Appendix 3.3

Transportation Impact Assessment

HEXAGON TRANSPORTATION CONSULTANTS, INC.

Willow Village Master Plan

Draft Transportation Impact Analysis

Prepared for:

ICF

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Hexagon Transportation Consultants, Inc.
Hexagon Office: 100 Century Center Court, Suite 501
San Jose, CA 95112
Hexagon Job Number: 18GB38
Phone: 408.971.6100
Client Name: ICF

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Executive Summary

This report presents the results of the Transportation Impact Analysis (TIA) conducted for the proposed Willow Village Master Plan Project in Menlo Park, California. The Proposed Project would redevelop an approximately 59-acre industrial site plus two parcels north of Willow Road[1] (collectively, the Project Site) as a mixed-use development. The Proposed Project would demolish all existing onsite buildings and landscaping on the 59-acre portion of the Project Site and construct new buildings, provide open space areas, and install infrastructure within a new Residential/Shopping District, Town Square District, and Campus District. In addition, the Proposed Project would alter two parcels (Hamilton Avenue Parcels North and South[2]) to accommodate realignment of Hamilton Avenue at Willow Road for Project Site access.

The Proposed Project would provide up to 1.6 million sf of space for office and accessory use (consisting of up to 1.25 million sf of office uses and the balance (350,000 square if office use is maximized) of accessory uses[3]) and up to 200,000 sf of commercial/retail space. The Proposed Project would also include up to 1,730 multi-family housing units, an up to 193-room hotel, and open spaces, including publicly accessible parks (e.g. 3.5 acre publicly accessible park, elevated linear park, town square, and dog park).

The Project Site would be bisected by a new north–south street (Main Street) and an east–west street, which would provide access to all three districts. It would include a circulation network for vehicles, bicycles, and pedestrians, inclusive of both public rights-of-way and private streets, that would be generally aligned to an east-to-west and a north-to-south grid. The Proposed Project would also alter parcels north of the industrial site, across Willow Road, on both the east and west sides of Hamilton Avenue (Hamilton Avenue Parcels North and South) to support realignment of the Hamilton Avenue right-of-way and provide access to the new elevated park. This would require demolition and reconstruction of an existing service station (Chevron gas station) and potentially an increase in 1,000 sf on Hamilton Avenue Parcel South and enable the potential addition of up to 6,700 sf of retail uses at the existing neighborhood shopping center on the Hamilton Avenue Parcel North. A total of 7,700 sf could be added to the Hamilton Avenue Parcels.

[1] For transportation analysis, “North/South” is aligned to be parallel to US 101. Hence, Willow Road and University Avenue are considered east-west streets, whereas Hamilton Road and Bayfront Expressway are considered north-south streets.
[2] Hamilton Avenue Parcels North and South consider Hamilton Avenue an east to west street, which differs from the compass directions used for the transportation analysis discussion.
[3] Accessory uses could include the following types of spaces: meeting/collaboration space, orientation space, training space, event space, incubator space, a business partner center, an event building (including pre-function space, collaboration areas, and meeting/event rooms), a visitor center, product demonstration areas, film studio, gathering terraces and private gardens, and space for other Meta accessory uses. Accessory uses could occur in spaces located anywhere throughout the Campus District

CEQA Vehicle-Miles Travelled Analysis

The most readily available long-range forecast year is the year-2040 conditions, which assumes the buildout of the City of Menlo Park General Plan and any pending General Plan Amendments, the buildout of the pending developments in the City of East Palo Alto (as of December 2020), and regional growth projected by the Association of Bay Area Governments (ABAG), modified by VTA/C/CAG for model land use inputs. Therefore, the project's VMT analysis was conducted under year-2040 conditions.

Office VMT

According to the City's VMT guidelines, office land use is evaluated based on a daily VMT per employee metric. Using the model, this metric is calculated only for home-based work trips, per OPR's Technical Advisory on Evaluating Transportation Impacts in CEQA. Based on the latest citywide travel demand model, the regional average office VMT is 15.9 per employee. Therefore, City's office VMT impact threshold, at 15% below regional average, would be 13.6 daily VMT per employee. Office land use was evaluated using the model under the year 2040 plus project scenario. For the Campus District, the applicant proposed a daily trip cap of 18,237 trips, which would be 20% below the standard ITE trip generation estimate. The model was adjusted to account for the proposed trip cap. As shown in Table ES-1 below, the project's Campus District land use would generate VMT at the City's VMT impact threshold and would thus not have a VMT impact.

Residential VMT

According to City VMT guidelines, the evaluation of residential land use is based on a daily VMT per capita metric. Using the model, this metric is calculated only for home-based trips, per OPR's technical advisory. Based on the latest citywide travel demand model, regional average residential VMT is 13.1 per capita. Therefore, the City's residential VMT impact threshold, at 15% below regional average, would be 11.2 daily VMT per capita.

For the residential land use, trip generation was adjusted to account for the Project's expected 2.03 people per unit compared to the ITE average of 2.46 people per unit. The VMT analysis also accounted for the applicant proposed TDM Plan for the mixed-use district. The TDM Plan proposed a 20% trip reduction from gross ITE trip generation through a combination of passive TDM measures and active TDM measures. Passive TDM measures include the project's proximity to complementary land uses, proximity to alternative transportation infrastructure, and the project's mixed-use nature. As discussed in Chapter 3 below, it is estimated that the passive TDM measures would achieve a 17% trip reduction from the gross ITE trip generation. Active TDM measures include TDM programs to be implemented to further promote alternative modes of travel. These TDM measures generally include providing transit, biking, and carpooling information to residents, assisting in ride-matching programs for residents, and could also include transit subsidies and other measures. To represent the applicant proposed 20% trip reduction goal and given that passive TDM measures are assumed to achieve a 17% trip reduction, the balance of 3% (20%-17%) trip reduction due to active TDM measures was assumed for the VMT analysis.

The Project's residential land use would require a 16% reduction in VMT to mitigate the significant VMT impact. The VMT analysis, as discussed above, already assumed 3% trip reduction due to active TDM measures. Therefore, mitigation of the VMT impact would require implementing a TDM Plan for the residential component that achieves at least 19% (3% + 16%) trip reduction via active TDM measures (see Figure 10 in Chapter 3 below) or increases the effectiveness of passive TDM measures. According to the Project's proposed TDM Plan dated July 2021 and attached in Appendix G, the proposed active TDM measures for the residential component could achieve at least a 19% reduction in trips, with an estimated reduction between between 11% and 36% [4]. This range represents the potential low to high range of effectiveness of the proposed TDM measures, as calculated by research data from the California Air Pollution Control Officers Association (CAPCOA). This range depends on how each TDM measure is eventually implemented. Therefore, it is feasible for the Project to mitigate its residential VMT impact by implementing its proposed TDM Plan.

IMPACT (TRA-2 in Transportation Chapter): As shown in Table ES-1 below, the Proposed Project's residential land use VMT is estimated to be 13.3 daily miles per capita, which would exceed the VMT threshold and result in a VMT impact. The mitigation measure TRA-2 identified below would fully mitigate this impact.

MITIGATION MEASURE (TRA 2 in Transportation Chapter): The residential land use of the Project Site will be required to implement a TDM Plan achieving a 36% reduction from gross ITE trip generation rates (for the Project, this reduction equals 6,023 daily trips). Should a different number of residential units be built, the total daily trips will be adjusted accordingly. The required residential TDM Plan will include annual monitoring and reporting requirements on the effectiveness of the TDM program. The Project applicant submitted a draft residential TDM Plan, which contained specific measures that would meet this trip reduction requirement. The draft TDM Plan is subject to City review and approval. If the annual monitoring finds that the TDM reduction is not met , the TDM coordinator will be required to work with City staff to detail next steps to achieve the TDM reduction. With the implementation of the required residential TDM Plan, the residential VMT impact would be **less than significant with mitigation (LTS/M)**.

Table ES- 1
Office and Residential VMT Evaluation

Land Use	Regional Average	VMT Threshold	Project VMT	VMT Impact	Additional TDM Mitigation needed to eliminate VMT impact
Office [1]	15.9	13.6	13.6	No	-
Residential [2]	13.1	11.2	13.3	Yes	16%

Notes:
** All data referenced the latest Menlo Park citywide travel demand forecast model.*
1. VMT for office land use is reported in VMT per employee.
2. VMT for residential land use is reported in VMT per capita.

[4] Willow Village TDM Plan. Prepared for Peninsula Innovation Partners. Fehr & Peers, Inc. July 2021

Hotel VMT

Based on consultation with the City and applicant, the hotel is expected to have a service area of approximately three (3) miles in radius. This means that most of the destinations of hotel patrons are expected to be within three miles of the hotel. While some trips are expected to be longer than three miles, the majority of the change in VMT is expected to occur within this three-mile radius. The evaluated daily VMT includes the entire length of the trip even when it extends beyond the three-mile radius.

The total daily VMT generated by land uses within a three-mile radius was compared under the "no hotel" and "with project" scenarios. As shown in Table ES-2, the proposed hotel component of the project was shown to slightly reduce the total daily VMT generated by land uses within a three-mile radius of the Project Site. Since the proposed hotel would be located within very close proximity to major employment in the Bayfront area, hotel patrons would enjoy shorter travel distances to their business destinations. It's location within a mixed-use project, including complementary retail space, also would allow hotel patrons to shop/dine within walking distance.

Because the proposed hotel component of the Project would not cause an increase in total VMT generated within the analysis area, it is concluded that the proposed hotel component of the Project would have a less than significant impact on vehicle miles travelled.

Table ES- 2
Hotel VMT Evaluation

	3-Mile Radius Area of Project Site		
	No Hotel Conditions [2]	With Project Conditions [2]	% Change
Total Daily VMT [1]	6,656,914	6,629,443	-0.4%

Notes:
1. Total daily VMT includes VMT generated by all trips having at least one trip-end in the analysis area, as estimated by the citywide travel demand model.
2. "No hotel conditions" represent conditions with the Proposed Project except the hotel component. "With project conditions" represent conditions with the Proposed Project including the hotel component.

Retail VMT

The project has two areas of retail development. The main Project Site includes up to 200,000 s.f. of retail space within a mixed use development. North of Willow Road, as a result of the proposed Hamilton Avenue realignment, the two retail parcels adjacent to Hamilton Avenue at the intersection with Willow Road ("Hamilton Avenue Parcels") would be reconfigured. The Project proposes to increase the total retail square footage at the Hamilton Avenue parcels by up to 7,700 s.f. to approximately 23,400 s.f. Because the retail at the Hamilton Avenue Parcels will require a separate use permit and would be operated as a separate retail use from the retail uses at the main Project Site, the Hamilton Avenue Parcels retail is evaluated separately from the retail component of the main Project Site. According to the City's VMT policy, local serving retail (defined as having total square footage less than 50,000 s.f.) would be exempt from a VMT analysis. The Project's proposed net 7,700 s.f. of potential retail development at the Hamilton Avenue Parcels would thus be exempt from VMT analysis. The discussion below is focused on the 200,000 s.f. of retail space at the main Project Site.

Based on the types of retail being proposed as well as nearby comparable retail stores, it is expected that the proposed retail would have a service area of approximately five (5) miles in radius. The 5-mile radius service area was selected based on engineering judgement, as it would cover most of Menlo Park, Palo Alto, as well as downtown Redwood City, and would include a mix of retail shops and restaurants comparable to the three cities. Assuming equal services, it is expected that people would patronize the closer store or restaurant. The five-mile radius service area also means that most of the destinations of the Project's retail patrons are expected to be within five miles of the project. While some trips are expected to be longer than five miles, the majority of the change in VMT is expected to occur within this five-mile radius.

The total daily VMT generated by land uses within a five-mile radius was compared under the "no retail" and "with project" scenarios. As shown in Table ES-3, the proposed retail component of the project was shown to slightly reduce the total daily VMT generated by land uses within a five-mile radius of the Project Site. Since the proposed retail space would be located in close proximity to the Belle Haven neighborhood, a large number of offices and life sciences buildings in the Bayfront area, as well as the project's proposed residential land uses, the proposed retail component would provide retail stores closer to homes for nearby residents and closer to jobs for nearby workers.

Because the proposed retail component of the Project would not cause an increase in total VMT generated by the analysis area, it is concluded that the proposed retail component of the Project would have a less than significant impact on vehicle miles travelled.

Table ES- 3
Retail VMT Evaluation

	5-Mile Radius Area of Project Site		
	No Retail Conditions [2]	With Project Conditions [2]	% Change
Total Daily VMT [1]	14,360,590	14,334,067	-0.2%

Notes:
1. Total daily VMT includes VMT generated by all trips having at least one trip-end in the analysis area, as estimated by the citywide travel demand model.
2. "No retail conditions" represent with the Proposed Project except the retail component. "With project conditions" represent with the Proposed Project including the retail component.

Non-CEQA Levels of Service Transportation Analysis

Until July 1, 2020, the City's TIA Guidelines used roadway congestion, commonly referred to as level of service (LOS), as the primary study metric for evaluating transportation impacts under CEQA. LOS is no longer a CEQA threshold of significance; however, the City's TIA Guidelines require that the TIA also analyze LOS for planning purposes (per General Plan Program Circ-3.A Transportation Impact Metrics):

> Supplement Vehicle Miles Traveled (VMT) and greenhouse gas emissions per service population (or other efficiency metric) metrics with Level of Service (LOS) in the transportation impact review process, and utilize LOS for identification of potential operational improvements, such as traffic signal upgrades and coordination, as part of the Transportation Master Plan.

The LOS analysis would determine whether the project traffic would cause an intersection LOS to exceed the City's LOS thresholds or cause either the average delay or average critical delay to exceed the City's intersection delay thresholds under near term and cumulative conditions. The LOS and delay thresholds vary depending on the street classifications as well as whether the intersection is on a State route or not.

The City's TIA Guidelines further require an analysis of the Proposed Project in relation to relevant policies of the Circulation Element and consideration of specific measures to address noncompliance with local policies which may occur as a result of the addition of project traffic. The TIA identifies measures that could be applied as conditions of approval that would bring operations back to pre-Project levels. Although not included in the TIA for purposes of this EIR, an analysis may be prepared separately to determine if there are potential measures that could bring the Proposed Project into conformance with the LOS goals of Circulation Policy 3.4. Implementation of any such measures would require review and approval by City decision makers.

Intersection level of service non-compliance caused by the proposed project under near-term (2025[5]) with project, cumulative (2040) with project, and cumulative (2040) with Dumbarton rail with project conditions were analyzed. Both near-term (year 2025) with project, and cumulative (year 2040) with project scenario forecasts of intersection turning movements were completed using the latest Menlo Park travel demand forecast model. The base model structure was refined for application within Menlo Park to add more detail to the zone structure and transportation network.

The cumulative with Dumbarton Rail scenario assumed that the Dumbarton Rail would be built and there would be a shift in vehicular trips to transit trips near the Project Site[6] as well as along the Dumbarton Rail corridor. Cumulative plus project conditions with Dumbarton Rail were evaluated relative to cumulative conditions with the Dumbarton Rail. This analysis is speculative since there is no current approved plan or financing to provide any Dumbarton transit service and is provided for informational purposes in the transportation analysis.

[5] 2025 is the earliest year for expected occupancy when this analysis started.
[6] *Dumbarton Rail Corridor Update Public Meeting*, Prepared by Facebook for the San Mateo County Transit District. March 15, 2021

The following intersections were adversely affected under either near term plus project or cumulative plus project scenarios during at least one peak hour (see Table ES-4 and ES-5):

City of Menlo Park:

1. Marsh Road and Bayfront Expressway [CMP]
5. Marsh Road and Bohannon Drive/Florence Street
13. Chilco Street and Hamilton Avenue
16. Willow Road and Bayfront Expressway [CMP]
17. Willow Road and Hamilton Avenue
18. Willow Road and Park Street
19. Willow Road and Ivy Drive
21. Willow Road and Newbridge Street
24. Willow Road and Bay Road
25. Willow Road and Hospital Plaza/Durham Street
30. O'Brien Drive and Kavanaugh Drive
32. Adam's Drive and O'Brien Drive

City of East Palo Alto:

39. University Avenue and Bay Road
42. University Avenue and Donohoe Street
44. Cooley Avenue and Donohoe Street
46. University Avenue and Woodland Avenue
47. E. Bayshore Road and Donohoe Street
49. Saratoga Avenue and Newbridge Street
50. East Bayshore Road and Euclid Avenue

Caltrans:

23. Willow Road and US 101 Southbound Ramps (AM peak hour)
43. US 101 Northbound Off-Ramp and Donohoe Street (AM and PM peak hours)
45. University Avenue and US 101 Southbound Ramps (AM peak hour)

Since the Cumulative with Dumbarton Rail scenario was analyzed for information only, analysis summary is presented only in Chapter 3.

Table ES- 4
Intersection Level of Service Summary (City of Menlo Park)

					Existing Conditions		Near-Term (2025) Conditions								Cumulative (2040) Conditions								
							No Project		Project Conditions				With Improvement				General Plan Conditions		Project Conditions				With Improvement			
#	Intersection	Peak Hour	Count Date	Traffic Control	Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay		Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay
1	Marsh Road & Bayfront Expressway*	AM	4/16/2019	Signal	50.5	D	52.0	D	**56.2**	**E**	**4.2**	**5.4**	50.2	D	-		**68.7**	**E**	**65.6**	**E**	**<4**	**<0.8**			
	Haven Avenue Southbound	*AM*			***75.0***	***E***	***71.2***	***E***	***70.6***	***E***	***<4***	***<0.8***					***71.2***	***E***	***73.4***	***E***	***<4***	***<0.8***			
		PM	4/16/2019	Signal	31.6	C	34.9	C	38.7	D	<4	4.7	38.9	D	-		**65.0**	**E**	**77.9**	**E**	12.9	12.5			
	Haven Avenue Southbound	*PM*			***69.0***	***E***	***66.9***	***E***	***65.6***	***E***	***<4***	***<0.8***					***67.7***	***E***	***67.7***	***E***	***<4***	***<0.8***			
2	Marsh Road & US 101 Northbound Off-Ramp	AM	4/16/2019	Signal	15.8	B	23.1	C	39.0	D	15.9	25.1					**60.9**	**E**	**62.2**	**E**	**<4**	**1.5**			
		PM	4/16/2019		13.3	B	15.8	B	16.8	B	<4	1.6					22.9	C	22.8	C	<4	<0.8			
3	Marsh Road & US 101 Southbound Off-Ramp	AM	4/16/2019	Signal	19.0	B	20.7	C	20.7	C	<4	<0.8					22.8	C	24.4	C	<4	2.0			
		PM	4/16/2019		17.0	B	17.6	B	17.6	B	<4	<0.8					19.2	B	18.8	B	<4	<0.8			
4	Marsh Road & Scott Drive	AM	4/16/2019	Signal	18.5	B	20.3	C	20.5	C	<4	<0.8					31.9	C	31.8	C	<4	<0.8			
		PM	4/16/2019		15.3	B	15.9	B	15.9	B	<4	<0.8					17.9	B	18.1	B	<4	<0.8			
5	Marsh Road & Bohannon Drive/Florence Street	AM	3/21/2019	Signal	35.3	D	40.0	D	41.6	D	<4	2.3					**58.0**	**E**	**60.4**	**E**	**<4**	**4.9**	**56.7**	**E**	**<0.8**
		PM	3/21/2019		34.6	C	36.3	D	37.3	D	<4	2.2					52.5	D	53.6	D	<4	1.6	48.3	D	<0.8
6	Marsh Road & Bay Road	AM	3/21/2019	Signal	19.7	B	23.6	C	25.2	C	<4	2.8					**64.2**	**E**	**64.8**	**E**	**<4**	**<0.8**			
		PM	3/21/2019		18.6	B	18.7	B	19.1	B	<4	<0.8					47.6	D	54.9	D	7.3	14.4			
7	Chrysler Drive & Bayfront Expressway	AM	4/16/2019	Signal	8.4	A	9.1	A	9.4	A	<4	<0.8					13.1	B	12.8	B	<4	6.4			
		PM	4/16/2019		13.1	B	17.3	B	18.3	B	<4	1.5					39.5	D	36.3	D	<4	<0.8			
8	Chilco Street & Bayfront Expressway	AM	4/16/2019	Signal	10.9	B	23.7	C	25.6	C	<4	5.3					44.5	D	49.2	D	4.7	13.5			
	Chilco Street Eastbound	*AM*			*19.0*	*B*	*48.7*	*D*	***56.8***	***E***	***8.1***	***12.6***					***112.4***	***F***	***108.9***	***F***	***<4***	***<0.8***			
		PM	4/16/2019		13.1	B	34.1	C	35.9	D	<4	4.5					**69.6**	**E**	**66.9**	**E**	**<4**	**<0.8**			
	Chilco Street Eastbound	*PM*			*22.4*	*C*	***107.8***	***F***	***116.2***	***F***	***8.4***	***15.2***					***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
9	MPK 21 Driveway & Bayfront Expressway	AM	4/25/2019	Signal	7.9	A	7.3	A	7.4	A	<4	<0.8					5.7	A	5.6	A	<4	<0.8			
		PM	4/25/2019		10.2	B	13.7	B	15.0	B	<4	1.4					36.3	D	36.1	D	<4	<0.8			
10	MPK 20 Driveway (east) & Bayfront Expressway	AM	4/25/2019	Signal	10.0	A	7.3	A	7.5	A	<4	<0.8					10.0	B	9.9	A	<4	<0.8			
		PM	4/25/2019		8.2	A	9.7	A	9.4	A	<4	<0.8					18.7	B	18.8	B	<4	<0.8			
11	Chrysler Drive & Constitution Drive	AM	3/21/2019	Signal	**50.6**	**D**	**59.8**	**E**	**55.1**	**E**	**<4**	**<0.8**					**>120**	**F**	**>120**	**F**	**<4**	**<0.8**			
		PM	3/21/2019		28.0	C	28.5	C	30.4	C	<4	1.6					**>120**	**F**	**>120**	**F**	**<4**	**<0.8**			
12	Chilco Street & Constitution Drive/MPK 22 Driveway[4]	AM	3/21/2019	AWSC/Signal[3]	**32.1**	**D**	24.8	C	24.6	C	<4	<0.8					**52.9**	**D**	**51.1**	**D**	**<4**	**<0.8**			
		PM	3/21/2019		**32.5**	**D**	**42.9**	**D**	**54.3**	**D**	**11.4**	**11.5**					**113.5**	**F**	**101.8**	**F**	**<4**	**<0.8**			
13	Chilco Street & Hamilton Avenue	AM	1/0/1900	AWSC	9.2	A	10.5	B	10.8	B	<4	<0.8	*Traffic signal potentially feasible*				24.5	C	**27.1**	**D**	<4	2.6	*Traffic signal potentially feasible*		
		PM	1/0/1900		16.8	C	19.0	C	**38.0**	**E**	**19.0**	**19.0**					**>120**	**F**	**>120**	**F**	**24.7**	**24.7**			
14	Ravenswood Avenue & Middlefield Road	AM	3/19/2019	Signal	36.1	D	43.1	D	44.9	D	<4	3.0					49.7	D	49.7	D	<4	<0.8			
		PM	3/19/2019		16.1	B	17.6	B	17.9	B	<4	<0.8					20.2	C	19.5	B	<4	<0.8			
15	Ringwood Avenue & Middlefield Road	AM	3/19/2019	Signal	12.5	B	13.2	B	13.7	B	**<4**	**<0.8**					13.2	B	13.2	B	<4	<0.8			
		PM	3/19/2019		13.7	B	15.2	B	15.4	B	<4	<0.8					21.0	C	21.1	C	<4	<0.8			
16	Willow Road & Bayfront Expressway*[1]	AM	4/23/2019	Signal	**>120**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**14.0**	**6.7**	***No feasible Improvement***				**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
		PM	4/23/2019		**>120**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**					**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
17	Willow Road & Hamilton Avenue[1][2]	AM	3/21/2019	Signal	**73.3**	**E**	**OVERSAT**	**F**	**OVERSAT**	**F**	**44.1**	**54.0**					**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
	Hamilton Avenue Southbound	*AM*			***64.7***	***E***	***64.9***	***E***	***>120***	***F***	***117.9***	***<0.8***					***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
	Main Street Northbound	*AM*			***82.0***	***F***	***83.3***	***F***	***113.7***	***F***	***30.4***	***>120***	***No feasible Improvement***				***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
		PM	3/21/2019	Signal	**>120**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**>120**	**>120**					**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
	Hamilton Avenue Southbound	*PM*			***94.3***	***F***	***>120***	***F***	***>120***	***F***	***>120***	***<0.8***					***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
	Main Street Northbound	*PM*			***>120***	***F***	***>120***	***F***	***>120***	***F***	***<4***	***>120***					***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
18	Willow Road & Park Street (future intersection)[1]	AM	--	Signal	Project Intersection		Project Intersection		**OVERSAT**	**F**	**36.8**	**53.0**	***No feasible Improvement***				Project Intersection		**OVERSAT**	**F**	**34.2**	**49.1**	***No feasible Improvement***		
		PM	--						**OVERSAT**	**F**	**17.5**	**23.1**							**OVERSAT**	**F**	**17.2**	**23.1**			
19	Willow Road & Ivy Drive[1]	AM	3/21/2019	Signal	**75.2**	**E**	**OVERSAT**	**F**	**OVERSAT**	**F**	**20.9**	**46.6**					**OVERSAT**	**F**	**OVERSAT**	**F**	**46.2**	**98.7**	**OVERSAT**	**F**	
	Ivy Drive Southbound	*AM*			***88.2***	***F***	***88.2***	***F***	***75.0***	***E***	***<4***	***<0.8***					***70.9***	***E***	***69.6***	***E***	***<4***	***<0.8***	***61.2***	***E***	***<0.8***
		PM	3/21/2019	Signal	39.5	D	**OVERSAT**	**F**	**OVERSAT**	**F**	**50.1**	**70.9**					**OVERSAT**	**F**	**OVERSAT**	**F**	**80.8**	**102.4**	**OVERSAT**	**F**	
	Ivy Drive Southbound	*PM*			***69.7***	***E***	***68.4***	***E***	***66.1***	***E***	***<4***	***<0.8***					***68.1***	***E***	***71.7***	***E***	***<4***	***3.6***	*49.0*	*D*	*<0.8*
20	Willow Road & O'Brien Drive[1]	AM	3/21/2019	Signal	**58.9**	**E**	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**					**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
	O'Brien Drive Northbound	*AM*			***66.4***	***E***	***72.6***	***E***	***66.4***	***E***	***<4***	***<0.8***					***>120***	***F***	***80.4***	***F***	***<4***	***<0.8***			
		PM	3/21/2019	Signal	**>120**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**					**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
	O'Brien Drive Northbound	*PM*			***>120***	***F***	***>120***	***F***	***>120***	***F***	***<4***	***<0.8***					***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
21	Willow Road & Newbridge Street[1]	AM	3/21/2019	Signal	**93.4**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**40.3**	**49.7**	**OVERSAT**	**F**			**OVERSAT**	**F**	**OVERSAT**	**F**	**25.9**	**74.2**	**OVERSAT**	**F**	
	Newbridge Street Southbound	*AM*			***62.9***	***E***	***69.3***	***E***	***104.2***	***F***	***34.9***	***43.0***	*79.6*	*F*	*9.0*		***>120***	***F***	***108.8***	***F***	***<4***	***<0.8***	***>120***	***F***	***67.3***
	Newbridge Street Northbound	*AM*			***>120***	***F***	***>120***	***F***	***>120***	***F***	***4.4***	***64.0***	*42.1*	*D*	*<0.8*		***>120***	***F***	***>120***	***F***	***101.4***	***>120***	***73.5***	***E***	***<0.8***
		PM	3/21/2019	Signal	**>120**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**	**OVERSAT**	**F**			**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**	**OVERSAT**	**F**	
	Newbridge Street Southbound	*PM*			***62.8***	***E***	***60.8***	***E***	***59.1***	***E***	***<4***	***1.5***	*74.5*	*E*	*26.0*		*84.3*	*F*	***>120***	***F***	***47.1***	***74.2***	***>120***	***F***	***>120***
	Newbridge Street Northbound	*PM*			***>120***	***F***	***>120***	***F***	***>120***	***F***	***<4***	***<0.8***	*51.3*	*D*	*<0.8*		***>120***	***F***	***>120***	***F***	***<4***	***<0.8***	*50.7*	*D*	*<0.8*
22	Willow Road & US 101 Northbound Ramps[1]	AM	3/13/2019	Signal	**92.8**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**11.5**					**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
		PM	3/13/2019		**83.9**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**					**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
23	Willow Road & US 101 Southbound Ramps[1]	AM	3/13/2019	Signal	38.5	D	**OVERSAT**	**F**	**OVERSAT**	**F**	**18.3**	**<0.8**	***No feasible Improvement***				**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
		PM	3/13/2019		**98.9**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**					**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			

Table ES-4 (Continued)
Intersection Level of Service Summary (City of Menlo Park)

					Existing Conditions		Near-Term (2025) Conditions								Cumulative (2040) Conditions							
							No Project		Project Conditions				With Improvement			General Plan Conditions		Project Conditions				With Improvement		
#	Intersection	Peak Hour	Count Date	Traffic Control	Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay
24	Willow Road & Bay Road[1]	AM	4/23/2019	Signal	45.3	D	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**38.3**	**OVERSAT**	**F**		**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**5.4**	**OVERSAT**	**F**	
	Bay Road Southbound	*AM*			***60.1***	***E***	***104.3***	***F***	***>120***	***F***	***31.7***	***31.7***	*27.0*	*C*	***<0.8***	***>120***	***F***	***>120***	***F***	***30.3***	***30.3***	*27.8*	*C*	*<0.8*
		PM	4/23/2019	Signal	**113.5**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**6.6**	**6.7**	**OVERSAT**	**F**		**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**	**OVERSAT**	**F**	
	Bay Road Southbound	*PM*			*29.0*	*C*	*49.2*	*D*	*53.5*	*D*	***4.3***	***4.3***	*23.9*	*C*	***<0.8***	***75.6***	***E***	***82.7***	***F***	***7.0***	***7.0***	*26.5*	*C*	*<0.8*
25	Willow Road & Hospital Plaza/Durham Street[1]	AM	4/16/2019	Signal	43.6	D	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**				**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**11.0**	**OVERSAT**	**F**	
	VA Medical Center Southbound	*AM*			***65.5***	***E***	***73.2***	***E***	***69.5***	***E***	***<4***	***<0.8***				***74.8***	***E***	***74.7***	***E***	***<4***	***<0.8***	***74.7***	***E***	***<0.8***
	Durham Street Northbound	*AM*			***73.9***	***E***	***93.6***	***F***	***79.6***	***E***	***<4***	***<0.8***				***>120***	***F***	***>120***	***F***	***6.0***	***5.4***	***>120***	***F***	***<0.8***
		PM	4/16/2019	Signal	**>120**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**				**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**1.3**	**OVERSAT**	**F**	
	VA Medical Center Southbound	*PM*			***67.6***	***E***	***72.2***	***E***	***70.2***	***E***	***<4***	***<0.8***				***74.2***	***E***	***74.5***	***E***	***<4***	***<0.8***	***69.4***	***E***	***<0.8***
	Durham Street Northbound	*PM*			***73.5***	***E***	***84.6***	***F***	***79.8***	***E***	***<4***	***<0.8***				***88.1***	***F***	***90.3***	***F***	***<4***	***2.8***	***59.9***	***E***	***<0.8***
26	Willow Road & Coleman Avenue	AM	3/19/2019	Signal	18.6	B	25.1	C	23.9	C	<4	<0.8				34.9	C	34.3	C	<4	<0.8			
		PM	3/19/2019		9.2	A	11.0	B	10.8	B	<4	<0.8				13.1	B	13.2	B	<4	<0.8			
27	Willow Road & Gilbert Avenue	AM	3/19/2019	Signal	19.7	B	20.0	C	19.9	B	<4	<0.8				24.4	C	23.9	C	<4	<0.8			
		PM	3/19/2019		10.3	B	13.0	B	12.4	B	<4	<0.8				14.2	B	14.1	B	<4	<0.8			
28	Willow Road & Middlefield Road	AM	3/19/2019	Signal	**61.6**	**E**	**62.3**	**E**	**62.5**	**E**	**<4**	**<0.8**				**64.5**	**E**	**65.0**	**E**	**<4**	**<0.8**			
	Middlefield Road Southbound	*AM*			***67.9***	***E***	***69.8***	***E***	***70.1***	***E***	***<4***	***<0.8***				***69.9***	***E***	***70.4***	***E***	***<4***	***<0.8***			
	Middlefield Road Northbound	*AM*			***67.3***	***E***	***67.7***	***E***	***67.7***	***E***	***<4***	***<0.8***				***67.4***	***E***	***67.2***	***E***	***<4***	***<0.8***			
		PM	3/19/2019	Signal	31.5	C	34.5	C	34.7	C	<4	<0.8				42.5	D	42.4	D	<4	<0.8			
	Middlefield Road Southbound	*PM*			*31.7*	*C*	*34.5*	*C*	*34.7*	*C*	*<4*	*<0.8*				*42.1*	*D*	*42.2*	*D*	*<4*	*<0.8*			
	Middlefield Road Northbound	*PM*			*31.2*	*C*	*34.3*	*C*	*34.7*	*C*	*<4*	*<0.8*				*40.6*	*D*	*40.8*	*D*	*<4*	*<0.8*			
29	O'Brien Drive/Loop Road & Main Street/O'Brien Drive (future intersection)	AM	--	Roundabout	Project Intersection		Project Intersection		7.4	A	7.4	7.4				Project Intersection		8.8	A	8.8	8.8			
		PM	--						9.2	A	9.2	9.2						11.0	B	11.0	11.0			
30	O'Brien Drive & Kavanaugh Drive	AM	4/25/2019	AWSC	11.8	B	12.7	B	**107.7**	**F**	**95.0**	**95.0**	*Traffic signal potentially feasible*			**>120**	**F**	**>120**	**F**	**105.8**	**105.8**	*Traffic signal potentially feasible*		
		PM	4/25/2019		15.2	C	29.6	D	**73.7**	**F**	**44.1**	**44.1**				**>120**	**F**	**>120**	**F**	**<4**	**<0.8**			
31	Adams Drive & Adams Court	AM	4/25/2019	TWSC	11.5	B	11.5	B	11.6	B	<4	<0.8				20.1	C	17.8	C	<4	<0.8			
		PM	4/25/2019		11.9	B	11.9	B	11.9	B	<4	<0.8				16.4	C	12.7	B	<4	<0.8			
32	Adams Drive & O'Brien Drive	AM	4/25/2019	TWSC	17.3	C	17.6	C	**62.5**	**F**	**44.9**	**44.9**	*Traffic signal potentially feasible*			**62.4**	**F**	**>120**	**F**	**>120**	**>120**	*Traffic signal potentially feasible*		
		PM	4/25/2019		**27.6**	**D**	34.0	D	**>120**	**F**	**>120**	**>120**				**>120**	**F**	**>120**	**F**	**>120**	**>120**			
33	University Avenue & Bayfront Expressway*	AM	4/25/2019	Signal	11.4	B	13.9	B	12.1	B	<4	<0.8				14.8	B	13.3	B	<4	<0.8			
		PM	4/25/2019		**94.1**	**F**	**105.8**	**F**	**108.7**	**F**	**<4**	**2.9**				**>120**	**F**	**>120**	**F**	**<4**	**3.1**			

Notes:
* Denotes CMP Intersection
AWSC - All Way Stop Control; TWSC - Two Way Stop Control
[1] Average delay is reported for signalized and AWSC intersections. For TWSC intersections, the delay for the worst stop-controlled movement is reported
"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]Intersections were analyzed using Synchro/SimTraffic software due to the close proximity of these intersections. Changes in average delay and critical delay calculated using Vistro.
[2]The intersection is not considered as non-compliant under cumulative plus project conditions because the critical movement of the local approach shifts with the addition of project traffic.
[3]Intersection operates as an AWSC under existing conditions. It would operate as signalized under background conditions.
[4]The intersection is not considered as non-compliant under background plus project and cumulative plus project conditions because the critical movement of the local approach shifts with the addition of project traffic.
Bold indicates substandard level of service
Bold indicates noncompliance. The project exceeds thresholds in the City of Menlo Park's TIA Guidelines.

Table ES- 5
Intersection Level of Service Summary (City of East Palo Alto)

#	Intersection	Peak Hour	Count Date	Traffic Control	Existing Conditions		Near-Term (2025) Conditions								Cumulative (2040) Conditions							
							No Project		with Project				With Improvement		General Plan Conditions		with Project				With Improvement	
					Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)*	LOS	Incr. in Avg/Crit Delay (sec)	Incr. in Critical V/C	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Incr. in Critical Delay (sec)	Incr. in Critical V/C	Avg. Delay (sec)	LOS
34	University Avenue & Purdue Avenue	AM	6/5/2019	TWSC/	16.5	C	19.7	C	29	D	0.9	0.118			25.9	C	28.0	C	0.8	0.017		
		PM	6/5/2019	Signalized[2]	**47.0**	**E**	**>120**	**F**	**>120**	**F**	**3.8**	**-0.033**			37.1	D	40.8	D	4.2	0.031		
35	University Avenue & Adams Drive	AM	4/25/2019	TWSC	**88.1**	**F**	**91.5**	**F**	**>120**	**F**	**0.4**	**0.084**			**>120**	**F**	**>120**	**F**	**1.4**	**0.253**		
		PM	4/25/2019		**>120**	**F**	**>120**	**F**	**>120**	**F**	**-2.8**	**-0.070**			**>120**	**F**	**>120**	**F**	**-7.3**	**-0.13**		
36	University Avenue & O'Brien Drive	AM	4/23/2019	Signalized	9.6	A	9.5	A	28.9	C	26.1	0.261			21.1	C	43.1	D	29.3	0.245		
		PM	4/23/2019		15.3	B	15.4	B	30.5	C	16.7	0.275			21.3	C	32.6	C	14.1	0.175		
37	University Avenue & Notre Dame Avenue	AM	3/4/2020	Signalized	4.1	A	4.1	A	7.8	A	5.0	0.093			8.0	A	10.6	B	3.1	0.07		
		PM	3/4/2020		9.3	A	9.4	A	10.2	B	1.4	0.012			12.2	B	15.6	B	4.1	0.038		
38	University Avenue & Kavanaugh Drive	AM	4/25/2019	Signalized	6.3	A	6.9	A	7.9	A	1.3	0.014			26.8	C	17.5	B	-12.1	-0.11		
		PM	4/25/2019		12.0	B	15.1	B	16.5	B	1.6	0.015			23.1	C	24.8	C	0.8	0.009		
39	University Avenue & Bay Road	AM	4/25/2019	Signalized	40.4	D	52.4	D	54.7	D	6.7	0.046	40.4	D	48.8	D	53.5	D	8.9	0.054		
		PM	4/25/2019		49.9	D	**60.9**	**E**	**70.6**	**E**	**18.6**	**0.063**	**57.0**	**E**	**68.3**	**E**	**69.0**	**E**	**-1.9**	**-0.008**		
40	University Avenue & Runnymede Street	AM	4/25/2019	Signalized	6.1	A	6.4	A	6.6	A	1.5	0.053			9.7	A	11.7	B	11	0.075		
		PM	4/25/2019		8.7	A	8.8	A	8.8	A	-0.1	-0.009			8.9	A	8.9	A	3.6	0.102		
41	University Avenue & Bell Street	AM	4/25/2019	Signalized	11.3	B	11.7	B	11.6	B	0.0	0.006			14.9	B	16.2	B	2	0.067		
		PM	4/25/2019		16.8	B	18.3	B	18.8	B	1.1	0.038			26.4	C	34.8	C	13.4	0.069		
42	University Avenue & Donohoe Street*	AM	5/1/2019	Signalized	**107.1**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**7.1**	**0.017**	***Corridor***		**OVERSAT**	**F**	**OVERSAT**	**F**	**-1.4**	**-0.002**	***Corridor***	
		PM	5/1/2019		**75.2**	**E**	**OVERSAT**	**F**	**OVERSAT**	**F**	**3.0**	**0.008**	***Improvement***		**OVERSAT**	**F**	**OVERSAT**	**F**	**-4.9**	**-0.009**	***Improvement***	
43	US 101 Northbound Off-Ramp & Donohoe Street*	AM	4/25/2019	Signalized	49.8	D	**OVERSAT**	**F**	**OVERSAT**	**F**	**71.7**	**0.171**	***Corridor***		**OVERSAT**	**F**	**OVERSAT**	**F**	**77.2**	**0.158**	***Corridor***	
		PM	4/25/2019		**>120**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**56.4**	**0.130**	***Improvement***		**OVERSAT**	**F**	**OVERSAT**	**F**	**46.5**	**0.102**	***Improvement***	
44	Cooley Avenue & Donohoe Street*	AM	6/5/2019	Signalized	32.9	C	**OVERSAT**	**F**	**OVERSAT**	**F**	**8.7**	**0.091**	***Corridor***		**OVERSAT**	**F**	**OVERSAT**	**F**	**29.3**	**0.091**	***Corridor***	
		PM	6/5/2019		36.7	D	**OVERSAT**	**F**	**OVERSAT**	**F**	**18.8**	**0.074**	***Improvement***		**OVERSAT**	**F**	**OVERSAT**	**F**	**63.7**	**0.143**	***Improvement***	
45	University Avenue & US 101 Southbound Ramps*	AM	4/25/2019	Signalized	**98.9**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**7.8**	**0.019**	***Corridor***		**OVERSAT**	**F**	**OVERSAT**	**F**	**-2.0**	**-0.004**	***Corridor***	
		PM	4/25/2019		**87.1**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**1.6**	**0.004**	***Improvement***		**OVERSAT**	**F**	**OVERSAT**	**F**	**6.7**	**0.016**	***Improvement***	
46	University Avenue & Woodland Avenue*	AM	4/25/2019	Signalized	**67.1**	**E**	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.1**	**0.000**	***Corridor***		**OVERSAT**	**F**	**OVERSAT**	**F**	**14.1**	**0.04**	***Corridor***	
		PM	4/25/2019		**>120**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**-7.8**	**-0.018**	***Improvement***		**OVERSAT**	**F**	**OVERSAT**	**F**	**19.1**	**0.045**	***Improvement***	
47	E. Bayshore Road & Donahoe Street*	AM	5/21/2019	Signalized	32.6	C	**OVERSAT**	**F**	**OVERSAT**	**F**	**5.7**	**0.013**	***Corridor***		**OVERSAT**	**F**	**OVERSAT**	**F**	**-22.4**	**-0.048**	***Corridor***	
		PM	5/21/2019		38.5	D	**OVERSAT**	**F**	**OVERSAT**	**F**	**5.8**	**0.015**	***Improvement***		**OVERSAT**	**F**	**OVERSAT**	**F**	**-5.3**	**-0.011**	***Improvement***	
48	E. Bayshore Road & Holland Street	AM	6/5/2019	TWSC	8.8	A	8.8	A	8.8	A	0.0	0.000			8.8	A	8.8	A	0.0	0.000		
		PM	6/5/2019		10.0	A	10	A	10	A	0.0	0.000			10	A	10.0	A	0.0	0.000		
49	Saratoga Avenue & Newbridge Street	AM	6/5/2019	TWSC	13.3	B	17.9	C	18.2	C	0.9	0.074			**>120**	**F**	**>120**	**F**	**9.8**	**0.061**	***No Feasible***	
		PM	6/5/2019		15.6	C	22.0	C	21.0	C	0.0	-0.024			**40.0**	**E**	28.6	D	**-2.2**	**-0.12**	***Improvement***	
50	E. Bayshore Road & Euclid Avenue*	AM	5/21/2019	AWSC	**52.4**	**F**	**OVERSAT**	**F**	**OVERSAT**	**F**	**3.6**	**0.028**	***Corridor***		**OVERSAT**	**F**	**OVERSAT**	**F**	**53.8**	**0.057**	***Corridor***	
		PM	5/21/2019		32.6	D	**OVERSAT**	**F**	**OVERSAT**	**F**	**-2.5**	**-0.016**	***Improvement***		**OVERSAT**	**F**	**OVERSAT**	**F**	**-2.7**	**-0.009**	***Improvement***	
51	Clarke Avenue & E. Bayshore Road	AM	9/25/2018	Signalized	13.9	B	13.9	B	14	B	0.2	0.008			14.1	B	14.2	B	0.2	0.014		
		PM	9/25/2018		10.7	B	10.7	B	12.5	B	1.7	0.031			13.9	B	14.0	B	0.2	0.007		
52	Pulgas Avenue & E. Bayshore Road	AM	6/5/2019	Signalized	20.4	C	20.9	C	21.7	C	1.7	0.042			25.4	C	26.5	C	1.4	0.017		
		PM	6/25/2019		19.9	B	33.1	C	37.6	D	5.7	0.034			48.1	D	47.3	D	-0.4	-0.002		

Note:
* Denotes a CMP interesection
AWSC - All Way Stop Control; TWSC - Two Way Stop Control
[1] Average delay is reported for signalized and AWSC intersections. For TWSC intersections, the delay for the worst stop-controlled movement is reported.
[2] Intersection is signalized under cumulative conditions.
"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.
* Intersections were analyzed using Synchro/SimTraffic software due to the close proximity of these intersections. Changes in critical delay and v/c calculated using Traffix.
Bold indicates substandard level of service
Bold indicates adverse effect

Adverse Effects and Recommended Improvements

Improvement options were studied for each intersection that were found to be non-compliant under the near term plus project conditions, and cumulative plus project conditions, were compared to near term no project, and cumulative no project conditions, respectively. Potential improvement strategies are shown in Table ES-6.

Table ES- 6
Recommended Improvements

#	Intersection	Potential Improvement	Notes
1	Marsh Road & Bayfront Expressway	Modify the southbound approach to include a shared left-through lane, shared through-right lane, and a right turn only lane.	This improvement is in Menlo Park's traffic impact fee (TIF) program. With implementation of these intersection modifications, the intersection would be in compliance with the TIA Guidelines and address the Proposed Project's share of the non compliant operation.
5	Marsh Road & Bohannon Drive/Florence Street	Physical improvements at this intersection are considered infeasible due to right-of-way constraints and/or adverse effects on pedestrian and bicycle travel.	The City's TIF program includes multi-modal improvements along the Marsh Road corridor such as Class II buffered bike lanes along Marsh Road from Bay Road to Scott Road, and installing sidewalks along the north-side of Marsh Road between Page Street and Bohannon Drive/Florence Street. Implementing recommended multi-modal facilities along the corridor (from the City's TIF program) could shift some motor vehicle traffic to alternative modes of travel and reduce congestion. With implementation of these multi-modal improvements, the intersection deficiencies could be further reduced and partially address the Proposed Project's share of the non compliant operations at this intersection.
13	Chilco Street & Hamilton Avenue	A traffic signal is not recommended until signal warrants conducted with a future year's actual counts have been met	The recommended improvement includes conducting a signal warrant analyses for a period of five years after full Project completion to determine if a signal would be warranted and if warranted, install a new signal. This improvement is included in the City's TIF program. With implementation of the intersection modifications, the intersection would be in compliance with the TIA Guidelines which would address the Proposed Project's share of the non compliant operation.
16 17 18 23	Willow Road & Bayfront Expressway; Willow Road & Hamilton Avenue; Willow Road & Park Street; Willow Road & US 101 southbound ramps	Physical improvements at thes intersection are considered infeasible due to right-of-way constraints and/or adverse effects on pedestrian and bicycle travel.	The TIF program also proposes multimodal improvements along this section of Willow Road. Implementing recommended multi-modal facilities along the corridor (from the City's TIF program) could shift some motor vehicle traffic to alternative modes of travel and reduce congestion. With implementation of these multi-modal improvements, the intersection deficiencies could be further reduced and partially address the Proposed Project's share of the non compliant operations along Willow Road.
19	Willow Road & Ivy Drive	The Menlo Park TIF proposes to install a right-turn overlap phase on southbound Ivy Drive and restrict eastbound Willow Road U-turns.	This would improve the critical movement delay of the local approach to better than cumulative no project conditions. The Project is required to pay traffic impact fees according to the City's current TIF schedule.

Table ES-6 (Continued)
Recommended Improvements

#	Intersection	Potential Improvement	Notes
21	Willow Road & Newbridge Street	The TIF program proposes to modify the signal timing to a protected left-turn phasing operation on Newbridge Street, provide a leading left-turn phase on the southbound movement and a lagging left-turn phase on the northbound movement, and optimize signal timing.	With implementation of these intersection modifications under project conditions, the critical movement delay would be reduced for the northbound movement to lower than no project conditions. However, the improvement would not address the southbound deficiency. Further improvements to address the southbound deficiency are not feasible.
24	Willow Road & Bay Road	The TIF program proposes to modify the southbound approach at this intersection to two left-turn lanes and one right-turn lane and to modify the westbound approach to add a right-turn lane. With these improvements under project conditions, the critical movement delay at the local approach would be reduced to lower than no project conditions.	This improvement would address the adverse effect on the intersection due to Project traffic. With implementation of these intersection modifications, the Willow Road and Bay Road intersection would be in compliance with the TIA Guidelines which would address the Proposed Project's share of the non compliant operation. With implementation of the recommended improvements from the TIF program for the Willow Road and Bay Road intersection the deficiency attributable to the Proposed Project would be addressed.
25	Willow Road & Hospital Plaza/Durham Street	The recommended improvement measure for this intersection is restriping northbound Durham Street as a shared left-through lane and right-turn lane, and adding a northbound right turn overlap phase.	With this improvement, the critical movement delay of the local approach would improve to better than cumulative no project conditions in the AM peak hour. The PM peak hour would continue to be non-compliant. If this recommended improvement measure is implemented, the Project should contribute its fair share (25%) towards the improvement. Fair share is calculated as the percentage of net project traffic generated of the overall cumulative traffic growth at this intersection.
30	O'Brien Drive & Kavanaugh Drive	The recommended improvement to bring this intersection back to pre-Project conditions is the installation of the new traffic signal and appropriate pedestrian and bicycle accommodation. Alternatively, traffic calming measures could be installed to discourage the use of Kavanaugh Drive, which is a residential street, and encourage vehicles to use O'Brien Drive and Adam's Drive instead. Other measures such as peak period turning movement restrictions could be considered to discourage traffic from using Kavanaugh Drive and improve intersection operations.	Monitoring of traffic operations at this intersection for a period of five years after full Project completion should be conducted to determine if signalization or alternative improvements are needed. If warranted, implementation of the new traffic signal would address the Proposed Project's share of the non compliant operation and bring the intersection into compliance with the TIA Guidelines. If the alternative measures are implemented, the intersection may or may not be brought into compliance with the TIA Guidelines and address the Proposed Project's share of the non compliant operation.
32	Adams Drive & O'Brien Drive	The recommended improvement to bring this intersection back to pre-Project conditions is the installation of the new traffic signal and appropriate pedestrian and bicycle accommodations at this intersection and within the vicinity. The expected intersection operational issues would be due to the increased through traffic on O'Brien Drive between the Project Site and University Avenue. Menlo Park's TIF program identifies an improvement to signalize the nearby intersection at University Avenue and Adams Drive in East Palo Alto. This improvement may provide an alternative route for Project vehicles to access the Project Site via University Avenue.	Monitoring of traffic operations at this intersection for a period of five years after full Project completion should be conducted to determine if signalization or alternative improvements are needed. If warranted, implementation of the new traffic signal would address the Proposed Project's share of the non compliant operation and bring the intersection into compliance with the TIA Guidelines. If the alternative measures are implemented, the intersection may or may not be brought into compliance with the TIA Guidelines and address the Proposed Project's share of the non compliant operation.

