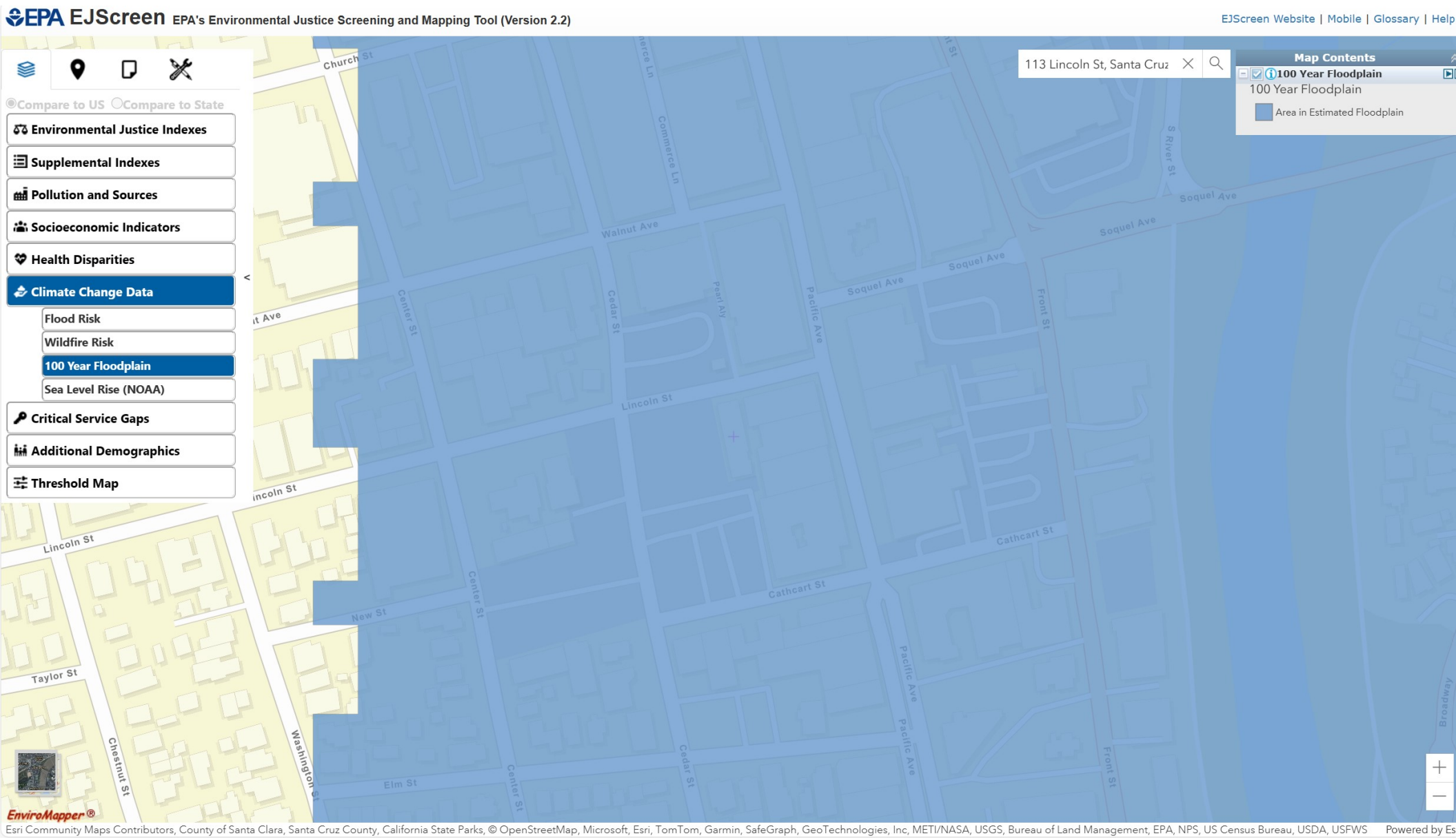
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Compare to US
Compare to State
Environmental Justice Indexes
Supplemental Indexes
Pollution and Sources
Socioeconomic Indicators
Health Disparities
Climate Change Data
Flood Risk
Wildfire Risk
100 Year Floodplain
Sea Level Rise (NOAA)
Critical Service Gaps
Additional Demographics
Threshold Map
113 Lincoln St, Santa Cruz
Map Contents
100 Year Floodplain
100 Year Floodplain
Area in Estimated Floodplain
Church St
Commerce Ln
Walnut Ave
Soquel Ave
S River St
Center St
Cedar St
Pearl Aly
Pacific Ave
Front St
Lincoln St
Cathcart St
New St
Taylor St
Chestnut St
Washington St
Elm St
Broadway
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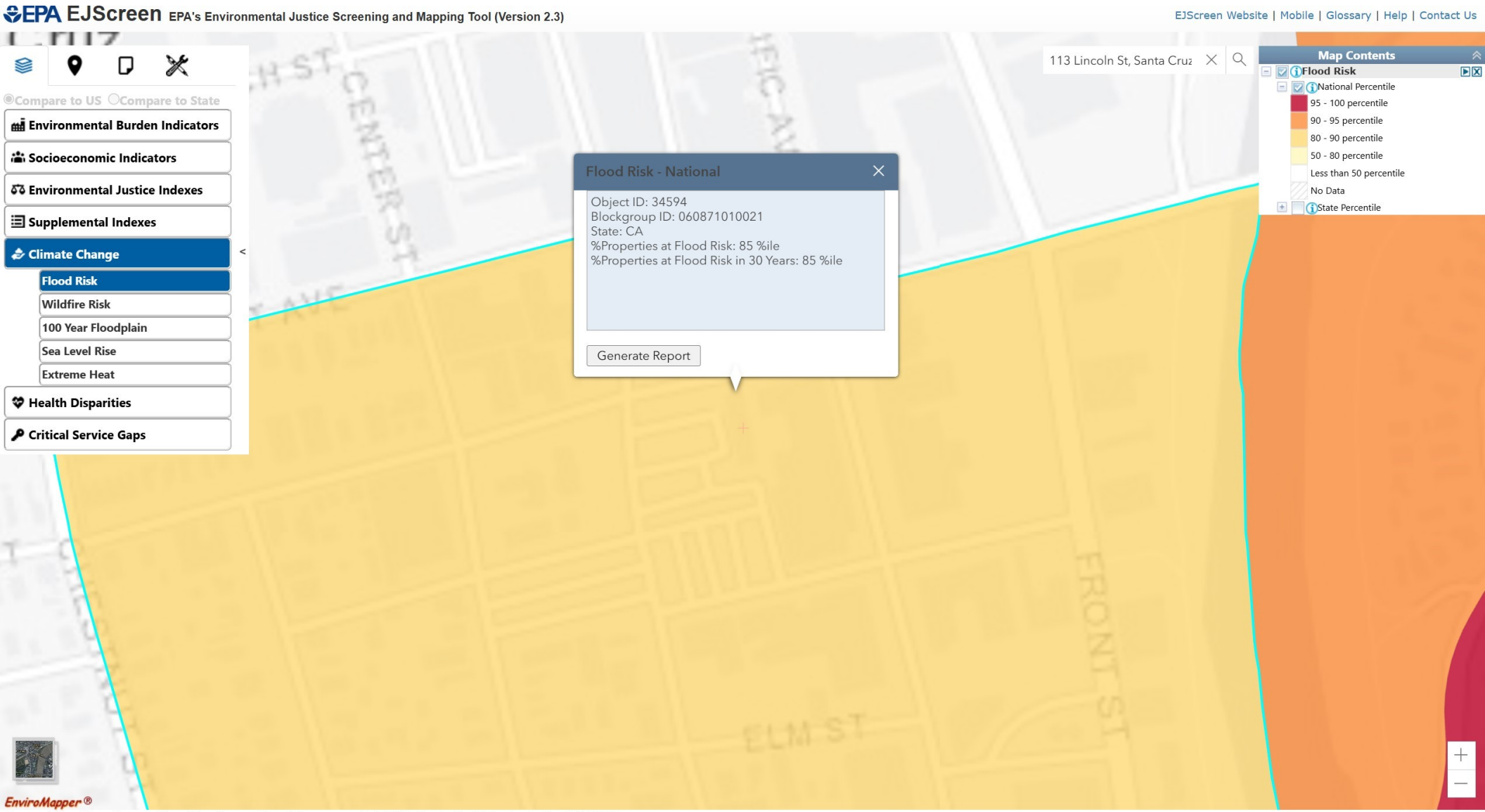
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Environmental Justice Indexes
Supplemental Indexes
Climate Change
Flood Risk
Wildfire Risk
100 Year Floodplain
Sea Level Rise
Extreme Heat
Health Disparities
Critical Service Gaps
113 Lincoln St, Santa Cruz
Flood Risk - National
Object ID: 34594
Blockgroup ID: 060871010021
State: CA
%Properties at Flood Risk: 85 %ile
%Properties at Flood Risk in 30 Years: 85 %ile
Generate Report
Map Contents
Flood Risk
National Percentile
95 - 100 percentile
90 - 95 percentile
80 - 90 percentile
50 - 80 percentile
Less than 50 percentile
No Data
State Percentile
CENTER ST
FRONT ST
ELM ST
EnviroMapper®
County of Santa Clara, County of Santa Cruz, Bureau of Land Management, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA
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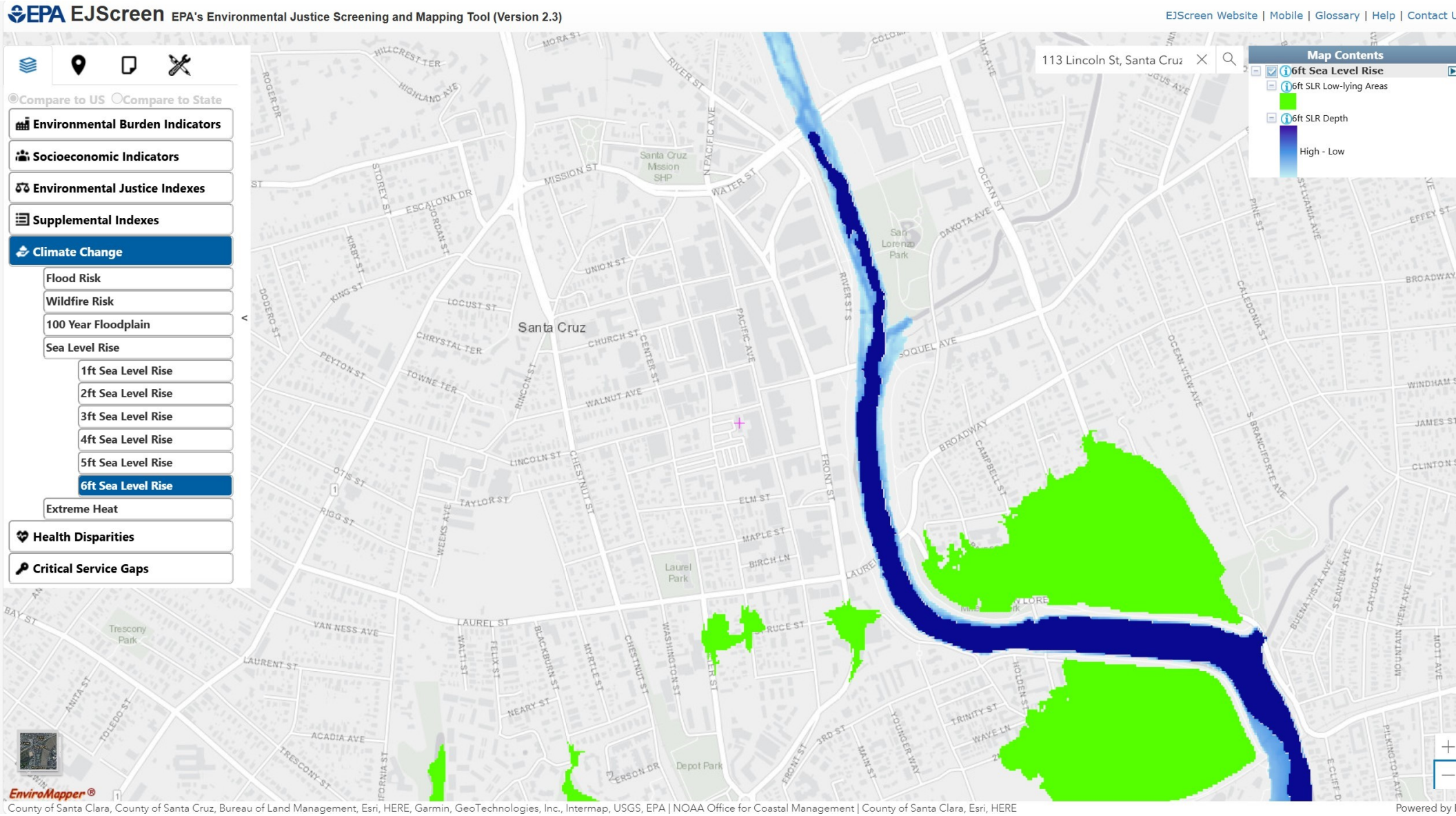
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Socioeconomic Indicators
Environmental Justice Indexes
Supplemental Indexes
Climate Change
Flood Risk
Wildfire Risk
100 Year Floodplain
Sea Level Rise
1ft Sea Level Rise
2ft Sea Level Rise
3ft Sea Level Rise
4ft Sea Level Rise
5ft Sea Level Rise
6ft Sea Level Rise
Extreme Heat
Health Disparities
Critical Service Gaps
113 Lincoln St, Santa Cruz
Map Contents
6ft Sea Level Rise
6ft SLR Low-lying Areas
6ft SLR Depth
High - Low
Santa Cruz
Santa Cruz Mission SHP
San Lorenzo Park
Laurel Park
Trescony Park
Depot Park
MISSION ST
WATER ST
RIVER ST
PACIFIC AVE
OCEAN ST
DAKOTA AVE
SOQUEL AVE
BROADWAY
CHURCH ST
LINCOLN ST
WALNUT AVE
LAUREL ST
VAN NESS AVE
LAURENT ST
EnviroMapper®
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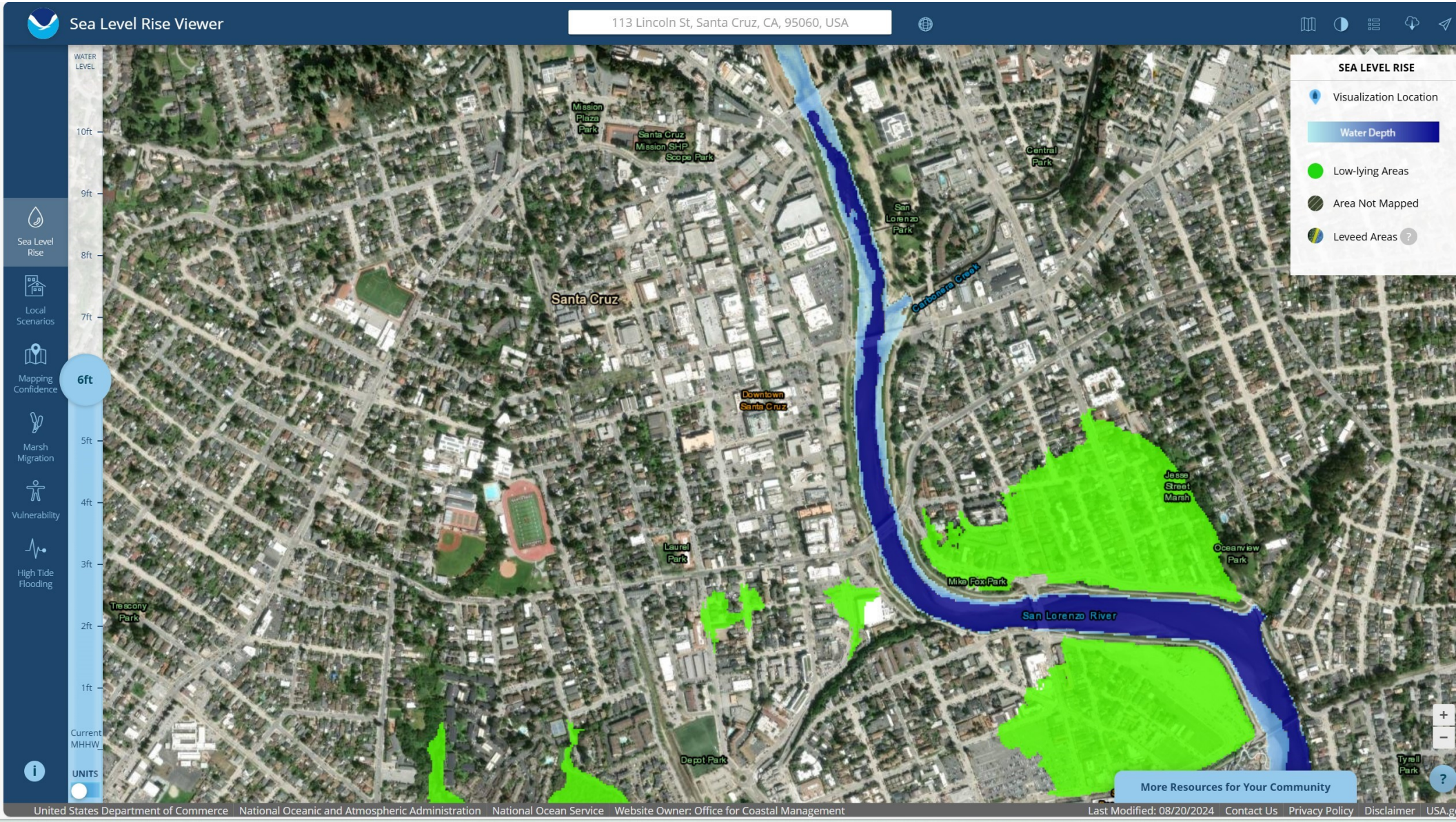
Sea Level Rise Viewer
113 Lincoln St, Santa Cruz, CA, 95060, USA
WATER LEVEL
10ft
9ft
8ft
7ft
6ft
5ft
4ft
3ft
2ft
1ft
Current MHHW
UNITS
Sea Level Rise
Local Scenarios
Mapping Confidence
Marsh Migration
Vulnerability
High Tide Flooding
SEA LEVEL RISE
Visualization Location
Water Depth
Low-lying Areas
Area Not Mapped
Leveed Areas
Mission Plaza Park
Santa Cruz Mission SHP
Scope Park
Central Park
San Lorenzo Park
Santa Cruz
Carbonera Creek
Downtown Santa Cruz
Jesse Street Marsh
Oceanview Park
Laurel Park
Mike Fox Park
San Lorenzo River
Trescony Park
Depot Park
Tyrell Park
More Resources for Your Community
United States Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service
Website Owner: Office for Coastal Management
Last Modified: 08/20/2024
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Privacy Policy
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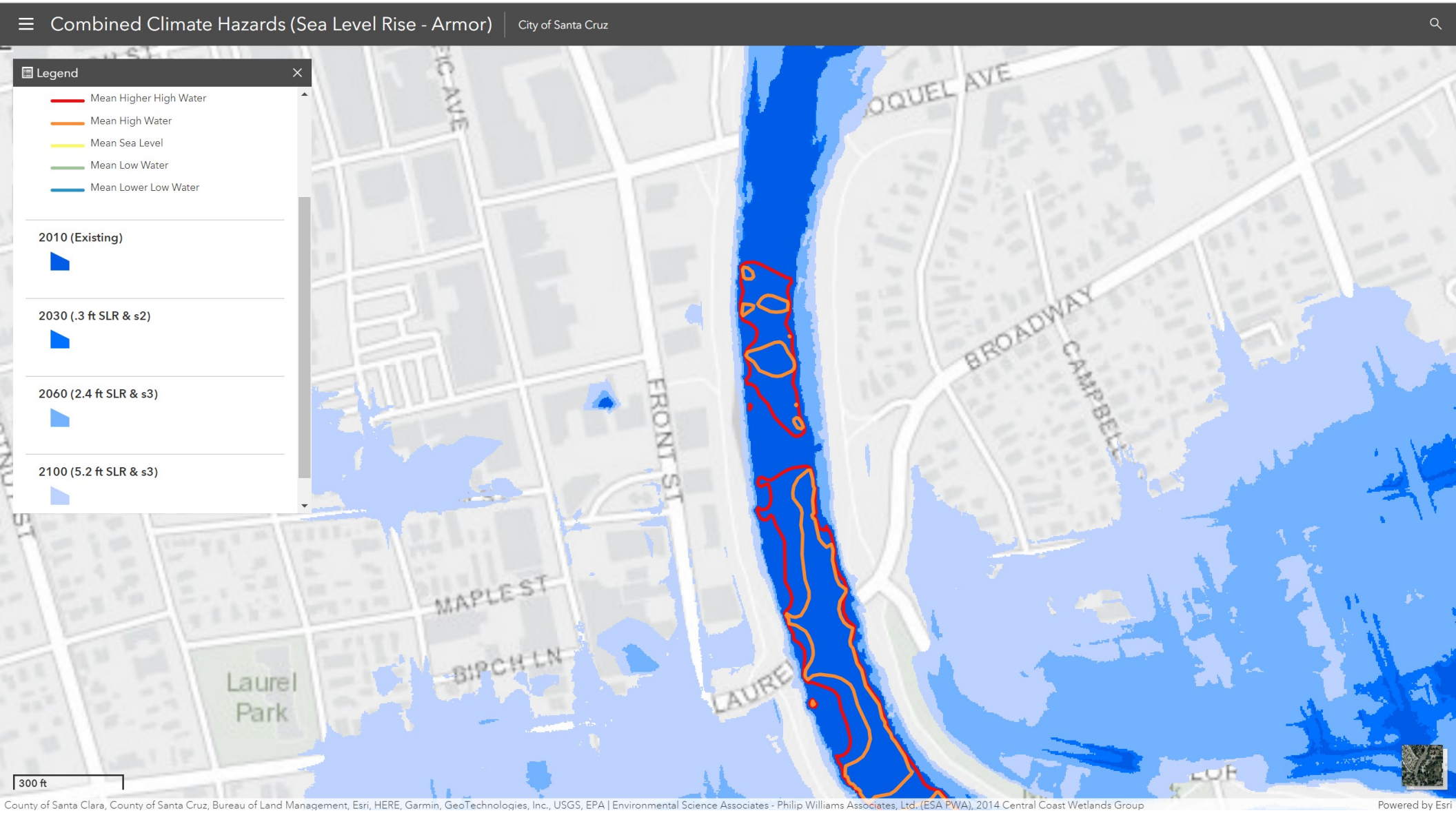
Combined Climate Hazards (Sea Level Rise - Armor)
City of Santa Cruz
Legend
Mean Higher High Water
Mean High Water
Mean Sea Level
Mean Low Water
Mean Lower Low Water
2010 (Existing)
2030 (.3 ft SLR & s2)
2060 (2.4 ft SLR & s3)
2100 (5.2 ft SLR & s3)
FRONT ST
BROADWAY
MAPLE ST
BIRCH LN
Laurel Park
300 ft
County of Santa Clara, County of Santa Cruz, Bureau of Land Management, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA | Environmental Science Associates - Philip Williams Associates, Ltd. (ESA PWA), 2014 Central Coast Wetlands Group
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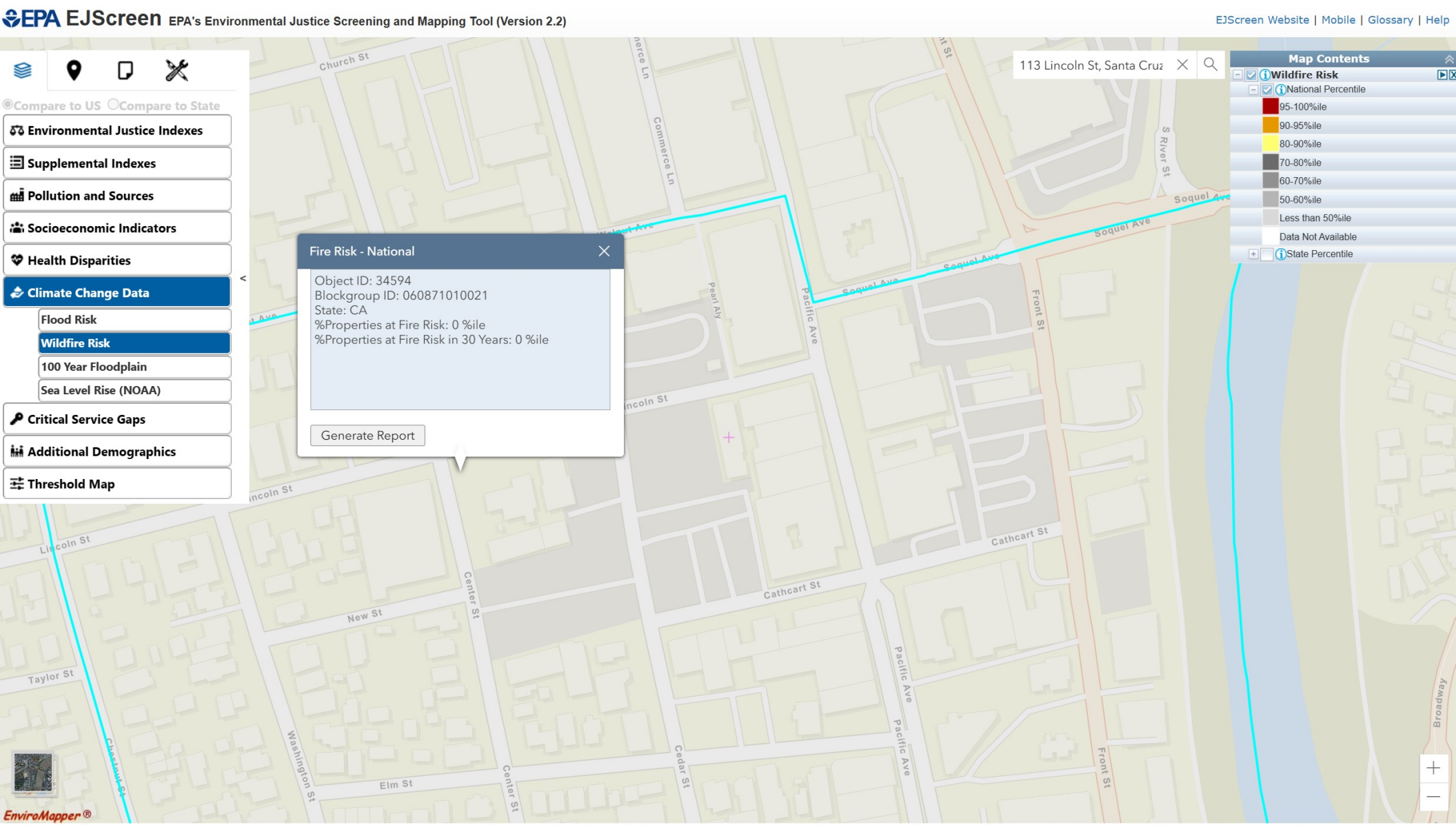
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Environmental Justice Indexes
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Pollution and Sources
Socioeconomic Indicators
Health Disparities
Climate Change Data
Flood Risk
Wildfire Risk
100 Year Floodplain
Sea Level Rise (NOAA)
Critical Service Gaps
Additional Demographics
Threshold Map
113 Lincoln St, Santa Cruz
Fire Risk - National
Object ID: 34594
Blockgroup ID: 060871010021
State: CA
%Properties at Fire Risk: 0 %ile
%Properties at Fire Risk in 30 Years: 0 %ile
Generate Report
Map Contents
Wildfire Risk
National Percentile
95-100%ile
90-95%ile
80-90%ile
70-80%ile
60-70%ile
50-60%ile
Less than 50%ile
Data Not Available
State Percentile
Church St
Commerce Ln
Soquel Ave
S River St
Pearl Aly
Pacific Ave
Front St
Lincoln St
Cathcart St
Center St
New St
Taylor St
Washington St
Elm St
Cedar St
Broadway
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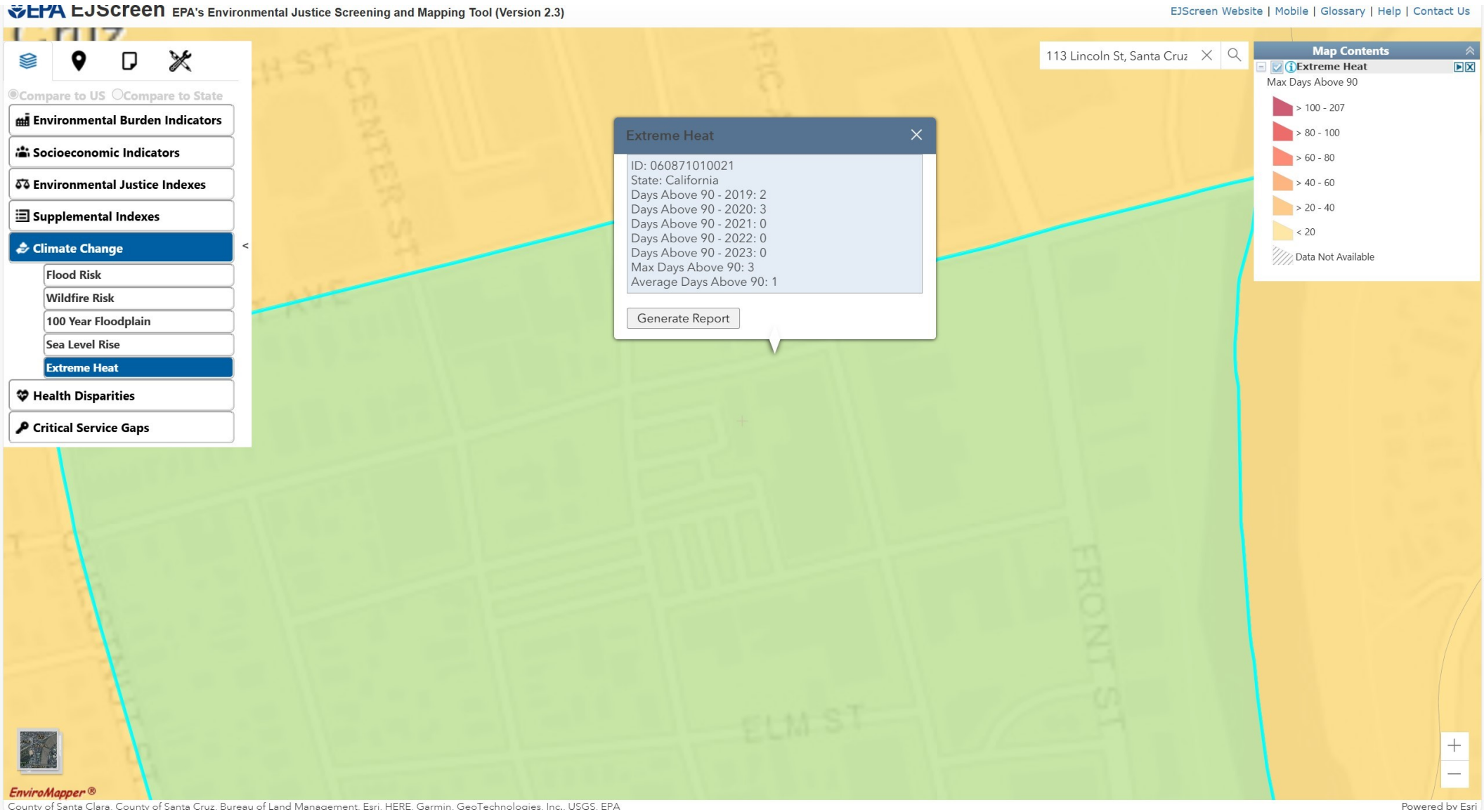
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Environmental Justice Indexes
Supplemental Indexes
Climate Change
Flood Risk
Wildfire Risk
100 Year Floodplain
Sea Level Rise
Extreme Heat
Health Disparities
Critical Service Gaps
113 Lincoln St, Santa Cruz
Extreme Heat
ID: 060871010021
State: California
Days Above 90 - 2019: 2
Days Above 90 - 2020: 3
Days Above 90 - 2021: 0
Days Above 90 - 2022: 0
Days Above 90 - 2023: 0
Max Days Above 90: 3
Average Days Above 90: 1
Generate Report
Map Contents
Extreme Heat
Max Days Above 90
> 100 - 207
> 80 - 100
> 60 - 80
> 40 - 60
> 20 - 40
< 20
Data Not Available
CENTER ST
FRONT ST
ELM ST
EnviroMapper®
County of Santa Clara, County of Santa Cruz, Bureau of Land Management, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA
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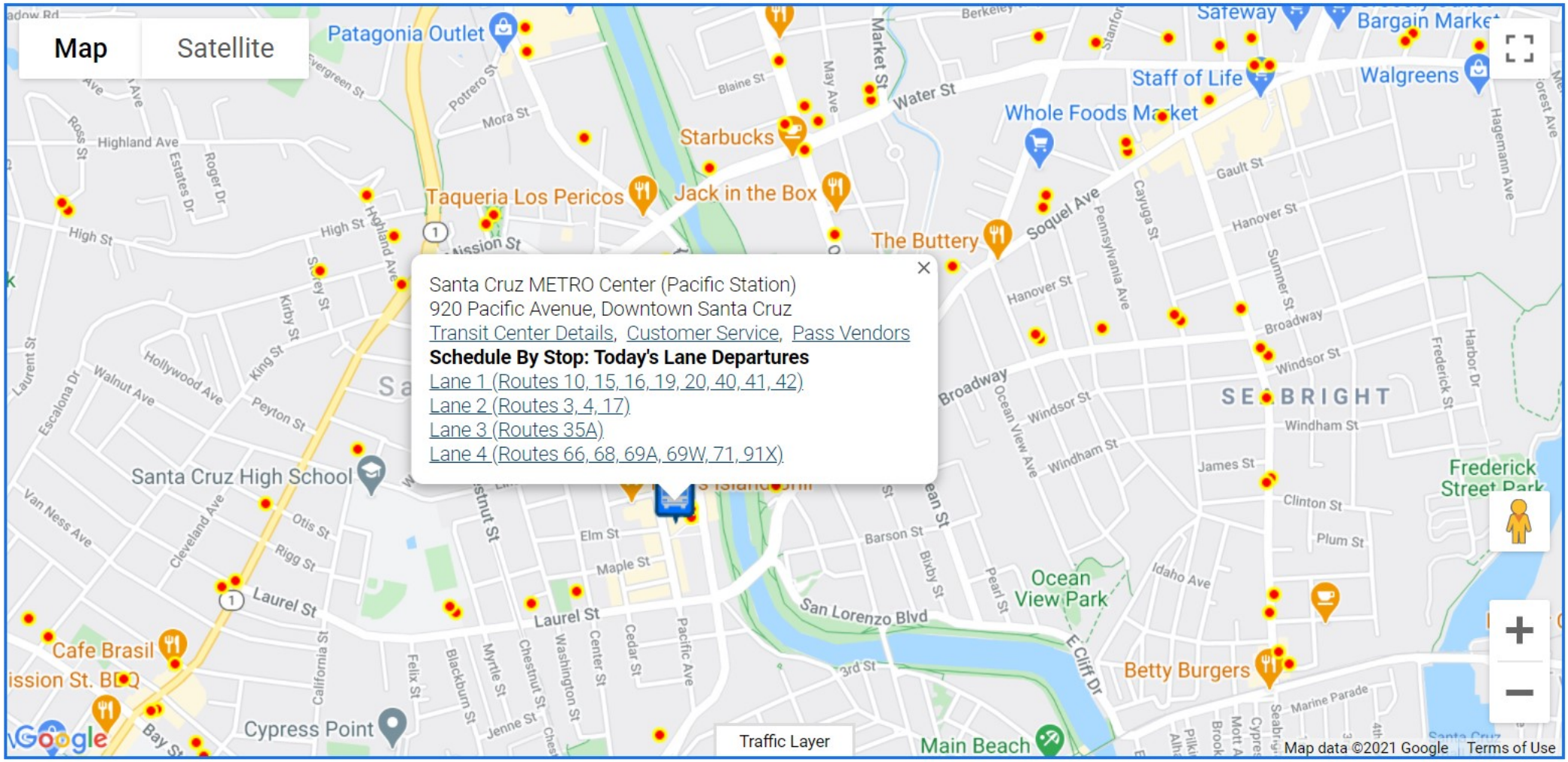
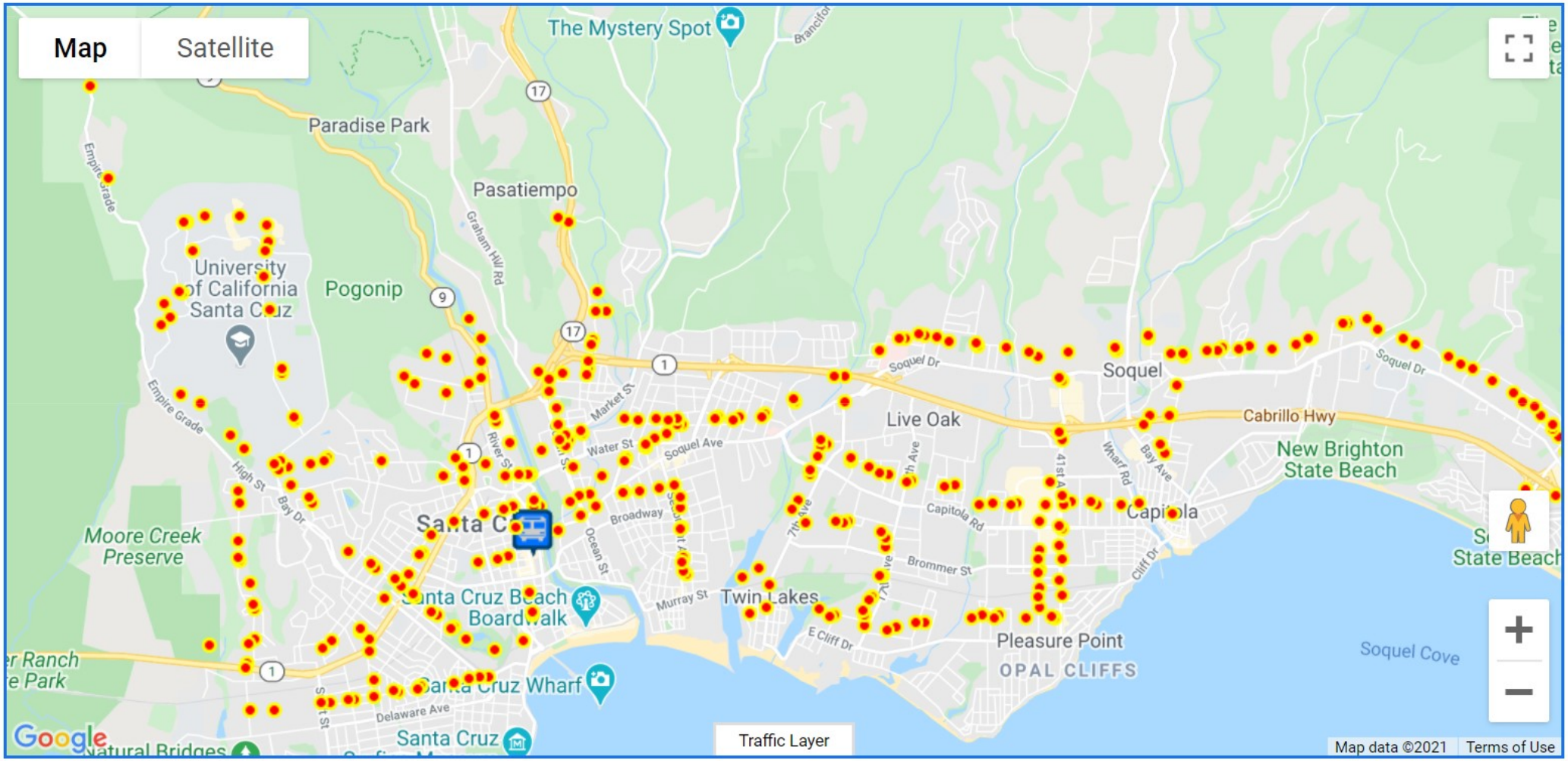

Map
Satellite
Santa Cruz METRO Center (Pacific Station)
920 Pacific Avenue, Downtown Santa Cruz
Transit Center Details, Customer Service, Pass Vendors
Schedule By Stop: Today's Lane Departures
Lane 1 (Routes 10, 15, 16, 19, 20, 40, 41, 42)
Lane 2 (Routes 3, 4, 17)
Lane 3 (Routes 35A)
Lane 4 (Routes 66, 68, 69A, 69W, 71, 91X)
Patagonia Outlet
Starbucks
Taqueria Los Pericos
Jack in the Box
The Buttery
Safeway
Staff of Life
Walgreens
Whole Foods Market
Santa Cruz High School
Cafe Brasil
Cypress Point
Ocean View Park
Betty Burgers
Main Beach
Frederick Street Park
SEABRIGHT
Water St
Soquel Ave
Broadway
Laurel St
Traffic Layer
Map data ©2021 Google
Terms of Use

Route:

Pick a Route



VI-9. REGIONAL PLANNING

Collaborating, in mutually beneficial regional partnerships, is the key for ensuring sustainable transportation and land use investments that will affect the future of Santa Cruz and the greater region.

KEY RECOMMENDATIONS

Successful regional collaboration can address:

- Existing and future regional vehicle traffic congestion problems on Highway 1
- The location, extent and balance of future employment and population growth, including the provision of mixed-use development and affordable housing near transit, to preserve open space
- The type and availability of transit services and accessible routes to expand person-trip travel options
- Managing multi-modal travel way capacity more efficiently
- Managing parking availability and cost to increase carpooling and transit, and to encourage more efficient, compact land use
- Expanding regional bicycle and recreational trail networks.

Key partners include UCSC, Metro, SCCRTC, Santa Cruz County, Caltrans, Downtown Merchant's Association and major Santa Cruz employers.

The challenge of transportation planning is that solutions to one issue generally have both beneficial and negative consequences for related issues. Therefore, success relies upon regional collaboration and relying on the principles of sustainable transportation planning. Applying the principles will reflect core community values and help achieve balanced and integrated regional transportation and land use solutions. This approach offers a comprehensive perspective to frame issues and solutions. Santa Cruz should:

1. **Support regional funding and implementation of key regional projects that can significantly benefit the city, including:**
    - Metrobase Transit District Consolidations Operations Facility
    - Right-of-way acquisition on rail corridor
    - Bike and pedestrian path on rail right-of-way
    - Local bike projects
    - Expanding local and regional bus service
2. **Ensure, as the proposed Regional Transportation Commission Highway 1 widening project moves forward, that the following criteria are sufficiently**

evaluated so selection and funding of future projects are consistent with the MTS vision and community needs.

- *New travel choices.* Make a major regional transportation investment to provide new travel choices to ensure high-occupancy, high-frequency regional transit service and carpooling that serves local and regional activity centers as the primary means to address vehicle traffic congestion and increase person-trip mobility.
- *Funding availability for transit.* Ensure that Highway 1 widening project capital, operating and maintenance costs, which would be covered by an increase in sales tax, do not reduce funding for bus and transit services. In addition, ensure that sales tax funds are annually available to support other priority transportation projects.
- *Acceptable levels of local street vehicle congestion.* Ensure that there are no significant local street vehicle traffic congestion and increased SOV traffic impacts induced by Highway 1 widening or as a result of construction impacts related to the widening project.
- *Support local transit, carpooling pedestrian and bicycle travel.* Ensure that the design and operations of the widening project connect to the local street system in a manner that can support transit and carpooling operations as a priority on local arterial streets. Additionally, support pedestrian and bicycle connections across the highway to interconnect north and south neighborhoods.
- *Demonstrate sufficient benefits relative to other feasible alternatives to justify project costs and impacts.* Ensure that the future travel benefits and travel time savings for transit and carpooling are sufficient to justify the costs and environmental impacts of a Highway 1 widening project when compared with other feasible alternatives, including a BRT system on the rail corridor.
- *Minimize auto-oriented land use impacts both regionally and locally.* Conduct an evaluation of the land use impacts of a Highway 1 widening project. It should monitor progress in promoting compact, walkable, mixed-use and transit-oriented development (moving away from inducing low density, auto-oriented development). The evaluation should identify other feasible alternatives that support sustainable land use.

BACKGROUND

Regional Setting

The City of Santa Cruz is located on the Monterey Bay between the San Francisco Bay Area to the north and the Monterey Peninsula to the south. As the home for the University of California at Santa Cruz, county government, and several of the County's largest employers, Santa Cruz is an employment center for Santa Cruz County. With coastal mountains, sandy beaches and a vibrant downtown, Santa Cruz is also a major tourist destination and recreation attraction for the San Francisco Bay Area and the Monterey Bay Area.

Population and Employment Growth

As shown in Table 1, Association of Monterey Bay Area Governments (AMBAG) forecasts for population and employment growth for the City and County of Santa Cruz indicate that:

- Local programs can influence 74% of Santa Cruz peak hour travel demand. 50% are local trips and 24% are commute trips into the City.
- 26% are commute trips out of the City, which are significantly less influenced by local programs.
- The City of Santa Cruz contributes less than 20% to total regional PM peak hour trips, declining from 18% in 2000 to 17% in 2020.
- Santa Cruz County's population, residential housing construction and employment are projected to increase at a greater rate than the City's between 2000 and 2020.
- 69 percent of regional population growth by 2020 will be in Watsonville and the unincorporated areas of Santa Cruz County, increasing by 31,561 from 180,334 to 211,895 by 2020.
- Approximately 211,895 people will live in South County, approximately 70 percent of the County's projected 2020 population. Due to South County's low-density development pattern, future growth will continue to contribute to increased auto dependence and is less responsive to transit services.
- A net 19% of the County workforce commutes to areas outside of the County for employment in areas such as Monterey County and the Bay Area, with the majority of these trips going to the Silicon Valley area in Santa Clara County.
- Population in Santa Cruz County is anticipated to increase by 17,8% between 2000 and 2020 growing from 257,739 to 303,646.
- Employment in Santa Cruz County is anticipated to increase by 19% between 2000 and 2020, growing from 140,589 to 168,532 jobs.

Table 1: Population and Employment Growth, Santa Cruz County 2000 - 2020

	2000	Size in Region	2020	Growth	Rate	Percent of Region	Percent of Growth
Employment							
Santa Cruz County	140,589		168,532	27,943	19.9%		
Population							
Capitola	11,172	4%	11,750	578	5.2%	4%	1%
Santa Cruz	55,013	21%	64,386	9,373	17.0%	21%	20%
Scotts Valley	11,218	4%	15,615	4,397	39.2%	5%	10%
Watsonville	43,620	17%	55,875	12,255	28.1%	18%	27%
Unincorporated	136,714	53%	156,020	19,306	14.1%	51%	42%
Santa Cruz County	257,737	100%	303,646	45,909	17.8%	100%	100%
Unincorporated + Watsonville	180,334	70%	211,895	31,561	42%	70%	69%

TRANSPORTATION SETTING

Network

Regionally, State Highway Route I is the major inter and intra county route for the County, following the coast from San Francisco and San Mateo County south through the City of Santa Cruz. Within the city, Highway 1, traverses from the recently improved Mission Street, traverses east to its junction with Highway 17. At Highway 17 Highway 1 forms a four-lane freeway extending south to Watsonville and Monterey County. State Highway 17, which traverses the Santa Cruz mountains, terminates in Santa Cruz and connects Santa Cruz County to the greater San Francisco Bay area.

Highways I and 17 experience average annual daily traffic volumes of up to 110,000 and 66,000, respectively. The two highways serve regional traffic, motorists who commute every day to the high-tech job centers in the Silicon Valley, and motorists who travel into Santa Cruz County to enjoy the scenic recreation opportunities offered by the region. Highway 17 is often subject to high accident rates, primarily due to motorists driving faster than is safe for conditions.

Traffic Volume/Capacity

Annual Average Daily Traffic (AADT) along Route I range from 36,000 near the Monterey County line to in excess of 110,000 near the "fishhook" interchange with Route 17. Between State Park Drive and Morrissey Boulevard, current AADT ranges from 83,000 to 110,000 with the highest daily volumes occurring between the Soquel and Morrissey interchanges.

Peak hour travel demand in the study area exceeds the carrying capacity of the highway. Route 1 operates at Level of Service (LOS) "F" for multiple hours each day. Typical northbound AM mid week recurrent morning congestion lasts for over 3.5 hours; mid week southbound PM congestion lasts for over 4 hours.

Recurrent congestion related queuing on State Route 1 extends for several miles during peak hours. In the PM, southbound traffic queues from the Bay Porter Interchange back through the 1/17 Junction towards Pasatiempo Drive and north on Route 1 towards the Route 9 Junction. In the AM peak period, northbound congested queuing typically extends from Morrissey Drive to beyond Freedom Boulevard. Accidents, events, and other incidents in the corridor can further increase congestion related delays in either direction, on any day, including weekends.

The AMBAG travel forecasting model projects that the 2020 Average Annual Daily Traffic (AADT) volumes in the study area will range from 115,000 near State Park Drive to 144,000 between Morrissey and Soquel. With this projected increase in travel demand, the extent and duration of congestion in the study area will significantly increase. The duration of daily northbound congested conditions would increase by several hours with weekday recurrent congestion related queues extending as far back as Watsonville during both the AM and PM peak periods. In the southbound direction, the anticipated increase in travel demands will further impact Route 17, Route 9, Ocean Street, and Mission Street as congestion queues extend north. Soquel Avenue, Seabright neighborhood, Morrissey Boulevard and the Hwy 1/9 intersection also experience high levels of vehicle traffic.

Accident Data

During the five year period, there were a total of 921 accidents on Hwy 1 from Morrissey-St. Park with no fatalities and 281 injuries resulting in a total accident rate of 1.22, which is below the statewide average rate of 1.60. The types of collisions were rear end (287), hit object (66), and sideswipe (47). The primary collision factors for these types of accidents were speeding (263); improper turn (40), and tailgating (45). The times of the day when a large percentage of these accidents occurred were 8:00 a.m. (60), 9:00 a.m. (36), and 5:00 p.m. (70).

Transit Services

Regional bus routes provide service to destinations in Santa Clara and Monterey Counties. Weekday service is provided by the Highway 17 Express Bus, which serves Santa Cruz, Scotts Valley and San Jose (destinations include the Caltrain Station and San Jose State University). Amtrak buses provide service to downtown Santa Cruz's transit center and to the San Jose Caltrain station, with train connections to San Francisco, Sacramento, Stockton and intermediate cities. Limited Amtrak bus service is also available between Watsonville and San Jose. Greyhound buses serve downtown Santa Cruz, Los Gatos and the San Jose Airport.

Modal Choice/Transit

Although the urbanized portions of the County, especially University oriented areas of Santa Cruz, exhibit support for alternative transportation modes including transit and bicycling, the preponderance of new growth has been at lower, less transit conducive densities in communities and unincorporated area lying south of Santa Cruz. As a result, a recent survey indicates that 83% of the County's workers commute in single occupant vehicles. Those who live in Santa Cruz County and work elsewhere also impact Highway 1. According to the 1990 Census approximately 20% of employed Santa Cruz County residents travel to jobs in Silicon Valley and beyond; a significant proportion of these travelers use Highway 1 to access Highway 17 over the Santa Cruz Mountains.

The Route 1 facility currently includes park and ride lots in support of transit use, vanpools, and high occupancy vehicles. "Express Buses", including Route 17 Express Service are trapped in mixed flow lanes with all other traffic, and no incentives such as ramp meter HOV bypass lanes or mainline HOV lanes exist to encourage ridesharing.

Lack of Alternative Routes

Owing to geography, topography and historical development patterns, Route 1 is the lifeline for transportation through the County and its urbanized areas. While Route 1 is the only continuous route through the County, Soquel Drive/Soquel Ave and other local arterials including Capitola Road and Murray Street/East Cliff Drive, serve as parallel routes within certain sections of the urbanized area. These roadways, however, are themselves congested during peak hours and little opportunity exists to expand their capacity. An underutilized branch rail line provides potential for future transit growth in the corridor, and including potential use for as a bicycle and pedestrian path. The closest parallel State highway for interregional travel is U.S Route 101, which is separated from Route 1 by coastal mountains.

REGIONAL TRANSPORTATION PLANNING

Institutional Context

The regional transportation planning agency for Santa Cruz County is the Santa Cruz County Regional Transportation Commission (SCCRTC). SCCRTC oversees planning and funding programs for local & regional projects using state and federal transportation funds. The City of Santa Cruz has one City representative on the 12-member SCCRTC board and many City transportation projects are funded through grant programs administered by the SCCRTC.

Adopted Plans and Programs

Three regional transportation planning efforts directly affect the future of transportation planning for the City of Santa Cruz:

1. The Master Transportation Investment Study (MTIS), approved by the RTC in 1999, which sets forth a program of $260 million in transportation projects for the Watsonville - Santa Cruz - UCSC corridor to be pursued over the next 15 years.
2. The Regional Transportation Plan (RTP), adopted by the RTC in October 2001, which is the comprehensive regional transportation planning document providing guidance for transportation policy and projects to improve mobility through 2025 and incorporates the MTIS decision.
3. The 2002 Regional Transportation Improvement Program (RTIP), adopted by the RTC in December 2001, which implements the RTP, proposes how regional funds should be spent to the California Transportation Commission, and is the summary document which tracks state and federal transportation funding through fiscal year 2006/07.

Key Regional Projects

The adopted RTP confirmed the recommendations of the MTIS, with the following projects having significant potential to affect the mobility future for the City of Santa Cruz:

- **Acquisition of the Santa Cruz Branch rail line** for future transportation resource for the community.
- **Development of a bicycle and pedestrian pathway adjacent to the rail line**, where freight operations will continue and future transit options will not be precluded.
- **Implementation of the Highway 1/17 Merge Lanes project**. This project provides operational improvements by widening the existing to add merge lanes between Highway 17 and Morrissey Blvd. It is funded with $52 million in State Transportation Improvement Program (STIP) funds and is scheduled to start construction in 2004. It can be characterized as the next step toward full highway widening (with Mission St. widening as the first step).
- **Planning for Highway 1 widening from four lanes to six lanes to add HOV lane both ways is beyond the limits of the upcoming Highway 1/17 Merge Lanes project.** This project would modify six interchanges and ten structures, including three additional structures for pedestrian over crossings and sound walls. The extended Highway 1 widening project is not yet funded and will require a local sales or gas tax to enable future construction.

- **Funding for a 15-year growth plan for increasing bus service**, including new buses, bus stops, equipment and upgraded maintenance/operations facilities.
- **Funding for high priority local bike projects**, including around schools, and an **electric bike program** allowing discounted distribution and sale of electric bikes to people committed to driving less.

None of these projects are fully funded yet.

CONSISTENCY WITH MTS GOALS

Table 2 presents 2002 Regional Transportation Improvement Program funded projects and longer-term RTP projects that will affect future City of Santa Cruz travel. The table provides a conceptual evaluation for consistency with the MTS goals. All identified RTIP and RTP projects are consistent with the MTS, with the following comments:

MTS High Priority Projects

The following projects are MTS high priority projects:

- Metrobase Transit District Consolidations Operations Facility.
- Right of Way Acquisition on rail corridor.
- Bike and pedestrian path on rail right-of-way.
- Local bike projects.
- Expanded Bus Service

Projects Requiring Further Evaluation

The proposed Highway 1 widening projects, both the 1) widening of existing on-ramps, adding auxiliary lanes and ramp metering, and 2) adding one HOV lane each direction - widening Highway 1 from 4 to 6 lanes - modification to 6 interchanges and 10 structures, including 3 pedestrian over crossing and sound walls, require additional design and operational information to evaluate project impacts and ensure consistency with MTS goals.

Key questions to be analyzed in the environmental analysis are:

1. The potential effect of increasing SOV use with the addition of HOV lanes.
2. Local street system peak hour traffic impacts associated with increased HOV and SOV traffic including the Highway 1 and Mission Street corridors, as well as on Soquel Avenue.
2. Operational efficiency and travel timesaving with the design of the transitions from Hwy 1 HOV lanes to local city streets including the flow of transit and ridesharing to UC, downtown and employment center locations.

4. Opportunities for new bicycle lanes and pedestrian connections across Highway 1 to link the north and south areas of Santa Cruz together.

A proposed Route 1 strategy for MTS is to

1. Recognize the regional problem;
2. Raise questions regarding the problem and potential solutions for consideration;
3. Identify issues, solutions and alternatives to address potential impacts for environmental analysis. Items identified by the Steering Committee are:

- Park and ride at Hwy 1/9 is critical.
- Park and ride all along the Hwy 1 corridor.
- Transit stops directly along Hwy 1 corridor (on the freeway).
- Consider Hwy 1 corridor/ROW as accommodating other very high occupancy transit systems (fixed guide way).
- Increase efficiency of Hwy 1 corridor.
- Provide better housing opportunities for those working in the City and currently residing in the County.
- Balance jobs & housing.
- Widening of all bridges across the corridor to accommodate bike lanes and pedestrian facilities.
- Parking pricing options.
- Consider appropriate transit technologies given regional distribution of land use, i.e. that 50% future growth is in low density, auto dependent unincorporated areas of county.
- Provide land use alternatives in EIR analysis for region.
- Providing alternatives, including HOV lanes, improve SOV travel.
- City hire separate EIR consultant to independently evaluate HOV lane impacts.
- Offer choices.
- Recommend rationale to council.
- Ensure that if there is a 1/2 cent sales tax to pay for the widening, that it does not eliminate funding for transit.
- What are the local street impacts of the Highway 1 widening?

Table 2: Regional Projects

Project	Cost	Consistent MTS	Remarks
Hwy 1 widening - merge lanes cost increases	$52 million	- Projects Funded in the RTIP that Affect the City --	need additional information to evaluate impacts & insure consistency with MTS goals
Metrobase - Transit District Consolidated Operations Facility	$31 million	Yes	**MTS high priority** *needs additional funds*
Traffic management - Hwy 1 freeway service patrol	$240,000	Yes	non capacity increasing project that improves safety and traffic flow
Traffic management - Commute solutions	$444,000	Yes	regional carpool program
Project management - SB45 planning funds	$230,000	Yes	helps track funding for all projects
Sanctuary Scenic Trail	$1.5 million		Only $150,000 currently funded
Santa Cruz Metro Center Rehabilitation	$6 million		
Highway 17 Bus Purchases	$4 million		
Santa Cruz Branch Rail Line Acquisition needs additional funds	$15 million	yes	**MTS high priority**
Regional Vanpool Incentive Program	$100,000		
Santa Cruz Area TMA Program	$90,000/yr		
Electric Bicycle Commuter Incentive Program	$1 million	yes	*needs additional funds*
One in Five (Don't Drive) Rideshare Promotion	$1 million	yes	*needs additional funds*
Bike & pedestrian path on rail right-of-way only environmental and planning phase funded	$12 million	yes	**MTS high priority**
Battery Backup of Signals program	$200,000		

City of Santa Cruz Projects

San Lorenzo River bike/ pedestrian bridge needs additional funds	$3 million	yes	**MTS high priority**
Santa Cruz Multimodal Station at Depot Site	$4 million		
Broadway-Brommer Bike Path	$2 million		
Beach Street Contraflow Bikeway	$600,000		
Front St. pavement rehabilitation	$325,000	yes	
High St./Highland Ave. pavement rehabilitation	$611,000	yes	
Water St. pavement rehabilitation	$195,000	yes	
EastCliff/Murray St. pavement rehabilitation	$395,000	yes	

Project	Cost	Consistent MTS	Remarks
San Lorenzo/E. Cliff/Riverside pavement rehabilitation	$900,000	yes	
West Cliff Dr Path Widening	$888,000	yes	*may need additional funds*
Mission St/Hwy 1 Lighting	$1 million	yes	*needs additional funds*
Water, Soquel, and Broadway pavement rehabilitation	$395,000	yes	aka "arterial roadway rehab"
Mission St/Hwy 1 Landscaping	$625,000		

RTP Projects that may be implemented/constructed 2002-2025 (Not currently funded)

Bus service improvements		yes	**MTS high priority**
-Bus stop improvements	$7.5 million		
-Fleet preventative maintenance	$1.1 million		
-Hwy 17 Express Service Expansion	$21 million		
-Local transit service expansion	$32.2 million		
-Replacement Buses	$69 million		
-Metro System Automated Customer Service	$200,000		
-Transit Alternative Fuel Conversions	$3.2 million		
-Transit Mobility Training Program Expansion	$1.2 million		
-Transit Service Operations and maintenance	$732 million		
-Transit Technological Improvements	$5 million		
-UCSC Bus Service Expansion	$12.3 million		
-Web-based Transit Rte Info	$300,000		
-ADA Paratransit fleet and service	$21.5 million		
-Countywide Specialized Transportation	$34.5 million		
-Liftline Consolidated Op Facility	$10 million		
-Non-ADA Paratransit Service Expansion	$17 million		
Hwy Improvements			
Adding 1 HOV lane each direction by Widening Hwy 1 from 4 to 6 lanes, Morrissey Blvd to State Park Drive	$300 million		need additional information to evaluate impacts & insure consistency with MTS goals
Hwy 1/9 intersection modifications and park and ride lot	$6 million	yes	
Intelligent Transportation Systems on Hwy 1	$3 million		
Bike/Ped bridge on Hwy1 @ Mattison	$2 million		
Hwy 1 Ramp Metering	$2.5 million		

Project	Cost	Consistent MTS	Remarks
Hwy 1/San Lorenzo Bridge Widening	$10 million		
Hwy 17 ITS	$7 million		
Hwy 17 Operational Improvements	$50 million		
Hwy 17 CHP Safety Program	$2.5 million		
local road improvements (MTS project listing) evaluate impacts & ensure consistency with MTS goals		yes	need additional information to
Neighborhood Traffic Management	$2.5 million		
Countywide bicycle projects	$75 million	yes	MTS high priority
Local Arterial EMS and HAR System	$600,000		
Intracity Rail Transit	$10 million		Passenger rail in City of SC
Other Regional Projects/Programs			
Bike to Work Project (Ecology Action)	$620,000		
Electric Vehicle Recharging Stations	$2 million		
Integrated Transportation Info Center			
Park and Ride Lot Development	$8 million		
Transit Oriented Development Program	$5 million		
Car sharing Program (SC TMA)	$2.5 million		

4.7 TRAFFIC & TRANSPORTATION

This section analyzes traffic and transportation impacts of the proposed project based on the trip generation, distribution and level of service analyses prepared by Kimley-Horn (May 2017) that was reviewed by the City of Santa Cruz Public Works Department staff and consulting traffic engineer, Ron Marquez. A summary of the methodology is included in Appendix F of this document.

Public and agency comments related to traffic and transportation were received during the public scoping period in response to the Notice of Preparation (NOP). Issues raised in these comments include:

- Traffic should be considered in the EIR.

To the extent that issues identified in public comments involve potentially significant effects on the environment according to the California Environmental Quality Act (CEQA) and/or are raised by responsible agencies, they are identified and addressed within this EIR. Public comments received during the public scoping period are included in Appendix B.

4.7.1 Environmental Setting

Regulatory Setting

A number of local, regional and state agencies are involved with transportation planning and implementation of transportation programs and improvements within the City of Santa Cruz. The City maintains local roadways and transportation facilities. The California Department of Transportation (Caltrans) has jurisdiction over State highway segments that traverse the City, including portions of Highways 1, 9, and 17. To address roadway and intersection improvements needed as a result of impacts of new development, the City has developed a "Traffic Impact Fee" (TIF) program. The TIF is applied to new development and redevelopment and is collected at the time of issuance of building permits (see discussion below in the "Planned Transportation Improvements" subsection for more details). The City also is active in acquiring transportation funding from federal, state, and local sources.

Other local and regional agencies responsible for transportation services and/or transportation planning are summarized below.

- *The Association of Monterey Bay Area Governments* (AMBAG) is the federally designated Metropolitan Planning Organization (MPO) for transportation planning activities in the tri-county Monterey Bay region (Santa Cruz, Monterey and San Benito counties). It is the lead agency responsible for developing and administering plans and programs to maintain eligibility and receive federal funds for the transportation systems in the region. AMBAG conducts regional transportation planning activities through its Metropolitan Transportation Plan (MTP), the Metropolitan Transportation Improvement Program

(MTIP), maintenance of a regional travel demand model and demographic forecasts. AMBAG works with regional transportation planning agencies, transit providers, the Monterey Bay Unified Air Pollution Control District (MBUAPCD), state and federal governments, and organizations having interest in or responsibility for transportation planning and programming.

- *The Santa Cruz Regional Transportation Commissio*n (SCCRTC) is the State designated Regional Transportation Planning Authority (RTPA) for transportation planning activities in Santa Cruz County. SCCRTC oversees planning and funding programs for local and countywide projects within Santa Cruz County using state and federal transportation funds. The City of Santa Cruz has one City representative on the 12-member SCCRTC board and some City transportation projects are funded through grant programs administered by the SCCRTC.
- *The Santa Cruz Metropolitan Transit District* (SCMTD) provides transit services throughout Santa Cruz County.

Study Area

The project area consists of the downtown area generally covered by the Downtown Recovery Plan (DRP) and the Central Business District zone, and specifically the lower downtown area generally between Soquel Avenue and Laurel Street on the north and south, and Cedar Street and the San Lorenzo River on the west and east. (Locations are shown on Figures 1-2 an d 2-1 in Section 3, Project Description.) The study area includes properties adjacent to the western San Lorenzo River levee.

Since the proposed project includes an amendment to the land use designation text for the Regional Visitor Commercial land use designation, the study area also includes lands located within this designation. In addition to the downtown area, the Regional Visitor Commercial (RVC) land use designation is applied to sites in the Beach area and upper Ocean Street adjacent.

The City's "Transportation Impact Study Guidelines" (2011), requires a traffic impact analyses to be conducted where a project would result in an increase of 50 or more trips during the weekday PM peak hour. In the City of Santa Cruz, the PM peak hour (between 4 PM and 6 PM) generally has the highest number of trips compared to the AM peak hour (between 7 AM and 9 AM) or the midday peak hour (City of Santa Cruz, April 2012-DEIR), and is considered the peak hour period for traffic impact studies in the City.

Based on the Transportation Impact Study Guidelines and the trip generation of the project, study intersections were selected for evaluation by the City Public Works Department and include those listed below. AM and PM peak traffic count data was collected on Thursday, May 22, 2014 and Tuesday November 17, by Kimley-Horn Associates.

1. Front Street / Laurel Street
2. Pacific Avenue / Laurel Street
3. Front Street / Cathcart Street
4. Front Street / Metro Station Driveway
5. Pacific Avenue / Metro Station Driveway
6. Pacific Avenue / Maple Street
7. Pacific Avenue / Front Street / Mission-Water Street
8. Front Street / Soquel Avenue
9. Pacific Avenue / Cathcart Street
10. Soquel Avenue / Pacific Avenue
11. Ocean Street / Water Street
12. Highway 1 / Highway 9
13. Chestnut Street / Mission Street / Highway 1

Roadway Network

Local Streets and Roads

Project site access will be provided primarily from Pacific Avenue, Front Street, Laurel Street and Soquel Avenue. Other local streets and roads include Maple Street, Elm Street and Cathcart Street.

Pacific Avenue is a north-south street and is classified as arterial in the City of Santa Cruz General Plan (City of Santa Cruz, June 2012). Between Laurel Street and Cathcart Street it is a two lane divided roadway. North of Cathcart Street, Pacific becomes a one-way roadway. There is two hour metered on-street parallel parking and sidewalks are present on both sides of the street. SCMTD buses use Pacific Avenue to enter Pacific Station, a large transit center providing regional service to the City of Santa Cruz.

Front Street is a north-south two lane arterial with left turn pockets. Between Cathcart Street and Soquel Avenue, Front Street becomes three lanes. Sidewalks and bicycle lanes are present on both sides of the street. Metered on-street parallel parking is provided on the east side of the street as well. Front Street provides direct access to three surface parking lots and one parking structure. SCMTD buses use Front Street to enter and exit the Metro Station transit center.

Laurel Street is an east-west arterial with left turn pockets. Bicycle lanes and sidewalks are present on both sides of the street. There is no on-street parking allowed on Laurel Street in the study area.

Soquel Avenue is an east-west arterial that provides a major east-west connection over the San Lorenzo River to downtown and to the eastern portion of the City. Near the study area it is a four lane roadway with sidewalks and bicycle lanes on both sides of the street. Limited, metered, parallel parking is provided on both sides of the street between Pacific Avenue and Front Street.

Water Street is an east-west four lane arterial with left turn pockets between Center Street and Branciforte Avenue east of the study area. At its intersection with Center Street, Water Street becomes Mission Street. Between Chestnut Street Extension and Center Street, Mission Street is a two lane arterial. There are bicycle lanes on both sides of the street and crosswalks at every intersection within the study area. There is on-street twelve hour metered parallel parking on the north side of the street between Center Street and River Street. East of Pacific Avenue twelve hour metered on-street parallel parking is available on the south side of the street until River Street.

Cedar Street is a north-south two lane arterial parallel to Pacific Avenue. There are bicycle lanes on both sides of the street and crosswalks at every intersection in the study area. Metered on-street parallel parking is provided as well as access to several paid surface parking lots and parking structure. At its intersection with Laurel Street, vehicles are restricted to right turns only southbound.

River Street is a north-south arterial that parallels the San Lorenzo River. It connects to State Route 9 at its northern terminus with State Route 1. South of Water Street it splits into River Street and S. River Street. River Street terminates at Front Street and S. River Street terminates at Soquel Avenue. Bicycle lanes are provided on both sides of the roadway on River Street between Front Street and State Route 9. While there is no bicycle facility on S. River Street the San Lorenzo Riverwalk runs parallel to it. (See below for more information on the San Lorenzo Riverwalk.) There are textured colored crosswalks connecting to the pedestrian bridge over the San Lorenzo River at the Regal Cinemas theater. Twelve hour metered on-street parallel parking is provided on the west side of S. River Street and on the east side of River Street between Front Street and S. River Street.

State Highways

State highways that are in the vicinity of the project site include segments of State Routes 1 and 17; State Route 1 is located approximately 1/2 mile driving distance northwest of the project site. Though referenced as “state routes” in Caltrans documents, the more common term, “highway”, is used in this EIR. Highways 1 and 17 serve regional traffic, including motorists who commute to jobs in the Santa Clara Valley and motorists who travel into Santa Cruz County for recreational opportunities offered in the county (City of Santa Cruz, April 2012, DEIR volume).

Highway 1 provides access to San Francisco to the north and Monterey to the south. Regionally, Highway 1 is the major inter- and intra-county route for Santa Cruz County. Within the City of Santa Cruz, it is oriented in an east-west direction, although the interregional alignment of Highway 1 is primarily north-south. It is a four-lane arterial along Mission Street from the west

side of Santa Cruz to Chestnut Street Extension, a four-lane expressway between Mission Street-Chestnut Street and River Street, and a four-lane freeway east of River Street. The speed limit on Highway 1 is 25 mph along Mission Street, 45 mph along the expressway section, and 55 and 65 mph on the freeway sections. Recurrent congestion results in queuing on Highway 1 that extends for several miles during peak hours. Accidents, events, and other incidents in the corridor can further increase congestion related delays in either direction, on any day, including weekends (City of Santa Cruz, April 2012, DEIR volume).

Highway 9 is a multi-lane highway between Highway 1 and Encinal Street. It is two-lanes north of Encinal Street that connects the City of Santa Cruz with the San Lorenzo Valley, and eventually, Saratoga and Los Gatos.

Highway 17 connects Santa Cruz with Scotts Valley and San Jose and other Santa Clara County communities. It is a four-lane freeway north of the Highway 1/ Highway 9 intersection. Highway 17 is the primary route between the Santa Clara Valley and Santa Cruz County that serves as both a commute route for Santa Cruz County residents that work in Santa Clara County and as a route for recreational visitors that come to Cruz County. Congestion occurs both during weekday commute times and on summer weekends. This winding, four-lane road has steep sections, frequent road crossings, and substandard median shoulders and outside shoulders for most of its length. In addition to the challenging roadway configuration, weather-related conditions such as thick fog, heavy rains and mudslides affect roadway operations (City of Santa Cruz, April 2012, DEIR volume).

Other Transportation Modes

Pedestrian and Bicycle Facilities

Pedestrian facilities within the study area include sidewalks, crosswalks, ADA ramps and pedestrian signal heads. The sidewalks on Pacific Avenue are 10 to 25 feet wide and crosswalks with ADA ramps are provided at every intersection. The sidewalks on Front Street are generally 8 to 10 feet wide and crosswalks are provided at intersections as well as in front of the Pacific Station transit center. Bicycle amenities include bicycle parking (located at Pacific Station), Class II facilities (bicycle lanes) and the San Lorenzo Riverwalk.

The San Lorenzo Riverwalk is a north-south bicycle and pedestrian path that follows the San Lorenzo River in Santa Cruz for approximately 2.5 miles. The paved trail is on the river levee on both the east and west sides of the river, except for a short segment in the vicinity of the County Building north of Soquel Avenue, which is currently under construction. A pedestrian/bicycle bridge north of Soquel Avenue connects both sides of the levee trail system, and can be accessed from River Street, approximately 750 feet north of the project site.

Public Transit Service

Public transit service in the City and County of Santa Cruz is provided by the Santa Cruz Metropolitan Transit District (SCMTD). Pacific Station, located on the east side of Pacific Avenue between Elm Street and Maple Street, is the largest transit center for SCMTD bus service. There are four bus departure lanes and a staffed customer service information booth. All routes except 33-34, 55, and 72-79 service the station. In September 2016, SCMTD implemented a large service reduction to address funding shortfalls. This reduction affected some of the routes servicing Pacific Station, however it is still provides high frequency service.

Existing Traffic Conditions

According to City data, from the years 2010 to 2014, 63% of commuters within the City drove alone, 11% walked, 10% bicycled, 8% carpooled, 6% took the bus, and 2% used other modes such as taxi, motorcycle (City of Santa Cruz, 2016 Annual Traffic Safety Report). This data shows significant progress towards the City's Climate Action Plan goals to increase biking and walking and decrease single-occupancy vehicle use within the City. Santa Cruz has one of the highest bicycle mode splits in the country, and a lower "Drive Alone" mode split than most California cities (Ibid.).

Vehicle Traffic

Vehicle traffic conditions are measured by average daily traffic (ADT), peak hour traffic volumes, level of service (LOS), average delay, and/or volume to capacity (V/C) ratio. Average daily traffic is the total number of cars passing over a segment of the roadway, in both directions on an average day. Peak hour volumes are the total number of cars passing over a roadway segment during the peak hour in the morning (AM) or afternoon/evening (PM) (City of Santa Cruz, April 2012, DEIR Volume).

