saratoga Drive & Franklin Parkway	Signal	AM	02/06/18		25.1	C	25.0	C	-0.1	25.0	C	-0.1	**45.3**	**D**	**45.2**	**D**	**-0.1**	**45.2**	**D**	**-0.1**	44.5	D	44.4	D	-0.1	44.4	D	-0.1
			PM	02/06/18		**52.5**	**D**	**52.5**	**D**	**0.0**	**52.5**	**D**	**0.0**	**80.7**	**F**	**80.7**	**F**	**0.0**	**80.7**	**F**	**0.0**	**80.0**	**E**	**79.9**	**E**	**-0.1**	**79.9**	**E**	**-0.1**
27	Saratoga Drive & Hillsdale Boulevard	Signal	AM	02/06/18	(3)	42.6	D	42.6	D	0.0	42.6	D	0.0	**49.7**	**D**	**49.7**	**D**	**0.0**	**49.7**	**D**	**0.0**	**59.0**	**E**	**59.0**	**E**	**0.0**	**59.0**	**E**	**0.0**
			PM	02/06/18	(3)	**105.5**	**F**	**105.6**	**F**	**0.1**	**105.6**	**F**	**0.1**	**>120**	**F**	**>120**	**F**	**0.3**	**>120**	**F**	**0.3**	**>120**	**F**	**>120**	**F**	**0.2**	**>120**	**F**	**0.2**

Notes:
AWSC = All-Way Stop Control ; TWSC = Two-Way Stop Control
"OVERSAT" indicates that the SimTraffic microsimulation model indicates that the intersection would experience capacity issues where the demand cannot be served by the intersection. Oversaturated intersections would operate at LOS F.

(1) Delays and LOS reported for side-street and two-way stop controlled intersections are for the worst approach.
(2) The intersection level of service is calculated using the SimTraffic microsimulation model.
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(4) Year 2030 conditions intersection level of service results are based on volumes published in the City of San Mateo General Plan Update - Revised Draft Environmental Report.

BOLD indicates a substandard level of service.
boxed and BOLD indicates substantial increase in intersection delay.

Freeway Segments

Potential project effects on freeway segments were analyzed in accordance with C/CAG CMP methods. The results of the freeway segment analysis show that the project would cause considerable increases in traffic volumes (one percent or more of freeway capacity) on two study freeway segments (see Table ES 3). The project is anticipated to have a considerable effect on two study freeway segments.

To reduce the project's adverse effects on freeway operations, a trip reduction of 58% would be required. It is not anticipated that a 58% trip reduction would be achievable. There are currently no planned improvements along these segments of SR 92 that would increase capacity.

Table ES 3
Freeway Segment Capacity Evaluation Summary

				Existing Conditions					Project Conditions		
Freeway	Segment	Dir	Peak Hour	# of Lanes	Capacity [1]	1% Capacity	LOS Standard [2]	Existing LOS [3]	Project Trips [4]	% Capacity	Adverse Effect
US 101	Whipple Avenue to SR 92	NB	AM	4	9,200	92	E	**F**	13	0.14%	NO
			PM	4	9,200	92	E	**F**	47	0.51%	NO
US 101	SR 92 to Peninsula Avenue	NB	AM	4	9,200	92	F	F	37	0.40%	NO
			PM	4	9,200	92	F	F	16	0.17%	NO
US 101	Peninsula Avenue to SR 92	SB	AM	4	9,200	92	F	F	7	0.08%	NO
			PM	4	9,200	92	F	F	39	0.42%	NO
US 101	SR 92 to Whipple Avenue	SB	AM	**4**	**9,200**	**92**	**E**	**F**	46	0.50%	NO
			PM	**4**	**9,200**	**92**	**E**	**F**	25	0.27%	NO
SR 92	I-280 to US 101	EB	AM	**2**	**4,400**	**44**	**D**	**F**	**50**	**1.14%**	**YES**
			PM	**2**	**4,400**	**44**	**D**	**F**	36	0.82%	NO
SR 92	US 101 to Alameda County Line	EB	AM	**3**	**6,900**	**69**	**E**	**F**	18	0.26%	NO
			PM	**3**	**6,900**	**69**	**E**	**F**	7	0.10%	NO
SR 92	Alameda County Line to US 101	WB	AM	**3**	**6,900**	**69**	**E**	**F**	3	0.04%	NO
			PM	**3**	**6,900**	**69**	**E**	**F**	19	0.28%	NO
SR 92	US 101 to I-280	WB	AM	**2**	**4,400**	**44**	**D**	**F**	29	0.66%	NO
			PM	**2**	**4,400**	**44**	**D**	**F**	**105**	**2.39%**	**YES**

Notes:

1. Freeways with six or more lanes are assumed to have a capacity of 2,300 vehicles per lane, and four-lane freeways are assumed to have a capacity of 2,200 vehicles per lane, per the *C/CAG Final San Mateo County Congestion Management Program 2017 Appendix B.*
2. LOS Standard referenced the *C/CAG Final San Mateo County Congestion Management Program 2017.*
3. Existing conditions referenced the *C/CAG LOS and Performance Measure Monitoring Report - 2017.*
4. Project trips are estimated via manual trip assignment.

BOLD indicates a substandard level of service.

Boxed and BOLD indicates an adverse effect on freeway operations.

Other Transportation Issues

Hexagon conducted a site plan review, queuing analysis as well as pedestrian, bicycle and transit facility analysis for the proposed project. Our recommendations are listed below.

Recommendations

- The proposed driveway at Delaware Street and Passage Way is expected to experience lengthy queues blocking other proposed garage entrances along Passage Way. It is recommended that the project applicant prohibit left-turns out of the driveway onto southbound Delaware Street. This could be accomplished with either a raised median on Delaware Street (still allowing left-turns into the driveway) or a right-turn channelization island on Passage Way.
- At the driveways for the daycare parking lot, it is recommended that the inbound be located as far north as possible to prevent vehicle queuing onto the inner northbound through lane on Grant Street.
- The project proposes a mid-block crosswalk across Grant Street. New mid-block crosswalks should be installed only after an engineering study determining the feasibility of the crosswalk. The project applicant should coordinate with City staff to determine the need for a mid-block crosswalk across Grant Street upon project completion.
- For ease of access, to minimize bicycle-vehicle interactions in the garage and to avoid cyclists riding on the garage ramps or bringing bicycles into elevators, the project should consider relocating all long-term bicycle parking spaces to the ground level. Hexagon recommends providing a centralized storage area on the ground floor of each building to minimize vehicle/bicycle interaction and provide an easily accessible location.
- There is a bus stop shown on page GEN-0.16 of the site plan package located on Delaware Street between Concar Drive and the proposed Depot Way. It is unknown if SamTrans has plans for a bus stop at this location. The project applicant should coordinate with SamTrans to determine the need for this bus stop and if there are potential improvements required to support a bus stop at this location.
- All five residential driveways (two on Depot Way, two on Passage Way, and one on Grant Street) are proposed to be between 24 and 26 feet wide. The width of the 7-Eleven driveway on Concar Drive is not shown on the site plan. Residential driveways greater than 20 feet wide and retail driveways greater than 26 feet wide exceed the maximum width requirements established in the City of San Mateo Municipal Code (Chapter 27.64.025 Driveways). Prior to final design, the project applicant should ensure that all driveways meet the width requirements.
- The City of San Mateo requires residential parking to be separated from guest and retail parking with a secured gate. The Grant Street entrance to Building 4 does not show a gate on the site plan. Prior to final design, the project applicant should ensure that all residential parking entrances are gated and that the gate for the Grant Street entrance to Building 4 does not result in vehicles queuing onto the street.
- The project site plan does not indicate the width of loading zones. Prior to final design, the project applicant should ensure that all loading zones are at least 10 feet wide, in compliance with San Mateo Municipal Code Section 27.64.320.
- To prevent potential queueing issues resulting from vehicles entering and exiting the loading zones, Hexagon recommends the loading zones near the Delaware Street/Depot Way and Depot Way/Concar Drive intersections be placed away from the driveways and closer to the center of the project site.

- The project applicant should designate at least one additional EV space as standard accessible EV space within the Trader Joe's, Building 2 retail and Building 4 residential parking facilities, in compliance with California Building Code (CBC) Section 11-B-208 and 11B-228.
- The project applicant should ensure that both parking spaces within each set of tandem spaces are assigned to the same residential unit.

1. Introduction

This report presents the results of the transportation impact analysis conducted for the proposed mixed-use development located at 640 Concar Drive in San Mateo, California (see Figure 1). The project proposes to replace the existing buildings on site and construct 961 residential units with 3,100 square feet of retail space, 7,400 square feet of restaurant space, 7,650 square feet of performance/ballet space, and 4,600 square feet of daycare space. In addition, the existing Trader Joe's and 7-Eleven would be rebuilt with the project. Trader Joe's would increase in size by 2,260 square feet to a total of 13,700 square feet and 7-Eleven would increase by 240 square feet to a total of 3,100 square feet. Vehicular access to the project site would be provided by driveways on Delaware Street, Concar Drive, and Grant Street (see Figure 2).

Scope of Study

The purpose of the transportation study is to identify any potential transportation issues related to the proposed project and to review the proposed site access and circulation, with a description of project parking. Since the project would generate more than 100 peak-hour vehicle trips onto roadways surrounding the project site, an analysis in accordance with C/CAG's CMP guidelines was prepared. Local intersection operations were evaluated following standards and methodologies set forth by the City of San Mateo. The transportation study includes an analysis of AM (7-9 AM) and PM (4-6 PM) peak hour traffic conditions during weekdays on the following study intersections:

Study Intersections

1. El Camino Real & 17th Avenue
2. El Camino Real & SR 92 Westbound Ramps
3. El Camino Real & SR 92 Eastbound Ramps
4. El Camino Real & 20th Avenue
5. El Camino Real & 25th Avenue
6. Delaware Street & Sunnybrae Avenue (unsignalized)
7. Delaware Street & 16th Avenue (unsignalized)
8. Delaware Street & Charles Lane
9. SR 92 Westbound Ramps & Concar Drive
10. Delaware Street & Concar Drive
11. Delaware Street & 19th Avenue
12. Delaware Street & Bermuda Drive
13. Delaware Street & Saratoga Drive
14. Delaware Street & 25th Avenue
15. Grant Street & Concar Drive
16. Grant Street & 19th Avenue

17. Ginnever Street & Bermuda Drive (unsignalized)
18. YMCA Driveway & 19th Avenue
19. US 101 Southbound Ramps & Fashion Island Boulevard
20. US 101 Northbound On-Ramp & Fashion Island Boulevard (unsignalized)
21. Norfolk Street & Fashion Island Boulevard
22. Delaware Street & Depot Way (proposed unsignalized intersection) *
23. Depot Way & Concar Drive (proposed signalized intersection) *
24. El Camino Real Southbound Ramps & Hillsdale Boulevard
25. El Camino Real Northbound Ramps & Hillsdale Boulevard
26. Saratoga Drive & Franklin Parkway
27. Saratoga Drive & Hillsdale Boulevard

* Indicates the intersection is proposed by the project and will be analyzed under only with-project conditions.

Study Freeway Segments

1. SR 92 between El Camino Real and 19th Avenue/Concar Drive
2. SR 92 between Delaware Street/Concar Drive and US 101
3. SR 92 east of US 101
4. US 101 south of SR 92
5. US 101 north of SR 92

Study Freeway ramps

SR 92 & 19th Avenue/Concar Drive Interchange

1. Eastbound Off-Ramp
2. Eastbound On-Ramp
3. Westbound Off-Ramp
4. Westbound On-Ramp

US 101 & Fashion Island Boulevard Interchange

5. Southbound Off-Ramp
6. Southbound On-Ramp
7. Northbound On-Ramp

SR 92 & El Camino Real Interchange

8. Eastbound On-Ramp from Southbound El Camino Real
9. Eastbound On-Ramp from Northbound El Camino Real
10. Westbound Off-Ramp

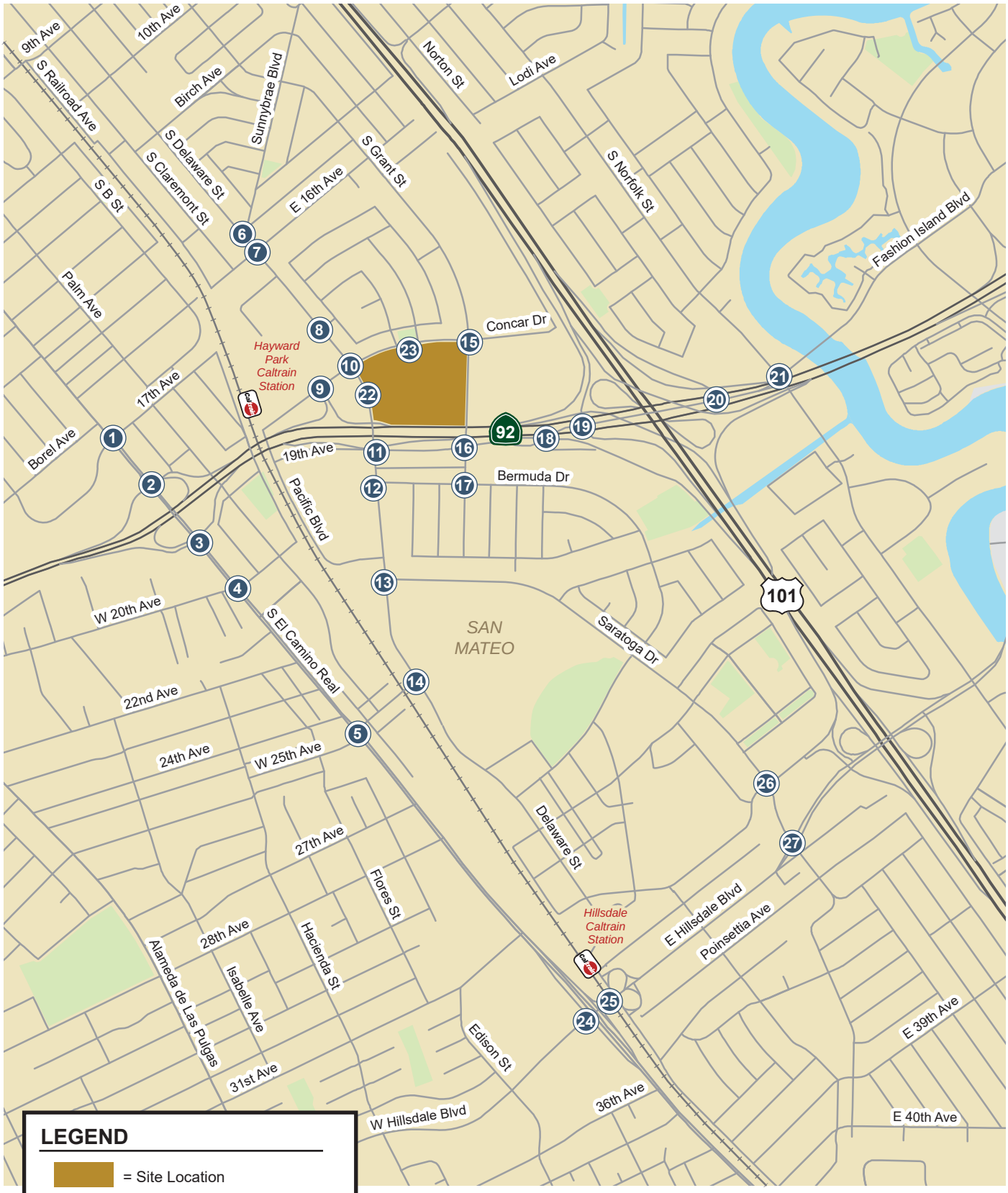


Figure 1
Site Location and Study Intersections

HEXAGON

NORTH
Not to Scale

Figure 2
Site Plan

HEXAGON

NORTH
Not to Scale

Traffic conditions at the study intersections were analyzed for the weekday AM and PM peak hours of adjacent street traffic. The AM peak hour of adjacent street traffic is generally between 7:00 and 9:00 AM, and the PM peak hour of adjacent street traffic is typically between 4:00 and 6:00 PM. It is during these periods on an average weekday that the most congested traffic conditions occur.

Traffic conditions were evaluated for the following scenarios:

Scenario 1: *Existing Conditions.* Existing traffic volumes were obtained from new manual turning movement counts conducted in February and May of 2018 and January of 2019. All traffic count data are contained in Appendix A.

Scenario 2: *Background Conditions.* Background traffic volumes were estimated by adding to existing peak hour volumes the projected volumes from approved but not yet completed developments. The approved project information is included in Appendix B.

Scenario 3: *Existing Plus Project Conditions.* Existing plus project traffic volumes were estimated by adding to existing traffic volumes the trips associated with the proposed project. Existing plus project conditions were evaluated relative to existing conditions in order to determine potential project-generated substantial increases in intersection delay.

Scenario 4: *Background Plus Project Conditions.* Background plus project traffic volumes were estimated by adding to background traffic volumes the trips associated with the proposed project. Background plus project conditions were evaluated relative to background conditions in order to determine potential project-generated substantial increases in intersection delay.

Scenario 5: *2030 Cumulative Conditions*. 2030 Cumulative conditions represent future traffic volumes on the future transportation network in accordance with the San Mateo General Plan. The 2030 AM and PM peak hour traffic volumes were based on the City of San Mateo General Plan 2030 travel demand forecasting model. Cumulative no project conditions were evaluated by subtracting the net project trips generated at the study intersections from the General Plan conditions traffic volumes.

Methodology

This section describes 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 field observations, new traffic counts, previous transportation studies, the City of San Mateo, and the Institute of Transportation Engineers (ITE) *Trip Generation, 10th Edition*. The following data were collected from these sources:

- Existing traffic volumes
- Existing lane geometries
- Signal timing and phasing
- Approved but not yet completed projects
- Applicable trip generation rates

Analysis Methodologies and Level of Service Standards

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.

City of San Mateo Intersections

This study utilizes the 2010 *Highway Capacity Manual* (HCM) methodology for signalized intersections, calculated with Synchro software. This method evaluates intersection operations on the basis of average control delay time for all vehicles at the intersection. This average delay can then be correlated to a level of service. Table 1 presents the level of service definitions for signalized intersections. The City of San Mateo level of service standard is mid-LOS D (delay of 45 seconds) or better for all signalized study intersections.

Table 1
Signalized Intersection Level of Service Definition Based on Average 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	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 20.0
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 many still pass through the intersection without stopping.	20.1 to 35.0
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 55.0
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 frequently.	55.1 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, *2010 Highway Capacity Manual* (Washington, D.C., 2010) p18-6.

Unsignalized Intersections

Levels of service at the unsignalized intersections were based on the 2010 *Highway Capacity Manual* method, calculated with Synchro software. This method is applicable for both two-way and all-way stop-controlled intersections. Two of the unsignalized study intersections operate with two-way stop control, two operate with all-way stop control, and the unsignalized intersection at US 101 northbound on-ramp and Fashion Island Boulevard is not stop-controlled. For two-way stop-controlled intersections, the reported levels of service are based on the worst approach delay at the intersection. The level of service for the all-way stop-controlled intersections are based on the average delay for all the intersection approaches. The City of San Mateo does not have a level of service standard for unsignalized intersections. Therefore, intersection levels of service for unsignalized intersections are reported for informational purposes only. The correlation between average control delay and LOS for unsignalized intersections is shown in Table 2.

Table 2
Unsignalized Intersection Level of Service Definition Based on Average Delay

Level of Service	Description	Average Control 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, *2010 Highway Capacity Manual* (Washington, D.C., 2010) p20-3.

Freeway Segments

Per CMP technical guidelines, a freeway segment LOS analysis is required when a project is expected to add trips greater than one percent of a segment's capacity. Per the C/CAG *Final San Mateo County Congestion Management Program 2017 Appendix B*, freeways with six or more lanes are assumed to have a capacity of 2,300 vehicles per lane, and four-lane freeways are assumed to have a capacity of 2,200 vehicles per lane.

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. Hexagon observed the study freeway ramps in April of 2019 and observed that some on-ramps are metered during certain peak periods. Therefore, this analysis consisted of a volume-to-capacity ratio evaluation for all study ramps to determine whether the ramps would have sufficient capacity to serve the additional project traffic. Additionally, a queuing analysis was performed for the metered on-ramps to determine the adequacy of ramp queue space under project conditions. The ramp capacities were obtained from the *Highway Capacity Manual 2000*, and considered the free-flow speed, the number of lanes on the ramp, and ramp metering. The *Highway Capacity Manual 2010* was not referenced because it does not report ramp capacities.

Report Organization

This report has a total of seven chapters. Chapter 2 describes existing conditions including the existing roadway network, transit service, bicycle 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 background plus project and existing plus project conditions. The cumulative conditions under year 2030 are presented in Chapter 5. Chapter 6 provides an evaluation of other transportation-related issues, such as vehicle queuing, potential project impacts on bicycle, pedestrian, and transit facilities, site access, on-site circulation, and parking. Chapter 7 presents the study conclusions including a summary of any recommended improvements.

2. Existing Conditions

This chapter describes the existing conditions for all of the major transportation facilities in the vicinity of the project site, including the roadway network, transit service, and bicycle and pedestrian facilities. Also included are the existing levels of service of the study intersections.

Existing Roadway Network

Regional access to the project study area is provided by US 101 and SR 92. These facilities are described below.

US 101 is an eight- to ten-lane north-south freeway in the vicinity of the site. US 101 extends northward through San Francisco and southward through San Jose. Access to and from the project study area is provided via its interchanges at SR 92 and Fashion Island Boulevard.

SR 92 is a four- to six- lane east-west freeway extending from Half Moon Bay in west San Mateo County to Hayward in Alameda County. SR 92 has a full interchange with US 101. Access to the project site is provided via its interchange at Concar Drive/19th Avenue.

Local access to the project site is provided via El Camino Real, 19th Avenue/Fashion Island Boulevard, Delaware Street, Grant Street, and Concar Drive. These roadways are described below.

El Camino Real is a six-lane north-south major arterial within the project vicinity with a posted speed limit at 35 miles per hour (mph). El Camino Real extends from Santa Clara County through San Mateo County. On-street parking is permitted along northbound El Camino Real from 25th Avenue to the SR 92 eastbound ramp and from the SR 92 westbound ramp to 17th Avenue. On-street parking is permitted along southbound El Camino Real from Lodato Avenue to 24th Street. Sidewalks are present on both sides of the road within the project vicinity. All signalized intersections along El Camino Real within the project vicinity have crosswalks with actuated pedestrian push buttons and signal heads. Bike lanes are provided on El Camino Real between the SR 92 eastbound and westbound ramps. El Camino Real provides access to the project site via its interchange with SR 92 and the intersection at 25th Avenue.

Delaware Street is a two- to four-lane north-south arterial within the project vicinity spanning from Peninsula Avenue to Hillsdale Boulevard, at which point it transitions into Pacific Boulevard. Sidewalks are present on both sides of the street for its entirety. Within the project vicinity, on-street parking is allowed between the Hillsdale Boulevard westbound ramp and 28th Avenue and on the northbound side from Saratoga Drive to Bermuda Avenue. Bike lanes are provided on Delaware Street between Sunnybrae Boulevard and Charles Lane and between Bermuda Drive and 28th Avenue. The road is designated as a bike route along northbound Delaware Street between Concar Drive and Bermuda Drive and on both sides between 28th Avenue and 31st Avenue. Delaware Street provides direct project access.

Grant Street is a two- to four-lane north-south collector street within the project vicinity spanning from 3rd Avenue to 19th Avenue. Sidewalks are present on both sides of the street for its entirety. On-street parking is permitted on both sides of the street for its entirety except from Concar Drive to 19th Avenue. Bike lanes are provided on Grant street between Bermuda Drive and Concar Drive. The road is a designated bike route north of Concar Drive. Grant Street provides direct project access.

Concar Drive is a two- to four- lane east-west arterial within the project vicinity spanning from Amphlett Boulevard to the SR 92 westbound ramps, at which point it transitions to a collector street until Pacific Boulevard. Sidewalks are present on both sides of the street except along eastbound Concar Drive between the SR 92 westbound ramps and Delaware Street. All signalized intersections along Concar Drive have crosswalks with actuated pedestrian push buttons and signal heads. On-street parking is prohibited on both sides of the street within the project vicinity. Bike lanes are provided on Concar Drive between Delaware Street and Grant Street. Concar Drive provides direct project access.

19th Avenue/Fashion Island Boulevard is a one/two-lane east-west arterial within the project vicinity spanning from Pacific Boulevard to Bridgepointe Parkway. 19th Avenue is a one-way street in the eastbound direction between Pacific Boulevard and Grant Street/Ginnever Street. Sidewalks are present along the southern half of 19th Avenue within the project vicinity and along both sides of Fashion Island Boulevard between 19th Avenue and the US 101 southbound ramps. On-street parking is permitted on both sides of the street from Pacific Boulevard to Delaware Street and only on the southern half of 19th Avenue from Delaware Street to Grant Street/Ginnever Street. On-street parking is prohibited along Fashion Island Boulevard within the project vicinity. Bike lanes are provided on 19th Avenue/Fashion Island Boulevard between Delaware Street and Mariners Island Boulevard. 19th Avenue/Fashion Island Boulevard provides project access via the intersections at Delaware Street and Grant Street.

Existing Pedestrian and Bicycle Facilities

The City-designated bicycle facilities in the project vicinity include Class I bike paths, Class II bike lanes, and Class III bike routes (see Figure 3). Bike paths are shared between pedestrians and bicyclists and separated from motor vehicle traffic. Bike lanes are lanes on roadways designated for use by bicycles with special lane markings, pavement legends, and signage. Bike routes are existing streets that accommodate bicycles but are not separate from the existing travel lanes. Bike routes are typically designated only with signs or pavement markings.

The City of San Mateo *Bicycle Master Plan (2011)* indicates there are Class I bike paths between the Hayward Park Caltrain Station and 16th Avenue and on the bridge crossing the train tracks at 19th Avenue. Additionally, the Foster City Levee Pedway exists along the east side of Seal Slough from Shoal Drive until it connects with the Bay Trail. The Class II bike lanes and Class III bike routes that exist within the project vicinity are shown on Figure 3.

Figure 3
Existing Bicycle Facilities

NORTH
Not to Scale

According to the City of San Mateo *Bicycle Master Plan* (2011), Hillsdale Boulevard between Edison Street and Norfolk Street, as well as Delaware Street between Charles Lane and 19th Avenue, are classified as Class III bike routes, but these roadway segments lack proper bike route signage. Signage is only visible along northbound Delaware Street between Bermuda Drive and Concar Drive. Hillsdale Boulevard and Delaware Street are major arterials with relatively high traffic volumes. Thus, bicyclists should ride with caution on these streets.

Overall, the existing bicycle facilities lack adequate connectivity between the project site and surrounding land uses. Small segments in the bicycle network near the project site lack proper signage and lead to an unconnected network. As part of the Station Park Green project, the development project has constructed a Class I multi-use path on the north side of Concar Drive, connecting Concar Passage with the Hayward Park Caltrain Station.

Pedestrian facilities near the project site consist of sidewalks along both sides of most roadways, as well as crosswalks at all signalized intersections. Within the immediate vicinity of the project site, crosswalks are lacking across the north leg at the Delaware Street and 19th Avenue intersection. Continuous pedestrian facilities are present between the project site and the Hayward Park and Hillsdale Caltrain Stations.

Existing Transit Service

Existing transit service to the study area is provided by the San Mateo County Transit District (SamTrans), Norfolk Caltrain Shuttle, and Caltrain. The bus routes that provide peak-hour services near the project site are described in Table 3 and shown on Figure 4.

Table 3
Existing Bus Service

Bus Route	Description	Operating Hours	Peak-Hour Headway	Closest Bus Stop	Walk Distance to Project Site Center
53	Between Peninsula/Humbolt and Borel School	7 AM to 8 AM and 1 PM to 3:30 PM	10 min.	Grant St & Concar Dr	500 feet
292	Between Downtown San Francisco and Hillsdale Mall	4 AM to 2:30 AM	30 min.	Delaware St & Charles Ln or Delaware St & Bermuda Dr	1,400 feet
Norfolk Shuttle	Between Hillsdale Caltrain Station and various area office buildings	7 AM to 9:30 AM and 3 PM to 7 PM	30-45 min.	Concar Dr & Pacific Blvd or Concar Dr & Amphlett Blvd	1,700 feet or 1,600 feet

Caltrain Service

Commuter rail service between San Francisco and Gilroy is provided by Caltrain. The project site center is located about 2,000 feet east of the Hayward Park Caltrain station, which is about an 8-minute walk or a 3-minute bike ride. Caltrain provides service at this station with approximately 60-minute headways during the weekday AM and PM commute hours, midday, and at nights. Service is provided with approximately 90-minute headways on weekends. Continuous pedestrian facilities exist between the project site and the Hayward Park Caltrain station.