Table ES-6 (Continued)
Recommended Improvements

#	Intersection	Potential Improvement	Notes
39	University Avenue & Bay Road	Potential modification to bring the intersection to pre-Project conditions would be to add an exclusive eastbound right-turn lane and a second eastbound left-turn lane on University Avenue, add a second northbound left-turn lane on Bay Road, add a second westbound left-turn lane on University Avenue, and modify signal phasing.	Since this intersection is located within the City of East Palo Alto, the recommended measure to bring the intersection back to pre-Project conditions and address the Project's share of the non compliant operation would be to make a fair share (34%) contribution towards this improvement. Fair share is calculated as the percentage of net project traffic generated divided by the overall cumulative traffic growth at this intersection. The Menlo Park TIF includes improvements at the University Avenue and Bay Road intersection, but not sufficient improvements to bring the intersection back to pre-Project conditions, as described above. However, the Project's fair share contribution towards this intersection would be calculated considering credit from its TIF payment.
42 43 44 45 46 47 50	University Avenue & Donohoe Street; US 101 Northbound Off-ramp & Donohoe Street; Cooley Avenue & Donohoe Street; University Avenue & US 101 Southbound Ramps; University Avenue & Woodland Avenue; E. Bayshore Road & Donohoe Street; Donohoe Street & Euclid Avenue	East Palo Alto plans to widen the northbound approach on Donohoe Street at the US 101 northbound off-ramp to accommodate four through lanes to improve the vehicular throughput at this intersection. This improvement will require median modifications and narrowing the southbound Donohoe Street approach to Cooley Avenue to include two through lanes and a full length left-turn lane. In addition, the traffic signals will be coordinated with adjacent traffic signals on Donohoe Street. East Palo Alto also plans to install a new traffic signal at the US 101 northbound on-ramp and Donohoe Street and Bayshore Road and Euclid Avenue to coordinate with other closely spaced traffic signals along Donohoe Street. Along with new traffic signals, appropriate pedestrian and bicycle accommodation will be provided. This includes pedestrian countdown timers, Americans with Disabilities Act (ADA) compliant curbs, and bicycle detection loops. In order to align with the proposed driveway for the University Plaza Phase II site on the north side of Donohoe Street, the US 101 on-ramp will be shifted approximately 30 feet to the south. In addition, the northbound approach on Donohoe Street will be restriped to accommodate a short exclusive left-turn pocket (approximately 60 feet in length), a shared left-through lane, and a shared through-right lane. These improvements would require widening of the US 101 northbound on-ramp to accommodate two lanes that taper down to a single lane before this ramp connects with the loop on-ramp from eastbound University Avenue. A northbound right turn only will also be added to Bayshore Road and Euclid Avenue.	Because the improvements in this corridor are all interconnected and dependent on each other to work, the recommended improvement measure would be for the Project sponsor to contribute its fair share to improvements at all six intersections in this corridor. Fair share is calculated as the percentage of net project traffic generated of the overall cumulative traffic growth at this intersection. • Donohoe Street & Cooley Avenue: 10% fair share • Donohoe Street & US 101 Northbound Off-Ramp: 24% fair share • Donohoe Street & University Avenue: 31% fair share • Donohoe Street & US 101 Northbound On-Ramp: 8% fair share • Donohoe Street/Bayshore Road & Euclid Avenue: 2% fair share • US 101 Southbound Ramps & University Avenue: 33% fair share The Menlo Park TIF includes improvements at the University Avenue and Donohoe Street and University Avenue and US 101 southbound ramps intersections, which funding would go toward the planned coordinated system of intersections. The Project's fair share contribution towards these two intersections would be calculated considering credit from its TIF payment.
49	Saratoga Avenue & Newbridge Street	Physical improvements at this intersection are considered infeasible due to proximity to Willow Road.	

Intersection Queuing Analysis

The analysis of intersection levels of service was supplemented with a vehicle queuing analysis for intersection left-turning movements where the proposed project would add significant trips per lane in the vicinity of the Project Site and affect intersection operations. Locations where the estimated 95th percentile queues would exceed the available storage capacity for the movement are discussed below. Queuing issues are operational issues resulting from signal timing and queue storage provisions. Queuing issues are not considered a CEQA issue related to hazards.

Eastbound Left-turn at Willow Road and Bayfront Expressway (#16)

Under near-term conditions, the 95th percentile queue would exceed the storage length of the turn pocket by 15 vehicles during the AM peak hour and four vehicles during the PM peak hour. The Proposed Project would add three vehicles to the 95th percentile queue during the AM peak hour and PM peak hour. There is no room to extend the left turn pocket due to the emergency vehicle only lane cut in the median.

Eastbound Left-turn at Willow Road and Ivy Drive (#19)

Under near-term conditions, the 95th percentile queue exceeds the storage length of the turn pocket by three vehicles during the AM peak hour. The Proposed Project would add one vehicle to the 95th percentile queue during the AM peak hour and one vehicle during the PM peak hour. There is no room to further extend this left-turn.

Southbound Left-turn at Willow Road and Bay Road (#24)

Under near-term conditions, the 95th percentile queue exceeds the storage length of the turn pocket by 13 vehicles during the AM peak hour and one vehicle during the PM peak hour. The Proposed Project would add six vehicles to the 95th percentile queue during the AM peak hour and three vehicles during the PM peak hour. Menlo Park's TIF has a project to add a second left-turn lane to this intersection, which would add additional storage for left-turning vehicles. The exact length of the addition will be determined during the design phase for the intersection improvement. Construction of the recommended improvement would reduce the queuing deficiency created by the Proposed Project.

Eastbound Left-turn and Southbound left-turn at University Avenue and O'Brien Drive (#36)

The existing vehicle storage for the eastbound left turn pocket on University Avenue at O'Brien Drive is 125 feet, which provides enough spaces for about 5 vehicles. Under existing conditions, the 95th percentile queue exceeds the storage length of the turn pocket by 3 vehicles during the AM peak hour. The Proposed Project would add 22 vehicles to the 95th percentile queue during the AM peak hour. There is no room to lengthen the eastbound left turn pocket.

The existing vehicle storage for the southbound left turn pocket on O'Brien Drive at University Avenue is 60 feet, which provides enough spaces for 2 vehicles. Under existing conditions, the 95th percentile queue exceeds the storage length of the turn pocket by one vehicle during the AM peak hour and 11 vehicles during the PM peak hour. The Project would add one vehicle to the 95th percentile queue during the AM peak hour. There would be no increase to the 95th percentile queue length during the PM peak hour. There is room to extend the left turn pocket to accommodate the estimated 95th percentile queue of 325 feet.

Menlo Park's Traffic Impact Fee (TIF) program identifies an improvement to signalize the nearby intersection at University Avenue and Adams Drive in East Palo Alto. This improvement may provide an alternative route for Project vehicles to access the Project Site via University Avenue, and alleviate potential queuing issues at this intersection.

Freeway Facilities Analysis

To determine the Proposed Project's potential freeway adverse effects, a select-zone analysis within the Menlo Park model was performed to estimate the increase in project traffic volume between existing conditions and near term with project conditions. Freeway segments that would experience a freeway adverse effect generated by the Proposed Project are identified below.

San Mateo County

The proposed project would add traffic greater than 1% capacity to the following study freeway segments operating below its LOS standard:

- SR 84 – from Willow Road to Alameda County Line – PM Peak Hour
- SR 84 – from Alameda County Line to Willow Road – AM Peak Hour
- US 101 – between Santa Clara County Line and Whipple Avenue – AM & PM Peak Hours
- US 101 – from Whipple Avenue to SR 92 – PM Peak Hour
- US 101 – from SR 92 to Whipple Avenue – AM Peak Hour

Santa Clara County

The proposed project would add traffic greater than 1% capacity to the following mixed-flow freeway segments operating below its LOS standard:

- US 101 – from SR 85 to Embarcadero Road – AM & PM Peak Hours
- US 101 – from Embarcadero Road to SR 85 – PM Peak hour

The proposed project would add traffic greater than 1% capacity to the following HOV freeway segment operating below its LOS standard:

- US 101 – from Oregon Expressway to Embarcadero Road – AM Peak Hour

Freeway Improvements

It should be noted that the near term plus project conditions model run assumed the US 101 express lane project in San Mateo County. Improvements to eliminate the adverse freeway effects on US 101 and on SR 84 within San Mateo County would require additional capacity improvements and/or additional TDM measures that would reduce peak-hour vehicle trip-making by more than 70%. San Mateo County currently has no plans to further improve US 101 beyond the identified express lane projects. There are also no identified plans to improve the Bayfront Expressway (SR 84) corridor. Such an aggressive TDM plan would also not be feasible.

Within Santa Clara County, Valley Transportation Authority's Valley Transportation Plan 2040 identifies freeway express lane projects along US 101 that would convert the existing HOV lanes to express lanes and add a second express lane in each direction. This improvement would increase the capacity of the freeway and would adequately address the freeway impacts.

The potential Dumbarton Rail corridor would slightly reduce the Project contribution to the identified adverse effects but would not eliminate any. Therefore, the Project's adverse effects on US 101 and on SR 84 freeway segments in San Mateo County would remain.

Freeway Ramp Analysis

A freeway ramp analysis is conducted under near term plus project conditions to determine whether freeway ramps would continue to have sufficient capacity to serve the forecasted traffic demand. Under near term plus project conditions, all study freeway ramps would continue to have sufficient capacity to serve the anticipated demand.

Roadway ADT Analysis

The roadway ADT analysis was conducted under cumulative with project conditions. To determine net Project added traffic, a select zone analysis was conducted using the Menlo Park model under cumulative with project conditions and existing conditions. The proposed project would generate non-compliance at the following roadway segments:

- Willow Road, east of Durham Street
- Willow Road, east of Blackburn Avenue
- Middlefield Road, south of Willow Road
- Marsh Road, east of Bohannon Drive
- O'Brien Drive, south of Willow Road
- O'Brien Drive, north of University Avenue
- Bay Road, north of Willow Road

Internal Site Access, Circulation, and Parking

Appendix H includes the analysis of the main Willow Village site as well as the Hamilton parcels. The site plan review evaluated the internal site's intersection operations, potential queuing issues, and general site access and circulation for the proposed seven new internal streets, 14 parking garage driveways, and 20 new intersections. The results of the level of service analysis show that the intersection of Driveway B & East Loop Road would operate at LOS D during the AM peak hour. Vehicles turning left out of Driveway B would be expected to experience an average delay of 31 seconds while waiting for a sufficient opening on East Loop Road. During the AM peak hour, approximately 101 vehicles (16 heading eastbound and 85 heading westbound) would be expected to exit the garage, which would be one to two vehicles per minute. Therefore, although exiting drivers would experience some wait time, operations at Driveway B are expected to be adequate. The results of the queuing analysis show that the intersection of Hamilton Avenue/Main Street & Willow Road is expected to have insufficient turn lane storage to accommodate the anticipated traffic volumes under near-term plus project conditions. However, it is assumed that vehicles would choose to instead enter the project site via Park Street. Hexagon recommends the following regarding the internal project circulation:

Circulation Related Recommendations

- To prevent southbound queues from spilling back onto Willow Road on Park Street and Main Street, Hexagon recommends coordinating the adjacent signals.

Sight Distance Related Recommendations

- As discussed under Mitigation Measure TRA-2 (see Transportation Chapter of the draft EIR), prior to issuance of the building permit for the North Garage, the applicant shall revise the access design to provide adequate sight distance for the eastern driveway or other design solutions to reduce hazards to a less than significant level, to the satisfaction of the Public Works Director. Potential solutions that would reduce hazards to a less than significant level include restricting the eastern driveway to inbound vehicles only or prohibiting exiting left turns, modifying landscaping or relocating the driveway to the west to allow for adequate sight distance for exiting vehicles, or installing an all-way stop or signal. If driveway A were restricted to inbound vehicles only, all outbound vehicles would use Driveway B, which would provide adequate sight distance for vehicles exiting the north office garage. Driveway B might need multiple exiting lanes to limit queuing inside the garage for exiting vehicles. Alternatively, Driveway A could be moved farther west on East Loop Road so that adequate sight distance could be provided.

- Prior to final design, the project applicant should ensure that landscaping and vegetation would not obstruct visibility at the parking garage driveways.
- Hexagon recommends including 30 feet of red curb on both sides of all garage driveways to prevent vehicles from parking and obstructing the vision of exiting drivers.
- If vehicles exiting the garages cannot see oncoming pedestrians on the sidewalk, Hexagon recommends installing warning signs to alert pedestrians when vehicles are exiting the garages.
- If any driveways are moved from their position on the current site plan, sight distance should be reevaluated.

Parking Garage Circulation Related Recommendations

- Prior to final design, it is recommended that all driveway widths meet the City's requirements.
- At garage driveways where gates and garage doors are proposed, Hexagon recommends conducting an operational analysis to ensure that gate opening and closing times would not create queuing issues or cause vehicles to spill onto the roadway network.
- Prior to final design, the residential parking on level P1 of building RS2 should be shown to be gated and separated from the retail parking on levels 1 and 2. In addition, the roll-up gate in building RS3 should be clearly shown to separate the retail parking in level B1 and the residential parking in level B2.
- It is recommended that all drive aisle and parking stall widths meet the City's requirements.
- It is recommended that adequate turnaround space is provided at all dead-end drive aisles.

Parking Related Recommendations

- If individual vehicles are not able to be retrieved in the tandem puzzle parking, the tandem spaces should be assigned to one residential unit.
- Prior to final design, Hexagon recommends that the required number of ADA and EV parking spaces be provided in all parking garages.

Pedestrian Related Recommendations

- Hexagon recommends that a crosswalk is provided at the intersection of Center Street & East Street and that midblock crosswalks are provided on Center Street and Park Street to reduce block size and improve pedestrian convenience.

Hamilton Parcels Recommendations

- The Hamilton Avenue Parcels are located within the C-2-S zoning district, which per Menlo Park Municipal Code Section 16.37(7), will have parking requirements established by the planning commission for each development. The Hamilton Avenue Parcel North proposes total potential development up to 22,402 square feet and 93 spaces. The Hamilton Avenue Parcel South proposes total development of 5,760 s.f. and 13 spaces. It is recommended that the project applicant confirm that sufficient parking is provided for the proposed total development as part of future architectural control and use permit applications with the City.

1. Introduction

This report presents the results of the Transportation Impact Analysis (TIA) conducted for the proposed Willow Village Master Plan Project in Menlo Park, California. Proposed Project would redevelop an approximately 59-acre industrial site plus two parcels north of Willow Road[7] (collectively, the Project Site) as a mixed-use development (Figure 1). The Proposed Project would demolish all existing onsite buildings and landscaping on the 59-acre portion of the Project Site and construct new buildings, provide open space areas, and install infrastructure within a new Residential/Shopping District, Town Square District, and Campus District. In addition, the Proposed Project would alter two parcels (Hamilton Avenue Parcels North and South[8]) to accommodate realignment of Hamilton Avenue at Willow Road for Project Site access.

The Proposed Project would provide up to 1.6 million sf of space for office and accessory use (consisting of up to 1.25 million sf of office uses and the balance (350,000 square if office use is maximized) of accessory uses[9]) and up to 200,000 sf of commercial/retail space. The Proposed Project would also include up to 1,730 multi-family housing units, an up to 193-room hotel, and open spaces, including publicly accessible parks (e.g. 3.5 acre publicly accessible park, elevated linear park, town square, and dog park).

The Project Site would be bisected by a new north–south street (Main Street) and an east–west street, which would provide access to all three districts. It would include a circulation network for vehicles, bicycles, and pedestrians, inclusive of both public rights-of-way and private streets, that would be generally aligned to an east-to-west and a north-to-south grid (Figure 2). The Proposed Project would also alter parcels north of the industrial site, across Willow Road, on both the east and west sides of Hamilton Avenue (Hamilton Avenue Parcels North and South) to support realignment of the Hamilton Avenue right-of-way and provide access to the new elevated park. This would require demolition and reconstruction of an existing service station (Chevron gas station) and potentially an increase in 1,000 sf on Hamilton Avenue Parcel South and enable the potential addition of up to 6,700 sf of retail uses at the existing neighborhood shopping center on the Hamilton Avenue Parcel North. A total of 7,700 sf could be added to the Hamilton Avenue Parcels (Figure 3).

[7] For transportation analysis, “North/South” is aligned to be parallel to US 101. Hence, Willow Road and University Avenue are considered east-west streets, whereas Hamilton Avenue and Bayfront Expressway are considered north-south streets.
[8] Hamilton Avenue Parcels North and South consider Hamilton Avenue an east to west street, which differs from the compass directions used for the transportation analysis discussion.
[9] Accessory uses could include the following types of spaces: meeting/collaboration space, orientation space, training space, event space, incubator space, a business partner center, an event building (including pre-function space, collaboration areas, and meeting/event rooms), a visitor center, product demonstration areas, film studio, gathering terraces and private gardens, and space for other Meta accessory uses. Accessory uses could occur in spaces located anywhere throughout the Campus District

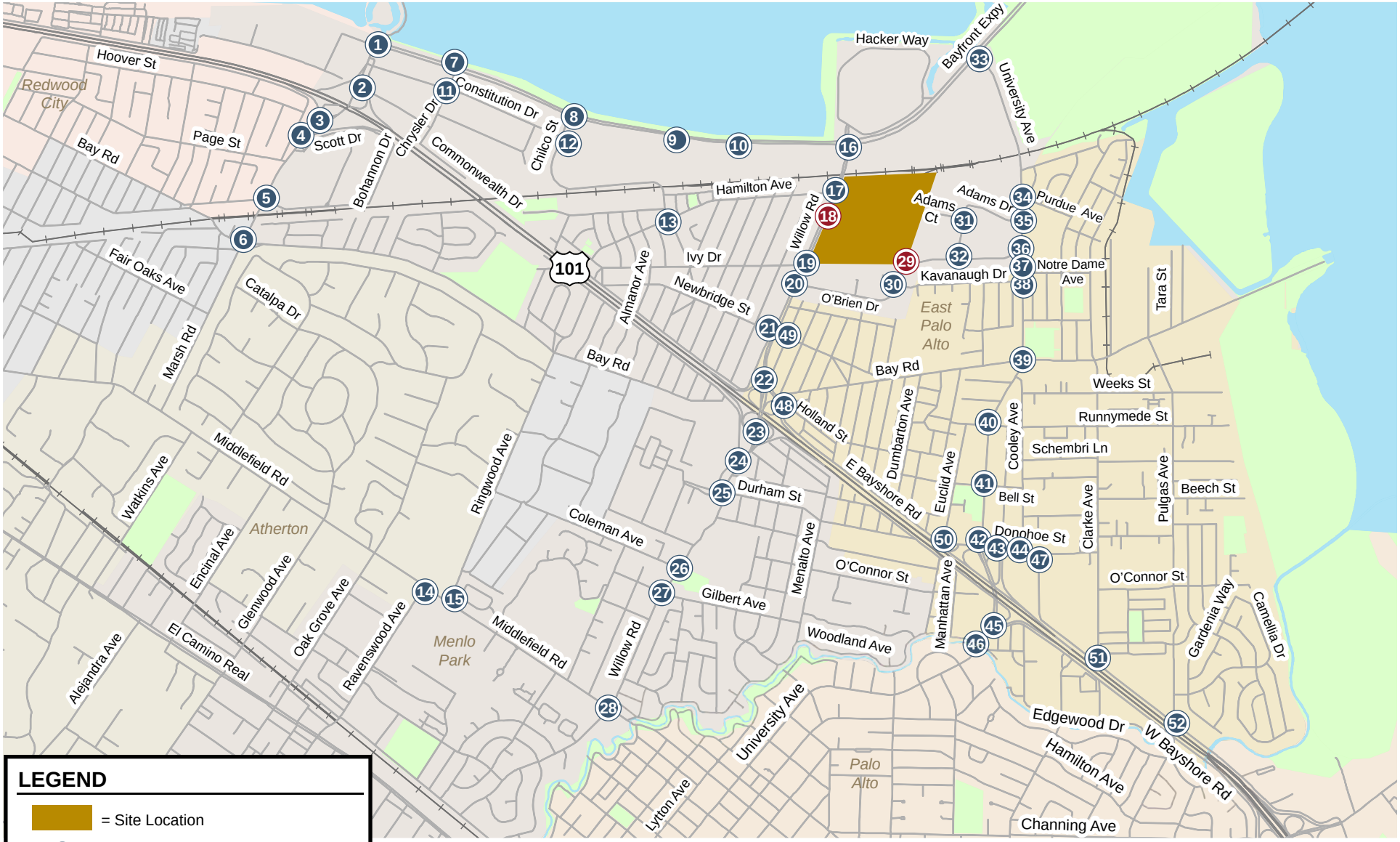


Figure 1
Site Location and Study Intersections

NORTH
Not to Scale

LEGEND	
1	Town Square
2	Grocery Store on Ground Level
3	Publicly Accessible Park
4	Publicly Accessible Dog Park
5	Elevated Park Access (Elevator and Stairs)
6	Elevated Park
7	Hotel
8	Mixed-Use Block
9	Residential Block
10a	Office Campus
10b	Meeting & Collaboration Space
11	Parking Garage with Transit Hub on Ground Level
12	Proposed Multi-use Pathway
13	Willow Road Tunnel
14	Realigned Hamilton Avenue

Figure 2
Site Plan

NORTH
Not to Scale

Figure 3
Hamilton Avenue Parcels Site Plan

NORTH
Not to Scale

Scope of Study

The purpose of the transportation study is to identify any transportation operational issues in accordance with City of Menlo Park standards and procedures. This report includes a CEQA VMT analysis, non-CEQA level of service (LOS) analysis (or roadway congestion analysis) and on-site access and circulation review to inform local planning efforts per the City's TIA Guidelines.

CEQA VMT Analysis

Per the City of Menlo Park VMT guidelines adopted in July 2020 and updated in January 2022, mixed-use projects will have each component analyzed independently against the appropriate thresholds. The Project proposes office, residential, hotel and retail land uses. OPR's *Technical Advisory on Evaluating Transportation Impacts in CEQA* recommends that VMT analysis for a mixed-use project should account for internal capture. Internal capture is defined as walking, bicycling, and tram trips between the various types of land use within the Project. By reducing external vehicle trips, internal capture reduces VMT for a mixed-use project in comparison to single-use developments. The project proposes office, residential, hotel and retail land uses. Each of the Project's land uses' VMT threshold of significance is listed below:

- An office project is considered to have a significant impact on VMT if the project's VMT exceeds a threshold of 15 percent below the regional average VMT per employee.
- A residential project is considered to have a significant impact on VMT if the project's VMT exceeds a threshold of 15 percent below the regional average VMT per capita.
- Hotel and retail projects are considered to have a significant impact on VMT if the project results in a net increase in total City VMT.

It should be noted that the City's VMT guidelines exempt local serving retail projects (defined as 50,000 square feet or less) from carrying out a VMT analysis. However, this project exceeds that size.[10]

Non-CEQA Level of Service (Roadway Congestion Analysis)

An LOS analysis was conducted to identify whether the proposed project would comply with local policies.

The traffic analysis is based on the AM and PM peak-hour level of service for 42 signalized intersections and 10 unsignalized intersections in the vicinity of the Project Site as illustrated in Figure 1. Traffic conditions at the study intersections were analyzed for the weekday AM and PM peak hours of adjacent street traffic. The AM peak hour is expected to occur between 7:00 AM and 10:00 AM, and the PM peak hour between 4:00 PM and 7:00 PM on a typical weekday. These are the hours during which most traffic congestion occurs on the roadways. Intersections within the City of East Palo Alto are also studied due to Menlo Park's settlement agreement with the City of East Palo Alto.

The proposed project would generate greater than 100 peak-hour trips. The San Mateo County City/County Association of Governments (C/CAG) administers the CMP. Therefore, an analysis in accordance with the C/CAG CMP guidelines is included.

[10] The VMT for the main Project Site was evaluated. The reconstruction of the service station would not increase VMT, and the modest increase in retail square footage at Hamilton Avenue Parcel North would be operated as a separate project and would be substantially below the City's threshold. Therefore, VMT was not studied for the reconstruction of the service station and the potential increase in square footage at Hamilton Parcel North.

Study Intersections

1. Marsh Road and Bayfront Expressway [Menlo Park]*
2. Marsh Road and US 101 Northbound Off-Ramp [Caltrans]
3. Marsh Road and US 101 Southbound Off-Ramp [Caltrans]
4. Marsh Road and Scott Drive [Menlo Park]
5. Marsh Road and Bohannon Drive/Florence Street [Menlo Park]
6. Marsh Road and Bay Road [Menlo Park]
7. Chrysler Drive and Bayfront Expressway [Menlo Park]
8. Chilco Street and Bayfront Expressway [Menlo Park]
9. MPK 21 Driveway and Bayfront Expressway [Menlo Park]
10. MPK 20 Driveway and Bayfront Expressway [Menlo Park]
11. Chrysler Drive and Constitution Drive [Menlo Park]
12. Chilco Street and Constitution Drive/MPK 22 Driveway (unsignalized) [Menlo Park]
13. Chilco Street and Hamilton Avenue (unsignalized) [Menlo Park]
14. Ravenswood Avenue and Middlefield Road [Menlo Park]
15. Ringwood Avenue and Middlefield Road [Menlo Park]
16. Willow Road and Bayfront Expressway [Menlo Park]*
17. Willow Road and Hamilton Avenue [Menlo Park]
18. Willow Road and Park Street (future intersection) [Menlo Park]
19. Willow Road and Ivy Drive [Menlo Park]
20. Willow Road and O'Brien Drive [Menlo Park]
21. Willow Road and Newbridge Street [Menlo Park]
22. Willow Road and US 101 Northbound Ramps [Caltrans]
23. Willow Road and US 101 Southbound Ramps [Caltrans]
24. Willow Road and Bay Road [Menlo Park]
25. Willow Road and Hospital Plaza/Durham Street [Menlo Park]
26. Willow Road and Coleman Avenue [Menlo Park]
27. Willow Road and Gilbert Avenue [Menlo Park]
28. Willow Road and Middlefield Road [Menlo Park]
29. O'Brien Drive/Loop Road and Main Street/O'Brien Drive (future intersection) [Menlo Park]
30. O'Brien Drive and Kavanaugh Drive (unsignalized) [Menlo Park]
31. Adams Drive and Adams Court (unsignalized) [Menlo Park]
32. Adams Drive and O'Brien Drive (unsignalized) [Menlo Park]
33. University Avenue and Bayfront Expressway [Menlo Park]*
34. University Avenue and Purdue Avenue (unsignalized) [East Palo Alto]
35. University Avenue and Adams Drive (unsignalized) [East Palo Alto]
36. University Avenue and O'Brien Drive [East Palo Alto]
37. University Avenue and Notre Dame Avenue [East Palo Alto]
38. University Avenue and Kavanaugh Drive [East Palo Alto]
39. University Avenue and Bay Road [East Palo Alto]
40. University Avenue and Runnymede Street [East Palo Alto]
41. University Avenue and Bell Street [East Palo Alto]
42. University Avenue and Donohoe Street [East Palo Alto]
43. US 101 Northbound Off-Ramp and Donohoe Street [Caltrans]
44. Cooley Avenue and Donohoe Street [East Palo Alto]
45. University Avenue and US 101 Southbound Ramps [Caltrans]
46. University Avenue and Woodland Avenue [East Palo Alto]
47. East Bayshore Road and Donohoe Street [East Palo Alto]
48. East Bayshore Road and Holland Street (unsignalized) [East Palo Alto]
49. Saratoga Avenue and Newbridge Street (unsignalized) [East Palo Alto]

50. East Bayshore Road and Euclid Avenue (unsignalized) [East Palo Alto]
51. Clarke Avenue and East Bayshore Road [East Palo Alto]
52. Puglas Avenue and East Bayshore Road [East Palo Alto]

*Denotes CMP facilities

Freeway Segments

San Mateo County

- SR 84 – between US 101 and Alameda County Line
- US 101 – between Santa Clara County Line and SR 92
- SR 109 (University Avenue) – between Kavanaugh Drive and SR 84
- SR 114 (Willow Road) – between US 101 and SR 84

Santa Clara County

- US 101 – between SR 85 and Embarcadero Road

Alameda County

- SR 84 – between San Mateo County Line and I-880

Freeway Ramps

US 101 & Marsh Road Interchange

- Southbound off-ramp to Marsh Road
- Northbound on-ramp from westbound Marsh Road

US 101 & Willow Road Interchange

- Northbound off-ramp to Willow Road
- Northbound on-ramp from westbound Willow Road
- Southbound on-ramp from westbound Willow Road
- Southbound off-ramp to Willow Road

US 101 & University Avenue Interchange

- Northbound off-ramp to Donohoe Street
- Southbound on-ramp from University Avenue

Traffic conditions were evaluated for the following scenarios:

Scenario 1: *Existing Conditions.* Existing traffic volumes at the study intersections are based on traffic counts obtained from the City of Menlo Park and/or previous studies for other nearby developments.

Scenario 2: *Near-term (2025) Conditions.* The near-term scenario assumed a year 2025 horizon[11] and was analyzed using the model. Traffic volumes were obtained from the Menlo Park Travel Demand Model and adjusted based on existing counts and model results. In addition, traffic and roadway improvements associated with the approved developments were assumed as directed by City Staff.

[11] 2025 is the earliest year for expected occupancy when this analysis started.

Scenario 3: *Near-term (2025) plus Project Conditions.* The near term plus project scenario was analyzed using the model. Traffic volumes were obtained from the Menlo Park Travel Demand Model and adjusted based on existing counts and model results. The near-term plus project scenario was evaluated relative to the near-term scenario.

Scenario 4: *Cumulative (2040) Conditions.* The cumulative scenario assumed a year 2040 horizon and represented the buildout of the adopted General Plan for the City of Menlo Park, including a pending General Plan Amendment for 123 Independence Drive. This scenario was analyzed using the model. Traffic volumes were obtained from the Menlo Park Travel Demand Model and adjusted based on existing counts and model results. In addition, traffic and roadway improvements associated with the approved developments were assumed as directed by City Staff.

Scenario 5: *Cumulative (2040) Plus Project Conditions.* The cumulative plus project scenario was analyzed using the model. Traffic volumes were obtained from the Menlo Park Travel Demand Model and adjusted based on existing counts and model results. The cumulative plus project scenario was evaluated relative to the cumulative scenario.

Scenario 6: *Cumulative (2040) with Dumbarton Rail.* The cumulative with Dumbarton Rail scenario assumed that the Dumbarton Rail would be built and there would be a shift in vehicular trips to transit trips near the Project Site[12] as well as along the Dumbarton Rail corridor. Cumulative plus project conditions with Dumbarton Rail were evaluated relative to cumulative conditions with the Dumbarton Rail. This analysis is speculative since there is no current approved plan or financing to provide any Dumbarton transit service and is provided for informational purposes in the transportation analysis.

Methodology

This section presents the methods used to determine the traffic conditions at study intersections for each scenario described above. It includes descriptions of the data requirements, the analysis methodologies, and the applicable level of service standards and criteria used to determine if a project is compliant with local policies.

Data Requirements

The data required for the analysis were obtained from the City of Menlo Park, field observations, and previous studies. The following data were obtained from these sources:

- existing peak-hour intersection turning-movement volumes,
- existing lane configurations,
- signal timing and phasing, and
- list of approved projects.

Existing counts and field observations were conducted prior to the COVID19 pandemic. No adjustments to the data were made based on pandemic conditions.

[12] *Dumbarton Rail Corridor Update Public Meeting*, Prepared by Facebook for the San Mateo County Transit District. March 15, 2021

Intersection Level of Service Methodologies

Traffic conditions 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 forced-flow conditions with extreme delays.

As stated above, LOS is no longer a CEQA threshold. However, the General Plan and City's TIA Guidelines require that the TIA also analyze LOS for local planning purposes (per General Plan Program Circ-3.A Transportation Impact Metrics):

> Supplement Vehicle Miles Traveled (VMT) and greenhouse gas emissions per service population (or other efficiency metric) metrics with Level of Service (LOS) in the transportation impact review process, and utilize LOS for identification of potential operational improvements, such as traffic signal upgrades and coordination, as part of the Transportation Master Plan.

The LOS analysis would determine whether the project traffic would cause an intersection LOS to exceed the City's LOS thresholds or cause either the average delay or average critical delay to exceed the City's intersection delay thresholds under near term and cumulative conditions. The LOS and delay thresholds vary depending on the street classifications as well as whether the intersection is on a State route or not.

The City's TIA Guidelines further require an analysis of the Proposed Project in relation to relevant policies of the Circulation Element and consideration of specific measures to address noncompliance with local policies which may occur as a result of the addition of project traffic. The TIA identifies measures that could be applied as conditions of approval that would bring operations back to pre-Project levels. Although not included in the TIA for purposes of this EIR, an analysis may be prepared separately to determine if there are potential measures that could bring the Proposed Project into conformance with the LOS goals of Circulation Policy 3.4. Implementation of any such measures would require review and approval by City decision makers.

The level of service standard for the City of East Palo Alto at the study intersections is LOS D or better.

Microscopic Simulation of Study Intersections

Due to the close proximity of selected study intersections, six study intersections in the vicinity of the US 101/University Avenue interchange, and ten intersections along Willow Road, were analyzed using the Synchro/SimTraffic 9 software. Unlike macroscopic models of isolated intersection operations such as the Highway Capacity Manual methodology, SimTraffic is a microscopic model that measures the full impact of queuing and blocking of intersections. This software also provides a visual animation of the traffic operations. Simulated delay values were correlated to the level of service definitions set forth in the 2000 Highway Capacity Manual (HCM) methodology.

Macroscopic Analysis of Signalized Intersections

Traffic operations at the signalized study intersections in the City of Menlo Park were evaluated using the VISTRO software based on the level of service method described in the Highway Capacity Manual (HCM) 6th Edition. The study intersections in the City of East Palo Alto and the City of Palo Alto were evaluated using the TRAFFIX software based on the 2000 HCM methodology. The study intersections in Atherton were evaluated using the SYNCHRO software based on the HCM 6th Edition methodology. The 2000 HCM and HCM 6th Edition evaluate signalized intersection operations on the basis of average control delay time for all vehicles at the intersection. Table 1 shows the level of service definitions for signalized intersections.

Unsignalized Intersections

Peak-hour levels of motor vehicle delay at the unsignalized study intersections in the City of Menlo Park were evaluated using the VISTRO software based on the HCM 6th Edition. The study intersections in the City of East Palo Alto were evaluated using the TRAFFIX software based on the 2000 HCM methodology. With these methods, operations are defined by the average control delay per vehicle (measured in seconds) for each movement that must yield the right-of-way. At side-street controlled intersections (two-way or one-way stop control), the control delay (and LOS) is reported for the approach with the highest delay. For all-way stop-controlled intersections, the average delay (and LOS) for all movements is reported. Table 2 summarizes the relationship between average control delay per vehicle and LOS for unsignalized intersections.

Table 1
Signalized Intersection Level of Service Definitions Based on Control 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 some vehicles may 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, *Highway Capacity Manual 6th Edition* (Washington, D.C., 2016), p.16-19.

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

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

Source: Transportation Research Board, *Highway Capacity Manual 6th Edition* (Washington D.C., 2016).

Freeway Segments

Freeway segments within the County of San Mateo are evaluated by using the volume-to-capacity (V/C) ratio method according to the City/County Association of Governments (C/CAG) CMP guidelines. The CMP specifies varying capacities be used based on the number of lanes and the free-flow travel speed. The County of San Mateo freeway segment V/C ratio is correlated to level of service as shown in Table 3.

Within Santa Clara County, freeway segments are analyzed as prescribed in the Santa Clara County CMP technical guidelines. The level of service for freeway segments is estimated based on vehicle density. Vehicle density on a segment is correlated to level of service as shown in Table 3. The CMP requires that mixed-flow lanes and auxiliary lanes be analyzed separately from high-occupancy vehicle (HOV) lanes. The CMP specifies that a capacity of 2,300 vehicles per hour per lane (vphpl) be used for segments three lanes or wider in one direction, and a capacity of 2,200 vphpl be used for segments two lanes wide in one direction. HOV lanes are specified as having a capacity of 1,650 vphpl.

Freeway segments within Alameda County are evaluated by using V/C ratios according to the Alameda County Transportation Commission (ACTC) guidelines. The CMP specifies that a capacity of 2,000 vehicles per hour per lane (vphpl) be used for all freeway segments. The Alameda County freeway segment V/C ratio is correlated to level of service as shown in Table 3.

Freeway Ramps

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

Table 3
Freeway Segment Level of Service Definition

Level of Service	Description	San Mateo County [1] Maximum V/C Ratio	Santa Clara County [2] Density (vehicles/mile/ lane)	Alameda County [3] Maximum V/C Ratio
A	Average operating speeds at the free-flow speed generally prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.	0.28	11.0 or less	0.35
B	Speeds at the free-flow speed are generally maintained. The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high.	0.46	11.0 to 18.0	0.58
C	Speeds at or near the free-flow speed of the freeway prevail. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more vigilance on the part of the driver.	0.67	18.0 to 26.0	0.75
D	Speeds begin to decline slightly with increased flows at this level. Freedom to maneuver within the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort levels.	0.85	26.0 to 46.0	0.90
E	At this level, the freeway operates at or near capacity. Operations in this level are volatile, because there are virtually no usable gaps in the traffic stream, leaving little room to maneuver within the traffic stream.	1	46.0 to 58.0	1
F	Vehicular flow breakdowns occurs. Large queues form behind breakdown points.	greater than 1	greater than 58.0	greater than 1

Source:

1. City/County Association of Governments of San Mateo County, Final San Mateo County Congestion Management Program 2019, Table B-1 (65 mph free-flow speed).
2. Santa Clara County Valley Transportation Authority, Transportation Impact Analysis Guidelines, Updated October 2014.
3. Alameda Cunty Congestion Management Agency, *2020 Multimodal Monitoring Report*, Table A-1.

Level of Service Standards and Adverse Effect Criteria

City of Menlo Park Definition of Adverse Effect

The following thresholds are from the City of Menlo Park's TIA Guidelines and the proposed project's compliance with local policies was evaluated based on these thresholds.

- A project is considered potentially noncompliant with local policies if the addition of project traffic causes an intersection on a collector street operating at LOS "A" through "C" to operate at an unacceptable level (LOS "D," "E" or "F") or have an increase of 23 seconds or greater in average vehicle delay, whichever comes first. Potential noncompliance shall also include a project that causes an intersection on arterial streets or local approaches to State controlled signalized intersections operating at LOS "A" through "D" to operate at an unacceptable level (LOS "E" or "F") or have an increase of 23 seconds or greater in average vehicle delay, whichever comes first.
- A project is also considered potentially noncompliant if the addition of project traffic causes an increase of more than 0.8 seconds of average delay to vehicles on all critical movements for intersections operating at a near-term LOS "D" through "F" for collector streets and at a near-term LOS "E" or "F" for arterial streets. For local approaches to State controlled signalized intersections, a project is considered to be potentially noncompliant if the addition of project traffic causes an increase of more than 0.8 seconds of delay to vehicles on the most critical movements for intersections operating at a near-term LOS "E" or "F."

State (Caltrans) Controlled Intersections Definition of Adverse Effect

For signalized intersections involving two state routes, the proposed project is considered potentially non-compliant with local policies if for any peak hour:

- The level of service degrades from an acceptable LOS D or better under existing conditions to an unacceptable LOS E or F under existing plus project conditions, and the average delay per vehicle increases by four seconds or more, or
- The level of service is an unacceptable LOS E or F under existing conditions and the addition of project trips causes an increase in the average control delay at the intersection by four seconds or more.

City of East Palo Alto Definition of Adverse Effect

The following thresholds are used in East Palo Alto, and the proposed project's compliance with local policies was evaluated based on these thresholds:

At a signalized intersection, the project is considered to have an adverse effect if it:

- Causes operations to degrade from LOS D (or better) to LOS E or F; or
- Exacerbates LOS E or F conditions by both increasing critical movement delay by four or more seconds and increasing volume-to-capacity ratio (V/C ratio) by 0.01 at an intersection evaluated using the TRAFFIX software; or
- Increases the V/C ratio by > 0.01 at an intersection that exhibits unacceptable operations, even if the calculated LOS is acceptable; or
- Causes planned future intersections to operate at LOS E or F.

At an unsignalized intersection, the proposed project is considered to have an adverse effect if it:

- Causes operations to degrade from LOS D or better to LOS E or F; or
- Exacerbates LOS E or F conditions by increasing control delay by five or more seconds; and
- Causes volumes under project conditions to exceed the Caltrans Peak-Hour Volume Warrant Criteria.

Intersection Vehicle Queuing Analysis

For selected high-demand movements at the study intersections, the estimated maximum vehicle queues were compared to the existing or planned storage capacity. The queuing analysis is used to determine the appropriate storage lengths for the high-demand turn lanes where the proposed project would add a substantial number of trips to these movements. Vehicle queues were estimated using Vistro or Synchro for intersections analyzed with this software and a Poisson probability distribution for intersections analyzed in Traffix. Poisson probability distribution estimates the probability of "n" vehicles for a vehicle movement using the following formula:

$$\text{Probability } (X=n) = \frac{\lambda^n e^{-(\lambda)}}{n!}$$

Where:

Probability (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 queue per lane (vehicles per hour per lane/signal cycles per hour)

The basis of the analysis is as follows: (1) the Poisson probability distribution, Vistro, or Synchro is used to estimate the 95th percentile maximum number of queued vehicles per signal cycle 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.

For signalized intersections, the 95th percentile queue length value indicates that during the peak hour, a queue of this length or less would occur on 95 percent of the signal cycles. In other words, a queue length larger than the 95th percentile queue would only occur on five percent of the signal cycles (about three cycles during the peak hour for a signal with a 60-second cycle length). Therefore, left-turn storage pocket designs based on the 95th percentile queue length would ensure that storage space would be exceeded only five percent of the time. The 95th percentile queue length is also known as the "design queue length."

2. CEQA VMT Analysis

Project VMT is defined as the total distance traveled by vehicles traveling to and from the Proposed Project over a typical day. In order to estimate VMT for the various land use components, the citywide travel demand forecast model was used. The citywide model is the best available model to represent travel within the City of Menlo Park, and serves as the primary forecasting tool for the City. The model is a mathematical representation of travel within the nine Bay Area counties, as well as the Santa Cruz, San Benito, Monterey and San Joaquin counties. The base model structure was developed by the Metropolitan Transportation Commission (MTC) and further refined by the City/County Association of Governments and Santa Clara Valley Transportation Authority for use within San Mateo County and Santa Clara County. The City further refined this model for application with Menlo Park to add more detail to the zone structure and transportation network. The model has a base year of year 2019 (see Appendix E, Transportation/Traffic, of this EIR for the model's calibration and validation memo).

There are four main components of the model: 1) trip generation, 2) trip distribution, 3) mode choice, and 4) trip assignment. The model uses socioeconomic inputs (i.e., population, income, employment) aggregated into geographic areas, called transportation analysis zones (TAZ) to estimate travel within the model area. There are 80 TAZs within the model to represent the City of Menlo Park. The model was used to estimate the Proposed Project's effect on VMT in accordance with the City's VMT guidelines.

VMT Evaluation

The most readily available long-range forecast year is the year-2040 conditions, which assumes the buildout of the City of Menlo Park General Plan and any pending General Plan Amendments, the buildout of the pending developments in the City of East Palo Alto (as of December 2020), and regional growth projected by the Association of Bay Area Governments (ABAG), modified by VTA/C/CAG for model land use inputs. Therefore, the project's VMT analysis was conducted under year-2040 conditions.

Office and Residential Land Uses

According to the City's VMT guidelines, office land use is evaluated based on a daily VMT per employee metric. Using the model, this metric is calculated only for home-based work trips, per OPR's Technical Advisory on Evaluating Transportation Impacts in CEQA. Based on the latest citywide travel demand model, the regional average office VMT is 15.9 per employee. Therefore, City's office VMT impact threshold, at 15% below regional average, would be 13.6 daily VMT per employee.

According to City VMT guidelines, the evaluation of residential land use is based on a daily VMT per capita metric. Using the model, this metric is calculated only for home-based trips, per OPR's technical advisory. Based on the latest citywide travel demand model, regional average residential VMT is 13.1

per capita. Therefore, the City's residential VMT impact threshold, at 15% below regional average, would be 11.2 daily VMT per capita.

Office and residential land uses were evaluated using the model under the year-2040 plus project scenario. For the Campus District, the applicant proposed a daily trip cap of 18,237 trips, which would be 20% below the standard ITE trip generation estimate. The model was adjusted to account for the proposed trip cap. As shown in Table 4 below, the project's Campus District land use would generate VMT at the City's VMT impact threshold and would thus not have a VMT impact.

For the residential land use, trip generation was adjusted to account for the Project's expected 2.03 people per unit compared to the ITE average of 2.46 people per unit. The VMT analysis also accounted for the applicant proposed TDM Plan for the mixed-use district. The TDM Plan proposed a 20% trip reduction from gross ITE trip generation through a combination of passive TDM measures and active TDM measures. Passive TDM measures include the project's proximity to complementary land uses, proximity to alternative transportation infrastructure, and the project's mixed-use nature. As discussed in Chapter 3 below, it is estimated that the passive TDM measures would achieve a 17% trip reduction from the gross ITE trip generation. Active TDM measures include TDM programs to be implemented to further promote alternative modes of travel. These TDM measures generally include providing transit, biking, and carpooling information to residents, assisting in ride-matching programs for residents, and could also include transit subsidies and other measures. To represent the applicant proposed 20% trip reduction goal and given that passive TDM measures are assumed to achieve a 17% trip reduction, the balance of 3% (20%-17%) trip reduction due to active TDM measures was assumed for the VMT analysis.

The Project's residential land use would require a 16% reduction in VMT to mitigate the significant VMT impact. The VMT analysis, as discussed above, already assumed 3% trip reduction due to active TDM measures. Therefore, mitigation of the VMT impact would require implementing a TDM Plan for the residential component that achieves at least 19% (3% + 16%) trip reduction via active TDM measures (see Figure 10 below in Chapter 3) or increases the effectiveness of passive TDM measures. According to the Project's proposed TDM Plan dated July 2021 and attached in Appendix G, the proposed active TDM measures for the residential component could achieve at least a 19% reduction in trips, with an estimated reduction between between 11% and 36% [13]. This range represents the potential low to high range of effectiveness of the proposed TDM measures, as calculated by research data from the California Air Pollution Control Officers Association (CAPCOA). This range depends on how each TDM measure is eventually implemented. Therefore, it is feasible for the Project to mitigate its residential VMT impact by implementing its proposed TDM Plan.

Table 4
Office and Residential VMT Evaluation

Land Use	Regional Average	VMT Threshold	Project VMT	VMT Impact	Additional TDM Mitigation needed to eliminate VMT impact
Office [1]	15.9	13.6	13.6	No	-
Residential [2]	13.1	11.2	13.3	Yes	16%

Notes:
** All data referenced the latest Menlo Park citywide travel demand forecast model.*
1. VMT for office land use is reported in VMT per employee.
2. VMT for residential land use is reported in VMT per capita.

[13] Willow Village TDM Plan. Prepared for Peninsula Innovation Partners. Fehr & Peers, Inc. July 2021

IMPACT (TRA-2 in Transportation Chapter): As shown in Table 4 above, the Proposed Project's residential land use VMT is estimated to be 13.3 daily miles per capita, which would exceed the VMT threshold and result in a VMT impact. The mitigation measure TRA-2 identified below would fully mitigate this impact.

MITIGATION MEASURE (TRA 2 in Transportation Chapter): The residential land use of the Project Site will be required to implement a TDM Plan achieving a 36% reduction from gross ITE trip generation rates (for the Proposed Project, this reduction equals 6,023 daily trips). Should a different number of residential units be built, the total daily trips will be adjusted accordingly. The required residential TDM Plan will include annual monitoring and reporting requirements on the effectiveness of the TDM program. The Project applicant submitted a draft residential TDM Plan, which contained specific measures that would meet this trip reduction requirement. The draft TDM Plan is subject to City review and approval . If the annual monitoring finds that the TDM reduction is not met, the TDM coordinator will be required to work with City staff to detail next steps to achieve the TDM reduction. With the implementation of the required residential TDM Plan, the residential VMT impact would be **less than significant with mitigation (LTS/M)**.

Hotel

Hotel land uses are not explicitly represented in the model. Therefore, the hotel rooms and jobs expected for the Proposed Project are accounted for separately. Hotel employees are represented in the model by service employees. To reflect trips by hotel patrons, residential land use was used as a proxy, as it most closely resembles the behavior pattern of a hotel guest. Trip making characteristics for these proxy residential land uses were restricted to offices and restaurants/shops to mimic patron activities at a typical business hotel (home-based work and home-based shopping trips). Other types of trip-making typical to an actual home such as school trips generally are not applicable to hotel guests. Given the model would only explicitly represent hotel employee VMT without this adjustment, this proxy evaluation provides a conservative analysis as it attributes more VMT (hotel guest VMT) to the Proposed Project. This methodology is undertaken only for VMT purposes.

Project Study Area

Based on consultation with the City and applicant, the hotel is expected to have a service area of approximately three (3) miles in radius. This means that most of the destinations of hotel patrons are expected to be within three miles of the hotel. While some trips are expected to be longer than three miles, the majority of the change in VMT is expected to occur within this three-mile radius. The evaluated daily VMT includes the entire length of the trip even when it extends beyond the three-mile radius.

Scenario Evaluation

The hotel VMT analysis was conducted using the City's transportation model. To evaluate the effect of the hotel component on total daily VMT, the analysis compared two scenarios: 1) with project, and 2) with project without the hotel component (or the "no hotel" scenario).

It was assumed that new hotels would not increase trips overall but would reorient existing trips. Therefore, when hotel trips were added in one zone, they must be subtracted from other zones. This process was represented in the model by redistribution of the hotel attractions from nearby existing hotels. Eleven comparable hotels were found within the area for this redistribution effort (see Figure 4). The proposed hotel would be located within very close proximity to major employment in the Bayfront area, such that hotel patrons may enjoy shorter travel distances to their business destinations. Its location within a mixed-use project, including complementary retail space, also would allow hotel patrons to shop/dine within walking distance.

Service employees were coded in the model under “no hotel” conditions for the zones representing the eleven existing hotels. Under the “with-project” model run, service employees at these zones were shifted to the project zone. According to the project applicant, the hotel would have 210 employees. Thus, approximately 19 service employees were shifted from each of the existing zones to the project zone under the “with-project” model run.

The zones representing the eleven existing hotels do not include any residential land use as a proxy for hotel patrons under the “no hotel” scenario. Thus, residential dwelling units were first added to these zones under the “no hotel” model run, so that under the “with-project” model run, shifting these residential land uses to the project zone would still maintain the same model-wide total land uses. Approximately 270 households were needed at the project zone in addition to the 210 service employees under the “with-project” model run for the model to compute trip generation roughly equivalent to the daily trip generation estimated for the hotel component based on ITE rates. Therefore, under the “no hotel” model run, 270 households were evenly distributed to the eleven zones with existing hotels. It should be noted that the project’s proposed TDM plan is accounted for in the daily trip generation estimates.

VMT Evaluation

The total daily VMT generated by land uses within a three-mile radius was compared under the “no hotel” and “with project” scenarios. As shown in Table 5, the proposed hotel component of the project was shown to slightly reduce the total daily VMT generated by land uses within a three-mile radius of the Project Site. Since the proposed hotel would be located within very close proximity to major employment in the Bayfront area, hotel patrons would enjoy shorter travel distances to their business destinations. It’s location within a mixed-use project, including complementary retail space, also would allow hotel patrons to shop/dine within walking distance.

Because the proposed hotel component of the Project would not cause an increase in total VMT generated within the analysis area, it is concluded that the proposed hotel component of the Project would have a less than significant impact on vehicle miles travelled.

Table 5
Hotel VMT Evaluation

	3-Mile Radius Area of Project Site		
	No Hotel Conditions [2]	With Project Conditions [2]	% Change
Total Daily VMT [1]	6,656,914	6,629,443	-0.4%

Notes:
1. Total daily VMT includes VMT generated by all trips having at least one trip-end in the analysis area, as estimated by the citywide travel demand model.
2. "No hotel conditions" represent conditions with the Proposed Project except the hotel component. "With project conditions" represent conditions with the Proposed Project including the hotel component.

