Easton Research Park West Tentative Subdivision Map Project

LOCAL TRANSPORTATION ANALYSIS

DRAFT REPORT

Prepared for:
City of Rancho Cordova

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FEHR PEERS

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INTRODUCTION

This study analyzes the transportation and traffic effects of the proposed Easton Research Park West Industrial project on the local transportation system, following the analysis guidance documented in *Transportation Analysis Guidelines (TAG)*, County of Sacramento, 2020, as specified in the City of Rancho Cordova Transportation Impact Guidelines. In this report, the Easton Research Park West Industrial is referred to as the Project.

Consistent with the TAG, this report presents an analysis of localized traffic circulation using level of service (LOS), consistent with General Plan Circulation Element policies that require land development evaluate and address adverse effects to local and regional roadways. This analysis, referred to as local transportation analysis (LTA), also includes evaluates the potential need for multimodal transportation improvements (e.g., transit, bicycle, pedestrian) where there is the potential for the project to cause a substantial worsening of conditions for multimodal travel. The purpose of the LTA is to ensure that each project provides its fair share of infrastructure improvements to accommodate its multimodal transportation demands. This LTA quantifies the expected changes in transportation conditions and evaluates the need for and efficacy of potential improvements.

The City's TAG provides VMT screening criteria for development projects based on project characteristics and/or project location. Projects may be screened out of VMT impacts using project size, VMT efficiency maps, transit availability, and provision of affordable housing. A project that meets at least one of the VMT screening criteria would have a less than significant VMT impact. The Project is located within 1/2-mile of the Sacramento Regional Transit Gold Line Hazel light rail station. Therefore, the project is screened from VMT analysis.

PROJECT DESCRIPTION

The Project site is in Rancho Cordova, proposed south of Folsom Boulevard and west of Natomas Road (Future Hazel Avenue extension). The Project site is located on about 107 acres and proposes approximately 1,486,000 square feet industrial warehouse land use.

The project location and study intersections are shown in **Figure 1.** The project site plan is included in **Appendix A.**.

1 Study Intersection

Project Site

Figure 1

Study Area

ANALYSIS METHODOLOGY

This study analyzes traffic operations using LOS as the primary measure of performance. Automobile LOS is a qualitative description of traffic flow from the perspective of motorists. The Highway Capacity Manual (HCM) defines six levels of service from LOS A representing the least congested traffic conditions to LOS F representing the most congested traffic conditions. These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving, as well as speed, travel time, traffic interruptions, and freedom to maneuver.

Intersection Operations

The different jurisdictions in which the study intersections are located all employ the procedures described in the *Highway Capacity Manual (HCM) 6th Edition* (Transportation Research Board, 2016) to analyze operations. This study uses the Synchro and SimTraffic software programs to conduct the HCM 6th Edition analyses for traffic signal-controlled intersections. Roundabout operations analysis was conducted using SIDRA Intersection software.

Intersection LOS at signalized and all-way stop controlled intersections is based on the weighted average control delay measured in seconds per vehicle for all motorists traveling through the intersection. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration. In addition, for side-street stop-controlled intersections, this study reports the average control delay for the lane group with the greatest delay.

Table 1 presents the control delay range for each LOS for signalized and unsignalized intersections. The delay ranges for signalized intersections are different from unsignalized intersections. The HCM anticipates that motorists expect signalized intersections to carry higher traffic volume that result in greater delay than an unsignalized intersection. Unsignalized intersections are associated with more uncertainty as delays are less predictable, which can reduce users' delay tolerance.

Table 1: Levels of Service Definitions – Intersections

Level of Service	Description	Average Control Delay[1]	
		Signalized Intersections	Unsignalized Intersections
A	Volume-to-capacity ratio is low and either progression is exceptionally favorable, or cycle length is very short. Most vehicles arrive during the green phase and travel through the intersection without stopping.	≤ 10	≤ 10
B	Volume-to-capacity ratio is low and either progression is highly favorable, or the cycle length is short. More vehicles stop than with LOS A.	>10 to 20	>10 to 15
C	Progression is favorable or the cycle length is moderate. Individual cycle failures (i.e., one or more queued vehicles are not able to depart because of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.	>20 to 35	>15 to 25
D	Volume-to-capacity ratio is high and either progression is ineffective, or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.	>35 to 55	>25 to 35
E	Volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.	>55 to 80	>35 to 50
F	Volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.	>80	>50

Notes:
1. Average control delay presented in seconds per vehicle. Delay values are rounded to the nearest second and evaluated for LOS based on the above delay ranges (i.e., 10 seconds per vehicle = LOS A)

Source: *Highway Capacity Manual 6th Edition*, Transportation Research Board, 2016.

This study analyzes signalized intersections using the Synchro micro-simulation module SimTraffic to apply the methodologies presented in the HCM. Synchro considers traffic volumes, lane configurations, signal timings, and other parameters. SimTraffic additionally considers interactions between adjacent intersections, turn lane spillbacks, coordinated signal timing, and upstream/downstream bottlenecks. SimTraffic is preferable to use when operating conditions are near capacity, turn lane storage exceedance is common, and/or intersections are spaced closely together. Outside of these conditions, Synchro is generally appropriate for use.

Roadway Segments

Roadway segments are analyzed by comparing the average daily traffic volume to daily volume targets identified presented in **Table 2**. These targets are used as guidelines to identify the need for new or upgraded facilities based on daily traffic volumes.

Table 2: Level of Service Criteria for Roadway Segments

Facility Type	# of Lanes	Maximum Volume for Given Service Level				
		A	B	C	D	E
Residential	2	600	1,200	2,000	3,000	4,500
Residential collector with frontage	2	1,600	3,200	4,800	6,400	8,000
Residential collector without frontage	2	6,000	7,000	8,000	9,000	10,000
Arterial, low access control	2	9,000	10,500	12,000	13,500	15,000
Arterial, low access control	4	18,000	21,000	24,000	27,000	30,000
Arterial, low access control	6	27,000	31,500	36,000	40,500	45,000
Arterial, moderate access control	2	10,800	12,600	14,400	16,200	18,000
Arterial, moderate access control	4	21,600	25,200	28,800	32,400	36,000
Arterial, moderate access control	6	32,400	37,800	43,200	48,600	54,000
Arterial, high access control	2	12,000	14,000	16,000	18,000	20,000
Arterial, high access control	4	24,000	28,000	32,000	36,000	40,000
Arterial, high access control	6	36,000	42,000	48,000	54,000	60,000
Rural, 2-lane road, 24' of pavement, 6' paved shoulders	2	2,200	4,300	7,100	12,200	20,000
Rural, 2-lane road, <24' of pavement, < 6' shoulders	2	1,000	2,100	3,400	6,000	12,800

Notes:

Facility Type	Stops/Mile	Driveway	Speed
Arterial, low access control	4+	Frequent	25-35 MPH
Arterial, moderate access control	2-4	Limited	35-45 MPH
Arterial, high access control	1-2	None	45-55 MPH

Source:
Sacramento County Transportation Analysis Guidelines, July 1, 2020

Freeway Off-Ramp Queuing

This study reports the maximum queue at freeway off-ramps based on an average of ten simulation runs using the SimTraffic micro-simulation module. As noted in the intersection operations methodology section above, the SimTraffic micro-simulation module considers interactions between adjacent intersections, turn lane spillbacks, coordinated signal timing, and upstream/downstream bottlenecks. SimTraffic is preferable when conditions are near capacity, turn lane storage exceedance is common, and/or intersections are spaced closely together.

SimTraffic reports the average maximum vehicle queue length in feet. This report assumes that each vehicle in the queue occupies approximately 25 feet. Since the SimTraffic output does not round to the nearest vehicle length, this analysis rounds the SimTraffic outputs up to the next highest 25-foot interval.

These average maximum queue estimates are then compared to the storage length on the freeway off-ramp, as measured via aerial imagery from the limit line of the off-ramp terminal intersection to the off-ramp gore point at the mainline.

SIGNIFICANT TRANSPORTATION EFFECTS

The Sacramento County TAG LTA identifies the following performance targets to determine if the project's effect is significant and require improvements:

Roadway Segments

A project is considered to have a significant effect if it would:

- Result in a roadway segment operating at an acceptable LOS to deteriorate to an unacceptable LOS; or
- Increase the V/C ration by more than 0.05 at a roadway segment the is operating at an unacceptable LOS without the project.

Signalized Intersections

A project is considered to have a significant effect if it would:

- Result in a signalized intersection operating at an acceptable LOS to deteriorate to an unacceptable LOS; or
- Increase the average delay by more than 5 seconds at a signalized intersection that is operating at an unacceptable LOS without the project.

Freeway Ramps

A project is considered to have a significant effect if it would:

- Result in or significantly lengthen ramp queues exceeding storage capacity.

Bicycle and Pedestrian Facilities

A project is considered to have a significant effect if it would:

- Eliminate or adversely affect an existing bikeway or pedestrian facility in a way that would discourage its use.
- Interfere with the implementation of planned bikeway as shown in the Bicycle Master Plan, or conflict with the Pedestrian Master Plan; or
- Fail to provide adequate access for bicyclists and pedestrians, resulting in unsafe conditions, including unsafe bicycle/pedestrian, bicycle/motor vehicle, or pedestrian/motor vehicle conflicts.

Transit

A project is considered to have a significant effect if it would:

- Eliminate or adversely affect existing transit access, service, or operations.
- Interfere with the implementation of transit service as planned in the Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS); or
- Substantially increase transit demand and fail to provide adequate transit service.

ANALYSIS SCENARIOS

This section presents the transportation analysis scenarios and methods used to conduct the transportation analysis including travel demand forecasting and LOS analysis.

This study analyzes the following scenarios to identify the transportation effects of the project under baseline and cumulative conditions:

1. Baseline Conditions
2. Baseline Plus Project Conditions
3. Cumulative Conditions
4. Cumulative Plus Project Conditions

BASELINE CONDITIONS

This chapter describes the baseline transportation system including the roadway, bicycle, pedestrian, and transit systems within the study area.

Roadway System

Regional access to the project is provided by US-50, which is an eight-lane freeway within the study area. Access to the project site is provided through the Hazel Avenue interchange, Hazel Avenue, and Folsom Boulevard.

Folsom Boulevard – is an east-west arterial that generally runs parallel to US-50 and connects the City of Sacramento to the City of Rancho Cordova and the City of Folsom. At Hazel Avenue, Folsom Boulevard consists of two lanes in each direction and has a posted speed limit of 35 miles per hour east of Hazel Avenue and 45 miles per hour west of Hazel Avenue.

Hazel Avenue – is a north-south arterial that extends from City of Roseville to Folsom Boulevard. It has two to three lanes in each direction within the project area. Hazel Avenue provides regional north-south access over the American River, which is a heavily utilized connection for travel between the US-50 corridor and Fair Oaks, Orangevale, and Placer County communities to the north. Hazel Avenue has a posted speed limit of 45 miles per hour at the US 50/Hazel Avenue interchange

Nimbus Road – is the south leg of the Hazel Avenue/Folsom Boulevard intersection and provides access to the Aerojet Rocketdyne facility. The access is controlled by a security gate that is located about 1,000 feet south of Folsom Boulevard.

Hazel Avenue/Folsom Boulevard Intersection – is located about 300 feet south of the US 50/Hazel Avenue interchange northbound off-ramp. The intersection has traffic signal control. Pedestrian crossings are provided on the north, east, and west legs of the intersection. The south leg of the intersection is crossed by two rail lines (U.S. DOT Crossing Inventory Number – 753546R), operated by Sacramento Regional Transit (i.e., Gold Line LRT) and by Union Pacific Railroad (UPRR). The UPRR line terminates about 1,700 east of Nimbus Road and is primarily used for switching activities.

Traffic Volumes

This study was initiated during the current Coronavirus Disease 2019 (Covid-19) pandemic. The pandemic has prompted government and public health officials to encourage physical distancing (i.e., limit in-person economic and social interactions), which has altered conventional travel behavior as more people work remotely, school campuses remained closed at the beginning of the 2020-21 school year, and many businesses operate at reduced capacity. Therefore, collecting a traditional traffic count was not sufficient to capture the typical roadway and intersection traffic conditions that existed before the pandemic. This study uses a few data sources to replicate the pre-pandemic traffic conditions as closely as possible. **Table 3** includes the list of sources for the traffic count data. As shown in **Table 3**, new traffic counts were collected at all study intersections and roadway segments in September 2020. This study also relied on traffic count data collected at various intersections and roadways within 2018 – 2019 timeframe. Additionally, this study uses turning movement estimates for 2019 obtained from StreetLight Data, which uses location data from mobile devices (e.g., mobile phones, global position system (GPS) devices, etc.) and historic traffic counts to estimate daily average turning movements. For study intersections and/or roadway segments that did not have any historic data available, the September 2020 traffic count data was factored and balanced using the adjacent intersection and/or roadway segment data from 2018-2019.

Figure 2 presents the baseline peak hour turning movements for all study intersections.

Table 3: Count Data Sources

Intersection/Roadway	Source-1	Source-2
Hazel Avenue / US 50 Westbound Off-Ramp/Tributary Point Drive	September 2020[1]	February 2018[2]
Hazel Avenue / US 50 Eastbound Ramps	September 2020[1]	February 2018[2]
Folsom Boulevard / US 50 Westbound Ramps	September 2020[1]	StreetLight Data 2019[3]
Folsom Boulevard / US 50 Eastbound Ramps	September 2020[1]	StreetLight Data 2019[3]
Hazel Avenue / Folsom Boulevard	September 2020[1]	February 2018[2]
Folsom Boulevard East of Hazel Avenue	September 2020[1]	-

Notes:
[1] September 2020 data reflects observed traffic volumes collected on September 9, 2020.
[2] February 2018 data was obtained from a previous study.
[3] StreetLight Data provided average daily turning movement estimates for the year of 2019

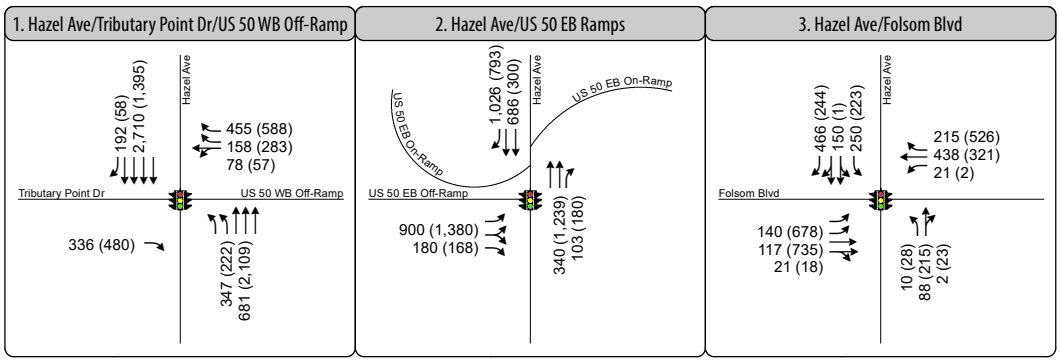


Figure 2

Peak Hour Traffic Volumes and Lane Configurations - Existing Conditions

Roadway Capacity Analysis

Table 4 shows average daily traffic (ADT) volume and corresponding LOS for the study roadway segments under baseline conditions. The existing roadways in the study have adequate capacity and operate acceptably at LOS A.

