HEXAGON TRANSPORTATION CONSULTANTS, INC.

New Elementary School in Foster City

Traffic Impact Analysis

Prepared for:

San Mateo-Foster City School District

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Executive Summary

This report presents the results of the Traffic Impact Analysis (TIA) conducted for the proposed elementary school at Charter Square (corner of Shell Boulevard and Beach Park Boulevard) in Foster City, California. The project as proposed would construct a K-5 elementary school with up to 600 students on the site, replacing the current shopping center. Access to the site would be provided by existing driveways on Shell Boulevard and Beach Park Boulevard.

This study was conducted for the purpose of identifying potential traffic impacts related to the proposed development and to review the proposed site access and circulation. The potential impacts of the project were evaluated in accordance with the standards set forth by the City of Foster City and the City/County Association of Governments (C/CAG) of San Mateo County CMP. The traffic study includes an analysis of AM, midday, and PM peak hour traffic conditions for three (3) signalized intersections and six (6) unsignalized intersections in the vicinity of the project site, which were identified by the City of Foster City. The analysis focuses on the peak commute periods between 7:00 and 9:00 AM, between 12:00 and 3:00 PM, and between 4:00 and 6:00 PM, because it is during these hours that traffic conditions on the surrounding roadways are generally the most congested. The study also includes an analysis of student drop-off/pick-up circulation, safe routes to the school, and transit, bicycle, and pedestrian access.

Project Trip Generation

The trip generation rates for the proposed school were derived from trip generation counts Hexagon conducted at the existing elementary schools in Foster City. The trip generation counts were conducted on a standard school day on three separate weeks between January and February of 2017. As directed by City staff, the highest school rate during each peak hour was used to present a conservative estimate. The magnitude of traffic generated by the proposed school was estimated by multiplying the observed Foster City schools' trip generation rates by the projected maximum enrollment (600 students) for the school.

Based on the surveyed trip generation rates and a maximum enrollment of 600 students, the project would generate 504 trips (270 inbound and 234 outbound) during the AM peak hour, 300 trips (143 inbound and 157 outbound) during the midday peak hour, and 126 trips (68 inbound and 58 outbound) during the PM peak hour.

Trips that are generated by the existing shopping center and post office on the site should be subtracted from the gross project trip generation estimates. Trip rates for the shopping center and post office were based on trip generation counts conducted at the existing site. Based on the trip generation

counts, the existing site is generating 231 trips during the AM peak hour, 315 trips during the midday peak hour, and 312 trips during the PM peak hour.

After applying the appropriate trip generation rates and trip credits, the project would generate 273 new vehicle trips during the AM peak hour, and would subtract 15 vehicle trips and 186 vehicle trips during the midday and PM peak hours, respectively.

It should also be noted that project volumes were added to the roadway network without reassigning existing vehicle trips of the adjacent Elementary schools (i.e. Foster City Elementary School, Brewer Island Elementary School, and Audubon Elementary School). While the trips generated by the proposed school would be new to the roadways immediately adjacent to the project site, in a regional context, the new elementary school trips would be merely reassigned trips from other schools in the area where the students would have otherwise attended. With this new school, the existing elementary schools in Foster City will see a decrease in traffic. This decrease was not accounted for in the traffic study, so the traffic study numbers are conservative.

Project Impacts

The results of the intersection level of service analysis are shown in Table ES-1. The analysis determined that under all scenarios with and without the project, all of the signalized study intersections are expected to operate at acceptable levels (LOS D or better). In addition, all but one of the stop-controlled study intersections would operate at LOS C or better under all scenarios. The intersection of Shell Boulevard and Bounty Drive would operate at LOS D during the PM peak hour with and without the school. This level of service analysis indicates that vehicles on the stop-controlled approaches (the Sand Cove Apartments private driveway and Bounty Drive) would experience significant delays (between 25-35 seconds). Eastbound left-turns from the Sand Cove Apartments private driveway to northbound Shell Boulevard, as well as westbound left-turns from Bounty Drive to southbound Shell Boulevard require vehicles to wait for a gap in both the northbound and southbound traffic flows. Thus, the high volumes on Shell Boulevard contribute to the low level of service.

Signal Warrant Analysis

Signal warrant checks (California *MUTCD 2014 Edition, Section 4, Warrant 3*) were performed for the unsignalized study intersections adjacent to the project site. The peak-hour traffic volumes at the intersections on Shell Boulevard at Catamaran Street and Beach Park Boulevard, as well as the Catamaran Street/Beach Park Boulevard intersection would not warrant signalization under all scenarios with and without the project, including cumulative conditions.

Other Transportation Issues

Based on a review of the project site plan, there would be no issues regarding site access along Shell Boulevard and Beach Park Boulevard; and no issues are expected to arise regarding on-site circulation. Although outbound traffic at the driveway on Beach Park Boulevard is estimated to experience significant delays, the analysis is a conservative estimate and the congestion at the project driveways would last in total about 10 to 15 minutes given that the school would maintain specific drop-off and pick-up times. The parking provided by the project would meet the minimum parking requirements set forth by the City of Foster City zoning regulations. Furthermore, the proposed project would not have an adverse effect on the existing transit, pedestrian, or bicycle facilities in the study area. Thus, no project sponsored improvements would be necessary.

Although the analysis and findings conclude that no mitigation measures are required, Hexagon has provided the following recommendations resulting from the site access and circulation analysis.

Recommendations

- During student unloading/loading periods, school staff or volunteers should direct traffic as they approach the loading zones to ensure vehicles pull as far forward as possible and stop to drop-off and pick-up in the right lane to maintain the consistent traffic flow on the site. Staff or volunteers should also ensure that parents do not leave their vehicles unattended in the loading zone or passing lane while they visit the school. Parents should be directed to load/unload students in a timely manner and then exit the loading zone using the passing lane. Parents that need additional time should be directed to park in the designated on-site parking spaces to ensure the loading zone and passing lane are available for their intended purposes.

- A crosswalk should be added across Catamaran Street at its intersection with Beach Park Boulevard to improve the overall network of sidewalks and crosswalks in the study area, and provide good connectivity and safe routes to the school.

- Signage should be added at the driveway on Beach Park Boulevard restricting outbound traffic to right-turns only during the peak hours.

Table ES-1
Intersection Level of Service Summary

Study Number	Intersection	Peak Hour	Count Date	Control Type	Existing				Background				Cumulative			
					No Project		with Project		No Project		with Project		No Project		with Project	
					Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS	Avg. Delay (sec)	LOS
1	Mariners Island Boulevard/Edgewater Boulevard and Hillsdale Boulevard	AM	2/14/17	Signal	39.2	D	40.0	D	43.9	D	44.8	D	44.9	D	45.8	D
		Midday	2/14/17		40.8	D	40.8	D	40.8	D	40.8	D	40.8	D	40.8	D
		PM	2/14/17		43.3	D	43.2	D	50.6	D	50.5	D	52.5	D	52.4	D
2	Shell Boulevard and Hillsdale Boulevard	AM	2/14/17	Signal	22.3	C	22.6	C	24.5	C	25.2	C	25.6	C	26.2	C
		Midday	1/24/17		24.2	C	24.0	C	24.2	C	24.0	C	24.2	C	24.0	C
		PM	2/14/17		27.9	C	27.8	C	31.4	C	31.2	C	32.8	C	32.6	C
3	Shell Boulevard and Bounty Drive	AM	2/14/17	TWSC [1]	16.9	C	17.2	C	17.0	C	17.2	C	18.7	C	19.1	C
		Midday	1/24/17		17.2	C	16.9	C	17.2	C	16.9	C	17.2	C	16.9	C
		PM	2/14/17		27.6	D	27.6	D	28.5	D	28.2	D	33.1	D	32.9	D
4	Shell Boulevard and Catamaran Street	AM	2/14/17	AWSC	11.7	B	12.7	B	11.8	B	12.8	B	14.0	B	15.7	C
		Midday	2/14/17		10.3	B	10.3	B	10.3	B	10.3	B	10.3	B	10.3	B
		PM	1/31/17		11.7	B	11.4	B	11.8	B	11.5	B	13.5	B	13.2	B
5	Edgewater Boulevard and Beach Park Boulevard	AM	2/14/17	Signal	23.4	C	23.2	C	23.4	C	23.2	C	24.0	C	23.8	C
		Midday	2/14/17		26.7	C	25.2	C	26.7	C	25.3	C	26.7	C	25.3	C
		PM	1/24/17		31.9	C	30.4	C	31.6	C	30.1	C	32.6	C	30.9	C
6	Farragut Boulevard and Beach Park Boulevard	AM	2/14/17	TWSC [1]	19.8	C	20.0	C	19.8	C	20.0	C	20.5	C	20.8	C
		Midday	2/14/17		15.4	C	14.4	B	15.4	C	14.4	B	15.4	C	14.4	B
		PM	1/24/17		19.5	C	18.8	C	19.5	C	18.8	C	20.6	D	19.9	C
7	Catamaran Street and Beach Park Boulevard	AM	2/14/17	TWSC [1]	12.5	B	16.1	C	12.5	B	16.1	C	12.7	B	16.6	C
		Midday	2/14/17		11.8	B	12.1	B	11.8	B	12.1	B	11.8	B	12.1	B
		PM	1/31/17		11.9	B	10.6	B	11.9	B	10.6	B	12.1	B	10.7	B
8	Shell Boulevard and Beach Park Boulevard	AM	1/31/17	AWSC	12.4	B	13.2	B	12.4	B	13.2	B	12.8	B	13.6	B
		Midday	2/14/17		10.7	B	10.8	B	10.7	B	10.8	B	10.7	B	10.8	B
		PM	2/14/17		12.3	B	11.8	B	12.3	B	11.8	B	12.9	B	12.4	B
9	Beach Park Boulevard and Foster City Boulevard	AM	2/14/17	AWSC	10.9	B	11.0	B	10.9	B	11.0	B	11.1	B	11.2	B
		Midday	2/14/17		8.8	A	8.7	A	8.8	A	8.7	A	8.8	A	8.7	A
		PM	2/14/17		8.1	A	7.9	A	8.1	A	7.9	A	8.3	A	8.1	A

Note:

TWSC = Two-Way Stop Control

AWSC = All-Way Stop Control

[1] For TWSC intersections, the worst approach's delay and level of service is reported.

Bold indicates a substandard level of service.

Bold indicates a significant project impact.

1. Introduction

This report presents the results of the Traffic Impact Analysis (TIA) conducted for the proposed elementary school at Charter Square in Foster City, California. The project site is located on the northwest corner of the Shell Boulevard and Beach Park Boulevard intersection (see Figure 1). The project would construct a K-5 elementary school with a maximum of 600 students on the site, replacing the current shopping center and post office. The school would retain the existing site driveways, which include three driveways on Shell Boulevard and one driveway on Beach Park Boulevard (see Figure 2).

Scope of Study

This study was conducted for the purpose of identifying potential traffic impacts related to the proposed development and to review the proposed site access and circulation. The potential impacts of the project were evaluated in accordance with the standards set forth by the City of Foster City and the City/County Association of Governments (C/CAG) of San Mateo County CMP. A County Congestion Management Program (CMP) analysis was not required because the project would add fewer than 100 peak hour trips to CMP roadways (SR 92 and US 101). The traffic study includes an analysis of AM, midday, and PM peak hour traffic conditions for three (3) signalized intersections and six (6) unsignalized intersections in the vicinity of the project site as specified by the City of Foster City. The study also includes an analysis of student drop-off/pick-up circulation, safe routes to the school, and transit, bicycle, and pedestrian access.

Study Intersections

1. Mariners Island Boulevard/Edgewater Boulevard and Hillsdale Boulevard
2. Shell Boulevard and Hillsdale Boulevard
3. Shell Boulevard and Bounty Drive (unsignalized)
4. Shell Boulevard and Catamaran Street (unsignalized)
5. Edgewater Boulevard and Beach Park Boulevard
6. Farragut Boulevard and Beach Park Boulevard (unsignalized)
7. Catamaran Street and Beach Park Boulevard (unsignalized)
8. Shell Boulevard and Beach Park Boulevard (unsignalized)
9. Beach Park Boulevard and Foster City Boulevard (unsignalized)

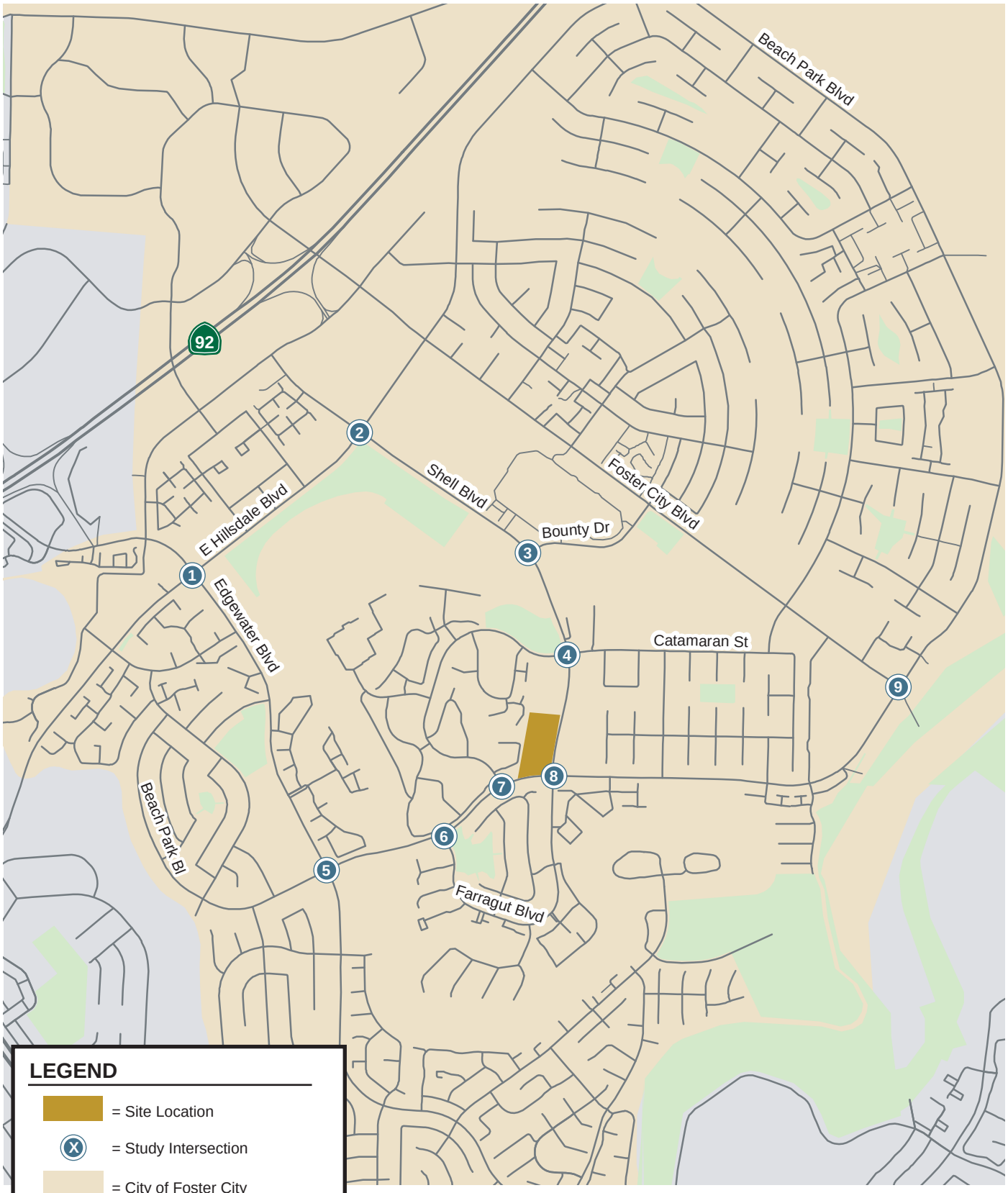

Figure 1
Site Location and Study Intersections

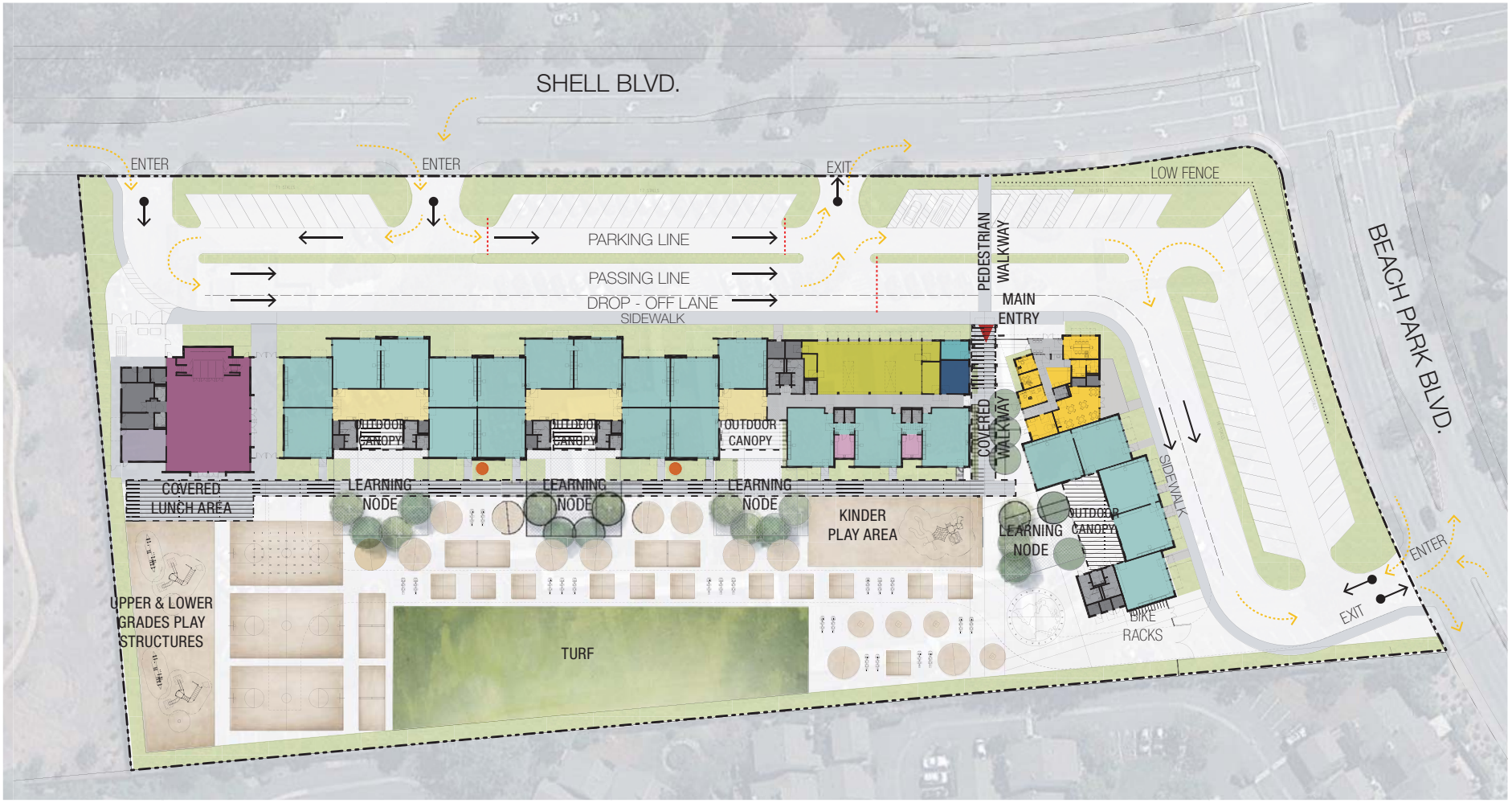

Figure 2
Project Site Plan

NORTH
Not to Scale

Analysis Time Periods

Traffic conditions at the study intersections were analyzed for the weekday AM, midday, and PM peak hours of adjacent street traffic. The AM peak hour occurs between 7:00 AM and 9:00 AM, the midday peak hour will coincide with the school dismissal time sometime between 2:00 PM and 4:00 PM, and the PM peak hour occurs between 4:00 PM and 6:00 PM on a regular weekday. The peak hour of school traffic in the morning would coincide with the AM peak hour of commute traffic (generally between 7:00 and 9:00 AM). It is during these peak commute periods that traffic is busiest, and the impact on the roadway system by traffic from the school would be greatest.

