

# APPENDIX G

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## Transportation Memos

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## Memorandum

**To:** Anais Schenk  
County of Santa Cruz Planning Department  
Stephanie Strelow  
Dudek

**From:** Chris Gregerson, P.E., T.E., PTOE, PTP  
Frederik Venter, P.E.

**Re:** **Santa Cruz County Travel Demand Model (SCC TDM) Update**  
Sustainability Policy and Regulatory Update EIR, Santa Cruz County

**Date:** October 20, 2021

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This memorandum documents the process undertaken to update the Santa Cruz County Travel Demand Model (SCC TDM) for the purposes of performing an analysis completed for four scenarios (Existing plus Project, 2040 Baseline, 2040 Project, and 2040 Cumulative) as part of the environmental documentation for the Santa Cruz County Sustainability Policy and Regulatory Update (Sustainability Update) EIR. In addition, this memorandum documents the analysis methods used to complete the SB 743 compliant Vehicle Miles Traveled (VMT) analysis.

### Model Overview

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The Santa Cruz County Travel Demand Model (SCC Model) is designed to forecast future travel patterns on both roadway and transit routes throughout Santa Cruz County (SCC). The model can be used to assess how changes in population, employment, demographics and transportation infrastructure affect travel patterns within the county. The SCC Model is a four-step travel demand model based on the TransCAD platform. The SCC Model was developed to provide more detailed information on travel patterns within Santa Cruz County than could be accomplished by the regional travel demand model.

The California Transportation Commission publishes and periodically updates guidelines for the development of long-range transportation plans that includes guidelines for regional travel demand modeling. The SCC Model follows these guidelines to allow an evaluation of multi-modal plans. These guidelines include sensitivity to the following policies/programs including:

- Land Use
- Geographic scale
- Sensitivity to mode
- Pricing
- Sensitivity to congestion
- Validation
- Documentation

The SCC Model is an enhanced four step model. The four primary sub-models making up the four-step model process are:

1. Trip Generation. This initial step calculates person ends using trip generation rates established during model estimation and refined to Santa Cruz County. Truck trips are currently included in non-home based and are not estimated separately. The SCC TDM runs a series of complex steps



to estimate daily trip productions and attractions by various trip purposes for each TAZ. The trip purposes are listed below:

- a. Home-Based Work (HW)
- b. Home-Based Other (HO)
- c. Home-Based School, K-12 (HK)
- d. Home-Based College (HC)
- e. Home-Based Shopping (HS)
- f. Work-Based Other (WO)
- g. Other-Based Other (OO)

The production model uses several variables to generate trips such as number of workers, household income, age, household size and car availability depending on the trip purpose. Trip productions for every TAZ in the model are compiled separately by each trip purpose. The attraction model uses employment categories for the HW trip purpose, whereas it uses the employment categories and number of students (K-12 and University) for all non-HW trip purposes. The attraction model estimates trip attractions to each TAZ by regression coefficients that vary by employment type. Trip attractions for every TAZ are compiled by each purpose and by each employment type based on these regression coefficients.

2. Trip Distribution. The second general step estimates how many trips travel from one zone to any other zone. The distribution is based on the number of trip ends generated in each of the two zones, and on factors that relate the likelihood of travel between any two zones to the travel time between the two zones such as distance, cost, time, and varies by accessibility to passenger vehicles, transit, and walking or biking. This step also determines how many trips enter or leave the model area.
3. Mode Choice. This step uses demographics and the comparison of distance, time, cost, and access between modes to estimate the proportions of the total person trips using drive-alone or shared-ride passenger auto, transit, walk or bike modes for travel between each pair of zones.
4. Trip Assignment. In this final step, vehicle trips and transit trips from one zone to another are assigned to specific travel routes between the zones. Congested travel information is used to influence each of the steps described above starting with vehicle availability for all models and starting with land use location for integrated land use transportation models.

## Methodology

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The SCC TDM was most recently updated to contain a base year of 2019 and future year of 2040. These updates were based on data provided by the County and the incorporated Cities within the County. The data provided included building permits, pending and approved projects (land use and infrastructure), and the County's previous General Plan. The land use updates were incorporated into the model by updating the information at the Traffic Analysis Zone (TAZ) level. There are 696 TAZs within the County, including 364 TAZs within the unincorporated parts of the County. In consultation with the SCCRTC and Santa Cruz County, the transportation analysis zone (TAZ) geography for the SCC Model is based on the AMBAG TAZ geography with revisions for Santa Cruz County. The land use updates included updating the households and population information in each TAZ, as well as the employment by category, and number of students in both K-12 schools and university students.

### *Socioeconomic and Employment Data*

When updating the residential data within the model (households and population), socioeconomic data (SED) associated with each TAZ must also be updated. The SED in the SCC TDM provides information about the makeup of the households in each TAZ. There are several different variables in the model SED, including age of the residents, household size, household income, number of vehicles per household,



number of workers per household, and the number of vehicles per worker. It should be noted that while the SCC TDM uses dwelling units as its input, there is no differentiation between single-family and multi-family residential in terms of trip generation and distribution.

To update the socioeconomic distribution at each TAZ for both the base year and future year scenarios, the existing distribution was assumed for any TAZ with over ten households before the update. For those TAZs with ten or fewer households, the average distribution was calculated based on the surrounding TAZs to provide a similar context for the subject TAZ.

The employment variables that were modified to update the number of workers by employment category used in the model are listed below:

1. Agriculture
2. Construction
3. Industrial and Manufacturing
4. Retail
5. Service (White Collar, Food Services, and jobs not included in other categories)
6. Public Administration (Government, Health Care, and Educational jobs)

These categories were determined by AMBAG and are inherited by the AMBAG regional travel demand model on which the SCC TDM was originally based. While AMBAG is in the middle of an update to their regional travel demand model that would change these land use categories, they are currently consistent with the regional model. **Exhibit 1** outlines the North American Industry Classification System (NAICS) codes that fall in each employment category.

**Exhibit 1 – Land Use Categories in the SCC TDM**

Category	Description and NAICS codes
<b>Agriculture</b>	Agriculture, Forestry, Fishing, and Hunting (11)
<b>Construction</b>	Construction (23)
<b>Industrial</b>	Mining (21), Utilities (22), and Manufacturing (31-33)
<b>Retail</b>	Wholesale Trade (42) and Retail Trade (44-45)
<b>Service</b>	Transportation and Warehousing (48-49), Information (51), Finance and Insurance (52), Real Estate Rental and Leasing (53), Professional, Scientific, and Technical Services (54), Management of Companies and Enterprises (55), Art, Entertainment, and Recreation (71), Accommodation and Food Service (72) and Other Services (81)
<b>Public</b>	Administrative and Support and Waste Management and Remediation Services (56), Educational Services (61), Health Care and Social Assistance (62), and Public Administration (92)

For projects that did not include an assumption of the number of employees, a conversion factor was needed to create a usable input for the model. This was done using the daily trip generation rates from the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 10<sup>th</sup> Edition*. The number of daily trips was calculated based on the square footage of the land uses where employees was unknown. The resulting number of trips was then divided by the ITE trips per employee trip rate to back calculate the number of employees for each land use.