Table 4: Roadway Level of Service – Baseline Conditions

Roadway	Type	Lanes	Baseline Condition		
			ADT	VC	LOS
Folsom Boulevard: Hazel Avenue to Aerojet Road	Arterial, moderate access control	4	16,600	0.46	A
Folsom Boulevard: West of Hazel Avenue	Arterial, moderate access control	4	18,400	0.51	A

Notes:
ADT = average daily traffic volume
VC – Volume-to-Capacity Ratio
Fehr & Peers, 2021

Intersection Operations Analysis

Table 5 displays the weekday AM and PM peak hour traffic operations analysis results at the study intersections under baseline conditions (refer to Appendix A for detailed calculations). This table indicates that most of the intersections operate acceptably except the Hazel Avenue/Folsom Boulevard intersection.

Table 5: Intersection Level of Service – Baseline Conditions

Intersection	Traffic Control[1]	LOS Standard	Peak Hour	Baseline Conditions	
				Delay[2]	LOS
Hazel Avenue / US 50 Westbound Off-Ramp/Tributary Point Drive	Signal	E	AM	35	C
			PM	33	C
Hazel Avenue / US 50 Eastbound Ramps	Signal	E	AM	26	C
			PM	13	B
Hazel Avenue / Folsom Boulevard	Signal	E	AM	33	C
			PM	**86**	**F**

Notes:
Bold text indicates unacceptable operations.
1. The overall average intersection control delay is reported in seconds per vehicle for signalized and all-way stop controlled intersections.

Source: Fehr & Peers, 2021.

Freeway Off-Ramp Queues

Table 6 shows the weekday peak hour maximum off-ramp queues at the five US-50 off-ramps in the study area under baseline conditions based on outputs from the SimTraffic microsimulation model. The table shows that all the off-ramp queues are accommodated within the available storage.

Table 6: Peak Hour Freeway Off-Ramp Queuing – Baseline Conditions

Intersection	Available Storage (feet)	Peak Hour	Maximum Queue (ft)[2]
US 50 WB Off-Ramp at Hazel Ave	2,000	AM	325
		PM	425
US 50 EB Off-Ramp at Hazel Ave	1,300	AM	250
		PM	250

Notes:
Bold text indicates unacceptable operations.
1. The available storage is estimated by measuring the distance from the gore point where the off-ramp departs from the mainline to the limit line at the ramp terminal intersection with the local street, as measured from aerial imagery. Distance is reported in feet.
2. Reported maximum queue is calculated using the average of 10 SimTraffic microsimulation runs.

Source: Fehr & Peers, 2021.

Bicycle/Pedestrian System

Figure 3 displays the existing pedestrian and bicycle facilities located near the project site. As shown, Class II bike lane facilities (designated with appropriate signing and striping) exist along Folsom Boulevard near the project site. The Jedediah Smith Memorial Trail provides north-south bicycle and pedestrian access over US-50 to Folsom Boulevard near the Aerojet Road off-ramp. Sidewalks are present along Folsom Boulevard west of Aerojet Road but do not exist east of Aerojet Road. At Hazel Avenue/Folsom Boulevard Intersection, crosswalks with push-button pedestrian activation are present on north, east, and west legs.

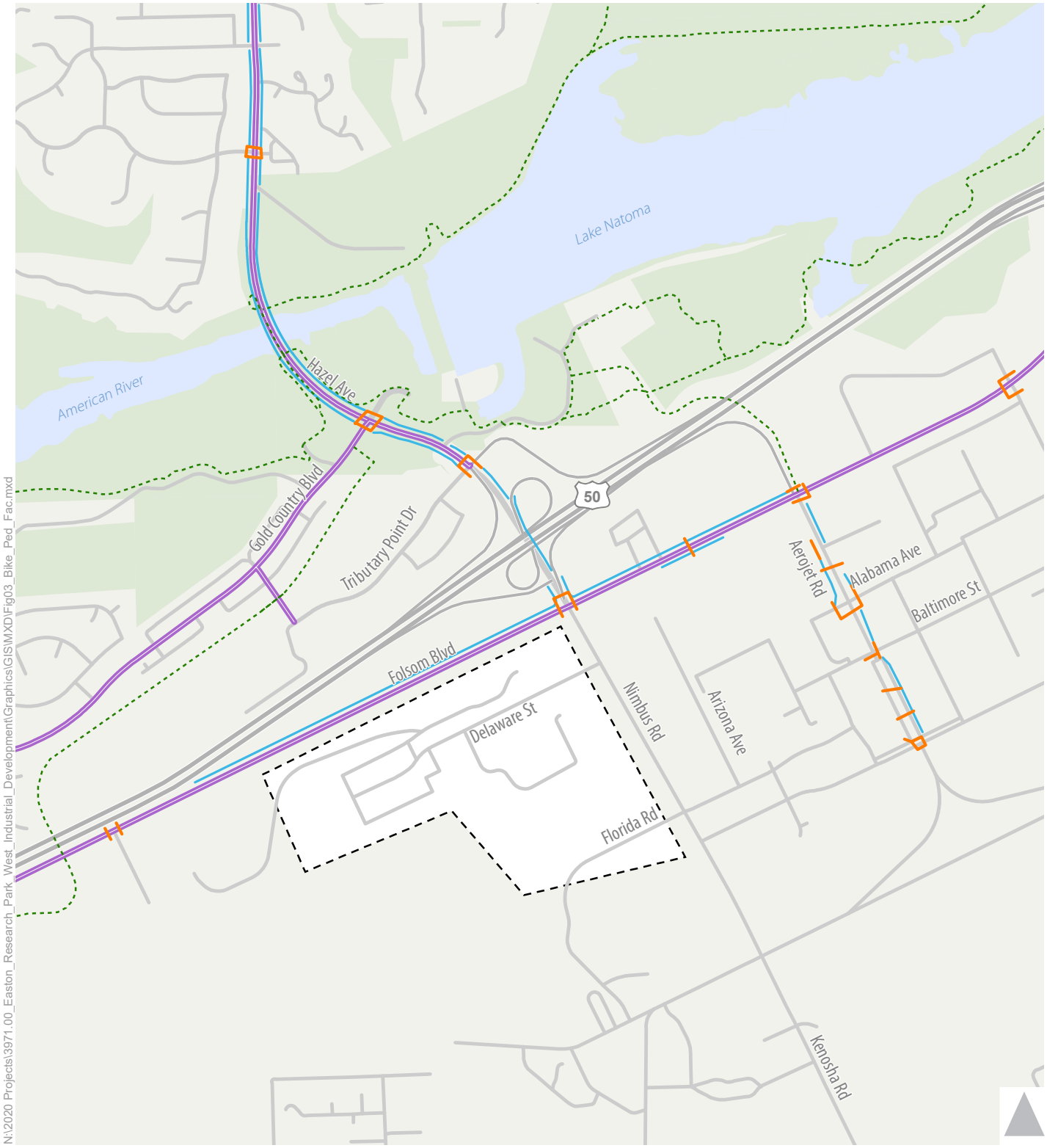


Figure 3

Baseline Bicycle and Pedestrian Facilities

Transit System

Sacramento Regional Transit (SacRT) is the primary transit operator in the study area, operating both light-rail transit and bus transit service. The project site is located west of the Hazel Light Rail Station along the Gold Line light-rail service, which operates between Downtown Sacramento and Folsom. The Gold Line light-rail service operates from 5:00 AM to 11:30 PM on weekdays, with shorter service windows on weekends and holidays. While the Gold Line operates with 15-minute headways during weekday peak hours west of the Sunrise station, it operates with 30-minute headways in the study area at the Hazel Light Rail Station. The light rail stations include park-and-ride facilities and bike racks. The project is about a 1,200-foot walk to the Hazel Light Rail Station, measured from the southwest corner of the Hazel Avenue/Folsom Boulevard intersection.

SacRT's Hazel Express (Route 109) commuter bus also operates in the study area. The Hazel Express is an express commuter route that connects Oak Avenue in Orangevale to Downtown Sacramento. This route operates at 30-minute intervals during the AM and PM peak hours only, with AM peak hour travel towards Downtown Sacramento and PM peak hour travel towards Orangevale. The closest bus stop to the project site serving this route is at Hazel Avenue and Gold County Boulevard, which is about a half-mile walk from the project site measured from the southwest corner of the Hazel Avenue/Folsom Boulevard intersection.

BASELINE PLUS PROJECT CONDITIONS

Trip Generation

Trip generation for the project was calculated using trip generation rates from the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 10th Edition. Table 7 includes the estimated number of daily, AM peak hour, and PM peak hour vehicle trips for the project, using ITE Land Use Code 154 (High-Cube Transload and Short-Term Storage Warehouse). This land use category best matches use description (i.e., intended operation) provided by the applicant. **Table 7** presents the vehicle trip generation estimate for the project.

Table 7: Project Vehicle Trip Generation Estimate

Land Use[1]	ITE Code	Quantity (1,000 Square Feet)	Time Period	Vehicle Trips		
				Total	Entry	Exit
High-Cube Transload and Short-Term Storage Warehouse[1]	154	1,486	Daily	2,080	1,040	1,040
			AM	119	92	27
			PM	149	42	107

Notes:
KSF = thousand square feet
[1]High-Cube Transload and Short-Term Storage Warehouse facilities have a primary function of consolidation and distribution of pallet loads (or larger) for manufacturers, wholesalers, or retailers. The typically have little storage duration, high throughput, and are high-efficiency facilities.

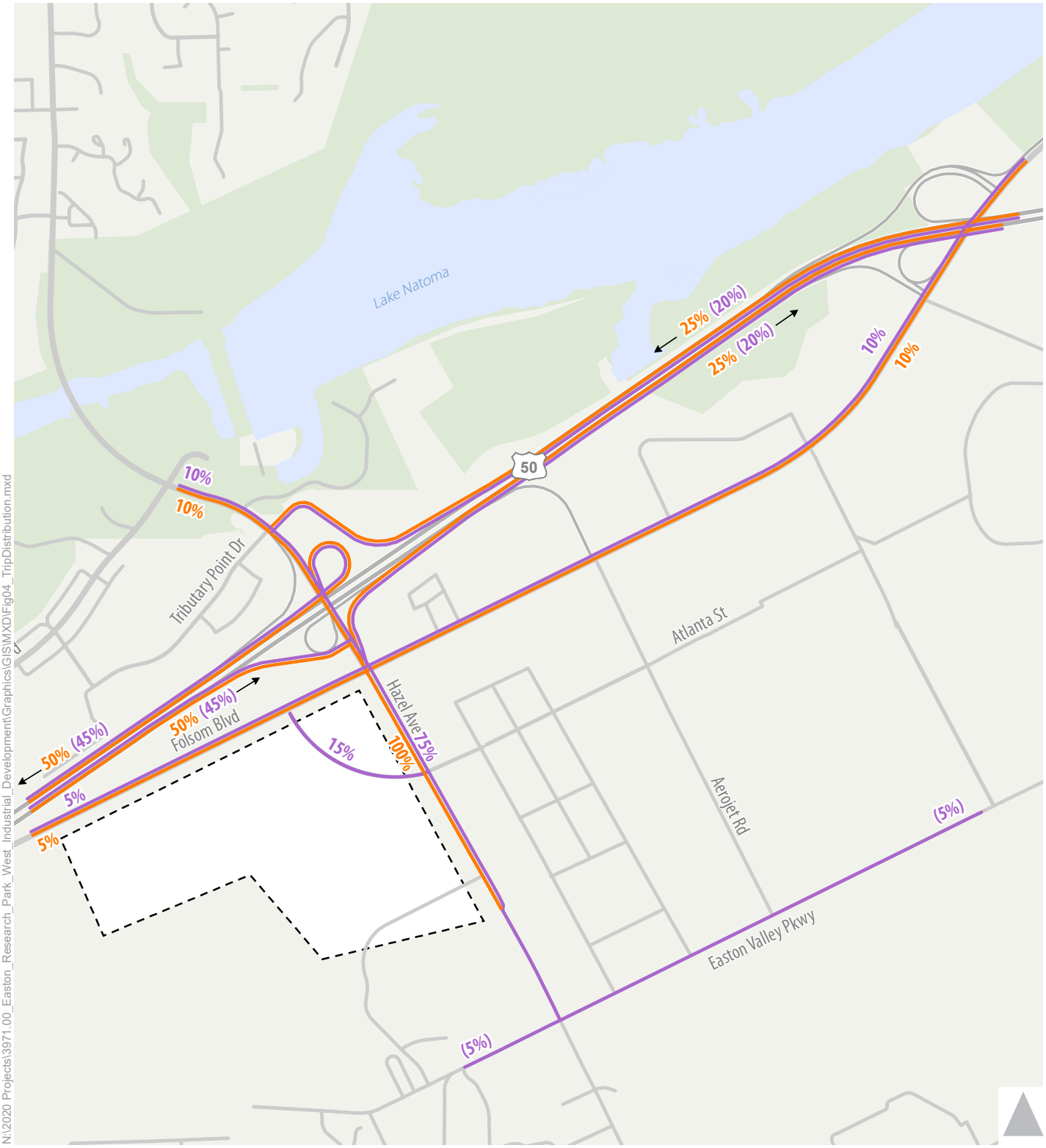
Source:
Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 10th Edition
Fehr & Peers, 2021

Trip Distribution

Figure 4 displays the expected trip distribution for baseline and cumulative conditions. The trip distribution shown on **Figure 4** was developed based on existing turning movement traffic volume counts and a project-only assignment from a modified version of SACOG's Activity-Based Travel Simulation Model (SACSIM 19).