The project site center is located about 1.3 miles north of the Hillsdale Caltrain station, which is about a 30-minute walk or a 7-minute bike ride. The Norfolk Caltrain Shuttle that stops near the project site (see Table 3) travels to the Hillsdale Caltrain Station, which provides baby bullet train service. Caltrain provides service at this station with approximately 10- to 30-minute headways during the weekday AM and PM commute hours and 60-minute headways midday, at nights and on weekends. Continuous pedestrian facilities exist between the project site and the Hillsdale Caltrain station.

Figure 4
Existing Transit Services

NORTH
Not to Scale

Existing Intersection Lane Configurations and Traffic Volumes

The existing lane configurations at the study intersections were confirmed by observations in the field and are shown on Figure 5. Existing traffic volumes were obtained from new peak hour counts collected in January 2019 and from existing counts collected in February and May of 2018. The existing AM and PM peak hour intersection volumes are shown in Figure 6. Intersection turning-movement count data are presented in Appendix A.

Existing Intersection Levels of Service

The results show that the following intersections are currently operating at unacceptable levels of service (see Table 4):

- Delaware Street & 19th Avenue – PM Peak Hour (LOS E)
- Grant Street & 19th Avenue – PM Peak Hour (LOS F)
- YMCA Driveway & 19th Avenue – PM Peak Hour (LOS F)
- US 101 Southbound Ramps & Fashion Island Boulevard – AM & PM Peak Hours (LOS E & LOS F, respectively)
- Norfolk Street & Fashion Island Boulevard – AM & PM Peak Hours (LOS F & LOS E, respectively)
- Saratoga Drive & Franklin Parkway – PM Peak Hour (Low LOS D)
- Saratoga Drive & Hillsdale Boulevard – PM Peak Hour (LOS F)

Intersection level of service calculation sheets are provided in Appendix C for all scenarios.

Simulation Analysis

It should be noted that intersections along the 19th Avenue/Fashion Island Boulevard currently experience feedback queue issues beyond what is reflected in the typical HCM level of service calculations by Synchro. Therefore, a microsimulation model of the corridor was developed using the SimTraffic software to better reflect existing intersection operating conditions (see Table 4 for a full list of intersections analyzed using SimTraffic and the resulting delays). Unlike the typical intersection analysis models such as the *Highway Capacity Manual* that analyze intersections in isolation, SimTraffic is a model that measures the full impact of queuing and blocking attributed to closely spaced intersections by simulating the travel of each vehicle. In addition to reporting statistics such as average vehicle delay, the simulation software produces visual animation files that depict traffic operations. The existing AM and PM peak hour models were calibrated based on observed queuing and field signal timing data.

As shown on Table 4, several intersections along the simulated corridor are experiencing oversaturated conditions where the demand cannot be served by the intersection due to downstream congestion. These intersections are considered to operate at LOS F.

Unsignalized Intersections

The unsignalized intersection at Delaware Street and 16th Avenue currently operates at LOS E during the PM peak hour. The City of San Mateo is currently studying alternatives to signalize this intersection along with the Delaware Street and Sunnybrae Boulevard intersection.

The unsignalized intersection at the US 101 northbound on-ramp and Fashion Island Boulevard was analyzed using the SimTraffic microsimulation model. Due to existing congestion at downstream intersections during both the AM and PM peak hours, the microsimulation model was unable to fully serve all traffic at this intersection. Therefore, the intersection is considered to operate at LOS F for the left-turn movement. Hexagon conducted a signal warrant analysis for this intersection using the CA MUTCD Peak Hour Signal Warrant. The intersection would not be warranted for a traffic signal under existing conditions based on both the AM and PM peak hour traffic volumes.

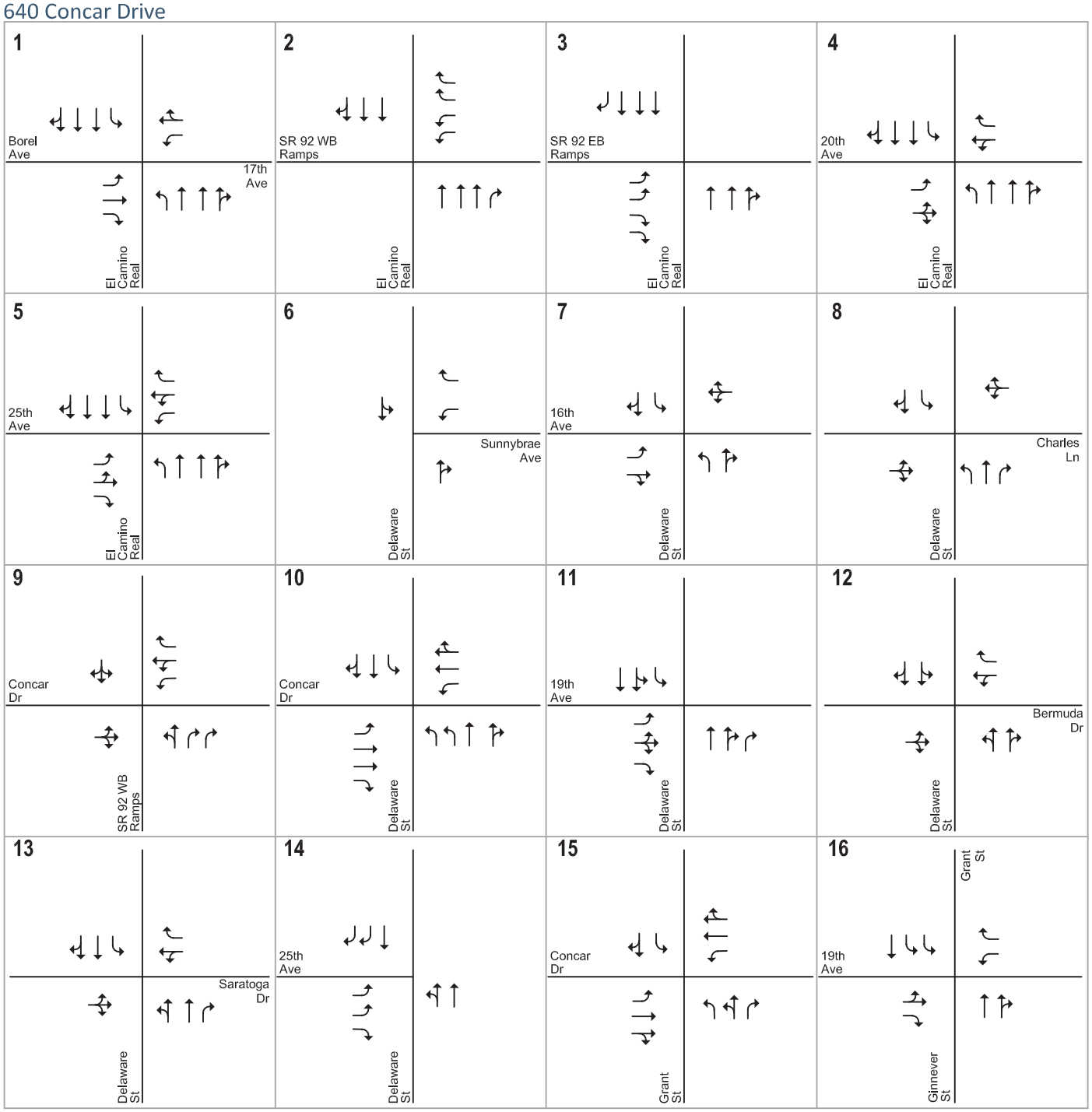


Figure 5
Existing Lane Configurations

NORTH
Not to Scale

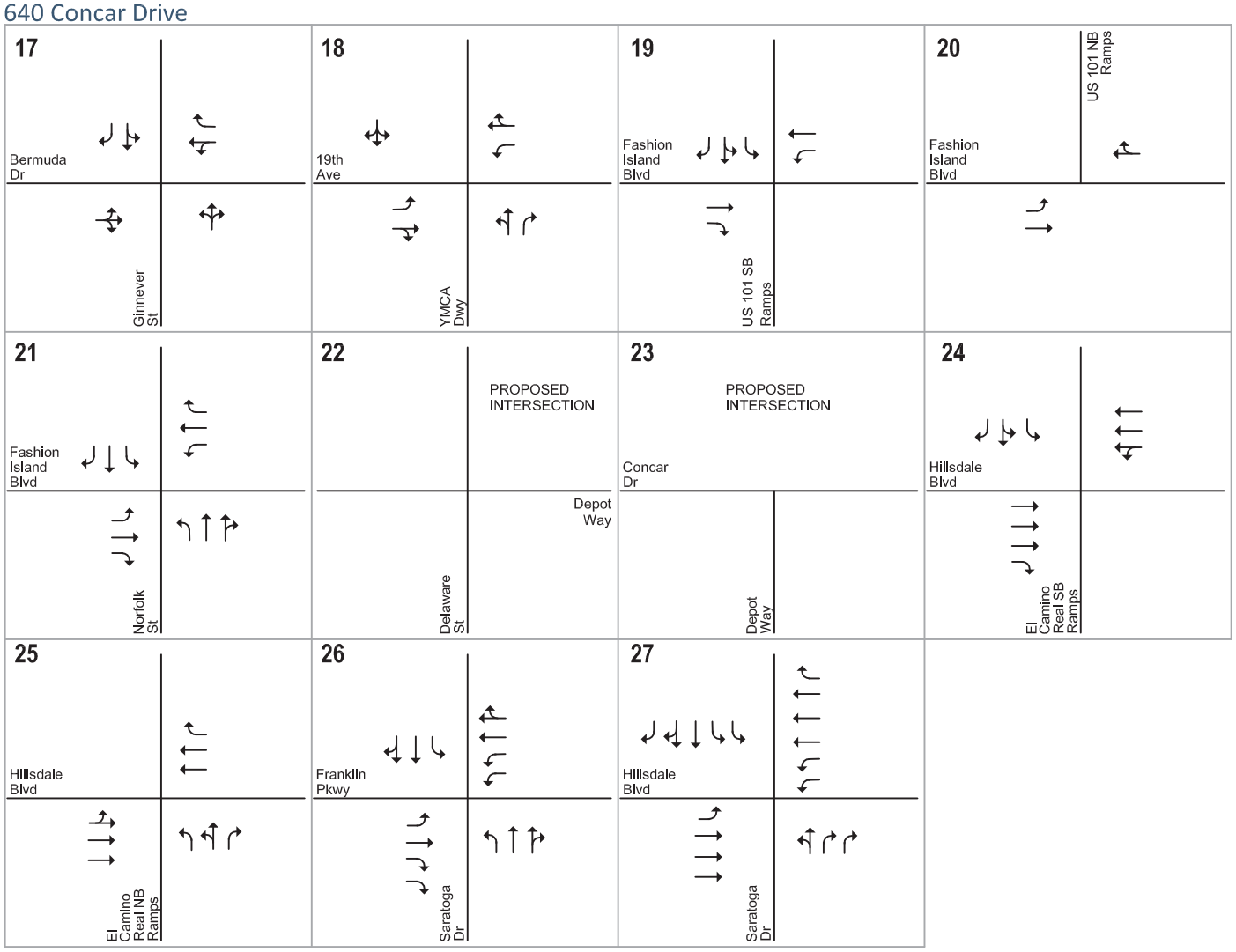
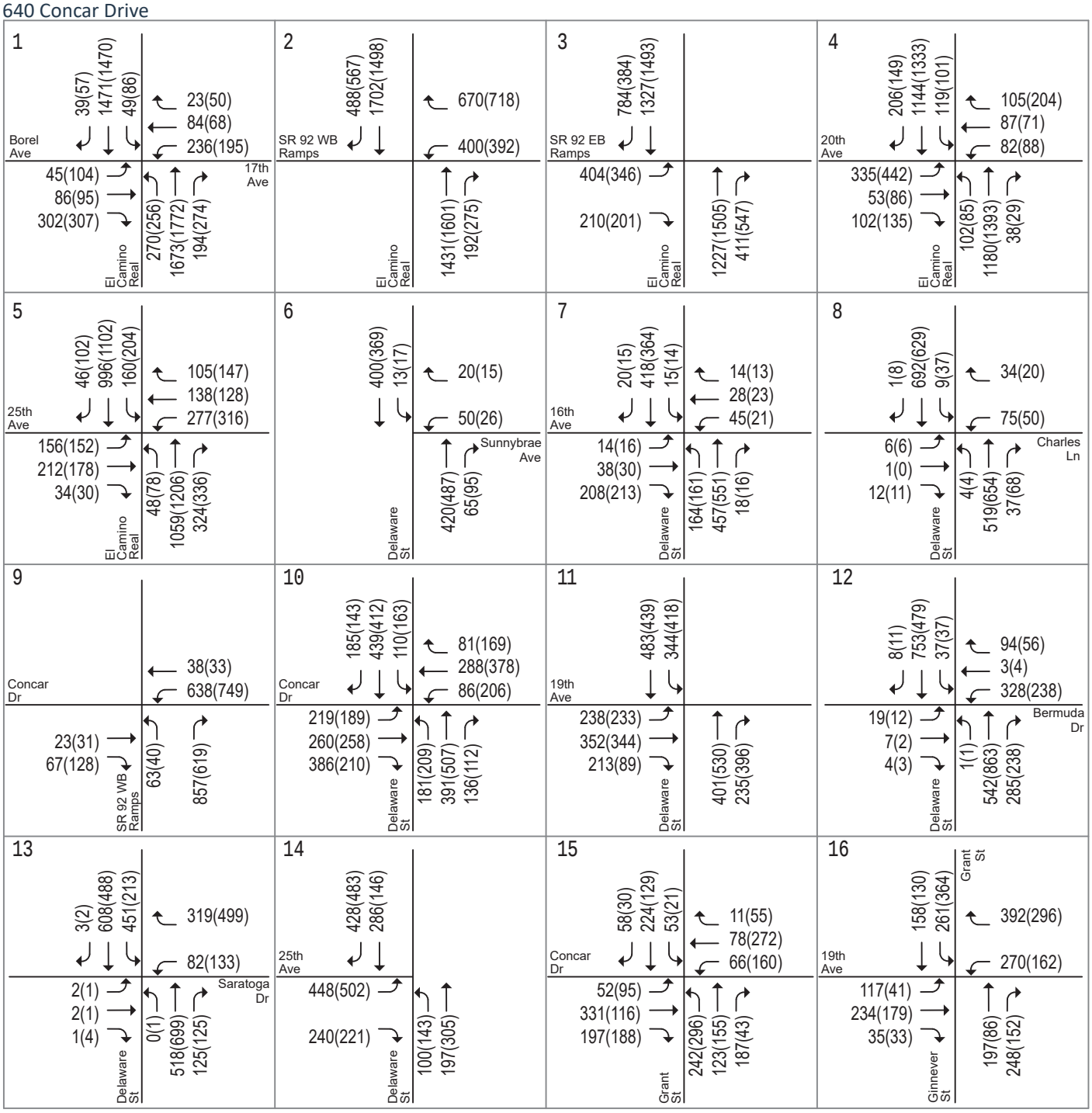


Figure 5
Existing Lane Configurations

NORTH
Not to Scale



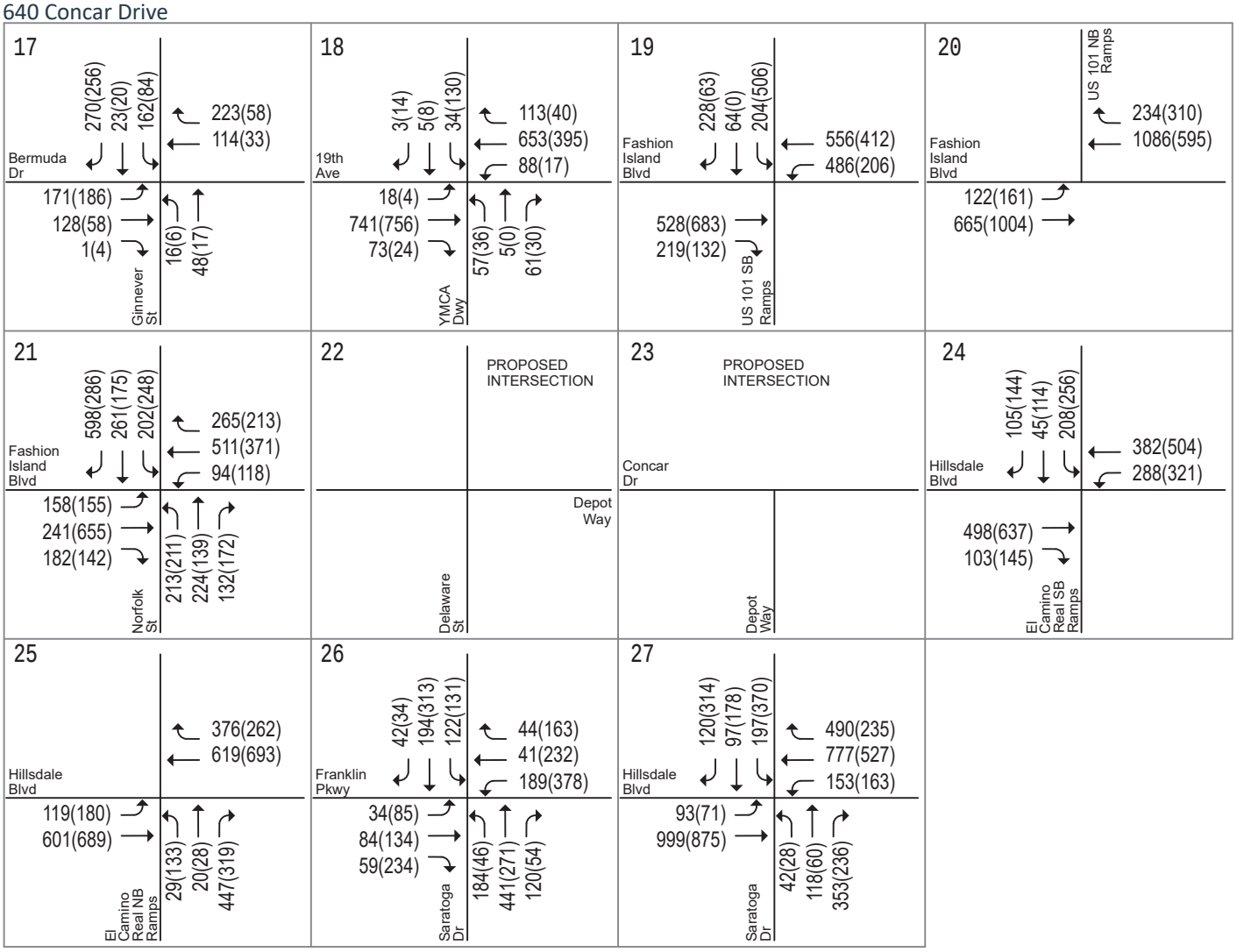
LEGEND

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

Figure 6
Existing Traffic Volumes

HEXAGON

NORTH
Not to Scale



LEGEND

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

Figure 6
Existing Traffic Volumes

HEXAGON

NORTH
Not to Scale

Table 4
Existing Intersection Levels of Service

#	Intersection	Control	Peak Hour	Count Date	Note	Existing Avg. Delay (sec)	Existing LOS
1	El Camino Real & 17th Ave	Signal	AM	05/22/18		23.4	C
			PM	05/22/18		23.6	C
2	El Camino Real & SR 92 WB Ramps	Signal	AM	01/29/18		16.0	B
			PM	01/29/18		18.3	B
3	El Camino Real & SR 92 EB Ramps	Signal	AM	01/29/19		10.1	B
			PM	01/29/19		10.7	B
4	El Camino Real & 20th Avenue	Signal	AM	01/29/19		29.0	C
			PM	01/29/19		36.7	D
5	El Camino Real & 25th Avenue	Signal	AM	01/29/19		33.8	C
			PM	01/29/19		40.4	D
6	Delaware Street & Sunnybrae Avenue	TWSC	AM	02/27/18	(1)	19.0	C
			PM	02/27/18	(1)	19.4	C
7	Delaware Street & 16th Avenue	AWSC	AM	02/27/18		31.2	D
			PM	02/27/18		38.1	E
8	Delaware Street & Charles Lane	Signal	AM	01/29/19		8.4	A
			PM	01/29/19		6.1	A
9	SR 92 WB Ramps & Concar Drive	Signal	AM	02/27/18	(2)	9.9	A
			PM	02/27/18	(2)	7.5	A
10	Delaware Street & Concar Drive	Signal	AM	02/27/18	(2)	29.8	C
			PM	02/27/18	(2)	31.9	C
11	Delaware Street & 19th Avenue	Signal	AM	02/06/18	(2)	31.8	C
			PM	02/06/18	(2)	**71.4**	**E**
12	Delaware Street & Bermuda Drive	Signal	AM	01/29/19	(2)	15.9	B
			PM	01/29/19	(2)	25.1	C
13	Delaware Street & Saratoga Drive	Signal	AM	01/29/19	(2)	19.7	B
			PM	01/29/19	(2)	20.3	C
14	Delaware Street & 25th Avenue	Signal	AM	01/29/19		12.7	B
			PM	01/29/19		12.4	B
15	Grant Street & Concar Drive	Signal	AM	01/29/19	(2)	28.0	C
			PM	01/29/19	(2)	24.6	C
16	Grant Street & 19th Avenue	Signal	AM	02/06/18	(2 3)	27.0	C
			PM	02/06/18	(2 3)	**OVERSAT**	**F**

Notes:
AWSC = All-Way Stop Control
TWSC = Two-Way Stop Control
"OVERSAT" indicates that the SimTraffic microsimulation model indicates that the intersection would experience capacity issues where the demand cannot be served by the intersection. Oversaturated intersections would operate at LOS F.

(1) Delays and LOS reported for side-street and two-way stop controlled intersections are for the worst approach.
(2) The intersection level of service is calculated using the SimTraffic microsimulation model.
(3) The intersection level of service is calculated using the HCM 2000 module with the Synchro software. These intersections have unusual signal operations that cannot be supported by the Synchro HCM 2010 module.

BOLD indicates a substandard level of service.

Table 4 (continued)
Existing Intersection Levels of Service Summary

#	Intersection	Control	Peak Hour	Count Date	Note	Existing Avg. Delay (sec)	Existing LOS
17	Ginnever Street & Bermuda Drive	AWSC	AM	01/29/19	(2)	12.3	B
			PM	01/29/19	(2)	9.2	A
18	YMCA Driveway & 19th Avenue	Signal	AM	01/29/19	(2)	25.8	C
			PM	01/29/19	(2)	**OVERSAT**	**F**
19	US 101 SB Ramps & Fashion Island	Signal	AM	02/06/18	(2)	**79.9**	**E**
			PM	02/06/18	(2)	**OVERSAT**	**F**
20	US 101 NB On-Ramp & Fashion Island	Side-Street Stop	AM	01/29/19	(1 2 3)	OVERSAT	F
			PM	01/29/19	(1 2 3)	OVERSAT	F
21	Norfolk Street & Fashion Island Boulevard	Signal	AM	02/06/18	(2)	**83.7**	**F**
			PM	02/06/18	(2)	**58.8**	**E**
22	Delaware Street & Depot Way/Shopping Center Dwy	TWSC	AM	01/29/19	(1)	Project Driveway	
			PM	01/29/19	(1)		
23	Depot Way/Park Crosswalk & Concar	Future Signal	AM	01/29/19		Project Driveway	
			PM	01/29/19			
24	El Camino Real SB Ramps & Hillsdale Boulevard	Signal	AM	02/06/18	(3)	27.9	C
			PM	02/06/18	(3)	28.2	C
25	El Camino Real NB Ramps & Hillsdale Boulevard	Signal	AM	02/06/18	(3)	29.7	C
			PM	02/06/18	(3)	26.1	C
26	Saratoga Drive & Franklin Parkway	Signal	AM	02/06/18		25.1	C
			PM	02/06/18		**52.5**	**D**
27	Saratoga Drive & Hillsdale Boulevard	Signal	AM	02/06/18	(3)	42.6	D
			PM	02/06/18	(3)	**105.5**	**F**

Notes:
AWSC = All-Way Stop Control
TWSC = Two-Way Stop Control
"OVERSAT" indicates that the SimTraffic microsimulation model indicates that the intersection would experience capacity issues where the demand cannot be served by the intersection. Oversaturated intersections would operate at LOS F.

(1) Delays and LOS reported for side-street and two-way stop controlled intersections are for the worst approach.
(2) The intersection level of service is calculated using the SimTraffic microsimulation model.
(3) The intersection level of service is calculated using the HCM 2000 module with the Synchro software. These intersections have unusual signal operations that cannot be supported by the Synchro HCM 2010 module.

BOLD indicates a substandard level of service.

Existing Freeway Ramp Capacity Analysis

This analysis consisted of a volume-to-capacity ratio evaluation of ten freeway ramps at the interchanges of SR 92/Concar Drive/19th Avenue, US 101/Fashion Island Boulevard, and SR 92/El Camino Real. 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 study on-ramps in April of 2019 and found that the US 101 northbound and southbound on-ramps from Fashion Island Boulevard were metered during both the AM and PM peak hours. The SR 92 eastbound on-ramps from southbound and northbound El Camino Real currently have ramp meter equipment installed but not operating. Caltrans could turn on the ramp meter in the future. As a conservative approach, it is assumed that all on-ramps with existing ramp meter equipment are metered during both the AM and PM peak hours.

It is assumed that the metered on-ramps would each have a capacity of 900 vehicles per hour per lane. The peak-hour freeway ramp volumes were derived from the collected traffic counts. As shown in Table 5, all freeway ramps currently have sufficient capacity to serve the existing traffic volumes, with volume-to-capacity ratios that are below 1.0, which means that the existing traffic demand is lower than the ramp capacity during both the AM and PM peak hours.

Hexagon observed that the currently metered US-101 northbound on-ramp at Fashion Island Boulevard had only minimal periodic queues during the AM peak hour (0-5 vehicle queue) and moderate periodic queues during the PM peak hour (2-9 vehicle queue). The US-101 southbound on-ramp experienced heavy queuing during the AM peak hour due to southbound freeway congestion. Many vehicles ignored the meter since the queue to enter the freeway sometimes prevented vehicles from moving forward when signaled. The meter queue sometimes extended to the US-101 Southbound / Fashion Island intersection. The same ramp experienced light queuing during the PM peak hour with queues of up to 7 vehicles forming periodically. No queues were observed in the HOV lanes for either on-ramp. For the currently metered on-ramps, a ramp queuing analysis is conducted in Chapter 4.

Table 5
Existing Freeway Ramp Capacity Analysis

Interchange	Ramp	Type	Pk Hr	Lanes Mixed	Lanes HOV	Lanes Meter	Existing Conditions Capacity [1]	Existing Conditions Peak Volume	Existing Conditions V/C
SR 92/Concar Dr/19th Ave	EB Off-Ramp to 19th Ave	Diagonal	AM	1			2000	803	0.40
			PM	1			2000	666	0.33
	EB On-Ramp from 19th Ave	Diagonal	AM	1			2000	537	0.27
			PM	1			2000	904	0.45
	WB Off-Ramp to Concar Dr	Diagonal	AM	1			2000	920	0.46
			PM	1			2000	659	0.33
	WB On-Ramp from Concar Dr	Diagonal	AM	1			2000	708	0.35
			PM	1			2000	880	0.44
US 101/Fashion Island Blvd	SB Off-Ramp to Fashion Island Blvd	Diagonal	AM	1			2000	496	0.25
			PM	1			2000	569	0.28
	SB On-Ramp from Fashion Island Blvd	Diagonal	AM	1	1	ON	1800	768	0.43
			PM	1	1	ON	1800	338	0.19
	NB On-Ramp from Fashion Island Blvd	Diagonal	AM	1	1	ON	1800	357	0.20
			PM	1	1	ON	1800	471	0.26
SR 92/El Camino Real	EB On-Ramp from SB El Camino Real	Loop	AM	1		ON [2]	900	784	0.87
			PM	1		ON [2]	900	384	0.43
	EB On-Ramp from NB El Camino Real	Diagonal	AM	1	1	ON [2]	1800	411	0.23
			PM	1	1	ON [2]	1800	548	0.30
	WB Off-Ramp to El Camino Real	Diagonal	AM	1			1900	1070	0.56
			PM	1			1900	1110	0.58

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. HCM 2010 was not referenced because it does not report ramp capacities.
2. On-ramps were not metered during field observations. However, because ramp meter equipment is installed, this study assumes that the on-ramps are metered during both the AM and PM peak hours.