Traffic conditions were evaluated for the following scenarios:

Scenario 1: *Existing Conditions.* Existing traffic volumes at study intersections were based on traffic counts conducted on a standard school day on three separate weeks between January and February of 2017. The study intersections were evaluated with a level of service analysis using Synchro software in accordance with the *2010 Highway Capacity Manual* methodology.

Scenario 2: *Background Conditions.* Background traffic volumes reflect traffic added by projected volumes from approved but not yet completed developments in the project area. The approved project trips and/or approved project information was provided by the City of Foster City. The City of Foster City approved project information is included in Appendix B.

Scenario 3: *Existing plus Project Conditions.* Existing traffic volumes with the project were estimated by adding to existing traffic volumes the additional traffic generated by the project. Existing plus project conditions were evaluated relative to existing conditions in order to determine the effects the project would have on the existing roadway network.

Scenario 4: *Project Conditions.* Projected peak-hour traffic volumes with the project were estimated by adding to background traffic volumes the additional traffic generated by the project. Project Conditions were evaluated relative to background conditions in order to determine potential project impacts.

Scenario 5: *Cumulative Conditions.* Cumulative conditions are represented by future traffic volumes, at the estimated date of maximum enrollment, on the future roadway network. Cumulative conditions include traffic growth projected to occur due to the approved development projects and proposed but not yet approved (pending) development projects in the study area. The added traffic from pending projects was based on the list of pending projects identified by the City of Foster City.

Methodology

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

Data Requirements

The data required for the analysis were obtained from new traffic counts, the City of Foster City, the San Mateo-Foster City School District, and field observations. The following data were collected from these sources:

- existing peak-hour intersection turning-movement volumes
- lane configurations
- intersection signal timing and phasing
- approved project list
- projected school enrollment boundary lines

Level of Service Standards and Analysis Methodologies

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

City of Foster City Signalized Intersections

The City of Foster City level of service standards were used to evaluate the signalized study intersections. The City of Foster City evaluates intersection level of service based on *the Highway Capacity Manual* (HCM) 2010 method using the Synchro software. The 2010 HCM method evaluates signalized intersection operations on the basis of average control delay time for all vehicles at the intersection. This average delay can then be correlated to a level of service. The City of Foster City level of service standard for signalized intersections is LOS D or better. The correlation between delay and level of service is shown in Table 1.

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, *2000 Highway Capacity Manual* (Washington, D.C., 2000), p.10-16.

Unsignalized Intersections

Level of service at unsignalized intersections was based on the *2010 Highway Capacity Manual* (2010 HCM) method using the Synchro software. This method is applicable for both two-way and all-way stop-controlled intersections. The six unsignalized study intersections operate under both two-way or all-way stop control. For two-way stop-controlled intersections, the reported levels of service are based on the worst approach delay at the intersection. Unlike signalized intersections, the City of Foster City does not have a level of service standard for unsignalized intersections. Therefore, intersection levels of service for unsignalized intersections are reported for informational purposes only. The correlation between average control delay and LOS for unsignalized intersections is shown in Table 2.

Table 2
Unsignalized Intersection Level of Service Definitions Based on Control Delay

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

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

CMP Freeway Segments

Per CMP technical guidelines, a freeway segment level of service analysis is required when a project is expected to add trips greater than one percent of a segment's capacity. Given that new freeway trips generated by the project are expected to be produced only by some staff, the project is expected to add considerably less than the one percent threshold of freeway capacity to all segments in the area. Therefore, a detailed analysis of freeway segment levels of service was not performed. A simple freeway segment capacity evaluation to substantiate this determination is presented in Table 3.

Table 3
Freeway Segment Capacity Evaluation

Freeway	Segment	Dir	Peak Hour	Existing Conditions [1] # of Lanes	Capacity	LOS	Project Conditions Project Trips [2]	% Capacity	Impact
US 101	Whipple Avenue to SR 92	NB	AM	**4**	**9,200**	**F**	3	0.03%	NO
			PM	**4**	**9,200**	**F**	0	0.00%	NO
US 101	SR 92 to Peninsula Avenue	NB	AM	**4**	**9,200**	**F**	0	0.00%	NO
			PM	**4**	**9,200**	**F**	1	0.01%	NO
US 101	Peninsula Avenue to SR 92	SB	AM	**4**	**9,200**	**F**	3	0.03%	NO
			PM	**4**	**9,200**	**F**	0	0.00%	NO
US 101	SR 92 to Whipple Avenue	SB	AM	**4**	**9,200**	**F**	3	0.03%	NO
			PM	**4**	**9,200**	**F**	1	0.01%	NO
SR 92	I-280 to US 101	EB	AM	**2**	**4,400**	**F**	0	0.00%	NO
			PM	**2**	**4,400**	**F**	1	0.02%	NO
SR 92	US 101 to Alameda County Line	EB	AM	3	6,900	C	3	0.04%	NO
			PM	**3**	**6,900**	**F**	1	0.01%	NO
SR 92	Alameda County Line to US 101	WB	AM	3	6,900	C	3	0.04%	NO
			PM	**3**	**6,900**	**F**	1	0.01%	NO
SR 92	US 101 to I-280	WB	AM	**2**	**4,400**	**F**	3	0.07%	NO
			PM	**2**	**4,400**	**F**	0	0.00%	NO

Notes:
[1] Existing freeway conditions referenced the Level of Service and Performance Measure Monitoring Report - 2015.
[2] Project trips are estimated via manual trip assignment.
BOLD indicates a substandard level of service.

Intersection Operations

The analysis of intersection level of service was supplemented with an analysis of traffic operations for intersections where the project would add a significant number of left turns. The operations analysis is based on vehicle queuing for high demand left-turn movements at intersections. Vehicle queues were estimated using a Poisson probability distribution, which estimates the probability of "n" vehicles for a vehicle movement using the following formula:

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

Where:

P (x=n) = probability of "n" vehicles in queue per lane
n = number of vehicles in the queue per lane
λ = average # of vehicles in the queue per lane (vehicles per hr per lane/signal cycles per hr)

The basis of the analysis is as follows: (1) the Poisson probability distribution is used to estimate the 95th percentile maximum number of queued vehicles 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. This analysis thus provides a basis for estimating future turn pocket storage requirements at 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. Or, a queue length larger than the 95th percentile

queue would only occur on 5 percent of the signal cycles (about 3 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 5 percent of the time. The 95th percentile queue length is also known as the "design queue length."

Report Organization

The remainder of this report is divided into six chapters. Chapter 2 describes the existing roadway network, transit services, and pedestrian facilities. Chapter 3 presents the intersection operations under the background scenario conditions, including the approved projects in the City of Foster City. Chapter 4 describes the methods used to estimate project traffic and its impact on the transportation system. Chapter 5 describes cumulative traffic conditions. Chapter 6 presents the analysis of other transportation issues including site access and circulation, transit services, bicycle and pedestrian facilities, and vehicle queuing. Chapter 7 includes a summary of project impacts, any proposed mitigation measures, and recommended improvements.

2. Existing Conditions

This chapter describes the existing conditions for transportation facilities in the vicinity of the site, including the roadway network, transit service, pedestrian and bicycle facilities.

Existing Roadway Network

Regional access to the project site is provided via US 101 and State Route 92 (SR 92).

US 101 is an eight-lane north-south freeway in the vicinity of the site. US 101 extends northward through San Francisco and southward through San Jose. Access to and from the project study area is provided via a full interchange at Hillsdale Boulevard.

SR 92 is a four- to six- lane east-west freeway extending from Half Moon Bay in west San Mateo County to Hayward in Alameda County. Access to and from the project study area is provided via partial interchanges at Metro Center Boulevard, Chess Drive, Edgewater Boulevard, and Fashion Island Boulevard.

Indirect local access to the site is provided on Hillsdale Boulevard, Mariners Boulevard/Edgewater Boulevard, Bounty Drive, Catamaran Street, and Farragut Boulevard. Direct local access to the project site is provided on Shell Boulevard and Beach Park Boulevard. These roadways are described below.

Hillsdale Boulevard is an arterial roadway that extends in an east-west direction starting at the College of San Mateo and transitioning into Beach Park Boulevard. According to the City of Foster City General Plan, arterials are defined as roadways generally designed to feed heavy volumes of through traffic to freeways with such traffic controls as medians, traffic lights, and separate turning lanes. In the vicinity of the project site, Hillsdale Boulevard has six lanes. Hillsdale Boulevard provides access to the Charter Square School site via Edgewater Boulevard, Shell Boulevard, and Beach Park Boulevard.

Mariners Boulevard/Edgewater Boulevard is a north-south, four-lane arterial roadway that extends from 3rd Avenue to Baffin Street. In the immediate vicinity of the proposed project, Mariners Boulevard/Edgewater Boulevard permits on-street parking and has bike lanes on both sides of the street. Mariners Boulevard/Edgewater Boulevard provides access to the project site via Beach Park Boulevard.

Shell Boulevard is a north-south, four-lane arterial roadway that runs parallel to Mariners Boulevard/Edgewater Boulevard. In the vicinity of the proposed project, Shell Boulevard permits on-street parking and has bike lanes on both sides of the street. Shell Boulevard provides direct access to the project site via three driveways.

Beach Park Boulevard is an east-west, four-lane arterial roadway that extends from Polaris Avenue to Hillsdale Boulevard. Beach Park Boulevard provides direct access to the project site via a full-access driveway.

Bounty Drive is a north-south, two-lane local collector that extends from Shell Boulevard to Comet Drive. Collector streets are designed to channel traffic from local streets to arterials, and to handle short trips within neighborhoods. Bounty Drive provides access to the project site via Shell Boulevard.

Catamaran Street is an east-west, two-lane local collector that extends from Beach Park Boulevard to Spinnaker Street. Catamaran Street provides access to the project site via Shell Boulevard and Beach Park Boulevard.

Farragut Boulevard is a north-south, two-lane local collector that extends from Beach Park Boulevard south where it transitions into Halsey Boulevard. Farragut Boulevard provides access to the project site via Beach Park Boulevard.

Existing Pedestrian and Bicycle Facilities

Pedestrian facilities consist of sidewalks, crosswalks, and pedestrian signals at signalized intersections. In the project vicinity, sidewalks exist along both sides of Hillsdale Boulevard, Edgewater Boulevard, Shell Boulevard, Beach Park Boulevard, Bounty Drive, Catamaran Street, and Farragut Boulevard, providing pedestrian access to and from the project site. Marked crosswalks with pedestrian signal heads and push buttons are provided on all approaches of the signalized study intersections. At the unsignalized study intersections, marked crosswalks are provided along all stop-controlled approaches, except on the north leg of the Catamaran Street/Beach Park Boulevard intersection, and the north leg of the Beach Park Boulevard/Foster City Boulevard intersection. Although some crosswalk connections are missing on Beach Park Boulevard and Shell Boulevard, the overall network of sidewalks and crosswalks in the study area has good connectivity and provides pedestrians with safe routes to the school site.

There are several bicycle facilities in the vicinity of the project site. The existing bicycle facilities within the study area are described below, and are shown on Figure 3.

Class I Bikeway/Trail is an off-street path with exclusive right-of-way for non-motorized transportation used for commuting as well as recreation. The Foster City Pedway is a Class I bicycle/pedestrian pathway that follows the outer lagoons and bay, encircling Foster City. Located approximately one mile from the project site, the trail includes a segment located within the City of San Mateo, as well as a portion of the San Francisco Bay Trail. The San Francisco Bay Trail is a 500-mile Class I facility that provides a multi-use path around the entire San Francisco Bay running through all nine Bay Area counties, 47 cities, and across the region's seven toll bridges. Within the project vicinity, the Foster City Pedway and the San Francisco Bay Trail are accessible via Beach Park Boulevard.

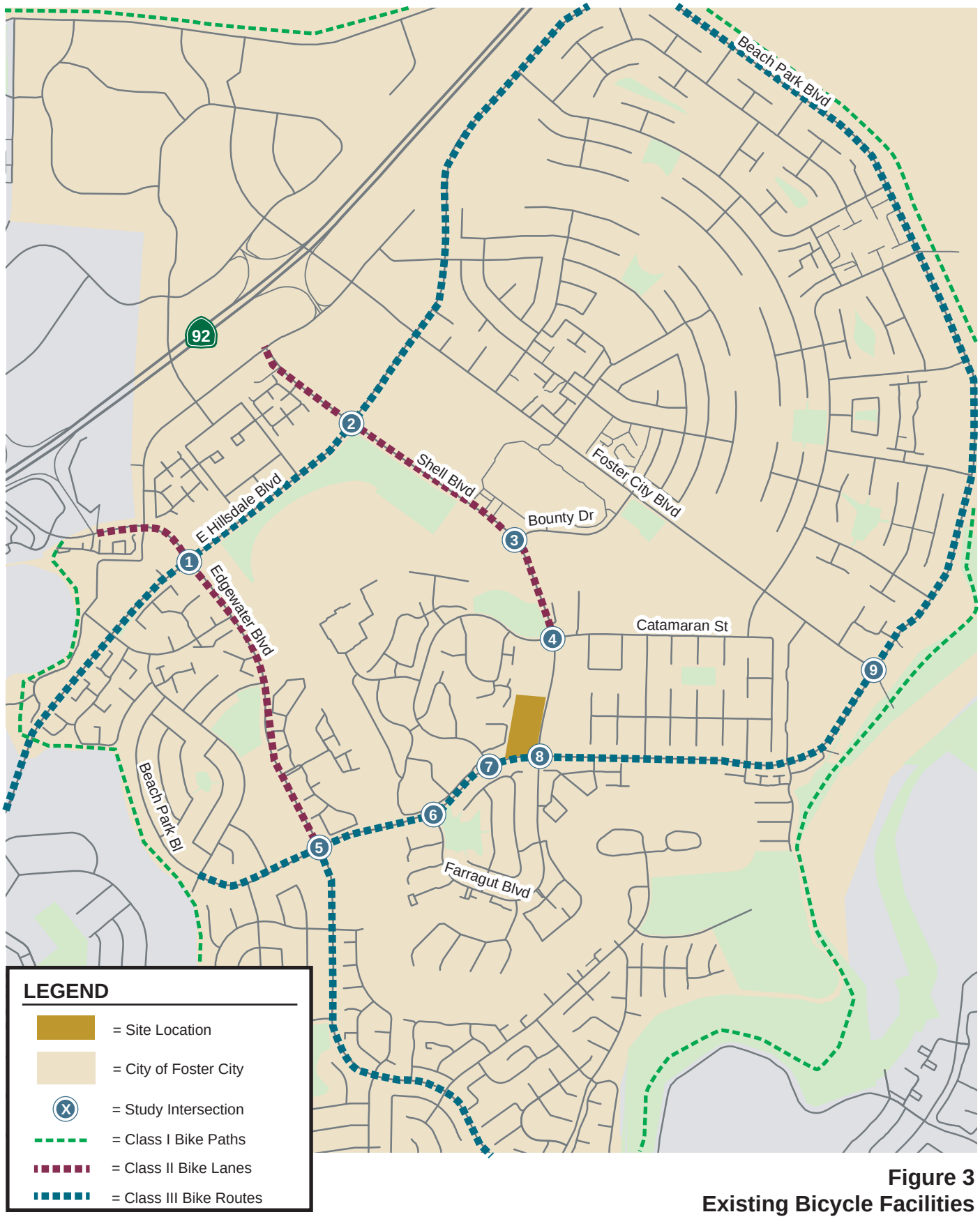

Figure 3
Existing Bicycle Facilities

Class II Bike Lanes are preferential use areas within a roadway designated for bicycles. Within the project vicinity, Class II bike lanes are present on Edgewater Boulevard between Beach Park Boulevard and the SR 92 northbound ramps, and on Shell Boulevard between Metro City Boulevard and Catamaran Street.

Class III Bike Routes are signed bike routes that provide a connection to Class I and Class II facilities. Bike routes serve as transportation routes within neighborhoods to parks, schools, and other community amenities. The following roadway segments are designated Class III bike routes in the vicinity of the project site:

- Hillsdale Boulevard, from Edison Street to Beach Park Boulevard
- Edgewater Boulevard, from Beach Park Boulevard to Baffin Street
- Beach Park Boulevard, from Virgo Lane to Hillsdale Boulevard

Although none of the local and residential streets adjacent to the project site (e.g. Bounty Drive, Catamaran Street, Farragut Boulevard) are designated as bike routes, due to their low traffic volumes, they are conducive to bicycle usage.

Existing Transit Service

Existing transit services near the project site are provided by the San Mateo County Transit District (SamTrans) and Alameda-Contra Costa Transit District (AC Transit) (See Figure 4). The study area is served directly by four local bus routes and one regional route. Bus lines that run through the study area are listed in Table 4, including their route description and commute hour headways.

Local Route 251 operates on Hillsdale Boulevard, Edgewater Boulevard, Shell Boulevard, and Beach Park Boulevard in the vicinity of the project. The closest bus stop is located adjacent to the project site, approximately 500 feet walking distance on Shell Boulevard north of Beach Park Boulevard. Route 251 operates between the Hillsdale Shopping Center and Beach Park Boulevard/Foster City Boulevard intersection. Weekday service is from approximately 11:30 AM to 8:20 PM with between 60 and 120-minute headways during commute hours.

Local Route 256 operates on Hillsdale Boulevard, Edgewater Boulevard, Shell Boulevard, and Beach Park Boulevard. The closest bus stops are located less than 1,000 feet walking distance at the northeast corner of the Catamaran Street/Beach Park Boulevard intersection, and on Shell Boulevard south of Catamaran Street. Route 256 operates between the Hillsdale Shopping Center and Beach Park Boulevard/Foster City Boulevard intersection. Weekday service is from approximately 6:35 AM to 5:25 PM with 60-minute headways during commute hours.

Limited Route 54 operates on Hillsdale Boulevard and Edgewater Boulevard. The closest stops are located adjacent to the project site on Beach Park Boulevard at the opposite corners of the Shell Boulevard/Beach Park Boulevard intersection. Route 54 operates between the Norfolk Street/Hillsdale Boulevard intersection and Bowditch Middle School. Transit service is provided on school days only, with one trip in the AM and up to three trips in the PM.