Project trips were assigned to the study intersections and driveways in accordance with the trip distribution percentages. Those trips were then added to the baseline traffic volumes and cumulative traffic volume forecasts.

Figure 5 shows the project only trip assignment under baseline conditions and **Figure 6** shows the Baseline Plus Project volume forecasts.



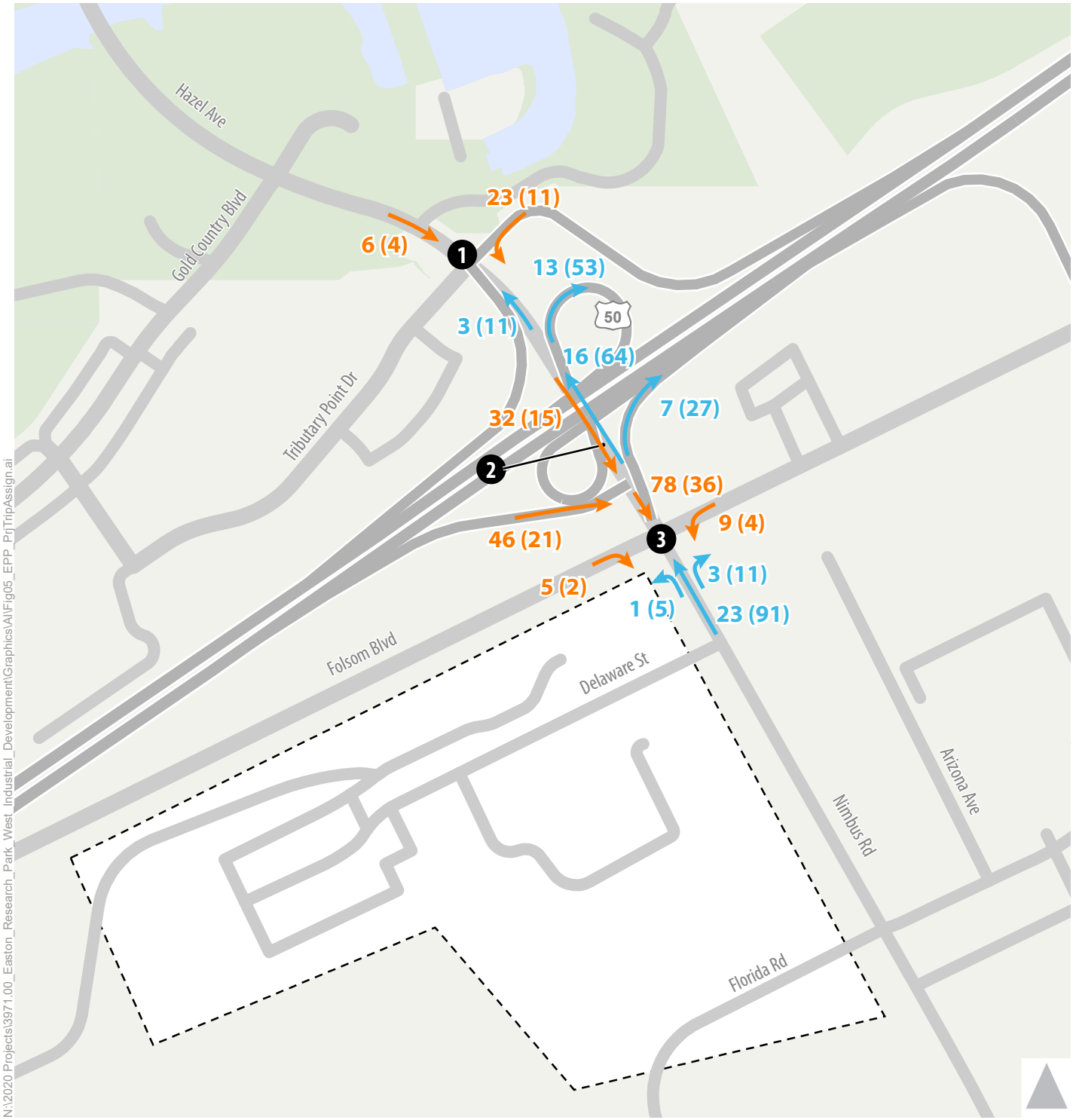
x% Existing Trip Distribution Percentage

x% Cumulative Trip Distribution Percentage

Project Site

Figure 4

Existing & Cumulative Year Preliminary Project Trip Distribution



AM (PM) Incoming Peak Hour Turning Movement Volume

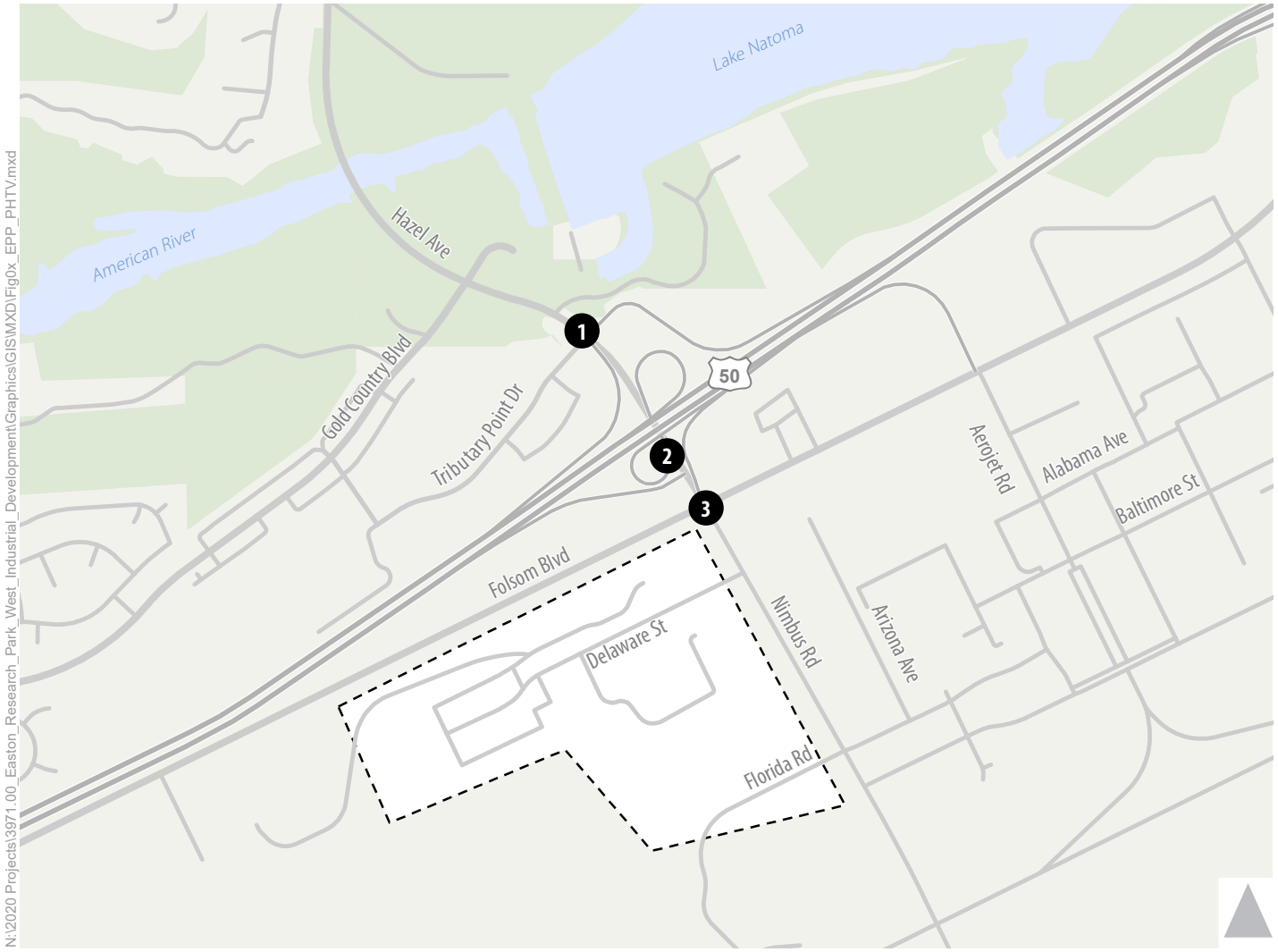
AM (PM) Outgoing Peak Hour Turning Movement Volume

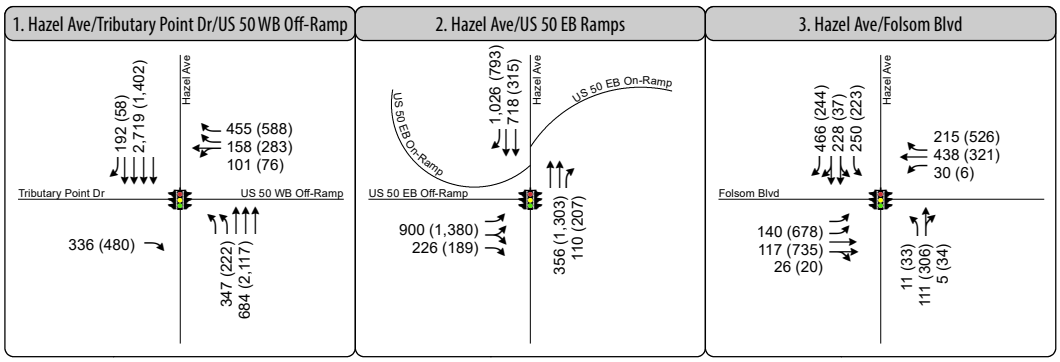
1 Study Intersection

Project Site

Figure 5

Project Trip Assignment - Baseline Plus Project Conditions





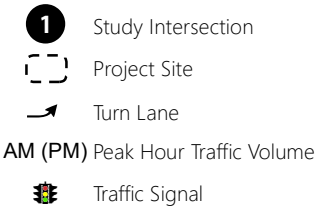


Figure 6

Peak Hour Traffic Volumes and Lane Configurations - Baseline Plus Project Conditions

Operations Analysis

The following presents the operations analysis under Baseline Conditions with the addition of the Project.

Baseline Plus Project Roadway Capacity Analysis

Table 8 shows the ADT and corresponding LOS for the study roadway segments under baseline plus project conditions. The study roadway segments continue to operate at acceptably, at LOS A, under baseline plus project conditions.

Table 8: Roadway ADT Level of Service – Baseline Plus Project Conditions

Roadway[1]	Lanes	Baseline Condition			Baseline Plus Project Condition		
		ADT	VC	LOS	ADT	VC	LOS
Folsom Boulevard: Hazel Avenue to Aerojet Road	4	16,600	0.46	A	16,800	0.47	A
Folsom Boulevard: West of Hazel Avenue	4	18,400	0.51	A	18,500	0.51	A

Source:
[1]Roadway Classification – Moderate Access Control
ADT = Average daily traffic volume
VC – Volume-to-Capacity Ratio
Fehr & Peers, 2021

Baseline Plus Project Intersection Operations Analysis

Table 9 presents the weekday AM and PM peak hour traffic operations analysis results at the intersections under baseline plus project conditions (refer to Appendix A for detailed calculations). As shown, most of the intersections will continue to operate acceptably. However, the addition of project traffic would worsen unacceptable LOS F conditions at the Hazel Avenue/Folsom Boulevard intersection during the PM peak hour.

However, this intersection will be grade separated with the US-50 / Hazel Avenue interchange project. Therefore, physical capacity enhancements to this intersection (e.g., additional turn lanes or travel lanes) are not recommended as improvements would have limited utility. In addition, an interim improvement was analyzed that would provide one shared through/left-turn lane and on shared through/right-turn lane on the northbound approach to the intersection. With this improvement, the intersection LOS would improve from LOS D to LOS C in the AM peak hour. The intersection would continue to operate at LOS F during the PM peak hour with a decrease in delay from 92.2 seconds to 92.0 seconds.

Table 9: Intersection Level of Service – Baseline Plus Project Conditions

Intersection	Traffic Control	LOS Standard	Peak Hour	Baseline Condition		Baseline Plus Project Condition	
				Delay	LOS	Delay	LOS
Hazel Avenue / US 50 Westbound Off-Ramp/Tributary Point Drive	Signal	E	AM	35	C	58	C
			PM	33	C	34	C
Hazel Avenue / US 50 Eastbound Ramps	Signal	E	AM	26	C	43	D
			PM	13	B	15	B
Hazel Avenue / Folsom Boulevard	Signal	E	AM	33	C	40	D
			PM	**86**	**F**	**93**	**F**

Notes:
Bold text indicates unacceptable operations.
1. The overall average intersection control delay is reported in seconds per vehicle for signalized intersections.
Source: Fehr & Peers, 2021.

Freeway Off-Ramp Queues

Table 10 shows the weekday peak hour maximum off-ramp queues at the two US-50 off-ramps in the study area under baseline plus project conditions. The table shows that the maximum queues increase but remain within the available storage.

Table 10: Peak Hour Freeway Off-Ramp Queuing – Baseline Plus Project Conditions

Intersection	Available Storage(ft)[1]	Peak Hour	Maximum Queue (ft)[2]	
			Baseline Conditions	Baseline + Project Conditions
US 50 WB Off-Ramp at Hazel Ave	2,000	AM	325	575
		PM	425	500
US 50 EB Off-Ramp at Hazel Ave	1,300	AM	250	350
		PM	250	400

Notes:
Bold text indicates unacceptable operations.
1. The ramp length is estimated by measuring the distance from the gore point where the off-ramp departs from the mainline to the limit line at the ramp terminal intersection with the local street, as measured from aerial imagery. Distance is reported in feet.
2. Maximum queue, as calculated using the average of 10 SimTraffic microsimulation runs.
Source: Fehr & Peers, 2021.

CUMULATIVE CONDITIONS

This section presents the cumulative effects of the proposed project on the transportation system. Cumulative scenarios analyzed for this report include:

- Cumulative No Project
- Cumulative Plus Project

Land Use and Roadway Network Assumptions

The cumulative analysis is based on the latest version of the SACSIM19 travel demand model developed by the Sacramento Area Council of Governments (SACOG). The 2040 land use inputs developed by SACOG include the land development that is anticipated to occur over the next 20 years in the SACOG region. This includes new residential units and non-residential buildings in the Glenborough and Easton Place developments adjacent to the proposed project.