### Calibration and Validation

The trip generation, trip distribution, and mode choice models were estimated and calibrated mainly using data from the 2012 California Household Travel Survey and the 2012 Transit On-Board Survey. The Santa Cruz County transit onboard survey data (2012) was used to generate calibration targets for the transit modes.

Validation of the model was performed to ensure that the model output matches available traffic counts, roadway speeds, transit ridership, etc. In addition, the model was validated across screenlines composed of several roadways to ensure that overall traffic flows are captured. The goal is to meet or exceed Caltrans and Federal Highway Administration static model validation guidelines. As part of the static validation procedure, elements of the trip generation, trip distribution, and traffic assignment modules are adjusted when necessary.

The results of the model validation and comparison to best practice standards is shown in **Exhibit 2** and **Exhibit 3**. The calibration results were within industry accepted ranges for all measures for the daily validation exercise. This certifies that the model meets standard validation criteria.

**Exhibit 2 – Static Model Validation for 2019 Base Year Model**

Static Model Validation								
Criteria	Target	Daily	AM	MID	PM	OFF	AM Peak Hour	PM Peak Hour
			(6AM-9AM)	(9AM-4PM)	(4PM-7PM)	(7PM-6AM)	(7AM-8AM)	(5PM-6PM)
<b>Model/Count Ratio</b>	0.90-1.10	1.00	0.96	0.98	0.97	0.82	0.90	0.98
<b>Percent Within Caltrans Maximum Deviation</b>	> 75%	76%	68%	78%	77%	60%	63%	59%
<b>Percent Root Mean Square Error</b>	< 40%	34%	60%	42%	52%	71%	62%	64%
<b>Correlation Coefficient</b>	> 0.88	0.97	0.85	0.88	0.82	0.74	0.90	0.91

**Exhibit 3 – Static Model Validation for 2019 Base Year Model (Screenline)**

Static Model Validation (Screenline)				
Criteria	Target	Daily	AM Peak Hour	PM Peak Hour
			(7AM-8AM)	(5PM-6PM)
<b>Model/Count Ratio</b>	0.90-1.10	0.94	0.85	0.83
<b>Percent Within Caltrans Maximum Deviation</b>	> 75%	73%	66%	57%
<b>Percent Root Mean Square Error</b>	< 40%	39%	50%	59%
<b>Correlation Coefficient</b>	> 0.88	0.96	0.94	0.89

The Santa Cruz County Travel Demand Model (TDM) has been determined to be statistically valid based on Caltrans and Federal Highway Administration (FHWA) requirements. The following static tests were completed as part of the basis of this determination:

- Model Volume/Count Ratio
- Percent of Volumes/Counts within Maximum Deviation
- Percent Root Mean Square Error
- Correlation Coefficient
- Screenline Analysis



## Memorandum

**To:** Anais Schenk  
County of Santa Cruz Planning Department  
Stephanie Strelow  
Dudek

**From:** Chris Gregerson, P.E., T.E., PTOE, PTP  
Frederik Venter, P.E.

**Re:** **Vehicle Miles Traveled (VMT) Analysis**  
Sustainability Policy and Regulatory Update EIR, Santa Cruz County

**Date:** July 20, 2021

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This memorandum documents the SB 743 compliant Vehicle Miles Traveled (VMT) analysis completed for four scenarios (Existing plus Project, 2040 Baseline, 2040 Project, and 2040 Cumulative) as part of the environmental documentation for the Santa Cruz County Sustainability Policy and Regulatory Update (Sustainability Update) EIR. With the passage of SB 743, VMT has become the metric for determining if new development will result in a “significant transportation impact” under the California Environmental Quality Act (CEQA), replacing Level of Service (LOS) as a metric for determining impacts. This memorandum summarizes the VMT analysis and resultant findings for the four scenarios.

Santa Cruz County currently has VMT thresholds and analysis guidelines that were used as the basis of the analysis contained herein.

### Methodology and Assumptions

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For all land uses, the Santa Cruz County Travel Demand Model (SCC TDM) was used as the principal tool to determine VMT. The SCC TDM contains a base year of 2019 and future year of 2040, both of which were used to determine the VMT impact of the land uses for the four analysis scenarios. These land uses were analyzed for the following analysis scenarios:

- Existing – 2019 land use in the incorporated and unincorporated areas of the County
- Existing plus Project – 2019 land uses in the incorporated areas and 2040 project land uses in the unincorporated areas
- 2040 Baseline – 2040 land uses in the incorporated and unincorporated areas based on adopted plans
- 2040 Project– 2040 land uses in the incorporated areas based on adopted plans and 2040 land uses in the unincorporated area based on the Project scenario
- 2040 Cumulative – 2040 land uses in the incorporated areas based on adopted and reasonably foreseeable future projects and 2040 land uses in the unincorporated area based on the Project scenario

The land uses assumed for each analysis scenario were provided by County staff for the unincorporated areas of the County. Land use assumptions for the cities in the baseline and cumulative scenarios were provided from staff at each of cities. The project land use for the County was forecasted based on the updated General Plan intensities as proposed in the Built Environment Element taking into account vacant and underutilized land as well as proximity to corridors that will support transit and active transportation facilities. **Attachment 1** provides a list of the roadway and land use assumptions for each

of the scenarios and **Attachment 2** provides an explanation on how the land use assumptions were arrived at for the Project scenario.

### **Roadway Network Assumptions**

In addition to land uses, County staff provided roadway network assumptions for the analysis scenarios as shown in **Attachment 1**. For the 2040 scenarios, the roadway network assumptions were additive. All assumptions for 2040 Baseline were included in 2040 Project, plus the scenario-specific assumptions, and all assumptions for 2040 Project were included in 2040 Cumulative, plus the scenario-specific assumptions. As noted above, for the Existing plus Project scenario, all roadway network assumptions included in the 2040 Project scenario for the unincorporated portions of the County were included in the Existing plus Project scenario while the incorporated portions of the County were consistent with the Existing scenario.

### **Land use Inputs**

The SCC TDM provides land uses based on residential and employment classifications. Employment classifications are broken into six categories that group together various industries based on similar trip making characteristics. These categories were determined by AMBAG and are inherited by the AMBAG regional travel demand model on which the SCC TDM was originally based. While AMBAG is in the middle of an update to their regional travel demand model that would change these land use categories, they are currently consistent with the regional model.