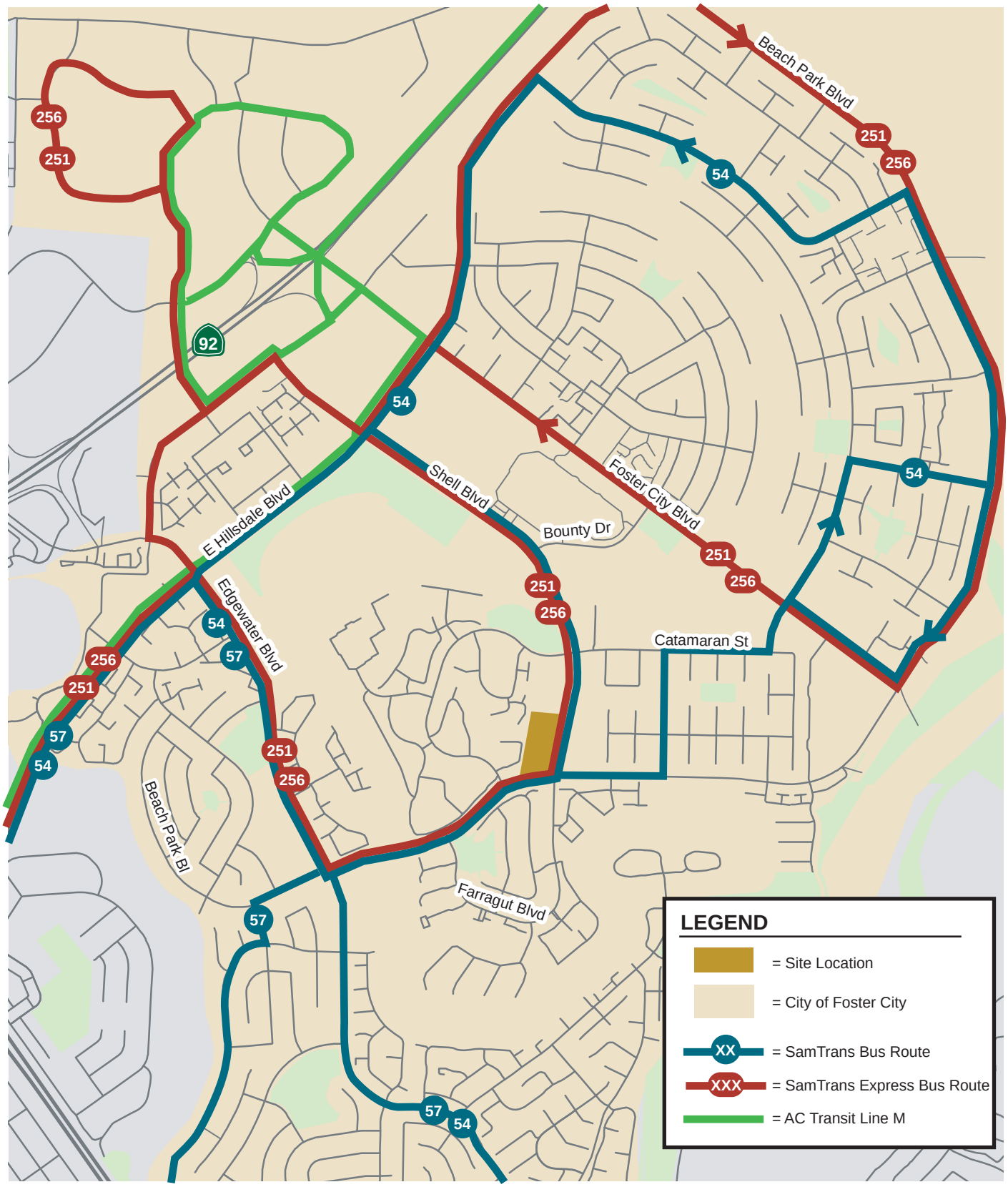

Figure 4
Existing Transit Service

Limited Route 57 operates on Hillsdale Boulevard, Edgewater Boulevard, Beach Park Boulevard, Catamaran Street. The closest stop is located within ½ mile walking distance at the intersection of Edgewater Boulevard and Beach Park Boulevard. Route 57 operates between the Hillsdale Caltrain Station and the Port Royal Avenue/Cumberland Court intersection. Transit service is provided on school days only, with one trip in the morning and one trip in the evening.

Transbay Route M is operated by AC Transit on Hillsdale Boulevard. Transbay routes provide service across all three Bay Area bridges, connecting to the East Bay. The closest stop is located within approximately one and a half mile from the project site at the northwest corner of the Hillsdale Boulevard/Edgewater Boulevard intersection. Route M operates between Hillsdale Shopping Center and the Hayward BART Station. Weekday service is from approximately 6:50 AM to 6:55 PM with between 35 and 40-minute headways during commute hours.

Table 4
Existing Transit Services

Bus Route	Route Description	Headway [1]
Local Route 251	Hillsdale Shopping Center to Beach Park/Foster City	60 - 120 min
Local Route 256	Hillsdale Shopping Center to Beach Park/Foster City	60 min
Limited Route 54*	Hillsdale/Norfolk to Bowditch Middle School	N/A [2]
Limited Route 57*	Edgewater/Beach Park to Hillsdale High School	N/A [3]
Transbay Route M (ACT Route) [4]	Hillsdale Shopping Center to Hayward BART Station	35 - 40 min
Mariners' Island Caltrain Shuttle	Hillsdale Caltrain Station to Port Royal/Cumberland	40 - 45 min

Notes:
* Route operates only on school days.
[1] Approximate headways during peak commute periods.
[2] Route 54 has only one trip in the AM and three trips in the PM.
[3] Route 57 has only one trip in the AM and one trip in the PM.
[4] ACT Route = Operated by Alameda-Contra Costa Transit District.

SamTrans also funds a shuttle service between San Mateo and Foster City. The Mariners' Island Caltrain shuttle runs on Hillsdale Boulevard and Shell Boulevard, between the Hillsdale Caltrain Station and the Mariners' Island area, north of the project site. The shuttle is scheduled to align with the arrival times of Caltrain trains. Weekday service is from approximately 6:55 AM to 10:25 AM, and from approximately 3:10 PM to 6:40 PM with between 40 and 45-minute headways during commute hours.

Existing Intersection Lane Configurations

The existing lane configurations at the study intersections were determined by observations in the field and are shown on Figure 5.

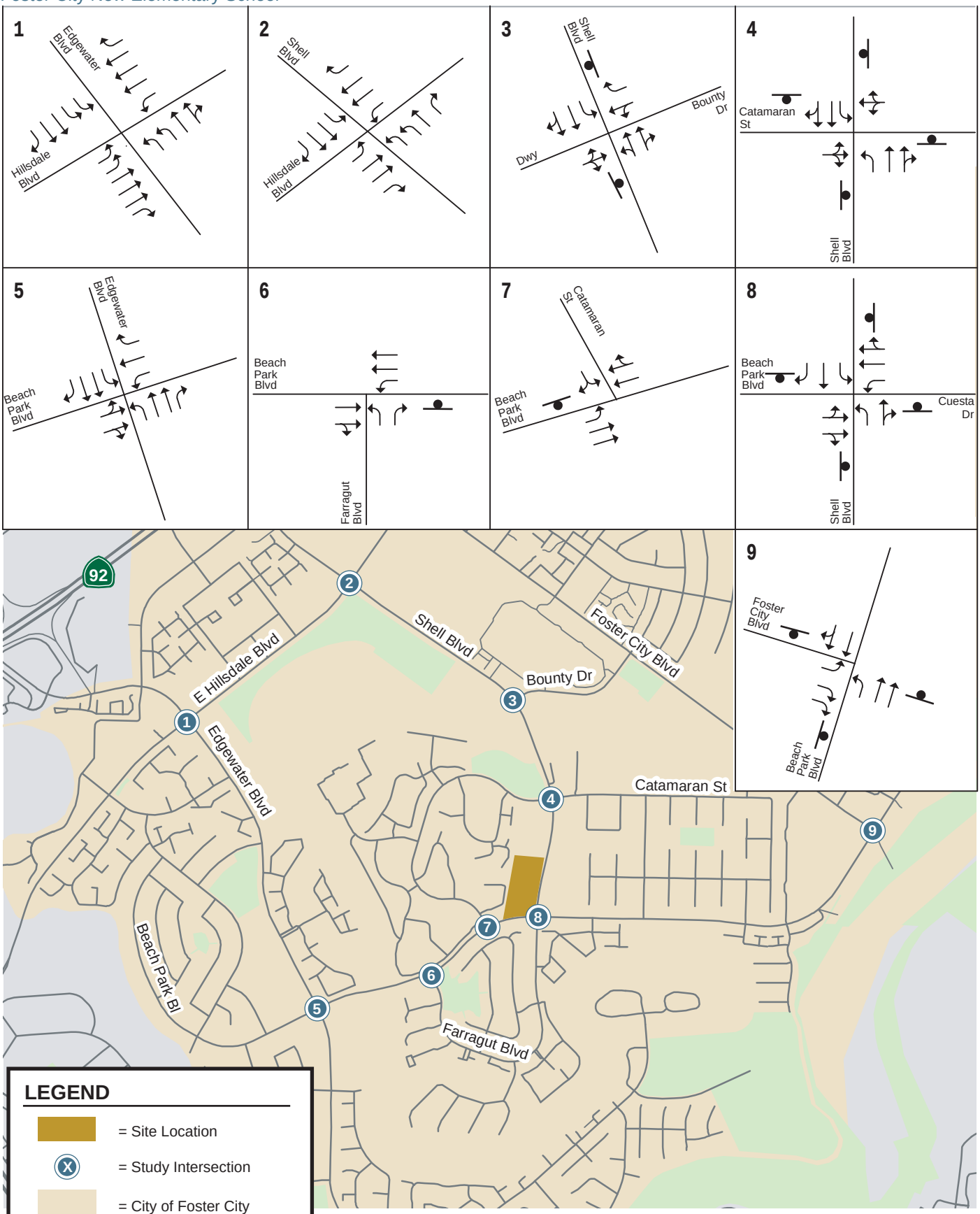

Figure 5
Existing Lane Configurations

Existing Traffic Volumes

Existing traffic volumes were obtained from new peak-hour turning movement counts. New traffic counts were collected on a standard school day on three separate weeks between January and February of 2017. The highest peak hour count among the three days at each intersection was used for the LOS analysis at the direction of the City of Foster City. The existing peak-hour intersection volumes are shown in Figure 6. Intersection turning-movement counts conducted for this analysis are presented in Appendix A.

Existing Intersection Levels of Service

Intersection levels of service were evaluated against City of Foster City standards. The results of the analysis show that all of the signalized study intersections currently operate at acceptable levels of service (LOS D or better) during the AM, midday, and PM peak hours. Results of the intersection LOS analysis under existing conditions are summarized in Table 5. The intersection levels of service calculation sheets are included in Appendix D.

The analysis results also show that all of the stop-controlled (unsignalized) study intersections currently operate at LOS C or better during all peak hours, except at the Shell Boulevard/Bounty Drive intersection during the PM peak hour which currently operates at LOS D. The level of service analysis indicates that vehicles on the stop-controlled approaches (the Sand Cove Apartments private driveway and Bounty Drive) currently experience significant delays. Eastbound left-turns from the Sand Cove Apartments private driveway to northbound Shell Boulevard, as well as westbound left-turns from Bounty Drive to southbound Shell Boulevard require vehicles to wait for a gap in both the northbound and southbound traffic flows. Thus, the high volumes on Shell Boulevard contribute to the low level of service.

Observed Existing Traffic Conditions

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

Overall, most study intersections operated adequately during the AM, midday, and PM peak hours of traffic, and the level of service analysis appears to accurately reflect actual existing traffic conditions. However, field observations showed that some operational problems currently occur during the peak commute hours. These issues are described below.

Edgewater Boulevard and Beach Park Boulevard

During the PM peak hour, the southbound and westbound left-turn queues occasionally extend beyond their respective turn pockets. Combined with congestion in both the southbound and westbound through lanes, sometimes left-turning vehicles require more than one signal cycle to clear the intersection. During the AM and midday peak hours, there were no observed operational issues.

Foster City New Elementary School

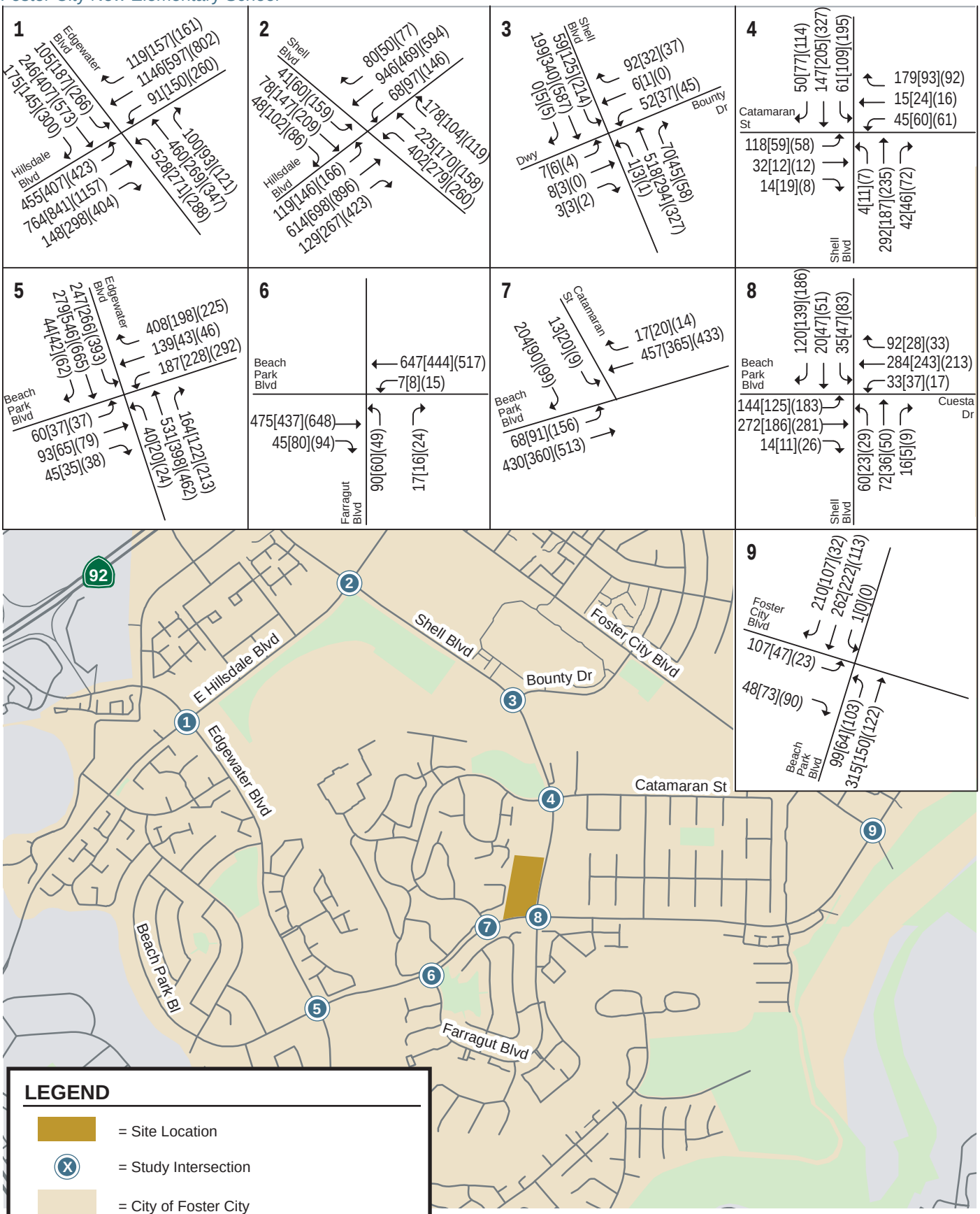

Figure 6
Existing Traffic Volumes

HEXAGON

NORTH
Not to Scale

Table 5
Existing Intersection Levels of Service

Study Number	Intersection	Peak Hour	Count Date	Control Type	Existing Conditions Average Delay (sec.)	Existing Conditions LOS
1	Mariners Island Boulevard/Edgewater Boulevard and Hillsdale Boulevard	AM	2/14/17	Signal	39.2	D
		Midday	2/14/17		40.8	D
		PM	2/14/17		43.3	D
2	Shell Boulevard and Hillsdale Boulevard	AM	2/14/17	Signal	22.3	C
		Midday	1/24/17		24.2	C
		PM	2/14/17		27.9	C
3	Shell Boulevard and Bounty Drive	AM	2/14/17	TWSC [1]	16.9	C
		Midday	1/24/17		17.2	C
		PM	2/14/17		27.6	D
4	Shell Boulevard and Catamaran Street	AM	2/14/17	AWSC	11.7	B
		Midday	2/14/17		10.3	B
		PM	1/31/17		11.7	B
5	Edgewater Boulevard and Beach Park Boulevard	AM	2/14/17	Signal	23.4	C
		Midday	2/14/17		26.7	C
		PM	1/24/17		31.9	C
6	Farragut Boulevard and Beach Park Boulevard	AM	2/14/17	TWSC [1]	19.8	C
		Midday	2/14/17		15.4	C
		PM	1/24/17		19.5	C
7	Catamaran Street and Beach Park Boulevard	AM	2/14/17	TWSC [1]	12.5	B
		Midday	2/14/17		11.8	B
		PM	1/31/17		11.9	B
8	Shell Boulevard and Beach Park Boulevard	AM	1/31/17	AWSC	12.4	B
		Midday	2/14/17		10.7	B
		PM	2/14/17		12.3	B
9	Beach Park Boulevard and Foster City Boulevard	AM	2/14/17	AWSC	10.9	B
		Midday	2/14/17		8.8	A
		PM	2/14/17		8.1	A

Notes:
TWSC = Two-Way Stop Control
AWSC = All-Way Stop Control
[1] For TWSC intersections, the worst approach's delay and level of service is reported.
Bold indicates a substandard level of service.
Bold indicates a significant project impact.

Signal Warrant Analysis

Signal warrant checks (California *MUTCD 2014 Edition, Section 4, Warrant 3*) were performed for the unsignalized study intersections adjacent to the project site. The analysis revealed that the existing peak-hour traffic volumes at the intersections on Shell Boulevard at Catamaran Street and Beach Park Boulevard, as well as the Catamaran Street/Beach Park Boulevard intersection do not warrant signalization. The signal warrant worksheets are included in Appendix E.

3. Background Conditions

This chapter presents a summary of the traffic conditions that would occur under background conditions, including any changes to the roadway network. Background conditions are defined as conditions just prior to completion of the proposed development. Traffic volumes for background conditions comprise volumes from existing traffic counts plus traffic generated by other approved developments in the vicinity of the site.

Roadway Network and Traffic Volumes

The roadway network under background conditions is assumed to be the same as under existing conditions.

Background traffic volumes for the study intersections were estimated by adding to existing traffic volumes the trips generated by approved developments that have not yet been constructed or occupied, including the Gilead Sciences Integrated Corporate development, TownePlace Suites Hotel, Foster Square, Chess-Hatch development, Pilgrim Triton development, Harry's Hofbrau, and the Lincoln Centre Life Sciences Research Campus. Approved project trips and/or approved project information were obtained from the City of Foster City. The list of nearby projects that are included in the background scenario can be found in Appendix B. Traffic volumes for all components of traffic are tabulated in Appendix C. Figure 7 shows the intersection turning-movement volumes under background conditions.