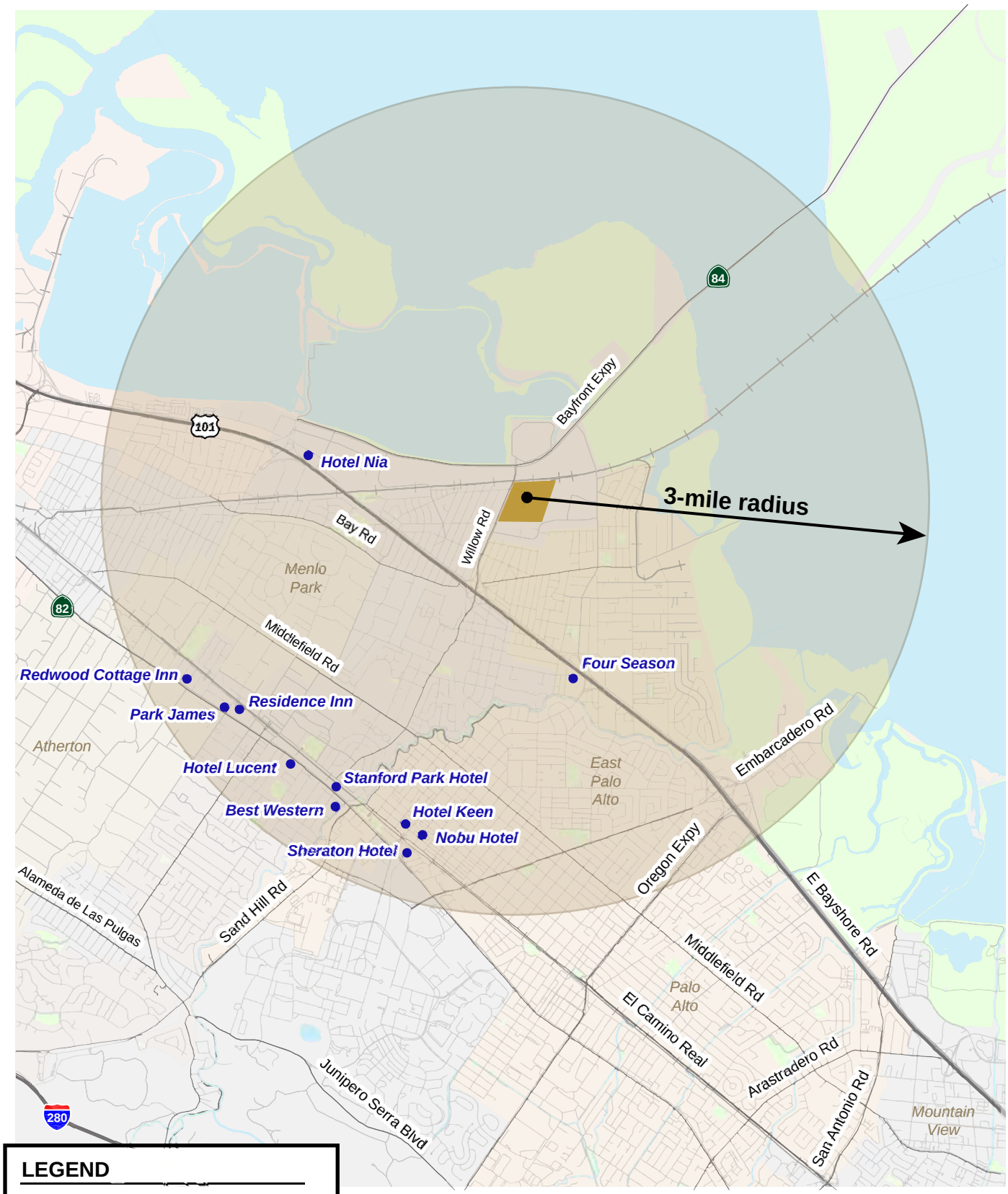


Figure 4
Locations of Comparable Hotel Land Use

Retail

The project has two areas of retail development. The main Project Site includes up to 200,000 s.f. of retail space within a mixed use development. North of Willow Road, as a result of the proposed Hamilton Avenue realignment, the two retail parcels adjacent to Hamilton Avenue at the intersection with Willow Road ("Hamilton Avenue Parcels") would be reconfigured. The Project proposes to increase the total retail square footage at the Hamilton Avenue parcels by up to 7,700 s.f. to approximately 23,400 s.f. Because the retail at the Hamilton Avenue Parcels will require a separate use permit and would be operated as a separate retail use from the retail uses at the main Project Site, the Hamilton Avenue Parcels retail is evaluated separately from the retail component of the main Project Site. According to the City's VMT policy, local serving retail (defined as having total square footage less than 50,000 s.f.) would be exempt from a VMT analysis. The Project's proposed net 7,700 s.f. of potential retail development at the Hamilton Avenue Parcels would thus be exempt from VMT analysis. The discussion below is focused on the 200,000 s.f. of retail space at the main Project Site.

Project Study Area

Based on the types of retail being proposed as well as nearby comparable retail stores, it is expected that the proposed retail would have a service area of approximately five (5) miles in radius. The 5-mile radius service area was selected based on engineering judgement, as it would cover most of Menlo Park, Palo Alto, as well as downtown Redwood City, and would include a mix of retail shops and restaurants comparable to the three cities. Assuming equal services, it is expected that people would patronize the closer store or restaurant. The five-mile radius service area also means that most of the destinations of the Project's retail patrons are expected to be within five miles of the project. While some trips are expected to be longer than five miles, the majority of the change in VMT is expected to occur within this five-mile radius.

Scenario Evaluation

The retail VMT analysis was conducted using the City's transportation model. To evaluate the effect of the retail component on total daily VMT, the analysis compared two scenarios: 1) with project, and 2) with project without the retail component (or the "no retail" scenario).

Similar to the hotel evaluation methodology discussed above, retail employees were redistributed from existing retail locations for the purpose of the VMT analysis. Six (6) comparable retail sites were found within the area for this redistribution effort (see Figure 5).

Retail employees were coded in the model under "no retail" conditions for the zones representing the six existing retail sites. Under the "with-project" model run, retail employees at these zones were shifted to the project zone. The retail land use is expected to generate 571 employees based on the City's default retail employees-per-square-foot conversion rate (1 employee per 350 square feet). Retail employees were shifted from each of the existing zones to the project zone under the "with-project" model run. The number of retail employees shifted from each existing zone was proportionally based on each zone's existing retail employment size (see Figure 6).

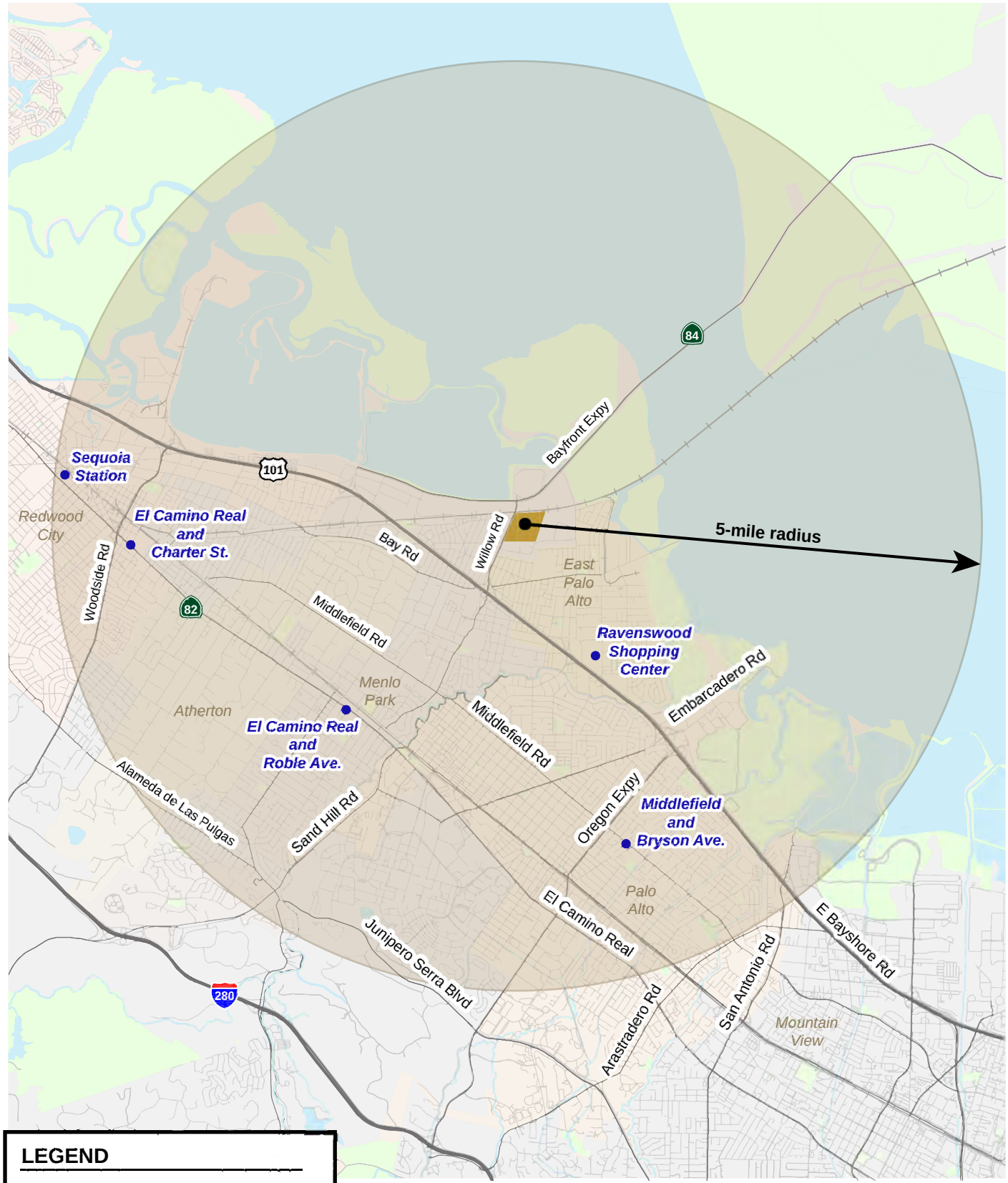


Figure 5
Locations of Comparable Retail Land Use

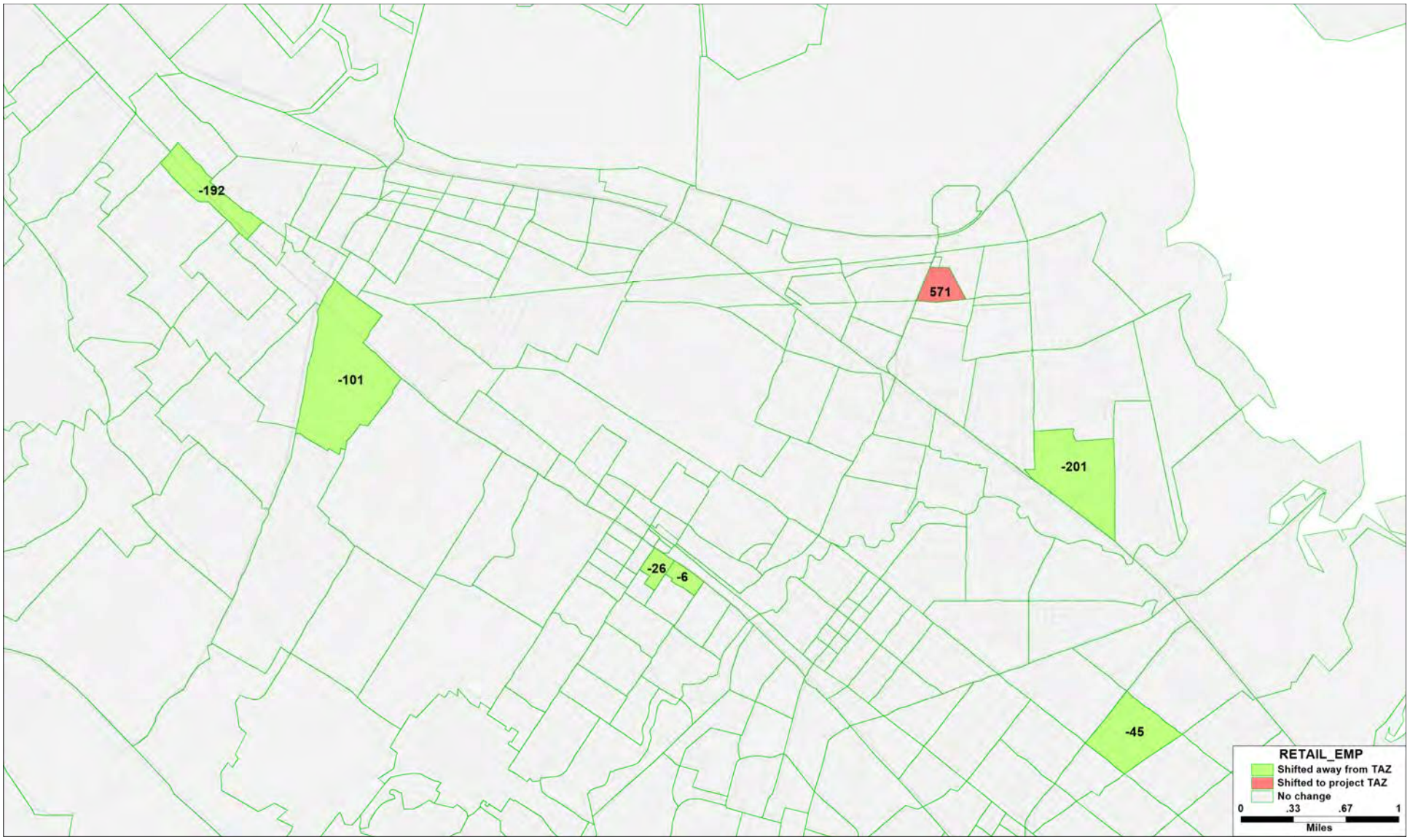


Figure 6
Retail Employment Shifts for VMT Analysis

VMT Evaluation

The total daily VMT generated by land uses within a five-mile radius was compared under the "no retail" and "with project" scenarios. As shown in Table 6, the proposed retail component of the project was shown to slightly reduce the total daily VMT generated by land uses within a five-mile radius of the Project Site. Since the proposed retail space would be located in close proximity to the Belle Haven neighborhood, a large number of offices and life sciences buildings in the Bayfront area, as well as the project's proposed residential land uses, the proposed retail component would provide retail stores closer to homes for nearby residents and closer to jobs for nearby workers.

Because the proposed retail component of the Project would not cause an increase in total VMT generated by the analysis area, it is concluded that the proposed retail component of the Project would have a less than significant impact on vehicle miles travelled.

Table 6
Retail VMT Evaluation

	5-Mile Radius Area of Project Site		
	No Retail Conditions [2]	With Project Conditions [2]	% Change
Total Daily VMT [1]	14,360,590	14,334,067	-0.2%

Notes:
1. Total daily VMT includes VMT generated by all trips having at least one trip-end in the analysis area, as estimated by the citywide travel demand model.
2. "No retail conditions" represent with the Proposed Project except the retail component. "With project conditions" represent with the Proposed Project including the retail component.

Event VMT

The Campus District would consist of up to 1.6 million square feet of space for office and accessory uses, consisting of up to 1.25 million sf of office uses and the balance (350,000 sf if office uses were maximized) of accessory uses[14]. In addition to serving as a gathering space for the surrounding campuses, the applicant proposes to host approximately 55 events per year, that would attract majority non-Menlo Park Meta workers and/or guests. Ten of these events are envisioned as large-sized events with attendance varying between 2,500 and 5,000 people. 15 of these events are envisioned as medium-sized events with attendance varying between 1,000 and 2,500 people. The remaining 30 events would be small-sized events with attendance lower than 1,000 people. It is anticipated that the small-sized events would generate a minimal number of trips that would not exceed the proposed Campus District trip cap. The Project is proposing an allowance of up to 25 exceptions to the trip cap for days when there are medium-size or large-size events. Due to the limited number of events that would exceed the proposed trip cap, it is deemed that such events are not typical conditions and do not require a VMT analysis for CEQA purposes. This impact would be ***less than significant***.

While some of these events could potentially generate substantial traffic that could affect intersection operations in the Project area, specific event details are not known. While congestion is not a CEQA impact, the Project would be required, as a condition of Project approval, to submit event traffic plans

[14] Accessory uses could include the following types of spaces: meeting/collaboration space, orientation space, training space, event space, incubator space, a business partner center, an event building (including pre-function space, collaboration areas, and meeting/event rooms), a visitor center, product demonstration areas, film studio, gathering terraces and private gardens, and space for other Meta accessory uses. Accessory uses could occur in spaces located anywhere throughout the Campus District.

for large events for City approval to demonstrate measures that would be taken to minimize the events' effect on roadway traffic conditions.

Impacts on Pedestrian, Bicycle and Transit Facilities

The project is consistent with all applicable pedestrian, bicycle and transit related plans, ordinances and policies, as listed below:

- City of Menlo Park Circulation Element of the General Plan
- City of Menlo Park Municipal Code, Sections 16.43.100 and 16.45.090
- City of Menlo Park Transportation Master Plan
- City of Menlo Park Transportation Impact Fee

Pedestrian and Bicycle Facilities

The Proposed Project would include multiple pedestrian and bicycle connections between the Project Site and the surrounding roadway network and within the Project Site. The planned bicycle and pedestrian facilities within the Project Site are discussed in Appendix H.

The proposed pedestrian connections to the surrounding roadway network include crosswalks at the proposed signalized intersections on Willow Road at Main Street and Park Street that would connect the Project Site to the Belle Haven neighborhood. The proposed bicycle connections include connections to the existing class II bike lane along Willow Road via Park Street and Main Street. In addition, the Proposed Project includes an elevated park that would provide grade separated pedestrian and bicycle access between the Project site and the Belle Haven neighborhood.

Menlo Park's TIF program also proposes the following bicycle and pedestrian facilities in the immediate vicinity of the Project Site which would improve connections between the Project Site and the surrounding neighborhoods:

- Bicycle signals, cross-bike markings, high visibility crosswalks, and pedestrian improvements at the eastbound right-turn channelizing island at Willow Road and Bayfront Expressway
- Class III bike routes, wider sidewalks, and narrower median on Ivy Drive
- Wider median on the west leg of Willow Road and Ivy Drive, increased pedestrian crossing time, and high visibility crosswalks at the intersection
- Curb ramps, high visibility crosswalks, increased pedestrian crossing times, and bulbouts on the southeast and southwest corners at Willow Road and O'Brien Drive
- Sidewalks and class II bike lanes on both sides of Adams Drive between O'Brien Drive and University Avenue
- Sidewalks and class II bike lanes on both sides of O'Brien Drive between Willow Road and University Avenue
- Install class IV protected bike lanes along Willow Road

The Proposed Project also includes a subgrade pedestrian, bicycle, and tram connection between the main Project Site and the Meta West Campus. This connection would be known as the Willow Road Tunnel. The Willow Road Tunnel would extend between Facebook Way in the Meta West Campus and North Loop Road in the Willow Village Campus underneath Willow Road. The proposed design of the tunnel includes a sidewalk along the eastern edge, a two-way class I bike path which would connect the Bay Trail to the Project Site, and a two-way tram connection between the West Campus and the Project Site. The tunnel would not allow vehicular traffic other than the trams and the bicycle and pedestrian access would be open to the public similar to the existing tunnel between the East and West Campuses.

Pedestrian and Bicycle Access to Schools

Schools in the immediate vicinity of the Project Site include Mid-Peninsula High School, Open Mind School, Cesar Chavez Ravenswood Middle School, San Francisco 49ers Academy, Creative Montessori learning, Belle Haven School, TIDE Academy, and Costano Elementary School. Bicycle and pedestrian access to each school is described below:

- **Mid-Peninsula High School.** This school is located immediately west of the Project Site. Pedestrian and bicycle access from the Project Site to the school would be via Willow Road, which has continuous sidewalks along the south side, and existing Class II bicycle facilities on both sides of the road.
- **Open Mind School.** This school is located immediately west of the Project Site on O'Brien Drive. There are currently no sidewalks or bicycle facilities on O'Brien Drive between the school and the Project Site. The Project proposes a sidewalk that would connect the Project Site with the school's driveway, as part of the Project proposed roundabout at the East Loop Road/O'Brien Drive location.
- **Cesar Chavez Ravenswood Middle School,** San Francisco 49ers Academy, Creative Montessori Learning. These schools are located on Bay Road between Willow Road and University Avenue. Pedestrian and bicycle access from the Project Site to these schools would be via Willow Road to Alberni Street and Ralmar Avenue. These streets have sidewalks along both sides. These are also residential streets with low vehicular speeds and volumes and therefore, bicycle friendly. Access to the San Francisco 49ers Academy and Creative Montessori is directly from Bay Road, which has sidewalks along both sides. Also, Bay Road has dedicated bicycle lanes.
- **Belle Haven School.** This school is located approximately 0.4 miles north of the Project Site. Pedestrian and bicycle access from the Project Site to this school would be via Ivy Drive or Hamilton Avenue. Pedestrian amenities include crosswalks and pedestrian push buttons at the intersections of Willow Road and Ivy Drive and Willow Road and Hamilton Avenue, a continuous sidewalk along the south side of Willow Road, a continuous sidewalk along both sides of Ivy Drive and Hamilton Avenue between the school and the Project Site, and bulbouts on Hamilton Avenue. However, there are no designated bicycle facilities on Ivy Drive or Hamilton Avenue.

- **Costano Elementary School.** The school is located 0.2 miles south of the Project Site on University Avenue at Adams Drive. Pedestrian and bicycle access from the Project Site is via Adams Drive or O'Brien Drive. There are limited pedestrian connections between the Project Site and the school. Sidewalk facilities are lacking along O'Brien Drive and Adams Drive, and there are no crosswalks at University Avenue and O'Brien Drive or University Avenue and Adams Drive. Class II bicycle lanes and sidewalks are proposed along O'Brien Drive and Adams Drive in Menlo Park's TIF, which would improve bicycle and pedestrian access to the school. Implementation of this improvement from the TIF Program would reduce this potential effect on bicyclists and pedestrians from the proposed project.
- **Tide Academy.** This school is located approximately 1.2 miles north of the Project Site. Pedestrian and bicycle access from the Project Site to this school would be via Ivy Drive or Hamilton Avenue. Chilco Street, and Jefferson Drive. Pedestrian amenities include crosswalks and pedestrian push buttons at the intersections of Willow Road and Ivy Drive and Willow Road and Hamilton Avenue, a continuous sidewalk along the south side of Willow Road, a continuous sidewalk along both sides of Ivy Drive, Hamilton Avenue, Chilco Street, and Jefferson Drive between the school and the Project Site, and bulbouts on Hamilton Avenue. There are also designated bicycle facilities on Chilco Street and Jefferson Drive, however, there are no designated bicycle facilities on Ivy Drive or Hamilton Avenue.

Transit Facilities

The Proposed Project would provide tram stops and shuttle stops on the Project Site for use by Meta workers. A detailed description of the tram and shuttle services is provided in Appendix I.

The Proposed Project is expected to generate an increase in transit demand, which could be accommodated by the available capacity of the SamTrans bus service. The SamTrans routes 81, 281, 296, 397, Dumbarton Express Lines, M2 Belle Haven Shuttle, and M4 Willow Road shuttle serve the immediate vicinity of the project area with approximately 15 to 25-minute headways during the AM and PM peak commute hours. Bus stops are within a typical walking distance (one-quarter mile or 5 minutes) of the Project Site. The Proposed Project would make no change to existing public transit facilities. However, by adding vehicle trips and increasing delay at intersections along bus routes, it would increase bus travel time. Bus services that would be affected in the vicinity of the Project Site include bus routes (DB, M2 Belle Haven Shuttle, M4 Willow Road Shuttle, SamTrans Route 81) along Willow Road, University Avenue, and O'Brien Drive.

Proposed intersection improvements to reduce intersection delay include improvements at Willow Road and Ivy Drive, Willow Road and Hospital Plaza/Durham Street, Willow Road and Newbridge Street, Willow Road and Bay Road, O'Brien Drive and Kavanaugh Drive, and Adam's Drive and O'Brien Drive. These improvements would help to reduce some bus delay along these routes. The City's TIF includes installing Transit Signal Priority (TSP) for queue jumps by shoulder running buses on northbound and southbound Bayfront Expressway and allowing the use of the existing right turn lane for queue jump with TSP at Willow Road and O'Brien Drive. The timing and implementation of these TSP projects are not certain

The Caltrain electrification project would enable Caltrain to provide more frequent train service at the Menlo Park, Palo Alto, and Redwood City Caltrain stations. 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 Proposed Project.

3. Non-CEQA Level of Service Transportation Analysis

This chapter describes the existing conditions level of service and observed traffic conditions at roadway facilities in the vicinity of the site. It also describes the method by which project traffic is estimated and any adverse effects to intersection levels of service caused by the proposed project under existing, near-term (2025), cumulative (2040), and cumulative (2040) with Dumbarton rail conditions.

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 7. Existing traffic volumes were obtained from new peak hour counts collected in year 2019 and year 2020. The existing AM and PM peak hour intersection volumes are shown in Figure 8. Intersection turning-movement count data are presented in Appendix A.

Existing Intersection Levels of Service

The results of the intersection level-of-service analysis under existing conditions show that many of the study intersections currently operate at an unacceptable level (see Table 7 and 8). As noted in the ConnectMenlo DEIR, the counted traffic volumes at the Menlo Park study intersections along Willow Road did not appropriately reflect the actual traffic demand, and isolated intersection analysis fails to capture these results. Similarly, the counted traffic volumes at the East Palo Alto study intersections in the vicinity of the US 101/University Avenue interchange do not reflect actual traffic demand. Therefore, instead of calculated level of service, the existing level of service results are reported based on level of service as identified by field observations and microsimulation to reflect “unserved demand”. The microsimulation methodology and assumptions for Willow Road are documented in Appendix B. Hexagon has also developed a microsimulation model for intersections in the vicinity of the US 101/University Avenue interchange, which has been used for other studies in East Palo Alto. This microsimulation model was used to analyze level of service for intersections near the US 101/University Avenue interchange.

The intersection level of service calculation sheets are included in Appendix C. The following study intersections (See Figure 9) currently operate at an unacceptable level of service during at least one peak hour:

11. Chrysler Drive and Constitution Drive (AM peak hour)
12. Chilco Street and Constitution Drive/MPK 22 Driveway (AM and PM peak hours)
16. Willow Road and Bayfront Expressway (AM and PM peak hours)
17. Willow Road and Hamilton Avenue (AM and PM peak hours)
19. Willow Road and Ivy Drive (AM peak hour)
20. Willow Road and O'Brien Drive (AM and PM peak hours)
21. Willow Road and Newbridge Street (AM and PM peak hours)
22. Willow Road and US 101 Northbound Ramps (AM and PM peak hours)
23. Willow Road and US 101 Southbound Ramps (PM peak hour)
24. Willow Road and Bay Road (PM peak hour)
25. Willow Road and Hospital Plaza/Durham Street (PM peak hour)
28. Willow Road and Middlefield Road (AM peak hour)
32. Adam's Drive and O'Brien Drive (PM peak hour)
33. University Avenue and Bayfront Expressway (PM peak hour)
34. University Avenue and Purdue Avenue (PM peak hour)
35. University Avenue and Adams Drive (AM and PM peak hours)
42. University Avenue and Donohoe Street (AM and PM peak hours)
43. US 101 Northbound Off-Ramp and Donohoe Street (PM peak hour)
45. University Avenue and US 101 Southbound Ramps (AM and PM peak hours)
46. University Avenue and Woodland Avenue (AM and PM peak hours)
50. E. Bayshore Road & Euclid Avenue (AM peak hour)

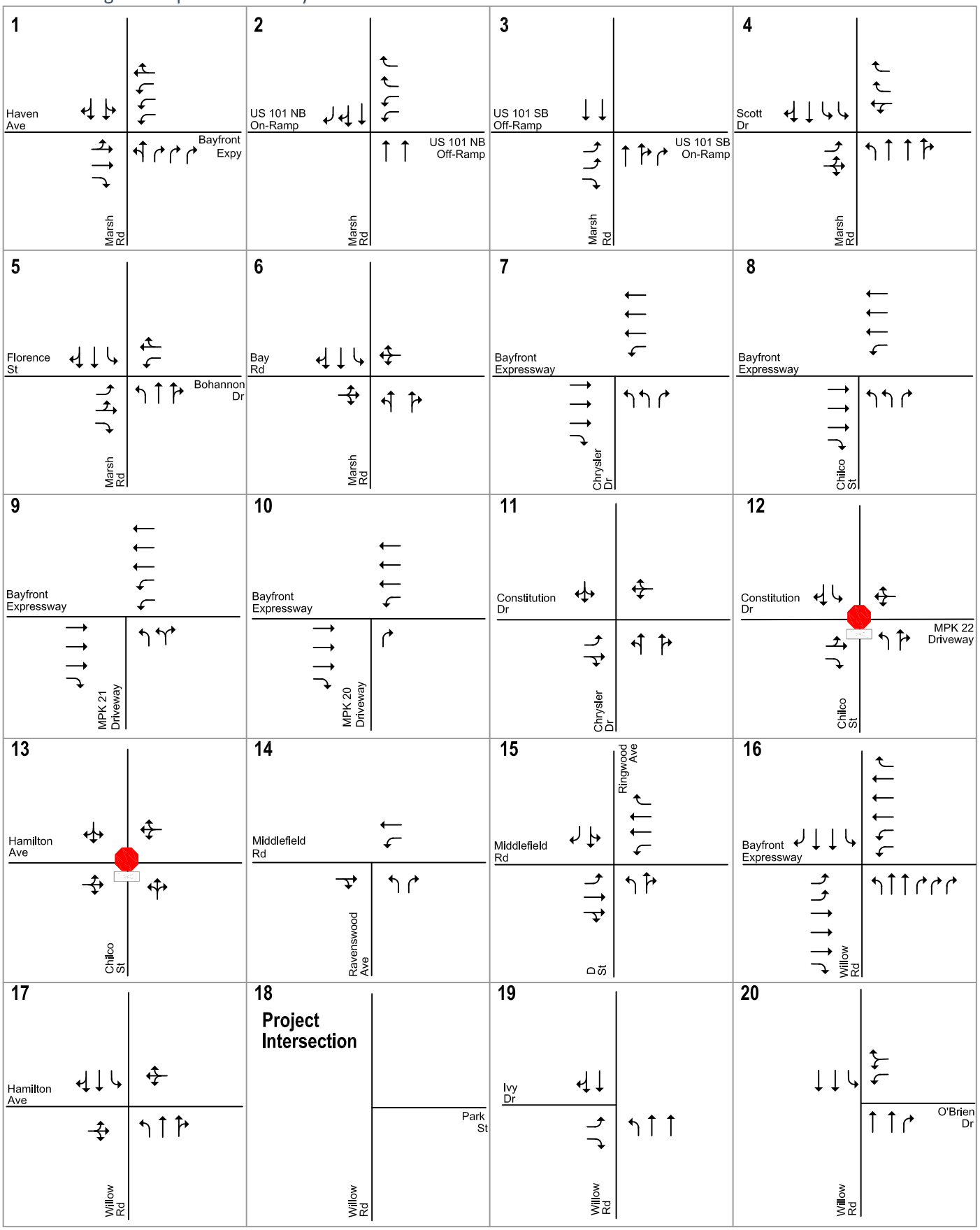


Figure 7
Existing Lane Configurations

NORTH
Not to Scale

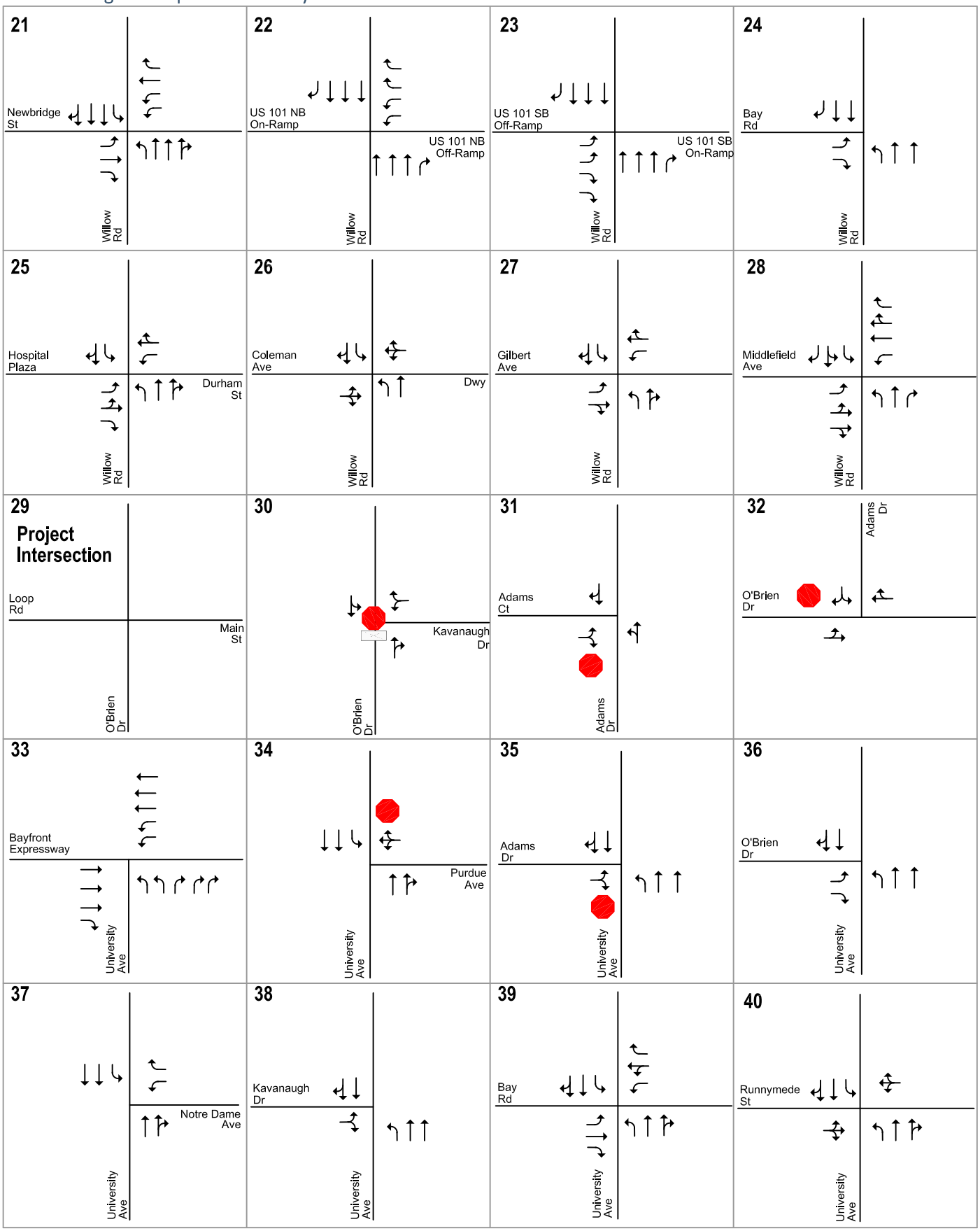
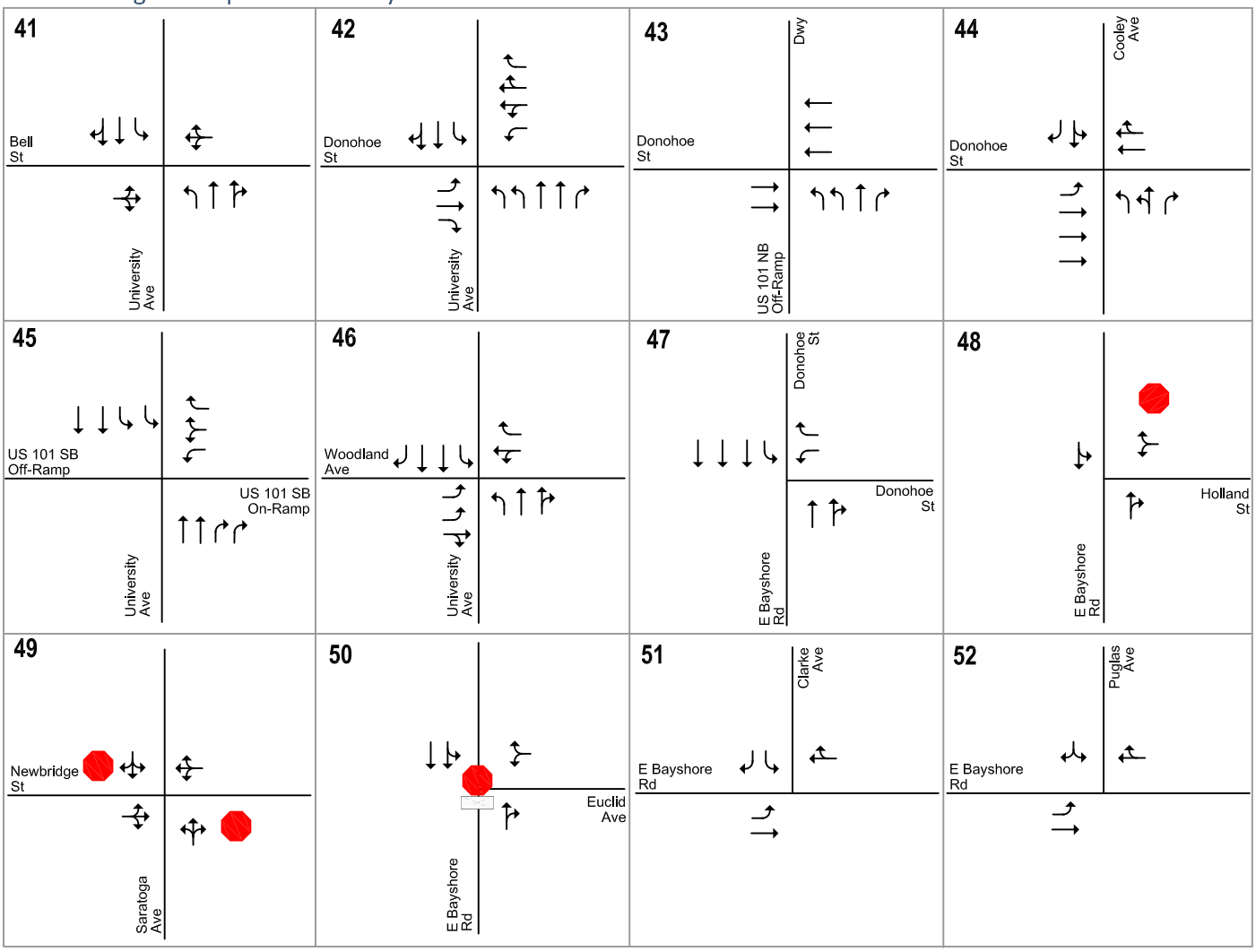


Figure 7
Existing Lane Configurations

NORTH
Not to Scale



LEGEND

= Stop Controlled Approach

= Stop Controlled Intersection

Figure 7
Existing Lane Configurations

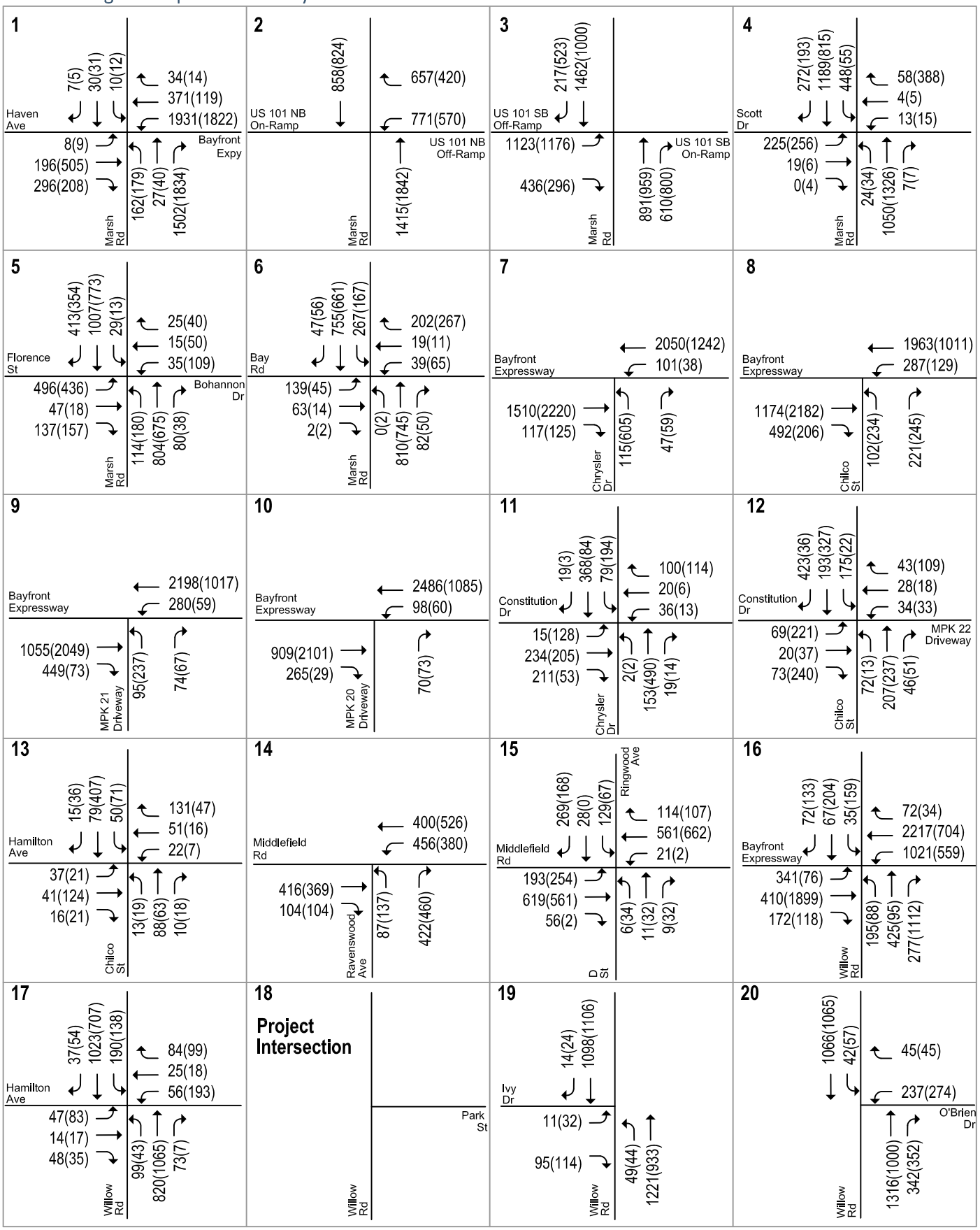


Figure 8
Existing Traffic Volumes

NORTH
Not to Scale

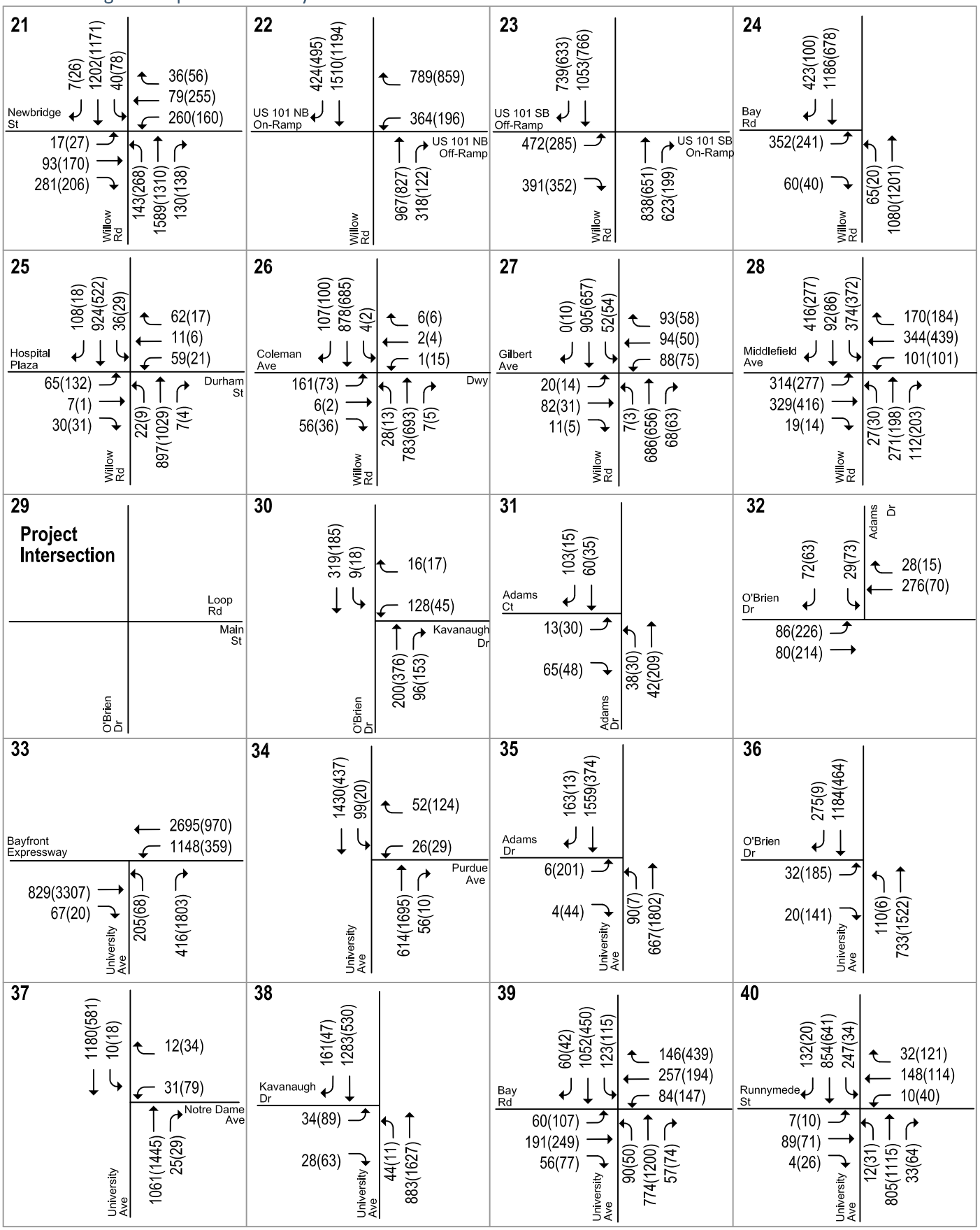
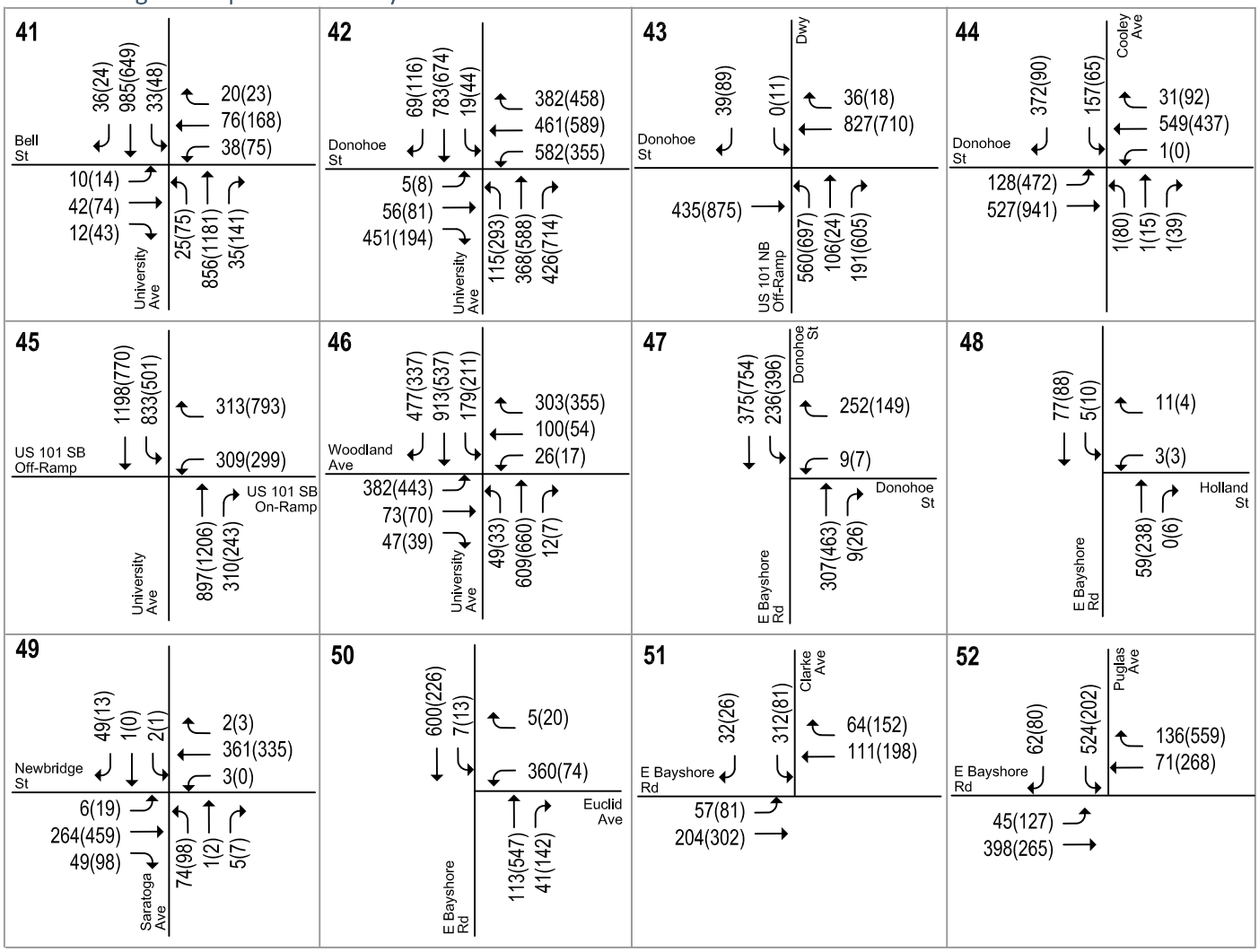


Figure 8
Existing Traffic Volumes

NORTH
Not to Scale



LEGEND

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

Figure 8
Existing Traffic Volumes

Table 7
Existing Intersection Levels of Service (Menlo Park)

#	Intersection	Peak Hour	Count Date	Traffic Control	Existing Conditions Avg. Delay (sec)[1]	LOS
1	Marsh Road & Bayfront Expressway*	AM	4/16/2019	Signal	50.5	D
		PM	4/16/2019		31.6	C
2	Marsh Road & US 101 Northbound Off-Ramp	AM	4/16/2019	Signal	15.8	B
		PM	4/16/2019		13.3	B
3	Marsh Road & US 101 Southbound Off-Ramp	AM	4/16/2019	Signal	19.0	B
		PM	4/16/2019		17.0	B
4	Marsh Road & Scott Drive	AM	4/16/2019	Signal	18.5	B
		PM	4/16/2019		15.3	B
5	Marsh Road & Bohannon Drive/Florence Street	AM	3/21/2019	Signal	35.3	D
		PM	3/21/2019		34.6	C
6	Marsh Road & Bay Road	AM	3/21/2019	Signal	19.7	B
		PM	3/21/2019		18.6	B
7	Chrysler Drive & Bayfront Expressway	AM	4/16/2019	Signal	8.4	A
		PM	4/16/2019		13.1	B
8	Chilco Street & Bayfront Expressway	AM	4/16/2019	Signal	10.9	B
		PM	4/16/2019		13.1	B
9	MPK 21 Driveway & Bayfront Expressway	AM	4/25/2019	Signal	7.9	A
		PM	4/25/2019		10.2	B
10	MPK 20 Driveway (east) & Bayfront Expressway	AM	4/25/2019	Signal	10.0	A
		PM	4/25/2019		8.2	A
11	Chrysler Drive & Constitution Drive	AM	3/21/2019	Signal	**50.6**	**D**
		PM	3/21/2019		28.0	C
12	Chilco Street & Constitution Drive/MPK 22 Driveway	AM	3/21/2019	AWSC	**32.1**	**D**
		PM	3/21/2019		**32.5**	**D**
13	Chilco Street & Hamilton Avenue	AM	1/0/1900	AWSC	9.2	A
		PM	1/0/1900		16.8	C
14	Ravenswood Avenue & Middlefield Road	AM	3/19/2019	Signal	36.1	D
		PM	3/19/2019		16.1	B
15	Ringwood Avenue & Middlefield Road	AM	3/19/2019	Signal	12.5	B
		PM	3/19/2019		13.7	B
16	Willow Road & Bayfront Expressway*[1]	AM	4/23/2019	Signal	**>120**	**F**
		PM	4/23/2019		**>120**	**F**
17	Willow Road & Hamilton Avenue[1]	AM	3/21/2019	Signal	**73.3**	**E**
		PM	3/21/2019		**>120**	**F**
18	Willow Road & Park Street (future intersection)[1]	AM	--		Project Intersection	
		PM	--			
19	Willow Road & Ivy Drive[1]	AM	3/21/2019	Signal	**75.2**	**E**
		PM	3/21/2019		39.5	D
20	Willow Road & O'Brien Drive[1]	AM	3/21/2019	Signal	**58.9**	**E**
		PM	3/21/2019		**>120**	**F**
21	Willow Road & Newbridge Street[1]	AM	3/21/2019	Signal	**93.4**	**F**
		PM	3/21/2019		**>120**	**F**
22	Willow Road & US 101 Northbound Ramps[1]	AM	3/13/2019	Signal	**92.8**	**F**
		PM	3/13/2019		**83.9**	**F**
23	Willow Road & US 101 Southbound Ramps[1]	AM	3/13/2019	Signal	38.5	D
		PM	3/13/2019		**98.9**	**F**
24	Willow Road & Bay Road[1]	AM	4/23/2019	Signal	45.3	D
		PM	4/23/2019		**113.5**	**F**

Table 7 (Continued)
Existing Intersection Levels of Service (Menlo Park)

#	Intersection	Peak Hour	Count Date	Traffic Control	Existing Conditions Avg. Delay (sec)[1]	Existing Conditions LOS
25	Willow Road & Hospital Plaza/Durham Street[1]	AM	4/16/2019	Signal	43.6	D
		PM	4/16/2019		**>120**	**F**
26	Willow Road & Coleman Avenue	AM	3/19/2019	Signal	18.6	B
		PM	3/19/2019		9.2	A
27	Willow Road & Gilbert Avenue	AM	3/19/2019	Signal	19.7	B
		PM	3/19/2019		10.3	B
28	Willow Road & Middlefield Road	AM	3/19/2019	Signal	**61.6**	**E**
		PM	3/19/2019		31.5	C
29	O'Brien Drive/Loop Road & Main Street/O'Brien Drive (future intersection)	AM	--		Project Intersection	
		PM	--			
30	O'Brien Drive & Kavanaugh Drive	AM	4/25/2019	TWSC	11.8	B
		PM	4/25/2019		15.2	C
31	Adams Drive & Adams Court	AM	4/25/2019	TWSC	11.5	B
		PM	4/25/2019		11.9	B
32	Adams Drive & O'Brien Drive	AM	4/25/2019	TWSC	17.3	C
		PM	4/25/2019		**27.6**	**D**
33	University Avenue & Bayfront Expressway*	AM	4/25/2019	Signal	11.4	B
		PM	4/25/2019		**94.1**	**F**

Notes:
* Denotes CMP Intersection
AWSC - All Way Stop Control; TWSC - Two Way Stop Control
[1] Average delay is reported for signalized and AWSC intersections. For TWSC intersections, the delay for the worst stop-controlled movement is reported
[1]Intersections were analyzed using Synchro/SimTraffic software due to the close proximity of these intersections.
Bold indicates substandard level of service

Table 8
Existing Intersection Levels of Service (East Palo Alto)

#	Intersection	Peak Hour	Count Date	Traffic Control	Existing Conditions Delay (sec)[1]	LOS
34	University Avenue & Purdue Avenue	AM	6/5/2019	TWSC	16.5	C
		PM	6/5/2019		**47.0**	**E**
35	University Avenue & Adams Drive	AM	4/25/2019	TWSC	**88.1**	**F**
		PM	4/25/2019		**>120**	**F**
36	University Avenue & O'Brien Drive	AM	4/23/2019	Signalized	9.6	A
		PM	4/23/2019		15.3	B
37	University Avenue & Notre Dame Avenue	AM	3/4/2020	Signalized	4.1	A
		PM	3/4/2020		9.3	A
38	University Avenue & Kavanaugh Drive	AM	4/25/2019	Signalized	6.3	A
		PM	4/25/2019		12.0	B
39	University Avenue & Bay Road	AM	4/25/2019	Signalized	40.4	D
		PM	4/25/2019		49.9	D
40	University Avenue & Runnymede Street	AM	4/25/2019	Signalized	6.1	A
		PM	4/25/2019		8.7	A
41	University Avenue & Bell Street	AM	4/25/2019	Signalized	11.3	B
		PM	4/25/2019		16.8	B
42	University Avenue & Donohoe Street*	AM	5/1/2019	Signalized	**107.1**	**F**
		PM	5/1/2019		**75.2**	**E**
43	US 101 Northbound Off-Ramp & Donohoe Street*	AM	4/25/2019	Signalized	49.8	D
		PM	4/25/2019		**>120**	**F**
44	Cooley Avenue & Donohoe Street*	AM	6/5/2019	Signalized	32.9	C
		PM	6/5/2019		36.7	D
45	University Avenue & US 101 Southbound Ramps*	AM	4/25/2019	Signalized	**98.9**	**F**
		PM	4/25/2019		**87.1**	**F**
46	University Avenue & Woodland Avenue*	AM	4/25/2019	Signalized	**67.1**	**E**
		PM	4/25/2019		**>120**	**F**
47	E. Bayshore Road & Donahoe Street*	AM	5/21/2019	Signalized	32.6	C
		PM	5/21/2019		38.5	D
48	E. Bayshore Road & Holland Street	AM	6/5/2019	TWSC	8.8	A
		PM	6/5/2019		10.0	A
49	Saratoga Avenue & Newbridge Street	AM	6/5/2019	TWSC	13.3	B
		PM	6/5/2019		15.6	C
50	E. Bayshore Road & Euclid Avenue*	AM	5/21/2019	AWSC	**52.4**	**F**
		PM	5/21/2019		32.6	D
51	Clarke Avenue & E. Bayshore Road	AM	9/25/2018	Signalized	13.9	B
		PM	9/25/2018		10.7	B
52	Pulgas Avenue & E. Bayshore Road	AM	6/5/2019	Signalized	20.4	C
		PM	6/25/2019		19.9	B

Note:
AWSC - All Way Stop Control; TWSC - Two Way Stop Control

[1] Average delay is reported for signalized and AWSC intersections. For TWSC intersections, the delay for the worst stop-controlled movement is reported.