Existing Freeway Levels of Service

The levels of service for the freeway segments were obtained from the *2017 San Mateo County Congestion Management Program (CMP) Monitoring Report*. Table 6 summarizes the level of service standard and existing levels of service on the study freeway segments. C/CAG established LOS E as the minimum acceptable level of service for all segments of US 101 within San Mateo County, unless the segment was operating at LOS F in 1991 (the date when the CMP was first adopted), in which case the LOS standard is LOS F. The study freeway segments of US 101 between Peninsula Avenue and SR 92 are subject to the LOS F standard. C/CAG established LOS D as the minimum acceptable level of service for segments of SR 92 between I-280 and US 101 and LOS E for segments of SR 92 between US 101 and the Alameda County Line. As shown in Table 6, both the eastbound and westbound directions presently operate at LOS F during both the AM and PM peak hours.

Table 6
Existing Freeway Levels of Service in San Mateo County

Freeway	Segment	Dir	Peak Hour	# of Lanes	Capacity [1]	LOS Standard [2]	Existing LOS [3]
US 101	Whipple Avenue to SR 92	NB	AM	**4**	**9,200**	**E**	**F**
			PM	**4**	**9,200**	**E**	**F**
US 101	SR 92 to Peninsula Avenue	NB	AM	4	9,200	F	F
			PM	4	9,200	F	F
US 101	Peninsula Avenue to SR 92	SB	AM	4	9,200	F	F
			PM	4	9,200	F	F
US 101	SR 92 to Whipple Avenue	SB	AM	**4**	**9,200**	**E**	**F**
			PM	**4**	**9,200**	**E**	**F**
SR 92	I-280 to US 101	EB	AM	**2**	**4,400**	**D**	**F**
			PM	**2**	**4,400**	**D**	**F**
SR 92	US 101 to Alameda County Line	EB	AM	**3**	**6,900**	**E**	**F**
			PM	**3**	**6,900**	**E**	**F**
SR 92	Alameda County Line to US 101	WB	AM	**3**	**6,900**	**E**	**F**
			PM	**3**	**6,900**	**E**	**F**
SR 92	US 101 to I-280	WB	AM	**2**	**4,400**	**D**	**F**
			PM	**2**	**4,400**	**D**	**F**

Notes:
1. Freeways with six or more lanes are assumed to have a capacity of 2,300 vehicles per lane, and four-lane freeways are assumed to have a capacity of 2,200 vehicles per lane, per the *C/CAG Final San Mateo County Congestion Management Program 2017 Appendix B.*
2. LOS Standard referenced the *C/CAG Final San Mateo County Congestion Management Program 2017.*
3. Existing conditions referenced the *C/CAG LOS and Performance Measure Monitoring Report - 2017.*

BOLD indicates a substandard level of service.

Observed Existing Traffic Conditions

Traffic conditions were observed in the field at each study intersection in order to identify existing operational deficiencies and to confirm the accuracy of the calculated 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, (2) identify any locations where the level of service analysis does not accurately reflect existing traffic conditions. Hexagon conducted field observations on a regular weekday during the AM and PM peak hours in January and February of 2019. Some of the study intersections had no significant operational issues, and vehicular queues on all approaches were mostly able to clear in one cycle. The observed operational issues at the remaining study intersections are identified below.

El Camino Real and 17th Avenue/Bovet Road

During the AM peak hour, the eastbound right-turn and westbound left-turn movements often required two signal cycles to clear the El Camino Real/17th Avenue intersection due to the crossing of pedestrians. Long queues were observed for the left-turning traffic on northbound El Camino Real that reached the capacity of the turn pockets and took 1-2 cycles to clear. Southbound through traffic was heavy at several of the study intersections on El Camino Real. However, all queued vehicles cleared during most cycles.

During the PM peak hour, eastbound right-turn and westbound left-turn movements from 17th Avenue/Bovet Road still had to wait for the crossing of pedestrians, but some queues were able to clear within one signal cycle. The northbound left-turn queue at the El Camino Real/17th Avenue intersection was observed to sometimes extend out of the turn pocket but was able to clear in one to two cycles. The northbound through-traffic often extended to the SR 92 westbound ramps, but queued vehicles cleared during most cycles.

El Camino Real and SR 92 Westbound Ramps

During the AM peak hour, there was heavy demand for the SR 92 westbound on-ramp from southbound El Camino Real, but most cars were able to clear in one cycle. Southbound through traffic was heavy at several of the study intersections on El Camino Real. However, all queued vehicles cleared during most cycles.

During the PM peak hour, many cars were able to make the westbound right-turns on red from SR 92 when the northbound traffic on El Camino Real cleared.

El Camino Real and 20th Avenue

During the AM peak hour, the eastbound left-turn movement from 20th Avenue onto northbound El Camino Real occasionally required more than one signal cycle to clear. Southbound through traffic was heavy at several of the study intersections on El Camino Real. However, all queued vehicles cleared during most cycles.

During the PM peak hour, long vehicle queues were observed on southbound El Camino Real at 20th Avenue, causing traffic to sometimes stop within the intersection at the SR 92 eastbound ramps. However, once the signal at 20th Avenue turned green, all traffic was able to clear the intersection in one signal cycle.

El Camino Real and 25th Avenue

During the AM peak hour, the southbound left-turn movement from El Camino Real onto 25th Avenue occasionally required more than one signal cycle to clear. Southbound through traffic was heavy at several of the study intersections on El Camino Real. However, all queued vehicles cleared during most cycles.

During the PM peak hour, the crossing of Caltrain often impeded traffic flow on 25th Avenue, causing the eastbound through traffic and southbound left-turn traffic at this intersection to require more than one signal cycle to clear. The southbound left-turn movement consistently required more than one cycle, and the queue was never quite cleared.

Delaware Street between Sunnybrae Avenue and Concar Drive

During the AM peak hour, the southbound traffic on Delaware Street queued from 16th Avenue northward past Sunnybrae Avenue, making it difficult for cars to make westbound left-turns from Sunnybrae Avenue. The few vehicles making westbound left-turns from Sunnybrae Avenue cars were let into the southbound queue on Delaware Street by other drivers and did not have to wait for the queue to clear. Most traffic at Delaware Street and 16th Avenue flowed northbound and southbound. However, some cars made northbound left-turns onto 16th Avenue and eastbound right-turns from 16th Avenue, which slowed the southbound through-traffic.

During the PM peak hour, the northbound traffic on Delaware Street queued from 16th Avenue southward past Charles Lane. It was observed to take approximately 5 to 6 seconds for each car in the queue to go through the unsignalized intersection. Several pedestrians were observed to cross Delaware Street at 16th Avenue. The southbound queue was also present during the PM, making it difficult for the few cars to turn left from Sunnybrae Avenue onto southbound Delaware Street.

Concar Drive between SR 92 Westbound Ramps and Grant Street

During the AM peak hour, the eastbound through and right-turn queues at Concar Drive and Delaware Street frequently spilled onto the SR 92 off-ramp and sometimes took more than one cycle to clear. This especially occurred when pedestrians crossed Concar Drive at Delaware Street. The eastbound left-turn queue at the Delaware Street/Concar Drive intersection sometimes spilled out of the turn pocket but cleared within one signal cycle most of the time.

During the PM peak hour, all left-turn queues at Concar Drive and Delaware street cleared the intersection during one signal cycle most of the time. The westbound left-turn queue at Concar Drive and Grant Street sometimes spilled out of the turn pocket and took one to two signal cycles to clear.

Hillsdale Boulevard between El Camino Real and Saratoga Drive

During the AM peak hour, all intersection queues were able to clear in one signal cycle most of the time. There was sometimes heavy demand for the northbound left-turn movement at Franklin Parkway, however most queues cleared in one or two cycles.

During the PM peak hour, eastbound traffic on Hillsdale Boulevard queued from Saratoga Drive past the Hillsdale Shopping Center. Most eastbound vehicles required multiple cycles to clear along this queue. Vehicles frequently got stuck between the two signals at El Camino Real. The northbound right-turn movement from El Camino Real contributed to the delays and impacted the eastbound through- and southbound left-turn movements. Most left-turn movements at El Camino Real and Hillsdale Boulevard required two or more cycles to clear. The southbound left-turn and northbound right-turn movements at Hillsdale Boulevard and Saratoga Drive required multiple cycles to clear the intersection. The southbound left-turn queue on Saratoga Drive extended to Franklin Parkway and impacted turning movements at the Franklin Parkway/Saratoga Drive intersection. Vehicles were frequently stuck in the intersection, impeding eastbound through, southbound through, and westbound left-turn movements.

19th Avenue/Fashion Island Boulevard

During the AM peak hour, there was heavy demand for the US 101 southbound on-ramp from both eastbound and westbound 19th Avenue/Fashion Island Boulevard, with the peak demand coming from westbound traffic. Most westbound and some eastbound vehicles required multiple cycles to clear along 19th Avenue/Fashion Island Boulevard.

During the PM peak hour, eastbound traffic on 19th Avenue/Fashion Island Boulevard queued from Norfolk Street westward past Grant Street and often extended to Delaware Street. Most eastbound vehicles required multiple cycles to clear along this queue.

Delaware Street & 19th Avenue

During the AM peak hour, the eastbound queue from the Delaware Street/19th Avenue intersection often extended up to the freeway. The eastbound left-turn movements onto Delaware Street took one to two cycles to clear, while the eastbound through movements often took more than one cycle to clear. Many vehicles pulled into the eastbound queue from the ARCO gas station.

During the PM peak hour, the southbound and eastbound left-turn queues at the Delaware Street/19th Avenue intersection required one to two signal cycles to clear.

19th Avenue/Fashion Island Boulevard & Grant Street

During the AM peak hour, the westbound left-turn queue extended out of the turn pocket at the Grant Street intersection and sometimes required multiple cycles to clear.

During the PM peak hour, the southbound left-turn and northbound right-turn vehicles at the Grant Street intersection were able to turn onto eastbound 19th Avenue in one cycle.

Fashion Island Boulevard & YMCA Driveway

During the AM peak hour, the eastbound through-traffic at the YMCA driveway intersection often had to wait for the queue to clear from the downstream intersection before proceeding through.

During the PM peak hour, the southbound left-turn and northbound right-turn vehicles at the YMCA driveway intersection frequently required multiple cycles to turn onto eastbound Fashion Island Boulevard.

Fashion Island Boulevard & US 101 Southbound Ramps

During the AM peak hour, westbound left-turn vehicles at the US 101 southbound ramps intersection frequently spilled out of the turn pocket and required multiple cycles to turn onto southbound US 101.

During the PM peak hour, the southbound left-turn vehicles at the US 101 southbound ramps intersection were able to turn onto eastbound Fashion Island Boulevard in one cycle.

Fashion Island Boulevard & Norfolk Street

During the AM peak hour, the westbound through and left-turn vehicles at the Norfolk intersection frequently required multiple cycles to clear the intersection.

No significant operational issues were observed during the PM peak hour for the northbound, southbound and westbound movements.

Delaware Street between Bermuda Drive and 25th Avenue

During the AM peak hour, there was heavy demand for the southbound left-turn at Delaware Street and Saratoga Drive, but the queue was able to clear in one cycle most of the time. The crossing of the Caltrain impacted turning movements at the Delaware Street/25th Avenue intersection and required one to two cycles to return to normal. Construction also impacted traffic operations at Delaware Street and 25th Avenue at the time of observations. The outermost southbound right-turn lane was closed, and the portion of 25th Avenue near the Caltrain tracks was closed periodically. However, when the road was not closed for Caltrain or construction, all vehicles seemed to clear in one signal cycle.

During the PM peak hour, the northbound traffic on Delaware Street was heavy, but most queues cleared during one cycle. However, due to the heavy northbound traffic, the southbound permitted left-turn at the Delaware Street/Bermuda Street intersection sometimes took two cycles to clear. There were several Caltrain crossings at Delaware Street and 25th Avenue that disrupted intersection operations and required about two cycles to return to normal. The eastbound left-turn queue from 25th Avenue often required two signal cycles. The northbound left-turn onto 25th Avenue sometimes extended towards the bend, but was able to clear in one signal cycle.

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 and traffic generated by other approved developments in the vicinity of the site. This chapter describes the procedure used to determine background traffic volumes and the resulting traffic conditions.

Background Transportation Network

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, with a few exceptions. There are three Caltrain grade separation projects (at 25th Avenue, 28th Avenue and 31st Avenue) that are currently under construction and are anticipated to be completed by 2020 according to Caltrain. The completion of these three Caltrain grade separation projects will provide new routes to cross the Caltrain tracks between El Camino Real and Delaware Street and will affect travel patterns in the immediate vicinity. Background conditions assumes the completion of these three Caltrain grade separations.

Background Traffic Volumes

Background traffic volumes were estimated for the project completion year by adding traffic from approved but not yet completed developments in the project area. The approved and under-construction developments included in this study are listed below.

1. Hillsdale Shopping Center Redevelopment: Demolish a portion of the current shopping center and construct new retail plus a 10-screen movie theater. Total size increase will be 20,157 s.f.
2. 1650 Delaware Street: Demolish commercial use and construct 73 residential units.
3. Station Park Green Development: 599 residential units, 11,000 s.f. of office space, and 26,000 s.f. of retail space
4. Bay Meadows Phase II Transportation Corridor Plan
5. 1 Waters Park Drive: Demolish office buildings and construct 190 residential units
6. Hampton Inn & Suites: Demolish the hotel and construct 180 residential units
7. Hillsdale Terraces: 13,978 s.f. commercial space and 74 condominiums
8. Franklin Templeton Campus Expansion: Construct 245,260 s.f. of office space, expanding the existing campus to a total of 813,683 s.f. of office space

Background traffic volumes were obtained by combining existing traffic volumes with the additional trips generated from the approved projects. The AM and PM peak hour traffic volumes under background conditions are shown on Figure 7.

Background Intersection Levels of Service

The following intersections would operate at unacceptable levels of service under background conditions (see Table 7):

- SR 92 Westbound Ramps & Concar Drive – AM & PM Peak Hours (low LOS D & LOS F, respectively)
- Delaware Street & Concar Drive – AM & PM Peak Hours (LOS F)
- Delaware Street & 19th Avenue – AM & PM Peak Hours (LOS F)
- Delaware Street & Bermuda Drive – PM Peak Hour (LOS F)
- Delaware Street & Saratoga Drive – PM Peak Hour (LOS F)
- Grant Street & 19th Avenue – AM & PM Peak Hours (low LOS D & LOS F, respectively)
- YMCA Driveway & 19th Avenue – AM & PM Peak Hours (LOS F)
- US 101 Southbound Ramps & Fashion Island Boulevard – AM & PM Peak Hours (LOS F)
- Norfolk Street & Fashion Island Boulevard – AM & PM Peak Hours (LOS F)
- Saratoga Drive & Franklin Parkway – AM & PM Peak Hours (Low LOS D & LOS F, respectively)
- Saratoga Drive & Hillsdale Boulevard – AM & PM Peak Hours (Low LOS D & LOS F, respectively)

Simulation Analysis

The micro-simulation models were run under background conditions, and the reported intersection delays reflect an average of 10 model runs to account for variations in vehicle simulation. During the AM peak hour under background conditions, the simulation results show that the main bottleneck for the 19th Avenue/Fashion Island Boulevard is at the US 101 southbound on-ramp ramp meter. Due to ramp metering, traffic already occasionally queues out of the on-ramp under existing conditions. With the additional traffic under background conditions, the ramp meter causes queue spillback issue along eastbound 19th Avenue past Delaware Street and on westbound Fashion Island Boulevard past Norfolk Street. The feedback queues on 19th Avenue cause southbound traffic on Delaware Street north of 19th Avenue as well as eastbound right-turn and westbound left-turn traffic on Concar Drive at Delaware Street to also experience feedback queues.

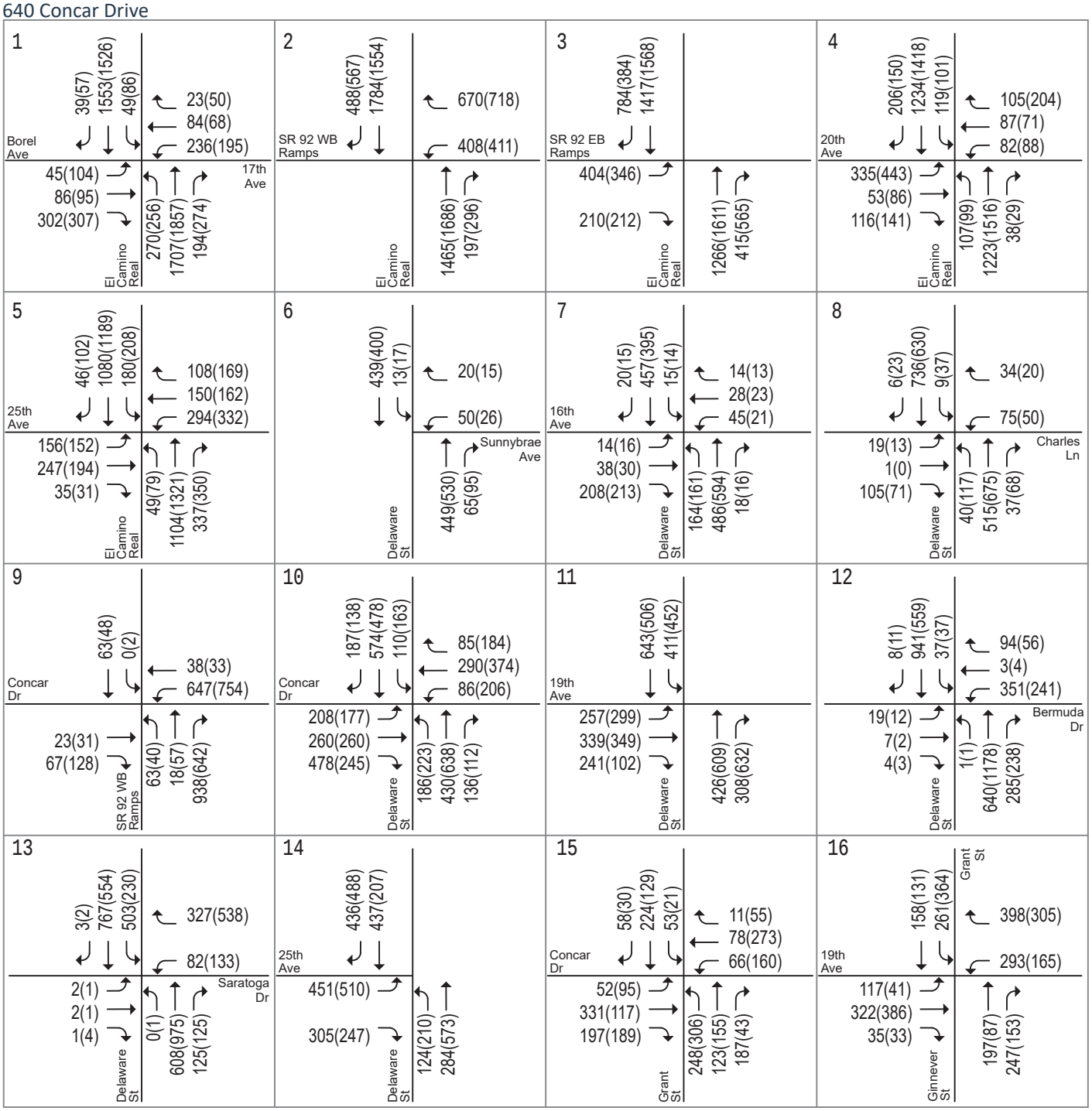
During the PM peak hour under background conditions, the simulation results show that there would be heavy traffic on eastbound 19th Avenue/Fashion Island Boulevard. The bottleneck at the Norfolk Street intersection causes spillback queues along the entire eastbound corridor past Delaware Street. As a result, nearly all intersections along Delaware Street and Grant Street feeding traffic onto the 19th Avenue/Fashion Island Boulevard corridor also experience feedback queues.

Unsignalized Intersections

Under background conditions, the unsignalized intersection at Delaware Street and 16th Avenue would operate at LOS E during both the AM and PM peak hours. The City of San Mateo is currently studying alternatives to signalize this intersection along with the Delaware Street and Sunnybrae Boulevard intersection.

The unsignalized intersections at Ginnever Street and Bermuda Drive as well as at the US 101 northbound on-ramp and Fashion Island Boulevard were analyzed using the SimTraffic microsimulation model. Due to congestion along the simulated corridor during both the AM and PM peak hours, the microsimulation model was unable to fully serve all traffic at these two unsignalized intersections. Therefore, these two intersections are considered to operate at LOS F.

Hexagon conducted a signal warrant analysis for these two intersections using the CA MUTCD Peak Hour Signal Warrant. The all-way stop-controlled intersection at Ginnever Street and Bermuda Drive would not meet the signal warrant based on peak hour traffic volumes. The unsignalized intersection at US 101 Northbound On-Ramp and Fashion Island Boulevard would meet the signal warrant during both the AM and PM peak hours under background conditions based on peak hour traffic volumes.



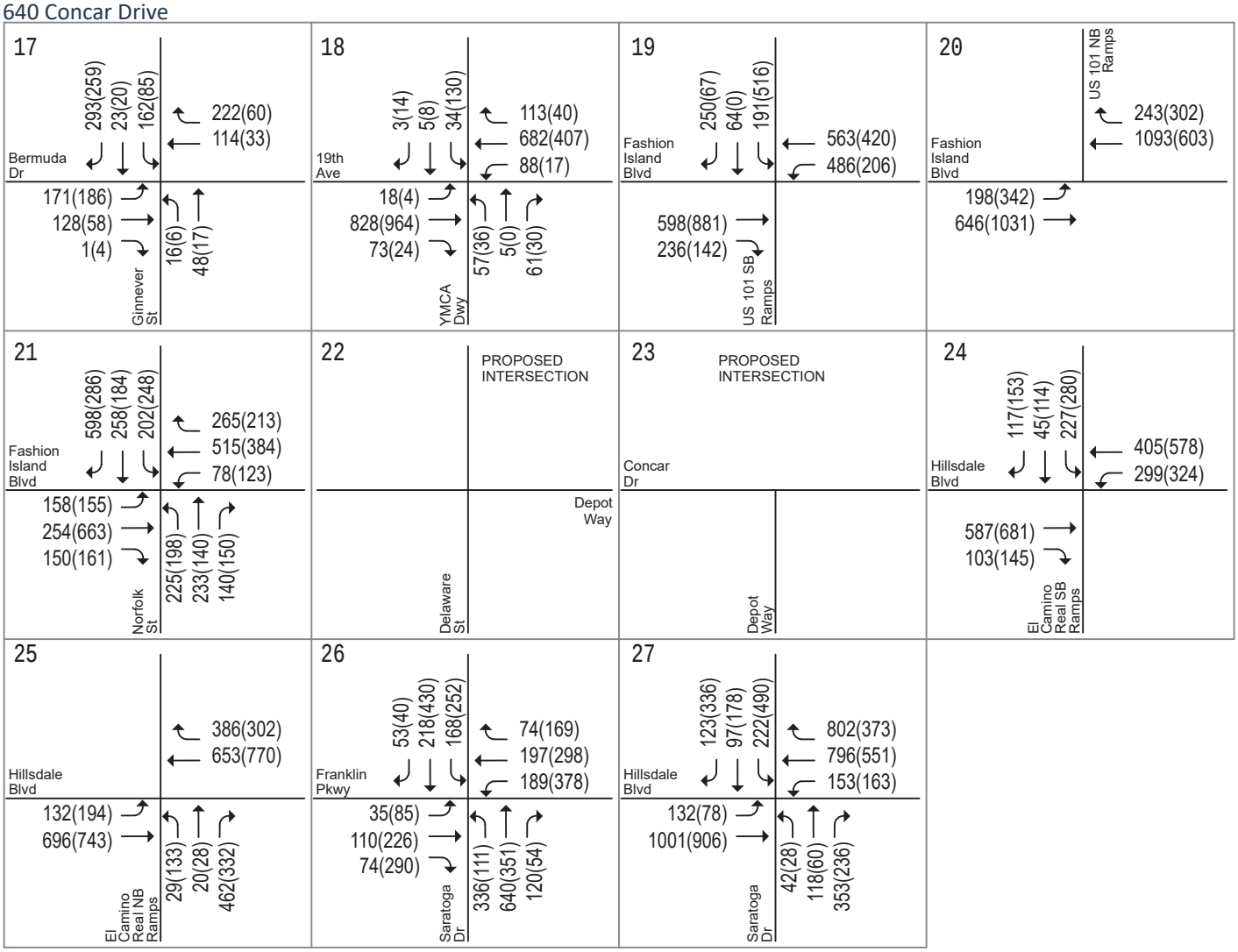
LEGEND

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

Figure 7
Background Traffic Volumes

HEXAGON

NORTH
Not to Scale



LEGEND

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

Figure 7
Background Traffic Volumes

NORTH
Not to Scale

Table 7
Background Level of Service Summary

#	Intersection	Control	Peak Hour	Count Date	Note	Existing Avg. Delay (sec)	Existing LOS	Background Avg. Delay (sec)	Background LOS
1	El Camino Real & 17th Ave	Signal	AM	05/22/18		23.4	C	24.2	C
			PM	05/22/18		23.6	C	24.4	C
2	El Camino Real & SR 92 WB Ramps	Signal	AM	01/29/18		16.0	B	16.1	B
			PM	01/29/18		18.3	B	18.4	B
3	El Camino Real & SR 92 EB Ramps	Signal	AM	01/29/19		10.1	B	10.0	A
			PM	01/29/19		10.7	B	10.7	B
4	El Camino Real & 20th Avenue	Signal	AM	01/29/19		29.0	C	30.8	C
			PM	01/29/19		36.7	D	39.4	D
5	El Camino Real & 25th Avenue	Signal	AM	01/29/19		33.8	C	39.0	D
			PM	01/29/19		40.4	D	44.6	D
6	Delaware Street & Sunnybrae Avenue	TWSC	AM	02/27/18	(1)	19.0	C	20.8	C
			PM	02/27/18	(1)	19.4	C	21.1	C
7	Delaware Street & 16th Avenue	AWSC	AM	02/27/18		31.2	D	41.6	E
			PM	02/27/18		38.1	E	48.8	E
8	Delaware Street & Charles Lane	Signal	AM	01/29/19		8.4	A	11.8	B
			PM	01/29/19		6.1	A	7.4	A
9	SR 92 WB Ramps & Concar Drive	Signal	AM	02/27/18	(2)	9.9	A	**46.3**	**D**
			PM	02/27/18	(2)	7.5	A	**OVERSAT**	**F**
10	Delaware Street & Concar Drive	Signal	AM	02/27/18	(2)	29.8	C	**OVERSAT**	**F**
			PM	02/27/18	(2)	31.9	C	**OVERSAT**	**F**
11	Delaware Street & 19th Avenue	Signal	AM	02/06/18	(2)	31.8	C	**OVERSAT**	**F**
			PM	02/06/18	(2)	**71.4**	**E**	**OVERSAT**	**F**
12	Delaware Street & Bermuda Drive	Signal	AM	01/29/19	(2)	15.9	B	21.7	C
			PM	01/29/19	(2)	25.1	C	**OVERSAT**	**F**
13	Delaware Street & Saratoga Drive	Signal	AM	01/29/19	(2)	19.7	B	21.9	C
			PM	01/29/19	(2)	20.3	C	**OVERSAT**	**F**
14	Delaware Street & 25th Avenue	Signal	AM	01/29/19		12.7	B	17.3	B
			PM	01/29/19		12.4	B	16.4	B
15	Grant Street & Concar Drive	Signal	AM	01/29/19	(2)	28.0	C	27.1	C
			PM	01/29/19	(2)	24.6	C	26.7	C
16	Grant Street & 19th Avenue	Signal	AM	02/06/18	(2 3)	27.0	C	**46.8**	**D**
			PM	02/06/18	(2 3)	**OVERSAT**	**F**	**OVERSAT**	**F**

Notes:
AWSC = All-Way Stop Control
TWSC = Two-Way Stop Control
"OVERSAT" indicates that the SimTraffic microsimulation model indicates that the intersection would experience capacity issues where the demand cannot be served by the intersection. Oversaturated intersections would operate at LOS F.

(1) Delays and LOS reported for side-street and two-way stop controlled intersections are for the worst approach.
(2) The intersection level of service is calculated using the SimTraffic microsimulation model.
(3) The intersection level of service is calculated using the HCM 2000 module with the Synchro software. These intersections have unusual signal operations that cannot be supported by the Synchro HCM 2010 module.

BOLD indicates a substandard level of service.