Intersection Level of Service Analysis

The results of the level of service analysis under background conditions are summarized in Table 6. The results show that all of the study intersections are expected to operate at an acceptable LOS D or better during the AM, midday, and PM peak hours of traffic. Level of service calculation sheets are included in Appendix D.

The analysis results also show that, under background conditions, all but one of the stop-controlled study intersections would continue to operate at LOS C or better during all peak hours. During the PM peak hour, the Shell Boulevard/Bounty Drive intersection would continue to operate at LOS D. The level of service analysis indicates that vehicles on the stop-controlled approaches (the Sand Cove Apartments private driveway and Bounty Drive) would experience significant delays.

Foster City New Elementary School

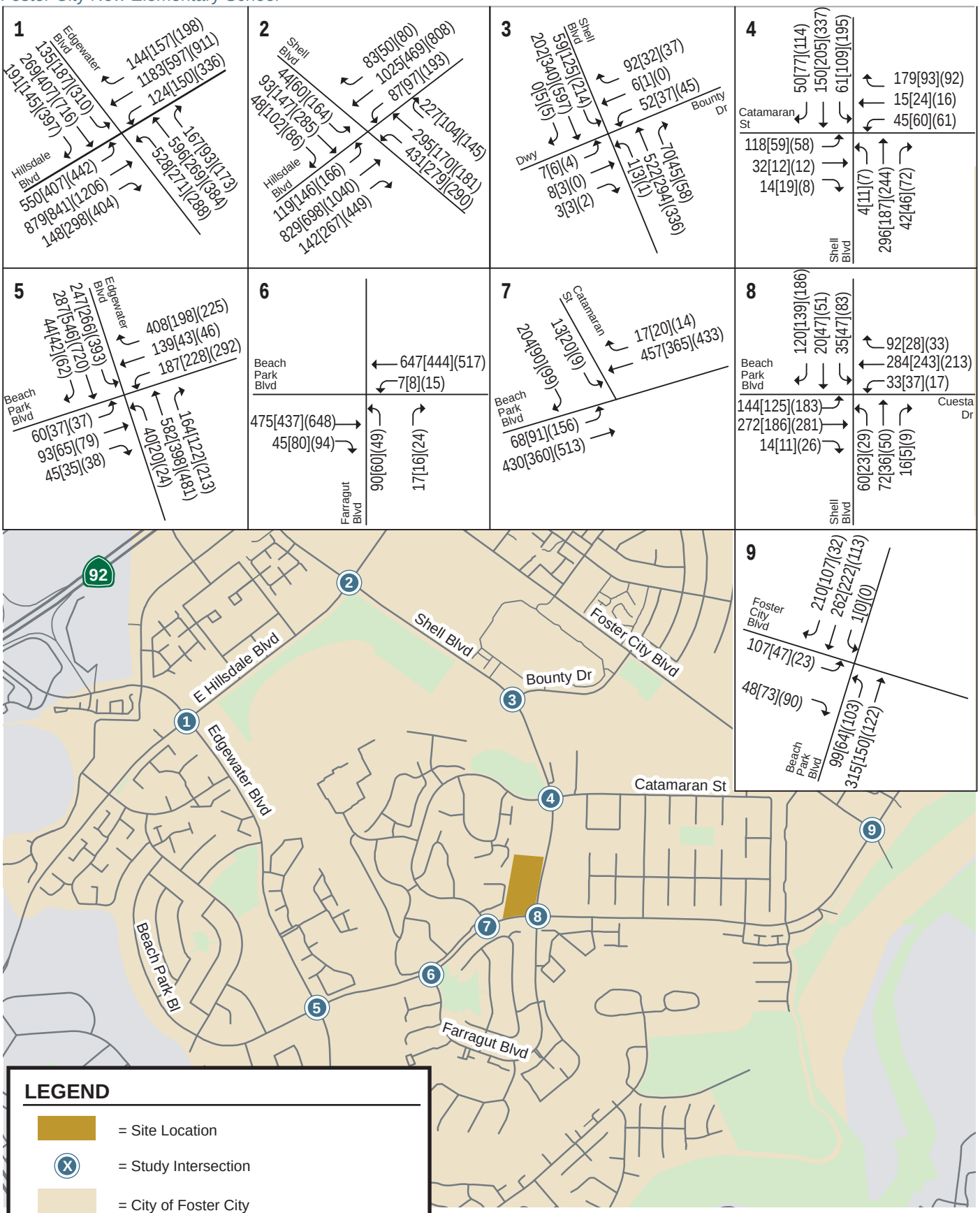

Figure 7
Background Traffic Volumes

HEXAGON

NORTH
Not to Scale

Table 6
Background Intersection Levels of Service

Study Number	Intersection	Peak Hour	Control Type	Background Conditions Average Delay (sec.)	Background Conditions LOS
1	Mariners Island Boulevard/Edgewater Boulevard and Hillsdale Boulevard	AM	Signal	43.9	D
		Midday		40.8	D
		PM		50.6	D
2	Shell Boulevard and Hillsdale Boulevard	AM	Signal	24.5	C
		Midday		24.2	C
		PM		31.4	C
3	Shell Boulevard and Bounty Drive	AM	TWSC [1]	17.0	C
		Midday		17.2	C
		PM		28.5	D
4	Shell Boulevard and Catamaran Street	AM	AWSC	11.8	B
		Midday		10.3	B
		PM		11.8	B
5	Edgewater Boulevard and Beach Park Boulevard	AM	Signal	23.4	C
		Midday		26.7	C
		PM		31.6	C
6	Farragut Boulevard and Beach Park Boulevard	AM	TWSC [1]	19.8	C
		Midday		15.4	C
		PM		19.5	C
7	Catamaran Street and Beach Park Boulevard	AM	TWSC [1]	12.5	B
		Midday		11.8	B
		PM		11.9	B
8	Shell Boulevard and Beach Park Boulevard	AM	AWSC	12.4	B
		Midday		10.7	B
		PM		12.3	B
9	Beach Park Boulevard and Foster City Boulevard	AM	AWSC	10.9	B
		Midday		8.8	A
		PM		8.1	A

Notes:
TWSC = Two-Way Stop Control
AWSC = All-Way Stop Control
[1] For TWSC intersections, the worst approach's delay and level of service is reported.
Bold indicates a substandard level of service.
Bold indicates a significant project impact.

Signal Warrant Analysis

Signal warrant checks (California *MUTCD 2014 Edition, Section 4, Warrant 3*) were performed for the unsignalized study intersections adjacent to the project site. The peak-hour traffic volumes at the intersections on Shell Boulevard at Catamaran Street and Beach Park Boulevard, as well as the Catamaran Street/Beach Park Boulevard intersection would not warrant signalization under background conditions. The signal warrant worksheets are included in Appendix E.

4. Project Conditions

This chapter describes traffic conditions with the project. It begins with a description of the transportation system under project conditions and the method by which project traffic is estimated. A summary of levels of service under existing plus project traffic conditions, as well as under project traffic conditions are presented in this chapter. Existing plus project traffic conditions could potentially occur if the project were to be occupied prior to the other approved projects in the area. Project conditions are represented by background traffic conditions with the addition of traffic generated by the project.

Significant Impact Criteria

Significance criteria are used to establish what constitutes an impact. For this analysis, the criteria used to determine impacts on intersections are based on the thresholds established by the City of Foster City and the Congestion Management Program (CMP).

City of Foster City Definition of Significant Intersection Impacts

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

1. The level of service at the intersection degrades from an acceptable LOS D or better under background conditions to an unacceptable LOS E or F under project conditions, or
2. The level of service at the intersection is an unacceptable LOS E or F under background conditions and the addition of project trips causes both the critical-movement delay at the intersection to increase by four (4) or more seconds.

A significant impact by the City of Foster City standards is said to be satisfactorily mitigated when measures are implemented that would restore intersection level of service to background conditions or better.

Transportation Network under Project Conditions

It is assumed in this analysis that the transportation network under project conditions would be the same as the background transportation network.

Project Trip Estimates

The magnitude of traffic produced by a new development and the locations where that traffic would appear were estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. In determining project trip generation, the magnitude of traffic traveling to and from the

proposed school was estimated for the AM, midday, and PM peak hours. As part of the project trip distribution, the directions to and from which the project trips would travel were estimated. In the project trip assignment, the project trips were assigned to specific streets and intersections. These procedures are described below.

Trip Generation

The trip generation rates for the proposed school were derived from trip generation counts Hexagon conducted at the existing elementary schools in Foster City. The trip generation counts were conducted on a standard school day on three separate weeks between January and February of 2017. The observed trip generation rates are presented in Table 7. As directed by City staff, the highest school rate during each peak hour was used to present a conservative estimate. The magnitude of traffic generated by the proposed school was estimated by multiplying the observed Foster City schools' trip generation rates by the projected maximum enrollment (600 students) for the school.

Table 7
Trip Generation Rate Surveys

Count Location [1]	Students	AM Peak Hour				Midday Peak Hour [2]				PM Peak Hour			
		In	Out	Total	Rate [3]	In	Out	Total	Rate [3]	In	Out	Total	Rate [3]
Audubon Elementary	748 students	302	264	566	0.76	186	186	372	**0.50**	66	45	111	0.15
Brewer Island Elementary	665 students	299	260	559	**0.84**	124	128	252	0.38	73	66	139	**0.21**
Foster City Elementary	874 students	385	331	716	0.82	158	198	356	0.41	30	35	65	0.07
Foster City Average: Elementary Schools		329	285	614	0.81	156	171	327	0.43	56	49	105	0.14

Notes:
[1] Peak hour trip rates (per student) based on Hexagon Transportation Consultants' survey conducted at all three schools in Foster City on January 26, January 31, February 2, and February 7, 2017.
[2] Midday peak hour trip generation reflects 2 PM - 4 PM, which is when dismissal for a standard school day occurs.
[3] **Bold** indicates the highest peak hour trip rate among the survey schools used for the proposed school.

Based on the surveyed trip generation rates and a maximum enrollment of 600 students, the project would generate 504 trips (270 inbound and 234 outbound) during the AM peak hour, 300 trips (143 inbound and 157 outbound) during the midday peak hour, and 126 trips (68 inbound and 58 outbound) during the PM peak hour.

Trips that are generated by the existing shopping center and post office on the site can be subtracted from the gross project trip generation estimates. Trip rates for the shopping center and post office were based on trip generation counts conducted on a weekday in February 2017 at the existing site. Based on the trip generation counts, the existing site is generating 231 trips during the AM peak hour, 315 trips during the midday peak hour, and 312 trips during the PM peak hour. The trip generation counts are presented in Appendix A.

After applying the appropriate trip generation rates and trip credits, the project would generate 273 new vehicle trips during the AM peak hour, and would subtract 15 vehicle trips and 186 vehicle trips during the midday and PM peak hours, respectively (see Table 8).

Table 8
Project Trip Generation Estimates

Land Use	Size	AM Peak Hour Rate [1]	AM In	AM Out	AM Total	Midday Peak Hour Rate [1]	Midday In	Midday Out	Midday Total	PM Peak Hour [2] Rate [1]	PM In	PM Out	PM Total
Proposed Use													
Elementary School	600 students/staff	0.84	270	234	504	0.50	143	157	300	0.21	68	58	126
Existing Use [3]													
Charter Square Shopping Center			(126)	(105)	(231)		(150)	(165)	(315)		(173)	(139)	(312)
Net Total Project Trips			144	129	273		(7)	(8)	(15)		(105)	(81)	(186)

Notes:
[1] Peak hour trip rates (per student) based on Hexagon Transportation Consultants' survey conducted on a standard full-school day on three separate weeks between January and February of 2017.
[2] PM peak hour trip generation reflects 5 PM - 6 PM, which is when peak project traffic and peak background traffic overlap.
[3] Existing peak hour traffic from the Charter Square Shopping based on driveway counts conducted on February 23, 2017.

It should also be noted that project volumes were added to the roadway network without reassigning existing vehicle trips of the adjacent Elementary schools (i.e. Foster City Elementary School, Brewer Island Elementary School, and Audubon Elementary School). While the trips generated by the proposed school would be new to the roadways immediately adjacent to the project site, in a regional context, the new elementary school trips would be merely reassigned trips from other schools in the area where the students would have otherwise attended. With this new school, the existing elementary schools in Foster City will see a decrease in traffic. This decrease was not accounted for in the traffic study, so the traffic study numbers are conservative.

Trip Distribution and Assignment

The trip distribution pattern for the project was estimated based on the locations of the existing Foster City schools, as well as the existing travel patterns on the surrounding roadway network. Once the existing school locations were mapped, the attendance area for the new elementary school was assumed (see Figure 8). It was assumed that about 70 percent of the student population would live within the primary attendance area, and the remaining 30 percent of students were assumed to live near the edges of the initial boundary, primarily in areas to the northeast and south where there are more residential units.

Four separate trip distributions were used for the project in this study: (1) staff and visitors, (2) working parents in the AM, (3) working parents in the PM, and (4) non-working parents. Based on Hexagon's previous experience with other schools, the total estimated project trips generated by the new elementary school were assumed to comprise 10 percent staff and visitors, 60 percent working parents, and 30 percent non-working parents. The trip distribution for staff was assumed to come primarily from outside the city and oriented toward the freeways. Working parents were assumed to drop off their students on the way to work and pick-up their students after work before going home. Thus, they were oriented toward the freeways similar to the school staff distribution. Non-working parents' trips were assumed to be oriented toward the residential neighborhoods, as described above. The trip distribution for the existing shopping center was assumed to be about 35 percent within the attendance area, with the remaining 65 percent to/from other residential areas of Foster City, primarily to the northeast and south.

Figure 8
Project's Assumed Attendance Area

NORTH
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The trip distribution patterns, including that of the existing shopping center, are illustrated on Figures 9, 10, 11, 12, and 13. The peak-hour trips generated by the project were assigned to the roadway network in accordance with the project trip distribution patterns. The project trip assignment at each study intersection of the existing shopping center and the proposed project are shown on Figures 14 and 15, respectively. The net project trip assignment for the proposed project is shown on the attached Figure 16. Negative trips shown for some movements reflect the removal of the existing shopping center from the existing traffic due to the project.

Existing Plus Project Traffic Volumes

Project trips, as represented in the previously mentioned project trip assignment, were added to existing traffic volumes to obtain existing plus project traffic volumes. The existing plus project traffic volumes are shown on Figure 17.

Existing Plus Project Intersection Analysis

The results of the level of service analysis under existing plus project conditions are summarized in Table 9. The results show that all of the signalized study intersections would continue to operate at acceptable levels of service (LOS D or better) during all peak hours.

Under existing plus project conditions, all of the stop-controlled study intersections, except the Shell Boulevard/Bounty Drive intersection, would operate at LOS C or better during all peak hours. The intersection of Shell Boulevard and Bounty Drive during the PM peak hour would operate at LOS D. The level of service analysis indicates that vehicles on the stop-controlled approaches (the Sand Cove Apartments private driveway and Bounty Drive) would experience significant delays.