* Intersections were analyzed using Synchro/SimTraffic software due to the close proximity of these intersections.
Bold indicates substandard level of service

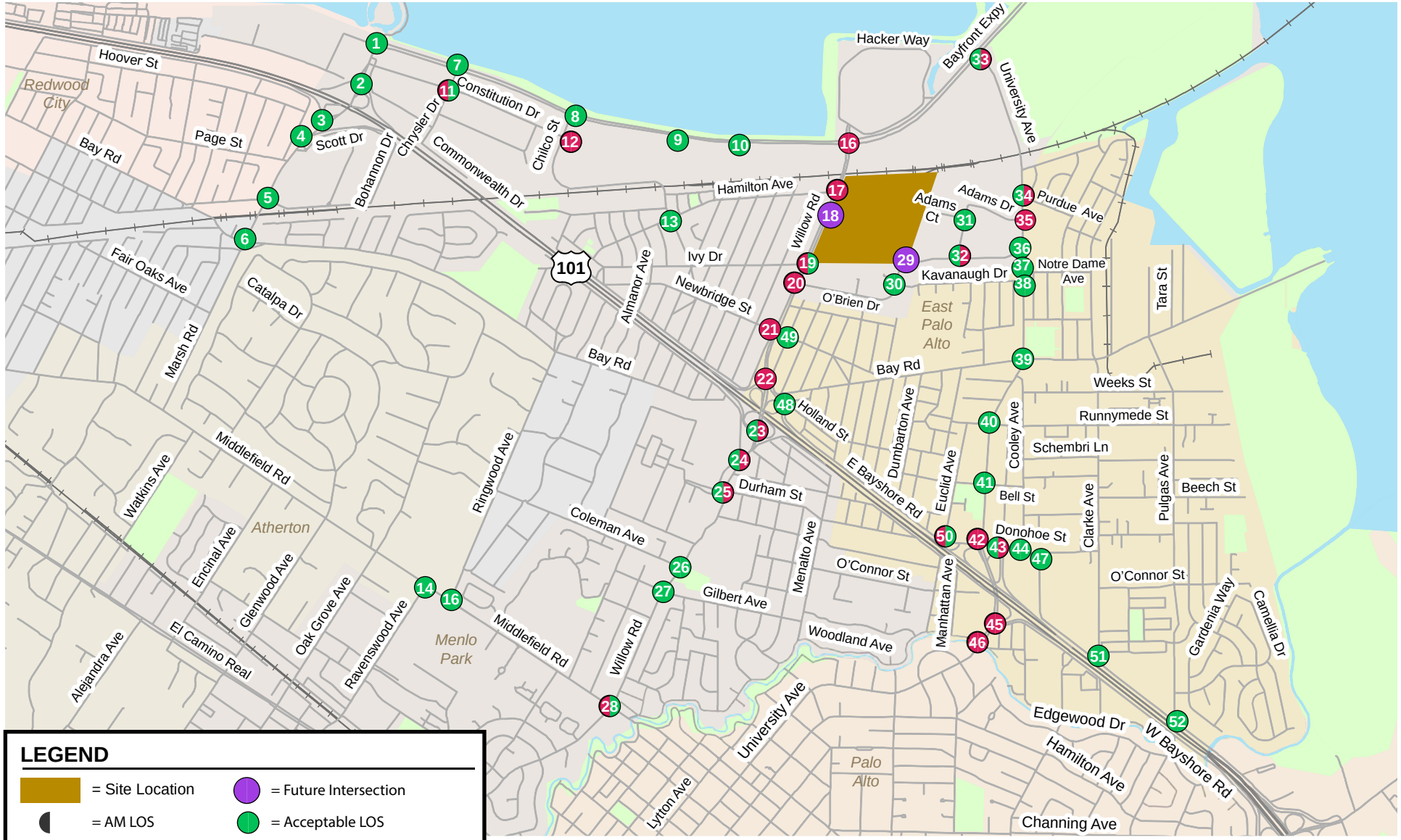


Figure 9
Existing Intersection Level of Service Summary

Existing Freeway Levels of Service

Existing weekday AM and PM peak hour traffic volumes on the study freeway segments were obtained from the *San Mateo County Congestion Management Program 2019* for segments within San Mateo County. The *Valley Transportation Authority 2018 CMP Monitoring Report* was referenced for segments within Santa Clara County. The *Alameda County Transportation Commission 2018 LOS Monitoring Report* was referenced for segments within Alameda County. As shown on Tables 9 to 11, the following freeway segments are currently operating below their respective level of service standards, or at LOS F:

San Mateo County

- SR 84 – between Willow Road and University Avenue, AM Peak Hour
- SR 84 – between University Avenue and Alameda County Line, AM & PM Peak Hours
- US 101 – between Santa Clara County Line and SR 92, AM & PM Peak Hours
- SR 109 – from SR 84 to Kavanaugh Drive, AM & PM Peak Hours

Santa Clara County

The following mixed-flow freeway segments are currently operating at LOS F:

- US 101 – from SR 85 to Rengstorff Avenue – AM & PM Peak Hours
- US 101 – from Rengstorff to San Antonio Avenue – PM Peak Hour
- US 101 – from San Antonio Avenue to Embarcadero Road – AM & PM Peak Hours
- US 101 – from Embarcadero Road to SR 85 – PM Peak Hour

The following HOV freeway segments are currently operating at LOS F:

- US 101 – from San Antonio Avenue to Embarcadero Road – PM Peak Hour
- US 101 – from Oregon Expressway to Embarcadero Road – AM Peak Hour

Alameda County

- SR 84 – Paseo Padre Parkway to San Mateo County Line – AM Peak Hour
- SR 84 – Newark Boulevard to I-880 – PM Peak Hour

Table 9
Existing Freeway LOS – San Mateo County

CMP Facility	Roadway Segment	Dir.	Pk Hr	LOS Standard	Capacity	Existing LOS
SR 84	US 101 to Willow Rd	SB	AM	D	1,100	C
		SB	PM	D	1,100	B
SR 84	Willow Rd to US 101	NB	AM	D	1,100	C
		NB	PM	D	1,100	B
SR 84	Willow Rd to University Ave	SB	AM	E	1,100	F
		SB	PM	E	1,100	E
SR 84	University Ave to Willow Rd	NB	AM	E	1,100	**F**
		NB	PM	E	1,100	E
SR 84	University Ave to Alameda County Line	SB	AM	F	2,100	**F**
		SB	PM	F	2,100	**F**
SR 84	Alameda County Line to University Ave	NB	AM	F	2,100	**F**
		NB	PM	F	2,100	**F**
US 101	Santa Clara County Line to Whipple Ave	NB	AM	F	2,300	**F**
		NB	PM	F	2,300	**F**
US 101	Whipple Ave to Santa Clara County Line	SB	AM	F	2,300	**F**
		SB	PM	F	2,300	**F**
US 101	Whipple Ave to SR 92	NB	AM	E	2,300	**F**
		NB	PM	E	2,300	**F**
US 101	SR 92 to Whipple Ave	SB	AM	E	2,300	**F**
		SB	PM	E	2,300	**F**
SR 109 (University Ave)	Kavanaugh Dr to SR 84	EB	AM	E	1,100	C
		EB	PM	E	1,100	C
SR 109 (University Ave)	SR 84 to Kavanaugh Dr	WB	AM	E	1,100	**F**
		WB	PM	E	1,100	**F**
SR 114 (Willow Rd)	US 101 to SR 84	EB	AM	E	1,100	B
		EB	PM	E	1,100	B
SR 114 (Willow Rd)	SR 84 to US 101	WB	AM	E	1,100	C
		WB	PM	E	1,100	C

Notes:
Data referenced San Mateo Couny City/County Association of Governments *Congestion Management Program 2019.*
Bold indicates non-compliant LOS

Table 10
Existing Freeway LOS – Santa Clara County

Freeway	Segment	Dir	Peak Hour	Existing Conditions					
				Mixed-Flow			HOV Lane		
				Capacity[1]	Volume[2] (pc/hr/ln)	LOS[2]	Capacity[1]	Volume[2] (pc/hr/ln)	LOS[2]
US 101	SR 85 to N. Shoreline Blvd	NB	AM	9,200	1,512	**F**	1,650	1,751	E
			PM	9,200	1,358	**F**	1,650	1,635	D
US 101	N. Shoreline Blvd to Rengstorff Ave	NB	AM	6,900	1,660	**F**	3,300	1,730	D
			PM	6,900	1,298	**F**	3,300	1,683	D
US 101	Rengstorff Ave to San Antonio Ave	NB	AM	6,900	1,747	E	3,300	1,716	D
			PM	6,900	1,333	**F**	3,300	1,646	D
US 101	San Antonio Ave to Oregon Expwy	NB	AM	6,900	1,262	**F**	3,300	1,693	D
			PM	6,900	1,083	**F**	3,300	1,482	**F**
US 101	Oregon Expwy to Embarcadero Rd	NB	AM	6,900	1,367	**F**	1,650	1,693	**F**
			PM	6,900	1,271	**F**	1,650	1,588	**F**
US 101	Embarcadero Rd to Oregon Expwy	SB	AM	6,900	1,991	D	1,650	n/a	A
			PM	6,900	1,135	**F**	1,650	1,627	D
US 101	Oregon Expwy to San Antonio Ave	SB	AM	6,900	1,989	D	3,300	919	A
			PM	6,900	1,050	**F**	3,300	1,693	D
US 101	San Antonio Ave to Rengstorff Ave	SB	AM	6,900	1,890	E	3,300	780	A
			PM	6,900	1,125	**F**	3,300	1,610	D
US 101	Rengstorff Ave to N. Shoreline Blvd	SB	AM	6,900	1,976	D	3,300	1,369	C
			PM	6,900	1,072	**F**	3,300	1,508	D
US 101	N. Shoreline Blvd to SR 85	SB	AM	6,900	1,950	D	1,650	1,068	A
			PM	6,900	1,115	**F**	1,650	1,752	E

Notes:
HOV = high-occupancy vehicle; LOS = level of service
1. Capacity is based on the capacities cited in VTA's *Transportation Impact Analysis Guidelines* (2014).
2. Volume, and Level of service (LOS) on each segment are taken from VTA's *2018 CMP Monitoring Report*. VTA did not report volume and density for segments with speed above 75.2 mph.
Bold indicates a substandard level of service.

Table 11
Existing Freeway LOS – Alameda County

CMP Facility	Roadway Segment	Dir.	Pk Hr	Capacity	Existing LOS
SR 84	San Mateo County Line to Toll Plaza	EB	AM	2,200	A
		EB	PM	2,200	C
SR 84	Toll Plaza to San Mateo County Line	WB	AM	2,200	F
		WB	PM	2,200	A
SR 84	Toll Plaza to Thornton Ave	EB	AM	2,200	A
		EB	PM	2,200	B
SR 84	Paseo Padre Pkwy to Toll Plaza	WB	AM	2,200	F
		WB	PM	2,200	C
SR 84	Thornton Ave to Newark Blvd	EB	AM	2,200	A
		EB	PM	2,200	C
SR 84	Newark Blvd to Paseo Padre Pkwy	WB	AM	2,200	E
		WB	PM	2,200	A
SR 84	Newark Blvd to I-880	EB	AM	2,200	D
		EB	PM	2,200	F
SR 84	I-880 to Newark Blvd	WB	AM	2,200	D
		WB	PM	2,200	D

Notes:

Data referenced the Alameda County Transportation Comission *2018 LOS Monitoring Report, Appendix B.*

Existing Freeway Ramp Capacity Analysis

This analysis consists of a volume-to-capacity ratio evaluation of the study freeway ramps. The ramp capacities were obtained from the *Highway Capacity Manual 2000 (Chapter 25),* which considers both the free-flow speed and the number of lanes on the study ramps. It was assumed that if ramp meter equipment is present, on-ramps on northbound US 101 would be metered during the AM peak hour, and on-ramps on southbound US 101 would be metered during the PM peak hour. Metered ramps are analyzed with a capacity of 900 vehicles per hour for the mixed-flow lanes. As shown on Table 12, the existing ramps currently have sufficient capacity to serve the existing traffic volumes.

Table 12
Freeway Ramp Capacity

Interchange	Ramp	Peak Hour	Lanes Type	Mixed	HOV	Meter [1]	Capacity [2]	Existing Conditions Volume [3]	V/C
US 101/Marsh Road	SB Off-ramp to Marsh Road	AM	Diagonal	2	-	-	3,800	1,332	0.35
		PM					3,800	1,156	0.30
	NB on-ramp from WB Marsh Road	AM	Diagonal	2	1	YES	1,800	1,559	0.87
		PM				-	2,000	1,472	0.74
US 101/Willow Road	NB off-ramp to Willow Road	AM	Diagonal	2	-	-	3,800	1,153	0.30
		PM					3,800	1,055	0.28
	NB on-ramp from WB Willow Road	AM	Diagonal	1	1	YES	1,800	424	0.24
		PM				-	2,000	495	0.25
	SB on-ramp from WB Willow Road	AM	Loop	1	-	-	1,900	739	0.39
		PM				YES	900	633	0.70
	SB off-ramp to Willow Road	AM	Diagonal	2	-	-	3,800	863	0.23
		PM					3,800	637	0.17
US 101/University Avenue	NB off-ramp to Donohoe Street	AM	Diagonal	1	-	-	2,000	857	0.43
		PM					2,000	1,326	0.66
	SB on-ramp from University Avenue	AM	Diagonal	2	-	-	1,800	1,143	0.64
		PM				YES	900	744	0.83

Notes:
NB = Northbound; SB = Southbound; EB = Eastbound; WB = Westbound
1. Northbound on-ramps are assumed metered during the AM peak hour. Southbound on-ramps are assumed metered during the PM peak hour.
2. Ramp capacities were obtained from *Highway Capacity Manual 2000* , and considered the free-flow speed, the number of lanes on the ramp, and ramp metering.
3. Existing volumes referenced intersection counts collected in 2019.

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 May, October, and November 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.

Marsh Road between Bayfront Expressway and Bay Road

There were no operational deficiencies observed along this corridor during the AM peak hour.

During the PM peak hour, the eastbound traffic on Marsh Road queued from Bayfront Expressway past the 101 SB Off-Ramp. Most eastbound vehicles required more than one cycle to clear along this queue. The southbound left-turn movement at the Marsh Road/US 101 SB Off-Ramp intersection also received heavy demand. These vehicles usually waited through more than one queue to cross the intersection due to downstream spillback queues on eastbound Marsh Road.

Middlefield Road between Marsh Road and University Avenue

During the AM peak hour, southbound traffic was heavy. The southbound left-turn queue at the Ringwood Avenue/Middlefield Road intersection occasionally exceeded the left-turn pocket as vehicles traveled to Menlo-Atherton High School. The northbound left-turn queue at the Ravenswood Avenue/Middlefield Road intersection frequently filled the entire block and occasionally impacted operations at Ringwood Avenue, as vehicles in the through lane waited to merge into the left-turn lane.

During the PM peak hour, the northbound left-turn queue at the Ravenswood Avenue/Middlefield Road intersection sometimes filled the entire block and occasionally impacted operations at Ringwood Avenue as vehicles in the through lane waited to merge into the left-turn lane. Vehicles making an eastbound right-turn from Ravenswood Avenue were observed to wait to merge to the southbound left-turn lane at the Ringwood Avenue/Middlefield Road intersection. The northbound right-turn movement at the Willow Road/Middlefield Road intersection received heavy demand but was often observed to be blocked by the northbound through queue.

Bayfront Expressway between Marsh Road and University Avenue

Due to signal failures at the Bayfront Expressway and Marsh Road intersection during the day of observation, the observed AM peak hour conditions along this corridor were deemed atypical.

During the PM peak hour, the southbound traffic on Bayfront Expressway queued from University Avenue northward past upstream intersections. Most southbound vehicles required multiple cycles to clear intersections along this queue. The eastbound left-turn queue at the Chrysler Drive/Bayfront Expressway intersection extended past upstream intersections and required multiple cycles to clear. The southbound right-turn and northbound left-turn movements at the Chilco Street/Bayfront Expressway intersection sometimes required two signal cycles to clear due to eastbound spillback queues at the Chilco Street and Constitution Drive intersection. The eastbound left-turn movement frequently required two signal cycles to clear the Chilco Street/Bayfront Expressway intersection.

Chilco Street & Constitution Drive/MPK 22 Driveway

During the AM peak hour, all approaches of this unsignalized intersection were busy. Vehicles frequently made left turns at all approaches. The two unsignalized pedestrian crosswalks were heavily utilized. The westbound through-right lane frequently queued towards Bayfront Expressway and was observed to take up to a minute to clear. The queue was observed to occasionally extend to the end of the southbound right-turn pocket on Bayfront Expressway.

During the PM peak hour, eastbound spillback queues from the Chilco Street and Bayfront Expressway intersection affected traffic operations at this intersection. At the Chilco Street and Constitution Drive intersection, the westbound vehicles frequently queued towards, and sometimes onto, Bayfront Expressway.

Chrysler Drive & Constitution Drive

During the AM peak hour, there were no significant operational issues at this intersection.

During the PM peak hour, eastbound spillback queues from the Chrysler Drive and Bayfront Expressway intersection affected traffic operations at this intersection. At the Chrysler Drive and Constitution Drive intersection, the eastbound queues extended past upstream intersections. The westbound left-turn queue frequently extended into the southbound right-turn lane on Bayfront Expressway. The westbound left-turn queue was usually able to clear in one signal cycle, although it was observed to be sometimes blocked by the eastbound spillback queue. The northbound right-turn movement sometimes required multiple signal cycles to clear due to eastbound downstream queuing issues.

Willow Road between Hamilton Avenue and Gilbert Avenue

During the AM peak hour, there was heavy demand on westbound Willow Road along this corridor. Westbound vehicles often required multiple cycles to clear an intersection. As a result, the southbound right-turn and northbound left-turn movements on the side streets turning onto westbound Willow Road also required multiple cycles to clear the intersection. The westbound queue was usually able to clear at the Willow Road/Durham Street intersection due to the long through phase. The eastbound left-turn movement at the Newbridge Street intersection received heavy demand and occasionally required two signal cycles to clear. Vehicles at the US 101 northbound off-ramp turning right onto eastbound Willow Road frequently queued onto the auxiliary lane on US 101 and required multiple cycles to clear.

During the PM peak hour, there was heavy demand on eastbound Willow Road along this corridor. Eastbound vehicles often required multiple cycles to clear an intersection. As a result, the northbound right-turn and southbound left-turn movements on the side street turning onto eastbound Willow Road also required multiple cycles to clear the intersection. The westbound left-turn movement at the Hamilton Avenue intersection received heavy demand that often required two signal cycles to clear. Vehicles at the US 101 northbound off-ramp turning right onto eastbound Willow Road frequently queued onto the auxiliary lane on US 101 and required multiple cycles to clear. Vehicles at the US 101 southbound off-ramp turning left onto eastbound Willow Road were often impacted by eastbound spillback queues and were observed to block the westbound through movement. The westbound left-turn queue extended onto US 101 southbound and impacted freeway operations. Vehicles were observed to utilize the parking lane to access the westbound right-turn movement at the Willow Road/Coleman Avenue intersection.

University Avenue between Purdue Avenue and Woodland Avenue

During the AM peak hour, there was heavy demand on westbound University Avenue along this corridor. Westbound vehicles often required multiple cycles to clear an intersection between Adams Drive and Woodland Avenue. Eastbound traffic between Bay Road and the US 101 SB Ramps was also heavy and often required multiple cycles to clear. At the unsignalized intersection of University Avenue and Adams Drive, the eastbound and southbound left-turn movements occasionally had extended wait periods due to continuous westbound traffic. Protected signal phasing is recommended at the University Avenue and Runnymede Street intersection due to potentially hazardous interactions between vehicles performing permitted left-turns across heavy traffic and crossing pedestrians.

During the PM peak hour, there was heavy demand on eastbound University Avenue along this corridor. Eastbound vehicles often required multiple cycles to clear an intersection. As a result, the left-turn movements on the side streets also required multiple cycles or extended wait periods to clear the intersection. Eastbound traffic between Bay Road and Donohoe Street occasionally required more than one cycle to clear. At the unsignalized intersection of University Avenue and Purdue Avenue, vehicles were observed to make northbound right-turns, despite existing signage prohibiting that maneuver. At the University Avenue/Adams Drive intersection, vehicles were observed to pass through the intersection during a break in westbound traffic and wait in the median area until drivers allowed them to merge. The westbound left-turn movement at the University Avenue/Bay Road intersection sometimes required more than one cycle to clear. The eastbound left-turn movement at the University Avenue/Bell Street intersection frequently queued out of the turn pocket and required multiple cycles to clear.

Donohoe Street between University Avenue and Cooley Avenue

During the AM peak hour, there was heavy demand on northbound Donohoe Street along this corridor. Northbound vehicles often required multiple cycles to the clear an intersection. As a result, the westbound right-turn and eastbound left-turn movements on the side streets turning onto northbound Donohoe Street also required multiple cycles to clear the intersection. At the Cooley Avenue/Donohoe Street intersection, there was high demand for the number 1 lane. The congestion was due to spillback from the downstream intersections at University Avenue/Donohoe Street and US 101 NB Off-Ramp/Donohoe Street.

During the PM peak hour, there was heavy demand on northbound Donohoe Street along this corridor. Northbound vehicles often required multiple cycles to the clear an intersection. The eastbound left-turn vehicles at the US 101 NB Off-Ramp/Donohoe Street intersection were observed to frequently fail to clear the intersection in one green cycle due to high volume and northbound spillback queues. At the Cooley Avenue/Donohoe Street intersection, there was high demand for the number 1 lane. The congestion was due to spillback from the downstream.

Project Trips Estimates

Trip generation estimates for the mixed-use development are based on standard trip generation rates published in the Institute of Transportation Engineers (ITE) Trip Generation, 10th Edition manual. Below is a general discussion of the trip generation estimation methodology (see Table 13). Detailed trip generation analysis is provided in Appendix D.

Gross Project Trip Generation

A description of the source of trip generation rates for each land-use is provided below:

- ***Office***. Initial trip estimates for office and accessory uses are based on “ITE Land Use code 710: General Office Building”.
- ***Residential.*** The trip estimate is based on the “ITE Land Use code 221: Multifamily Housing (Mid-Rise)”, which includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have between three to ten levels. Some of the apartments are designated as senior housing, which could have a lower trip rate. Thus, the trip generation estimate for the apartments is conservative.
- ***Retail.*** Trip estimates are based on “ITE Land Use code 820: Shopping Center”, which includes several types of retail uses like restaurants, movie theaters, bowling alleys etc. that are typically present in shopping centers.
- ***Hotel.*** Trip estimates are based on “ITE Land Use code 310: Hotel”.
- ***Publicly Accessible Park.*** Trip estimates are based on “ITE Land Use code 488: Soccer Complex”. The programmatic design of the park has not been determined. In order to provide a conservative estimate of potential traffic generation and allow for flexible programming for the project through the project review process, it is assumed that the park will have play structures and open field areas for warm-ups or casual play.

Transportation Demand Management (TDM)

The City of Menlo Park requires all new developments in the R-MU and O zoning districts to reduce their trip generation by 20 percent from standard trip generation rates via TDM strategies. The City has in practice applied the 20 percent reduction after crediting for any trip reductions based on a project's proximity to complimentary land uses, alternative transportation facilities, as well as reductions based on a project's mixed-use characteristics (see Appendix D for discussion on the project's trip reductions). As implemented by the City, this TDM ordinance is applied to daily trips, AM peak hour trips, and PM peak hour trips.

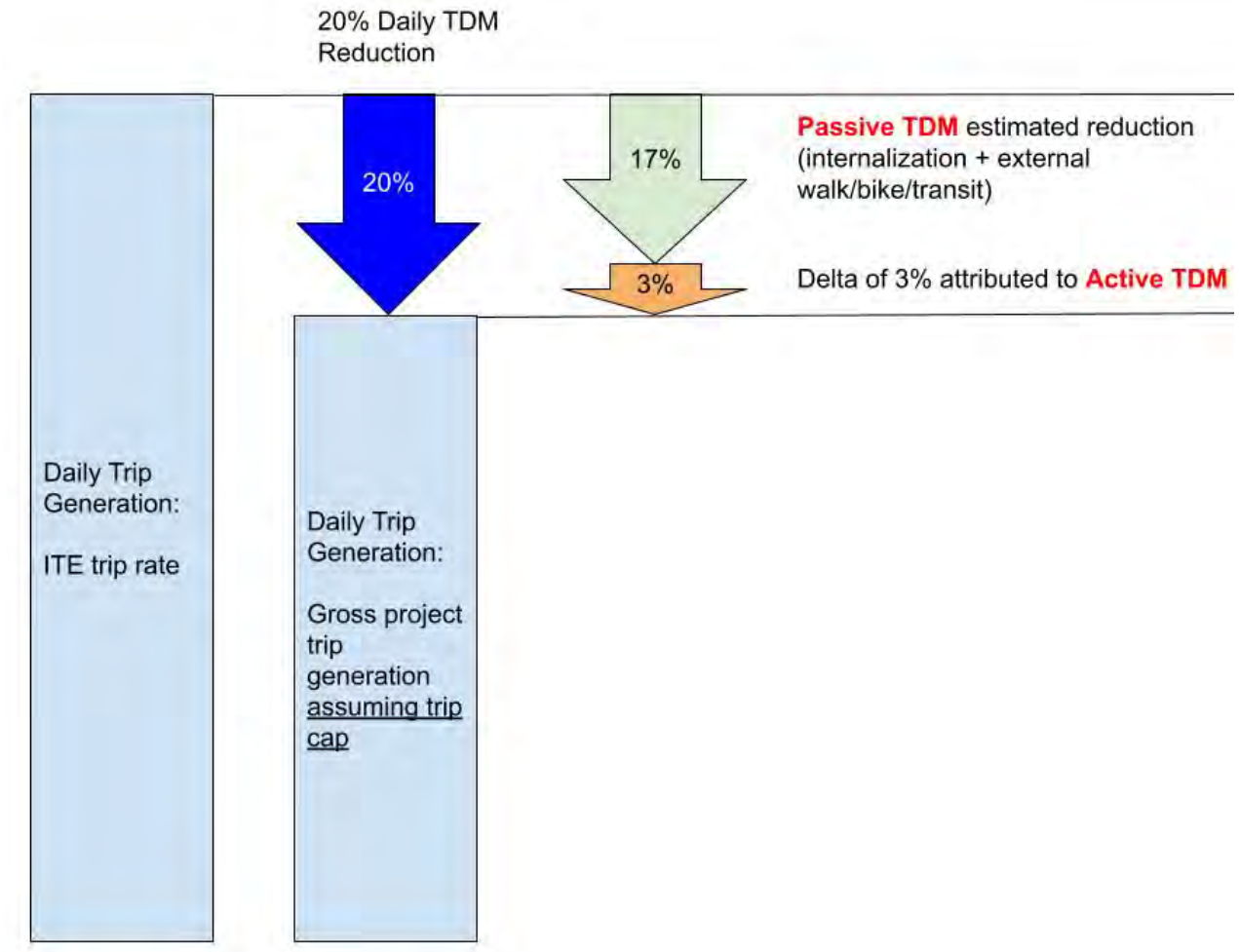
Per the Willow Village Adjustment Request: Transportation Demand Management, submitted by the applicant team, the applicant is proposing the following regarding TDM:

- For the Campus District, the applicant proposes a daily trip cap of 18,237 trips, and a trip cap of 1,670 trips during the AM and PM peak hours.
    - The daily trip cap represents a 20 percent reduction from gross ITE trip generation (see Figure 10).
    - The peak hour trip cap represents a 35-40 percent reduction from gross ITE trip generation.
- For the Residential/Shopping and Town Square Districts, the applicant proposes a 20 percent reduction from gross ITE trip generation for daily, and a 20 percent and 27 percent reduction from gross ITE trip generation during the AM and PM peak hours of commute, respectively.

TDM Monitoring

The City incorporates monitoring requirements into project conditions. The project's TDM plan is anticipated to be monitored annually to ensure effectiveness of the TDM plan. The details of the TDM monitoring plan will be developed as part of CDP, and will detail frequency and duration of monitoring for each land use, as well as the methodology to conduct monitoring. The monitoring plan will also specify corrective measures if the TDM plan is not achieving its stated effectiveness.

Figure 10
Graphical Representation of How the Transportation Analysis Modeled Daily Trip Generation for All Land Uses



Note: the TDM program would achieve a higher reduction, but only a 3% reduction from active TDM measures is needed to achieve a 20% reduction off of gross trip generation estimated using ITE trip generation rates (see discussion above).

Net Project Trip Generation

The project trip generation assumes the applicant's proposed TDM plans for the Campus District as well as for the Residential/Shopping and Town Square Districts. It should be noted that the trip reductions due to the applicant proposed TDM plans already accounted for trip reductions due to the Proposed Project's location efficiency, as well as internal capture due to the Proposed Project's mixed use nature (see Appendix D for details).

As shown in Table 13, the proposed project trips generated by the proposed land uses after accounting for the proposed TDM plans at the main Project Site would be 33,263 daily trips, 2,396 AM peak hour trips, and 2,907 PM peak hour trips.

Net project trip generation represents the number of new project trips added to the surrounding roadway network. The following categories of trips are credited from the site-specific trip cap to derive the net project trip generation.

Pass-By

The retail uses would attract some of their customers from people who are passing by the site on Willow Road or Bayfront Expressway heading towards their destination. These customers would not need to make a separate vehicle trip to come to the Project Site. Such vehicle trips are categorized as pass-by trips as they are not new trips generated on the roadway network and should be credited from the project trip generation. A pass-by trip reduction for retail trips was applied based on the average pass-by reduction rate published in the ITE Trip Generation Handbook, 3rd Edition. Pass-by data are typically available only for the PM peak hour. Hexagon assumed no pass-by trip reduction for the AM peak hour and half of the PM peak pass-by trip reduction for daily trip generation.

Existing Uses

Trips associated with the existing uses on the Project Site were credited against the new trip generation. The trips generated by the existing buildings on the site were estimated based on driveway counts conducted over three days in September 2019 per Facebook Willow Traffic Counts Memorandum, Fehr & Peers, March 26, 2020. The existing uses on the site generated an average of 11,700 trips daily, including 985 trips in the AM peak hour (699 inbound and 286 outbound trips), and 805 trips in the PM peak hour (250 inbound and 555 outbound trips).

As shown in Table 13, the net Proposed Project trips generated by the main Project Site on the roadway network would be 20,537 daily trips, including 1,411 AM peak hour trips (939 inbound trips and 472 outbound trips), and 1,914 PM peak hour trips (719 inbound trips and 1,195 outbound trips).

As shown in Table 14, the net trips generated by the Hamilton Parcels are estimated to be 218 daily trips, including 6 AM peak hour trips (3 inbound trips and 3 outbound trips), and 18 PM peak hour trips (9 inbound trips and 9 outbound trips)[15].

[15] The Hamilton Parcels are located within C-2-S zoning, which does not require implementation of a TDM Plan. Therefore, no TDM reductions were applied.

Table 13
Project Trip Generation Estimates (Main Project Site)

Land Use	ITE Land Use Code [1]	Size	Unit	Daily Rate [1]	Daily Total	AM Peak Hour Rate [1]	AM Peak Hour IN	AM Peak Hour OUT	AM Peak Hour Total	PM Peak Hour Rate [1]	PM Peak Hour IN	PM Peak Hour OUT	PM Peak Hour Total
Campus District													
Office	710	6,950	employees	3.28	22,796	0.37	2,135	437	2,572	0.40	556	2,224	2,780
TDM Reductions [2]					*(4,559)*		*(765)*	*(137)*	*(902)*		*(171)*	*(939)*	*(1,110)*
			Office Trip Cap [2]		**18,237**		**1,370**	**300**	**1,670**		**385**	**1,285**	**1,670**
Residential/Shopping and Town Square Districts													
Residential	221	1,730	d.u.	5.44	9,411	0.36	162	461	623	0.44	464	297	761
Retail	820	200	ksf	37.75	7,550	0.94	117	71	188	3.81	366	396	762
Hotel	310	193	rooms	8.36	1,613	0.47	54	37	91	0.60	59	57	116
Publicly Accessible Park [3]	488	3	fields	71.33	214	0.99	2	1	3	16.43	32	17	49
Subtotal					18,788		335	570	905		921	767	1,688
TDM Reductions [4]					*(3,762)*		*(67)*	*(112)*	*(179)*		*(245)*	*(206)*	*(451)*
Residential/Shopping and Town Square Districts Trips (MU)					**15,026**		**268**	**458**	**726**		**676**	**561**	**1,237**
Project Trips *after* TDM Reductions (Office + MU)					33,263		1,638	758	2,396		1,061	1,846	2,907
Retail Pass-By Reductions [5]					*(1,026)*		*0*	*0*	*0*		*(92)*	*(96)*	*(188)*
Total New Trips Generated by the Project					**32,237**		**1,638**	**758**	**2,396**		**969**	**1,750**	**2,719**
Existing Trip Generation Credit [6]					(11,700)		(699)	(286)	(985)		(250)	(555)	(805)
Net New Trips Generated on Roadway Network					**20,537**		**939**	**472**	**1,411**		**719**	**1,195**	**1,914**

Notes

d.u. = dwelling unit, ksf = 1,000 s.f.

1. Daily, AM, and PM peak hour average rates published in ITE Trip Generation Manual, 10th Edition, 2017 were used for each land use.
2. Office trip generation and TDM reductions reflect the proposed daily, AM and PM peak hour trip caps.
3. The publicly accessibleThe programmatic design of the park has not been determined. In order to provide a conservative estimate of potential traffic generation, it is assumed that the park will have play structures and open field areas for warm-ups or casual play. The park is planned for approximately 3.5 acres. Number of soccer fields on 3.5 acres of land was estimated based on the size of a standard soccer field. park is assumed to be programmable. ITE Land Use "Soccer Field" is analyzed as a proxy. Number of soccer fields was estimated based on the size of a standard soccer field.
4. For the Residential/Shopping and Town Square Districts, the applicant proposes a 20 percent reduction from gross ITE trip generation for daily, and a 20 percent and 27 percent reduction from gross ITE trip generation during the AM and PM peak hours of commute, respectively.
5. Pass-by trip reduction 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. Existing Use trip estimates based on driveway counts conducted over three days in September 2019 per Facebook Willow Traffic Counts Memorandum, Fehr & Peers, March 26, 2020. 8-9 AM in the AM peak period and 4-5 PM in the PM peak period have been considered as peak hours since they have the highest trips.

Table 14
Project Trip Generation Estimates (Hamilton Parcel)

Land Use	ITE Code [1]	Size		Daily Rate	Daily Trips	AM Peak Hour Rate	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour Rate	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Proposed Use													
General Retail	820	7.7	ksf	37.75	291	0.94	4	3	7	3.81	14	15	29
External Walk, Bike, and Transit [2]					*(28)*		*(1)*	*0*	*(1)*		*(1)*	*(1)*	*(2)*
Retail Pass-By Reduction (34%) [3]					*(45)*		*0*	*0*	*0*		*(4)*	*(5)*	*(9)*
Net Project Trips on Project Network					**218**		**3**	**3**	**6**		**9**	**9**	**18**

Notes:

ksf = 1,000 square feet

[1] Daily, AM, and PM peak hour average rates published in *ITE Trip Generation Manual, 10th Edition, 2017* were used for each land use.

[2] External walk, bike, and transit reduction developed using *US EPA Mixed Use Trip Generation Model v.4, 2010* .

[3] Pass-by trip reduction 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.

Trip Distribution and Assignment

The trip distribution pattern and trip assignment for the proposed uses were estimated based on the Menlo Park Travel Demand Model. The model estimated trip distribution pattern is summarized below:

- Dumbarton Bridge: approximately 11%
- US 101 to the north, including Haven Avenue: approximately 28%
- US 101 to the south, including Embarcadero Road: approximately 31%
- Marsh Road west of US 101: approximately 4%
- Willow Road west of US 101: approximately 8%
- University Avenue west of US 101: approximately 6%
- Menlo Park and East Palo Alto east of US 101: approximately 12%

Future Traffic Volumes

Both near-term (year 2025) and cumulative (year 2040) scenario forecasts of intersection turning movements, freeway traffic and ramp volumes were completed using the latest Menlo Park travel demand forecast model (citywide travel demand forecast model). The citywide model is the best available model to represent travel within the City of Menlo Park, and serves as the primary forecasting tool for the City. The model is a mathematical representation of travel within the nine Bay Area counties, as well as the Santa Cruz, San Benito, Monterey and San Joaquin counties. The base model structure was developed by the Metropolitan Transportation Commission (MTC) and further refined by the City/County Association of Governments and Santa Clara Valley Transportation Authority for use within San Mateo County and Santa Clara County. The City further refined this model for application with Menlo Park to add more detail to the zone structure and transportation network. There are 81 transportation analysis zones (TAZs) within the model to represent the City of Menlo Park.

Near-Term and Cumulative Traffic Volumes

Land use growth assumptions for Bay Area regions outside of Menlo Park and East Palo Alto for the near-term scenario (year 2025) are provided by the Association of Bay Area Governments (ABAG) and refined by VTA/C/CAG. Approved developments within the City of Menlo Park and the City of East Palo Alto were added to the existing land use to represent the year-2025 land use. The following approved projects within the City of Menlo Park and the City of East Palo Alto as of December 2020 were included:

- Menlo Gateway
- 1285 El Camino Real
- 123 Encinal Avenue
- 1010-1026 Alma Street
- 650-660 Live Oak Avenue
- 1275 El Camino Real
- Facebook Expansion Project (301-309 Constitution Drive)
- 500 El Camino Real
- New Magnet High School
- 1300 El Camino Real
- 1021 Evelyn Street
- 40 Middlefield Road
- 949 El Camino Real
- 1540 El Camino Real
- 115 El Camino Real

- 506-556 Santa Cruz Avenue
- 1125 Merrill Street
- 409 Glenwood Avenue
- 706-716 Santa Cruz Avenue
- 1345 Willow Road
- 201 El Camino Real
- 1021 Runnymede Street (East Palo Alto)

For the cumulative scenario, the City of Menlo Park land use assumed the buildout of the General Plan, as well as the portion of the proposed 123 Independence Drive project that would exceed the unrestricted dwelling units studied in the ConnectMenlo EIR. Pending developments as of December 2020 within the City of East Palo Alto were added to the near-term land use to represent the year-2040 land use for the city. Land use growth for other Bay Area regions for year 2040 were taken from Association of Bay Area Governments (ABAG) projections and refined by VTA/C/CAG. Table 15 shows the socioeconomic model inputs for the entire Bay Area separated by counties.

The forecasted intersection turning movements under all future scenarios were adjusted based on existing volumes to generate traffic volumes for near-term conditions (see Figure 11), near-term plus project conditions (see Figure 12), cumulative conditions (see Figure 13), and cumulative plus project conditions (see Figure 14).

Table 15
Socioeconomic Model Inputs for Bay Area

	Year 2040 Project Conditions Model Land Use Data			
County	Total Households	Total Population	Employed Residents	Total Jobs
San Francisco	447,340	1,076,365	559,923	759,509
San Mateo	320,377	909,511	444,478	481,116
Santa Clara	818,369	2,406,587	1,158,389	1,229,995
Alameda	705,337	1,965,356	891,473	947,642
Contra Costa	464,151	1,328,458	579,757	467,333
Solano	168,706	494,363	224,059	179,946
Napa	56,312	158,792	69,450	89,554
Sonoma	220,740	591,546	284,856	257,466
Marin	112,046	274,489	136,554	129,150
City of Menlo Park	18,532	46,741	21,369	60,969

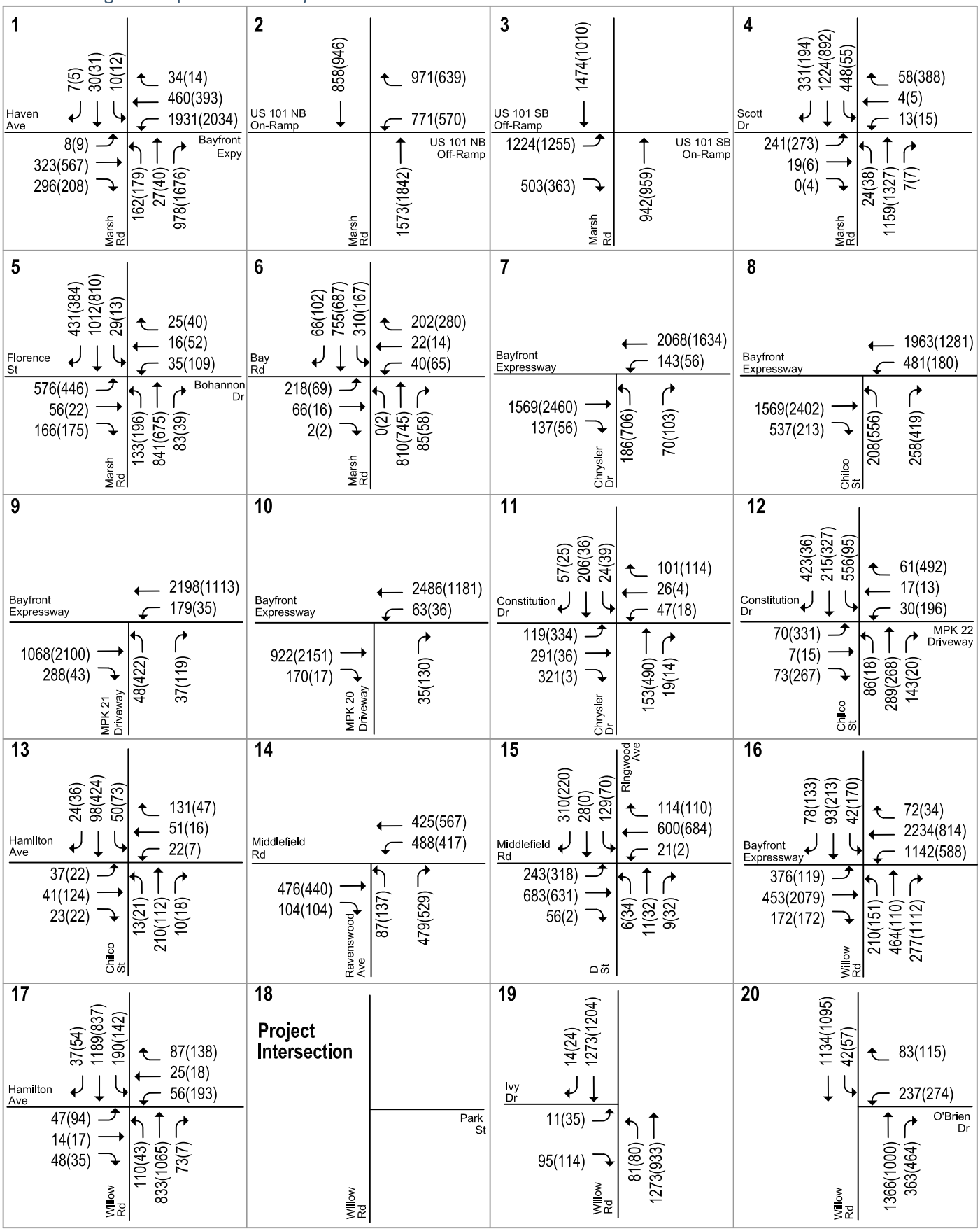


Figure 11
Near-Term Traffic Volumes

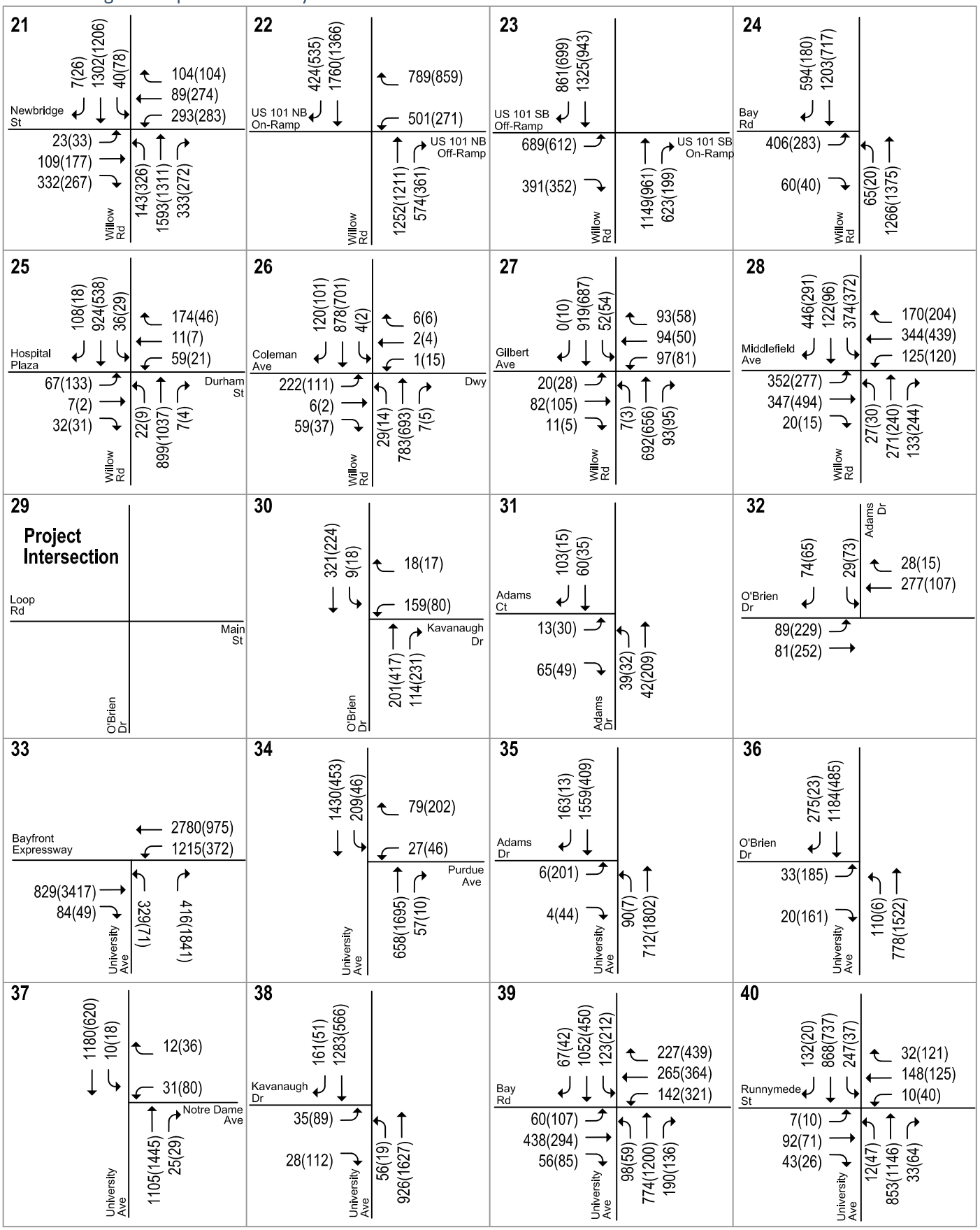
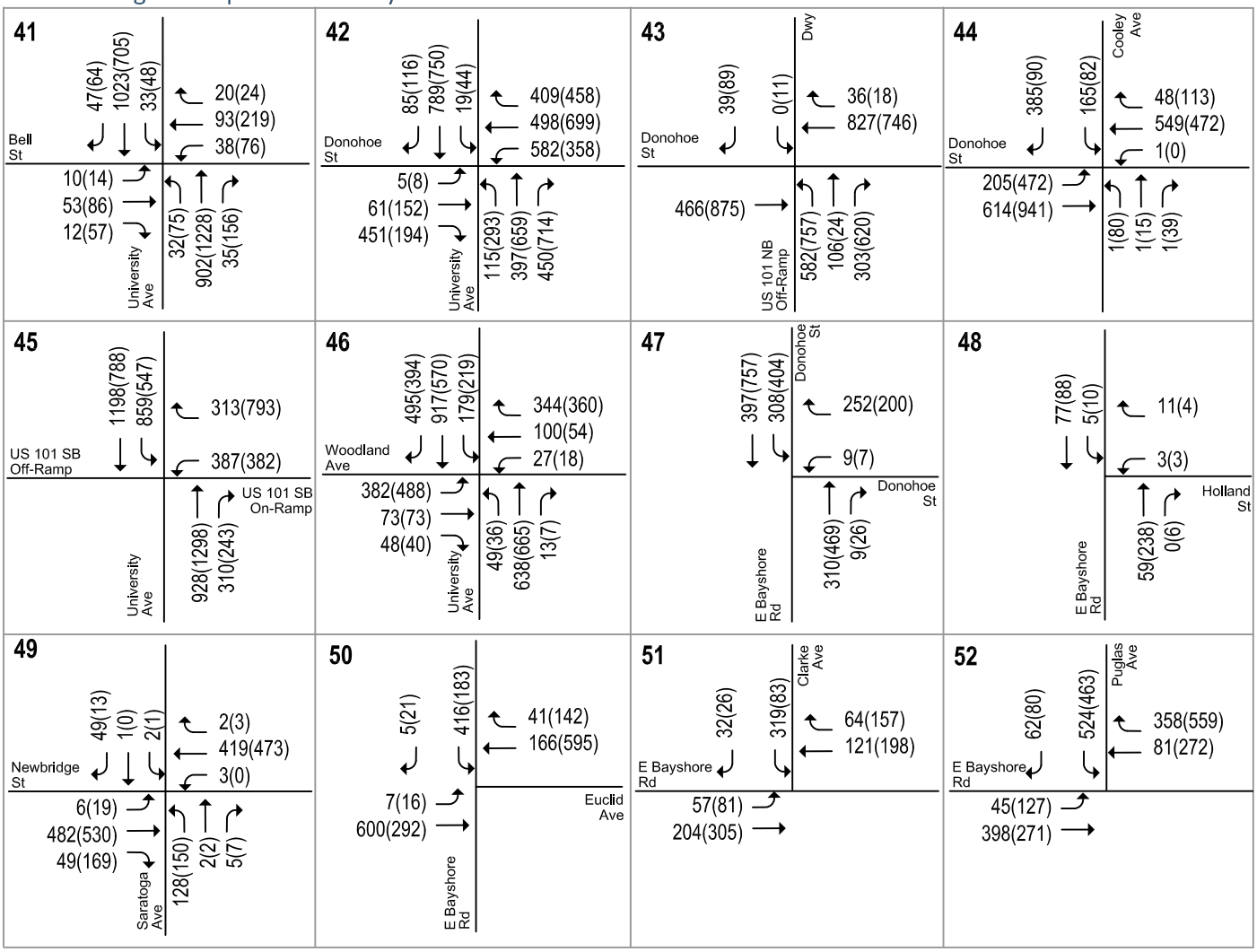