**Exhibit 1 – Land Use Categories in the SCC TDM**

<b>Category</b>	<b>Description and NAICS codes</b>
<b>Agriculture</b>	Agriculture, Forestry, Fishing, and Hunting (11)
<b>Construction</b>	Construction (23)
<b>Industrial</b>	Mining (21), Utilities (22), and Manufacturing (31-33)
<b>Retail</b>	Wholesale Trade (42) and Retail Trade (44-45)
<b>Service</b>	Transportation and Warehousing (48-49), Information (51), Finance and Insurance (52), Real Estate Rental and Leasing (53), Professional, Scientific, and Technical Services (54), Management of Companies and Enterprises (55), Art, Entertainment, and Recreation (71), Accommodation and Food Service (72) and Other Services (81)
<b>Public</b>	Administrative and Support and Waste Management and Remediation Services (56), Educational Services (61), Health Care and Social Assistance (62), and Public Administration (92)

In order to represent the land uses assumed for the four analysis scenarios in the SCC TDM, the non-residential land uses needed to be converted into jobs if the number of jobs were not provided. For projects that did not include an assumption of number of employees a conversion was needed to create a usable input for the model. This was done use the daily trip generation rates listed in the *Trip Generation Handbook, 10<sup>th</sup> Edition* published by the Institute of Transportation Engineers (ITE) for 1,000 square-feet and employees. The number of daily trips was calculated based on the square footage of the land uses where employees was unknown. The resulting number of trips was then divided by the ITE trip rate for per employee trips to back calculate the number of employees for each land use. It should be noted that while the SCC TDM uses dwelling units as its input, there is no differentiation between single-family and multi-family residential in terms of trip generation and distribution.



## Analysis

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The following sections detail the analysis completed:

### ***Residential and Employment-based Land Uses (Excludes Retail)***

The VMT for the residential land uses was computed by combining the production VMT for all Home-Based trip purposes. VMT for non-residential land uses was computed from the attraction Home-Based Work VMT. The external VMT for residential land uses was determined by multiplying the calibrated external trip distance for each TAZ by the total internal-external (I-X) Home-Based trips for that TAZ (the external trip distances were calibrated using Teralytics big data). The external VMT for non-residential land uses was determined by multiplying the calibrated external trip distance by TAZ determined previously by the total internal-external (I-X) Home-Based Work trips for that TAZ.

To determine the share of the non-residential VMT for each of the employment-based land uses (Agriculture, Construction, Industrial, Office, and Public), the total number of trips attracted to each TAZ were calculated by multiplying the model's underlying trip generation rate for the Home-Based Work trip purpose by jobs for each employment type. Each land use category's share of the VMT was calculated by dividing the number of trips for each employment category by the total number of Home-Based Work Trips. The VMT for each land use category was calculated by multiplying the each of the land use category's share by the total Home-Based Work VMT (including External VMT).

Residential and employment based VMT per Capita and VMT per Employee, respectively, for each TAZ were computed by dividing the residential and non-residential VMT by TAZ by the total population or total employees.

Additional analysis was conducted that determined residential and employment based VMT per Capita and VMT per Employee, respectively, for only the growth in land use in the unincorporated portion of the County. This analysis was completed to exclude the influence of existing land uses and focus only on the influence of growth in the unincorporated portion of the County.

This analysis was completed by first calculating the growth for each land use category on a TAZ-by-TAZ basis between the Existing scenario and each of the other scenarios. If positive, rather than zero, the growth was then multiplied by the VMT per capita or VMT per employee depending on the land use category for each TAZ. This product was summed for all TAZs in the unincorporated portion of the County and divided by the total job or housing growth in the unincorporated portion of the County for each land use category to calculate a weighted average VMT per capita or VMT per employee depending on the land use category.

It should be noted that while there is no negative growth in overall employment, certain TAZs contain negative growth in specific land use categories when a shift in employment type occurs, for example when redevelopment or repurposing of a building occurs. This may occur when residential housing is built in an area previously assumed to be industrial or a building shifts uses from office to retail. The negative growth was excluded from the weighted analysis of VMT per capita and VMT per employee so as to not artificially lower the trip length. The effect of the employment reduction is captured in the overall trip making characteristics as modeled by the SCC TDM, but a trip is not shortened due to negative growth. The negative growth is also taken into account when looking at the total VMT rather than VMT per capita or VMT per employee. This is discussed further in the retail analysis section of this memorandum.

**Exhibit 2** summarizes the VMT per capita and VMT per employee for the unincorporated portion of the County by scenario. As shown, for all scenarios, the residential land uses result in a VMT per capita above the County’s threshold, but less than the existing VMT. In addition, for all scenarios and all employment-based land use categories, VMT per employee exceeds the County threshold, but also is less than the existing VMT.

### ***Retail Land Uses***

While generally retail land uses can be analyzed qualitatively when assumed to be locally serving, for the purposes of this analysis, and consistent with Santa Cruz County VMT guidelines, the retail land uses were analyzed using a “net change” metric. This means that if a proposed retail use results in additional VMT, it would result in a finding of significance. Page 4 and 7 of the Santa Cruz County SB 743 Implementation Guidelines<sup>1</sup> specifically addresses some of the key issues surrounding how a retail land uses should be evaluated in terms of their VMT impact.

Local serving retail primarily serves pre-existing needs (i.e. they do not generate new trips because they meet existing demand). Because of this, local-serving retail uses can be presumed to reduce trip lengths when a new store is proposed. Essentially, the assumption is that someone will travel to a newly constructed local serving store because of its proximity, rather than the proposed retail store fulfilling an unmet need (i.e. the person had an existing need that was met by the retail located further away and is now traveling to the new retail use because it is closer to the person’s origin location). This results in a trip on the roadway network becoming shorter, rather than a new trip being added to the roadway network, which would result in an impact to the overall transportation system. Conversely, residential and office land uses often drive new trips given that they introduce new participants to the transportation system. The Santa Cruz County SB 743 Implementation Guidelines provides for a general threshold of 50,000 square-feet as an indicator as to whether a retail store can be considered local serving or not.

The VMT for the retail land uses was calculated using a methodology that is consistent with the employment-based land uses discussed previously. VMT for the retail land uses was computed from the attraction Home-Based Work VMT. The total number of trips attracted to each TAZ were calculated by multiplying the model’s underlying trip generation rate for the Home-Based Work trip purpose by the number of jobs in the retail land use category. The retail share of VMT was then calculated by dividing VMT by the number of retail trips for each TAZ. The total VMT for the retail land uses was calculated by multiplying the each of the retail land uses’ share by the total Home-Based Work VMT (including External VMT).

**Exhibit 3** below summarizes the total retail VMT by analysis scenario in the unincorporated portion of the County. As shown in **Exhibit 3**, all four analysis scenarios result in a total VMT that is lower than the Existing scenario. This reduction is primarily due to retail and housing becoming closer in proximity (more infill development), which lowers VMT overall.

Note that all scenarios experience a net positive in retail growth compared to the Existing scenario even if some individual TAZs experience negative retail growth. Therefore, the negative growth does impact the total VMT, but does not modify trip lengths. Generally, the results summarized in **Exhibit 3** indicate that in the future the retail stores will be located in closer proximity to housing.

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<sup>1</sup> *Analyzing Vehicle Miles Traveled for CEQA Compliance*. County of Santa Cruz. Implemented July 2020. Updated May 2021.