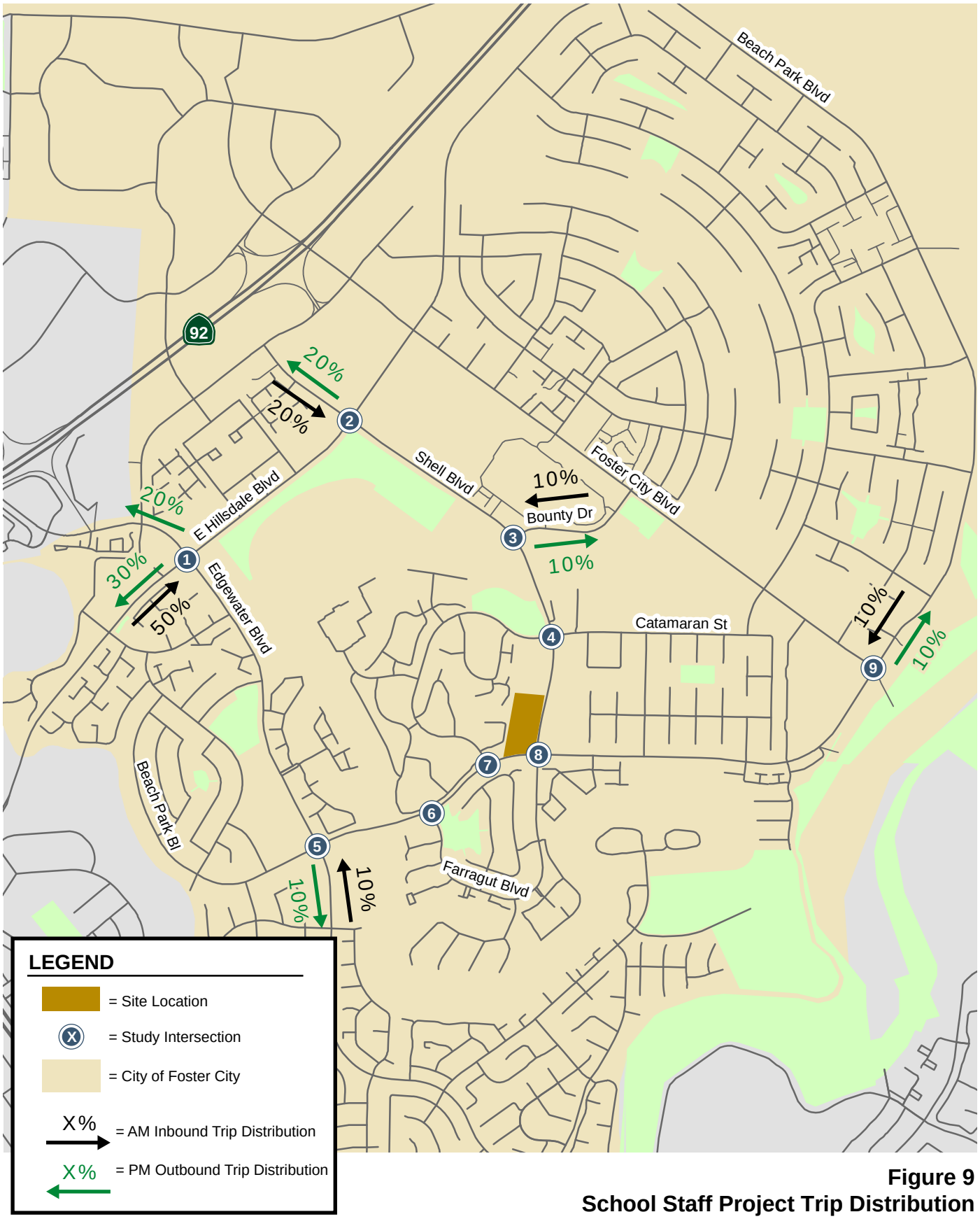

Figure 9
School Staff Project Trip Distribution

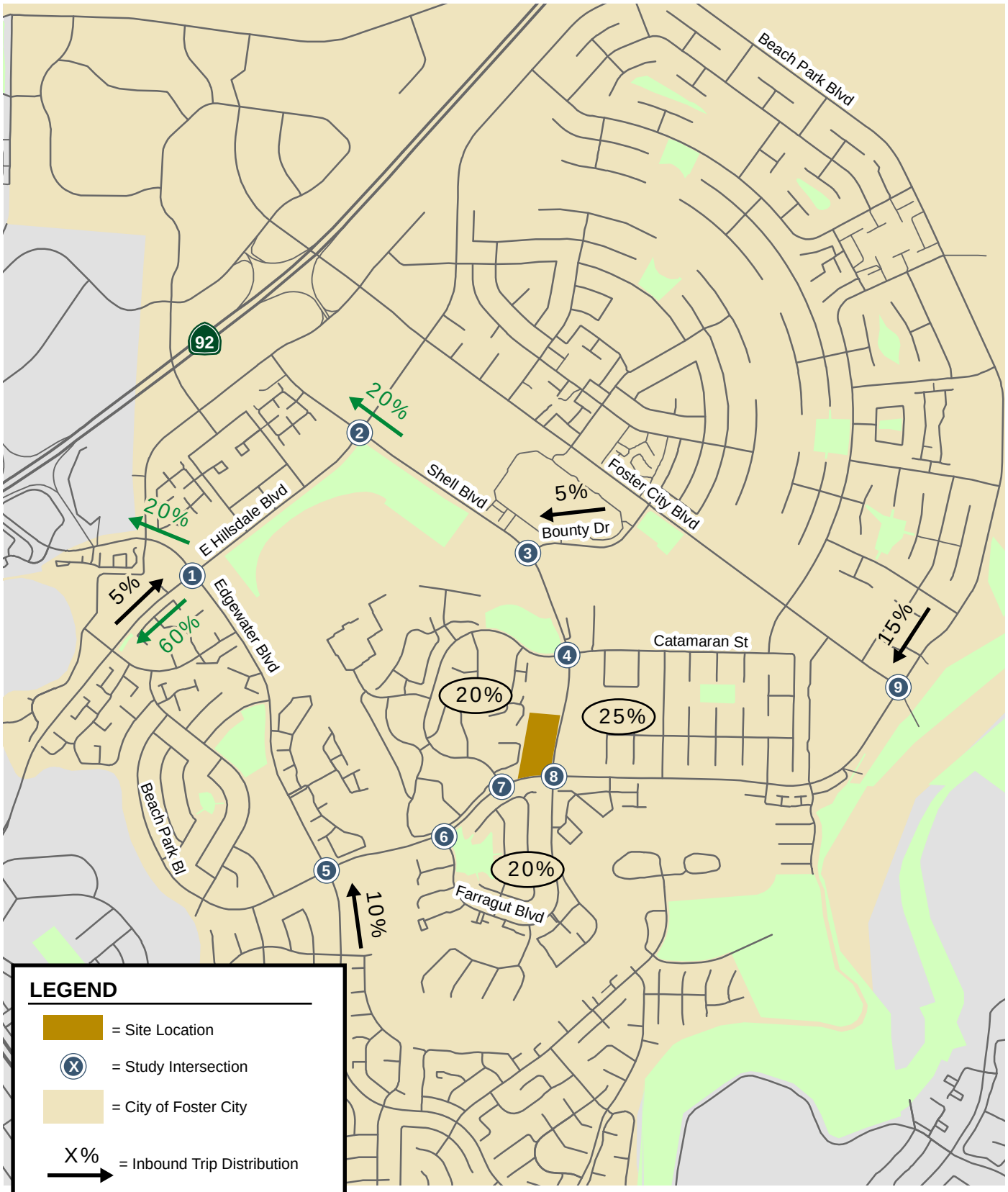

Figure 10
Working Parents AM Project Trip Distribution

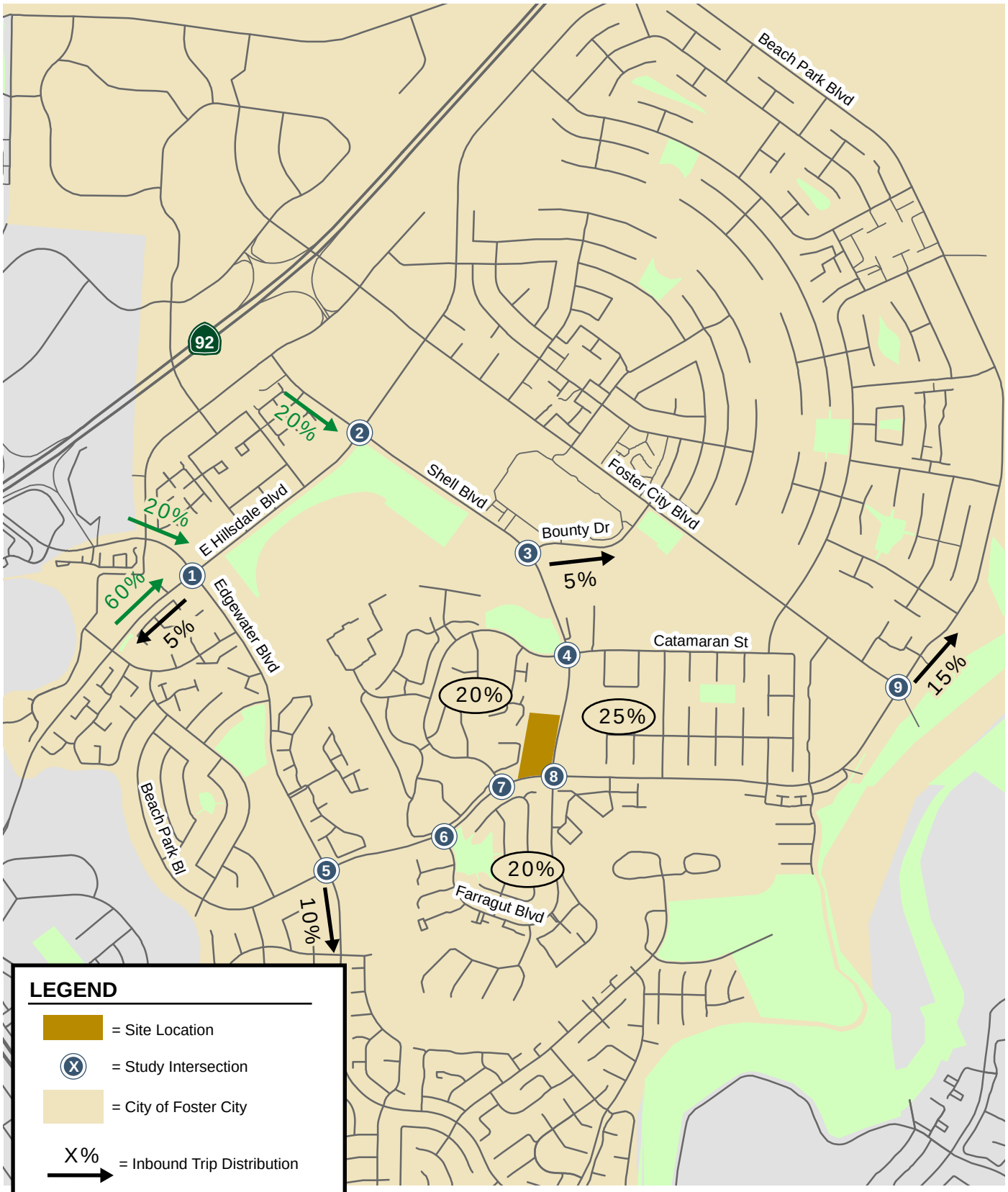

Figure 11
Working Parents PM Project Trip Distribution

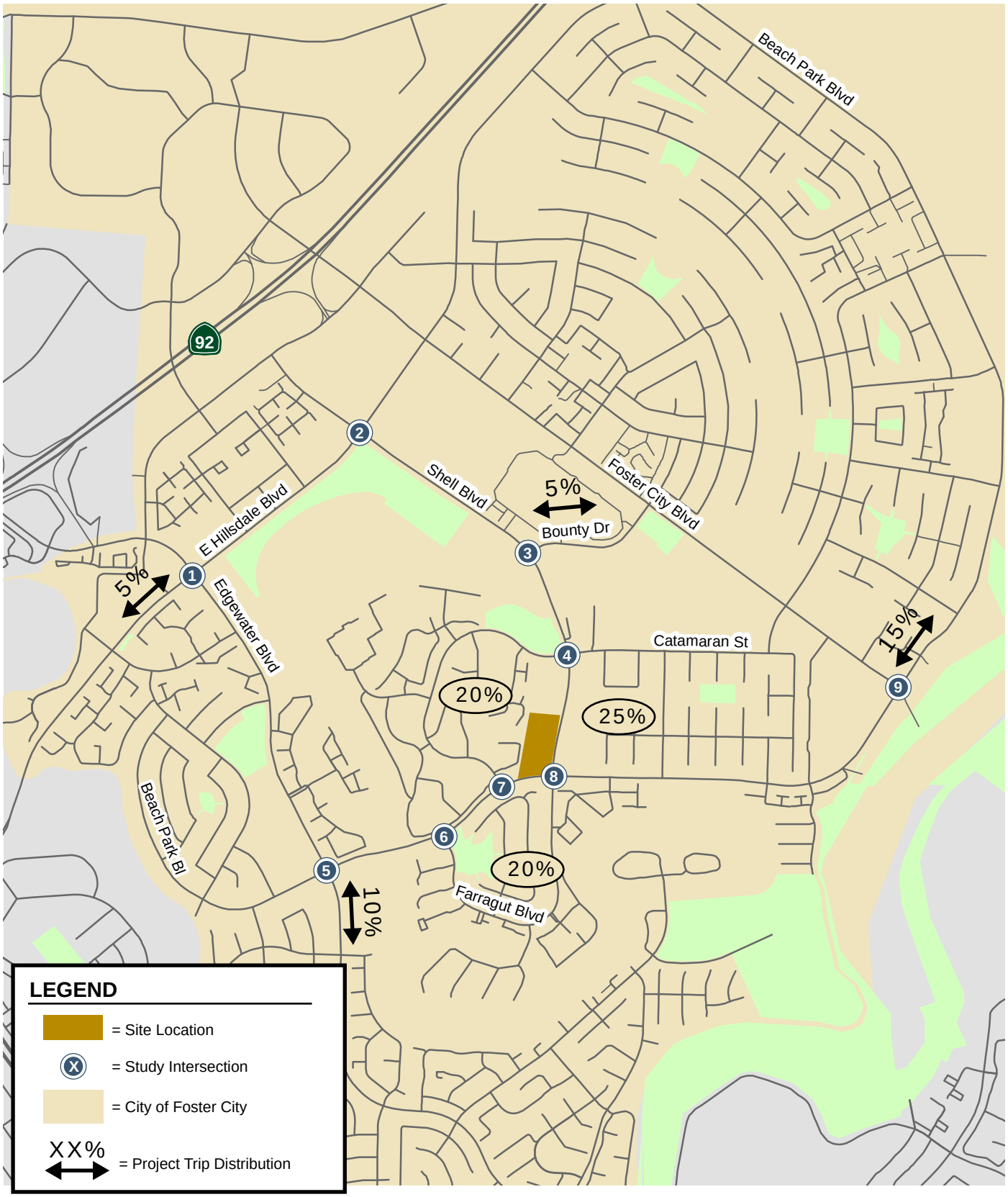

Figure 12
Non-Working Parents AM, Midday, PM Project Trip Distribution

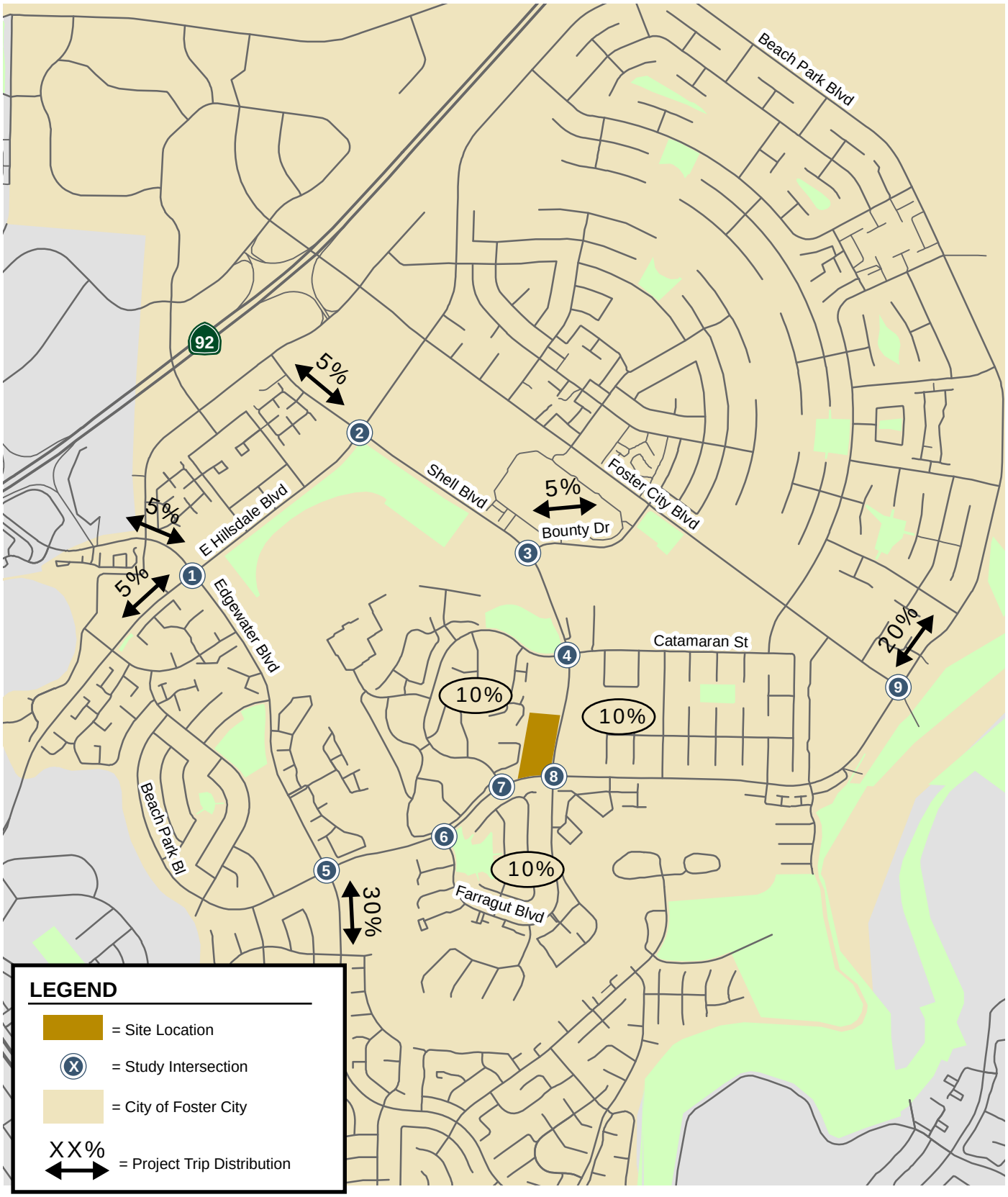

Figure 13
Existing Shopping Center Trip Distribution

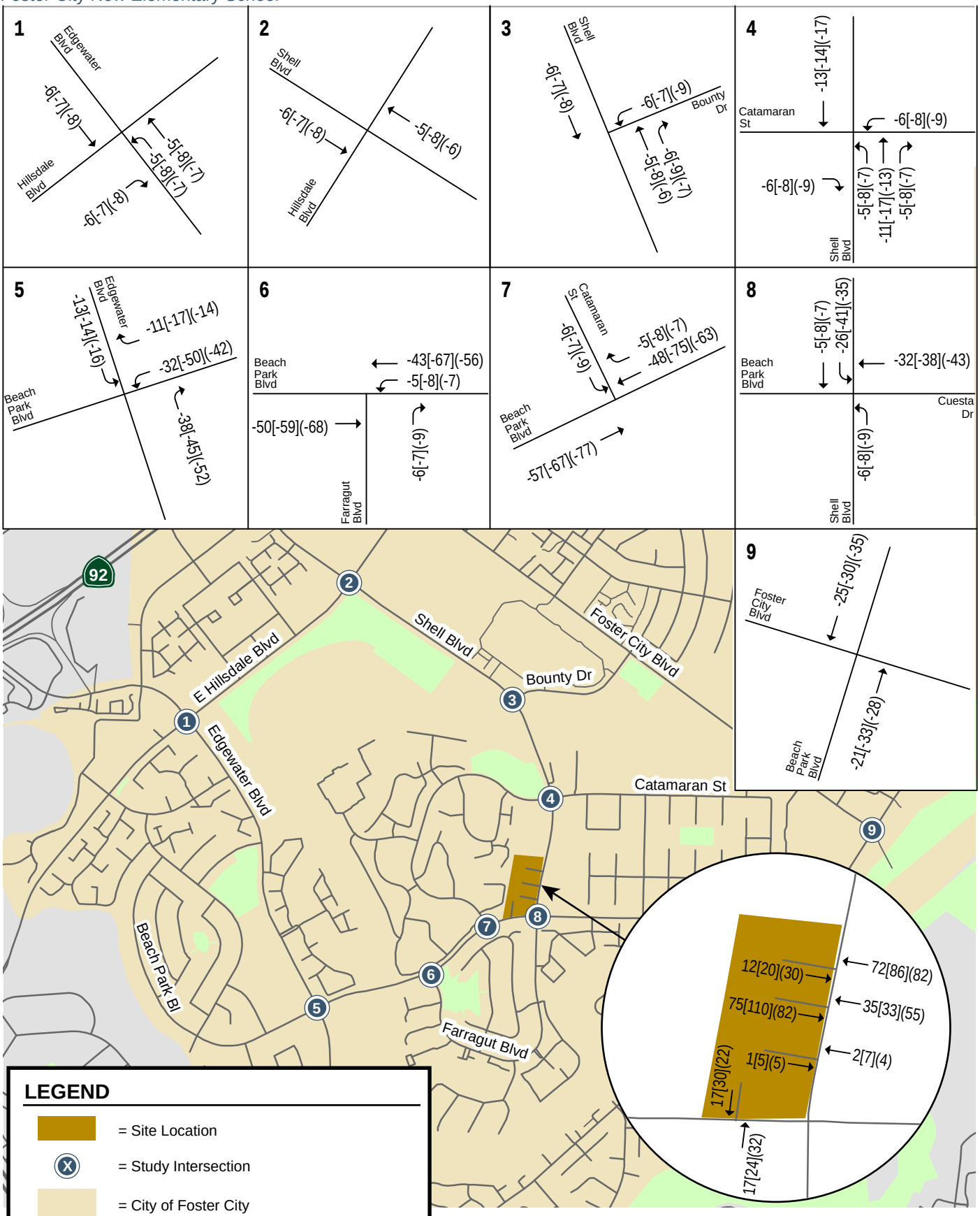

Figure 14
Existing Shopping Center Project Trip Assignment

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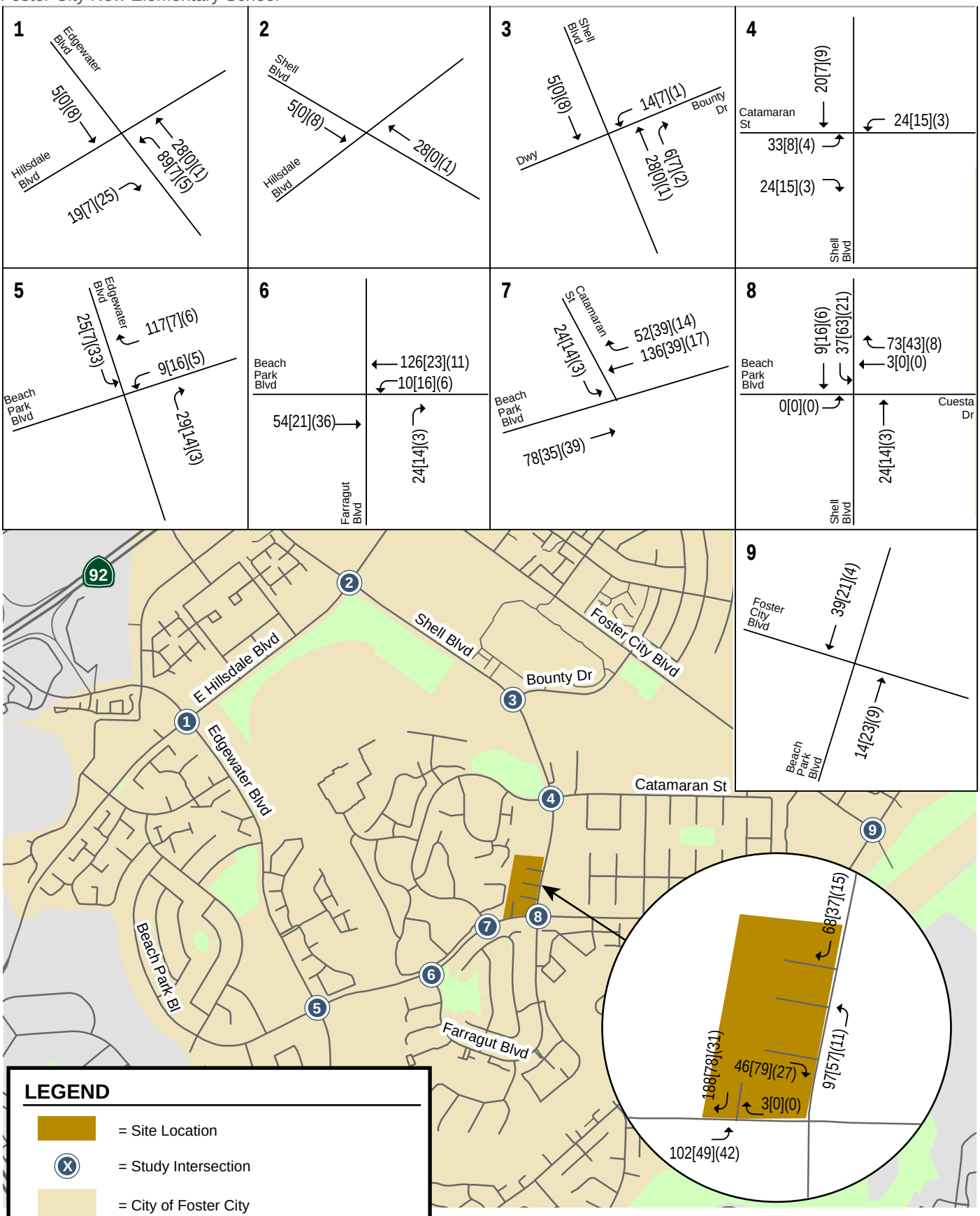