To evaluate the performance of roadways and levels of traffic congestion, many jurisdictions, including the city of Santa Cruz, use LOS. "Level of Service" is a qualitative measure that describes the level of traffic congestion and delay at intersections based on the amount of vehicle traffic that a roadway or intersection can accommodate and factors such as maneuverability, driver dissatisfaction, and delay. Traffic flow along roadways is typically controlled by the volume and capacity of the nearest intersection, therefore intersections are analyzed using LOS as an indicator of congestion. Intersections are rated based on a scale of LOS "A" through LOS "F," with LOS A representing free-flowing conditions and LOS F representing congested conditions. The intermediate levels of service represent incremental levels of congestion and delay between these two extremes. Table 4.7-1 relates the operational characteristics to each associated LOS category for signalized and unsignalized intersections.

The signalized intersection LOS methodology addresses the LOS for the intersection as a whole, whereas LOS methodology for unsignalized intersections computes delay for the minor

movements. The critical volume to capacity ratio (V/C) is another measure of the operating conditions of an intersection as opposed to LOS. It is not the average of all the movements at the intersection and is not used as a measure to define the levels of service.

The City of Santa Cruz General Plan 2030 seeks to maintain LOS D or better at signalized intersections during the PM peak hour (Action M3.1.3). However, the General Plan also accepts a lower level of service and higher congestion at major regional intersections if necessary improvements would be prohibitively costly or result in significant, unacceptable environmental impacts (Action M3.1.4).

Caltrans, which has jurisdiction over state highways, endeavors to maintain a target LOS at the transition between LOS C and D. However, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS (Caltrans, December 2002). If an existing State highway facility is operating at less than the appropriate target LOS, the existing LOS should be maintained (Ibid.).

TABLE 4.7-1: Intersection Level of Service Definitions

Level of Service	Description	Signalized (sec/veh.)	Unsignalized (sec/veh.)*
A	Free flow with no delays. Users are virtually unaffected by others in the traffic stream.	≤ 10	≤ 10
B	Stable traffic. Traffic flows smoothly with few delays.	>10 – 20	>10 – 15
C	Stable flow but the operation of individual users becomes affected by other vehicles. Modest delays.	>20 – 35	>15 – 25
D	Approaching unstable flow. Operation of individual users becomes significantly affected by other vehicles. Delays may be more than one cycle during peak hours.	>35 – 55	>25 – 35
E	Unstable flow with operating conditions at or near the capacity level. Long delays and vehicle queuing.	>55 – 80	>35 – 50
F	Forced or breakdown flow that causes reduced capacity. Stop and go traffic conditions. Excessive long delays and vehicle queuing.	> 80	> 50

*Two-way stop control intersection

SOURCE: Transportation Research Board, *Highway Capacity Manual 2010*, National Research Council as cited in City of Santa Cruz General Plan 2030 EIR.

Intersection Levels of Service

Intersection turning movement counts were conducted on Thursday, May 22, 2014 and Tuesday November 17, 2015 at the study intersections during the PM peak period (4:00 pm to 6:00 pm). From these counts the peak one-hour period was identified. Figure 4.7-1 shows the traffic volumes during the PM peak one-hour period. LOS for the project traffic study intersections was calculated using methods defined in the *Highway Capacity Manual, 2010 and 2000* (HCM) and Synchro 8 traffic analysis software. HCM 2010 was used for all intersections except for the intersection of Pacific Avenue / Front Street / Mission-Water Street due to the presence of a fifth approach at this location, which HCM 2010 cannot analyze correctly. Therefore, HCM 2000 was used to analyze this study intersection. The delay and corresponding LOS for each of the study intersections was calculated.

Table 4.7-2 shows the resulting LOS based on approach to the intersection. All intersections operate at an acceptable LOS except Highway 1 / Highway 9 and Chestnut Street / Mission Street, which operate at LOS E.

State Highway Operations

Based on the most recent (2015) Caltrans Traffic Census Program (Caltrans 2015) data, the annual average daily traffic (AADT) on state highways within Santa Cruz is as follows:

- Highway 1
  - At Highway 17, AADT is approximately 61,000 to 86,000 trips with 4,950 to 6,300 trips occurring during the peak hour.
  - At Emeline Street Connection, AADT is approximately 85,000 to 86,000 trips with approximately 5,900 to 6,300 trips occurring during the peak hour.
  - At Morrissey Boulevard, AADT is approximately 85,000 to 94,000 trips with 5,900 to 6,300 trips occurring during the peak hour.
- Highway 17, at Pasatiempo (between Santa Cruz and Scotts Valley). AADT is approximately 67,000 to 70,000 trips with 5,700 to 6,000 trips occurring during the peak hour.
- Highway 9 within Santa Cruz City Limits. AADT is approximately 5,000 to 5,200 trips with 530 to 550 trips occurring during the peak hour as measured at the City limits, north of Encinal.

Review by the City's consulting traffic engineer, Ron Marquez, indicates that the highway segments in the vicinity of the project site are operating at LOS of C and D during the peak hour as summarized on Table 4.7-3.

TABLE 4.7-2: Existing Intersection Weekday PM Peak Hour Levels of Service

#	Intersection	Control Type	Jurisdiction	Threshold[2]	Existing Conditions[1]		
					PM Peak Hour		
					Movement	Delay[3]	LOS
1	Front Street / Laurel Street	Signal	Santa Cruz	D	Overall	30.8	C
2	Pacific Avenue / Laurel Street	Signal	Santa Cruz	D	Overall	17.9	B
3	Front Street / Cathcart Street	Signal	Santa Cruz	D	Overall	19.0	B
4	Front Street / Metro Station Access	Signal	Santa Cruz	D	Overall	4.9	A
5	Pacific Avenue / Metro Station Access	SSSC	Santa Cruz	D	Overall	1.1	A
		Worst Approach	Santa Cruz	D	WB	11.4	B
6	Pacific Avenue / Maple Street	AWSC	Santa Cruz	D	Overall	8.1	A
7	Pacific Avenue / Front Street / Mission-Water Street	Signal	Santa Cruz	D	Overall	20.2	C
8	Front Street / Soquel Avenue	Signal	Santa Cruz	D	Overall	21.9	C
9	Pacific Avenue / Cathcart Street	AWSC	Santa Cruz	D	Overall	8.8	A
10	Soquel Avenue / Pacific Avenue	SSSC	Santa Cruz	D	Overall	3.6	A
		Worst Approach		D	WB	10.3	B
11	Ocean Street / Water Street	Signal	Santa Cruz	D	Overall	35.3	D
12	Highway 1 / Highway 9	Signal	Caltrans	C-D	**Overall**	**71.7**	**E**
13	Chestnut Street / Mission Street / Highway 1	Signal	Caltrans	C-D	**Overall**	**74.1**	**E**

Source: Kimley-Horn May 2017.

Notes:

1. Analysis performed using HCM 2010 methodologies, except for Intersection 7 where HCM 2000 methodology was applied.
2. The City of Santa Cruz has established LOS D as the minimum acceptable LOS for overall intersection operations during the AM and PM peak hours. Caltrans maintains a standard of between LOS C and D.
3. Delay indicated in seconds/vehicle.
4. Intersections that fall below the LOS threshold are shown in **bold**.

TABLE 4.7-3: Existing Highway Traffic Volumes and Peak Hour Levels of Service

Segment	Direction	Number of Lanes	Volume	Max Flow Rate for C	Max Flow Rate for D	LOS
Route 1: Route 9 to Route 17	N	2	2,080	2,761	3,444	C
	S	2	3,120	2,761	3,444	D
Route 1: Route 17 to Emeline	N	2	2,820	2,761	3,444	D
	S	2	1,880	2,761	3,444	C
Route 17: Route 1 to Pasatiempo	N	3	3,300	3,888	5,165	C
	S	3	2,700	3,888	5,165	C
Peak hour volumes from Caltrans 2015 Peak hour factor-.92, free flow speed – 55, heavy vehicle factor-.985 (Exhibit 11-17 HCM 2010)						

SOURCE: Ron Marquez, Traffic Engineer Consultant

Planned Transportation System Improvements

Metropolitan Transportation Improvement Program

AMBAG, as an MPO, is required by state and federal laws to develop and adopt a Metropolitan Transportation Improvement Program (MTIP), a multi-year transportation project program that includes multi-modal projects, including but not limited to major highway, arterial, transit, bikeway and pedestrian projects. The 2016 MTIP is a four-year program that covers the federal fiscal years from October 1, 2016 through September 30, 2020. The MTIP implements the 2035 Monterey Bay Area Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) adopted by the AMBAG Board of Directors in June 2014. The 2035 MTP/SCS is a financially constrained document and includes identified transportation improvement projects for the region. Once the projects are included in the MTP, they become eligible for inclusion in the MTIP and FSTIP. The projects included in the 2016 MTIP are consistent with the 2035 MTP/SCS (AMBAG, September 2016). Planned projects in the vicinity of Ocean Street and Ocean Street Extension include improvements to the Highway/9 intersection, Highway 1 auxiliary lanes (Soquel Avenue to 41st Avenue), and High Occupancy Vehicle (HOV) lanes between the Morrissey and San Andreas interchanges.

City of Santa Cruz Planned Improvements

The City's adopted Capital Improvements Program (CIP) is a multi-year schedule of projects with their associated costs and proposed funding sources. The CIP represents the best efforts to allocate available resources toward projects that maximize benefit and address the most critical needs. Major improvements on the current 2018-2020 CIP include: Highway 1 / Highway 9-River Street intersection improvement (programmed for 2018/19) described below; intersection improvements at the Ocean Street/Water Street intersection (programmed for completion in 2018); Branciforte Creek bike/pedestrian bridge path connection on the San Lorenzo River levee (under construction); and preliminary work to replace the Highway 1 bridge over the San Lorenzo River.

The City of Santa Cruz has adopted a "Traffic Impact Fee" (TIF) program based on future projected trips generated for each new development or redevelopment project. The TIF program, originally adopted in June 2005, evaluated over 60 intersections and identified numerous projects within the City which were needed in order to address the effects of cumulative development, and established fees. The fees are used to fund planned improvements at intersections and roadways included in the program. New development and redevelopment projects are required to pay traffic impact fees, which are paid at the time of building permit issuance. The TIF was updated in November 2012 to reflect traffic conditions associated with buildout accommodated by the City's General Plan as identified in the City's *General Plan 2030* EIR. All of the projects noted above are TIF program intersections, except for the Highway 1 bridge project. The program also funds bike and pedestrian projects (15% of fees collected) and neighborhood improvement projects adjacent to significant development (5% of fee collected).

Bicycle and Pedestrian Improvements

The City's recently adopted *Active Transportation Plan* (2017) includes the following paths that are included in the FY2018-2020 CIP: Branciforte Creek Connection to complete the levee path over Branciforte Creek and under the Soquel Bridge, Monterey Bay Sanctuary Scenic Trail Network Segment 7 along the railroad track on the west side of the City, and the San Lorenzo River Trestle Bridge trail widening project. The Plan also includes numerous other infill and improvements to existing bike and pedestrian facilities.

Regional Transportation Plan Improvements

The SCCRTC periodically completes a Regional Transportation Plan (RTP) and Regional Transportation Improvement Program (RTIP) according to state guidelines to guide short- and long-range transportation planning and project implementation for the county. This 2014 RTP provides guidance for transportation policy and projects through the year 2035. Projects identified in the RTP that are within the project vicinity include:

- Highway 1/Highway 9 Intersection Modifications (also on City CIP and MTIP).
- Highway 1 bridge replacement over San Lorenzo River (also on City CIP).
- Highway 17: Preparation of study to determine long-range solutions to access, operations and safety on this route.
- Branciforte Creek multi-use path and bridge (also on City CIP and under construction)
- Ocean Street Widening from Soquel to East Cliff
- Hwy 1/Mission St at Chestnut/King/Union Intersection Modification
- Pacific Station: Bike Station
- River St/River Street South Intersection Modification
- Water Street Signal Synchronization
- Soquel/Branciforte/Water (San Lorenzo River to Branciforte) Bike Lane Treatments

Planned State Highway Improvements

Highway 1. As indicated above, improvements for the Highway 1 Soquel to Morrissey Auxiliary Lanes Project are complete. In addition, the SCCRTC has been working with Caltrans and the Federal Highway Administration since 1986 on studies for longer-term improvements to Highway 1. The current Caltrans Route Concept Report for Highway 1 includes the addition of HOV lanes to Highway 1 to reduce congestion, encourage carpooling, expand express bus service, and improve safety in the Watsonville to Santa Cruz corridor. (Caltrans, April 2006). This project will add a lane in each direction from Morrissey Boulevard in the City of Santa Cruz to San Andreas/Larkin Valley Road. Caltrans' *Corridor System Management Plan* for Routes 1 and 183 also supports HOV lanes on Highway 1 in conjunction with other transportation demand management strategies (Caltrans, October 2011).

A Draft EIR for the Highway 1 Corridor Investment Program was prepared and released for public review and comment in November 2015 (Caltrans and FHWA, November 2015). The Draft EIR considers three alternatives including an HOV Lane alternative with auxiliary lanes and a Transportation System Management alternative without HOV lanes. A final decision on the preferred alternative has not been made yet. The Draft EIR provides a program level analysis of the Highway 1 corridor alternatives using a two tiered approach. Tier I is a long term, program-level analysis for the future of the Highway 1 corridor between Santa Cruz and Aptos. The Tier I concept for the corridor would be built over time through a series of smaller incremental projects (referred to as Tier II projects). The Tier II analysis includes project-level analysis of smaller incremental projects within the Tier I corridor which would move forward based on available funding. Each of the Tier II projects would undergo separate environmental and public review. Caltrans received a total of 263 letters, emails, and recorded comments from public agencies, organizations and individuals, on the Draft EIR. Based on review of the comments received, the project team has identified a need to update the air quality, natural environment, and traffic operations studies, as well as reporting of the cumulative impacts of the project alternatives prior to completion and release of a Final EIR.

Caltrans has prepared and approved a "Corridor System Management Plan" (CSMP) for Highway 1 from the junction of Highway 68 in Monterey County to King Street/Mission Street in Santa Cruz. The following strategies will be used to manage State Route 1 over the next 20 years:

- Cost-effective maintenance and preservation of the roadway.
- Support improvement of transit service, including new express bus service on HOV lanes if implemented in the Santa Cruz corridor.
- Support land use and transportation planning efforts through participating in local development review and regional planning efforts.
- Reduce congestion through transportation demand management to increase the use of transit, improve bicycle and pedestrian programs, and encourage programs such as carpools, ridesharing, telecommuting, and park-and-ride facilities.

- Implement Intelligent Transportation Systems/Traveler Information/Traffic Management to improve incident management and provide real time traveler information which helps reduce delay.
- Increase modal options such as Caltrain and integrate transit, bicycle and pedestrian transportation into a coordinated multimodal system.
- Collaborate with local partners on a ramp metering plan.
- Operational Improvements, including auxiliary lanes, intersection improvements, and other system refinements to enhance existing services and reduce delay.
- Upgrade intersections to maximize throughput on the State highway and parallel routes.
- Increase the capacity, operational efficiency and connections on parallel roads to reduce local traffic demand on Highway 1.
- Improve mobility, accessibility, reliability, reduce congestion and improve safety by improving capacity on the existing system (Caltrans, October 2011).

Highway 17. Highway 17 connects Santa Cruz with Scotts Valley and San Jose and other Santa Clara County communities. It is a four-lane freeway north of the Highway 1/ Highway 9 intersection. The highway is the primary route between the Santa Clara Valley and Santa Cruz County that serves as both a commute route for Santa Cruz County residents that work in Santa Clara County and for recreational visitors that come to Cruz County. Congestion occurs both during weekday commute times and on summer weekends. This winding, four-lane road has steep sections, frequent road crossings, and substandard median shoulders and outside shoulders for most of its length. In addition to the challenging roadway configuration, weather-related conditions such as thick fog, heavy rains and mudslides affect roadway operations (City of Santa Cruz, April 2012-DEIR volume). According to the Transportation Concept Report for State Route 17 in District 5, (Caltrans District 5, January 2006), the target level of service for Highway 17 between Ocean Street and Scotts Valley is LOS E. The highway segment between Santa Cruz and Scotts Valley is considered to be a four-lane freeway (Caltrans, January 2006).

Highway 9. The current Caltrans Route Concept Report for Highway 9 includes recommendations to widen the shoulders to accommodate bicycle traffic, widening to four lanes from the junction of Highway 1 and Highway 9 to the Santa Cruz city limits, and other left turn improvements outside of the City of Santa Cruz (Caltrans, September 2007).

The Highway 1/Highway 9-River Street intersection, which is controlled by a signal, currently operates at LOS E during the both the PM and Design Day peak hours, which does not meet Caltrans standards. The City is working with Caltrans to implement lane modifications at this intersection. The improvements require Caltrans approval and an encroachment permit. With implementation of these improvements, the intersection would continue to operate at LOS E during the existing PM peak hours, but the average delay would be reduced by approximately 20 seconds.

The following improvements are identified for the Highway 1/Highway 9-River Street intersection, and are included in the current City Traffic Impact Fee (TIF) Program:

- Northbound Approach: Modify the intersection to consist of one left/thru, one-thru, two right lanes and a bike lane; add one northbound lane on Highway 9 and a shoulder/bike lane.
- Southbound Approach: Modify the intersection to consist of two-left, one-left/thru, one-thru, one right lane and a bike lane.
- Eastbound Approach: Reconstruct to consist of two left, three through, and one right-turn lanes.
- Upgrade all sidewalks and access ramps to meet ADA requirements.

Currently, a Project Report, preliminary engineering and associated studies, and environmental review are complete. Construction is anticipated in 2018.

4.7.2 Impacts and Mitigation Measures

Thresholds of Significance

In accordance with the California Environmental Quality Act (CEQA); State CEQA Guidelines (including Appendix G); City of Santa Cruz plans, policies and/or guidelines; and agency and professional standards, a project impact would be considered significant if the project would:

7a Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit (see discussion of City standards below);

7b Change the level of service of a State Highway roadway segment from acceptable operation (LOS A, B, or C) to deficient operation (LOS D, E or F) or result in a change in LOS for a segment currently operating at a deficient level based on Caltrans significance criteria[1];

7c Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;

7d Substantially increase hazards due to a design feature (for example, sharp curves or dangerous intersections) or incompatible uses (for example, farm equipment);

[1] Caltrans. December 2002. "Guide for the Preparation of Traffic Impact Studies."

7e Result in inadequate emergency access; or

7f Conflict with adopted policies, plans, or programs regarding public transit, bicycle or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

The City of Santa Cruz General Plan 2030 strives to maintain a LOS of "D" or better as the acceptable level of service for intersections. A significant impact would result if LOS dropped below a "D" level of service or where a project would contribute traffic increases of more than three percent at intersections currently operating at unacceptable levels (E or F), as further described below. This criteria is applied only to intersections within the City's jurisdiction, but not to Caltrans intersections. The City's General Plan 2030 also accounts for accepting a LOS below "D" at major regional intersections where improvements would be prohibitively costly or result in significant, unacceptable environmental impacts. There are no other adopted plans, ordinances, or policies that establish "measures of effectiveness" for the performance of the circulation system.

For City intersections that already operate at unacceptable levels of service (E or F), the City considers project impacts to be significant if congestion will worsen measurably at the intersection as a result of the project. "Measurably worse" is considered to be a three percent increase in trips at the affected intersection. The City has used the three percent significance criterion for project trip contribution at existing impacted intersections, except for Caltrans-maintained intersections (which are subject to the criteria in 3b above), in part based on directives in the City's existing General Plan to accept a certain level of congestion during peak hours at major intersections, as well as to reflect variations in daily traffic volumes. The three percent criterion has been used throughout the City and is based upon the likelihood that a project will result in an observable increase in congestion at a given intersection or road segment. This is based in part on information provided by Caltrans, in the yearly "Traffic Volumes" reports, which identifies the standard deviation expected with regard to reliability of traffic count data. The standard deviation ranges indicate a 12 percent deviation at 10,000 vehicle trips, meaning that if a traffic count totals 10,000 vehicles per day, then approximately 90 percent of the time, the actual traffic counts will lie within a range of 8,800 to 11,200 vehicles. Thus, the three percent reflects this variation in daily traffic conditions (California Department of Transportation, June 2015).

Regarding Caltrans' intersections and other Caltrans maintained facilities, the Caltrans Traffic Impact Study Guidelines (Caltrans 2002) state that Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on State highway facilities. As such, LOS C through D is considered to be acceptable traffic operations during the peak hour at intersections maintained by Caltrans. The Guidelines also state that if an existing State highway facility is operating at less than the appropriate target LOS, the existing MOE (LOS) should be maintained (Caltrans, 2002).

Vehicle Miles Traveled

In September 2013 Governor Brown signed Senate Bill 743 which made significant changes to how transportation impacts are to be assessed under CEQA. SB 743 directs the Governor's Office of Planning and Research (OPR) to develop a new metric to replace LOS as a measure of impact significance and suggests vehicle miles travelled as that metric. According to the legislation, upon certification of the guidelines, automobile delay, as described solely by LOS shall not be considered a significant impact (Section 21009(a)(2)). SB 743 also creates a new CEQA exemption for certain projects that are consistent with the regional Sustainable Communities Strategy.

OPR has released draft CEQA Guidelines to address this requirement; however, at the time this analysis was completed the Guidelines have not been finalized or certified. It is anticipated that the revisions to the CEQA Guidelines will be finalized in 2017. According to the most recent draft CEQA Guidelines released by the OPR, lead agencies would have a grace period of two years to update and adopt new thresholds once the final Guidelines have been adopted. The City of Santa Cruz will update its transportation standards of significance to reflect SB 743 once the state has finalized the guidelines. Because there are no adopted thresholds and the revised State CEQA Guidelines' have not yet been certified, vehicle miles travelled is not utilized as a standard of significance in this EIR. However, VMT estimates are provided in the Impact 4.7-1 discussion as an informational item.

Analytical Method

The proposed project consists of amendments to the City's Downtown Recovery Plan, General Plan, Local Coastal Plan and Zoning Code regarding development in the downtown area and Central Business District. The proposed project would not directly result in new development. However, the proposed Downtown Plan amendment would expand areas for potential additional building height that could accommodate intensified redevelopment of existing developed sites. City staff estimates that the proposed amendments could indirectly lead to development, resulting in a potential net increase of 711 new residential units and 2,200 square feet of office space with a net decrease of approximately 14,700 square feet of commercial building space over existing conditions within the downtown area. The proposed General Plan amendment would increase FAR in areas designated as RVC in the General Plan, but would not lead to development on sites not already considered in the General Plan and General Plan EIR. The proposed LCP and Zoning Code amendments would not result in changes that could indirectly lead to intensified development.

A project traffic impact study was prepared for the project in accordance with City requirements. As indicated, above, the City of Santa Cruz uses LOS To evaluate the performance of roadways and levels of traffic congestion. The project traffic impact study was based on intersection turning movement counts taken on Thursday, May 22, 2014 and Tuesday November 17, 2015 at the study intersections during the PM peak period (4:00 pm to 6:00 pm), from which the PM peak hour was determined.

The traffic study computed intersection LOS using the 2010 and 2000 HCM methodology and Synchro 8 software. The result of the HCM calculations is an estimate of average control delay at the intersection which corresponds to an LOS grade as shown in Table 4.7-1 above. Project trip generation is provided in the traffic impact study, and traffic distributed on city streets utilizing the City's traffic model that was developed as part of the General Plan 2030 using Traffix software. AMBAG maintains a regional travel demand model, but it was not used as the City's model is more detailed and specific to conditions in the City. The study scenarios analyzed include existing conditions, existing with the project, and cumulative conditions, including the project. The traffic impact analysis also includes evaluation of other travel modes based on adopted regional plans and review with City of Santa Cruz staff.

Impacts and Mitigation Measures

As described in the Initial Study (see Appendix A), there are no adopted congestion management programs[2] for the project area (7c). The following impact analyses address impacts to City streets and intersections (7a) and state highways (7b), the potential to substantially increase hazards or result in inadequate emergency access (7d-e), and potential project conflicts with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities or impacts to the performance of these facilities (7f).

Traffic Impacts

Impact 4.7-1: **Circulation System Impacts.** The project will result in an increase in daily and peak hour trips, but would not cause existing or planned intersections to operate at an unacceptable Level of Service (LOS) or further degrade intersections that already operate at an unacceptable LOS (7a). Therefore, the impact is *less than significant.*

A LOS analysis was completed to comply with City regulations, and as discussed above, LOS is the performance measure used to evaluate the effectiveness of the circulation system. In order to identify the potential traffic impacts of the project using LOS, a multi-step process was utilized. The first step is calculating trip generation, which estimates the total arriving and departing traffic during a peak hour and on a daily basis. Trip generation was estimated for the project by applying vehicle trip generation rates to the project development based on land use. Figure 4.7-2 shows the downtown project area zones and study intersections. Trip rates specific to the downtown area were used from the City of Santa Cruz General Plan EIR (City of Santa Cruz 2012). The project area was divided into zones and trip generation was calculated separately for each zone. Trip generation calculations include a 40 percent trip reduction due to proximity to the downtown transit center, mixed use development, bicycle use and walking trips. The project

[2] The Code of Federal Regulations, Title 23 Volume 1, adopted in April 2005 require Transportation Management Areas (TMAs) to prepare Congestion Management Programs. TMAs are defined as urbanized areas with a population over 200,000. There are eight such areas in California plus Santa Barbara that asked to be included (City of Santa Cruz, 2012).

would generate 293 weekday PM peak hour trips (188 in and 106 out) between 4 and 6 PM and 2,627 daily trips as summarized on Table 4.7-4.

TABLE 4.7-4: Project Trip Generation

Land Uses	Size	Units	Daily Trips	PM Peak Hour		
				Total Peak Hour	IN	OUT
Trip Generation Rates[1]						
Commercial		1,000 Sq Ft	44.32	2.71	44%	56%
Office		1,000 Sq Ft	11.01	1.49	17%	83%
Townhomes[2]		Dwelling Unit(DUs)	7.50	0.62	65%	35%
Apartments		DUs	6.65	0.62	65%	35%
Trips Generated						
Area X - Riverfront						
Commercial	11,171	Sq Ft	496	30	13	17
Office	18,296	Sq Ft	202	27	5	22
Townhomes	321	DUs	2,408	199	129	70
Apartments	0	DUS	0	0	0	0
Area X Total Trips			*3,106*	*256*	*147*	*109*
40% Reduction for Downtown Area[3]			*(1,242)*	*(102)*	*(59)*	*(44)*
Area X Net Trips			***1,864***	***154***	***88***	***65***
Area Y - E. Pacific/W. Front Pacific Station						
Commercial	(27,864)	Sq Ft	(1,236)	(76)	(33)	(43)
Office	(16,105)	Sq Ft	(178)	(24)	(4)	(20)
Townhomes	0	DUs	0	0	0	0
Apartments	370	DUs	2,462	229	149	80
Area Y Total Trips			*1,048*	*129*	*112*	*17*
40% Reduction for Downtown Area[3]			*(419)*	*(52)*	*(45)*	*(7)*
Parking Garage Added Trips[4]				*52*	*26*	*26*
Area Y Net Trips			***629***	***129***	***93***	***36***
Area Z - W. Pacific						
Commercial	2,000	Sq Ft	90	5	2	3
Office	0	Sq Ft	0	0	0	0
Townhomes	0	DUs	0	0	0	0
Apartments	20,000	DUs	134	12	8	4
Area Z Total Trips			*224*	*17*	*10*	*7*
40% Reduction for Downtown Area[3]			*(90)*	*(7)*	*(4)*	*(3)*
Area Z Net Trips			***134***	***10***	***6***	***4***
Total Project Trips			***2,627***	***293***	***188***	***106***

Source: Kimley Horn, May 2017.

Notes:

1. Trip generation rates obtained from Appendix C of the City of Santa Cruz General Plan 2030 EIR.
2. ITE Land Use 270 Rates used for Townhomes per City direction (email correspondence with Ron Marquez dated 04/22/16).
3. 40% Reduction for mixed use development in Downtown Santa Cruz per City direction (email correspondence with Ron Marquez dated 04/22/16).
4. Required parking per City Code= 414+880+871=2,165 spaces. With 20% reduction=1,732, so 259 additional spaces (1,991-1,732) that will generate traffic. 10% in the AM peak = 26 trips; 20% in the PM peak = 52 trips.

The second step of the forecasting process is trip distribution, which identifies the origins and destinations of inbound and outbound project traffic. These origins and destinations are typically based on demographics and existing or anticipated travel patterns in the study area. Figure 4.7-2 shows the trip distribution that was applied to the study area roadway network.

The third step is traffic assignment, which involves the allocation of project traffic to streets and intersections in the study area. Traffic distribution patterns are indicated by percentage orientation, while traffic assignment allocates specific volume forecasts to individual roadway links and intersection turning movements throughout the study area. Figure 4.7-3 depicts project trip assignment.

With the forecasting process complete and project traffic assignments developed, the impact of the project is identified by comparing operational (LOS) conditions with and without the project at the study intersections. Table 4.7-5 summarizes the PM peak hour LOS at the study intersections for Existing Conditions with and without the project. See Figure 4.7-4 for intersection traffic volumes with the addition of project traffic.

As shown, traffic associated with the project will not degrade LOS to below acceptable levels at any of the study intersections under the jurisdiction of the City. The two Caltrans intersections of Highway 1 / Highway 9 and Chestnut Street / Mission Street would continue operate at LOS E as a result of the proposed project. There are improvements identified for the Highway 1/Highway 9-River Street intersection as discussed above, which are included in the current City Traffic Impact Fee (TIF) Program, and the Chestnut Street / Mission Street intersection is included in the RTIP. The improvements are already required under existing conditions without the project. Traffic associated with the project does not further degrade the LOS at the two Caltrans intersections, and would not substantially increase delay. Therefore, based on the significance criteria discussed above, traffic associated with the project would not cause existing or planned intersections to operate at an unacceptable Level of Service (LOS) or further degrade intersections that already operate at an unacceptable LOS. Therefore, the impact is less than significant.

For informational purposes, a per capita VMT resulting from potential development accommodated by the proposed plan amendments was estimated utilizing trip length information from the California Statewide Travel Demand Model and percentages for different trip types, i.e., home to work, included in the CalEEMod air emissions model. Estimated new net development, including reduction in commercial uses, is estimate to result in a total of weekday VMT of 14,059 trips. Based on U.S. Census data for the downtown area and employee projections in the City's General Plan 2030 EIR, total residential and employee population is estimated at approximately 1,280, which results in a weekday per capita VMT of 11.0. According to the Santa Cruz County Regional Transportation Commission, VMT per capita within Santa Cruz County is estimated to decrease by 17% from approximately 15.3 to approximately 12.5 between 2005 and 2035 (Santa Cruz County Regional Transportation Commission. Although no VMT standards have been developed within the City, this preliminary project per capita VMT

estimate shows that VMT would be below existing and projected county-wide estimates, which in large part is a reflection of the project's location downtown and in proximity to transit, bicycle and pedestrian facilities.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

TABLE 4.7-5: Intersection Weekday PM Peak Hour Levels of Service with Project

#	Intersection	LOS Threshold[1]	Existing Conditions[2]			Existing Plus Project Conditions[2]		
			PM Peak Hour			PM Peak Hour		
			Movement	Delay[3]	LOS	Movement	Delay[3]	LOS
1	Front Street / Laurel Street	D	Overall	30.8	C	Overall	31.2	C
2	Pacific Avenue / Laurel Street	D	Overall	17.9	B	Overall	18.5	B
3	Front Street / Cathcart Street	D	Overall	19.0	B	Overall	18.9	B
4	Front Street / Metro Station Driveway	D	Overall	4.9	A	Overall	5.1	A
5	Pacific Avenue / Metro Station Driveway	D	Overall	1.1	A	Overall	1.1	A
		D	WB	11.4	B	WB	11.6	B
6	Pacific Avenue / Maple Street	D	Overall	8.1	A	Overall	8.2	A
7	Pacific Avenue / Front Street / Mission-Water Street	D	Overall	20.2	C	Overall	21.1	C
8	Front Street / Soquel Avenue	D	Overall	21.9	C	Overall	23.1	C
9	Pacific Avenue / Cathcart Street	D	Overall	8.8	A	Overall	8.9	A
10	Soquel Avenue / Pacific Avenue	D	Overall	3.6	A	Overall	3.6	A
		D	WB	10.3	B	WB	10.3	B
11	Ocean Street / Water Street	D	Overall	35.3	D	Overall	35.6	D
12	Highway 1 / Highway 9	C-D	**Overall**	**71.7**	**E**	**Overall**	**74.1**	**E**
13	Chestnut Street / Mission Street / Highway 1	C-D	**Overall**	**74.1**	**E**	**Overall**	**73.8**	**E**

Impact 4.7-2: **Highway Segment Impacts.** The project will result in an increase in daily and peak hour trips, but would not result in a change to an unacceptable LOS along state highway segments (7a). This is a *less-significant impact*.

The project will result in approximately 38 to 59 additional PM peak hour trips along Highway 1 and 20 additional peak hour trips along Highway 17, representing a 0.2 to 1.8 percent increase. All of the study highway segments would operate at acceptable levels of service according the LOS targets established by Caltrans as summarized on Table 4.7-6.

TABLE 4.7-6: Highway Traffic Volumes and Peak Hour Levels of Service

Segment	Direction	Number of Lanes	Max Flow Rate for C	Max Flow Rate for D	Existing		Existing plus Project			
					Volume	LOS	Project Trips	Volume	Percent Change	LOS
Route 1: Route 9 to Route 17	N	2	2,761	3,444	2,080	C	38	2,118	1.8%	C
	S	2	2,761	3,444	3,120	D	21	3,141	0.7%	D
Route 1: Route 17 to Emeline	N	2	2,761	3,444	2,820	D	24	2,844	0.9%	D
	S	2	2,761	3,444	1,880	C	14	1,894	0.7%	C
Route 17: Route 1 to Pasatiempo	N	3	3,888	5,165	3,300	C	7	3,307	0.2%	C
	S	3	3,888	5,165	2,700	C	13	2,713	0.5%	C
Peak hour volumes from Caltrans 2015 Peak hour factor-.92, free flow speed – 55, heavy vehicle factor-.985 (Exhibit 11-17 HCM 2010)										

SOURCE: Ron Marquez, Traffic Engineer Consultant

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Access and Hazards

Impact 4.7-3: **Project Access.** The project will not result in creation of hazards due to design of the project circulation system or introduction of incompatible uses (7d). Therefore, the project would result in *no impact*.

The proposed project does not include any design features that would change vehicle circulation or access. The project includes some minor changes to clarify the locations of pedestrian access to open space and areas around downtown. However, these changes do not result in hazardous features such as sharp curves or dangerous intersections. Therefore, there is no impact as a result of the project.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4,7-4: **Emergency Access.** The project will not result in inadequate emergency access (7e). Therefore, the project would result in *no impact*.

There are no proposed changes to vehicle circulation and the proposed project does not modify emergency access from existing conditions. Therefore, there is no impact related to emergency access.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Transit, Pedestrian and Bicycle Travel

Impact 4.7-5: **Transit, Pedestrian and Bicycle Travel.** The project will not conflict with adopted policies, plans, or programs regarding public transit, bicycle or pedestrian facilities, or otherwise decrease the performance or safety of such facilities (7f). Therefore, the project would result in *no impact*.

The Santa Cruz City Council recently accepted an Active Transportation Plan (ATP) (City of Santa Cruz, February 2017). The ATP includes a number of recommendations including programs and projects to create an integrated network of walkways and bikeways that connect neighborhoods to employment centers, commercial land uses, educational facilities, and recreational opportunities. The recommended projects in the ATP are prioritized and ranked based on a number of criteria including crash data, proximity to trip generators, traffic counts and public comments.

The SCMTD completes a Short Range Transit Plan (SRTP) every five years that contains a review of procedures and an analysis of existing services that results in service improvements and investments. The most recent SRTP (SCMTD 2013) contains a number of policy, practice, and service recommendations. Policy and practice recommendations primarily address SCMTD infrastructure. In 2016, SCMTD underwent a comprehensive operational analysis to reduce operating expenses in order to address a structural deficit of $6.5 million. The operating analysis resulted in a number of service changes that help to reduce operating costs and superseded the recommendations in the SRTP.

The Downtown Recovery Plan has a strong emphasis on pedestrian scale design and accessibility and includes a new pedestrian connection between Pacific Avenue and Front Street in the vicinity of Elm Street as well as bicycle access at the Elm Street extension to the San Lorenzo Riverwalk. None of the design features in the Downtown Recovery Plan conflict with the ATP or the SRTP and the design emphasis on pedestrians supports the objectives and goals of the ATP. Therefore, there is no impact related to conflicts with plans or programs related to active transportation and transit.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

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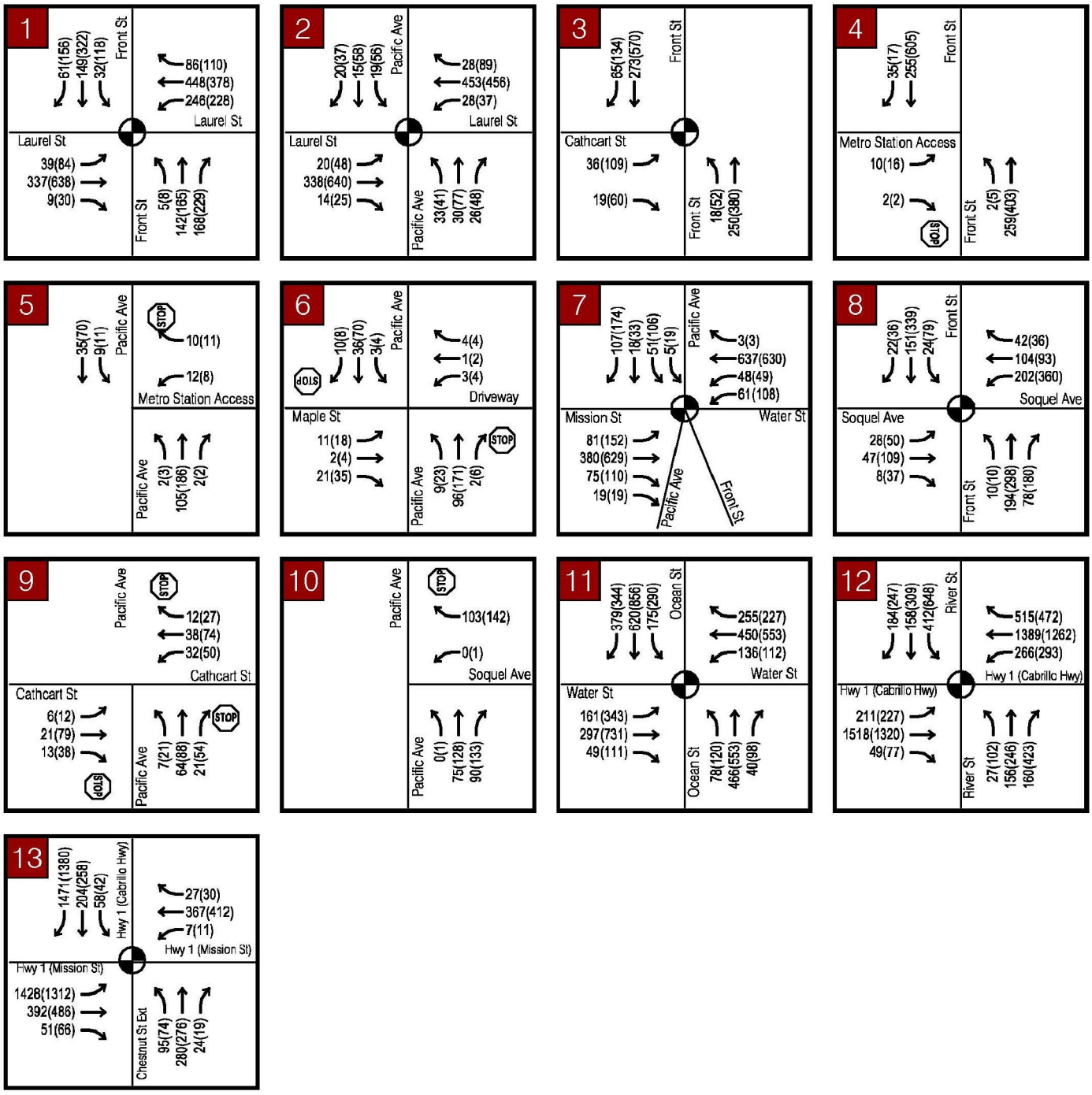


SOURCE: Kimley Horn

FIGURE 4.7-1

Existing PM Peak Hour Traffic Volumes

DUDEK

City of Santa Cruz Downtown Plan Amendments EIR

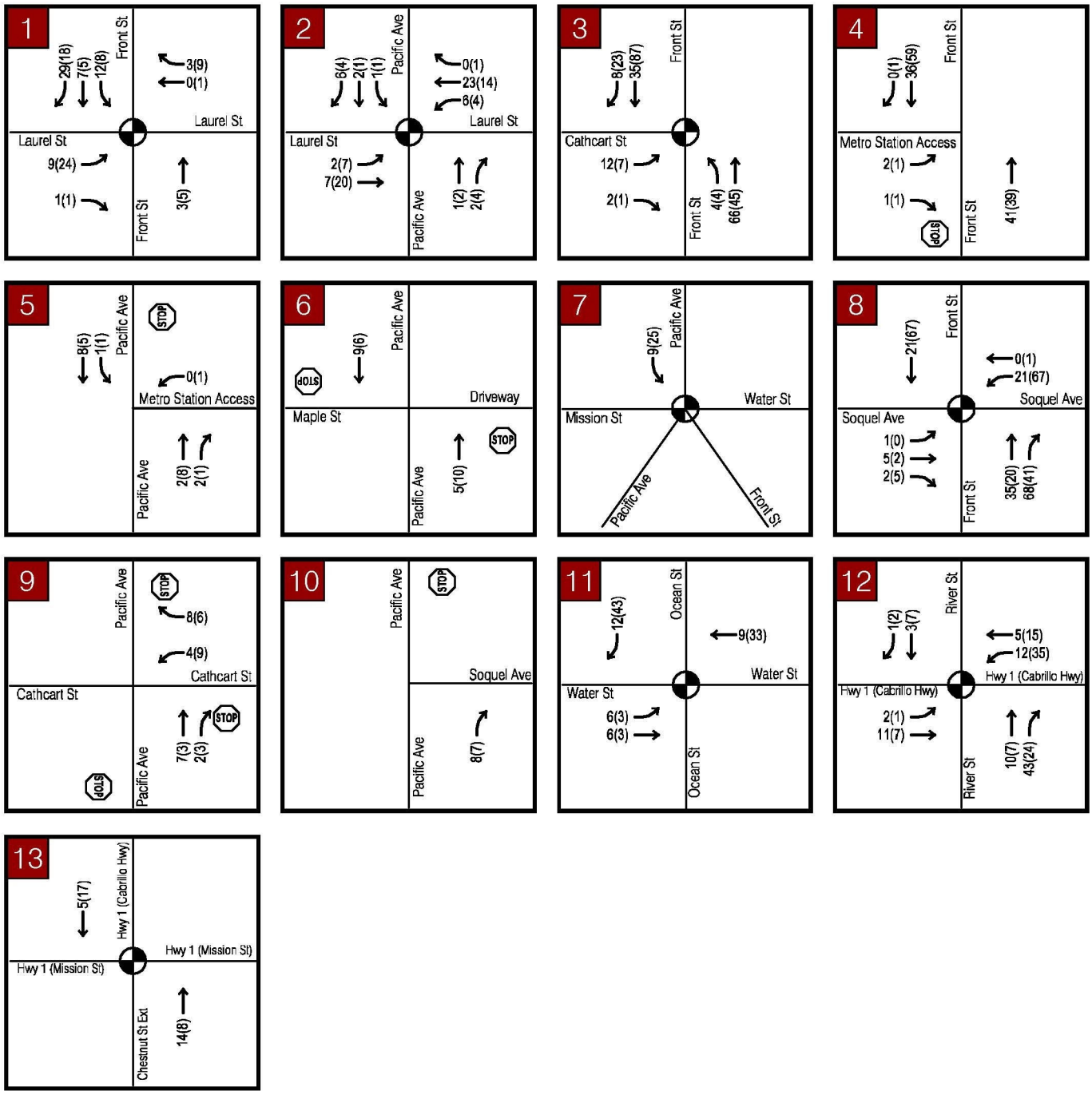
SOURCE: Kimley Horn

FIGURE 4.7-2

Project Trip Distribution

DUDEK

City of Santa Cruz Downtown Plan Amendments EIR



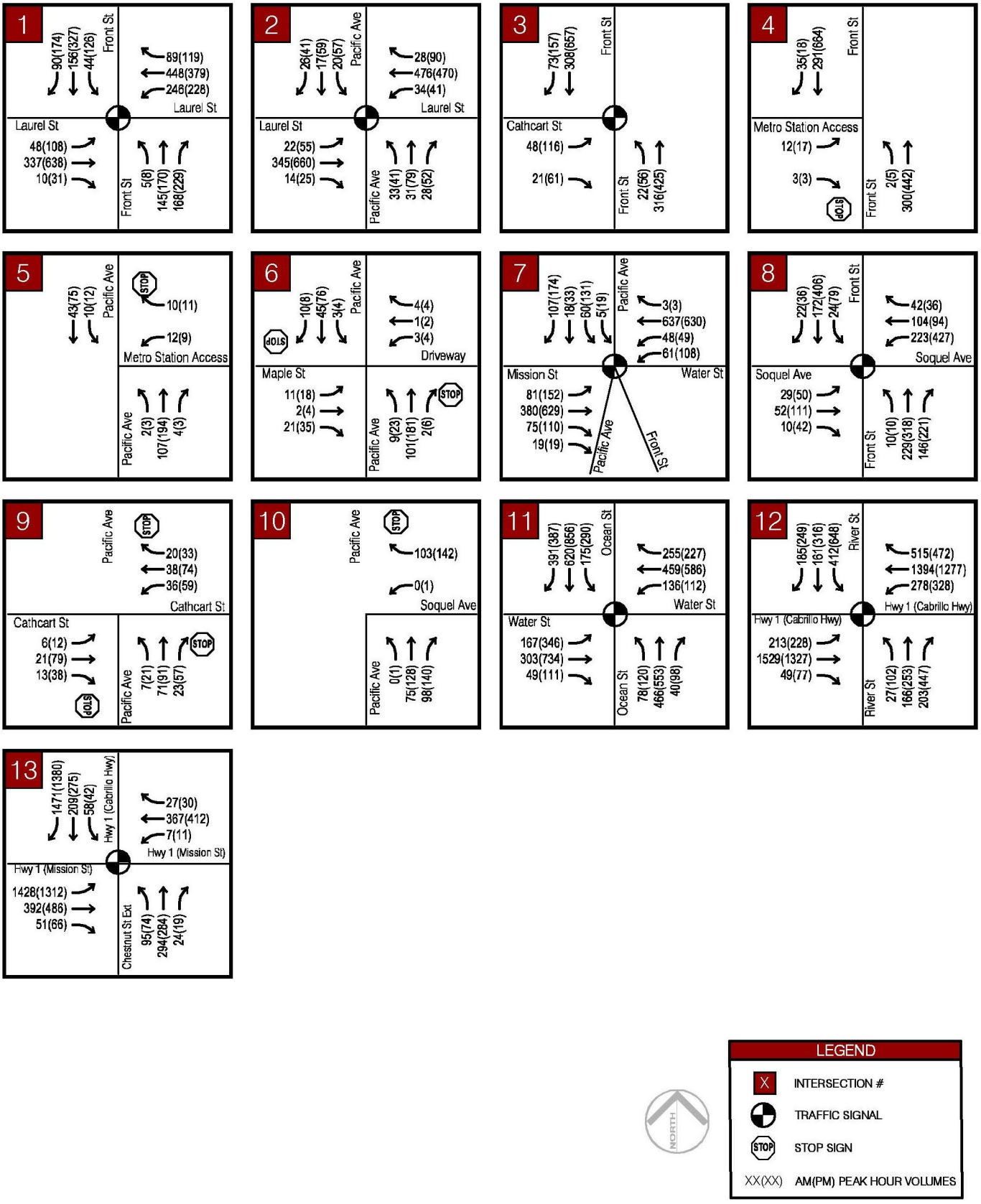
SOURCE: Kimley Horn

FIGURE 4.7-3

Project Trip Assignment

DUDEK

City of Santa Cruz Downtown Plan Amendments EIR



SOURCE: Kimley Horn

FIGURE 4.7-4

Peak Hour Traffic Volumes with Project

DUDEK

City of Santa Cruz Downtown Plan Amendments EIR

4.4 TRANSPORTATION & TRAFFIC

4.4.1 ENVIRONMENTAL SETTING

IN THIS SECTION:

- Regulatory Setting
- Summary of Transportation Modes & Use
- Transportation Plans & Studies
- Road Network & Traffic Conditions
- Bicycle & Pedestrian Circulation
- Public Transit
- Rail Service
- Planned Improvements
- Transportation Management
- Parking

This section was prepared with assistance from Ron Marquez, traffic consultant to the City of Santa Cruz Public Works Department, and Jeff Waller of Hatch Mott MacDonald (formerly Higgins and Associates), who ran the TRAFFIX model and developed Level of Service calculations under the direction of City staff and consultants. A summary of the traffic analysis methodology is included in Appendix C. Traffic volumes and intersection level of service calculations are included in Technical Appendices F-5 and F-6, respectively. The technical appendices are available for review at the City of Santa Cruz Planning Department[1] and are also included on the Draft EIR CD and on the online version of the Draft EIR on the City's website at www.cityofsantacruz.com, Planning Department.

REGULATORY SETTING

A number of local, regional and state agencies are involved with transportation planning and implementation of transportation programs and improvements within the City of Santa Cruz. The City maintains local roadways and bike and pedestrian facilities. The California Department of Transportation (Caltrans) has jurisdiction over State highway segments that traverse the City, including portions of Highways 1, 9, and 17. To help fund local roadway and intersection improvements, the City has developed a "Traffic Impact Fee" (TIF) that is applied to new development at the time of issuance of building permits (see discussion below in the "Planned Transportation Improvements" subsection for more details), and the City is active in acquiring transportation funding from federal and state sources.

[1] Located at 809 Center Street, Room 107, Santa Cruz, California during business hours: Monday through Thursday, 8 AM to 12 PM and 1 to 5 PM.

The City's Zoning Ordinance includes a trip reduction program requirement for specified classifications of employers (Chapter 10.46-Citywide Trip Reduction Program). Key purposes are: to establish programs and requirements for new and existing employers that will help to reduce traffic congestion and to improve air quality; to assist employers in identifying and utilizing cost-effective programs and methods to reduce vehicle trips made by employees; and to ensure the City plays a significant role in promoting alternatives to the use of single-occupant vehicles. The Zoning Ordinance also provides regulations regarding parking and parking space requirements for different land uses in Chapter 12 that include provisions for reduced parking for specified shared parking opportunities.

In addition to the City and Caltrans, other local and regional agencies responsible for transportation services and/or transportation planning include:

- *The Association of Monterey Bay Area Governments* (AMBAG) addresses transportation problems and concerns through its regional transportation system management element and preparation of regional traffic forecasts related to local land use and population projections. AMBAG is the federally designated Metropolitan Planning Organization (MPO) for transportation planning activities in the tri-county Monterey Bay Region. It is the lead agency responsible for developing and administering plans and programs to maintain eligibility and receive federal funds for the transportation systems in the region. AMBAG works with regional transportation planning agencies, transit providers, the Monterey Bay Unified Air Pollution Control District (MBUAPCD), state and federal governments, and organizations having interest in or responsibility for transportation planning and programming. AMBAG also coordinates transportation planning and programming activities with the three counties and 18 local jurisdictions within the Monterey Bay Region. AMBAG develops the Metropolitan Transportation Plan (MTP) and the Metropolitan Transportation Improvement Program (MTIP). (AMBAG website; online at http://www.ambag.org/programs/met_transp_plann.html).
- *The Santa Cruz Metropolitan Transit District* (SCMTD) provides transit services throughout Santa Cruz County.
- *The Santa Cruz Regional Transportation Commissio*n (SCCRTC) oversees planning and funding programs for local and regional projects within Santa Cruz County using state and federal transportation funds. The City of Santa Cruz has one City representative on the 12-member SCCRTC board and many City transportation projects are funded through grant programs administered by the SCCRTC (Fukuji Planning and Design, July 2003).
- *The University of California at Santa Cruz (UCSC)* implements a transportation systems management and parking program that provides a comprehensive package of commute options, including carpools, bicycles, and transit; free bus passes; and shuttle buses serving all areas of the campus.

SUMMARY OF TRANSPORTATION MODES & USE

The movement of people and goods is provided via a range of transportation modes including private and shared auto on a network of local and regional roads and highways; public transit; bicycle; walking; and rail service that is currently used for freight movement and limited seasonal visitor use. Transportation modes provide access for work, shopping, recreation, and

personal and social purposes. The state highways through the City also carry regional and statewide traffic. Key activity centers in the City include:

- The Mission Street corridor in the Westside;
- Ocean Street;
- Soquel Avenue in the eastside; the downtown area; the beach-Boardwalk area;
- the Harvey West-River Street area; and
- UCSC (Fukiji Planning and Design, July 2003).

The joint City-UCSC "Master Transportation Study" (MTS) found that 70% of daily residential mobility within the City is for local trips. For peak-hour travel citywide, 50% is local and 50% is regional travel. Of regional trips, commute in and commute out trips are roughly split in half (Fukiji Planning and Design, July 2003). Surveys conducted as part of the MTS found that 30% of trips in Santa Cruz are for work compared to 25% for social purposes, 18% for personal purposes, 14% for school, and 13% for shopping (Ibid.).

Daily citywide residential trips were made by auto, bus, bicycle and walking. City resident travel patterns identified in the MTS are shown on Figure 4.4-1.[2] For the PM peak period (4 PM to 7 PM), 80% of all travel modes used a car (68% drove alone and 12% carpooled) and 20% bicycled, walked or rode transit. Of these travel groups, full and part-time employees comprised 84% of the trips, compared to 16% for students and retired persons (Fukiji Planning and Design, July 2003). The Santa Cruz County Regional Transportation Commission reports that the number of people per vehicle has remained fairly constant over the last 15 years at an average of 1.2 persons per vehicle in the morning and 1.3 in the evening based on annual vehicle occupancy counts for Highway 1 and Highway 17 (Santa Cruz County Regional Transportation Commission, June 2010).

LOCAL & REGIONAL TRANSPORTATION PLANS & STUDIES

City-UCSC Master Transportation Study

In April 2000, the City of Santa Cruz and the University of California at Santa Cruz initiated a partnership to jointly fund a community-based approach to planning the City's transportation future that resulted in the completion of "The Master Transportation Study" (MTS). The Mission Statement of the study is to *"Create a Transportation Plan for the City of Santa Cruz that is inspiring, innovative and implementable with broad-based community support."* The MTS integrates pedestrian, bicycle, transit and street transportation plans and programs as a foundation for updating the City's General Plan, City zoning ordinance, UCSC's Long Range Development Plan and other city and regional transportation planning documents (Fukuji Planning and Design, July 2003). The MTS is not an adopted plan, but was reviewed and accepted by the City Council.

The MTS recommends a series of City-initiated strategies, short-term transit strategies and long-term recommendations to reduce single-occupant trips, increase multiple-occupant vehicles,

[2] All EIR figures are included in Chapter 7.0 at the end of the EIR (before appendices) for ease of reference as some figures are referenced in several sections.

increase transit, bicycle and pedestrian modes, and improve traffic system efficiency. Elements of these recommendations include an emphasis on carpooling and recommended support of a Bus Rapid Transit (BRT) system. The recommended travel mode splits as envisioned in the MTS would shift as follows:

- SINGLE-OCCUPANT VEHICLES (SOV): Decrease by 13% for internal trips and 4% for external trips.
- MULTIPLE-OCUPPANT VEHICLES (MOV): Increase by 4% for internal trips and 3% for external trips.
- BUS USE: Increase by 2% for internal trips and 1% for external trips.
- BIKE USE: Increase by 3% for internal trips.
- PEDESTRIAN USE: Increase by 4% for internal trips (Fukuji Planning and Design, July 2003).

  (Fukuji Planning and Design, July 2003).

The following projects are identified as MTS high priority projects:

- Metrobase Transit District Consolidations Operations Facility,
- Right-of-Way Acquisition on rail corridor,
- Bike and pedestrian path on rail right-of-way,
- Local bike projects and expanded bus service.

Santa Cruz County Regional Transportation Plan (RTP)

The Santa Cruz County Regional Transportation Commission (SCCRTC) deals with transportation issues in Santa Cruz County. The purpose of the SCCRTC is to:

- Set priorities for major capital improvements to the County's transportation infrastructure, including highways, major roads, rail and alternative transportation facilities.
- Pursue and allocate funding for all elements of the County's transportation system.
- Adopt policies to improve mobility, access and air quality.
- Plan for future projects and programs to improve the regional transportation system.
- Inform businesses and the public about alternatives to driving alone and the need to better manage our existing transportation system.
- Conduct programs to encourage the use of alternative transportation modes (Santa Cruz County Regional Transportation Commission website: www.sccrtc.org).

The *Regional Transportation Plan* (RTP) is a state-mandated, long-range plan that serves as a blueprint to guide future transportation funding decisions. The RTP, prepared by the SCCRTC, outlines transportation challenges and establishes investment priorities for all of Santa Cruz County. The plan includes lists of transit, highway, local road, bike, and pedestrian needs in the region and estimates the amount of local, state and federal dollars that may be available for these projects over the next 25 years. The plan is updated to reflect the latest funding and project needs every four to five years (Santa Cruz County Regional Transportation Commission website, online at: http://www.sccrtc.org/rtp.html.)

The current version was adopted by the SCCRTC in June 2010. The "2010 RTP" is a minor update of the last version, completed in 2005, and provides guidance for transportation policy and projects through the year 2035. The 2010 RTP is the SCCRTC's comprehensive planning document, which identifies the goals, projects, and programs that will maintain and improve the County's transportation system over the next twenty-five years. Identified improvements and projects are categorized as either "Constrained", meaning there are foreseeable funds for the improvement or "Unconstrained", meaning new revenues would need to be generated or become available. Individual projects listed in the 2010 RTP must still undergo separate design and environmental processes, and can only be implemented as local, state and federal funds become available (Santa Cruz County Regional Transportation Commission, June 2010).

The 2010 RTP carries forward goals from the 2001 and 2005 RTPs, which are to:

- Preserve and maintain the existing transportation system, emphasizing safety and efficiency
- Increase mobility by providing an improved and integrated multi-modal transportation system.
- Coordinate land use and transportation decisions to ensure that the region's social, cultural, and economic vitality are sustained for current and future generations.
- Ensure that the transportation system complements and enhances the natural environment of the Monterey Bay region and reduce greenhouse gas emissions.
- Make the most efficient use of limited transportation financial resources.
- Solicit broad public input on all aspects of regional and local transportation plans. Santa Cruz County Regional Transportation Commission, June 2010).

The 2010 RTP assigns future transportation funds to a range of projects and programs designed to maintain the current transportation system, provide traffic congestion relief and broaden transportation options. Key proposals include:

- Maintenance of the existing transportation network including roads, highways, bike lanes, sidewalks, and transit.
- Safety and operational improvements to Highways 1, 9, 17, 129 and 152.
- Adding auxiliary lanes and High Occupancy Vehicle (HOV) lanes on Highway 1 between Aptos and Santa Cruz.
- Modifications to major arterial roads -- including bus, pedestrian and bicycle facilities.
- Expanded bus service, with additional Highway 17 Express buses and more Park and Ride lots to serve Silicon Valley, University of California Santa Cruz (UCSC), and south county commuters.
- Construction of the Monterey Bay Sanctuary Scenic Trail Network along the coast.
- Local bicycle and pedestrian projects designed to increase bicycle commuting, and provide safe bicycle and pedestrian routes to schools.
- Expansion of specialized transport services in response to projected increases in senior and disabled populations.

- Increased availability of information about road conditions, transit operations, and other transportation options.
- Landscaping and lighting improvements to make transportation corridors part of livable communities (Santa Cruz County Regional Transportation Commission, June 2010).

The 2010 RTP also includes a new discussion on greenhouse gas (GHG) emissions in relation to transportation planning. In the absence of tools to measure the effectiveness of specific RTC policies towards reducing GHGs and without having the specific GHG reduction targets from the state during development of the 2010 RTP, the new chapter introduces some of the best practices which could be included in a portfolio of strategies to meet future emission reduction goals in Santa Cruz County. The RTP includes many projects that pro-actively implement GHG reduction strategies such as: operating a Commute Solutions program to encourage ridesharing; funding freeway service patrols to remove incidents and improve traffic flow; adding high occupancy vehicle lanes in the Highway 1 corridor to encourage carpools, vanpools and transit use; acquiring the rail corridor for goods movement, bicycle and pedestrian access and possible passenger service; and supporting bicycle, pedestrian and transit projects (Santa Cruz County Regional Transportation Commission, June 2010).

Monterey Bay Area Metropolitan Transportation Plan (AMBAG)

AMBAG is the MPO (Metropolitan Planning Organization) for the Monterey Bay Area, and as the region's MPO, AMBAG is required to produce certain documents that maintain the region's eligibility for federal transportation assistance. The Metropolitan Transportation Plan (MTP) is the federally mandated long-range transportation plan for the Monterey Bay Area. This plan lays out a financially constrained list of transportation projects over the following 25 years that will enhance regional mobility (AMBAG website, "Metropolitan Transportation Plan", online at: http://www.ambag.org/programs/met_transp_plann/mtp.html).

Federal regulations require that this long-range transportation plan be both financially constrained and fall under the on-road motor vehicle emissions budget included in the Federal Air Quality Maintenance Plan. The MTP, referenced as *Monterey Bay Area Mobility 2035*, was approved by the AMBAG Board of Directors on June 8, 2010, and includes goals, policies, programs and projects to meet the stated objectives and meet the transportation needs and deficiencies. Programs and projects are taken from each county's RTP and first incorporated, in their entirety, into the MTP (AMBAG, June 2010).

As a region that meets federal standards for ozone precursors, the region is considered to be in 'attainment' for those standards. As an attainment region, the MTP is only required to be updated every five years. Because new state legislation, SB 375, calls for MPOs to prepare a Sustainable Communities Strategy (SCS) to be used to synchronize and coordinate both the metropolitan transportation planning process and the regional housing needs allocation process, AMBAG is treating this 2010 update of the MTP as a minor update. Beginning with the 2012 update, AMBAG is moving to a four-year update cycle to align regional planning efforts for transportation with an eight year housing planning cycle. (AMBAG website, "Metropolitan Transportation Plan", online at: http://www.ambag.org/programs/met_transp_plann/mtp.html).

Caltrans' Corridor System Management Plan

Caltrans is in the process of developing a "Corridor System Management Plan" (CSMP) for Highway 1 from the junction of Highway 68 in Monterey County to King Street/Mission Street in Santa Cruz to develop strategies to manage the corridor and sustain existing transportation investments (Caltrans, October 2010). The draft plan indicates that the following strategies will be used to manage State Route 1 over the next 20 years:

- Maintenance and preservation of the roadway.
- Support improvement of transit service, including new express bus service on the HOV lanes planned for the Santa Cruz corridor.
- Support land use and transportation planning efforts such as AMBAG's "Blueprint Plan".
- Reduce congestion by encouraging programs that increase the use of transit, improve bicycle and pedestrian programs and encourage programs such as carpools, ridesharing, telecommuting and park-and-ride facilities to reduce demand.
- Intelligent Transportation Systems/Traveler Information/Traffic Management to clear congestion after collisions.
- Operational Improvements, including auxiliary lanes, intersection improvements, ramp metering (Caltrans, October 2010).

ROAD NETWORK & TRAFFIC CONDITIONS

Road and Highway Network

LOCAL ROADWAYS

The City's road system consists of arterial highways and arterial, collector and local streets (see Figure4.4-2). These different classifications relate to different transportation functions and are classified in terms of access, mobility, design and use. Additionally, visitor/coastal access and truck routes have been designated to facilitate the movement of visitor traffic and commodities.

Highways and arterial streets carry the City's heaviest traffic flows and provide regional and inter-community access. State highways through the City are described in the following section. Major arterial streets within the City include:

- Ocean Street (the primary north-south arterial);
- Mission Street, Water Street, Soquel Avenue and Broadway Avenue-Laurel Street (the primary east-west arterials);
- Other designated arterial streets include Bay Street, Delaware Avenue, Morrissey Blvd., Murray Street-San Lorenzo Blvd., Seabright Avenue, Market Street, Beach Street, Second Street, Front Street, Pacific Avenue, Cedar Avenue, Center Street, Walnut Street, River Street and High Street.

Collector streets provide circulation within and between neighborhoods and commercial and industrial areas. These streets usually serve relatively short trips and are meant to collect traffic from local streets and distribute them to the arterial network. Examples of collector streets

include: California Street, Chestnut Street, Escalona Drive, Fairmount Street, Frederick Street, King Street, Swift Street, and West Cliff Drive.

Local streets provide direct access to abutting land uses, collectors, or arterials, and usually do not accommodate bus routes.

Visitor/coastal access routes are intended to be inviting to visitors and to provide convenient, clear access to and from visitor and coastal destinations. Highways 1 and 17, Ocean Street and Mission Street are key visitor routes into Santa Cruz and the City's beach areas. West Cliff Drive also provides a scenic route along the coast.

Truck routes are intended to channel trucks through the community and away from residential and other areas where they would be a nuisance. The truck routes in the City are Highway 1 – Mission Street, Highway 17, Bay Street north of Mission, Empire Grade west of Bay, Highway 9, Morrissey Boulevard, and Soquel Avenue.

STATE HIGHWAYS

State highways that go through the City of Santa Cruz include segments of Highways 1, 17, and 9. Though referenced as "state routes" in Caltrans documents, the more common term, "highway", is used in this EIR. Highways 1 and 17 serve regional traffic, including motorists who commute to jobs in the Santa Clara Valley and motorists who travel into Santa Cruz County for recreational opportunities offered in the county. A short segment of Highway 9 also is within city limits.

Highway 1 provides access to San Francisco to the north and Monterey to the south. Regionally, Highway 1 is the major inter- and intra-county route for Santa Cruz County. Within the City of Santa Cruz, it is oriented in an east-west direction, although the interregional alignment of Highway 1 is primarily north-south. It is a four-lane arterial along Mission Street from the west side of Santa Cruz to Chestnut Street Extension, a four-lane expressway between Mission Street-Chestnut Street and River Street, and a four-lane freeway east of River Street. The speed limit on Highway 1 is 25 miles per hour (mph) along Mission Street, 45 mph along the expressway section, and 55 and 65 mph on the freeway sections further east. Recurrent congestion results in queuing on Highway 1 that extends for several miles during peak hours. Accidents, events, and other incidents in the corridor can further increase congestion related delays in either direction, on any day, including weekends.

Highway 9 is a two-lane state highway that connects the City of Santa Cruz with the San Lorenzo Valley, and eventually, Saratoga and Los Gatos. Approximately 0.5 miles of Route 9 are located within Santa Cruz city limits.

Highway 17 connects Santa Cruz with Scotts Valley and San Jose and other Santa Clara County communities. It is a four-lane freeway north of the Highway 1/ Highway 9 intersection. Highway 17 is the primary route between the Santa Clara Valley and Santa Cruz County that serves as both a commute route for Santa Cruz County residents that work in Santa Clara County and for recreational visitors that come to Cruz County. Congestion occurs both during weekday commute times and on summer weekends. This winding, four-lane road has steep sections, frequent road crossings, and substandard median shoulders and outside shoulders for

most of its length. In addition to the challenging roadway configuration, weather-related conditions such as thick fog, heavy rains and mudslides affect roadway operations.

Existing Traffic Conditions & Level of Service

Traffic conditions are measured by average daily traffic (ADT), peak hour traffic volumes, and level of service (LOS), average delay, and volume to capacity (V/C) ration. Average daily traffic is the total number of cars passing over a segment of the roadway, in both directions, on an average day. Peak hour volumes are the total number of cars passing over a roadway segment during the peak hour in the morning (AM) or afternoon/evening (PM). In the City of Santa Cruz, the peak hour for weekdays occurs in the evening.

"Level of Service" (LOS) is used to identify the magnitude of traffic congestion and delay at intersections. Traffic flows along city streets are typically controlled by the volume and capacity of the nearest intersection (City of Santa Cruz, 1994). Intersections are rated based on a grading scale of LOS "A" through LOS "F", with LOS A representing free flowing conditions and LOS F representing forced flow conditions. The intermediate levels of service represent incremental levels of congestion and delay between these two extremes.

The signalized intersection LOS methodology addresses the capacity, LOS, and other performance measures for lane groups and intersection approaches and the LOS for the intersection as a whole. Capacity is evaluated in terms of the ratio of demand flow rate to capacity (v/c ratio), whereas LOS is evaluated on the basis of control delay per vehicle (in seconds per vehicle). Control delay is the portion of the total delay attributed to traffic signal operation for signalized intersections. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay as listed in the following table from the *Highway Capacity Manual 2000,* Transportation Research Board.

LOS CRITERIA FOR SIGNALIZED INTERSECTIONS

LOS	LOS Control Delay per Vehicle (seconds/vehicle)
A	≤ 10
B	> 10–20
C	> 20–35
D	> 35–55
E	> 55–80
F	> 80

Capacity analysis at two-way stop control (TWSC) intersections depends on a clear description and understanding of the interaction of drivers on the minor or stop-controlled approach with drivers on the major street. Both gap acceptance and empirical models have been developed to describe this interaction. LOS for a TWSC intersection is determined by the computed or measured control delay and is defined for each minor movement. LOS is not defined for the intersection as a whole as shown in the following table.

LOS CRITERIA FOR TWSC INTERSECTIONS

LOS	LOS Control Delay per Vehicle (s/veh)
A	**0–10**
B	**> 10–15**
C	**> 15–25**
D	**> 25-35**
E	**> 35-50**
F	**> 50**

SOURCE: *Highway Capacity Manual 2000,* Transportation Research Board

The City of Santa Cruz has established LOS D as the minimum acceptable LOS for overall intersection operations during weekday AM and PM peak hours. However, the existing General Plan recognizes that some major regional intersections (which were once part of the "Congestion Management Program" – a formerly mandated state program[3]) as experiencing lower levels of service than the City's LOS D standard. Thus, the existing General Plan accepts a lower (i.e., worse) LOS at these intersections (listed below) per existing Circulation Policy 5.1.2 due to environmental, economic, and/or feasibility constraints with implementing improvements at these locations.

- Mission St. / Chestnut St.-Hwy 1 (F)
- Highway 1 / River St.-Hwy 9 (F)
- Ocean St. / Plymouth St. (F)
- Water St. / Ocean St. (F)
- Soquel Ave. / Ocean St. (F)
- Soquel Ave. / Water St. / Morrissey Blvd. (E)

Caltrans, which has jurisdiction over state highways, endeavors to maintain a target LOS at the transition between LOS C and D. However, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS (Caltrans, December 2002). If an existing State highway facility is operating at less than the appropriate target LOS, the existing LOS should be maintained (Ibid.).

The critical volume to capacity ratio (V/C) is another measure of the operating conditions of an intersection as opposed to LOS. The ratio provided in the worksheets is a calculation of the volume to capacity for the critical movements at the intersection. It is not the average of all the movements at the intersection. V/C is not used as a measure to define the levels of service.

[3] The Code of Federal Regulations, Title 23 Volume 1, adopted in April. 2005 require Transportation Management Areas (TMAs) to prepare Congestion Management Programs. TMAs are defined as urbanized areas with a population over 200,000. There are eight such areas in California plus Santa Barbara that asked to be included.

LOCAL INTERSECTION LEVELS OF SERVICE

Weekday Peak Hour Traffic Conditions. In the City of Santa Cruz, the peak hour for weekdays occurs in the evening. The PM peak hour (roughly 4 PM to 7PM) generally has the highest number of trips compared to the AM peak hour (7 AM to 10 AM) or the midday peak hour (Fukuji Planning and Design, July 2003). Intersection traffic counts were collected during the weekday PM peak hour (4:00 – 6:00 PM) at nearly 80 intersections throughout the City. The counts were done in May 2006, November 2006 and February 2007. The intersection counts are included in Appendix F-5.

The City's consulting traffic engineer compared traffic counts taken for the General Plan traffic with counts taken in 2008 and 2009 that were obtained from the SCCRTC to ensure the validity of the counts for the General Plan EIR analysis. The review indicates that all but one of the counts the City made in 2006 were higher than those reported by the Commission (Marquez, March 2010; see Appendix C for details). Traffic counts were also compared to traffic volumes reported by Caltrans; overall the counts reported for 2006 are 8% higher than those reported in 2008 (Ibid.).

In Fall 2010, UCSC completed new traffic counts at intersections within the City. Of the 24 intersections that the City was able to compare, traffic volumes increased for about half of these and half decreased. Overall, on average, traffic has decreased by 5%. The increased traffic increases were at intersections along Mission Street, High Street, and at the River/Water, Bay/W. Cliff, Delaware/Swift and Front/Laurel intersections (see Appendix C). The increased traffic has been addressed in the City's traffic model. Traffic from projects that were being constructed and/or occupied after the General Plan traffic counts were taken have been added to the "Existing" baseline conditions (see Appendix C) as these projects would be generating traffic at the time the EIR NOP was released. As a result, the existing-baseline condition for this EIR is slightly higher overall than the 2010 counts (Marquez, personal communication, February 2011), except for three intersections – Bay/West Cliff, King/Storey, and Laurel/Front. However, overall, the City continues to see lower counts than were experienced four years ago. Thus, the traffic estimates made for the General Plan 2030 are conservatively high and represent a worst-case scenario for CEQA purposes.

Quantitative Levels of Service (LOS) analysis was performed for the study intersections based the *2000 Highway Capacity Manual* methodologies, prepared by the Transportation Research Board. Intersection operations were evaluated using the Traffix analysis software. Intersection traffic flow operations are evaluated using a level of service (LOS) concept. The technical LOS calculations are included in Technical Appendix F-6, which is available for review at the City of Santa Cruz Planning Department[4] and is also included on the Draft EIR CD and on the online version of the Draft EIR on the City's website at www.cityofsantacruz.com, Planning Department.