Exhibit 2 – Vehicle Miles Traveled (VMT) by Land Use and Scenario for Unincorporated Santa Cruz County

Jurisdiction	VMT/Capita (Residential)	VMT/Employee (Agriculture)	VMT/Employee (Construction)	VMT/Employee (Industrial)	VMT/Employee (Service)	VMT/Employee (Public)	VMT/Employee (Total)
<b>Existing VMT Threshold</b>	<b>8.9</b>	<b>12.6</b>	<b>12.0</b>	<b>11.0</b>	<b>7.4</b>	<b>7.0</b>	<b>8.9</b>
Existing Scenario	12.6	15.4	14.7	17.1	9.9	10.0	11.9
Existing + Project Scenario	12.1	15.2	14.2	16.8	9.8	9.8	11.7
2040 Baseline Scenario	12.0	14.2	13.5	15.3	9.3	9.1	10.8
2040 Project Scenario	11.9	14.3	13.3	15.7	9.2	9.3	11.0
2040 Cumulative Scenario	12.0	14.3	13.5	17.6	9.3	9.3	11.1
Existing + Project Scenario Growth (1)	10.3	15.2	13.6	16.6	9.8	9.6	11.6
2040 Baseline Scenario Growth (1)	10.1	13.8	13.4	13.1	8.9	8.7	9.9
2040 Project Scenario Growth (1)	10.0	14.3	12.8	15.5	9.2	9.0	10.9
2040 Cumulative Scenario Growth (1)	10.3	14.3	12.9	19.9	9.3	8.7	11.3
Existing plus Project Scenario Compared to Threshold (%)	36.0%	20.7%	18.9%	52.7%	31.6%	40.2%	31.2%
2040 Baseline Scenario Compared to Threshold (%)	34.4%	12.8%	13.3%	39.0%	25.1%	30.0%	21.7%
2040 Project Scenario Compared to Threshold (%)	33.4%	13.5%	11.6%	42.2%	23.9%	32.3%	23.4%
2040 Cumulative Scenario Compared to Threshold (%)	34.3%	13.3%	12.6%	60.1%	24.8%	31.9%	24.9%
Existing plus Project Growth Compared to Threshold (%)	15.6%	20.8%	14.1%	51.0%	32.4%	36.7%	29.9%
2040 Baseline Growth Compared to Threshold (%)	13.2%	10.0%	11.8%	18.9%	20.1%	24.1%	11.7%
2040 Project Growth Compared to Threshold (%)	12.3%	13.6%	7.0%	40.8%	24.7%	28.8%	22.1%
2040 Cumulative Growth Compared to Threshold (%)	15.1%	13.3%	8.0%	80.6%	25.1%	24.4%	27.3%

Note: Retail land uses are based on "Net Change" rather than an efficiency metric.

(1) Calculated by using the weighted average of land use growth for each land use category

Exhibit 3 – Retail Vehicle Miles Traveled (VMT) by scenario for Unincorporated Santa Cruz County

Jurisdiction	Retail
Existing Scenario	87,047
Existing + Project Scenario	86,427
2040 Baseline Scenario	78,927
2040 Project Scenario	81,175
2040 Cumulative Scenario	83,657
Existing plus Project Scenario Compared to Existing (%)	-0.7%
2040 Baseline Scenario Compared to Existing (%)	-9.3%
2040 Project Scenario Compared to Existing (%)	-6.7%
2040 Cumulative Scenario Compared to Existing (%)	-3.9%

### Transit and Active Transportation Improvements

The Project scenario also includes a number of VMT reducing elements such as policies to support the implementation of bus on shoulder transit, bus rapid transit, rail, and other high-quality transit facilities in the County. However, because the County is not the transit district and cannot implement these services, they are not accounted for in the Project VMT results. The model also cannot forecast reductions due to new and improved active transportation facilities which is an important component of the Project and the Access and Mobility Element. Therefore, reductions related to increases in bicycle and pedestrian mode share are also not accounted for in the Project VMT results presented above. While certain methodologies exist and are available for estimating VMT reductions due to transit and active transportation improvements, all of these improvements combined would not reduce the VMT impact to a level below significance. It is generally recognized by CAPCOA and other standard methodologies, including the County's VMT Guidelines that 15-percent is the maximum reduction possible due to transportation demand management strategies particularly in this suburban context. Therefore, specific reductions for the Active Transportation Plan or for transit projects that the County is supporting are not taken as part of the Project VMT results. This is discussed further in the environmental documentation.

### Findings

Based on the results of this analysis, the following findings are made:

- The residential land uses do exceed the VMT threshold of significance for all analysis scenarios. **The scenarios are determined to have a significant transportation impact for residential development.**
- The employment-based land uses do exceed the threshold of significance for all land use categories and for all analysis scenarios. **As a result, the project is determined for all non-residential land use categories, except retail, to have a significant transportation impact.**
- The retail land uses do not result in a net increase in total VMT and therefore, **the Project is determined to not have a significant transportation impact for retail uses.**