Table 7 (continued)
Background Level of Service Summary

#	Intersection	Control	Peak Hour	Count Date	Note	Existing Avg. Delay (sec)	Existing LOS	Background Avg. Delay (sec)	Background LOS
17	Ginnever Street & Bermuda Drive	AWSC	AM	01/29/19	(2)	12.3	B	11.8	B
			PM	01/29/19	(2)	9.2	A	OVERSAT	F
18	YMCA Driveway & 19th Avenue	Signal	AM	01/29/19	(2)	25.8	C	**OVERSAT**	**F**
			PM	01/29/19	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**
19	US 101 SB Ramps & Fashion Island	Signal	AM	02/06/18	(2)	**79.9**	**E**	**OVERSAT**	**F**
			PM	02/06/18	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**
20	US 101 NB On-Ramp & Fashion Island	Side-Street Stop	AM	01/29/19	(1 2 3)	OVERSAT	F	OVERSAT	F
			PM	01/29/19	(1 2 3)	OVERSAT	F	OVERSAT	F
21	Norfolk Street & Fashion Island Boulevard	Signal	AM	02/06/18	(2)	**83.7**	**F**	**96.9**	**F**
			PM	02/06/18	(2)	**58.8**	**E**	**OVERSAT**	**F**
22	Delaware Street & Depot Way/Shopping Center Dwy	TWSC	AM	01/29/19	(1)	Project Driveway		Project Driveway	
			PM	01/29/19	(1)				
23	Depot Way/Park Crosswalk & Concar	Future Signal	AM	01/29/19		Project Driveway		Project Driveway	
			PM	01/29/19					
24	El Camino Real SB Ramps & Hillsdale Boulevard	Signal	AM	02/06/18	(3)	27.9	C	31.1	C
			PM	02/06/18	(3)	28.2	C	29.7	C
25	El Camino Real NB Ramps & Hillsdale Boulevard	Signal	AM	02/06/18	(3)	29.7	C	28.6	C
			PM	02/06/18	(3)	26.1	C	26.5	C
26	Saratoga Drive & Franklin Parkway	Signal	AM	02/06/18		25.1	C	**45.3**	**D**
			PM	02/06/18		**52.5**	**D**	**80.7**	**F**
27	Saratoga Drive & Hillsdale Boulevard	Signal	AM	02/06/18	(3)	42.6	D	**49.7**	**D**
			PM	02/06/18	(3)	**105.5**	**F**	**>120**	**F**

Notes:
AWSC = All-Way Stop Control
TWSC = Two-Way Stop Control
"OVERSAT" indicates that the SimTraffic microsimulation model indicates that the intersection would experience capacity issues where the demand cannot be served by the intersection. Oversaturated intersections would operate at LOS F.

(1) Delays and LOS reported for side-street and two-way stop controlled intersections are for the worst approach.
(2) The intersection level of service is calculated using the SimTraffic microsimulation model.
(3) The intersection level of service is calculated using the HCM 2000 module with the Synchro software. These intersections have unusual signal operations that cannot be supported by the Synchro HCM 2010 module.

BOLD indicates a substandard level of service.

4. Project Conditions

This chapter describes traffic conditions with the project and includes: (1) the method by which project traffic is estimated and (2) a level of service summary. Existing plus project conditions are represented by existing traffic conditions with the addition of traffic generated by the project. Existing plus project traffic conditions could potentially occur if the project were to be occupied prior to the other approved projects in the area. Background plus project conditions are represented by background traffic conditions with the addition of traffic generated by the project.

Transportation Network under Project Conditions

Under project conditions, it is assumed in this analysis that the transportation network for the existing plus project scenario as well as the background plus project scenario would be the same as the existing and background transportation network, respectively, at all study intersections, except the project driveways. The project proposes to add two private roadways. The proposed Depot Way would connect Delaware Street to Concar Drive via the project site. The proposed Passage Way would replace a currently unnamed road and would connect Delaware Street to Grant Street. The proposed intersection at Depot Way and Concar Drive would be signalized, and the remaining intersections would be unsignalized.

Project Description

The project proposes to replace the existing buildings on site and construct 961 residential units with 3,100 square feet of retail space, 7,400 square feet of restaurant space, 7,650 square feet of performance/ballet space, and 4,600 square feet of daycare space. In addition, the existing Trader Joe's and 7-Eleven would be rebuilt with the project. Trader Joe's would increase in size by 2,260 square feet to a total of 13,700 square feet and 7-Eleven would increase by 240 square feet to a total of 3,100 square feet. The project also proposes a 3,800 square-foot leasing center and approximately 11,900 square feet of residential amenities. However, the leasing center and amenities were not included in the project trip generation because they are accessible to residents only. Vehicular access to the project site would be provided by driveways on Delaware Street, Concar Drive, and Grant Street (see Figure 2).

Project Trip Estimates

The magnitude of traffic produced by a new development and the locations where that traffic would appear were 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 was estimated for the AM and PM peak hours. As part of the project trip distribution, the directions to and from which the project trips would travel were estimated. In the project trip assignment, the project trips were assigned to specific streets and intersections. These procedures are described below.

Trip Generation

Project Trip Generation

Vehicle trips generated by the proposed project were estimated using the trip rates published in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 10th Edition* (2017) for "Multifamily Housing Mid-Rise" (Land Use 221), "Shopping Center" (Land Use 820), "Fast Casual Restaurant" (Land Use 930), "Recreational Community Center, General Urban/Suburban" (Land Use 495), and "Day Care Center, General Urban/Suburban" (Land Use 565). Vehicle trips generated by the proposed Trader Joe's and 7-Eleven were estimated using trip rates based on counts conducted on Thursday, April 26, 2018. Using these rates, the proposed project would generate 592 trips (226 inbound and 366 outbound) during the AM peak hour and 1,092 trips (600 inbound and 492 outbound) during the PM peak hour.

Project Trip Reductions

Since this project is mixed-use in nature, provides safe pedestrian facilities, and is located near other developments, Hexagon used US EPA's MXD model to determine the applicable trip reduction for the project. The MXD model (Mixed Use Trip Generation Model v 4.0, 2010) was developed by Fehr & Peers for the US EPA to account for internal trip capture and external walking, biking and transit trip reductions due to the nature of mixed-use developments and local area characteristics. It does not account for specific trip reduction strategies that the project might incorporate, such as shuttles, bus passes, or bike-share. Based on the MXD model, a 15% trip reduction during the AM peak hour, a 16.3% trip reduction during the PM peak hour, and a 17.8% daily trip reduction were applied. After crediting these reductions, the proposed project would generate 528 vehicle trips (206 inbound and 322 outbound trips) during the AM peak hour and 993 vehicle trips (543 inbound and 450 outbound trips) during the PM peak hour.

In addition, trip generation for retail uses is typically adjusted to account for pass-by-trips. Pass-by-trips are trips that are already on the adjacent roadways (and are therefore already counted in the existing traffic) but would turn into the site while passing by. Pass-by-trips are therefore excluded from the traffic projections (although pass-by traffic is accounted for at the site entrances). Pass-by trip reductions are based on the average pass-by trip reduction rates published in the ITE *Trip Generation Handbook, 3rd Edition.* A pass-by trip reduction of 34% was applied to the retail component of the project, 43% was applied to the restaurant component, 36% was applied to Trader Joe's, and 51% was applied to 7-Eleven. Hexagon assumes no pass-by trip reduction during the AM peak hour. After applying the appropriate pass-by trip reductions, it is estimated that the proposed project would generate 528 vehicle trips (206 inbound and 322 outbound trips) during the AM peak hour and 765 vehicle trips (425 inbound and 340 outbound trips) during the PM peak hour.

Existing Trip Credits

Because the project would replace the existing uses on the site, trips associated with the existing buildings were subtracted from the project-generated traffic to derive the net trips. The trips generated by the existing uses on the site were estimated based on driveway counts conducted on April 26th, 2018. Inbound trips generated by Trader Joe's and 7-Eleven were captured by counters stationed at the door who counted each group that arrived together as one inbound trip. People exiting Trader Joe's and 7-Eleven often did not exit in groups and thus outbound trips for the Trader Joe's and 7-Eleven were estimated based on inbound counts and the directional distribution data from ITE *Trip Generation, 10th Edition* for Shopping Center (ITE Code 820). Pass-by trip reductions were also applied to the existing retail trips. Using these rates and the applied trip reductions, the existing uses are estimated to generate 405 trips (216 inbound and 189 outbound) during the AM peak hour and 599 trips (270 inbound and 329 outbound) during the PM peak hour.

Net Trip Generation

After applying the appropriate trip generation rates, trip reductions, and the existing trip credits, Table 8 shows that the project would generate 2,471 net new daily trips, with 123 net new trips (-10 inbound and 133 outbound) occurring during the AM peak hour and 166 net new trips (155 inbound and 11 outbound) occurring during the PM peak hour.

Trip Distribution and Assignment

Trips generated by the proposed project were distributed to the study network based on the existing travel patterns on the surrounding roadway system and the locations of complementary land uses (see Figures 8 and 9). The proposed residential use would typically generate outbound trips in the morning to employment areas and inbound trips in the evening from employment areas. The proposed commercial uses would typically generate trips from the nearby residential areas.

The peak-hour trips generated by the existing and proposed uses 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 trips generated by the existing uses to be removed were subtracted from the roadway network prior to assigning project trips. Figure 10 shows the net project trip assignment at the study intersections.

Driveway Assumptions

Access to the project site would be provided by driveways on Delaware Street, Concar Drive, and Grant Street. The project driveways are shown in Figure 11. Driveways A, D, and G are assumed to be full access driveways. Driveways B, C, E, and J are assumed to be right-in-right-out driveways. Driveway F is assumed to be a right-out only driveway. Driveway H is assumed to be a left-out-right-out driveway and Driveway I is assumed to be a left-in-right-in driveway. The project trip assignment assumptions are detailed in Appendix D.

Table 8
Project Trip Generation

Land Use	Size	Unit	Daily Rate	Daily Trips	AM Peak Hour Rate	AM Peak Hour % In	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour Rate	PM Peak Hour % In	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Proposed Uses														
Residential [1]	961	d.u.	5.44	5,228	0.36	26%	90	256	346	0.44	61%	258	165	423
Mixed-Use Reduction [3]				(931)			(14)	(38)	(52)			(42)	(27)	(69)
Residential Trips (Resi)				4,297			76	218	294			216	138	354
General Commercial [2]	3.1	ksf	37.75	117	0.94	62%	2	1	3	3.81	48%	6	6	12
Mixed-Use Reduction [3]				(21)			0	0	0			(1)	(1)	(2)
PM Pass-By Reduction (34%) [4]				(16)			0	0	0			(2)	(2)	(4)
Retail Trips (Com)				80			2	1	3			3	3	6
Restaurant [7]	7.4	ksf	315.17	2,332	2.07	67%	10	5	15	14.13	55%	58	47	105
Mixed-Use Reduction [3]				(415)			(1)	(1)	(2)			(9)	(8)	(17)
PM Pass-By Reduction (43%) [8]				(412)			0	0	0			(21)	(17)	(38)
Restaurant Trips (Rest)				1,505			9	4	13			28	22	50
Ballet / Performance Space [9]	7.65	ksf	28.82	220	1.76	66%	9	4	13	2.31	47%	8	10	18
Mixed-Use Reduction [3]				(39)			(1)	(1)	(2)			(1)	(2)	(3)
Ballet / Performance Trips (BPS)				181			8	3	11			7	8	15
Day Care [10]	4.6	ksf	47.62	219	11.00	53%	27	24	51	11.12	47%	24	27	51
Mixed-Use Reduction [3]				(39)			(4)	(4)	(8)			(4)	(4)	(8)
Day Care Trips (DC)				180			23	20	43			20	23	43
Trader Joe's [13]	13.7	ksf	287.59	3,940	4.55	60%	37	25	62	28.76	51%	201	193	394
PM Pass-By Reduction (36%) [5]				(709)			0	0	0			(72)	(69)	(141)
Trader Joe's Trips (TJ)				3,231			37	25	62			129	124	253
7-Eleven [13]	3.1	ksf	287.10	890	32.87	50%	51	51	102	28.67	51%	45	44	89
PM Pass-By Reduction (51%) [6]				(227)			0	0	0			(23)	(22)	(45)
7-Eleven Trips (7E)				663			51	51	102			22	22	44
Project Trips (P = Resi + Com + Rest + BPS + DC + TJ + 7E)				**10,137**			**206**	**322**	**528**			**425**	**340**	**765**
Existing Use														
Shopping Center [11]				5,250			138	121	259			213	312	525
PM Pass-By Reduction (34%) [4]				(893)			0	0	0			(72)	(106)	(178)
Existing Shopping Center Trips				4,357			138	121	259			141	206	347
Trader Joe's [12]				3,290			31	21	52			168	161	329
PM Pass-By Reduction (36%) [5]				(592)			0	0	0			(60)	(58)	(118)
Existing Trader Joe's Trips				2,698			31	21	52			108	103	211
7-Eleven [12]				820			47	47	94			42	40	82
PM Pass-By Reduction (51%) [6]				(209)			0	0	0			(21)	(20)	(41)
Existing 7-Eleven Trips				611			47	47	94			21	20	41
Existing Trips (E)				**7,666**			**216**	**189**	**405**			**270**	**329**	**599**
Net Project Trip Generation (Net = P - E)				**2,471**			**(10)**	**133**	**123**			**155**	**11**	**166**

Notes:
All rates are from: Institute of Transportation Engineers, *Trip Generation, 10th Edition*
1. Land Use Code 221: Multifamily Housing (Mid-Rise), General Urban/Suburban (average rates, expressed in trips per dwelling unit)
2. Land Use Code 820: Shopping Center, General Urban/Suburban (average rates, expressed in trips per 1,000 s.f.).
3. Trip reduction of 15% in the AM and 16.3% in the PM, daily reduction calculated at 17.8%. Based on MXD model developed by Fehr & Peers for the US EPA to account for internal capture and external walking, biking, and transit trips due to mixed-use development and local area characteristics. (Mixed Use Trip Generation Model v 4.0, 2010)
4. Pass-by trip reduction for Land Use Code 820: Shopping Center is based on the average pass-by trip reduction rate published in the ITE *Trip Generation Handbook, 3rd Edition.* Hexagon assumes no pass-by trip reduction during the AM peak hour and half of the PM peak pass-by reduction for daily trip generation.
5. Pass-by trip reduction for Land Use Code 850: Supermarket is based on the average pass-by trip reduction rate published in the ITE *Trip Generation Handbook, 3rd Edition.* Hexagon assumes no pass-by trip reduction during the AM peak hour and half of the PM peak pass-by reduction for daily trip generation.
6. Pass-by trip reduction for Land Use Code 851: Convenience Market (Open 24 Hours) is based on the average pass-by trip reduction rate published in the ITE *Trip Generation Handbook, 3rd Edition.* Hexagon assumes no pass-by trip reduction during the AM peak hour and half of the PM peak pass-by reduction for daily trip generation.
7. Land Use Code 930: Fast Casual Restaurant, General Urban/Suburban (average rates, expressed in trips per 1,000 s.f.)
8. Pass-by trip reduction for Fast Casual Restaurant is based on the average pass-by trip rate for High-Turnover Restaurant (ITE 932) as published in the ITE *Trip Generation Handbook, 3rd Edition.* Hexagon assumes no pass-by trip reduction during the AM peak hour and half of the PM peak pass-by reduction for daily trip generation.
9. Land Use Code 495: Recreational Community Center, General Urban/Suburban (average rates, expressed in trips per 1,000 s.f.)
10. Land Use Code 565: Day Care Center, General Urban/Suburban (average rates, expresed in trips per 1,000 s.f.)
11. Peak-hour trips from driveway counts conducted on Thursday, April 26th, 2018. Daily trips were estimated by assuming PM peak hour trips to be 10% of daily trips.
12. Peak-hour inbound trips from trip generation counts conducted on Thursday, April 26th, 2018. Outbound trips were estimated using directional distribution percentages provided by ITE's Trip Generation, 10th Edition. Daily trips were estimated by assuming PM peak hour trips to be 10% of daily trips.
13. Peak-hour trip rates based on counts conducted on Thursday, April 26th, 2018. Mixed-Use Reduction was not applied. Daily trips were estimated by assuming PM peak hour trips to be 10% of daily trips.

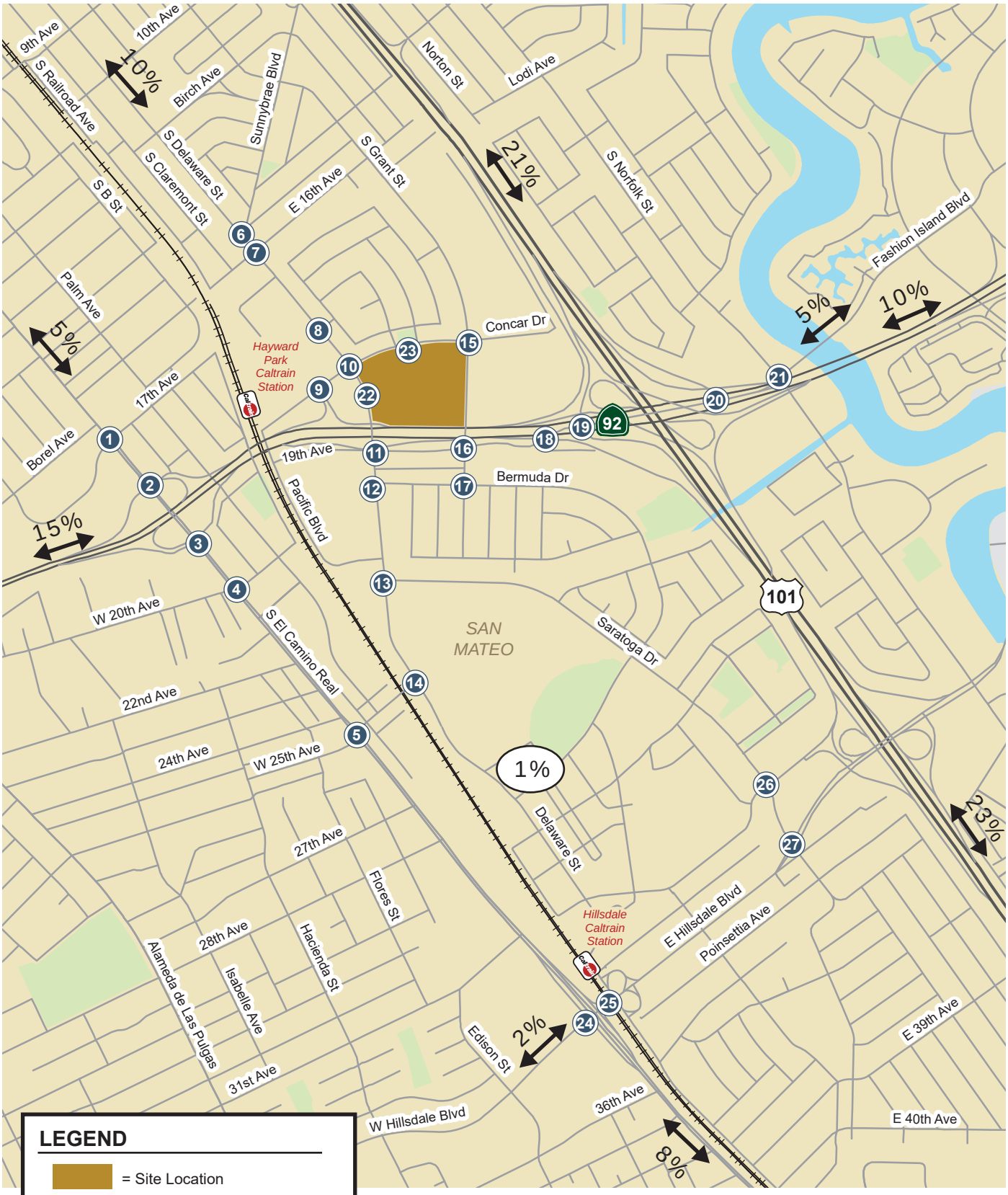


Figure 8
Residential Trip Distribution Pattern

NORTH
Not to Scale

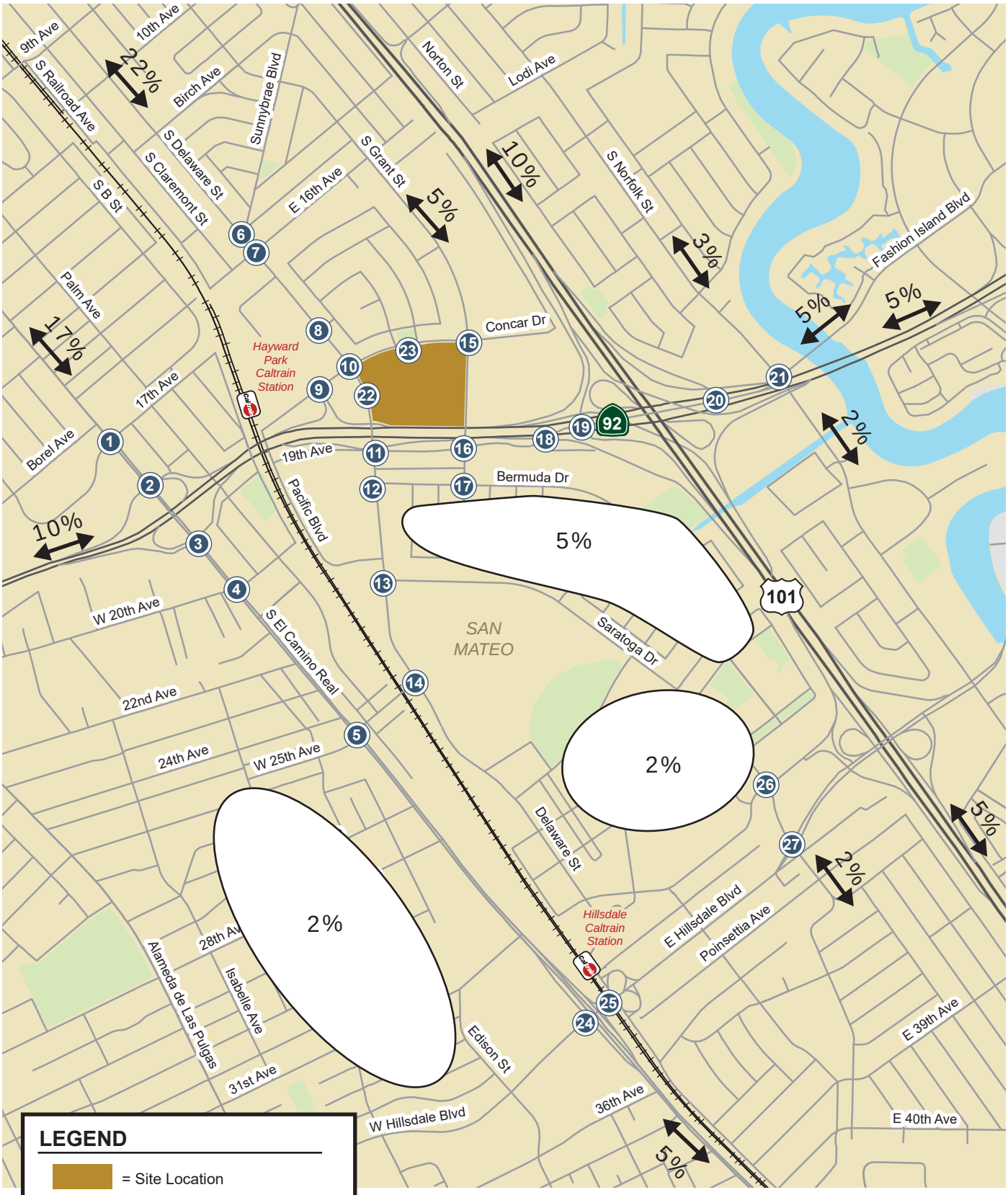
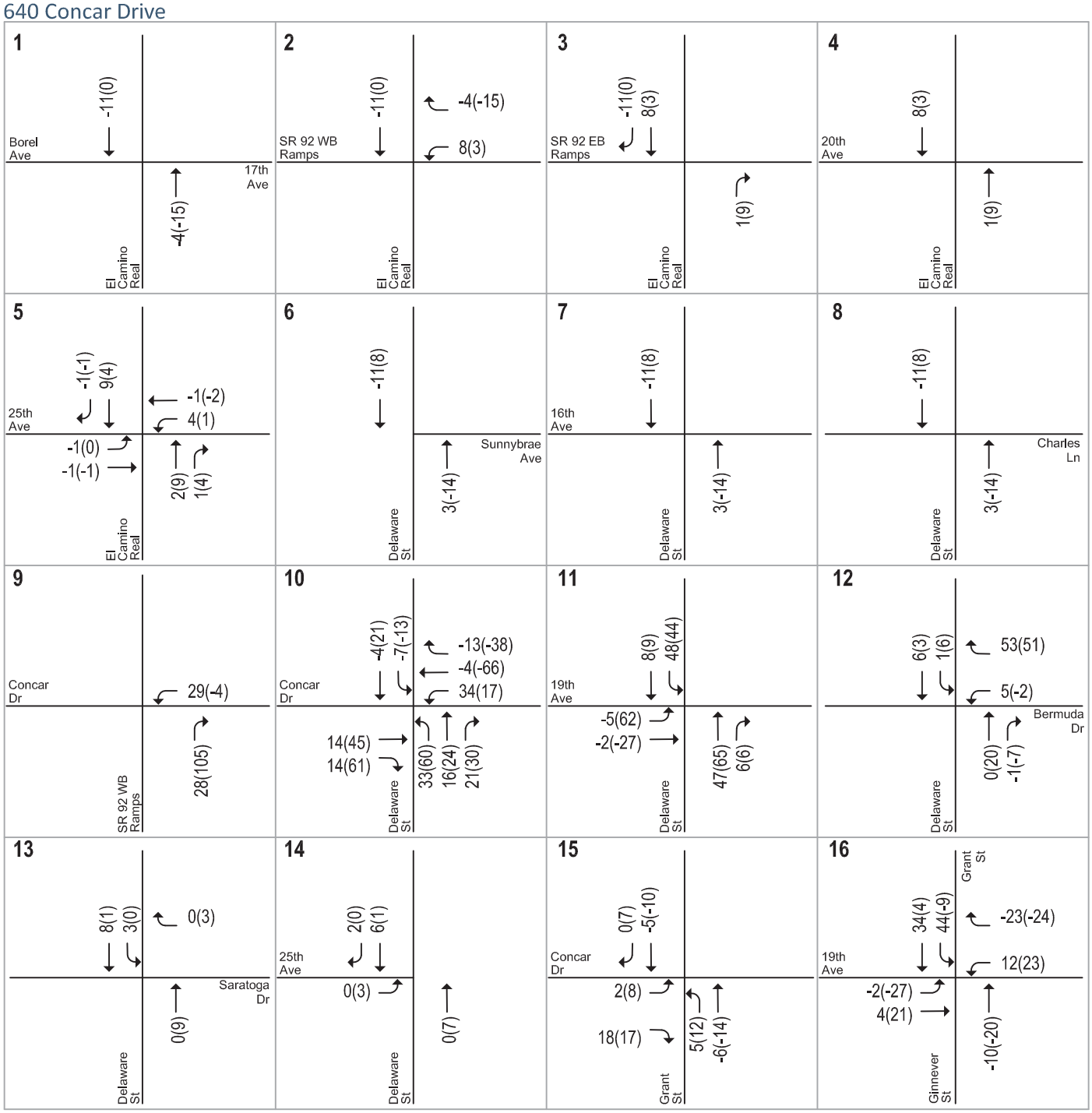