Existing intersection PM peak hour levels of service are summarized in Table 4.4-1. All of the study intersections currently operate at an acceptable LOS except for the following 11 intersections, of which six intersections are signalized, and five intersections are unsignalized.

[4] Located at 809 Center Street, Room 107, Santa Cruz, California during business hours: Monday through Thursday, 8 AM to 12 PM and 1 to 5 PM.

For these intersections. Table 4.4-1 also identifies the delay (in seconds) and V/C ratio[5] for the intersections operating at unacceptable levels. For unsignalized intersections, the unacceptable LOS is usually due to delays on a minor leg of the intersection.

- Highway 1 / Highway 9-River Street (F)
- Highway 9-River / Street-Encinal (E)
- Ocean Street / San Lorenzo Blvd. -East Cliff Drive (E)
- Ocean Street / Water Street (E)
- Mission Street / Bay Street (E)
- Bay Street / Escalona Drive (F)
- Bay Street / California Street (F)
- Bay Street / California Avenue (F)
- Laurent Street / High Street (F)
- Western Drive / High Street (E)
- Seabright Avenue / Water Street (F)

Summer and Weekend Peak Hour Traffic Conditions. The City also experiences significant traffic during the summers and holiday weekends due to tourist traffic. A portion of the City's circulation system is affected by seasonal surges resulting from coastal access demands from all of northern California. Santa Cruz has recognized that it is not practical to build to accommodate this seasonal demand, and has considered beach access congestion to be acceptable as long as it does not divert traffic onto residential streets. The 2030 Plan has focused on addressing the congestion associated with the weekday travel of City residents, employees and customers.

STATE HIGHWAY TRAFFIC OPERATIONS & LEVEL OF SERVICE

Based on the most recent Caltrans traffic data (2009 counts), the average daily trips (ADT) on state highways within Santa Cruz is as follows:

- Highway 1, Morrissey Boulevard. ADT is approximately 88,000 to 97,000 trips with 6,300 to 6,900 trips occurring during the peak hour.
- Highway 17, between Santa Cruz and Scotts Valley. ADT is approximately 63,000 - 73,000 trips with 5,700 – 6,300 trips occurring during the peak hour.
- Highway 9 within Santa Cruz City Limits. ADT is approximately 5,000 trips with approximately 510-550 trips in the peak hour as measured at the City limits, north of Encinal.

[5] The V/C ratio is the average adjusted volume of vehicles for each movement over the serviceable capacity of each movement at the intersection. The volume for each approach is adjusted for percentage of trucks and buses, for peaking characteristics, and for abutting parking characteristics. The capacity of each movement is adjusted for lane width, grade, and green time available.

TABLE 4.4-1
Existing Intersection PM Peak Hour Levels of Service

	Intersection	PM Peak LOS	Delay [in seconds]	V/C Ratio
SIGNALIZED INTERSECTIONS				
1	Hwy 1/Western	B		
2	Mission/Swift	B		
3	Mission/Miramar	B		
4	Mission/Almar-Younglove	B		
5	**Mission/Bay**	**E**	**55.8**	**0.944**
6	Mission/Laurel	B		
7	Mission/Walnut	B		
8	Mission/King-Union	C		
9	Mission/Chestnut-Hwy. 1	D		
10	High/Moore	A		
11	Bay-Coolidge/High	D		
12	Bay/Nobel-Iowa	B		
13	Bay/King	B		
14	California/Laurel	C		
15	Chestnut/Laurel	B		
16	Center/Laurel	B		
17	Center/Mission	B		
18	Pacific/Laurel	B		
19	Front/Laurel	C		
20	Front/Metro Center	A		
21	Front/Cathcart	A		
22	Front/Soquel	C		
23	Front/Cooper	A		
24	Front-Pacific/Mission-Water	B		
25	River/Water	C		
26	N. Pacific/River	B		
27	River/Potrero	B		
28	**River/Hwy. 1**	**F**	**83.9**	**0.942**
29	**River/Encinal**	**E**	**73.9**	**1.099**
30	San Lorenzo/Laurel-Broadway	B		
31	Riverside/San Lorenzo	C		
32	Riverside/Third	C		
33	Riverside/Beach	A		
34	**Ocean/San Lorenzo-East Cliff**	**E**	**64.7**	**1.061**
35	Ocean/Broadway	C		
36	Ocean/Soquel	D		
37	**Ocean/Water**	**E**	**73.6**	**1.081**
38	Ocean/Kennan-Washburn	A		
39	Ocean-Hwy.17/Ocean-Plymouth	C		
40	Market/Water	C		

TABLE 4.4-1
Existing Intersection PM Peak Hour Levels of Service

	Intersection	PM Peak LOS	Delay [in seconds]	V/C Ratio
41	N. Branciforte/Water	D		
42	Branciforte/Soquel	C		
43	S. Branciforte/Broadway	B		
44	Seabright/Soquel	C		
45	Seabright/Broadway	B		
46	Seabright/Murray	D		
47	Morrissey/Water-Soquel	C		
48	Morrissey/Fairmount	A		
49	Frederick/Soquel	C		
50	Hagemann-Trevethan/Soquel	A		
51	Park/Soquel	B		
52	Capitola Rd./Soquel Ave.	C		
53	La Fonda/Soquel	B		
54	Riverside-Dakota/Soquel (new)	A		
55	River S./Soquel	B		
56	Seventh Ave./Soquel Ave.	C		
57	Seventh Ave./Capitola Rd.	C		
58	Seventh Ave./Eaton	D		
UNSIGNALIZED INTERSECTIONS				
59	**Bay/California St**	**F**	**434.0**	**1.704**
60	**Bay/California Ave**	**F**	**67.6**	**1.130**
61	West Cliff/Bay	C		
62	Beach/Pacific Ave	C		
63	Pacific Avenue/Center	B		
64	Storey/King	B		
65	River/Fern	B		
66	King/Laurel	B		
67	**Laurent/High**	**F**	**59.6**	**1.066**
68	Market/Isbel-Goss	B		
69	North Branciforte/Goss	B		
70	Highway 1/Shaffer Rd	B		
71	Cedar/Laurel	C		
72	**Bay/Escalona**	**F**	**782.2**	**2.015**
73	**Western/High**	**E**	**45.9**	**05.44**
74	Cliff/Beach	B		
75	Riverside/Second-Liebrandt	A		
76	**Seabright/Water**	**F**	**112.8**	**0.589**
77	Swift and Delaware	C		
78	Seventh Ave./Brommer	C		
79	Seventh Ave./E. Cliff	C		

SOURCE: Hatch Mott MacDonald

State Route 1 (Highway 1). The highest average daily traffic volumes along Highway 1 within Santa Cruz County occur in Capitola at the 41st Avenue interchange with 94,000 to 104,000 ADT (Caltrans, October 2010). The segment near the Morrissey Blvd. interchange carried the second highest volume of traffic. Highway 1 west of Morrissey Boulevard is currently operating at LOS D-E (Caltrans, October 2010). Congestion along Highway 1 extends for several miles during peak hours.

According to the *Transportation Concept Report* for Highway 1, the target level of service for State Highway 1 east of Morrissey Boulevard is LOS D (Caltrans, April 2006). Additionally, according to the *Caltrans Guide for the Preparation of Traffic Impact Studies (Caltrans, 2002),* if an existing State Highway facility is operating at less than the target LOS, the guide states that the existing LOS should be maintained (Caltrans, 2002).

Caltrans is in the process of developing a "Corridor System Management Plan" (CSMP) for Highway 1 from the junction of Highway 68 in Monterey County to King Street/Mission Street in Santa Cruz to develop strategies to manage the traffic and congestion along the corridor and sustain existing transportation investments. According to the draft plan released in October 2010, a small segment of the City is located in Segment 4 (Larkin Valley to Branciforte Creek Bridge), with the remainder of the City being located in Segment 5 (Branciforte Creek Bridge to King Street). The draft CSMP indicates that between Branciforte Creek and King Street, traffic volumes are projected to increase from 54,000 average daily trips (AADT) in 2008 to 60,000 in 2025. Existing and future LOS along Highway 1 as identified by Caltrans in this draft plan is identified below (Caltrans, October 2010).

	Existing LOS (2007)	Future LOS (2030)
❑ Hwy 1, Larkin Valley Road to Branciforte Creek Bridge	E - F	F
❑ Branciforte Creek Bridge to King St.	D - E	E - F

The *Concept Report* for Highway 1 indicates that to achieve LOS D on Highway 1, added capacity, operational improvements, and investment in the multi-modal system will be required (Caltrans, April 2006). The Route Concept Report for Highway 1 includes the addition of High Occupancy Vehicle (HOV) lanes to Highway 1 in each direction to reduce congestion, encourage carpooling, expand express bus service, and improve safety from Morrissey Boulevard to San Andreas/Larkin Valley Road. Caltrans' draft *Corridor System Management Plan* for Routes 1 and 183 indicates that LOS along added Highway 1 HOV lanes during peak hours would range between B and C in the year 2035 (Caltrans, October 2010). While the overall LOS would remain unchanged in the other lanes with addition of an HOV lane, average speeds would be increased and delays and average travel time would be reduced (Ibid.).

In October 2008, Caltrans completed improvements to Highways 1 and 17 as part of the Route 1/17 Merge Lanes Project, which was designed to improve merging by adding additional merge lanes from Highway 1 to Highway 17. The project added merge lanes to the connection between northbound Route 1 and northbound Route 17 and to southbound Route 1 through the 1/17 interchange. Existing bridge structures were widened or replaced, soundwalls were constructed, and landscaping was installed.

State Route 17 (Highway 17). Highway 17 near Pasatiempo Boulevard is currently operating at LOS F (Caltrans, April 2006). According to the *Transportation Concept Report* for Highway 17, the target peak level of service for State Highway 17 between the Ocean Street and Scotts Valley is LOS E (Caltrans, January 2006). The Route Concept Report for Highway 17 indicates that widening is not envisioned and this segment of the highway is considered to be a four-lane freeway (Caltrans, January 2006).

Traffic Forecasts

The SCCRTC's *Regional Transportation Plan* (RTP) indicates that annual Vehicle Miles Traveled (VMT) throughout Santa Cruz County will increase over 2005 levels within the next 30 years. These VMT projections are made using AMBAG's Regional Travel Demand Model (RTDM). The current RTDM is developed and calibrated for 2005 and forecast for the year 2035.[6] Overall the RTP forecasts the following traffic conditions between the years 2005 and 2035 within Santa Cruz County:

- Daily person trips (trips per person) are projected to increase by 16%.
- Single-occupant auto travel for work trips is projected to increase by 13%.
- Daily vehicle miles of travel are projected to increase by 40%.
- The largest increases in vehicle miles traveled are projected to be on freeways (Santa Cruz County Regional Transportation Commission, June 2010, page 2-10).

According to the SCCRTC, there are three reasons why traffic congestion is a major issue in Santa Cruz County, as well as elsewhere in the state and nation. First, more people are driving more miles and per person vehicle registrations are at an all time high. Second, investment in transportation facilities and services has not kept pace with growing demands for road space and transportation alternatives due to decreases in the amount of transportation funding available for local projects. Third, there has been a lack of consensus on how to invest in the County's transportation system (Santa Cruz County Regional Transportation Commission, June 2010).

The joint City-UCSC "Master Transportation Study" (MTS) also made traffic projections for the years 2000 to 2020 based on AMBAG traffic model projections and population projections, which have now been superseded by more current projections as described in the POPULATION AND HOUSING (Chapter 4.2) section of this EIR. The AMBAG projections at the time the MTS was prepared assumed a 15% increase in population growth within the City (from 67,900 to 78,100 people in 2020) and a 24% increase in employment growth (from 37,800 workers to 47,000 workers 2020) (Fukuji Planning and Design, July 2003). However, current adopted AMBAG forecasts show a lower level of forecast growth with estimated population at 65,884 in 2030 and 41,548 workers in 2030.

[6] The AMBAG model relies on land-use and socio-economic data from the AMBAG forecast and road and transit network information to estimate traffic volumes and determine trip generation rates by mode. Where possible, the model is calibrated using existing roadway data (Santa Cruz County Regional Transportation Commission, June 2010).

The MTS includes a goal of no net growth in traffic between 2000 and 2020 and examined two scenarios to substantially decrease single-occupant travel and increase use of other transportation modes. One scenario increases transit use moderately and carpooling substantially. The second scenario increases transit substantially and carpooling moderately. Both scenarios were based on implementation of regional transportation improvements of either the addition of a HOV lane on Highway 1 or development of a Bus Rapid Transit (BRT) corridor along the Union Pacific Railroad right-of-way (Fukuji Planning and Design, July 2003). In Scenario 1, to achieve no growth in the year 2020 traffic, single-occupant travel internal to Santa Cruz needs to be reduced by 29%, carpooling increased by 75%, transit use increased by 50%, and bicycling and walking modes increased by 38% and 100%, respectively (Ibid.). Without a change in travel patterns, the MTS predicted a 19% increase in vehicle miles traveled between the years 2000 and 2020.

BICYCLE & PEDESTRIAN CIRCULATION

Bicycle Circulation

The existing bikeway system in the City of Santa Cruz has developed over the last 35 years. The City of Santa Cruz' bicycle system is comprised of off-street multi-use paths (Class I), on-street bicycle lanes (Class II) and on-street bicycle routes (Class III). Class I and Class II bike facilities are shown on Figure 4.4-3. Class I bike paths are currently limited to West Cliff Drive, the San Lorenzo River levees, a new path under Highway 1 from the river levee, and a new path under Highway 1 at Lee Street, all of which are also shared by pedestrians. A Class I path also is provided on the UCSC campus.

Support facilities include different classes of bicycle parking facilities, which are required by City parking regulations, and shower facilities at major employment facilities. All of the SCMTD buses are equipped with front-mounted bicycle racks capable of carrying two bicycles (City of Santa Cruz, November 2008). The University of California operates a bike shuttle near the intersection of Bay/Mission Streets to transport bicycles to the University.

In October 2007, the City of Santa Cruz was awarded the Silver Level Bicycle Friendly Community by the League of American Bicyclists. According to data contained in the 2000 Census, approximately 4.7% of the commuters within the City of Santa Cruz are bicyclists (City of Santa Cruz, 2008). The City's existing Bicycle Plan, adopted in November 2008, forecasts a bicycling increase to 7% of the peak hour traffic within a 5-year period.

The emphasis of the 2008 Bicycle Transportation Plan shifted from earlier plans in 2000 and 2004 Plans, which were focused on completing large-scale bicycle projects on the major commute corridors. Many of those significant projects have been completed—Bay Street, Beach Street, Broadway-Laurel, High Street, Soquel Avenue, and major portions of the San Lorenzo River Path. The bicycling projects to be pursued in the next five years include completing those significant projects begun in the earlier Plans, as well as building the connector projects that can get bicyclists from origin to destination easily and safely. One new possibility for an east-west bicycle travel corridor is the Union Pacific rail right-of- way, which the SCCRTC has purchased and begun a planning process.

Pedestrian Circulation

The City has approximately 135 miles of sidewalks. Approximately 50 miles of sidewalk is missing from the existing system; predominate problem areas are the upper eastside and Westlake areas that have large continuous sidewalk links missing (Fukuji Planning and Design, July 2003).

The "Pedestrian System" chapter of the Master Transportation Study is considered the City's Pedestrian Plan. The MTS was accepted by the City Council on December 9, 2003. The MTS goals for Santa Cruz's pedestrian system are to:

- Provide multiple transportation modes thereby creating a flexible and adaptive transportation system throughout the City of Santa Cruz.
- Close all "gaps" in the pedestrian network and connect all major destinations and activity centers.
- Ensure that the City's diverse user groups have access to a sustainable and efficient mode of transportation / Create a system that is "scaleable" and responds to changing community needs, and provide flexibility and variety in the City's transportation network.
- Adopt design standards for the pedestrian system to assure a high level of user amenities, safety and quality.

Overall, priorities for the City's pedestrian system include completion and maintenance of the City sidewalk system, improve safety, adopt pedestrian-friendly street designs, enhance key pedestrian connections, and encourage walking (Fukuji Planning and Design, July 2003). .

PUBLIC TRANSIT

Transit service within Santa Cruz County is primarily provided by the Santa Cruz Metropolitan Transit District (SCMTD). Regional bus routes provide service to destinations in Santa Clara and Monterey Counties including daily weekday service via Highway 17 by the SCMTD. SCMTD buses provide service from the downtown Santa Cruz transit center to the San Jose Caltrain station, with connections to San Francisco, Sacramento, Stockton and other cities. Greyhound bus service also is provided from Downtown Santa Cruz to select destinations.

The City of Santa Cruz operated the Summer Beach Shuttle in the past when private donations were available. The Shuttle provided service to and from destinations within the City of Santa Cruz, such as the Downtown and the Santa Cruz Boardwalk. Use of the County Government Center parking lot was used in conjunction with the beach shuttle. Due to lack of funding, the Summer Beach Shuttle was discontinued over ten years ago. Recently the business sector has initiated a Beach-Downtown Shuttle for the summer of 2010. Budget constraints have prevented the City from continuing operation of a beach shuttle.

SCMTD Service

The Santa Cruz Metropolitan Transit District (SCMTD), also known as Santa Cruz Metro, provides transit service within Santa Cruz County. SCMTD provides the following types of service: regional (Highway 17 Express), intercity (8 routes), urban local-feeder (16 routes), UCSC (7 routes) and rural routes (7 routes) (Wilbur Smith Associates, December 2008). The Highway 17 Express Bus service was initiated after the 1989 Loma Prieta earthquake in response to an emergency need for transit over the Hill while Highway 17 was being repaired, and is currently a joint operation between the SCMTD, . Amtrak, and the Santa Clara Valley Transportation Authority (VTA). The route currently connects Santa Cruz (downtown METRO station) and San Jose (Diridon station); at the Diridon station, passengers can connect to the Santa Clara Valley Transportation Authority' transit system and Caltrain and Amtrak regional rail systems (Ibid.).

The District serves transit centers in Santa Cruz, Capitola, Felton, Scotts Valley and downtown Watsonville. SCMTD routes also meet Monterey-Salinas Transit (MST) routes at the Watsonville Transit Center. The two operators have provided reciprocal transfers since 1989. Additionally, SCMTD partners with the University of California, Santa Cruz (UCSC) to provide late night fixed route and demand response service in the general Westside Santa Cruz area (AMBAG, June 2010).

The SCMTD complements its regular fixed-route bus service with ParaCruz, a shared ride-door-to-door paratransit service that provides public transportation for persons who are unable to independently use fixed route buses due to a disability some or all of the time. It is provided by public transportation systems as part of the requirements of the Americans with Disabilities Act of 1990 (ADA). Rides are scheduled in advance and frequently include picking up and dropping off other customers along the way. ParaCruz operates a fleet of lift-equipped small buses and ramp-equipped minivans. On November 1, 2004, Santa Cruz METRO assumed direct operation of the ParaCruz (Santa Cruz Metropolitan Transit District, "METRO Para Cruz ADA Paratransit Service").

SCMTD's total ridership on fixed route service for Fiscal Year 2008-09 was 5,987,518; annual expenses for providing these transit services, including ParaCruz, were approximately $37 million (Santa Cruz County Regional Transportation Commission, June 2010). From 2003 to 2007, there had been a general increase in fare revenues and total operating cost, while ridership and hours of operation declined (Wilbur Smith Associates, December 2008). However, the SCCRTC noted a 7% increase in ridership since Fiscal Year 2004/05 due to rising gasoline prices, traffic congestion, and job market uncertainty (Santa Cruz County Regional Transportation Commission, June 2010).

Increasing congestion on highways and the local transportation network in Santa Cruz County is expected to generate more transit service demand (AMBAG, June 2010). However, the SCCRTC's RTP does not envision expansion of transit services without additional revenues. In order to increase transit service to levels needed to meet projected population growth, greenhouse gas emission reduction goals, and significantly increase the percentage of people using transit, bus service would need to be increased by 25% at an additional annual cost of approximately $11 million (Santa Cruz County Regional Transportation Commission, June 2010). To accommodate this demand, the SCMTD would like to increase service, but due to

ongoing funding shortfalls, SCMTD is struggling to maintain existing service (Ibid.). Due to declining sales tax and other non-fare revenue sources, the SCMTD reduced service in the fall of 2010. It is expected that transit service will continue with minor improvements without major route cuts or rate changes for about five years, however, additional funding will be necessary in the future for expansion of service (White, SCMTD, personal communication, August 2011).

In recent years, Metro has been working on upgrading its transit operations facilities in an effort to reduce operating costs, improve efficiency, and allow for future expansion of the transit system (Santa Cruz County Regional Transportation Commission, June 2010). In 2008, Santa Cruz METRO completed the compressed natural gas-CNG fueling station and conversion of 40 buses.

Bus Rapid Transit (BRT)

The joint City-UCSC "Master Transportation Study" (MTS) recommends "Bus Rapid Transit" (BRT) for long-term implementation as the technology with the highest potential to increase ridership and shift travel modes to transit. BRT is a rubber tire vehicle system operation on an exclusive transit way or dedicated busway with flexibility to operate on surface streets with mixed flow traffic. According to the MTS, a BRT system has significant potential to affect a regional commute shift away from SOV to transit for trips to and from the UCSC campus, downtown and the Harvey West area. A BRT busway could operate on a dedicated HOV lane along Highway 1 or on a shared bus/freight/bicycle lane using the Union Pacific rail corridor. Application to Soquel Avenue and Water Street was also considered (Fukuji Planning and Design, July 2003).

RAIL SERVICE

Freight Service

The former Union Pacific Railroad rail line forms a continuous, single-track, 32-two mile corridor from Davenport to the City of Watsonville. The Santa Cruz County Regional Transportation Commission is in the process of purchasing the right-of-way and is awaiting final approval from the state. This branch rail line extends from Watsonville Junction in Pajaro north to Davenport and passes through much of the county's urban area. For many years, freight deliveries to and from the CEMEX cement plant in Davenport occurred three times per week. As of 2010, CEMEX plant operations ceased due to the economic downturn. The rail line is currently operated by Sierra Northern. Sierra Northern Railway. Sierra runs trains twice per week to serve existing freight customers and stores empty rail cars in the unused northern section of the rail line. Sierra will be responsible for operations, maintenance and start-up costs associated with rail service (Santa Cruz County Transportation Commission, February 2011).

Recreational Service

The Santa Cruz Big Trees and Pacific Railway Company operates a tourist-oriented passenger service between Felton and the Santa Cruz Beach Boardwalk on its 9-mile track line from Santa Cruz to its current terminus at Roaring Camp. The service is provided daily during mid June through the end of August, and weekends and holidays in May, early June, September through

October, late November, and December. The trains run twice in each direction every day during regular operations, and partially use the Union Pacific Railway tracks that cross Pacific Avenue just north of the intersection of Pacific Avenue and Beach Street. The line is occasionally used for freight (AMBAG, June 2010). Historically the line crossed the Santa Cruz Mountains to Los Gatos, but was abandoned in 1939 past Olympia. The tunnel sections are now used as records storage for major corporations in the San Francisco Bay Area (Ibid.).

Passenger Service

The Santa Cruz Branch line has been the subject of a number of studies regarding its potential for passenger rail service. A 1996 study analyzed the potential viability of inter-city passenger rail service between Santa Cruz and Watsonville to San Jose. The 1999 Major Transportation Investment Study examined three options for passenger rail on the Santa Cruz Branch line along the Watsonville- Santa Cruz-UCSC corridor. Also in 1999, the Around-the-Bay Rail Study looked at the feasibility of partnering with Monterey County to bring passenger rail from the San Francisco Bay Area to both counties, as well as linking the two counties via a wharf-to-wharf type rail transit service.

On May 6, 2010, the SCCRTC unanimously agreed to acquire the Santa Cruz Branch Rail Line right-of-way, which is being finalized. Future transportation uses could include passenger rail service, transit, bicycle and pedestrian facilities, and freight rail service. This project was one of the selected outcomes for the Watsonville-Santa Cruz-UCSC corridor from the SCCRTC's 1999 Major Transportation Investment Study. The SCCRTC also intends to maintain the existing freight service on the rail line. The *2005 Regional Transportation Plan* (Policy 3.4.5) supports reserving areas adjacent to rail lines for future rail and bus facilities as part of new development adjacent to rail lines. Passenger service to from Santa Cruz to Davenport is currently being considered by the SCCRTC.

PLANNED IMPROVEMENTS

State Highways

STATE ROUTE 1

Beginning in 1986 the Santa Cruz County Regional Transportation Commission (SCCRTC), working with Caltrans and the Federal Highway Administration, conducted a series of studies to identify an affordable and appropriate response to the growing congestion problem on Highway 1, including feasibility studies for Highway Occupancy Vehicle Lanes (HOV) on Highway 1 and a toll lane feasibility study in 2002. The current Caltrans Route Concept Report for Highway 1 includes the addition of High Occupancy Vehicle (HOV) lanes to Highway 1 (California Department of Transportation, April 2006). This project will add a lane in each direction to reduce congestion, encourage carpooling, expand express bus service, and improve safety. The limits of this project extend from Morrissey Boulevard to San Andreas/Larkin Valley Road. Preliminary traffic performance data shows the anticipated shift in traffic volumes from local arterials to Highway 1 with the HOV Lane Alternative (Santa Cruz Regional Transportation Commission website, http://www.sccrtc.org/hov.html). Caltrans' draft *Corridor System Management Plan* for Routes 1 and 183 also supports HOV lanes on Highway 1 in

conjunction with other transportation demand management strategies (Caltrans, October 2010).Detailed project design and environmental data is in development and is expected to be available in the winter of 2012. Funding is not secured to advance the project beyond the current environmental study. The SCCRTC's *2010 Regional Transportation Plan* assumes adoption of a transportation sales tax measure to provide a significant amount of the funding needed to advance this project into the next development phase – final design, right-of-way, and construction (Santa Cruz Regional Transportation Commission website, http://www.sccrtc.org/hov.html).

In 2006, the Santa Cruz County Regional Transportation Commission initiated work on the preliminary design and environmental review phase of the Highway 1 Soquel to Morrissey Auxiliary Lanes Project spanning the busiest section of Highway 1 in Santa Cruz County (carrying 115,000 vehicles per day in 2006). An auxiliary lane connects an adjacent highway on-ramp with the next highway off-ramp thereby extending the weaving and merging distance between the ramps and improving traffic flow and safety on the highway. An auxiliary lane is not designed for use by through traffic, but to provide greater separation between vehicles entering and exiting the freeway from mainline traffic. The Soquel/Morrissey Auxiliary Lanes project proposes to add 12–foot wide auxiliary lanes northbound and southbound between Soquel Avenue and Morrissey Boulevard, respectively. This project includes reconstruction of the La Fonda Avenue overcrossing; the La Fonda Avenue overcrossing must be replaced to accommodate the auxiliary lanes under the bridge. The new La Fonda Avenue bridge will be wider to provide bike lanes and wider sidewalks for pedestrians. This project is designed to complement the work recently completed as part of the Highway 1/17Merge Lanes Project, by eliminating the proposed lane drop north of the La Fonda Avenue resulting from the Highway 1/Highway 17 Project. Design is nearly complete, and the final environmental documents were approved by Caltrans, although the project is contingent on approval by the California Transportation Commission.. Funding has been secured for the project. Construction could begin in 2012 or 2013.

STATE ROUTE 17

According to the Transportation Concept Report for State Route 17 in District 5 (Caltrans District 5, January 2006), the target level of service for State Highway 17 between the Ocean Street and Scotts Valley is LOS E. The Route Concept Report for Highway 17 indicates that the highway segment between Santa Cruz and Scotts Valley accommodates local and regional trips. Recognizing the existing policy of the Santa Cruz County Regional Transportation Commission, widening is not envisioned and this segment of the highway is considered to be a four-lane freeway (Caltrans, January 2006).

Reconstruction of the highway to meet current standards would be both exorbitantly expensive and environmentally destructive. Thus, over the past two decades, the Santa Cruz County Regional Transportation Commission (SCCRTC) has consistently opted to keep Highway 17 a four-lane highway, targeting funds for safety and operational improvements. Median barriers, acceleration-deceleration lanes, motorist call boxes and changeable message signs are improvements that have been installed over the past decade.

In the fall of 2000, Caltrans completed a Project Report that assessed the operational value and cost of constructing a 1.1-mile truck climbing lane on northbound Highway 17 at the

summit. As a result of the study, Caltrans recommended, and the Regional Transportation Commission concurred, not building the project ("No Build"), as the potential benefits of the project were not justified by the high cost and potentially significant environmental impacts. As an alternative, Caltrans continued to evaluate other potential safety and operational improvements on Highway 17. The products of this analysis were two safety improvement projects on Highway 17 at Laurel Curve and Glenwood Curve.

In response to the need for further safety and reliability improvements in this corridor, the *Highway 17 Transportation Improvement Study* was conducted to provide SCCRTC, Santa Clara Valley Transit Authority (VTA), and SCMTD to recommend safety and efficiency improvement projects with the following two main objectives: 1) recommend steps *to optimize* the Highway 17 Express Bus service reliability; and 2) *expand* Highway 17 Express Bus ridership in the corridor in order to reduce vehicle trips, miles traveled, and emissions. Recognizing that the roadway and traffic conditions along Highway 17 affect the operation of the Highway 17 Express Bus service, an additional objective was to recommend safety and operational improvements to add reliability, speed and functionality to the project corridor to benefit both the patrons of the Highway 17 Express Bus service and the motorists traveling along this route. A series of recommendations were made to support and expand the existing transit service on Highway 17, including provision of weekend service.

STATE ROUTE 9

The Highway 1/Highway 9 intersection, which is controlled by a signal, currently operates at LOS E during the both the PM and Design Day peak hours, which does not meet Caltrans standards. The City is working with Caltrans to implement lane modifications at this intersection. The improvements require Caltrans approval and an encroachment permit. With implementation of these improvements, the intersection would operate at LOS D during both the existing PM and Design Day peak hours.

The following improvements are included in the Highway 1/Highway 9 intersection planned improvement:

- Widen and add a left-thru turn lane from Highway 9 southbound.
- Improve the northbound River Street approach to modify the existing exclusive left-turn lane to a shared thru/left-turn lane.
- Widen and add a second left-turn lane from Highway 1 southbound onto Highway 9.
- Widen and add a second northbound lane on Highway 9.
- Modify signal.
- Add bike lane and shoulder

Currently, a Project Report, preliminary engineering, associated studies and environmental review are underway. The improvements are already required under existing conditions.

Planned City Improvements

The City faces an ongoing challenge to meet its capital needs with limited resources. Preparing and adopting a Capital Improvements Program (CIP) is an important part of the City's planning

process to identify and meet those needs. It is a multi-year schedule of projects with their associated costs and proposed funding sources. The CIP represents the best efforts to allocate available resources toward projects that provide the most benefit for the people of Santa Cruz. In addition to the Highway 1 / Highway 9 intersection improvement described above, other major improvements on the current CIP include: intersection improvements at Mission/Bay and Mission/Chestnut (design and environmental review); intersection signalization (Bay/West Cliff); installation of a roundabout at the Pacific/Beach intersection;

The City operates a "Traffic Impact Fee" (TIF) program based on future projected trips generated for each new project. The TIF program, adopted in June 2005, evaluated over 60 intersections and identified numerous projects within the City which were needed to address the effects of cumulative development, and fees established. The fees are used to fund planned improvements at those intersections and roadways included in the program. New development and redevelopment projects are required to pay traffic impact fees, which are calculated at the time of building permit issuance. The TIF includes highway intersections on Mission (Highway 1) and at the Highway 1 / Highway 9 intersection.

The City's TIF program includes both a City-wide TIF fee and a Beach/South of Laurel (B/SOL) TIF. New projects that are located in the B/SOL area are required to pay both fees. The fee program is updated annually in July. The fees are based on project trip generation and are calculated at the time the project applies for a building permit. By ordinance the City has identified the per trip fee, which was determined by dividing the total cost of all projects identified in the City's "Cumulative Development Traffic Study" by the total cumulative additional trips added by new development. The fee assumes the City will fund 25% of the cost of improvements as a result of existing capacity differences. In addition, 15% of the fee is dedicated to alternative transportation. The current City-wide fee is $405 per trip. The current B/SOL fee is $94 per trip.

Bicycle and Pedestrian Path Improvements

The City's adopted *Bicycle Transportation Plan* (2008) includes the following new paths: Arana Gulch path to connect Broadway with Brommer Street; Branciforte Creek Connection to complete the levee path under the Soquel Bridge; Monterey Bay Sanctuary Scenic Trail Network (as discussed below); and Spring Street Connection to UCSC. The Plan also includes numerous other improvements to existing bike lanes and facilities.

The Monterey Bay Sanctuary Scenic Trail Network (MBSST) is proposed to span the Monterey Bay from Lover's Point in Pacific Grove to Wilder Ranch in Santa Cruz. The SCCRTC is in the process of developing a more detailed plan for the Santa Cruz County portion of the trail. The MBSST efforts will ultimately result in a network of continuous multi-use recreational, interpretive and transportation pathways spanning the Monterey Bay that will also be an important piece of the 1,300 mile statewide California Coastal Trail (Santa Cruz Regional Transportation Commission, January 2008). If the SCCRTC is successful in its rail line acquisition efforts, part of the network may be built within the rail line right-of-way (Ibid.).

The SCCRTC is working on a comprehensive Master Planning process that will include: developing goals and objectives; identifying and assessing possible segments; setting design options; soliciting and incorporating input from interested parties and the community at large;

preparing cost estimates for segments; and conducting environmental analysis of the Plan. In addition to identifying new trails, the MBSST Network is intended to link together (and upgrade where needed) trail segments that already exist and to fill in gaps in the existing trail system (Santa Cruz Regional Transportation Commission, January 2008).

TRANSPORTATION MANAGEMENT

Transportation System Management

Transportation Systems Management (TSM) refers to methods to find optimum strategies to relieve, lessen or control traffic congestion with minimum roadway widening. These strategies can reduce vehicle travel time and enhance system accessibility with little impact on other modes (Fukuji Planning and Design, July 2003). Examples of TSM measures include signal synchronization, intersection modifications, access management, i.e., consolidation of driveways, railroad crossing modifications, highway ramp metering, preferential treatment for high occupancy vehicles, and signage and lighting upgrades.

Transportation Demand Management

Transportation Demand Management (TDM) refers to measures that can be implemented to encourage the use of alternative modes of transportation to single occupancy vehicles. TDM emphasizes the movement of people and goods rather than motor vehicles, and gives priority to public transit, ridesharing and non-motorized travel, particularly under congested conditions (Fukuji Planning and Design, July 2003). TDM is a demand side strategy with the purpose to change human travel behavior through incentives and disincentives in order to reduce the number of peak-hour vehicle trips, shift trips to non-peak times, and increase the percentage of people bicycling, walking, riding transit, carpooling and vanpooling (Ibid.). Examples include carpool and vanpool rideshare matching, employer outreach and assistance, emergency ride home programs, telecommuting, bike loan programs, bicycle parking subsidies, bicycle advocacy, and parking pricing and management strategies.

Existing agencies and programs that support and promote TDM in the city of Santa Cruz include the following as presented in the "Master Transportation Study":

- *Santa Cruz Regional Transportation Commission* (SCCRTC) serves many transportation roles in Santa Cruz County, including housing "Commute Solutions" and providing bicycle planning and funding to the region. Commute Solutions provides carpool and vanpool ride matching to commuters throughout Santa Cruz County, especially long-distance commuters.
- *Transportation Membership Services* is run by Ecology Action and offers programs that encourage member employees to use transportation modes other than driving alone to commute to and from work, including Emergency Ride Home Programs, 0% Interest Bicycle Loan Programs and Discount Metro Bus Passes.
- *Ecology Action* supports "Bike to Work," a 10-year old community-based effort that seeks to increase the number of people riding bikes. Ecology Action also receives funds for the Electric Bike Commuter Incentive Program.

- *Onsite Employer Programs*. Major employers within the City that implement TDM measures include: UCSC, SCMTD, the City of Santa Cruz, the County of Santa Cruz, the Seaside Company, the Santa Cruz Medical Clinic, and others.

Traffic Calming

Measures to reduce speeding and cutting through neighborhoods has been a focus over the years as these issues have been raised by residents. Measures include installation of traffic claming measures, signage, and improving the arterial street system.

PARKING

The City of Santa Cruz maintains both on-street and off-street public parking throughout the City, including the Downtown Parking District. Amendments to the State CEQA Guidelines, effective in March 2010, eliminated the environmental checklist question regarding adequacy of parking. Nonetheless, general background on existing conditions is provided below.

Downtown Parking District

Public parking in the downtown area is managed by the Downtown Parking District, which includes the most concentrated City ownership and operation of parking in the City and is the only parking district in the City. In 2007, there were 4,510 parking spaces available to the public, including 820 on-street spaces, 2,247 off-street spaces, and 1,443 private spaces ("Downtown Parking Study, 2007"). In 2010, there were 4,583 parking spaces available to the public, including 830 on-street spaces, 2,226 off-street parking spaces and 1,527 private parking spaces. In 2010, the parking supply (4,583 spaces) in the Downtown Parking District exceeded demand (4,504 spaces). However, by the year 2012 with new projects in place, the demand (4,731 spaces) is estimated to exceed supply (4,638 spaces) by 93 spaces.

The City-operated spaces include a wide variety of parking types dispersed throughout the District, including meters that have different time periods. The municipal parking garages have an average peak occupancy of approximately 85%, with the Cedar/Church garage almost 100% occupied at peak times (Fukuji Planning and Design, July 2003).

New businesses are exempt from typical parking requirements required elsewhere in the City. Business owners have the option of providing required parking or paying a Deficiency Fee that is used to fund, operate and maintain parking facilities. The District charges an annual deficiency fee.

Beach / South of Laurel Area

The Beach / South of Laurel area includes the area directly adjacent to the Downtown Parking District and stretching down to the Beach. It provides parking for both its own set of uses, though also experiences overflow demand from the Downtown and the Beach Areas. The Beach Area itself includes the largest supply of privately provided for-charge parking in the City, as well as a mix of publicly provided parking (Fukuji Planning and Design, July 2003).

The Beach / South of Laurel Area includes about 7,800 parking spaces with over 80% of which, about 6,300 space, are in the Beach Area. A total of 4,145 spaces, a little over 50% of the total, are available to the general public, independent of intended activity. A total of 3,562 of these spaces are in the in the Beach Area and 583 spaces are in the South of Laurel district. Unrestricted publicly available Beach Area spaces are dominated by the two Seaside Company lots, with a combined total of 1,771 spaces, and the City owned and operated 430-space Wharf lot. Other spaces include other City operated lots, on-street meters, and free curbside spaces. South of Laurel general public access spaces include small City operated lots, on-street meters, and free curbside parking spaces. The City operates 633 on-street meters in the Beach and South of Laurel areas (Fukuji Planning and Design, July 2003).

Residential Parking Permit Programs

Due to seasonal influx of visitors and UCSC students and encroachment into residential neighborhoods, the City implements a residential parking program in the following neighborhoods: beach area, downtown, Lighthouse/Cowell neighborhood, eastside, Seabright, and Westside. Residents in these areas must purchase permits to park on streets without citations. According to information on the City's Public Works Department website, the coastal permit programs are enforced seasonally from May 15th through September 30th, between the hours of 9 AM and 9 PM, everyday. The Westside permit program is enforced from September 15th through June 30th, Monday through Friday, during posted hours (excluding City holidays). Parking in these areas without a permit is subject to a citation and fine. The downtown and eastside area permit requirements are enforced all year.

4.4.2 RELEVANT PROJECT ELEMENTS

PROPOSED GOALS, POLICIES & ACTIONS

The proposed *General Plan 2030* includes goals, policies and actions that address transportation planning, management and traffic. The MOBILITY chapter of the draft *General Plan 2030* corresponds to the required circulation element. Its purpose is to set forth policies and ways to ease the ability of people and vehicles to move around, out of, and into the City in the long term, through 2030. This chapter looks at ways to facilitate transportation alternatives, keep transportation and road systems safe and efficient, and systematically interconnect bicycle and pedestrian ways. The proposals below aim to encourage greater use of alternative transportation modes and reduce automobile travel in concert with other parts of the Plan that foster supportive land uses, building types, and activities. The City Council accepted the following key principle with regard to Mobility:

> *We will provide an accessible, comprehensive, and effective transportation system that integrates automobile use with sustainable and innovative transportation options—including enhanced public transit, bicycle, and pedestrian networks throughout the community.*

The draft General Plan includes four goals and 19 associated policies with 94 accompanying actions that address transportation management and modes of travel. The four goals related to transportation are outlined below. Overall, the accompanying policies and actions Furthermore, proposed General Plan policies seek to maintain an acceptable LOS D or better at signalized intersections with acceptance of a lower LOS at major regional intersections (M3.1.3, M3.1.4) and promote transportation system management strategies (M2.5.2) and other alternative transportation modes.

GOAL M1	Land use patterns, street design, parking, and access solutions that facilitate multiple transportation alternatives.
GOAL M2	A safe, sustainable, efficient, adaptive, and accessible transportation system.
GOAL M3	A safe, efficient, and adaptive road system.
GOAL M4	A citywide interconnected system of safe, inviting, and accessible pedestrian ways and bikeways.

Other goals, policies and actions promote sustainable land use patterns, such as encouraging mixed-use development along the City's four major transportation corridors that have easy access to pedestrian, bike and transit facilities, and encouraging use of alternative transportation modes.

PROPOSED IMPROVEMENTS

The draft *General Plan 2030* includes several policies and actions that call for implementation of road, pedestrian, bicycle and transit improvements through the City's Capital Improvement Program and other sources (M2.1.3, M2.3.2, M3.2.2). The draft Plan supports regional funding and implementation of key regional projects "that can significantly benefit Santa Cruz and further the City's mobility policies" (M2.1.4). There are no specific road transportation improvements identified for specific locations, except for improvement of access to/from the Harvey West area, including a possible new approach to Highway 1 (M3.1.13), and that the circulation system of the specific plan for the Swenson parcel shall be from Shaffer Road (LU1.1.4).

Several policies address visitor traffic improvements. .Policy ED1.2.1 specifically encourages transportation improvements and pedestrian activity along Ocean Street to stimulate economic vitality. Policy ED1.8.4 directs the City to improve access to and routes between tourist and visitor designations and lodging facilities as part of the City's economic development policies. The proposed General Plan also calls for updating the Beach and South of Laurel Area Plan to reflect needed improvements along the Visitor/Beach Area travel corridors (M3.3.3) with improvement of access along these corridors through coordinated signs and street naming, protected turn lanes, remote parking/shuttle programs, and other strategies (M3.3.2).

The draft Plan promotes alternative transportation improvements with TSM strategies, road improvements and widening/expansion projects that can achieve an acceptable LOS (M2.32). Action M4.3.2 seeks to develop bike commute routes along the railroad right-of-way, West Cliff Drive, Broadway, King and other streets. The draft General Plan also includes a policy that prohibits approval or construction of an Eastern Access to the University without a citywide

vote (M2.1.5). No other specific road or alternative transportation projects are identified for specific support. The draft *General Plan 2030* also encourages passenger rail transit or other alternative transportation options along the existing rail corridor via the continued support, acquisition, and expansion of railroad rights-of-way (M2.2) and encourages the continuing transport of goods by rail (M2.2.1). Policy LU4.5 supports securing land for development of a transit center along the rail line, and evaluation of a rail transit stop is to be included in the Area Plan analysis for the Golf Club Drive area (LU1.15). Pedestrian and bicycle access to Pogonip and nearby employment areas are also to be included in this future area plan.

POTENTIAL FUTURE DEVELOPMENT

The *General Plan 2030* Land Use Map and land use designations are largely unchanged from the 1990-2005 General Plan / Local Coastal Program, except for three new mixed use land designations that have been developed and applied to the following major transportation corridors: Mission Street, Ocean Street, Soquel Avenue, and Water Street. Additionally, land use designation changes are proposed for three specified sites: Swenson, Golf Club Drive area, and an addition to the Dimeo Lane landfill site. The Swenson and Golf Club Drive sites are designated for residential uses. A 5.5-acre parcel immediately south of and adjacent to the City's Landfill and Resource Recovery Center on Dimeo Lane has been acquired by the City, and it is expected that future uses would be ancillary to the landfill and Resource Recovery Center uses. Specific uses have not yet been identified and will be determined in the future, however, the parcel is not planned for expansion of the landfill disposal operations (Arman, personal communication, April 2010).

Additionally, some of the *General Plan 2030* policies and actions also support mixed use districts and/or intensified redevelopment along transit and commercial corridors (Policies LU3.3.1 and LU4.1). In addition, the proposed *General Plan 2030* supports development of a downtown performing arts center or expansion of the Civic Center (Policy HA2.2.5).

4.4.3 IMPACTS AND MITIGATION MEASURES

CRITERIA FOR DETERMINING SIGNIFICANCE

In accordance with the California Environmental Quality Act (CEQA), State CEQA Guidelines (including Appendix G), City of Santa Cruz plans, policies and/or guidelines, and agency and professional standards, a project impact would be considered significant if the project would:

4a Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit (see discussion of City standards below);

4b Change the level of service of a State Highway roadway segment from acceptable operation (LOS A, B, or C) to deficient operation (LOS D, E or F) based on Caltrans significance criteria[7];

4c Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;

4d Substantially increase hazards due to a design feature (for example, sharp curves or dangerous intersections) or incompatible uses (for example, farm equipment);

4e Result in inadequate emergency access; or

4f Conflict with adopted policies, plans, or programs regarding public transit, bicycle or pedestrian facilities or otherwise decrease the performance or safety of such facilities.

The City of Santa Cruz considers "D" or better to be an acceptable intersection level of service for intersections, which is a policy in the City's existing General Plan as well as in the proposed General Plan. A significant impact would result if LOS dropped below a "D" level of service or where a project would contribute traffic increases of more than 3% at intersections currently operating at unacceptable levels (E or F), as further described below. The existing and proposed General Plans also account for accepting a LOS below "D" at major regional intersections where improvements would be prohibitively costly or result in significant, unacceptable environmental impacts. There are no other adopted plans, ordinances or policies that establish "measures of effectiveness" for the performance of the circulation system.

For City intersections that already operate at unacceptable levels of service (E or F), the City considers project impacts to be significant if congestion will measurably worsen at the intersection as a result of the project. "Measurably worse" is considered to be a 3% increase in trips at the affected intersection. The City has used the 3% significance criterion for project trip contribution at existing impacted intersections, in part based on directives in the City's existing General Plan to accept a certain level of congestion during peak hours at major intersections, as well as to reflect variations in daily traffic volumes. The 3% criterion has been used throughout the City and is based upon the likelihood that a project will result in an observable increase in congestion at a given intersection or road segment. This is based in part on information provided by Caltrans in the yearly "Traffic Volumes" reports that identifies the standard deviation expected with regards to reliability of traffic count data. The standard deviation ranges indicate a 12% deviation at 10,000 vehicle trips, meaning that if a traffic count totals 10,000 vehicles per day, then approximately 90% of the time, the actual traffic counts will lie within a range of 8,800 to 11,200 vehicles. Thus, the 3% reflects this variation in daily traffic conditions (California Department of Transportation, June 2006).

[7] Caltrans. December 2002. "Guide for the Preparation of Traffic Impact Studies."

IMPACT ANALYSIS

Based on the significance criteria identified above, the following impact analyses address potential impacts to the City's circulation system (4a); potential traffic impacts on state highways (4b); potential increase in hazards (4d); and potential conflicts with adopting policies, plans or programs that support alternative transportation (4f). There are no applicable congestion management programs in effect within the City of Santa Cruz (4c), and thus this is not an issue that needs discussion. Emergency access issues (4e) are addressed in the "Fire Protection" and "Police Protection" subsections of the PUBLIC SERVICES (Chapter 4.8) section of this EIR.

Potential Future Development & Buildout

Adoption and implementation of the proposed *General Plan 2030* would not directly result in increased new development. However, the draft General Plan includes policies and a land use map that support additional development. The proposed General Plan would accommodate future development. As described in the PROJECT DESCRIPTION and LAND USE sections of this EIR (Chapters 3.0 and 4.1, respectively), buildout projections were estimated for the draft General Plan to provide an estimate of the amount of development that is expected to occur by the year 2030.[8] The projections indicate the following level of new development by the year 2030:

- 3,350 residential units
- 1,087,983 square feet of commercial development and 311 hotel rooms
- 1,273,913 square of office space
- 776,926 square feet of industrial development.

The proposed *General Plan 2030* supports infill development along transportation corridors to promote alternative land use patterns to help reduce automobile travel. Development under the proposed General Plan would primarily occur on vacant infill sites, on underutilized properties that could redeveloped at higher densities and/or land use intensities, and in the new mixed-use districts along the City's four major street corridors: Mission Street, Ocean Street, Soquel Avenue, and Water Street. Based on the estimated development occurring under the proposed plan,[9] approximately 55 percent of all new housing, 45 percent of new commercial development and 52 percent of new office development would located along these corridors. Thus, new development would be concentrated in specific areas.

The proposed General Plan also includes other policies and actions that could result in development that supports year-round expanded performances, events, visitors that would result in potential traffic increases. These potential uses include:

[8] The projections are based on the draft Land Use Map, taking into account land use map changes, vacant lands, sites subject to reuse or redevelopment, and underutilized parcels, assuming that not all development will occur at maximum density. On average it is assumed that all new development will occur at 80% of the permitted residential density or floor area ratio. See Appendix B for further discussion.

[9] See Table 3-3 in the PROJECT DESCRIPTION (Chapter 3.0) section of this EIR and Figure 2-3 for estimated distribution of new development per specific areas in the City.

- Supporting a downtown performing arts center or expansion of the Civic Center (HA2.2.5),
- Amending the Zoning Ordinance to allow development of arts and cultural facilities in a wide variety of districts (HA2.2.4),
- Supporting Santa Cruz as a year-round conference destination (Policy ED1.4), and supporting development of a new conference center (ED1.4.1) or developments that accommodate conferences (ED1.5.1),
- Encouraging development of new lodging facilities (ED1.5) and attracting top-end, full-service hotels (ED1.5.2),
- Supporting year-round events (HA3.2.4), and promoting Santa Cruz as a year-round arts destination, and
- Promoting Santa Cruz as a principal retail, cultural, recreational, entertainment and commercial destination in the region (ED1.1).

There are no specific locations or intensity of development anticipated for these types of uses. It is likely that development of such entertainment and/or visitor-serving uses would be within the total square footage of commercial development that has been estimated for the proposed *General Plan 2030* buildout. Adoption of Arts and Entertainment Districts also is supported in the draft plan (HA3.1.1), but most performances do not occur during peak commute hours.

Impact 4.4-1: Traffic Impacts on Intersections Levels of Service (LOS) Adoption and implementation of the proposed *General Plan 2030* would accommodate future development that would result in increased vehicle trips and traffic, resulting in changes in intersection levels of service to unacceptable levels or further deterioration of intersections currently operating at unacceptable levels of service. With implementation of proposed *General Plan 2030* policies and actions, including road improvements identified in an updated Traffic Impact Fee program, intersection operations would be improved and traffic levels would be reduced, except at eight intersections. This is considered a *significant impact*.

PROJECT TRIP GENERATION AND DISTRIBUTION

Adoption and implementation of the proposed *General Plan 2030* would not directly result in increased population or new development. However, the draft General Plan includes policies and a land use map that support additional development as summarized above. This potential development would generate an estimated 78,260 new daily trips with approximately 7,180 trips occurring during the PM peak hour. The Traffix model was used for the traffic impact analysis, which estimates the trip generation for all uses and distributes these new trips to the existing road network.

The trip generation is based on the new potential development expected with buildout under the *General Plan 2030*. Results of surveys conducted for the MTS indicate that 58% of all trips by City residents are made for shopping, work or personal purposes. In addition about 75% of

all trips made by residents remain within the City of Santa Cruz. If it is assumed that this distribution will remain relatively constant for all new residents in the City then approximately 44% of all trips made by new residents will be to commercial, office, industrial or personal service facilities within the City (Marquez, March 2010). Appendix C provides a full description of trip generation assumptions. A reduction was also included for trips generated along the new mixed-use corridors in which transportation modes other than vehicles would be used.

The traffic forecast includes assumptions regarding trip reduction due to mixed use and smart growth developments, which in part utilized information identified in the MTS regarding travel patterns, taking into account travel patterns identified in the City's "Master Transportation Study." See Appendix C for further discussion of these underlying assumptions and the details of determining trip generation rates.

INTERSECTION LEVEL OF SERVICE

Project traffic volumes were calculated by adding peak-hour project trips generated by the estimated General Plan buildout to the existing volumes, which are provided in Appendix F-5. The LOS calculations are included in Technical Appendix F-6, which is available for review at the City of Santa Cruz Planning Department[10] and is also included on the Draft EIR CD and on the online version of the Draft EIR on the City's website at www.cityofsantacruz.com, Planning Department.

Intersection levels of service during the PM peak hour with addition of new development accommodated by the *General Plan 2030* are summarized on Table 4.4-2. A majority of the intersections would drop from LOS B or C to LOS C or D, but would remain within the City's acceptable LOS of "D". However, 21 intersections would operate at unacceptable levels of service. Of these, the following ten intersections would degrade from acceptable to unacceptable levels of service as follows, which include three unsignalized intersections:

- Mission / Laure1 – from LOS B to **F**
- Mission / King-Union – from LOS C to **F**
- Mission / Chestnut – from LOS D to **F**
- Ocean / Broadway – From LOS C to **F**
- N. Branciforte / Water – From LOS D to **E**
- Branciforte / Soquel – From LOS C to **E**
- Seabright / Murray – From LOS D to **E**
- Beach / Pacific – From LOS C to **E**
- River / Fern – From LOS B to **F**
- Swift / Delaware– From LOS C to **F**

Five intersections would drop from an unacceptable "E" to "F" LOS s to include the following, of which only one is unsignalized (Western/High):

- Mission / Bay – From LOS **E** to **F**
- River / Encinal – From LOS **E** to **F**
- Ocean / San Lorenzo-East Cliff – From **E** to **F**

[10] Located at 809 Center Street, Room 107, Santa Cruz, California during business hours: Monday through Thursday, 8 AM to 12 PM and 1 to 5 PM.

- Ocean / Water – From **E** to **F**
- Western / High – From **E** to **F**

Six intersections would continue to operate at unacceptable levels of service E or F as identified below, which are unsignalized, except for the signalized River/Highway 1 intersection. For unsignalized intersections the delays are experienced on the minor approach.

- River / Highway 1 – Remain at **F** with further delays
- Bay / Escalona – Remain at **F** with further delays
- High / Laurent – Remain at **F** with further delays
- Seabright / Water – Remain at **F** with further delays
- Bay / California Ave. – Remain at **F** with further delays
- Bay / California St. – Remain at **F** with further delays

Improvements have been identified for the intersections forecast to operate at unacceptable levels of service as a result of future development accommodated by the *General Plan 2030*. Many of the impacted intersections can be improved to an acceptable LOS with signalization, turning restrictions, and/or other improvements. Table 4.4-3 summarizes these improvements and resulting LOS and delays for the impacted intersections. However, even with improvements, the following eight intersections would remain at an unacceptable LOS:

- Western / High – Would improve from **F** to **E**
- River / Highway 1 – Would remain at **F**
- Bay / Mission – Would remain at **E**
- Laurel / Mission – Would remain at **F**
- Chestnut / Mission – Would remain at **F**
- Ocean / Water – Would improve from **F** to **E**
- Seabright / Water – Would improve from **F** to **E**
- Seabright / Murray – Would remain at **E**

Intersections that are identified in the current TIF Program as requiring improvement in the future are those listed below. The proposed General Plan 2030 supports maintaining and updating the City's Traffic Impact Fee (TIF) program to implement road improvements (M3.1.5, M2.1.3). The TIF Program would be updated to reflect new intersections and/or new or revised improvements identified as a result of the EIR analyses and recommendations. Improvement costs and potentially revised impact fees would be calculated.

- Western/High (Extended two-way left turn lane)
- High/Laurent (Signalization)
- River-Hwy 9/Hwy 9
- Bay/Escalona (turn Restrictions
- Mission/Bay
- Mission/Chestnut
- Ocean/Water
- Bay/California Street
- Branciforte/Soquel
- Ocean/San Lorenzo-E. Cliff Dr
- Seabright/Murray
- Beach/Pacific

TABLE 4.4-2
Intersection PM Peak Hour Levels of Service with *General Plan 2030* Buildout

	Intersection	PM Peak LOS	Delay [in seconds]	V/C Ratio
SIGNALIZED INTERSECTIONS				
1	Western/Hwy. 1	B		
2	Swift/Mission	D		
3	Miramar/Mission	C		
4	Almar-Younglove/Mission	C		
5	**Bay/Mission**	**F**	**164.1**	**1.347**
6	**Laurel/Mission**	**F**	**87.9**	**1.201**
7	Walnut/Mission	D		
8	**King-Union/Mission**	**F**	**90.5**	**1.143**
9	**Chestnut-Hwy. 1/Mission**	**F**	**121.8**	**1.228**
10	Moore/High	A		
11	Bay/High/Coolidge	D		
12	Bay/Nobel-Iowa	B		
13	Bay/King	C		
14	California/Laurel	C		
15	Chestnut/Laurel	C		
16	Center/Laurel	C		
17	Center/Mission	C		
18	Pacific/Laurel	D		
19	Front/Laurel	D		
20	Front/Metro Center	A		
21	Front/Cathcart	A		
22	Front/Soquel	C		
23	Front/Cooper	A		
24	Front-Pacific/Mission-Water	C		
25	River/Water	D		
26	N. Pacific/River	B		
27	River/Potrero	B		
28	**River/Hwy. 1**	**F**	**209.0**	**1.540**
29	**River/Encinal**	**F**	**198.7**	**1.715**
30	San Lorenzo/Laurel-Broadway	B		
31	Riverside/San Lorenzo	D		
32	Riverside/Third	D		
33	Riverside/Beach	A		
34	**Ocean/San Lorenzo-East Cliff**	**F**	**113.9**	**1.168**
35	**Ocean/Broadway**	**F**	**90.8**	**1.153**
36	Ocean/Soquel	D		
37	**Ocean/Water**	**F**	**169.4**	**1.454**
38	Ocean/Kennan-Washburn	B		
39	Ocean-Hwy.17/Ocean-Plymouth	D		
40	Market/Water	C		

TABLE 4.4-2
Intersection PM Peak Hour Levels of Service with *General Plan 2030* Buildout

	Intersection	PM Peak LOS	Delay [in seconds]	V/C Ratio
41	**N. Branciforte/Water**	**E**	**73.7**	**1.117**
42	**Branciforte/Soquel**	**E**	**67.6**	**1.073**
43	S. Branciforte/Broadway	B		
44	Seabright/Soquel	D		
45	Seabright/Broadway	C		
46	**Seabright/Murray**	**E**	**62.7**	**1.013**
47	Morrissey/Water-Soquel	D		
48	Morrissey/Fairmount	B		
49	Frederick/Soquel	D		
50	Hagemann-Trevethan/Soquel	B		
51	Park/Soquel	B		
52	Capitola Rd./Soquel Ave.	C		
53	La Fonda/Soquel	B		
54	Riverside-Dakota/Soquel (new)	A		
55	River S./Soquel	B		
56	Seventh Ave./Soquel Ave.	C		
57	Seventh Ave./Capitola Rd.	C		
58	Seventh Ave./Eaton	D		
UNSIGNALIZED INTERSECTIONS				
59	**Bay/California St**	**F**	**OVRFLW**	**2.917**
60	**Bay/California Ave**	**F**	**150.3**	**1.429**
61	West Cliff/Bay	C		
62	**Beach/Pacific Ave**	**E**	**39.9**	**1.058**
63	Pacific Avenue/Center	C		
64	Storey/King	D		
65	**River/Fern**	**F**	**OVRFLW**	**1,251**
66	King/Laurel	D		
67	**Laurent/High**	**F**	**94.1**	**1.190**
68	Market/Isbel-Goss	C		
69	North Branciforte/Goss	C		
70	Highway 1/Shaffer Rd	C		
71	Cedar/Laurel	D		
72	**Bay/Escalona**	**F**	**OVRFLW**	
73	**Western/High**	**F**	**69.5**	**0.678**
74	Cliff/Beach	B		
75	Riverside/Second-Liebrandt	A		
76	**Seabright/Water**	**F**	**OVRFLW**	**2.963**
77	**Swift and Delaware**	**F**	**241.6**	**2.751**
78	Seventh Ave./Brommer	D		
79	Seventh Ave./E. Cliff	C		

SOURCE: Hatch Mott MacDonald

TABLE 4.4-3
Intersection PM Peak Hour Levels of Service with Recommended Improvements

Intersection	Existing		Buildout		Recommended Improvement	With Mitigation	
	LOS	Delay	LOS	Delay		LOS	Delay
Western Dr/High St	E	45.9	F	69.5	TWLTL	**E**	38.1
High/Laurent	F	59.6	F	94.1	Signalize	B	18.2
River-Hwy 9/Hwy 1	F	83.9	F	209	Ebnd 2l 3t 1r, wbnd 2l 3t 1r, nbnd 1tl 1t 2r, sbnd 2l 1tl 1t 1r	**F**	80.8
River/Fern	B	14.5	F	Ovrfl	Signalize no l esbnd	B	15.1
River/Encinal	E	73.9	F	198.7	Ebnd 1l 1tr 1r, wbnd 1l 1tr, nbnd 1l, 1t, 1r, sbnd 1l,1t, 1tr	D	37.9
Bay St/Escalona Dr	F	782.2	F	Ovrfl	Escalona right turns only	C	18.3
Bay/Mission	E	55.8	F	164.1	Ebnd 1l, 2t,1r, wbnd 1l,2t,1r,nbnd 1l,1t,1r, sbnd 2l,1t,1r	**E**	57.7
Mission/Laurel	C	24.9	F	87.9	Add Ebnd r	**F**	85.6
Mission/King	C	32.7	F	90.5	Ebnd no l, 2t, 1tr, wbnd 1l, 1t, 1tr,nbnd 1ltr, sbnd 2l 1ltr	D	50.8
Mission/Chestnut	D	42.9	F	121.8	Ebnd 2l, 2t, 1r, wbnd 1lt,1t, 1r, nbnd 1l, 1t, 1tr, sbnd 1l,2t, 2r	**F**	112.9
Ocean/Water	E	73.6	F	169.4	Ebnd 2l, 2t, 1r, wbnd 1l,2t, 1r, nbnd 1l, 2t, 1tr, sbnd 2l, 3t, 1r	**F**	130.7
Seabright/Water	F	112.8	F	Ovrfl	Extend TWLTL & add nbnd r	**E**	39
Water/Branciforte	D	36.6	E	73.7	Add ebnd 1, nbound r & sbnd r	D	53.6
California Ave/Bay	F	67.6	F	150.3	Allow nbnd t free	D	26.4
California St/Bay	F	434	F	Ovrfl	Allow sbnd t free	B	12.5
Branciforte/Soquel	C	23.6	E	67.6	Esbnd 1 l, 1t, 1 tr, wsbnd 1l, 1tr no splt phase	C	24.5
Ocean St/Broadway	C	34.3	F	90.8	Prohibit lfts from Ocean	D	36.5
Pacific/Beach	C	20.9	E	39.9	Roundabout	C	
Ocean St/San Lorenzo-ECliff Dr	E	64.7	F	113.9	Add sbnd r	D	53.2
Seabright/Murray	D	43.7	E	62.7	ADD wsbnd r, nbnd r & sbnd r	**E**	59.4
Swift/Delaware	C	23.9	F	241.6	Roundabout/Signal	C	20.1

The mitigation measure column reflects the recommended lane geometry where r = right turn lane, rt = right/through lane, l = left turn lane, lt = left/through lane, t = through lane, and twltl = two-way left turn lane.

SOURCE: Ron Marquez

IMPACT DISCUSSION

The proposed *General Plan 2030* strives to maintain LOS D or better at signalized intersections with acceptance of a lower LOS at major regional intersections if necessary improvements would be too costly or result in significant environmental impacts (Policies M3.1.3, M3.1.4). In conjunction with this directive, Policies M2.1.3, M2.1.4 and ED1.9.2 direct the City to implement pedestrian, bike, mass transit, and road system improvements through the Capital Improvements Program (CIP), and draft plan supports "regional funding and implementation of key regional projects that can significantly benefit Santa Cruz and further the City's mobility policies," although it is not clear what these projects may be. As most of the recommended improvements to impacted intersections are within the City's TIF Program or would be added with proposed updating of the TIF (M3.1.5), the needed improvements are expected to be implemented over time as projects are added to the City's CIP. Intersections along state highways would also come under the jurisdiction of Caltrans. Overall, intersection improvements would be constructed within existing developed rights-of way, and would not be expected to required construction on undeveloped land that would result in potential significant impacts. However, an appropriate level of environmental review would be required at the time a specific intersection improvement is proposed.

As shown on Table 4.4-3, eight intersections would remain at unacceptable levels of service even with implementation of identified improvements. These include four major intersections within the City that carry regional and visitor traffic: River-Highway 9/Highway 1; Mission/Chestnut, Mission/Bay and Ocean/Water. For these intersections, the proposed *General Plan 2030* accepts a lower LOS at major regional intersections (M3.1.4). These intersections would be considered major intersections, and are also included in the existing General Plan as deficient intersections for which a lower LOS would be accepted. However, while, the City may be willing to accept a lower LOS at the intersections along Highway 1- Mission Street, these intersections are within the jurisdiction of Caltrans and would not meet its desired C-D LOS. The recommended intersection improvements would improve delay to slightly less than what occurs under existing conditions even though an acceptable LOS still would not be achieved with the improvements at one of these intersections: River-Highway 9/Highway 1.

The other four intersections that would remain at unacceptable levels of service include: Mission/Laurel (Caltrans intersection), High/Western, Seabright/Water and Seabright/Murray. As shown on Table 4.4-3, delays would be reduced below existing levels with implementation of the recommended improvements at the High/Western and Seabright/Water intersections. The level of service calculation for these two intersections is based on the left turn movement from the minor stop controlled street. Overall both of these intersection operate well, despite the LOS. However, the Mission/Laurel and Seabright/Murray intersection would operate at an unacceptable level of service.

The Draft *General Plan 2030* includes goals, policies and actions that set forth comprehensive measures to reduce vehicle trips, increase vehicle occupancy, encourage use of alternative transportation modes, and promote alternative-sustainable land use patterns, all of which would help reduce vehicle trips, and avoid and minimize adverse impacts related to traffic. A summary of the proposed *General Plan 2030* policies that serve to reduce/mitigate impacts of increased traffic is presented in Table 4.4-4.

Policy M2.3 and its four accompanying actions seek to increase the efficiency of the City's multi-modal transportation system to design for and accommodate multiple transportation modes (M2.3.1), as well as TSM measures and road improvements to achieve an acceptable level of service (M2.3.2). Policies M3.1.1 and M3.1.2 direct the City to seek ways to reduce vehicle trip demand, reduce the number of peak hour vehicle trips, and encourage high occupant vehicle travel. A significant rise in vehicle occupancy from the existing average of 1.2-1.3 persons per vehicle would provide additional road capacity, increase the efficiency of the existing transportation and roadway system and reduce the need for costly improvement to the road system (Santa Cruz County Regional Transportation Commission, June 2010).

TABLE 4.4-4
Proposed General Plan Policies and Actions that Reduce Traffic Impacts

Type of Measure / Action	Policies / Actions

MAINTAIN LEVEL OF SERVICE STANDARD & IMPLEMENT TRANSPORTATION IMPROVEMENTS	• Maintain LOS D or better at signalized intersections; accept lower LOS at major regional intersections: M3.1.3, M3.1.4
	• Implement road improvements & alternative transportation to achieve acceptable LOS: M2.3.2
	• Manage, reduce congestion: M.3.1, M2.4.4 (work with UCSC)
	• Maintain road system with efficient arterial operations: M3.2.2, M3.3.6, M3.1.12 (coordinated signal timing)
	• Promote TSM strategies: M2.5.2
	• Improve access along the Visitor/Beach Area travel corridors: M3.3.2
	• Maintain/update Traffic Impact Fee and implement road improvements: M3.1.5; M2.1.3
	  ⅄ Implement pedestrian, bike, transit & road improvement through CIP: M2.1.3, ED1.9.2
	  ⅄ Support regional funding & implementation of key regional projects that benefit Santa Cruz: M2.1.4
	  ⅄ Transportation improvements on Ocean: ED1.2.1
	  ⅄ Visitor access improvements: ED1.8.4

REDUCE AUTO/VEHICLE TRIPS & INCREASE VEHICLE OCCUPANCY	• Reduce auto dependence, vehicle trips and peak hour trip & increase vehicle occupancy: M1.1, M3.1.1, M3.1.2 • Encourage employment-related strategies (i.e., flex-time, telecommuting, parking management, ridesharing): M3.1.7, M3.1.8, M2.4.4
ENCOURAGE MULTI-MODAL SYSTEMS	• Design, accommodate & increase efficiency of multiple transportation modes: M2.3, M2.3.1, ED1.9.2 (alternative transportation), NRC4.4.2, M3.1.11 (studies to determine deficiencies) • Include pedestrian, bike, transit facilities in ROW acquisition, street design, bridge & road projects: M1.4.1, M1.4.2, M2.3.3 • Develop Depot Park as multi-modal center: LU3.5.2 • Multi-modal use of future rights-of-way: M1.4.2
ENCOURAGE ALTERNATIVE TRANSPORTATION MODES	• Encourage use of alternative transportation modes: M.2.1.2 • Promote alternative transportation with TSM strategies: M2.3.2, M2.5.2 • Connect activity centers with pedestrian & bike paths: M1.1.2 • Encourage hotels to provide bike/shuttle programs: M2.3.4 • Employment and parking-related strategies: M3.1.7, M3.1.8, M3.1.9 **(CONTINUED ON NEXT PAGE)**

TABLE 4.4-4
Proposed General Plan Policies and Actions that Reduce Traffic Impacts

Type of Measure / Action	Policies / Actions
➤ Bicycle Use	• Interconnected bike network & maintain/update Bike Plan: M4.2, M4.2.1, M4.2.2, M4.2.3 • Implement bicycle improvements: M2.1.3 • Bike lanes: M4.3.1, 4.5.4 • Bike commute routes: M4.3.2 (rail r-o-w, West Cliff, Broadway) • Support bicycle improvements, amenities & maintenance: M4.4 & actions, M4.2.6, M4.3, M4.5 & actions, PR1.6.4 (at parks); CC8.4 (at educational facilities)
➤ Pedestrian Use	• Connected street and pedestrian network: CD5.1, M1.1.2, M1.1.3, M4.1.5 (development dedication) • Implement pedestrian improvements: M2.1.3, M1.3.1 • Implement MTS pedestrian recommendations; update/implement Pedestrian Master Plan: CD5.1.1, M1.2, M4.1.1 • Encourage walking: M4.1, M4.1.3 and pedestrian access: CC8.4 • Neighborhood parking strategies & development designs to foster pedestrians: CD 5.2.3, M4.1.7
➤ Transit Use & Expansion	• Encourage transit options & increased transit service, capacity & ridership: M1.1.3, M2.1.1, M2.4, M2.4.2, M2.4.6, M2.4.7, M2.4.8 (commuter travel), M2.4.9 • Implement transit improvements: M2.1.3 • Consider giving priority to transit on City corridors: M2.4.5 • Conveniently located transit stops, centers & transit links: M.1.4, M2.4.11 and as part of new development: M2.4.12, M2.4.12 • Encourage maintenance/upgrading of transit infrastructure: M.2.4.10 • Encourage Beach shuttle: M2.4.1
➤ Rail	• Encourage/support passenger rail transit & other modes along rail ROW: M2.2, M2.2.1 • Rail Land Use Plan: LU4.2.4 • Rail Transit Center: LU4.5, LU4.5.2 • Condition development along rail-potential stops: LU4.5.2 • Encourage transport of good by rail: M2.2.2
LAND USES / PATTERNS TO REDUCE VEHICLE TRIPS	• Reduce auto use with pedestrian/transit-oriented activity centers & development centers (M1.1) • Expand neighborhood facilities (LU4.3, LU4.3.1) • Encourage land use changes that reduce auto use: LU4.2); locate community facilities within walking distance to residential areas and transit: (CC2.1.4) • Encourage home occupations & telecommuting: LU4.4, LU4.4.1 and live-work units: LU4.1.4, HA4.4 (artists) • Ensure optimum utilization of infill parcels (LU1.1, LU1.1.1) and Consolidation of Underutilized Parcels (LU1.1.2) • Encourage mixed uses: LU3.5 (Lower Pacific), LU3.6 (River) , LU4.1.1, LU4.2.2 (new districts), LU4.2.3, LU4.1.3 • Encourage assembly of small parcels along transit: CD3.3, CD3.3.1, CD3.3.2 **(CONTINUED ON NEXT PAGE)**

TABLE 4.4-4
Proposed General Plan Policies and Actions that Reduce Traffic Impacts

Type of Measure / Action	Policies / Actions
	• Encourage higher/maximum densities: LU3.6.1 (Lower Front St), LU3.7, LU3.7.1, LU3.8 • Encourage higher densities along transit/commercial corridors: LU4.1, LU4.1.1 • Encourage University shopping/services on UC lands: LU4.2.5
REDUCE & DISCOURAGE THROUGH-TRAFFIC IN NEIGHBORHOODS	• Discourage, reduce, and slow through-traffic: M3.3 • Enhance neighborhood livability through road& transit design: M3.3.1 • New development to be designed to discourage through traffic and encourage bicycle or pedestrian connections: M3.3.5 • Reduce traffic in residential neighborhoods by improving arterial and collector streets: M3.3.6 • Develop neighborhood traffic control plans where necessary to minimize traffic impacts on local streets: M3.3.7

Policy M2.1.2 encourages use of alternative modes of transportation, and numerous policies and actions support expanded and improved bicycle and pedestrian facilities, a well as increased transit use. Several policies support higher land use densities along transit corridors (LU4.1, LU4.2, M1.1) to support land use patterns that reduce reliance on automobiles. Home occupations and telecommuting also are encouraged (LU4.4). The draft General Plan also directs the City to improve access to and routes between tourist and visitor designations and lodging facilities as part of the City's economic development policies ED1.8.4).