### Attachments:

**Attachment 1** – Scenario Assumptions for General Plan EIR

**Attachment 2** – Growth Forecast Memo

## Attachment 1

### *Scenario Assumptions for General Plan EIR*



**Attachment 1: Scenario Assumptions for General Plan EIR**

2040 Scenario	Baseline / No Project	Project: Sustainability Update	Cumulative
<b>Description</b>	Approved General Plans, GP amendments and projects	Sustainability Policy and Regulatory Update to the General Plan and County Code, including General Plan amendments, code modernization, and implementation of the Sustainable Santa Cruz County Plan. Greater growth than AMBAG’s 2040 projections.	Pending projects or plans that are not yet approved or may not even be submitted but are known as possible growth. The projects included below are in addition to growth that would be accounted for by the General Plan. In other words, if there are pending projects that are consistent with current zoning and GP then they should not also be included here.
<b>Plans / Zoning Amendments</b>	<ul style="list-style-type: none"> <li>Existing County General Plan</li> <li>Existing Specific/Area Plans</li> <li>Existing County Code</li> <li>All cities’ existing General Plans</li> <li>County zoning amendments: DRI, PF workforce housing and ag housing</li> </ul>	<ul style="list-style-type: none"> <li>Revised GP Elements as part of Sustainability Update</li> <li>New zoning designations as part of Sustainability Update - Rezone of Select Opportunity Sites</li> <li>Countywide Design Guidelines</li> <li>Pleasure Point Vision and Design Principles</li> </ul>	<ul style="list-style-type: none"> <li>SLV Complete Streets Plan</li> </ul>
<b>Land Use Projects</b>	<p>Data for base year update was provided to Kimley Horn separately. In addition to considering the plans described above the following specific projects were assumed for the horizon year:</p> <ul style="list-style-type: none"> <li>2340 Harper – 11 DUs</li> <li>Workbench (5701 Soquel Drive) – 16 DUs – TAZ 470</li> <li>“Erlach” R-combining site (PUD for APNs 037-101-02, 037-061-66,037-061-04, for 102 units) – TAZ 470</li> <li>“Atkinson” R-combining site (APN 048-211-23 and 09, 200 units.) – TAZ 470</li> <li>Nissan Dealership: 12,550 sqft retail and 10,000 sqft service</li> <li>Kaiser TAZ – reduce by 57 DUs</li> <li>Mid Penn Site at 15th/Capitola: Add 57 DUs and 29,696 sqft of MOB.</li> <li>Paul Minnie: 15 DUs and 2,826 sqft of office</li> <li>Portola Mixed Use (3911 Portola Dr): 33 DUs and 8,845 sqft commercial</li> <li>3900 Maplethorpe Lane: 10 DUs</li> <li>4129 and 4205 Clares St: 10 DUs</li> <li>Cannabis growth</li> <li>Cabrillo College – maintained growth</li> <li>UCSC: 19,500 students, 2,900 employees (The current number of students is approximately 19,000 with imposed max</li> </ul>	<ul style="list-style-type: none"> <li>Focused growth in infill areas and urban service areas – see Attachment 2</li> <li>Development at Soquel Dr/Thurber</li> <li>Medical Facilities on Soquel: assume 150-200,000 sqft of outpatient surgery, 100,000 sqft of new hospital, and 150-200,000 sqft of “senior” living (includes independent, assisted living, and skilled nursing).</li> </ul>	<ul style="list-style-type: none"> <li>Dominican Hospital</li> <li>Cemex Site: See Alternative 5 of Cemex Reuse Plan <a href="http://www.co.santa-cruz.ca.us/Portals/0/Cemex/Draft_Santa_Cruz_Coastal_Reuse_Plan_0214_19.pdf">http://www.co.santa-cruz.ca.us/Portals/0/Cemex/Draft_Santa_Cruz_Coastal_Reuse_Plan_0214_19.pdf</a></li> <li>Medical Office Building on Soquel</li> <li>East Cliff Village Center Redevelopment: including 1) 7,800 sqft additional MOB (expanding from 9,200 up to 17,000 sqft); 2) Assisted Living 131 DUs; Multifamily 174 DUs; and Restaurant/Retail 10,000 sqft.</li> <li>Brommer and 7<sup>th</sup>: Move 44 DU from Kaiser TAZ to this TAZ. Also add visitor accommodation use.</li> <li>Prather Lane (3071 Prather Lane and 2215 Soquel Drive): 20,000 MOB and 60 DU affordable senior housing</li> <li>Locatelli Mattison Townhomes (2450 Mattison Lane): net 10 DUs (24 DUs total)</li> <li>3300 Maplethorpe: 11 DUs</li> <li>Interlight (5630 Soquel Dr): 82 assisted care DUs with demo of church. IS found that there would be only approximately 80 new daily trips.</li> </ul> <p><b>OTHER JURISDICTIONS:</b></p> <ul style="list-style-type: none"> <li>Capitola Mall</li> <li>UCSC per EIR</li> <li>908 Ocean Street: 408 SOU project-application submitted</li> <li>1930 Ocean St Ext: 32 condo project; approved with GP amendment and rezoning</li> <li>2035 N Pacific: 26 residential units, 4,300 sf commercial-include since Downtown Plan buildout almost complete</li> <li>119 Coral: Supportive/Transitional housing-120 studies with demolition of existing 6 units and support facilities</li> <li>418/428/440/504 Front St. Santa Cruz: 170 DU and 10,338 retail commercial</li> </ul>

**Vehicle Miles Traveled (VMT) Analysis**

Sustainability Policy and Regulatory Update EIR, Santa Cruz County



**Attachment 1: Scenario Assumptions for General Plan EIR**

	<ul style="list-style-type: none"> <li>of 19,500. There are currently approximately 2,800 staff and faculty.)</li> <li>Redwood Elementary: add 33 dwelling units in TAZ 38 (polygon FID 414)</li> </ul>		<ul style="list-style-type: none"> <li>Santa Cruz Wharf Master Plan: 15,000 sf public use buildings and 22,000 commercial (retail) infill</li> <li>Oak Creek Park-Glen Canyon Rd/Mt. Hermon Rd, Scotts Valley: 52 DU and 25,000 sqft of commercial (assume retail and services?)</li> <li>La Madrona Hotel: 180 room hotel, 6,600 sf restaurant, 184 residential units (110 senior/u4 family)</li> <li>Dunslee Way PD: 25 townhouses, 5,000 sf commercial: Approved 2016</li> <li>139-261 Miles Lane, Watsonville: 61 DUs and two inpatient and outpatient treatment facilities (residential substance use disorder treatment facility and outpatient rehab facility).</li> <li>Downtown Watsonville Specific Plan: 2,369 residential units, 613,349 square feet of cafes/restaurants and bars, 204,450 square feet of retail, 51,112 square feet of office, and 153,337 square feet of industrial.</li> <li>975 Main St: 20,000 square feet of commercial</li> </ul>
<p><b>Transportation Projects</b></p>	<ul style="list-style-type: none"> <li>Constrained RTP project list including auxiliary lanes from 41st to Soquel and State Park to Park/Bay.</li> <li>County Capital Improvement Program</li> <li>Signal enhancements on Soquel and 41st</li> <li>Signal at Robertson / Soquel</li> <li>The following projects from the County General Plan:             <ul style="list-style-type: none"> <li>Capitola Rd widening (also in CIP)</li> <li>O’Neill Ranch Road (extension from upper 41<sup>st</sup> to Soquel San Jose Road)</li> <li>Widen Rio Del Mar Overpass</li> <li>Widen State Park</li> <li>Reconstruct Rio Del Mar/Clubhouse</li> <li>Widen 152, Green Valley Road and Airport Boulevard so long as widening preserves ROW for protected facilities as called out in forthcoming ATP</li> <li>All bicycle and pedestrian facility improvements which have not yet been implemented.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Projects from Existing General Plan Scenario</li> <li>Projects from Sustainable Santa Cruz County Plan – see Appendix to General Plan</li> <li>Portola Drive Streetscape Improvements</li> <li>41<sup>st</sup> improvements – See Memorandum X</li> <li>Active Transportation Plan projects – see also above note about SLV Complete Streets Plan</li> </ul>	<p>Projects from Existing General Plan Scenario</p> <ul style="list-style-type: none"> <li>Mitigations/improvements from Kaiser and other projects.</li> <li>High quality transit in rail corridor - TBD</li> <li>Highway 17 Express service connects to 41<sup>st</sup> Ave and State Park Dr</li> <li>HOV lanes on Highway 1</li> </ul>

**Vehicle Miles Traveled (VMT) Analysis**

Sustainability Policy and Regulatory Update EIR, Santa Cruz County

**Appendix B**

*Growth Forecast Memo*



## Memorandum

**To:** Anais Schenk  
County of Santa Cruz Planning Department

**From:** Chris Gregerson, P.E., T.E., PTOE, PTP  
Frederik Venter, P.E.

**Re:** **Project Scenario Analysis**  
Santa Cruz General Plan Update, Santa Cruz County

**Date:** April 1, 2021

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This memorandum documents the analysis completed to determine the roadway network assumptions that should be assumed for the 2040 Project scenario as part of the analysis completed for the Santa Cruz County General Plan Update.