Figure 15
Proposed Project Trip Assignment

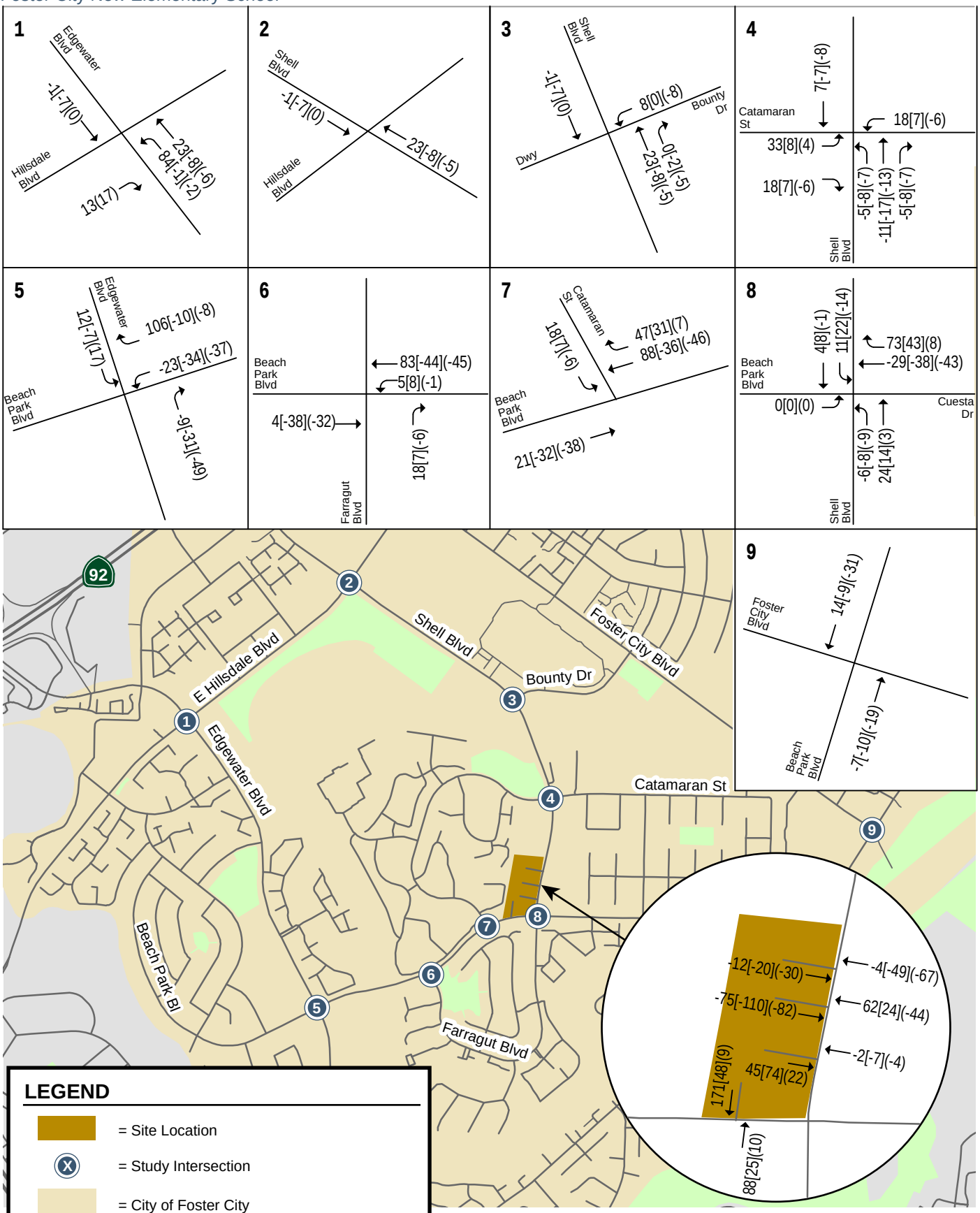
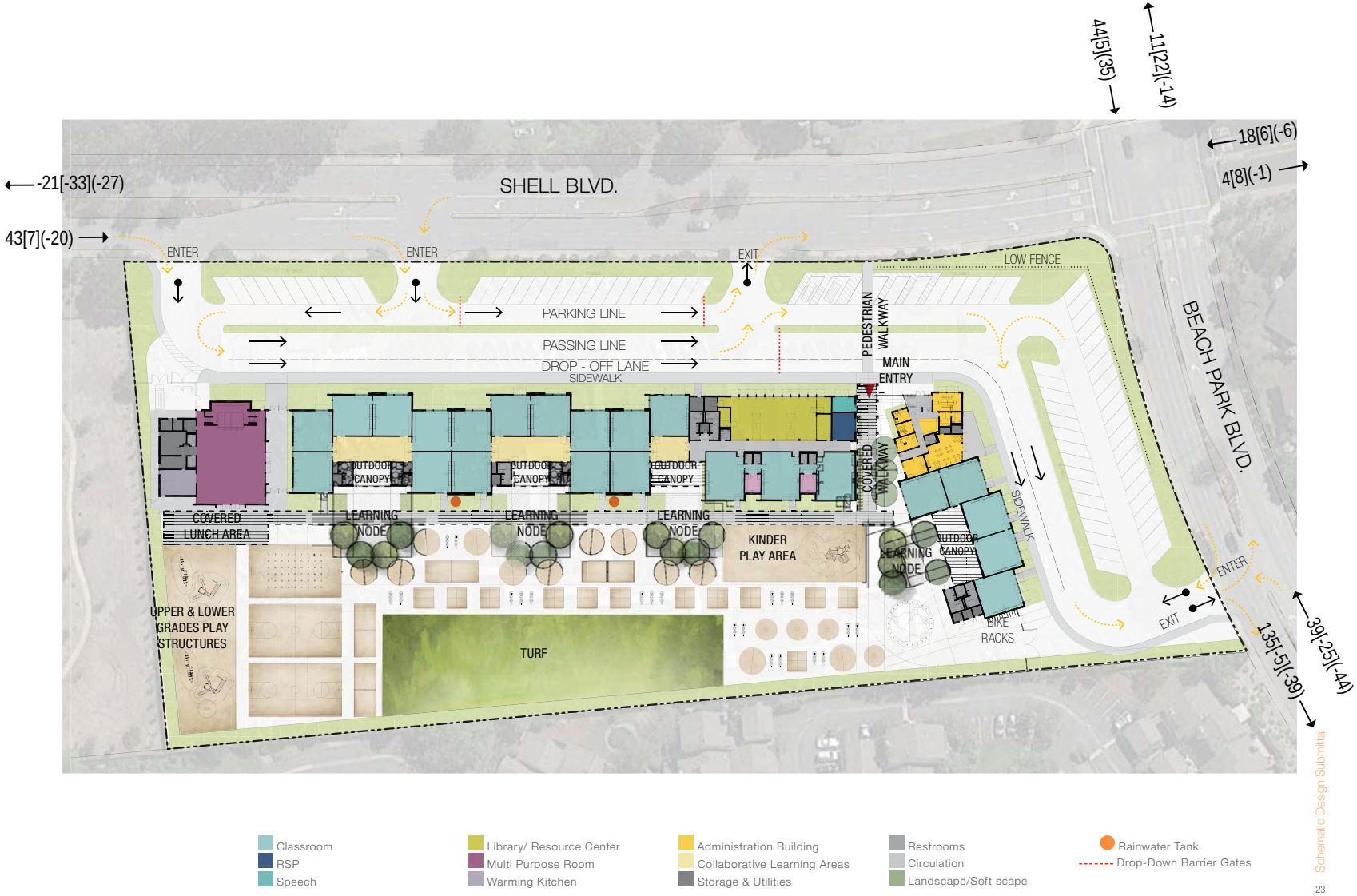


Figure 16
Net Project Trip Assignment



Schematic Design Submittal

LEGEND

XX[XX](XX) = AM[Midday](PM) Peak-Hour Traffic Volumes

Figure 16
Net Project Trip Assignment (continued)

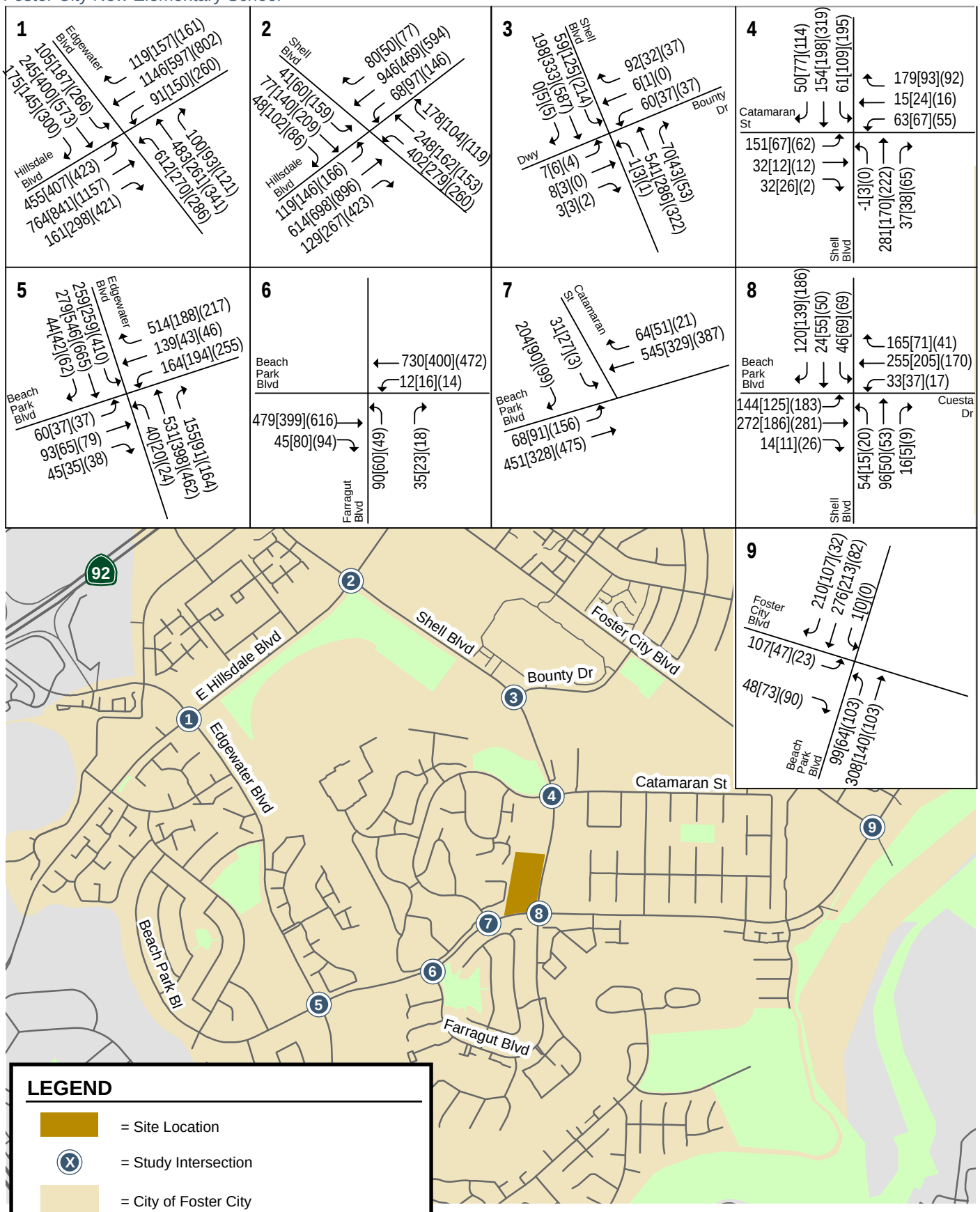


Figure 17
Existing Plus Project Traffic Volumes

Table 9
Existing Plus Project Level of Service Summary

Study Number	Intersection	Peak Hour	Control Type	Existing Conditions			
				No Project		With Project	
				Average Delay (sec.)	LOS	Average Delay (sec.)	LOS
1	Mariners Island Boulevard/Edgewater Boulevard and Hillsdale Boulevard	AM	Signal	39.2	D	40.0	D
		Midday		40.8	D	40.8	D
		PM		43.3	D	43.2	D
2	Shell Boulevard and Hillsdale Boulevard	AM	Signal	22.3	C	22.6	C
		Midday		24.2	C	24.0	C
		PM		27.9	C	27.8	C
3	Shell Boulevard and Bounty Drive	AM	TWSC [1]	16.9	C	17.2	C
		Midday		17.2	C	16.9	C
		PM		27.6	D	27.6	D
4	Shell Boulevard and Catamaran Street	AM	AWSC	11.7	B	12.7	B
		Midday		10.3	B	10.3	B
		PM		11.7	B	11.4	B
5	Edgewater Boulevard and Beach Park Boulevard	AM	Signal	23.4	C	23.2	C
		Midday		26.7	C	25.2	C
		PM		31.9	C	30.4	C
6	Farragut Boulevard and Beach Park Boulevard	AM	TWSC [1]	19.8	C	20.0	C
		Midday		15.4	C	14.4	B
		PM		19.5	C	18.8	C
7	Catamaran Street and Beach Park Boulevard	AM	TWSC [1]	12.5	B	16.1	C
		Midday		11.8	B	12.1	B
		PM		11.9	B	10.6	B
8	Shell Boulevard and Beach Park Boulevard	AM	AWSC	12.4	B	13.2	B
		Midday		10.7	B	10.8	B
		PM		12.3	B	11.8	B
9	Beach Park Boulevard and Foster City Boulevard	AM	AWSC	10.9	B	11.0	B
		Midday		8.8	A	8.7	A
		PM		8.1	A	7.9	A

Notes:
TWSC = Two-Way Stop Control
AWSC = All-Way Stop Control
[1] For TWSC intersections, the worst approach's delay and level of service is reported.
Bold indicates a substandard level of service.
Bold indicates a significant project impact.

Background Plus Project Traffic Volumes

Peak hour traffic volumes with the project were estimated by adding to background traffic volumes the additional traffic generated by the project. Project conditions were evaluated relative to background conditions in order to determine potential project impacts. The project traffic volumes are shown graphically on Figure 18 for background plus project conditions. Traffic volumes for all components of traffic are tabulated in Appendix B.

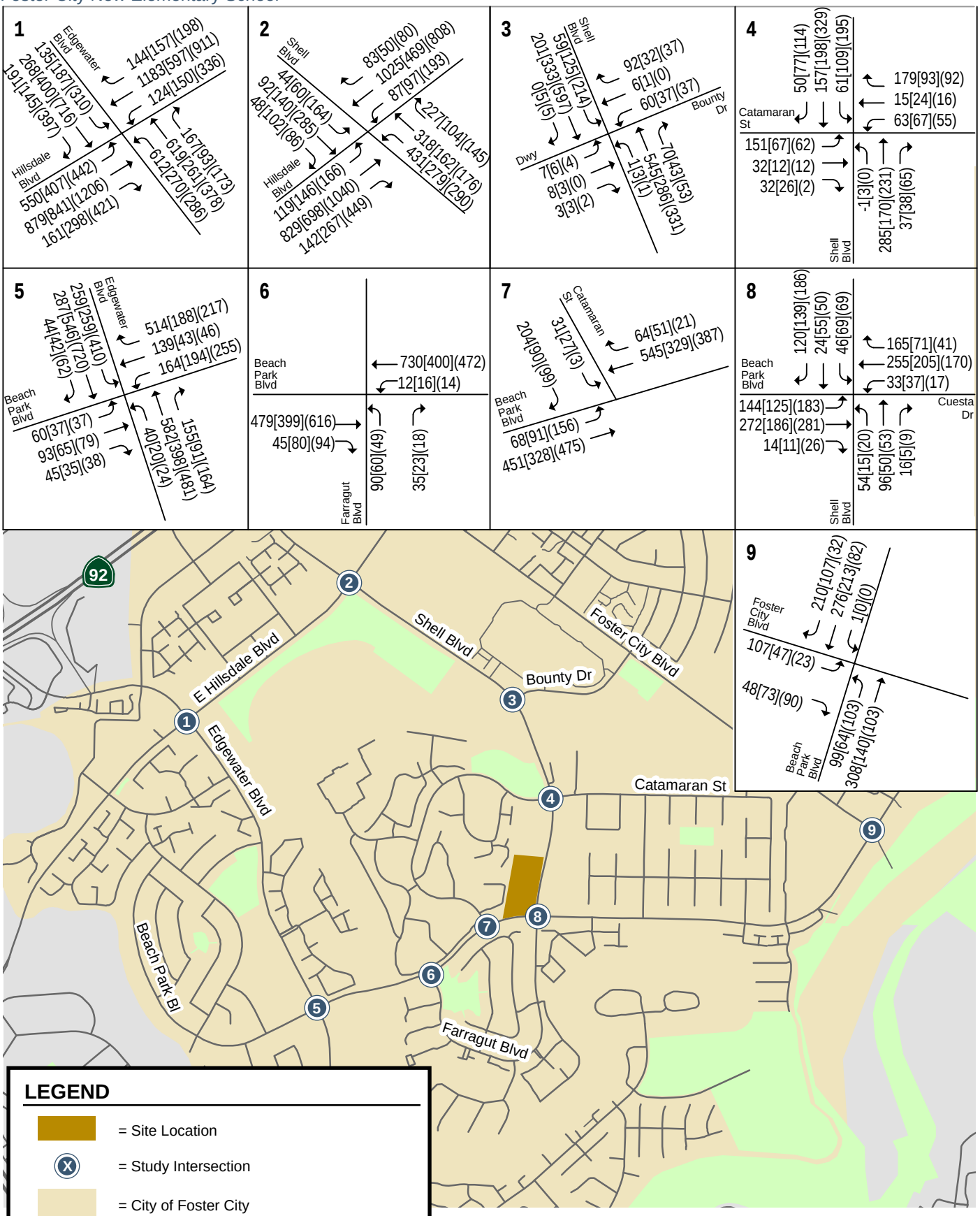


Figure 18
Background Plus Project Traffic Volumes

NORTH
Not to Scale

Background Plus Project Intersection Analysis

The results of the level of service analysis under background plus project conditions are summarized in Table 10. Results of the intersection LOS analysis show that all of the signalized study intersections would operate at an acceptable level of service (LOS D or better) during the AM, midday, and PM peak hours under background plus project conditions. The intersection levels of service calculation sheets are included in Appendix D.