The cumulative scenario also includes both new local roadways that would be constructed with the forecasted land use development and regional transportation projects listed in the financially constrained project list in SACOG's 2020 MTP/SCS. New local roadways in the study area include Easton Valley Parkway, an east-west arterial that would extend east from Hazel Avenue through the Glenborough development to Prairie City Road, and Glenborough Drive, which would add a southern leg to the Folsom Boulevard / US-50 Eastbound Ramps intersection and extend south to Easton Valley Parkway.

Regional transportation projects in the study area include the construction of the US-50 / Hazel Avenue interchange improvement project. Based on information obtained from the *Hazel Avenue/U.S. 50 Interchange Project Public Draft Environmental Impact Report/Environmental Assessment* prepared by Caltrans and the County of Sacramento, the Hazel Avenue interchange project would reconfigure the interchange ramps, ramp terminal intersections, and elevate Hazel Avenue above Folsom Boulevard and the light-rail tracks. This study uses the lane configurations and traffic control devices proposed for Alternative 1, based on direction from Sacramento County staff.

Under Alternative 1, a jug handle would provide circulation between Hazel Avenue and Folsom Boulevard. The jug handle would intersect Folsom Boulevard west of the proposed Hazel Avenue overcrossing and intersect Hazel Avenue at the future Atlanta Street extension into Easton Place, located south of Folsom Boulevard. As a result of the interchange project, the study intersection of Hazel Avenue / Folsom Boulevard would be grade separated and turning movements between these two streets would shift to the jug handle. The Hazel Avenue interchange project documentation also indicates that Hazel Avenue would be widened and extended south to the future Easton Valley Parkway.

Traffic Forecasting

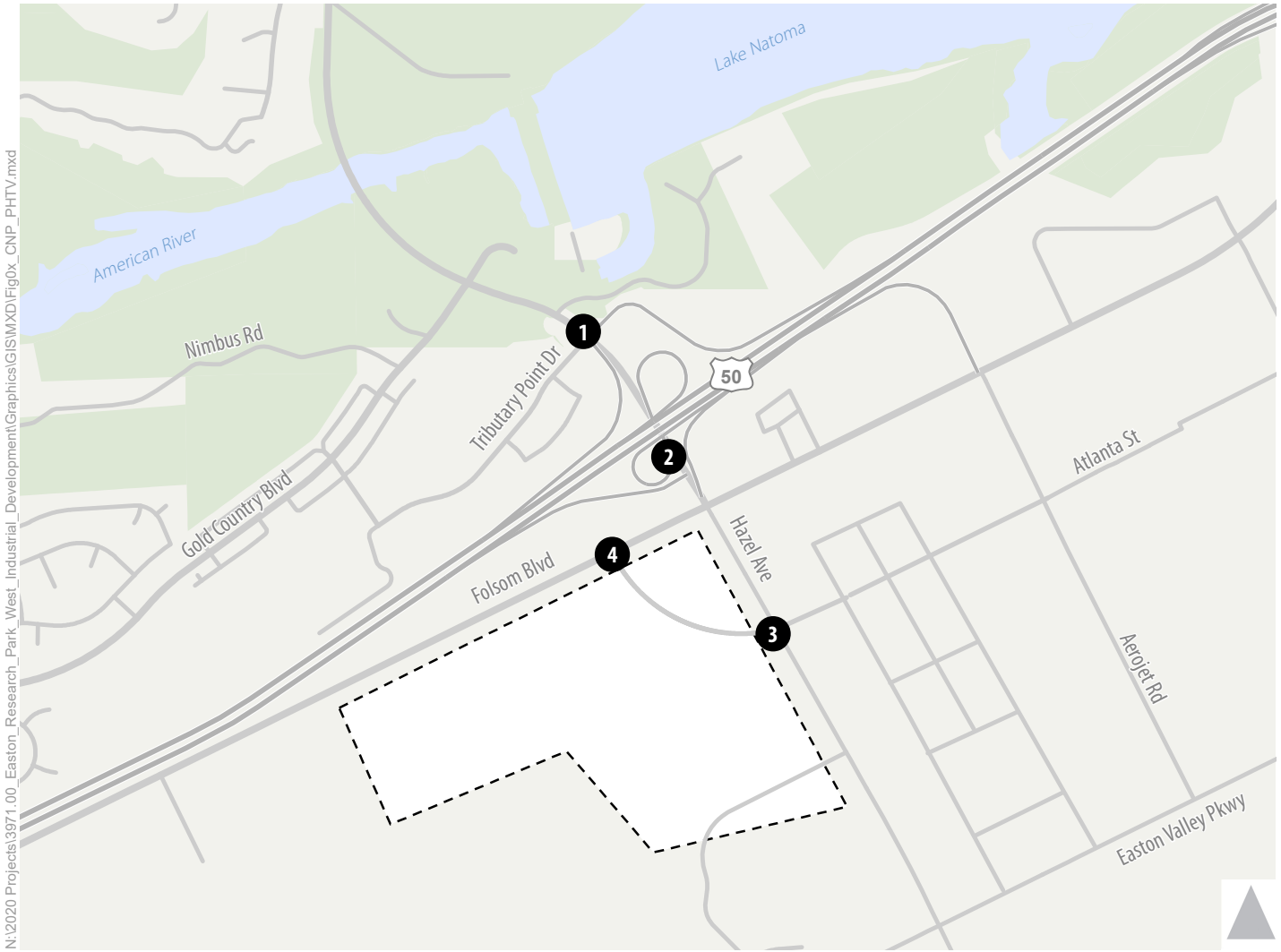
This study uses the SACSIM19 regional activity-based travel forecasting model to prepare daily and peak hour traffic volume forecasts for the cumulative scenarios. The off-the-shelf model lacks sufficient detail and was not fully calibrated for the project study area. Therefore, roadway network and travel analysis zone (TAZ) loading detail were refined in the study area. However, this study did not modify the underlying land use inputs generated by SACOG for the 2040 horizon year.

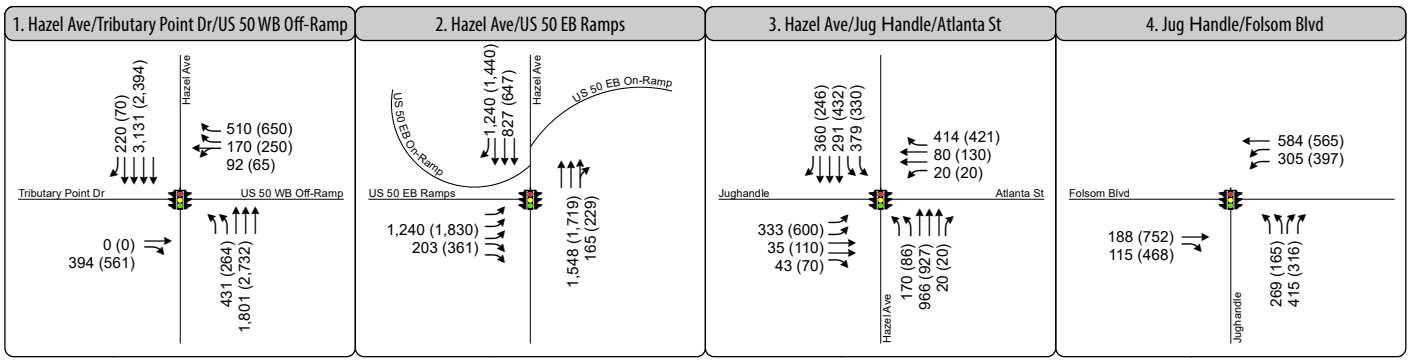
This study uses a forecasting adjustment procedure known as the "difference method" to prepare the cumulative traffic volume forecasts. The difference method adds the increment of growth (i.e., increase or decrease in traffic volume) between the model forecast scenario and base year model to baseline traffic volumes at the study intersections, roadway segments, and freeway off-ramps to develop forecasts. This method corrects potential anomalies within the model and assures a more accurate forecast. This forecasting procedure is calculated as follows:

Cumulative Forecast = Baseline Traffic Count + (Cumulative Model Volume – Base Year Model Volume)

In instances where the turning movement does not currently exist (e.g., turning movements onto Glenborough Drive at the Folsom Boulevard / US-50 Eastbound Ramps intersection), this study uses the raw cumulative model volume directly. This study also rounds the cumulative traffic forecasts to the nearest 10 vehicles to reflect the likely variation in travel from day-to-day.

Figure 7 presents the forecasted cumulative no project traffic volumes.





1 Study Intersection

Project Site

Turn Lane

AM (PM) Peak Hour Traffic Volume

Traffic Signal

Figure 7

Peak Hour Traffic Volumes and Lane Configurations - Cumulative No Project Conditions

Potential Limitations to Travel Demand Model and Forecasts (COVID-19)

Transportation and mobility are being transformed through several forces ranging from new technologies, different personal preferences, and the unique effects of the current COVID-19 pandemic, the combination of which could alter traditional travel demand relationships in the near- and long-term future. While travel activity will likely return to some form of normality after the pandemic has concluded, it is possible that some of these temporary changes will influence people's travel choices into the future, including either accelerating or diminishing some of the emerging trends in transportation that were already underway prior to the pandemic, including:

- Substitution of internet shopping and home delivery for some shopping or meal-related travel
- Substitution of telework for commute travel.
- Substitution of virtual interactions for in-person interactions (i.e., telemedicine, online/distance education, etc.)
- Substitution of social media for social/recreational travel
- New travel modes and choices: Transportation Network Companies (TNCs), such as Uber and Lyft, car share, bike share, scooter share, and on-demand micro transit have increased the travel options available to travelers in the Sacramento area, and have contributed to changes in traditional travel demand relationships. For example, combined bus and rail ridership on SacRT has declined by approximately 20 percent between 2016 and 2019. The SACSIM model was calibrated to 2016 conditions and may not fully capture all the factors influencing transit ridership declines today or in the future.

Automation of vehicles: Both passenger vehicles and commercial vehicles and trucks are evolving to include more automation. Research, development, and deployment testing is proceeding on fully automated vehicles, for which no human driver would be required, and the vehicle itself can navigate the roadways take people or goods where they need to go. Uncertainty exists for the behavioral response to AVs. In terms of VMT impacts on the transportation system and the environment, the worst-case scenario would be one in which AVs are privately owned, like they are now, but the automated function of the vehicles would be used to travel more:

  - Reposition vehicles to serve different members of a household.
  - Reduce the value travelers place on time spent in a vehicle, resulting in an increase in the willingness to make longer trips.
  - Increase the willingness to drive more to avoid parking costs or tolls.

Connected vehicles (CVs)—can communicate wireless with its surroundings including other vehicles, bicyclists, pedestrians, roadway infrastructure (i.e., traffic signals, toll facilities, traffic management facilities,

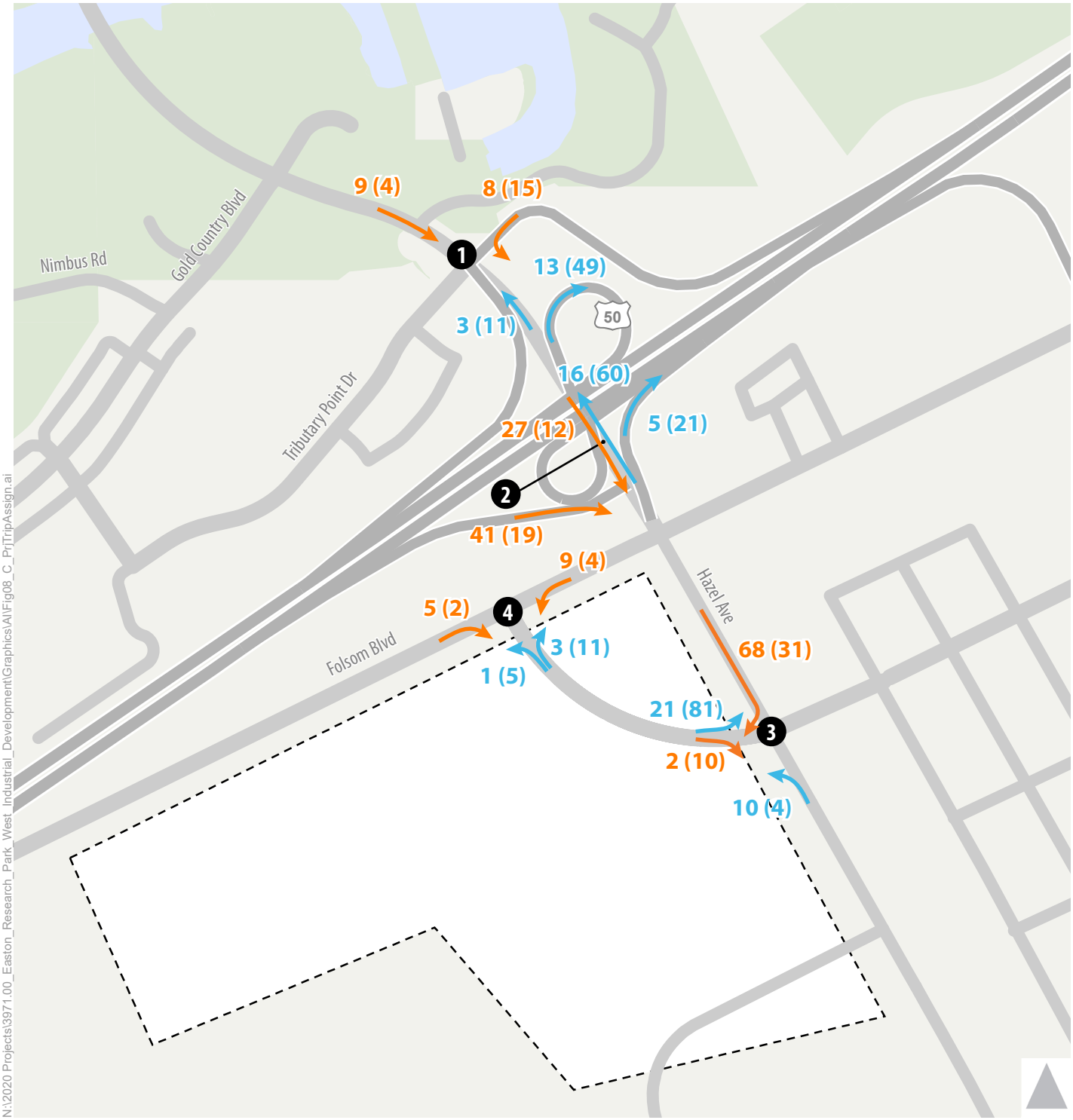
etc.) and the internet. The influence that CVs may have is still speculative but includes potential for reductions in collisions and congestion and greater overall network performance optimization.