### Purpose of Analysis

Currently, the roadway network assumptions for the 2040 Project scenario have not been finalized and this analysis was completed to provide County staff and project team members with information that will be used to determine which roadway network assumptions should be included. Under consideration were HOV lanes along Highway 1 between Morrissey Boulevard and San Andreas Road/Larkin Valley Road and the 17<sup>th</sup> Avenue Overcrossing that would allow drivers to pass over Highway 1 without having to use either Soquel Drive or 41<sup>st</sup> Avenue. Four model runs were completed as outlined below:

- 1) 17<sup>th</sup> Avenue Overcrossing only
- 2) HOV lanes only
- 3) 17<sup>th</sup> Avenue Overcrossing and HOV lanes
- 4) No HOV lanes or 17<sup>th</sup> Avenue Overcrossing

The results of these model runs were compared to the 2040 Baseline scenario to provide a comparison that will enable County staff and project team members to determine what improvements should be included.

### Analysis

The analysis was completed by modifying the roadway networks for each of the four Project scenarios and then running the Santa Cruz County Travel Demand Model (“SCC TDM” or “model”). In addition to the roadway network modifications outlined above, the following improvements were also made to all four Project scenarios:

- 1) New signalized intersection at Soquel Dr/Chanticleer Ave that extends north and connects to a new local east-west road that connects to Thurber north (and parallel to) Soquel Dr. Note that this is slightly different than what was planned in the SSCC.
- 2) Thurber Ln extended to south of Soquel Dr. (See Figure 7-7 of SSCC)
- 3) New east-west connection between 17<sup>th</sup> Ave and Chanticleer Ave that also connects to new Thurber extension. (See Figure 7-7 of SSCC)
- 4) New local circulation improvements on Kaiser site to connect to Chanticleer on the west and Mattison Lane on the east. (see Figure 7-7 from SSCC)

- 5) New local roadway connecting 17th and Chanticleer just south of Staples (see Figure 7-7 from SSCC)
- 6) Connect El Dorado Ave to 17th Ave north of rail-trail with new local roadway and add connection in northeast quadrant of block (See Figure 7-13 from SSCC)
- 7) Connect 17th Ave and Paget Ave south of rail-trail with new local roadway (See Figure 7-13 from SSCC).
- 8) Create new local circulation improvements in upper 41st Ave and Rodeo Gulch Rd area as shown in Figure 7-10 of SSCC (approximately 5 new roadways to create more of a grid system)
- 9) New frontage road between Mar Vista Dr and State Park Dr on north side of Highway 1. (See Figure 7-14 of SSCC).
- 10) New road connecting from new frontage to Soquel Dr parallel with State Park Dr. (See Figure 7-14 of SSCC)

These improvements were not included in the 2040 Baseline scenario but were included in all four Project scenario model runs. In addition, County staff provided land use assumptions that varied from the 2040 Baseline scenario and remained constant through the four Project scenario model runs.

The Countywide Vehicle Miles Traveled (VMT), VMT per capita, Congested VMT (CVMT), Vehicle Hours Traveled (VHT), and PM peak-hour volumes were selected as the comparison metrics from which the decision will be made as to which improvements will be included in the Project scenario. **Exhibit 1** below summarizes the comparison of these metrics, except for the PM peak-hour volumes, to the Baseline scenario. As shown in **Exhibit 1**, while the Countywide VMT increases in all Project scenarios, the VMT/capita for the two Project scenarios without the HOV lanes is less than the VMT/capita for the Baseline scenario. However, only the Project scenarios with HOV lanes results in a reduction of CVMT, defined as having a volume-to-capacity (V/C) ratio greater than 1.0.

To further determine where CVMT is located, **Exhibit 2** summarizes CVMT by roadway operating jurisdiction and by scenario. As shown in **Exhibit 2**, the large majority of CVMT is along Caltrans' facilities, such as Highway 1 and Highway 17. One item to note is that CVMT increases in the City of Santa Cruz and City of Watsonville when HOV lanes are included, likely due to additional vehicles traveling out of their way to access Highway 1.

**Exhibit 1 – VMT, CVMT, and VHT by Scenario**

Scenario	VMT	VMT/Capita	Congested VMT (V/C > 1.0)	VHT
Baseline	5,635,571	18.1	617,252	166,946
Project	5,658,422	17.9	633,682	167,961
Difference	22,851	-	16,430	1,015
Project + Overcrossing	5,657,086	17.9	644,482	167,884
Difference	21,515	-	27,229	937
Project + HOV Lanes	5,887,601	18.6	297,440	167,555
Difference	252,030	-	-319,812	609
Project + Overcrossing + HOV Lanes	5,886,192	18.6	291,612	167,436
Difference	250,622	-	-325,641	490

### Exhibit 2 – CVMT by Jurisdiction and Scenario

Scenario	Jurisdiction						
	Caltrans	Santa Cruz County	City of Santa Cruz	City of Capitola	City of Scotts Valley	City of Watsonville	Total
Baseline	601,991	663	13,050	0	404	1,144	617,252
Project	619,657	666	11,809	0	404	1,146	633,682
Project + Overcrossing	630,474	654	11,804	0	405	1,144	644,482
Project + HOV Lanes	282,373	266	13,231	0	402	1,167	297,440
Project + Overcrossing + HOV Lanes	276,539	266	13,236	0	404	1,167	291,612

In addition to the metrics summarized in **Exhibit 1** and **Exhibit 2**, screenline volumes were taken throughout the County to determine how the different roadway network assumptions affected volumes on various major roadways in the County. While the focus remained on PM peak-hour volumes, assumed to be the most congested conditions during the day, volumes were summarized for Daily, AM peak-hour, and PM peak-hour, as shown in **Exhibit 3**. In order to focus on roadways that would provide the largest fluctuation in volumes due to the modified assumptions for each scenario, a subset of the screenline roadways were selected for comparison. These include segments of 41<sup>st</sup> Avenue north and south of Highway 1, and roadways that parallel Highway 1, but are adjacent to the selected 41<sup>st</sup> Avenue segments. This information is summarized in a table, as shown in **Exhibit 4**.

**Exhibit 5**, **Exhibit 6**, **Exhibit 7**, **Exhibit 8**, and **Exhibit 9** are model plots that graphically display the volume information contained within **Exhibit 4** for the four Project scenarios and the Baseline scenario. The four Project scenario model plots contain both the PM peak-hour volume in black and the difference from the Baseline scenario PM peak-hour volume in red.

### Conclusions

While the two Project scenarios with HOV lanes reduce CVMT and generally reduce the volumes on arterials parallel to Highway 1, they also increase Countywide VMT/capita compared to the Baseline scenario. Therefore, the HOV lanes should not be considered for inclusion in the Project scenario.