The analysis results also show that, under background plus project conditions, all of the stop-controlled study intersections, except the Shell Boulevard/Bounty Drive intersection, would operate at LOS C or better during all peak hours. The intersection of Shell Boulevard and Bounty Drive during the PM peak hour would operate at LOS D. The level of service analysis indicates that vehicles on the stop-controlled approaches (the Sand Cove Apartments private driveway and Bounty Drive) would experience significant delays. However, the delays would not change with the project.

It should be noted that, at some study intersections, the average delay under project conditions is shown to be lower than under no-project conditions. This occurs because the estimated net project trips would subtract trips from the existing traffic flow, and because intersection delay is a weighted average of all intersection movements. When project traffic is added to movements with delays lower than the average intersection delay, the average delay for the entire intersection can decrease. Level of service calculation sheets are included in Appendix D.

Signal Warrant Analysis

Signal warrant checks (California *MUTCD 2014 Edition, Section 4, Warrant 3*) were performed for the unsignalized study intersections adjacent to the project site. The peak-hour traffic volumes at the intersections on Shell Boulevard at Catamaran Street and Beach Park Boulevard, as well as the Catamaran Street/Beach Park Boulevard intersection would not satisfy the signal warrant under project conditions, including existing conditions. The signal warrant worksheets are included in Appendix E.

Table 10
Background Plus Project Level of Service Summary

Study Number	Intersection	Peak Hour	Control Type	Background Conditions			
				No Project		With Project	
				Average Delay (sec.)	LOS	Average Delay (sec.)	LOS
1	Mariners Island Boulevard/Edgewater Boulevard and Hillsdale Boulevard	AM	Signal	43.9	D	44.8	D
		Midday		40.8	D	40.8	D
		PM		50.6	D	50.5	D
2	Shell Boulevard and Hillsdale Boulevard	AM	Signal	24.5	C	25.2	C
		Midday		24.2	C	24.0	C
		PM		31.4	C	31.2	C
3	Shell Boulevard and Bounty Drive	AM	TWSC [1]	17.0	C	17.2	C
		Midday		17.2	C	16.9	C
		PM		28.5	D	28.2	D
4	Shell Boulevard and Catamaran Street	AM	AWSC	11.8	B	12.8	B
		Midday		10.3	B	10.3	B
		PM		11.8	B	11.5	B
5	Edgewater Boulevard and Beach Park Boulevard	AM	Signal	23.4	C	23.2	C
		Midday		26.7	C	25.3	C
		PM		31.6	C	30.1	C
6	Farragut Boulevard and Beach Park Boulevard	AM	TWSC [1]	19.8	C	20.0	C
		Midday		15.4	C	14.4	B
		PM		19.5	C	18.8	C
7	Catamaran Street and Beach Park Boulevard	AM	TWSC [1]	12.5	B	16.1	C
		Midday		11.8	B	12.1	B
		PM		11.9	B	10.6	B
8	Shell Boulevard and Beach Park Boulevard	AM	AWSC	12.4	B	13.2	B
		Midday		10.7	B	10.8	B
		PM		12.3	B	11.8	B
9	Beach Park Boulevard and Foster City Boulevard	AM	AWSC	10.9	B	11.0	B
		Midday		8.8	A	8.7	A
		PM		8.1	A	7.9	A

Notes:

TWSC = Two-Way Stop Control

AWSC = All-Way Stop Control

[1] For TWSC intersections, the worst approach's delay and level of service is reported.

Bold indicates a substandard level of service.

Bold indicates a significant project impact.

5. Cumulative Conditions

This chapter presents a summary of the traffic conditions that would occur under cumulative conditions with the proposed project. Cumulative conditions are defined as conditions after the completion of the proposed development. Traffic volumes for cumulative conditions comprise volumes from existing traffic counts, traffic growth from approved development projects, and traffic growth from pending development projects in the vicinity of the site.

Roadway Network and Traffic Volumes

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

Cumulative conditions for the study intersections comprise the existing traffic volumes, trips generated by nearby approved developments that have not yet been constructed or occupied (see Chapter 3), and proposed but not yet approved (pending) development projects, including the Marina Center, Harbor Cove Apartments Renovation, Beach Cove Apartments Expansion, Franciscan Apartments Expansion, and the Shadow Cove Apartments Expansion. Project trips were then added to the growth estimates to create the cumulative conditions volumes. The list of pending project trips and/or pending project information were obtained from the City of Foster City. Traffic volumes for all components of traffic are tabulated in Appendix C. Figure 19 shows the intersection turning-movement volumes under cumulative conditions.

Intersection Levels of Service Analysis

The results of the level of service analysis under cumulative conditions show that all of the signalized study intersections would operate at acceptable levels of service (LOS D or better) during the AM, midday, and PM peak hours under cumulative and cumulative plus project conditions (see Table 11). The intersection levels of service calculation sheets are included in Appendix D.

Under cumulative conditions, all but one of the stop-controlled study intersections would operate at LOS C or better during both peak hours with and without the project. The intersection of Shell Boulevard and Bounty Drive during the PM peak hour would operate at LOS E, assuming the Sand Cove expansion project is approved and implemented. This level of service analysis indicates that vehicles on the stop-controlled approaches would experience long delays (between 35-50 seconds). The pending Sand Cove Apartments Expansion would increase traffic volumes along Shell Boulevard, requiring vehicles on the stop-controlled approaches to wait longer for a gap in the northbound and southbound traffic flows. The net trips generated by the school would subtract vehicles on Shell Boulevard and Bounty Drive, compared to the existing shopping center it replaces, resulting in LOS D during the PM peak hour.

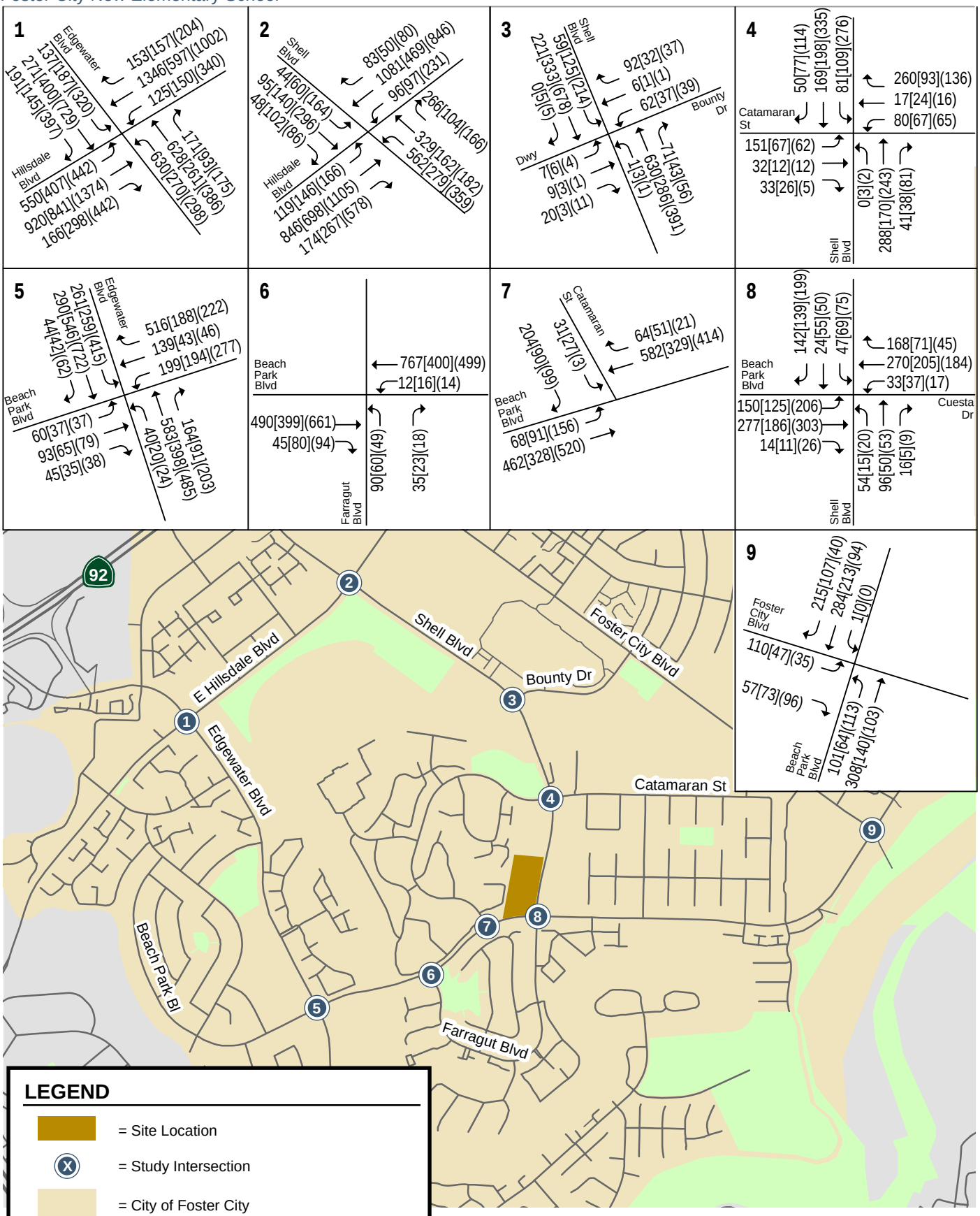


Figure 19
Cumulative Plus Project Traffic Volumes

Table 11
Cumulative Level of Service Summary

Study Number	Intersection	Peak Hour	Control Type	Cumulative Conditions			
				No Project		With Project	
				Average Delay (sec.)	LOS	Average Delay (sec.)	LOS
1	Mariners Island Boulevard/Edgewater Boulevard and Hillsdale Boulevard	AM	Signal	44.9	D	45.8	D
		Midday		40.8	D	40.8	D
		PM		52.5	D	52.4	D
2	Shell Boulevard and Hillsdale Boulevard	AM	Signal	25.6	C	26.2	C
		Midday		24.2	C	24.0	C
		PM		32.8	C	32.6	C
3	Shell Boulevard and Bounty Drive	AM	TWSC [1]	18.7	C	19.1	C
		Midday		17.2	C	16.9	C
		PM		33.1	D	32.9	D
4	Shell Boulevard and Catamaran Street	AM	AWSC	14.0	B	15.7	C
		Midday		10.3	B	10.3	B
		PM		13.5	B	13.2	B
5	Edgewater Boulevard and Beach Park Boulevard	AM	Signal	24.0	C	23.8	C
		Midday		26.7	C	25.3	C
		PM		32.6	C	30.9	C
6	Farragut Boulevard and Beach Park Boulevard	AM	TWSC [1]	20.5	C	20.8	C
		Midday		15.4	C	14.4	B
		PM		20.6	D	19.9	C
7	Catamaran Street and Beach Park Boulevard	AM	TWSC [1]	12.7	B	16.6	C
		Midday		11.8	B	12.1	B
		PM		12.1	B	10.7	B
8	Shell Boulevard and Beach Park Boulevard	AM	AWSC	12.8	B	13.6	B
		Midday		10.7	B	10.8	B
		PM		12.9	B	12.4	B
9	Beach Park Boulevard and Foster City Boulevard	AM	AWSC	11.1	B	11.2	B
		Midday		8.8	A	8.7	A
		PM		8.3	A	8.1	A

Notes:

TWSC = Two-Way Stop Control

AWSC = All-Way Stop Control

[1] For TWSC intersections, the worst approach's delay and level of service is reported.

Bold indicates a substandard level of service.

Bold indicates a significant project impact.

Signal Warrant Analysis

Signal warrant checks (California *MUTCD 2014 Edition, Section 4, Warrant 3*) were performed for the unsignalized study intersections adjacent to the project site. The peak-hour traffic volumes at the intersections on Shell Boulevard at Catamaran Street and Beach Park Boulevard, as well as the Catamaran Street/Beach Park Boulevard intersection would not warrant signalization under cumulative conditions. The signal warrant worksheets are included in Appendix E.

6. Other Transportation Issues

This chapter presents other transportation issues associated with the project. These include an analysis of:

- Vehicle Queuing
- Site access and circulation
- Parking
- Evaluation of transit, bicycle, and pedestrian access

Unlike the level of service impact methodology, which is adopted by the City Council, the analyses in this chapter are based on professional judgement in accordance with the standards and methods employed by the traffic engineering community.

Queuing Analysis

The operations analysis is based on vehicle queuing for high-demand movements at intersections. Vehicle queues were estimated using a Poisson probability distribution, which estimates the probability of "n" vehicles for a vehicle movement using the following formula:

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

Where:

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

n = number of vehicles in the queue per lane

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

The basis of the analysis is as follows: (1) the Poisson probability distribution 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.

The following five left-turn movements were examined as part of the queuing analysis for this project:

- Northbound left-turn at Edgewater Boulevard and Hillsdale Boulevard
- Westbound left-turn at Shell Boulevard and Bounty Drive
- Westbound and southbound left-turn at Edgewater Boulevard and Beach Park

The estimated queue lengths based on the Poisson numerical calculations show queuing deficiencies at one intersection (see Table 12).

Edgewater Boulevard and Beach Park Boulevard

At the intersection of Edgewater Boulevard and Beach Park Boulevard, the westbound and southbound left-turn queues during the PM peak hour currently exceed the existing storage capacity by 200 feet and 75 feet, or eight and three vehicles, respectively. Field observations confirmed this as there were minor operational issues for both turn movements at the study intersection (see Chapter 2). The 95th percentile queue of the westbound left-turn movement would continue to exceed the storage capacity by 200 feet under background conditions, while under cumulative conditions the vehicle queue would increase to 225 feet beyond the storage capacity. Also, under background and cumulative conditions the southbound left-turn vehicle queue would remain the same, exceeding the left-turn storage pocket by 75 feet. With the addition of the project, the 95th percentile queue for the westbound left-turn movement would decrease by two vehicles under the existing, background, and cumulative scenarios. The 95th percentile queue for the southbound left-turn movement would remain the same under existing plus project and background project conditions, and increase by one vehicle under cumulative plus project conditions. The small increase in queue length for the westbound left-turn movement would have an insignificant effect on traffic operations at this intersection.

The westbound and southbound left-turn movements during the AM and midday peak hours are expected to have sufficient storage under all scenarios with and without the project.

Site Access and On-Site Circulation

The site access and circulation evaluation is based on the June 8, 2017 site plan prepared by HMC Architects, Inc. The project site plan is shown on Figure 2. On-site vehicular circulation was reviewed in accordance with generally accepted traffic engineering standards.

Project Driveway Design

Site access was evaluated to determine the adequacy of the site's driveways with regard to the following: traffic volume, delays, vehicle queues, geometric design, and corner sight distance. The school would make use of the existing driveways serving the site. The project driveways measure 23 to 28 feet wide (measured at the throat), which is an acceptable width for a two-way driveway.
Three of the four driveways are located on Shell Boulevard, and one driveway is located on Beach Park Boulevard. Because of the median on Shell Boulevard, the northern and southern driveways operate as right-turn only; there is a median break at the middle driveway, which accommodates all movements. The fourth driveway is located at the southwestern corner of the project site on Beach Park Boulevard and currently operates as a full-access driveway.

To allow for safe and efficient student drop-off and pick-up operations, the school proposes to restrict the northern two driveways on Shell Boulevard to inbound traffic only. The southern driveway would allow outbound traffic only. The driveway on Beach Park Boulevard would allow both right and left inbound turns. To avoid cross-traffic, outbound traffic would be restricted to right-turns only during the student drop-off/pick-up periods, as described below.