These policies would serve to help reduce project vehicular traffic and thus reduce traffic impacts in addition to proposed intersection improvements. Of the eight identified intersections that would remain at unacceptable levels of service with implementation of identified improvements, four are at major intersections where the City has historically accepted a lower level of service at major regional intersections where improvements would be too prohibitively costly or could result in unacceptable significant environmental impacts, and this policy is maintained in the proposed General Plan (M3.1.4), although the intersections within Caltrans' jurisdiction would not meet Caltrans LOS standards. Additionally, the delays at these intersections would be less than without the improvement, and at the Highway 1/Highway 9 intersection, the delay would be less than under existing conditions. The other four intersections that would remain at unacceptable levels of service, although delays would be reduced to levels below existing conditions at the Western/High and Seabright/Water intersections.

Roadway, as well as bicycle and other non-vehicular improvements, would be contingent on future funding. The potential growth estimated to result from implementation of the proposed *General Plan 2030* could generate nearly $32 million in impact fees at current rates that could be used for improvements, of which 15% would be for alternative transportation. However the TIF program, including improvements, costs and impact fees, would be updated pursuant to actions specified in the draft General Plan (M3.1.5). Improvements to intersections along state highways would be contingent on Caltrans approval and state and/or federal funding. Revenues for transportation, including road and other transportation mode improvements, have not kept pace with the multimodal needs of travelers in Santa Cruz County (Santa Cruz County

Regional Transportation Commission, June 2010). Given chronic state budget deficits, as well as reduced local revenues funding road, bicycle, and pedestrian improvements will continue to be a challenge. Additionally, the lack of community consensus on regional highway improvements and local multi-use paths further constrain the feasibility of either roadway or alternative transportation mode improvements being implemented (Santa Cruz County Regional Transportation Commission, June 2010).

Revenue issues and service cuts have reduced the SCMTD's level of service, affecting the ability to increase transit service. It is estimated that 1,500 to 2,000 additional transit passengers may need to be served with projected General Plan buildout. It is expected that service would continue along major the City's major transportation corridors and where high use is concentrated. However, additional funding will be necessary to expand transit service in the future and provide implementation of "Sustainable Community" strategies,[11] and such funding, is at this time uncertain (SCMTD, White, personal communication, August 2011).

Conclusion. Future development accommodated by the proposed *General Plan 2030* would generate traffic that would result in unacceptable levels of service at 21 intersections, all of which could be improved to acceptable levels with intersection improvements, except for four local intersections and four intersections on state highways. Therefore, these intersections could not be improved to an acceptable LOS to meet City or Caltrans' standards, and the resulting effects on these eight intersections would be considered a significant impact unavoidable impact as no feasible improvements have been identified. With implementation of the identified improvements and proposed *General Plan 2030* policies and actions to reduce vehicular traffic, increase vehicle occupancy and support/encourage use of alternative transportation measures, the impact could be reduced to a less-than-significant level at the remaining impacted intersections. However, funding availability likely will remain constrained for major facility improvements and expansion of transit service into the foreseeable future. Thus, implementation of recommended improvements and alternative transportation facilities cannot be assured, and thus, the impact to the intersections identified as operating at unacceptable levels of service under the proposed *General Plan 2030* remains significant.

Mitigation Measures

With implementation of the proposed *Plan 2030* policies and actions to reduce vehicular traffic, increase vehicle occupancy and support/encourage use of alternative transportation measures, the impact could be reduced to a less-than-significant level at all but four intersections along state highways and the four local intersections. Impacts would remain significant and unavoidable. With uncertainly regarding funding and implementation of transportation projects for the other intersections, the impact remains

[11] Senate Bill 375 (SB 375) provides a means for addressing greenhouse gas (GHG) emissions by aligning regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation, thereby discouraging urban sprawl and reducing vehicle miles traveled, with an emphasis on increasing land use intensity along transit corridors. See the GLOBAL CLIMATE CHANGE (Chapter 4.12) section of this EIR for further discussion.

significant and unavoidable. However, revision of the following *General Plan 2030* action is recommended.

Recommended Revisions to the *Draft General Plan 2030*

Revise or add policies/actions as indicated below. Deleted text is shown in ~~strikeout~~ typeface, and new text is shown in underlined typeface.

M3.1.4 Accept a lower level of service and higher congestion at major regional intersections if necessary improvements would be ~~too~~ prohibitively costly or result in significant, unacceptable environmental impacts.

Impact 4.4-2: Traffic Impacts on State Highway Levels of Service (LOS) Adoption and implementation of the proposed *General Plan 2030* would accommodate future development that would result in increased vehicle trips and traffic on state highways in the regions (Routes 1, 17, and 9), which would further exacerbate existing unacceptable levels of service. This is considered a *significant impact*.

The proposed project would result in increased traffic on state highway segments. It is estimated that the proposed project would generate approximately 78,235 weekday daily trips. Based on the results of the TRAFFIX model, the distribution of project traffic to state highways is estimated as follows:

- Highway 1, southbound: 24.6% of all trips
- Highway 9, north of City Limits: 1.9% of all trips
- Highway 17, northbound: 20.5% of all trips

Based on this distribution, traffic resulting from future development accommodated by the proposed *General Plan 2030* would increase traffic on southbound Highway 1 by approximately 19,250 daily trips, on northbound Highway 17 by approximately 16,000 daily trips, and on northbound Highway 9 by about 1,500 daily trips. This represents an increase of approximately 20% on Highway 1 and 22% on Highway 17, which would be considered a substantial increase.

According to the Transportation Concept Report for state highways, the target level of service for State Highway 1 west of Morrissey Boulevard is LOS D, and the target level of service for State Highway 17 south of Pasatiempo is LOS E (Caltrans, April 2006, January 2006). However, according to the Caltrans Guide for the Preparation of Traffic Impact Studies (Caltrans, 2002), if an existing State Highway facility is operating at less than the target LOS, the guide states that the existing LOS should be maintained. Highway 1 between Morrissey and Branciforte Creek Bridge operates at a E-F LOS (Caltrans, October 2010), and Highway 17 operates at LOS F (Caltrans, January 2006).

The addition of project-related traffic would contribute to significantly worsened conditions. However, some of this traffic would be within projected future volumes estimated by Caltrans. According to Caltrans' studies, Highway 1 traffic near Morrissey-Branciforte Creek Bridge is expected to increase by 50,000 daily trips in 2030-2035 (Caltrans, October 2010). Future year traffic volumes were projected using growth rates from AMBAG's regional travel demand model, version April 2007, applied to 2007 counts (Ibid.). By incorporating trip reduction and smart growth design in the proposed General Plan policies and actions, the forecast of increased traffic on Route 1 as a result of potential development accommodated by the *General Plan 2030* is significantly less than that anticipated in Caltrans Corridor Systems Management Plan.

The Route Concept Report for Highway 1 includes the addition of High Occupancy Vehicle (HOV) lanes to Highway 1. This project will add a lane in each direction to reduce congestion, encourage carpooling, expand express bus service, and improve safety. The limits of this project extend from Morrissey Boulevard to San Andreas Road/Larkin Valley Road. Project environmental review and preliminary design are underway. Caltrans' draft "Corridor System Management Plan's" strategy for Highway 1 includes new express bus services on the planned HOV lanes, support of land use and transportation efforts to reduce traffic, and overall reduction of congestion by encouraging alternative transportation facilities and programs. The County and Caltrans are also working on design and environmental review for reconstruction of the La Fonda Avenue overcrossing as part of the Auxiliary Lane Project.

The Route Concept Report for Highway 17 identifies an increase of about 8,100 daily trips to the year 2023 (Caltrans, January 2006). The report acknowledges that Highway 17 will remain a 4-lane freeway without widening. Using the traffic forecast in the Corridor System Management Plan for Route 1 the increase in volume on Route 17 would range from 30,000 to 40,000 vehicles per day by the year 2035. Again this figure is well above the volume forecast for the general plan.

As discussed above in the Impact 4.4-1 analysis, the Draft *General Plan 2030* includes goals, policies and actions that set forth comprehensive measures to reduce vehicle trips, increase vehicle occupancy, encourage use of alternative transportation modes, and promote alternative-sustainable land use patterns, all of which would help reduce vehicle trips, and avoid and minimize adverse impacts related to traffic. The draft Plan encourages use of alternative modes of transportation, and numerous policies and actions support expanded and improved bicycle and pedestrian facilities, as well as increased transit use. Several policies support higher land use densities along transit corridors to support land use patterns that reduce reliance on automobiles. The draft Plan supports regional funding and implementation of key regional projects "that can significantly benefit Santa Cruz and further the City's mobility policies" (M2.1.4).

Caltrans is responsible for improvements along state routes and has proposed a series of improvements along Highway 1, which would improve transit and carpooling with addition of an HOV lane. While overall levels of service would remain unchanged if the additional lane were not an HOV lane, average speeds would be increased and delays reduced (Caltrans, October 2010). Similarly, Highway 17 is forecast to remain at an unacceptable LOS in the future with no potential improvements having been identified. Both the Highway 1 planned HOV lanes and Soquel/Morrissey auxiliary lanes are supported in the current Regional

Transportation Plan. The SCCRTC assumes that a half-cent, 30-year sales tax measure or similar local funding mechanism will be ultimately be approved (Santa Cruz Regional Transportation Plan, June 2010).

The increase of 1,500 vehicles per day on Route 9 will not result in a significant impact. The existing volumes on Route 9 range from 5,000 AADT to 5,600 ADT north of City limits during peak months. Traffic volumes have increased on this highway approximately 1,000 vehicles per day in the last 30 years. Route 9 is a conventional undivided two-lane highway which is classified as a major collector. No major improvements are planned in the corridor from Santa Cruz to Felton north of the City limits. (Transportation Planning Fact Sheet State Route (SR) 9 in Santa Cruz County, Caltrans).

Conclusion. Future development accommodated by the proposed *General Plan 2030* would generate traffic that would contribute to existing and future forecast unacceptable levels of service along Highway 1 and Highway 17. Project traffic represents a significant addition, although the estimated General Plan buildout traffic is less than the future forecasts estimated by Caltrans in its draft "Corridor System Management Plan." With implementation of the proposed *General Plan 2030* policies and actions to reduce vehicular traffic, increase vehicle occupancy and support/encourage use of alternative transportation measures, and with future improvements along Highway 1 that are planned by Caltrans, traffic congestion along Highway 1 will be minimized. However, highway operations would continue to remain at unacceptable levels. Thus, the impact remains significant.

Mitigation Measures

None are known beyond those being considered for Highway 1 by Caltrans as discussed above.

Impact 4.4-3: Traffic Hazards
Adoption and implementation of the proposed *General Plan 2030* would not result in new roads that could potentially create hazards, and with implementation of proposed *General Plan 2030* policies and actions to ensure road safety, the project would not result in direct or indirect impacts related to increased hazards. Therefore, there is *no impact* related to road safety/hazards.

The proposed *General Plan 2030* does not include new roads or road alignments, and thus, would not create or increase hazards due to a road or intersection design. Action M3.1.13 does support an approach to Highway 1 to from the Harvey west area, but a specific location is not identified. If this option were to be considered in the future, it would require Caltrans' approval, and would be subject to project-level design and environmental review.

Furthermore, Policy M3.2 seeks to ensure road safety for all users. To this end, the plan proposes to maintain the condition of the existing road system (M3.2.1), ensure safe and

efficient arterial operations and designs (M3.2.2, M3.2.11), ensure adequate street widths and designs for emergency vehicles (M3.2.3), and improve traffic safety and flow, including at high collision and congested areas (M3.2.4, M3.2.5). Regular inspection and maintenance of street pavements is supported to help encourage bicycling (M3.2.6).

Conclusion. The proposed *General Plan 2030* does not include new roads or road alignments, and thus, would not create or increase hazards due to a road or intersection design. Implementation of the proposed *General Plan 2030* policies and actions would help to maintain road safety and prevent hazardous conditions due to future designs of roadway or intersection improvements. Therefore, there is no impact associated with creating or increasing hazards due a specific roadway design feature.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

Impact 4.4-4: Conflicts with Adopted Plans
Adoption and implementation of the proposed *General Plan 2030* would not result in conflicts with adopted plans, policies or programs that support alternative transportation, as the proposed goals, policies and actions directly support implementation and use of alternative transportation modes. Therefore, there is *no impact* related to potential conflicts with plans and policies.

Both the SCCRTC's *Regional Transportation Plan* and AMBAG's *Monterey Bay Area Mobility 2035* support and promote transit, bicycling, walking, carpooling and other alternative transportation modes. The proposed *General Plan 2030* directly supports these alternative modes as well. Action M2.1.2 encourages use of alternative modes of transportation, and numerous policies and actions support expanded and improved bicycle and pedestrian facilities, a well as increased transit use and passenger rail transit, as summarized on Table 4.4-4. Policy M2.3 seeks to increase the efficiency of the City's multi-modal transportation system. Several policies support higher land use densities along transit corridors (LU4.1, LU4.2, M1.1) to support land use patterns that reduce reliance on automobiles.

Conclusion. The proposed *General Plan 2030* directly supports regional plans and policies that support alternative transportation modes as it includes numerous policies and actions that encourage use of alternative modes of transportation, and support expanded and improved bicycle and pedestrian facilities, a well as increased transit use. Therefore, there is no impact related to potential conflict with adopted plans and policies that support alternative transportation.

Mitigation Measures

No mitigation measures are required as a significant impact has not been identified.

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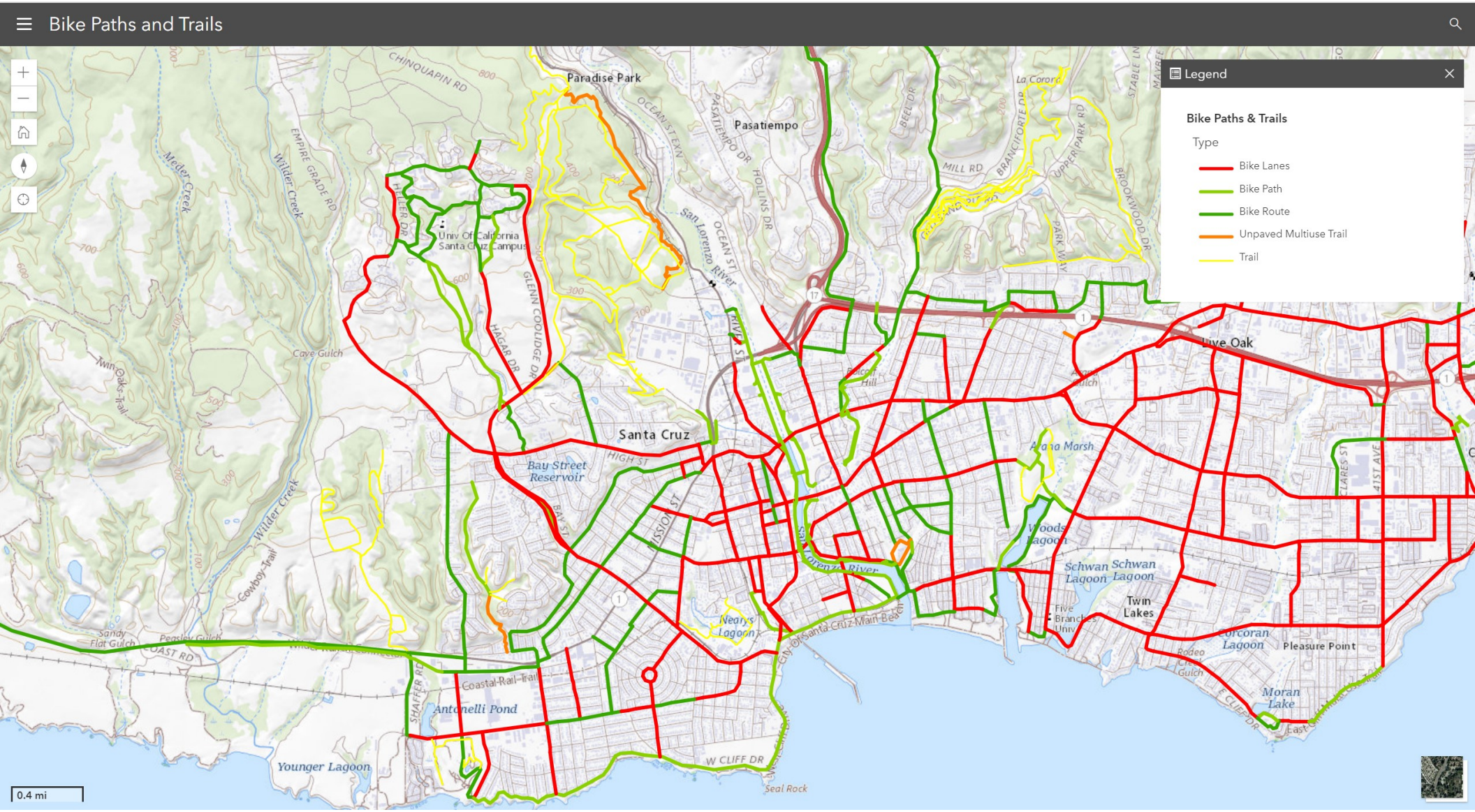
Bike Paths and Trails
Legend
Bike Paths & Trails
Type
Bike Lanes
Bike Path
Bike Route
Unpaved Multiuse Trail
Trail
Paradise Park
Pasatiempo
Santa Cruz
Live Oak
Twin Lakes
Pleasure Point
Bay Street Reservoir
Antonelli Pond
Younger Lagoon
Schwan Lagoon
Moran Lake
Seal Rock
Cave Gulch
Wilder Creek
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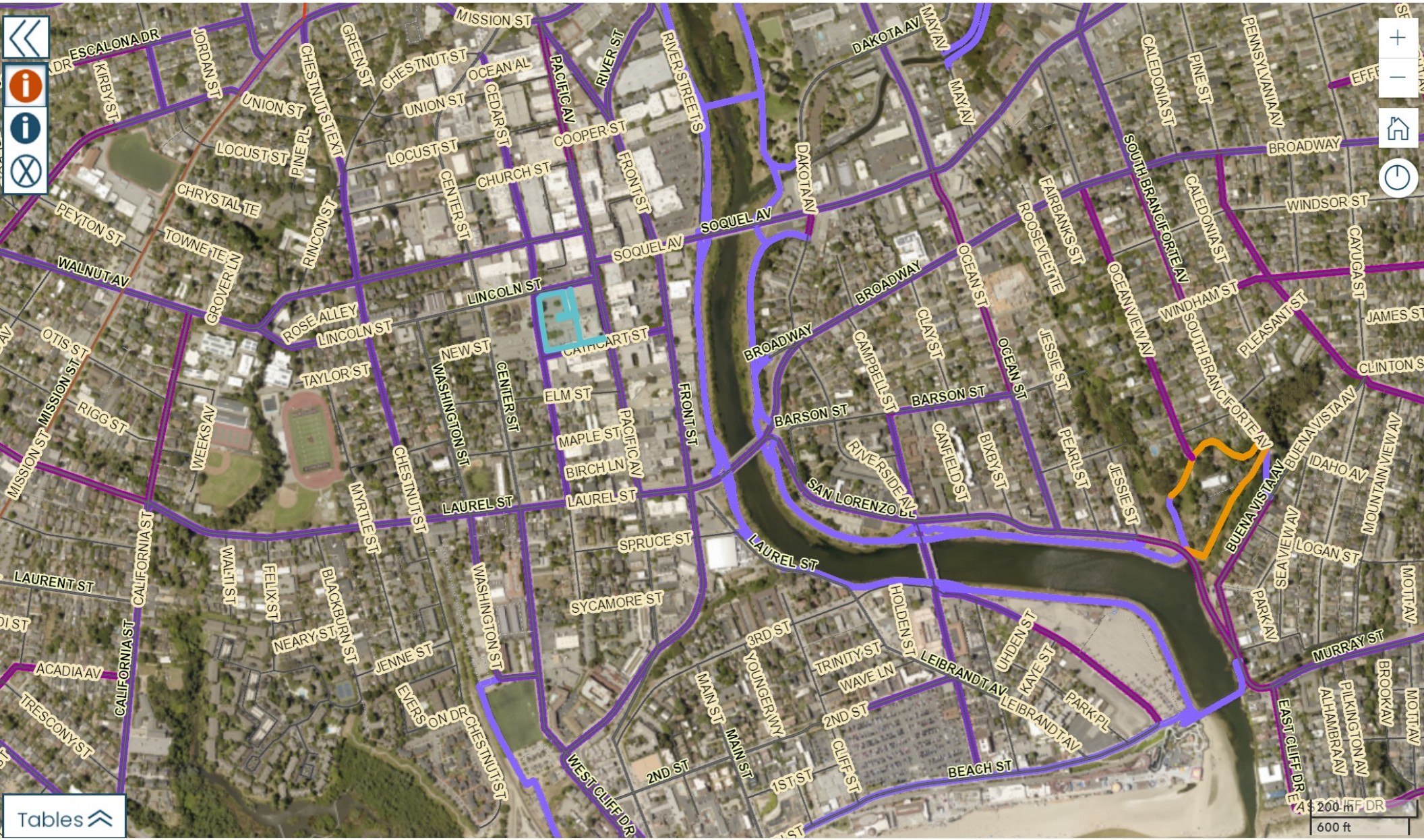
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UNION ST
CEDAR ST
PACIFIC AV
RIVER ST
RIVER STREETS
DAKOTA AV
MAY AV
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PINE ST
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JAMES ST
CLINTON S
LOCUST ST
PINE PL
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CENTER ST
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LINCOLN ST
ROSE ALLEY
CATHCART ST
NEW ST
OTIS ST
TAYLOR ST
WASHINGTON ST
ELM ST
MISSION ST
RIGG ST
WEEKS AV
MAPLE ST
PACIFIC AV
BIRCH LN
CHESTNUT ST
MYRTLE ST
LAUREL ST
SPRUCE ST
SYCAMORE ST
LAURENT ST
CALIFORNIA ST
WALTI ST
FELIX ST
BLACKBURN ST
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YOUNGER WY
MAIN ST
2ND ST
1ST ST
CLIFF ST
BEACH ST
TRINITY ST
WAVE LN
HOLDEN ST
LEIBRANDT AV
UHDEN ST
KAYE ST
PARK PL
LEIBRANDT AV
EAST CLIFF DR
ALHAMBRA AV
PILKINGTON AV
BROOK AV
MOTT AV
MURRAY ST
PARK AV
SEAVIEW AV
LOGAN ST
IDAHO AV
MOUNTAIN VIEW AV
BUENA VISTA AV
SAN LORENZO BL
RIVERSIDE AV
CANFIELD ST
BIXBY ST
PEARL ST
JESSIE ST
CAMPBELL ST
CLAY ST
OCEAN ST
BARSON ST
FAIRBANKS ST
ROOSEVELT TE
OCEANVIEW AV
WINDHAM ST
PLEASANT ST
SOUTH BRANCIFORTE AV
Tables
200 m
600 ft

Transportation Impact Study

Downtown Library and Affordable Housing Project
Santa Cruz, California

January 31, 2023

Prepared for:

City of Santa Cruz

Prepared by:

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EXECUTIVE SUMMARY

This report documents the results of a transportation impact study completed for the Santa Cruz Library project (the "proposed project", or "project"). The project proposes to construct a 38,086 square-foot library, a parking garage containing up to 400 spaces, 9,598 square-feet of commercial uses, a 1,905 square-foot day care, and 124 low-income residential dwelling units on the lot that includes one building located at 119 Lincoln Street and also City Parking Lot 4 at 600-698 Cedar Street in Santa Cruz, California. Access to the project site will be provided via one (1) proposed connection to an existing roadway, Cathcart Street.

This study was performed in accordance with the scope of work approved by the City of Santa Cruz, and in a manner consistent with the City of Santa Cruz's *Transportation Study Requirements for Development*. The following transportation facilities were included in this evaluation:

Intersections:

1. Front Street @ Soquel Avenue
2. Front Street @ Cathcart Street
3. Cathcart Street @ Pacific Avenue
4. Cathcart Street @ Cedar Street
5. Cathcart Street @ Project Driveway (plus Project scenarios only)

Based on the City's requirements, this transportation study was conducted for the study facilities for No Project under an Existing (2022) scenario and Plus Project conditions under Existing (2022) and Cumulative (2030) scenarios.

Significant findings of this study include:

- The proposed project is estimated to generate 2,144 new daily trips with 82 new trips occurring during the AM peak-hour and 269 new trips occurring during the PM peak-hour.
- As defined by the City, the addition of the proposed project to the Existing (2022) and Cumulative (2030) scenarios does not result in any of the study facilities operating below acceptable City LOS thresholds.
- Except for the northbound right movement at the Soquel Avenue intersection with Front Street (Intersection #1) and the eastbound right movement at the Cathcart intersection with Front Street (Intersection #2), the project does not cause any queue lengths to exceed the available storage or increase queue lengths that are deficient without the addition of the project. The northbound right movement at Intersection #1 is shared with the second through lane (shared through-right) and so the through trips affect the queue length at this intersection. As there is significant storage for the approach as a whole (one lane into two at the intersection) it is not anticipated that any safety issues will arise with this increased queue length. For the eastbound right movement at Intersection #2, while the 95th percentile queue exceeds the available storage, the average queue length is only 14-feet. In addition, the project only adds 4 trips per hour at this movement or one vehicle every 15 minutes. Therefore, no safety issues are anticipated at this intersection either due to the identified queue length with the addition of the project.

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INTRODUCTION

This report documents the results of a transportation impact study completed for the Santa Cruz Library project (the "proposed project", or "project"). The project proposes to construct a 38,086 square-foot library, a parking garage containing up to 400 spaces, 9,598 square-feet of commercial uses, a 1,905 square-foot day care, and 124 low-income residential dwelling units on the lot that includes one building located at 119 Lincoln Street and also City Parking Lot 4 at 600-698 Cedar Street in Santa Cruz, California. Access to the project site will be provided via one proposed connection to an existing roadway, Cathcart Street.

This study was performed in accordance with the scope of work approved by the City of Santa Cruz, and in a manner consistent with the City of Santa Cruz's *Transportation Study Requirements for Development*. The remaining sections of this report document the proposed project, analysis methodologies, deficiencies and improvements, and general study conclusions.

PROJECT DESCRIPTION

The project proposes to construct a 38,086 square-foot library, a parking garage containing up to 400 spaces, 9,598 square-feet of commercial uses, a 1,905 square-foot day care, and 124 low-income residential dwelling units on the lot that includes one building located at 119 Lincoln Street and also City Parking Lot 4 at 600-698 Cedar Street in Santa Cruz, California. Access to the project site will be provided via one proposed connection to an existing roadway, Cathcart Street. The project location is shown in **Figure 1** and the project site plan is shown in **Figure 2**. The following transportation facilities are included in this evaluation:

Intersections:

1. Front Street @ Soquel Avenue
2. Front Street @ Cathcart Street
3. Cathcart Street @ Pacific Avenue
4. Cathcart Street @ Cedar Street
5. Cathcart Street @ Project Driveway

Based on the City's requirements, this transportation study was conducted for the study facilities for No Project under an Existing (2022) scenario and Plus Project conditions under Existing (2022) and Cumulative (2030) scenarios.

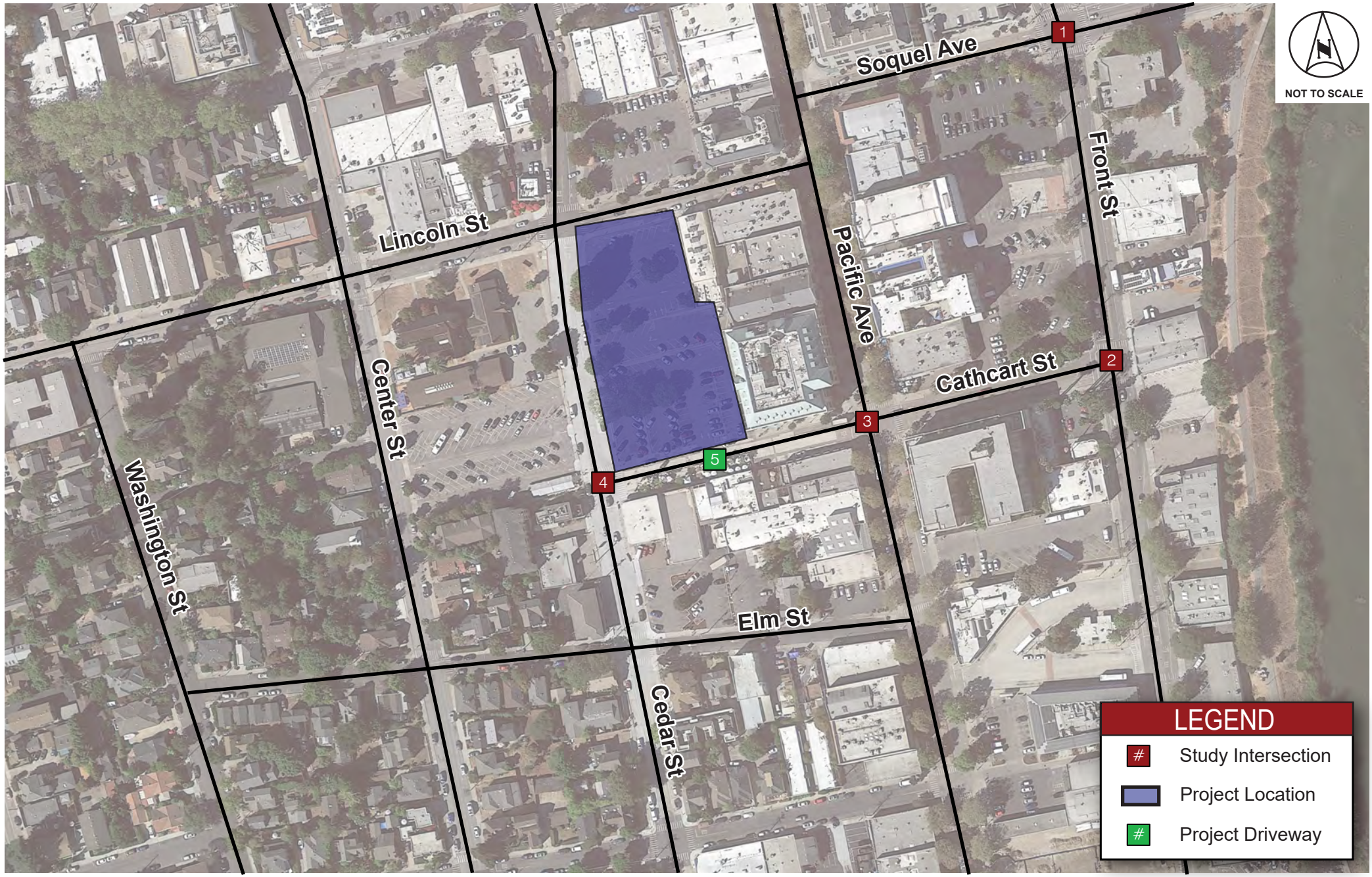

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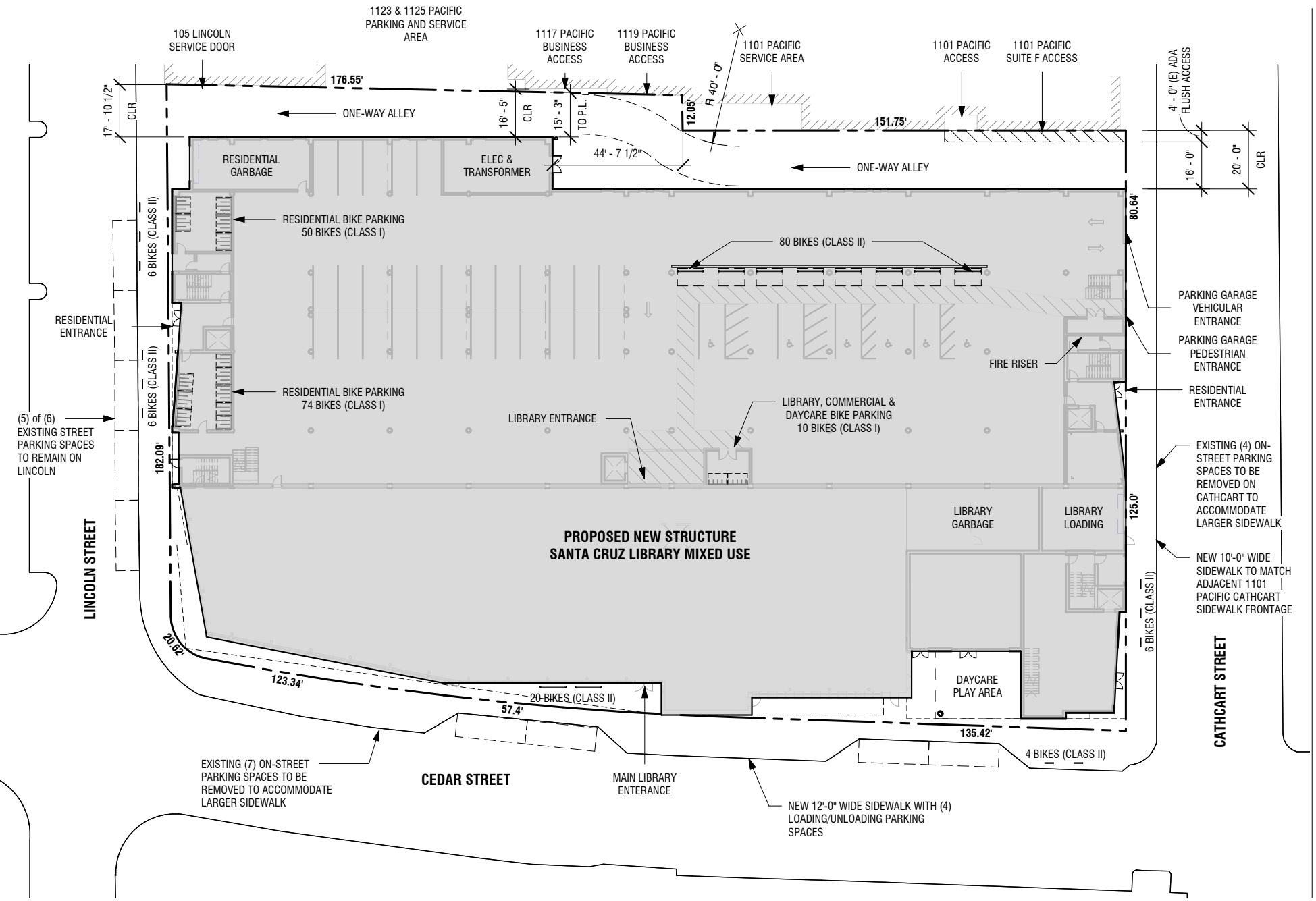
Figure 1
Project Vicinity Map



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08/16/2022

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Figure 2
Project Site Plan

PROJECT AREA ROADWAYS

The following are descriptions of the primary roadways in the vicinity of the project:

Soquel Avenue is an east-west principal arterial roadway that provides a primary connection between the east and west sides of Santa Cruz. The four-lane roadway carries approximately 15,300 vehicles per day[1] (vpd) between Pacific Avenue and Water Street in the vicinity of the proposed project location.

Front Street is a north-south minor arterial roadway that provides a primary connection from the project street (Cathcart Street) to Soquel Avenue. Between Laurel Street and River Street, Front Street carries approximately 13,800 vpd[1] with two through lanes in the Southbound direction and one through lane in the Northbound direction.

Cedar Street is a two-lane north-south collector roadway that runs from Center Street and ends at Sycamore Street. Cedar Street carries approximately 6,600 vpd[1] between Laurel Street and Lincoln Street.

Pacific Avenue is a two-lane north-south collector roadway that runs from Beach Street and ends at Water Street. Pacific Avenue is a one-way street between Cathcart Street and Church Street. Pacific Avenue carries approximately 3,400 vpd[1] between Laurel Street and Water Street.

ASSESSMENT OF PROPOSED PROJECT

Proposed Project Trip Generation and Assignment

The number of trips anticipated to be generated by the proposed project was approximated using data included in the *ITE Trip Generation Manual, 11th Edition*. The proposed project trip generation for the weekday AM and PM peak-hours is presented in Table 1. As shown in Table 1, the proposed project is estimated to generate 2,144 new daily trips with 82 new trips occurring during the AM peak-hour and 269 new trips occurring during the PM peak-hour.

As seen in Table 1, trips associated with the existing gym (Health/Fitness Club, ITE Land Use 492) were removed from the Net External Project Trips as directed by City of Santa Cruz staff. This is due to the proposed project replacing this existing gym when it is constructed. Therefore, these trips are already on the network and were included as part of the traffic counts collected.

Table 1 – Proposed Project Trip Generation

Land Use (ITE Code)	# Unit(s) / ksf	Daily Trips	AM Peak-Hour					PM Peak-Hour				
			Total Trips	IN		OUT		Total Trips	IN		OUT	
				%	Trips	%	Trips		%	Trips	%	Trips
Library (590)	38.1	2,653	52	71%	37	29%	15	338	48%	162	52%	176
Day Care Center (565)	1.9	91	21	52%	11	48%	10	21	48%	10	52%	11
Strip Retail Plaza (<40k) (822)	9.6	635	28	61%	17	39%	11	76	50%	38	50%	38
Multifamily Housing (Mid-Rise) (221)	124	545	43	23%	10	77%	33	49	61%	30	39%	19
Gross Project Trips		**3,924**	**144**	**-**	**75**	**-**	**69**	**484**	**-**	**240**	**-**	**244**
Reductions												
Health/Fitness Club (492)[1]	*5.3*	*-350*	*-7*	*23%*	*-4*	*49%*	*-3*	*-35*	*57%*	*-20*	*43%*	*-15*
40% Reduction for Downtown Area[2]		*-1,430*	*-55*	*-*	*-28*	*-*	*-27*	*-180*	*-*	*-88*	*-*	*-92*
Net External Project Trips:		**2,144**	**82**	**-**	**43**	**-**	**39**	**269**	**-**	**132**	**-**	**137**

Source: Trip Generation Manual, 11th Edition, ITE.

[1] Calculated under the basis that PM peak-hour represents 10% of daily trips. Daily trip generation numbers are not provided for this or similar Land Uses in ITE 11th Edition.

[2] 40% reduction for mixed use development in Downtown Santa Cruz per Santa Cruz Downtown Recovery Plan Amendment - Traffic Study, May 2017, Kimley-Horn and Associates. The reduction is generated by proximity to the Transit Center, mixed use internal capture, bicycle use, and walking trips. 40% reduction is applied to Project trips less existing fitness center trip reduction.

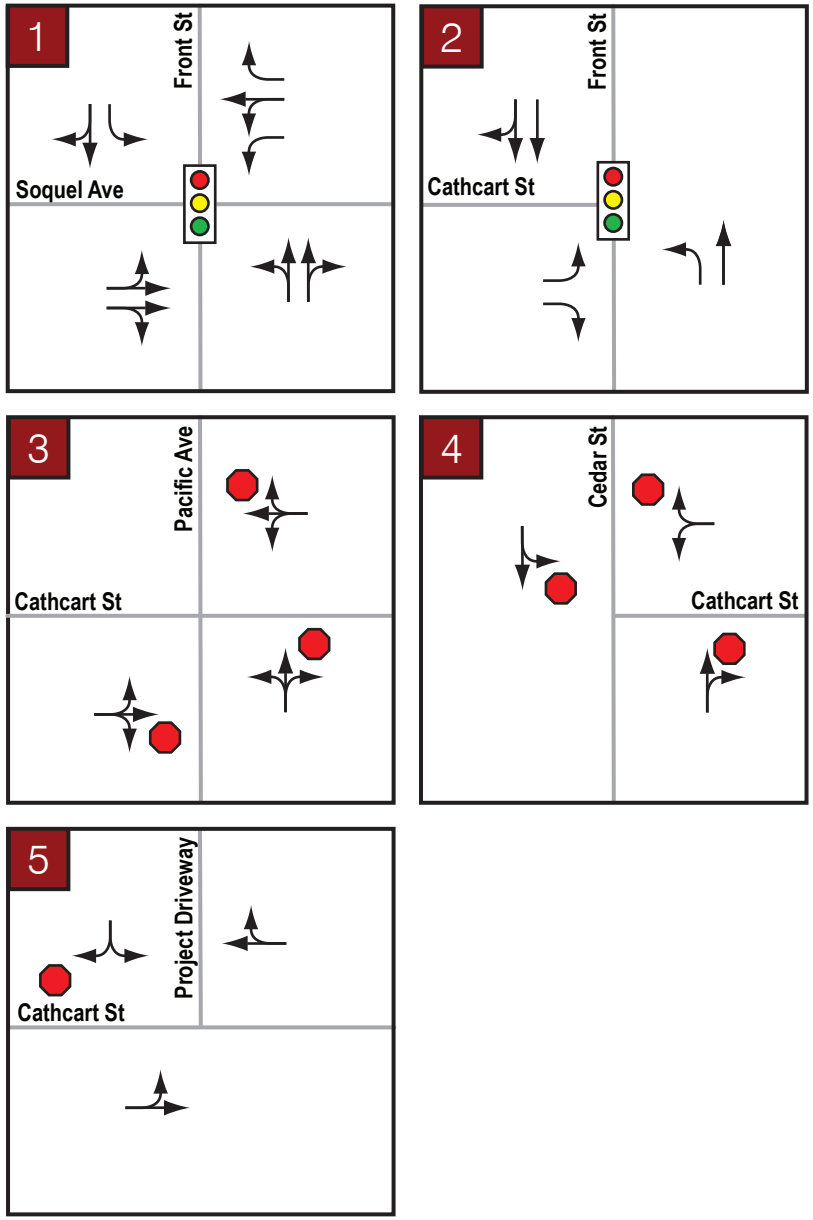
[1] *Santa Cruz County Average Daily Traffic Counts*, Santa Cruz County Regional Transportation Commission, 2015

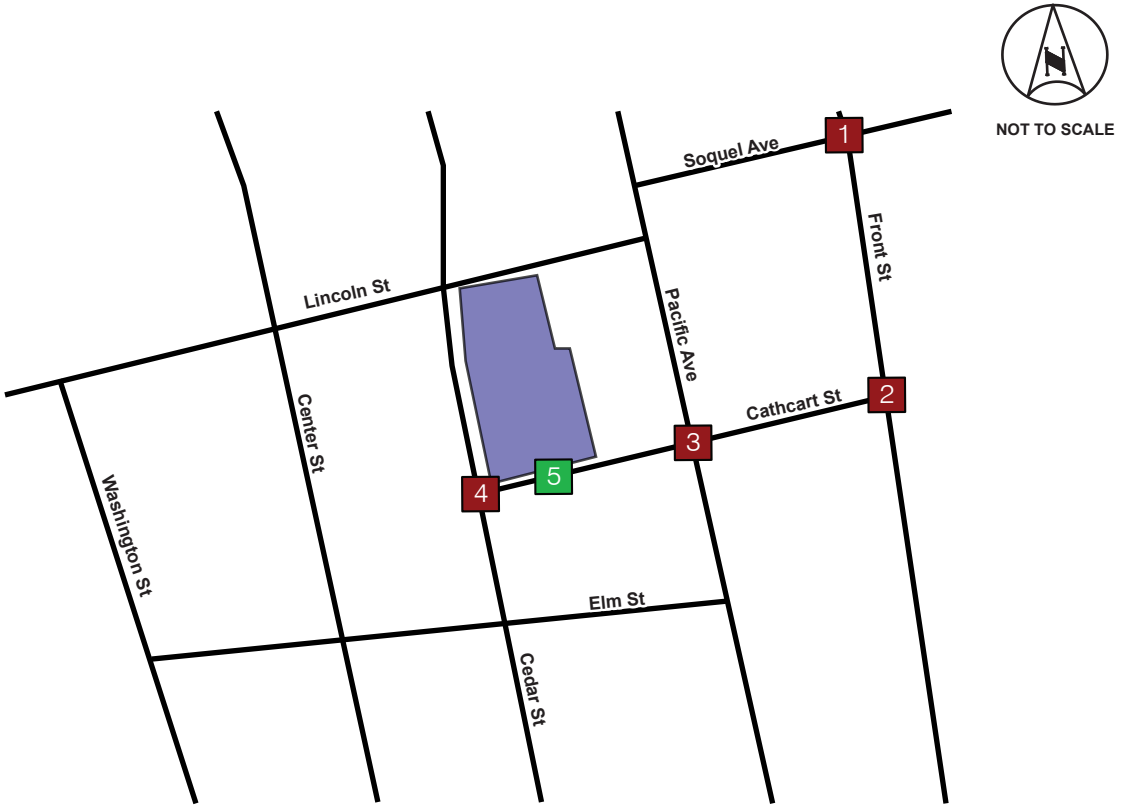
Project traffic was distributed and assigned to the roadway network using a combination of existing traffic conditions and engineering judgement. Trip distributions were reviewed by the City of Santa Cruz in the *Trip Generation and Distribution*[2] memo submitted to the City on September 12, 2022. The proposed project trip AM and PM distribution percentages are provided in **Figure 3**. **Figure 4** depicts the study intersections' facilities, existing traffic control, and existing lane configurations. The assignment of AM and PM peak-hour project trips is depicted in **Figure 5**.

[2] *Santa Cruz Library Trip Generation and Distribution*, Kimley-Horn, September 2022

Kimley»Horn

Figure 3
Project Trip Distribution





LEGEND

- # — Study Intersection
- # — Study Intersection (Project Driveway)
- Signalized Control
- Stop Control

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Figure 4
Study Facilities with Lane Geometry

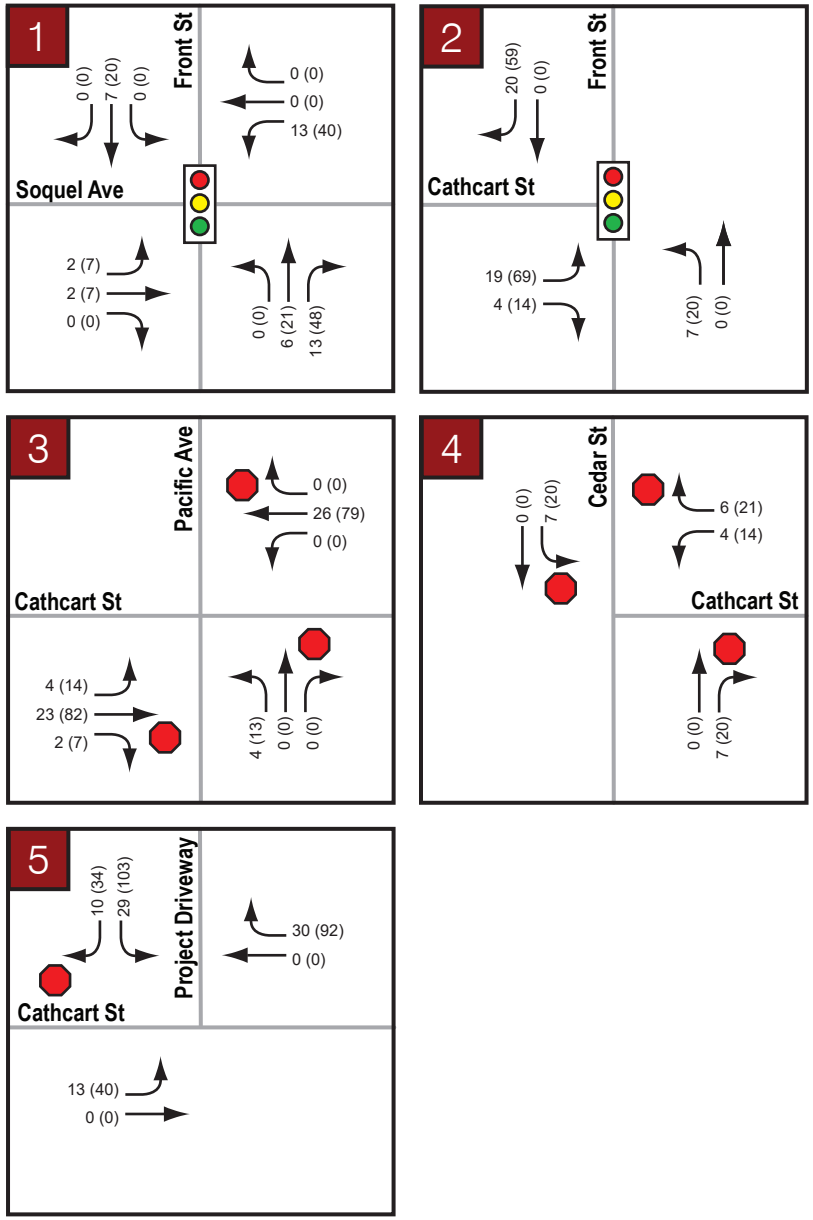

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Figure 5
Study Facilities with Project Trip Assignments

TRANSPORTATION STUDY METHODOLOGY

This transportation study was performed in accordance with the City's transportation study guidelines[3].

Level of Service Definitions

The level of service (LOS) of a facility is a qualitative measure used to describe operational conditions. LOS ranges from A, which represents minimal delay, to F, which represents heavy delay and a facility that is operating at or near its functional capacity. LOS for this study was determined using methods defined in the *Highway Capacity Manual (HCM) 6th Edition ("HCM6")*.

Intersection Analysis

The HCM includes procedures for analyzing side-street stop controlled (SSSC), all-way stop controlled (AWSC), and signalized intersections. The SSSC procedure defines LOS as a function of average control delay for each minor street approach movement. Conversely, the AWSC and signalized intersection procedures define LOS as a function of average control delay for the intersection. Table 2 presents intersection LOS definitions as defined in the HCM.

Table 2 – Intersection Level of Service Criteria

Level of Service (LOS)	Un-Signalized	Signalized
	Average Control Delay* (sec/veh)	Average Control Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F	> 50	> 80

Source: Highway Capacity Manual, 6th Edition
* Applied to the worst lane/lane group(s) for SSSC

LOS for the study intersections was determined using the Synchro® traffic analysis software. Synchro 11 uses HCM6 methodology to analyze intersection delay and LOS.

Analysis Scenarios

As described in the following sections, the LOS analysis was conducted for the study facilities for the following scenarios: Existing (2022) Conditions, Existing (2022) plus Proposed Project Conditions, and Cumulative (2030) plus Proposed Project Conditions.

[3] *City of Santa Cruz Transportation Study Requirements for Development*, City of Santa Cruz, 2021

EXISTING (2022) CONDITIONS

Existing traffic counts were collected to establish the existing conditions of the study area intersections. Counts were performed in September 2022 between 7-9 AM and 4-6 PM during typical weekdays (Tuesday-Thursday) with a particular emphasis on capturing conditions during normal peak periods.

Traffic counts from December 2017 at Intersection #1 (Front Street and Soquel Avenue) and Intersection #2 (Front Street and Cathcart Street) were compared against counts taken at both intersections in September 2022. As the December 2017 counts were higher at both intersections, the difference in intersection volumes between 2017 and 2022 was used to develop a factor and "grow" the 2022 counts taken at Intersection #3 (Cathcart Street and Pacific Avenue) and Intersection #4 (Cathcart Street and Cedar Street). Traffic counts used in the Existing (2022) conditions for the analysis are December 2017 volumes at Intersection #1 and #2 and factored September 2022 volumes at Intersection #3 and #4.

It is important to note that Cathcart Street between Cedar Street and Pacific Avenue is currently operating as a one-way road with only westbound traffic. This is due to the closure of the eastbound lane for outdoor dining. As reopening of the eastbound lane is expected once the project is constructed, counts in the westbound direction at both Intersection #3 and #4 were estimated using engineering judgement and existing traffic flow patterns at proximate intersections.

Existing (2022) Conditions AM and PM peak-hour traffic volumes are presented in Figure 6. 2017 and 2022 traffic count data sheets, along with calculations showing intersection growth rate calculation, are provided in Appendix A. Analysis worksheets for the scenario are included in Appendix B.

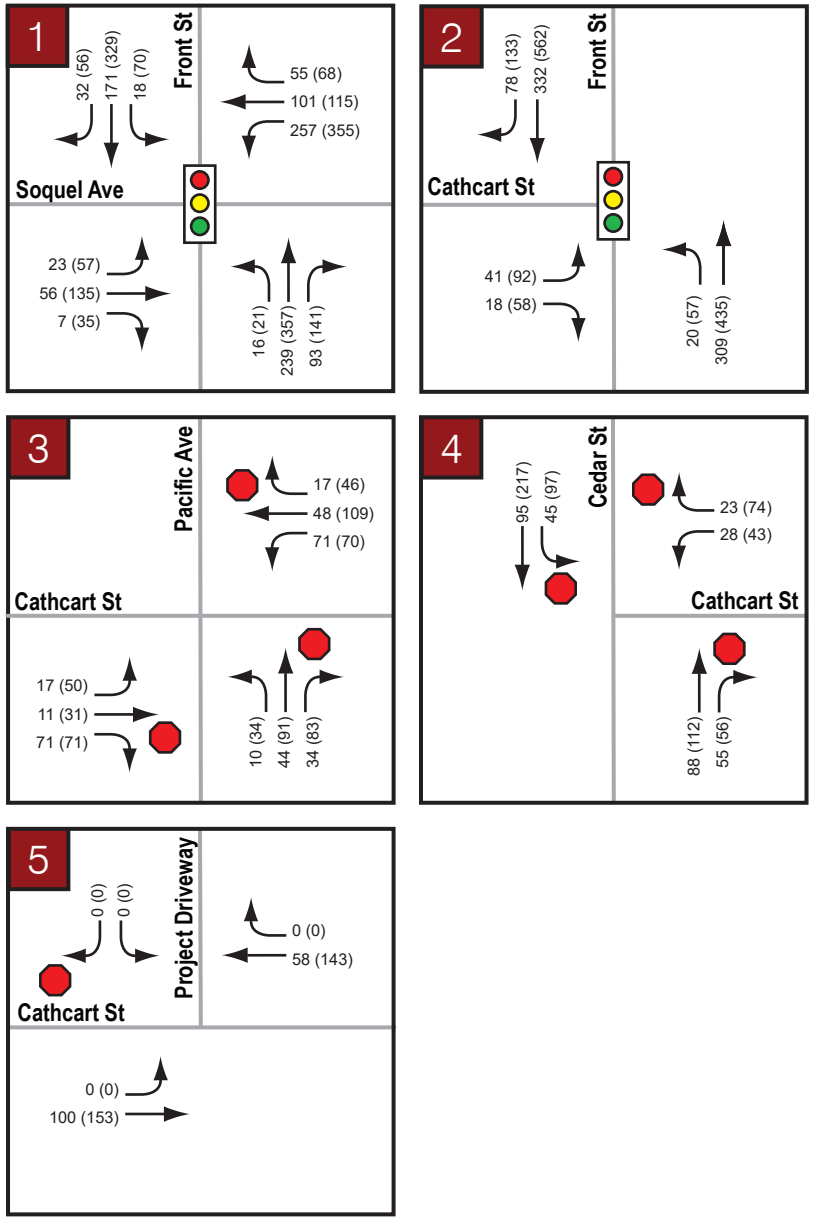
Intersections

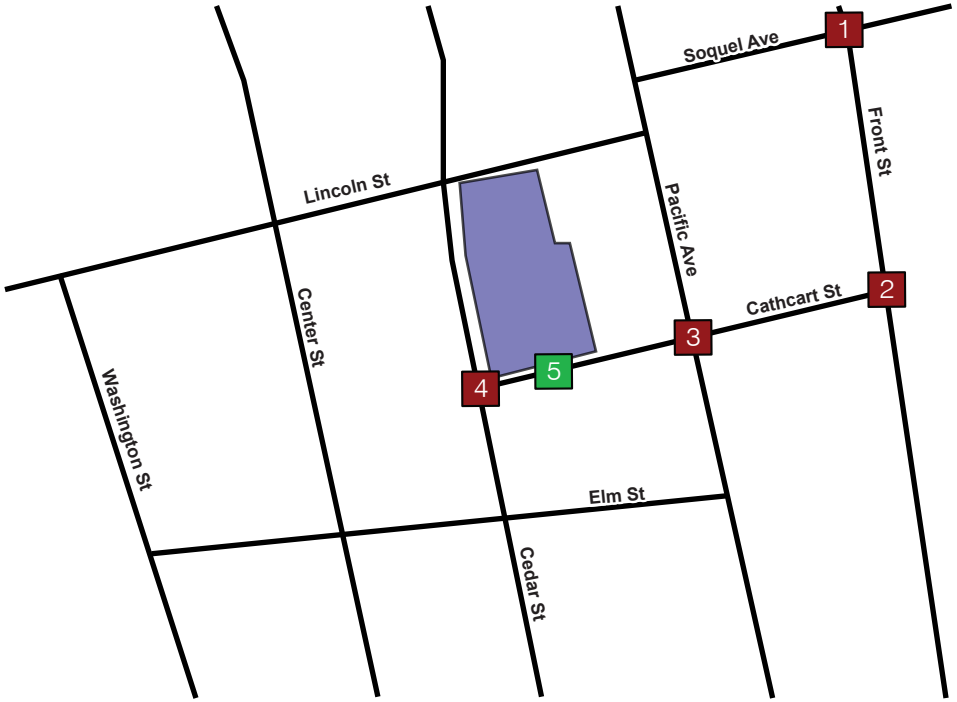
Table 3 presents the intersection operating conditions for this scenario. As indicated in Table 3, the study intersections operate between LOS A and LOS C during the AM and PM peak-hours.

Table 3 – Existing (2022) Intersection Levels of Service

ID	Intersection	LOS Threshold	Control	Peak Hour	Existing	
					Delay (sec)	LOS
1	Front Street @ Soquel Avenue	D	Signal	AM	32.6	C
				PM	24.7	C
2	Front Street @ Cathcart Street	D	Signal	AM	8.6	A
				PM	16.5	B
3	Cathcart Street @ Pacific Avenue	D	AWSC	AM	9.7	A
				PM	10.3	B
4	Cathcart Street @ Cedar Street	D	AWSC	AM	8.2	A
				PM	10.1	B
5	Cathcart Street @ Project Driveway	D	SSSC	AM	Not completed for scenario	
				PM		

Notes: **Bold** represents unacceptable operations.
Side Street Stop Controlled (SSSC) reported as intersection delay followed by worst approach's delay.





NOT TO SCALE

LEGEND

- Project Location
- # Study Intersection
- # Study Intersection (Project Driveway)
- Signalized Control
- Stop Control
- XX (XX) AM (PM) Peak-Hour Volumes

Kimley»Horn

Figure 6

Study Facilities with Existing Turning Movement Volumes

EXISTING (2022) PLUS PROPOSED PROJECT CONDITIONS

As previously discussed, the number of trips anticipated to be generated by the proposed project was derived using data included in the *ITE Trip Generation Manual, 11th Edition*. These trips were then assigned to the roadway network using engineering judgement and existing roadway volume patterns. Using these volumes, LOS was determined at the study facilities. Existing (2022) plus Proposed Project peak-hour traffic volumes are presented in Figure 7 for the AM and PM peak-hours. Analysis worksheets for the scenario are included in Appendix C.

Intersections

Table 4 presents the intersection operating conditions for this analysis scenario. As indicated in Table 4, the study intersections operate between LOS A and LOS D during the AM and PM peak-hours.

Table 4 – Existing (2022) plus Proposed Project Intersection Levels of Service

ID	Intersection	LOS Threshold	Control	Peak Hour	Existing		Existing plus Proposed Project	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Front Street @ Soquel Avenue	D	Signal	AM	32.6	C	32.8	C
				PM	24.7	C	37.4	D
2	Front Street @ Cathcart Street	D	Signal	AM	8.6	A	9.5	A
				PM	16.5	B	14.7	B
3	Cathcart Street @ Pacific Avenue	D	AWSC	AM	9.7	A	11.7	B
				PM	10.3	B	16.0	C
4	Cathcart Street @ Cedar Street	D	AWSC	AM	8.2	A	8.4	A
				PM	10.1	B	10.9	B
5	Cathcart Street @ Project Driveway	D	SSSC	AM	Not completed for scenario		1.9 (9.9 SB)	A
				PM			3.6 (14.0 SB)	B

Notes: **Bold** represents unacceptable operations. Shaded represents a project induced deficiency.
Side Street Stop Controlled (SSSC) reported as intersection delay followed by worst approach's delay.

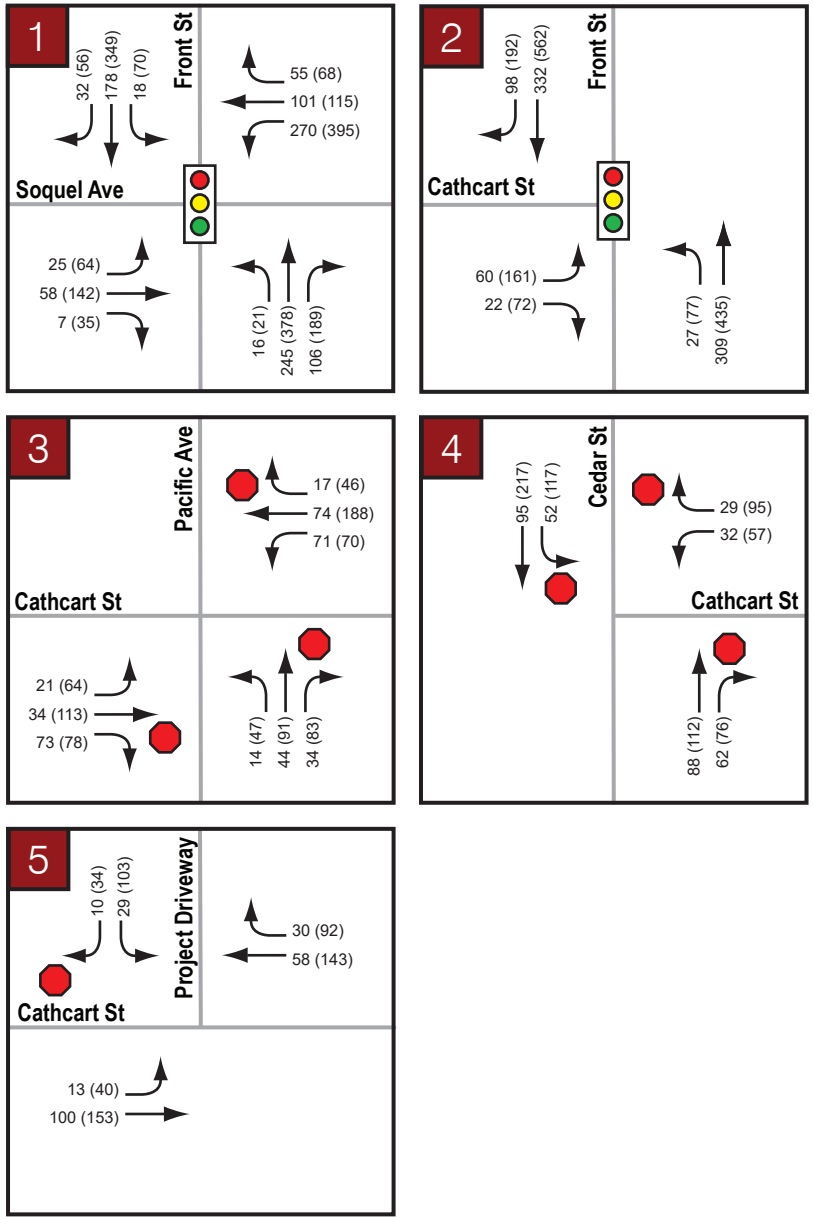


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Figure 7

Study Facilities with Existing Plus Project Turning Movement Volumes

CUMULATIVE (2030) PLUS PROPOSED PROJECT CONDITIONS

Peak-hour traffic volumes for Cumulative conditions were obtained from the City of Santa Cruz 2030 General Plan and include the growth anticipated by the University of Santa Cruz[4]. The volumes provided by the City, which can be found in Appendix E, were available for the two Front Street intersections with Soquel Avenue and Cathcart Street (Intersection #1 and Intersection #2). The volumes for the remaining Cathcart Street intersections (Intersections #3 – #5) were developed using a mix of volume balancing from the Cathcart Street intersection with Front Street (Intersection #2) and interpolating the background growth from the Santa Cruz County Travel Demand Model (SCC TDM) between the model's base year (2019) and future year (2040) and adding it to the counts obtained for Existing Conditions. The project volumes for the PM peak-hour were then layered on top of the volumes for Cumulative conditions to obtaining intersection turning movement volumes for Cumulative plus Project Conditions.

Using the volumes developed for Cumulative plus Project conditions, LOS was determined at the study facilities. Cumulative (2030) plus Proposed Project peak-hour traffic volumes are presented in Figure 8 for the AM and PM peak-hours. Detailed calculations are included in Appendix D.

Intersections

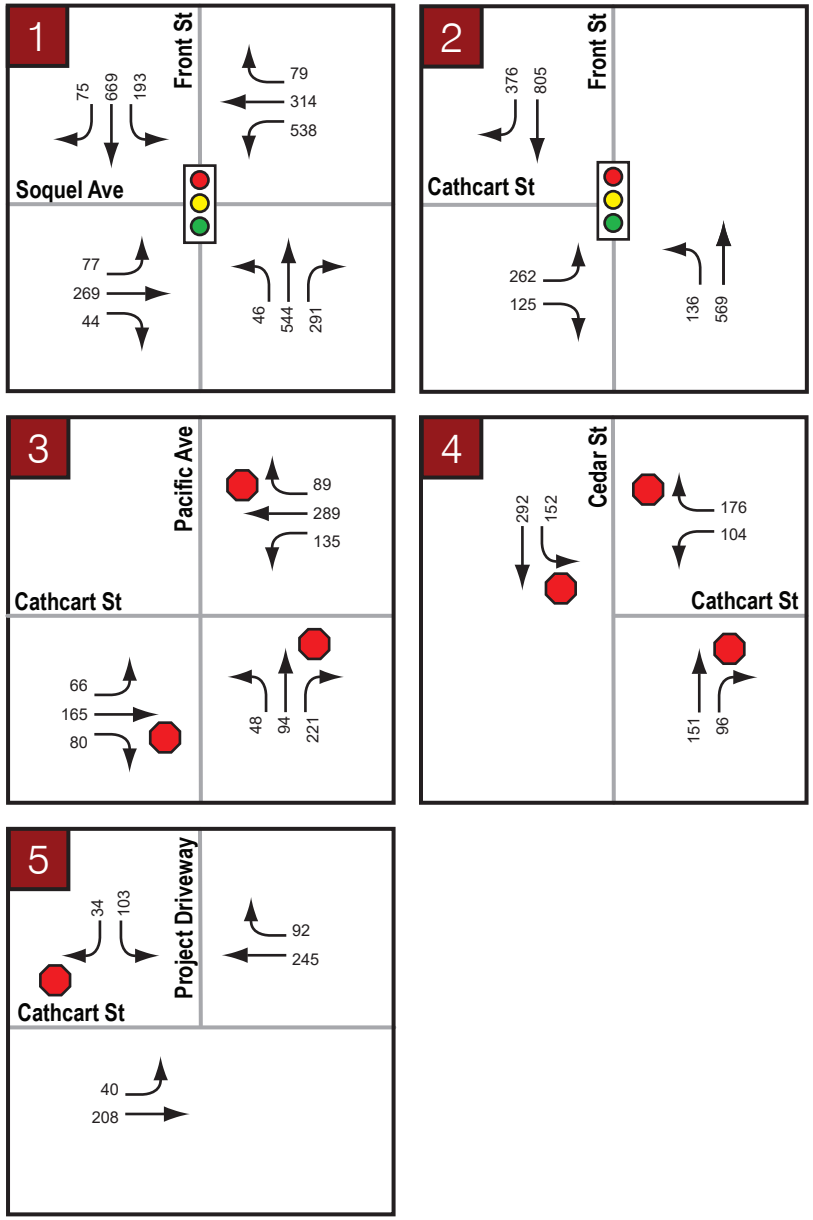
Table 5 presents the intersection operating conditions for this scenario. As indicated in Table 5, the study intersections operate between LOS A and LOS F. All intersections except the Front Street intersection with Soquel Avenue (Intersection #1) operate within the City's LOS threshold of LOS D.

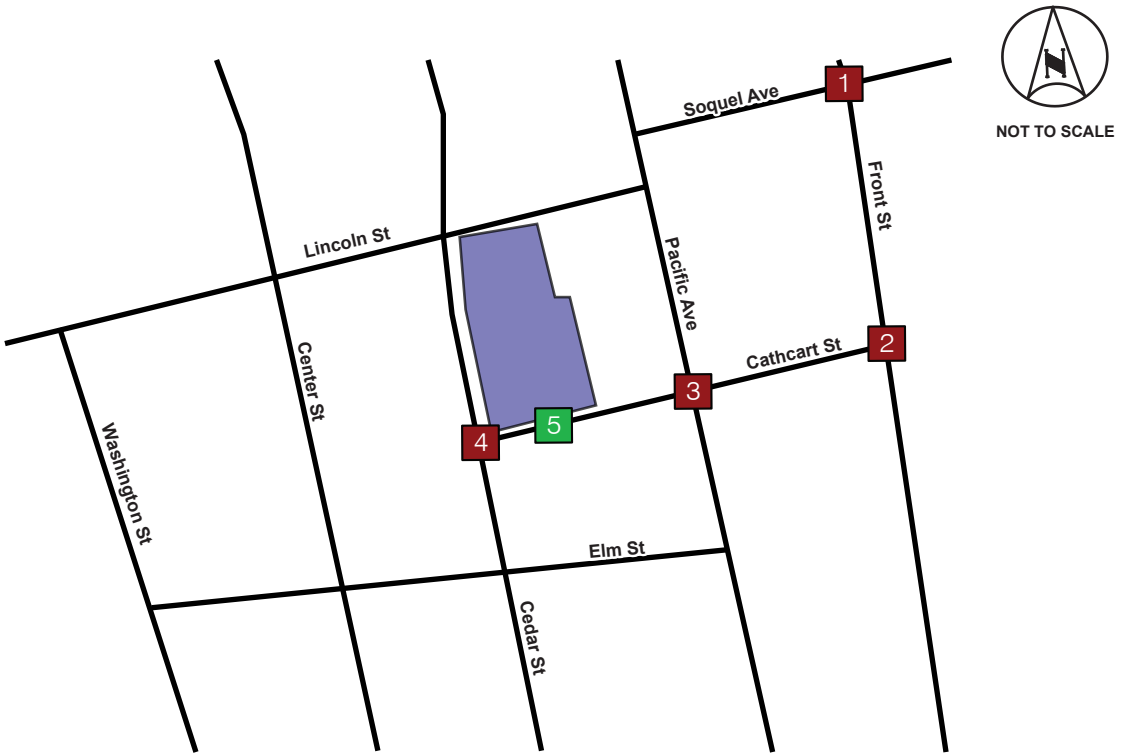
Table 5 – Cumulative (2030) plus Proposed Project Intersection Levels of Service

ID	Intersection	LOS Threshold	Control	Peak Hour	Existing plus Proposed Project		Cumulative plus Proposed Project	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Front Street @ Soquel Avenue	D	Signal	PM	37.4	D	**206.0**	**F**
2	Front Street @ Cathcart Street	D	Signal	PM	14.7	B	25.6	C
3	Cathcart Street @ Pacific Avenue	D	AWSC	PM	16.0	C	27.0	D
4	Cathcart Street @ Cedar Street	D	AWSC	PM	10.9	B	16.2	C
5	Cathcart Street @ Project Driveway	D	SSSC	PM	3.6 (14.0 SB)	B	3.5 (15.9 SB)	B

Notes: **Bold** represents unacceptable operations.
Side Street Stop Controlled (SSSC) reported as intersection delay followed by worst approach's delay.

[4] *Transportation Study Requirements for Development – Cumulative Buildout Volumes City of Santa Cruz Critical Intersections*. City of Santa Cruz. August 6, 2021.





LEGEND

- Project Location
- # Study Intersection
- # Study Intersection (Project Driveway)
- Signalized Control
- Stop Control
- XX PM Peak-Hour Volumes

Kimley»Horn

Figure 8

Study Facilities with Cumulative Plus Project PM Peak-Hour Turning Movement Volumes

DEFICIENCIES AND IMPROVEMENTS

Standards of Deficiency

The City of Santa Cruz's *Transportation Study Requirements for Development*[3] was referenced to identify standards of deficiency at the study area intersections. The following criteria were used:

> *The project traffic added to existing conditions would result in the level of service deteriorating below the City standard and would be more than 3% over existing total volume at the studied intersection. The City's current level of service standard is LOS D.*
>
> *The project traffic together with General Plan buildout and update traffic would result in a drop below the level of service standard for the City of Santa Cruz. (This is defined as a cumulatively considerable effect irrespective of the proportional increase to traffic volumes).*
>
> *The project conflicts with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.*
>
> *If the project site design does not have adequate parking or circulation capacity to accommodate the anticipated demand. (Parking demand shall be measured first using the City Parking requirements but may be adjusted using ITE 85 percentile parking generation rates and shared parking analysis factors at the discretion of the City Engineer and Transportation Manager). The City Parking Ordinance allows reductions but these must be thoroughly substantiated and quantified in the analysis, and they are not generally all applicable to a project.*

Summary of Deficiencies and Improvements

Existing (2022) plus Proposed Project Conditions

As reflected in Table 4, the addition of the proposed project results in no intersection deficiencies as defined by the City. The lowest LOS exhibited at any one study facilities is C under the Existing plus Proposed Project scenario.

Cumulative (2030) plus Proposed Project Conditions

As reflected in Table 5, the addition of the proposed project results in one intersection deficiency at the Front Street intersection with Soquel Avenue (Intersection #1) as defined by the City of Santa Cruz. Using the improvements proposed for Front Street as part of the Downtown Intersections Improvement Plan, the LOS and delay can be reduced from F to E and 206.0 to 73.7, respectively, as shown in Table 6. The analysis worksheet for Intersection #1 for Cumulative plus Proposed Project (Improved) conditions can be found at in Appendix F. The improvements include modifying the southbound approach to include a dedicated left-turn lane and an all-movement (left-thru-right) lane. This geometric configuration was chosen because it had been proposed as an improvement at this intersection in a past study[5] with the goal of having the intersection operate at LOS E. No other solution that was tested was able to reduce the delay to lower than what is shown in Table 6. While no feasible improvements were identified that would reduce the LOS and delay to LOS D, it should be noted that under the City's existing General Plan, the City accepts a lower LOS at some major regional intersections such as this one per Circulation Policy 5.1.2.