The 2018-2019 traffic counts collected for the transportation analysis are intended to reflect more conventional travel patterns prior to the pandemic. However, the travel forecasts developed for the proposed project may not account for the potential short-term or long-term behavioral changes that may result from the pandemic (e.g., shifting to more telecommuting and virtual meetings). While some of these changes may result in fewer average daily trips, the degree of these changes and their resilience over time is not known and cannot be predicted with a high degree of confidence.

Cumulative Trip Distribution

The cumulative trip distribution for the project was estimated using the same method as base year. Due to planned development surrounding the project site (i.e., Easton Place and Glenborough), cumulative growth in the overall SACOG region, and reasonably foreseeable transportation improvements (i.e., Easton Valley Parkway, Hazel Avenue interchange project, etc.), the project's trip distribution under cumulative conditions is anticipated to be different than the base year. **Figure 4** shows the trip distribution under cumulative conditions for the project.

Project trips are assigned to the study intersections and driveways in accordance with the trip distribution shown in **Figure 4**. The project trips are then added to the cumulative no project forecasts to yield the cumulative plus project volumes. **Figure 8** shows the project only trip assignment under cumulative conditions and **Figure 9** shows the Cumulative Plus Project volume forecasts.



AM (PM) Incoming Peak Hour Turning Movement Volume

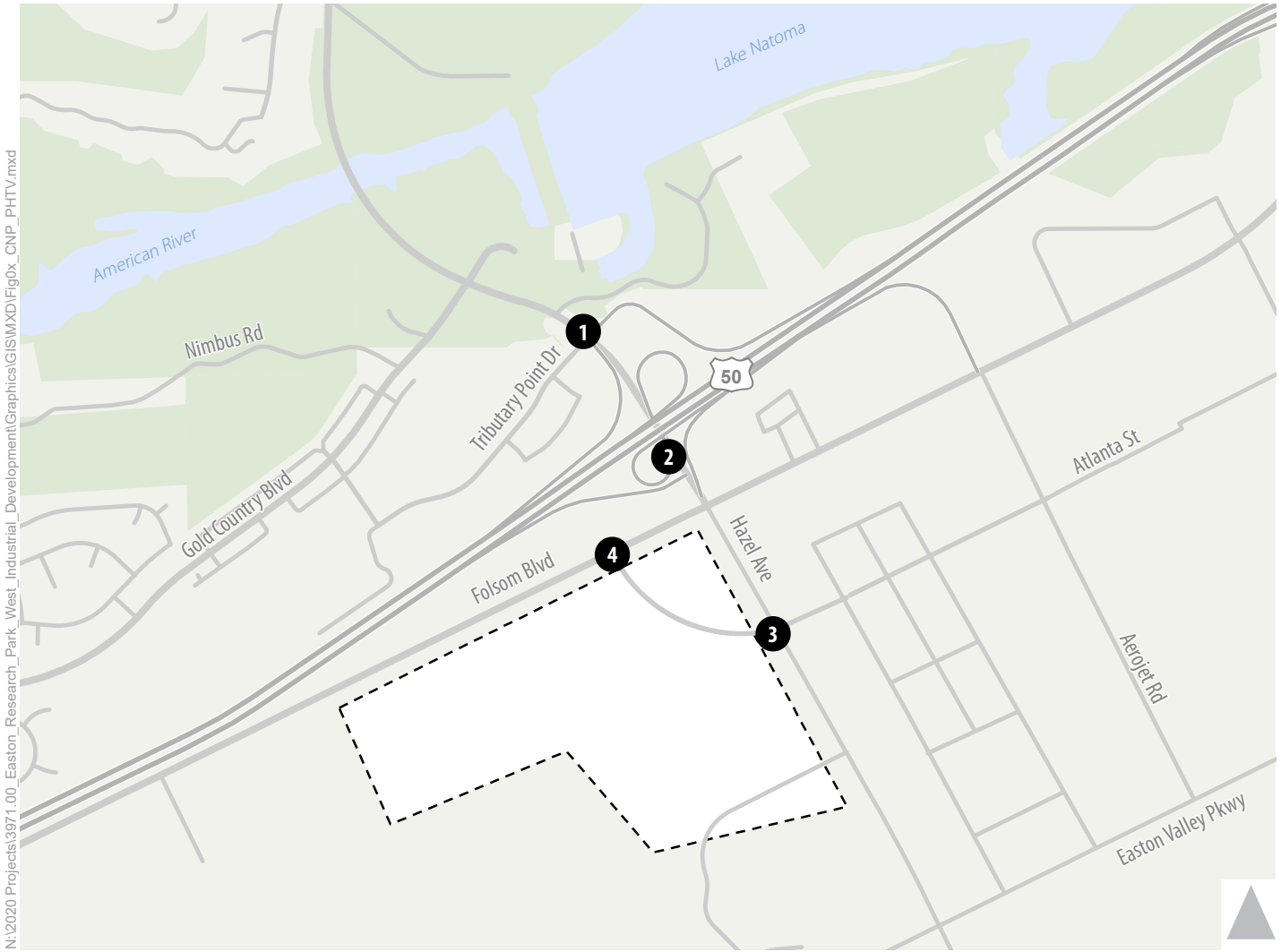
AM (PM) Outgoing Peak Hour Turning Movement Volume

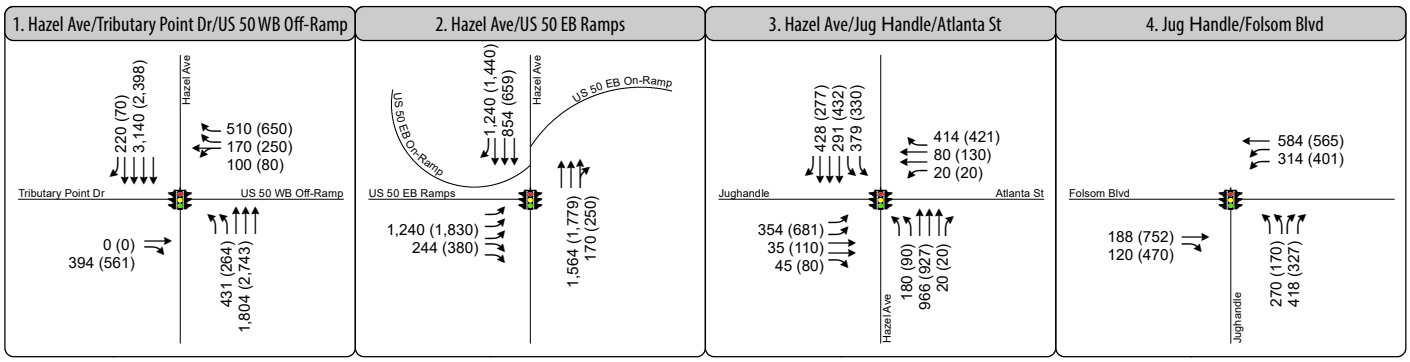
1 Study Intersection

Project Site

Figure 8

Project Trip Assignment - Cumulative Conditions





1 Study Intersection

Project Site

Turn Lane

AM (PM) Peak Hour Traffic Volume

Traffic Signal

Figure 9

Peak Hour Traffic Volumes and Lane Configurations - Cumulative Plus Project Conditions

Cumulative Operations Analysis

This chapter describes the cumulative transportation system including the roadway, intersection, and freeway off-ramp queuing.

Roadway Operations Analysis

Table 11 shows the ADT and corresponding LOS for the study roadway segments under cumulative conditions. The table shows that the study roadway segments are forecasted to operate at an acceptable LOS during the cumulative no project and cumulative plus project conditions. Therefore, the project would not significantly effect roadway segment operations per the Sacramento County significance criteria.

Table 11: Roadway ADT Level of Service – Cumulative Conditions

Roadway[1]	Lanes	Cumulative No Project Condition			Cumulative Plus Project Conditions		
		ADT	VC	LOS	ADT	VC	LOS
Folsom Boulevard: Hazel Avenue to Aerojet Road	4	20,300	0.56	A	20,500	0.57	A
Folsom Boulevard: West of Hazel Avenue	4	19,500	0.54	A	19,600	0.54	A

Source:
[1]Roadway Classification – Moderate Access Control
ADT = Average daily traffic volume
VC – Volume-to-Capacity Ratio
Fehr & Peers, 2021

Intersection Operation Analysis

Table 12 presents the weekday AM and PM peak hour traffic operations results at the study intersections under cumulative conditions, without and with the proposed project (refer to *Appendix A* for detailed calculations). This study assumes new actuated uncoordinated signal timings would be implemented under cumulative no project conditions, as the County and other agencies typically update signal timings as needed to address changing travel patterns over time. The signal timings are kept consistent between cumulative no project and cumulative plus project scenarios to quantify the project's effect on delay and LOS. Both the cumulative no project and cumulative plus project scenarios reflect intersection lane configurations shown in the Hazel Avenue / US-50 Interchange project documentation, as described above.

Table 12 shows that the project would exacerbate unacceptable LOS F operations at the Hazel Avenue / US 50 Westbound Off-Ramp/Tributary Point Drive intersection during the PM Peak Hour. This intersection would operate at the LOS F target under cumulative no project conditions.

The project is forecasted to increase the average control delay by 5 seconds compared to cumulative no project conditions, which would worsen LOS F conditions. Modify the traffic signal timings to provide coordinated signal timings in response to the changed demand produced by the Project along Hazel Avenue from the American River Bridge to Atlanta Street. Implementation of this improvement would result in LOS E operations by providing more efficient traffic signal operation and reducing average control delay per vehicle.

Since this significant effect occurs under cumulative conditions, the project is responsible for its fair share cost towards implementation of the modification, which is estimated at 9%. Fair share payment would be made to the City of Ranch Cordova and provided to Sacramento County for traffic signal maintenance when the City and Sacramento County establish a reciprocal funding agreement.

Table 12: Intersection Level of Service – Cumulative Conditions

Intersection	Traffic Control	LOS Standard	Peak Hour	Cumulative No Project Conditions		Cumulative Plus Project Conditions	
				Delay[1]	LOS	Delay[1]	LOS
Hazel Avenue / US 50 Westbound Off-Ramp/Tributary Point Drive	Signal	E	AM	54	D	56	E
			PM	**85**	**F**	**85**	**F**
Hazel Avenue / US 50 Eastbound Ramps	Signal	E	AM	23	C	23	C
			PM	46	D	49	D
Hazel Avenue / Jug Handle / Atlanta Street	Signal	E	AM	44	D	41	D
			PM	67	E	75	E
Jug Handle / Folsom Boulevard	Signal	E	AM	28	C	37	E
			PM	34	C	39	D
Jug Handle / Roundabout	Roundabout	E	AM	-	-	4	A
			PM	-	-	4	A

Notes:
Bold text indicates unacceptable operations.
1. The overall average intersection control delay is reported in seconds per vehicle for signalized intersections.
Source: Fehr & Peers, 2021.

Jug Handle Queues

Table 13 shows the weekday AM and PM peak hour maximum queue lengths on the northbound approach to the Jug Handle / Folsom Boulevard and on the eastbound approach to the Jug Handle / Atlanta Street/ Hazel Avenue intersection. As shown, the maximum vehicle queue would extend to the roundabout during some cycles during the PM peak hour under cumulative plus project conditions. To better manage vehicle queuing, we recommend modifying the lane configuration on the eastbound approach by converting the planned inside through lane to a left-turn lane to provide three eastbound to northbound left-turn lanes, one through lane, and a right-turn lane. This modification would provide more capacity for the highest volume movement on the approach. As shown, with this improvement the maximum vehicle queue would be reduced and not extend to the roundabout. In addition to reduced maximum queues, AM peak hour delay would reduce from 41 seconds to 37 seconds and PM peak hour delay would reduce from 75 seconds to 63 seconds.

Table 13: Peak Hour Jug Handle Queuing – Cumulative Conditions

Intersection	Available Storage(ft)[1]	Peak Hour	Maximum Queue (ft)	
			Cumulative + Project Conditions[2]	Cumulative + Project Conditions With Improvement
NB Approach – Jug handle / Folsom Boulevard	900	AM	225	-
		PM	125	-
EB Approach – Jug handle / Atlanta Street / Hazel Avenue	425	AM	225	225
		PM	400	250

Notes:
Bold text indicates unacceptable operations.
1. Storage measured from crosswalk to center of roundabout.
2. Maximum queue, as calculated using the average of 10 SimTraffic microsimulation runs.

Source: Fehr & Peers, 2021

Freeway Off-Ramp Queues

Table 14 shows the weekday peak hour maximum off-ramp queues at the two US-50 off-ramps in the study area under cumulative conditions. The table shows that the maximum queues increase but remain within the available storage.

Table 14: Peak Hour Freeway Off-Ramp Queuing – Cumulative Conditions

Intersection	Available Storage(ft)[1]	Peak Hour	Maximum Queue (ft)[2]	
			Cumulative No Project Conditions	Cumulative + Project Conditions
US 50 WB Off-Ramp at Hazel Ave	2,000	AM	350	375
		PM	650	800
US 50 EB Off-Ramp at Hazel Ave	1,300	AM	275	275
		PM	525	500

Notes:
Bold text indicates unacceptable operations.
1. The ramp length is estimated by measuring the distance from the gore point where the off-ramp departs from the mainline to the limit line at the ramp terminal intersection with the local street, as measured from aerial imagery. Distance is reported in feet.
2. Maximum queue, as calculated using the average of 10 SimTraffic microsimulation runs.