Figure 11
Near-Term Traffic Volumes

NORTH
Not to Scale



LEGEND

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

Figure 11
Near-Term Traffic Volumes

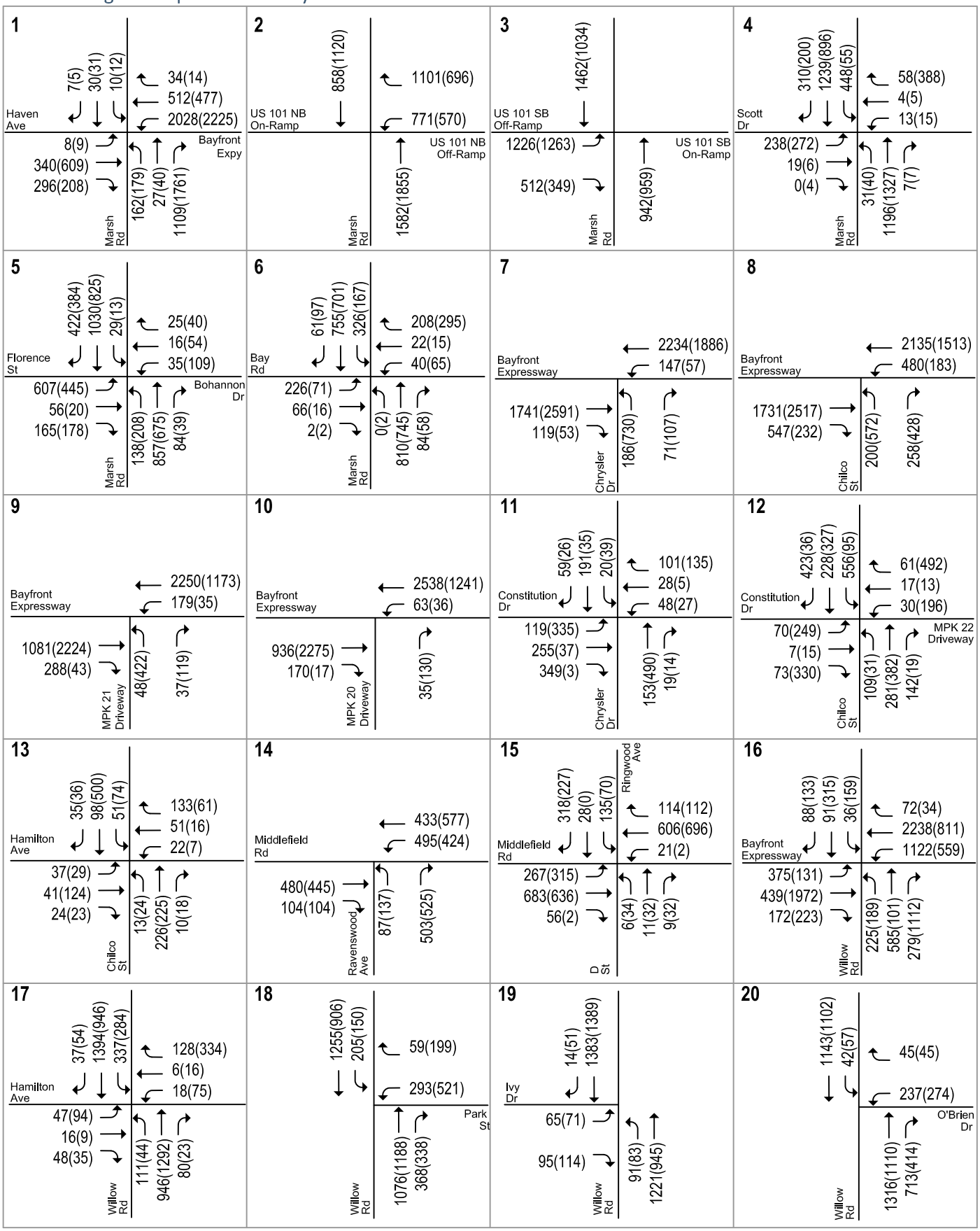


Figure 12
Near-Term Plus Project Traffic Volumes

NORTH
Not to Scale

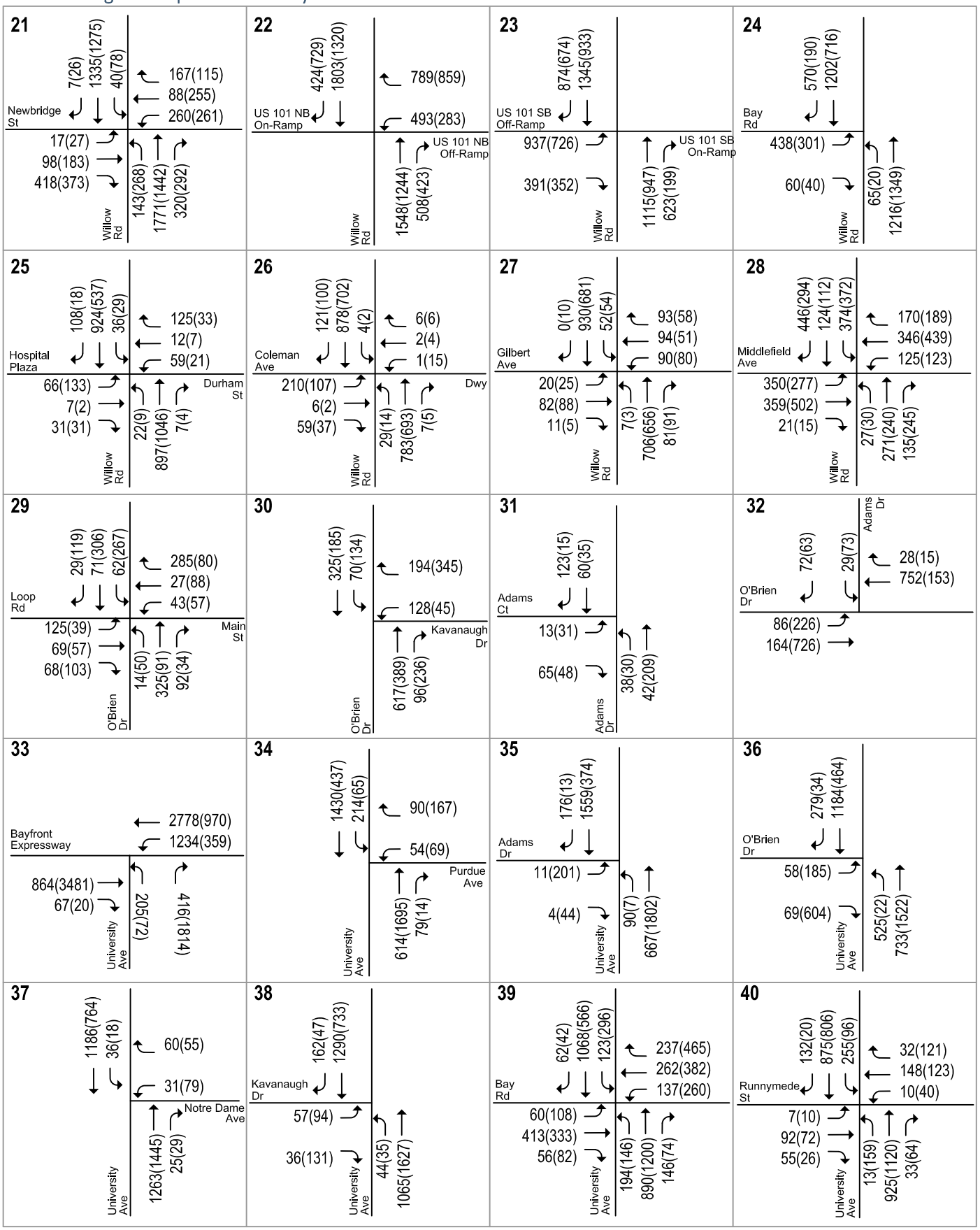
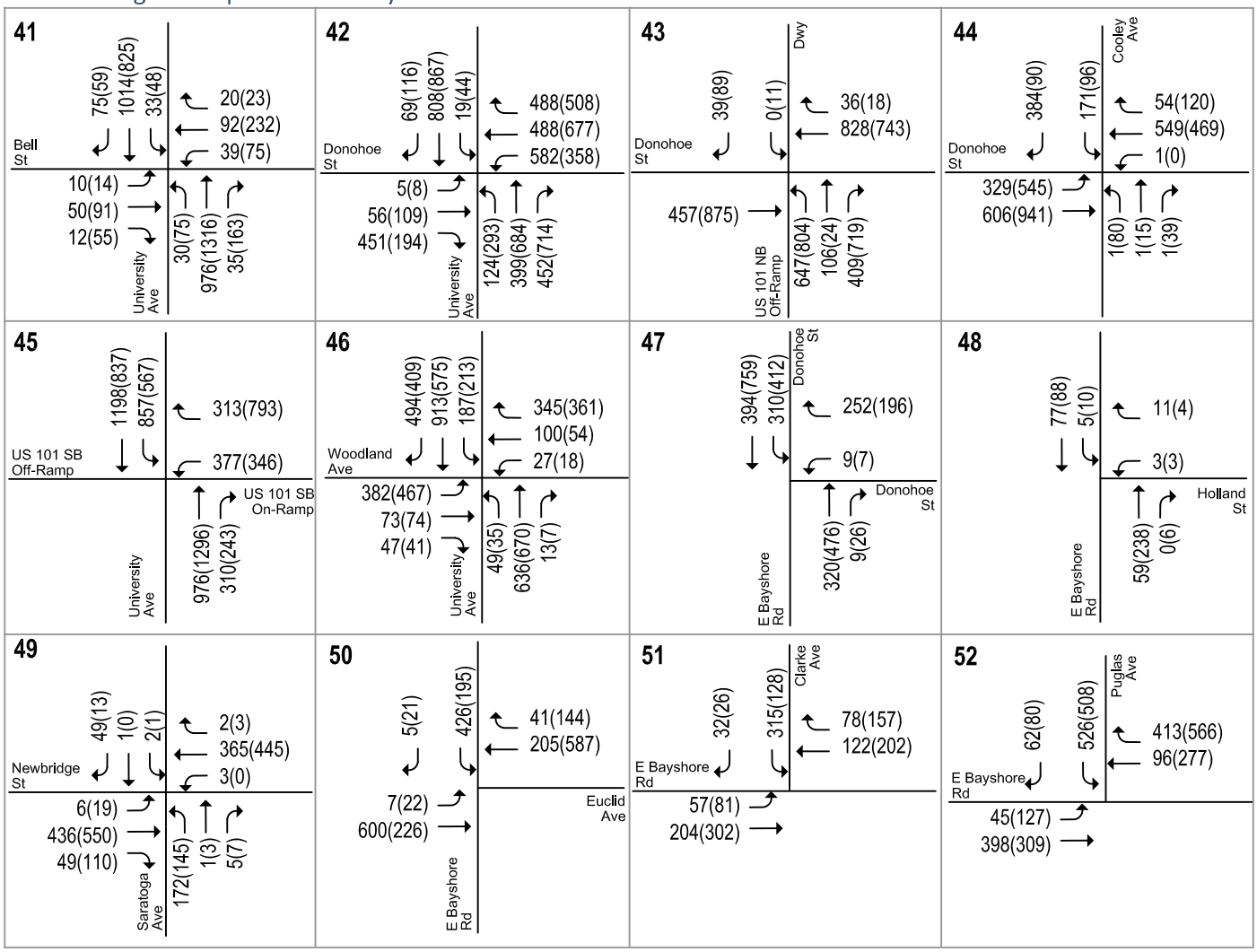


Figure 12
Near-Term Plus Project Traffic Volumes



LEGEND

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

Figure 12
Near-Term Plus Project Traffic Volumes

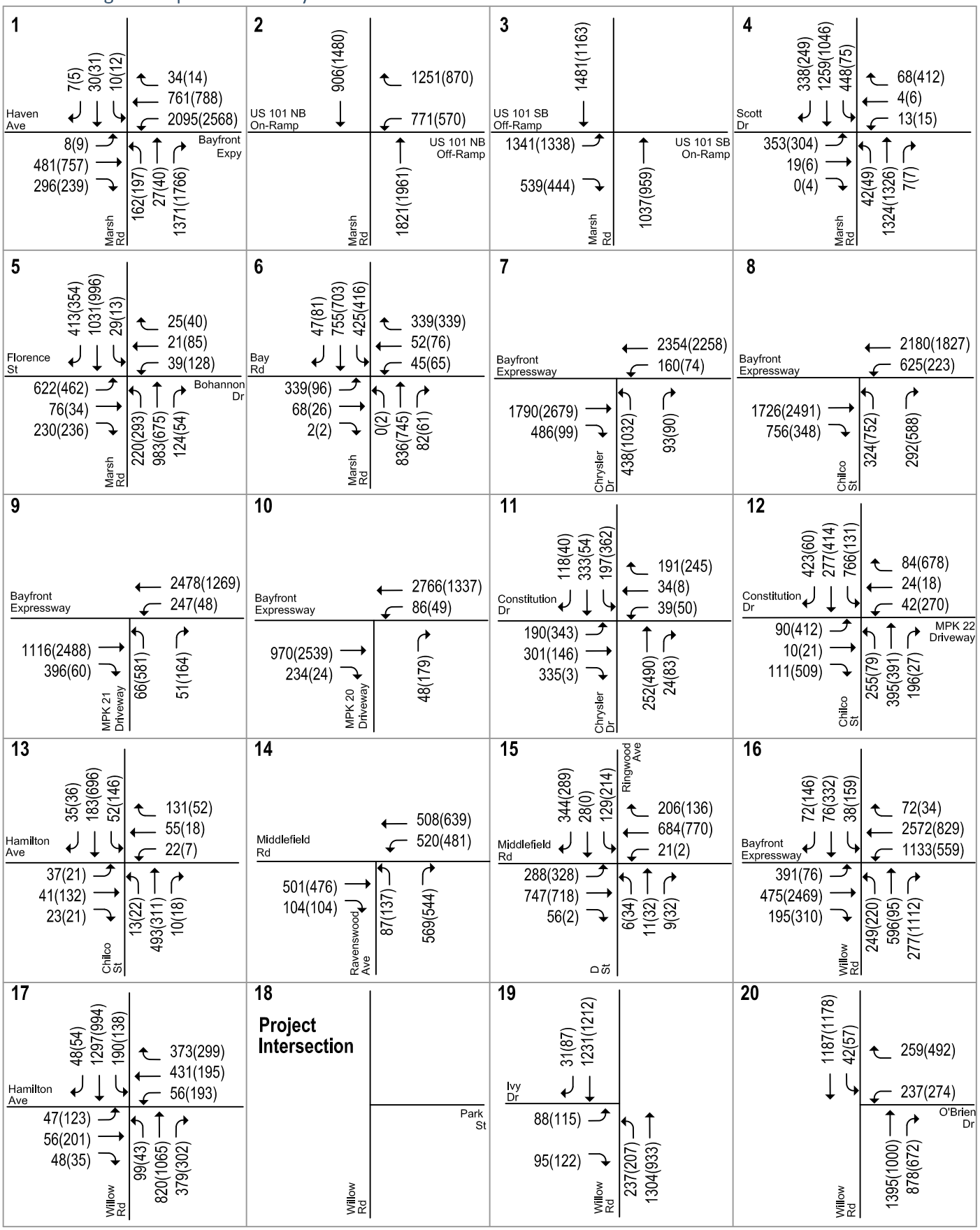


Figure 13
Cumulative Traffic Volumes

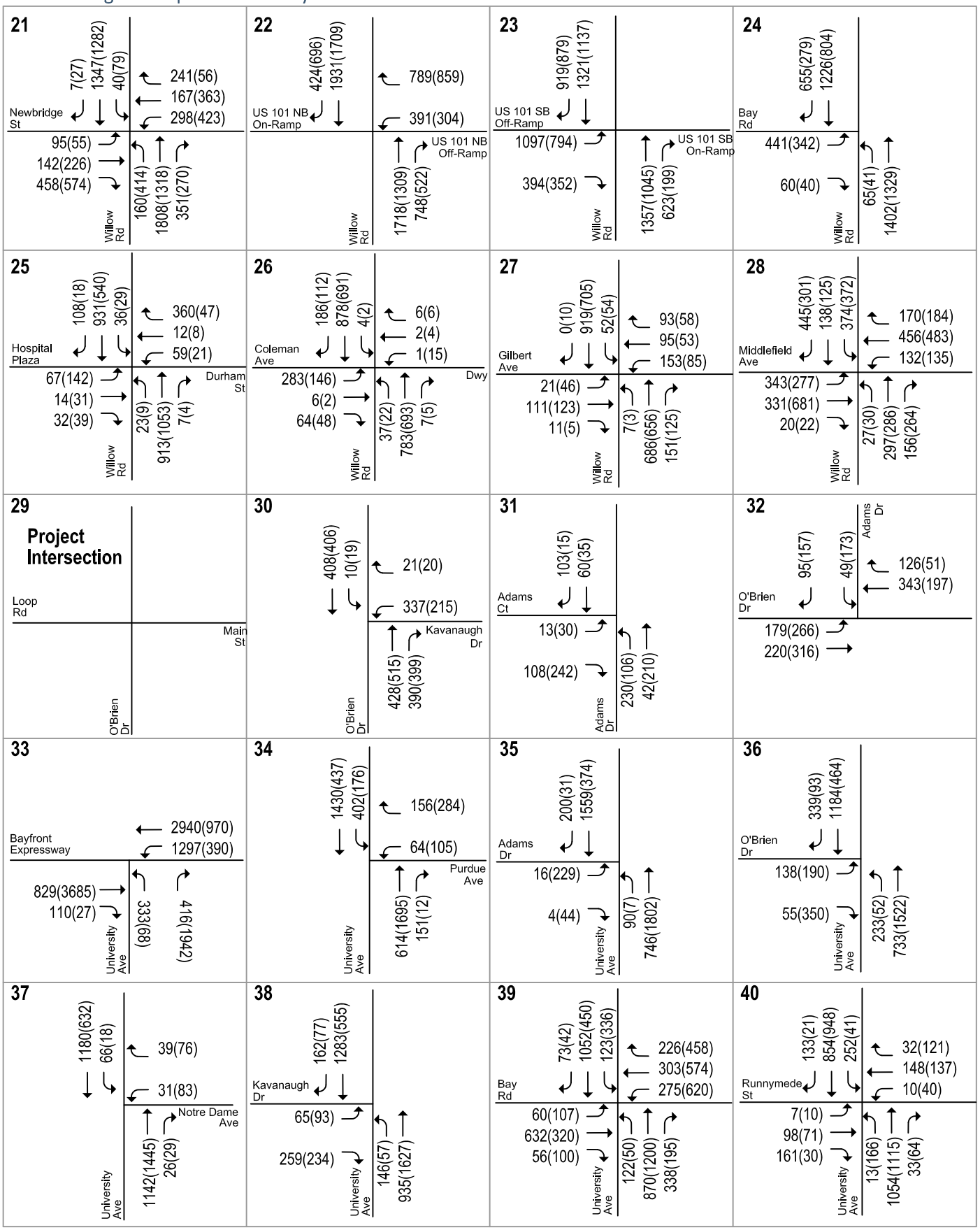
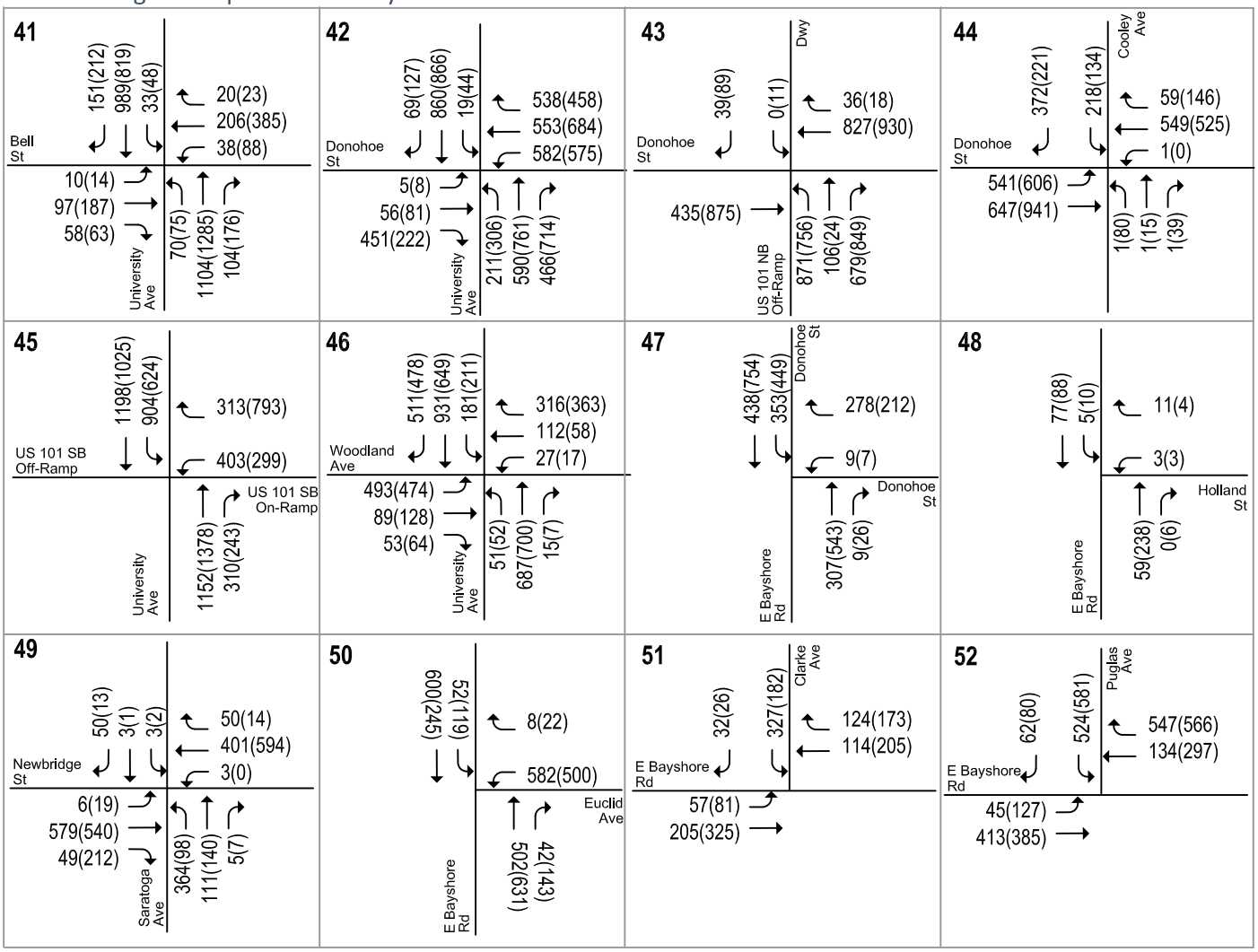


Figure 13
Cumulative Traffic Volumes



LEGEND

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

Figure 13
Cumulative Traffic Volumes

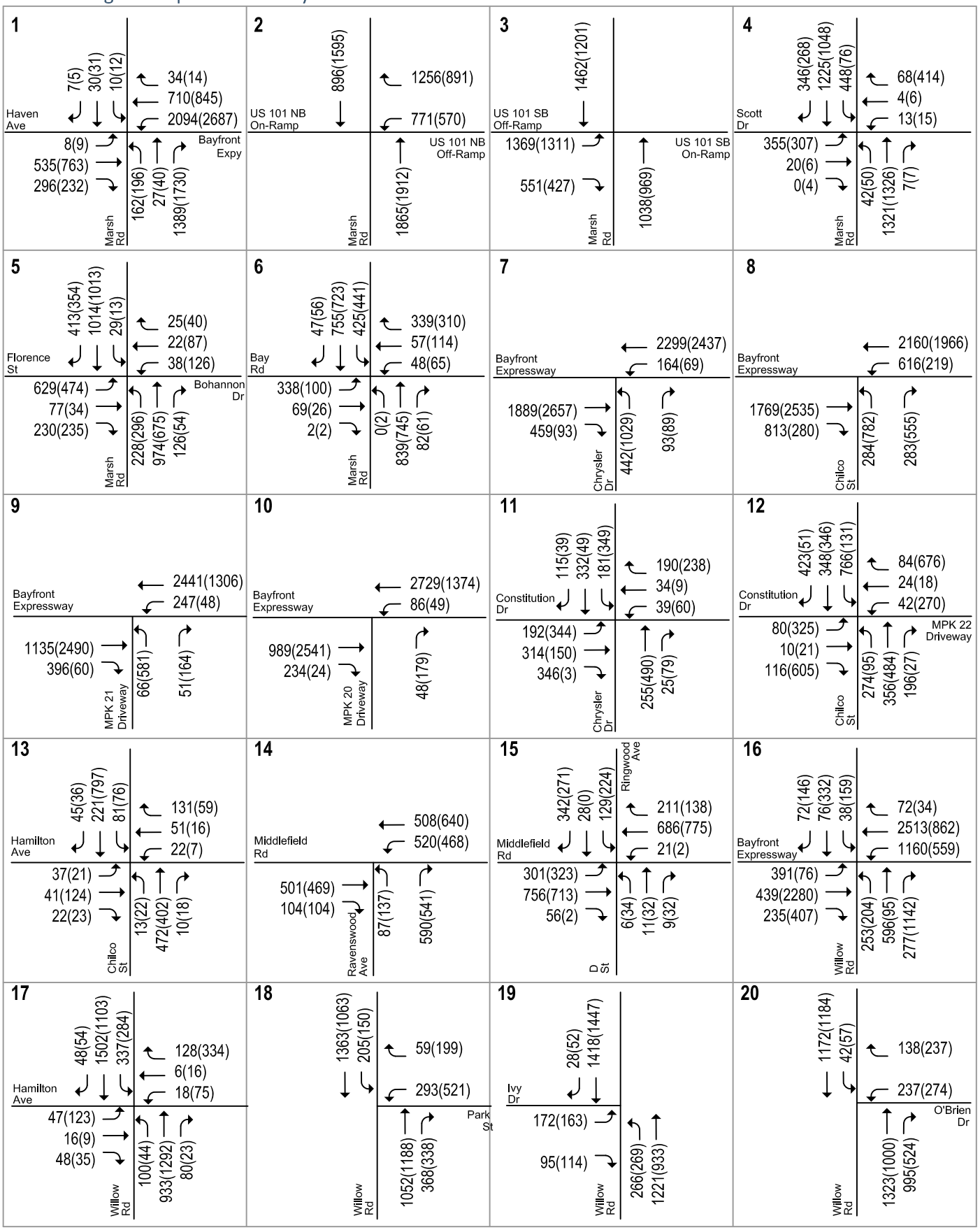


Figure 14
Cumulative Plus Project Traffic Volumes

NORTH
Not to Scale

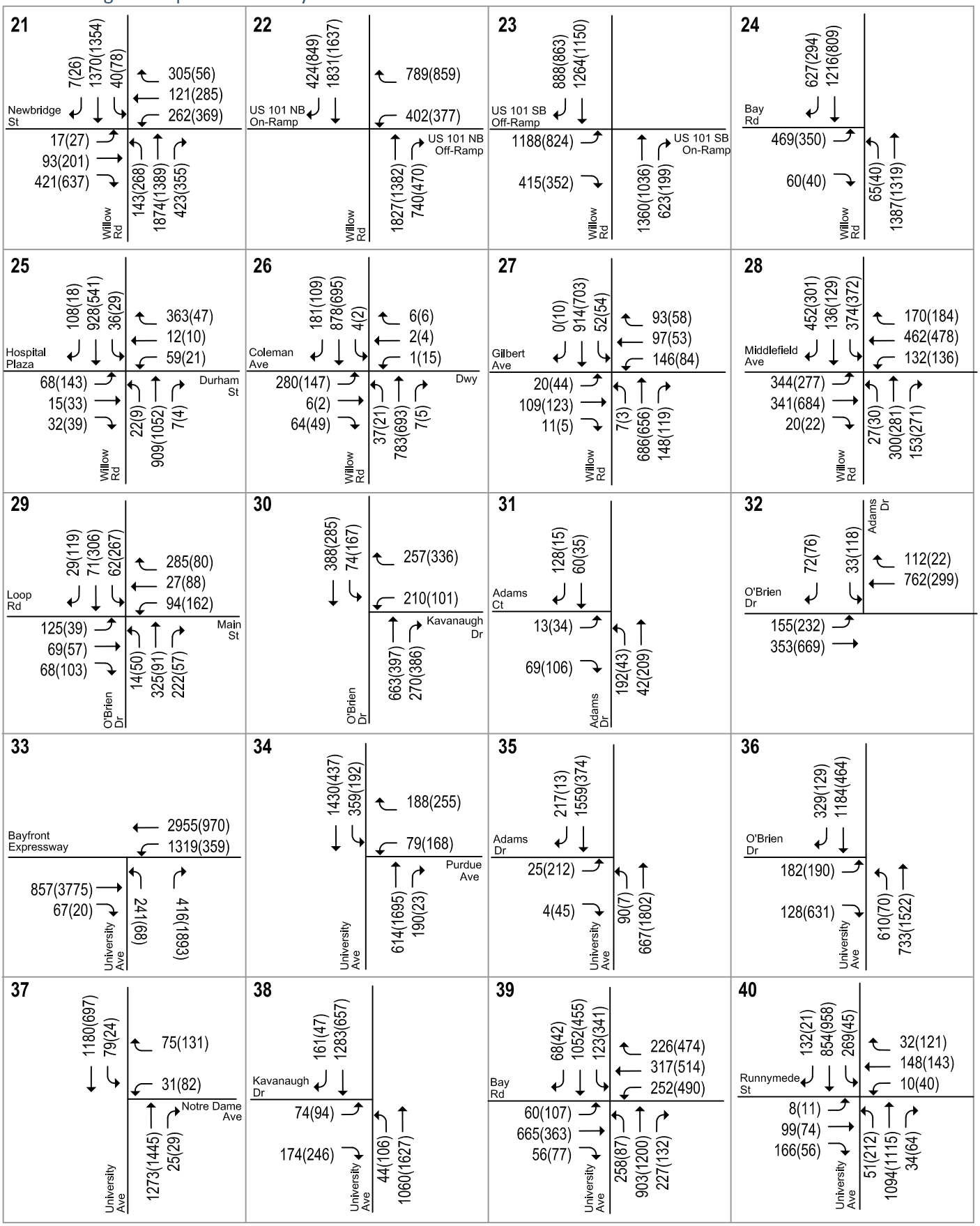
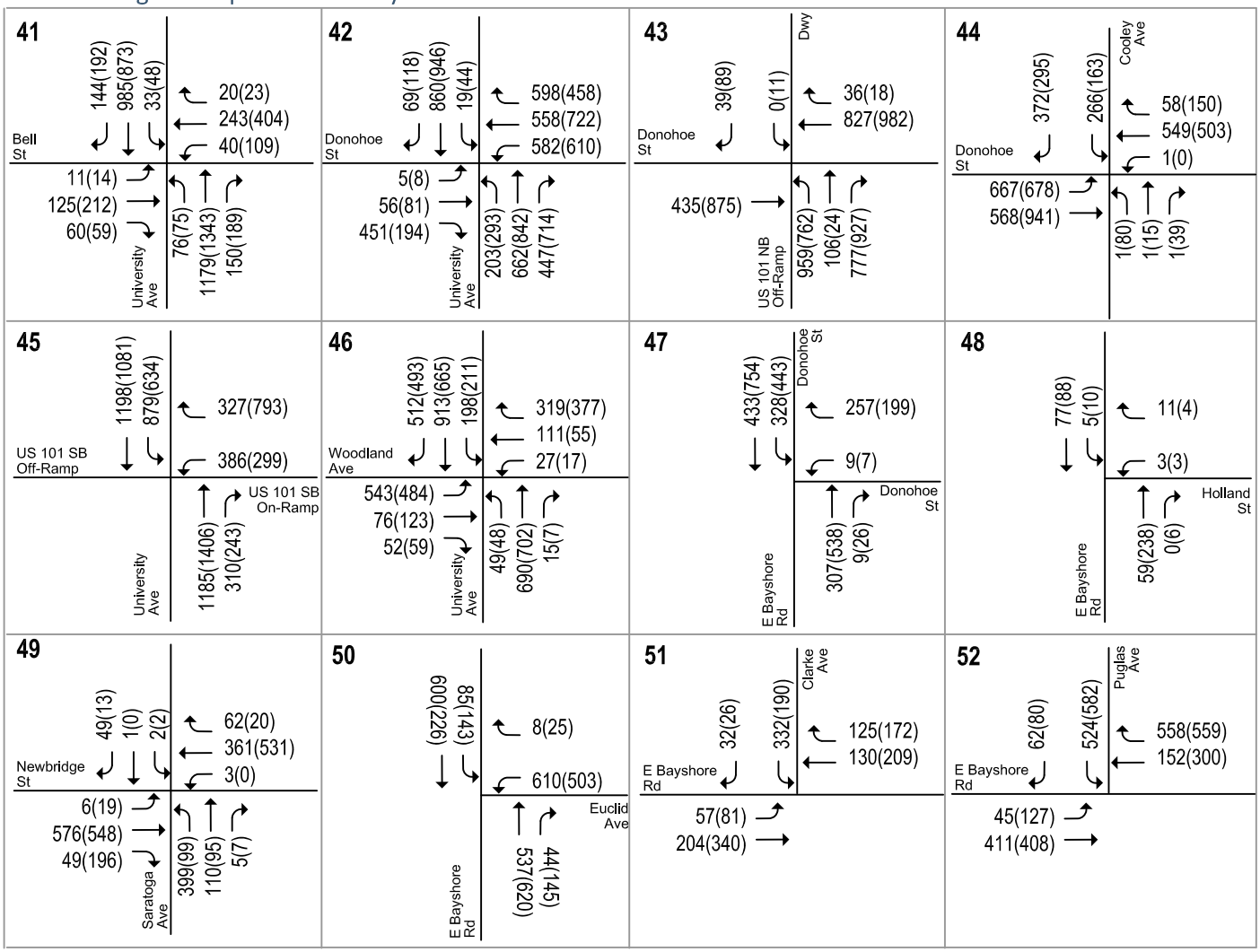


Figure 14
Cumulative Plus Project Traffic Volumes



LEGEND

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

Figure 14
Cumulative Plus Project Traffic Volumes

Cumulative with Dumbarton Rail Scenario

Dumbarton rail service has not been designed, subjected to environmental review, approved, or funded. As a result, future Dumbarton rail service is speculative at this time and might or might not occur. If it does occur, capacity, frequency, ridership and other operational features are unknown at this time. As a result, any forecast of potential future traffic with Dumbarton rail service is speculative. The following analysis is provided for informational purposes to give the public and decision makers an idea of what impact Dumbarton rail might have on traffic based on a specific set of ridership assumptions. These impacts would occur instead of the impact identified above under Cumulative (2040) Plus Project Intersection Levels of Service.

A cumulative with Dumbarton rail scenario was evaluated where the model assumed the operation of potential Dumbarton Rail service. The purpose of this scenario was to provide information on the possible effects of future Dumbarton Rail on the transportation network based on the assumptions made herein about such future service. A cumulative plus project with Dumbarton Rail scenario was compared against the cumulative with Dumbarton Rail scenario to inform the potential effects of the Project-generated traffic assuming potential Dumbarton Rail service.

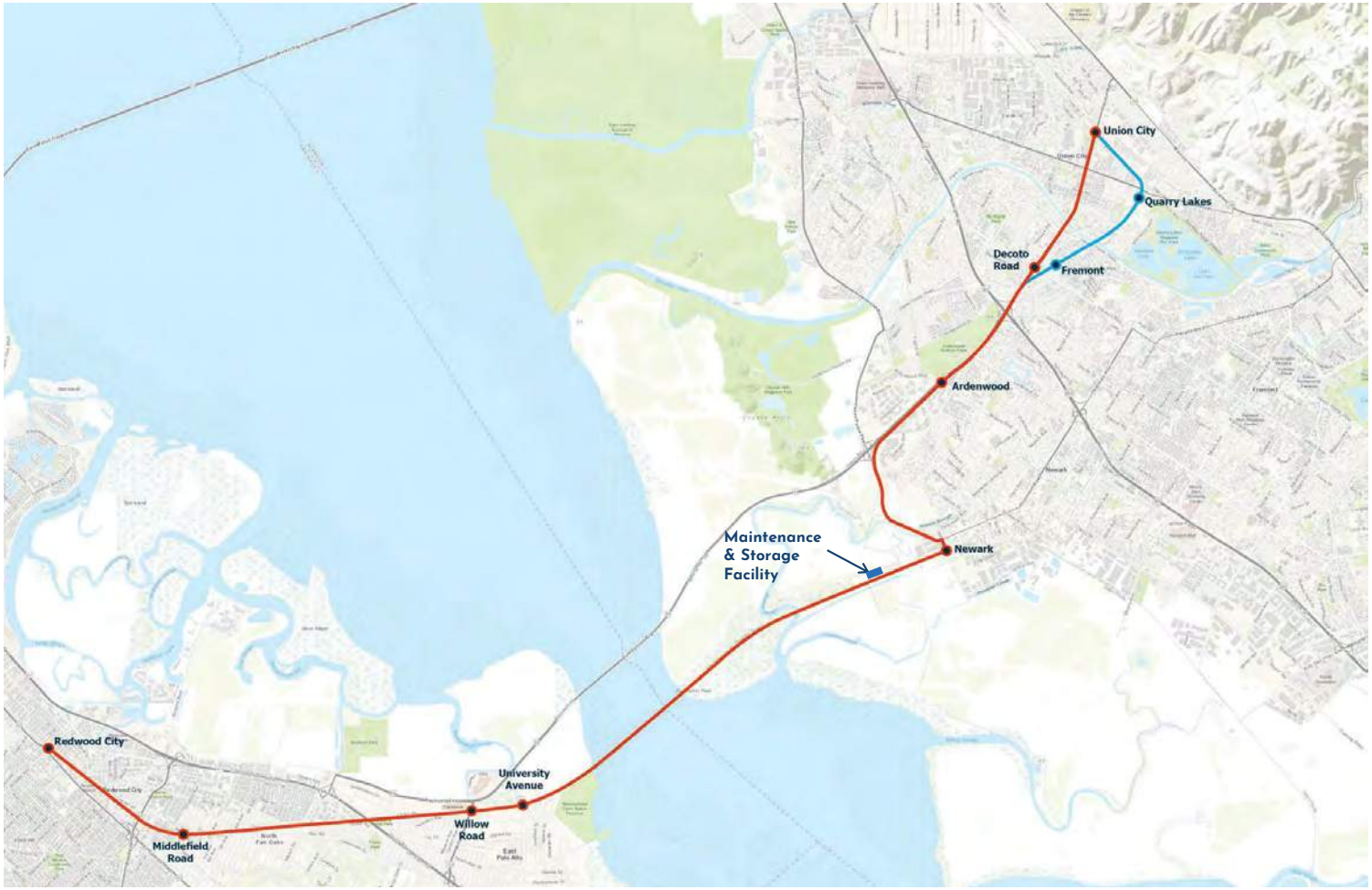
Based on the *Dumbarton Rail Corridor Update* in March 2021, preliminary forecasts suggest that under 2040 conditions, the high-end ridership projections for the highest-ridership alternative would be around 24,300 riders per day. In comparison, the low-end ridership projections for the lowest-ridership alternative would be around 14,600 riders per day. As shown on Figure 15, this highest ridership forecast would be realized over a potential corridor with 10 stations located between downtown Redwood City and the Union City BART station. It should be noted that this potential corridor includes a stop on Willow Road just north of the proposed Project Site. At the time of this study's initiation, the ability to park-and-ride at the stations along this potential corridor was not available.

This study assumed the highest ridership projections as well as no park-and-ride capability at the stations. More ridership along the Dumbarton Rail corridor would mean lower traffic volumes. Therefore, the assumptions of this study would equate to evaluating the largest potential reduction in traffic volumes assuming the operation of Dumbarton Rail service.

To represent the daily ridership in the model, daily travel between TAZs within a quarter-mile radius of the stations was reduced by 24,300 daily person-level driving trips, or roughly 19,000 daily vehicular-trips. During a one-hour peak hour, based on the highest ridership projections, the Dumbarton Rail corridor would reduce approximately 1,900 vehicular trips, of which approximately half of the trip reduction would occur within the study area. These trips are assumed to be between TAZ sets within a quarter-mile radius of different stations, as the stations are assumed to not contain park-and-ride capabilities. A quarter-mile radius from the stations represents walkable distances to the stations.

Figure 16 shows the model-adjusted intersection turning movement volumes for the cumulative with Dumbarton Rail scenario. Volumes under the cumulative plus project with Dumbarton Rail scenario are shown in Figure 17. The Dumbarton Rail was estimated to reduce the Proposed Project's vehicular trip generation by approximately 4%.

San Mateo County
TRANSIT DISTRICT



LRT, BRT, & AVT Alignment

Note: Alignments and stations are being studied for technical feasibility in regards to engineering, operations, land use, city and agency coordination

Figure 15
Proposed Dumbarton Rail Corridor Alignment

NORTH
Not to Scale

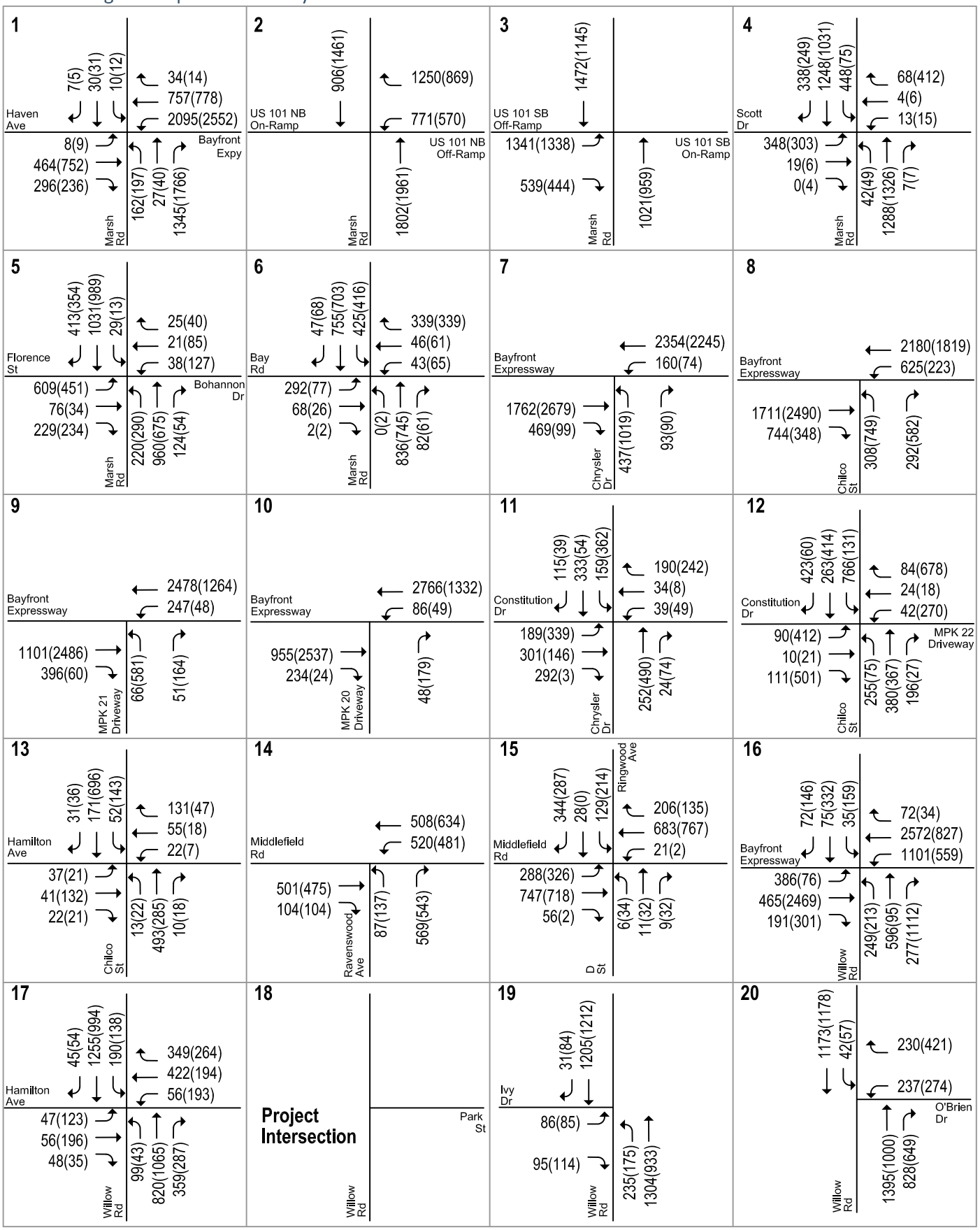


Figure 16
Cumulative Traffic Volumes with Dumbarton Rail Traffic Volumes

NORTH
Not to Scale

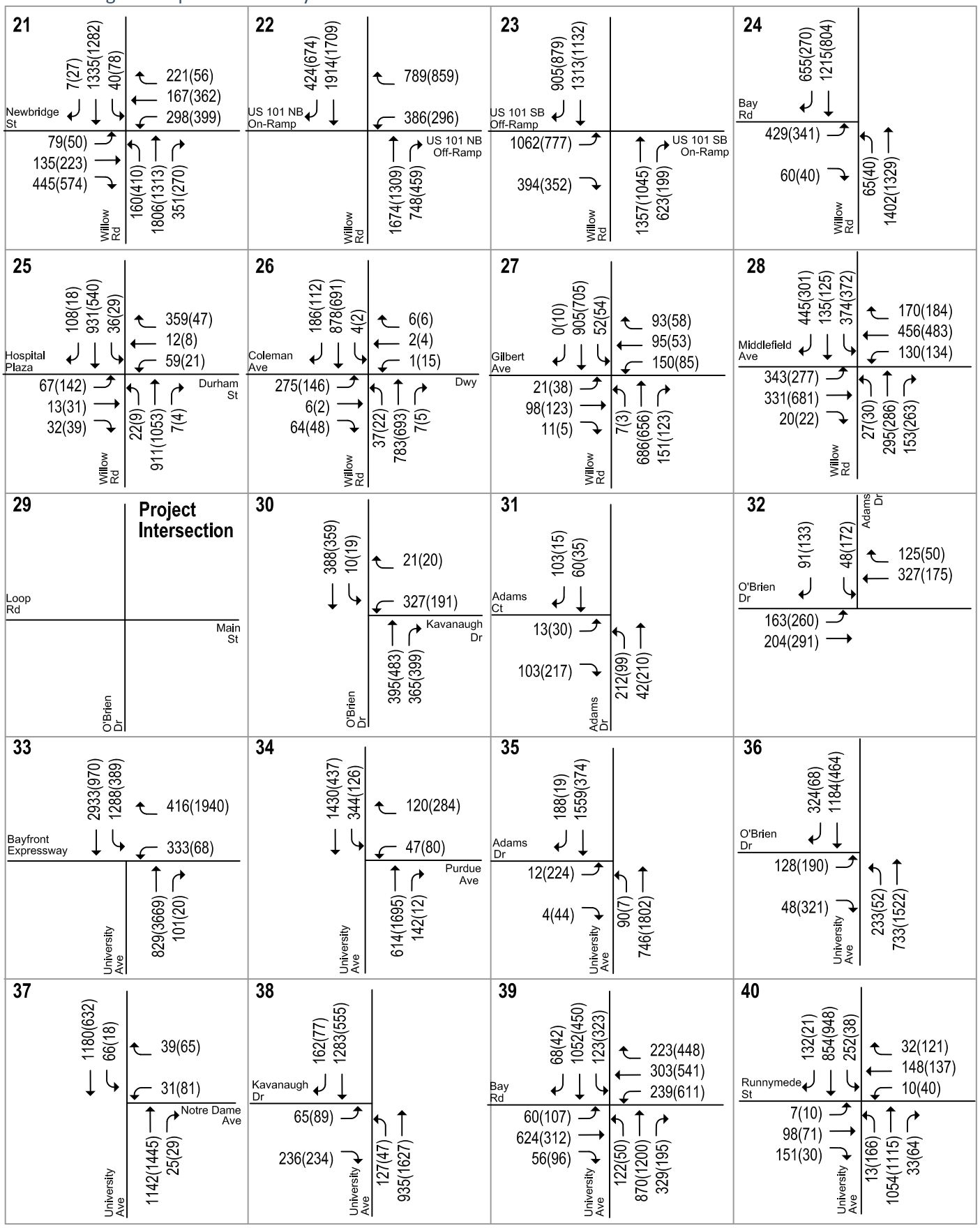
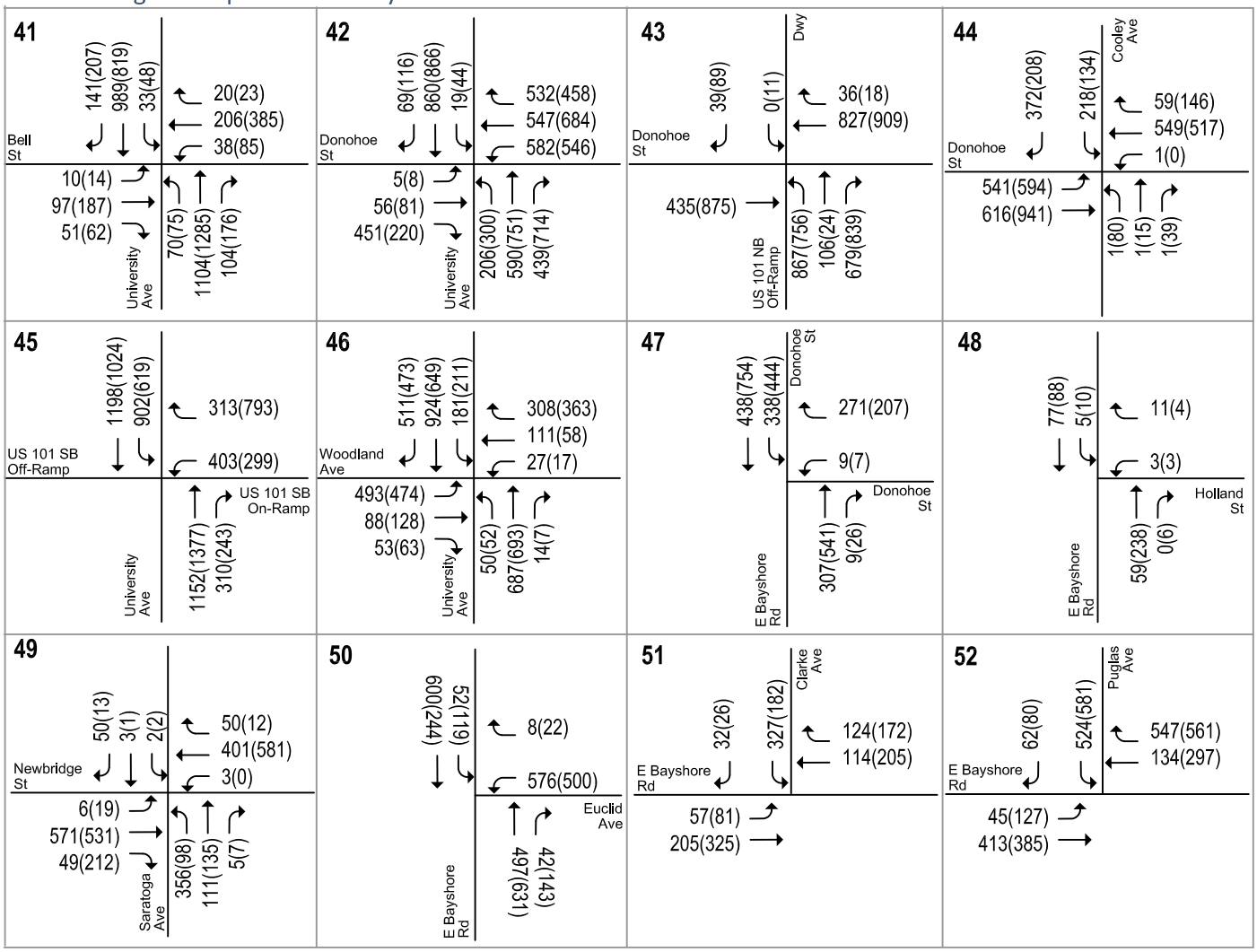