Figure 9
Retail Trip Distribution Pattern

NORTH
Not to Scale



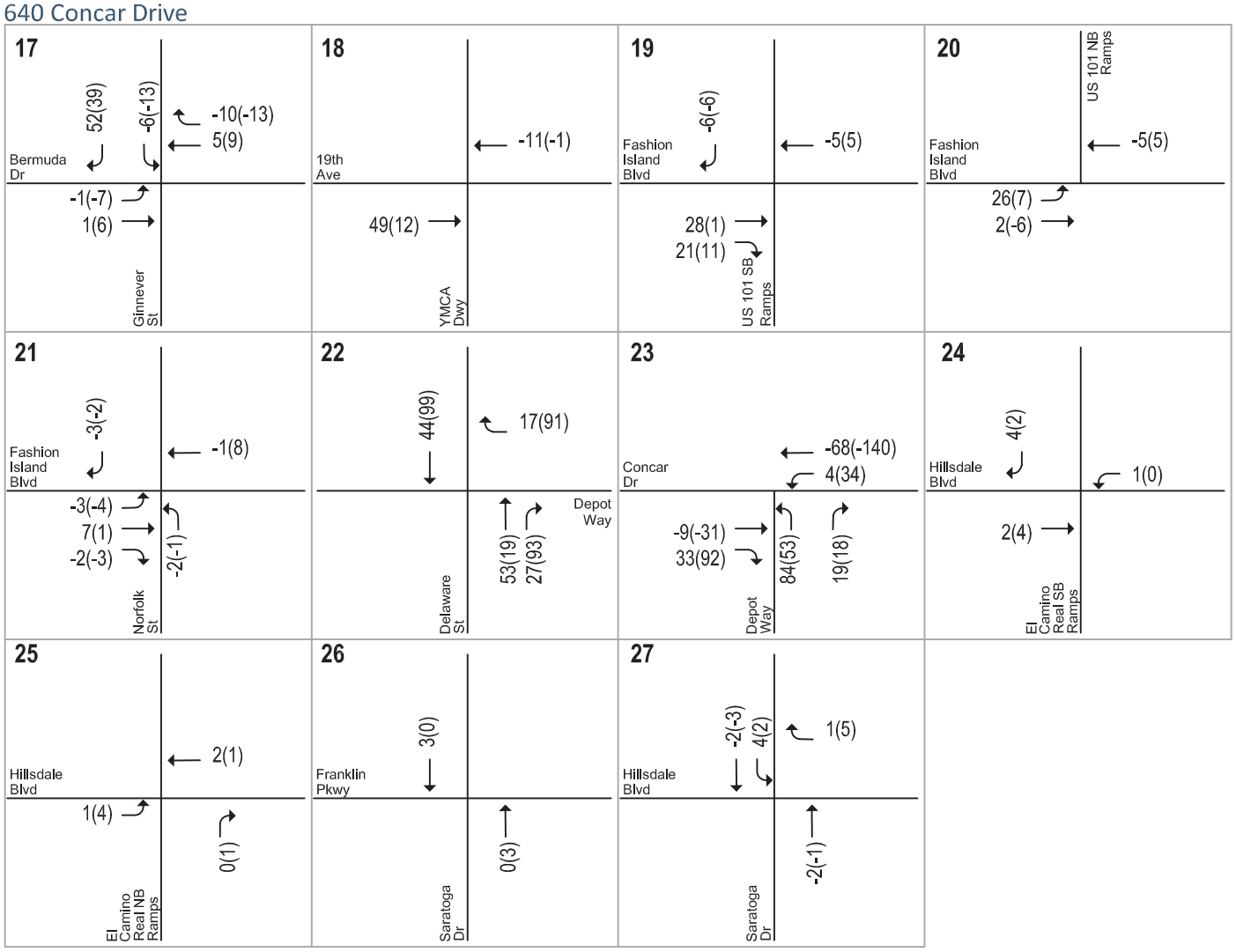
LEGEND

XX(XX) = AM(PM) Peak-Hour Trips

Figure 10
Net Project Trips

HEXAGON

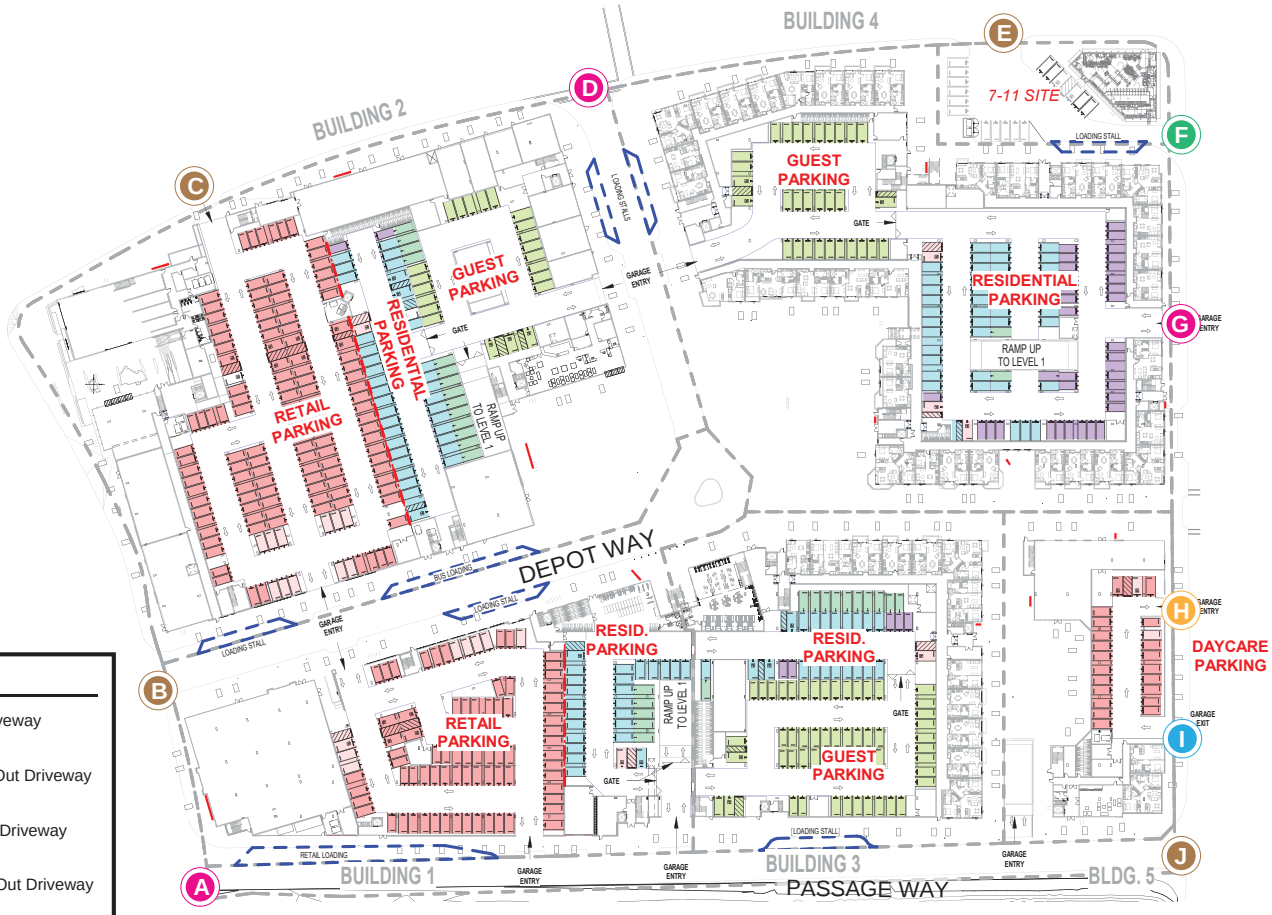
NORTH
Not to Scale



LEGEND

XX(XX) = AM(PM) Peak-Hour Trips

Figure 10
Net Project Trips



LEGEND

- X = Full Access Driveway
- X = Right-In-Right-Out Driveway
- X = Right-Out Only Driveway
- X = Left-Out-Right-Out Driveway
- X = Left-In-Right-In Driveway

Figure 11
Project Driveways

NORTH
Not to Scale

Substantial Intersection Delay Criteria

Per the City's General Plan Policy C 2.7, all projects are required, at a minimum, to pay a transportation mitigation fee. The transportation mitigation fee is used to fund planned transportation improvements that are identified in the City of San Mateo Traffic Mitigation Program.

In addition to paying the transportation impact fee, a development project may be required to fund off-site circulation improvements which are needed as a result of project generated traffic if:

a) The level of service at the intersection drops below mid-level LOS D (average delay of more than 45 seconds) when the project traffic is added, and

b) An intersection that operates below its level of service standard under the base year conditions experiences an increase in delay of four or more seconds, and

c) The needed improvement of the intersection(s) is not funded in the applicable five-year City Capital Improvement Program from the date of application approval.

The cost of the off-site improvements may be reimbursed by the City if a reimbursement program is established throughout the timeframe of the City of San Mateo's current Traffic Mitigation Program or at the time when the improvement was initially scheduled.

Unsignalized Intersections

The City of San Mateo does not have a level of service standard for unsignalized intersections. Transportation studies typically evaluate whether unsignalized intersections are functioning adequately and whether signalization is warranted using the peak-hour volume signal warrant described in the CA MUTCD. Signal warrant worksheets are provided in Appendix E

Existing Plus Project Traffic Volumes

Project trips, as represented in the above project trip assignment, were added to existing traffic volumes to obtain existing plus project traffic volumes. The existing plus project traffic volumes are shown on Figure 12.

Existing plus Project Conditions Intersection Levels of Service

Simulation Analysis

The micro-simulation models were run under existing plus project conditions, and the reported intersection delays reflect an average of 10 model runs to account for variations in vehicle simulation. During the AM peak hour under existing plus project conditions, the simulation results show that the main bottleneck for the 19th Avenue/Fashion Island Boulevard is at the US 101 southbound on-ramp ramp meter. Due to ramp metering, traffic already occasionally queues out of the on-ramp under existing conditions. With the additional project traffic under existing plus project conditions, the ramp meter causes queue spillback issues along eastbound 19th Avenue past Delaware Street and on westbound Fashion Island Boulevard past Norfolk Street. The feedback queues on 19th Avenue causes southbound traffic on Delaware Street at 19th Avenue to also experience feedback queues.

During the PM peak hour under existing plus project conditions, the simulation results show that there would be heavy traffic on eastbound 19th Avenue/Fashion Island Boulevard. The bottleneck at the Norfolk Street intersection causes spillback queues along the entire eastbound corridor past Delaware Street. The feedback queues on 19th Avenue causes southbound traffic on Delaware Street at 19th Avenue to also experience feedback queues.

Substantial Increases in Intersection Delay

Under existing plus project conditions, the project would generate substantial increases in intersection delays based on City's General Plan criteria at the following intersections (see Table 9):

- Delaware Street & Concar Drive – PM Peak Hour
- Delaware Street & 19th Avenue – AM & PM Peak Hours
- YMCA Driveway & 19th Avenue – PM Peak Hour

It should be noted that all of the above identified intersections are a result of corridor congestion along 19th Avenue/Fashion Island Boulevard. While the analysis indicates that these particular intersections would experience substantial intersection delay increases, improvements would still need to address the broader congestion issue along the whole corridor. Proposed improvement measures are discussed below.

Physical Improvements

At the time of this report, the City of San Mateo is studying potential alternatives to alleviate congestion along the 19th Avenue/Fashion Island Boulevard corridor. Preliminary analysis from the corridor study efforts have identified numerous improvement measures, listed below:

- Convert 19th Avenue between Delaware Street and Grant Street from the existing one-way eastbound operation to two-way operations with one lane in each direction.
- Construct intersection improvements at the Delaware Street and 19th Avenue intersection and the Grant Street and 19th Avenue intersection to accommodate the 19th Avenue two-way conversion. The following improvements are preliminarily identified:
    - Restripe southbound Delaware Street at 19th Avenue to include two left-turn lanes and one through lane. The northbound/southbound operations would be converted from split phasing to protected phasing.
    - Westbound 19th Avenue at Delaware Street would consist of one left-turn lane. Eastbound/westbound operations would be split phase
    - Westbound 19th Avenue at Grant Street would consist of one shared left-through lane and one right-turn lane.
- Widen the US 101 southbound on-ramp from Fashion Island Boulevard to include a second mixed-flow lane.
- Widen westbound Fashion Island Boulevard to include a right-turn pocket at the US 101 northbound on-ramp intersection
- Lengthen the eastbound left-turn pocket at the Norfolk Street and Fashion Island Boulevard intersection.
- Implement reversible lanes on the bridge between Norfolk Street and Harbor Seal Court. The AM peak period operations will be the same as existing conditions. The PM peak period operations will allow for two eastbound through lanes from west of Norfolk Street to just west of Harbor Seal Court where Fashion Island Boulevard opens up to two eastbound lanes. At the intersection of Norfolk Street and Fashion Island Boulevard, the eastbound approach will consist of one left-turn lane, one through lane and one shared through-right lane. The westbound approach will consist of one left-turn lane and one shared through-right lane.
- Implement signal coordination at all signalized intersections on 19th Avenue/Fashion Island Boulevard between Delaware Street and Norfolk Street

In addition to the improvements identified in the preliminary analysis from the corridor study efforts, the following improvements would also be needed to eliminate the project-generated substantial increases in intersection delays (see Table 9 below):

- Restripe eastbound 19th Avenue at the Grant Street intersection to include one shared left-through lane and one shared through-right lane.
- Restripe eastbound Fashion Island Boulevard at the US 101 southbound ramps intersection to include one through lane and one shared through-right lane.

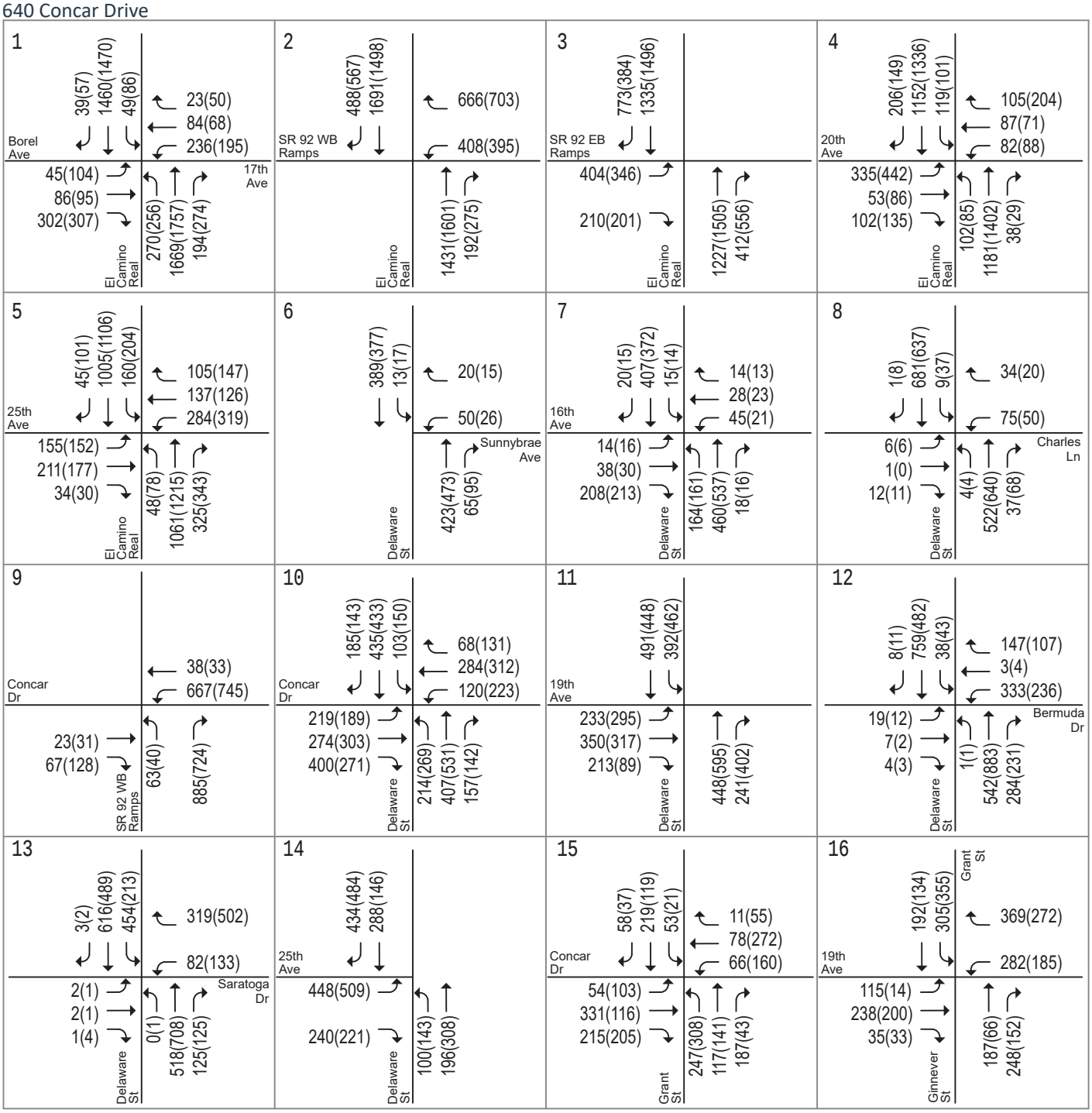
As shown under background conditions, the identified deficiencies along the 19th Avenue/Fashion Island Boulevard corridor would not be caused solely by the Concar Passage project. Improvement measures have been identified that will eliminate the project's substantial increases in intersection delays. The project will be required to pay its fair share of the improvements. However, the identified improvements are not currently on the City's Capital Improvement Program and funding is not currently available to ensure implementation. Therefore, the intersection delays at the identified intersections would remain substantial.

Unsignalized Intersections

Under existing plus project conditions, the unsignalized intersection at Delaware Street and 16th Avenue would operate at LOS E during the PM peak hour. The City of San Mateo is currently studying alternatives to signalize this intersection along with the Delaware Street and Sunnybrae Boulevard intersection. The project would generate a net negative 6 trips at this intersection during the PM peak hour.

The unsignalized intersection at the US 101 northbound on-ramp and Fashion Island Boulevard was analyzed using the SimTraffic microsimulation model. Due to congestion along the simulated corridor during both the AM and PM peak hours, the microsimulation model was unable to fully serve all traffic at this intersection. Therefore, the eastbound left-turn movement at this intersection is considered to operate at LOS F under existing plus project conditions. The project would add 26 vehicles to this eastbound left-turn movement during the AM peak hour and 7 vehicles during the PM peak hour.

Hexagon conducted a signal warrant analysis for the unsignalized intersection at US 101 Northbound On-Ramp and Fashion Island Boulevard using the CA MUTCD Peak Hour Signal Warrant. This intersection would meet the signal warrant during both the AM and PM peak hours under existing plus project conditions based on peak hour traffic volumes. Potential signalization would only require traffic signals to control the westbound movements and the eastbound left-turn movement, but not the eastbound through movement. Careful signal coordination with neighboring intersections along Fashion Island Boulevard would likely be needed to prevent queue spillback issues. A carefully coordinated signal at this intersection could prevent potential eastbound left-turn queues from extending into the eastbound through lane. However, since this intersection is controlled by Caltrans, the City cannot ensure the signalization of this intersection.



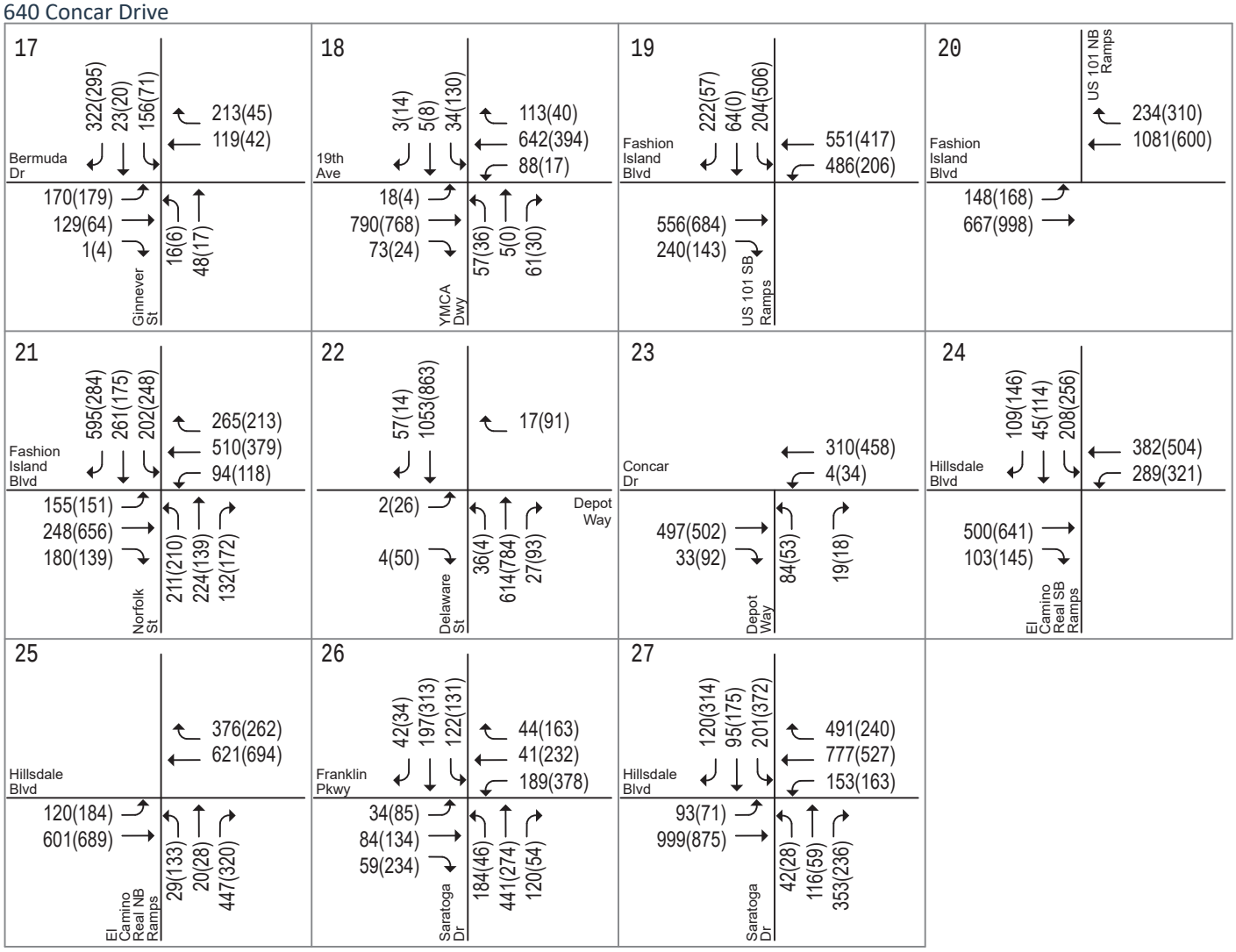
LEGEND

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

Figure 12
Existing Plus Project Traffic Volumes

HEXAGON

NORTH
Not to Scale



LEGEND

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

Figure 12
Existing Plus Project Traffic Volumes

NORTH
Not to Scale

Table 9
Existing plus Project Intersection Levels of Service Summary

						Existing		Existing plus Project			Improved Existing plus Project		
#	Intersection	Control	Peak Hour	Count Date	Note	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Incr. in Avg. Delay	Avg. Delay (sec)	LOS	Incr. in Avg. Delay
1	El Camino Real & 17th Ave	Signal	AM	05/22/18		23.4	C	23.3	C	-0.1	23.3	C	-0.1
			PM	05/22/18		23.6	C	23.5	C	-0.1	23.5	C	-0.1
2	El Camino Real & SR 92 WB Ramps	Signal	AM	01/29/18		16.0	B	16.0	B	0.0	16.0	B	0.0
			PM	01/29/18		18.3	B	18.0	B	-0.3	18.0	B	-0.3
3	El Camino Real & SR 92 EB Ramps	Signal	AM	01/29/19		10.1	B	10.1	B	0.0	10.1	B	0.0
			PM	01/29/19		10.7	B	10.7	B	0.0	10.7	B	0.0
4	El Camino Real & 20th Avenue	Signal	AM	01/29/19		29.0	C	29.2	C	0.2	29.2	C	0.2
			PM	01/29/19		36.7	D	36.7	D	0.0	36.7	D	0.0
5	El Camino Real & 25th Avenue	Signal	AM	01/29/19		33.8	C	34.0	C	0.2	34.0	C	0.2
			PM	01/29/19		40.4	D	40.7	D	0.3	40.7	D	0.3
6	Delaware Street & Sunnybrae Avenue	TWSC	AM	02/27/18	(1)	19.0	C	18.9	C	-	18.9	C	-
			PM	02/27/18	(1)	19.4	C	19.3	C	-	19.3	C	-
7	Delaware Street & 16th Avenue	AWSC	AM	02/27/18		31.2	D	30.4	D	-	30.4	D	-
			PM	02/27/18		38.1	E	35.8	E	-	35.8	E	-
8	Delaware Street & Charles Lane	Signal	AM	01/29/19		8.4	A	8.4	A	0.0	8.4	A	0.0
			PM	01/29/19		6.1	A	6.1	A	0.0	6.1	A	0.0
9	SR 92 WB Ramps & Concar Drive	Signal	AM	02/27/18	(2)	9.9	A	9.8	A	-0.1	7.9	A	-2.0
			PM	02/27/18	(2)	7.5	A	11.2	B	3.7	7.2	A	-0.3
10	Delaware Street & Concar Drive	Signal	AM	02/27/18	(2)	29.8	C	30.8	C	1.0	35.4	D	5.6
			PM	02/27/18	(2)	31.9	C	**49.8**	**D**	**17.9**	38.8	D	6.9
11	Delaware Street & 19th Avenue	Signal	AM	02/06/18	(2)	31.8	C	**46.0**	**D**	**14.2**	41.6	D	9.8
			PM	02/06/18	(2)	**71.4**	**E**	**OVERSAT**	**F**	**14.2**	**63.0**	**E**	**-8.4**
12	Delaware Street & Bermuda Drive	Signal	AM	01/29/19	(2)	15.9	B	18.9	B	3.0	15.6	B	-0.3
			PM	01/29/19	(2)	25.1	C	41.7	D	16.6	25.5	C	0.4
13	Delaware Street & Saratoga Drive	Signal	AM	01/29/19	(2)	19.7	B	19.6	B	-0.1	19.5	B	-0.2
			PM	01/29/19	(2)	20.3	C	29.9	C	9.6	28.8	C	8.5
14	Delaware Street & 25th Avenue	Signal	AM	01/29/19		12.7	B	12.7	B	0.0	12.7	B	0.0
			PM	01/29/19		12.4	B	12.4	B	0.0	12.4	B	0.0

Notes:
AWSC = All-Way Stop Control
TWSC = Two-Way Stop Control
"OVERSAT" indicates that the SimTraffic microsimulation model indicates that the intersection would experience capacity issues where the demand cannot be served by the intersection. Oversaturated intersections would operate at LOS F.

(1) Delays and LOS reported for side-street and two-way stop controlled intersections are for the worst approach.
(2) The intersection level of service is calculated using the SimTraffic microsimulation model.
(3) The intersection level of service is calculated using the HCM 2000 module with the Synchro software. These intersections have unusual signal operations that cannot be supported by the Synchro HCM 2010 module.

BOLD indicates a substandard level of service.
boxed and BOLD indicates substantial increase in intersection delay.

Table 9 (continued)
Existing plus Project Intersection Levels of Service Summary

						Existing		Existing plus Project			Improved Existing plus Project		
#	Intersection	Control	Peak Hour	Count Date	Note	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Incr. in Avg. Delay	Avg. Delay (sec)	LOS	Incr. in Avg. Delay
15	Grant Street & Concar Drive	Signal	AM	01/29/19	(2)	28.0	C	30.0	C	2.0	34.2	C	6.2
			PM	01/29/19	(2)	24.6	C	28.4	C	3.8	26.6	C	2.0
16	Grant Street & 19th Avenue	Signal	AM	02/06/18	(2 3)	27.0	C	42.6	D	15.6	26.9	C	-0.1
			PM	02/06/18	(2 3)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-2.2**	29.8	C	-2.2
17	Ginnever Street & Bermuda Drive	AWSC	AM	01/29/19	(2)	12.3	B	13.9	B	-	9.0	A	-
			PM	01/29/19	(2)	9.2	A	9.9	A	-	6.4	A	-
18	YMCA Driveway & 19th Avenue	Signal	AM	01/29/19	(2)	25.8	C	43.2	D	17.4	15.7	B	-10.1
			PM	01/29/19	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**4.7**	14.2	B	4.7
19	US 101 SB Ramps & Fashion Island	Signal	AM	02/06/18	(2)	**79.9**	**E**	**OVERSAT**	**F**	**2.7**	26.6	C	-53.3
			PM	02/06/18	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-0.1**	26.0	C	-0.1
20	US 101 NB On-Ramp & Fashion Island	Side-Street Stop	AM	01/29/19	(1 2 3)	OVERSAT	F	OVERSAT	F	-	33.5	D	-
			PM	01/29/19	(1 2 3)	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-
21	Norfolk Street & Fashion Island Boulevard	Signal	AM	02/06/18	(2)	**83.7**	**F**	**OVERSAT**	**F**	**-0.8**	**55.4**	**E**	**-28.3**
			PM	02/06/18	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-0.7**	**81.5**	**F**	**-27.5**
22	Delaware Street & Depot Way/Shopping Center Dwy	TWSC	AM	01/29/19	(1)	Project Driveway		25.0	C	-	25.0	C	-
			PM	01/29/19	(1)			28.8	D	-	28.8	D	-
23	Depot Way/Park Crosswalk & Concar	Future Signal	AM	01/29/19		Project Driveway		4.9	A	-	4.9	A	-
			PM	01/29/19				4.7	A	-	4.7	A	-
24	El Camino Real SB Ramps & Hillsdale Boulevard	Signal	AM	02/06/18	(3)	27.9	C	28.0	C	0.1	28.0	C	0.1
			PM	02/06/18	(3)	28.2	C	28.3	C	0.1	28.3	C	0.1
25	El Camino Real NB Ramps & Hillsdale Boulevard	Signal	AM	02/06/18	(3)	29.7	C	29.8	C	0.1	29.8	C	0.1
			PM	02/06/18	(3)	26.1	C	26.1	C	0.0	26.1	C	0.0
26	Saratoga Drive & Franklin Parkway	Signal	AM	02/06/18		25.1	C	25.0	C	-0.1	25.0	C	-0.1
			PM	02/06/18		**52.5**	**D**	**52.5**	**D**	**0.0**	**52.5**	**D**	**0.0**
27	Saratoga Drive & Hillsdale Boulevard	Signal	AM	02/06/18	(3)	42.6	D	42.6	D	0.0	42.6	D	0.0
			PM	02/06/18	(3)	**105.5**	**F**	**105.6**	**F**	**0.1**	**105.6**	**F**	**0.1**

Notes:
AWSC = All-Way Stop Control
TWSC = Two-Way Stop Control
"OVERSAT" indicates that the SimTraffic microsimulation model indicates that the intersection would experience capacity issues where the demand cannot be served by the intersection. Oversaturated intersections would operate at LOS F.