Table 6 – Cumulative (2030) plus Proposed Project plus Improvements Intersection Levels of Service

ID	Intersection	LOS Threshold	Control	Peak Hour	Cumulative (2030) plus Proposed Project		Cumulative (2030) plus Proposed Project (Improved)	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Front Street @ Soquel Avenue	D	Signal	PM	**206.0**	**F**	**73.7**	**E**

Notes: **Bold** represents unacceptable operations. The City of Santa Cruz has established LOS D as the minimum acceptable LOS for overall intersection operations during the AM and PM peak hours. However, under the existing General Plan, the City accepts a lower LOS (E) at some major regional intersections per existing Circulation Policy 5.1.2.

[5] *Santa Cruz Downtown Recover Plan Amendment – Traffic Study*. Kimley-Horn for the City of Santa Cruz. May 10, 2017.

VEHICLE MILES TRAVELED (VMT)

The proposed project is located in a VMT Efficient Area based on the Santa Cruz County Residential Screening Map[6]. This means that based on the VMT per capita threshold set by the City and County, the proposed project is located in an area that produces VMT per capita that is at least 15-percent below the Countywide average. Therefore, as noted in the memo developed by the City's Public Works Department and provided as **Appendix G**, the VMT for the proposed project is assumed to be less than significant in accordance with the adopted City of Santa Cruz guidelines.

OTHER CONSIDERATIONS

Intersection Queuing Evaluation

A queuing study was conducted to evaluate the capacity of the existing turn lanes at the study intersections. Synchro reports were used to conduct the queuing analysis. The 95th percentile vehicle queues were compared against the existing vehicle storage lengths at select intersection movements to determine if the queues are anticipated to exceed their available storage. Results of the queuing evaluation are presented in **Table 7**. Analysis sheets that include the anticipated vehicle queues are presented in **Appendices B – D**.

As presented in **Table 7**, the addition of the proposed project adds relatively small amounts of additional queuing except at the Front Street intersection with Soquel Avenue (Intersection #1). Shaded cells in the table represent conditions where the reported queue exceeds available vehicle storage capacity by more than one car length (25 ft). The addition of the proposed project results in the following:

- Except for the northbound right movement at the Soquel Avenue intersection with Front Street (Intersection #1) and both the eastbound right and northbound left movements at the Cathcart intersection with Front Street (Intersection #2), the project does not cause any queue lengths to exceed the available storage or increase queue lengths that are deficient without the addition of the project.
    - The northbound right movement at Intersection #1 is shared with the second through lane (shared through-right), so the through trips affect the queue length at this intersection. As there is significant storage for the approach as a whole (one lane into two at the intersection) it is not anticipated that any safety issues will arise with this increased queue length. In addition, improvements are planned for this intersection in the near future that would improve safety for all users by slightly modifying the intersection geometry (eastbound number one lane will be converted from a through-left to a left-only lane) and adding additional bicyclist infrastructure such as bike lane striping across the intersection for the Front Street approaches and a bike box for the westbound approach.
    - For the eastbound right movement at Intersection #2, while the 95th percentile queue exceeds the available storage, the average queue length is only 25-feet (one vehicle length). In addition, the project only adds 4 trips per hour at this movement or one vehicle every 15 minutes. Therefore, no safety issues are anticipated at this intersection either due to the identified queue length with the addition of the project.
    - For the northbound left movement at Intersection #2, while the 95th percentile queue exceeds the available storage, the average queue length is 70-feet, less than the available storage. In addition, the project only adds 7 trips per hour at this movement or two vehicles every 15 minutes. Therefore, no safety issues are anticipated at this intersection.
- At the Cathcart Street intersection with the Project Driveway (Intersection #5), the 95th percentile queue for the eastbound left movement is one vehicle or 25-feeet. There are no anticipated safety issues related to off-street queuing at Intersection #5.

6 *Analyzing Vehicle Miles Traveled for CEQA Compliance. SB 743 Implementation Guidelines for the County of Santa Cruz*. Santa Cruz County Planning Department. Implemented July 2020. Updated May 2021.

Table 7 – Intersection Queuing Evaluation Results

Intersection / Analysis Scenario	Movement	AM Peak-Hour		PM Peak-Hour	
		Available Storage (ft)	95th % Queue (ft)	Available Storage (ft)	95th % Queue (ft)
#1, Front Street @Soquel Avenue	NBR				
Existing (2022)		100	80	100	151
Existing (2022) plus Proposed Project			83		177
Cumulative (2030) plus Proposed Project			-		516
	NBL				
Existing (2022)		-	80	-	151
Existing (2022) plus Proposed Project			83		177
Cumulative (2030) plus Proposed Project			-		516
	WBL				
Existing (2022)		-	168	-	214
Existing (2022) plus Proposed Project			172		229
Cumulative (2030) plus Proposed Project			-		470
#2, Front Street @Cathcart Street	EBR				
Existing (2022)		25	16	25	24
Existing (2022) plus Proposed Project			17		37
Cumulative (2030) plus Proposed Project			-		70
	NBL				
Existing (2022)		100	24	100	56
Existing (2022) plus Proposed Project			29		72
Cumulative (2030) plus Proposed Project			-		171
	SBR				
Existing (2022)		-	60	-	127
Existing (2022) plus Proposed Project			65		135
Cumulative (2030) plus Proposed Project			-		236
#3, Cathcart Street @Pacific Avenue	EBR				
Existing (2022)		-	75	-	50
Existing (2022) plus Proposed Project			100		150
Cumulative (2030) plus Proposed Project			-		100
	NBL				
Existing (2022)		-	25	-	50
Existing (2022) plus Proposed Project			25		50
Cumulative (2030) plus Proposed Project			-		125
#4, Cathcart Street @Cedar Street	WBL/R				
Existing (2022)		-	25	-	25
Existing (2022) plus Proposed Project			25		25
Cumulative (2030) plus Proposed Project			-		75
	NBR				
Existing (2022)		-	25	-	25
Existing (2022) plus Proposed Project			25		50
Cumulative (2030) plus Proposed Project			-		50
	SBL				
Existing (2022)		-	25	-	75
Existing (2022) plus Proposed Project			25		75
Cumulative (2030) plus Proposed Project			-		150
#5, Cathcart Street @ Project Driveway	EBL				
Existing (2022) plus Proposed Project		-	25	-	25
Cumulative (2030) plus Proposed Project			-		25

Source: *Highway Capacity Manual (HCM) 2016* methodology per Synchro© v11/Simtraffic.
Notes: For approaches with dual left-turn lanes, the longest queue length is reported.
*Minimal 95th Percentile Queue, shaded cell indicates queue exceeds storage by > 25' (one vehicle length)

On-Site Transportation Review

In accordance with the City's *Guidelines*[3], the following aspects of the proposed project were evaluated:

1. *Proximity of proposed site driveway(s) to other driveways or intersections*
   Access to the site is provided via one (1) proposed roadway connections to Cathcart Street and one (1) one-way alley. A one-way alley follows the east side of the development and connects Cathcart Street and Lincoln Street. Both access points will be sufficient to serve delivery trucks, fire trucks, and other oversized vehicles.
2. *Adequacy of vehicle parking relative to both the anticipated demand and zoning code requirements*
   All required parking is anticipated to be accommodated entirely on-site. While existing on-street and off-street parking spaces will be removed with the addition of the project, a comparable number of parking spots will be included as part of the proposed project.
3. *Adequacy of the project site design to convey all vehicle types*
   The site will include access which is anticipated to accommodate the circulation needs of all vehicle types, including fire access. The proposed project will be utilizing proposed roadway connections to Cathcart Street and Lincoln Street.
4. *Adequacy of sight distance on-site*
   It is anticipated that sufficient sight distance for the proposed project driveway will be provided in a manner consistent with the guidelines presented in the *Geometric Design of Highways and Streets*, published by the American Association of State Highway and Transportation Officials (AASHTO), and the *Highway Design Manual*, published by Caltrans. According to the project site plan (**Figure 2**) there appears to be adequate sight distance on-site to facilitate safe and orderly circulation. It should also be noted that the entrance for the parking garage will be set back and an open-air design with support pillars will provide exiting vehicles with sight lines in both directions, including of the sidewalk for approaching directions. This contrasts with many garages designed with walls until the exit point. The project design will provide adequate sight distance for exiting vehicles of both oncoming vehicles and pedestrians.

Other Transportation-Related Deficiencies and Improvement Considerations

In accordance with the City's *Guidelines*[3], the proposed project was evaluated against the following *General Plan* goals:

- *Emergency Vehicle Access*
  The Fire Code of Santa Cruz County (Chapter 7.92)[7] states that fire apparatus access roads shall be a minimum of "12 ft (3658 mm) for an access road or driveway serving two or fewer habitable structures." As shown in project site plan (**Figure 2**), the project site will allow fire access to all parcels with a minimum alley width of 15'-3". As such, the proposed project is considered to allow for adequate access and on-site circulation for emergency vehicles.
- *Deliveries of Goods and Services*
  The proposed project is considered to allow for adequate on-site circulation for all vehicle types, including delivery vehicles for goods and services. Delivery vehicles will be able to circulate the site using access to the parking garage from Cathcart Street.
- *Access to Public Transit Services consistent with the City of Santa Cruz 2030 General Plan GOAL M1: "Land use patterns, street design, parking, and access solutions that facilitate multiple transportation alternatives (Cf. Lu4 Lu4.1.1, Lu4.2, ED1.9.2, and M2.2, 2.3.2, and 3.1.9)"*[8]
  There is a transit center located approximately 1,000 feet southeast of the project site. The site is connected to existing pedestrian facilities and is planned to improve the pedestrian facilities adjacent to the site by widening sidewalks.

[7] *Santa Cruz County Code – Chapter 7.92 FIRE CODE*, Santa Cruz County
[8] *City of Santa Cruz 2030 General Plan*, City of Santa Cruz

- ***Non-Motorized Transportation consistent with the City of Santa Cruz 2030 General Plan GOAL M2: "A safe, sustainable, efficient, adaptive, and accessible transportation system"*** [8]
  Bike parking facilities will be installed throughout the project site, with a total of 256 Class II bike parking spots.

CONCLUSIONS

Significant findings of this study include:

- The proposed project is estimated to generate 2,144 new daily trips with 82 new trips occurring during the AM peak-hour and 269 new trips occurring during the PM peak-hour.
- As defined by the City, the addition of the proposed project to the Existing (2022) Conditions does not result in any of the study facilities operating below acceptable City LOS thresholds.
- For Cumulative (2030) plus Proposed Project conditions, the addition of the proposed project results in one intersection deficiency at the Front Street intersection with Soquel Avenue (Intersection #1) as defined by the City of Santa Cruz. Using the improvements proposed for Front Street as part of the Downtown Intersections Improvement Plan, the LOS and delay can be reduced from F to E and 206.0 to 73.7, respectively, as shown in Table 6. The improvements include modifying the southbound approach to include a dedicated left-turn lane and an all-movement (left-thru-right) lane. This geometric configuration was chosen because it had been proposed as an improvement at this intersection in a past study[9] with the goal of having the intersection operate at LOS E. No feasible improvements were identified that would reduce the LOS and delay to LOS D.
- Except for the northbound right movement at the Soquel Avenue intersection with Front Street (Intersection #1) and both the eastbound right and northbound left movements at the Cathcart intersection with Front Street (Intersection #2), the project does not cause any queue lengths to exceed the available storage or increase queue lengths that are deficient without the addition of the project.
  - The northbound right movement at Intersection #1 is shared with the second through lane (shared through-right), so the through trips affect the queue length at this intersection. As there is significant storage for the approach as a whole (one lane into two at the intersection) it is not anticipated that any safety issues will arise with this increased queue length.
  - For the eastbound right movement at Intersection #2, while the 95th percentile queue exceeds the available storage, the average queue length is only 25-feet (one vehicle length). In addition, the project only adds 4 trips per hour at this movement or one vehicle every 15 minutes. Therefore, no safety issues are anticipated at this intersection either due to the identified queue length with the addition of the project.
  - For the northbound left movement at Intersection #2, while the 95th percentile queue exceeds the available storage, the average queue length is 70-feet, less than the available storage. In addition, the project only adds 7 trips per hour at this movement or two vehicles every 15 minutes. Therefore, no safety issues are anticipated at this intersection.
- At the Cathcart Street intersection with the Project Driveway (Intersection #5), the 95th percentile queue for the eastbound left movement is one vehicle or 25-feet. There are no anticipated safety issues related to off-street queuing at Intersection #5.
- The entrance for the parking garage will be set back and an open-air design with support pillars will provide exiting vehicles with sight lines in both directions, including of the sidewalk for approaching directions. This contrasts with many garages designed with walls until the exit point. The project design will provide adequate sight distance for exiting vehicles of both oncoming vehicles and pedestrians.

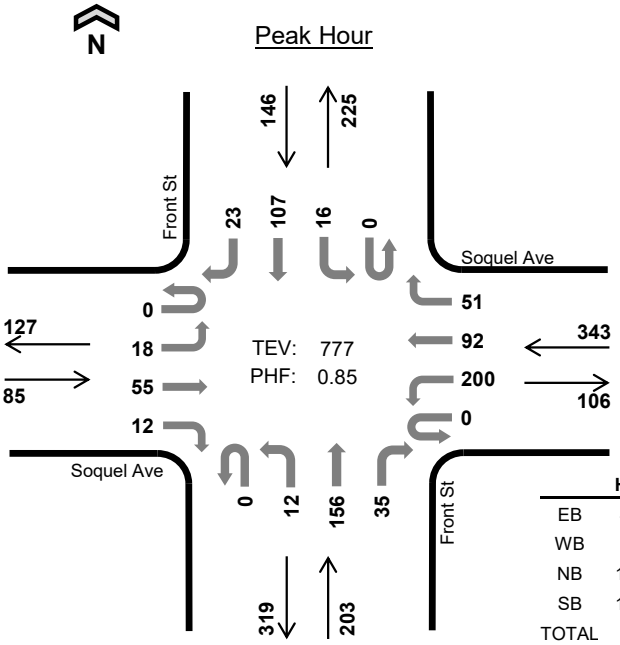
[9] *Santa Cruz Downtown Recover Plan Amendment – Traffic Study*. Kimley-Horn for the City of Santa Cruz. May 10, 2017.

Appendix A

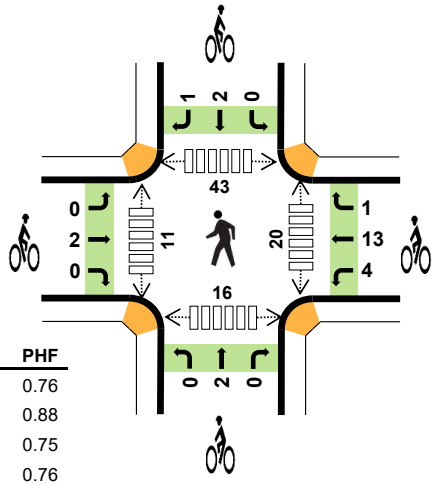
Traffic Count Data Sheets

Front St
Soquel Ave

Date: 09/15/2022
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 8:00 AM to 9:00 AM



	HV %:	PHF
EB	4.7%	0.76
WB	7.9%	0.88
NB	11.3%	0.75
SB	11.6%	0.76
TOTAL	9.1%	0.85



Two-Hour Count Summaries

Interval Start	Soquel Ave Eastbound				Soquel Ave Westbound				Front St Northbound				Front St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	2	1	0	0	24	6	1	0	1	19	3	0	0	9	0	66	0
7:15 AM	0	4	9	0	0	19	11	3	0	2	18	2	0	3	20	1	92	0
7:30 AM	0	1	4	2	0	26	9	4	0	2	18	12	0	6	19	3	106	0
7:45 AM	0	1	4	4	0	29	8	8	0	1	35	9	0	5	18	3	125	389
8:00 AM	**0**	**4**	**8**	**4**	**0**	**47**	**24**	**3**	**0**	**2**	**36**	**12**	**0**	**5**	**21**	**4**	**170**	493
8:15 AM	**0**	**2**	**14**	**4**	**0**	**43**	**30**	**7**	**0**	**4**	**36**	**5**	**0**	**3**	**25**	**4**	**177**	578
8:30 AM	**0**	**7**	**19**	**2**	**0**	**58**	**19**	**20**	**0**	**0**	**32**	**8**	**0**	**4**	**27**	**5**	**201**	673
8:45 AM	**0**	**5**	**14**	**2**	**0**	**52**	**19**	**21**	**0**	**6**	**52**	**10**	**0**	**4**	**34**	**10**	**229**	**777**
Count Total	0	26	73	18	0	298	126	67	0	18	246	61	0	30	173	30	1,166	0
Peak Hour All	**0**	**18**	**55**	**12**	**0**	**200**	**92**	**51**	**0**	**12**	**156**	**35**	**0**	**16**	**107**	**23**	**777**	**0**
Peak Hour HV	**0**	**0**	**3**	**1**	**0**	**22**	**3**	**2**	**0**	**0**	**17**	**6**	**0**	**3**	**12**	**2**	**71**	**0**
Peak Hour HV%	**-**	**0%**	**5%**	**8%**	**-**	**11%**	**3%**	**4%**	**-**	**0%**	**11%**	**17%**	**-**	**19%**	**11%**	**9%**	**9%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	2	4	3	*9*	0	1	0	0	*1*	3	8	8	3	*22*
7:15 AM	1	3	6	6	*16*	0	2	1	0	*3*	0	1	13	2	*16*
7:30 AM	1	4	4	6	*15*	1	4	2	1	*8*	3	7	13	4	*27*
7:45 AM	0	6	6	2	*14*	0	1	1	0	*2*	3	2	10	4	*19*
8:00 AM	**1**	**6**	**4**	**3**	***14***	**2**	**4**	**0**	**1**	***7***	**7**	**2**	**9**	**7**	*25*
8:15 AM	**1**	**7**	**5**	**5**	***18***	**0**	**9**	**0**	**1**	***10***	**6**	**3**	**15**	**5**	*29*
8:30 AM	**1**	**6**	**6**	**4**	***17***	**0**	**3**	**1**	**1**	***5***	**5**	**3**	**10**	**0**	*18*
8:45 AM	**1**	**8**	**8**	**5**	***22***	**0**	**2**	**1**	**0**	***3***	**2**	**3**	**9**	**4**	***18***
Count Total	6	42	43	34	*125*	3	26	6	4	*39*	29	29	87	29	*174*
Peak Hour	**4**	**27**	**23**	**17**	***71***	**2**	**18**	**2**	**3**	***25***	**20**	**11**	**43**	**16**	***90***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Soquel Ave Eastbound				Soquel Ave Westbound				Front St Northbound				Front St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	2	0	0	0	0	2	2	0	0	3	0	9	0
7:15 AM	0	0	1	0	0	2	0	1	0	0	5	1	0	0	5	1	16	0
7:30 AM	0	0	0	1	0	4	0	0	0	0	3	1	0	0	6	0	15	0
7:45 AM	0	0	0	0	0	5	1	0	0	0	4	2	0	0	2	0	14	54
8:00 AM	**0**	**0**	**0**	**1**	**0**	**5**	**1**	**0**	**0**	**0**	**3**	**1**	**0**	**1**	**2**	**0**	**14**	59
8:15 AM	**0**	**0**	**1**	**0**	**0**	**6**	**0**	**1**	**0**	**0**	**5**	**0**	**0**	**1**	**4**	**0**	**18**	61
8:30 AM	**0**	**0**	**1**	**0**	**0**	**5**	**0**	**1**	**0**	**0**	**3**	**3**	**0**	**0**	**4**	**0**	**17**	63
8:45 AM	**0**	**0**	**1**	**0**	**0**	**6**	**2**	**0**	**0**	**0**	**6**	**2**	**0**	**1**	**2**	**2**	**22**	**71**
Count Total	0	0	4	2	0	35	4	3	0	0	31	12	0	3	28	3	125	0
Peak Hour	**0**	**0**	**3**	**1**	**0**	**22**	**3**	**2**	**0**	**0**	**17**	**6**	**0**	**3**	**12**	**2**	**71**	**0**

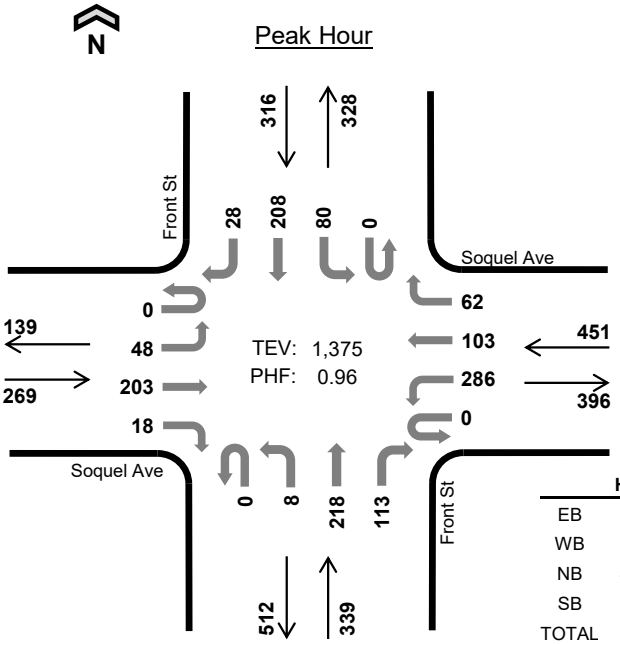
Two-Hour Count Summaries - Bikes

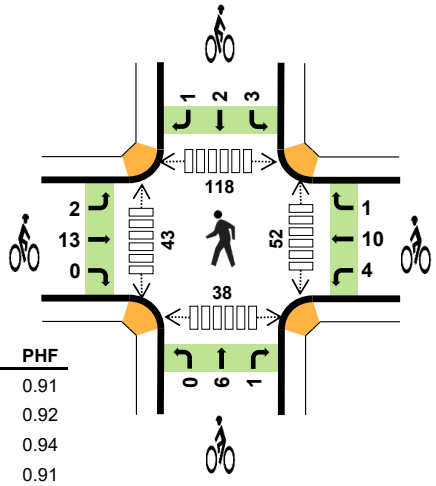
Interval Start	Soquel Ave Eastbound			Soquel Ave Westbound			Front St Northbound			Front St Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	1	0
7:15 AM	0	0	0	1	1	0	0	0	1	0	0	0	3	0
7:30 AM	0	1	0	2	2	0	0	1	1	0	0	1	8	0
7:45 AM	0	0	0	0	1	0	0	0	1	0	0	0	2	14
8:00 AM	**0**	**2**	**0**	**1**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**7**	20
8:15 AM	**0**	**0**	**0**	**0**	**8**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**10**	27
8:30 AM	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**5**	24
8:45 AM	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**3**	**25**
Count Total	0	3	0	7	17	2	0	3	3	0	2	2	39	0
Peak Hour	**0**	**2**	**0**	**4**	**13**	**1**	**0**	**2**	**0**	**0**	**2**	**1**	**25**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Front St
Soquel Ave

Date: 09/15/2022
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM





	HV %:	PHF
EB	0.7%	0.91
WB	3.1%	0.92
NB	4.4%	0.94
SB	3.5%	0.91
TOTAL	3.1%	0.96

Two-Hour Count Summaries

Interval Start	Soquel Ave Eastbound				Soquel Ave Westbound				Front St Northbound				Front St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**17**	**46**	**5**	**0**	**72**	**32**	**19**	**0**	**6**	**49**	**31**	**0**	**18**	**58**	**4**	**357**	0
4:15 PM	**0**	**9**	**62**	**3**	**0**	**75**	**23**	**14**	**0**	**0**	**60**	**24**	**0**	**20**	**48**	**6**	**344**	0
4:30 PM	**0**	**11**	**54**	**6**	**0**	**61**	**26**	**14**	**0**	**1**	**45**	**33**	**0**	**21**	**58**	**8**	**338**	0
4:45 PM	**0**	**11**	**41**	**4**	**0**	**78**	**22**	**15**	**0**	**1**	**64**	**25**	**0**	**21**	**44**	**10**	**336**	**1,375**
5:00 PM	0	10	44	4	0	74	27	22	0	2	55	27	0	18	52	13	348	1,366
5:15 PM	0	14	36	4	0	83	22	10	0	4	46	21	0	20	51	9	320	1,342
5:30 PM	0	4	34	11	0	81	11	13	0	2	55	19	0	22	56	16	324	1,328
5:45 PM	0	9	25	6	0	61	28	11	0	3	64	20	0	23	53	7	310	1,302
Count Total	0	85	342	43	0	585	191	118	0	19	438	200	0	163	420	73	2,677	0
Peak Hour All	**0**	**48**	**203**	**18**	**0**	**286**	**103**	**62**	**0**	**8**	**218**	**113**	**0**	**80**	**208**	**28**	**1,375**	**0**
Peak Hour HV	**0**	**0**	**2**	**0**	**0**	**8**	**2**	**4**	**0**	**0**	**12**	**3**	**0**	**1**	**10**	**0**	**42**	**0**
Peak Hour HV%	**-**	**0%**	**1%**	**0%**	**-**	**3%**	**2%**	**6%**	**-**	**0%**	**6%**	**3%**	**-**	**1%**	**5%**	**0%**	**3%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**0**	**5**	**3**	**4**	***12***	**6**	**4**	**1**	**2**	***13***	**17**	**6**	**24**	**13**	*60*
4:15 PM	**0**	**4**	**3**	**1**	***8***	**1**	**5**	**2**	**1**	***9***	**17**	**4**	**25**	**14**	*60*
4:30 PM	**1**	**2**	**4**	**4**	***11***	**4**	**2**	**3**	**1**	***10***	**10**	**15**	**38**	**7**	*70*
4:45 PM	**1**	**3**	**5**	**2**	***11***	**4**	**4**	**1**	**2**	***11***	**8**	**18**	**31**	**4**	***61***
5:00 PM	1	4	3	3	*11*	7	5	6	3	*21*	16	13	25	14	*68*
5:15 PM	0	3	1	1	*5*	3	2	1	3	*9*	16	8	28	5	*57*
5:30 PM	2	4	5	4	*15*	3	4	4	2	*13*	13	4	28	6	*51*
5:45 PM	1	2	7	5	*15*	0	4	2	3	*9*	17	10	45	9	*81*
Count Total	6	27	31	24	*88*	28	30	20	17	*95*	114	78	244	72	*508*
Peak Hour	**2**	**14**	**15**	**11**	***42***	**15**	**15**	**7**	**6**	***43***	**52**	**43**	**118**	**38**	***251***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Soquel Ave Eastbound				Soquel Ave Westbound				Front St Northbound				Front St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**1**	**0**	**0**	**1**	**2**	**0**	**1**	**3**	**0**	**12**	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**1**	**0**	**0**	**3**	**0**	**0**	**0**	**1**	**0**	**8**	0
4:30 PM	**0**	**0**	**1**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**3**	**1**	**0**	**0**	**4**	**0**	**11**	0
4:45 PM	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**2**	**0**	**0**	**5**	**0**	**0**	**0**	**2**	**0**	**11**	**42**
5:00 PM	0	0	0	1	0	1	1	2	0	0	2	1	0	1	2	0	11	41
5:15 PM	0	0	0	0	0	2	0	1	0	0	1	0	0	0	1	0	5	38
5:30 PM	0	1	1	0	0	3	0	1	0	0	3	2	0	0	4	0	15	42
5:45 PM	0	0	1	0	0	2	0	0	0	0	6	1	0	1	4	0	15	46
Count Total	0	1	4	1	0	16	3	8	0	0	24	7	0	3	21	0	88	0
Peak Hour	**0**	**0**	**2**	**0**	**0**	**8**	**2**	**4**	**0**	**0**	**12**	**3**	**0**	**1**	**10**	**0**	**42**	**0**

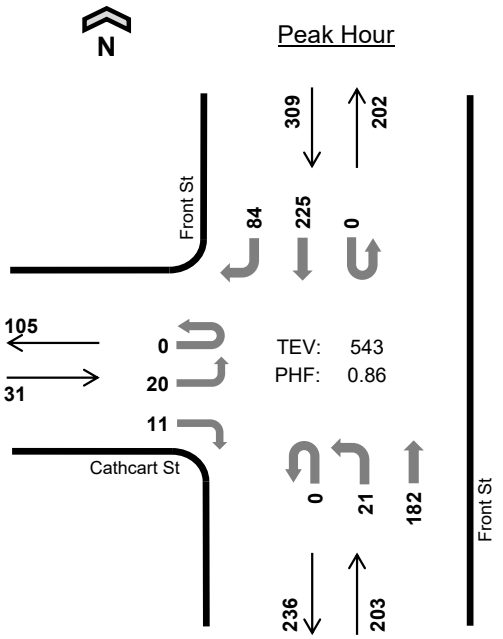
Two-Hour Count Summaries - Bikes

Interval Start	Soquel Ave Eastbound			Soquel Ave Westbound			Front St Northbound			Front St Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	**1**	**5**	**0**	**1**	**3**	**0**	**0**	**1**	**0**	**2**	**0**	**0**	**13**	0
4:15 PM	**0**	**1**	**0**	**2**	**2**	**1**	**0**	**2**	**0**	**1**	**0**	**0**	**9**	0
4:30 PM	**1**	**3**	**0**	**0**	**2**	**0**	**0**	**2**	**1**	**0**	**1**	**0**	**10**	0
4:45 PM	**0**	**4**	**0**	**1**	**3**	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**11**	**43**
5:00 PM	1	6	0	0	3	2	0	5	1	1	0	2	21	51
5:15 PM	1	2	0	0	2	0	0	0	1	0	0	3	9	51
5:30 PM	1	2	0	0	2	2	0	3	1	0	0	2	13	54
5:45 PM	0	0	0	0	4	0	0	1	1	2	1	0	9	52
Count Total	5	23	0	4	21	5	0	15	5	6	3	8	95	0
Peak Hour	**2**	**13**	**0**	**4**	**10**	**1**	**0**	**6**	**1**	**3**	**2**	**1**	**43**	**0**

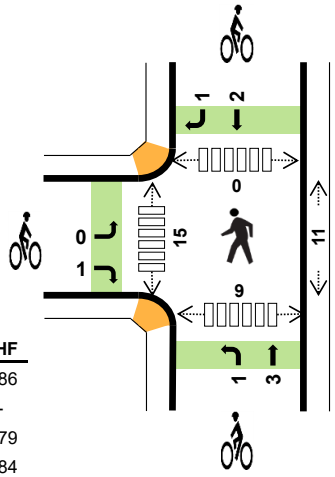
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Front St
Cathcart St

Date: 09/15/2022
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 8:00 AM to 9:00 AM



	HV %:	PHF
EB	9.7%	0.86
WB	-	-
NB	12.8%	0.79
SB	11.7%	0.84
TOTAL	12.0%	0.86



Two-Hour Count Summaries

Interval Start	Cathcart St Eastbound				N/A Westbound				Front St Northbound				Front St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	4	0	1	0	0	0	0	0	8	18	0	0	0	19	12	62	0
7:15 AM	0	4	0	2	0	0	0	0	0	7	16	0	0	0	25	10	64	0
7:30 AM	0	4	0	2	0	0	0	0	0	4	26	0	0	0	34	11	81	0
7:45 AM	0	6	0	6	0	0	0	0	0	4	40	0	0	0	37	11	104	311
8:00 AM	**0**	**6**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**4**	**45**	**0**	**0**	**0**	**51**	**18**	**127**	376
8:15 AM	**0**	**5**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**	**40**	**0**	**0**	**0**	**39**	**24**	**112**	424
8:30 AM	**0**	**2**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**9**	**39**	**0**	**0**	**0**	**65**	**27**	**146**	489
8:45 AM	**0**	**7**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**6**	**58**	**0**	**0**	**0**	**70**	**15**	**158**	**543**
Count Total	0	38	0	22	0	0	0	0	0	44	282	0	0	0	340	128	854	0
Peak Hour All	**0**	**20**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**21**	**182**	**0**	**0**	**0**	**225**	**84**	**543**	**0**
Peak Hour HV	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**3**	**23**	**0**	**0**	**0**	**22**	**14**	**65**	**0**
Peak Hour HV%	**-**	**5%**	**-**	**18%**	**-**	**-**	**-**	**-**	**-**	**14%**	**13%**	**-**	**-**	**-**	**10%**	**17%**	**12%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals EB	WB	NB	SB	Total	Bicycles EB	WB	NB	SB	Total	Pedestrians (Crossing Leg) East	West	North	South	Total
7:00 AM	0	0	3	5	*8*	0	0	1	0	*1*	1	5	0	0	*6*
7:15 AM	2	0	3	6	*11*	0	0	3	1	*4*	1	3	0	0	*4*
7:30 AM	0	0	6	11	*17*	0	0	2	3	*5*	4	6	1	0	*11*
7:45 AM	1	0	5	6	*12*	1	0	0	0	*1*	2	2	1	0	*5*
8:00 AM	**2**	**0**	**6**	**9**	***17***	**0**	**0**	**1**	**1**	***2***	**3**	**1**	**0**	**0**	*4*
8:15 AM	**0**	**0**	**6**	**9**	***15***	**1**	**0**	**0**	**1**	***2***	**0**	**7**	**0**	**0**	*7*
8:30 AM	**1**	**0**	**6**	**10**	***17***	**0**	**0**	**0**	**0**	***0***	**6**	**5**	**0**	**4**	*15*
8:45 AM	**0**	**0**	**8**	**8**	***16***	**0**	**0**	**3**	**1**	***4***	**2**	**2**	**0**	**5**	***9***
Count Total	6	0	43	64	*113*	2	0	10	7	*19*	19	31	2	9	*61*
Peak Hr	**3**	**0**	**26**	**36**	***65***	**1**	**0**	**4**	**3**	***8***	**11**	**15**	**0**	**9**	***35***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Cathcart St				N/A				Front St				Front St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	2	8	0
7:15 AM	0	2	0	0	0	0	0	0	0	0	3	0	0	0	3	3	11	0
7:30 AM	0	0	0	0	0	0	0	0	0	1	5	0	0	0	7	4	17	0
7:45 AM	0	1	0	0	0	0	0	0	0	0	5	0	0	0	5	1	12	48
8:00 AM	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**	**4**	**0**	**0**	**0**	**7**	**2**	**17**	57
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**0**	**4**	**5**	**15**	61
8:30 AM	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**5**	**0**	**0**	**0**	**6**	**4**	**17**	61
8:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**5**	**3**	**16**	**65**
Count Total	0	4	0	2	0	0	0	0	0	4	39	0	0	0	40	24	113	0
Peak Hour	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**3**	**23**	**0**	**0**	**0**	**22**	**14**	**65**	**0**

Two-Hour Count Summaries - Bikes

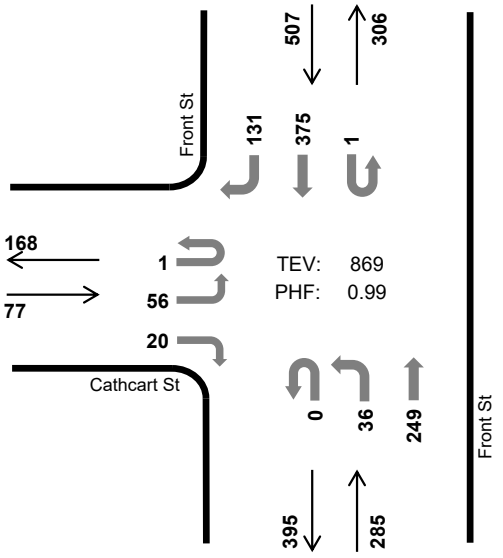
Interval Start	Cathcart St			N/A			Front St			Front St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	1	0
7:15 AM	0	0	0	0	0	0	1	2	0	0	1	0	4	0
7:30 AM	0	0	0	0	0	0	0	2	0	0	2	1	5	0
7:45 AM	1	0	0	0	0	0	0	0	0	0	0	0	1	11
8:00 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**2**	12
8:15 AM	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**2**	10
8:30 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	5
8:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**0**	**0**	**0**	**1**	**4**	**8**
Count Total	1	0	1	0	0	0	2	8	0	0	5	2	19	0
Peak Hour	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**3**	**0**	**0**	**2**	**1**	**8**	**0**

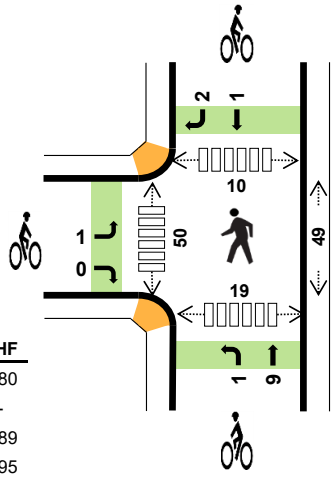
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Front St
Cathcart St

Date: 09/15/2022
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:45 PM to 5:45 PM

Peak Hour





	HV %:	PHF
EB	6.5%	0.80
WB	-	-
NB	4.2%	0.89
SB	3.4%	0.95
TOTAL	3.9%	0.99

Two-Hour Count Summaries

Interval Start	Cathcart St Eastbound				N/A Westbound				Front St Northbound				Front St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	11	0	4	0	0	0	0	0	9	69	0	0	0	102	26	221	0
4:15 PM	0	9	0	3	0	0	0	0	0	9	73	0	0	0	87	28	209	0
4:30 PM	0	12	0	1	0	0	0	0	0	8	65	0	0	0	96	32	214	0
4:45 PM	**0**	**15**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**8**	**72**	**0**	**0**	**0**	**90**	**30**	**220**	864
5:00 PM	**0**	**17**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**12**	**60**	**0**	**0**	**0**	**87**	**35**	**218**	861
5:15 PM	**0**	**7**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**9**	**60**	**0**	**1**	**0**	**99**	**33**	**213**	865
5:30 PM	**1**	**17**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**7**	**57**	**0**	**0**	**0**	**99**	**33**	**218**	**869**
5:45 PM	0	13	0	4	0	0	0	0	0	9	78	0	0	0	87	29	220	869
Count Total	1	101	0	32	0	0	0	0	0	71	534	0	1	0	747	246	1,733	0
Peak Hour All	**1**	**56**	**0**	**20**	**0**	**0**	**0**	**0**	**0**	**36**	**249**	**0**	**1**	**0**	**375**	**131**	**869**	**0**
Peak Hour HV	**0**	**4**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**10**	**0**	**0**	**0**	**9**	**8**	**34**	**0**
Peak Hour HV%	**0%**	**7%**	**-**	**5%**	**-**	**-**	**-**	**-**	**-**	**6%**	**4%**	**-**	**0%**	**-**	**2%**	**6%**	**4%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	1	0	3	5	*9*	0	0	0	1	*1*	12	8	5	5	*30*
4:15 PM	0	0	3	5	*8*	2	0	1	2	*5*	8	12	4	2	*26*
4:30 PM	1	0	3	7	*11*	1	0	3	4	*8*	7	23	0	3	*33*
4:45 PM	**2**	**0**	**5**	**3**	***10***	**0**	**0**	**1**	**0**	***1***	**8**	**18**	**3**	**2**	*31*
5:00 PM	**1**	**0**	**2**	**4**	***7***	**1**	**0**	**5**	**1**	***7***	**11**	**13**	**2**	**9**	*35*
5:15 PM	**0**	**0**	**2**	**4**	***6***	**0**	**0**	**0**	**1**	***1***	**12**	**2**	**3**	**4**	*21*
5:30 PM	**2**	**0**	**3**	**6**	***11***	**0**	**0**	**4**	**1**	***5***	**18**	**17**	**2**	**4**	***41***
5:45 PM	2	0	6	6	*14*	2	0	0	0	*2*	10	9	6	3	*28*
Count Total	9	0	27	40	*76*	6	0	14	10	*30*	86	102	25	32	*245*
Peak Hr	**5**	**0**	**12**	**17**	***34***	**1**	**0**	**10**	**3**	***14***	**49**	**50**	**10**	**19**	***128***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Cathcart St				N/A				Front St				Front St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	1	0	0	0	0	0	0	0	1	2	0	0	0	3	2	9	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	2	8	0
4:30 PM	0	1	0	0	0	0	0	0	0	0	3	0	0	0	5	2	11	0
4:45 PM	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**4**	**0**	**0**	**0**	**1**	**2**	**10**	38
5:00 PM	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**4**	**0**	**7**	36
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**1**	**3**	**6**	34
5:30 PM	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**3**	**3**	**11**	**34**
5:45 PM	0	2	0	0	0	0	0	0	0	1	5	0	0	0	3	3	14	38
Count Total	0	8	0	1	0	0	0	0	0	4	23	0	0	0	23	17	76	0
Peak Hour	**0**	**4**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**10**	**0**	**0**	**0**	**9**	**8**	**34**	**0**

Two-Hour Count Summaries - Bikes

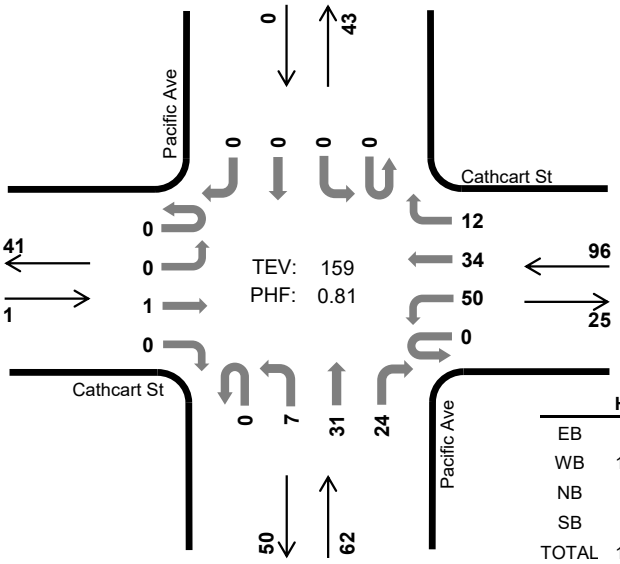
Interval Start	Cathcart St			N/A			Front St			Front St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	0
4:15 PM	0	0	2	0	0	0	0	1	0	0	0	2	5	0
4:30 PM	0	0	1	0	0	0	1	2	0	0	4	0	8	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	15
5:00 PM	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**4**	**0**	**0**	**1**	**0**	**7**	21
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	17
5:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**1**	**5**	**14**
5:45 PM	2	0	0	0	0	0	0	0	0	0	0	0	2	15
Count Total	3	0	3	0	0	0	2	12	0	0	6	4	30	0
Peak Hour	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**9**	**0**	**0**	**1**	**2**	**14**	**0**

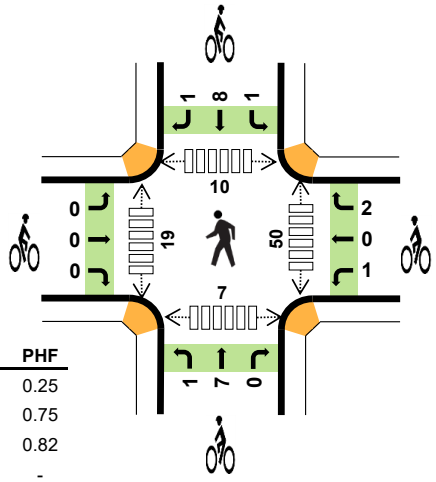
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Pacific Ave
Cathcart St

Date: 09/15/2022
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 8:00 AM to 9:00 AM

Peak Hour





	HV %:	PHF
EB	0.0%	0.25
WB	18.8%	0.75
NB	9.7%	0.82
SB	-	-
TOTAL	15.1%	0.81

Two-Hour Count Summaries

Interval Start	Cathcart St Eastbound				Cathcart St Westbound				Pacific Ave Northbound				Pacific Ave Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	2	0	1	6	5	0	0	1	4	0	0	0	0	0	19	0
7:15 AM	0	0	0	0	0	6	4	1	0	3	9	3	0	0	0	0	26	0
7:30 AM	0	1	0	1	0	10	3	1	0	1	4	1	0	1	0	0	23	0
7:45 AM	0	0	2	0	0	7	6	1	0	1	2	3	0	0	0	0	22	90
8:00 AM	**0**	**0**	**0**	**0**	**0**	**15**	**5**	**1**	**0**	**2**	**4**	**7**	**0**	**0**	**0**	**0**	**34**	105
8:15 AM	**0**	**0**	**0**	**0**	**0**	**10**	**9**	**4**	**0**	**2**	**12**	**5**	**0**	**0**	**0**	**0**	**42**	121
8:30 AM	**0**	**0**	**1**	**0**	**0**	**18**	**10**	**4**	**0**	**2**	**8**	**6**	**0**	**0**	**0**	**0**	**49**	147
8:45 AM	**0**	**0**	**0**	**0**	**0**	**7**	**10**	**3**	**0**	**1**	**7**	**6**	**0**	**0**	**0**	**0**	**34**	**159**
Count Total	0	1	5	1	1	79	52	15	0	13	50	31	0	1	0	0	249	0
Peak Hour All	**0**	**0**	**1**	**0**	**0**	**50**	**34**	**12**	**0**	**7**	**31**	**24**	**0**	**0**	**0**	**0**	**159**	**0**
Peak Hour HV	**0**	**0**	**0**	**0**	**0**	**16**	**2**	**0**	**0**	**1**	**2**	**3**	**0**	**0**	**0**	**0**	**24**	**0**
Peak Hour HV%	**-**	**-**	**0%**	**-**	**-**	**32%**	**6%**	**0%**	**-**	**14%**	**6%**	**13%**	**-**	**-**	**-**	**-**	**15%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	1	2	0	0	*3*	0	0	2	0	*2*	4	0	1	1	*6*
7:15 AM	0	3	1	0	*4*	0	2	2	1	*5*	12	6	2	2	*22*
7:30 AM	0	6	1	0	*7*	0	1	1	0	*2*	7	10	1	0	*18*
7:45 AM	0	1	1	0	*2*	0	0	0	2	*2*	14	9	1	3	*27*
8:00 AM	**0**	**5**	**2**	**0**	***7***	**0**	**1**	**3**	**4**	***8***	**9**	**4**	**4**	**3**	*20*
8:15 AM	**0**	**4**	**1**	**0**	***5***	**0**	**0**	**0**	**1**	***1***	**15**	**6**	**3**	**1**	*25*
8:30 AM	**0**	**6**	**2**	**0**	***8***	**0**	**0**	**1**	**3**	***4***	**13**	**5**	**2**	**3**	*23*
8:45 AM	**0**	**3**	**1**	**0**	***4***	**0**	**2**	**4**	**2**	***8***	**13**	**4**	**1**	**0**	***18***
Count Total	1	30	9	0	*40*	0	6	13	13	*32*	87	44	15	13	*159*
Peak Hour	**0**	**18**	**6**	**0**	***24***	**0**	**3**	**8**	**10**	***21***	**50**	**19**	**10**	**7**	***86***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Cathcart St Eastbound				Cathcart St Westbound				Pacific Ave Northbound				Pacific Ave Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	3	0
7:15 AM	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0	0	4	0
7:30 AM	0	0	0	0	0	6	0	0	0	1	0	0	0	0	0	0	7	0
7:45 AM	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	2	16
8:00 AM	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**7**	20
8:15 AM	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**5**	21
8:30 AM	**0**	**0**	**0**	**0**	**0**	**5**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**8**	22
8:45 AM	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**4**	**24**
Count Total	0	0	1	0	0	28	2	0	0	2	2	5	0	0	0	0	40	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**16**	**2**	**0**	**0**	**1**	**2**	**3**	**0**	**0**	**0**	**0**	**24**	**0**

Two-Hour Count Summaries - Bikes

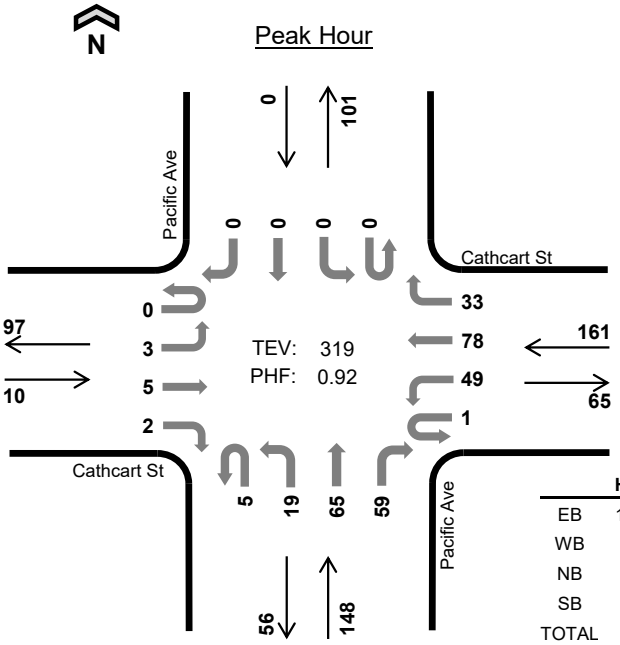
Interval Start	Cathcart St Eastbound			Cathcart St Westbound			Pacific Ave Northbound			Pacific Ave Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	2	0	0	0	0	2	0
7:15 AM	0	0	0	0	1	1	0	1	1	0	1	0	5	0
7:30 AM	0	0	0	0	1	0	0	1	0	0	0	0	2	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	2	0	2	11
8:00 AM	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**3**	**0**	**0**	**4**	**0**	**8**	17
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	13
8:30 AM	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**3**	**0**	**4**	15
8:45 AM	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**4**	**0**	**0**	**1**	**1**	**8**	**21**
Count Total	0	0	0	1	2	3	1	11	1	1	11	1	32	0
Peak Hour	**0**	**0**	**0**	**1**	**0**	**2**	**1**	**7**	**0**	**1**	**8**	**1**	**21**	**0**

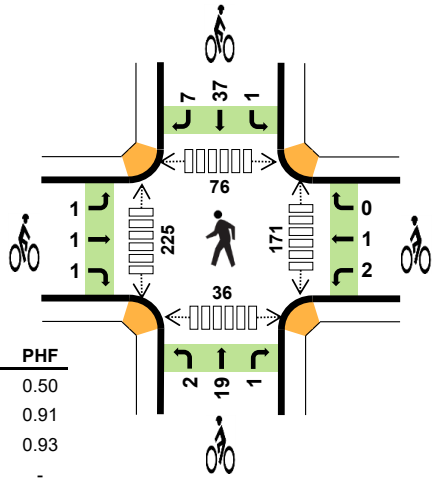
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Pacific Ave
Cathcart St

Date: 09/15/2022
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:45 PM to 5:45 PM

Peak Hour





	HV %:	PHF
EB	10.0%	0.50
WB	5.6%	0.91
NB	5.4%	0.93
SB	-	-
TOTAL	5.6%	0.92

Two-Hour Count Summaries

Interval Start	Cathcart St Eastbound				Cathcart St Westbound				Pacific Ave Northbound				Pacific Ave Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	2	0	0	17	9	4	1	3	20	11	0	0	0	0	67	0
4:15 PM	0	0	0	0	0	19	11	11	1	3	14	7	0	0	0	0	66	0
4:30 PM	0	0	0	0	0	14	11	13	0	2	21	13	0	0	0	0	74	0
4:45 PM	**0**	**1**	**0**	**0**	**0**	**17**	**19**	**8**	**1**	**4**	**13**	**22**	**0**	**0**	**0**	**0**	**85**	292
5:00 PM	**0**	**2**	**0**	**0**	**1**	**9**	**21**	**7**	**1**	**5**	**20**	**13**	**0**	**0**	**0**	**0**	**79**	304
5:15 PM	**0**	**0**	**1**	**1**	**0**	**12**	**19**	**5**	**1**	**3**	**18**	**8**	**0**	**0**	**0**	**0**	**68**	306
5:30 PM	**0**	**0**	**4**	**1**	**0**	**11**	**19**	**13**	**2**	**7**	**14**	**16**	**0**	**0**	**0**	**0**	**87**	**319**
5:45 PM	0	3	2	2	0	10	13	11	0	4	19	9	0	0	0	0	73	307
Count Total	0	6	9	4	1	109	122	72	7	31	139	99	0	0	0	0	599	0
Peak Hour All	**0**	**3**	**5**	**2**	**1**	**49**	**78**	**33**	**5**	**19**	**65**	**59**	**0**	**0**	**0**	**0**	**319**	**0**
Peak Hour HV	**0**	**0**	**1**	**0**	**0**	**9**	**0**	**0**	**0**	**2**	**1**	**5**	**0**	**0**	**0**	**0**	**18**	**0**
Peak Hour HV%	**-**	**0%**	**20%**	**0%**	**0%**	**18%**	**0%**	**0%**	**0%**	**11%**	**2%**	**8%**	**-**	**-**	**-**	**-**	**6%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	2	2	0	*4*	0	0	2	8	*10*	56	81	27	12	*176*
4:15 PM	0	4	0	0	*4*	2	2	2	12	*18*	44	64	9	12	*129*
4:30 PM	0	2	3	0	*5*	1	1	5	13	*20*	67	46	23	6	*142*
4:45 PM	**0**	**3**	**2**	**0**	***5***	**0**	**2**	**11**	**14**	***27***	**31**	**56**	**10**	**14**	*111*
5:00 PM	**0**	**0**	**1**	**0**	***1***	**3**	**0**	**2**	**11**	***16***	**47**	**55**	**20**	**4**	*126*
5:15 PM	**0**	**3**	**0**	**0**	***3***	**0**	**0**	**4**	**8**	***12***	**51**	**42**	**23**	**9**	*125*
5:30 PM	**1**	**3**	**5**	**0**	***9***	**0**	**1**	**5**	**12**	***18***	**42**	**72**	**23**	**9**	***146***
5:45 PM	0	4	2	0	*6*	0	0	6	3	*9*	53	78	14	7	*152*
Count Total	1	21	15	0	*37*	6	6	37	81	*130*	391	494	149	73	*1,107*
Peak Hour	**1**	**9**	**8**	**0**	***18***	**3**	**3**	**22**	**45**	***73***	**171**	**225**	**76**	**36**	***508***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Cathcart St Eastbound				Cathcart St Westbound				Pacific Ave Northbound				Pacific Ave Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	2	0	0	0	1	0	1	0	0	0	0	4	0
4:15 PM	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	4	0
4:30 PM	0	0	0	0	0	2	0	0	0	0	2	1	0	0	0	0	5	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**5**	18
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	15
5:15 PM	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	14
5:30 PM	**0**	**0**	**1**	**0**	**0**	**3**	**0**	**0**	**0**	**2**	**1**	**2**	**0**	**0**	**0**	**0**	**9**	**18**
5:45 PM	0	0	0	0	0	3	0	1	0	0	0	2	0	0	0	0	6	19
Count Total	0	0	1	0	0	19	1	1	0	3	3	9	0	0	0	0	37	0
Peak Hour	**0**	**0**	**1**	**0**	**0**	**9**	**0**	**0**	**0**	**2**	**1**	**5**	**0**	**0**	**0**	**0**	**18**	**0**

Two-Hour Count Summaries - Bikes

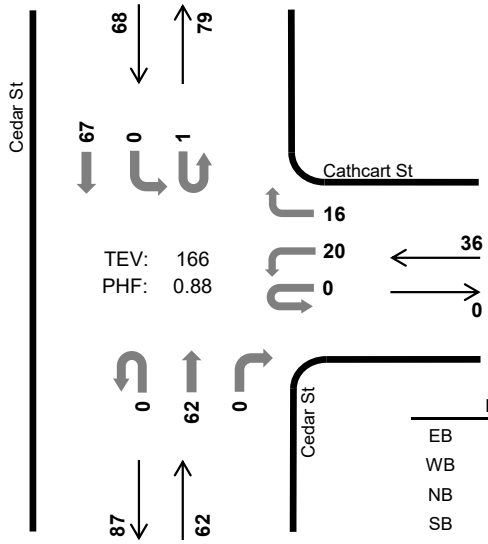
Interval Start	Cathcart St Eastbound			Cathcart St Westbound			Pacific Ave Northbound			Pacific Ave Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	2	0	0	8	0	10	0
4:15 PM	1	1	0	1	1	0	0	2	0	1	11	0	18	0
4:30 PM	1	0	0	0	0	1	0	5	0	0	12	1	20	0
4:45 PM	**0**	**0**	**0**	**1**	**1**	**0**	**2**	**8**	**1**	**0**	**13**	**1**	**27**	75
5:00 PM	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**7**	**4**	**16**	81
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**7**	**1**	**12**	75
5:30 PM	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**5**	**0**	**1**	**10**	**1**	**18**	**73**
5:45 PM	0	0	0	0	0	0	0	4	2	0	3	0	9	55
Count Total	3	2	1	3	2	1	2	32	3	2	71	8	130	0
Peak Hour	**1**	**1**	**1**	**2**	**1**	**0**	**2**	**19**	**1**	**1**	**37**	**7**	**73**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

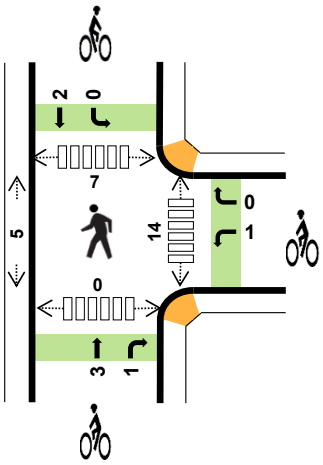
Cedar St
Cathcart St

Date: 09/15/2022
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 8:00 AM to 9:00 AM

Peak Hour



	HV %:	PHF
EB	-	-
WB	5.6%	0.82
NB	6.5%	0.78
SB	8.8%	0.77
TOTAL	7.2%	0.88



Two-Hour Count Summaries

Interval Start	N/A Eastbound				Cathcart St Westbound				Cedar St Northbound				Cedar St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	5	0	0	0	0	5	0	0	0	3	0	13	0
7:15 AM	0	0	0	0	0	2	0	2	0	0	3	0	0	0	8	0	15	0
7:30 AM	0	0	0	0	0	1	0	4	0	0	14	0	0	0	11	0	30	0
7:45 AM	0	0	0	0	0	3	0	3	0	0	15	0	0	0	9	0	30	88
8:00 AM	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**2**	**0**	**0**	**12**	**0**	**0**	**0**	**12**	**0**	**30**	105
8:15 AM	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**7**	**0**	**0**	**14**	**0**	**1**	**0**	**21**	**0**	**47**	137
8:30 AM	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**1**	**0**	**0**	**16**	**0**	**0**	**0**	**18**	**0**	**43**	150
8:45 AM	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**6**	**0**	**0**	**20**	**0**	**0**	**0**	**16**	**0**	**46**	**166**
Count Total	0	0	0	0	0	31	0	25	0	0	99	0	1	0	98	0	254	0
Peak Hour **All**	**0**	**0**	**0**	**0**	**0**	**20**	**0**	**16**	**0**	**0**	**62**	**0**	**1**	**0**	**67**	**0**	**166**	**0**
Peak Hour **HV**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**4**	**0**	**0**	**0**	**6**	**0**	**12**	**0**
Peak Hour **HV%**	**-**	**-**	**-**	**-**	**-**	**5%**	**-**	**6%**	**-**	**-**	**6%**	**-**	**0%**	**-**	**9%**	**-**	**7%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	2	1	*3*	0	0	0	0	*0*	1	0	1	1	*3*
7:15 AM	0	0	0	1	*1*	0	0	0	0	*0*	1	0	0	0	*1*
7:30 AM	0	1	2	1	*4*	0	1	0	1	*2*	2	0	1	0	*3*
7:45 AM	0	0	0	1	*1*	0	0	1	4	*5*	2	1	1	0	*4*
8:00 AM	**0**	**0**	**3**	**1**	***4***	**0**	**0**	**1**	**0**	***1***	**4**	**2**	**5**	**0**	*11*
8:15 AM	**0**	**0**	**0**	**2**	***2***	**0**	**0**	**1**	**0**	***1***	**5**	**1**	**1**	**0**	*7*
8:30 AM	**0**	**2**	**0**	**1**	***3***	**0**	**0**	**2**	**0**	***2***	**2**	**1**	**1**	**0**	*4*
8:45 AM	**0**	**0**	**1**	**2**	***3***	**0**	**1**	**0**	**2**	***3***	**3**	**1**	**0**	**0**	***4***
Count Total	0	3	8	10	*21*	0	2	5	7	*14*	20	6	10	1	*37*
Peak Hr	**0**	**2**	**4**	**6**	***12***	**0**	**1**	**4**	**2**	***7***	**14**	**5**	**7**	**0**	***26***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	N/A				Cathcart St				Cedar St				Cedar St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	3	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
7:30 AM	0	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	4	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	9
8:00 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**1**	**0**	**4**	10
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	11
8:30 AM	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**3**	10
8:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**3**	**12**
Count Total	0	0	0	0	0	1	0	2	0	0	8	0	0	0	10	0	21	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**4**	**0**	**0**	**0**	**6**	**0**	**12**	**0**

Two-Hour Count Summaries - Bikes

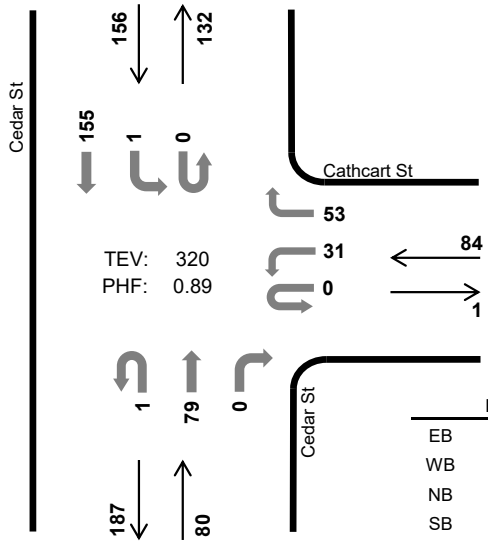
Interval Start	N/A			Cathcart St			Cedar St			Cedar St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	1	0	0	0	0	0	0	1	0	2	0
7:45 AM	0	0	0	0	0	0	0	1	0	0	4	0	5	7
8:00 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	8
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	9
8:30 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**2**	9
8:45 AM	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**3**	**7**
Count Total	0	0	0	2	0	0	0	4	1	0	7	0	14	0
Peak Hour	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**3**	**1**	**0**	**2**	**0**	**7**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

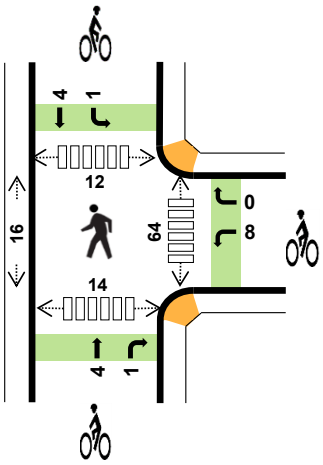
Cedar St
Cathcart St

Date: 09/15/2022
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:30 PM to 5:30 PM

Peak Hour



	HV %:	PHF
EB	-	-
WB	1.2%	0.81
NB	1.3%	0.80
SB	3.2%	0.91
TOTAL	2.2%	0.89



Two-Hour Count Summaries

Interval Start	N/A Eastbound UT	LT	TH	RT	Cathcart St Westbound UT	LT	TH	RT	Cedar St Northbound UT	LT	TH	RT	Cedar St Southbound UT	LT	TH	RT	15-min Total	Rolling One Hour
4:00 PM	0	0	0	0	0	6	0	11	0	0	21	0	0	0	29	0	67	0
4:15 PM	0	0	0	0	0	5	0	11	0	0	22	0	1	0	36	0	75	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**10**	**0**	**0**	**17**	**0**	**0**	**0**	**36**	**0**	**71**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**11**	**0**	**0**	**22**	**0**	**0**	**1**	**42**	**0**	**83**	296
5:00 PM	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**18**	**1**	**0**	**24**	**0**	**0**	**0**	**39**	**0**	**90**	319
5:15 PM	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**14**	**0**	**0**	**16**	**0**	**0**	**0**	**38**	**0**	**76**	**320**
5:30 PM	0	0	0	0	0	15	0	8	0	0	16	1	1	0	27	0	68	317
5:45 PM	0	0	0	0	0	4	0	11	0	0	19	0	2	0	37	0	73	307
Count Total	0	0	0	0	0	61	0	94	1	0	157	1	4	1	284	0	603	0
Peak Hour All	**0**	**0**	**0**	**0**	**0**	**31**	**0**	**53**	**1**	**0**	**79**	**0**	**0**	**1**	**155**	**0**	**320**	**0**
Peak Hour HV	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**5**	**0**	**7**	**0**
Peak Hour HV%	**-**	**-**	**-**	**-**	**-**	**0%**	**-**	**2%**	**0%**	**-**	**1%**	**-**	**-**	**0%**	**3%**	**-**	**2%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals EB	WB	NB	SB	Total	Bicycles EB	WB	NB	SB	Total	Pedestrians (Crossing Leg) East	West	North	South	Total
4:00 PM	0	1	1	0	*2*	0	0	0	3	*3*	14	7	3	0	*24*
4:15 PM	0	0	0	0	*0*	0	3	4	2	*9*	12	4	3	1	*20*
4:30 PM	**0**	**0**	**0**	**3**	***3***	**0**	**1**	**1**	**1**	***3***	**11**	**5**	**1**	**9**	*26*
4:45 PM	**0**	**1**	**0**	**0**	***1***	**0**	**2**	**2**	**2**	***6***	**14**	**4**	**1**	**1**	*20*
5:00 PM	**0**	**0**	**1**	**1**	***2***	**0**	**4**	**1**	**2**	***7***	**13**	**6**	**8**	**3**	*30*
5:15 PM	**0**	**0**	**0**	**1**	***1***	**0**	**1**	**1**	**0**	***2***	**26**	**1**	**2**	**1**	***30***
5:30 PM	0	1	2	1	*4*	0	1	1	5	*7*	22	3	9	0	*34*
5:45 PM	0	0	1	0	*1*	0	1	1	4	*6*	27	1	3	2	*33*
Count Total	0	3	5	6	*14*	0	13	11	19	*43*	139	31	30	17	*217*
Peak Hr	**0**	**1**	**1**	**5**	***7***	**0**	**8**	**5**	**5**	***18***	**64**	**16**	**12**	**14**	***106***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	N/A				Cathcart St				Cedar St				Cedar St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**3**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	6
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**2**	6
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**7**
5:30 PM	0	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	4	8
5:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	8
Count Total	0	0	0	0	0	0	0	3	0	0	5	0	0	0	6	0	14	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**5**	**0**	**7**	**0**

Two-Hour Count Summaries - Bikes

Interval Start	N/A			Cathcart St			Cedar St			Cedar St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	2	1	0	3	0
4:15 PM	0	0	0	3	0	0	0	3	1	1	1	0	9	0
4:30 PM	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**3**	0
4:45 PM	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**1**	**1**	**0**	**2**	**0**	**6**	21
5:00 PM	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**1**	**0**	**0**	**2**	**0**	**7**	25
5:15 PM	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**2**	**18**
5:30 PM	0	0	0	1	0	0	0	1	0	2	3	0	7	22
5:45 PM	0	0	0	1	0	0	0	1	0	0	4	0	6	22
Count Total	0	0	0	13	0	0	0	9	2	6	13	0	43	0
Peak Hour	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**4**	**1**	**1**	**4**	**0**	**18**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Appendix B

Analysis Worksheets for Existing (2022) Conditions

Lane Group	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	113	201	206	63	464	24	267
v/c Ratio	0.35	0.67	0.66	0.04	0.24	0.05	0.24
Control Delay	37.8	44.5	44.1	0.1	9.2	11.1	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.8	44.5	44.1	0.1	9.2	11.1	10.8
Queue Length 50th (ft)	30	113	115	0	54	6	66
Queue Length 95th (ft)	45	168	170	0	80	17	111
Internal Link Dist (ft)	141		198		118		108
Turn Bay Length (ft)				150			
Base Capacity (vph)	827	493	507	1583	1932	529	1095
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.41	0.41	0.04	0.24	0.05	0.24

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	56	7	257	101	55	16	239	93	18	171	32
Future Volume (veh/h)	23	56	7	257	101	55	16	239	93	18	171	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	30	74	9	204	239	0	21	319	124	24	225	42
Peak Hour Factor	0.76	0.76	0.76	0.88	0.88	0.88	0.75	0.75	0.75	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	68	176	22	291	305		67	756	282	274	484	90
Arrive On Green	0.07	0.07	0.07	0.16	0.16	0.00	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	925	2412	304	1781	1870	1585	74	2395	892	947	1533	286
Grp Volume(v), veh/h	59	0	54	204	239	0	250	0	214	24	0	267
Grp Sat Flow(s),veh/h/ln	1824	0	1816	1781	1870	1585	1820	0	1541	947	0	1819
Q Serve(g_s), s	2.8	0.0	2.5	9.7	11.0	0.0	0.0	0.0	9.9	1.9	0.0	10.6
Cycle Q Clear(g_c), s	2.8	0.0	2.5	9.7	11.0	0.0	9.5	0.0	9.9	11.8	0.0	10.6
Prop In Lane	0.51		0.17	1.00		1.00	0.08		0.58	1.00		0.16
Lane Grp Cap(c), veh/h	133	0	133	291	305		618	0	486	274	0	574
V/C Ratio(X)	0.44	0.00	0.41	0.70	0.78		0.40	0.00	0.44	0.09	0.00	0.47
Avail Cap(c_a), veh/h	434	0	432	523	549		618	0	486	274	0	574
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	0.0	39.8	35.6	36.1	0.0	24.3	0.0	24.5	29.2	0.0	24.7
Incr Delay (d2), s/veh	2.3	0.0	2.0	3.1	4.4	0.0	2.0	0.0	2.9	0.6	0.0	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	1.2	4.4	5.3	0.0	4.4	0.0	3.9	0.5	0.0	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.3	0.0	41.8	38.7	40.5	0.0	26.3	0.0	27.4	29.8	0.0	27.4
LnGrp LOS	D	A	D	D	D		C	A	C	C	A	C
Approach Vol, veh/h		113			443	A		464			291	
Approach Delay, s/veh		42.0			39.7			26.8			27.6	
Approach LOS		D			D			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		11.2		33.0		19.3		33.0				
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s		21.4		28.4		26.4		28.4				
Max Q Clear Time (g_c+I1), s		4.8		13.8		13.0		11.9				
Green Ext Time (p_c), s		0.5		1.4		1.7		2.6				

Intersection Summary												
HCM 6th Ctrl Delay			32.6									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	48	21	25	391	488
v/c Ratio	0.25	0.11	0.12	0.25	0.18
Control Delay	27.8	12.7	25.9	2.9	3.5
Queue Delay	0.0	0.0	0.0	0.3	0.0
Total Delay	27.8	12.7	25.9	3.2	3.5
Queue Length 50th (ft)	17	0	8	35	18
Queue Length 95th (ft)	41	16	24	60	60
Internal Link Dist (ft)	279			238	121
Turn Bay Length (ft)		25	100		
Base Capacity (vph)	301	287	226	1545	2738
Starvation Cap Reductn	0	0	0	614	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.16	0.07	0.11	0.42	0.18

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	18	20	309	332	78
Future Volume (veh/h)	41	18	20	309	332	78
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	48	21	25	391	395	93
Peak Hour Factor	0.86	0.86	0.79	0.79	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	121	107	71	1239	1584	369
Arrive On Green	0.07	0.07	0.04	0.66	0.55	0.55
Sat Flow, veh/h	1781	1585	1781	1870	2954	667
Grp Volume(v), veh/h	48	21	25	391	244	244
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1777	1750
Q Serve(g_s), s	1.6	0.8	0.8	5.4	4.3	4.4
Cycle Q Clear(g_c), s	1.6	0.8	0.8	5.4	4.3	4.4
Prop In Lane	1.00	1.00	1.00			0.38
Lane Grp Cap(c), veh/h	121	107	71	1239	984	969
V/C Ratio(X)	0.40	0.20	0.35	0.32	0.25	0.25
Avail Cap(c_a), veh/h	304	270	228	1239	984	969
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.2	26.9	28.5	4.4	7.0	7.1
Incr Delay (d2), s/veh	0.8	0.3	1.1	0.7	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.3	0.4	1.6	1.5	1.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.0	27.2	29.6	5.1	7.6	7.7
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	69			416	488	
Approach Delay, s/veh	27.8			6.5	7.7	
Approach LOS	C			A	A	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		8.7	6.6	39.4		46.0
Change Period (Y+Rc), s		4.6	* 4.2	5.6		5.6
Max Green Setting (Gmax), s		10.4	* 7.8	28.4		40.4
Max Q Clear Time (g_c+I1), s		3.6	2.8	6.4		7.4
Green Ext Time (p_c), s		0.0	0.0	3.0		2.6

Intersection Summary	
HCM 6th Ctrl Delay	8.6
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	9.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	11	71	71	48	17	10	44	34	0	0	0
Future Vol, veh/h	17	11	71	71	48	17	10	44	34	0	0	0
Peak Hour Factor	0.25	0.25	0.25	0.75	0.75	0.75	0.82	0.82	0.82	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	68	44	284	95	64	23	12	54	41	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	10.2	9.1	8.8
HCM LOS	B	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	11%	17%	52%
Vol Thru, %	50%	11%	35%
Vol Right, %	39%	72%	12%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	88	99	136
LT Vol	10	17	71
Through Vol	44	11	48
RT Vol	34	71	17
Lane Flow Rate	107	396	181
Geometry Grp	1	1	1
Degree of Util (X)	0.147	0.441	0.233
Departure Headway (Hd)	4.927	4.013	4.619
Convergence, Y/N	Yes	Yes	Yes
Cap	727	899	778
Service Time	2.969	2.035	2.649
HCM Lane V/C Ratio	0.147	0.44	0.233
HCM Control Delay	8.8	10.2	9.1
HCM Lane LOS	A	B	A
HCM 95th-tile Q	0.5	2.3	0.9

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	23	88	55	45	95
Future Vol, veh/h	28	23	88	55	45	95
Peak Hour Factor	0.82	0.82	0.78	0.78	0.77	0.77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	28	113	71	58	123
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	7.9	8.1	8.5
HCM LOS	A	A	A

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	55%	32%
Vol Thru, %	62%	0%	68%
Vol Right, %	38%	45%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	143	51	140
LT Vol	0	28	45
Through Vol	88	0	95
RT Vol	55	23	0
Lane Flow Rate	183	62	182
Geometry Grp	1	1	1
Degree of Util (X)	0.201	0.079	0.214
Departure Headway (Hd)	3.95	4.554	4.246
Convergence, Y/N	Yes	Yes	Yes
Cap	893	792	835
Service Time	2.044	2.554	2.328
HCM Lane V/C Ratio	0.205	0.078	0.218
HCM Control Delay	8.1	7.9	8.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.7	0.3	0.8