Figure 16
Cumulative Traffic Volumes with Dumbarton Rail Traffic Volumes



LEGEND

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

Figure 16
Cumulative Traffic Volumes with Dumbarton Rail Traffic Volumes

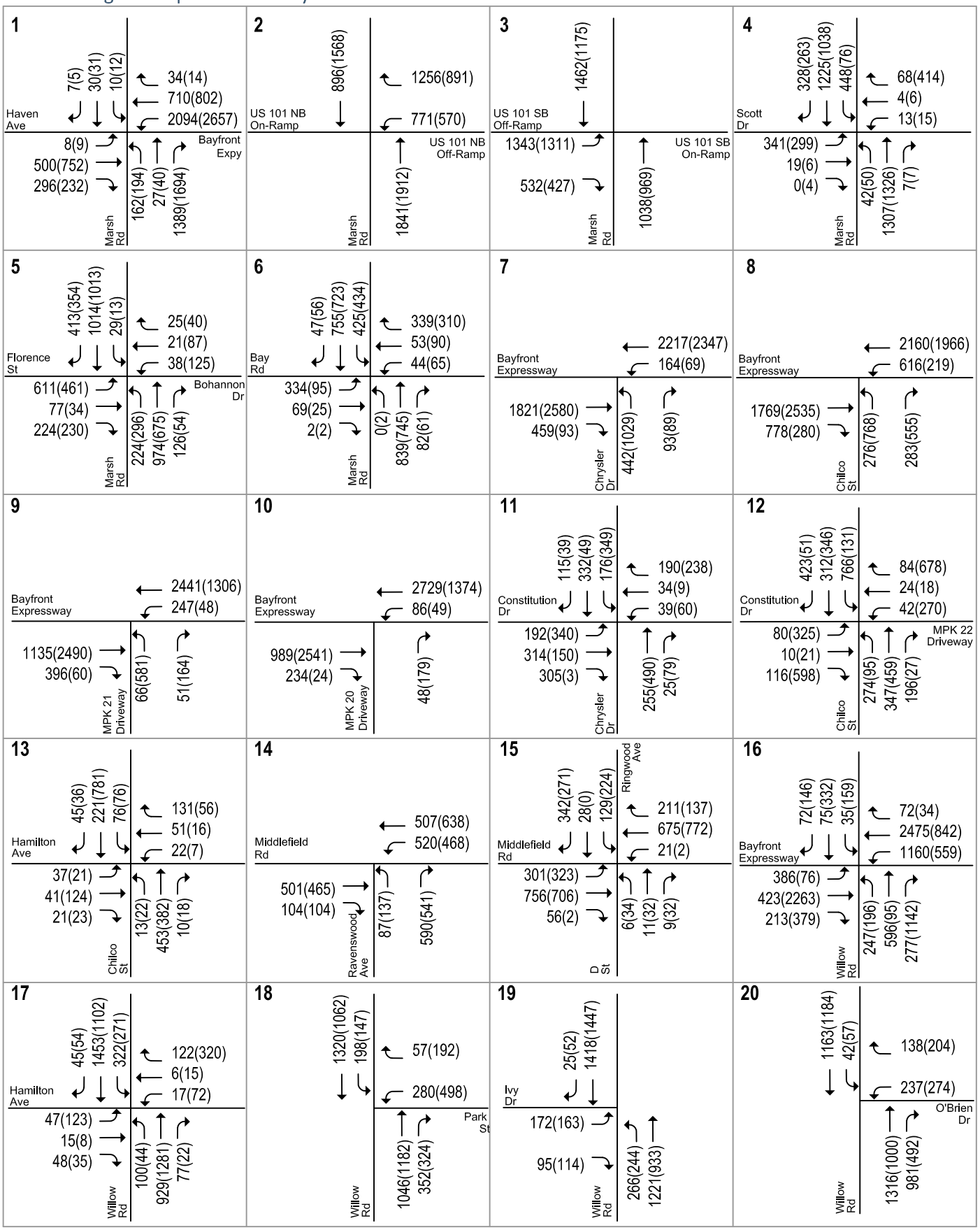


Figure 17
Cumulative Plus Project Traffic Volumes with Dumbarton Rail Traffic Volumes

NORTH
Not to Scale

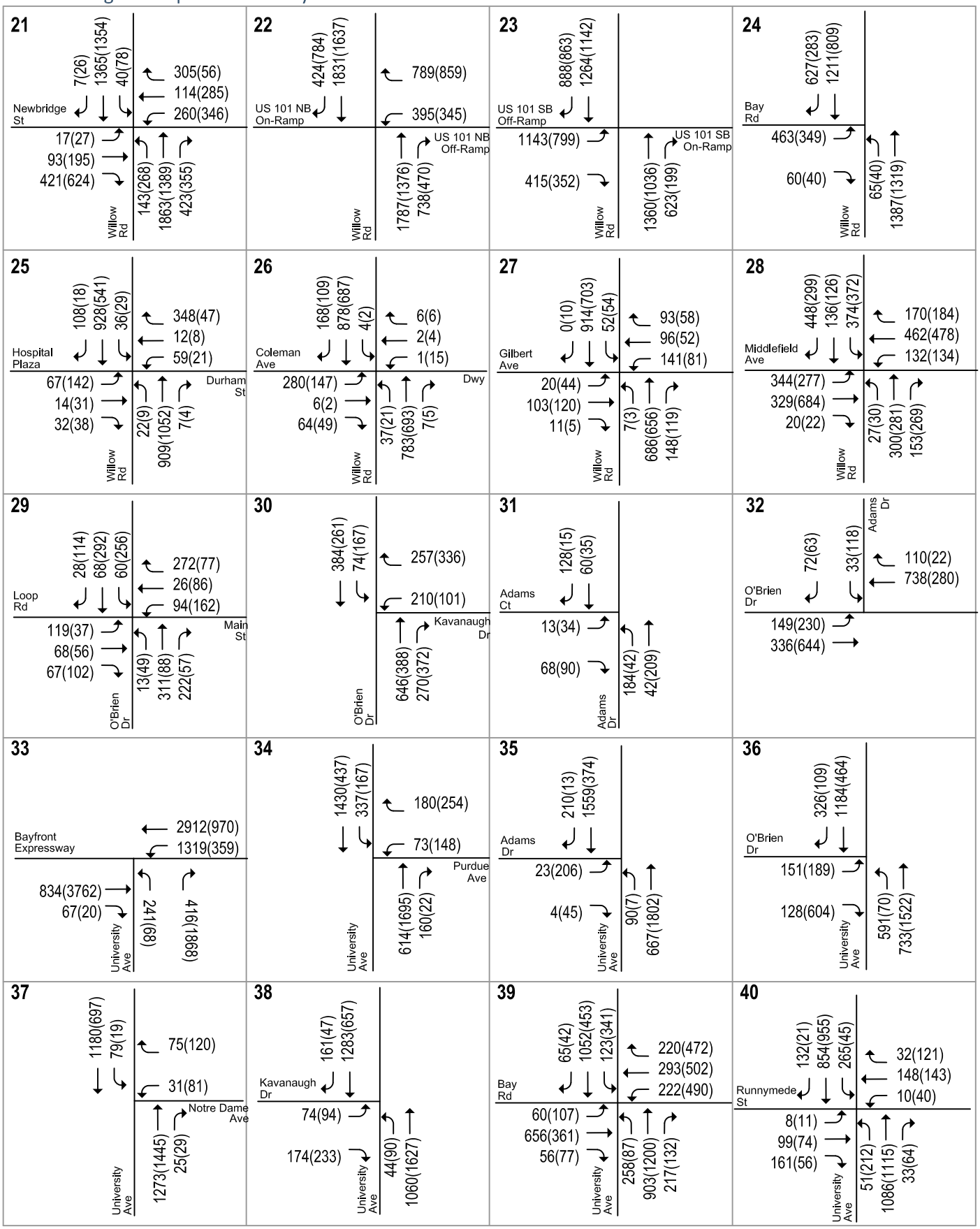
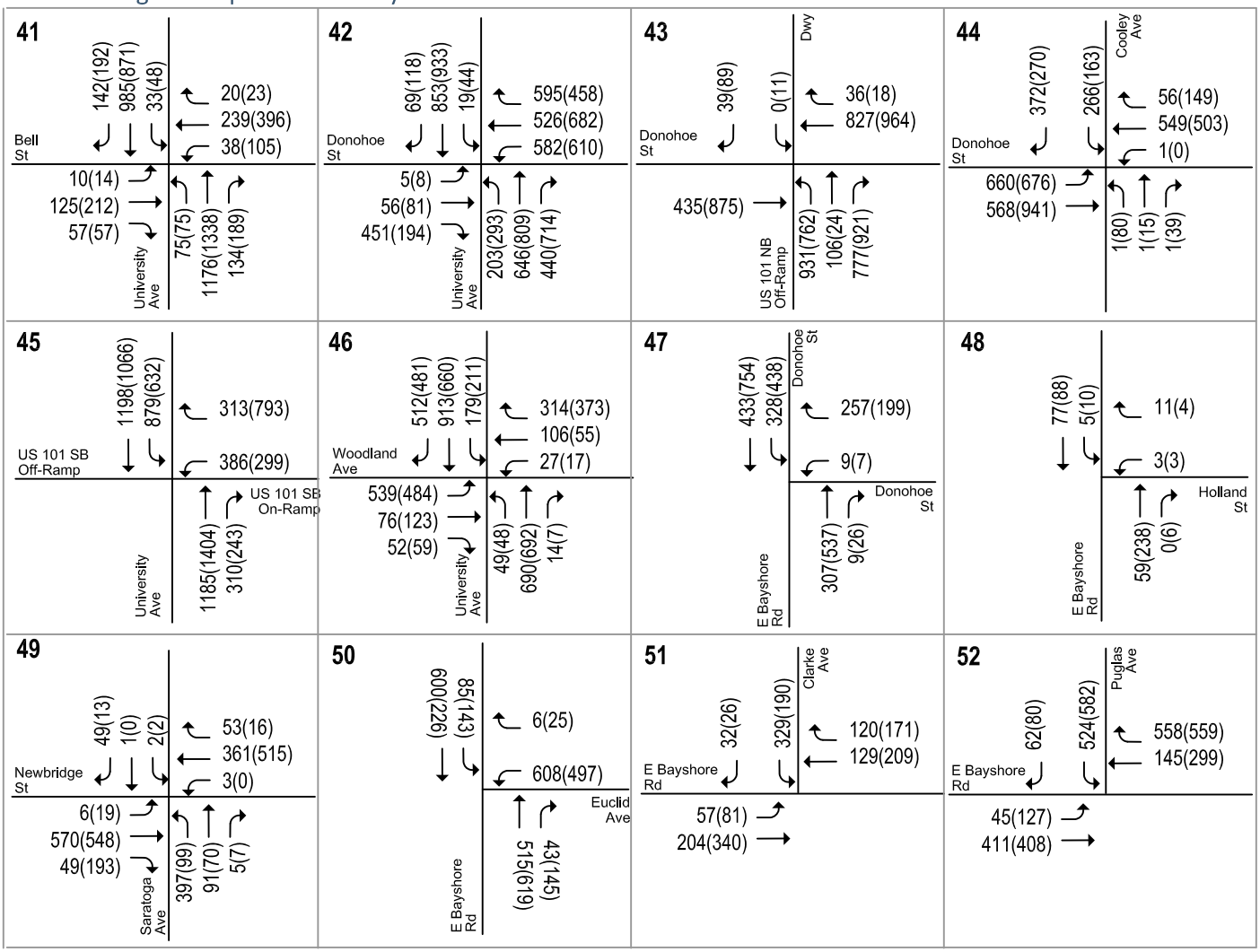


Figure 17
Cumulative Plus Project Traffic Volumes with Dumbarton Rail Traffic Volumes

NORTH
Not to Scale



LEGEND

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

Figure 17
Cumulative Plus Project Traffic Volumes with Dumbarton Rail Traffic Volumes

Future Transportation Networks

Near-term (2025) Conditions

The transportation network under near term conditions assumes a signal at Chilco Street and Constitution Drive/MPK 22 Driveway, consistent with the Menlo Gateway EIR and the Bayfront Campus Expansion EIR. The intersection would be restriped to include an eastbound left-turn lane and a shared through-right lane, two westbound left-turn lanes and a shared through-right lane, a northbound shared through-left lane and a right-turn lane, and a southbound shared left-through-right lane and right-turn lane. The roadway network for other study intersections is assumed to be the same as under existing conditions.

Near-term (2025) plus Project Conditions

The following improvements are proposed to the Street network under plus project conditions:

- **Willow Road and Hamilton Avenue**: Hamilton Avenue would be realigned and a south leg that would provide access to the Project Site would be added to the intersection. The south leg is identified as Main Street. The proposed lane configuration for the intersection would be modified to a northbound left-turn lane and shared through-right lane, a southbound left-turn lane and shared through-right lane, an eastbound left-turn lane, through lane, and shared through-right lane, and two westbound left-turn lanes, a through lane, and a shared through-right turn lane.

- **Willow Road and Park Street**: This is a proposed new signalized intersection with Park Street providing access to the Project Site. The proposed lane configuration for the intersection would be a northbound left-turn lane and a shared left right lane, an eastbound through lane and shared through-right lane, and two westbound left-turn lanes and two through lanes.

- **O'Brien Drive/Loop Road and Main Street/O'Brien Drive**: This is a proposed new roundabout intersection. The proposed lane configuration for the intersection would be one shared left-through-right lane on all approaches.

Cumulative (2040) Conditions

The transportation network under cumulative (2040) conditions and cumulative (2040) conditions with Dumbarton rail is assumed to include the improvements under near term conditions. The following additional road improvements in East Palo Alto identified in the Ravenswood/4 Corners TOD Specific Plan Environmental Impact Report (February 22, 2013) are also assumed:

- **University Avenue and Purdue Avenue (Mitigation Measure TRA-CUM-3)**: Install a traffic signal at this intersection. Along with a new traffic signal, appropriate pedestrian and bicycle accommodation will be provided.
- **University Avenue and Bay Road (Mitigation Measure TRA-CUM-4):** Add an exclusive eastbound right-turn lane and a second eastbound left-turn lane on University Avenue, add a second northbound left-turn lane on Bay Road, add a second westbound left-turn lane on University Avenue, and modify signal phasing.
- **University Avenue and Donohoe Street (Mitigation Measure TRA-CUM-5):** Add an exclusive westbound right-turn lane on University Avenue.

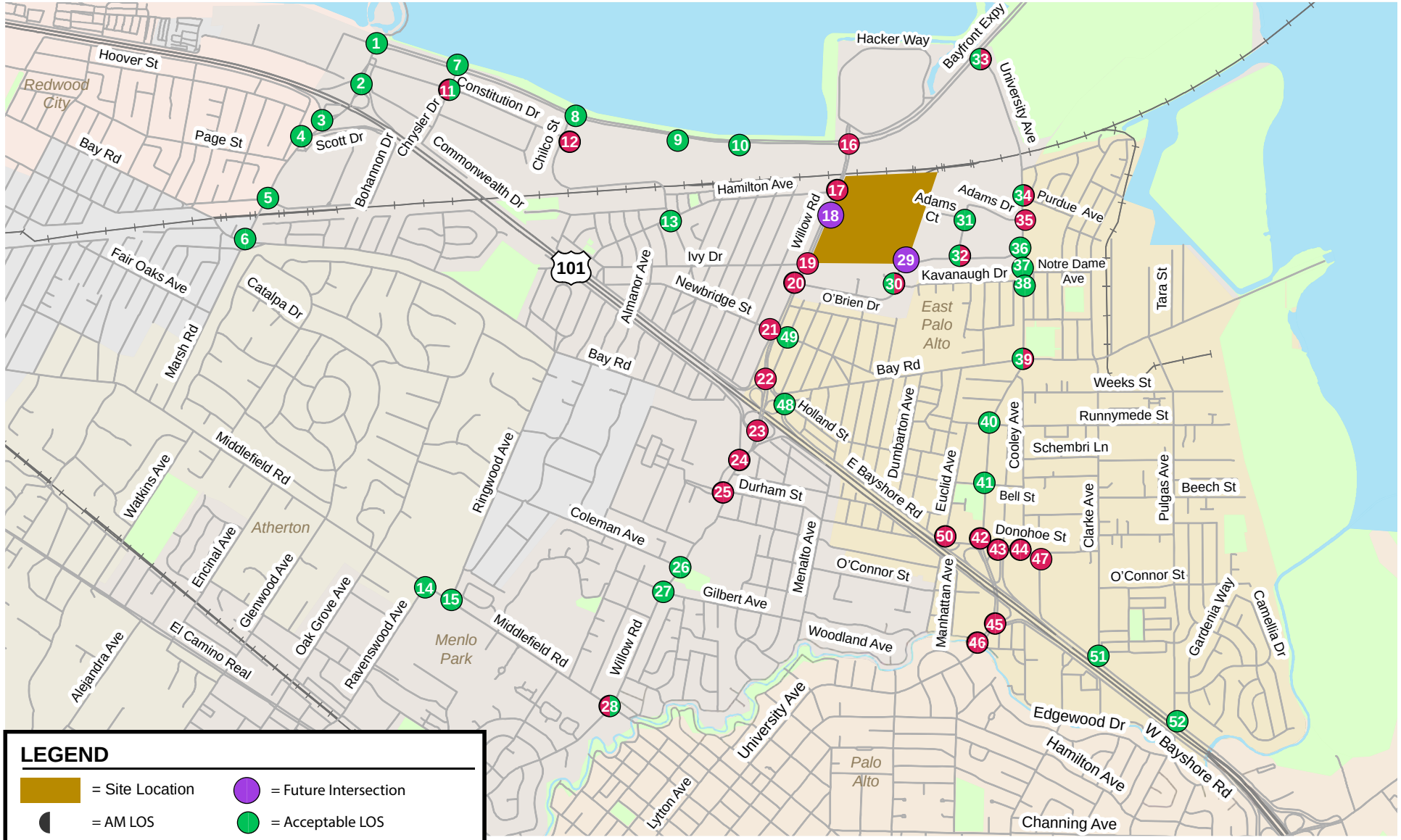
Cumulative (2040) plus Project Conditions

The transportation network under cumulative (2040) plus project conditions and cumulative (2040) plus project conditions with Dumbarton rail is assumed to include the proposed project improvements described under the near term plus project conditions. The roadway network for other study intersections is assumed to be the same as under cumulative (2040) conditions.

Near-Term (2025) Intersection Levels of Service

The results of the intersection level of service analysis under near-term conditions are summarized in Tables 16 and 17. The Willow Road corridor and 101/University Avenue interchange were analyzed using the Simtraffic microsimulation model as described Chapter 2. The microsimulation model indicates that the intersections would experience capacity issues where the demand cannot be served by the intersections. Oversaturated conditions would operate at LOS F and are indicated using 'OVERSAT' in the tables below. Vistro and Traffix were used to calculate critical delay and volume to capacity ratio at the Willow Road and 101/University Avenue intersections, respectively. The intersection LOS calculation sheets are included in Appendix C. The following study intersections (see Figure 18) would operate at an unacceptable level of service during at least one peak hour:

11. Chrysler Drive and Constitution Drive (AM peak hour)
12. Chilco Street and Constitution Drive/MPK 22 Driveway (PM peak hour)
16. Willow Road and Bayfront Expressway (AM and PM peak hours)
17. Willow Road and Hamilton Avenue (AM and PM peak hours)
19. Willow Road and Ivy Drive (AM and PM peak hours)
20. Willow Road and O'Brien Drive (AM and PM peak hours)
21. Willow Road and Newbridge Street (AM and PM peak hours)
22. Willow Road and US 101 Northbound Ramps (AM and PM peak hours)
23. Willow Road and US 101 Southbound Ramps (AM and PM peak hours)
24. Willow Road and Bay Road (AM and PM peak hours)
25. Willow Road and Hospital Plaza/Durham Street (AM and PM peak hours)
28. Willow Road and Middlefield Road (AM peak hour)
30. O'Brien Drive and Kavanaugh Drive (PM peak hour)
32. Adam's Drive and O'Brien Drive (PM peak hour)
33. University Avenue and Bayfront Expressway (PM peak hour)
34. University Avenue and Purdue Avenue (PM peak hour)
35. University Avenue and Adams Drive (AM and PM peak hours)
39. University Avenue and Bay Road (PM peak hour)
42. University Avenue and Donohoe Street (AM and PM peak hours)
43. US 101 Northbound Off-Ramp and Donohoe Street (AM and PM peak hours)
44. Cooley Avenue and Donohoe Street (AM and PM peak hours)
45. University Avenue and US 101 Southbound Ramps (AM and PM peak hours)
46. University Avenue and Woodland Avenue (AM and PM peak hours)
47. East Bayshore Road and Donohoe Street (AM and PM peak hours)
50. East Bayshore Road and Euclid Avenue (AM and PM peak hours)



LEGEND

- = Site Location
- = AM LOS
- = PM LOS
- = Future Intersection
- = Acceptable LOS
- = Unacceptable LOS

Figure 18
Near-Term Intersection Level of Service

Near-Term (2025) Plus Project Intersection Levels of Service

The results of the intersection level of service analysis under near term (2025) plus project conditions are summarized in Table 16 and 17. The Willow Road corridor and 101/University Avenue interchange were analyzed using the Simtraffic microsimulation model as described Chapter 2. The microsimulation model indicates that the intersections would experience capacity issues where the demand cannot be served by the intersections. Oversaturated conditions would operate at LOS F and are indicated using 'OVERSAT' in the tables below. Vistro and Traffix were used to calculate critical delay and volume to capacity ratio at the Willow Road and 101/University Avenue intersections, respectively. The intersection LOS calculation sheets are included in Appendix C.

Under near-term plus project conditions, the following 16 intersections (see Figure 19) would be non-compliant with local policies and would be adversely affected during either the AM or the PM peak hour as compared to near term conditions:

1. Marsh Road and Bayfront Expressway (AM peak hour)
13. Chilco Street and Hamilton Avenue (PM peak hour)
16. Willow Road and Bayfront Expressway (AM peak hour)
17. Willow Road and Hamilton Avenue (AM and PM peak hours)
18. Willow Road and Park Street (AM and PM peak hours)
21. Willow Road and Newbridge Street (AM and PM peak hours)
23. Willow Road and US 101 Southbound Ramps (AM peak hour)
24. Willow Road and Bay Road (AM peak hour)
30. O'Brien Drive and Kavanaugh Drive (AM and PM peak hours)
32. Adam's Drive and O'Brien Drive (AM and PM peak hours)
39. University Avenue and Bay Road (PM peak hour)
42. University Avenue and Donohoe Street (AM peak hour)
43. US 101 Northbound Off-Ramp and Donohoe Street (AM and PM peak hours)
44. Cooley Avenue and Donohoe Street (AM and PM peak hours)
45. University Avenue and US 101 Southbound Ramps (AM peak hour)
47. E. Bayshore Road and Donohoe Street (AM and PM peak hours)

Bold indicates intersections that already operate unacceptably under near-term conditions.

It should be noted that at some intersections the average delay is shown to decrease with the addition of Project traffic. This occurs because the intersection delay is a weighted average of all intersection movements. When traffic is added to movements with delays lower than the average intersection delay, the average delay for the entire intersection can decrease. Furthermore, the congestion and queue spillback at an adjacent intersection can constrain the traffic volume at some intersections resulting in a small decrease in average delay.

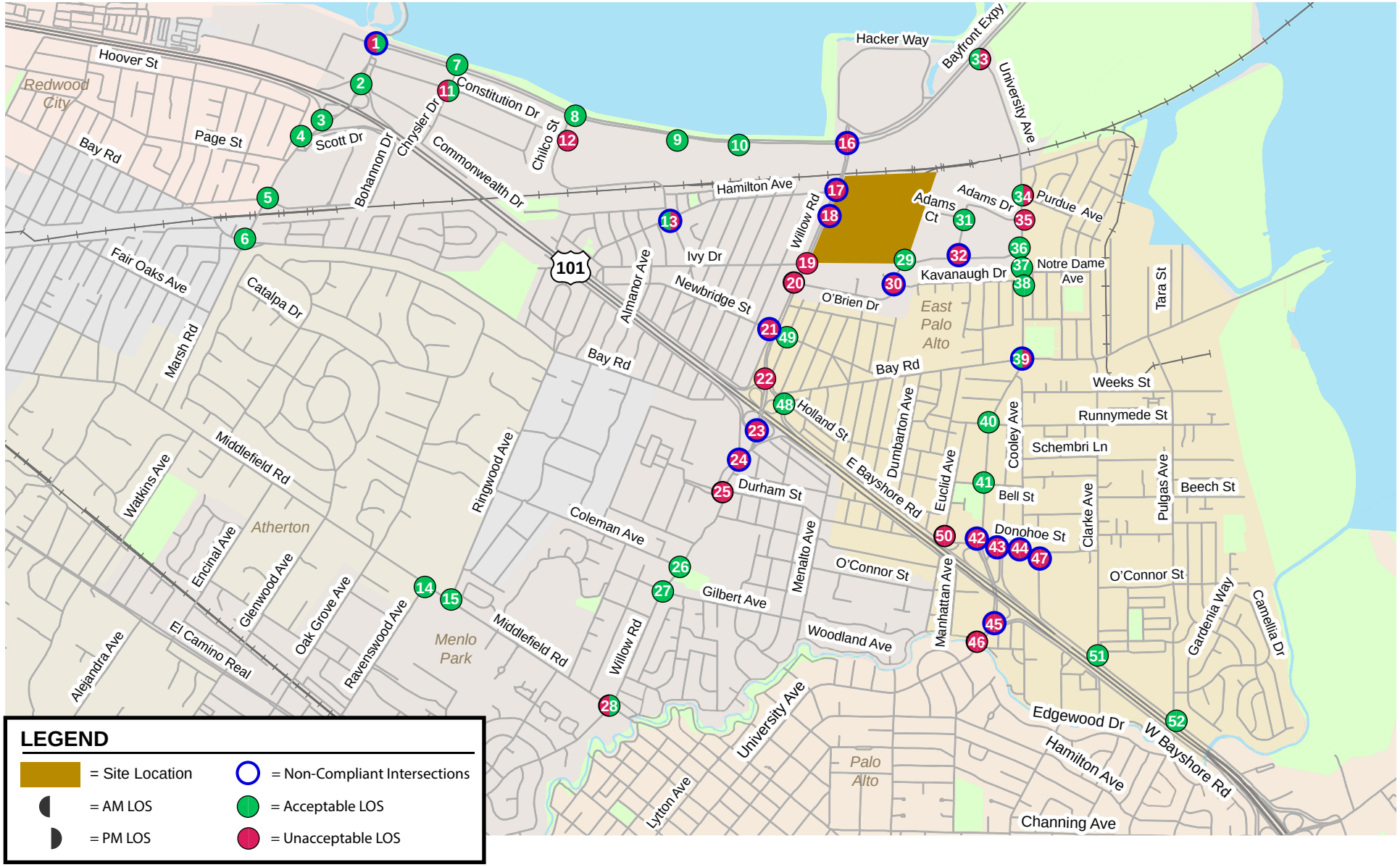


Figure 19
Near-Term Plus Project Intersection Level of Service Summary

NORTH
Not to Scale

Table 16
Near-Term (2025) Intersection Levels of Service (Menlo Park)

#	Intersection	Peak Hour	Traffic Control	Near-Term (2025) Conditions								
				No Project		Project Conditions				With Improvement		
				Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay
1	Marsh Road & Bayfront Expressway*	AM	Signal	52.0	D	**56.2**	**E**	**4.2**	**5.4**	50.2	D	**-**
	Haven Avenue Southbound	*AM*		***71.2***	***E***	***70.6***	***E***	***<4***	***<0.8***			
		PM	Signal	34.9	C	38.7	D	<4	4.7	38.9	D	-
	Haven Avenue Southbound	*PM*		***66.9***	***E***	***65.6***	***E***	***<4***	***<0.8***			
2	Marsh Road & US 101 Northbound Off-Ramp	AM	Signal	23.1	C	39.0	D	15.9	25.1			
		PM		15.8	B	16.8	B	<4	1.6			
3	Marsh Road & US 101 Southbound Off-Ramp	AM	Signal	20.7	C	20.7	C	<4	<0.8			
		PM		17.6	B	17.6	B	<4	<0.8			
4	Marsh Road & Scott Drive	AM	Signal	20.3	C	20.5	C	<4	<0.8			
		PM		15.9	B	15.9	B	<4	<0.8			
5	Marsh Road & Bohannon Drive/Florence Street	AM	Signal	40.0	D	41.6	D	<4	2.3			
		PM		36.3	D	37.3	D	<4	2.2			
6	Marsh Road & Bay Road	AM	Signal	23.6	C	25.2	C	<4	2.8			
		PM		18.7	B	19.1	B	<4	<0.8			
7	Chrysler Drive & Bayfront Expressway	AM	Signal	9.1	A	9.4	A	<4	<0.8			
		PM		17.3	B	18.3	B	<4	1.5			
8	Chilco Street & Bayfront Expressway	AM	Signal	23.7	C	25.6	C	<4	5.3			
		PM		34.1	C	35.9	D	<4	4.5			
9	MPK 21 Driveway & Bayfront Expressway	AM	Signal	7.3	A	7.4	A	<4	<0.8			
		PM		13.7	B	15.0	B	<4	1.4			
10	MPK 20 Driveway (east) & Bayfront Expressway	AM	Signal	7.3	A	7.5	A	<4	<0.8			
		PM		9.7	A	9.4	A	<4	<0.8			
11	Chrysler Drive & Constitution Drive	AM	Signal	**59.8**	**E**	**55.1**	**E**	**<4**	**<0.8**			
		PM		28.5	C	30.4	C	<4	1.6			
12	Chilco Street & Constitution Drive/MPK 22 Driveway[2]	AM	Signal	24.8	C	24.6	C	<4	<0.8			
		PM		**42.9**	**D**	**54.3**	**D**	**11.4**	**11.4**			
13	Chilco Street & Hamilton Avenue	AM	AWSC	10.5	B	10.8	B	<4	<0.8	*Traffic signal potentially feasible*		
		PM		19.0	C	**38.0**	**E**	**19.0**	**19.0**			
14	Ravenswood Avenue & Middlefield Road	AM	Signal	43.1	D	44.9	D	<4	3.0			
		PM		17.6	B	17.9	B	<4	<0.8			

Table 16 (Continued)
Near-Term (2025) Intersection Levels of Service (Menlo Park)

#	Intersection	Peak Hour	Traffic Control	Near-Term (2025) Conditions								
				No Project		Project Conditions				With Improvement		
				Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay
15	Ringwood Avenue & Middlefield Road	AM	Signal	13.2	B	13.7	B	<4	<0.8			
		PM		15.2	B	15.4	B	<4	<0.8			
16	Willow Road & Bayfront Expressway*[1]	AM	Signal	OVERSAT	F	OVERSAT	F	14.0	6.7	*No feasible Improvement*		
		PM		OVERSAT	F	OVERSAT	F	<4	<0.8			
17	Willow Road & Hamilton Avenue[1]	AM	Signal	OVERSAT	F	OVERSAT	F	44.1	54.0			
	Hamilton Avenue Southbound	*AM*		***64.9***	***E***	***>120***	***F***	***117.9***	***<0.8***			
	Main Street Northbound	*AM*		***83.3***	***F***	***113.7***	***F***	***30.4***	***>120***			
		PM	Signal	OVERSAT	F	OVERSAT	F	>120	>120	*No feasible Improvement*		
	Hamilton Avenue Southbound	*PM*		***>120***	***F***	***>120***	***F***	***>120***	***<0.8***			
	Main Street Northbound	*PM*		***>120***	***F***	***>120***	***F***	***<4***	***>120***			
18	Willow Road & Park Street (future intersection)[1]	AM	Signal	Project Intersection		OVERSAT	F	36.8	53.0	*No feasible Improvement*		
		PM				OVERSAT	F	17.5	23.1			
19	Willow Road & Ivy Drive[1]	AM	Signal	OVERSAT	F	OVERSAT	F	20.9	46.6			
	Ivy Drive Southbound	*AM*		***88.2***	***###***	***88.2***	***F***	***<4***	***4.7***			
		PM	Signal	OVERSAT	F	OVERSAT	F	50.1	70.9			
	Ivy Drive Southbound	*PM*		***68.4***	***E***	***66.1***	***E***	***<4***	***<0.8***			
20	Willow Road & O'Brien Drive[1]	AM	Signal	OVERSAT	F	OVERSAT	F	<4	<0.8			
	O'Brien Drive Northbound	*AM*		***72.6***	***E***	***66.4***	***E***	***<4***	***<0.8***			
		PM	Signal	OVERSAT	F	OVERSAT	F	<4	<0.8			
	O'Brien Drive Northbound	*PM*		***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
21	Willow Road & Newbridge Street[1]	AM	Signal	OVERSAT	F	OVERSAT	F	40.3	49.7	OVERSAT	F	
	Newbridge Street Southbound	*AM*		***69.3***	***E***	***104.2***	***F***	***34.9***	***43.0***	***79.6***	***F***	***9.0***
	Newbridge Street Northbound	*AM*		***>120***	***F***	***>120***	***F***	***4.4***	***64.0***	*42.1*	*D*	*<0.8*
		PM	Signal	OVERSAT	F	OVERSAT	F	<4	<0.8	OVERSAT	F	
	Newbridge Street Southbound	*PM*		***60.8***	***E***	***59.1***	***E***	***<4***	***1.5***	***74.5***	***E***	***26.0***
	Newbridge Street Northbound	*PM*		***>120***	***F***	***>120***	***F***	***<4***	***<0.8***	*51.3*	*D*	*<0.8*
22	Willow Road & US 101 Northbound Ramps[1]	AM	Signal	OVERSAT	F	OVERSAT	F	<4	11.5			
		PM		OVERSAT	F	OVERSAT	F	<4	<0.8			
23	Willow Road & US 101 Southbound Ramps[1]	AM	Signal	OVERSAT	F	OVERSAT	F	18.3	<0.8	*No feasible Improvement*		
		PM		OVERSAT	F	OVERSAT	F	<4	<0.8			
24	Willow Road & Bay Road[1]	AM	Signal	OVERSAT	F	OVERSAT	F	<4	38.3	OVERSAT	F	
	Bay Road Southbound	*AM*		***104.3***	***F***	***>120***	***F***	***31.7***	***31.7***	*27.0*	*C*	*<0.8*
		PM	Signal	OVERSAT	F	OVERSAT	F	6.6	6.7	OVERSAT	F	
	Bay Road Southbound	*PM*		*49.2*	*D*	*53.5*	*D*	*4.3*	*4.3*	*23.9*	*C*	*<0.8*

Table 16 (Continued)
Near-Term (2025) Intersection Levels of Service (Menlo Park)

#	Intersection	Peak Hour	Traffic Control	Near-Term (2025) Conditions								
				No Project		Project Conditions				With Improvement		
				Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay
25	Willow Road & Hospital Plaza/Durham Street[1]	AM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
	VA Medical Center Southbound	*AM*		***73.2***	***E***	***69.5***	***E***	***<4***	***<0.8***			
	Durham Street Northbound	*AM*		***93.6***	***F***	***79.6***	***E***	***<4***	***<0.8***			
		PM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
	VA Medical Center Southbound	*PM*		***72.2***	***E***	***70.2***	***E***	***<4***	***<0.8***			
	Durham Street Northbound	*PM*		***84.6***	***F***	***79.8***	***E***	***<4***	***<0.8***			
26	Willow Road & Coleman Avenue	AM	Signal	25.1	C	23.9	C	<4	<0.8			
		PM		11.0	B	10.8	B	<4	<0.8			
27	Willow Road & Gilbert Avenue	AM	Signal	20.0	C	19.9	B	<4	<0.8			
		PM		13.0	B	12.4	B	<4	<0.8			
28	Willow Road & Middlefield Road	AM	Signal	**62.3**	**E**	**62.5**	**E**	**<4**	**<0.8**			
	Middlefield Road Southbound	*AM*		***69.8***	***E***	***70.1***	***E***	***<4***	***<0.8***			
	Middlefield Road Northbound	*AM*		***67.7***	***E***	***67.7***	***E***	***<4***	***<0.8***			
		PM	Signal	34.5	C	34.7	C	<4	<0.8			
	Middlefield Road Southbound	*PM*		*34.5*	*C*	*34.7*	*C*	*<4*	*<0.8*			
	Middlefield Road Northbound	*PM*		*34.3*	*C*	*34.7*	*C*	*<4*	*<0.8*			
29	O'Brien Drive/Loop Road & Main Street/O'Brien Drive (future intersection)	AM	Roundabout	Project Intersection		7.4	A	7.4	7.4			
		PM				9.2	A	9.2	9.2			
30	O'Brien Drive & Kavanaugh Drive	AM	AWSC	12.7	B	**107.7**	**F**	**95.0**	**95.0**	*Traffic signal potentially feasible*		
		PM		**29.6**	**D**	**73.7**	**F**	**44.1**	**44.1**			
31	Adams Drive & Adams Court	AM	TWSC	11.5	B	11.6	B	<4	<0.8			
		PM		11.9	B	11.9	B	<4	<0.8			
32	Adams Drive & O'Brien Drive	AM	TWSC	17.6	C	**62.5**	**F**	**44.9**	**44.9**	*Traffic signal potentially feasible*		
		PM		**34.0**	**D**	**>120**	**F**	**>120**	**>120**			
33	University Avenue & Bayfront Expressway*	AM	Signal	13.9	B	12.1	B	<4	<0.8			
		PM		**105.8**	**F**	**108.7**	**F**	**<4**	**3.0**			

Notes:
* Denotes CMP Intersection
AWSC - All Way Stop Control; TWSC - Two Way Stop Control
[1] Average delay is reported for signalized and AWSC intersections. For TWSC intersections, the delay for the worst stop-controlled movement is reported
"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]Intersections were analyzed using Synchro/SimTraffic software due to the close proximity of these intersections. Changes in average delay and critical delay calculated using
[2]The intersection is not considered as non-compliant under background plus project conditions because the critical movement of the local approach shifts with the addition of project traffic.
Bold indicates substandard level of service
Bold indicates noncompliance. The project exceeds thresholds in the City of Menlo Park's TIA Guidelines.

Table 17
Near-Term (2025) Intersection Levels of Service (East Palo Alto)

#	Intersection	Peak Hour	Traffic Control	Near-Term (2025) Conditions							
				No Project		with Project				With Improvement	
				Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg/Crit Delay (sec)[1]	Incr. in Critical V/C	Avg. Delay (sec)[1]	LOS
34	University Avenue & Purdue Avenue	AM	TWSC	19.7	C	29	D	0.9	0.118		
		PM		**>120**	**F**	**>120**	**F**	**3.8**	**-0.033**		
35	University Avenue & Adams Drive	AM	TWSC	**91.5**	**F**	**>120**	**F**	**0.4**	**0.084**		
		PM		**>120**	**F**	**>120**	**F**	**-2.8**	**-0.070**		
36	University Avenue & O'Brien Drive	AM	Signalized	9.5	A	28.9	C	26.1	0.261		
		PM		15.4	B	30.5	C	16.7	0.275		
37	University Avenue & Notre Dame Avenue	AM	Signalized	4.1	A	7.8	A	5.0	0.093		
		PM		9.4	A	10.2	B	1.4	0.012		
38	University Avenue & Kavanaugh Drive	AM	Signalized	6.9	A	7.9	A	1.3	0.014		
		PM		15.1	B	16.5	B	1.6	0.015		
39	University Avenue & Bay Road	AM	Signalized	52.4	D	54.7	D	6.7	0.046	40.4	D
		PM		**60.9**	**E**	**70.6**	**E**	**18.6**	**0.063**	**57.0**	**E**
40	University Avenue & Runnymede Street	AM	Signalized	6.4	A	6.6	A	1.5	0.053		
		PM		8.8	A	8.8	A	-0.1	-0.009		
41	University Avenue & Bell Street	AM	Signalized	11.7	B	11.6	B	0.0	0.006		
		PM		18.3	B	18.8	B	1.1	0.038		
42	University Avenue & Donohoe Street*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**7.1**	**0.017**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**3.0**	**0.008**	***Improvement***	
43	US 101 Northbound Off-Ramp & Donohoe Street*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**71.7**	**0.171**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**56.4**	**0.130**	***Improvement***	
44	Cooley Avenue & Donohoe Street*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**8.7**	**0.091**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**18.8**	**0.074**	***Improvement***	
45	University Avenue & US 101 Southbound Ramps*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**7.8**	**0.019**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**1.6**	**0.004**	***Improvement***	
46	University Avenue & Woodland Avenue*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**0.1**	**0.000**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**-7.8**	**-0.018**	***Improvement***	
47	E. Bayshore Road & Donahoe Street*	AM	Signalized	**OVERSAT**	**F**	**>120**	**F**	**5.7**	**0.013**	***Corridor***	
		PM		**OVERSAT**	**F**	**>120**	**F**	**5.8**	**0.015**	***Improvement***	

Table 17 (Continued)
Near-Term (2025) Intersection Levels of Service (East Palo Alto)

#	Intersection	Peak Hour	Traffic Control	Near-Term (2025) Conditions: No Project Avg. Delay (sec)	LOS	with Project Avg. Delay (sec)*	LOS	Incr. in Avg/Crit Delay (sec)	Incr. in Critical V/C	With Improvement Avg. Delay (sec)	LOS
48	E. Bayshore Road & Holland Street	AM	TWSC	8.8	A	8.8	A	0.0	0.000		
		PM		10	A	10	A	0.0	0.000		
49	Saratoga Avenue & Newbridge Street	AM	TWSC	17.9	C	18.2	C	0.9	0.074		
		PM		22.0	C	21.0	C	0.0	-0.024		
50	E. Bayshore Road & Euclid Avenue*	AM	AWSC	**OVERSAT**	**F**	**OVERSAT**	**F**	**3.6**	**0.028**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**-2.5**	**-0.016**	***Improvement***	
51	Clarke Avenue & E. Bayshore Road	AM	Signalized	13.9	B	14	B	0.2	0.008		
		PM		10.7	B	12.5	B	1.7	0.031		
52	Pulgas Avenue & E. Bayshore Road	AM	Signalized	20.9	C	21.7	C	1.7	0.042		
		PM		33.1	C	37.6	D	5.7	0.034		

Note:
* Denotes a CMP interesection
AWSC - All Way Stop Control; TWSC - Two Way Stop Control
[1] Average delay is reported for signalized and AWSC intersections. For TWSC intersections, the delay for the worst stop-controlled movement is reported.
"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.
* Intersections were analyzed using Synchro/SimTraffic software due to the close proximity of these intersections. Changes in critical delay and v/c calculated using Traffix.
Bold indicates substandard level of service
Bold indicates adverse effect

Adverse Effects and Recommended Improvements

The intersection effects and recommended modifications to improve the intersections to pre-Project conditions or better are described below. It should be noted that the intersection analysis accounts for the Project's proposed trip reductions from gross ITE trip generation. The residential component's required TDM reduction to eliminate the VMT impact is partially accounted for as well (peak-hour trip generation assumed 10% active TDM reduction). The additional residential TDM reduction during the peak-hour resulting from the VMT impact mitigation would have resulted in approximately 50 (13 inbound and 37 outbound) fewer trips during the AM peak hour and 56 (34 inbound and 22 outbound) fewer trips during the PM peak hour. This level of trip reduction would not address any intersection adverse effects alone.

Marsh Road and Bayfront Expressway (#1)

This intersection is expected to operate at an acceptable LOS D during the AM peak hour and LOS C during the PM peak hour under near term conditions. The addition of Project traffic would cause the level of service at the intersection to worsen to an unacceptable LOS E during the AM peak hour. The intersection would operate at an acceptable LOS D during the PM peak hour. The deterioration of LOS from D to E constitutes non-compliance during the AM peak hour according to the thresholds established by the City of Menlo Park.

The recommended modification for this location is to modify the southbound approach to a shared left-through lane, shared through-right lane, and a right turn only lane. With this improvement, the intersection would operate acceptably at LOS D during both peak hours under near-term plus project conditions. This improvement is in Menlo Park's traffic impact fee (TIF) program. With implementation of these intersection modifications, the intersection would be in compliance with the TIA Guidelines and address the Proposed Project's share of the non-compliant operation.

Chilco Street and Hamilton Avenue (#13)

This intersection is expected to operate at an acceptable LOS B during the AM peak hour and LOS C during the PM peak hour under near term conditions. The addition of Project traffic would cause the level of service at the intersection to worsen to an unacceptable LOS E during the PM peak hour. The intersection would operate at an acceptable LOS B during the AM peak hour. The deterioration of LOS from C to E constitutes non-compliance during the PM peak hour according to the thresholds established by the City of Menlo Park.

Since the intersection currently operates as all-way-stop-controlled, potential modification to bring the intersection to pre-project conditions would be to signalize it. However, the intersection does not meet the signal warrant during either peak hour under near term plus project conditions. A traffic signal is not recommended for construction until signal warrants conducted with a future year's actual counts have been met. The recommended improvement includes conducting a signal warrant analyses for a period of five years after full Project completion to determine if a signal would be warranted and if warranted, install a new signal. This improvement is included in the City's TIF program.

Should the City pursue implementation of this improvement, the improvement would include new traffic signal and appropriate pedestrian and bicycle accommodation at this intersection including pedestrian countdown timers, Americans with Disabilities Act (ADA) compliant curbs, and bicycle detection loops. Signalization of this intersection could also encourage cut-through traffic along Chilco Street and on Hamilton Avenue when regional routes such as Bayfront Expressway, Willow Road or US 101 become congested. Potential traffic calming measures should also be considered in conjunction with a traffic signal if signal warrants are met in a future year.

With implementation of these intersection modifications (e.g. signal warrant analysis, potential signal installation, and related bicycle and pedestrian accommodations), the intersection would be in compliance with the TIA Guidelines which would address the Proposed Project's share of the non-compliant operation.

Willow Road Corridor (#16, #17, #18, #21, #23, #24)

Willow Road between Bayfront Expressway and Hospital Plaza/Durham Street is expected to experience capacity issues due to unserved demand at the intersections. These intersections would operate unacceptably under near term conditions during both peak hours. With the addition of Project traffic, intersections along the corridor would continue to operate unacceptably during both peak hours.

The intersections of Willow Road and Bayfront Expressway and Willow Road and US 101 southbound ramps would experience an increase in delay of over four seconds with the addition of project traffic in the AM peak hour and PM peak hour, respectively, and would be non-compliant per Menlo Park's guidelines for state-controlled intersections.

The intersections of Hamilton Avenue and Newbridge Street at Willow Road would experience an increase in delay of over 0.8 seconds with the addition of project traffic on the local approach to the intersection in both peak hours and the intersection of Bay Road at Willow Road would experience an increase in delay of over 0.8 seconds with the addition of Project traffic on the local approach to the intersection during the AM peak hour and would be non-compliant per Menlo Park's guidelines. Willow Road and Park Street, which is a new intersection under project conditions is also assumed to be non-compliant during both peak hours due to unserved demand at this intersection as determined in the microsimulation model developed for this corridor and described in Chapter 3.

The City of Menlo Park is implementing an adaptive traffic signal coordination system on the Willow Road corridor to improve traffic flow. Adaptive traffic control is a technology that automatically adjusts traffic signal timing based on actual traffic demand at an intersection. This measure will improve the intersection operations and could reduce the intersection delay. The reduction in delay due to adaptive signal coordination is not expected to bring the corridor intersections into compliance with the City's TIA guidelines or to substantially reduce the delay caused by the Project.

Physical intersection improvements (identified in the City's TIF program) that would improve intersection operations at the non-compliant intersections are:

- **Willow Road and Newbridge Street (#21)**- The TIF program proposes to modify the signal timing to a protected left-turn phasing operation on Newbridge Street, provide a leading left-turn phase on the southbound movement and a lagging left-turn phase on the northbound movement, and optimize signal timing. With implementation of these intersection modifications under project conditions, the critical movement delay would be reduced for the northbound movement to lower than no project conditions. However, the improvement would not address the southbound deficiency. Further improvements to address the southbound deficiency are not feasible.

- **Willow Road and Bay Road (#24) –** The TIF program proposes to modify the southbound approach at this intersection to two left-turn lanes and one right-turn lane and to modify the westbound approach to add a right-turn lane. With these improvements under project conditions, the critical movement delay at the local approach would be reduced to lower than no project conditions. This improvement would address the adverse effect on the intersection due to Project traffic. With implementation of these intersection modifications, the Willow Road and Bay Road intersection would be in compliance with the TIA Guidelines which would address the Proposed Project's share of the non- compliant operation. With implementation of the recommended improvements from the TIF program for the Willow Road and Bay Road intersection the deficiency attributable to the Proposed Project would be addressed. As mentioned previously, these improvements are included in the City's TIF program.

The Metropolitan Transportation Commission (MTC) Dumbarton Forward project would restripe Bayfront Expressway to add bus-only lanes on the shoulders during peak periods and implement signal timing improvements. The bus-only lanes would generally help the progression of shuttles and buses along the corridor. The signal timing improvements are also assumed to help with the general progression along Bayfront. However, specific details are unknown at this time regarding the improvements at the Willow Road and Bayfront Expressway intersection. The improvements' effectiveness in addressing the Project traffic generated adverse effect on traffic operations at this intersection cannot be determined. Furthermore, since this project is not led by the City of Menlo Park, implementation cannot be guaranteed.

Physical improvements are considered infeasible due to right-of-way constraints and/or adverse effects on pedestrian and bicycle travel at the intersections of Willow Road and Bayfront Expressway, Willow Road and US 101 southbound ramps, Willow Road and Hamilton Avenue, and Willow Road and Park Street.

The TIF program also proposes multimodal improvements along this section of Willow Road. These include an eastbound Willow Road one-way Class IV separated bikeway between Hamilton Avenue and the US 101/Willow Road Interchange, a westbound Willow Road one-way Class IV separated bikeway between the Dumbarton Rail Corridor and the US 101/Willow Road Interchange, high-visibility crosswalks and pedestrian signals on all legs at the intersection of Willow Road and O'Brien Drive, Class II bicycle lanes on eastbound Willow Road from O'Keefe Street to Bay Road, and Class II bicycle lanes on westbound Willow Road from Bay Road to Durham Street.

Implementing recommended multi-modal facilities along the corridor (from the City's TIF program) could shift some motor vehicle traffic to alternative modes of travel and reduce congestion. With implementation of these multi-modal improvements, the intersection deficiencies could be further reduced and partially address the Proposed Project's share of the non- compliant operations along Willow Road.

O'Brien Drive and Kavanaugh Drive (#30)

This intersection is expected to operate at an acceptable LOS B during the AM peak hour and an unacceptable LOS D during the PM peak hour under near term conditions. With the addition of project traffic, the intersection would operate at an unacceptable LOS F during both peak hours. This constitutes non-compliance during both peak hours according to the thresholds established by the City of Menlo Park.

Since the intersection currently operates as all-way-stop-controlled, potential modification to bring the intersection to pre-project conditions would be to signalize it. The intersection would meet the MUTCD signal warrant during both peak hours under project conditions (See Appendix F). The intersection lane configuration would need to be modified to a westbound left-turn lane and through lane, northbound left turn lane and right turn lane, and eastbound shared through-right lane. With this improvement, the intersection would operate acceptably at LOS B during the AM peak hour and LOS C during the PM peak hour under near term plus project conditions.