(1) Delays and LOS reported for side-street and two-way stop controlled intersections are for the worst approach.
(2) The intersection level of service is calculated using the SimTraffic microsimulation model.
(3) The intersection level of service is calculated using the HCM 2000 module with the Synchro software. These intersections have unusual signal operations that cannot be supported by the Synchro HCM 2010 module.

BOLD indicates a substandard level of service.
boxed and BOLD indicates substantial increase in intersection delay.

Background Plus Project Traffic Volumes

Project trips, as previously shown on Figure 10, were added to background traffic volumes to obtain background plus project traffic volumes. The background plus project traffic volumes at the study intersections are shown on Figure 13. Traffic volumes for all components of traffic are tabulated in Appendix B.

Background plus Project Intersection Levels of Service

Simulation Analysis

The micro-simulation models were run under background plus project conditions, and the reported intersection delays reflect an average of 10 model runs to account for variations in vehicle simulation. Compared to existing plus project conditions, during the AM peak hour, the feedback queues on 19th Avenue would cause southbound traffic on Delaware Street at 19th Avenue to also experience feedback queues that extend north past Concar Drive. Traffic operations on Concar Drive also would be affected as a result. The 19th Avenue feedback queue would also cause northbound traffic on Delaware Street to extend south past Saratoga Drive.

During the PM peak hour, the feedback queues on 19th Avenue would cause queues on Delaware Street in the northbound direction south of 19th Avenue and in the southbound direction north of 19th Avenue. Concar Drive traffic operations would also be affected by the feedback queues along Delaware Street.

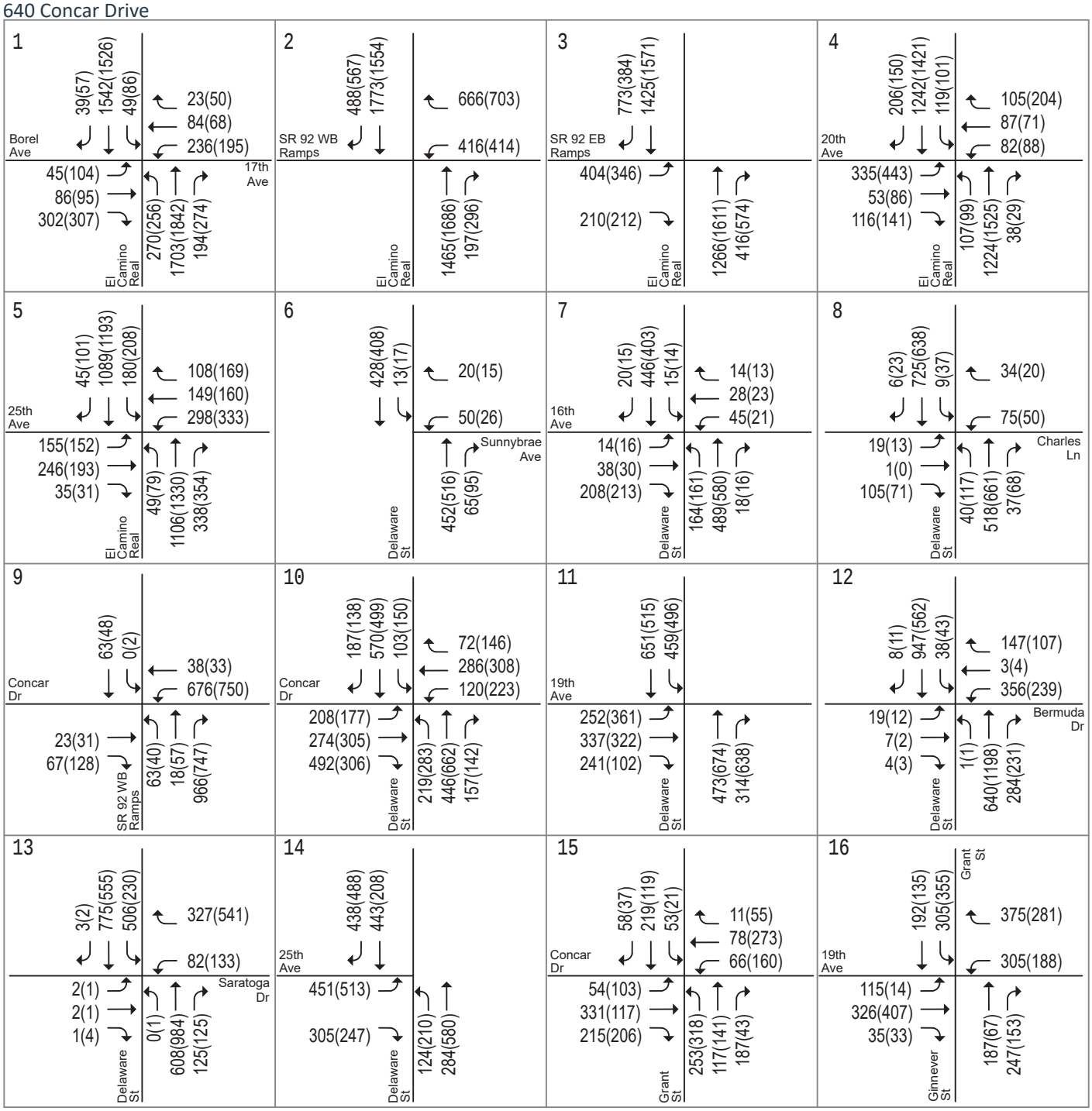
Substantial Increases in Intersection Delay

Under background plus project conditions, the project would generate substantial increases in intersection delays based on the City's General Plan criteria at the following intersections (see Table 10):

- SR 92 Westbound Ramps & Concar Drive – AM Peak Hour
- Delaware Street & 19th Avenue – AM Peak Hour
- Delaware Street & Bermuda Drive – AM Peak Hour
- Grant Street & Concar Drive – AM & PM Peak Hours
- Grant Street & 19th Avenue – AM Peak Hour
- YMCA Driveway & 19th Avenue – AM & PM Peak Hours
- US 101 Southbound Ramps & Fashion Island Boulevard – AM Peak Hour

It should be noted that all of the above identified intersections are a result of corridor congestion along 19th Avenue/Fashion Island Boulevard. While the analysis indicates that these particular intersections would experience substantial intersection delay increases, improvements would still need to address the broader congestion issue along the whole corridor.

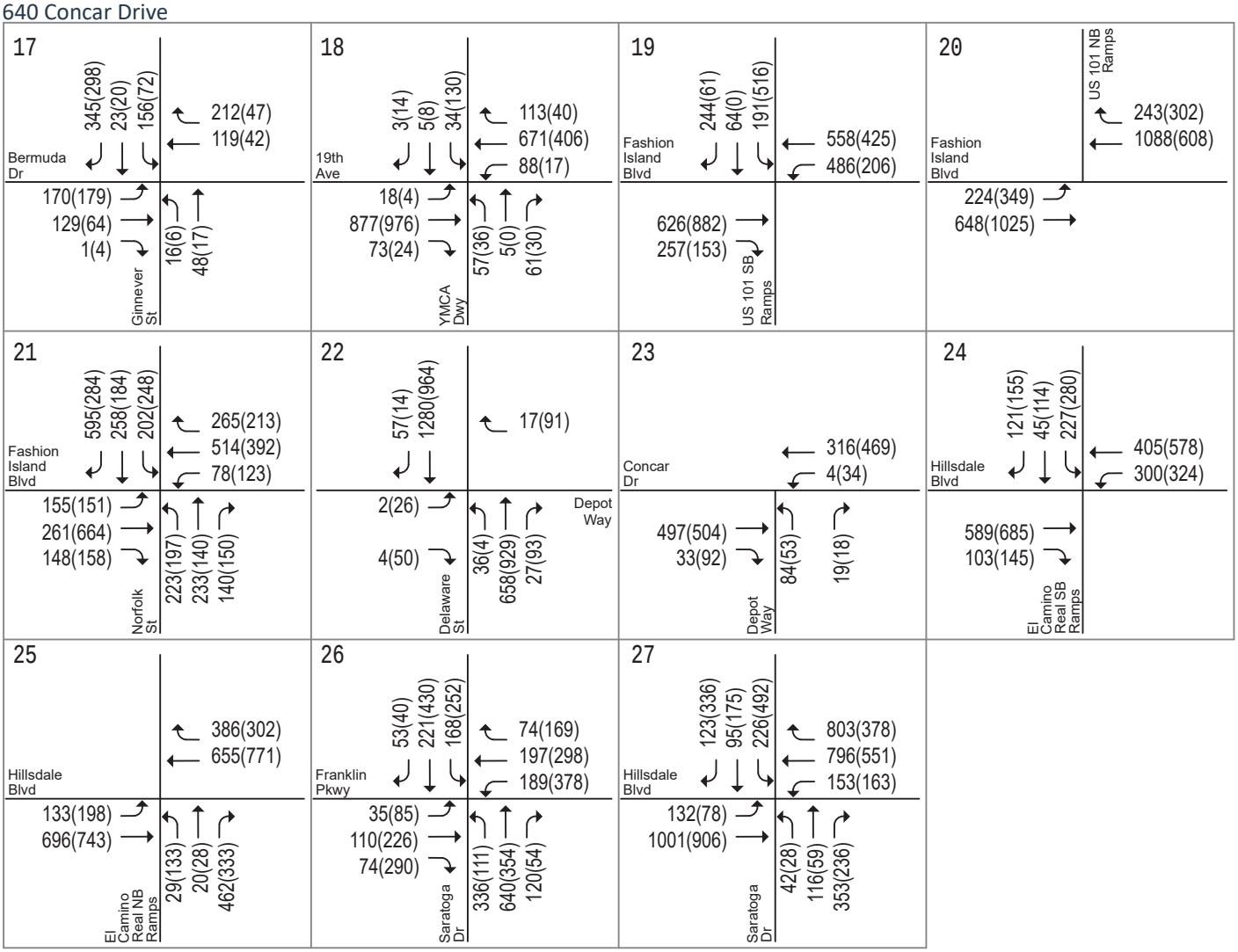
As shown under background conditions, the identified deficiencies along the 19th Avenue/Fashion Island Boulevard corridor would not be caused solely by the Concar Passage project. Improvement measures have been identified that will eliminate the project's substantial increases in intersection delays. The project will be required to pay its fair share of the improvements. However, the identified improvements are not currently on the City's Capital Improvement Program and funding is not currently available to ensure implementation. Therefore, the intersection delays at the identified intersections would remain substantial.



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 13
Background Plus Project Traffic Volumes

NORTH
Not to Scale

Unsignalized Intersections

The unsignalized intersection results under background plus project conditions remain the same as under existing plus project conditions, except at the Ginnever Street and Bermuda Drive intersection. This intersection was analyzed using the SimTraffic microsimulation model. Due to simulated congestion along the simulated corridor, the microsimulation model was unable to fully serve all traffic at this intersection. Therefore, this intersection is assumed to operate at LOS F under background plus project conditions. The project would add 41 vehicles and 21 vehicles to the intersection at Ginnever Street and Bermuda Drive during the AM and PM peak hours, respectively.

Hexagon conducted a signal warrant analysis at this intersection using the CA MUTCD Peak Hour Signal Warrant. The Ginnever Street and Bermuda Drive intersection would not warrant a traffic signal based on peak hour traffic volumes under background plus project conditions.

Table 10
Background Plus Project Level of Service Summary

					Background		Background plus Project			Improved Background plus Project		
#	Intersection	Control	Peak Hour	Note	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Δ Avg. Delay	Avg. Delay (sec)	LOS	Δ Avg. Delay
1	El Camino Real & 17th Ave	Signal	AM		24.2	C	24.1	C	-0.1	24.1	C	-0.1
			PM		24.4	C	24.3	C	-0.1	24.3	C	-0.1
2	El Camino Real & SR 92 WB Ramps	Signal	AM		16.1	B	16.1	B	0.0	16.1	B	0.0
			PM		18.4	B	18.1	B	-0.3	18.1	B	-0.3
3	El Camino Real & SR 92 EB Ramps	Signal	AM		10.0	A	10.0	A	0.0	10.0	A	0.0
			PM		10.7	B	10.7	B	0.0	10.7	B	0.0
4	El Camino Real & 20th Avenue	Signal	AM		30.8	C	30.9	C	0.1	30.9	C	0.1
			PM		39.4	D	39.4	D	0.0	39.4	D	0.0
5	El Camino Real & 25th Avenue	Signal	AM		39.0	D	39.0	D	0.0	39.0	D	0.0
			PM		44.6	D	44.7	D	0.1	44.7	D	0.1
6	Delaware Street & Sunnybrae Avenue	TWSC	AM	(1)	20.8	C	20.6	C	-	20.6	C	-
			PM	(1)	21.1	C	21.0	C	-	21.0	C	-
7	Delaware Street & 16th Avenue	AWSC	AM		41.6	E	40.2	E	-	40.2	E	-
			PM		48.8	E	45.6	E	-	45.6	E	-
8	Delaware Street & Charles Lane	Signal	AM		11.8	B	11.8	B	0.0	11.8	B	0.0
			PM		7.4	A	7.4	A	0.0	7.4	A	0.0
9	SR 92 WB Ramps & Concar Drive	Signal	AM	(2)	**46.3**	**D**	**OVERSAT**	**F**	**34+**	35.8	D	-10.5
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.0**	9.4	A	-71.0
10	Delaware Street & Concar Drive	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.4**	**OVERSAT**	**F**	**-0.3**
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.6**	42.6	D	-38.0
11	Delaware Street & 19th Avenue	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**15.9**	**OVERSAT**	**F**	**-17.8**
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.0**	**OVERSAT**	**F**	**-21.0**
12	Delaware Street & Bermuda Drive	Signal	AM	(2)	21.7	C	**OVERSAT**	**F**	**59+**	18.0	B	-3.7
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.7**	**OVERSAT**	**F**	**-2.4**
13	Delaware Street & Saratoga Drive	Signal	AM	(2)	21.9	C	28.0	C	6.1	21.3	C	-0.6
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.3**	**OVERSAT**	**F**	**-0.6**
14	Delaware Street & 25th Avenue	Signal	AM		17.3	B	17.4	B	0.1	17.4	B	0.1
			PM		16.4	B	16.5	B	0.1	16.5	B	0.1

Notes:
AWSC = All-Way Stop Control ; TWSC = Two-Way Stop Control
"OVERSAT" indicates that the SimTraffic microsimulation model indicates that the intersection would experience capacity issues where the demand cannot be served by the intersection. Oversaturated intersections would operate at LOS F.

(1) Delays and LOS reported for side-street and two-way stop controlled intersections are for the worst approach.
(2) The intersection level of service is calculated using the SimTraffic microsimulation model.
(3) The intersection level of service is calculated using the HCM 2000 module with the Synchro software. These intersections have unusual signal operations that cannot be supported by the Synchro HCM 2010 module.

BOLD indicates a substandard level of service.
boxed and BOLD indicates substantial increase in intersection delay.

Table 10 (continued)
Background Plus Project Level of Service Summary

					Background		Background plus Project			Improved Background plus Project		
#	Intersection	Control	Peak Hour	Note	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Δ Avg. Delay	Avg. Delay (sec)	LOS	Δ Avg. Delay
15	Grant Street & Concar Drive	Signal	AM	(2)	27.1	C	**OVERSAT**	**F**	**53+**	35.9	D	8.8
			PM	(2)	26.7	C	**OVERSAT**	**F**	**54+**	27.1	C	0.4
16	Grant Street & 19th Avenue	Signal	AM	(2 3)	**46.8**	**D**	**OVERSAT**	**F**	**34+**	32.2	C	-14.6
			PM	(2 3)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-1.8**	**OVERSAT**	**F**	**-3.3**
17	Ginnever Street & Bermuda Drive	AWSC	AM	(2)	11.8	B	12.8	B	-	9.2	A	-
			PM	(2)	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-
18	YMCA Driveway & 19th Avenue	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**7.9**	27.0	C	-53.0
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**5.7**	**OVERSAT**	**F**	**-30.9**
19	US 101 SB Ramps & Fashion Island	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**6.2**	28.2	C	-52.0
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-0.2**	25.2	C	-55.0
20	US 101 NB On-Ramp & Fashion Island	Side-Street Stop	AM	(1 2 3)	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-
			PM	(1 2 3)	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-
21	Norfolk Street & Fashion Island Boulevard	Signal	AM	(2)	**96.9**	**F**	**94.8**	**F**	**-2.1**	**48.1**	**D**	**-48.8**
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-0.6**	**82.5**	**F**	**-23.9**
22	Delaware Street & Depot Way/Shopping Center Dwy	TWSC	AM	(1)	Project Driveway		34.5	D	-	34.5	D	-
			PM	(1)			40.8	E	-	40.8	E	-
23	Depot Way/Park Crosswalk & Concar	Future Signal	AM		Project Driveway		4.9	A	-	4.9	A	-
			PM				4.7	A	-	4.7	A	-
24	El Camino Real SB Ramps & Hillsdale Boulevard	Signal	AM	(3)	31.1	C	31.3	C	0.2	31.3	C	0.2
			PM	(3)	29.7	C	29.8	C	0.1	29.8	C	0.1
25	El Camino Real NB Ramps & Hillsdale Boulevard	Signal	AM	(3)	28.6	C	28.6	C	0.0	28.6	C	0.0
			PM	(3)	26.5	C	26.5	C	0.0	26.5	C	0.0
26	Saratoga Drive & Franklin Parkway	Signal	AM		**45.3**	**D**	**45.2**	**D**	**-0.1**	**45.2**	**D**	**-0.1**
			PM		**80.7**	**F**	**80.7**	**F**	**0.0**	**80.7**	**F**	**0.0**
27	Saratoga Drive & Hillsdale Boulevard	Signal	AM	(3)	**49.7**	**D**	**49.7**	**D**	**0.0**	**49.7**	**D**	**0.0**
			PM	(3)	**>120**	**F**	**>120**	**F**	**0.3**	**>120**	**F**	**0.3**

Notes:
AWSC = All-Way Stop Control ; TWSC = Two-Way Stop Control
"OVERSAT" indicates that the SimTraffic microsimulation model indicates that the intersection would experience capacity issues where the demand cannot be served by the intersection. Oversaturated intersections would operate at LOS F.

(1) Delays and LOS reported for side-street and two-way stop controlled intersections are for the worst approach.
(2) The intersection level of service is calculated using the SimTraffic microsimulation model.
(3) The intersection level of service is calculated using the HCM 2000 module with the Synchro software. These intersections have unusual signal operations that cannot be supported by the Synchro HCM 2010 module.

BOLD indicates a substandard level of service.
boxed and BOLD indicates substantial increase in intersection delay.

Project Conditions Freeway Segment Analysis

The C/CAG CMP establishes level of service standards for freeway segments within the county. This project studies two freeway segments on US 101 and two segments on SR 92 within the project proximity. Per C/CAG's Traffic Impact Analysis (TIA) Policy, adopted in August 2006, a project is considered to have an adverse effect on freeway segment operations if it causes one of the following:

1) Freeway segments currently in compliance with the adopted LOS standard:

    a) A project is considered to adversely affect freeway segments if the project will cause the freeway segment to operate at a level of service that violates the standard adopted in the current Congestion Management Program (CMP).

    b) A project will be considered to adversely affect freeway segments if the cumulative analysis indicates that the combination of the proposed project and future cumulative traffic demand will result in the freeway segment to operate at a level of service that violates the standard adopted in the current Congestion Management Program (CMP) <u>and</u> the proposed project increases traffic demand on the freeway segment by an amount equal to one (1) percent or more of the segment capacity, or causes the freeway segment volume-to-capacity (v/c) ratio to increase by one (1) percent.

2) Freeway segments currently not in compliance with the adopted LOS standard:

    a) A project is considered to adversely affect freeway segments if the project will add traffic demand equal to one (1) percent or more of the segment capacity or causes the freeway segment volume-to-capacity (v/c) ratio to increase by one (1) percent.

Per CMP technical guidelines, a freeway segment LOS analysis is required when a project is expected to add trips greater than one percent of a segment's capacity. Per the C/CAG *Final San Mateo County Congestion Management Program 2017 Appendix B*, freeways with six or more lanes are assumed to have a capacity of 2,300 vehicles per lane, and four-lane freeways are assumed to have a capacity of 2,200 vehicles per lane. The traffic added by the project to each freeway segment is summarized in Table 11. The project is anticipated to adversely affect two study freeway segments, identified below:

- SR 92 Eastbound between I-280 and US 101 – AM Peak Hour
- SR 92 Westbound between US 101 and I-280 – PM Peak Hour

To reduce the project's effect on freeway segments, a trip reduction of 58% would be required. It is not anticipated that a 58% trip reduction would be achievable. There are currently no planned improvements along the impacted segments of SR 92 that would increase capacity.

Table 11
Project Conditions Freeway Segmenet Analysis

				Existing Conditions					Project Conditions		
Freeway	Segment	Dir	Peak Hour	# of Lanes	Capacity [1]	1% Capacity	LOS Standard [2]	Existing LOS [3]	Project Trips [4]	% Capacity	Adverse Effect
US 101	Whipple Avenue to SR 92	NB	AM	4	9,200	92	E	**F**	13	0.14%	NO
			PM	4	9,200	92	E	**F**	47	0.51%	NO
US 101	SR 92 to Peninsula Avenue	NB	AM	4	9,200	92	F	F	37	0.40%	NO
			PM	4	9,200	92	F	F	16	0.17%	NO
US 101	Peninsula Avenue to SR 92	SB	AM	4	9,200	92	F	F	7	0.08%	NO
			PM	4	9,200	92	F	F	39	0.42%	NO
US 101	SR 92 to Whipple Avenue	SB	AM	**4**	**9,200**	**92**	**E**	**F**	46	0.50%	NO
			PM	**4**	**9,200**	**92**	**E**	**F**	25	0.27%	NO
SR 92	I-280 to US 101	EB	AM	**2**	**4,400**	**44**	**D**	**F**	**50**	**1.14%**	**YES**
			PM	**2**	**4,400**	**44**	**D**	**F**	36	0.82%	NO
SR 92	US 101 to Alameda County Line	EB	AM	**3**	**6,900**	**69**	**E**	**F**	18	0.26%	NO
			PM	**3**	**6,900**	**69**	**E**	**F**	7	0.10%	NO
SR 92	Alameda County Line to US 101	WB	AM	**3**	**6,900**	**69**	**E**	**F**	3	0.04%	NO
			PM	**3**	**6,900**	**69**	**E**	**F**	19	0.28%	NO
SR 92	US 101 to I-280	WB	AM	**2**	**4,400**	**44**	**D**	**F**	29	0.66%	NO
			PM	**2**	**4,400**	**44**	**D**	**F**	**105**	**2.39%**	**YES**

Notes:

1. Freeways with six or more lanes are assumed to have a capacity of 2,300 vehicles per lane, and four-lane freeways are assumed to have a capacity of 2,200 vehicles per lane, per the *C/CAG Final San Mateo County Congestion Management Program 2017 Appendix B.*
2. LOS Standard referenced the *C/CAG Final San Mateo County Congestion Management Program 2017.*
3. Existing conditions referenced the *C/CAG LOS and Performance Measure Monitoring Report - 2017.*
4. Project trips are estimated via manual trip assignment.

BOLD indicates a substandard level of service.

Boxed and BOLD indicates an adverse effect on freeway operations.

Project Conditions Freeway Ramp Analysis

Neither the City of San Mateo nor C/CAG has adopted impact criteria for freeway ramps. Therefore, freeway ramps are analyzed to determine potential necessary improvements. Freeway ramp volumes under background plus project conditions were estimated by adding project trips and additional traffic generated by approved projects to existing volumes at the freeway ramps (see Table 12). The ramp analysis shows that under background plus project conditions all studied ramps would continue to have sufficient capacity to serve the projected traffic volumes.

Table 12
Project Conditions Freeway Ramp Analysis

				Existing Conditions			Background Conditions		Background plus Project Conditions		
Interchange	Ramp	Type	Pk Hr	Capacity [1]	Peak Volume	V/C	Peak Volume	V/C	Project Trips	Peak Volume	V/C
SR 92/Concar Dr/19th Ave	EB Off-Ramp to 19th Ave	Diagonal	AM	2000	803	0.40	837	0.42	-7	830	0.42
			PM	2000	666	0.33	750	0.38	35	785	0.39
	EB On-Ramp from 19th Ave	Diagonal	AM	2000	537	0.27	576	0.29	50	626	0.31
			PM	2000	904	0.45	972	0.49	28	1000	0.50
	WB Off-Ramp to Concar Dr	Diagonal	AM	2000	920	0.46	1019	0.51	28	1047	0.52
			PM	2000	659	0.33	739	0.37	105	844	0.42
	WB On-Ramp from Concar Dr	Diagonal	AM	2000	708	0.35	717	0.36	29	746	0.37
			PM	2000	880	0.44	885	0.44	-4	881	0.44
US 101/Fashion Island Blvd	SB Off-Ramp to Fashion Island Blvd	Diagonal	AM	2000	496	0.25	505	0.25	-6	499	0.25
			PM	2000	569	0.28	583	0.29	-6	577	0.29
	SB On-Ramp from Fashion Island Blvd	Diagonal	AM	1800	768	0.43	785	0.44	21	806	0.45
			PM	1800	338	0.19	348	0.19	11	359	0.20
	NB On-Ramp from Fashion Island Blvd	Diagonal	AM	1800	357	0.20	442	0.25	26	468	0.26
			PM	1800	471	0.26	644	0.36	7	651	0.36
SR 92/El Camino Real	EB On-Ramp from SB El Camino Real	Loop	AM	900	784	0.87	784	0.87	-11	773	0.86
			PM	900	384	0.43	384	0.43	0	384	0.43
	EB On-Ramp from NB El Camino Real	Diagonal	AM	1800	411	0.23	415	0.23	1	416	0.23
			PM	1800	548	0.30	566	0.31	9	575	0.32
	WB Off-Ramp to El Camino Real	Diagonal	AM	1900	1070	0.56	1078	0.57	4	1082	0.57
			PM	1900	1110	0.58	1129	0.59	-12	1117	0.59

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. HCM 2010 was not referenced because it does not report ramp capacities.

On-Ramp Queues

The queues at the on-ramps under background plus project conditions were estimated based on the ratio between the existing ramp volume and the estimate volume under background plus project conditions. As shown in Table 13, vehicle queues at the on-ramps would increase only slightly (up to 1 vehicle) for the US 101 SB on-ramp and increase up to 3 vehicles for the US 101 NB on-ramp. The US 101 NB on-ramp has the capacity to accommodate the anticipated vehicle queues during both AM and PM peak hours. The US 101 SB on-ramp currently reaches capacity during the AM peak hour but would be able to accommodate the anticipated vehicle queues during the PM peak hour.

Table 13
Background Plus Project Conditions Metered On-Ramp Queues

Interchange	Ramp	Peak Hour	Existing [1] Volume	Existing [1] Queue Length (veh.)	Background [2] Volume	Background [2] Queue Length (veh.)	Background Plus Project Conditions [2] Volume	Background Plus Project Conditions [2] Queue Length (veh.)
US 101/Fashion Island Blvd	SB On-Ramp from Fashion Island Blvd	AM	768	30	785	31	806	31
		PM	338	7	348	7	359	7
	NB On-Ramp from Fashion Island Blvd	AM	357	5	442	6	468	7
		PM	471	9	644	12	651	12

Notes:
1. Existing queue length represents the longest queue observed during the peak-hour period.
2. Queue lengths under background and project conditions were estimated based on the ratio between the existing ramp volume and the estimated future ramp volume, respectively.

5. Cumulative Conditions

This chapter presents a summary of the traffic conditions that would occur under cumulative conditions with the proposed project. Cumulative conditions represent future traffic conditions with expected growth in the area. The expected future growth under cumulative conditions was obtained from the City of San Mateo General Plan 2030 model. Thus, cumulative conditions reflect a horizon year of 2030.

Roadway Network and Traffic Volumes

The intersection lane configurations under cumulative conditions were assumed to be the same as described under background conditions.