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	100	58	0	0	0
Future Vol, veh/h	0	100	58	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	82	82	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	122	71	0	0	0

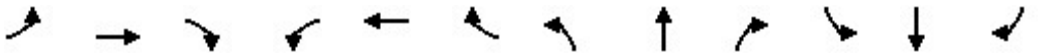
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	71	0	-	0	193	71
Stage 1	-	-	-	-	71	-
Stage 2	-	-	-	-	122	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1529	-	-	-	796	991
Stage 1	-	-	-	-	952	-
Stage 2	-	-	-	-	903	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1529	-	-	-	796	991
Mov Cap-2 Maneuver	-	-	-	-	796	-
Stage 1	-	-	-	-	952	-
Stage 2	-	-	-	-	903	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1529	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Lane Group	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	249	251	260	74	552	77	424
v/c Ratio	0.57	0.72	0.72	0.05	0.33	0.19	0.44
Control Delay	40.9	45.9	46.0	0.1	13.6	16.7	17.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	45.9	46.0	0.1	13.6	16.7	17.5
Queue Length 50th (ft)	69	149	155	0	83	23	146
Queue Length 95th (ft)	104	214	222	0	151	64	282
Internal Link Dist (ft)	141		198		118		108
Turn Bay Length (ft)				150			
Base Capacity (vph)	784	502	515	1583	1678	397	956
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.50	0.50	0.05	0.33	0.19	0.44

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	135	35	355	115	68	21	357	141	70	329	56
Future Volume (veh/h)	57	135	35	355	115	68	21	357	141	70	329	56
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	63	148	38	256	308	0	22	380	150	77	362	62
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.94	0.94	0.94	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	89	219	58	357	375		57	720	296	247	514	88
Arrive On Green	0.10	0.10	0.10	0.20	0.20	0.00	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	876	2147	571	1781	1870	1585	50	2179	895	874	1556	266
Grp Volume(v), veh/h	131	0	118	256	308	0	294	0	258	77	0	424
Grp Sat Flow(s),veh/h/ln	1827	0	1768	1781	1870	1585	1584	0	1541	874	0	1822
Q Serve(g_s), s	6.6	0.0	6.1	12.7	15.0	0.0	0.8	0.0	12.8	7.4	0.0	19.3
Cycle Q Clear(g_c), s	6.6	0.0	6.1	12.7	15.0	0.0	20.1	0.0	12.8	20.2	0.0	19.3
Prop In Lane	0.48		0.32	1.00		1.00	0.07		0.58	1.00		0.15
Lane Grp Cap(c), veh/h	186	0	180	357	375		564	0	509	247	0	602
V/C Ratio(X)	0.71	0.00	0.65	0.72	0.82		0.52	0.00	0.51	0.31	0.00	0.70
Avail Cap(c_a), veh/h	411	0	398	533	559		564	0	509	247	0	602
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.3	0.0	41.0	35.5	36.4	0.0	25.4	0.0	25.6	33.7	0.0	27.7
Incr Delay (d2), s/veh	4.8	0.0	4.0	2.7	6.1	0.0	3.4	0.0	3.6	3.3	0.0	6.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	2.8	5.7	7.3	0.0	5.7	0.0	5.1	1.8	0.0	9.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.1	0.0	45.0	38.2	42.4	0.0	28.8	0.0	29.2	37.0	0.0	34.5
LnGrp LOS	D	A	D	D	D		C	A	C	D	A	C
Approach Vol, veh/h		249			564	A		552			501	
Approach Delay, s/veh		45.6			40.5			28.9			34.9	
Approach LOS		D			D			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		14.3		36.0		23.6		36.0				
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s		21.4		31.4		28.4		31.4				
Max Q Clear Time (g_c+I1), s		8.6		22.2		17.0		22.1				
Green Ext Time (p_c), s		1.1		2.1		2.1		2.4				

Intersection Summary		
HCM 6th Ctrl Delay		36.3
HCM 6th LOS		D

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	115	73	64	489	732
v/c Ratio	0.49	0.27	0.32	0.35	0.32
Control Delay	32.9	9.5	31.7	4.7	7.7
Queue Delay	0.0	0.0	0.0	0.7	0.0
Total Delay	32.9	9.5	31.7	5.3	7.7
Queue Length 50th (ft)	44	0	24	59	73
Queue Length 95th (ft)	73	24	56	122	127
Internal Link Dist (ft)	279			238	121
Turn Bay Length (ft)		25	100		
Base Capacity (vph)	332	356	210	1417	2266
Starvation Cap Reductn	0	0	0	567	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.35	0.21	0.30	0.58	0.32

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	92	58	57	435	562	133
Future Volume (veh/h)	92	58	57	435	562	133
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	115	72	64	489	592	140
Peak Hour Factor	0.80	0.80	0.89	0.89	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	164	146	130	1230	1486	350
Arrive On Green	0.09	0.09	0.07	0.66	0.52	0.52
Sat Flow, veh/h	1781	1585	1781	1870	2947	673
Grp Volume(v), veh/h	115	72	64	489	368	364
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1777	1749
Q Serve(g_s), s	4.1	2.9	2.3	8.0	8.3	8.3
Cycle Q Clear(g_c), s	4.1	2.9	2.3	8.0	8.3	8.3
Prop In Lane	1.00	1.00	1.00			0.38
Lane Grp Cap(c), veh/h	164	146	130	1230	925	911
V/C Ratio(X)	0.70	0.49	0.49	0.40	0.40	0.40
Avail Cap(c_a), veh/h	335	298	211	1230	925	911
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.1	28.5	29.4	5.2	9.6	9.6
Incr Delay (d2), s/veh	2.0	1.0	1.1	1.0	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	1.1	1.0	2.6	3.1	3.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	31.1	29.5	30.5	6.2	10.8	10.9
LnGrp LOS	C	C	C	A	B	B
Approach Vol, veh/h	187			553	732	
Approach Delay, s/veh	30.5			9.0	10.9	
Approach LOS	C			A	B	

Timer - Assigned Phs	2	3	4	8
Phs Duration (G+Y+Rc), s	10.7	9.0	40.0	49.0
Change Period (Y+Rc), s	4.6	* 4.2	5.6	5.6
Max Green Setting (Gmax), s	12.4	* 7.8	31.4	43.4
Max Q Clear Time (g_c+I1), s	6.1	4.3	10.3	10.0
Green Ext Time (p_c), s	0.1	0.0	4.7	3.5

Intersection Summary	
HCM 6th Ctrl Delay	12.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	10.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	31	71	70	109	46	34	91	83	0	0	0
Future Vol, veh/h	50	31	71	70	109	46	34	91	83	0	0	0
Peak Hour Factor	0.50	0.50	0.50	0.91	0.91	0.91	0.93	0.93	0.93	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	100	62	142	77	120	51	37	98	89	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	10.5	10.2	10.3
HCM LOS	B	B	B

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	16%	33%	31%
Vol Thru, %	44%	20%	48%
Vol Right, %	40%	47%	20%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	208	152	225
LT Vol	34	50	70
Through Vol	91	31	109
RT Vol	83	71	46
Lane Flow Rate	224	304	247
Geometry Grp	1	1	1
Degree of Util (X)	0.308	0.387	0.329
Departure Headway (Hd)	4.965	4.582	4.789
Convergence, Y/N	Yes	Yes	Yes
Cap	718	781	744
Service Time	3.037	2.642	2.854
HCM Lane V/C Ratio	0.312	0.389	0.332
HCM Control Delay	10.3	10.5	10.2
HCM Lane LOS	B	B	B
HCM 95th-tile Q	1.3	1.8	1.4

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	43	74	112	56	97	217
Future Vol, veh/h	43	74	112	56	97	217
Peak Hour Factor	0.81	0.81	0.80	0.80	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	53	91	140	70	107	238
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9.1	9.1	11.2
HCM LOS	A	A	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	37%	31%
Vol Thru, %	67%	0%	69%
Vol Right, %	33%	63%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	168	117	314
LT Vol	0	43	97
Through Vol	112	0	217
RT Vol	56	74	0
Lane Flow Rate	210	144	345
Geometry Grp	1	1	1
Degree of Util (X)	0.261	0.195	0.439
Departure Headway (Hd)	4.479	4.864	4.583
Convergence, Y/N	Yes	Yes	Yes
Cap	800	735	783
Service Time	2.519	2.914	2.62
HCM Lane V/C Ratio	0.263	0.196	0.441
HCM Control Delay	9.1	9.1	11.2
HCM Lane LOS	A	A	B
HCM 95th-tile Q	1	0.7	2.3

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	153	143	0	0	0
Future Vol, veh/h	0	153	143	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	189	177	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	177	0	-	0	366	177
Stage 1	-	-	-	-	177	-
Stage 2	-	-	-	-	189	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1399	-	-	-	634	866
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	843	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1399	-	-	-	634	866
Mov Cap-2 Maneuver	-	-	-	-	634	-
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	843	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

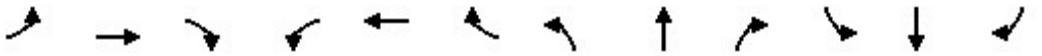
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1399	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Appendix C

Analysis Worksheets for
Existing (2022) plus Proposed Project Conditions

Lane Group	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	118	209	213	63	489	24	276
v/c Ratio	0.36	0.67	0.67	0.04	0.27	0.05	0.27
Control Delay	38.0	44.5	43.8	0.1	9.8	11.5	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.0	44.5	43.8	0.1	9.8	11.5	11.7
Queue Length 50th (ft)	31	117	120	0	57	6	70
Queue Length 95th (ft)	47	172	174	0	83	18	117
Internal Link Dist (ft)	141		198		118		108
Turn Bay Length (ft)				150			
Base Capacity (vph)	827	493	507	1583	1833	482	1039
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.42	0.42	0.04	0.27	0.05	0.27

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	58	7	270	101	55	16	245	106	18	178	32
Future Volume (veh/h)	25	58	7	270	101	55	16	245	106	18	178	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	76	9	211	249	0	21	327	141	24	234	42
Peak Hour Factor	0.76	0.76	0.76	0.88	0.88	0.88	0.75	0.75	0.75	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	72	175	21	301	316		65	733	303	263	487	87
Arrive On Green	0.07	0.07	0.07	0.17	0.17	0.00	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	973	2376	291	1781	1870	1585	70	2322	959	925	1543	277
Grp Volume(v), veh/h	62	0	56	211	249	0	264	0	225	24	0	276
Grp Sat Flow(s),veh/h/ln	1822	0	1818	1781	1870	1585	1822	0	1529	925	0	1820
Q Serve(g_s), s	2.9	0.0	2.7	10.1	11.5	0.0	0.0	0.0	10.6	1.9	0.0	11.0
Cycle Q Clear(g_c), s	2.9	0.0	2.7	10.1	11.5	0.0	10.1	0.0	10.6	12.5	0.0	11.0
Prop In Lane	0.53		0.16	1.00		1.00	0.08		0.63	1.00		0.15
Lane Grp Cap(c), veh/h	134	0	134	301	316		618	0	483	263	0	574
V/C Ratio(X)	0.46	0.00	0.42	0.70	0.79		0.43	0.00	0.47	0.09	0.00	0.48
Avail Cap(c_a), veh/h	433	0	432	523	549		618	0	483	263	0	574
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	0.0	39.8	35.3	35.9	0.0	24.5	0.0	24.7	29.7	0.0	24.8
Incr Delay (d2), s/veh	2.4	0.0	2.1	3.0	4.4	0.0	2.2	0.0	3.2	0.7	0.0	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	1.3	4.5	5.5	0.0	4.7	0.0	4.2	0.5	0.0	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.4	0.0	41.9	38.2	40.2	0.0	26.7	0.0	27.9	30.4	0.0	27.7
LnGrp LOS	D	A	D	D	D		C	A	C	C	A	C
Approach Vol, veh/h		118			460	A		489			300	
Approach Delay, s/veh		42.2			39.3			27.3			27.9	
Approach LOS		D			D			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		11.2		33.0		19.8		33.0				
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s		21.4		28.4		26.4		28.4				
Max Q Clear Time (g_c+I1), s		4.9		14.5		13.5		12.6				
Green Ext Time (p_c), s		0.5		1.4		1.7		2.7				

Intersection Summary												
HCM 6th Ctrl Delay			32.8									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	70	26	34	391	512
v/c Ratio	0.33	0.12	0.17	0.26	0.20
Control Delay	28.6	11.7	26.3	3.3	4.9
Queue Delay	0.0	0.0	0.0	0.3	0.0
Total Delay	28.6	11.7	26.3	3.6	4.9
Queue Length 50th (ft)	24	0	12	38	19
Queue Length 95th (ft)	52	17	29	66	65
Internal Link Dist (ft)	279			238	121
Turn Bay Length (ft)		25	100		
Base Capacity (vph)	301	291	226	1528	2569
Starvation Cap Reductn	0	0	0	594	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.23	0.09	0.15	0.42	0.20

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	60	22	27	309	332	98
Future Volume (veh/h)	60	22	27	309	332	98
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	70	26	34	391	395	117
Peak Hour Factor	0.86	0.86	0.79	0.79	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	141	125	90	1239	1472	431
Arrive On Green	0.08	0.08	0.05	0.66	0.54	0.54
Sat Flow, veh/h	1781	1585	1781	1870	2804	794
Grp Volume(v), veh/h	70	26	34	391	257	255
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1777	1727
Q Serve(g_s), s	2.3	0.9	1.1	5.4	4.7	4.8
Cycle Q Clear(g_c), s	2.3	0.9	1.1	5.4	4.7	4.8
Prop In Lane	1.00	1.00	1.00			0.46
Lane Grp Cap(c), veh/h	141	125	90	1239	965	938
V/C Ratio(X)	0.50	0.21	0.38	0.32	0.27	0.27
Avail Cap(c_a), veh/h	304	270	228	1239	965	938
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.9	26.3	28.0	4.4	7.4	7.5
Incr Delay (d2), s/veh	1.0	0.3	1.0	0.7	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.3	0.5	1.6	1.6	1.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.9	26.6	29.0	5.1	8.1	8.2
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	96			425	512	
Approach Delay, s/veh	27.6			7.0	8.1	
Approach LOS	C			A	A	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		9.4	7.3	38.7		46.0
Change Period (Y+Rc), s		4.6	* 4.2	5.6		5.6
Max Green Setting (Gmax), s		10.4	* 7.8	28.4		40.4
Max Q Clear Time (g_c+I1), s		4.3	3.1	6.8		7.4
Green Ext Time (p_c), s		0.1	0.0	3.1		2.6

Intersection Summary	
HCM 6th Ctrl Delay	9.5
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	11.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	34	73	71	74	17	14	44	34	0	0	0
Future Vol, veh/h	21	34	73	71	74	17	14	44	34	0	0	0
Peak Hour Factor	0.25	0.25	0.25	0.75	0.75	0.75	0.82	0.82	0.82	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	84	136	292	95	99	23	17	54	41	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	13.1	9.7	9.4
HCM LOS	B	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	15%	16%	44%
Vol Thru, %	48%	27%	46%
Vol Right, %	37%	57%	10%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	92	128	162
LT Vol	14	21	71
Through Vol	44	34	74
RT Vol	34	73	17
Lane Flow Rate	112	512	216
Geometry Grp	1	1	1
Degree of Util (X)	0.164	0.593	0.286
Departure Headway (Hd)	5.275	4.172	4.772
Convergence, Y/N	Yes	Yes	Yes
Cap	675	865	750
Service Time	3.341	2.205	2.818
HCM Lane V/C Ratio	0.166	0.592	0.288
HCM Control Delay	9.4	13.1	9.7
HCM Lane LOS	A	B	A
HCM 95th-tile Q	0.6	4	1.2

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	32	29	88	62	52	95
Future Vol, veh/h	32	29	88	62	52	95
Peak Hour Factor	0.82	0.82	0.78	0.78	0.77	0.77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	39	35	113	79	68	123
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	8.1	8.2	8.7
HCM LOS	A	A	A

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	52%	35%
Vol Thru, %	59%	0%	65%
Vol Right, %	41%	48%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	150	61	147
LT Vol	0	32	52
Through Vol	88	0	95
RT Vol	62	29	0
Lane Flow Rate	192	74	191
Geometry Grp	1	1	1
Degree of Util (X)	0.217	0.095	0.227
Departure Headway (Hd)	4.062	4.577	4.282
Convergence, Y/N	Yes	Yes	Yes
Cap	887	786	825
Service Time	2.071	2.586	2.382
HCM Lane V/C Ratio	0.216	0.094	0.232
HCM Control Delay	8.2	8.1	8.7
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.8	0.3	0.9

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	13	100	58	30	29	10
Future Vol, veh/h	13	100	58	30	29	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	82	82	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	122	71	37	32	11

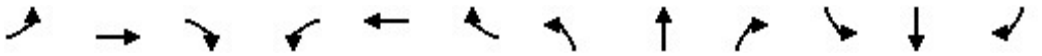
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	108	0	-	0	244	90
Stage 1	-	-	-	-	90	-
Stage 2	-	-	-	-	154	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1483	-	-	-	744	968
Stage 1	-	-	-	-	934	-
Stage 2	-	-	-	-	874	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1483	-	-	-	735	968
Mov Cap-2 Maneuver	-	-	-	-	735	-
Stage 1	-	-	-	-	923	-
Stage 2	-	-	-	-	874	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1483	-	-	-	783
HCM Lane V/C Ratio	0.011	-	-	-	0.054
HCM Control Delay (s)	7.5	0	-	-	9.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Lane Group	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	264	275	279	74	625	77	446
v/c Ratio	0.58	0.74	0.73	0.05	0.38	0.23	0.48
Control Delay	41.2	45.6	44.9	0.1	14.6	18.9	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	45.6	44.9	0.1	14.6	18.9	19.5
Queue Length 50th (ft)	74	164	166	0	97	25	164
Queue Length 95th (ft)	110	229	230	0	177	70	317
Internal Link Dist (ft)	141		198		118		108
Turn Bay Length (ft)				150			
Base Capacity (vph)	783	504	517	1583	1626	340	923
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.55	0.54	0.05	0.38	0.23	0.48

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	64	142	35	395	115	68	21	378	189	70	349	56
Future Volume (veh/h)	64	142	35	395	115	68	21	378	189	70	349	56
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	70	156	38	277	338	0	22	402	201	77	384	62
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.94	0.94	0.94	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	98	228	58	385	405		53	640	348	217	519	84
Arrive On Green	0.11	0.11	0.11	0.22	0.22	0.00	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	918	2140	540	1781	1870	1585	40	1935	1054	816	1571	254
Grp Volume(v), veh/h	139	0	125	277	338	0	336	0	289	77	0	446
Grp Sat Flow(s),veh/h/ln	1824	0	1773	1781	1870	1585	1516	0	1512	816	0	1825
Q Serve(g_s), s	7.0	0.0	6.4	13.7	16.4	0.0	1.3	0.0	15.0	8.2	0.0	20.6
Cycle Q Clear(g_c), s	7.0	0.0	6.4	13.7	16.4	0.0	21.8	0.0	15.0	23.2	0.0	20.6
Prop In Lane	0.50		0.30	1.00		1.00	0.07		0.70	1.00		0.14
Lane Grp Cap(c), veh/h	195	0	189	385	405		541	0	500	217	0	603
V/C Ratio(X)	0.71	0.00	0.66	0.72	0.84		0.62	0.00	0.58	0.36	0.00	0.74
Avail Cap(c_a), veh/h	411	0	399	533	559		541	0	500	217	0	603
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.0	0.0	40.8	34.5	35.6	0.0	26.1	0.0	26.3	35.9	0.0	28.2
Incr Delay (d2), s/veh	4.8	0.0	3.9	2.9	7.7	0.0	5.3	0.0	4.8	4.5	0.0	7.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	0.0	3.0	6.1	8.2	0.0	6.9	0.0	5.9	1.9	0.0	10.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.8	0.0	44.7	37.4	43.3	0.0	31.4	0.0	31.1	40.4	0.0	36.1
LnGrp LOS	D	A	D	D	D		C	A	C	D	A	D
Approach Vol, veh/h		264			615	A		625			523	
Approach Delay, s/veh		45.3			40.7			31.3			36.7	
Approach LOS		D			D			C			D	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		14.7		36.0		25.2		36.0				
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s		21.4		31.4		28.4		31.4				
Max Q Clear Time (g_c+I1), s		9.0		25.2		18.4		23.8				
Green Ext Time (p_c), s		1.1		1.7		2.1		2.4				

Intersection Summary												
HCM 6th Ctrl Delay			37.4									
HCM 6th LOS			D									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	201	90	87	489	794
v/c Ratio	0.71	0.29	0.44	0.38	0.42
Control Delay	39.8	13.6	34.6	5.9	9.8
Queue Delay	0.0	0.0	0.0	1.1	0.0
Total Delay	39.8	13.6	34.6	6.9	9.8
Queue Length 50th (ft)	76	10	33	74	90
Queue Length 95th (ft)	118	37	72	123	135
Internal Link Dist (ft)	279			238	121
Turn Bay Length (ft)		25	100		
Base Capacity (vph)	332	346	209	1274	1888
Starvation Cap Reductn	0	0	0	521	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.61	0.26	0.42	0.65	0.42

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	161	72	77	435	562	192
Future Volume (veh/h)	161	72	77	435	562	192
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	201	90	87	489	592	202
Peak Hour Factor	0.80	0.80	0.89	0.89	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	252	224	151	1230	1325	451
Arrive On Green	0.14	0.14	0.08	0.66	0.51	0.51
Sat Flow, veh/h	1781	1585	1781	1870	2695	886
Grp Volume(v), veh/h	201	90	87	489	404	390
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1777	1711
Q Serve(g_s), s	7.2	3.4	3.1	8.0	9.5	9.6
Cycle Q Clear(g_c), s	7.2	3.4	3.1	8.0	9.5	9.6
Prop In Lane	1.00	1.00	1.00			0.52
Lane Grp Cap(c), veh/h	252	224	151	1230	905	872
V/C Ratio(X)	0.80	0.40	0.58	0.40	0.45	0.45
Avail Cap(c_a), veh/h	335	298	211	1230	905	872
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.4	25.8	29.1	5.2	10.3	10.3
Incr Delay (d2), s/veh	7.0	0.4	1.3	1.0	1.6	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	1.2	1.3	2.6	3.6	3.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	34.4	26.2	30.4	6.2	11.9	12.0
LnGrp LOS	C	C	C	A	B	B
Approach Vol, veh/h	291			576	794	
Approach Delay, s/veh	31.9			9.9	11.9	
Approach LOS	C			A	B	

Timer - Assigned Phs	2	3	4	8
Phs Duration (G+Y+Rc), s	13.9	9.8	39.2	49.0
Change Period (Y+Rc), s	4.6	* 4.2	5.6	5.6
Max Green Setting (Gmax), s	12.4	* 7.8	31.4	43.4
Max Q Clear Time (g_c+I1), s	9.2	5.1	11.6	10.0
Green Ext Time (p_c), s	0.2	0.0	5.1	3.5

Intersection Summary	
HCM 6th Ctrl Delay	14.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	16
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	64	113	78	70	188	46	47	91	83	0	0	0
Future Vol, veh/h	64	113	78	70	188	46	47	91	83	0	0	0
Peak Hour Factor	0.50	0.50	0.50	0.91	0.91	0.91	0.93	0.93	0.93	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	128	226	156	77	207	51	51	98	89	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	19.4	13.4	12.5
HCM LOS	C	B	B

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	21%	25%	23%
Vol Thru, %	41%	44%	62%
Vol Right, %	38%	31%	15%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	221	255	304
LT Vol	47	64	70
Through Vol	91	113	188
RT Vol	83	78	46
Lane Flow Rate	238	510	334
Geometry Grp	1	1	1
Degree of Util (X)	0.384	0.71	0.493
Departure Headway (Hd)	5.812	5.011	5.312
Convergence, Y/N	Yes	Yes	Yes
Cap	618	719	678
Service Time	3.859	3.048	3.354
HCM Lane V/C Ratio	0.385	0.709	0.493
HCM Control Delay	12.5	19.4	13.4
HCM Lane LOS	B	C	B
HCM 95th-tile Q	1.8	6	2.7

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	57	95	112	76	117	217
Future Vol, veh/h	57	95	112	76	117	217
Peak Hour Factor	0.81	0.81	0.80	0.80	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	70	117	140	95	129	238
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9.8	9.6	12.2
HCM LOS	A	A	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	38%	35%
Vol Thru, %	60%	0%	65%
Vol Right, %	40%	62%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	188	152	334
LT Vol	0	57	117
Through Vol	112	0	217
RT Vol	76	95	0
Lane Flow Rate	235	188	367
Geometry Grp	1	1	1
Degree of Util (X)	0.3	0.26	0.484
Departure Headway (Hd)	4.596	4.993	4.744
Convergence, Y/N	Yes	Yes	Yes
Cap	776	713	756
Service Time	2.659	3.063	2.801
HCM Lane V/C Ratio	0.303	0.264	0.485
HCM Control Delay	9.6	9.8	12.2
HCM Lane LOS	A	A	B
HCM 95th-tile Q	1.3	1	2.7

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	40	153	143	92	103	34
Future Vol, veh/h	40	153	143	92	103	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	189	177	114	112	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	291	0	-	0	521	234
Stage 1	-	-	-	-	234	-
Stage 2	-	-	-	-	287	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1271	-	-	-	516	805
Stage 1	-	-	-	-	805	-
Stage 2	-	-	-	-	762	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1271	-	-	-	494	805
Mov Cap-2 Maneuver	-	-	-	-	494	-
Stage 1	-	-	-	-	770	-
Stage 2	-	-	-	-	762	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1271	-	-	-	546
HCM Lane V/C Ratio	0.039	-	-	-	0.273
HCM Control Delay (s)	7.9	0	-	-	14
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	1.1

Appendix D

Analysis Worksheets for
Cumulative (2030) plus Proposed Project Conditions

Lane Group	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	424	456	470	86	957	210	809
v/c Ratio	0.69	0.87	0.87	0.05	1.27	2.23	1.19
Control Delay	41.3	49.8	48.5	0.1	160.4	611.1	131.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	49.8	48.5	0.1	160.4	611.1	131.5
Queue Length 50th (ft)	123	255	262	0	~390	~212	~640
Queue Length 95th (ft)	164	#470	#478	0	#516	#310	#870
Internal Link Dist (ft)	141		198		118		108
Turn Bay Length (ft)				150			
Base Capacity (vph)	785	536	556	1583	751	94	677
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.85	0.85	0.05	1.27	2.23	1.19

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	269	44	538	314	79	46	544	291	193	669	75
Future Volume (veh/h)	77	269	44	538	314	79	46	544	291	193	669	75
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	292	48	463	512	0	50	591	316	210	727	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	107	389	67	523	549		42	323	348	103	546	62
Arrive On Green	0.15	0.15	0.15	0.29	0.29	0.00	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	689	2510	430	1781	1870	1585	0	977	1054	615	1651	186
Grp Volume(v), veh/h	224	0	200	463	512	0	504	0	453	210	0	809
Grp Sat Flow(s),veh/h/ln	1836	0	1793	1781	1870	1585	519	0	1512	615	0	1837
Q Serve(g_s), s	11.1	0.0	10.1	23.6	25.3	0.0	0.0	0.0	27.2	4.2	0.0	31.4
Cycle Q Clear(g_c), s	11.1	0.0	10.1	23.6	25.3	0.0	31.4	0.0	27.2	31.4	0.0	31.4
Prop In Lane	0.38		0.24	1.00		1.00	0.10		0.70	1.00		0.10
Lane Grp Cap(c), veh/h	284	0	278	523	549		213	0	500	103	0	607
V/C Ratio(X)	0.79	0.00	0.72	0.89	0.93		2.36	0.00	0.91	2.04	0.00	1.33
Avail Cap(c_a), veh/h	414	0	404	533	559		213	0	500	103	0	607
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.6	0.0	38.2	32.0	32.6	0.0	29.9	0.0	30.4	47.0	0.0	31.8
Incr Delay (d2), s/veh	6.1	0.0	3.5	16.1	22.5	0.0	628.0	0.0	22.7	501.5	0.0	160.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	0.0	4.6	12.2	14.6	0.0	41.0	0.0	12.7	16.7	0.0	40.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.8	0.0	41.7	48.1	55.2	0.0	657.8	0.0	53.2	548.4	0.0	192.5
LnGrp LOS	D	A	D	D	E		F	A	D	F	A	F
Approach Vol, veh/h		424			975	A		957			1019	
Approach Delay, s/veh		43.3			51.8			371.4			265.8	
Approach LOS		D			D			F			F	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		19.3		36.0		32.5		36.0				
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s		21.4		31.4		28.4		31.4				
Max Q Clear Time (g_c+I1), s		13.1		33.4		27.3		33.4				
Green Ext Time (p_c), s		1.6		0.0		0.6		0.0				

Intersection Summary		
HCM 6th Ctrl Delay	206.0	
HCM 6th LOS	F	

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	285	136	148	618	1284
v/c Ratio	0.89	0.40	1.03	0.50	0.71
Control Delay	57.0	17.4	120.7	7.4	13.1
Queue Delay	0.0	0.0	0.0	2.2	0.0
Total Delay	57.0	17.4	120.7	9.6	13.1
Queue Length 50th (ft)	112	25	~70	107	165
Queue Length 95th (ft)	#237	70	#171	172	236
Internal Link Dist (ft)	279			238	121
Turn Bay Length (ft)		25	100		
Base Capacity (vph)	332	349	144	1235	1814
Starvation Cap Reductn	0	0	0	459	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.86	0.39	1.03	0.80	0.71

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	262	125	136	569	805	376
Future Volume (veh/h)	262	125	136	569	805	376
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	285	136	148	618	875	409
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	331	294	135	1230	1211	561
Arrive On Green	0.19	0.19	0.08	0.66	0.51	0.51
Sat Flow, veh/h	1781	1585	1781	1870	2451	1093
Grp Volume(v), veh/h	285	136	148	618	658	626
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1777	1674
Q Serve(g_s), s	10.2	5.0	5.0	11.2	18.9	19.2
Cycle Q Clear(g_c), s	10.2	5.0	5.0	11.2	18.9	19.2
Prop In Lane	1.00	1.00	1.00			0.65
Lane Grp Cap(c), veh/h	331	294	135	1230	913	860
V/C Ratio(X)	0.86	0.46	1.10	0.50	0.72	0.73
Avail Cap(c_a), veh/h	335	298	135	1230	913	860
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.1	23.9	30.5	5.8	12.4	12.5
Incr Delay (d2), s/veh	18.9	0.4	105.8	1.5	4.9	5.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	1.8	6.0	3.6	7.5	7.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	45.0	24.4	136.3	7.2	17.3	17.9
LnGrp LOS	D	C	F	A	B	B
Approach Vol, veh/h	421			766	1284	
Approach Delay, s/veh	38.3			32.2	17.6	
Approach LOS	D			C	B	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		16.8	9.5	39.5		49.0
Change Period (Y+Rc), s		4.6	4.5	5.6		5.6
Max Green Setting (Gmax), s		12.4	5.0	31.4		43.4
Max Q Clear Time (g_c+I1), s		12.2	7.0	21.2		13.2
Green Ext Time (p_c), s		0.0	0.0	6.1		4.7

Intersection Summary	
HCM 6th Ctrl Delay	25.6
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	27
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	66	165	80	135	289	89	48	94	221	0	0	0
Future Vol, veh/h	66	165	80	135	289	89	48	94	221	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	72	179	87	147	314	97	52	102	240	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	17	37.7	20.4
HCM LOS	C	E	C

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	13%	21%	26%
Vol Thru, %	26%	53%	56%
Vol Right, %	61%	26%	17%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	363	311	513
LT Vol	48	66	135
Through Vol	94	165	289
RT Vol	221	80	89
Lane Flow Rate	395	338	558
Geometry Grp	1	1	1
Degree of Util (X)	0.667	0.573	0.885
Departure Headway (Hd)	6.089	6.099	5.838
Convergence, Y/N	Yes	Yes	Yes
Cap	596	592	625
Service Time	4.089	4.124	3.838
HCM Lane V/C Ratio	0.663	0.571	0.893
HCM Control Delay	20.4	17	37.7
HCM Lane LOS	C	C	E
HCM 95th-tile Q	5	3.6	10.5

Intersection	
Intersection Delay, s/veh	16.2
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	104	176	151	96	152	292
Future Vol, veh/h	104	176	151	96	152	292
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	113	191	164	104	165	317
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	13.4	11.8	20.4
HCM LOS	B	B	C

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	37%	34%
Vol Thru, %	61%	0%	66%
Vol Right, %	39%	63%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	247	280	444
LT Vol	0	104	152
Through Vol	151	0	292
RT Vol	96	176	0
Lane Flow Rate	268	304	483
Geometry Grp	1	1	1
Degree of Util (X)	0.396	0.469	0.711
Departure Headway (Hd)	5.31	5.546	5.3
Convergence, Y/N	Yes	Yes	Yes
Cap	677	648	680
Service Time	3.357	3.596	3.338
HCM Lane V/C Ratio	0.396	0.469	0.71
HCM Control Delay	11.8	13.4	20.4
HCM Lane LOS	B	B	C
HCM 95th-tile Q	1.9	2.5	5.9

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	40	208	245	92	103	34
Future Vol, veh/h	40	208	245	92	103	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	226	266	100	112	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	366	0	-	0	628	316
Stage 1	-	-	-	-	316	-
Stage 2	-	-	-	-	312	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1193	-	-	-	447	724
Stage 1	-	-	-	-	739	-
Stage 2	-	-	-	-	742	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1193	-	-	-	429	724
Mov Cap-2 Maneuver	-	-	-	-	429	-
Stage 1	-	-	-	-	709	-
Stage 2	-	-	-	-	742	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	15.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1193	-	-	-	477
HCM Lane V/C Ratio	0.036	-	-	-	0.312
HCM Control Delay (s)	8.1	0	-	-	15.9
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.3

Appendix E

Cumulative Buildout Volumes
City of Santa Cruz Critical Intersections

Cumulative Buildout Volumes City of Santa Cruz Critical Intersections

3/19/2020

#	Intersection	NORTHE	NORTHE	NORTHE	SOUTHE	SOUTHE	SOUTHE	EASTBN	EASTBN	EASTBN	WESTBN	WESTBN	WESTBN	TOTAL	SOURCE
		LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT		
1	Western/High	240	0	94	0	0	0	0	755	164	61	448	0	1762	GP
2	Bay/High	174	508	55	515	882	68	178	380	275	113	309	269	3726	GP
3	Moore/High	24	7	17	45	21	41	9	880	35	24	661	21	1785	GP
4	Laurent/High	16	49	16	32	24	16	34	856	38	14	735	30	1860	GP
5	River/Potrero	90	766	86	272	737	103	129	10	76	197	9	255	2730	GP
6	River/Hwy. 1	99	454	726	1109	545	571	490	2350	86	561	1862	693	9546	Downtown Plan
7	River/Fern	410	1112	0	0	1564	43	1	0	106	0	0	0	3236	GP
8	River/Encinal	576	563	111	8	488	145	210	6	1047	117	6	15	3292	GP
9	Ocean-Hwy. 17/Plymouth	405	654	0	186	1101	239	71	208	495	127	97	55	3638	Ocean Ext
10	Market/Isbel-Goss	47	154	147	202	114	1	4	192	36	63	77	218	1255	GP
11	North Branciforte/Goss	220	70	95	3	113	61	40	312	295	33	74	1	1317	GP
12	Morrissey/Fairmount	53	794	28	53	862	108	160	89	127	24	27	82	2407	GP
13	Bay/Nobel-Iowa	100	717	98	42	1168	56	39	49	129	65	45	41	2549	GP
14	Bay/Escalona	27	811	41	145	1108	70	61	43	40	49	33	62	2490	GP
15	Bay/King	148	723	160	194	972	110	61	161	100	98	97	167	2991	GP
16	King/Laurel	171	69	60	36	62	10	20	430	154	67	262	15	1356	GP
17	Storey/King	0	0	0	551	0	53	26	380	0	0	278	88	1376	GP
18	Route 1/Shaffer Rd	62	0	80	0	0	0	0	690	51	38	536	0	1457	GP
19	Western/Hwy. 1	19	113	205	203	86	44	27	451	25	88	382	232	1875	GP
20	Swift/Mission	96	76	692	67	42	16	30	721	82	452	637	117	3028	GP
21	Miramar/Mission	111	31	164	103	15	137	95	1991	58	178	1428	89	4400	GP
22	Almar-Younglove/Mission	38	1	276	45	0	44	0	1808	24	219	1468	2	3925	GP
23	Bay/Mission	146	170	133	454	194	157	166	2178	109	222	1692	348	5969	190 W Cliff
24	Laurel/Mission	412	223	41	33	285	23	51	2259	487	77	1886	48	5825	GP
25	Walnut/Mission	125	151	59	78	146	85	145	2012	182	41	1791	41	4856	GP
26	King-Union/Mission	20	6	19	1161	1	4	0	2556	3	14	1987	217	5988	GP
27	Chestnut-Hwy. 1/Mission	138	332	46	71	497	1822	2436	1060	42	33	849	93	7419	Downtown Plan
28	N. Pacific/RIVER	226	31	59	44	26	17	20	659	382	32	713	51	2260	GP
29	Center/Mission	98	0	621	0	0	0	0	843	64	423	691	0	2740	GP
30	Front-Pacific/Mission-Water	0	0	0	64	371	221	263	1133	165	166	893	39	3315	Downtown Plan
31	River/Water	111	384	252	312	426	58	82	1166	62	204	958	346	4361	GP
32	Ocean/Kennan-Washburn	39	1540	52	59	1733	11	40	0	53	47	0	39	3613	GP
33	Ocean/Water	203	1359	96	522	1448	399	495	1578	162	168	1008	339	7777	Downtown Plan
34	Market/Water	0	0	0	507	0	189	223	1836	0	0	1170	128	4053	GP
35	N. Branciforte/Water	322	323	78	41	219	129	458	1273	470	101	930	50	4394	GP
36	Seabright/Water	60	0	49	0	0	0	0	1353	121	23	1021	0	2627	GP
37	Morrissey/Water-Soquel	19	127	30	293	233	75	535	1695	38	63	1489	36	4633	GP
38	Frederick/Soquel	146	0	433	0	0	0	0	1755	93	226	1416	0	4069	GP
39	Hagemann-Trevethan/Soquel	77	14	34	74	14	86	69	2092	53	22	1503	24	4062	GP
40	Park/Soquel	53	18	26	128	7	70	39	2147	30	12	1409	28	3967	GP
41	Capitola/Soquel	708	16	77	47	25	28	20	920	1149	79	672	25	3766	GP
42	La Fonda/Soquel	1	1	1	52	0	76	97	763	2	2	524	69	1588	GP
43	Bay/California Ave	269	0	47	0	0	0	0	656	204	64	608	0	1848	GP
44	Bay/California St	0	0	0	263	0	95	132	597	0	0	466	420	1973	GP
45	California/Laurel	35	224	326	23	169	29	11	828	30	168	752	20	2615	GP
46	Chestnut/Laurel	141	59	95	26	72	76	111	982	91	79	866	28	2626	GP
47	Center/Laurel	62	94	56	133	77	50	30	965	65	56	823	58	2469	GP
48	Cedar/Laurel	0	0	14	0	0	116	68	1195	26	0	898	94	2411	GP
49	Pacific/Laurel	59	96	44	97	59	63	162	1075	44	64	982	91	2836	508 Front TIA
50	Front/Laurel	4	228	254	202	366	262	165	996	29	227	830	195	3758	508 Front TIA
51	Front/Metro Center	14	661	20	0	833	17	14	0	19	6	0	11	1595	508 Front TIA
52	Front/Cathcart	116	569	0	0	805	317	193	0	111	0	0	0	2111	508 Front TIA
53	Front/Soquel	46	523	243	193	649	75	70	262	44	498	314	79	2996	508 Front TIA
54	Front/Cooper	79	504	0	0	668	78	148	0	148	0	0	0	1625	GP
55	River S./Soquel	0	0	0	445	0	161	0	602	0	0	619	178	2005	GP
56	Riverside-Dakota/Soquel (new	36	17	39	29	2	72	13	960	3	3	689	17	1880	GP
57	Ocean/Soquel	318	817	296	353	611	269	259	601	129	188	424	83	4348	GP
58	Branciforte/Soquel	56	143	79	58	170	116	163	843	112	101	579	34	2454	GP
59	Seabright/Soquel	217	45	223	90	128	70	32	1075	125	179	585	16	2785	GP
60	San Lorenzo/Laurel-Broadway	498	0	33	0	0	0	0	858	542	0	693	0	2624	GP
61	Ocean/Broadway	12	521	89	230	699	296	253	534	47	102	443	118	3344	GP
62	S. Branciforte/Broadway	70	51	9	115	77	104	75	725	64	8	433	75	1806	GP
63	Seabright/Broadway	171	242	51	10	269	112	184	394	253	47	183	13	1929	GP
64	Pacific Avenue/Center	18	166	549	34	162	214	0	0	0	444	172	62	1821	190 W Cliff
65	West Cliff/Bay	54	383	0	0	432	414	421	0	58	0	0	0	1762	190 W Cliff
66	Pacific/Beach	21	120	35	116	149	239	548	235	48	0	0	0	1511	190 W Cliff
67	Cliff/Beach	0	0	0	186	0	0	229	426	0	0	0	0	841	GP
68	Riverside/Beach	0	0	0	96	0	0	0	339	0	0	0	0	435	GP
69	Riverside/Second	0	0	0	43	164	117	0	0	5	2	7	0	338	GP

Appendix F

Analysis Worksheets for
Cumulative (2030) plus Proposed Project (Improved) Conditions

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Protected Phases	2	6	6			8		4
Permitted Phases				Free	8		4	
Minimum Initial (s)	7.0	7.0	7.0		7.0	7.0	7.0	7.0
Minimum Split (s)	20.0	20.0	20.0		20.0	20.0	20.0	20.0
Total Split (s)	20.0	39.0	39.0		71.0	71.0	71.0	71.0
Total Split (%)	15.4%	30.0%	30.0%		54.6%	54.6%	54.6%	54.6%
Maximum Green (s)	15.4	34.4	34.4		66.4	66.4	66.4	66.4
Yellow Time (s)	3.6	3.6	3.6		3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0	1.0	1.0
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0
Minimum Gap (s)	2.0	2.0	2.0		2.0	2.0	2.0	2.0
Time Before Reduce (s)	5.0	7.0	7.0		7.0	7.0	7.0	7.0
Time To Reduce (s)	20.0	20.0	20.0		20.0	20.0	20.0	20.0
Recall Mode	None	Max	Max		None	None	None	None
Walk Time (s)	5.0	5.0	5.0		5.0	5.0	5.0	5.0
Flash Dont Walk (s)	16.0	16.0	16.0		16.0	16.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0	0		0	0	0	0
90th %ile Green (s)	15.4	34.4	34.4		66.4	66.4	66.4	66.4
90th %ile Term Code	Max	MaxR	MaxR		Max	Max	Max	Max
70th %ile Green (s)	15.4	34.4	34.4		66.4	66.4	66.4	66.4
70th %ile Term Code	Max	MaxR	MaxR		Max	Max	Max	Max
50th %ile Green (s)	15.4	34.4	34.4		66.4	66.4	66.4	66.4
50th %ile Term Code	Max	MaxR	MaxR		Hold	Hold	Max	Max
30th %ile Green (s)	15.4	34.4	34.4		66.4	66.4	66.4	66.4
30th %ile Term Code	Max	MaxR	MaxR		Hold	Hold	Max	Max
10th %ile Green (s)	15.4	34.4	34.4		66.4	66.4	66.4	66.4
10th %ile Term Code	Max	MaxR	MaxR		Hold	Hold	Max	Max

Intersection Summary
Cycle Length: 130
Actuated Cycle Length: 130
Control Type: Actuated-Uncoordinated
90th %ile Actuated Cycle: 130
70th %ile Actuated Cycle: 130
50th %ile Actuated Cycle: 130
30th %ile Actuated Cycle: 130
10th %ile Actuated Cycle: 130

Lane Group	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	424	456	470	86	957	189	830
v/c Ratio	1.02	1.03	1.02	0.05	0.88	1.01	0.97
Control Delay	104.5	96.6	94.0	0.1	36.4	100.5	54.6
Queue Delay	0.0	0.0	0.0	0.0	3.9	0.0	0.0
Total Delay	104.5	96.6	94.0	0.1	40.3	100.5	54.6
Queue Length 50th (ft)	~195	~430	~441	0	338	~163	686
Queue Length 95th (ft)	#305	#653	#665	0	#494	#336	#997
Internal Link Dist (ft)	333		837		222		326
Turn Bay Length (ft)				150			
Base Capacity (vph)	415	444	461	1583	1085	188	859
Starvation Cap Reductn	0	0	0	0	75	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.02	1.03	1.02	0.05	0.95	1.01	0.97

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	269	44	538	314	79	46	544	291	193	669	75
Future Volume (veh/h)	77	269	44	538	314	79	46	544	291	193	669	75
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	292	48	463	512	0	50	591	316	210	727	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	82	297	51	471	495		50	637	535	240	843	95
Arrive On Green	0.12	0.12	0.12	0.26	0.26	0.00	0.51	0.51	0.51	0.51	0.51	0.51
Sat Flow, veh/h	689	2510	430	1781	1870	1585	39	1248	1048	615	1651	186
Grp Volume(v), veh/h	224	0	200	463	512	0	500	0	457	210	0	809
Grp Sat Flow(s),veh/h/ln	1836	0	1793	1781	1870	1585	821	0	1513	615	0	1837
Q Serve(g_s), s	15.4	0.0	14.4	33.6	34.4	0.0	16.3	0.0	27.5	38.9	0.0	50.1
Cycle Q Clear(g_c), s	15.4	0.0	14.4	33.6	34.4	0.0	66.4	0.0	27.5	66.4	0.0	50.1
Prop In Lane	0.38		0.24	1.00		1.00	0.10		0.69	1.00		0.10
Lane Grp Cap(c), veh/h	217	0	212	471	495		450	0	773	240	0	938
V/C Ratio(X)	1.03	0.00	0.94	0.98	1.03		1.11	0.00	0.59	0.88	0.00	0.86
Avail Cap(c_a), veh/h	217	0	212	471	495		450	0	773	240	0	938
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	57.3	0.0	56.9	47.5	47.8	0.0	32.7	0.0	22.3	47.9	0.0	27.8
Incr Delay (d2), s/veh	68.7	0.0	45.8	37.3	49.6	0.0	76.9	0.0	1.2	28.5	0.0	8.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.3	0.0	9.2	19.7	22.7	0.0	24.5	0.0	9.9	8.9	0.0	23.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	126.0	0.0	102.7	84.8	97.4	0.0	109.5	0.0	23.5	76.4	0.0	36.1
LnGrp LOS	F	A	F	F	F		F	A	C	E	A	D
Approach Vol, veh/h		424			975	A		957			1019	
Approach Delay, s/veh		115.0			91.4			68.5			44.4	
Approach LOS		F			F			E			D	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		20.0		71.0		39.0		71.0				
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s		15.4		66.4		34.4		66.4				
Max Q Clear Time (g_c+I1), s		17.4		68.4		36.4		68.4				
Green Ext Time (p_c), s		0.0		0.0		0.0		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			73.7									
HCM 6th LOS			E									

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Appendix G

Vehicle Miles Traveled (VMT) Analysis for
119 Lincoln Street – Downtown Library and Affordable Housing Project

CITY OF SANTA CRUZ

PUBLIC WORKS DEPARTMENT

809 Center Street, Room 201, Santa Cruz CA 95060 • 831 420-5160 • Fax: 831 420-5161

November 17, 2022

Re: Vehicle Miles Traveled (VMT) Analysis for 119 Lincoln Street- Downtown Library and Affordable Housing Project

To: Brian Borguno, Development Manager
From: Claire Gallogly, AICP, Transportation Planner

This memorandum documents the results of a VMT analysis done for the proposed project at 119 Lincoln Street (the "proposed project", or "project"). Existing conditions include one parking lot with 134 spaces and one building located at 119 Lincoln Street The project proposes to construct a 38,086 square-foot library, a parking garage containing up to 400 spaces, 9,598 square-feet of commercial uses, a 1,905 square foot day care, and 124 low-income residential dwelling units.

This analysis uses the City of Santa Cruz SB743 Implementation Guidelines, adopted May 12, 2022.

The proposed project is located in a VMT Efficient Area based on the Santa Cruz City Residential Screening Map. This means that based on the VMT per capita threshold set by the City and County, the proposed project is located in an area that produces VMT per capita that is at least 15-percent below the Countywide average. Additionally, each of the project elements can use the screening criteria in Exhibit 2 of the City of Santa Cruz SB 743 Implementation Guidelines as follows:

- Projects near High Quality Transit: this project is within ½ mile of a High Quality Transit Stop as defined by California Public Resources Code section 21064.3
- Affordable Housing: this screening criteria covers the 124 units of affordable housing
- Local Essential Service: this screening criteria covers the day care and government offices uses (Library)
- Local Serving Retail: this screening criteria covers the 9,598 square feet of commercial uses, less than the threshold of 50,000 square feet

While the parking on site represents a net increase of up to 266 spaces (maximum 400 new, replacing 134 existing), because this parking is part of the public supply of parking and is not dedicated to these uses, the parking is analyzed as part of the overall shared public supply. In this case, the Parking District is projected to lose 448 spaces by 2030[1], but only projected to gain up to 400 with this project. This represents a net loss in the shared public supply of 48 spaces. This project does not add more parking than required by the City of Santa Cruz

Therefore, the VMT for this project is assumed to be less than significant in accordance with the adopted City of Santa Cruz guidelines.

[1] Lot 4 (-134), Lot 5 (-108), Lot 23 (-24), Lot 12 (-15), Lot 2 (-26), Lot 22 (-25), Lot 27 (-32), Lot 11 (-24), Lot 16 (-38), Lot 14 (-22)

Transportation Impact Study

Downtown Library and Affordable Housing Project
Santa Cruz, California

DRAFT
December 23, 2022

Prepared for:

City of Santa Cruz

Prepared by:

Kimley»Horn

555 Capitol Mall, Suite 300
Sacramento, California 95814

Phone: (916) 858-5800

EXECUTIVE SUMMARY

This report documents the results of a transportation impact study completed for the Santa Cruz Library project (the "proposed project", or "project"). The project proposes to construct a 38,086 square-foot library, a parking garage containing up to 400 spaces, 9,598 square-feet of commercial uses, a 1,905 square-foot day care, and 124 low-income residential dwelling units on the lot that includes one building located at 119 Lincoln Street and also City Parking Lot 4 at 600-698 Cedar Street in Santa Cruz, California. Access to the project site will be provided via one (1) proposed connection to an existing roadway, Cathcart Street.

This study was performed in accordance with the scope of work approved by the City of Santa Cruz, and in a manner consistent with the City of Santa Cruz's *Transportation Study Requirements for Development*. The following transportation facilities were included in this evaluation:

Intersections:

1. Front Street @ Soquel Avenue
2. Front Street @ Cathcart Street
3. Cathcart Street @ Pacific Avenue
4. Cathcart Street @ Cedar Street
5. Cathcart Street @ Project Driveway (plus Project scenarios only)

Based on the City's requirements, this transportation study was conducted for the study facilities for No Project under an Existing (2022) scenario and Plus Project conditions under Existing (2022) and Cumulative (2042) scenarios.

Significant findings of this study include:

- The proposed project is estimated to generate 2,144 new daily trips with 82 new trips occurring during the AM peak-hour and 269 new trips occurring during the PM peak-hour.
- As defined by the City, the addition of the proposed project to the Existing (2022) and Cumulative (2042) scenarios does not result in any of the study facilities operating below acceptable City LOS thresholds.
- Except for the northbound right movement at the Soquel Avenue intersection with Front Street (Intersection #1) and the eastbound right movement at the Cathcart intersection with Front Street (Intersection #2), the project does not cause any queue lengths to exceed the available storage or increase queue lengths that are deficient without the addition of the project. The northbound right movement at Intersection #1 is shared with the second through lane (shared through-right) and so the through trips affect the queue length at this intersection. As there is significant storage for the approach as a whole (one lane into two at the intersection) it is not anticipated that any safety issues will arise with this increased queue length. For the eastbound right movement at Intersection #2, while the 95th percentile queue exceeds the available storage, the average queue length is only 14-feet. In addition, the project only adds 4 trips per hour at this movement or one vehicle every 15 minutes. Therefore, no safety issues are anticipated at this intersection either due to the identified queue length with the addition of the project.

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INTRODUCTION

This report documents the results of a transportation impact study completed for the Santa Cruz Library project (the "proposed project", or "project"). The project proposes to construct a 38,086 square-foot library, a parking garage containing up to 400 spaces, 9,598 square-feet of commercial uses, a 1,905 square-foot day care, and 124 low-income residential dwelling units on the lot that includes one building located at 119 Lincoln Street and also City Parking Lot 4 at 600-698 Cedar Street in Santa Cruz, California. Access to the project site will be provided via one proposed connection to an existing roadway, Cathcart Street.

This study was performed in accordance with the scope of work approved by the City of Santa Cruz, and in a manner consistent with the City of Santa Cruz's *Transportation Study Requirements for Development*. The remaining sections of this report document the proposed project, analysis methodologies, deficiencies and improvements, and general study conclusions.

PROJECT DESCRIPTION

The project proposes to construct a 38,086 square-foot library, a parking garage containing up to 400 spaces, 9,598 square-feet of commercial uses, a 1,905 square-foot day care, and 124 low-income residential dwelling units on the lot that includes one building located at 119 Lincoln Street and also City Parking Lot 4 at 600-698 Cedar Street in Santa Cruz, California. Access to the project site will be provided via one proposed connection to an existing roadway, Cathcart Street. The project location is shown in **Figure 1** and the project site plan is shown in **Figure 2**. The following transportation facilities are included in this evaluation:

Intersections:

1. Front Street @ Soquel Avenue
2. Front Street @ Cathcart Street
3. Cathcart Street @ Pacific Avenue
4. Cathcart Street @ Cedar Street
5. Cathcart Street @ Project Driveway

Based on the City's requirements, this transportation study was conducted for the study facilities for No Project under an Existing (2022) scenario and Plus Project conditions under Existing (2022) and Cumulative (2042) scenarios.

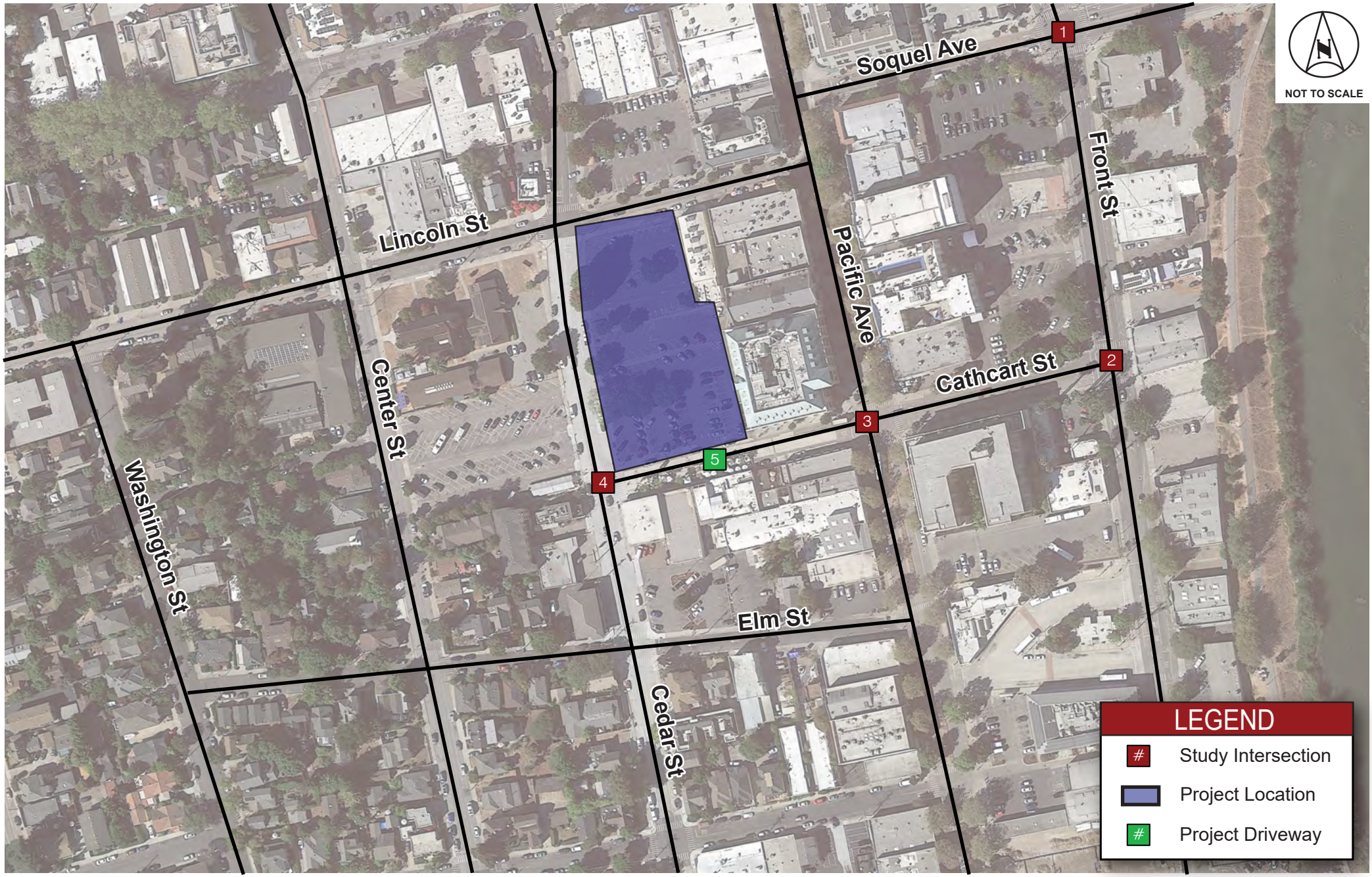
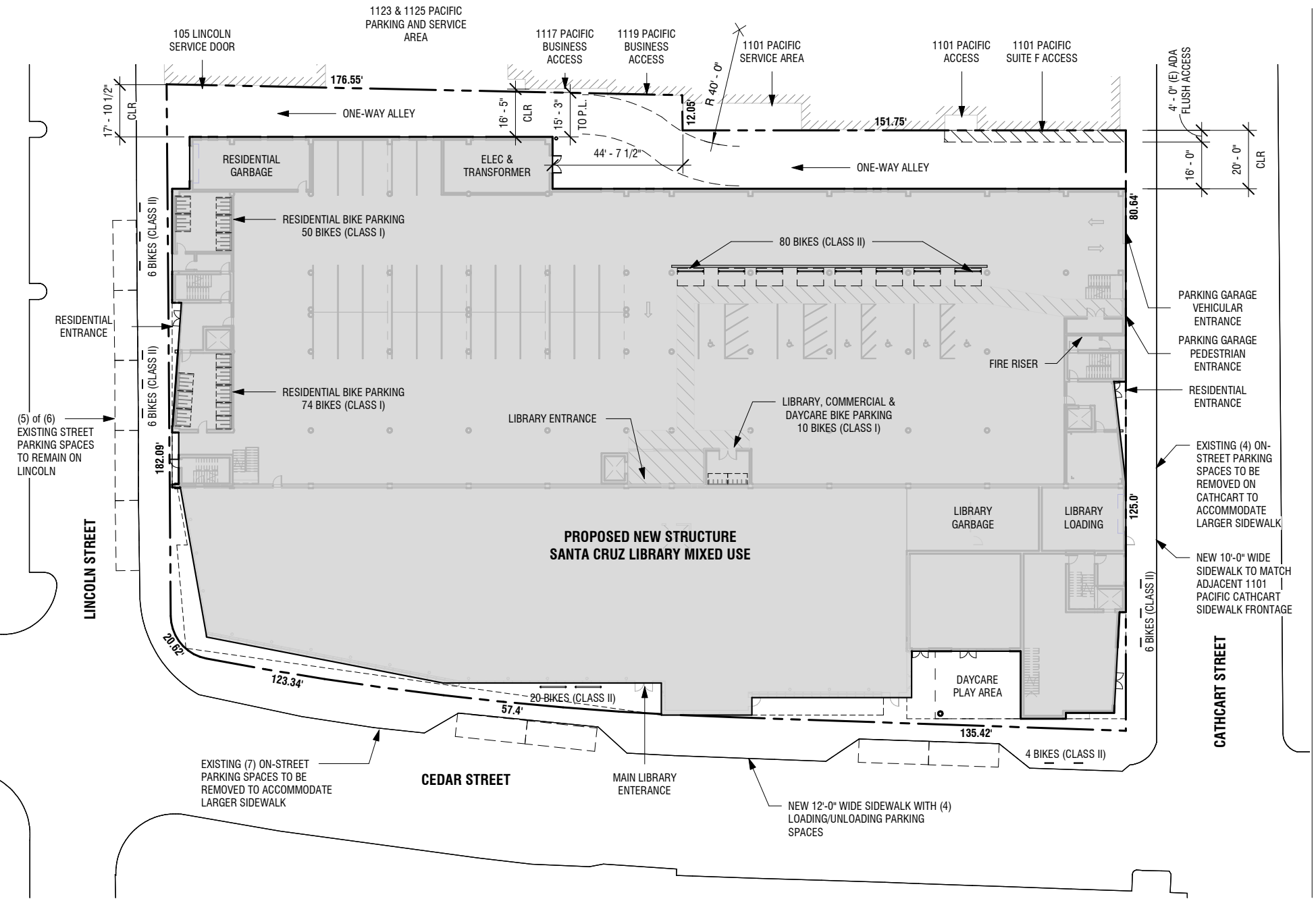


Figure 1
Project Vicinity Map



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SC LIBRARY MIXED USE
600-698 CEDAR STREET
SANTA CRUZ, CALIFORNIA
08/16/2022

Figure 2
Project Site Plan

PROJECT AREA ROADWAYS

The following are descriptions of the primary roadways in the vicinity of the project:

Soquel Avenue is an east-west principal arterial roadway that provides a primary connection between the east and west sides of Santa Cruz. The four-lane roadway carries approximately 15,300 vehicles per day[1] (vpd) between Pacific Avenue and Water Street in the vicinity of the proposed project location.

Front Street is a north-south minor arterial roadway that provides a primary connection from the project street (Cathcart Street) to Soquel Avenue. Between Laurel Street and River Street, Front Street carries approximately 13,800 vpd[1] with two through lanes in the Southbound direction and one through lane in the Northbound direction.

Cedar Street is a two-lane north-south collector roadway that runs from Center Street and ends at Sycamore Street. Cedar Street carries approximately 6,600 vpd[1] between Laurel Street and Lincoln Street.

Pacific Avenue is a two-lane north-south collector roadway that runs from Beach Street and ends at Water Street. Pacific Avenue is a one-way street between Cathcart Street and Church Street. Pacific Avenue carries approximately 3,400 vpd[1] between Laurel Street and Water Street.

ASSESSMENT OF PROPOSED PROJECT

Proposed Project Trip Generation and Assignment

The number of trips anticipated to be generated by the proposed project was approximated using data included in the *ITE Trip Generation Manual, 11th Edition*. The proposed project trip generation for the weekday AM and PM peak-hours is presented in Table 1. As shown in Table 1, the proposed project is estimated to generate 2,144 new daily trips with 82 new trips occurring during the AM peak-hour and 269 new trips occurring during the PM peak-hour.

As seen in Table 1, trips associated with the existing gym (Health/Fitness Club, ITE Land Use 492) were removed from the Net External Project Trips as directed by City of Santa Cruz staff. This is due to the proposed project replacing this existing gym when it is constructed. Therefore, these trips are already on the network and were included as part of the traffic counts collected.

Table 1 – Proposed Project Trip Generation

Land Use (ITE Code)	# Unit(s) / ksf	Daily Trips	AM Peak-Hour					PM Peak-Hour				
			Total Trips	IN		OUT		Total Trips	IN		OUT	
				%	Trips	%	Trips		%	Trips	%	Trips
Library (590)	38.1	2,653	52	71%	37	29%	15	338	48%	162	52%	176
Day Care Center (565)	1.9	91	21	52%	11	48%	10	21	48%	10	52%	11
Strip Retail Plaza (<40k) (822)	9.6	635	28	61%	17	39%	11	76	50%	38	50%	38
Multifamily Housing (Mid-Rise) (221)	124	545	43	23%	10	77%	33	49	61%	30	39%	19
Gross Project Trips		**3,924**	**144**	**-**	**75**	**-**	**69**	**484**	**-**	**240**	**-**	**244**
Reductions												
Health/Fitness Club (492)[1]	*5.3*	*-350*	*-7*	*23%*	*-4*	*49%*	*-3*	*-35*	*57%*	*-20*	*43%*	*-15*
40% Reduction for Downtown Area[2]		*-1,430*	*-55*	*-*	*-28*	*-*	*-27*	*-180*	*-*	*-88*	*-*	*-92*
Net External Project Trips:		**2,144**	**82**	**-**	**43**	**-**	**39**	**269**	**-**	**132**	**-**	**137**

Source: Trip Generation Manual, 11th Edition, ITE.

[1] Calculated under the basis that PM peak-hour represents 10% of daily trips. Daily trip generation numbers are not provided for this or similar Land Uses in ITE 11th Edition.

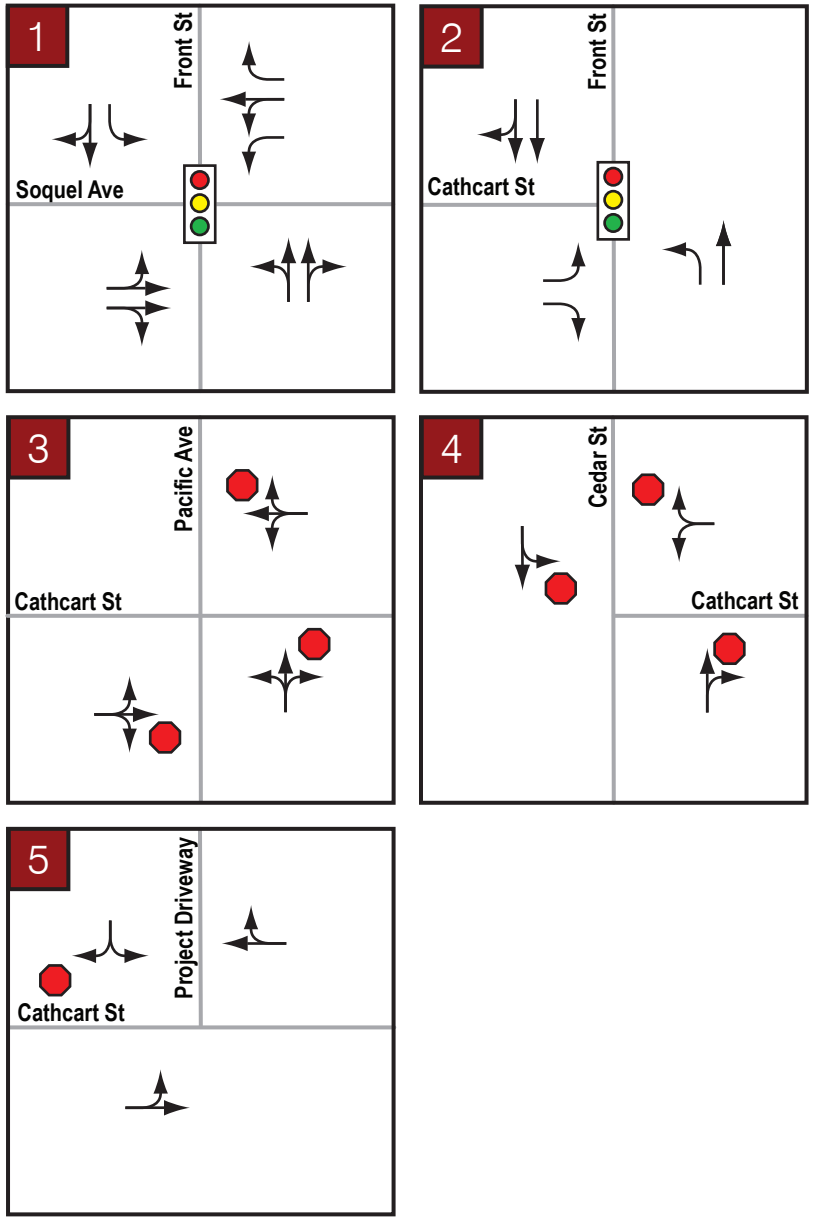
[2] 40% reduction for mixed use development in Downtown Santa Cruz per Santa Cruz Downtown Recovery Plan Amendment - Traffic Study, May 2017, Kimley-Horn and Associates. The reduction is generated by proximity to the Transit Center, mixed use internal capture, bicycle use, and walking trips. 40% reduction is applied to Project trips less existing fitness center trip reduction.

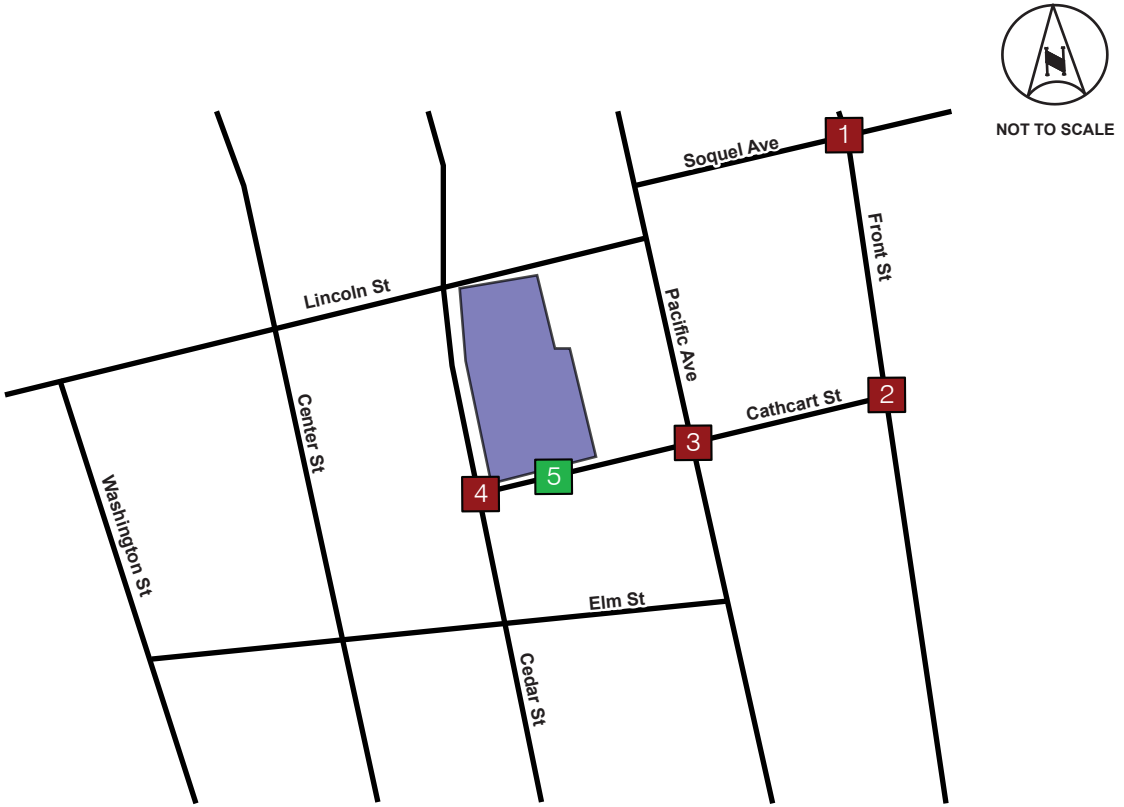
[1] *Santa Cruz County Average Daily Traffic Counts*, Santa Cruz County Regional Transportation Commission, 2015

Project traffic was distributed and assigned to the roadway network using a combination of existing traffic conditions and engineering judgement. Trip distributions were reviewed by the City of Santa Cruz in the *Trip Generation and Distribution*[2] memo submitted to the City on September 12, 2022. The proposed project trip AM and PM distribution percentages are provided in **Figure 3**. **Figure 4** depicts the study intersections' facilities, existing traffic control, and existing lane configurations. The assignment of AM and PM peak-hour project trips is depicted in **Figure 5**.