Table 12
Queuing Analysis Summary

Measurement	Edgewater Boulevard and Hillsdale Boulevard NBL AM	NBL Mid	NBL PM	Shell Boulevard and Bounty Drive WBL AM	WBL Mid	WBL PM	Edgewater Boulevard and Beach Park Boulevard WBL AM	WBL Mid	WBL PM	SBL AM	SBL Mid	SBL PM	Catamaran Street and Beach Park Boulevard SBL AM	SBL Mid	SBL PM
Existing															
Cycle/Delay [1] (sec)	125	150	150	16.9	17.2	27.6	90	130	130	90	130	130	12.5	11.8	11.9
Volume (vphpl)	528	271	288	52	37	45	187	228	292	247	266	393	13	20	9
Avg. Queue (veh/ln.)	9.2	5.6	6.0	0.2	0.2	0.3	4.7	8.2	10.5	6.2	9.6	14.2	0.0	0.1	0.0
Avg. Queue [2] (ft./ln)	229	141	150	6	4	9	117	206	264	154	240	355	1	2	1
95th %. Queue (veh/ln.)	14	10	10	1	1	1	3	8	16	5	9	15	0	1	0
95th %. Queue (ft./ln)	350	250	250	25	25	25	75	200	400	125	225	375	0	25	0
Storage (ft./ ln.)	975	975	975	275	275	275	200	200	200	300	300	300	125	125	125
Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	**N**	Y	Y	**N**	Y	Y	Y
Existing Plus Project															
Cycle/Delay [1] (sec)	125	150	150	17.2	16.9	27.6	90	130	130	90	130	130	16.1	12.1	10.6
Volume (vphpl)	612	270	286	60	37	37	164	194	255	259	259	410	31	27	3
Avg. Queue (veh/ln.)	10.6	5.6	6.0	0.3	0.2	0.3	4.1	7.0	9.2	6.5	9.4	14.8	0.1	0.1	0.0
Avg. Queue [2] (ft./ln)	266	141	149	7	4	7	103	175	230	162	234	370	3	2	0
95th %. Queue (veh/ln.)	16	10	10	1	1	1	3	7	14	5	9	15	1	1	0
95th %. Queue (ft./ln)	400	250	250	25	25	25	75	175	350	125	225	375	25	25	0
Storage (ft./ ln.)	975	975	975	275	275	275	200	200	200	300	300	300	125	125	125
Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	**N**	Y	Y	**N**	Y	Y	Y
Background															
Cycle/Delay [1] (sec)	125	110	150	17.0	17.2	28.5	90	130	130	90	130	130	12.5	11.8	11.9
Volume (vphpl)	528	271	288	52	37	45	187	228	292	247	266	393	13	20	9
Avg. Queue (veh/ln.)	9.2	4.1	6.0	0.2	0.2	0.4	4.7	8.2	10.5	6.2	9.6	14.2	0.0	0.1	0.0
Avg. Queue [2] (ft./ln)	229	104	150	6	4	9	117	206	264	154	240	355	1	2	1
95th %. Queue (veh/ln.)	14	8	10	0	1	0	3	8	16	5	9	15	0	1	0
95th %. Queue (ft./ln)	350	200	250	0	25	0	75	200	400	125	225	375	0	25	0
Storage (ft./ ln.)	975	975	975	275	275	275	200	200	200	300	300	300	125	125	125
Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	**N**	Y	Y	**N**	Y	Y	Y
Background Plus Project															
Cycle/Delay [1] (sec)	125	110	150	17.2	16.9	28.2	90	130	130	90	130	130	16.1	12.1	10.6
Volume (vphpl)	612	270	286	60	37	37	164	194	255	259	259	410	31	27	3
Avg. Queue (veh/ln.)	10.6	4.1	6.0	0.3	0.2	0.3	4.1	7.0	9.2	6.5	9.4	14.8	0.1	0.1	0.0
Avg. Queue [2] (ft./ln)	266	103	149	7	4	7	103	175	230	162	234	370	3	2	0
95th %. Queue (veh/ln.)	16	8	10	1	1	1	3	7	14	5	9	15	1	1	0
95th %. Queue (ft./ln)	400	200	250	25	25	25	75	175	350	125	225	375	25	25	0
Storage (ft./ ln.)	975	975	975	275	275	275	200	200	200	300	300	300	125	125	125
Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	**N**	Y	Y	**N**	Y	Y	Y
Cumulative															
Cycle/Delay [1] (sec)	125	150	150	18.7	17.2	33.1	90	130	130	90	130	130	12.7	11.8	12.1
Volume (vphpl)	546	271	300	54	37	47	222	228	314	249	266	398	13	20	9
Avg. Queue (veh/ln.)	9.5	5.6	6.3	0.3	0.2	0.4	5.6	8.2	11.3	6.2	9.6	14.4	0.0	0.1	0.0
Avg. Queue [2] (ft./ln)	237	141	156	7	4	11	139	206	283	156	240	359	1	2	1
95th %. Queue (veh/ln.)	15	10	11	1	1	2	5	8	17	5	9	15	0	1	0
95th %. Queue (ft./ln)	375	250	275	25	25	50	125	200	425	125	225	375	0	25	0
Storage (ft./ ln.)	975	975	975	275	275	275	200	200	200	300	300	300	125	125	125
Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	**N**	Y	Y	**N**	Y	Y	Y
Cumulative Plus Project															
Cycle/Delay [1] (sec)	125	150	150	19.1	16.9	32.9	90	130	130	90	130	130	16.6	12.1	10.7
Volume (vphpl)	630	270	298	62	37	39	199	194	277	261	259	415	31	27	3
Avg. Queue (veh/ln.)	10.9	5.6	6.2	0.3	0.2	0.4	5.0	7.0	10.0	6.5	9.4	15.0	0.1	0.1	0.0
Avg. Queue [2] (ft./ln)	273	141	155	8	4	9	124	175	250	163	234	375	4	2	0
95th %. Queue (veh/ln.)	17	10	11	1	1	2	4	7	15	5	9	16	1	1	0
95th %. Queue (ft./ln)	425	250	275	25	25	50	100	175	375	125	225	400	25	25	0
Storage (ft./ ln.)	975	975	975	275	275	275	200	200	200	300	300	300	125	125	125
Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	**N**	Y	Y	**N**	Y	Y	Y

Notes:
[1] Vehicle queue calculations based on cycle length for signalized intersections, and the worst approach's delay for unsignalized intersections.
[2] Assumes 25 Feet Per Vehicle

Project Driveway Operations

A level of service analysis was conducted at each of the four project driveways to ensure that they would operate without excessive delay or queues (see Table 13). Under background plus project conditions, all but one of the project driveways would operate at LOS C or better during the AM, midday, and PM peak hours. The driveway on Beach Park Boulevard would operate at LOS E during the AM peak hour. The LOS results indicate that vehicles at the project driveways on Shell Boulevard would experience minor delays, and those at the Beach Park Boulevard would experience longer delays. However, it should be noted that the analysis is a conservative estimate, and the delays at the project driveways would last in total only about 10 to 15 minutes given that the school would maintain specific drop-off and pick-up times.

Northern driveway on Shell Boulevard

The northern driveway on Shell Boulevard would be restricted to inbound right-turns only during drop-off and pick-up periods. Inbound right-turns have no conflicting traffic, thus there would be no delays.

Middle Driveway on Shell Boulevard

The middle driveway on Shell Boulevard would allow only inbound traffic during drop-off and pick-up periods. Both inbound right-turns and left-turns would be allowed given that there is a median break on Shell Boulevard at the middle driveway. Inbound left-turns would require vehicles to wait for a gap in the southbound traffic flow. Under background conditions, the calculated average delay for this movement is 8.4 seconds, which equates to LOS A. The northbound left-turn storage comprises 150 feet, while the 95th percentile queue length for the inbound left-turn is estimated to be 50 feet, or two vehicles. Thus, the left-turn queues are not expected to spill over into the northbound through-lane on Shell Boulevard. Inbound right-turns would experience no delay.

South Driveway on Shell Boulevard

The south driveway on Shell Boulevard would be restricted to outbound right-turns only. The outbound traffic would experience average delays of 10 to 11 seconds, which equates to LOS B. There should not be any queuing issues at this driveway.

Beach Park Boulevard Driveway

Hexagon examined whether outbound left-turns could be allowed at the Beach Park Boulevard driveway during peak student drop-off and pick-up times. The potential delays were found to be excessive. In addition, the outbound left-turn movement would conflict with the inbound left-turn movement. For these reasons, the outbound driveway on Beach Park Boulevard should be restricted to right-turns only during drop-off and pick-up periods. The driveway would allow all movements at off-peak times. Inbound left-turns from Beach Park Boulevard into this driveway would require vehicles to wait for a gap in the westbound traffic flow. The expected delays for this movement is 10.0 seconds (LOS B). Delay for outbound right-turns would be 45.0 seconds (LOS E) due to the high volume of traffic having to wait for a gap in the westbound traffic flow on Beach Park Boulevard. The queue storage capacity for drop-off/pick-up operations would consist of 450 feet, compared to an estimated outbound 95th percentile queue length of 400 feet, or 16 vehicles. Although the outbound traffic is estimated to experience long delays, the analysis is a conservative estimate, and the delay at the project driveways would last in total about 10 to 15 minutes. The 95th percentile queue length for the inbound left-turn is estimated to be 75 feet, or three vehicles, compared to the 125 feet of storage capacity. Thus, the left-turn queues are not expected to spill over into the eastbound through-lane on Beach Park Boulevard.

The driveway levels of service calculation sheets are included in Appendix D.

Table 13
Project Driveway Level of Service Summary

Intersection	Movement [1]	Peak Hour	Existing with Project Avg. Delay (sec)	Existing with Project LOS	Background with Project Avg. Delay (sec)	Background with Project LOS	Cumulative with Project Avg. Delay (sec)	Cumulative with Project LOS
Shell Bouelvard/Driveway #1	Inbound Right	AM	0.0	A	0.0	A	0.0	A
		Midday	0.0	A	0.0	A	0.0	A
		PM	0.0	A	0.0	A	0.0	A
Shell Bouelvard/Driveway #2	Inbound Left	AM	8.4	A	8.4	A	8.5	A
		Midday	8.1	A	8.1	A	8.1	A
		PM	7.9	A	7.9	A	8.0	A
	Inbound Right	AM	0.0	A	0.0	A	0.0	A
		Midday	0.0	A	0.0	A	0.0	A
		PM	0.0	A	0.0	A	0.0	A
Shell Bouelvard/Driveway #3	Outbound Right	AM	9.5	A	9.5	A	9.6	A
		Midday	10.7	B	10.7	B	10.7	B
		PM	9.6	A	9.6	A	9.7	A
Beach Park Bouelvard/Driveway #4	Inbound Left	AM	10.0	B	10.0	B	10.3	B
		Midday	8.4	A	8.4	A	8.4	A
		PM	8.6	A	8.6	A	8.7	A
	Inbound Right	AM	0.0	A	0.0	A	0.0	A
		Midday	0.0	A	0.0	A	0.0	A
		PM	0.0	A	0.0	A	0.0	A
	Outbound Right	AM	**45.0**	**E**	**45.0**	**E**	**51.0**	**F**
		Midday	11.5	B	11.5	B	11.5	B
		PM	10.2	B	10.2	B	10.3	B

Note:
[1] For the project driveways, the worst movement's delay and level of service is reported.
Bold indicates a substandard level of service.

On-Site Circulation

The on-site circulation was reviewed in accordance with the City of Foster City Zoning Code and generally accepted traffic engineering standards. Generally, the proposed plan would provide vehicle traffic with adequate connectivity through the parking areas. Vehicles traveling within the project site would primarily circulate in a north-south, counterclockwise manner. The student drop-off and passing drive aisles, located adjacent to the school building, would each be 15 feet wide with a landscaped median separating the drive aisles from the parking area. The project would provide 60-degree parking throughout the project site. Parking spaces throughout the site would be adjacent to one-way, 16-foot wide drive aisles. All of the drive aisles throughout the project site would meet the City's standards and provide sufficient room for vehicles to back out of the parking stalls. Parking space dimensions would comprise stalls measuring 9'-wide by 19'-long, and would meet the standards set forth by the City.

Student Drop-off and Pick-up

The site plan designates the drive aisle adjacent to the school building as a student loading/unloading zone (see Figure 20). The student loading zone would extend approximately 850 feet from the northern driveway on Shell Boulevard to the southwestern driveway on Beach Park Boulevard. During the peak periods before and after school, the on-site circulation of the student drop-off/pick-up would occur in two areas of the student unloading/loading zone: the area adjacent to Shell Boulevard and the area adjacent to Beach Park Boulevard. Figure 19 shows the project student drop-off/pick-up circulation during student loading/unloading periods.

The student drop-off/pick-up circulation adjacent to Shell Boulevard would access the student loading zone from the two entry-only driveways, with the northern driveway on Shell Boulevard only allowing right turns into the project site and the second driveway allowing both right and left turns into the project site. Vehicles entering the site from the second driveway on Shell Boulevard would only be allowed to turn right once on the site, and would have to navigate north to the start of the student loading/unloading zone. The project would install a drop-down barrier gate to prevent vehicles from turning left into the adjacent parking drive aisle once entering the site (see Figure 20). After vehicles from Shell Boulevard have completed their drop-off/pick-up, they would be able to either exit via the third (exit-only) driveway on Shell Boulevard or circulate through the site in the parking lane and passing lane to the Beach Park Boulevard driveway. Vehicles exiting on Shell Boulevard would only be able to turn right onto southbound Shell Boulevard, while vehicles exiting on Beach Park Boulevard would only be able to turn right onto westbound Beach Park Boulevard during the student drop-off/pick-up periods. The project would also install drop-down barrier gates adjacent to the exit-only driveway to prevent vehicles from turning left into the parking drive aisle and trying to make a left from the second driveway, as well as to prevent vehicles from conflicting with the student crosswalk near the main entry area (see Figure 20). Vehicles desiring to access northbound Shell Boulevard would have to circulate through the site in the passing lane and parking lane to exit at the Beach Park Boulevard driveway, and then use Catamaran Street to access northbound Shell Boulevard.

Overall, the site plan provides a good design for drop-off and pick-up operations. School staff or volunteers should direct traffic as they approach the loading zones to ensure vehicles pull as far forward as possible and stop to drop-off and pick-up in the right lane to maintain the traffic flow through the site. Staff or volunteers should also ensure that parents do not leave their vehicles unattended in the loading zone or passing lane while they visit the school. Parents should be directed to load/unload students in a timely manner and then exit the loading zone using the passing lane. Parents that need additional time, for example to complete a phone call or to communicate with students, should be directed to park in the designated on-site parking spaces to ensure the loading zone and passing lane are available for their intended purposes.

Access to Northbound Shell Boulevard

During drop-off and pick-up periods, the project site would not provide direct access to northbound Shell Boulevard. The middle driveway on Shell Boulevard would be restricted to inbound traffic only, while the driveway on Beach Park Boulevard would restrict outbound traffic to right-turns only. In addition, Shell Boulevard and Beach Park Boulevard are too narrow to safely complete a U-turn. Therefore, traffic would have to use Catamaran Street to access northbound Shell Boulevard. During non-peak times, outbound traffic would be able make left-turns at both driveways to access northbound Shell Boulevard.

Sight Distance at the Project Driveways

There are no existing trees or visual obstructions along the project frontages to obscure sight distance at the project driveways. There are also no curves in the roadway along the project frontage on Shell Boulevard or Beach Park Boulevard. Clear sight distance triangles should be provided at the project driveways to optimize sight distance. Any landscaping and signage should be located in such a way to ensure an unobstructed view for drivers exiting the site.

New Foster City Elementary School - Conceptual Site Plan

San Mateo-Foster City School District

ON-SITE TRAFFIC STUDY
05.12.17
05.10.2017

NORTH SCALE: 1"=25'-0"

0' 25' 50' 100'

HMC Architects

Figure 20
Project Student Drop-Off/Pick-Up Circulation

NORTH
Not to Scale

Parking Supply

The City of Foster City Parking Code (Section 17.62.060) states that elementary schools are required to provide one parking stall per employee. The site plan dated June 8, 2017 shows a total of 75 on-site parking spaces. It is assumed that the school would have fewer than 35 employees. Therefore, the proposed parking supply would meet the minimum parking requirements set forth by the City's parking code.

Per the California Building Code (CBC) Table 11B-6, three (3) accessible spaces are required for projects with 51 to 75 parking spaces. Of the required accessible parking spaces, one (1) van accessible space is required. As shown on the site plan, the project would provide three (3) accessible parking spaces. The project site plan shows one of the three accessible parking spaces to be van accessible. Therefore, the accessible parking provisions as shown on the current project site plan would meet the CBC requirements.

Transit, Pedestrian and Bicycle Analysis

Pedestrian facilities in the study area consist of sidewalks located on both sides of Shell Boulevard, Beach Park Boulevard, and other nearby neighborhood roadways in the vicinity of the project. Marked crosswalks are provided on all approaches of the signalized study intersections, and are provided along majority of the stop-controlled approaches at the unsignalized study intersections (see Chapter 2 for detailed discussion). A crosswalk should be added across Catamaran Street at its intersection with Beach Park Boulevard. With this addition, the overall network of sidewalks and crosswalks in the study area will provide good connectivity and safe routes to the school.

The school would provide a crosswalk on-site, near the Shell Boulevard/Beach Park Boulevard intersection, to link the sidewalk to the main entry of the school building. A fence should be positioned along the site boundaries to direct pedestrian and bicycle traffic to the crosswalk and prevent students from walking through the parking lots (see Figure 20).

The project site is not directly served by any bicycle facilities. Shell Boulevard and Beach Park Boulevard are each four-lane arterial roadways with relatively narrow curb-lane widths. There is no space to add bike lanes to these arterials. For these reasons, the project site is not conducive to bicycle access by elementary school-age children.

The project site is well-served by SamTrans and AC Transit buses. It is unlikely that any students would take buses to school. However, it is possible that some staff might take the bus. The existing transit services would adequately accommodate any new riders to/from the school.

7. Conclusions

The potential impacts of the project were evaluated in accordance with the standards set forth by the City of Foster City and the City/County Association of Governments (C/CAG) of San Mateo County CMP. The traffic study includes an analysis of AM, midday, and PM peak hour traffic conditions for three (3) signalized intersections and six (6) unsignalized intersections in the vicinity of the project site, which were identified by the City of Foster City. The analysis focuses on the peak commute periods between 7:00 and 9:00 AM, between 12:00 and 3:00 PM, and between 4:00 and 6:00 PM, because it is during these hours that traffic conditions on the surrounding roadways are generally the most congested.

Intersection Level of Service Analysis

The analysis determined that under all scenarios with and without the project, all of the signalized study intersections are expected to operate at acceptable levels (LOS D or better). In addition, all but one of the stop-controlled study intersections would operate at LOS C or better under all scenarios. Under cumulative conditions, the intersection of Shell Boulevard and Bounty Drive during the PM peak hour would operate at LOS E, assuming the Sand Cove expansion project is approved and implemented. This level of service analysis indicates that vehicles on the stop-controlled approaches would experience long delays (between 35-50 seconds). The pending Sand Cove Apartments Expansion would increase traffic volumes along Shell Boulevard, requiring vehicles on the stop-controlled approaches to wait longer for a gap in the northbound and southbound traffic flows. The net trips generated by the school would subtract vehicles on Shell Boulevard and Bounty Drive, compared to the existing shopping center it replaces, resulting in LOS D during the PM peak hour.

Signal Warrant Analysis

Signal warrant checks (California *MUTCD 2014 Edition, Section 4, Warrant 3*) were performed for the unsignalized study intersections adjacent to the project site. The peak-hour traffic volumes at the intersections on Shell Boulevard at Catamaran Street and Beach Park Boulevard, as well as the Catamaran Street/Beach Park Boulevard intersection would not warrant signalization under all scenarios with and without the project, including cumulative conditions.

Other Transportation Issues

Based on a review of the project site plan, there would be no issues regarding site access along Shell Boulevard and Beach Park Boulevard; and no issues are expected to arise regarding on-site circulation. Although outbound traffic at the driveway on Beach Park Boulevard is estimated to experience long delays, the analysis is a conservative estimate and the congestion at the project driveways would last in total about 10 to 15 minutes given that the school would maintain specific drop-

off and pick-up times. The parking provided by the project would meet the minimum parking requirements set forth by the City of Foster City zoning regulations. Furthermore, the proposed project would not have an adverse effect on the existing transit, pedestrian, or bicycle facilities in the study area. Thus, no project sponsored improvements would be necessary.

Although the analysis and findings conclude that no mitigation measures are required, Hexagon has provided the following recommendations resulting from the site access and circulation analysis.

Recommendations

- During student unloading/loading periods, school staff or volunteers should direct traffic as they approach the loading zones to ensure vehicles pull as far forward as possible and stop to drop-off and pick-up in the right lane to maintain the consistent traffic flow on the site. Staff or volunteers should also ensure that parents do not leave their vehicles unattended in the loading zone or passing lane while they visit the school. Parents should be directed to load/unload students in a timely manner and then exit the loading zone using the passing lane. Parents that need additional time should be directed to park in the designated on-site parking spaces to ensure the loading zone and passing lane are available for their intended purposes.

- A crosswalk should be added across Catamaran Street at its intersection with Beach Park Boulevard to improve the overall network of sidewalks and crosswalks in the study area, and provide good connectivity and safe routes to the school.

- Signage should be added at the driveway on Beach Park Boulevard restricting outbound traffic to right-turns only during the peak hours.