Cumulative Conditions Traffic Volumes

Cumulative 2030 traffic conditions were evaluated for the AM and PM peak hours. The 2030 AM and PM peak hour traffic volumes were based on the City of San Mateo General Plan 2030 model. The traffic growth at each study intersection reported in the current General Plan was first linearly proportioned to account for only the remaining years until year 2030. The traffic growth was then added onto the existing intersection volumes. As a conservative approach, the intersection volumes were set to be not lower than background plus project conditions traffic volumes. Hexagon has determined that the proposed project is included in the Year 2030 forecasts.

Cumulative No Project Conditions Traffic Volumes

The cumulative no project conditions were evaluated by subtracting the net project trips generated at the study intersections from the General Plan conditions traffic volumes.

Intersection Levels of Service Analysis

Simulation Analysis

The micro-simulation models were ran under cumulative and cumulative no project conditions and the reported intersection delays reflect an average of 10 model runs to account for variations in vehicle simulation. During both the AM and PM peak hours under cumulative no project and cumulative with project conditions, the simulation results show that all simulated study intersections would experience lengthy delays and/or throughput issues where the added demand cannot be accommodated by the model. Therefore, all intersections analyzed using the microsimulation model are considered to operate at LOS F.

Substantial Increases in Intersection Delay

Under cumulative plus project conditions, the project would generate substantial increases in intersection delays based on the City's General Plan criteria at the following intersections when compared against cumulative no project conditions (see Table 14):

- Delaware Street & 19th Avenue – AM & PM Peak Hours
- Grant Street & 19th Avenue – AM Peak Hour
- YMCA Driveway & 19th Avenue – AM & PM Peak Hours
- US 101 Southbound Ramps & Fashion Island Boulevard – AM Peak Hour

Improvements necessary to eliminate the substantial increases in intersection delays under cumulative conditions are the same as discussed under background plus project conditions. As shown under background conditions, the identified deficiencies along the 19th Avenue/Fashion Island Boulevard corridor would not be caused solely by the Concar Passage project. Improvement measures have been identified that will eliminate the project's substantial increases in intersection delays(see Table 14). The project will be required to pay its fair share of the improvements. However, the identified improvements are not currently on the City's Capital Improvement Program and funding is not currently available to ensure implementation. Therefore, the intersection delays at the identified intersections would remain substantial.

Unsignalized Intersections

The unsignalized intersection results under background plus project conditions remain the same under cumulative plus project conditions, except the intersection at Ginnever Street and Bermuda Drive would meet the signal warrant during the AM peak hour based on forecasted traffic volumes for both the cumulative no project and cumulative with project conditions. A traffic signal at this location would require careful coordination with the intersection at Grant Street and 19th Avenue, which is only approximately 315 feet north of the Bermuda Drive intersection.

Table 14
Cumulative Level of Service Summary

					Year 2030 no Project Conditions (4)		Year 2030 GP Conditions (4)			Improved Year 2030 GP Conditions (4)		
#	Intersection	Control	Peak Hour	Note	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Δ Avg. Delay	Avg. Delay (sec)	LOS	Δ Avg. Delay
1	El Camino Real & 17th Ave	Signal	AM		26.9	C	26.7	C	-0.2	26.7	C	-0.2
			PM		27.6	C	27.5	C	-0.1	27.5	C	-0.1
2	El Camino Real & SR 92 WB Ramps	Signal	AM		17.6	B	17.5	B	-0.1	17.5	B	-0.1
			PM		20.7	C	20.4	C	-0.3	20.4	C	-0.3
3	El Camino Real & SR 92 EB Ramps	Signal	AM		10.6	B	10.6	B	0.0	10.6	B	0.0
			PM		11.3	B	11.3	B	0.0	11.3	B	0.0
4	El Camino Real & 20th Avenue	Signal	AM		32.1	C	32.2	C	0.1	32.2	C	0.1
			PM		**46.1**	**D**	**46.2**	**D**	**0.1**	**46.2**	**D**	**0.1**
5	El Camino Real & 25th Avenue	Signal	AM		42.8	D	42.9	D	0.1	42.9	D	0.1
			PM		**46.3**	**D**	**46.5**	**D**	**0.2**	**46.5**	**D**	**0.2**
6	Delaware Street & Sunnybrae Avenue	TWSC	AM	(1)	24.0	C	23.7	C	-	23.7	C	-
			PM	(1)	27.8	D	27.6	D	-	27.6	D	-
7	Delaware Street & 16th Avenue	AWSC	AM		62.5	F	61.7	F	-	61.7	F	-
			PM		109.7	F	105.7	F	-	105.7	F	-
8	Delaware Street & Charles Lane	Signal	AM		11.6	B	11.6	B	0.0	11.6	B	0.0
			PM		8.1	A	8.1	A	0.0	8.1	A	0.0
9	SR 92 WB Ramps & Concar Drive	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.7**	**OVERSAT**	**F**	**0.7**
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.0**	**OVERSAT**	**F**	**0.0**
10	Delaware Street & Concar Drive	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.6**	**OVERSAT**	**F**	**1.6**
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**3.5**	**OVERSAT**	**F**	**3.5**
11	Delaware Street & 19th Avenue	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**16.3**	**OVERSAT**	**F**	**-37.9**
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**8.4**	**OVERSAT**	**F**	**-9.9**
12	Delaware Street & Bermuda Drive	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.4**	**OVERSAT**	**F**	**-5.6**
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.8**	**OVERSAT**	**F**	**-0.3**
13	Delaware Street & Saratoga Drive	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.4**	**OVERSAT**	**F**	**0.4**
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.3**	**OVERSAT**	**F**	**0.3**
14	Delaware Street & 25th Avenue	Signal	AM		21.4	C	21.6	C	0.2	21.6	C	0.2
			PM		28.3	C	28.5	C	0.2	28.5	C	0.2
15	Grant Street & Concar Drive	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.4**	**OVERSAT**	**F**	**0.4**
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.4**	**OVERSAT**	**F**	**0.4**

Notes:
AWSC = All-Way Stop Control ; TWSC = Two-Way Stop Control
"OVERSAT" indicates that the SimTraffic microsimulation model indicates that the intersection would experience capacity issues where the demand cannot be served by the intersection.

(1) Delays and LOS reported for side-street and two-way stop controlled intersections are for the worst approach.
(2) The intersection level of service is calculated using the SimTraffic microsimulation model.
(3) The intersection level of service is calculated using the HCM 2000 module with the Synchro software. These intersections have unusual signal operations that cannot be supported
(4) Year 2030 conditions intersection level of service results are based on volumes published in the City of San Mateo General Plan Update - Revised Draft Environmental Report.

BOLD indicates a substandard level of service.
boxed and BOLD indicates substantial increase in intersection delay.

Table 14 (continued)
Cumulative Level of Service Summary

#	Intersection	Control	Peak Hour	Note	Year 2030 no Project Conditions (4) Avg. Delay (sec)	LOS	Year 2030 GP Conditions (4) Avg. Delay (sec)	LOS	Δ Avg. Delay	Improved Year 2030 GP Conditions (4) Avg. Delay (sec)	LOS	Δ Avg. Delay
16	Grant Street & 19th Avenue	Signal	AM	(2 3)	**OVERSAT**	**F**	**OVERSAT**	**F**	**10.7**	**OVERSAT**	**F**	**-36.2**
			PM	(2 3)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-3.0**	**OVERSAT**	**F**	**-12.6**
17	Ginnever Street & Bermuda Drive	AWSC	AM	(2)	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-
			PM	(2)	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-
18	YMCA Driveway & 19th Avenue	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**7.6**	**OVERSAT**	**F**	**3.3**
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**5.6**	**OVERSAT**	**F**	**-13.8**
19	US 101 SB Ramps & Fashion Island	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**5.4**	**OVERSAT**	**F**	**-12.3**
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-0.2**	**OVERSAT**	**F**	**-66.5**
20	US 101 NB On-Ramp & Fashion Island	Side-Street Stop	AM	(1 2 3)	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-
			PM	(1 2 3)	OVERSAT	F	OVERSAT	F	-	OVERSAT	F	-
21	Norfolk Street & Fashion Island Boulevard	Signal	AM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-0.8**	**OVERSAT**	**F**	**-39.3**
			PM	(2)	**OVERSAT**	**F**	**OVERSAT**	**F**	**-1.0**	**OVERSAT**	**F**	**-30.8**
22	Delaware Street & Depot Way/Shopping Center Dwy	TWSC	AM	(1)	Project Driveway		39.3	E	-	39.3	E	-
			PM	(1)			67.7	F	-	67.7	F	-
23	Depot Way/Park Crosswalk & Concar	Future Signal	AM		Project Driveway		4.8	A	-	4.8	A	-
			PM				4.5	A	-	4.5	A	-
24	El Camino Real SB Ramps & Hillsdale Boulevard	Signal	AM	(3)	31.2	C	31.3	C	0.1	31.3	C	0.1
			PM	(3)	30.2	C	30.3	C	0.1	30.3	C	0.1
25	El Camino Real NB Ramps & Hillsdale Boulevard	Signal	AM	(3)	31.4	C	31.4	C	0.0	31.4	C	0.0
			PM	(3)	28.3	C	28.2	C	-0.1	28.2	C	-0.1
26	Saratoga Drive & Franklin Parkway	Signal	AM		44.5	D	44.4	D	-0.1	44.4	D	-0.1
			PM		**80.0**	**E**	**79.9**	**E**	**-0.1**	**79.9**	**E**	**-0.1**
27	Saratoga Drive & Hillsdale Boulevard	Signal	AM	(3)	**59.0**	**E**	**59.0**	**E**	**0.0**	**59.0**	**E**	**0.0**
			PM	(3)	**>120**	**F**	**>120**	**F**	**0.2**	**>120**	**F**	**0.2**

Notes:
AWSC = All-Way Stop Control ; TWSC = Two-Way Stop Control
"OVERSAT" indicates that the SimTraffic microsimulation model indicates that the intersection would experience capacity issues where the demand cannot be served by the intersection.

(1) Delays and LOS reported for side-street and two-way stop controlled intersections are for the worst approach.
(2) The intersection level of service is calculated using the SimTraffic microsimulation model.
(3) The intersection level of service is calculated using the HCM 2000 module with the Synchro software. These intersections have unusual signal operations that cannot be supported
(4) Year 2030 conditions intersection level of service results are based on volumes published in the City of San Mateo General Plan Update - Revised Draft Environmental Report.

BOLD indicates a substandard level of service.
boxed and BOLD indicates substantial increase in intersection delay.

6. Other Transportation Issues

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

- Operations analysis – vehicle queuing and storage at selected intersections,
- Potential impacts to transit, pedestrian and bicycle facilities,
- Site access, on-site circulation, and
- Parking.

Unlike the level of service analysis, which is specified in the City of San Mateo General Plan, the analyses in this chapter are based on professional judgment in accordance with the standards and methods employed by the traffic engineering community.

Although operational issues are not considered CEQA impacts, they do describe traffic conditions that are relevant to describing the project environment.

Vehicle Queuing

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 determining whether the addition of project trips would exacerbate peak hour queues and delays, as well as estimating future storage requirements at intersections.

Based on the selection criteria of 10 or more project trips per left-turn lane, the following lanes were analyzed during the specified peak hour:

- SR 92 WB Ramps & Concar Drive – westbound left-turn lane – AM Peak Hour
- Delaware Street & Concar Drive – northbound left-turn lane – AM & PM Peak Hours
- Delaware Street & Concar Drive – westbound left-turn lane – AM & PM Peak Hours
- Delaware Street & 19th Avenue – southbound left-turn lane – AM & PM Peak Hours
- Delaware Street & 19th Avenue – eastbound left-turn lane – PM Peak Hour
- Grant Street & 19th Avenue – southbound left-turn lane – AM Peak Hour
- Grant Street & 19th Avenue – westbound left-turn lane – PM Peak Hour
- US 101 NB On-Ramp & Fashion Island Boulevard – eastbound left-turn lane – AM Peak Hour

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 are provided in Tables 15 and 16. 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 existing turn pockets at the following locations during at least one study period:

- Delaware Street & 19th Avenue – southbound left-turn lane
- Grant Street & 19th Avenue – southbound left-turn lane
- Grant Street & 19th Avenue – westbound left-turn lane

Below is a detailed discussion of the above identified locations under background plus project conditions.

Delaware Street & 19th Avenue – southbound left-turn lane

The project is expected to add 48 vehicles during the AM peak hour and 44 vehicles during the PM peak hour onto the southbound left-turn movement under background plus project conditions and would lengthen the 95th percentile queues. Since the 95th percentile queue under background plus project conditions is longer during the AM peak hour (300 feet compared to 250 feet during the PM peak hour), the following discussion is focused on the AM peak hour.

This left-turn movement has two turn lanes with approximately 180 feet of available queue storage space per lane. Under background conditions during the AM peak hour, the 95th percentile queue length would be 275 feet, with back-of-queue extending out of the turn pocket. Under background plus project conditions, the proposed project would add 48 southbound left-turn vehicles during the AM peak hour. The 95th percentile queue length would be extended by 25 feet to 300 feet.

The anticipated queue length under both background and background plus project conditions would block the proposed driveway on Delaware Street at Passage Way. There is no room to further extend this turn pocket. Southbound left-turn vehicles turning into the Passage Way driveway could bypass this southbound left-turn queue by using the two-way left-turn median. However, vehicles trying to turn left out of Passage Way onto southbound Delaware Street would be blocked by the 95th percentile queue for the southbound left-turn movement at Delaware Street and 19th Avenue. Potential improvement options for vehicles trying to turn left out of the Passage Way driveway are discussed below in the Site Access section.

Grant Street & 19th Avenue – southbound left-turn lane

This left-turn movement has two turn lanes with approximately 180 feet of available queue storage space per lane. Under background conditions during the AM peak hour, the 95th percentile queue length would be 200 feet, with the back-of-queue extending out of the turn pocket. Under background plus project conditions, the proposed project would add 44 southbound left-turn vehicles during the AM peak hour. The 95th percentile queue length would be extended by 25 feet to 225 feet.

The anticipated queue length under both background and background plus project conditions would block the proposed Passage Way driveway. However, there would be no left-turn movements into or out of the Passage Way driveway at Grant Street. Therefore, the 95th percentile queue would not considerably affect driveway operations at the Passage Way driveway.

Grant Street & 19th Avenue – westbound left-turn lane

The project is expected to add 23 vehicles during the PM peak hour onto the westbound left-turn lane under background plus project conditions and would lengthen the 95th percentile queues. Vehicles from the Bridgepointe Parkway area would need to make this turning movement to access the proposed retail, Trader Joe's, and residential buildings 1, 3, and 5 due to driveway restrictions and the one-way section of 19th Avenue. This left-turn movement has one turn lane with approximately 170 feet of available queue storage space. Under background conditions during the PM peak hour, the 95th percentile queue length would be 200 feet, with back-of-queue extending out of the turn pocket. Under background plus project conditions, the proposed project would add 23 westbound left-turn vehicles during the PM peak hour and the 95th percentile queue length would increase by 25 feet to 225 feet.

There is no room to further extend the turn pocket to accommodate the expected 95th percentile queue.

Table 15
AM Queuing Analysis Summary

Measurement	SR 92 WB Ramps & Concar Drive [3]	Delaware Street & Concar Drive	Delaware Street & Concar Drive	Delaware Street & 19th Avenue [3]	Grant Street & 19th Avenue [3]	US 101 NB On-Ramp & Fashion Island Blvd
	WBL	NBL	WBL [4]	SBL	SBL	EBL
Existing						
Cycle/Delay[1] (sec)	55	110	110	70	125	13.9
Volume (vphpl)	338	91	86	274	131	122
Avg. Queue (veh/ln.)	5	3	3	5	5	0
Avg. Queue[2] (ft./ln)	125	75	75	125	125	0
95th %. Queue (veh/ln.)	9	6	6	9	8	2
95th %. Queue (ft./ln)	225	150	150	225	200	50
Storage (ft./ ln.)	290	250	180	180	180	190
Adequate (Y/N)	Y	Y	Y	N	N	Y
Background						
Cycle/Delay[1] (sec)	55	110	110	70	125	16.3
Volume (vphpl)	343	93	86	349	131	198
Avg. Queue (veh/ln.)	5	3	3	7	5	1
Avg. Queue[2] (ft./ln)	125	75	75	175	125	25
95th %. Queue (veh/ln.)	9	6	6	11	8	3
95th %. Queue (ft./ln)	225	150	150	275	200	75
Storage (ft./ ln.)	290	250	180	180	180	190
Adequate (Y/N)	Y	Y	Y	N	N	Y
Background plus Project						
Cycle/Delay[1] (sec)	55	110	110	70	125	17.1
Volume (vphpl)	357	110	120	367	153	224
Avg. Queue (veh/ln.)	5	3	4	7	5	1
Avg. Queue[2] (ft./ln)	125	75	100	175	125	25
95th %. Queue (veh/ln.)	10	7	7	12	9	3
95th %. Queue (ft./ln)	250	175	175	300	225	75
Storage (ft./ ln.)	290	250	450	180	180	190
Adequate (Y/N)	Y	Y	Y	N	N	Y

Notes:

1. Vehicle queue calculations are based on cycle length for signalized intersections, and movement delay for unsignalized intersections
2. Assumes 25 Feet Per Vehicle Queued
3. Average queues are calibrated based on field observations
4. Under project conditions, the storage is until the Depot Way/Concar Drive intersection since no driveways would use the two-way left-turn lane

Table 16
PM Queuing Analysis Summary

Measurement	Delaware Street & Concar Drive NBL	Delaware Street & Concar Drive [3] WBL [4]	Delaware Street & 19th Avenue [3] SBL	Delaware Street & 19th Avenue EBL	Grant Street & 19th Avenue [3] WBL
Existing					
Cycle/Delay[1] (sec)	115	60	65	90	95
Volume (vphpl)	105	206	284	293	162
Avg. Queue (veh/ln.)	3	3	5	7	4
Avg. Queue[2] (ft./ln)	75	75	125	175	100
95th %. Queue (veh/ln.)	7	7	9	12	8
95th %. Queue (ft./ln)	175	175	225	300	200
Storage (ft./ ln.)	250	180	180	750	170
Adequate (Y/N)	Y	Y	N	Y	N
Background					
Cycle/Delay[1] (sec)	115	60	65	90	95
Volume (vphpl)	112	206	318	329	165
Avg. Queue (veh/ln.)	4	3	6	8	4
Avg. Queue[2] (ft./ln)	100	75	150	200	100
95th %. Queue (veh/ln.)	7	7	10	13	8
95th %. Queue (ft./ln)	175	175	250	325	200
Storage (ft./ ln.)	250	180	180	750	170
Adequate (Y/N)	Y	Y	N	Y	N
Background plus Project					
Cycle/Delay[1] (sec)	115	60	65	90	95
Volume (vphpl)	142	223	335	346	188
Avg. Queue (veh/ln.)	5	4	6	9	5
Avg. Queue[2] (ft./ln)	113	93	151	216	124
Avg. Queue[2] (ft./ln)	125	100	150	225	125
95th %. Queue (veh/ln.)	8	7	10	14	9
95th %. Queue (ft./ln)	200	175	250	350	225
Storage (ft./ ln.)	250	180	180	750	170
Adequate (Y/N)	Y	Y	N	Y	N

Notes:
1. Vehicle queue calculations are based on cycle length for signalized intersections, and movement delay for unsignalized intersections
2. Assumes 25 Feet Per Vehicle Queued
3. Average queues are calibrated based on field observations
4. Under project conditions, the storage is until the Depot Way/Concar Drive intersection since no driveways would use the two-way left-turn lane

Bicycles, Pedestrians and Transit

Pedestrian Facilities

The existing network of sidewalks and crosswalks in the immediate vicinity of the project site has good connectivity and provides pedestrians with continuous facilities to various points of interest in the study area, including the Hayward Park Caltrain Station, Hillsdale Caltrain Station, and nearby bus stops on Concar Drive, Delaware Street, and Grant Street (see Figure 4 in Chapter 2). Pedestrian access to the project's buildings would be provided via existing sidewalks on Concar Drive, Delaware Street, and Grant Street and new sidewalks on Depot Way and Passage Way.

The leasing office and lounge are proposed at the center of the project site. The project would also provide two central outdoor plazas for residents that can be accessed from the main entry and all the apartment units. A 28-foot wide walkway, also functioning as an emergency vehicle access road, would connect Depot Way at the center of the project site to Grant Street. In addition to central campus access, several pedestrian pathways and access points would be located along the project perimeter and between buildings.

The project proposes a mid-block crosswalk across the Grant Street. New mid-block crosswalks should be installed only after an engineering study determining the feasibility of the crosswalk. The project applicant should coordinate with City staff to determine the need for a mid-block crosswalk across Grant Street upon project completion. The project also proposes a new traffic signal with crosswalks at the Concar Drive and Depot Way intersection. The signalized crosswalks would replace the existing mid-block crosswalk across Concar Drive and would enhance pedestrian safety as they cross Concar Drive mid-block.

Outside of trips to and from local transit stops, the project is expected to generate some pedestrian and bicycle traffic to nearby schools. Sunnybrae Elementary School is located 0.8 miles (a 16-minute walk) away from the project site. Borel Middle School is located 1.6 miles (an 11-minute bike ride) away and has bus stops on Concar Drive for SamTrans Route 53, which travels directly to the school (see Table 3). Additionally, there are 3 independent high schools within walking or biking distance: The Nueva School San Mateo Campus (0.9 miles), Compass High School (1.1 miles), and Junipero Serra High School (1.6 miles). There are continuous pedestrian facilities to these nearby schools; however, the only continuous bicycle route is between The Nueva School and the project site in the northbound direction.

The project proposes detached sidewalks along the streets fronting the project site. Detached sidewalks provide barriers between pedestrians and roadway traffic and would improve pedestrian safety and comfort levels.

Bicycle Facilities

The project could potentially generate bicycle traffic between the project site, nearby schools, and the Hayward Park and Hillsdale Caltrain stations. Continuous bicycle facilities are not present between the project site and the nearby Hayward Park and Hillsdale Caltrain Stations or most of the nearby schools.

<u>On-Site Bicycle Facilities</u>

Per City requirements, the project is required to provide 51 short-term and 883 long-term bicycle parking spaces for the proposed residential use and 19 short-term and 3 long-term bicycle parking spaces for the proposed non-residential uses (see Table 17). In total, the project is required to provide 70 short-term and 886 long-term bicycle parking spaces on site. The project proposes 75 short-term bicycle parking spaces among 13 bicycle racks near the proposed building entrances, ranging in size from two to eight bicycles per rack. The project proposes at least one secured bike storage room on the ground-level and basement-level of the garage of each proposed building, providing a total of 1,141

long-term bicycle parking spaces among 22 different storage rooms. Overall, the project bicycle parking provision meets City requirements.

As shown on the site plan, long-term bicycle parking spaces are proposed to be placed within the garage in multiple locations. For ease of access, to minimize bicycle-vehicle interactions in the garage and to avoid cyclists riding on the garage ramps or bringing bicycles into elevators, the project should consider relocating all long-term bicycle parking spaces to the ground level.

Additionally, a bike depot would be located on Depot Way, in the northeast corner of Building 1. Residents and retail employees could use the bike depot as a convenient on-site location to fix and store their bikes, as well as a lounge with showers and restrooms.

Table 17
City of San Mateo Off-Street Bicycle Parking Requirements

			Bicycle Parking Requirement[1]			
			Short-Term		Long-Term	
Use Type	Size	Units	Ratio	Spaces	Ratio	Spaces
Residential Use						
Studio	213	du	0.05/unit	11	1.0/unit	213
1 Bedroom	471	du	0.05/unit	24	1.0/unit	471
2 Bedrooms	159	du	0.10/unit	16	1.25/unit	199
Required Residential Spaces				**51**		**883**
Non-Residential Use						
Trader Joe's [2]	13,700	sf	1/2,000 unit	7	1/12,000 unit	1
Building 2						
Retail [2]	3,100	sf	1/2,000 unit	2	1/12,000 unit	0
Restaurant [3]	2,400	sf	1/10,000 unit	0	1/20,000 unit	0
Ballet/Performance Space [4]	7,650	sf	1/2,000 unit	4	1/12,000 unit	1
Food Hall [3]	5,000	sf	1/10,000 unit	1	1/20,000 unit	0
Daycare [5]	4,600	sf	1/20 students [6]	3	1/20 employees [6]	1
7-Eleven [2]	3,130	sf	1/2,000 unit	2	1/12,000 unit	0
Required Non-Residential Spaces				**19**		**3**
Total Required Parking Spaces				**70**		**886**
Total Proposed Parking Spaces				*75 spaces (13 bike racks)*		*1,141 spaces (22 storage rooms)*

Notes:
1. Parking requirements based on City of San Mateo Zoning Code Section 27.64.262.
2. Use category: Retail stores (3i)
3. Use category: Restaurant (9c)
4. Use category: Dance Studio (4c)
5. Use category: Day Nurseries (5b)
6. Daycare students and employees estimated based on rates published in ITE's *Trip Generation, 10th Edition.* Assuming a rate of 2.45 employees per 1,000 s.f., the daycare is estimated to have 12 employees. Assuming a rate of 14.10 students per 1,000 s.f., the daycare is estimated to have 65 students.

Transit Facilities

As discussed in Chapter 2 and shown in Figure 4, the project site is served by three bus routes, and all buses stop within walking distance of the project site. In addition, the Hayward Park Caltrain station is located approximately 2,000 feet west of the center of the project site and is also within walking distance. The Hillsdale Caltrain station is located approximately 1.3 miles south of the center of the project site, which is a 30-minute walk or a 7-minute bike ride. There is also a free Caltrain shuttle that stops within walking distance of the project site and travels to the Hillsdale Caltrain Station. There are continuous pedestrian facilities connecting the project site to the various bus stops and the Hayward Park and Hillsdale Caltrain stations. The project is anticipated to generate additional transit ridership on the buses, the Caltrain shuttles, and Caltrain. The Caltrain electrification project would enable Caltrain to provide more frequent train service. Caltrain predicts an initial capacity increase of over 30%. It is expected that the Caltrain electrification project would accommodate the potential increase in transit ridership generated by the project. It is assumed that should the free shuttle service become full, additional shuttles would be provided to meet the demand.

There is a bus stop shown on page GEN-0.16 of the site plan package located on Delaware Street between Concar Drive and the proposed Depot Way. It is unknown if SamTrans has plans for a bus stop at this location. The project applicant should coordinate with SamTrans to determine the need for this bus stop and if there are potential improvements required to support a bus stop at this location.

Site Access and Circulation

This section describes the site access and circulation of the proposed project. This review is based on project site plans prepared by MVE Partners dated June 14, 2019 (see Figure 2).

Site Access

Site access was evaluated to determine the adequacy of the site driveways regarding traffic volumes. The proposed buildings would replace the existing buildings on-site. All five buildings would have a parking garage with below-grade and ground-level parking, and buildings 1, 3, and 5 would share a parking garage. Access to the new buildings and the proposed ground-level and below-grade parking lots would be provided by two driveways on Delaware Street, three driveways on Concar Drive, and five driveways on Grant Street (see Figure 11). Driveways A, D, and G are assumed to be full access driveways. Driveways B, C, E, and J are assumed to be right-in-right-out driveways. Driveway F is assumed to be a right-out only driveway from the proposed 7-Eleven. The project site plan shows the Daycare Exit (Driveway H) to be a left-out-right-out driveway and the Daycare Entrance (Driveway I) to be a left-in-right-in driveway.

Currently, they Daycare Entrance (Driveway I) is proposed just north of the southbound left-turn pocket going into the YMCA driveway. This means that any potential queues entering the Daycare driveway would have to queue on the inner through lane on Grant Street. To minimize the potential need for vehicles to queue on Grant Street, it is recommended that the Daycare Entrance be located as far north of the YMCA driveway as possible.

Driveway Sight Distance

According to the Caltrans *Highway Design Manual*, the minimum stopping sight distance is the distance required by the user, traveling at a given speed, to bring the vehicle or bicycle to a stop after an object ½-foot high on the road becomes visible. Stopping sight distance for motorists is measured from the driver's eyes, which are assumed to be 3 ½ feet above the pavement surface, to an object ½-foot high on the road. The required stopping sight distances are based on the Caltrans *Highway Design Manual*, Table 201.1. For driveways on Delaware Street, Concar Drive, and Grant Street, which have a posted speed limit of 25 mph, the Caltrans stopping sight distance requirement is 200 feet (based on a design speed of 30 mph).

Since there is no on-street parking or severe roadway curves, the project driveways along Delaware Street, Concar Drive, and Grant Street would all have adequate sight distance. The garage entrances along the proposed on-site roadway, Depot Way, would also have adequate sight distance, provided that landscaping does not obscure a driver's view. Landscaping at all project driveways must be situated in such a way that does not interfere with sight distance.

Driveway Queuing

Hexagon conducted a queueing analysis for the project driveways that provide left-turn access into the project site. As shown in Tables 18 and 19, there would be sufficient storage space for vehicles turning left into the project site.