[2] *Santa Cruz Library Trip Generation and Distribution*, Kimley-Horn, September 2022

Figure 3
Project Trip Distribution





LEGEND

- # Study Intersection
- # Study Intersection (Project Driveway)
- Signalized Control
- Stop Control

Figure 4
Study Facilities with Lane Geometry

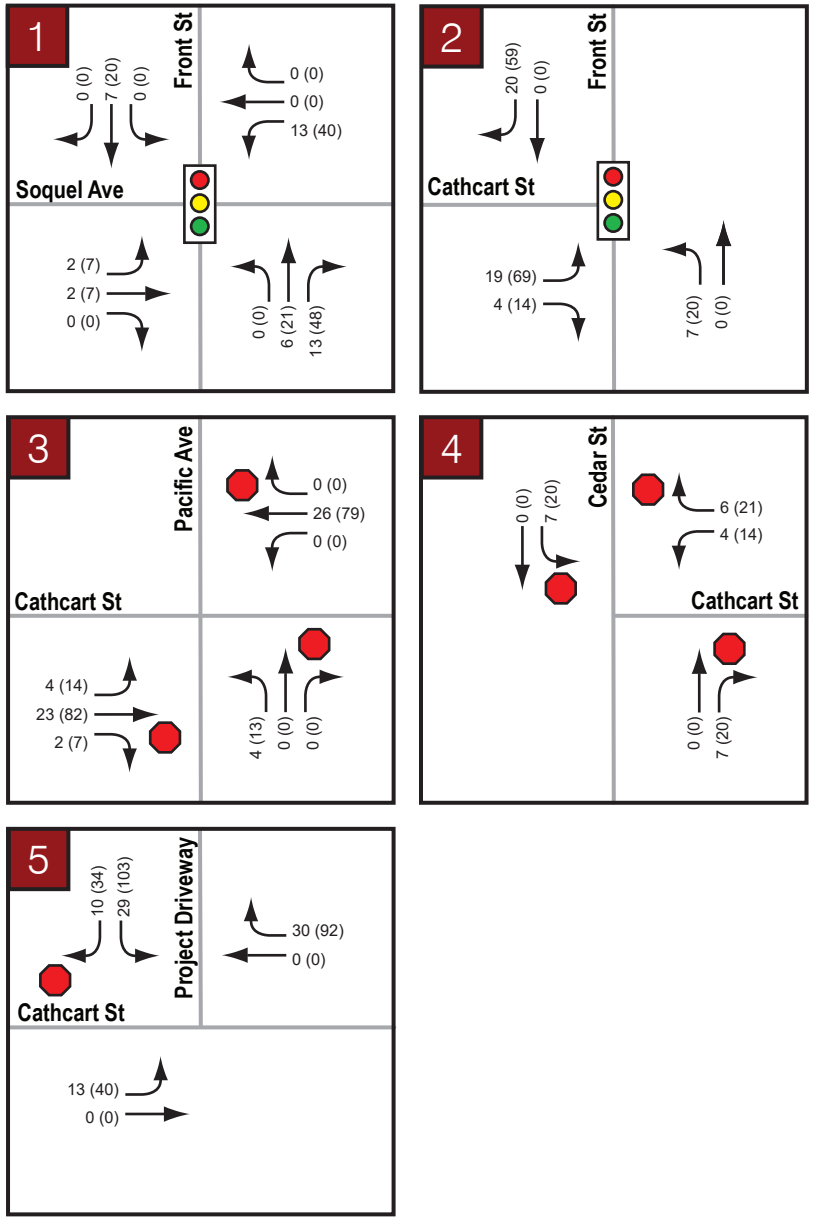


Figure 5
Study Facilities with Project Trip Assignments

TRANSPORTATION STUDY METHODOLOGY

This transportation study was performed in accordance with the City's transportation study guidelines[3].

Level of Service Definitions

The level of service (LOS) of a facility is a qualitative measure used to describe operational conditions. LOS ranges from A, which represents minimal delay, to F, which represents heavy delay and a facility that is operating at or near its functional capacity. LOS for this study was determined using methods defined in the *Highway Capacity Manual (HCM) 6th Edition ("HCM6")*.

Intersection Analysis

The HCM includes procedures for analyzing side-street stop controlled (SSSC), all-way stop controlled (AWSC), and signalized intersections. The SSSC procedure defines LOS as a function of average control delay for each minor street approach movement. Conversely, the AWSC and signalized intersection procedures define LOS as a function of average control delay for the intersection. Table 2 presents intersection LOS definitions as defined in the HCM.

Table 2 – Intersection Level of Service Criteria

Level of Service (LOS)	Un-Signalized	Signalized
	Average Control Delay* (sec/veh)	Average Control Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F	> 50	> 80

Source: Highway Capacity Manual, 6th Edition
* Applied to the worst lane/lane group(s) for SSSC

LOS for the study intersections was determined using the Synchro® traffic analysis software. Synchro 11 uses HCM6 methodology to analyze intersection delay and LOS.

Analysis Scenarios

As described in the following sections, the LOS analysis was conducted for the study facilities for the following scenarios: Existing (2022) Conditions, Existing (2022) plus Proposed Project Conditions, and Cumulative (2042) plus Proposed Project Conditions.

[3] *City of Santa Cruz Transportation Study Requirements for Development*, City of Santa Cruz, 2021

EXISTING (2022) CONDITIONS

Existing traffic counts were collected to establish the existing conditions of the study area intersections. Counts were performed in September 2022 between 7-9 AM and 4-6 PM during typical weekdays (Tuesday-Thursday) with a particular emphasis on capturing conditions during normal peak periods.

Traffic counts from December 2017 at Intersection #1 (Front Street and Soquel Avenue) and Intersection #2 (Front Street and Cathcart Street) were compared against counts taken at both intersections in September 2022. As the December 2017 counts were higher at both intersections, the difference in intersection volumes between 2017 and 2022 was used to develop a factor and "grow" the 2022 counts taken at Intersection #3 (Cathcart Street and Pacific Avenue) and Intersection #4 (Cathcart Street and Cedar Street). Traffic counts used in the Existing (2022) conditions for the analysis are December 2017 volumes at Intersection #1 and #2 and factored September 2022 volumes at Intersection #3 and #4.

It is important to note that Cathcart Street between Cedar Street and Pacific Avenue is currently operating as a one-way road with only westbound traffic. This is due to the closure of the eastbound lane for outdoor dining. As reopening of the eastbound lane is expected once the project is constructed, counts in the westbound direction at both Intersection #3 and #4 were estimated using engineering judgement and existing traffic flow patterns at proximate intersections.

Existing (2022) Conditions AM and PM peak-hour traffic volumes are presented in Figure 6. 2017 and 2022 traffic count data sheets, along with calculations showing intersection growth rate calculation, are provided in Appendix A. Analysis worksheets for the scenario are included in Appendix B.

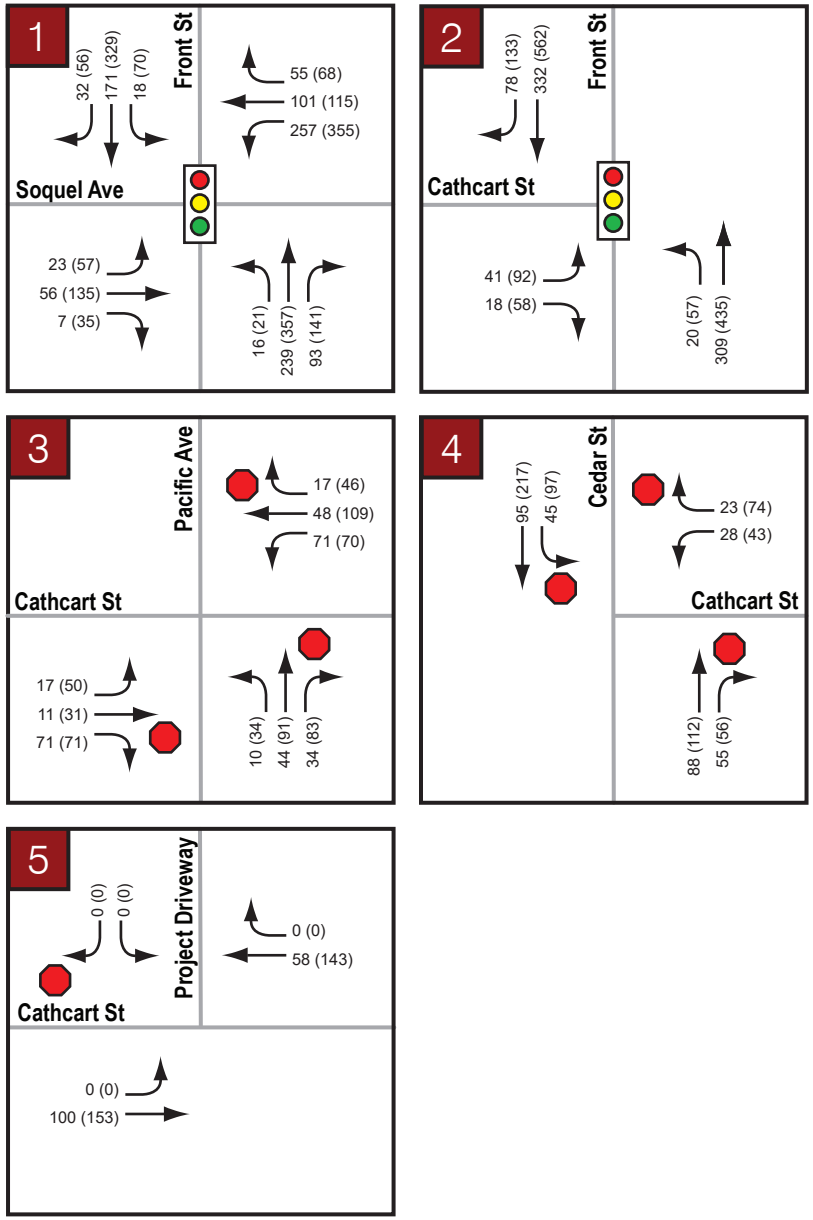
Intersections

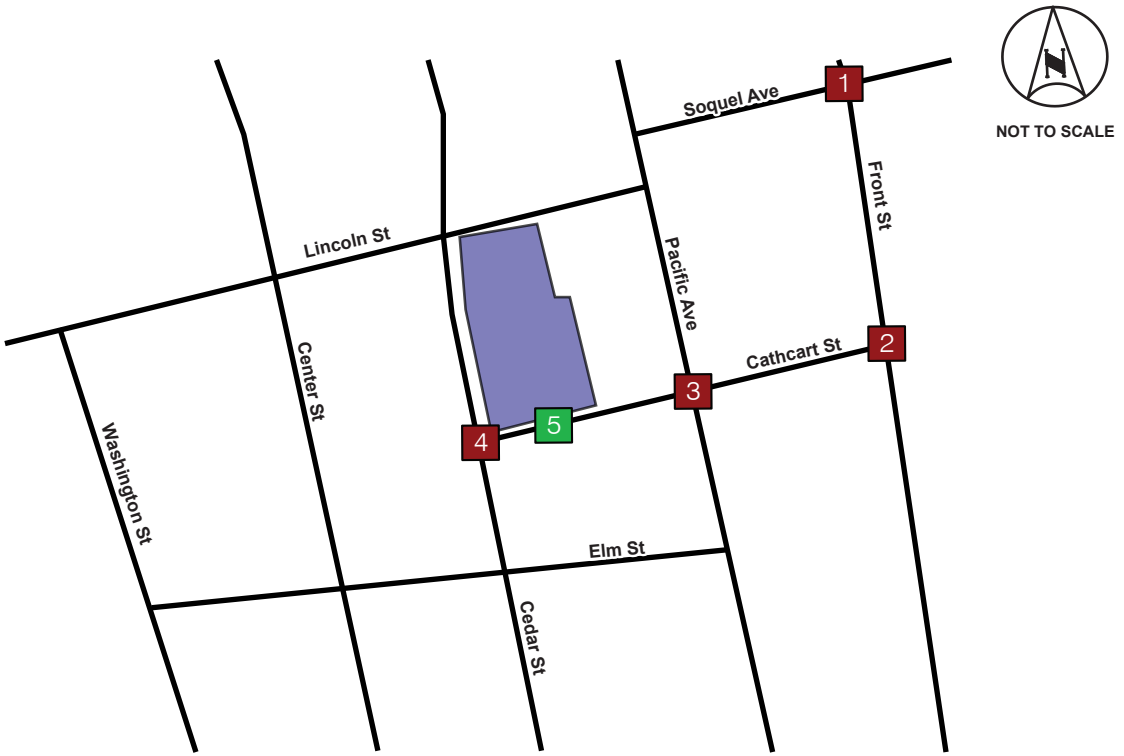
Table 3 presents the intersection operating conditions for this scenario. As indicated in Table 3, the study intersections operate between LOS A and LOS C during the AM and PM peak-hours.

Table 3 – Existing (2022) Intersection Levels of Service

ID	Intersection	LOS Threshold	Control	Peak Hour	Existing	
					Delay (sec)	LOS
1	Front Street @ Soquel Avenue	D	Signal	AM	32.6	C
				PM	24.7	C
2	Front Street @ Cathcart Street	D	Signal	AM	8.6	A
				PM	16.5	B
3	Cathcart Street @ Pacific Avenue	D	AWSC	AM	9.7	A
				PM	10.3	B
4	Cathcart Street @ Cedar Street	D	AWSC	AM	8.2	A
				PM	10.1	B
5	Cathcart Street @ Project Driveway	D	SSSC	AM	Not completed for scenario	
				PM		

Notes: **Bold** represents unacceptable operations.
Side Street Stop Controlled (SSSC) reported as intersection delay followed by worst approach's delay.





LEGEND

- Project Location
- # Study Intersection
- # Study Intersection (Project Driveway)
- Signalized Control
- Stop Control
- XX (XX) AM (PM) Peak-Hour Volumes

Figure 6
Study Facilities with Existing Turning Movement Volumes

EXISTING (2022) PLUS PROPOSED PROJECT CONDITIONS

As previously discussed, the number of trips anticipated to be generated by the proposed project was derived using data included in the *ITE Trip Generation Manual, 11th Edition*. These trips were then assigned to the roadway network using engineering judgement and existing roadway volume patterns. Using these volumes, LOS was determined at the study facilities. Existing (2022) plus Proposed Project peak-hour traffic volumes are presented in Figure 7 for the AM and PM peak-hours. Analysis worksheets for the scenario are included in Appendix C.

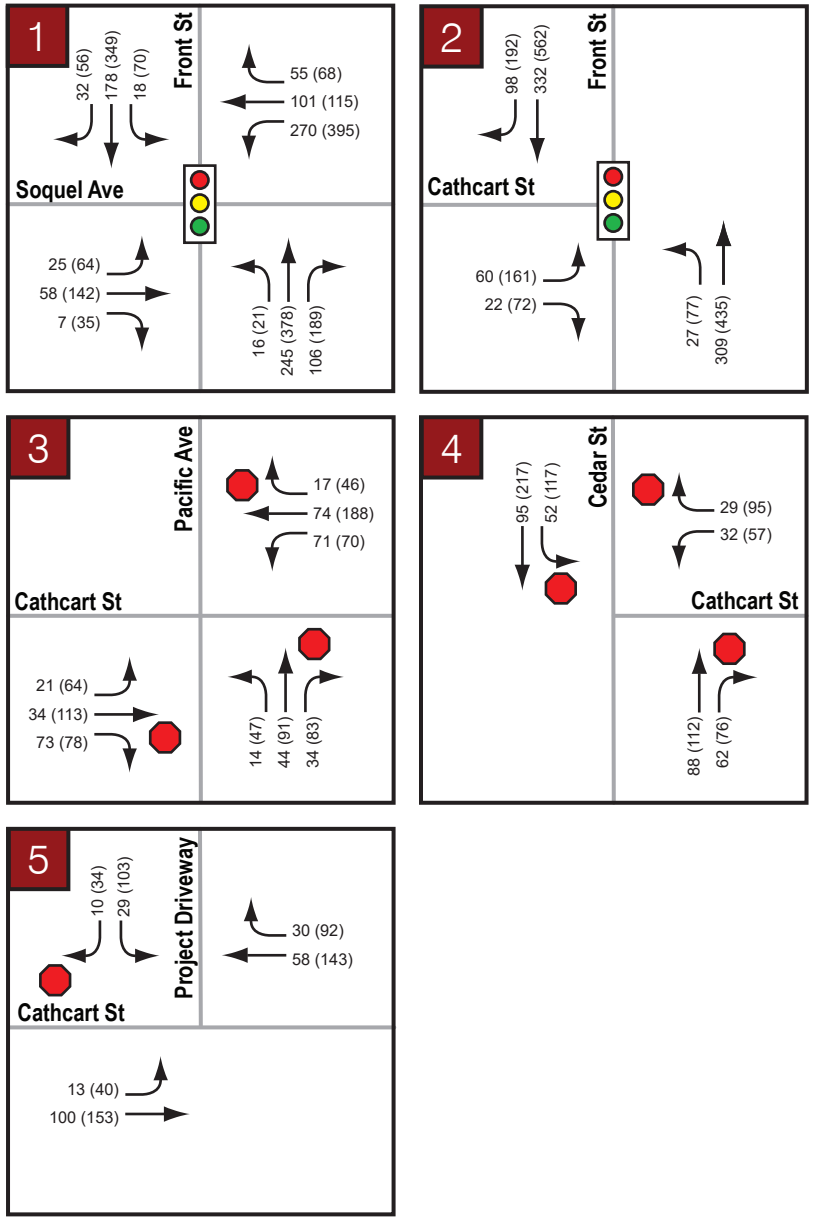
Intersections

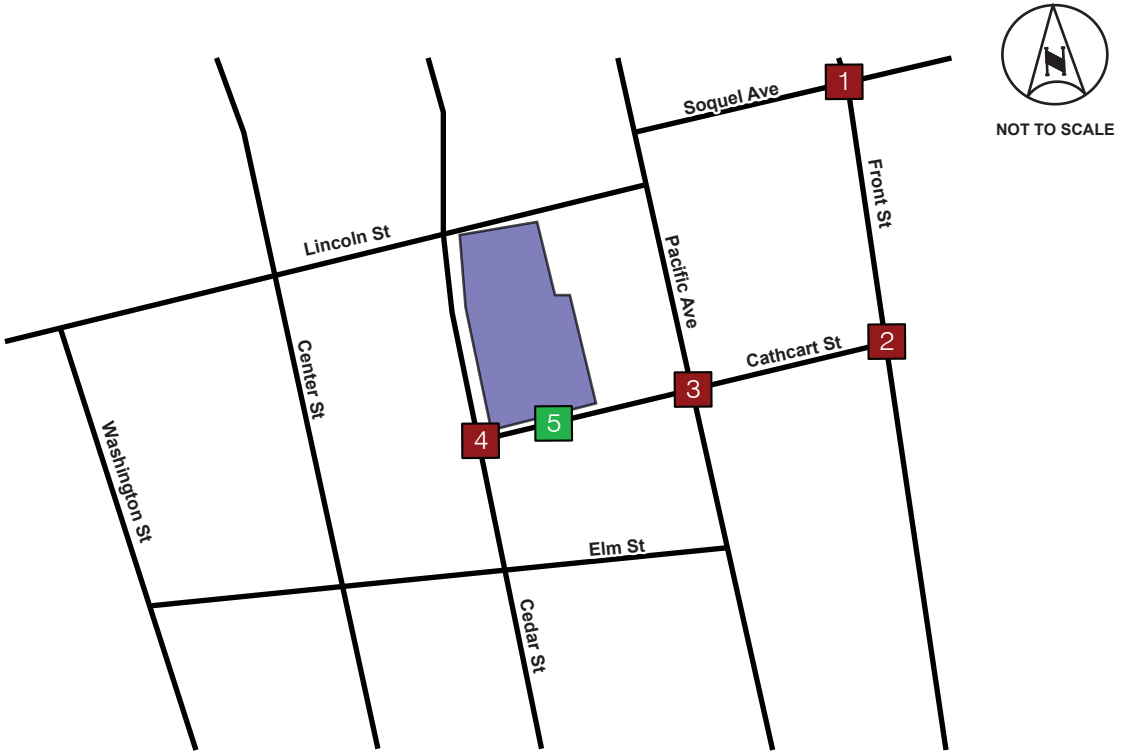
Table 4 presents the intersection operating conditions for this analysis scenario. As indicated in Table 4, the study intersections operate between LOS A and LOS D during the AM and PM peak-hours.

Table 4 – Existing (2022) plus Proposed Project Intersection Levels of Service

ID	Intersection	LOS Threshold	Control	Peak Hour	Existing		Existing plus Proposed Project	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Front Street @ Soquel Avenue	D	Signal	AM	32.6	C	32.8	C
				PM	24.7	C	37.4	D
2	Front Street @ Cathcart Street	D	Signal	AM	8.6	A	9.5	A
				PM	16.5	B	14.7	B
3	Cathcart Street @ Pacific Avenue	D	AWSC	AM	9.7	A	11.7	B
				PM	10.3	B	16.0	C
4	Cathcart Street @ Cedar Street	D	AWSC	AM	8.2	A	8.4	A
				PM	10.1	B	10.9	B
5	Cathcart Street @ Project Driveway	D	SSSC	AM	Not completed for scenario		1.9 (9.9 SB)	A
				PM			3.6 (14.0 SB)	B

Notes: **Bold** represents unacceptable operations. Shaded represents a project induced deficiency.
Side Street Stop Controlled (SSSC) reported as intersection delay followed by worst approach's delay.





LEGEND

- Project Location
- # Study Intersection
- # Study Intersection (Project Driveway)
- Signalized Control
- Stop Control
- XX (XX) AM (PM) Peak-Hour Volumes

Kimley»Horn

Figure 7

1.522 *Study Facilities with Existing Plus Project Turning Movement Volumes*

CUMULATIVE (2042) PLUS PROPOSED PROJECT CONDITIONS

Peak-hour traffic volumes for Cumulative conditions were obtained from the City of Santa Cruz 2030 General Plan and include the growth anticipated by the University of Santa Cruz[4]. The volumes provided by the City, which can be found in Appendix E, were available for the two Front Street intersections with Soquel Avenue and Cathcart Street (Intersection #1 and Intersection #2). The volumes for the remaining Cathcart Street intersections (Intersections #3 – #5) were developed using a mix of volume balancing from the Cathcart Street intersection with Front Street (Intersection #2) and interpolating the background growth from the Santa Cruz County Travel Demand Model (SCC TDM) between the model's base year (2019) and future year (2040) and adding it to the counts obtained for Existing Conditions. The project volumes for the PM peak-hour were then layered on top of the volumes for Cumulative conditions to obtaining intersection turning movement volumes for Cumulative plus Project Conditions.

Using the volumes developed for Cumulative plus Project conditions, LOS was determined at the study facilities. Cumulative (2042) plus Proposed Project peak-hour traffic volumes are presented in Figure 8 for the AM and PM peak-hours. Detailed calculations are included in Appendix D.

Intersections

Table 5 presents the intersection operating conditions for this scenario. As indicated in Table 5, the study intersections operate between LOS A and LOS F. All intersections except the Front Street intersection with Soquel Avenue (Intersection #1) operate within the City's LOS threshold of LOS D.

Table 5 – Cumulative (2042) plus Proposed Project Intersection Levels of Service

ID	Intersection	LOS Threshold	Control	Peak Hour	Existing plus Proposed Project		Cumulative plus Proposed Project	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Front Street @ Soquel Avenue	D	Signal	PM	37.4	D	**206.0**	**F**
2	Front Street @ Cathcart Street	D	Signal	PM	14.7	B	25.6	C
3	Cathcart Street @ Pacific Avenue	D	AWSC	PM	16.0	C	27.0	D
4	Cathcart Street @ Cedar Street	D	AWSC	PM	10.9	B	16.2	C
5	Cathcart Street @ Project Driveway	D	SSSC	PM	3.6 (14.0 SB)	B	3.5 (15.9 SB)	B

Notes: **Bold** represents unacceptable operations.
Side Street Stop Controlled (SSSC) reported as intersection delay followed by worst approach's delay.

[4] *Transportation Study Requirements for Development – Cumulative Buildout Volumes City of Santa Cruz Critical Intersections*. City of Santa Cruz. August 6, 2021.

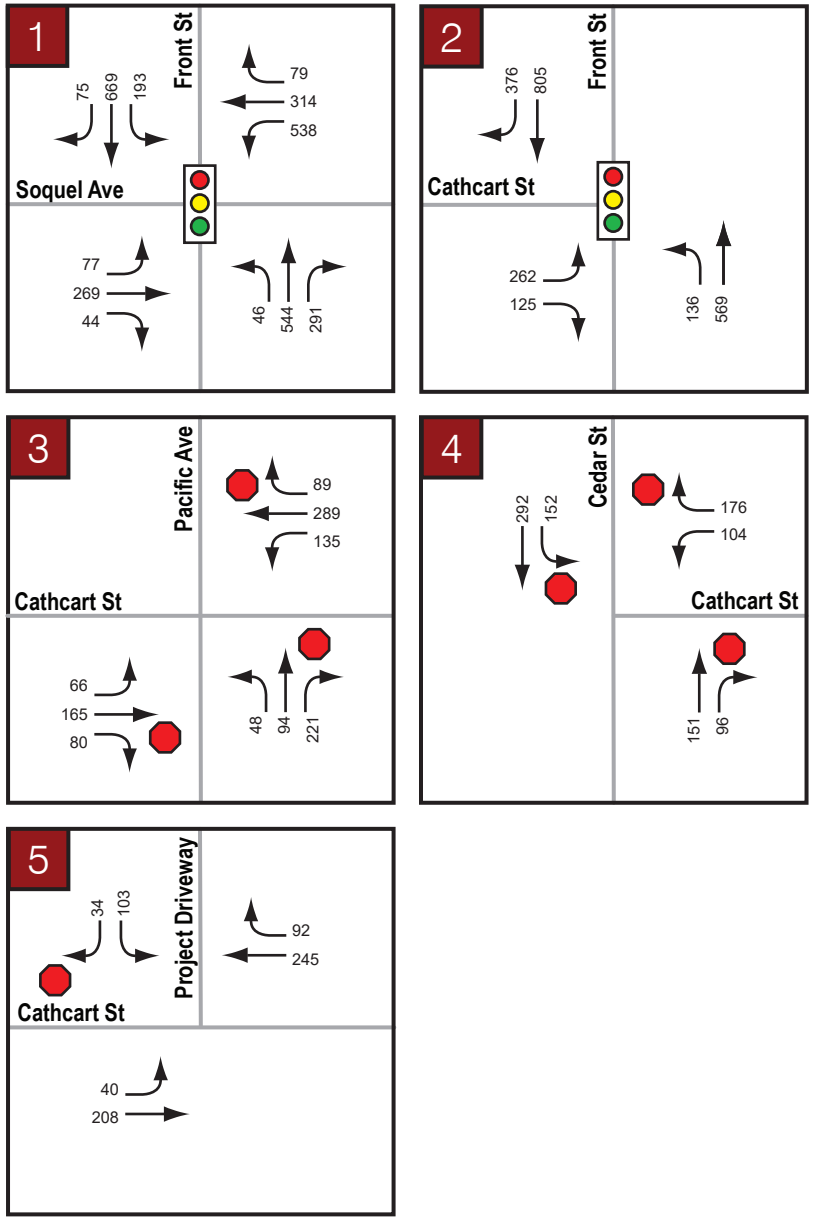


Figure 8
Study Facilities with Cumulative Plus Project PM Peak-Hour Turning Movement Volumes

DEFICIENCIES AND IMPROVEMENTS

Standards of Deficiency

The City of Santa Cruz's *Transportation Study Requirements for Development*[3] was referenced to identify standards of deficiency at the study area intersections. The following criteria were used:

> *The project traffic added to existing conditions would result in the level of service deteriorating below the City standard and would be more than 3% over existing total volume at the studied intersection. The City's current level of service standard is LOS D.*
>
> *The project traffic together with General Plan buildout and update traffic would result in a drop below the level of service standard for the City of Santa Cruz. (This is defined as a cumulatively considerable effect irrespective of the proportional increase to traffic volumes).*
>
> *The project conflicts with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.*
>
> *If the project site design does not have adequate parking or circulation capacity to accommodate the anticipated demand. (Parking demand shall be measured first using the City Parking requirements but may be adjusted using ITE 85 percentile parking generation rates and shared parking analysis factors at the discretion of the City Engineer and Transportation Manager). The City Parking Ordinance allows reductions but these must be thoroughly substantiated and quantified in the analysis, and they are not generally all applicable to a project.*

Summary of Deficiencies and Improvements

Existing (2022) plus Proposed Project Conditions

As reflected in Table 4, the addition of the proposed project results in no intersection deficiencies as defined by the City. The lowest LOS exhibited at any one study facilities is C under the Existing plus Proposed Project scenario.

Cumulative (2042) plus Proposed Project Conditions

As reflected in Table 5, the addition of the proposed project results in one intersection deficiency at the Front Street intersection with Soquel Avenue (Intersection #1) as defined by the City of Santa Cruz. Using the improvements proposed for Front Street as part of the Downtown Intersections Improvement Plan, the LOS and delay can be reduced from F to E and 206.0 to 73.7, respectively, as shown in Table 6. The analysis worksheet for Intersection #1 for Cumulative plus Proposed Project (Improved) conditions can be found at the end of Appendix D. The improvements include modifying the eastbound approach from a thru-left and thru-right to a dedicated left-turn lane and a thru-right. In addition, the southbound approach was modified to include a dedicated left-turn lane and an all-movement (left-thru-right) lane. While no feasible improvements were identified that would reduce the LOS and delay to LOS D, it should be noted that under the City's existing General Plan, the City accepts a lower LOS at some major regional intersections such as this one per Circulation Policy 5.1.2.

Table 6 – Cumulative (2042) plus Proposed Project plus Improvements Intersection Levels of Service

ID	Intersection	LOS Threshold	Control	Peak Hour	Cumulative (2042) plus Proposed Project		Cumulative (2042) plus Proposed Project (Improved)	
					Delay (sec)	LOS	Delay (sec)	LOS
1	Front Street @ Soquel Avenue	D	Signal	PM	**206.0**	**F**	**73.7**	**E**

Notes: **Bold** represents unacceptable operations. The City of Santa Cruz has established LOS D as the minimum acceptable LOS for overall intersection operations during the AM and PM peak hours. However, under the existing General Plan, the City accepts a lower LOS (E) at some major regional intersections per existing Circulation Policy 5.1.2.

VEHICLE MILES TRAVELED (VMT)

The proposed project is located in a VMT Efficient Area based on the Santa Cruz County Residential Screening Map[5]. This means that based on the VMT per capita threshold set by the City and County, the proposed project is located in an area that produces VMT per capita that is at least 15-percent below the Countywide average. Therefore, as noted in the memo developed by the City's Public Works Department and provided as Appendix F, the VMT for the proposed project is assumed to be less than significant in accordance with the adopted City of Santa Cruz guidelines.

OTHER CONSIDERATIONS

Intersection Queuing Evaluation

A queuing study was conducted to evaluate the capacity of the existing turn lanes at the study intersections. Synchro reports were used to conduct the queuing analysis. The 95th percentile vehicle queues were compared against the existing vehicle storage lengths at select intersection movements to determine if the queues are anticipated to exceed their available storage. Results of the queuing evaluation are presented in Table 7. Analysis sheets that include the anticipated vehicle queues are presented in Appendices B – D.

As presented in Table 7, the addition of the proposed project adds relatively small amounts of additional queuing except at the Front Street intersection with Soquel Avenue (Intersection #1). Shaded cells in the table represent conditions where the reported queue exceeds available vehicle storage capacity by more than one car length (25 ft). The addition of the proposed project results in the following:

- Except for the northbound right movement at the Soquel Avenue intersection with Front Street (Intersection #1) and both the eastbound right and northbound left movements at the Cathcart intersection with Front Street (Intersection #2), the project does not cause any queue lengths to exceed the available storage or increase queue lengths that are deficient without the addition of the project.
    - The northbound right movement at Intersection #1 is shared with the second through lane (shared through-right), so the through trips affect the queue length at this intersection. As there is significant storage for the approach as a whole (one lane into two at the intersection) it is not anticipated that any safety issues will arise with this increased queue length. In addition, improvements are planned for this intersection in the near future that would improve safety for all users by slightly modifying the intersection geometry (eastbound number one lane will be converted from a through-left to a left-only lane) and adding additional bicyclist infrastructure such as bike lane striping across the intersection for the Front Street approaches and a bike box for the westbound approach.
    - For the eastbound right movement at Intersection #2, while the 95th percentile queue exceeds the available storage, the average queue length is only 25-feet (one vehicle length). In addition, the project only adds 4 trips per hour at this movement or one vehicle every 15 minutes. Therefore, no safety issues are anticipated at this intersection either due to the identified queue length with the addition of the project.
    - For the northbound left movement at Intersection #2, while the 95th percentile queue exceeds the available storage, the average queue length is 70-feet, less than the available storage. In addition, the project only adds 7 trips per hour at this movement or two vehicles every 15 minutes. Therefore, no safety issues are anticipated at this intersection.
- At the Cathcart Street intersection with the Project Driveway (Intersection #5), the 95th percentile queue for the eastbound left movement is one vehicle or 25-feeet. There are no anticipated safety issues related to off-street queuing at Intersection #5.

5 *Analyzing Vehicle Miles Traveled for CEQA Compliance. SB 743 Implementation Guidelines for the County of Santa Cruz*. Santa Cruz County Planning Department. Implemented July 2020. Updated May 2021.

Table 7 – Intersection Queuing Evaluation Results

Intersection / Analysis Scenario	Movement	AM Peak-Hour		PM Peak-Hour	
		Available Storage (ft)	95th % Queue (ft)	Available Storage (ft)	95th % Queue (ft)
#1, Front Street @Soquel Avenue	NBR				
Existing (2022)		100	80	100	151
Existing (2022) plus Proposed Project			83		177
Cumulative (2042) plus Proposed Project			-		516
	NBL				
Existing (2022)		-	80	-	151
Existing (2022) plus Proposed Project			83		177
Cumulative (2042) plus Proposed Project			-		516
	WBL				
Existing (2022)		-	168	-	214
Existing (2022) plus Proposed Project			172		229
Cumulative (2042) plus Proposed Project			-		470
#2, Front Street @Cathcart Street	EBR				
Existing (2022)		25	16	25	24
Existing (2022) plus Proposed Project			17		37
Cumulative (2042) plus Proposed Project			-		70
	NBL				
Existing (2022)		100	24	100	56
Existing (2022) plus Proposed Project			29		72
Cumulative (2042) plus Proposed Project			-		171
	SBR				
Existing (2022)		-	60	-	127
Existing (2022) plus Proposed Project			65		135
Cumulative (2042) plus Proposed Project			-		236
#3, Cathcart Street @Pacific Avenue	EBR				
Existing (2022)		-	75	-	50
Existing (2022) plus Proposed Project			100		150
Cumulative (2042) plus Proposed Project			-		100
	NBL				
Existing (2022)		-	25	-	50
Existing (2022) plus Proposed Project			25		50
Cumulative (2042) plus Proposed Project			-		125
#4, Cathcart Street @Cedar Street	WBL/R				
Existing (2022)		-	25	-	25
Existing (2022) plus Proposed Project			25		25
Cumulative (2042) plus Proposed Project			-		75
	NBR				
Existing (2022)		-	25	-	25
Existing (2022) plus Proposed Project			25		50
Cumulative (2042) plus Proposed Project			-		50
	SBL				
Existing (2022)		-	25	-	75
Existing (2022) plus Proposed Project			25		75
Cumulative (2042) plus Proposed Project			-		150
#5, Cathcart Street @ Project Driveway	EBL				
Existing (2022) plus Proposed Project		-	25	-	25
Cumulative (2042) plus Proposed Project			-		25

Source: *Highway Capacity Manual (HCM) 2016* methodology per Synchro© v11/Simtraffic.
Notes: For approaches with dual left-turn lanes, the longest queue length is reported.
*Minimal 95th Percentile Queue, shaded cell indicates queue exceeds storage by > 25' (one vehicle length)

On-Site Transportation Review

In accordance with the City's *Guidelines*[3], the following aspects of the proposed project were evaluated:

1. *Proximity of proposed site driveway(s) to other driveways or intersections*
   Access to the site is provided via one (1) proposed roadway connections to Cathcart Street and one (1) one-way alley. A one-way alley follows the east side of the development and connects Cathcart Street and Lincoln Street. Both access points will be sufficient to serve delivery trucks, fire trucks, and other oversized vehicles.
2. *Adequacy of vehicle parking relative to both the anticipated demand and zoning code requirements*
   All required parking is anticipated to be accommodated entirely on-site. While existing on-street and off-street parking spaces will be removed with the addition of the project, a comparable number of parking spots will be included as part of the proposed project.
3. *Adequacy of the project site design to convey all vehicle types*
   The site will include access which is anticipated to accommodate the circulation needs of all vehicle types, including fire access. The proposed project will be utilizing proposed roadway connections to Cathcart Street and Lincoln Street.
4. *Adequacy of sight distance on-site*
   It is anticipated that sufficient sight distance for the proposed project driveway will be provided in a manner consistent with the guidelines presented in the *Geometric Design of Highways and Streets*, published by the American Association of State Highway and Transportation Officials (AASHTO), and the *Highway Design Manual*, published by Caltrans. According to the project site plan (**Figure 2**) there appears to be adequate sight distance on-site to facilitate safe and orderly circulation. It should also be noted that the entrance for the parking garage will be set back and an open-air design with support pillars will provide exiting vehicles with sight lines in both directions, including of the sidewalk for approaching directions. This contrasts with many garages designed with walls until the exit point. The project design will provide adequate sight distance for exiting vehicles of both oncoming vehicles and pedestrians.

Other Transportation-Related Deficiencies and Improvement Considerations

In accordance with the City's *Guidelines*[3], the proposed project was evaluated against the following *General Plan* goals:

- *Emergency Vehicle Access*
  The Fire Code of Santa Cruz County (Chapter 7.92)[6] states that fire apparatus access roads shall be a minimum of "12 ft (3658 mm) for an access road or driveway serving two or fewer habitable structures." As shown in project site plan (**Figure 2**), the project site will allow fire access to all parcels with a minimum alley width of 15'-3". As such, the proposed project is considered to allow for adequate access and on-site circulation for emergency vehicles.
- *Deliveries of Goods and Services*
  The proposed project is considered to allow for adequate on-site circulation for all vehicle types, including delivery vehicles for goods and services. Delivery vehicles will be able to circulate the site using access to the parking garage from Cathcart Street.
- *Access to Public Transit Services consistent with the City of Santa Cruz 2030 General Plan GOAL M1: "Land use patterns, street design, parking, and access solutions that facilitate multiple transportation alternatives (Cf. Lu4 Lu4.1.1, Lu4.2, ED1.9.2, and M2.2, 2.3.2, and 3.1.9)"*[7]
  There is a transit center located approximately 1,000 feet southeast of the project site. The site is connected to existing pedestrian facilities and is planned to improve the pedestrian facilities adjacent to the site by widening sidewalks.

[6] *Santa Cruz County Code – Chapter 7.92 FIRE CODE*, Santa Cruz County
[7] *City of Santa Cruz 2030 General Plan*, City of Santa Cruz

- *Non-Motorized Transportation consistent with the City of Santa Cruz 2030 General Plan GOAL M2: "A safe, sustainable, efficient, adaptive, and accessible transportation system"* [7]
  Bike parking facilities will be installed throughout the project site, with a total of 256 Class II bike parking spots.

CONCLUSIONS

Significant findings of this study include:

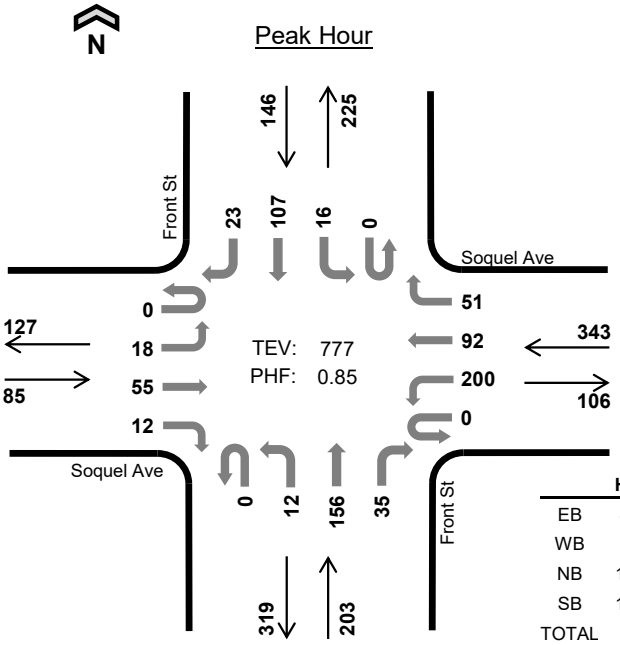
- The proposed project is estimated to generate 2,144 new daily trips with 82 new trips occurring during the AM peak-hour and 269 new trips occurring during the PM peak-hour.
- As defined by the City, the addition of the proposed project to the Existing (2022) Conditions does not result in any of the study facilities operating below acceptable City LOS thresholds.
- For Cumulative (2042) plus Proposed Project conditions, the addition of the proposed project results in one intersection deficiency at the Front Street intersection with Soquel Avenue (Intersection #1) as defined by the City of Santa Cruz. Using the improvements proposed for Front Street as part of the Downtown Intersections Improvement Plan, the LOS and delay can be reduced from F to E and 206.0 to 73.7, respectively, as shown in Table 6. The improvements include modifying the eastbound approach from a thru-left and thru-right to a dedicated left-turn lane and a thru-right. In addition, the southbound approach was modified to include a dedicated left-turn lane and an all-movement (left-thru-right) lane. No feasible improvements were identified that would reduce the LOS and delay to LOS D.
- Except for the northbound right movement at the Soquel Avenue intersection with Front Street (Intersection #1) and both the eastbound right and northbound left movements at the Cathcart intersection with Front Street (Intersection #2), the project does not cause any queue lengths to exceed the available storage or increase queue lengths that are deficient without the addition of the project.
  - The northbound right movement at Intersection #1 is shared with the second through lane (shared through-right), so the through trips affect the queue length at this intersection. As there is significant storage for the approach as a whole (one lane into two at the intersection) it is not anticipated that any safety issues will arise with this increased queue length.
  - For the eastbound right movement at Intersection #2, while the 95th percentile queue exceeds the available storage, the average queue length is only 25-feet (one vehicle length). In addition, the project only adds 4 trips per hour at this movement or one vehicle every 15 minutes. Therefore, no safety issues are anticipated at this intersection either due to the identified queue length with the addition of the project.
  - For the northbound left movement at Intersection #2, while the 95th percentile queue exceeds the available storage, the average queue length is 70-feet, less than the available storage. In addition, the project only adds 7 trips per hour at this movement or two vehicles every 15 minutes. Therefore, no safety issues are anticipated at this intersection.
- At the Cathcart Street intersection with the Project Driveway (Intersection #5), the 95th percentile queue for the eastbound left movement is one vehicle or 25-feeet. There are no anticipated safety issues related to off-street queuing at Intersection #5.
- The entrance for the parking garage will be set back and an open-air design with support pillars will provide exiting vehicles with sight lines in both directions, including of the sidewalk for approaching directions. This contrasts with many garages designed with walls until the exit point. The project design will provide adequate sight distance for exiting vehicles of both oncoming vehicles and pedestrians.

Appendix A

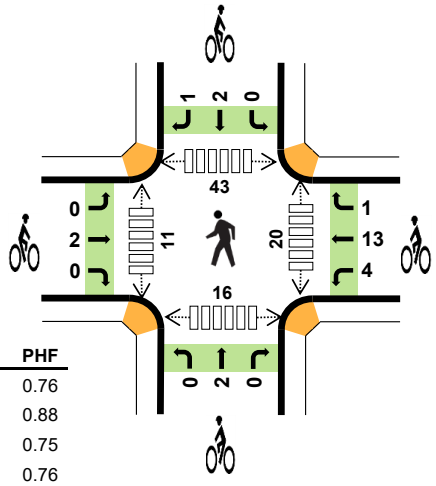
Traffic Count Data Sheets

Front St
Soquel Ave

Date: 09/15/2022
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 8:00 AM to 9:00 AM



	HV %:	PHF
EB	4.7%	0.76
WB	7.9%	0.88
NB	11.3%	0.75
SB	11.6%	0.76
TOTAL	9.1%	0.85



Two-Hour Count Summaries

Interval Start	Soquel Ave Eastbound				Soquel Ave Westbound				Front St Northbound				Front St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	2	1	0	0	24	6	1	0	1	19	3	0	0	9	0	66	0
7:15 AM	0	4	9	0	0	19	11	3	0	2	18	2	0	3	20	1	92	0
7:30 AM	0	1	4	2	0	26	9	4	0	2	18	12	0	6	19	3	106	0
7:45 AM	0	1	4	4	0	29	8	8	0	1	35	9	0	5	18	3	125	389
8:00 AM	**0**	**4**	**8**	**4**	**0**	**47**	**24**	**3**	**0**	**2**	**36**	**12**	**0**	**5**	**21**	**4**	**170**	493
8:15 AM	**0**	**2**	**14**	**4**	**0**	**43**	**30**	**7**	**0**	**4**	**36**	**5**	**0**	**3**	**25**	**4**	**177**	578
8:30 AM	**0**	**7**	**19**	**2**	**0**	**58**	**19**	**20**	**0**	**0**	**32**	**8**	**0**	**4**	**27**	**5**	**201**	673
8:45 AM	**0**	**5**	**14**	**2**	**0**	**52**	**19**	**21**	**0**	**6**	**52**	**10**	**0**	**4**	**34**	**10**	**229**	**777**
Count Total	0	26	73	18	0	298	126	67	0	18	246	61	0	30	173	30	1,166	0
Peak Hour All	**0**	**18**	**55**	**12**	**0**	**200**	**92**	**51**	**0**	**12**	**156**	**35**	**0**	**16**	**107**	**23**	**777**	**0**
Peak Hour HV	**0**	**0**	**3**	**1**	**0**	**22**	**3**	**2**	**0**	**0**	**17**	**6**	**0**	**3**	**12**	**2**	**71**	**0**
Peak Hour HV%	**-**	**0%**	**5%**	**8%**	**-**	**11%**	**3%**	**4%**	**-**	**0%**	**11%**	**17%**	**-**	**19%**	**11%**	**9%**	**9%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	2	4	3	*9*	0	1	0	0	*1*	3	8	8	3	*22*
7:15 AM	1	3	6	6	*16*	0	2	1	0	*3*	0	1	13	2	*16*
7:30 AM	1	4	4	6	*15*	1	4	2	1	*8*	3	7	13	4	*27*
7:45 AM	0	6	6	2	*14*	0	1	1	0	*2*	3	2	10	4	*19*
8:00 AM	**1**	**6**	**4**	**3**	***14***	**2**	**4**	**0**	**1**	***7***	**7**	**2**	**9**	**7**	*25*
8:15 AM	**1**	**7**	**5**	**5**	***18***	**0**	**9**	**0**	**1**	***10***	**6**	**3**	**15**	**5**	*29*
8:30 AM	**1**	**6**	**6**	**4**	***17***	**0**	**3**	**1**	**1**	***5***	**5**	**3**	**10**	**0**	*18*
8:45 AM	**1**	**8**	**8**	**5**	***22***	**0**	**2**	**1**	**0**	***3***	**2**	**3**	**9**	**4**	***18***
Count Total	6	42	43	34	*125*	3	26	6	4	*39*	29	29	87	29	*174*
Peak Hour	**4**	**27**	**23**	**17**	***71***	**2**	**18**	**2**	**3**	***25***	**20**	**11**	**43**	**16**	***90***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Soquel Ave Eastbound				Soquel Ave Westbound				Front St Northbound				Front St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	2	0	0	0	0	2	2	0	0	3	0	9	0
7:15 AM	0	0	1	0	0	2	0	1	0	0	5	1	0	0	5	1	16	0
7:30 AM	0	0	0	1	0	4	0	0	0	0	3	1	0	0	6	0	15	0
7:45 AM	0	0	0	0	0	5	1	0	0	0	4	2	0	0	2	0	14	54
8:00 AM	**0**	**0**	**0**	**1**	**0**	**5**	**1**	**0**	**0**	**0**	**3**	**1**	**0**	**1**	**2**	**0**	**14**	59
8:15 AM	**0**	**0**	**1**	**0**	**0**	**6**	**0**	**1**	**0**	**0**	**5**	**0**	**0**	**1**	**4**	**0**	**18**	61
8:30 AM	**0**	**0**	**1**	**0**	**0**	**5**	**0**	**1**	**0**	**0**	**3**	**3**	**0**	**0**	**4**	**0**	**17**	63
8:45 AM	**0**	**0**	**1**	**0**	**0**	**6**	**2**	**0**	**0**	**0**	**6**	**2**	**0**	**1**	**2**	**2**	**22**	**71**
Count Total	0	0	4	2	0	35	4	3	0	0	31	12	0	3	28	3	125	0
Peak Hour	**0**	**0**	**3**	**1**	**0**	**22**	**3**	**2**	**0**	**0**	**17**	**6**	**0**	**3**	**12**	**2**	**71**	**0**

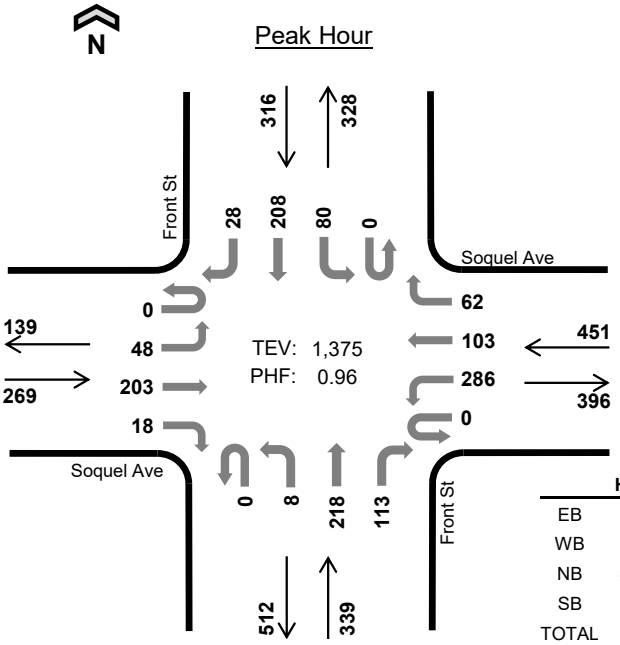
Two-Hour Count Summaries - Bikes

Interval Start	Soquel Ave Eastbound			Soquel Ave Westbound			Front St Northbound			Front St Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	1	0
7:15 AM	0	0	0	1	1	0	0	0	1	0	0	0	3	0
7:30 AM	0	1	0	2	2	0	0	1	1	0	0	1	8	0
7:45 AM	0	0	0	0	1	0	0	0	1	0	0	0	2	14
8:00 AM	**0**	**2**	**0**	**1**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**7**	20
8:15 AM	**0**	**0**	**0**	**0**	**8**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**10**	27
8:30 AM	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**5**	24
8:45 AM	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**3**	**25**
Count Total	0	3	0	7	17	2	0	3	3	0	2	2	39	0
Peak Hour	**0**	**2**	**0**	**4**	**13**	**1**	**0**	**2**	**0**	**0**	**2**	**1**	**25**	**0**

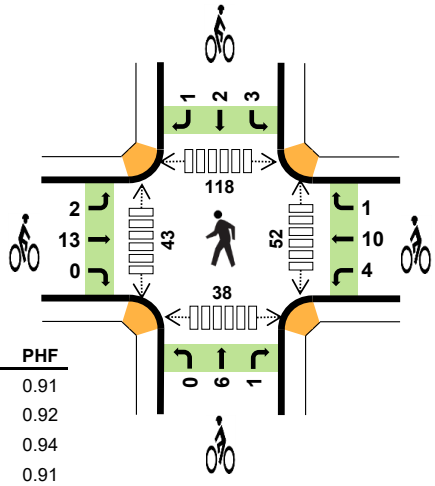
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Front St
Soquel Ave

Date: 09/15/2022
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM



	HV %:	PHF
EB	0.7%	0.91
WB	3.1%	0.92
NB	4.4%	0.94
SB	3.5%	0.91
TOTAL	3.1%	0.96



Two-Hour Count Summaries

Interval Start	Soquel Ave Eastbound				Soquel Ave Westbound				Front St Northbound				Front St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**17**	**46**	**5**	**0**	**72**	**32**	**19**	**0**	**6**	**49**	**31**	**0**	**18**	**58**	**4**	**357**	0
4:15 PM	**0**	**9**	**62**	**3**	**0**	**75**	**23**	**14**	**0**	**0**	**60**	**24**	**0**	**20**	**48**	**6**	**344**	0
4:30 PM	**0**	**11**	**54**	**6**	**0**	**61**	**26**	**14**	**0**	**1**	**45**	**33**	**0**	**21**	**58**	**8**	**338**	0
4:45 PM	**0**	**11**	**41**	**4**	**0**	**78**	**22**	**15**	**0**	**1**	**64**	**25**	**0**	**21**	**44**	**10**	**336**	**1,375**
5:00 PM	0	10	44	4	0	74	27	22	0	2	55	27	0	18	52	13	348	1,366
5:15 PM	0	14	36	4	0	83	22	10	0	4	46	21	0	20	51	9	320	1,342
5:30 PM	0	4	34	11	0	81	11	13	0	2	55	19	0	22	56	16	324	1,328
5:45 PM	0	9	25	6	0	61	28	11	0	3	64	20	0	23	53	7	310	1,302
Count Total	0	85	342	43	0	585	191	118	0	19	438	200	0	163	420	73	2,677	0
Peak Hour All	**0**	**48**	**203**	**18**	**0**	**286**	**103**	**62**	**0**	**8**	**218**	**113**	**0**	**80**	**208**	**28**	**1,375**	**0**
Peak Hour HV	**0**	**0**	**2**	**0**	**0**	**8**	**2**	**4**	**0**	**0**	**12**	**3**	**0**	**1**	**10**	**0**	**42**	**0**
Peak Hour HV%	**-**	**0%**	**1%**	**0%**	**-**	**3%**	**2%**	**6%**	**-**	**0%**	**6%**	**3%**	**-**	**1%**	**5%**	**0%**	**3%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**0**	**5**	**3**	**4**	***12***	**6**	**4**	**1**	**2**	***13***	**17**	**6**	**24**	**13**	*60*
4:15 PM	**0**	**4**	**3**	**1**	***8***	**1**	**5**	**2**	**1**	***9***	**17**	**4**	**25**	**14**	*60*
4:30 PM	**1**	**2**	**4**	**4**	***11***	**4**	**2**	**3**	**1**	***10***	**10**	**15**	**38**	**7**	*70*
4:45 PM	**1**	**3**	**5**	**2**	***11***	**4**	**4**	**1**	**2**	***11***	**8**	**18**	**31**	**4**	***61***
5:00 PM	1	4	3	3	*11*	7	5	6	3	*21*	16	13	25	14	*68*
5:15 PM	0	3	1	1	*5*	3	2	1	3	*9*	16	8	28	5	*57*
5:30 PM	2	4	5	4	*15*	3	4	4	2	*13*	13	4	28	6	*51*
5:45 PM	1	2	7	5	*15*	0	4	2	3	*9*	17	10	45	9	*81*
Count Total	6	27	31	24	*88*	28	30	20	17	*95*	114	78	244	72	*508*
Peak Hour	**2**	**14**	**15**	**11**	***42***	**15**	**15**	**7**	**6**	***43***	**52**	**43**	**118**	**38**	***251***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Soquel Ave Eastbound				Soquel Ave Westbound				Front St Northbound				Front St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**1**	**0**	**0**	**1**	**2**	**0**	**1**	**3**	**0**	**12**	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**1**	**0**	**0**	**3**	**0**	**0**	**0**	**1**	**0**	**8**	0
4:30 PM	**0**	**0**	**1**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**3**	**1**	**0**	**0**	**4**	**0**	**11**	0
4:45 PM	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**2**	**0**	**0**	**5**	**0**	**0**	**0**	**2**	**0**	**11**	**42**
5:00 PM	0	0	0	1	0	1	1	2	0	0	2	1	0	1	2	0	11	41
5:15 PM	0	0	0	0	0	2	0	1	0	0	1	0	0	0	1	0	5	38
5:30 PM	0	1	1	0	0	3	0	1	0	0	3	2	0	0	4	0	15	42
5:45 PM	0	0	1	0	0	2	0	0	0	0	6	1	0	1	4	0	15	46
Count Total	0	1	4	1	0	16	3	8	0	0	24	7	0	3	21	0	88	0
Peak Hour	**0**	**0**	**2**	**0**	**0**	**8**	**2**	**4**	**0**	**0**	**12**	**3**	**0**	**1**	**10**	**0**	**42**	**0**

Two-Hour Count Summaries - Bikes

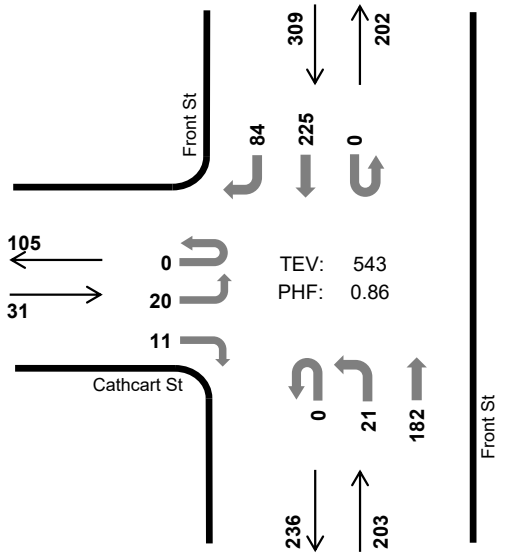
Interval Start	Soquel Ave Eastbound			Soquel Ave Westbound			Front St Northbound			Front St Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	**1**	**5**	**0**	**1**	**3**	**0**	**0**	**1**	**0**	**2**	**0**	**0**	**13**	0
4:15 PM	**0**	**1**	**0**	**2**	**2**	**1**	**0**	**2**	**0**	**1**	**0**	**0**	**9**	0
4:30 PM	**1**	**3**	**0**	**0**	**2**	**0**	**0**	**2**	**1**	**0**	**1**	**0**	**10**	0
4:45 PM	**0**	**4**	**0**	**1**	**3**	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**11**	**43**
5:00 PM	1	6	0	0	3	2	0	5	1	1	0	2	21	51
5:15 PM	1	2	0	0	2	0	0	0	1	0	0	3	9	51
5:30 PM	1	2	0	0	2	2	0	3	1	0	0	2	13	54
5:45 PM	0	0	0	0	4	0	0	1	1	2	1	0	9	52
Count Total	5	23	0	4	21	5	0	15	5	6	3	8	95	0
Peak Hour	**2**	**13**	**0**	**4**	**10**	**1**	**0**	**6**	**1**	**3**	**2**	**1**	**43**	**0**

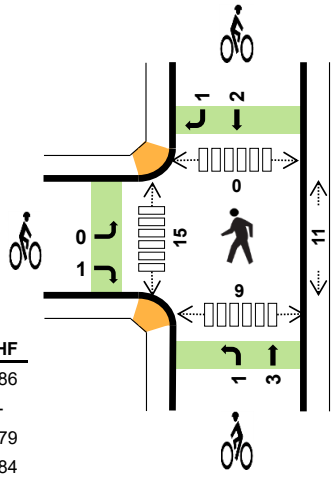
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Front St
Cathcart St

Peak Hour

Date: 09/15/2022
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 8:00 AM to 9:00 AM





	HV %:	PHF
EB	9.7%	0.86
WB	-	-
NB	12.8%	0.79
SB	11.7%	0.84
TOTAL	12.0%	0.86

Two-Hour Count Summaries

Interval Start	Cathcart St Eastbound				N/A Westbound				Front St Northbound				Front St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	4	0	1	0	0	0	0	0	8	18	0	0	0	19	12	62	0
7:15 AM	0	4	0	2	0	0	0	0	0	7	16	0	0	0	25	10	64	0
7:30 AM	0	4	0	2	0	0	0	0	0	4	26	0	0	0	34	11	81	0
7:45 AM	0	6	0	6	0	0	0	0	0	4	40	0	0	0	37	11	104	311
8:00 AM	**0**	**6**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**4**	**45**	**0**	**0**	**0**	**51**	**18**	**127**	376
8:15 AM	**0**	**5**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**	**40**	**0**	**0**	**0**	**39**	**24**	**112**	424
8:30 AM	**0**	**2**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**9**	**39**	**0**	**0**	**0**	**65**	**27**	**146**	489
8:45 AM	**0**	**7**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**6**	**58**	**0**	**0**	**0**	**70**	**15**	**158**	**543**
Count Total	0	38	0	22	0	0	0	0	0	44	282	0	0	0	340	128	854	0
Peak Hour All	**0**	**20**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**21**	**182**	**0**	**0**	**0**	**225**	**84**	**543**	**0**
Peak Hour HV	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**3**	**23**	**0**	**0**	**0**	**22**	**14**	**65**	**0**
Peak Hour HV%	**-**	**5%**	**-**	**18%**	**-**	**-**	**-**	**-**	**-**	**14%**	**13%**	**-**	**-**	**-**	**10%**	**17%**	**12%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals EB	WB	NB	SB	Total	Bicycles EB	WB	NB	SB	Total	Pedestrians (Crossing Leg) East	West	North	South	Total
7:00 AM	0	0	3	5	*8*	0	0	1	0	*1*	1	5	0	0	*6*
7:15 AM	2	0	3	6	*11*	0	0	3	1	*4*	1	3	0	0	*4*
7:30 AM	0	0	6	11	*17*	0	0	2	3	*5*	4	6	1	0	*11*
7:45 AM	1	0	5	6	*12*	1	0	0	0	*1*	2	2	1	0	*5*
8:00 AM	**2**	**0**	**6**	**9**	***17***	**0**	**0**	**1**	**1**	***2***	**3**	**1**	**0**	**0**	*4*
8:15 AM	**0**	**0**	**6**	**9**	***15***	**1**	**0**	**0**	**1**	***2***	**0**	**7**	**0**	**0**	*7*
8:30 AM	**1**	**0**	**6**	**10**	***17***	**0**	**0**	**0**	**0**	***0***	**6**	**5**	**0**	**4**	*15*
8:45 AM	**0**	**0**	**8**	**8**	***16***	**0**	**0**	**3**	**1**	***4***	**2**	**2**	**0**	**5**	***9***
Count Total	6	0	43	64	*113*	2	0	10	7	*19*	19	31	2	9	*61*
Peak Hr	**3**	**0**	**26**	**36**	***65***	**1**	**0**	**4**	**3**	***8***	**11**	**15**	**0**	**9**	***35***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Cathcart St				N/A				Front St				Front St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	2	8	0
7:15 AM	0	2	0	0	0	0	0	0	0	0	3	0	0	0	3	3	11	0
7:30 AM	0	0	0	0	0	0	0	0	0	1	5	0	0	0	7	4	17	0
7:45 AM	0	1	0	0	0	0	0	0	0	0	5	0	0	0	5	1	12	48
8:00 AM	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**	**4**	**0**	**0**	**0**	**7**	**2**	**17**	57
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**0**	**4**	**5**	**15**	61
8:30 AM	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**5**	**0**	**0**	**0**	**6**	**4**	**17**	61
8:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**5**	**3**	**16**	**65**
Count Total	0	4	0	2	0	0	0	0	0	4	39	0	0	0	40	24	113	0
Peak Hour	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**3**	**23**	**0**	**0**	**0**	**22**	**14**	**65**	**0**

Two-Hour Count Summaries - Bikes

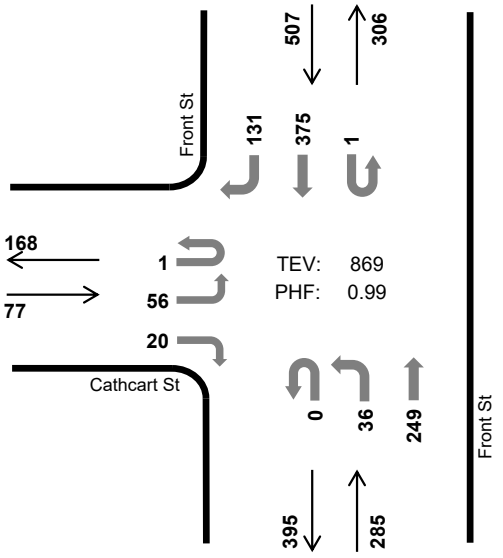
Interval Start	Cathcart St			N/A			Front St			Front St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	1	0
7:15 AM	0	0	0	0	0	0	1	2	0	0	1	0	4	0
7:30 AM	0	0	0	0	0	0	0	2	0	0	2	1	5	0
7:45 AM	1	0	0	0	0	0	0	0	0	0	0	0	1	11
8:00 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**2**	12
8:15 AM	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**2**	10
8:30 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	5
8:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**0**	**0**	**0**	**1**	**4**	**8**
Count Total	1	0	1	0	0	0	2	8	0	0	5	2	19	0
Peak Hour	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**3**	**0**	**0**	**2**	**1**	**8**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

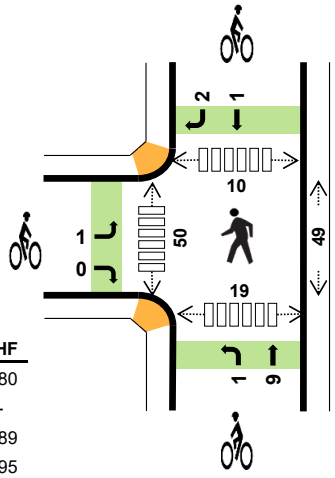
Front St
Cathcart St

Date: 09/15/2022
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:45 PM to 5:45 PM

Peak Hour



	HV %:	PHF
EB	6.5%	0.80
WB	-	-
NB	4.2%	0.89
SB	3.4%	0.95
TOTAL	3.9%	0.99



Two-Hour Count Summaries

Interval Start	Cathcart St Eastbound				N/A Westbound				Front St Northbound				Front St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	11	0	4	0	0	0	0	0	9	69	0	0	0	102	26	221	0
4:15 PM	0	9	0	3	0	0	0	0	0	9	73	0	0	0	87	28	209	0
4:30 PM	0	12	0	1	0	0	0	0	0	8	65	0	0	0	96	32	214	0
4:45 PM	**0**	**15**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**8**	**72**	**0**	**0**	**0**	**90**	**30**	**220**	864
5:00 PM	**0**	**17**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**12**	**60**	**0**	**0**	**0**	**87**	**35**	**218**	861
5:15 PM	**0**	**7**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**9**	**60**	**0**	**1**	**0**	**99**	**33**	**213**	865
5:30 PM	**1**	**17**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**7**	**57**	**0**	**0**	**0**	**99**	**33**	**218**	**869**
5:45 PM	0	13	0	4	0	0	0	0	0	9	78	0	0	0	87	29	220	869
Count Total	1	101	0	32	0	0	0	0	0	71	534	0	1	0	747	246	1,733	0
Peak Hour All	**1**	**56**	**0**	**20**	**0**	**0**	**0**	**0**	**0**	**36**	**249**	**0**	**1**	**0**	**375**	**131**	**869**	**0**
Peak Hour HV	**0**	**4**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**10**	**0**	**0**	**0**	**9**	**8**	**34**	**0**
Peak Hour HV%	**0%**	**7%**	**-**	**5%**	**-**	**-**	**-**	**-**	**-**	**6%**	**4%**	**-**	**0%**	**-**	**2%**	**6%**	**4%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	1	0	3	5	*9*	0	0	0	1	*1*	12	8	5	5	*30*
4:15 PM	0	0	3	5	*8*	2	0	1	2	*5*	8	12	4	2	*26*
4:30 PM	1	0	3	7	*11*	1	0	3	4	*8*	7	23	0	3	*33*
4:45 PM	**2**	**0**	**5**	**3**	***10***	**0**	**0**	**1**	**0**	***1***	**8**	**18**	**3**	**2**	*31*
5:00 PM	**1**	**0**	**2**	**4**	***7***	**1**	**0**	**5**	**1**	***7***	**11**	**13**	**2**	**9**	*35*
5:15 PM	**0**	**0**	**2**	**4**	***6***	**0**	**0**	**0**	**1**	***1***	**12**	**2**	**3**	**4**	*21*
5:30 PM	**2**	**0**	**3**	**6**	***11***	**0**	**0**	**4**	**1**	***5***	**18**	**17**	**2**	**4**	***41***
5:45 PM	2	0	6	6	*14*	2	0	0	0	*2*	10	9	6	3	*28*
Count Total	9	0	27	40	*76*	6	0	14	10	*30*	86	102	25	32	*245*
Peak Hr	**5**	**0**	**12**	**17**	***34***	**1**	**0**	**10**	**3**	***14***	**49**	**50**	**10**	**19**	***128***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Cathcart St				N/A				Front St				Front St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	1	0	0	0	0	0	0	0	1	2	0	0	0	3	2	9	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	2	8	0
4:30 PM	0	1	0	0	0	0	0	0	0	0	3	0	0	0	5	2	11	0
4:45 PM	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**4**	**0**	**0**	**0**	**1**	**2**	**10**	38
5:00 PM	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**4**	**0**	**7**	36
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**1**	**3**	**6**	34
5:30 PM	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**3**	**3**	**11**	**34**
5:45 PM	0	2	0	0	0	0	0	0	0	1	5	0	0	0	3	3	14	38
Count Total	0	8	0	1	0	0	0	0	0	4	23	0	0	0	23	17	76	0
Peak Hour	**0**	**4**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**10**	**0**	**0**	**0**	**9**	**8**	**34**	**0**

Two-Hour Count Summaries - Bikes

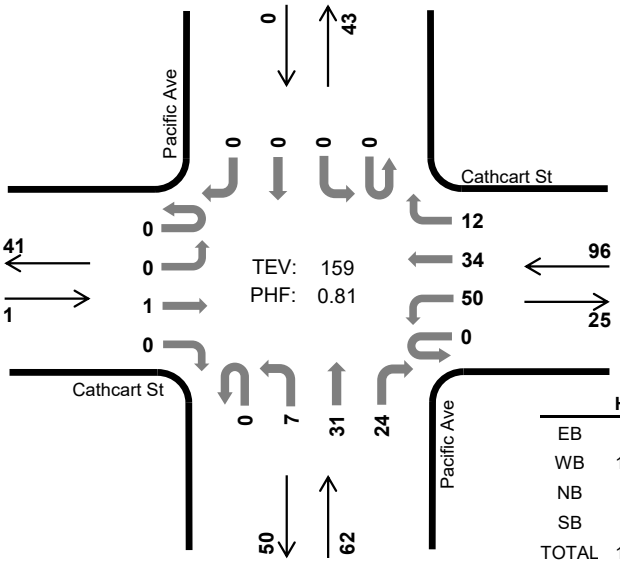
Interval Start	Cathcart St			N/A			Front St			Front St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	0
4:15 PM	0	0	2	0	0	0	0	1	0	0	0	2	5	0
4:30 PM	0	0	1	0	0	0	1	2	0	0	4	0	8	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	15
5:00 PM	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**4**	**0**	**0**	**1**	**0**	**7**	21
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	17
5:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**1**	**5**	**14**
5:45 PM	2	0	0	0	0	0	0	0	0	0	0	0	2	15
Count Total	3	0	3	0	0	0	2	12	0	0	6	4	30	0
Peak Hour	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**9**	**0**	**0**	**1**	**2**	**14**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

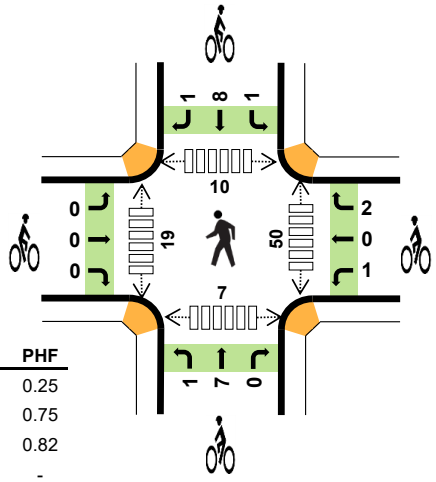
Pacific Ave
Cathcart St

Date: 09/15/2022
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 8:00 AM to 9:00 AM

Peak Hour



	HV %:	PHF
EB	0.0%	0.25
WB	18.8%	0.75
NB	9.7%	0.82
SB	-	-
TOTAL	15.1%	0.81



Two-Hour Count Summaries

Interval Start	Cathcart St Eastbound				Cathcart St Westbound				Pacific Ave Northbound				Pacific Ave Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	2	0	1	6	5	0	0	1	4	0	0	0	0	0	19	0
7:15 AM	0	0	0	0	0	6	4	1	0	3	9	3	0	0	0	0	26	0
7:30 AM	0	1	0	1	0	10	3	1	0	1	4	1	0	1	0	0	23	0
7:45 AM	0	0	2	0	0	7	6	1	0	1	2	3	0	0	0	0	22	90
8:00 AM	**0**	**0**	**0**	**0**	**0**	**15**	**5**	**1**	**0**	**2**	**4**	**7**	**0**	**0**	**0**	**0**	**34**	105
8:15 AM	**0**	**0**	**0**	**0**	**0**	**10**	**9**	**4**	**0**	**2**	**12**	**5**	**0**	**0**	**0**	**0**	**42**	121
8:30 AM	**0**	**0**	**1**	**0**	**0**	**18**	**10**	**4**	**0**	**2**	**8**	**6**	**0**	**0**	**0**	**0**	**49**	147
8:45 AM	**0**	**0**	**0**	**0**	**0**	**7**	**10**	**3**	**0**	**1**	**7**	**6**	**0**	**0**	**0**	**0**	**34**	**159**
Count Total	0	1	5	1	1	79	52	15	0	13	50	31	0	1	0	0	249	0
Peak Hour All	**0**	**0**	**1**	**0**	**0**	**50**	**34**	**12**	**0**	**7**	**31**	**24**	**0**	**0**	**0**	**0**	**159**	**0**
Peak Hour HV	**0**	**0**	**0**	**0**	**0**	**16**	**2**	**0**	**0**	**1**	**2**	**3**	**0**	**0**	**0**	**0**	**24**	**0**
Peak Hour HV%	**-**	**-**	**0%**	**-**	**-**	**32%**	**6%**	**0%**	**-**	**14%**	**6%**	**13%**	**-**	**-**	**-**	**-**	**15%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	1	2	0	0	*3*	0	0	2	0	*2*	4	0	1	1	*6*
7:15 AM	0	3	1	0	*4*	0	2	2	1	*5*	12	6	2	2	*22*
7:30 AM	0	6	1	0	*7*	0	1	1	0	*2*	7	10	1	0	*18*
7:45 AM	0	1	1	0	*2*	0	0	0	2	*2*	14	9	1	3	*27*
8:00 AM	**0**	**5**	**2**	**0**	***7***	**0**	**1**	**3**	**4**	***8***	**9**	**4**	**4**	**3**	*20*
8:15 AM	**0**	**4**	**1**	**0**	***5***	**0**	**0**	**0**	**1**	***1***	**15**	**6**	**3**	**1**	*25*
8:30 AM	**0**	**6**	**2**	**0**	***8***	**0**	**0**	**1**	**3**	***4***	**13**	**5**	**2**	**3**	*23*
8:45 AM	**0**	**3**	**1**	**0**	***4***	**0**	**2**	**4**	**2**	***8***	**13**	**4**	**1**	**0**	***18***
Count Total	1	30	9	0	*40*	0	6	13	13	*32*	87	44	15	13	*159*
Peak Hour	**0**	**18**	**6**	**0**	***24***	**0**	**3**	**8**	**10**	***21***	**50**	**19**	**10**	**7**	***86***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Cathcart St Eastbound				Cathcart St Westbound				Pacific Ave Northbound				Pacific Ave Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	3	0
7:15 AM	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0	0	4	0
7:30 AM	0	0	0	0	0	6	0	0	0	1	0	0	0	0	0	0	7	0
7:45 AM	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	2	16
8:00 AM	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**7**	20
8:15 AM	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**5**	21
8:30 AM	**0**	**0**	**0**	**0**	**0**	**5**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**8**	22
8:45 AM	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**4**	**24**
Count Total	0	0	1	0	0	28	2	0	0	2	2	5	0	0	0	0	40	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**16**	**2**	**0**	**0**	**1**	**2**	**3**	**0**	**0**	**0**	**0**	**24**	**0**