The addition of the 17<sup>th</sup> Avenue Overcrossing increases countywide VMT but reduces VMT/capita compared to the Baseline scenario. The addition of the 17<sup>th</sup> Avenue Overcrossing decreases countywide VMT and increases CVMT compared to the Project scenario without HOV lanes or the 17<sup>th</sup> Avenue Overcrossing. The addition of the 17<sup>th</sup> Avenue Overcrossing also has minimal impact on the PM peak-hour volumes along the roadways in the vicinity of the Overcrossing as shown in **Exhibit 7**. Therefore, while the addition of the 17<sup>th</sup> Avenue Overcrossing provides some benefits, these benefits should be compared to the overall cost of the Overcrossing to determine whether it should be included in the Project scenario.

It is recommended that neither the 17<sup>th</sup> Avenue Overcrossing, nor the Highway 1 HOV lanes are included in the Project scenario.

### Attachments

**Exhibit 3** – Daily, AM Peak-hour, and PM Peak-hour Screenline Volumes

**Exhibit 4** – PM Peak-hour Screenline Volumes (41<sup>st</sup> Avenue Focus)

**Exhibit 5** – Model Plot of Baseline PM Peak-hour Screenline Volumes

**Exhibit 6** – Model Plot of Project PM Peak-hour Screenline Volumes

**Exhibit 7** – Model Plot of Project plus 17<sup>th</sup> Avenue Overcrossing PM Peak-hour Screenline Volumes

**Exhibit 8** – Model Plot of Project plus HOV Lanes PM Peak-hour Screenline Volumes

**Exhibit 9** – Model Plot of Project plus 17<sup>th</sup> Avenue Overcrossing plus HOV Lanes PM Peak-hour Screenline Volumes

# Exhibit 2 - Daily, AM Peakhour, and PM Peak-hour Screenline Volumes

ID	Location	Daily Volumes				
		2040 Baseline	2040 Proj + Oxing	2040 Proj + HOV Lanes	2040 Proj + HOV + Oxing	2040 Project
<b>41st Ave Screen Lines</b>						
19101	North of Portola Dr	7,197	7,268	8,071	7,815	7,482
19136	North of Capitola Rd	30,180	29,915	33,756	33,173	30,401
19405	South of Highway 1 Interchange	55,025	54,623	62,735	61,966	55,563
24360	Between Soquel Dr and Cory St	7,708	7,702	10,045	9,452	8,154
<b>Soquel Ave</b>						
22473	Between Chanticleer Ave and Mattison Ln	7,118	7,368	6,021	5,975	7,361
31560	South of Highway 1 Interchange	31,350	31,720	33,381	32,973	32,034
<b>Bay Ave</b>						
19319	South of Highway 1 Interchange	16,483	16,597	17,823	17,823	16,651
<b>Brommer St</b>						
24407	Between Chanticleer and 30th Ave	7,328	7,506	5,969	5,925	7,508
<b>Capitola Ave</b>						
31315	South of Highway 1	2,229	2,470	2,425	2,432	2,496
<b>Capitola Rd</b>						
31322	Between Chanticleer and 30th Ave	19,052	18,949	17,826	17,603	19,133
31565	Between Jose Ave and 7th Ave	17,672	17,480	15,434	15,212	17,672
<b>El Rancho Dr</b>						
45683	North of Carbonera Dr	683	691	731	719	691
<b>Freedom Blvd</b>						
45522	North of Highway 1 Interchange	17,623	17,881	20,089	20,091	17,881
<b>Graham Hill Rd</b>						
27786	Between Westwood Rd and Hidden Creek Ln	17,183	17,155	17,492	17,548	17,169
<b>Holohan Rd</b>						
34339	West of SR 152/E Lake Ave	11,004	10,867	10,987	10,988	10,868
<b>Park Ave</b>						
19428	South of Highway 1 Interchange	17,071	17,160	15,854	15,862	17,137
<b>Porter St</b>						
31265	North of Highway 1 Interchange	17,694	17,504	23,661	23,615	17,775
<b>Portola Dr</b>						
31363	Between 24th Ave to 26th Ave	11,679	11,793	10,176	10,133	11,834
<b>Soquel Ave</b>						
45522	North of Highway 1 Interchange	17,623	17,881	20,089	20,091	17,881
<b>Soquel Dr</b>						
22697	Between Rio del Mar Blvd and Freedom Blvd	10,130	10,056	1,254	1,254	10,151
23970	Between Highway 1 and Mission Dr	29,472	29,307	22,295	21,103	30,314
31679	Between Winkle Ave and Stanley St	30,859	30,587	20,818	20,601	30,813
34875	Between Park Dr and Aptos Creek Rd	12,601	12,767	9,746	9,746	12,762
<b>17th Ave Overcrossing</b>						
47766	17TH AVE OXing	0	4,812	0	4,912	0

# Exhibit 2 - Daily, AM Peakhour, and PM Peak-hour Screenline Volumes

ID	Location	Daily Volumes				
		2040 Baseline	2040 Proj + Oxing	2040 Proj + HOV Lanes	2040 Proj + HOV + Oxing	2040 Project
<b>Northbound SR 1</b>						
22596	Between Mar Monte Ave and San Andreas Rd	48,434	48,665	53,035	53,015	48,661
35368	Between San Andreas Rd and Freedom Blvd	48,661	48,702	39,988	39,977	48,743
35364	Between Freedom Blvd and Rio del Mar Blvd	48,832	48,983	44,017	44,018	48,952
35353	Between Rio del Mar Blvd and State Park Dr	51,124	51,188	45,557	45,557	51,196
35354	Between State Park Dr and Park Ave	51,391	51,488	45,933	45,915	51,494
24665	Between Park Ave and Porter St	54,748	54,882	48,713	48,725	54,867
19414	Between Porter St and 41st Ave	58,902	59,061	50,360	50,397	59,061
35348	Between 41st Ave and Soquel Dr	51,850	51,985	46,309	46,304	52,034
32663	Between Soquel Dr and Morrissey Blvd	56,813	57,192	45,937	46,073	56,994
35299	Between Morrissey Blvd and Hwy 17	50,889	51,036	54,766	54,737	51,084
<b>Northbound HOV</b>						
47805	Between San Andreas Rd and Freedom Blvd	0	0	16,608	16,609	0
47809	Between Freedom Blvd and Rio del Mar Blvd	0	0	19,345	19,341	0
47813	Between Rio del Mar Blvd and State Park Dr	0	0	19,353	19,348	0
47817	Between State Park Dr and Park Ave	0	0	21,045	21,043	0
47821	Between Park Ave and Porter St	0	0	22,055	22,055	0
47825	Between Porter St and 41st Ave	0	0	24,543	24,519	0
47829	Between 41st Ave and Soquel Dr	0	0	23,258	23,257	0
47833	Between Soquel Dr and Morrissey Blvd	0	0	21,263	21,344	0
<b>Southbound SR 1</b>						
32443	Between Morrissey Blvd and Hwy 17	52,593	52,771	57,135	57,140	52,764
35321	Between Soquel Dr and Morrissey Blvd	57,441	57,655	47,958	47,970	57,692
35344	Between 41st Ave and Soquel Dr	51,695	51,799	46,102	46,055	51,822
35347	Between Porter St and 41st Ave	59,055	59,316	50,735	50,748	59,296
45428	Between Park Ave and Porter St	53,128	53,347	47,875	47,896	53,363
35355	Between State Park Dr and Park Ave	52,793	53,041	47,718	47,696	53,015
21450	Between Rio del Mar Blvd and State Park Dr	53,012	53,257	46,432	46,431	53,267
35365	Between Freedom Blvd and Rio del Mar Blvd	51,236	51,512	47,991	47,988	51,494
35367	Between San Andreas Rd and Freedom Blvd	51,513	51,709	44,310	44,329	51,698
34176	Between Mar Monte Ave and San Andreas Rd	50,049	50,319	54,416	54,425	50,323
<b>Southbound HOV</b>						
47776	Between Soquel Dr and Morrissey Blvd	0	0	22,047	22,002	0
47780	Between 41st Ave and Soquel Dr	0	0	22,921	22,942	0
47784	Between Porter St and 41st Ave	0	0	26,003	26,021	0
47788	Between Park Ave and Porter St	0	0	22,746	22,743	0
47792	Between State Park Dr and Park Ave	0	0	20,468	20,463	0
47796	Between Rio del Mar Blvd and State Park Dr	0	0	19,394	19,387	0
47800	Between Freedom Blvd and Rio del Mar Blvd	0	0	16,647	16,644	0
47804	Between San Andreas Rd and Freedom Blvd	0	0	14,049	14,038	0
<b>Highway 1/Coast Rd</b>						
33004	West of Shatter Rd	13,522	13,387	13,451	13,454	13,388
<b>SR 9</b>						
30320	North of Keystone Way	9,575	9,617	9,699	9,740	9,629
<b>Northbound SR 17</b>						
32975	North of Glenwood Dr	33,035	33,099	33,646	33,518	33,244
45385	North of Carbonera Dr	44,395	44,378	44,870	44,775	44,376
<b>Southbound SR 17</b>						
35253	North of Glenwood Dr	33,052	33,212	33,730	33,623	33,244
45382	North of Carbonera Dr	45,010	44,986	45,459	45,390	44,992
<b>SR 152</b>						
45858	North of Holohan Rd	12,317	12,416	12,375	12,376	12,416