Delaware Street & Passage Way – westbound left-turn

The westbound approach would have one lane for both left- and right-turns exiting the site. Under background plus project conditions during the PM peak hour, the 95th percentile queue length would be 525 feet, with back-of-queue extending past the residential driveway to Building 3. The average queue would be 350 feet, with back-of-queue extending past the retail driveways. Also, as discussed above in the Queuing section, the 95th percentile queue for the southbound left-turn movement at Delaware Street and 19th Avenue would extend past the Passage Way driveway and would affect vehicles turning left out of the Passage Way driveway.

Hexagon recommends the project prohibit left-turns out of Passage Way onto southbound Delaware Street with a raised median on Delaware Street or a right-turn channelization island on Passage Way. This turn restriction would prevent 67 retail and 25 residential outbound trips from Passage Way onto southbound Delaware Street. With U-turns prohibited at the northbound left-turn movement at the Delaware Street and Concar Drive intersection, these trips would instead use southbound Grant Street and turn onto westbound Bermuda Drive to access southbound Delaware Street or the SR 92 eastbound on ramp. The proposed intersection improvement measures include the 19th Avenue two-way conversion project. With this improvement measure, project traffic heading to southbound Delaware Street could instead turn onto westbound 19th Avenue instead of onto Bermuda Drive. Subtracting these trips from the southbound left-turn movement at the Delaware Street/19th Avenue intersection, the anticipated queue length under background plus project conditions would improve from 300 feet to 275 feet during the AM peak hour.

Since approximately 73% of the westbound left-turn vehicles at the Passage Way driveway were estimated to be retail trips, it is unlikely that a TDM program would minimize the driveway queuing issue. The TDM program would be tailored to residential and employee trips but not retail patron trips.

Table 18
AM Project Driveway Queueing Analysis Summary

Measurement	Delaware Street & Passage Way SBL	Depot Way & Concar Drive WBL	Grant Street & Building 4 Dwy NBL	Grant Street & Daycare Dwy NBL	Delaware Street & Depot Way NBL	Delaware Street & Passage Way WBL	Depot Way & Concar Drive NBL
Background plus Project							
Delay[1] (sec)	9.2	8.5	8.6	8.7	12.6	34.5	16.3
Volume (vphpl)	34	4	6	15	36	82	103
Avg. Queue (veh/ln.)	0	0	0	0	0	1	0
Avg. Queue[2] (ft./ln)	0	0	0	0	0	25	0
95th %. Queue (veh/ln.)	1	1	1	1	1	2	2
95th %. Queue (ft./ln)	25	25	25	25	25	50	50
Storage (ft./ ln.)	140	135	225	90	140	290	150
Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y

Notes:
1. Vehicle queue calculations are based on movement delay for unsignalized intersections
2. Assumes 25 Feet Per Vehicle Queued

Table 19
PM Project Driveway Queueing Analysis Summary

Measurement	Delaware Street & Passage Way SBL	Depot Way & Concar Drive WBL	Grant Street & Building 4 Dwy NBL	Grant Street & Daycare Dwy NBL	Delaware Street & Depot Way NBL	Delaware Street & Passage Way WBL	Depot Way & Concar Drive NBL
Background plus Project							
Delay[1] (sec)	11.7	8.8	8.5	8.5	10.2	>120	18.5
Volume (vphpl)	125	34	16	13	4	152	71
Avg. Queue (veh/ln.)	0	0	0	0	0	14	0
Avg. Queue[2] (ft./ln)	0	0	0	0	0	350	0
95th %. Queue (veh/ln.)	2	1	1	1	1	21	2
95th %. Queue (ft./ln)	50	25	25	25	25	525	50
Storage (ft./ ln.)	140	135	225	90	140	290	150
Adequate (Y/N)	Y	Y	Y	Y	Y	N	Y

Notes:
1. Vehicle queue calculations are based on movement delay for unsignalized intersections
2. Assumes 25 Feet Per Vehicle Queued

On-Site Circulation

The project proposes to construct a new “L”-shaped roadway on-site that runs in an east-west direction from Delaware Street to the center of the project site and runs in a north-south direction to Concar Drive. This roadway would provide access to the parking garage entrances. All parking aisle and parking stall dimensions within the proposed below-grade and ground-level garage parking lots are shown to comply with the minimum requirements of the City “Standard Drawings and Specifications”. All parking spaces appear to have sufficient space near the end of dead-end aisles for vehicles to turn around.

The project proposes a centralized location for ride-share and shuttle pick-ups and drop-offs near The Depot lounge. The Depot would be located near the center of the project site in Building 2. The lounge would serve as a waiting area or workspace for residents and retail employees. Two residential loading zones are shown directly in front of The Depot lounge, with one multi-use loading zone dedicated to a future neighborhood shuttle and ride-shares. In addition to these central loading zones, four other loading zones dedicated to residential and retail or ride-share use are shown along Depot Way and on Passage Way near Building 3. A loading zone for Trader Joe’s is also shown on Passage Way.

All five residential driveways (two on Depot Way, two on Passage Way, and one on Grant Street) are proposed to be between 24 and 26 feet wide. The width of the 7-Eleven driveway on Concar Drive is not shown on the site plan. Residential driveways greater than 20 feet wide and retail driveways greater than 26 feet wide exceed the maximum width requirements established in the City of San Mateo Municipal Code (Chapter 27.64.025 Driveways). Prior to final design, the project applicant should ensure that all driveways meet the width requirements.

The City of San Mateo requires residential parking to be separated from guest and retail parking with a secured gate. The Grant Street entrance to Building 4 does not show a gate on the site plan. Prior to final design, the project applicant should ensure that all residential parking entrances are gated and that the gate for the Grant Street entrance to Building 4 does not result in vehicles queuing onto the street.

Emergency Vehicle Access and Circulation

All driveway and drive aisles on-site would be at least 20 feet wide and would comply with the City requirement for emergency vehicle access. Additionally, an emergency vehicle access road would connect the corner of Depot Way, at the center of the project site, directly east to Grant Street. The emergency vehicle access road would be 28 feet wide.

Loading Vehicles Access and Circulation

The project proposes a mixed-use development with 19,930 s.f. of commercial space and 7,400 s.f. of restaurant space. Per City of San Mateo Municipal Code Section 27.64.390, the project site should provide a total of four loading zones. The project site plan proposes a total of seven loading zones, with two zones located on Passage Way, and five zones located along Depot Way. All buildings would have a loading zone located near a building entrance. The proposed loading zones meet the length requirement specified in the San Mateo Municipal Code Section 27.64.320; however, the site plan does not show the width of the loading zones. Prior to final design, the project applicant should ensure that all loading zones are at least 10 feet wide. To prevent potential queueing issues resulting from vehicles entering and exiting the loading zones, Hexagon recommends the loading zones near the Delaware Street/Depot Way and Depot Way/Concar Drive intersections be placed away from the driveways and closer to the center of the project site.

Garbage Trucks Access and Circulation

The project site plan shows 11 trash collection rooms at the basement level and four trash collection rooms on level 1 of the project. All trash would be transported to the trash compactor room located on level 1 between buildings 1 and 3 on the southern edge of the project site. Garbage truck access to the proposed trash compactor room would be provided on Passage Way, where trucks can enter and exit via Delaware Street. Trucks could also make right-turns in from or out onto southbound Grant Street. Overall, garbage truck access and circulation would be adequate.

Pedestrian and Bicycle Access and Circulation

The proposed project would provide adequate pedestrian walkways and access to buildings and parking areas. A loading zone dedicated to bus and automotive shuttles would be located on Depot Way, south of building 2. The site plan shows three pedestrian crosswalks near the center of the project site, providing access to The Depot, the art plaza, park plaza, bike depot, and fitness center. Each building would contain a mailroom near a lobby and staircase. The site plan shows a reserved parking space for USPS use at buildings 2, 3, and 4.

The project site plan shows multiple bicycle storage areas throughout the basement and ground levels of each building. Bicycle storage in the basement levels are not always near the stairs, so riders would need to travel through the parking lot to exit the garage. Hexagon recommends providing a centralized storage area on the ground floor of each building to minimize vehicle/bicycle interaction and provide an easily accessible location.

Parking

The project would provide standard parking spaces and tandem parking stalls in below-grade and ground-level parking garages. The project would provide 1,343 residential parking spaces and 255 non-residential parking spaces for a total of 1,598 parking spaces. The project TDM Plan prepared by Nelson Nygaard addresses whether the project proposes a sufficient number of parking spaces. This section discusses the types of parking spaces proposed by the project.

ADA Spaces

Table 20 and 21 summarize the accessible parking requirements for each parking facility according to the California Building Code (CBC) Section 11-B-208 and 11B-228. As shown, the project proposes sufficient accessible and van accessible parking spaces based on the proposed total parking spaces within each parking facility. However, the project proposes insufficient standard accessible EV parking spaces for the Trader Joe's parking facility, the Building 2 retail parking facility, and the Building 4 residential parking facility. The project applicant should designate at least one additional accessible EV space within the Trader Joe's, Building 2 retail and Building 4 residential parking facilities.

Table 20
ADA Parking Requirements

Building	Parking Facility	Total Parking Spaces	ADA Spaces		Van Accessible	
			Required [1]	Proposed [3]	Required [1]	Proposed [3]
Building 1, 3, 5	Residential [2]	536	11	19	2	6
	Trader Joe's	81	4	5	1	3
	Daycare	23	1	2	1	2
Building 2	Residential [2]	448	9	12	2	4
	Retail	135	5	8	1	4
Building 4	Residential [2]	356	8	8	2	2
	7-Eleven	17	1	2	1	2

Notes:
1. Parking requirements based on California Building Code Section 11B-208.2.
2. Number of Parking Spaces includes residential guest stalls.
3. Count of proposed ADA/Van accessible spaces also include EV ADA/Van accessible spaces.

Table 21
ADA EV Parking Requirements

Building	Parking Facility	Total EV Spaces	Standard Accessible		Van Accessible	
			Required [1]	Proposed	Required [1]	Proposed
Building 1, 3, 5	Residential [2]	53	2	0	1	3
	Trader Joe's	6	**1**	**0**	**1**	**1**
	Daycare	2	0	0	1	1
Building 2	Residential [2]	45	1	0	1	2
	Retail	12	**1**	**0**	**1**	**1**
Building 4	Residential [2]	36	**1**	**0**	**1**	**1**
	7-Eleven	2	0	0	1	1

Notes:
1. Parking requirements based on California Building Code Section 11B-228.3.2.1.
2. Number of Parking Spaces includes residential guest stalls.
BOLD and boxed indicates insufficient provision of accessible EV spaces.

Compact Spaces

According to the San Mateo Municipal Code Section 27.64.265, the project is permitted to provide compact parking spaces up to 30% in parking facilities with up to 100 spaces, and up to 40% in parking facilities with greater than 100 spaces. As shown in Table 22, the proposed number of compact parking spaces complies with City requirements.

Table 22
Compact Spaces

Building	Parking Facility	Total Parking Spaces	Compact Spaces	
			Permitted [1]	Proposed
Building 1, 3, 5	Residential [2]	536	214	58
	Trader Joe's	81	24	23
	Daycare	23	7	3
Building 2	Residential [2]	448	179	5
	Non-Res	135	54	18
Building 4	Residential [2]	356	142	48
	7-Eleven	17	5	0

Notes:
1. Permitted compact spaces based on San Mateo Municipal Code Chapter 27.64.265.
2. Number of Parking Spaces includes residential guest stalls.

Tandem Spaces

The project proposes 125 sets of tandem spaces within the gated residential sections (Building 1 with 26 sets, Building 2 with 62 sets, Building 3 with 20 sets and Building 4 with 17 sets). The project applicant should ensure that both parking spaces within each set of tandem spaces are assigned to the same residential unit.

7. Conclusions

This report presents the results of the transportation impact analysis conducted for the proposed mixed-use development located at 640 Concar Drive in San Mateo, California. The project proposes to replace the existing buildings on site and construct 961 residential units with 3,100 square feet of retail space, 7,400 square feet of restaurant space, 7,650 square feet of performance/ballet space, and 4,600 square feet of daycare space. In addition, the existing Trader Joe's and 7-Eleven would be rebuilt with the project. Trader Joe's would increase in size by 2,260 square feet to a total of 13,700 square feet and 7-Eleven would increase by 240 square feet to a total of 3,100 square feet. The project also proposes a 3,800 square-foot leasing center and approximately 11,900 square feet of residential amenities. However, the leasing center and amenities were not included in the project trip generation because they are accessible to residents only. Vehicular access to the project site would be provided by driveways on Delaware Street, Concar Drive, and Grant Street.

The purpose of the transportation study is to identify any potential transportation issues related to the proposed project and to review the proposed site access and circulation. Local intersection operations were evaluated following standards and methodologies set forth by the City of San Mateo. The transportation study includes an analysis of AM (7:00 – 9:00 AM) and PM (4:00 – 6:00 PM) peak hour traffic conditions during weekdays on 27 study intersections and 10 freeway ramps in the vicinity of the project site.

Intersection Level of Service Results

Under existing plus project conditions, the project would generate substantial increases in intersection delays based on the City's General Plan criteria at the following intersections:

- Delaware Street & Concar Drive
- Delaware Street & 19th Avenue
- YMCA Driveway & 19th Avenue

Under background plus project conditions, the project would generate substantial increases in intersection delays based on the City's General Plan criteria at the following intersections:

- SR 92 Westbound Ramps & Concar Drive
- Delaware Street & 19th Avenue
- Delaware Street & Bermuda
- Grant Street & Concar Drive
- Grant Street & 19th Avenue
- YMCA Driveway & 19th Avenue
- US 101 Southbound Ramps & Fashion Island Boulevard

Under cumulative plus project conditions, the project would generate substantial increases in intersection delays based on the City's General Plan criteria at the following intersections:

- Delaware Street & 19th Avenue
- Grant Street & 19th Avenue
- YMCA Driveway & 19th Avenue
- US 101 Southbound Ramps & Fashion Island Boulevard

It should be noted that all of the above identified intersections are a result of corridor congestion along 19th Avenue/Fashion Island Boulevard, and were analyzed using the micro-simulation analysis. The micro-simulation analysis showed that these intersections were either the bottlenecks causing the corridor congestion, or intersections affected by the feedback queues at the bottlenecks. Therefore, while the analysis indicates that these particular intersections would experience substantial intersection delay increases, improvements would still need to address the broader congestion issue along the whole corridor. Potential improvement measures are discussed below.

At the time of this report, the City of San Mateo is studying potential alternatives to alleviate congestion along the 19th Avenue/Fashion Island Boulevard corridor. Preliminary analysis from the corridor study efforts have identified numerous improvement measures, listed below:

- Convert 19th Avenue between Delaware Street and Grant Street from the existing one-way eastbound operation to two-way operations with one lane in each direction.
- Construct intersection improvements at the Delaware Street and 19th Avenue intersection and the Grant Street and 19th Avenue intersection to accommodate the 19th Avenue two-way conversion. The following improvements are preliminarily identified:
    - Restripe southbound Delaware Street at 19th Avenue to include two left-turn lanes and one through lane. The northbound/southbound operations would be converted from split phasing to protected phasing.
    - Westbound 19th Avenue at Delaware Street would consist of one left-turn lane. Eastbound/westbound operations would be split phase
    - Westbound 19th Avenue at Grant Street would consist of one shared left-through lane and one right-turn lane.
- Widen the US 101 southbound on-ramp from Fashion Island Boulevard to include a second mixed-flow lane.
- Widen westbound Fashion Island Boulevard to include a right-turn pocket at the US 101 northbound on-ramp intersection
- Lengthen the eastbound left-turn pocket at the Norfolk Street and Fashion Island Boulevard intersection.
- Implement reversible lanes on the bridge between Norfolk Street and Harbor Seal Court. The AM peak period operations will be the same as existing conditions. The PM peak period operations will allow for two eastbound through lanes from west of Norfolk Street to just west of Harbor Seal Court where Fashion Island Boulevard opens up to two eastbound lanes. At the intersection of Norfolk Street and Fashion Island Boulevard, the eastbound approach will consist of one left-turn lane, one through lane and one shared through-right lane. The westbound approach will consist of one left-turn lane and one shared through-right lane.
- Implement signal coordination at all signalized intersections on 19th Avenue/Fashion Island Boulevard between Delaware Street and Norfolk Street

In addition to the improvements identified in the preliminary analysis from the corridor study efforts, the following improvements would also be needed to eliminate the project-generated substantial increases in intersection delays:

- Restripe eastbound 19th Avenue at the Grant Street intersection to include one shared left-through lane and one shared through-right lane.
- Restripe eastbound Fashion Island Boulevard at the US 101 southbound ramps intersection to include one through lane and one shared through-right lane.

As shown under background conditions, the identified deficiencies along the 19th Avenue/Fashion Island Boulevard corridor would not be caused solely by the Concar Passage project. Improvement measures have been identified that will eliminate the project's substantial increases in intersection delays. The project will be required to pay its fair share of the improvements. However, the identified improvements are not currently on the City's Capital Improvement Program and funding is not currently available to ensure implementation. Therefore, the intersection delays at the identified intersections would remain substantial.

Freeway Segments

Potential project effects on freeway segments were analyzed in accordance with C/CAG CMP methods. The results of the freeway segment analysis show that the project would cause considerable increases in traffic volumes (one percent or more of freeway capacity) on two study freeway segments. The project is anticipated to have a considerable effect on two study freeway segments.

To reduce the project's adverse effects on freeway operations, a trip reduction of 58% would be required. It is not anticipated that a 58% trip reduction would be achievable. There are currently no planned improvements along these segments of SR 92 that would increase capacity.

Freeway Ramp Capacity Analysis

The freeway ramp analysis with and without the proposed project show that the selected ramps currently have and would continue to have sufficient capacity to serve the projected traffic volumes under project conditions. All study freeway ramps are expected to have a volume-to-capacity (V/C) ratio well below 1.0.

Other Transportation Issues

Hexagon conducted a site plan review, queuing analysis as well as pedestrian, bicycle and transit facility analysis for the proposed project. Our recommendations are listed below.

Recommendations

- The proposed driveway at Delaware Street and Passage Way is expected to experience lengthy queues blocking other proposed garage entrances along Passage Way. It is recommended that the project applicant prohibit left-turns out of the driveway onto southbound Delaware Street. This could be accomplished with either a raised median on Delaware Street (still allowing left-turns into the driveway) or a right-turn channelization island on Passage Way.
- At the driveways for the daycare parking lot, it is recommended that the inbound be located as far north as possible to prevent vehicle queuing onto the inner northbound through lane on Grant Street.
- The project proposes a mid-block crosswalk across Grant Street. New mid-block crosswalks should be installed only after an engineering study determining the feasibility of the crosswalk. The project applicant should coordinate with City staff to determine the need for a mid-block crosswalk across Grant Street upon project completion.
- For ease of access, to minimize bicycle-vehicle interactions in the garage and to avoid cyclists riding on the garage ramps or bringing bicycles into elevators, the project should consider relocating all long-term bicycle parking spaces to the ground level. Hexagon recommends providing a centralized storage area on the ground floor of each building to minimize vehicle/bicycle interaction and provide an easily accessible location.
- There is a bus stop shown on page GEN-0.16 of the site plan package located on Delaware Street between Concar Drive and the proposed Depot Way. It is unknown if SamTrans has plans for a bus stop at this location. The project applicant should coordinate with SamTrans to determine the need for this bus stop and if there are potential improvements required to support a bus stop at this location.

- All five residential driveways (two on Depot Way, two on Passage Way, and one on Grant Street) are proposed to be between 24 and 26 feet wide. The width of the 7-Eleven driveway on Concar Drive is not shown on the site plan. Residential driveways greater than 20 feet wide and retail driveways greater than 26 feet wide exceed the maximum width requirements established in the City of San Mateo Municipal Code (Chapter 27.64.025 Driveways). Prior to final design, the project applicant should ensure that all driveways meet the width requirements.
- The City of San Mateo requires residential parking to be separated from guest and retail parking with a secured gate. The Grant Street entrance to Building 4 does not show a gate on the site plan. Prior to final design, the project applicant should ensure that all residential parking entrances are gated and that the gate for the Grant Street entrance to Building 4 does not result in vehicles queuing onto the street.
- The project site plan does not indicate the width of loading zones. Prior to final design, the project applicant should ensure that all loading zones are at least 10 feet wide, in compliance with San Mateo Municipal Code Section 27.64.320.
- To prevent potential queueing issues resulting from vehicles entering and exiting the loading zones, Hexagon recommends the loading zones near the Delaware Street/Depot Way and Depot Way/Concar Drive intersections be placed away from the driveways and closer to the center of the project site.
- The project applicant should designate at least one additional EV space as standard accessible EV space within the Trader Joe's, Building 2 retail and Building 4 residential parking facilities, in compliance with California Building Code (CBC) Section 11-B-208 and 11B-228.
- The project applicant should ensure that both parking spaces within each set of tandem spaces are assigned to the same residential unit.

Concar Passage Mixed-Use Development
General Plan Conformace Transportation Analysis

Technical Appendices

April 3, 2020

Appendix A
Traffic Counts

Appendix B
Volume Summary

Appendix C
Intersection Level of Service Calculations

Appendix D
Project Trip Assignment Assumptions

Project Trip Assignment Assumptions

To/From El Camino Real north of SR 92

We assumed inbound/outbound traffic to use SR 92, with the following driveway splits:

- Residential Use in Building 2: We assumed inbound traffic to travel on SR 92 eastbound with 70% to enter via Driveway B and 30% via Driveway D. We assumed 70% to exit via Driveway D and 30% via Driveway B to the SR 92 westbound on-ramp at Concar Drive.
- Proposed Trader Joe's: We assumed 50% to enter/exit via Driveway A and 50% via Driveway B.

To/From Delaware Street north of Concar Drive

We assumed the most direct route to Delaware Street, given the driveway restrictions, with the following driveway splits:

- Residential Use in Building 2: We assumed 100% to enter via Driveway D, 70% to exit via Driveway D, and 30% to exit via Driveway B.
- Proposed Trader Joe's: We assumed 100% to enter via Driveway A, 50% to exit via Driveway A, and 50% to exit via Driveway B.

To/From US 101 north of SR 92

- Residential Use in Building 4: We assumed 100% to use the US 101 on- and off-ramps at Fashion Island Boulevard and enter/exit via Driveway G.
- Residential Use in Building 2: We assumed 100% to travel on SR 92 westbound and enter via Driveway D, 50% to exit via Driveway D to Grant Street and use the US 101 northbound on-ramp at Fashion Island Boulevard, and 50% to exit via Driveway D to Delaware Street and use the SR 92 eastbound on-ramp at the Delaware Street/19th Avenue interchange.
- Residential Use in Buildings 1, 3, and 5: We assumed 100% to travel on SR 92 westbound and enter via Driveway A. We assumed 50% to exit via Driveway J and use the US 101 northbound on-ramp at Fashion Island Boulevard, and 50% to exit via Driveway A and use the SR 92 eastbound on-ramp at the Delaware Street/19th Avenue interchange.
- Proposed 7-Eleven: We assumed 100% to travel on SR 92 westbound and enter via Driveway E and 100% to exit via Driveway F and use the US 101 northbound on-ramp at Fashion Island Boulevard.
- Proposed Trader Joe's: We assumed 100% to travel on SR 92 westbound and enter via Driveway A, 50% to exit via Driveway A and use the SR 92 eastbound on-ramp at the Delaware Street/19th Avenue interchange, and 50% to exit via Driveway A to 19th Avenue and use the US 101 northbound on-ramp at Fashion Island Boulevard.
- Project Retail: We assumed 100% to travel on SR 92 westbound and enter via Driveway C and 100% to exit via Driveway C to Grant Street and use the US 101 northbound on-ramp at Fashion Island Boulevard.
- Daycare: We assumed 100% to use the US 101 on- and off-ramps at Fashion Island Boulevard.

To/From Bridgepoint Parkway Area

We assumed inbound/outbound traffic to use Fashion Island Boulevard, with the following driveway splits:

- Residential Use in Buildings 1, 3, and 5: We assumed 100% to travel on Fashion Island Boulevard westbound to Bermuda Drive and enter via Driveway A, and 100% to exit via Driveway J to 19th Avenue/Fashion Island Boulevard.
- Proposed Trader Joe's: We assumed all inbound traffic to travel on Fashion Island Boulevard westbound to Bermuda Drive with 50% to enter via Driveway A and 50% via Driveway B. We assumed 100% to exit via Driveway A to 19th Avenue/Fashion Island Boulevard.

To/From SR 92 East of US 101

We assumed inbound/outbound traffic to take the most direct route to the SR 92 ramps, given the driveway restrictions.

To/From US 101 south of Hillsdale Boulevard

We assumed 10% of inbound traffic to use the US 101 northbound off-ramp at Hillsdale Boulevard and travel northbound on Saratoga Drive to Delaware Street and 90% to use the SR 92 westbound on-ramp at the US 101/SR 92 interchange. We assumed 10% of outbound traffic to travel southbound on Saratoga Drive to the US 101 southbound on-ramp at Hillsdale Boulevard, 45% to use the SR 92 eastbound on-ramp at the Delaware Street/19th Avenue interchange, and 45% to use the US 101 southbound on-ramp at Fashion Island Boulevard. Note the following driveway splits:

- Proposed Trader Joe's: We assumed 5% to travel on Saratoga Drive northbound and enter via Driveway A, 5% to travel on Saratoga Drive northbound and enter via Driveway B, and 90% to travel on SR 92 westbound and enter via Driveway A. We assumed 10% to exit via Driveway A to Saratoga Drive and use the US 101 southbound on-ramp at Hillsdale Boulevard, 45% to exit via Driveway A and use the SR 92 eastbound on-ramp at the Delaware Street/19th Avenue interchange, and 45% to exit via Driveway A to 19th Avenue and use the US 101 southbound on-ramp at Fashion Island Boulevard.

To/From El Camino Real south of Hillsdale Boulevard and Hillsdale Boulevard west of El Camino Real

We assumed 50% of inbound/outbound traffic to use SR 92, 40% to use 25th Avenue/Delaware Street, and 10% to use Hillsdale Boulevard/Delaware Street. Note the following driveway splits:

- Proposed Trader Joe's: We assumed a 50% split for Driveways A and B among inbound routes. For outbound traffic, we assumed a 50% split for vehicles using SR 92 with the remaining routes using Driveway A only.

Under background conditions, when the Caltrain grade separations are complete, we assume that half of the trips using 25th Avenue would divert to use 28th Avenue to turn onto El Camino Real.

To/From SR 92 west of El Camino Real

We assumed all vehicles to take the most direct route to the SR 92 ramps, given the driveway restrictions, with the following driveway splits:

- Residential Use in Building 2: We assumed inbound traffic to travel on SR 92 eastbound with 70% to enter via Driveway B and 30% via Driveway D. We assumed 70% to exit via Driveway D and 30% via Driveway B to the SR 92 westbound on-ramp at Concar Drive.
- Proposed Trader Joe's: We assumed 50% to enter/exit via Driveway A and 50% via Driveway B.

To/From 25th Avenue west of El Camino Real

We assumed 60% of inbound/outbound traffic to use Delaware Street and 40% to use SR 92, with the following driveway splits:

- Residential Use in Building 2: We assumed 60% to travel on Delaware Street northbound to enter via Driveway B, and 40% to travel on El Camino Real northbound to the SR 92 eastbound on-ramp and enter via Driveway D. We assumed outbound traffic to exit via Driveway D, with 60% to travel on Delaware Street southbound to 25th Avenue and 40% to use the SR 92 westbound on-ramp at Concar Drive.
- Proposed Trader Joe's: We assumed a 50% split for Driveways A and B among inbound routes. For outbound traffic, we assumed a 50% split for vehicles using SR 92 with the remaining routes using Driveway A only.

To/From Bay Meadows and Saratoga Drive south of Hillsdale Boulevard

We assumed all vehicles to use Delaware Street, with the following driveway splits:

- Residential Use in Building 2: We assumed inbound traffic to travel on Delaware Street northbound, with 70% to enter via Driveway B and 30% via Driveway D. We assumed 100% to exit via Driveway D to Delaware Street.

To/From Norfolk Street

We assumed all vehicles to use Fashion Island Boulevard, with the following driveway splits:

- Proposed Trader Joe's: We assumed inbound traffic to travel on Fashion Island Boulevard westbound to Bermuda Drive with 50% to enter via Driveway A and 50% via Driveway B. We assumed 100% to exit via Driveway A to 19th Avenue/Fashion Island Boulevard.

To/From Grant Street north of Concar Drive

We assumed the most direct route to North Grant Street, given the driveway restrictions, with the following driveway splits:

- Proposed Trader Joe's: We assumed 100% to enter/exit via Driveway D.
- Project Retail: We assumed 100% to enter via Driveway D and 100% to exit via Driveway C.

Appendix E
Signal Warrants