Two-Hour Count Summaries - Bikes

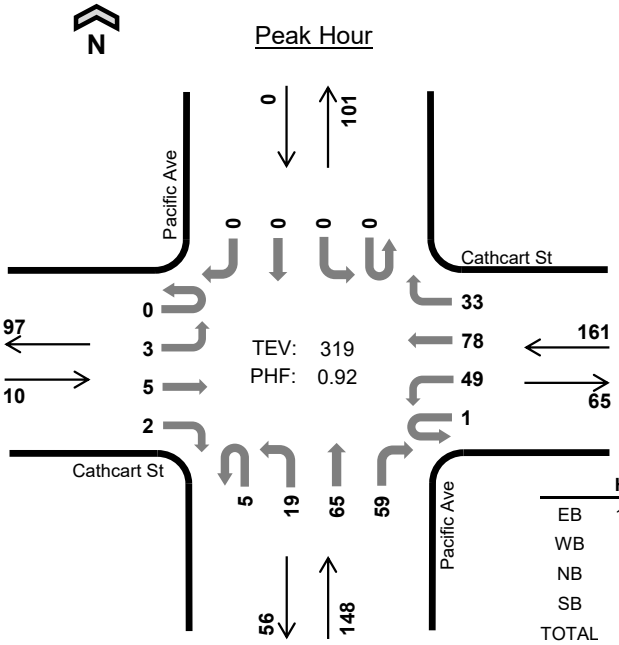
Interval Start	Cathcart St Eastbound			Cathcart St Westbound			Pacific Ave Northbound			Pacific Ave Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	2	0	0	0	0	2	0
7:15 AM	0	0	0	0	1	1	0	1	1	0	1	0	5	0
7:30 AM	0	0	0	0	1	0	0	1	0	0	0	0	2	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	2	0	2	11
8:00 AM	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**3**	**0**	**0**	**4**	**0**	**8**	17
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	13
8:30 AM	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**3**	**0**	**4**	15
8:45 AM	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**4**	**0**	**0**	**1**	**1**	**8**	**21**
Count Total	0	0	0	1	2	3	1	11	1	1	11	1	32	0
Peak Hour	**0**	**0**	**0**	**1**	**0**	**2**	**1**	**7**	**0**	**1**	**8**	**1**	**21**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

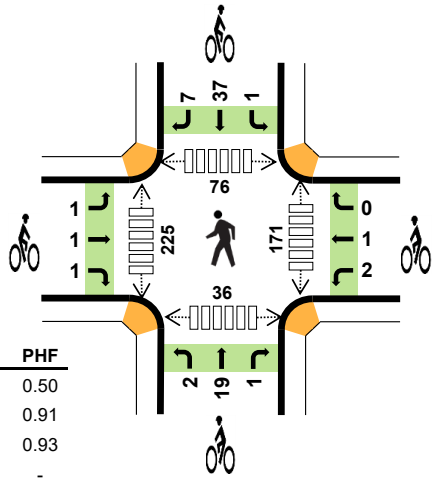
Pacific Ave
Cathcart St

Date: 09/15/2022
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:45 PM to 5:45 PM

Peak Hour



	HV %:	PHF
EB	10.0%	0.50
WB	5.6%	0.91
NB	5.4%	0.93
SB	-	-
TOTAL	5.6%	0.92



Two-Hour Count Summaries

Interval Start	Cathcart St Eastbound				Cathcart St Westbound				Pacific Ave Northbound				Pacific Ave Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	2	0	0	17	9	4	1	3	20	11	0	0	0	0	67	0
4:15 PM	0	0	0	0	0	19	11	11	1	3	14	7	0	0	0	0	66	0
4:30 PM	0	0	0	0	0	14	11	13	0	2	21	13	0	0	0	0	74	0
4:45 PM	**0**	**1**	**0**	**0**	**0**	**17**	**19**	**8**	**1**	**4**	**13**	**22**	**0**	**0**	**0**	**0**	**85**	292
5:00 PM	**0**	**2**	**0**	**0**	**1**	**9**	**21**	**7**	**1**	**5**	**20**	**13**	**0**	**0**	**0**	**0**	**79**	304
5:15 PM	**0**	**0**	**1**	**1**	**0**	**12**	**19**	**5**	**1**	**3**	**18**	**8**	**0**	**0**	**0**	**0**	**68**	306
5:30 PM	**0**	**0**	**4**	**1**	**0**	**11**	**19**	**13**	**2**	**7**	**14**	**16**	**0**	**0**	**0**	**0**	**87**	**319**
5:45 PM	0	3	2	2	0	10	13	11	0	4	19	9	0	0	0	0	73	307
Count Total	0	6	9	4	1	109	122	72	7	31	139	99	0	0	0	0	599	0
Peak Hour All	**0**	**3**	**5**	**2**	**1**	**49**	**78**	**33**	**5**	**19**	**65**	**59**	**0**	**0**	**0**	**0**	**319**	**0**
Peak Hour HV	**0**	**0**	**1**	**0**	**0**	**9**	**0**	**0**	**0**	**2**	**1**	**5**	**0**	**0**	**0**	**0**	**18**	**0**
Peak Hour HV%	**-**	**0%**	**20%**	**0%**	**0%**	**18%**	**0%**	**0%**	**0%**	**11%**	**2%**	**8%**	**-**	**-**	**-**	**-**	**6%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	2	2	0	*4*	0	0	2	8	*10*	56	81	27	12	*176*
4:15 PM	0	4	0	0	*4*	2	2	2	12	*18*	44	64	9	12	*129*
4:30 PM	0	2	3	0	*5*	1	1	5	13	*20*	67	46	23	6	*142*
4:45 PM	**0**	**3**	**2**	**0**	***5***	**0**	**2**	**11**	**14**	***27***	**31**	**56**	**10**	**14**	*111*
5:00 PM	**0**	**0**	**1**	**0**	***1***	**3**	**0**	**2**	**11**	***16***	**47**	**55**	**20**	**4**	*126*
5:15 PM	**0**	**3**	**0**	**0**	***3***	**0**	**0**	**4**	**8**	***12***	**51**	**42**	**23**	**9**	*125*
5:30 PM	**1**	**3**	**5**	**0**	***9***	**0**	**1**	**5**	**12**	***18***	**42**	**72**	**23**	**9**	***146***
5:45 PM	0	4	2	0	*6*	0	0	6	3	*9*	53	78	14	7	*152*
Count Total	1	21	15	0	*37*	6	6	37	81	*130*	391	494	149	73	*1,107*
Peak Hour	**1**	**9**	**8**	**0**	***18***	**3**	**3**	**22**	**45**	***73***	**171**	**225**	**76**	**36**	***508***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Cathcart St Eastbound				Cathcart St Westbound				Pacific Ave Northbound				Pacific Ave Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	2	0	0	0	1	0	1	0	0	0	0	4	0
4:15 PM	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	4	0
4:30 PM	0	0	0	0	0	2	0	0	0	0	2	1	0	0	0	0	5	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**5**	18
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	15
5:15 PM	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	14
5:30 PM	**0**	**0**	**1**	**0**	**0**	**3**	**0**	**0**	**0**	**2**	**1**	**2**	**0**	**0**	**0**	**0**	**9**	**18**
5:45 PM	0	0	0	0	0	3	0	1	0	0	0	2	0	0	0	0	6	19
Count Total	0	0	1	0	0	19	1	1	0	3	3	9	0	0	0	0	37	0
Peak Hour	**0**	**0**	**1**	**0**	**0**	**9**	**0**	**0**	**0**	**2**	**1**	**5**	**0**	**0**	**0**	**0**	**18**	**0**

Two-Hour Count Summaries - Bikes

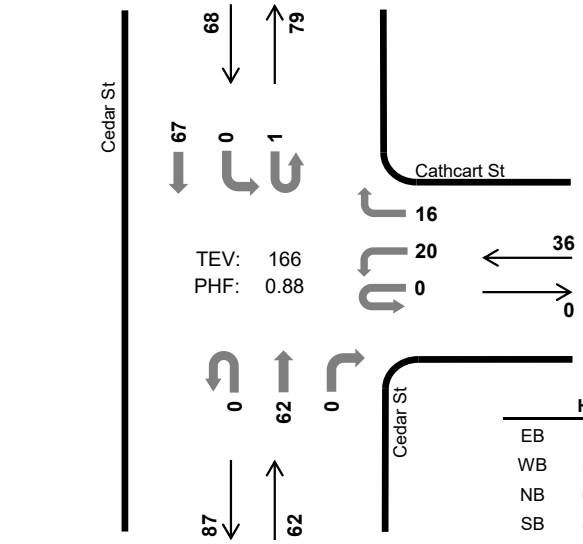
Interval Start	Cathcart St Eastbound			Cathcart St Westbound			Pacific Ave Northbound			Pacific Ave Southbound			15-min Total	Rolling One Hour
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	2	0	0	8	0	10	0
4:15 PM	1	1	0	1	1	0	0	2	0	1	11	0	18	0
4:30 PM	1	0	0	0	0	1	0	5	0	0	12	1	20	0
4:45 PM	**0**	**0**	**0**	**1**	**1**	**0**	**2**	**8**	**1**	**0**	**13**	**1**	**27**	75
5:00 PM	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**7**	**4**	**16**	81
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**7**	**1**	**12**	75
5:30 PM	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**5**	**0**	**1**	**10**	**1**	**18**	**73**
5:45 PM	0	0	0	0	0	0	0	4	2	0	3	0	9	55
Count Total	3	2	1	3	2	1	2	32	3	2	71	8	130	0
Peak Hour	**1**	**1**	**1**	**2**	**1**	**0**	**2**	**19**	**1**	**1**	**37**	**7**	**73**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

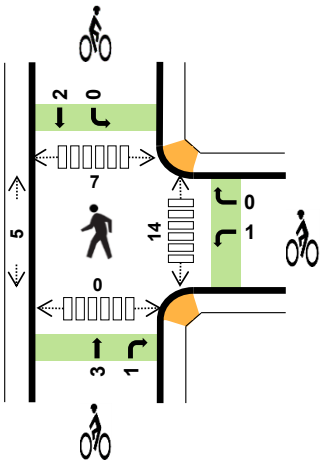
Cedar St
Cathcart St

Date: 09/15/2022
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 8:00 AM to 9:00 AM

Peak Hour



	HV %:	PHF
EB	-	-
WB	5.6%	0.82
NB	6.5%	0.78
SB	8.8%	0.77
TOTAL	7.2%	0.88



Two-Hour Count Summaries

Interval Start		N/A Eastbound				Cathcart St Westbound				Cedar St Northbound				Cedar St Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM		0	0	0	0	0	5	0	0	0	0	5	0	0	0	3	0	13	0
7:15 AM		0	0	0	0	0	2	0	2	0	0	3	0	0	0	8	0	15	0
7:30 AM		0	0	0	0	0	1	0	4	0	0	14	0	0	0	11	0	30	0
7:45 AM		0	0	0	0	0	3	0	3	0	0	15	0	0	0	9	0	30	88
8:00 AM		**0**	**0**	**0**	**0**	**0**	**4**	**0**	**2**	**0**	**0**	**12**	**0**	**0**	**0**	**12**	**0**	**30**	105
8:15 AM		**0**	**0**	**0**	**0**	**0**	**4**	**0**	**7**	**0**	**0**	**14**	**0**	**1**	**0**	**21**	**0**	**47**	137
8:30 AM		**0**	**0**	**0**	**0**	**0**	**8**	**0**	**1**	**0**	**0**	**16**	**0**	**0**	**0**	**18**	**0**	**43**	150
8:45 AM		**0**	**0**	**0**	**0**	**0**	**4**	**0**	**6**	**0**	**0**	**20**	**0**	**0**	**0**	**16**	**0**	**46**	**166**
Count Total		0	0	0	0	0	31	0	25	0	0	99	0	1	0	98	0	254	0
Peak Hour	**All**	**0**	**0**	**0**	**0**	**0**	**20**	**0**	**16**	**0**	**0**	**62**	**0**	**1**	**0**	**67**	**0**	**166**	**0**
	HV	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**4**	**0**	**0**	**0**	**6**	**0**	**12**	**0**
	HV%	**-**	**-**	**-**	**-**	**-**	**5%**	**-**	**6%**	**-**	**-**	**6%**	**-**	**0%**	**-**	**9%**	**-**	**7%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals EB	WB	NB	SB	Total	Bicycles EB	WB	NB	SB	Total	Pedestrians (Crossing Leg) East	West	North	South	Total
7:00 AM	0	0	2	1	*3*	0	0	0	0	*0*	1	0	1	1	*3*
7:15 AM	0	0	0	1	*1*	0	0	0	0	*0*	1	0	0	0	*1*
7:30 AM	0	1	2	1	*4*	0	1	0	1	*2*	2	0	1	0	*3*
7:45 AM	0	0	0	1	*1*	0	0	1	4	*5*	2	1	1	0	*4*
8:00 AM	**0**	**0**	**3**	**1**	***4***	**0**	**0**	**1**	**0**	***1***	**4**	**2**	**5**	**0**	*11*
8:15 AM	**0**	**0**	**0**	**2**	***2***	**0**	**0**	**1**	**0**	***1***	**5**	**1**	**1**	**0**	*7*
8:30 AM	**0**	**2**	**0**	**1**	***3***	**0**	**0**	**2**	**0**	***2***	**2**	**1**	**1**	**0**	*4*
8:45 AM	**0**	**0**	**1**	**2**	***3***	**0**	**1**	**0**	**2**	***3***	**3**	**1**	**0**	**0**	***4***
Count Total	0	3	8	10	*21*	0	2	5	7	*14*	20	6	10	1	*37*
Peak Hr	**0**	**2**	**4**	**6**	***12***	**0**	**1**	**4**	**2**	***7***	**14**	**5**	**7**	**0**	***26***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	N/A				Cathcart St				Cedar St				Cedar St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	3	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
7:30 AM	0	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	4	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	9
8:00 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**1**	**0**	**4**	10
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	11
8:30 AM	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**3**	10
8:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**3**	**12**
Count Total	0	0	0	0	0	1	0	2	0	0	8	0	0	0	10	0	21	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**4**	**0**	**0**	**0**	**6**	**0**	**12**	**0**

Two-Hour Count Summaries - Bikes

Interval Start	N/A			Cathcart St			Cedar St			Cedar St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	1	0	0	0	0	0	0	1	0	2	0
7:45 AM	0	0	0	0	0	0	0	1	0	0	4	0	5	7
8:00 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	8
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	9
8:30 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**2**	9
8:45 AM	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**3**	**7**
Count Total	0	0	0	2	0	0	0	4	1	0	7	0	14	0
Peak Hour	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**3**	**1**	**0**	**2**	**0**	**7**	**0**

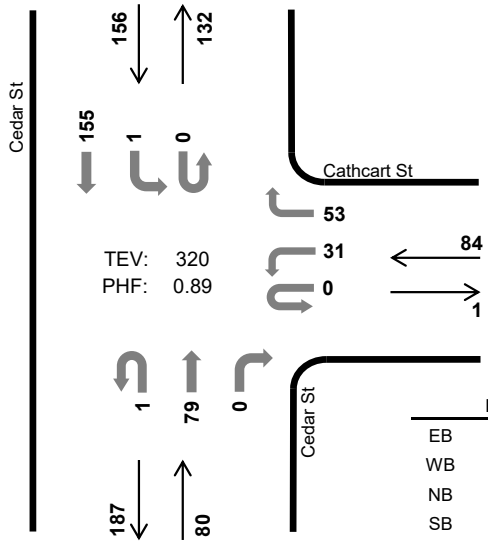
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Cedar St
Cathcart St

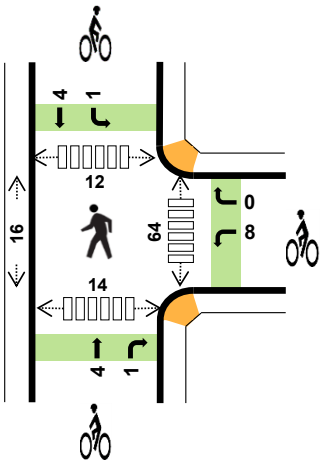
Date: 09/15/2022
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:30 PM to 5:30 PM

N

Peak Hour



	HV %:	PHF
EB	-	-
WB	1.2%	0.81
NB	1.3%	0.80
SB	3.2%	0.91
TOTAL	2.2%	0.89



Two-Hour Count Summaries

Interval Start	N/A Eastbound				Cathcart St Westbound				Cedar St Northbound				Cedar St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	6	0	11	0	0	21	0	0	0	29	0	67	0
4:15 PM	0	0	0	0	0	5	0	11	0	0	22	0	1	0	36	0	75	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**10**	**0**	**0**	**17**	**0**	**0**	**0**	**36**	**0**	**71**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**11**	**0**	**0**	**22**	**0**	**0**	**1**	**42**	**0**	**83**	296
5:00 PM	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**18**	**1**	**0**	**24**	**0**	**0**	**0**	**39**	**0**	**90**	319
5:15 PM	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**14**	**0**	**0**	**16**	**0**	**0**	**0**	**38**	**0**	**76**	**320**
5:30 PM	0	0	0	0	0	15	0	8	0	0	16	1	1	0	27	0	68	317
5:45 PM	0	0	0	0	0	4	0	11	0	0	19	0	2	0	37	0	73	307
Count Total	0	0	0	0	0	61	0	94	1	0	157	1	4	1	284	0	603	0
Peak Hour All	**0**	**0**	**0**	**0**	**0**	**31**	**0**	**53**	**1**	**0**	**79**	**0**	**0**	**1**	**155**	**0**	**320**	**0**
Peak Hour HV	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**5**	**0**	**7**	**0**
Peak Hour HV%	**-**	**-**	**-**	**-**	**-**	**0%**	**-**	**2%**	**0%**	**-**	**1%**	**-**	**-**	**0%**	**3%**	**-**	**2%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	1	1	0	2	0	0	0	3	*3*	14	7	3	0	*24*
4:15 PM	0	0	0	0	*0*	0	3	4	2	*9*	12	4	3	1	*20*
4:30 PM	**0**	**0**	**0**	**3**	***3***	**0**	**1**	**1**	**1**	***3***	**11**	**5**	**1**	**9**	*26*
4:45 PM	**0**	**1**	**0**	**0**	***1***	**0**	**2**	**2**	**2**	***6***	**14**	**4**	**1**	**1**	*20*
5:00 PM	**0**	**0**	**1**	**1**	***2***	**0**	**4**	**1**	**2**	***7***	**13**	**6**	**8**	**3**	*30*
5:15 PM	**0**	**0**	**0**	**1**	***1***	**0**	**1**	**1**	**0**	***2***	**26**	**1**	**2**	**1**	***30***
5:30 PM	0	1	2	1	*4*	0	1	1	5	*7*	22	3	9	0	*34*
5:45 PM	0	0	1	0	*1*	0	1	1	4	*6*	27	1	3	2	*33*
Count Total	0	3	5	6	*14*	0	13	11	19	*43*	139	31	30	17	*217*
Peak Hr	**0**	**1**	**1**	**5**	***7***	**0**	**8**	**5**	**5**	***18***	**64**	**16**	**12**	**14**	***106***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	N/A				Cathcart St				Cedar St				Cedar St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**3**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	6
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**2**	6
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**7**
5:30 PM	0	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	4	8
5:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	8
Count Total	0	0	0	0	0	0	0	3	0	0	5	0	0	0	6	0	14	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**5**	**0**	**7**	**0**

Two-Hour Count Summaries - Bikes

Interval Start	N/A			Cathcart St			Cedar St			Cedar St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	2	1	0	3	0
4:15 PM	0	0	0	3	0	0	0	3	1	1	1	0	9	0
4:30 PM	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**3**	0
4:45 PM	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**1**	**1**	**0**	**2**	**0**	**6**	21
5:00 PM	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**1**	**0**	**0**	**2**	**0**	**7**	25
5:15 PM	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**2**	**18**
5:30 PM	0	0	0	1	0	0	0	1	0	2	3	0	7	22
5:45 PM	0	0	0	1	0	0	0	1	0	0	4	0	6	22
Count Total	0	0	0	13	0	0	0	9	2	6	13	0	43	0
Peak Hour	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**4**	**1**	**1**	**4**	**0**	**18**	**0**

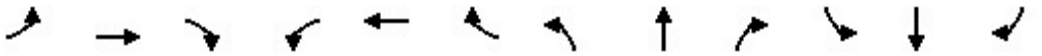
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Appendix B

Analysis Worksheets for Existing (2022) Conditions

Lane Group	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	113	201	206	63	464	24	267
v/c Ratio	0.35	0.67	0.66	0.04	0.24	0.05	0.24
Control Delay	37.8	44.5	44.1	0.1	9.2	11.1	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.8	44.5	44.1	0.1	9.2	11.1	10.8
Queue Length 50th (ft)	30	113	115	0	54	6	66
Queue Length 95th (ft)	45	168	170	0	80	17	111
Internal Link Dist (ft)	141		198		118		108
Turn Bay Length (ft)				150			
Base Capacity (vph)	827	493	507	1583	1932	529	1095
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.41	0.41	0.04	0.24	0.05	0.24

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	56	7	257	101	55	16	239	93	18	171	32
Future Volume (veh/h)	23	56	7	257	101	55	16	239	93	18	171	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	30	74	9	204	239	0	21	319	124	24	225	42
Peak Hour Factor	0.76	0.76	0.76	0.88	0.88	0.88	0.75	0.75	0.75	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	68	176	22	291	305		67	756	282	274	484	90
Arrive On Green	0.07	0.07	0.07	0.16	0.16	0.00	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	925	2412	304	1781	1870	1585	74	2395	892	947	1533	286
Grp Volume(v), veh/h	59	0	54	204	239	0	250	0	214	24	0	267
Grp Sat Flow(s),veh/h/ln	1824	0	1816	1781	1870	1585	1820	0	1541	947	0	1819
Q Serve(g_s), s	2.8	0.0	2.5	9.7	11.0	0.0	0.0	0.0	9.9	1.9	0.0	10.6
Cycle Q Clear(g_c), s	2.8	0.0	2.5	9.7	11.0	0.0	9.5	0.0	9.9	11.8	0.0	10.6
Prop In Lane	0.51		0.17	1.00		1.00	0.08		0.58	1.00		0.16
Lane Grp Cap(c), veh/h	133	0	133	291	305		618	0	486	274	0	574
V/C Ratio(X)	0.44	0.00	0.41	0.70	0.78		0.40	0.00	0.44	0.09	0.00	0.47
Avail Cap(c_a), veh/h	434	0	432	523	549		618	0	486	274	0	574
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	0.0	39.8	35.6	36.1	0.0	24.3	0.0	24.5	29.2	0.0	24.7
Incr Delay (d2), s/veh	2.3	0.0	2.0	3.1	4.4	0.0	2.0	0.0	2.9	0.6	0.0	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	1.2	4.4	5.3	0.0	4.4	0.0	3.9	0.5	0.0	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.3	0.0	41.8	38.7	40.5	0.0	26.3	0.0	27.4	29.8	0.0	27.4
LnGrp LOS	D	A	D	D	D		C	A	C	C	A	C
Approach Vol, veh/h		113			443	A		464			291	
Approach Delay, s/veh		42.0			39.7			26.8			27.6	
Approach LOS		D			D			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		11.2		33.0		19.3		33.0				
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s		21.4		28.4		26.4		28.4				
Max Q Clear Time (g_c+I1), s		4.8		13.8		13.0		11.9				
Green Ext Time (p_c), s		0.5		1.4		1.7		2.6				

Intersection Summary												
HCM 6th Ctrl Delay			32.6									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	48	21	25	391	488
v/c Ratio	0.25	0.11	0.12	0.25	0.18
Control Delay	27.8	12.7	25.9	2.9	3.5
Queue Delay	0.0	0.0	0.0	0.3	0.0
Total Delay	27.8	12.7	25.9	3.2	3.5
Queue Length 50th (ft)	17	0	8	35	18
Queue Length 95th (ft)	41	16	24	60	60
Internal Link Dist (ft)	279			238	121
Turn Bay Length (ft)		25	100		
Base Capacity (vph)	301	287	226	1545	2738
Starvation Cap Reductn	0	0	0	614	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.16	0.07	0.11	0.42	0.18

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	18	20	309	332	78
Future Volume (veh/h)	41	18	20	309	332	78
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	48	21	25	391	395	93
Peak Hour Factor	0.86	0.86	0.79	0.79	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	121	107	71	1239	1584	369
Arrive On Green	0.07	0.07	0.04	0.66	0.55	0.55
Sat Flow, veh/h	1781	1585	1781	1870	2954	667
Grp Volume(v), veh/h	48	21	25	391	244	244
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1777	1750
Q Serve(g_s), s	1.6	0.8	0.8	5.4	4.3	4.4
Cycle Q Clear(g_c), s	1.6	0.8	0.8	5.4	4.3	4.4
Prop In Lane	1.00	1.00	1.00			0.38
Lane Grp Cap(c), veh/h	121	107	71	1239	984	969
V/C Ratio(X)	0.40	0.20	0.35	0.32	0.25	0.25
Avail Cap(c_a), veh/h	304	270	228	1239	984	969
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.2	26.9	28.5	4.4	7.0	7.1
Incr Delay (d2), s/veh	0.8	0.3	1.1	0.7	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.3	0.4	1.6	1.5	1.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.0	27.2	29.6	5.1	7.6	7.7
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	69			416	488	
Approach Delay, s/veh	27.8			6.5	7.7	
Approach LOS	C			A	A	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		8.7	6.6	39.4		46.0
Change Period (Y+Rc), s		4.6	* 4.2	5.6		5.6
Max Green Setting (Gmax), s		10.4	* 7.8	28.4		40.4
Max Q Clear Time (g_c+I1), s		3.6	2.8	6.4		7.4
Green Ext Time (p_c), s		0.0	0.0	3.0		2.6

Intersection Summary	
HCM 6th Ctrl Delay	8.6
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	9.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	11	71	71	48	17	10	44	34	0	0	0
Future Vol, veh/h	17	11	71	71	48	17	10	44	34	0	0	0
Peak Hour Factor	0.25	0.25	0.25	0.75	0.75	0.75	0.82	0.82	0.82	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	68	44	284	95	64	23	12	54	41	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	10.2	9.1	8.8
HCM LOS	B	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	11%	17%	52%
Vol Thru, %	50%	11%	35%
Vol Right, %	39%	72%	12%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	88	99	136
LT Vol	10	17	71
Through Vol	44	11	48
RT Vol	34	71	17
Lane Flow Rate	107	396	181
Geometry Grp	1	1	1
Degree of Util (X)	0.147	0.441	0.233
Departure Headway (Hd)	4.927	4.013	4.619
Convergence, Y/N	Yes	Yes	Yes
Cap	727	899	778
Service Time	2.969	2.035	2.649
HCM Lane V/C Ratio	0.147	0.44	0.233
HCM Control Delay	8.8	10.2	9.1
HCM Lane LOS	A	B	A
HCM 95th-tile Q	0.5	2.3	0.9

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	23	88	55	45	95
Future Vol, veh/h	28	23	88	55	45	95
Peak Hour Factor	0.82	0.82	0.78	0.78	0.77	0.77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	28	113	71	58	123
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	7.9	8.1	8.5
HCM LOS	A	A	A

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	55%	32%
Vol Thru, %	62%	0%	68%
Vol Right, %	38%	45%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	143	51	140
LT Vol	0	28	45
Through Vol	88	0	95
RT Vol	55	23	0
Lane Flow Rate	183	62	182
Geometry Grp	1	1	1
Degree of Util (X)	0.201	0.079	0.214
Departure Headway (Hd)	3.95	4.554	4.246
Convergence, Y/N	Yes	Yes	Yes
Cap	893	792	835
Service Time	2.044	2.554	2.328
HCM Lane V/C Ratio	0.205	0.078	0.218
HCM Control Delay	8.1	7.9	8.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.7	0.3	0.8

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	100	58	0	0	0
Future Vol, veh/h	0	100	58	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	82	82	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	122	71	0	0	0

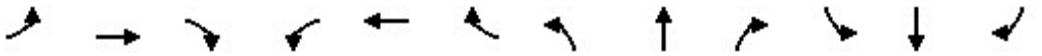
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	71	0	-	0	193	71
Stage 1	-	-	-	-	71	-
Stage 2	-	-	-	-	122	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1529	-	-	-	796	991
Stage 1	-	-	-	-	952	-
Stage 2	-	-	-	-	903	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1529	-	-	-	796	991
Mov Cap-2 Maneuver	-	-	-	-	796	-
Stage 1	-	-	-	-	952	-
Stage 2	-	-	-	-	903	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1529	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Lane Group	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	249	251	260	74	552	77	424
v/c Ratio	0.57	0.72	0.72	0.05	0.33	0.19	0.44
Control Delay	40.9	45.9	46.0	0.1	13.6	16.7	17.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	45.9	46.0	0.1	13.6	16.7	17.5
Queue Length 50th (ft)	69	149	155	0	83	23	146
Queue Length 95th (ft)	104	214	222	0	151	64	282
Internal Link Dist (ft)	141		198		118		108
Turn Bay Length (ft)				150			
Base Capacity (vph)	784	502	515	1583	1678	397	956
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.50	0.50	0.05	0.33	0.19	0.44

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	135	35	355	115	68	21	357	141	70	329	56
Future Volume (veh/h)	57	135	35	355	115	68	21	357	141	70	329	56
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	63	148	38	256	308	0	22	380	150	77	362	62
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.94	0.94	0.94	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	89	219	58	357	375		57	720	296	247	514	88
Arrive On Green	0.10	0.10	0.10	0.20	0.20	0.00	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	876	2147	571	1781	1870	1585	50	2179	895	874	1556	266
Grp Volume(v), veh/h	131	0	118	256	308	0	294	0	258	77	0	424
Grp Sat Flow(s),veh/h/ln	1827	0	1768	1781	1870	1585	1584	0	1541	874	0	1822
Q Serve(g_s), s	6.6	0.0	6.1	12.7	15.0	0.0	0.8	0.0	12.8	7.4	0.0	19.3
Cycle Q Clear(g_c), s	6.6	0.0	6.1	12.7	15.0	0.0	20.1	0.0	12.8	20.2	0.0	19.3
Prop In Lane	0.48		0.32	1.00		1.00	0.07		0.58	1.00		0.15
Lane Grp Cap(c), veh/h	186	0	180	357	375		564	0	509	247	0	602
V/C Ratio(X)	0.71	0.00	0.65	0.72	0.82		0.52	0.00	0.51	0.31	0.00	0.70
Avail Cap(c_a), veh/h	411	0	398	533	559		564	0	509	247	0	602
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.3	0.0	41.0	35.5	36.4	0.0	25.4	0.0	25.6	33.7	0.0	27.7
Incr Delay (d2), s/veh	4.8	0.0	4.0	2.7	6.1	0.0	3.4	0.0	3.6	3.3	0.0	6.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	2.8	5.7	7.3	0.0	5.7	0.0	5.1	1.8	0.0	9.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.1	0.0	45.0	38.2	42.4	0.0	28.8	0.0	29.2	37.0	0.0	34.5
LnGrp LOS	D	A	D	D	D		C	A	C	D	A	C
Approach Vol, veh/h		249			564	A		552			501	
Approach Delay, s/veh		45.6			40.5			28.9			34.9	
Approach LOS		D			D			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		14.3		36.0		23.6		36.0				
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s		21.4		31.4		28.4		31.4				
Max Q Clear Time (g_c+I1), s		8.6		22.2		17.0		22.1				
Green Ext Time (p_c), s		1.1		2.1		2.1		2.4				

Intersection Summary												
HCM 6th Ctrl Delay			36.3									
HCM 6th LOS			D									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	115	73	64	489	732
v/c Ratio	0.49	0.27	0.32	0.35	0.32
Control Delay	32.9	9.5	31.7	4.7	7.7
Queue Delay	0.0	0.0	0.0	0.7	0.0
Total Delay	32.9	9.5	31.7	5.3	7.7
Queue Length 50th (ft)	44	0	24	59	73
Queue Length 95th (ft)	73	24	56	122	127
Internal Link Dist (ft)	279			238	121
Turn Bay Length (ft)		25	100		
Base Capacity (vph)	332	356	210	1417	2266
Starvation Cap Reductn	0	0	0	567	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.35	0.21	0.30	0.58	0.32

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	92	58	57	435	562	133
Future Volume (veh/h)	92	58	57	435	562	133
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	115	72	64	489	592	140
Peak Hour Factor	0.80	0.80	0.89	0.89	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	164	146	130	1230	1486	350
Arrive On Green	0.09	0.09	0.07	0.66	0.52	0.52
Sat Flow, veh/h	1781	1585	1781	1870	2947	673
Grp Volume(v), veh/h	115	72	64	489	368	364
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1777	1749
Q Serve(g_s), s	4.1	2.9	2.3	8.0	8.3	8.3
Cycle Q Clear(g_c), s	4.1	2.9	2.3	8.0	8.3	8.3
Prop In Lane	1.00	1.00	1.00			0.38
Lane Grp Cap(c), veh/h	164	146	130	1230	925	911
V/C Ratio(X)	0.70	0.49	0.49	0.40	0.40	0.40
Avail Cap(c_a), veh/h	335	298	211	1230	925	911
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.1	28.5	29.4	5.2	9.6	9.6
Incr Delay (d2), s/veh	2.0	1.0	1.1	1.0	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	1.1	1.0	2.6	3.1	3.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	31.1	29.5	30.5	6.2	10.8	10.9
LnGrp LOS	C	C	C	A	B	B
Approach Vol, veh/h	187			553	732	
Approach Delay, s/veh	30.5			9.0	10.9	
Approach LOS	C			A	B	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		10.7	9.0	40.0		49.0
Change Period (Y+Rc), s		4.6	* 4.2	5.6		5.6
Max Green Setting (Gmax), s		12.4	* 7.8	31.4		43.4
Max Q Clear Time (g_c+I1), s		6.1	4.3	10.3		10.0
Green Ext Time (p_c), s		0.1	0.0	4.7		3.5

Intersection Summary	
HCM 6th Ctrl Delay	12.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	10.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	31	71	70	109	46	34	91	83	0	0	0
Future Vol, veh/h	50	31	71	70	109	46	34	91	83	0	0	0
Peak Hour Factor	0.50	0.50	0.50	0.91	0.91	0.91	0.93	0.93	0.93	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	100	62	142	77	120	51	37	98	89	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	10.5	10.2	10.3
HCM LOS	B	B	B

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	16%	33%	31%
Vol Thru, %	44%	20%	48%
Vol Right, %	40%	47%	20%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	208	152	225
LT Vol	34	50	70
Through Vol	91	31	109
RT Vol	83	71	46
Lane Flow Rate	224	304	247
Geometry Grp	1	1	1
Degree of Util (X)	0.308	0.387	0.329
Departure Headway (Hd)	4.965	4.582	4.789
Convergence, Y/N	Yes	Yes	Yes
Cap	718	781	744
Service Time	3.037	2.642	2.854
HCM Lane V/C Ratio	0.312	0.389	0.332
HCM Control Delay	10.3	10.5	10.2
HCM Lane LOS	B	B	B
HCM 95th-tile Q	1.3	1.8	1.4

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	43	74	112	56	97	217
Future Vol, veh/h	43	74	112	56	97	217
Peak Hour Factor	0.81	0.81	0.80	0.80	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	53	91	140	70	107	238
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9.1	9.1	11.2
HCM LOS	A	A	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	37%	31%
Vol Thru, %	67%	0%	69%
Vol Right, %	33%	63%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	168	117	314
LT Vol	0	43	97
Through Vol	112	0	217
RT Vol	56	74	0
Lane Flow Rate	210	144	345
Geometry Grp	1	1	1
Degree of Util (X)	0.261	0.195	0.439
Departure Headway (Hd)	4.479	4.864	4.583
Convergence, Y/N	Yes	Yes	Yes
Cap	800	735	783
Service Time	2.519	2.914	2.62
HCM Lane V/C Ratio	0.263	0.196	0.441
HCM Control Delay	9.1	9.1	11.2
HCM Lane LOS	A	A	B
HCM 95th-tile Q	1	0.7	2.3

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	153	143	0	0	0
Future Vol, veh/h	0	153	143	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	189	177	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	177	0	-	0	366	177
Stage 1	-	-	-	-	177	-
Stage 2	-	-	-	-	189	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1399	-	-	-	634	866
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	843	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1399	-	-	-	634	866
Mov Cap-2 Maneuver	-	-	-	-	634	-
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	843	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1399	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Appendix C

Analysis Worksheets for
Existing (2022) plus Proposed Project Conditions

Lane Group	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	118	209	213	63	489	24	276
v/c Ratio	0.36	0.67	0.67	0.04	0.27	0.05	0.27
Control Delay	38.0	44.5	43.8	0.1	9.8	11.5	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.0	44.5	43.8	0.1	9.8	11.5	11.7
Queue Length 50th (ft)	31	117	120	0	57	6	70
Queue Length 95th (ft)	47	172	174	0	83	18	117
Internal Link Dist (ft)	141		198		118		108
Turn Bay Length (ft)				150			
Base Capacity (vph)	827	493	507	1583	1833	482	1039
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.42	0.42	0.04	0.27	0.05	0.27

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	58	7	270	101	55	16	245	106	18	178	32
Future Volume (veh/h)	25	58	7	270	101	55	16	245	106	18	178	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	76	9	211	249	0	21	327	141	24	234	42
Peak Hour Factor	0.76	0.76	0.76	0.88	0.88	0.88	0.75	0.75	0.75	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	72	175	21	301	316		65	733	303	263	487	87
Arrive On Green	0.07	0.07	0.07	0.17	0.17	0.00	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	973	2376	291	1781	1870	1585	70	2322	959	925	1543	277
Grp Volume(v), veh/h	62	0	56	211	249	0	264	0	225	24	0	276
Grp Sat Flow(s),veh/h/ln	1822	0	1818	1781	1870	1585	1822	0	1529	925	0	1820
Q Serve(g_s), s	2.9	0.0	2.7	10.1	11.5	0.0	0.0	0.0	10.6	1.9	0.0	11.0
Cycle Q Clear(g_c), s	2.9	0.0	2.7	10.1	11.5	0.0	10.1	0.0	10.6	12.5	0.0	11.0
Prop In Lane	0.53		0.16	1.00		1.00	0.08		0.63	1.00		0.15
Lane Grp Cap(c), veh/h	134	0	134	301	316		618	0	483	263	0	574
V/C Ratio(X)	0.46	0.00	0.42	0.70	0.79		0.43	0.00	0.47	0.09	0.00	0.48
Avail Cap(c_a), veh/h	433	0	432	523	549		618	0	483	263	0	574
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	0.0	39.8	35.3	35.9	0.0	24.5	0.0	24.7	29.7	0.0	24.8
Incr Delay (d2), s/veh	2.4	0.0	2.1	3.0	4.4	0.0	2.2	0.0	3.2	0.7	0.0	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	1.3	4.5	5.5	0.0	4.7	0.0	4.2	0.5	0.0	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.4	0.0	41.9	38.2	40.2	0.0	26.7	0.0	27.9	30.4	0.0	27.7
LnGrp LOS	D	A	D	D	D		C	A	C	C	A	C
Approach Vol, veh/h		118			460	A		489			300	
Approach Delay, s/veh		42.2			39.3			27.3			27.9	
Approach LOS		D			D			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		11.2		33.0		19.8		33.0				
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s		21.4		28.4		26.4		28.4				
Max Q Clear Time (g_c+I1), s		4.9		14.5		13.5		12.6				
Green Ext Time (p_c), s		0.5		1.4		1.7		2.7				

Intersection Summary												
HCM 6th Ctrl Delay			32.8									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	70	26	34	391	512
v/c Ratio	0.33	0.12	0.17	0.26	0.20
Control Delay	28.6	11.7	26.3	3.3	4.9
Queue Delay	0.0	0.0	0.0	0.3	0.0
Total Delay	28.6	11.7	26.3	3.6	4.9
Queue Length 50th (ft)	24	0	12	38	19
Queue Length 95th (ft)	52	17	29	66	65
Internal Link Dist (ft)	279			238	121
Turn Bay Length (ft)		25	100		
Base Capacity (vph)	301	291	226	1528	2569
Starvation Cap Reductn	0	0	0	594	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.23	0.09	0.15	0.42	0.20

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	60	22	27	309	332	98
Future Volume (veh/h)	60	22	27	309	332	98
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	70	26	34	391	395	117
Peak Hour Factor	0.86	0.86	0.79	0.79	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	141	125	90	1239	1472	431
Arrive On Green	0.08	0.08	0.05	0.66	0.54	0.54
Sat Flow, veh/h	1781	1585	1781	1870	2804	794
Grp Volume(v), veh/h	70	26	34	391	257	255
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1777	1727
Q Serve(g_s), s	2.3	0.9	1.1	5.4	4.7	4.8
Cycle Q Clear(g_c), s	2.3	0.9	1.1	5.4	4.7	4.8
Prop In Lane	1.00	1.00	1.00			0.46
Lane Grp Cap(c), veh/h	141	125	90	1239	965	938
V/C Ratio(X)	0.50	0.21	0.38	0.32	0.27	0.27
Avail Cap(c_a), veh/h	304	270	228	1239	965	938
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.9	26.3	28.0	4.4	7.4	7.5
Incr Delay (d2), s/veh	1.0	0.3	1.0	0.7	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.3	0.5	1.6	1.6	1.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.9	26.6	29.0	5.1	8.1	8.2
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	96			425	512	
Approach Delay, s/veh	27.6			7.0	8.1	
Approach LOS	C			A	A	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		9.4	7.3	38.7		46.0
Change Period (Y+Rc), s		4.6	* 4.2	5.6		5.6
Max Green Setting (Gmax), s		10.4	* 7.8	28.4		40.4
Max Q Clear Time (g_c+I1), s		4.3	3.1	6.8		7.4
Green Ext Time (p_c), s		0.1	0.0	3.1		2.6

Intersection Summary	
HCM 6th Ctrl Delay	9.5
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	11.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	34	73	71	74	17	14	44	34	0	0	0
Future Vol, veh/h	21	34	73	71	74	17	14	44	34	0	0	0
Peak Hour Factor	0.25	0.25	0.25	0.75	0.75	0.75	0.82	0.82	0.82	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	84	136	292	95	99	23	17	54	41	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	13.1	9.7	9.4
HCM LOS	B	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	15%	16%	44%
Vol Thru, %	48%	27%	46%
Vol Right, %	37%	57%	10%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	92	128	162
LT Vol	14	21	71
Through Vol	44	34	74
RT Vol	34	73	17
Lane Flow Rate	112	512	216
Geometry Grp	1	1	1
Degree of Util (X)	0.164	0.593	0.286
Departure Headway (Hd)	5.275	4.172	4.772
Convergence, Y/N	Yes	Yes	Yes
Cap	675	865	750
Service Time	3.341	2.205	2.818
HCM Lane V/C Ratio	0.166	0.592	0.288
HCM Control Delay	9.4	13.1	9.7
HCM Lane LOS	A	B	A
HCM 95th-tile Q	0.6	4	1.2

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	32	29	88	62	52	95
Future Vol, veh/h	32	29	88	62	52	95
Peak Hour Factor	0.82	0.82	0.78	0.78	0.77	0.77
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	39	35	113	79	68	123
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	8.1	8.2	8.7
HCM LOS	A	A	A

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	52%	35%
Vol Thru, %	59%	0%	65%
Vol Right, %	41%	48%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	150	61	147
LT Vol	0	32	52
Through Vol	88	0	95
RT Vol	62	29	0
Lane Flow Rate	192	74	191
Geometry Grp	1	1	1
Degree of Util (X)	0.217	0.095	0.227
Departure Headway (Hd)	4.062	4.577	4.282
Convergence, Y/N	Yes	Yes	Yes
Cap	887	786	825
Service Time	2.071	2.586	2.382
HCM Lane V/C Ratio	0.216	0.094	0.232
HCM Control Delay	8.2	8.1	8.7
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.8	0.3	0.9

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	13	100	58	30	29	10
Future Vol, veh/h	13	100	58	30	29	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	82	82	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	122	71	37	32	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	108	0	-	0	244	90
Stage 1	-	-	-	-	90	-
Stage 2	-	-	-	-	154	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1483	-	-	-	744	968
Stage 1	-	-	-	-	934	-
Stage 2	-	-	-	-	874	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1483	-	-	-	735	968
Mov Cap-2 Maneuver	-	-	-	-	735	-
Stage 1	-	-	-	-	923	-
Stage 2	-	-	-	-	874	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1483	-	-	-	783
HCM Lane V/C Ratio	0.011	-	-	-	0.054
HCM Control Delay (s)	7.5	0	-	-	9.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Lane Group	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	264	275	279	74	625	77	446
v/c Ratio	0.58	0.74	0.73	0.05	0.38	0.23	0.48
Control Delay	41.2	45.6	44.9	0.1	14.6	18.9	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	45.6	44.9	0.1	14.6	18.9	19.5
Queue Length 50th (ft)	74	164	166	0	97	25	164
Queue Length 95th (ft)	110	229	230	0	177	70	317
Internal Link Dist (ft)	141		198		118		108
Turn Bay Length (ft)				150			
Base Capacity (vph)	783	504	517	1583	1626	340	923
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.55	0.54	0.05	0.38	0.23	0.48

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	64	142	35	395	115	68	21	378	189	70	349	56
Future Volume (veh/h)	64	142	35	395	115	68	21	378	189	70	349	56
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	70	156	38	277	338	0	22	402	201	77	384	62
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.94	0.94	0.94	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	98	228	58	385	405		53	640	348	217	519	84
Arrive On Green	0.11	0.11	0.11	0.22	0.22	0.00	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	918	2140	540	1781	1870	1585	40	1935	1054	816	1571	254
Grp Volume(v), veh/h	139	0	125	277	338	0	336	0	289	77	0	446
Grp Sat Flow(s),veh/h/ln	1824	0	1773	1781	1870	1585	1516	0	1512	816	0	1825
Q Serve(g_s), s	7.0	0.0	6.4	13.7	16.4	0.0	1.3	0.0	15.0	8.2	0.0	20.6
Cycle Q Clear(g_c), s	7.0	0.0	6.4	13.7	16.4	0.0	21.8	0.0	15.0	23.2	0.0	20.6
Prop In Lane	0.50		0.30	1.00		1.00	0.07		0.70	1.00		0.14
Lane Grp Cap(c), veh/h	195	0	189	385	405		541	0	500	217	0	603
V/C Ratio(X)	0.71	0.00	0.66	0.72	0.84		0.62	0.00	0.58	0.36	0.00	0.74
Avail Cap(c_a), veh/h	411	0	399	533	559		541	0	500	217	0	603
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.0	0.0	40.8	34.5	35.6	0.0	26.1	0.0	26.3	35.9	0.0	28.2
Incr Delay (d2), s/veh	4.8	0.0	3.9	2.9	7.7	0.0	5.3	0.0	4.8	4.5	0.0	7.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	0.0	3.0	6.1	8.2	0.0	6.9	0.0	5.9	1.9	0.0	10.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.8	0.0	44.7	37.4	43.3	0.0	31.4	0.0	31.1	40.4	0.0	36.1
LnGrp LOS	D	A	D	D	D		C	A	C	D	A	D
Approach Vol, veh/h		264			615	A		625			523	
Approach Delay, s/veh		45.3			40.7			31.3			36.7	
Approach LOS		D			D			C			D	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		14.7		36.0		25.2		36.0				
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s		21.4		31.4		28.4		31.4				
Max Q Clear Time (g_c+I1), s		9.0		25.2		18.4		23.8				
Green Ext Time (p_c), s		1.1		1.7		2.1		2.4				

Intersection Summary												
HCM 6th Ctrl Delay			37.4									
HCM 6th LOS			D									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	201	90	87	489	794
v/c Ratio	0.71	0.29	0.44	0.38	0.42
Control Delay	39.8	13.6	34.6	5.9	9.8
Queue Delay	0.0	0.0	0.0	1.1	0.0
Total Delay	39.8	13.6	34.6	6.9	9.8
Queue Length 50th (ft)	76	10	33	74	90
Queue Length 95th (ft)	118	37	72	123	135
Internal Link Dist (ft)	279			238	121
Turn Bay Length (ft)		25	100		
Base Capacity (vph)	332	346	209	1274	1888
Starvation Cap Reductn	0	0	0	521	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.61	0.26	0.42	0.65	0.42

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	161	72	77	435	562	192
Future Volume (veh/h)	161	72	77	435	562	192
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	201	90	87	489	592	202
Peak Hour Factor	0.80	0.80	0.89	0.89	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	252	224	151	1230	1325	451
Arrive On Green	0.14	0.14	0.08	0.66	0.51	0.51
Sat Flow, veh/h	1781	1585	1781	1870	2695	886
Grp Volume(v), veh/h	201	90	87	489	404	390
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1777	1711
Q Serve(g_s), s	7.2	3.4	3.1	8.0	9.5	9.6
Cycle Q Clear(g_c), s	7.2	3.4	3.1	8.0	9.5	9.6
Prop In Lane	1.00	1.00	1.00			0.52
Lane Grp Cap(c), veh/h	252	224	151	1230	905	872
V/C Ratio(X)	0.80	0.40	0.58	0.40	0.45	0.45
Avail Cap(c_a), veh/h	335	298	211	1230	905	872
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.4	25.8	29.1	5.2	10.3	10.3
Incr Delay (d2), s/veh	7.0	0.4	1.3	1.0	1.6	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	1.2	1.3	2.6	3.6	3.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	34.4	26.2	30.4	6.2	11.9	12.0
LnGrp LOS	C	C	C	A	B	B
Approach Vol, veh/h	291			576	794	
Approach Delay, s/veh	31.9			9.9	11.9	
Approach LOS	C			A	B	

Timer - Assigned Phs	2	3	4	8
Phs Duration (G+Y+Rc), s	13.9	9.8	39.2	49.0
Change Period (Y+Rc), s	4.6	* 4.2	5.6	5.6
Max Green Setting (Gmax), s	12.4	* 7.8	31.4	43.4
Max Q Clear Time (g_c+I1), s	9.2	5.1	11.6	10.0
Green Ext Time (p_c), s	0.2	0.0	5.1	3.5

Intersection Summary	
HCM 6th Ctrl Delay	14.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	16
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	64	113	78	70	188	46	47	91	83	0	0	0
Future Vol, veh/h	64	113	78	70	188	46	47	91	83	0	0	0
Peak Hour Factor	0.50	0.50	0.50	0.91	0.91	0.91	0.93	0.93	0.93	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	128	226	156	77	207	51	51	98	89	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	19.4	13.4	12.5
HCM LOS	C	B	B

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	21%	25%	23%
Vol Thru, %	41%	44%	62%
Vol Right, %	38%	31%	15%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	221	255	304
LT Vol	47	64	70
Through Vol	91	113	188
RT Vol	83	78	46
Lane Flow Rate	238	510	334
Geometry Grp	1	1	1
Degree of Util (X)	0.384	0.71	0.493
Departure Headway (Hd)	5.812	5.011	5.312
Convergence, Y/N	Yes	Yes	Yes
Cap	618	719	678
Service Time	3.859	3.048	3.354
HCM Lane V/C Ratio	0.385	0.709	0.493
HCM Control Delay	12.5	19.4	13.4
HCM Lane LOS	B	C	B
HCM 95th-tile Q	1.8	6	2.7

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	57	95	112	76	117	217
Future Vol, veh/h	57	95	112	76	117	217
Peak Hour Factor	0.81	0.81	0.80	0.80	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	70	117	140	95	129	238
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9.8	9.6	12.2
HCM LOS	A	A	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	38%	35%
Vol Thru, %	60%	0%	65%
Vol Right, %	40%	62%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	188	152	334
LT Vol	0	57	117
Through Vol	112	0	217
RT Vol	76	95	0
Lane Flow Rate	235	188	367
Geometry Grp	1	1	1
Degree of Util (X)	0.3	0.26	0.484
Departure Headway (Hd)	4.596	4.993	4.744
Convergence, Y/N	Yes	Yes	Yes
Cap	776	713	756
Service Time	2.659	3.063	2.801
HCM Lane V/C Ratio	0.303	0.264	0.485
HCM Control Delay	9.6	9.8	12.2
HCM Lane LOS	A	A	B
HCM 95th-tile Q	1.3	1	2.7

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	40	153	143	92	103	34
Future Vol, veh/h	40	153	143	92	103	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	81	81	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	189	177	114	112	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	291	0	-	0	521	234
Stage 1	-	-	-	-	234	-
Stage 2	-	-	-	-	287	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1271	-	-	-	516	805
Stage 1	-	-	-	-	805	-
Stage 2	-	-	-	-	762	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1271	-	-	-	494	805
Mov Cap-2 Maneuver	-	-	-	-	494	-
Stage 1	-	-	-	-	770	-
Stage 2	-	-	-	-	762	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1271	-	-	-	546
HCM Lane V/C Ratio	0.039	-	-	-	0.273
HCM Control Delay (s)	7.9	0	-	-	14
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	1.1

Appendix D

Analysis Worksheets for
Cumulative (2042) plus Proposed Project Conditions

Lane Group	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	424	456	470	86	957	210	809
v/c Ratio	0.69	0.87	0.87	0.05	1.27	2.23	1.19
Control Delay	41.3	49.8	48.5	0.1	160.4	611.1	131.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	49.8	48.5	0.1	160.4	611.1	131.5
Queue Length 50th (ft)	123	255	262	0	~390	~212	~640
Queue Length 95th (ft)	164	#470	#478	0	#516	#310	#870
Internal Link Dist (ft)	141		198		118		108
Turn Bay Length (ft)				150			
Base Capacity (vph)	785	536	556	1583	751	94	677
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.85	0.85	0.05	1.27	2.23	1.19

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	269	44	538	314	79	46	544	291	193	669	75
Future Volume (veh/h)	77	269	44	538	314	79	46	544	291	193	669	75
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	292	48	463	512	0	50	591	316	210	727	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	107	389	67	523	549		42	323	348	103	546	62
Arrive On Green	0.15	0.15	0.15	0.29	0.29	0.00	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	689	2510	430	1781	1870	1585	0	977	1054	615	1651	186
Grp Volume(v), veh/h	224	0	200	463	512	0	504	0	453	210	0	809
Grp Sat Flow(s),veh/h/ln	1836	0	1793	1781	1870	1585	519	0	1512	615	0	1837
Q Serve(g_s), s	11.1	0.0	10.1	23.6	25.3	0.0	0.0	0.0	27.2	4.2	0.0	31.4
Cycle Q Clear(g_c), s	11.1	0.0	10.1	23.6	25.3	0.0	31.4	0.0	27.2	31.4	0.0	31.4
Prop In Lane	0.38		0.24	1.00		1.00	0.10		0.70	1.00		0.10
Lane Grp Cap(c), veh/h	284	0	278	523	549		213	0	500	103	0	607
V/C Ratio(X)	0.79	0.00	0.72	0.89	0.93		2.36	0.00	0.91	2.04	0.00	1.33
Avail Cap(c_a), veh/h	414	0	404	533	559		213	0	500	103	0	607
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.6	0.0	38.2	32.0	32.6	0.0	29.9	0.0	30.4	47.0	0.0	31.8
Incr Delay (d2), s/veh	6.1	0.0	3.5	16.1	22.5	0.0	628.0	0.0	22.7	501.5	0.0	160.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	0.0	4.6	12.2	14.6	0.0	41.0	0.0	12.7	16.7	0.0	40.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.8	0.0	41.7	48.1	55.2	0.0	657.8	0.0	53.2	548.4	0.0	192.5
LnGrp LOS	D	A	D	D	E		F	A	D	F	A	F
Approach Vol, veh/h		424			975	A		957			1019	
Approach Delay, s/veh		43.3			51.8			371.4			265.8	
Approach LOS		D			D			F			F	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		19.3		36.0		32.5		36.0				
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s		21.4		31.4		28.4		31.4				
Max Q Clear Time (g_c+I1), s		13.1		33.4		27.3		33.4				
Green Ext Time (p_c), s		1.6		0.0		0.6		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			206.0									
HCM 6th LOS			F									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	285	136	148	618	1284
v/c Ratio	0.89	0.40	1.03	0.50	0.71
Control Delay	57.0	17.4	120.7	7.4	13.1
Queue Delay	0.0	0.0	0.0	2.2	0.0
Total Delay	57.0	17.4	120.7	9.6	13.1
Queue Length 50th (ft)	112	25	~70	107	165
Queue Length 95th (ft)	#237	70	#171	172	236
Internal Link Dist (ft)	279			238	121
Turn Bay Length (ft)		25	100		
Base Capacity (vph)	332	349	144	1235	1814
Starvation Cap Reductn	0	0	0	459	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.86	0.39	1.03	0.80	0.71

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	262	125	136	569	805	376
Future Volume (veh/h)	262	125	136	569	805	376
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	285	136	148	618	875	409
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	331	294	135	1230	1211	561
Arrive On Green	0.19	0.19	0.08	0.66	0.51	0.51
Sat Flow, veh/h	1781	1585	1781	1870	2451	1093
Grp Volume(v), veh/h	285	136	148	618	658	626
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1777	1674
Q Serve(g_s), s	10.2	5.0	5.0	11.2	18.9	19.2
Cycle Q Clear(g_c), s	10.2	5.0	5.0	11.2	18.9	19.2
Prop In Lane	1.00	1.00	1.00			0.65
Lane Grp Cap(c), veh/h	331	294	135	1230	913	860
V/C Ratio(X)	0.86	0.46	1.10	0.50	0.72	0.73
Avail Cap(c_a), veh/h	335	298	135	1230	913	860
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.1	23.9	30.5	5.8	12.4	12.5
Incr Delay (d2), s/veh	18.9	0.4	105.8	1.5	4.9	5.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	1.8	6.0	3.6	7.5	7.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	45.0	24.4	136.3	7.2	17.3	17.9
LnGrp LOS	D	C	F	A	B	B
Approach Vol, veh/h	421			766	1284	
Approach Delay, s/veh	38.3			32.2	17.6	
Approach LOS	D			C	B	

Timer - Assigned Phs	2	3	4	8
Phs Duration (G+Y+Rc), s	16.8	9.5	39.5	49.0
Change Period (Y+Rc), s	4.6	4.5	5.6	5.6
Max Green Setting (Gmax), s	12.4	5.0	31.4	43.4
Max Q Clear Time (g_c+I1), s	12.2	7.0	21.2	13.2
Green Ext Time (p_c), s	0.0	0.0	6.1	4.7

Intersection Summary	
HCM 6th Ctrl Delay	25.6
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	27
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	66	165	80	135	289	89	48	94	221	0	0	0
Future Vol, veh/h	66	165	80	135	289	89	48	94	221	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	72	179	87	147	314	97	52	102	240	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	17	37.7	20.4
HCM LOS	C	E	C

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	13%	21%	26%
Vol Thru, %	26%	53%	56%
Vol Right, %	61%	26%	17%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	363	311	513
LT Vol	48	66	135
Through Vol	94	165	289
RT Vol	221	80	89
Lane Flow Rate	395	338	558
Geometry Grp	1	1	1
Degree of Util (X)	0.667	0.573	0.885
Departure Headway (Hd)	6.089	6.099	5.838
Convergence, Y/N	Yes	Yes	Yes
Cap	596	592	625
Service Time	4.089	4.124	3.838
HCM Lane V/C Ratio	0.663	0.571	0.893
HCM Control Delay	20.4	17	37.7
HCM Lane LOS	C	C	E
HCM 95th-tile Q	5	3.6	10.5

Intersection	
Intersection Delay, s/veh	16.2
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	104	176	151	96	152	292
Future Vol, veh/h	104	176	151	96	152	292
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	113	191	164	104	165	317
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	13.4	11.8	20.4
HCM LOS	B	B	C

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	37%	34%
Vol Thru, %	61%	0%	66%
Vol Right, %	39%	63%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	247	280	444
LT Vol	0	104	152
Through Vol	151	0	292
RT Vol	96	176	0
Lane Flow Rate	268	304	483
Geometry Grp	1	1	1
Degree of Util (X)	0.396	0.469	0.711
Departure Headway (Hd)	5.31	5.546	5.3
Convergence, Y/N	Yes	Yes	Yes
Cap	677	648	680
Service Time	3.357	3.596	3.338
HCM Lane V/C Ratio	0.396	0.469	0.71
HCM Control Delay	11.8	13.4	20.4
HCM Lane LOS	B	B	C
HCM 95th-tile Q	1.9	2.5	5.9

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	40	208	245	92	103	34
Future Vol, veh/h	40	208	245	92	103	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	226	266	100	112	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	366	0	-	0	628	316
Stage 1	-	-	-	-	316	-
Stage 2	-	-	-	-	312	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1193	-	-	-	447	724
Stage 1	-	-	-	-	739	-
Stage 2	-	-	-	-	742	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1193	-	-	-	429	724
Mov Cap-2 Maneuver	-	-	-	-	429	-
Stage 1	-	-	-	-	709	-
Stage 2	-	-	-	-	742	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	15.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1193	-	-	-	477
HCM Lane V/C Ratio	0.036	-	-	-	0.312
HCM Control Delay (s)	8.1	0	-	-	15.9
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	269	44	538	314	79	46	544	291	193	669	75
Future Volume (veh/h)	77	269	44	538	314	79	46	544	291	193	669	75
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	292	48	463	512	0	50	591	316	210	727	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	82	297	51	471	495		50	637	535	240	843	95
Arrive On Green	0.12	0.12	0.12	0.26	0.26	0.00	0.51	0.51	0.51	0.51	0.51	0.51
Sat Flow, veh/h	689	2510	430	1781	1870	1585	39	1248	1048	615	1651	186
Grp Volume(v), veh/h	224	0	200	463	512	0	500	0	457	210	0	809
Grp Sat Flow(s),veh/h/ln	1836	0	1793	1781	1870	1585	821	0	1513	615	0	1837
Q Serve(g_s), s	15.4	0.0	14.4	33.6	34.4	0.0	16.3	0.0	27.5	38.9	0.0	50.1
Cycle Q Clear(g_c), s	15.4	0.0	14.4	33.6	34.4	0.0	66.4	0.0	27.5	66.4	0.0	50.1
Prop In Lane	0.38		0.24	1.00		1.00	0.10		0.69	1.00		0.10
Lane Grp Cap(c), veh/h	217	0	212	471	495		450	0	773	240	0	938
V/C Ratio(X)	1.03	0.00	0.94	0.98	1.03		1.11	0.00	0.59	0.88	0.00	0.86
Avail Cap(c_a), veh/h	217	0	212	471	495		450	0	773	240	0	938
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	57.3	0.0	56.9	47.5	47.8	0.0	32.7	0.0	22.3	47.9	0.0	27.8
Incr Delay (d2), s/veh	68.7	0.0	45.8	37.3	49.6	0.0	76.9	0.0	1.2	28.5	0.0	8.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.3	0.0	9.2	19.7	22.7	0.0	24.5	0.0	9.9	8.9	0.0	23.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	126.0	0.0	102.7	84.8	97.4	0.0	109.5	0.0	23.5	76.4	0.0	36.1
LnGrp LOS	F	A	F	F	F		F	A	C	E	A	D
Approach Vol, veh/h		424			975	A		957			1019	
Approach Delay, s/veh		115.0			91.4			68.5			44.4	
Approach LOS		F			F			E			D	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		20.0		71.0		39.0		71.0				
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6				
Max Green Setting (Gmax), s		15.4		66.4		34.4		66.4				
Max Q Clear Time (g_c+I1), s		17.4		68.4		36.4		68.4				
Green Ext Time (p_c), s		0.0		0.0		0.0		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			73.7									
HCM 6th LOS			E									

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.
Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Appendix E

Cumulative Buildout Volumes
City of Santa Cruz Critical Intersections

Cumulative Buildout Volumes City of Santa Cruz Critical Intersections

3/19/2020

#	Intersection	NORTHE	NORTHE	NORTHE	SOUTHE	SOUTHE	SOUTHE	EASTBN	EASTBN	EASTBN	WESTBN	WESTBN	WESTBN	TOTAL	SOURCE
		LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT		
1	Western/High	240	0	94	0	0	0	0	755	164	61	448	0	1762	GP
2	Bay/High	174	508	55	515	882	68	178	380	275	113	309	269	3726	GP
3	Moore/High	24	7	17	45	21	41	9	880	35	24	661	21	1785	GP
4	Laurent/High	16	49	16	32	24	16	34	856	38	14	735	30	1860	GP
5	River/Potrero	90	766	86	272	737	103	129	10	76	197	9	255	2730	GP
6	River/Hwy. 1	99	454	726	1109	545	571	490	2350	86	561	1862	693	9546	Downtown Plan
7	River/Fern	410	1112	0	0	1564	43	1	0	106	0	0	0	3236	GP
8	River/Encinal	576	563	111	8	488	145	210	6	1047	117	6	15	3292	GP
9	Ocean-Hwy. 17/Plymouth	405	654	0	186	1101	239	71	208	495	127	97	55	3638	Ocean Ext
10	Market/Isbel-Goss	47	154	147	202	114	1	4	192	36	63	77	218	1255	GP
11	North Branciforte/Goss	220	70	95	3	113	61	40	312	295	33	74	1	1317	GP
12	Morrissey/Fairmount	53	794	28	53	862	108	160	89	127	24	27	82	2407	GP
13	Bay/Nobel-Iowa	100	717	98	42	1168	56	39	49	129	65	45	41	2549	GP
14	Bay/Escalona	27	811	41	145	1108	70	61	43	40	49	33	62	2490	GP
15	Bay/King	148	723	160	194	972	110	61	161	100	98	97	167	2991	GP
16	King/Laurel	171	69	60	36	62	10	20	430	154	67	262	15	1356	GP
17	Storey/King	0	0	0	551	0	53	26	380	0	0	278	88	1376	GP
18	Route 1/Shaffer Rd	62	0	80	0	0	0	0	690	51	38	536	0	1457	GP
19	Western/Hwy. 1	19	113	205	203	86	44	27	451	25	88	382	232	1875	GP
20	Swift/Mission	96	76	692	67	42	16	30	721	82	452	637	117	3028	GP
21	Miramar/Mission	111	31	164	103	15	137	95	1991	58	178	1428	89	4400	GP
22	Almar-Younglove/Mission	38	1	276	45	0	44	0	1808	24	219	1468	2	3925	GP
23	Bay/Mission	146	170	133	454	194	157	166	2178	109	222	1692	348	5969	190 W Cliff
24	Laurel/Mission	412	223	41	33	285	23	51	2259	487	77	1886	48	5825	GP
25	Walnut/Mission	125	151	59	78	146	85	145	2012	182	41	1791	41	4856	GP
26	King-Union/Mission	20	6	19	1161	1	4	0	2556	3	14	1987	217	5988	GP
27	Chestnut-Hwy. 1/Mission	138	332	46	71	497	1822	2436	1060	42	33	849	93	7419	Downtown Plan
28	N. Pacific/RIVER	226	31	59	44	26	17	20	659	382	32	713	51	2260	GP
29	Center/Mission	98	0	621	0	0	0	0	843	64	423	691	0	2740	GP
30	Front-Pacific/Mission-Water	0	0	0	64	371	221	263	1133	165	166	893	39	3315	Downtown Plan
31	River/Water	111	384	252	312	426	58	82	1166	62	204	958	346	4361	GP
32	Ocean/Kennan-Washburn	39	1540	52	59	1733	11	40	0	53	47	0	39	3613	GP
33	Ocean/Water	203	1359	96	522	1448	399	495	1578	162	168	1008	339	7777	Downtown Plan
34	Market/Water	0	0	0	507	0	189	223	1836	0	0	1170	128	4053	GP
35	N. Branciforte/Water	322	323	78	41	219	129	458	1273	470	101	930	50	4394	GP
36	Seabright/Water	60	0	49	0	0	0	0	1353	121	23	1021	0	2627	GP
37	Morrissey/Water-Soquel	19	127	30	293	233	75	535	1695	38	63	1489	36	4633	GP
38	Frederick/Soquel	146	0	433	0	0	0	0	1755	93	226	1416	0	4069	GP
39	Hagemann-Trevethan/Soquel	77	14	34	74	14	86	69	2092	53	22	1503	24	4062	GP
40	Park/Soquel	53	18	26	128	7	70	39	2147	30	12	1409	28	3967	GP
41	Capitola/Soquel	708	16	77	47	25	28	20	920	1149	79	672	25	3766	GP
42	La Fonda/Soquel	1	1	1	52	0	76	97	763	2	2	524	69	1588	GP
43	Bay/California Ave	269	0	47	0	0	0	0	656	204	64	608	0	1848	GP
44	Bay/California St	0	0	0	263	0	95	132	597	0	0	466	420	1973	GP
45	California/Laurel	35	224	326	23	169	29	11	828	30	168	752	20	2615	GP
46	Chestnut/Laurel	141	59	95	26	72	76	111	982	91	79	866	28	2626	GP
47	Center/Laurel	62	94	56	133	77	50	30	965	65	56	823	58	2469	GP
48	Cedar/Laurel	0	0	14	0	0	116	68	1195	26	0	898	94	2411	GP
49	Pacific/Laurel	59	96	44	97	59	63	162	1075	44	64	982	91	2836	508 Front TIA
50	Front/Laurel	4	228	254	202	366	262	165	996	29	227	830	195	3758	508 Front TIA
51	Front/Metro Center	14	661	20	0	833	17	14	0	19	6	0	11	1595	508 Front TIA
52	Front/Cathcart	116	569	0	0	805	317	193	0	111	0	0	0	2111	508 Front TIA
53	Front/Soquel	46	523	243	193	649	75	70	262	44	498	314	79	2996	508 Front TIA
54	Front/Cooper	79	504	0	0	668	78	148	0	148	0	0	0	1625	GP
55	River S./Soquel	0	0	0	445	0	161	0	602	0	0	619	178	2005	GP
56	Riverside-Dakota/Soquel (new	36	17	39	29	2	72	13	960	3	3	689	17	1880	GP
57	Ocean/Soquel	318	817	296	353	611	269	259	601	129	188	424	83	4348	GP
58	Branciforte/Soquel	56	143	79	58	170	116	163	843	112	101	579	34	2454	GP
59	Seabright/Soquel	217	45	223	90	128	70	32	1075	125	179	585	16	2785	GP
60	San Lorenzo/Laurel-Broadway	498	0	33	0	0	0	0	858	542	0	693	0	2624	GP
61	Ocean/Broadway	12	521	89	230	699	296	253	534	47	102	443	118	3344	GP
62	S. Branciforte/Broadway	70	51	9	115	77	104	75	725	64	8	433	75	1806	GP
63	Seabright/Broadway	171	242	51	10	269	112	184	394	253	47	183	13	1929	GP
64	Pacific Avenue/Center	18	166	549	34	162	214	0	0	0	444	172	62	1821	190 W Cliff
65	West Cliff/Bay	54	383	0	0	432	414	421	0	58	0	0	0	1762	190 W Cliff
66	Pacific/Beach	21	120	35	116	149	239	548	235	48	0	0	0	1511	190 W Cliff
67	Cliff/Beach	0	0	0	186	0	0	229	426	0	0	0	0	841	GP
68	Riverside/Beach	0	0	0	96	0	0	0	339	0	0	0	0	435	GP
69	Riverside/Second	0	0	0	43	164	117	0	0	5	2	7	0	338	GP

Appendix F

Vehicle Miles Traveled (VMT) Analysis for
119 Lincoln Street – Downtown Library and Affordable Housing Project

PUBLIC WORKS DEPARTMENT
809 Center Street, Room 201, Santa Cruz CA 95060 • 831 420-5160 • Fax: 831 420-5161

November 17, 2022

Re: Vehicle Miles Traveled (VMT) Analysis for 119 Lincoln Street- Downtown Library and Affordable Housing Project

To: Brian Borguno, Development Manager
From: Claire Gallogly, AICP, Transportation Planner

This memorandum documents the results of a VMT analysis done for the proposed project at 119 Lincoln Street (the "proposed project", or "project"). Existing conditions include one parking lot with 134 spaces and one building located at 119 Lincoln Street The project proposes to construct a 38,086 square-foot library, a parking garage containing up to 400 spaces, 9,598 square-feet of commercial uses, a 1,905 square foot day care, and 124 low-income residential dwelling units.

This analysis uses the City of Santa Cruz SB743 Implementation Guidelines, adopted May 12, 2022.

The proposed project is located in a VMT Efficient Area based on the Santa Cruz City Residential Screening Map. This means that based on the VMT per capita threshold set by the City and County, the proposed project is located in an area that produces VMT per capita that is at least 15-percent below the Countywide average. Additionally, each of the project elements can use the screening criteria in Exhibit 2 of the City of Santa Cruz SB 743 Implementation Guidelines as follows:

- Projects near High Quality Transit: this project is within ½ mile of a High Quality Transit Stop as defined by California Public Resources Code section 21064.3
- Affordable Housing: this screening criteria covers the 124 units of affordable housing
- Local Essential Service: this screening criteria covers the day care and government offices uses (Library)
- Local Serving Retail: this screening criteria covers the 9,598 square feet of commercial uses, less than the threshold of 50,000 square feet

While the parking on site represents a net increase of up to 266 spaces (maximum 400 new, replacing 134 existing), because this parking is part of the public supply of parking and is not dedicated to these uses, the parking is analyzed as part of the overall shared public supply. In this case, the Parking District is projected to lose 448 spaces by 2030[1], but only projected to gain up to 400 with this project. This represents a net loss in the shared public supply of 48 spaces. This project does not add more parking than required by the City of Santa Cruz

Therefore, the VMT for this project is assumed to be less than significant in accordance with the adopted City of Santa Cruz guidelines.

[1] Lot 4 (-134), Lot 5 (-108), Lot 23 (-24), Lot 12 (-15), Lot 2 (-26), Lot 22 (-25), Lot 27 (-32), Lot 11 (-24), Lot 16 (-38), Lot 14 (-22)