Source: Fehr & Peers, 2021

APPENDIX A

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	347	333	96.0%	43.0	3.5	D
	Through	681	687	100.9%	17.9	3.1	B
	Right Turn						
	Subtotal	1,028	1,020	99.2%	26.1	2.0	C
SB	Left Turn						
	Through	2,710	2,678	98.8%	42.7	4.0	D
	Right Turn	192	196	101.9%	12.4	2.0	B
	Subtotal	2,902	2,874	99.0%	40.6	3.7	D
EB	Left Turn						
	Through						
	Right Turn	336	336	99.9%	31.6	6.8	C
	Subtotal	336	336	99.9%	31.6	6.8	C
WB	Left Turn	78	78	100.0%	58.1	12.8	E
	Through	158	154	97.2%	52.9	10.5	D
	Right Turn	455	465	102.2%	11.1	3.1	B
	Subtotal	691	696	100.8%	25.6	5.9	C
Total		4,957	4,926	99.4%	34.9	2.0	C

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Baseline Conditions**
Volume and Delay by Movement **AM Peak Hour**

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn						
	Through	686	668	97.4%	43.7	6.2	D
	Right Turn	1,026	990	96.5%	27.4	5.0	C
	Subtotal	1,712	1,658	96.9%	34.0	5.4	C
EB	Left Turn	900	883	98.1%	13.4	1.8	B
	Through						
	Right Turn	180	172	95.6%	7.2	1.3	A
	Subtotal	1,080	1,055	97.7%	12.4	1.5	B
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,792	2,713	97.2%	25.7	3.5	C

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Baseline Conditions**
Volume and Delay by Movement **AM Peak Hour**

Intersection 3 **Hazel Ave./Folsom Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	10	6	64.0%	42.7	36.7	D
	Through						
	Right Turn	90	98	108.4%	22.2	3.3	C
	Subtotal	100	104	104.0%	24.3	3.2	C
SB	Left Turn	250	249	99.7%	49.8	9.2	D
	Through	150	122	81.6%	46.6	10.0	D
	Right Turn	466	473	101.5%	13.6	2.6	B
	Subtotal	866	844	97.5%	28.9	4.5	C
EB	Left Turn	140	131	93.7%	70.3	13.6	E
	Through	117	106	90.3%	29.8	11.8	C
	Right Turn	21	24	114.3%	23.1	21.4	C
	Subtotal	278	261	93.8%	49.5	8.5	D
WB	Left Turn	21	21	101.0%	90.8	30.2	F
	Through	438	425	97.1%	41.1	6.4	D
	Right Turn	215	221	102.9%	9.4	2.4	A
	Subtotal	674	668	99.1%	32.0	4.6	C
Total		1,918	1,877	97.9%	32.6	3.4	C

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Baseline Conditions**
Volume and Delay by Movement **PM Peak Hour**

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	222	218	98.0%	50.1	6.1	D
	Through	2,109	1,926	91.3%	36.3	4.8	D
	Right Turn						
	Subtotal	2,331	2,143	91.9%	37.7	4.7	D
SB	Left Turn						
	Through	1,395	1,413	101.3%	31.0	4.2	C
	Right Turn	58	60	103.4%	5.3	1.2	A
	Subtotal	1,453	1,473	101.4%	30.0	4.2	C
EB	Left Turn						
	Through						
	Right Turn	480	500	104.1%	22.5	3.7	C
	Subtotal	480	500	104.1%	22.5	3.7	C
WB	Left Turn	57	46	80.7%	46.3	15.5	D
	Through	283	290	102.5%	46.3	6.6	D
	Right Turn	588	600	102.0%	26.0	3.2	C
	Subtotal	928	936	100.8%	33.2	4.4	C
Total		5,192	5,051	97.3%	33.1	3.4	C

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Baseline Conditions**
Volume and Delay by Movement **PM Peak Hour**

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn						
	Through	300	282	94.1%	34.7	5.2	C
	Right Turn	793	815	102.7%	10.7	0.8	B
	Subtotal	1,093	1,097	100.4%	17.0	2.0	B
EB	Left Turn	1,380	1,364	98.8%	10.3	1.4	B
	Through						
	Right Turn	168	167	99.3%	7.1	2.0	A
	Subtotal	1,548	1,531	98.9%	9.9	1.3	A
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,641	2,628	99.5%	12.9	1.4	B

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Baseline Conditions**
Volume and Delay by Movement **PM Peak Hour**

Intersection 3 **Hazel Ave./Folsom Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	28	26	92.9%	76.1	22.5	E
	Through						
	Right Turn	238	214	89.9%	26.9	5.3	C
	Subtotal	266	240	90.2%	31.9	3.9	C
SB	Left Turn	223	231	103.5%	74.3	9.4	E
	Through	1	2	160.0%	32.2	59.4	C
	Right Turn	244	236	96.6%	8.0	1.4	A
	Subtotal	468	468	100.0%	40.9	4.2	D
EB	Left Turn	678	465	68.6%	281.1	28.7	F
	Through	735	673	91.6%	38.6	9.8	D
	Right Turn	18	21	115.6%	33.8	15.7	C
	Subtotal	1,431	1,159	81.0%	135.7	17.1	F
WB	Left Turn	2	1	60.0%	73.7	102.0	E
	Through	321	314	97.7%	63.5	7.7	E
	Right Turn	526	526	99.9%	57.5	11.9	E
	Subtotal	849	840	99.0%	60.1	9.6	E
Total		3,014	2,708	89.8%	86.1	7.2	F

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Baseline + Project AM**
Volume and Delay by Movement **Peak Hour**

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	347	335	96.6%	50.6	7.0	D
	Through	684	674	98.5%	18.7	4.2	B
	Right Turn						
	Subtotal	1,031	1,009	97.8%	29.3	3.8	C
SB	Left Turn						
	Through	2,719	2,419	89.0%	82.8	6.6	F
	Right Turn	192	184	96.0%	16.9	3.1	B
	Subtotal	2,911	2,603	89.4%	78.1	6.4	E
EB	Left Turn						
	Through						
	Right Turn	336	331	98.5%	38.1	11.3	D
	Subtotal	336	331	98.5%	38.1	11.3	D
WB	Left Turn	101	91	90.3%	71.7	25.6	E
	Through	158	166	105.1%	70.0	19.9	E
	Right Turn	455	451	99.1%	11.9	3.7	B
	Subtotal	714	708	99.2%	33.3	10.5	C
Total		4,992	4,651	93.2%	57.8	4.2	E

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn						
	Through	718	615	85.6%	73.8	11.7	E
	Right Turn	1,026	868	84.6%	48.3	6.9	D
	Subtotal	1,744	1,483	85.0%	59.0	9.3	E
EB	Left Turn	900	874	97.2%	21.2	3.5	C
	Through						
	Right Turn	226	222	98.1%	18.2	5.9	B
	Subtotal	1,126	1,096	97.3%	20.6	3.6	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,870	2,579	89.9%	42.6	6.1	D

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Baseline + Project AM**
Volume and Delay by Movement **Peak Hour**

Intersection 3 **Hazel Ave/Folsom Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	11	9	83.6%	71.4	29.5	E
	Through						
	Right Turn	116	108	93.4%	22.6	3.0	C
	Subtotal	127	118	92.6%	26.5	4.5	C
SB	Left Turn	250	233	93.3%	60.9	16.3	E
	Through	228	202	88.4%	64.6	19.3	E
	Right Turn	466	409	87.8%	16.5	4.3	B
	Subtotal	944	844	89.4%	40.3	9.6	D
EB	Left Turn	140	137	97.7%	82.4	14.6	F
	Through	117	121	103.2%	39.9	11.0	D
	Right Turn	26	30	116.9%	26.1	17.8	C
	Subtotal	283	288	101.8%	58.3	9.9	E
WB	Left Turn	30	30	100.0%	97.5	19.3	F
	Through	438	449	102.5%	44.7	4.8	D
	Right Turn	215	229	106.4%	10.5	2.6	B
	Subtotal	683	708	103.6%	35.7	3.9	D
Total		2,037	1,957	96.1%	40.2	5.3	D

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Baseline + Project PM**
Volume and Delay by Movement **Peak Hour**

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	222	208	93.5%	48.0	8.1	D
	Through	2,120	1,979	93.4%	37.7	5.6	D
	Right Turn						
	Subtotal	2,342	2,187	93.4%	38.6	5.4	D
SB	Left Turn						
	Through	1,399	1,408	100.7%	31.6	4.2	C
	Right Turn	58	58	100.7%	5.1	0.9	A
	Subtotal	1,457	1,467	100.7%	30.6	3.8	C
EB	Left Turn						
	Through						
	Right Turn	480	484	100.9%	21.7	3.8	C
	Subtotal	480	484	100.9%	21.7	3.8	C
WB	Left Turn	68	72	105.3%	53.7	19.9	D
	Through	283	272	96.0%	54.3	18.6	D
	Right Turn	588	579	98.4%	27.2	4.0	C
	Subtotal	939	922	98.2%	37.4	9.0	D
Total		5,218	5,060	97.0%	34.4	4.2	C

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn						
	Through	315	314	99.7%	36.6	5.7	D
	Right Turn	793	776	97.8%	9.7	1.4	A
	Subtotal	1,108	1,090	98.3%	17.4	2.9	B
EB	Left Turn	1,380	1,364	98.9%	13.2	4.8	B
	Through						
	Right Turn	189	194	102.9%	7.9	3.2	A
	Subtotal	1,569	1,559	99.3%	12.5	4.5	B
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,677	2,648	98.9%	14.5	3.7	B

Intersection 3 **Hazel Ave/Folsom Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	33	26	78.8%	79.9	34.7	E
	Through						
	Right Turn	340	237	69.6%	28.0	5.3	C
	Subtotal	373	263	70.5%	32.6	6.0	C
SB	Left Turn	223	234	105.1%	74.8	7.3	E
	Through	37	40	108.1%	80.8	29.5	F
	Right Turn	244	245	100.3%	12.3	3.8	B
	Subtotal	504	519	103.0%	45.4	3.8	D
EB	Left Turn	678	472	69.6%	303.1	27.8	F
	Through	735	659	89.7%	53.0	15.3	D
	Right Turn	20	16	82.0%	41.9	40.2	D
	Subtotal	1,433	1,147	80.1%	155.3	20.0	F
WB	Left Turn	6	4	73.3%	89.0	77.8	F
	Through	321	308	96.1%	61.0	10.3	E
	Right Turn	526	529	100.5%	54.1	13.9	D
	Subtotal	853	842	98.7%	57.4	9.0	E
Total		3,163	2,771	87.6%	93.0	8.2	F

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Right Turn	900	200	29	300	50	300	55	0%	0%
NB	Left Turn	350	125	30	200	52	200	60	0%	0%
	Through	375	100	23	175	41	175	53	0%	0%
SB	Through	900	575	93	800	97	800	97	12%	0%
	Right Turn	250	75	32	175	105	275	118	0%	0%
WB	Left/Through	175	175	19	250	16	225	1	22%	0%
	Right Turn	1,525	175	71	350	133	325	121	0%	0%

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Baseline Conditions**
Queue Length **AM Peak Hour**

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	1,850	150	22	250	42	250	59	0%	0%
	Shared	1,850	125	20	200	49	225	71	0%	0%
	Right Turn	725	25	7	50	19	50	22	0%	0%
SB	Through	700	675	59	925	100	800	70	6%	4%
	Right Diagonal	225	100	48	250	92	225	71	0%	0%
0										
0										

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Right Turn	900	175	29	300	47	300	52	0%	0%
NB	Left Turn	350	100	18	150	23	150	30	0%	0%
	Through	750	350	43	425	52	450	48	0%	0%
SB	Through	900	250	31	350	47	350	56	0%	0%
	Right Turn	250	25	7	50	16	50	18	0%	0%
WB	Left/Through	175	200	12	250	8	225	1	26%	0%
	Right Turn	1,525	275	67	425	142	425	133	8%	0%

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	1,850	150	30	225	49	225	53	0%	0%
	Shared	1,850	150	31	225	45	250	43	0%	0%
	Right Turn	725	25	5	50	13	50	15	0%	0%
SB	Through	700	150	50	350	92	425	98	1%	0%
	Right Diagonal	225	25	10	25	51	25	71	0%	0%
0										
0										

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Right Turn	900	225	75	350	180	350	170	0%	0%
NB	Left Turn	350	150	42	250	93	250	85	0%	1%
	Through	375	100	20	200	36	175	50	0%	0%
SB	Through	900	825	104	1,000	76	950	24	20%	14%
	Right Turn	1,250	150	65	350	76	350	4	0%	0%
WB	Left/Through	175	200	11	250	13	225	1	35%	0%
	Right Turn	1,525	225	111	500	265	575	340	0%	0%

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	1,850	200	22	350	65	350	88	0%	0%
	Shared	1,850	175	22	325	72	325	90	0%	0%
	Right Turn	725	75	32	125	73	125	80	0%	0%
SB	Through	700	775	66	825	65	825	51	23%	21%
	Right Diagonal	225	175	37	325	32	250	0	1%	0%
0										
0										

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Right Turn	900	175	34	300	84	300	87	0%	0%
NB	Left Turn	350	100	14	150	19	150	24	0%	0%
	Through	750	375	54	475	69	500	75	0%	0%
SB	Through	900	275	27	375	49	375	70	0%	0%
	Right Turn	1,250	25	5	50	15	50	21	0%	0%
WB	Left/Through	175	200	14	250	13	225	1	34%	0%
	Right Turn	1,525	325	62	525	96	500	67	6%	0%

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	1,850	200	95	375	194	375	197	0%	0%
	Shared	1,850	200	95	375	189	400	190	0%	0%
	Right Turn	725	25	14	75	35	75	36	0%	0%
SB	Through	700	175	71	350	135	375	137	2%	1%
	Right Diagonal	225	50	41	125	116	125	116	0%	0%
0										
0										

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Baseline + Mitigated Project**
Volume and Delay by Movement **AM Peak Hour**

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	347	376	108.4%	47.5	5.9	D
	Through	687	697	101.4%	18.2	3.2	B
	Right Turn						
	Subtotal	1,034	1,073	103.8%	28.5	3.5	C
SB	Left Turn						
	Through	2,716	2,646	97.4%	63.3	15.3	E
	Right Turn	192	185	96.3%	15.7	3.1	B
	Subtotal	2,908	2,830	97.3%	60.2	14.4	E
EB	Left Turn						
	Through						
	Right Turn	336	332	98.8%	31.2	5.1	C
	Subtotal	336	332	98.8%	31.2	5.1	C
WB	Left Turn	93	89	95.9%	53.0	6.3	D
	Through	158	166	105.3%	55.5	8.3	E
	Right Turn	455	444	97.5%	10.6	1.3	B
	Subtotal	706	699	99.0%	26.7	2.5	C
Total		4,984	4,934	99.0%	46.6	8.8	D

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn						
	Through	707	660	93.3%	55.8	8.5	E
	Right Turn	1,026	996	97.0%	36.3	4.4	D
	Subtotal	1,733	1,655	95.5%	44.0	5.7	D
EB	Left Turn	900	924	102.6%	15.3	3.3	B
	Through						
	Right Turn	210	206	98.1%	10.6	2.7	B
	Subtotal	1,110	1,130	101.8%	14.4	3.0	B
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,843	2,785	98.0%	31.9	3.2	C