The recommended improvement to bring this intersection back to pre-Project conditions is the installation of the new traffic signal and appropriate pedestrian and bicycle accommodation. This includes the proposed Class II bicycle lanes along O'Brien Drive between Willow Road and University Avenue, pedestrian countdown timers, Americans with Disabilities Act (ADA) compliant curbs, and bicycle detection loops. However, a decision for signalization should not be made until signal warrants conducted with a future year's actual counts have been met. It is important to note that the intersection would be located approximately 300 feet west of the proposed roundabout at O'Brien Drive and Loop Road. Prior to a decision for signalizing this intersection, further analysis should be conducted to ensure that queues resulting from the signal would not back into the roundabout and cause a gridlock situation.

Alternatively, traffic calming measures could be installed to discourage the use of Kavanaugh Drive, which is a residential street, and encourage vehicles to use O'Brien Drive and Adam's Drive instead. Kavanaugh Drive is located within the City of East Palo Alto, and the City of Menlo Park does not have jurisdiction to install traffic calming along this street. Other measures such as peak period turning movement restrictions could be considered to discourage traffic from using Kavanaugh Drive and improve intersection operations.

Monitoring of traffic operations at this intersection for a period of five years after full Project completion should be conducted to determine if signalization or alternative improvements are needed. If warranted, implementation of the new traffic signal would address the Proposed Project's share of the non-compliant operation and bring the intersection into compliance with the TIA Guidelines. If the alternative measures are implemented, the intersection may or may not be brought into compliance with the TIA Guidelines and address the Proposed Project's share of the non-compliant operation.

Adams Drive and O'Brien Drive (#32)

This intersection is expected to operate at an acceptable LOS C during the AM peak hour and an unacceptable LOS D during the PM peak hour under near term conditions. With the addition of Project traffic, the intersection would operate at an unacceptable LOS F during both peak hours. This constitutes non-compliance during both peak hours according to the thresholds established by the City of Menlo Park.

Since the intersection currently operates as two-way-stop-controlled, potential modification to bring the intersection to pre-project conditions would be to signalize it. The intersection would meet the MUTCD signal warrant during the PM peak hour under project conditions (see Appendix F). The intersection lane configuration would need to be modified to a westbound shared left-right lane, southbound left-turn lane and through lane, and northbound shared through-right lane. With this improvement, the intersection would operate acceptably at LOS B during the AM peak hour and LOS C during the PM peak hour under near term plus project conditions.

The recommended improvement to bring this intersection back to pre-Project conditions is the installation of the new traffic signal and appropriate pedestrian and bicycle accommodations at this intersection and within the vicinity. This includes the proposed Class II bicycle lanes along O'Brien Drive between Willow Road and University Avenue, pedestrian countdown timers, Americans with Disabilities Act (ADA) compliant curbs, and bicycle detection loops.

The expected intersection operational issues under background plus project conditions would be due to the increased through traffic on O'Brien Drive between the Project Site and University Avenue. Menlo Park's TIF program identifies an improvement to signalize the nearby intersection at University Avenue and Adams Drive in East Palo Alto. This improvement may provide an alternative route for Project vehicles to access the Project Site via University Avenue.

Monitoring of traffic operations at this intersection for a period of five years after full Project completion should be conducted to determine if signalization or alternative improvements are needed. If warranted, implementation of the new traffic signal would address the Proposed Project's share of the non-compliant operation and bring the intersection into compliance with the TIA Guidelines. If the alternative measures are implemented, the intersection may or may not be brought into compliance with the TIA Guidelines and address the Proposed Project's share of the non-compliant operation.

University Avenue and Bay Road (#39)

This intersection is expected to operate at an acceptable LOS D during the AM peak hour and an unacceptable LOS E during the PM peak hour under near term conditions. With the addition of Project traffic, the intersection would continue to operate acceptably in the AM peak hour. In the PM peak hour, the increase in the average critical delay would be greater than four seconds. This constitutes non-compliance during the PM peak hour according to the thresholds established by the City of East Palo Alto.

Potential modification to bring the intersection to pre-Project conditions would be to add an exclusive eastbound right-turn lane and a second eastbound left-turn lane on University Avenue, add a second northbound left-turn lane on Bay Road, add a second westbound left-turn lane on University Avenue, and modify signal phasing. This is also a mitigation measure identified in the Ravenswood/4 Corners TOD Specific Plan Environmental Impact Report (February 22, 2013), which would be implemented under cumulative conditions. With this improvement under project conditions, the average delay at the intersection would be better than under near term no project conditions. Since this intersection is located within the City of East Palo Alto, the recommended measure to bring the intersection back to pre-Project conditions and address the Project's share of the non-compliant operation would be to make a fair share (34%) contribution towards this improvement. Fair share is calculated as the percentage of net project traffic generated divided by the overall cumulative traffic growth at this intersection. The Menlo Park TIF includes improvements at the University Avenue and Bay Road intersection, but not sufficient improvements to bring the intersection back to pre-Project conditions, as described above. However, the Project's fair share contribution towards this intersection would be calculated considering credit from its TIF payment.

US 101/University Avenue Interchange (#42, #43, #44, #45, #47)

The US 101/University Avenue interchange is expected to experience capacity issues due to unserved demand at the intersections in its vicinity including University Avenue and Donohoe Street, US 101 northbound off-ramp and Donohoe Street, Cooley Avenue and Donohoe Street, University Avenue and US 101 southbound ramps, University Avenue and Woodland Avenue, E. Bayshore Road and Donohoe Street, and E. Bayshore Road and Euclid Avenue. These intersections would operate unacceptably under near term conditions during both peak hours. With the addition of Project traffic, these intersections would continue to operate unacceptably during both peak hours. The increase in delay is expected to be greater than four seconds, and the increase in the volume to capacity ratio is expected to be greater than 0.01 under project conditions at University Avenue and Donohoe Street in the AM peak hour, US 101 northbound off-ramp and Donohoe Street during both peak hours, Cooley Avenue and Donohoe Street during both peak hours, E. Bayshore Road and Donohoe Street during both peak hours, and University Avenue and US 101 southbound ramps in the AM peak hour. This constitutes non-compliance according to the thresholds established by the City of East Palo Alto.

East Palo Alto plans to widen the northbound approach on Donohoe Street at the US 101 northbound off-ramp to accommodate four through lanes to improve the vehicular throughput at this intersection. This improvement will require median modifications and narrowing the southbound Donohoe Street approach to Cooley Avenue to include two through lanes and a full length left-turn lane. In addition, the traffic signals will be coordinated with adjacent traffic signals on Donohoe Street.

East Palo Alto also plans to install a new traffic signal at the US 101 northbound on-ramp and Donohoe Street and Bayshore Road and Euclid Avenue to coordinate with other closely spaced traffic signals along Donohoe Street. Along with new traffic signals, appropriate pedestrian and bicycle accommodation will be provided. This includes pedestrian countdown timers, Americans with Disabilities Act (ADA) compliant curbs, and bicycle detection loops. In order to align with the proposed driveway for the University Plaza Phase II site on the north side of Donohoe Street, the US 101 on-ramp will be shifted approximately 30 feet to the south. In addition, the northbound approach on Donohoe Street will be restriped to accommodate a short exclusive left-turn pocket (approximately 60 feet in length), a shared left-through lane, and a shared through-right lane. These improvements would require widening of the US 101 northbound on-ramp to accommodate two lanes that taper down to a single lane before this ramp connects with the loop on-ramp from eastbound University Avenue. A northbound right turn only will also be added to Bayshore Road and Euclid Avenue. Planned Donohoe Street improvements are included in Appendix E.

With these improvements, average delay at these intersections would be below that under near term conditions without the Project. Since this intersection is located within the City of East Palo Alto, the recommended improvement measure to bring the intersection/interchange back to pre-Project conditions and address the Project's share of the non- compliant operation would be for the Project sponsor to make a fair share contribution towards these improvements. Because the improvements in this corridor are all interconnected and dependent on each other to work, the recommended improvement measure would be for the Project sponsor to contribute its fair share to improvements at all six intersections in this corridor. Fair share is calculated as the percentage of net project traffic generated of the overall cumulative traffic growth at this intersection.

- Donohoe Street & Cooley Avenue: 10% fair share
- Donohoe Street & US 101 Northbound Off-Ramp: 24% fair share
- Donohoe Street & University Avenue: 31% fair share
- Donohoe Street & US 101 Northbound On-Ramp: 8% fair share
- Donohoe Street/Bayshore Road & Euclid Avenue: 2% fair share
- US 101 Southbound Ramps & University Avenue: 33% fair share

The Menlo Park TIF includes improvements at the University Avenue and Donohoe Street and University Avenue and US 101 southbound ramps intersections, which funding would go toward the planned coordinated system of intersections. The Project's fair share contribution towards these two intersections would be calculated considering credit from its TIF payment.

Cumulative (2040) Intersection Levels of Service

The results of the intersection level of service analysis under cumulative conditions are summarized in Tables 18 and 19. The Willow Road corridor and 101/University Avenue interchange were analyzed using the Simtraffic microsimulation model as described Chapter 2. The microsimulation model indicates that the intersections would experience capacity issues where the demand cannot be served by the intersections. Oversaturated conditions would operate at LOS F and are indicated using 'OVERSAT' in the tables below. Vistro and Traffix were used to calculate critical delay and volume to capacity ratio at the Willow Road and 101/University Avenue intersections, respectively. The intersection LOS calculation sheets are included in Appendix C. The following study intersections (see Figure 20) would operate at an unacceptable level of service during at least one peak hour:

1. Marsh Road and Bayfront Expressway (AM and PM peak hours)
2. Marsh Road and US 101 Northbound off-ramp (AM peak hour)
5. Marsh Road and Bohannon Drive/Florence Street (AM peak hour)
6. Marsh Road and Bay Road (AM peak hour)
8. Chilco Street and Bayfront Expressway (PM peak hour)
11. Chrysler Drive and Constitution Drive (AM and PM peak hours)
12. Chilco Street and Constitution Drive/MPK 22 Driveway (AM and PM peak hours)
13. Chilco Street and Hamilton Avenue (PM peak hour)
16. Willow Road and Bayfront Expressway (AM and PM peak hours)
17. Willow Road and Hamilton Avenue (AM and PM peak hours)
19. Willow Road and Ivy Drive (AM and PM peak hours)
20. Willow Road and O'Brien Drive (AM and PM peak hours)
21. Willow Road and Newbridge Street (AM and PM peak hours)
22. Willow Road and US 101 Northbound Ramps (AM and PM peak hours)
23. Willow Road and US 101 Southbound Ramps (AM and PM peak hours)
24. Willow Road and Bay Road (AM and PM peak hours)
25. Willow Road and Hospital Plaza/Durham Street (AM and PM peak hours)
28. Willow Road and Middlefield Road (AM peak hour)
30. O'Brien Drive and Kavanaugh Drive (AM and PM peak hours)
32. Adam's Drive and O'Brien Drive (AM and PM peak hours)
33. University Avenue and Bayfront Expressway (PM peak hour)
35. University Avenue and Adams Drive (AM and PM peak hours)
39. University Avenue and Bay Road (PM peak hour)
42. University Avenue and Donohoe Street (AM and PM peak hours)
43. US 101 Northbound Off-Ramp and Donohoe Street (AM and PM peak hours)
44. Cooley Avenue and Donohoe Street (AM and PM peak hours)
45. University Avenue and US 101 Southbound Ramps (AM and PM peak hours)
46. University Avenue and Woodland Avenue (AM and PM peak hours)
47. E. Bayshore Road and Donohoe Street (AM and PM peak hour)
49. Saratoga Avenue and Newbridge Street (AM and PM peak hours)
50. East Bayshore Road and Euclid Avenue (AM and PM peak hours)

Cumulative (2040) Plus Project Intersection Levels of Service

The results of the intersection level of service analysis under near cumulative (2040) plus project conditions are summarized in Tables 18 and 19. The intersection LOS calculation sheets are included in Appendix C. Under cumulative plus project conditions, the following 17 intersections (see Figure 21) would be non-compliant with local policies during either the AM or the PM peak hour as compared to cumulative conditions. All of these intersections would already be operating at unacceptable levels of service under cumulative conditions.

5. Marsh Road and Bohannon Drive/Florence Street (AM peak hour)
13. Chilco Street and Hamilton Avenue (AM and PM peak hours)
18. Willow Road and Park Street (AM and PM peak hours)
19. Willow Road and Ivy Drive (PM peak hour)
21. Willow Road and Newbridge Street (AM and PM peak hours)
24. Willow Road and Bay Road (AM and PM peak hours)
25. Willow Road and Hospital Plaza/Durham Street (AM and PM peak hours)
30. O'Brien Drive and Kavanaugh Drive (AM peak hour)
32. Adam's Drive and O'Brien Drive (AM and PM peak hours)
43. US 101 Northbound Off-Ramp and Donohoe Street (AM and PM peak hours)
44. Cooley Avenue and Donohoe Street (PM peak hour)
45. University Avenue and US 101 Southbound Ramps (PM peak hour)
46. University Avenue and Woodland Avenue (AM and PM peak hours)
49. Saratoga Avenue and Newbridge Street (AM peak hour)
50. East Bayshore Road and Euclid Avenue (AM peak hour)

Bold denotes intersections that would be non-compliant under cumulative plus project conditions during either AM or PM peak hours but are compliant under near-term plus project conditions during both peak hours.

It should be noted that at some intersections the average delay is shown to decrease with the addition of Project traffic. This occurs because the intersection delay is a weighted average of all intersection movements. When traffic is added to movements with delays lower than the average intersection delay, the average delay for the entire intersection can decrease. Furthermore, the congestion and queue spillback at an adjacent intersection can constrain the traffic volume at some intersections resulting in a small decrease in average delay.

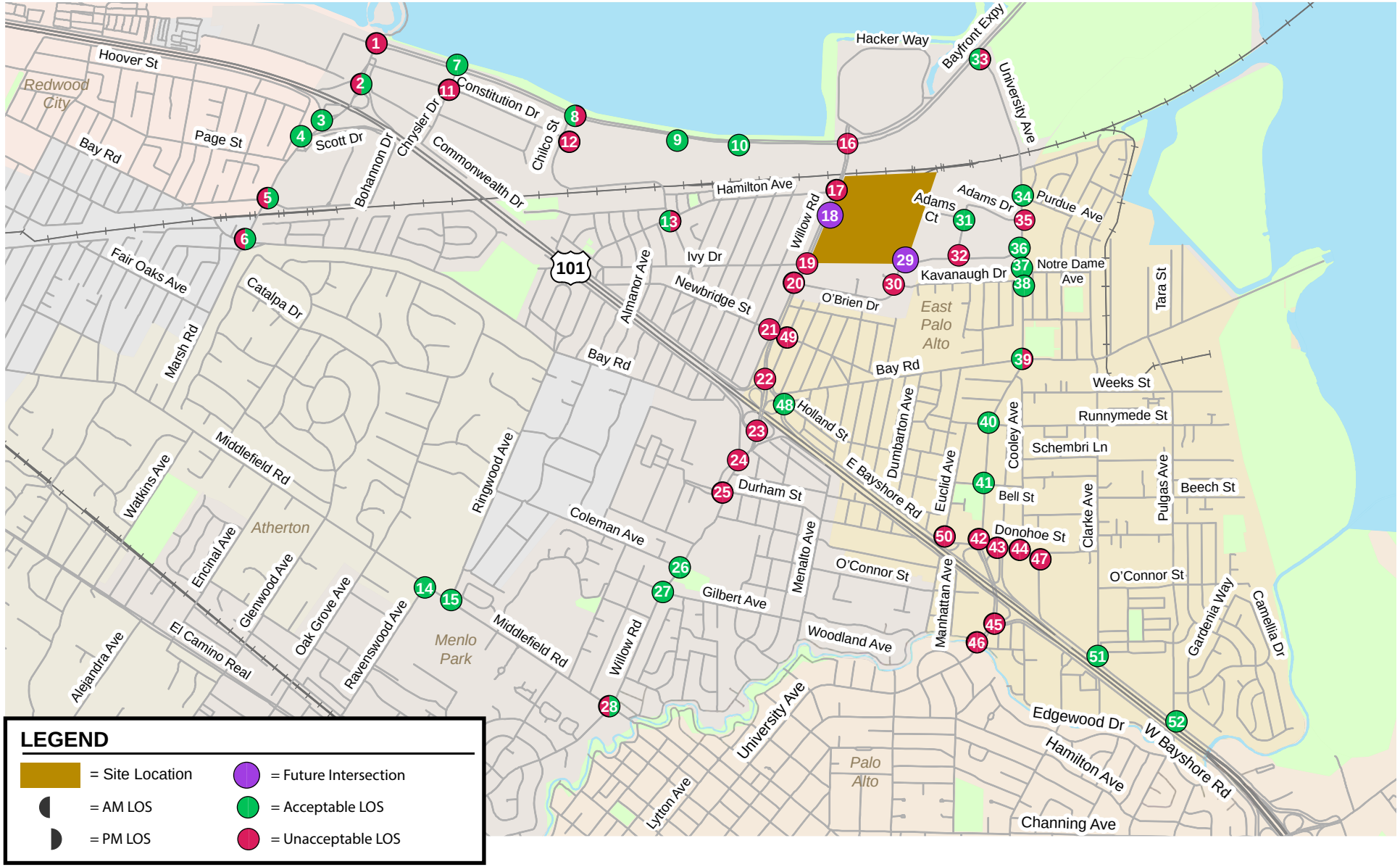


Figure 20
Cumulative (2040) Intersection Level of Service Summary

NORTH
Not to Scale

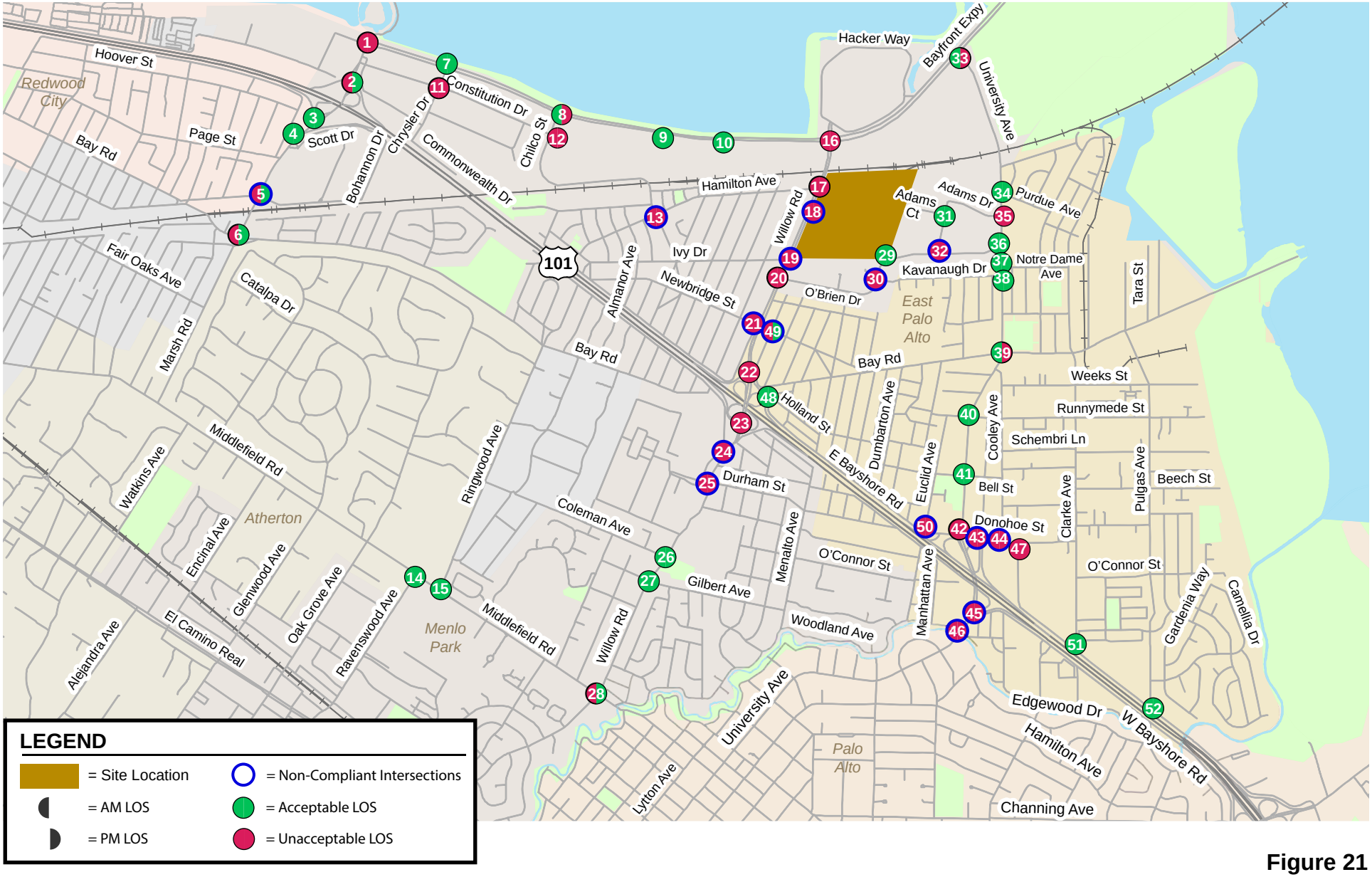


Figure 21
Cumulative (2040) Plus Project Intersection Level of Service Summary

NORTH
Not to Scale

Table 18
Cumulative (2040) Intersection Levels of Service (Menlo Park)

#	Intersection	Peak Hour	Traffic Control	Cumulative (2040) Conditions								
				General Plan Conditions		Project Conditions				With Improvement		
				Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay
1	Marsh Road & Bayfront Expressway*	AM	Signal	**68.7**	**E**	**65.6**	**E**	**<4**	**<0.8**			
	Haven Avenue Southbound	*AM*		***71.2***	***E***	***73.4***	***E***	***<4***	***<0.8***			
		PM	Signal	**65.0**	**E**	**77.9**	**E**	**12.9**	**12.5**			
	Haven Avenue Southbound	*PM*		***67.7***	***E***	***67.7***	***E***	***<4***	***<0.8***			
2	Marsh Road & US 101 Northbound Off-Ramp	AM	Signal	**60.9**	**E**	**62.2**	**E**	**<4**	**1.5**			
		PM		22.9	C	22.8	C	<4	<0.8			
3	Marsh Road & US 101 Southbound Off-Ramp	AM	Signal	22.8	C	24.4	C	<4	2.0			
		PM		19.2	B	18.8	B	<4	<0.8			
4	Marsh Road & Scott Drive	AM	Signal	31.9	C	31.8	C	<4	<0.8			
		PM		17.9	B	18.1	B	<4	<0.8			
5	Marsh Road & Bohannon Drive/Florence Street	AM	Signal	**58.0**	**E**	**60.4**	**E**	**<4**	**4.9**	**56.7**	**E**	**<0.8**
		PM		52.5	D	53.6	D	<4	1.6	48.3	D	<0.8
6	Marsh Road & Bay Road	AM	Signal	**64.2**	**E**	**64.8**	**E**	<4	<0.8			
		PM		47.6	D	54.9	D	7.3	14.4			
7	Chrysler Drive & Bayfront Expressway	AM	Signal	13.1	B	12.8	B	<4	6.4			
		PM		39.5	D	36.3	D	<4	<0.8			
8	Chilco Street & Bayfront Expressway	AM	Signal	44.5	D	49.2	D	4.7	13.5			
	Chilco Street Eastbound	*AM*		***112.4***	***F***	***108.9***	***F***	***<4***	***<0.8***			
		PM		**69.6**	**E**	**66.9**	**E**	**<4**	**<0.8**			
	Chilco Street Eastbound	*PM*		***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
9	MPK 21 Driveway & Bayfront Expressway	AM	Signal	5.7	A	5.6	A	<4	<0.8			
		PM		36.3	D	36.1	D	<4	<0.8			
10	MPK 20 Driveway (east) & Bayfront Expressway	AM	Signal	10.0	B	9.9	A	<4	<0.8			
		PM		18.7	B	18.8	B	<4	<0.8			
11	Chrysler Drive & Constitution Drive	AM	Signal	**>120**	**F**	**>120**	**F**	**<4**	**<0.8**			
		PM		**>120**	**F**	**>120**	**F**	**<4**	**<0.8**			
12	Chilco Street & Constitution Drive/MPK 22 Driveway[2]	AM	Signal	**52.9**	**D**	**51.1**	**D**	**<4**	**<0.8**			
		PM		**113.5**	**F**	**101.8**	**F**	**<4**	**<0.8**			
13	Chilco Street & Hamilton Avenue	AM	AWSC	24.5	C	**27.1**	**D**	<4	2.6	*Traffic signal potentially feasible*		
		PM		**>120**	**F**	**>120**	**F**	**24.7**	**24.7**			
14	Ravenswood Avenue & Middlefield Road	AM	Signal	49.7	D	49.7	D	<4	<0.8			
		PM		20.2	C	19.5	B	<4	<0.8			

Table 18 (continued)
Cumulative (2040) Intersection Levels of Service (Menlo Park)

#	Intersection	Peak Hour	Traffic Control	Cumulative (2040) Conditions								
				General Plan Conditions		Project Conditions				With Improvement		
				Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay
15	Ringwood Avenue & Middlefield Road	AM	Signal	13.2	B	13.2	B	<4	<0.8			
		PM		21.0	C	21.1	C	<4	<0.8			
16	Willow Road & Bayfront Expressway*[1]	AM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
17	Willow Road & Hamilton Avenue[1][2]	AM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
	Hamilton Avenue Southbound	*AM*		***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
	Main Street Northbound	*AM*		***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
		PM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
	Hamilton Avenue Southbound	*PM*		***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
	Main Street Northbound	*PM*		***>120***	***F***	***>120***	***F***	***<4***	***>120***			
18	Willow Road & Park Street (future intersection)[1]	AM	Signal	Project Intersection		**OVERSAT**	**F**	**34.2**	**49.1**	***No feasible Improvement***		
		PM				**OVERSAT**	**F**	**17.2**	**23.1**			
19	Willow Road & Ivy Drive[1]	AM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**46.2**	**98.7**	**OVERSAT**	**F**	
	Ivy Drive Southbound	*AM*		***70.9***	***E***	***69.6***	***E***	***<4***	***<0.8***	***61.2***	***E***	***<0.8***
		PM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**80.8**	**102.4**	**OVERSAT**	**F**	
	Ivy Drive Southbound	*PM*		***68.1***	***E***	***71.7***	***E***	***<4***	***3.6***	*49.0*	*D*	*<0.8*
20	Willow Road & O'Brien Drive[1]	AM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
	O'Brien Drive Northbound	*AM*		***>120***	***F***	***80.4***	***F***	***<4***	***<0.8***			
		PM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
	O'Brien Drive Northbound	*PM*		***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
21	Willow Road & Newbridge Street[1]	AM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**25.9**	**74.2**	**OVERSAT**	**F**	
	Newbridge Street Southbound	*AM*		***>120***	***F***	***108.8***	***F***	***<4***	***<0.8***	***>120***	***F***	***67.3***
	Newbridge Street Northbound	*AM*		***>120***	***F***	***>120***	***F***	***101.4***	***>120***	***73.5***	***E***	***<0.8***
		PM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**	**OVERSAT**	**F**	
	Newbridge Street Southbound	*PM*		***84.3***	***F***	***>120***	***F***	***47.1***	***74.2***	***>120***	***F***	***>120***
	Newbridge Street Northbound	*PM*		***>120***	***F***	***>120***	***F***	***<4***	***<0.8***	*50.7*	*D*	*<0.8*
22	Willow Road & US 101 Northbound Ramps[1]	AM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
23	Willow Road & US 101 Southbound Ramps[1]	AM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
24	Willow Road & Bay Road[1]	AM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**5.4**	**OVERSAT**	**F**	
	Bay Road Southbound	*AM*		***>120***	***F***	***>120***	***F***	***30.3***	***30.3***	*27.8*	*C*	*<0.8*
		PM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**	**OVERSAT**	**F**	
	Bay Road Southbound	*PM*		***75.6***	***E***	***82.7***	***F***	***7.0***	***7.0***	*26.5*	*C*	*<0.8*

Table 18 (continued)
Cumulative (2040) Intersection Levels of Service (Menlo Park)

#	Intersection	Peak Hour	Traffic Control	Cumulative (2040) Conditions								
				General Plan Conditions		Project Conditions				With Improvement		
				Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay
25	Willow Road & Hospital Plaza/Durham Street[1]	AM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**11.0**	**OVERSAT**	**F**	
	VA Medical Center Southbound	*AM*		***74.8***	***E***	***74.7***	***E***	***<4***	***<0.8***	***74.7***	***E***	***<0.8***
	Durham Street Northbound	*AM*		***>120***	***F***	***>120***	***F***	***6.0***	***5.4***	***>120***	***F***	***<0.8***
		PM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**1.3**	**OVERSAT**	**F**	
	VA Medical Center Southbound	*PM*		***74.2***	***E***	***74.5***	***E***	***<4***	***<0.8***	***69.4***	***E***	***<0.8***
	Durham Street Northbound	*PM*		***88.1***	***F***	***90.3***	***F***	***<4***	***2.8***	***59.9***	***E***	***<0.8***
26	Willow Road & Coleman Avenue	AM	Signal	34.9	C	34.3	C	<4	<0.8			
		PM		13.1	B	13.2	B	<4	<0.8			
27	Willow Road & Gilbert Avenue	AM	Signal	24.4	C	23.9	C	<4	<0.8			
		PM		14.2	B	14.1	B	<4	<0.8			
28	Willow Road & Middlefield Road	AM	Signal	**64.5**	**E**	**65.0**	**E**	**<4**	**<0.8**			
	Middlefield Road Southbound	*AM*		***69.9***	***E***	***70.4***	***E***	***<4***	***<0.8***			
	Middlefield Road Northbound	*AM*		***67.4***	***E***	***67.2***	***E***	***<4***	***<0.8***			
		PM	Signal	42.5	D	42.4	D	<4	<0.8			
	Middlefield Road Southbound	*PM*		*42.1*	*D*	*42.2*	*D*	*<4*	*<0.8*			
	Middlefield Road Northbound	*PM*		*40.6*	*D*	*40.8*	*D*	*<4*	*<0.8*			
29	O'Brien Drive/Loop Road & Main Street/O'Brien Drive (future intersection)	AM	Roundabout	Project Intersection		8.8	A	8.8	8.8			
		PM				11.0	B	11.0	11.0			
30	O'Brien Drive & Kavanaugh Drive	AM	AWSC	**>120**	**F**	**>120**	**F**	**105.8**	**105.8**	*Traffic signal potentially feasible*		
		PM		**>120**	**F**	**>120**	**F**	**<4**	**<0.8**			
31	Adams Drive & Adams Court	AM	TWSC	20.1	C	17.8	C	<4	<0.8			
		PM		16.4	C	12.7	B	<4	<0.8			
32	Adams Drive & O'Brien Drive	AM	TWSC	**62.4**	**F**	**>120**	**F**	**>120**	**>120**	*Traffic signal potentially feasible*		
		PM		**>120**	**F**	**>120**	**F**	**>120**	**>120**			
33	University Avenue & Bayfront Expressway*	AM	Signal	14.8	B	13.3	B	<4	<0.8			
		PM		**>120**	**F**	**>120**	**F**	**<4**	**2.9**			

Notes:
* Denotes CMP Intersection
AWSC - All Way Stop Control; TWSC - Two Way Stop Control
[1] Average delay is reported for signalized and AWSC intersections. For TWSC intersections, the delay for the worst stop-controlled movement is reported
"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]Intersections were analyzed using Synchro/SimTraffic software due to the close proximity of these intersections. Changes in average delay and critical delay calculated using Vistro.

[2]The intersection is not considered as non-compliant under cumulative plus project conditions because the critical movement of the local approach shifts with the addition of project traffic.
Bold indicates substandard level of service
Bold indicates noncompliance. The project exceeds thresholds in the City of Menlo Park's TIA Guidelines.

Table 19
Cumulative (2040) Intersection Levels of Service (East Palo Alto)

#	Intersection	Peak Hour	Traffic Control	Cumulative (2040) Conditions: General Plan Conditions Avg. Delay (sec)	LOS	with Project Avg. Delay (sec)	LOS	Incr. in Critical Delay (sec)	Incr. in Critical V/C	With Improvement Avg. Delay (sec)	LOS
34	University Avenue & Purdue Avenue	AM	Signalized	25.9	C	28	C	0.8	0.017		
		PM		37.1	D	40.8	D	4.2	0.031		
35	University Avenue & Adams Drive	AM	TWSC	**>120**	**F**	**>120**	**F**	**1.4**	**0.253**		
		PM		**>120**	**F**	**>120**	**F**	**-7.3**	**-0.130**		
36	University Avenue & O'Brien Drive	AM	Signalized	21.1	C	43.1	D	29.3	0.245		
		PM		21.3	C	32.6	C	14.1	0.175		
37	University Avenue & Notre Dame Avenue	AM	Signalized	8.0	A	10.6	B	3.1	0.070		
		PM		12.2	B	15.6	B	4.1	0.038		
38	University Avenue & Kavanaugh Drive	AM	Signalized	26.8	C	17.5	B	-12.1	-0.110		
		PM		23.1	C	24.8	C	0.8	0.009		
39	University Avenue & Bay Road	AM	Signalized	48.8	D	53.5	D	8.9	0.054		
		PM		**68.3**	**E**	**69.0**	**E**	**-1.9**	**-0.008**		
40	University Avenue & Runnymede Street	AM	Signalized	9.7	A	11.7	B	11	0.075		
		PM		8.9	A	8.9	A	3.6	0.102		
41	University Avenue & Bell Street	AM	Signalized	14.9	B	16.2	B	2	0.067		
		PM		26.4	C	34.8	C	13.4	0.069		
42	University Avenue & Donohoe Street*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**-1.4**	**-0.002**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**-4.9**	**-0.009**	***Improvement***	
43	US 101 Northbound Off-Ramp & Donohoe Street*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**77.2**	**0.158**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**46.5**	**0.102**	***Improvement***	
44	Cooley Avenue & Donohoe Street*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**29.3**	**0.091**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**63.7**	**0.143**	***Improvement***	
45	University Avenue & US 101 Southbound Ramps*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**-2.0**	**-0.004**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**6.7**	**0.016**	***Improvement***	
46	University Avenue & Woodland Avenue*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**14.1**	**0.040**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**19.1**	**0.045**	***Improvement***	
47	E. Bayshore Road & Donahoe Street*	AM	Signalized	**>120**	**F**	**>120**	**F**	**-22.4**	**-0.048**	***Corridor***	
		PM		**>120**	**F**	**>120**	**F**	**-5.3**	**-0.011**	***Improvement***	

Table 19 (continued)
Cumulative (2040) Intersection Levels of Service (East Palo Alto)

#	Intersection	Peak Hour	Traffic Control	Cumulative (2040) Conditions: General Plan Conditions Avg. Delay (sec)	LOS	with Project Avg. Delay (sec)	LOS	Incr. in Critical Delay (sec)	Incr. in Critical V/C	With Improvement Avg. Delay (sec)	LOS
48	E. Bayshore Road & Holland Street	AM	TWSC	8.8	A	8.8	A	0.0	0.000		
		PM		10.0	A	10.0	A	0.0	0.000		
49	Saratoga Avenue & Newbridge Street	AM	TWSC	**>120**	**F**	**>120**	**F**	**9.8**	**0.061**	***No Feasible***	
		PM		**40.0**	**E**	28.6	D	**-2.2**	**-0.120**	***Improvement***	
50	E. Bayshore Road & Euclid Avenue*	AM	AWSC	**OVERSAT**	**F**	**OVERSAT**	**F**	**53.8**	**0.057**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**-2.7**	**-0.009**	***Improvement***	
51	Clarke Avenue & E. Bayshore Road	AM	Signalized	14.1	B	14.2	B	0.2	0.014		
		PM		13.9	B	14.0	B	0.2	0.007		
52	Pulgas Avenue & E. Bayshore Road	AM	Signalized	25.4	C	26.5	C	1.4	0.017		
		PM		48.1	D	47.3	D	-0.4	-0.002		

Note:
* Denotes a CMP interesection
AWSC - All Way Stop Control; TWSC - Two Way Stop Control
[1] Average delay is reported for signalized and AWSC intersections. For TWSC intersections, the delay for the worst stop-controlled movement is reported.
"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.
* Intersections were analyzed using Synchro/SimTraffic software due to the close proximity of these intersections. Changes in critical delay and v/c calculated using Traffix.
Bold indicates substandard level of service
Bold indicates adverse effect

Adverse Effects and Recommended Improvements

For intersections that are non-compliant under both near-term plus project conditions and cumulative plus project conditions, the recommended improvements proposed under near term plus project conditions would be sufficient to address cumulative non-compliance. Improvements for intersections that are non-compliant only under cumulative plus project conditions are described below.

Marsh Road and Bohannon Drive/Florence Street (#5)

This intersection is expected to operate at an unacceptable LOS E during the AM peak hour and an acceptable LOS D during the PM peak hour under cumulative conditions. The addition of Project traffic would cause the average critical delay to increase by more than 0.8 during the AM peak hour. The intersection would continue to operate at an acceptable LOS D during the PM peak hour. This constitutes non-compliance during the AM peak hour according to the thresholds established by the City of Menlo Park.

Modification of the westbound approach at this intersection to a left-turn lane, two through lanes, and a right-turn lane would improve the average delay to better than cumulative no project conditions. Menlo Park's TIF program proposes Class II buffered bike lanes along Marsh Road from Bay Road to Scott Road in both directions and the removal of on-street parking in the eastbound direction. The restriping of the vehicle travel lanes to include a westbound right-turn only lane and the proposed Class II buffered bike lane would require narrowing the travel lanes to 11 feet and removal of the median. While this is possible, removal of the median would require removing at least one tree as well as the signal pole in the median. Upgrades to at least one mast arm would be required to replace the removed median signal. Physical improvements at this intersection are considered infeasible due to right-of-way constraints and/or adverse effects on pedestrian and bicycle travel. The City's TIF program includes multi-modal improvements along the Marsh Road corridor such as Class II buffered bike lanes along Marsh Road from Bay Road to Scott Road, and installing sidewalks along the north-side of Marsh Road between Page Street and Bohannon Drive/Florence Street. Implementing recommended multi-modal facilities along the corridor (from the City's TIF program) could shift some motor vehicle traffic to alternative modes of travel and reduce congestion. With implementation of these multi-modal improvements, the intersection deficiencies could be further reduced and partially address the Proposed Project's share of the non-compliant operations at this intersection.

Willow Road and Ivy Drive (#19)

Willow Road and Ivy Drive is an intersection on the Willow Road Corridor, which is expected to experience capacity issues due to unserved demand at the intersections. This intersection would operate unacceptably under cumulative conditions during both peak hours. With the addition of Project traffic, it would continue to operate unacceptable during both peak hours. In the PM peak hour, the increase in the critical movement delay of the local approach would be greater than 0.8 seconds. This constitutes non-compliance during the PM peak hour according to the thresholds established by the City of Menlo Park.

The Menlo Park TIF proposes to install a right-turn overlap phase on southbound Ivy Drive and restrict eastbound Willow Road U-turns. This would improve the critical movement delay of the local approach to better than cumulative no project conditions. The Project is required to pay traffic impact fees according to the City's current TIF schedule.

Willow Road and Hospital Plaza/Durham Street (#25)

Willow Road and Hospital Plaza/Durham Street is an intersection on the Willow Road Corridor, which is expected to experience capacity issues due to unserved demand at the intersections. This intersection would operate unacceptably under cumulative conditions during both peak hours. With the addition of Project traffic, it would continue to operate unacceptably during both peak hours. In the AM and PM peak hour, the increase in the critical movement delay of the local approach would be greater than 0.8 seconds. This constitutes non-compliance during both peak hours according to the thresholds established by the City of Menlo Park.

The recommended improvement measure for this intersection is restriping northbound Durham Street as a shared left-through lane and right-turn lane, and adding a northbound right turn overlap phase. With this improvement, the critical movement delay of the local approach would improve to better than cumulative no project conditions in the AM peak hour. The PM peak hour would continue to be non-compliant. If this recommended improvement measure is implemented, the Project should contribute its fair share (25%) towards the improvement. Fair share is calculated as the percentage of net project traffic generated of the overall cumulative traffic growth at this intersection.

University Avenue and Woodland Avenue (#46)

University Avenue and Woodland Avenue is in the vicinity of the US 101/University Avenue interchange and is expected to experience capacity issues due to unserved demand at the intersections. This intersection would operate unacceptably under cumulative conditions during both peak hours. With the addition of Project traffic, it would continue to operate unacceptably during both peak hours. In the AM and PM peak hour, the increase in the average critical delay would be greater than four seconds and the increase in the volume to capacity ratio would be greater than 0.01. This constitutes non-compliance during both peak hours according to the thresholds established by the City of East Palo Alto.

The recommended Donohoe Street improvements (see Appendix E) at Euclid Avenue and at the US 101 northbound on-ramp would improve traffic flow on University Avenue and eliminate the queue spillback that extends from Donohoe Street past Woodland Avenue. While the University Avenue and Woodland Avenue intersection is expected to continue to operate at LOS F during both peak hours, the Donohoe Street improvements would reduce the average delay at the intersection below cumulative conditions without the Project. With these improvements, the intersection would comply with the City of East Palo Alto's level of service policy. As discussed under the background plus Project discussion above, the project would pay its fair share costs towards the intersection improvements at the 6 intersections of the University Avenue/Donohoe Street/US 101 corridor.

Saratoga Avenue and Newbridge Street (#49)

This intersection is expected to operate at an acceptable LOS F during the AM peak hour and an unacceptable LOS E during the PM peak hour under cumulative conditions. With the addition of Project traffic, the intersection average critical delay at the intersection would increase by four seconds and the volume to capacity ratio would increase by 0.01 during the AM peak hour. This constitutes as non-compliance during the AM peak hour according to the thresholds established by the City of East Palo Alto.

Since the intersection currently operates as two-way-stop-controlled, potential modification to bring the intersection to pre-project conditions would be to signalize it. The intersection would meet the MUTCD signal warrant during both peak hours under project conditions (see Appendix F). With this improvement, the intersection would operate acceptably at LOS C during the AM peak hour and LOS B during the PM peak hour under cumulative plus project conditions. However, since the intersection is located only 200 feet south of Willow Road, signalization is not recommended. Short of signalization, no other improvements are feasible. Furthermore, given this intersection is located outside of the City of Menlo Park, the City cannot ensure implementation of any improvements. This intersection is also not listed with improvements in the City of East Palo Alto TIF.

Bayshore Road and Euclid Avenue (#50)

Bayshore Road and Euclid Avenue is in the vicinity of the US 101/University Avenue interchange and is expected to experience capacity issues due to unserved demand at the intersections. This intersection would operate unacceptably under cumulative conditions during both peak hours. With the addition of Project traffic, it would continue to operate unacceptably during both peak hours. In the AM peak hour, the increase in the average critical delay would be greater than four seconds and the increase in the volume to capacity ratio would be greater than 0.01. This constitutes non-compliance during the AM peak hour according to the thresholds established by the City of East Palo Alto.

Since the intersection currently operates as all-way-stop-controlled, potential modification to bring the intersection to pre-project conditions would be to signalize it and add a westbound right turn only lane. This improvement is included in the recommended Donohoe Street improvements (see Appendix E, Transportation/Traffic, of this EIR). The proposed improvements at Euclid Avenue and at the US 101 northbound on-ramp would improve traffic flow on University Avenue and eliminate the queue spillback that extends from Donohoe Street past Woodland Avenue. This would reduce the average delay at the intersection below cumulative conditions without the project. With these improvements, the intersection would be in compliance with the City of East Palo Alto's level of service policy. As discussed under the background plus project discussion above, the Project would pay its fair share costs towards the intersection improvements at the 6 intersections of the University Avenue/Donohoe Street/US 101 corridor, which includes the intersection at Bayshore Road and Euclid Avenue.

Cumulative (2040) Plus Dumbarton Rail Intersection Levels of Service

The results of the intersection level of service analysis under cumulative conditions with the Dumbarton Rail are summarized in Table 20 and 21. All study intersections are expected to operate better cumulative conditions with the Dumbarton rail than without the Dumbarton rail. The intersection LOS calculation sheets are included in Appendix C. The following study intersection would improve to acceptable LOS with the Dumbarton Rail during at least one peak hour:

6. Marsh Road and Bay Road (AM peak hour)

Cumulative (2040) Plus Project with Dumbarton Rail Intersection Levels of Service

The results of the intersection level of service analysis under cumulative (2040) plus project conditions with the Dumbarton rail are summarized in Tables 20 and 21. Compared to cumulative plus project conditions without the Dumbarton Rail, the delay at all of the intersections would improve with Dumbarton Rail. While the overall motor vehicle operations would experience reduced delay with Dumbarton Rail, when evaluating for intersection LOS compliance, the determination is based on the relative increase in delay due to the Project compared to no project conditions (cumulative conditions with Dumbarton Rail). Comparing “cumulative plus project with Dumbarton Rail” conditions to “cumulative plus project without Dumbarton Rail” conditions, the following study intersection would no longer be non-compliant:

25. Willow Road & Durham Street

The following additional study intersections would be non-compliant under cumulative plus project conditions with the Dumbarton rail as compared to cumulative plus project conditions without the Dumbarton Rail:

6. Marsh Road and Bay Road (AM peak hour)
11. Chrysler Drive and Constitution Drive (AM peak hour)
16. Willow Road and Bayfront Expressway (AM peak hour)

Under cumulative conditions with or without the Project, the road network is over saturated. Since the Dumbarton rail would reduce vehicular traffic in the area due to the increase in transit mode share, the Menlo Park Travel Demand model assigns more Project-generated traffic at some intersections where vehicular capacity is now available. Menlo Park’s level of service standards and adverse effect criteria are very stringent where a small change in traffic can trigger a non-compliance at an intersection. Therefore, the relative increase in delay due to the Project at some intersections between “cumulative with Dumbarton Rail” and “cumulative plus project with Dumbarton Rail” would be greater than the Menlo Park’s threshold, causing additional intersections to be non-compliant under cumulative plus project conditions with the Dumbarton rail.

Adverse Effects and Recommended Improvements

For intersections that are non-compliant under cumulative plus project conditions and cumulative plus project with Dumbarton rail conditions, the improvements proposed under cumulative plus project conditions would be sufficient to address cumulative non-compliance. Improvements for intersections that are non-compliant only under cumulative plus project with Dumbarton rail conditions are described below. As noted below, no additional feasible improvements are identified and the improvement measures identified below are for informational purposes only.

Marsh Road and Bay Road (#6)

This intersection is expected to operate at an acceptable LOS D during both peak hours under cumulative conditions with the Dumbarton rail. The addition of Project traffic would cause the intersection to operate at LOS E during the AM peak hour. The intersection would continue to operate at an acceptable LOS D during the PM peak hour. This constitutes non-compliance during the AM peak hour according to the thresholds established by the City of Menlo Park.

Physical improvements at this intersection are considered infeasible due to right-of-way constraints and/or adverse effects on pedestrian and bicycle travel. Menlo Park's TIF program proposes Class II buffered bike lanes along Marsh Road from Bay Road to Scott Road in both directions. The improvement may lead to an overall increase in bicycle mode share but would not offset the Project traffic.

Chrysler Drive and Constitution Drive (#11)

This intersection is expected to operate at an unacceptable LOS F during both peak hours under cumulative conditions with Dumbarton rail. With the addition of Project traffic, the average critical delay would increase by more than 0.8 seconds during the AM peak hour. The intersection would continue to operate acceptably during the PM peak hour. This constitutes non-compliance during the AM peak hour according to the thresholds established by the City of Menlo Park.

Physical improvements at this intersection are considered infeasible due to right-of-way constraints and/or adverse effects on pedestrian and bicycle travel.

Willow Road and Bayfront Expressway 9#16)

Improvements for this intersection are discussed under the near term plus project section as part of the Willow Road corridor improvements, and is not repeated here.