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Baseline + Mitigated Project**
Volume and Delay by Movement **AM Peak Hour**

Intersection 3 **Hazel Ave/Folsom Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	13	12	89.2%	15.0	20.3	B
	Through						
	Right Turn	146	146	100.0%	30.6	6.3	C
	Subtotal	159	158	99.1%	29.8	5.6	C
SB	Left Turn	250	243	97.3%	48.8	19.4	D
	Through	201	180	89.8%	52.2	17.7	D
	Right Turn	466	437	93.7%	13.9	2.0	B
	Subtotal	917	860	93.8%	31.2	8.5	C
EB	Left Turn	140	134	95.4%	77.1	16.1	E
	Through	117	128	109.1%	40.3	11.7	D
	Right Turn	24	24	100.0%	32.0	22.0	C
	Subtotal	281	285	101.5%	56.5	12.2	E
WB	Left Turn	27	24	90.4%	79.2	28.4	E
	Through	438	457	104.3%	40.1	6.2	D
	Right Turn	215	219	101.8%	7.8	2.1	A
	Subtotal	680	700	102.9%	31.1	4.9	C
Total		2,037	2,003	98.3%	34.4	3.8	C

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	222	228	102.9%	51.8	7.9	D
	Through	2,117	2,039	96.3%	39.4	4.3	D
	Right Turn						
	Subtotal	2,339	2,267	96.9%	40.6	4.3	D
SB	Left Turn						
	Through	1,402	1,406	100.3%	32.4	2.5	C
	Right Turn	58	57	97.9%	5.1	2.0	A
	Subtotal	1,460	1,463	100.2%	31.3	2.4	C
EB	Left Turn						
	Through						
	Right Turn	480	518	108.0%	24.2	3.8	C
	Subtotal	480	518	108.0%	24.2	3.8	C
WB	Left Turn	76	70	92.6%	55.3	12.4	E
	Through	283	274	96.8%	57.4	11.9	E
	Right Turn	588	580	98.6%	28.7	4.5	C
	Subtotal	947	924	97.6%	39.3	6.7	D
Total		5,226	5,172	99.0%	36.1	3.7	D

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn						
	Through	326	340	104.4%	39.6	6.6	D
	Right Turn	793	826	104.1%	12.2	1.8	B
	Subtotal	1,119	1,166	104.2%	20.2	2.8	C
EB	Left Turn	1,380	1,422	103.1%	14.0	5.2	B
	Through						
	Right Turn	205	200	97.8%	9.5	2.4	A
	Subtotal	1,585	1,623	102.4%	13.5	4.8	B
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,704	2,789	103.1%	16.3	3.6	B

Intersection 3 **Hazel Ave/Folsom Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	32	30	92.5%	19.6	15.9	B
	Through						
	Right Turn	309	323	104.6%	27.3	3.1	C
	Subtotal	341	353	103.5%	26.9	2.9	C
SB	Left Turn	223	213	95.4%	79.8	13.4	E
	Through	64	60	94.4%	72.8	19.5	E
	Right Turn	244	238	97.5%	13.0	3.8	B
	Subtotal	531	511	96.3%	47.7	6.8	D
EB	Left Turn	678	538	79.4%	273.0	20.7	F
	Through	735	678	92.2%	65.6	14.6	E
	Right Turn	22	21	96.4%	51.8	24.9	D
	Subtotal	1,435	1,237	86.2%	155.7	11.9	F
WB	Left Turn	9	11	124.4%	97.5	68.8	F
	Through	321	311	96.9%	56.3	11.0	E
	Right Turn	526	512	97.4%	49.1	15.9	D
	Subtotal	856	835	97.5%	52.8	10.8	D
Total		3,163	2,936	92.8%	92.0	3.9	F

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Cumulative No Project**
Volume and Delay by Movement **AM Peak Hour**

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	431	402	93.2%	54.1	6.5	D
	Through	1,801	1,781	98.9%	31.0	3.7	C
	Right Turn						
	Subtotal	2,232	2,182	97.8%	35.2	3.5	D
SB	Left Turn						
	Through	3,131	2,640	84.3%	77.3	9.6	E
	Right Turn	220	188	85.6%	18.5	4.2	B
	Subtotal	3,351	2,829	84.4%	73.4	9.0	E
EB	Left Turn						
	Through						
	Right Turn	394	384	97.5%	38.8	9.0	D
	Subtotal	394	384	97.5%	38.8	9.0	D
WB	Left Turn	82	80	98.0%	52.6	7.3	D
	Through	170	170	100.2%	60.9	5.0	E
	Right Turn	510	494	96.9%	28.8	3.4	C
	Subtotal	762	745	97.8%	38.8	3.2	D
Total		6,739	6,140	91.1%	53.5	4.0	D

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	1,548	1,516	97.9%	26.5	5.7	C
	Right Turn	165	158	95.8%	24.3	9.0	C
	Subtotal	1,713	1,674	97.7%	26.3	6.0	C
SB	Left Turn						
	Through	827	722	87.3%	30.0	3.9	C
	Right Turn	1,240	1,067	86.0%	22.6	0.9	C
	Subtotal	2,067	1,789	86.5%	25.7	1.7	C
EB	Left Turn	1,240	1,184	95.5%	17.5	2.7	B
	Through						
	Right Turn	203	206	101.7%	5.7	1.2	A
	Subtotal	1,443	1,391	96.4%	15.8	2.4	B
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		5,223	4,854	92.9%	23.0	2.6	C

Intersection 3 **Jughandle/Folsom Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	170	162	95.3%	57.3	10.5	E
	Through	966	922	95.5%	73.2	36.0	E
	Right Turn	20	19	94.0%	44.3	43.5	D
	Subtotal	1,156	1,103	95.4%	70.6	32.6	E
SB	Left Turn	379	350	92.2%	37.5	5.9	D
	Through	291	240	82.5%	26.8	4.6	C
	Right Turn	360	327	90.9%	13.0	2.8	B
	Subtotal	1,030	917	89.0%	25.9	3.1	C
EB	Left Turn	333	330	99.0%	39.1	5.3	D
	Through	35	36	102.9%	25.3	7.4	C
	Right Turn	43	32	75.3%	4.2	1.4	A
	Subtotal	411	398	96.8%	35.1	4.9	D
WB	Left Turn	20	20	98.0%	46.7	21.5	D
	Through	80	84	104.5%	29.5	4.9	C
	Right Turn	414	416	100.6%	22.4	3.8	C
	Subtotal	514	520	101.1%	24.6	3.1	C
Total		3,111	2,938	94.4%	44.0	13.1	D

Intersection 4 **Hazel Ave/Folsom Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	240	212	88.5%	41.0	13.6	D
	Through						
	Right Turn	370	359	97.0%	23.5	10.2	C
	Subtotal	610	571	93.6%	30.0	11.7	C
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	188	198	105.5%	21.9	6.1	C
	Right Turn	112	115	102.5%	4.1	0.8	A
	Subtotal	300	313	104.4%	15.4	4.3	B
WB	Left Turn	299	289	96.7%	58.7	18.8	E
	Through	584	579	99.2%	17.5	3.8	B
	Right Turn						
	Subtotal	883	868	98.3%	31.4	7.7	C
Total		1,793	1,753	97.8%	28.2	7.5	C

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	264	263	99.5%	93.2	13.3	F
	Through	2,732	2,571	94.1%	77.2	13.1	E
	Right Turn						
	Subtotal	2,996	2,834	94.6%	78.7	13.0	E
SB	Left Turn						
	Through	2,396	2,190	91.4%	93.3	7.6	F
	Right Turn	70	67	96.0%	12.7	1.9	B
	Subtotal	2,466	2,257	91.5%	90.9	7.3	F
EB	Left Turn						
	Through						
	Right Turn	561	500	89.1%	112.4	40.8	F
	Subtotal	561	500	89.1%	112.4	40.8	F
WB	Left Turn	70	64	91.4%	139.0	53.9	F
	Through	250	218	87.4%	133.2	46.4	F
	Right Turn	650	681	104.7%	49.2	4.5	D
	Subtotal	970	963	99.3%	74.8	15.0	E
Total		6,993	6,554	93.7%	84.9	6.0	F

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	1,719	1,628	94.7%	34.6	9.9	C
	Right Turn	229	198	86.5%	35.7	12.0	D
	Subtotal	1,948	1,826	93.7%	34.7	9.9	C
SB	Left Turn						
	Through	647	554	85.6%	61.4	9.2	E
	Right Turn	1,440	1,191	82.7%	86.9	11.4	F
	Subtotal	2,087	1,744	83.6%	78.9	10.3	E
EB	Left Turn	1,830	1,788	97.7%	33.9	3.9	C
	Through						
	Right Turn	361	371	102.7%	5.2	1.2	A
	Subtotal	2,191	2,158	98.5%	29.0	3.6	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		6,226	5,729	92.0%	45.9	4.6	D

Intersection 3 **Jughandle/Folsom Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	86	69	80.0%	80.2	24.7	F
	Through	927	820	88.4%	144.2	34.6	F
	Right Turn	20	19	96.0%	189.3	40.5	F
	Subtotal	1,033	908	87.9%	140.2	33.8	F
SB	Left Turn	330	320	97.0%	45.7	10.9	D
	Through	432	386	89.4%	28.7	5.3	C
	Right Turn	246	220	89.3%	9.1	0.9	A
	Subtotal	1,008	926	91.9%	29.8	4.0	C
EB	Left Turn	600	606	101.1%	55.1	6.6	E
	Through	110	108	98.2%	23.8	6.5	C
	Right Turn	69	77	111.3%	3.4	0.9	A
	Subtotal	779	791	101.6%	45.8	6.1	D
WB	Left Turn	20	20	98.0%	64.4	22.5	E
	Through	130	128	98.2%	42.2	11.3	D
	Right Turn	421	416	98.9%	42.0	27.7	D
	Subtotal	571	564	98.7%	42.6	21.8	D
Total		3,391	3,188	94.0%	67.2	6.7	E

Intersection 4 **Hazel Ave/Folsom Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	157	136	86.6%	28.4	4.3	C
	Through						
	Right Turn	305	284	93.2%	16.7	2.4	B
	Subtotal	462	420	91.0%	20.5	2.9	C
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	752	737	98.0%	59.8	19.2	E
	Right Turn	422	423	100.2%	10.0	2.3	A
	Subtotal	1,174	1,160	98.8%	41.5	11.9	D
WB	Left Turn	357	342	95.9%	60.9	22.0	E
	Through	565	570	100.8%	10.5	2.8	B
	Right Turn						
	Subtotal	922	912	98.9%	29.6	8.9	C
Total		2,558	2,492	97.4%	33.6	7.7	C

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Cumulative Plus Project**
Volume and Delay by Movement **AM Peak Hour**

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	431	435	100.9%	56.8	5.8	E
	Through	1,804	1,759	97.5%	31.6	5.6	C
	Right Turn						
	Subtotal	2,235	2,194	98.2%	36.5	4.7	D
SB	Left Turn						
	Through	3,140	2,543	81.0%	83.0	9.5	F
	Right Turn	220	178	80.9%	18.9	3.0	B
	Subtotal	3,360	2,721	81.0%	78.8	9.1	E
EB	Left Turn						
	Through						
	Right Turn	394	380	96.4%	38.5	9.9	D
	Subtotal	394	380	96.4%	38.5	9.9	D
WB	Left Turn	100	103	103.2%	57.6	10.2	E
	Through	170	177	104.0%	59.1	10.0	E
	Right Turn	510	528	103.5%	29.7	4.3	C
	Subtotal	780	808	103.6%	39.7	4.2	D
Total		6,769	6,103	90.2%	55.9	4.6	E

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	1,564	1,532	98.0%	26.2	4.6	C
	Right Turn	170	163	96.0%	24.7	5.9	C
	Subtotal	1,734	1,695	97.8%	26.0	4.7	C
SB	Left Turn						
	Through	854	693	81.2%	33.4	3.3	C
	Right Turn	1,240	1,063	85.7%	23.7	1.6	C
	Subtotal	2,094	1,756	83.9%	27.5	1.8	C
EB	Left Turn	1,240	1,233	99.5%	17.1	2.5	B
	Through						
	Right Turn	244	258	105.6%	4.5	1.0	A
	Subtotal	1,484	1,491	100.5%	14.9	2.1	B
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		5,312	4,942	93.0%	23.2	1.7	C

Intersection 3 **Hazel Ave./Jughandle/Atlanta St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	180	168	93.1%	51.5	4.4	D
	Through	966	956	98.9%	63.3	17.5	E
	Right Turn	20	20	102.0%	30.7	26.9	C
	Subtotal	1,166	1,144	98.1%	61.0	14.9	E
SB	Left Turn	379	334	88.0%	41.7	6.5	D
	Through	291	256	87.8%	26.7	4.0	C
	Right Turn	428	354	82.8%	13.6	3.4	B
	Subtotal	1,098	944	85.9%	27.2	2.5	C
EB	Left Turn	354	337	95.3%	42.9	10.1	D
	Through	35	32	92.6%	32.0	8.8	C
	Right Turn	45	43	96.0%	3.9	1.3	A
	Subtotal	434	413	95.1%	37.8	8.2	D
WB	Left Turn	20	21	106.0%	40.8	13.7	D
	Through	80	84	105.5%	29.8	5.5	C
	Right Turn	414	426	103.0%	23.1	3.6	C
	Subtotal	514	532	103.5%	24.8	3.1	C
Total		3,212	3,032	94.4%	41.0	6.2	D

Intersection 4 **Atlanta St/Folsom Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	270	221	81.9%	53.7	32.7	D
	Through						
	Right Turn	418	366	87.6%	35.3	28.2	D
	Subtotal	688	587	85.3%	42.2	30.0	D
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	188	174	92.8%	20.7	6.4	C
	Right Turn	120	123	102.3%	4.6	1.3	A
	Subtotal	308	297	96.5%	14.2	4.2	B
WB	Left Turn	314	285	90.8%	82.4	44.2	F
	Through	584	586	100.3%	19.5	4.8	B
	Right Turn						
	Subtotal	898	871	97.0%	40.4	16.0	D
Total		1,894	1,756	92.7%	36.5	17.0	D

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	264	258	97.6%	88.1	11.3	F
	Through	2,743	2,577	93.9%	73.7	13.8	E
	Right Turn						
	Subtotal	3,007	2,834	94.3%	75.1	13.4	E
SB	Left Turn						
	Through	2,398	2,149	89.6%	91.4	18.6	F
	Right Turn	70	70	99.4%	8.8	2.1	A
	Subtotal	2,468	2,219	89.9%	88.8	18.1	F
EB	Left Turn						
	Through						
	Right Turn	561	507	90.4%	126.0	48.2	F
	Subtotal	561	507	90.4%	126.0	48.2	F
WB	Left Turn	80	72	89.5%	172.2	52.3	F
	Through	250	221	88.5%	170.2	47.1	F
	Right Turn	650	642	98.8%	45.1	3.0	D
	Subtotal	980	935	95.4%	84.0	14.3	F
Total		7,016	6,495	92.6%	84.8	6.5	F

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	1,779	1,582	88.9%	46.5	7.4	D
	Right Turn	250	221	88.5%	46.4	10.8	D
	Subtotal	2,029	1,803	88.9%	46.5	7.6	D
SB	Left Turn						
	Through	659	582	88.3%	62.1	8.6	E
	Right Turn	1,440	1,185	82.3%	82.6	10.8	F
	Subtotal	2,099	1,766	84.2%	75.9	9.7	E
EB	Left Turn	1,830	1,882	102.8%	35.8	8.5	D
	Through						
	Right Turn	380	381	100.2%	5.5	1.4	A
	Subtotal	2,210	2,263	102.4%	30.7	7.3	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		6,338	5,832	92.0%	49.2	3.4	D

Intersection 3 **Hazel Ave./Jughandle/Atlanta St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	90	93	103.1%	89.2	14.2	F
	Through	927	774	83.5%	169.2	21.2	F
	Right Turn	20	15	74.0%	226.7	70.1	F
	Subtotal	1,037	882	85.1%	161.8	20.5	F
SB	Left Turn	330	318	96.4%	58.7	12.2	E
	Through	432	385	89.1%	31.0	8.3	C
	Right Turn	277	250	90.3%	9.3	3.7	A
	Subtotal	1,039	953	91.7%	34.7	5.7	C
EB	Left Turn	681	653	95.9%	67.1	13.6	E
	Through	110	103	93.8%	18.6	5.5	B
	Right Turn	80	84	104.5%	3.6	1.0	A
	Subtotal	871	840	96.4%	54.7	10.6	D
WB	Left Turn	20	18	90.0%	68.4	25.2	E
	Through	130	156	120.0%	40.8	6.3	D
	Right Turn	421	425	100.9%	35.6	4.4	D
	Subtotal	571	599	104.9%	38.2	3.7	D
Total		3,518	3,274	93.1%	74.9	4.9	E

Intersection 4 **Atlanta St/Folsom Blvd** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	170	176	103.5%	26.5	3.2	C
	Through						
	Right Turn	327	316	96.8%	17.6	1.6	B
	Subtotal	497	492	99.1%	20.8	2.0	C
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	752	713	94.8%	59.8	21.6	E
	Right Turn	470	470	100.1%	11.2	2.1	B
	Subtotal	1,222	1,183	96.8%	40.4	12.5	D
WB	Left Turn	401	366	91.4%	98.7	48.7	F
	Through	565	535	94.7%	11.0	1.9	B
	Right Turn						
	Subtotal	966	902	93.3%	46.5	19.6	D
Total		2,685	2,577	96.0%	38.9	9.5	D

LANE SUMMARY

Site: 1 [Easton Research Park / Jughandle]

Cumulative + Project (AM Peak Hour)
Site Category: (None)
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
East: Jughandle Road													
Lane 1	381	3.0	1365	0.279	100	5.1	LOS A	1.4	36.3	Full	1600	0.0	0.0
Lane 2[d]	381	3.0	1365	0.279	100	5.1	LOS A	1.4	36.3	Full	1600	0.0	0.0
Approach	762	3.0		0.279		5.1	LOS A	1.4	36.3				
North: Jughandle Road													
Lane 1	218	3.0	1285	0.170	100	4.2	LOS A	0.7	18.9	Full	1600	0.0	0.0
Lane 2[d]	218	3.0	1285	0.170	100	4.2	LOS A	0.7	18.9	Full	1600	0.0	0.0
Approach	436	3.0		0.170		4.2	LOS A	0.7	18.9				
West: Project Access Driveway													
Lane 1[d]	24	3.0	951	0.025	100	4.0	LOS A	0.1	2.2	Full	1600	0.0	0.0
Approach	24	3.0		0.025		4.0	LOS A	0.1	2.2				
Intersection	1222	3.0		0.279		4.7	LOS A	1.4	36.3				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: 1 [Easton Research Park / Jughandle]

Cumulative + Project (PM Peak Hour)
Site Category: (None)
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
East: Jughandle Road													
Lane 1	258	3.0	1352	0.191	100	4.2	LOS A	0.9	22.2	Full	1600	0.0	0.0
Lane 2[d]	258	3.0	1352	0.191	100	4.2	LOS A	0.9	22.2	Full	1600	0.0	0.0
Approach	516	3.0		0.191		4.2	LOS A	0.9	22.2				
North: Jughandle Road													
Lane 1	441	3.0	1331	0.331	100	5.7	LOS A	1.8	45.5	Full	1600	0.0	0.0
Lane 2[d]	441	3.0	1331	0.331	100	5.7	LOS A	1.8	45.5	Full	1600	0.0	0.0
Approach	881	3.0		0.331		5.7	LOS A	1.8	45.5				
West: Project Access Driveway													
Lane 1[d]	95	3.0	640	0.148	100	7.3	LOS A	0.5	13.1	Full	1600	0.0	0.0
Approach	95	3.0		0.148		7.3	LOS A	0.5	13.1				
Intersection	1492	3.0		0.331		5.3	LOS A	1.8	45.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Intersection 4 **Atlanta St/Folsom Blvd** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	625	75	20	125	39	125	35	0%	0%
	Right Turn	625	50	9	75	18	100	24	0%	0%
NB	Left Turn	25	50	7	50	9	50	10	0%	58%
	Left/Through	825	150	81	200	95	225	101	0%	0%
	Right Turn	25	50	5	75	14	75	17	0%	19%
WB	Left Turn	1,650	250	118	325	218	325	208	18%	0%
	Through/Right	1,650	200	47	350	75	375	119	0%	0%
0										

Intersection 3 **Hazel Ave./Jughandle/Atlanta St** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	425	150	14	225	48	225	53	0%	0%
	Through	575	25	9	50	22	50	23	0%	0%
	Right Turn	225	25	4	50	11	50	19	0%	0%
NB	Left Turn	325	100	30	200	89	200	97	0%	0%
	Through	975	325	90	450	131	475	142	55%	0%
	Right Turn	175	50	42	125	101	125	95	0%	0%
SB	Left Turn	325	150	19	225	46	225	59	0%	0%
	Through	1,175	75	11	100	22	100	25	0%	0%
	Right Turn	325	125	39	225	65	225	79	0%	0%
WB	Left Turn	325	25	7	50	12	50	14	0%	0%
	Through	1,125	100	63	250	145	275	120	1%	0%
	Right Turn	175	175	22	250	20	225	14	12%	0%

Intersection 4 **Atlanta St/Folsom Blvd** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	625	525	117	675	103	625	90	50%	22%
	Right Turn	625	125	26	225	50	200	50	0%	0%
NB	Left Turn	25	25	6	50	6	50	11	0%	23%
	Left/Through	750	75	11	125	18	125	19	0%	0%
	Right Turn	25	50	4	50	15	75	18	0%	34%
WB	Left Turn	1,050	300	264	375	315	375	287	35%	0%
	Through/Right	1,050	125	23	275	60	275	53	0%	0%
0										

Intersection 3 **Hazel Ave./Jughandle/Atlanta St** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	425	325	66	425	90	400	81	4%	0%
	Through	575	75	71	200	222	225	243	0%	0%
	Right Turn	225	50	9	75	14	50	14	0%	0%
NB	Left Turn	325	175	28	425	53	375	24	0%	0%
	Through	975	625	113	775	127	800	114	52%	0%
	Through/Right	975	650	117	800	134	800	103	0%	1%
SB	Left Turn	325	275	47	375	60	350	36	10%	0%
	Through	1,100	125	93	275	202	325	174	0%	0%
	Right Turn	325	75	27	125	49	125	53	0%	0%
WB	Left Turn	325	25	13	75	22	75	25	0%	0%
	Through	825	225	32	425	79	400	103	1%	0%
	Right Turn	175	200	10	250	10	225	0	28%	0%

Intersection: 10: Hazel Ave/1 & Atlanta St

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	L	T	R	L	T	T	R	L	L	T
Maximum Queue (ft)	165	223	202	48	24	22	40	254	210	142	142	284
Average Queue (ft)	68	65	111	14	10	12	13	76	182	92	80	190
95th Queue (ft)	120	120	181	43	28	27	36	232	230	141	144	272
Link Distance (ft)			552	552			1120	1120				966
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400	400			200	300			150	300	300	
Storage Blk Time (%)								1	16			0
Queuing Penalty (veh)								5	6			0

Intersection: 10: Hazel Ave/1 & Atlanta St

Movement	NB	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	T	T	R	L	L	T	T	T	R
Maximum Queue (ft)	292	380	210	110	124	97	80	79	192
Average Queue (ft)	234	300	68	73	92	31	52	42	97
95th Queue (ft)	321	398	217	121	137	66	76	70	170
Link Distance (ft)	966	966				1153	1153	1153	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			150	300	300				300
Storage Blk Time (%)		50							
Queuing Penalty (veh)		10							

Intersection: 3: Hazel Ave & Atlanta St

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	L	T	R	L	T	T	R	L	L	T
Maximum Queue (ft)	165	217	254	159	46	28	72	433	210	53	359	510
Average Queue (ft)	113	167	203	61	15	13	38	250	187	15	80	376
95th Queue (ft)	157	223	269	139	48	34	78	452	228	47	271	477
Link Distance (ft)			550	550			819	819				966
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400	400			200	300			150	300	300	
Storage Blk Time (%)									43			33
Queuing Penalty (veh)									28			30

Intersection: 3: Hazel Ave & Atlanta St

Movement	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	T	TR	L	L	T	T	T	R
Maximum Queue (ft)	462	584	330	360	412	176	190	126
Average Queue (ft)	356	384	250	275	201	107	102	90
95th Queue (ft)	471	532	420	429	472	179	183	124
Link Distance (ft)	966	966			1088	1088	1088	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)			300	300				300
Storage Blk Time (%)			24	33				
Queuing Penalty (veh)			34	47				

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Right Turn	900	225	35	350	65	325	62	0%	0%
NB	Left Turn	350	200	24	275	38	275	24	0%	0%
	Through	1,100	300	48	350	36	350	37	0%	0%
SB	Through	900	875	113	1,000	73	925	58	19%	10%
	Right Turn	1,250	125	32	325	59	350	0	0%	0%
WB	Left/Through	1,525	250	45	350	61	350	57	0%	0%
	Right Turn	1,525	175	28	250	34	250	40	5%	0%

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	525	175	22	250	49	275	63	0%	0%
	Right Turn	525	50	9	75	13	75	21	0%	0%
NB	Through	1,175	125	25	200	46	225	58	0%	0%
	Through/Right	1,175	250	50	425	103	450	102	0%	0%
SB	Through	1,100	350	161	1,000	395	1,025	344	0%	1%
	Right Turn	600	25	3	25	13	25	18	0%	0%
0										

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	900	25	41	75	207	200	381	0%	0%
	Right Turn	900	600	145	825	184	775	145	0%	2%
NB	Left Turn	350	150	28	225	49	200	41	0%	0%
	Through	1,125	750	133	1,000	155	1,000	138	0%	0%
SB	Through	900	825	155	975	122	925	105	5%	10%
	Right Turn	1,250	25	14	75	66	75	94	0%	0%
WB	Left/Through	1,525	450	184	650	278	650	300	0%	0%
	Right Turn	1,525	300	42	425	85	425	92	25%	0%

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	500	400	37	525	53	525	62	0%	2%
	Right Turn	500	50	12	100	23	100	28	0%	0%
NB	Through	1,100	300	55	500	103	525	117	0%	0%
	Through/Right	1,100	550	81	725	81	725	96	0%	0%
SB	Through	1,125	975	242	1,300	260	1,225	195	39%	9%
	Right Turn	600	600	56	675	80	625	0	58%	0%
0										

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Right Turn	900	250	68	350	105	350	90	0%	0%
NB	Left Turn	350	200	17	275	30	275	46	0%	0%
	Through	1,100	325	37	375	47	375	37	0%	0%
SB	Through	900	900	73	975	41	925	16	22%	11%
	Right Turn	250	125	36	325	58	350	3	0%	0%
WB	Left/Through	1,525	250	35	375	53	375	48	0%	0%
	Right Turn	1,525	175	26	250	32	250	25	5%	0%

SimTraffic Post-Processor **Easton Research Park**
Average Results from 10 Runs **Cumulative Plus Project**
Queue Length **AM Peak Hour**

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	525	175	22	275	42	275	44	0%	0%
	Right Turn	525	50	13	75	15	75	18	0%	0%
NB	Through	1,175	125	33	250	66	250	92	0%	0%
	Through/Right	1,175	300	53	500	146	475	136	0%	0%
SB	Through	1,100	400	163	1,100	379	1,075	321	0%	1%
	Right Turn	600	25	24	75	114	125	167	0%	0%
0										

Intersection 1 **Hazel Ave/Tributary Point Dr-US 50 WB Off-Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	900	250	359	450	582	475	479	0%	19%
	Right Turn	900	700	210	850	173	850	150	0%	30%
NB	Left Turn	350	150	18	200	26	200	37	0%	0%
	Through	1,125	800	183	1,000	191	975	174	7%	1%
SB	Through	900	875	129	975	53	950	44	5%	16%
	Right Turn	250	25	21	75	89	100	122	0%	0%
WB	Left/Through	1,525	625	197	825	282	800	261	0%	0%
	Right Turn	1,525	300	46	425	106	450	112	19%	0%

Intersection 2 **Hazel Ave/US 50 EB Ramp** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	500	375	53	500	67	500	70	0%	3%
	Right Turn	500	50	10	100	19	100	21	0%	0%
NB	Through	1,100	350	53	475	70	475	73	0%	0%
	Through/Right	1,100	575	94	750	104	750	115	0%	0%
SB	Through	1,125	1,050	173	1,300	181	1,225	42	38%	8%
	Right Turn	600	600	69	675	54	625	0	53%	0%
0										