Table 20
Cumulative (2040) With Dumbarton Rail Intersection Levels of Service (Menlo Park)

#	Intersection	Peak Hour	Traffic Control	Cumulative Conditions (With Dumbarton Rail)								
				No Project Conditions		Project Conditions				With Improvement		
				Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay
1	Marsh Road & Bayfront Expressway*	AM	Signal	**68.5**	**E**	**65.3**	**E**	**<4**	**<0.8**			
	Haven Avenue Southbound	*AM*		***70.5***	***E***	***71.7***	***E***	***<4***	***<0.8***			
		PM	Signal	**63.2**	**E**	**72.8**	**E**	**9.6**	**11.4**			
	Haven Avenue Southbound	*PM*		***67.6***	***E***	***67.6***	***E***	***<4***	***<0.8***			
2	Marsh Road & US 101 Northbound Off-Ramp	AM	Signal	**60.7**	**E**	**61.9**	**E**	**<4**	**1.4**			
		PM		22.9	C	22.7	C	<4	<0.8			
3	Marsh Road & US 101 Southbound Off-Ramp	AM	Signal	22.8	C	22.6	C	<4	<0.8			
		PM		19.2	B	18.7	B	<4	<0.8			
4	Marsh Road & Scott Drive	AM	Signal	31.2	C	30.4	C	<4	<0.8			
		PM		17.8	B	17.8	B	<4	<0.8			
5	Marsh Road & Bohannon Drive/Florence Street	AM	Signal	**57.8**	**E**	**58.7**	**E**	**<4**	**2.7**	**55.1**	**E**	**<0.8**
		PM		51.5	D	53.1	D	<4	2.7	48.1	D	<0.8
6	Marsh Road & Bay Road	AM	Signal	54.5	D	**63.5**	**E**	**9.0**	**18.9**	***No feasible Improvement***		
		PM		47.9	D	51.2	D	<4	6.8			
7	Chrysler Drive & Bayfront Expressway	AM	Signal	13.0	B	12.5	B	<4	6.0			
		PM		38.3	D	33.5	C	<4	<0.8			
8	Chilco Street & Bayfront Expressway	AM	Signal	43.2	D	45.5	D	<4	7.3			
	Chilco Street Eastbound	*AM*		***116.3***	***F***	***108.8***	***F***	***<4***	***<0.8***			
		PM		**68.3**	**E**	**65.6**	**E**	**<4**	**<0.8**			
	Chilco Street Eastbound	*PM*		*>120*	*F*	***>120***	***F***	***<4***	***<0.8***			
9	MPK 21 Driveway & Bayfront Expressway	AM	Signal	5.7	A	5.6	A	<4	<0.8			
		PM		36.3	D	36.1	D	<4	<0.8			
10	MPK 20 Driveway (east) & Bayfront Expressway	AM	Signal	10.1	B	9.9	A	<4	<0.8			
		PM		18.6	B	18.8	B	<4	<0.8			
11	Chrysler Drive & Constitution Drive	AM	Signal	**>120**	**F**	**>120**	**F**	**31.2**	**50.3**	***No feasible Improvement***		
		PM		**>120**	**F**	**>120**	**F**	**<4**	**<0.8**			
12	Chilco Street & Constitution Drive/MPK 22 Driveway[2]	AM	Signal	**50.1**	**D**	**53.9**	**D**	**<4**	**<0.8**			
		PM		**111.8**	**F**	**99.2**	**F**	**<4**	**<0.8**			
13	Chilco Street & Hamilton Avenue	AM	AWSC	23.6	C	24.3	C	<4	<0.8	*Traffic signal potentially feasible*		
		PM		**>120**	**F**	**>120**	**F**	**18.2**	**18.2**			
14	Ravenswood Avenue & Middlefield Road	AM	Signal	49.7	D	49.7	D	<4	<0.8			
		PM		20.3	C	19.5	B	<4	<0.8			

Table 20 (continued)
Cumulative (2040) with Dumbarton Rail Intersection Levels of Service (Menlo Park)

#	Intersection	Peak Hour	Traffic Control	Cumulative Conditions (With Dumbarton Rail)								
				No Project Conditions		Project Conditions				With Improvement		
				Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay
15	Ringwood Avenue & Middlefield Road	AM	Signal	13.2	B	13.2	B	<4	<0.8			
		PM		21.0	C	21.1	C	<4	<0.8			
16	Willow Road & Bayfront Expressway*[1]	AM	Signal	OVERSAT	F	OVERSAT	F	5.3	<0.8	*No feasible Improvement*		
		PM		OVERSAT	F	OVERSAT	F	<4	<0.8			
17	Willow Road & Hamilton Avenue[1][2]	AM	Signal	OVERSAT	F	OVERSAT	F	<4	<0.8			
	Hamilton Avenue Southbound	*AM*		*>120*	*F*	*>120*	*F*	*<4*	*<0.8*			
	Main Street Northbound	*AM*		*>120*	*F*	*>120*	*F*	*<4*	*<0.8*			
		PM	Signal	OVERSAT	F	OVERSAT	F	<4	<0.8			
	Hamilton Avenue Southbound	*PM*		*>120*	*F*	*>120*	*F*	*27.4*	*<0.8*			
	Main Street Northbound	*PM*		*>120*	*F*	*>120*	*F*	*<4*	*>120*			
18	Willow Road & Park Street (future intersection)[1]	AM	Signal	Project Intersection		OVERSAT	F	33.6	47.8	*No feasible Improvement*		
		PM				OVERSAT	F	16.2	21.7			
19	Willow Road & Ivy Drive[1]	AM	Signal	OVERSAT	F	OVERSAT	F	52.0	105.8	OVERSAT	F	
	Ivy Drive Southbound	*AM*		*72.8*	*E*	*69.6*	*E*	*<4*	*<0.8*	*61.3*	*E*	*<0.8*
		PM	Signal	OVERSAT	F	OVERSAT	F	85.2	107.3	OVERSAT	F	
	Ivy Drive Southbound	*PM*		*65.2*	*E*	*71.7*	*E*	*6.5*	*7.9*	*60.4*	*E*	*<0.8*
20	Willow Road & O'Brien Drive[1]	AM	Signal	OVERSAT	F	OVERSAT	F	<4	<0.8			
	O'Brien Drive Northbound	*AM*		*108.2*	*F*	*80.4*	*F*	*<4*	*<0.8*			
		PM	Signal	OVERSAT	F	OVERSAT	F	<4	<0.8			
	O'Brien Drive Northbound	*PM*		*>120*	*F*	*>120*	*F*	*<4*	*<0.8*			
21	Willow Road & Newbridge Street[1]	AM	Signal	OVERSAT	F	OVERSAT	F	31.5	97.3	OVERSAT	F	
	Newbridge Street Southbound	*AM*		*115.1*	*F*	*108.8*	*F*	*<4*	*<0.8*	*>120*	*F*	*103.1*
	Newbridge Street Northbound	*AM*		*>120*	*F*	*>120*	*F*	*>120*	*>120*	*23.2*	*C*	*<0.8*
		PM	Signal	OVERSAT	F	OVERSAT	F	<4	<0.8	OVERSAT	F	
	Newbridge Street Southbound	*PM*		*83.5*	*F*	*>120*	*F*	*42.8*	*67.4*	*>120*	*F*	*101.1*
	Newbridge Street Northbound	*PM*		*>120*	*F*	*>120*	*F*	*<4*	*<0.8*	*31.2*	*C*	*<0.8*
22	Willow Road & US 101 Northbound Ramps[1]	AM	Signal	OVERSAT	F	OVERSAT	F	<4	<0.8			
		PM		OVERSAT	F	OVERSAT	F	<4	<0.8			
23	Willow Road & US 101 Southbound Ramps[1]	AM	Signal	OVERSAT	F	OVERSAT	F	<4	<0.8			
		PM		OVERSAT	F	OVERSAT	F	<4	<0.8			
24	Willow Road & Bay Road[1]	AM	Signal	OVERSAT	F	OVERSAT	F	<4	6.7	OVERSAT	F	
	Bay Road Southbound	*AM*		*>120*	*F*	*>120*	*F*	*36.1*	*36.1*	*27.6*	*C*	*<0.8*
		PM	Signal	OVERSAT	F	OVERSAT	F	<4	<0.8	OVERSAT	F	
	Bay Road Southbound	*PM*		*74.5*	*E*	*81.7*	*F*	*7.2*	*7.2*	*26.5*	*C*	*<0.8*

Table 20 (continued)
Cumulative (2040) With Dumbarton Rail Intersection Levels of Service (Menlo Park)

#	Intersection	Peak Hour	Traffic Control	Cumulative Conditions (With Dumbarton Rail)								
				No Project Conditions		Project Conditions				With Improvement		
				Avg. Delay (sec)[1]	LOS	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Delay	Incr. in Avg. Critical Delay	Avg. Delay (sec)[1]	LOS	Incr. in Avg. Critical Delay
25	Willow Road & Hospital Plaza/Durham Street[1]	AM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
	VA Medical Center Southbound	*AM*		***74.7***	***E***	***74.7***	***E***	***<4***	***<0.8***			
	Durham Street Northbound	*AM*		***>120***	***F***	***>120***	***F***	***<4***	***<0.8***			
		PM	Signal	**OVERSAT**	**F**	**OVERSAT**	**F**	**<4**	**<0.8**			
	VA Medical Center Southbound	*PM*		***74.2***	***E***	***74.0***	***E***	***<4***	***<0.8***			
	Durham Street Northbound	*PM*		***88.1***	***F***	***88.1***	***F***	***<4***	***<0.8***			
26	Willow Road & Coleman Avenue	AM	Signal	33.9	C	33.6	C	<4	3.4			
		PM		13.1	B	13.2	B	<4	<0.8			
27	Willow Road & Gilbert Avenue	AM	Signal	23.7	C	23.4	C	<4	<0.8			
		PM		14.1	B	13.9	B	<4	<0.8			
28	Willow Road & Middlefield Road	AM	Signal	**64.4**	**E**	**64.8**	**E**	**<4**	**0.8**			
	Middlefield Road Southbound	*AM*		***69.8***	***E***	***70.0***	***E***	***<4***	***<0.8***			
	Middlefield Road Northbound	*AM*		***67.4***	***E***	***67.2***	***E***	***<4***	***<0.8***			
		PM	Signal	42.5	D	42.3	D	<4	<0.8			
	Middlefield Road Southbound	*PM*		*42.1*	*D*	*42.1*	*D*	*<4*	*<0.8*			
	Middlefield Road Northbound	*PM*		*40.6*	*D*	*40.7*	*D*	*<4*	*<0.8*			
29	O'Brien Drive/Loop Road & Main Street/O'Brien Drive (future intersection)	AM	Roundabout	Project Intersection		8.4	A	8.4	8.4			
		PM				10.2	B	10.2	10.2			
30	O'Brien Drive & Kavanaugh Drive	AM	AWSC	**>120**	**F**	**>120**	**F**	**>120**	**>120**	*Traffic signal potentially feasible*		
		PM		**>120**	**F**	**>120**	**F**	**10.9**	**10.9**			
31	Adams Drive & Adams Court	AM	TWSC	18.9	C	17.3	C	<4	<0.8			
		PM		15.8	C	12.6	B	<4	<0.8			
32	Adams Drive & O'Brien Drive	AM	TWSC	**47.2**	**E**	**>120**	**F**	**>120**	**>120**	*Traffic signal potentially feasible*		
		PM		**>120**	**F**	**>120**	**F**	**>120**	**>120**			
33	University Avenue & Bayfront Expressway*	AM	Signal	14.7	B	13.1	B	<4	<0.8			
		PM		**>120**	**F**	**>120**	**F**	**<4**	**<0.8**			

Notes:
* Denotes CMP Intersection
AWSC - All Way Stop Control; TWSC - Two Way Stop Control
[1] Average delay is reported for signalized and AWSC intersections. For TWSC intersections, the delay for the worst stop-controlled movement is reported
"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]Intersections were analyzed using Synchro/SimTraffic software due to the close proximity of these intersections. Changes in average delay and critical delay calculated using Vistro.
[2]The intersection is not considered as non-compliant under cumulative plus project conditions because the critical movement of the local approach shifts with the addition of project traffic.
Bold indicates substandard level of service
Bold indicates noncompliance. The project exceeds thresholds in the City of Menlo Park's TIA Guidelines.

Table 21
Cumulative (2040) With Dumbarton Rail Intersection Levels of Service (East Palo Alto)

#	Intersection	Peak Hour	Traffic Control	Cumulative (2040) Conditions (Dumbarton Rail)							
				No Project		with Project				With Improvement	
				Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Incr. in Critical Delay (sec)	Incr. in Critical V/C	Avg. Delay (sec)	LOS
34	University Avenue & Purdue Avenue	AM	Signalized	25.9	C	22.3	C	-3.8	-0.071		
		PM		28.0	C	24.2	C	-3.6	-0.081		
35	University Avenue & Adams Drive	AM	TWSC	**>120**	**F**	**>120**	**F**	**1.5**	**0.322**		
		PM		**>120**	**F**	**>120**	**F**	**-6.9**	**-0.122**		
36	University Avenue & O'Brien Drive	AM	Signalized	20.4	C	38.7	D	24.3	0.225		
		PM		20.1	C	31.4	C	14.4	0.176		
37	University Avenue & Notre Dame Avenue	AM	Signalized	8.0	A	10.6	B	3.1	0.070		
		PM		11.3	B	14.8	B	4.1	0.036		
38	University Avenue & Kavanaugh Drive	AM	Signalized	24.7	C	17.5	B	3.1	0.070		
		PM		22.7	C	23.5	C	4.4	0.039		
39	University Avenue & Bay Road	AM	Signalized	47.4	D	52	D	8.4	0.056		
		PM		**64.0**	**E**	**67.7**	**E**	**3.7**	**0.012**		
40	University Avenue & Runnymede Street	AM	Signalized	9.4	A	10.9	B	8.1	0.062		
		PM		8.9	A	8.9	A	3.5	0.100		
41	University Avenue & Bell Street	AM	Signalized	14.9	B	15.9	B	1.6	0.055		
		PM		26.1	C	32.9	C	10.9	0.062		
42	University Avenue & Donohoe Street*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**4.6**	**0.011**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**-4.9**	**-0.009**	***Improvement***	
43	US 101 Northbound Off-Ramp & Donohoe Street*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**77.2**	**0.158**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**48.9**	**0.108**	***Improvement***	
44	Cooley Avenue & Donohoe Street*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**27.2**	**0.085**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**62.9**	**0.143**	***Improvement***	
45	University Avenue & US 101 Southbound Ramps*	AM	Signalized	**OVERSAT**	**F**	**OVERSAT**	**F**	**-2.5**	**-0.005**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**7.0**	**0.017**	***Improvement***	
46	University Avenue & Woodland Avenue*	AM	Signalized	**OVERSAT**	**E**	**OVERSAT**	**E**	**14.1**	**0.040**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**12.0**	**0.028**	***Improvement***	
47	E. Bayshore Road & Donahoe Street*	AM	Signalized	**>120**	**F**	**>120**	**F**	**-8.8**	**-0.019**	***Corridor***	
		PM		**>120**	**F**	**>120**	**F**	**-4.9**	**-0.010**	***Improvement***	

Table 21 (continued)
Cumulative (2040) With Dumbarton Rail Intersection Levels of Service (East Palo Alto)

#	Intersection	Peak Hour	Traffic Control	Cumulative (2040) Conditions (Dumbarton Rail)							
				No Project		with Project				With Improvement	
				Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Incr. in Critical Delay (sec)	Incr. in Critical V/C	Avg. Delay (sec)	LOS
48	E. Bayshore Road & Holland Street	AM	TWSC	8.8	A	8.8	A	0.0	0.000		
		PM		10.0	A	10.0	A	0.0	0.000		
49	Saratoga Avenue & Newbridge Street	AM	TWSC	**>120**	**F**	**>120**	**F**	**4.7**	**0.075**	***No Feasible***	
		PM		**37.2**	**E**	25.0	D	-2.6	-0.103	***Improvement***	
50	E. Bayshore Road & Euclid Avenue*	AM	AWSC	**OVERSAT**	**F**	**OVERSAT**	**F**	**42.4**	**0.062**	***Corridor***	
		PM		**OVERSAT**	**F**	**OVERSAT**	**F**	**-5.7**	**-0.016**	***Improvement***	
51	Clarke Avenue & E. Bayshore Road	AM	Signalized	14.1	B	14.2	B	0.1	0.008		
		PM		13.9	B	14.0	B	0.1	0.007		
52	Pulgas Avenue & E. Bayshore Road	AM	Signalized	25.4	C	26.2	C	1.1	0.013		
		PM		47.4	D	47.2	D	0.2	0.001		

Note:
* Denotes a CMP interesection
AWSC - All Way Stop Control; TWSC - Two Way Stop Control
[1] Average delay is reported for signalized and AWSC intersections. For TWSC intersections, the delay for the worst stop-controlled movement is reported.
"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.
[*] Intersections were analyzed using Synchro/SimTraffic software due to the close proximity of these intersections. Changes in critical delay and v/c calculated using Traffix.
Bold indicates substandard level of service
Bold indicates adverse effect

Intersection Vehicle Queuing

The analysis of intersection levels of service was supplemented with a vehicle queuing analysis for intersection left-turning movements where the proposed project would add significant trips per lane in the vicinity of the Project Site and affect intersection operations (see Figure 22). This analysis provides a basis for estimating future storage requirements at these intersections (see Table 22). Vehicle queues were estimated using the methodology described in Chapter 1. The following turn movements were selected for evaluation:

- Northbound left-turn at Marsh Road and Bayfront Expressway
- Eastbound left-turn at Willow Road and Bayfront Expressway
- Eastbound left-turn and Southbound left-turn at Willow Road and Ivy Drive
- Southbound left-turn at Willow Road and US 101 southbound ramps
- Southbound left-turn at Willow Road and Bay Road
- Westbound shared left-through lane and Eastbound shared through-right lane at O'Brien Drive and Kavanaugh Drive
- Southbound shared left/through lane at Adams Drive and O'Brien Drive
- Eastbound left-turn and Southbound left-turn at University Avenue and O'Brien Drive
- Eastbound left-turn at University Avenue and Kavanaugh Drive

Locations where the estimated 95th percentile queues would exceed the available storage capacity for the movement are discussed below. Queuing issues are operational issues resulting from signal timing and queue storage provisions. Queuing issues are not considered a CEQA issue related to hazards.

Eastbound Left-turn at Willow Road and Bayfront Expressway (#16)

The existing vehicle storage for the eastbound left turn pocket on Willow Road at Bayfront Expressway is 300 feet, which provides enough space for about 12 vehicles. Under existing conditions, the 95th percentile queue would exceed the storage of the left turn pocket by 12 vehicles in the AM peak hour. Under near-term conditions, the 95th percentile queue would exceed the storage length of the turn pocket by 15 vehicles during the AM peak hour and four vehicles during the PM peak hour. The Proposed Project would add three vehicles to the 95th percentile queue during the AM peak hour and PM peak hour. There is no room to extend the left turn pocket due to the emergency vehicle only lane cut in the median.

Eastbound Left-turn at Willow Road and Ivy Drive (#19)

The existing vehicle storage for the eastbound left turn pocket on Willow Road at Ivy Drive is 125 feet, which provides enough space for about 5 vehicles. Under existing conditions, the 95th percentile queue would be accommodated by the left turn pocket. Under near-term conditions, the 95th percentile queue exceeds the storage length of the turn pocket by three vehicles during the AM peak hour. The Proposed Project would add one vehicle to the 95th percentile queue during the AM peak hour and one vehicle during the PM peak hour. There is no room to further extend this left-turn.

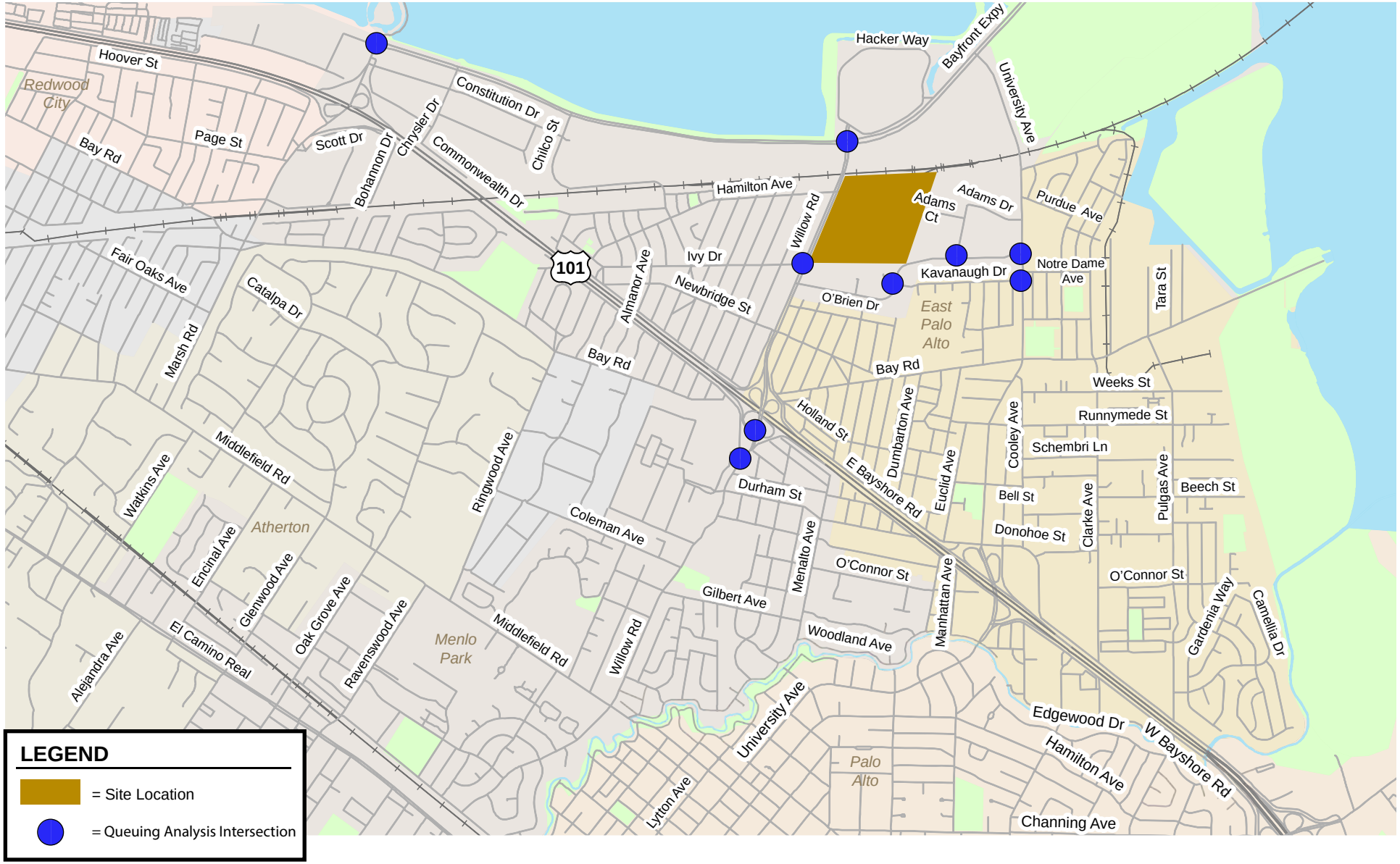


Figure 22
Queuing Analysis Locations

Southbound Left-turn at Willow Road and Bay Road (#24)

The existing vehicle storage for the southbound left turn pocket on Willow Road at Bay Road is 250 feet, which provides enough space for about 10 vehicles. Under existing conditions, the 95th percentile queue would exceed the storage length of the left turn pocket by 6 vehicles. Under near-term conditions, the 95th percentile queue exceeds the storage length of the turn pocket by 13 vehicles during the AM peak hour and one vehicle during the PM peak hour. The Proposed Project would add six vehicles to the 95th percentile queue during the AM peak hour and three vehicles during the PM peak hour. Menlo Park's TIF has a project to add a second left-turn lane to this intersection, which would add additional storage for left-turning vehicles. The exact length of the addition will be determined during the design phase for the intersection improvement. Construction of the recommended improvement would reduce the queuing deficiency created by the Proposed Project.

Eastbound Left-turn and Southbound left-turn at University Avenue and O'Brien Drive (#36)

The existing vehicle storage for the eastbound left turn pocket on University Avenue at O'Brien Drive is 125 feet, which provides enough spaces for about 5 vehicles. Under existing conditions, the 95th percentile queue exceeds the storage length of the turn pocket by 3 vehicles during the AM peak hour. The Proposed Project would add 22 vehicles to the 95th percentile queue during the AM peak hour. There is no room to lengthen the eastbound left turn pocket.

The existing vehicle storage for the southbound left turn pocket on O'Brien Drive at University Avenue is 60 feet, which provides enough spaces for 2 vehicles. Under existing conditions, the 95th percentile queue exceeds the storage length of the turn pocket by one vehicle during the AM peak hour and 11 vehicles during the PM peak hour. The Project would add one vehicle to the 95th percentile queue during the AM peak hour. There would be no increase to the 95th percentile queue length during the PM peak hour. There is room to extend the left turn pocket to accommodate the estimated 95th percentile queue of 325 feet.

Menlo Park's Traffic Impact Fee (TIF) program identifies an improvement to signalize the nearby intersection at University Avenue and Adams Drive in East Palo Alto. This improvement may provide an alternative route for Project vehicles to access the Project Site via University Avenue, and alleviate potential queuing issues at this intersection.

Table 22
Intersection Vehicle Queuing Results

Intersection	Marsh Road & Bayfront Expressway[4]		Willow Road & Bayfront Expressway[4]		Willow Road & Ivy Drive[4]			
Movement	NBLT		EBLT		EBLT		SBLT	
Peak Hour Period	AM	PM	AM	PM	AM	PM	AM	PM
Existing								
Cycle/Delay[1] (sec)	160	160	140	140	130	130	130	130
Lanes	3	3	1	1	1	1	1	1
Volume (vph)	1931	1822	195	88	49	44	11	32
95th% Queue (veh/ln)	36	29	24	5	4	3	1	2
95th% Queue (ft/ln)	900	725	600	125	100	75	25	50
Storage (ft/ ln)	1350	1350	300	300	125	125	125	125
Adequate (Y/N)	Y	Y	***N***	Y	Y	Y	Y	Y
Near-Term								
Cycle/Delay[1] (sec)	160	160	140	140	130	130	130	130
Lanes	3	3	1	1	1	1	1	1
Volume (vph)	1931	2034	210	151	81	80	11	35
95th% Queue (veh/ln)	36	34	27	8	8	5	1	2
95th% Queue (ft/ln)	900	850	675	200	200	125	25	50
Storage (ft/ ln)	1350	1350	300	300	125	125	125	125
Adequate (Y/N)	Y	Y	***N***	Y	***N***	Y	Y	Y
Near-Term Plus Project								
Cycle/Delay[1] (sec)	160	160	140	140	130	130	130	130
Lanes	3	3	1	1	1	1	1	1
Volume (vph)	2028	2225	225	189	91	83	65	71
95th% Queue (veh/ln)	41	40	30	9	11	6	4	4
95th% Queue (ft/ln)	1025	1000	750	225	275	150	100	100
Storage (ft/ ln)	1350	1350	300	300	125	125	125	125
Adequate (Y/N)	Y	Y	***N***	Y	***N***	***N***	Y	Y

Notes:
NB = northbound; SB = southbound; WB = westbound; EB = eastbound; L/T/R = shared left-through-right; RT = right turn movement; LT = left turn movement
[1] Vehicle queue calculations based on cycle length for signalized intersections and delay for the approach for unsignalized intersections.
[2] Assumes 25 feet per vehicle queued.
[3] Intersection is all-way-stop-controlled under existing conditions and signalized under background condiitions.
[4] 95th Percentile queue length used from Vistro software.
[5] 95th Percentile queue length developed using Poisson Distribution.

Table 22
Intersection Vehicle Queuing Results (Continued)

Intersection	Willow Road & US 101 Southbound Ramps[4]		Willow Road & Bay Road[4]		O'Brien Drive & Kavanugh Drive[4]			
Movement	SBLT		SBLT		WBL/T		EBT/R	
Peak Hour Period	AM	PM	AM	PM	AM	PM	AM	PM
Existing								
Cycle/Delay[1] (sec)	80	80	48	48	12.7	10.1	11.4	17.9
Lanes	2	2	1	1	1	1	1	1
Volume (vph)	472	285	352	241	328	203	296	529
95th% Queue (veh/ln)	8	3	16	7	3	2	3	7
95th% Queue (ft/ln)	200	75	400	175	75	50	75	175
Storage (ft/ ln)	400	400	250	250	330	330	1800	1800
Adequate (Y/N)	Y	Y	***N***	Y	Y	Y	Y	Y
Near-Term								
Cycle/Delay[1] (sec)	80	80	48	48	13.6	11.8	12.4	39
Lanes	2	2	1	1	1	1	1	1
Volume (vph)	689	612	406	283	330	242	315	648
95th% Queue (veh/ln)	10	8	23	11	3	2	3	14
95th% Queue (ft/ln)	250	200	575	275	75	50	75	350
Storage (ft/ ln)	400	400	250	250	330	330	1800	1800
Adequate (Y/N)	Y	Y	***N***	***N***	Y	Y	Y	Y
Near-Term Plus Project								
Cycle/Delay[1] (sec)	80	80	48	48	28.6	22.4	190.5	129.2
Lanes	2	2	1	1	1	1	1	1
Volume (vph)	937	726	438	301	395	319	713	625
95th% Queue (veh/ln)	13	9	29	13	7	5	35	26
95th% Queue (ft/ln)	325	225	725	325	175	125	875	650
Storage (ft/ ln)	400	400	250	250	330	330	1800	1800
Adequate (Y/N)	Y	Y	***N***	***N***	Y	Y	Y	Y

Notes:
NB = northbound; SB = southbound; WB = westbound; EB = eastbound; L/T/R = shared left-through-right; RT = right turn movement; LT = left turn movement
[1] Vehicle queue calculations based on cycle length for signalized intersections and delay for the approach for unsignalized intersections.
[2] Assumes 25 feet per vehicle queued.
[3] Intersection is all-way-stop-controlled under existing conditions and signalized under background condiitions.
[4] 95th Percentile queue length used from Vistro software.
[5] 95th Percentile queue length developed using Poisson Distribution.

Table 22
Intersection Vehicle Queuing Results (Continued)

Intersection	Adams Drive and O'Brien Drive[4]		University Avenue & Purdue Avenue[5]			
Movement	SBL/T		WBLT		NBLT	
Peak Hour Period	AM	PM	AM	PM	AM	PM
Existing						
Cycle/Delay[1] (sec)	4.4	4.1	16.5	16.5	16.5	16.5
Lanes	1	1	1	1	1	1
Volume (vph)	166	440	99	20	26	29
95th% Queue (veh/ln)	1	1	2	1	1	1
95th% Queue (ft/ln)	25	25	50	25	25	25
Storage (ft/ ln)	625	625	75	75	50	50
Adequate (Y/N)	Y	Y	Y	Y	Y	Y
Near-Term						
Cycle/Delay[1] (sec)	4.5	3.9	16.5	16.5	16.5	16.5
Lanes	1	1	1	1	1	1
Volume (vph)	170	481	209	46	27	46
95th% Queue (veh/ln)	1	1	3	1	1	1
95th% Queue (ft/ln)	25	25	75	25	25	25
Storage (ft/ ln)	625	625	75	75	50	50
Adequate (Y/N)	Y	Y	Y	Y	Y	Y
Near-Term Plus Project						
Cycle/Delay[1] (sec)	3.9	1.2	16.5	16.5	16.5	16.5
Lanes	1	1	1	1	1	1
Volume (vph)	250	952	214	65	54	69
95th% Queue (veh/ln)	1	1	3	1	1	1
95th% Queue (ft/ln)	25	25	75	25	25	25
Storage (ft/ ln)	625	625	75	75	50	50
Adequate (Y/N)	Y	Y	Y	Y	Y	Y

Notes:
NB = northbound; SB = southbound; WB = westbound; EB = eastbound; L/T/R = shared left-through-right; RT = right turn movement; LT = left turn movement
[1] Vehicle queue calculations based on cycle length for signalized intersections and delay for the approach for unsignalized intersections.
[2] Assumes 25 feet per vehicle queued.
[3] Intersection is all-way-stop-controlled under existing conditions and signalized under background condiitions.
[4] 95th Percentile queue length used from Vistro software.
[5] 95th Percentile queue length developed using Poisson Distribution.

Table 22
Intersection Vehicle Queuing Results (Continued)

Intersection	University Avenue & O'Brien Drive[5]				University Avenue & Kavanaugh Drive[5]	
Movement	EBLT		SBLT		EBLT	
Peak Hour Period	AM	PM	AM	PM	AM	PM
Existing						
Cycle/Delay[1] (sec)	150	150	150	150	150	150
Lanes	1	1	1	1	1	1
Volume (vph)	110	6	32	185	44	11
95th% Queue (veh/ln)	8	1	3	13	4	2
95th% Queue (ft/ln)	200	25	75	325	100	50
Storage (ft/ ln)	125	125	50	50	100	100
Adequate (Y/N)	***N***	Y	***N***	***N***	Y	Y
Near-Term						
Cycle/Delay[1] (sec)	150	150	150	150	150	150
Lanes	1	1	1	1	1	1
Volume (vph)	110	6	33	185	56	19
95th% Queue (veh/ln)	8	1	4	13	5	2
95th% Queue (ft/ln)	200	25	100	325	125	50
Storage (ft/ ln)	125	125	50	50	100	100
Adequate (Y/N)	***N***	Y	***N***	***N***	***N***	Y
Near-Term Plus Project						
Cycle/Delay[1] (sec)	150	150	150	150	150	150
Lanes	1	1	1	1	1	1
Volume (vph)	525	22	58	185	44	35
95th% Queue (veh/ln)	30	3	5	13	4	4
95th% Queue (ft/ln)	750	75	125	325	100	100
Storage (ft/ ln)	125	125	50	50	100	100
Adequate (Y/N)	***N***	Y	***N***	***N***	Y	Y

Notes:
NB = northbound; SB = southbound; WB = westbound; EB = eastbound; L/T/R = shared left-through-right; RT = right turn movement; LT = left turn movement
[1] Vehicle queue calculations based on cycle length for signalized intersections and delay for the approach for unsignalized intersections.
[2] Assumes 25 feet per vehicle queued.
[3] Intersection is all-way-stop-controlled under existing conditions and signalized under background condiitions.
[4] 95th Percentile queue length used from Vistro software.
[5] 95th Percentile queue length developed using Poisson Distribution.

Freeway Facilities Analysis

In analyzing the freeway segments, the citywide travel demand forecast model was used to forecast the increase in traffic volumes between existing and near term plus project conditions. For the purpose of this study, freeway levels of service under cumulative conditions are calculated based on volume to capacity (V/C) ratio. A freeway segment is assumed to operate at LOS F under future conditions if,

- The freeway segment already operates at LOS F under existing conditions, or
- The ConnectMenlo model forecasts the freeway segment to operate at a V/C ratio above 1 under future conditions.

Definition of Adverse Freeway Effects

San Mateo County

Within San Mateo County, the project is said to create an adverse effect on traffic conditions on a freeway segment if for either peak hour:

1. The analysis indicates that the combination of the proposed project and future traffic demand will result in the freeway segment operating at a level of service that exceeds the standard adopted by the current CMP and the proposed project increases traffic demand on the freeway segment by an amount equal to one percent (1%) or more of the segment capacity, or
2. The project will add traffic demand equal to one percent (1%) or more of the segment capacity if the freeway segment is currently not in compliance with the adopted LOS standard.

Santa Clara County

VTA CMP guidelines define that a project would cause an adverse effect on freeway operations if for either peak hour:

1. The project would deteriorate freeway levels of service from an acceptable level to an unacceptable level, or
2. If the freeway already operates at an unacceptable level under existing conditions, and the project would add traffic exceeding one percent (1%) of the freeway capacity.

Alameda County

The Alameda County CMP does not have a policy for determining a threshold of significance for CMP requirements. The freeway segment analysis (see Table 25 below) is provided only for information.

Freeway Analysis

To determine the Proposed Project's potential freeway adverse effects, a select-zone analysis within the Menlo Park model was performed to estimate the increase in project traffic volume between existing conditions and near term with project conditions. Freeway segments that would experience a freeway adverse effect generated by the Proposed Project are identified below.

San Mateo County

As shown on Table 23, the proposed project would add traffic greater than 1% capacity to the following study freeway segments operating below its LOS standard:

- SR 84 – from Willow Road to Alameda County Line – PM Peak Hour
- SR 84 – from Alameda County Line to Willow Road – AM Peak Hour
- US 101 – between Santa Clara County Line and Whipple Avenue – AM & PM Peak Hours
- US 101 – from Whipple Avenue to SR 92 – PM Peak Hour
- US 101 – from SR 92 to Whipple Avenue – AM Peak Hour

Santa Clara County

As shown on Table 24, the proposed project would add traffic greater than 1% capacity to the following mixed-flow freeway segments operating below its LOS standard:

- US 101 – from SR 85 to Embarcadero Road – AM & PM Peak Hours
- US 101 – from Embarcadero Road to SR 85 – PM Peak hour

The proposed project would add traffic greater than 1% capacity to the following HOV freeway segment operating below its LOS standard:

- US 101 – from Oregon Expressway to Embarcadero Road – AM Peak Hour

Freeway Improvements

It should be noted that the near term plus project conditions model run assumed the US 101 express lane project in San Mateo County. Improvements to eliminate the adverse freeway effects on US 101 and on SR 84 within San Mateo County would require additional capacity improvements and/or additional TDM measures that would reduce peak-hour vehicle trip-making by more than 70%. San Mateo County currently has no plans to further improve US 101 beyond the identified express lane projects. There are also no identified plans to improve the Bayfront Expressway (SR 84) corridor. Such an aggressive TDM plan would also not be feasible.

Within Santa Clara County, Valley Transportation Authority's Valley Transportation Plan 2040 identifies freeway express lane projects along US 101 that would convert the existing HOV lanes to express lanes and add a second express lane in each direction. This improvement would increase the capacity of the freeway and would adequately address the freeway impacts.

The potential Dumbarton Rail corridor would slightly reduce the Project contribution to the identified adverse effects but would not eliminate any. Therefore, the Project's adverse effects on US 101 and on SR 84 freeway segments in San Mateo County would remain.

Table 23
Freeway Analysis – San Mateo County

CMP Facility	Roadway Segment	Dir.	Pk Hr	LOS Standard	Capacity	Existing LOS	Near Term + Project	
							LOS	% Project Added
SR 84	US 101 to Willow Rd	SB	AM	D	1,100	C	C	0.0%
		SB	PM	D	1,100	B	D	2.2%
SR 84	Willow Rd to US 101	NB	AM	D	1,100	C	D	4.3%
		NB	PM	D	1,100	B	B	2.1%
SR 84	Willow Rd to University Ave	SB	AM	E	1,100	F	**F**	**0.9%**
		SB	PM	E	1,100	E	**F**	**4.0%**
SR 84	University Ave to Willow Rd	NB	AM	E	1,100	**F**	**F**	**3.2%**
		NB	PM	E	1,100	E	E	1.0%
SR 84	University Ave to Alameda County Line	SB	AM	F	2,100	**F**	**F**	**0.5%**
		SB	PM	F	2,100	**F**	**F**	**2.1%**
SR 84	Alameda County Line to University Ave	NB	AM	F	2,100	**F**	**F**	**1.7%**
		NB	PM	F	2,100	**F**	**F**	**0.5%**
US 101	Santa Clara County Line to Whipple Ave	NB	AM	F	2,300	**F**	**F**	**1.1%**
		NB	PM	F	2,300	**F**	**F**	**2.7%**
US 101	Whipple Ave to Santa Clara County Line	SB	AM	F	2,300	**F**	**F**	**2.3%**
		SB	PM	F	2,300	**F**	**F**	**1.4%**
US 101	Whipple Ave to SR 92	NB	AM	E	2,300	**F**	**F**	**0.7%**
		NB	PM	E	2,300	**F**	**F**	**1.6%**
US 101	SR 92 to Whipple Ave	SB	AM	E	2,300	**F**	**F**	**1.2%**
		SB	PM	E	2,300	**F**	**F**	**0.9%**
SR 109 (University Ave)	Kavanaugh Dr to SR 84	EB	AM	E	1,100	C	C	0.0%
		EB	PM	E	1,100	C	D	0.1%
SR 109 (University Ave)	SR 84 to Kavanaugh Dr	WB	AM	E	1,100	**F**	**F**	**0.1%**
		WB	PM	E	1,100	**F**	**F**	**0.0%**
SR 114 (Willow Rd)	US 101 to SR 84	EB	AM	E	1,100	B	B	9.6%
		EB	PM	E	1,100	B	B	9.6%
SR 114 (Willow Rd)	SR 84 to US 101	WB	AM	E	1,100	C	C	5.2%
		WB	PM	E	1,100	C	C	5.7%

Notes:

Data referenced San Mateo Couny City/County Association of Governments *Congestion Management Program 2019.*

Bold indicates non-compliant LOS

box and BOLD indicates adverse effect

Table 24
Freeway Analysis – Santa Clara County

Freeway	Segment	Dir	Peak Hour	Existing Conditions: Mixed-Flow Capacity[1]	Mixed-Flow Volume[2] (pc/hr/ln)	Mixed-Flow LOS[2]	HOV Lane Capacity[1]	HOV Lane Volume[2] (pc/hr/ln)	HOV Lane LOS[2]	Near Term + Project Conditions: Mixed Flow LOS	Mixed Flow Project added	Mixed Flow % Capacity	HOV LOS	HOV Project added	HOV % Capacity
US 101	SR 85 to N. Shoreline Blvd	NB	AM	9,200	1,512	**F**	1,650	1,751	E	**F**	**187**	**2.0%**	E	8	0.5%
			PM	9,200	1,358	**F**	1,650	1,635	D	**F**	**118**	**1.3%**	D	6	0.4%
US 101	N. Shoreline Blvd to Rengstorff Ave	NB	AM	6,900	1,660	**F**	3,300	1,730	D	**F**	**198**	**2.9%**	D	16	0.5%
			PM	6,900	1,298	**F**	3,300	1,683	D	**F**	**124**	**1.8%**	D	12	0.4%
US 101	Rengstorff Ave to San Antonio Ave	NB	AM	6,900	1,747	E	3,300	1,716	D	**F**	**208**	**3.0%**	D	17	0.5%
			PM	6,900	1,333	**F**	3,300	1,646	D	**F**	**132**	**1.9%**	D	14	0.4%
US 101	San Antonio Ave to Oregon Expwy	NB	AM	6,900	1,262	**F**	3,300	1,693	D	**F**	**232**	**3.4%**	D	12	0.4%
			PM	6,900	1,083	**F**	3,300	1,482	**F**	**F**	**152**	**2.2%**	**F**	**15**	**0.4%**
US 101	Oregon Expwy to Embarcadero Rd	NB	AM	6,900	1,367	**F**	1,650	1,693	**F**	**F**	**224**	**3.3%**	**F**	**19**	**1.1%**
			PM	6,900	1,271	**F**	1,650	1,588	**F**	**F**	**151**	**2.2%**	**F**	**16**	**0.9%**
US 101	Embarcadero Rd to Oregon Expwy	SB	AM	6,900	1,991	D	1,650	n/a	A	D	118	1.7%	C	11	0.7%
			PM	6,900	1,135	**F**	1,650	1,627	D	**F**	**190**	**2.8%**	D	17	1.0%
US 101	Oregon Expwy to San Antonio Ave	SB	AM	6,900	1,989	D	3,300	919	A	D	118	1.7%	B	11	0.3%
			PM	6,900	1,050	**F**	3,300	1,693	D	**F**	**191**	**2.8%**	D	17	0.5%
US 101	San Antonio Ave to Rengstorff Ave	SB	AM	6,900	1,890	E	3,300	780	A	E	104	1.5%	B	10	0.3%
			PM	6,900	1,125	**F**	3,300	1,610	D	**F**	**201**	**2.9%**	D	15	0.5%
US 101	Rengstorff Ave to N. Shoreline Blvd	SB	AM	6,900	1,976	D	3,300	1,369	C	D	101	1.5%	C	10	0.3%
			PM	6,900	1,072	**F**	3,300	1,508	D	**F**	**195**	**2.8%**	D	15	0.4%
US 101	N. Shoreline Blvd to SR 85	SB	AM	6,900	1,950	D	1,650	1,068	A	E	56	0.8%	A	4	0.3%
			PM	6,900	1,115	**F**	1,650	1,752	E	**F**	**93**	**1.3%**	E	7	0.4%

Notes:
HOV = high-occupancy vehicle; LOS = level of service
1. Capacity is based on the capacities cited in VTA's *Transportation Impact Analysis Guidelines* (2014).
2. Volume, and Level of service (LOS) on each segment are taken from VTA's *2018 CMP Monitoring Report*. VTA did not report volume and density for segments with speed above 75.2
Bold indicates a substandard level of service.
Outline indicates an adverse effect

Table 25
Freeway Analysis – Alameda County

CMP Facility	Roadway Segment	Dir.	Pk Hr	Capacity	Existing LOS	Near Term + Project Conditions	
						Project Traffic	% Capacity
SR 84	San Mateo County Line to Toll Plaza	EB	AM	2,200	A	30	0.5%
		EB	PM	2,200	C	131	2.0%
SR 84	Toll Plaza to San Mateo County Line	WB	AM	2,200	F	109	1.7%
		WB	PM	2,200	A	33	0.5%
SR 84	Toll Plaza to Thornton Ave	EB	AM	2,200	A	30	0.5%
		EB	PM	2,200	B	131	2.0%
SR 84	Paseo Padre Pkwy to Toll Plaza	WB	AM	2,200	F	108	1.2%
		WB	PM	2,200	C	33	0.4%
SR 84	Thornton Ave to Newark Blvd	EB	AM	2,200	A	21	0.3%
		EB	PM	2,200	C	99	1.5%
SR 84	Newark Blvd to Paseo Padre Pkwy	WB	AM	2,200	E	74	0.8%
		WB	PM	2,200	A	25	0.3%
SR 84	Newark Blvd to I-880	EB	AM	2,200	D	17	0.3%
		EB	PM	2,200	F	75	1.1%
SR 84	I-880 to Newark Blvd	WB	AM	2,200	D	57	0.6%
		WB	PM	2,200	D	22	0.3%

Notes:
Data referenced the Alameda County Transportation Comission *2018 LOS Monitoring Report, Appendix B.*

Freeway Ramp Analysis

A freeway ramp analysis is conducted under near term plus project conditions to determine whether freeway ramps would continue to have sufficient capacity to serve the forecasted traffic demand. For the purpose of this study, the project is said to create an adverse effect on a freeway ramp if:

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

As shown on Table 26, under near term plus project conditions, all study freeway ramps would continue to have sufficient capacity to serve the anticipated demand.

Table 26
Freeway Ramp Capacity Analysis

Interchange	Ramp	Peak Hour	Lanes				Capacity [2]	Existing Conditions		Near Term + Project Conditions	
			Type	Mixed	HOV	Meter [1]		Volume [3]	V/C	Volume	V/C
US 101/Marsh Road	SB Off-ramp to Marsh Road	AM	Diagonal	2	-	-	3,800	1,332	0.35	1,441	0.38
		PM					3,800	1,156	0.30	1,212	0.32
	NB on-ramp from WB Marsh Road	AM	Diagonal	2	1	YES	1,800	1,559	0.87	1,738	0.97
		PM				-	2,000	1,472	0.74	1,612	0.81
US 101/Willow Road	NB off-ramp to Willow Road	AM	Diagonal	2	-	-	3,800	1,153	0.30	1,282	0.34
		PM					3,800	1,055	0.28	1,142	0.30
	NB on-ramp from WB Willow Road	AM	Diagonal	1	1	YES	1,800	424	0.24	424	0.24
		PM				-	2,000	495	0.25	729	0.36
	SB on-ramp from WB Willow Road	AM	Loop	1	-	-	1,900	739	0.39	874	0.46
		PM				YES	900	633	0.70	674	0.75
	SB off-ramp to Willow Road	AM	Diagonal	2	-	-	3,800	863	0.23	1,328	0.35
		PM					3,800	637	0.17	1,078	0.28
US 101/University Avenue	NB off-ramp to Donohoe Street	AM	Diagonal	1	-	-	2,000	857	0.43	1,162	0.58
		PM					2,000	1,326	0.66	1,547	0.77
	SB on-ramp from University Avenue	AM	Diagonal	2	-	-	1,800	1,143	0.64	1,167	0.65
		PM				YES	900	744	0.83	810	0.90

Notes:
NB = Northbound; SB = Southbound; EB = Eastbound; WB = Westbound
1. Northbound on-ramps are assumed metered during the AM peak hour. Southbound on-ramps are assumed metered during the PM peak hour.
2. Ramp capacities were obtained from *Highway Capacity Manual 2000* , and considered the free-flow speed, the number of lanes on the ramp, and ramp metering.
3. Existing volumes referenced intersection counts collected in 2019.

Roadway ADT Analysis

This analysis included the evaluation of roadway average daily traffic (ADT) for 10 roadway segments (see Table 27 below) to determine the project's effect on City street segments. According to the City of Menlo Park *Transportation Impact Analysis Guidelines* published in July 2020, a project-generated traffic impact on City street segments would be considered potentially noncompliant if:

1. On Main Street, Avenue-Mixed Use, and Avenue-Neighborhood, a traffic impact may be considered potentially noncompliant if the existing ADT is:
    1) Greater than 19,000, and there is a net increase of 100 trips or more in ADT due to project related traffic;
    2) The ADT is greater than 10,000 but less than 18,000, and the project related traffic increases the ADT by 12.5%, or the ADT becomes 18,000 or more; or
    3) The ADT is less than 10,000, and the project related traffic increases the ADT by 25%.
2. On Mixed-Use Collector, and Neighborhood Collector, a traffic impact may be considered potentially noncompliant if the existing ADT is:
    1) Greater than 9,000, and there is a net increase of 50 trips or more in ADT due to project related traffic;
    2) The ADT is greater than 5,000 but less than 9,000, and the project related traffic increases the ADT by 12.5% or the ADT becomes 9,000 or more; or
    3) The ADT is less than 5,000, and the project related traffic increases the ADT by 25%.
3. On Neighborhood Connector, Bicycle Boulevard, and Local Access, a traffic impact may be considered potentially noncompliant if the existing ADT is:
    1) Greater than 1,350, and there is a net increase of 25 trips or more in ADT due to project related traffic;
    2) The ADT is greater than 750 but less than 1,350, and the project related traffic increases the ADT by 12.5% or the ADT becomes 1,350; or
    3) The ADT is less than 740, and the project related traffic increases the ADT by 25%.

The roadway ADT analysis was conducted under cumulative with project conditions. To determine net Project added traffic, a select zone analysis was conducted using the Menlo Park model under cumulative with project conditions and existing conditions. As shown on Table 27, the Project would generate non-compliance at the following roadway segments:

- Willow Road, east of Durham Street
- Willow Road, east of Blackburn Avenue
- Middlefield Road, south of Willow Road
- Marsh Road, east of Bohannon Drive
- O'Brien Drive, south of Willow Road
- O'Brien Drive, north of University Avenue
- Bay Road, north of Willow Road

Table 27
Roadway ADT Analysis

Roadway	Classification	Average Daily Traffic			Compliance Analysis	
		Existing [1]	Cumulative with Project	Net Increase in Project Traffic	Applicable Criteria	Compliant?
Willow Road, east of Durham Street	Avenue - Mixed Use	28,875	31,400	550	7.B.1(1)	**No**
Willow Road, east of Blackburn Avenue	Avenue - Mixed Use	22,962	24,050	410	7.B.1(1)	**No**
Middlefield Road, north of Willow Road	Avenue - Mixed Use	18,188	20,037	64	7.B.1(1)	Yes
Middlefield Road, south of Willow Road	Avenue - Mixed Use	21,058	23,687	285	7.B.1(1)	**No**
Marsh Road, east of Bohannon Drive	Mixed Use Collector	33,128	39,213	669	7.B.2(1)	**No**
Hamilton Avenue, south of Madera Avenue	Neighborhood Collector	2,866	3,589	265	7.B.2(3)	Yes
O'Brien Drive, south of Willow Road	Mixed Use Collector	7,409	13,942	2,600	7.B.2(2)	**No**
O'Brien Drive, north of University Avenue	Mixed Use Collector	4,635	16,232	6,457	7.B.2(3)	**No**
Adams Drive, north of University Avenue [2]	Mixed Use Collector	3,265	3,763	84	7.B.2(3)	Yes
Bay Road, north of Willow Road	Neighborhood Collector	6,362	12,637	841	7.B.2(2)	**No**

Notes:
[1] Average Daily Traffic data was obtained from the City of Menlo Park
[2] Average Daily Traffic was estimated using factors derived from ADT data and peak hour counts
Bold indicates a project-generated non-compliance for study roadway

Internal Site Access, Circulation, and Parking

Appendix H includes the analysis of the main Willow Village site as well as the Hamilton parcels. The site plan review evaluated the internal site's intersection operations, potential queuing issues, and general site access and circulation for the proposed seven new internal streets, 14 parking garage driveways, and 20 new intersections. The results of the level of service analysis show that the intersection of Driveway B & East Loop Road would operate at LOS D during the AM peak hour. Vehicles turning left out of Driveway B would be expected to experience an average delay of 31 seconds while waiting for a sufficient opening on East Loop Road. During the AM peak hour, approximately 101 vehicles (16 heading eastbound and 85 heading westbound) would be expected to exit the garage, which would be one to two vehicles per minute. Therefore, although exiting drivers would experience some wait time, operations at Driveway B are expected to be adequate. The results of the queuing analysis show that the intersection of Hamilton Avenue/Main Street & Willow Road is expected to have insufficient turn lane storage to accommodate the anticipated traffic volumes under near-term plus project conditions. However, it is assumed that vehicles would choose to instead enter the project site via Park Street. Hexagon recommends the following regarding the internal project circulation:

Circulation Related Recommendations

- To prevent southbound queues from spilling back onto Willow Road on Park Street and Main Street, Hexagon recommends coordinating the adjacent signals.

Sight Distance Related Recommendations

- As discussed under Mitigation Measure TRA-3 (see Transportation Chapter of the draft EIR), prior to issuance of the building permit for the North Garage, the applicant shall revise the access design to provide adequate sight distance for the eastern driveway or other design solutions to reduce hazards to a less than significant level, to the satisfaction of the Public Works Director. Potential solutions that would reduce hazards to a less than significant level include restricting the eastern driveway to inbound vehicles only or prohibiting exiting left turns, modifying landscaping or relocating the driveway to the west to allow for adequate sight distance for exiting vehicles, or installing an all-way stop or signal. If driveway A were restricted to inbound vehicles only, all outbound vehicles would use Driveway B, which would provide adequate sight distance for vehicles exiting the north office garage. Driveway B might need multiple exiting lanes to limit queuing inside the garage for exiting vehicles. Alternatively, Driveway A could be moved farther west on East Loop Road so that adequate sight distance could be provided.
- Prior to final design, the project applicant should ensure that landscaping and vegetation would not obstruct visibility at the parking garage driveways.
- Hexagon recommends including 30 feet of red curb on both sides of all garage driveways to prevent vehicles from parking and obstructing the vision of exiting drivers.
- If vehicles exiting the garages cannot see oncoming pedestrians on the sidewalk, Hexagon recommends installing warning signs to alert pedestrians when vehicles are exiting the garages.
- If any driveways are moved from their position on the current site plan, sight distance should be reevaluated.

Parking Garage Circulation Related Recommendations

- Prior to final design, it is recommended that all driveway widths meet the City's requirements.
- At garage driveways where gates and garage doors are proposed, Hexagon recommends conducting an operational analysis to ensure that gate opening and closing times would not create queuing issues or cause vehicles to spill onto the roadway network.
- Prior to final design, the residential parking on level P1 of building RS2 should be shown to be gated and separated from the retail parking on levels 1 and 2. In addition, the roll-up gate in building RS3 should be clearly shown to separate the retail parking in level B1 and the residential parking in level B2.
- It is recommended that all drive aisle and parking stall widths meet the City's requirements.
- It is recommended that adequate turnaround space is provided at all dead-end drive aisles.

Parking Related Recommendations

- If individual vehicles are not able to be retrieved in the tandem puzzle parking, the tandem spaces should be assigned to one residential unit.
- Prior to final design, Hexagon recommends that the required number of ADA and EV parking spaces be provided in all parking garages.

Pedestrian Related Recommendations

- Hexagon recommends that a crosswalk is provided at the intersection of Center Street & East Street and that midblock crosswalks are provided on Center Street and Park Street to reduce block size and improve pedestrian convenience.

Hamilton Parcels Recommendations

- The Hamilton Avenue Parcels are located within the C-2-S zoning district, which per Menlo Park Municipal Code Section 16.37(7), will have parking requirements established by the planning commission for each development. The Hamilton Avenue Parcel North proposes total potential development up to 22,402 square feet and 93 spaces. The Hamilton Avenue Parcel South proposes total development of 5,760 s.f. and 13 spaces. It is recommended that the project applicant confirm that sufficient parking is provided for the proposed total development as part of future architectural control and use permit applications with the City.

Willow Village Master Plan Project

Technical Appendices

April 5, 2022

Appendix A
Traffic Counts

Appendix B
Willow Road Microsimulation

Appendix C
Level of Service Analysis

Appendix D
Trip Generation Analysis

Appendix E
Planned Donohoe Street Improvements

Appendix F
Signal Warrant Analysis

Appendix G
Project's Transportation Demand Management Plan

Appendix H
Internal Intersection Analysis

Appendix I

Facebook/Meta's Tram and Shuttle Services

Appendix J
Model Validation Memo