# Exhibit 2 - Daily, AM Peakhour, and PM Peak-hour Screenline Volumes

ID	Location	AM Volumes				
		2040 Baseline	2040 Proj + Oxing	2040 Proj + HOV Lanes	2040 Proj + HOV + Oxing	2040 Project
<b>41st Ave Screen Lines</b>						
19101	North of Portola Dr	526	539	561	553	545
19136	North of Capitola Rd	2,156	2,147	2,244	2,223	2,180
19405	South of Highway 1 Interchange	3,443	3,452	3,658	3,631	3,488
24360	Between Soquel Dr and Cory St	378	384	338	295	405
<b>Soquel Ave</b>						
22473	Between Chanticleer Ave and Mattison Ln	134	144	135	129	149
31560	South of Highway 1 Interchange	995	991	1,175	1,131	1,046
<b>Bay Ave</b>						
19319	South of Highway 1 Interchange	899	913	936	936	914
<b>Brommer St</b>						
24407	Between Chanticleer and 30th Ave	146	150	142	141	152
<b>Capitola Ave</b>						
31315	South of Highway 1	97	110	104	104	110
<b>Capitola Rd</b>						
31322	Between Chanticleer and 30th Ave	756	743	666	659	754
31565	Between Jose Ave and 7th Ave	586	546	529	491	593
<b>El Rancho Dr</b>						
45683	North of Carbonera Dr	34	35	35	35	35
<b>Freedom Blvd</b>						
45522	North of Highway 1 Interchange	1,033	1,047	1,179	1,179	1,047
<b>Graham Hill Rd</b>						
27786	Between Westwood Rd and Hidden Creek Ln	611	586	670	671	586
<b>Holohan Rd</b>						
34339	West of SR 152/E Lake Ave	662	662	669	669	662
<b>Park Ave</b>						
19428	South of Highway 1 Interchange	414	414	430	430	414
<b>Porter St</b>						
31265	North of Highway 1 Interchange	1,517	1,553	1,600	1,630	1,548
<b>Portola Dr</b>						
31363	Between 24th Ave to 26th Ave	334	342	329	326	343
<b>Soquel Ave</b>						
45522	North of Highway 1 Interchange	1,033	1,047	1,179	1,179	1,047
<b>Soquel Dr</b>						
22697	Between Rio del Mar Blvd and Freedom Blvd	24	26	23	23	26
23970	Between Highway 1 and Mission Dr	639	656	771	709	720
31679	Between Winkle Ave and Stanley St	375	423	309	311	423
34875	Between Park Dr and Aptos Creek Rd	382	392	417	417	392
<b>17th Ave Overcrossing</b>						
47766	17TH AVE OXing	0	215	0	192	0



# Exhibit 2 - Daily, AM Peakhour, and PM Peak-hour Screenline Volumes

ID	Location	AM Volumes				
		2040 Baseline	2040 Proj + Oxing	2040 Proj + HOV Lanes	2040 Proj + HOV + Oxing	2040 Project
<b>Northbound SR 1</b>						
22596	Between Mar Monte Ave and San Andreas Rd	2,796	2,776	2,982	2,982	2,776
35368	Between San Andreas Rd and Freedom Blvd	2,955	2,929	2,502	2,502	2,929
35364	Between Freedom Blvd and Rio del Mar Blvd	3,264	3,230	2,798	2,799	3,231
35353	Between Rio del Mar Blvd and State Park Dr	3,234	3,205	2,791	2,792	3,206
35354	Between State Park Dr and Park Ave	3,249	3,229	2,784	2,784	3,229
24665	Between Park Ave and Porter St	3,476	3,463	2,951	2,951	3,464
19414	Between Porter St and 41st Ave	3,898	3,890	3,212	3,212	3,883
35348	Between 41st Ave and Soquel Dr	3,691	3,687	3,099	3,092	3,701
32663	Between Soquel Dr and Morrissey Blvd	3,443	3,542	2,903	2,931	3,503
35299	Between Morrissey Blvd and Hwy 17	3,126	3,183	3,395	3,398	3,181
<b>Northbound HOV</b>						
47805	Between San Andreas Rd and Freedom Blvd	0	0	695	695	0
47809	Between Freedom Blvd and Rio del Mar Blvd	0	0	809	809	0
47813	Between Rio del Mar Blvd and State Park Dr	0	0	810	810	0
47817	Between State Park Dr and Park Ave	0	0	900	900	0
47821	Between Park Ave and Porter St	0	0	962	961	0
47825	Between Porter St and 41st Ave	0	0	1,085	1,100	0
47829	Between 41st Ave and Soquel Dr	0	0	1,058	1,058	0
47833	Between Soquel Dr and Morrissey Blvd	0	0	941	952	0
<b>Southbound SR 1</b>						
32443	Between Morrissey Blvd and Hwy 17	3,724	3,734	3,947	3,935	3,734
35321	Between Soquel Dr and Morrissey Blvd	4,210	4,209	3,335	3,334	4,208
35344	Between 41st Ave and Soquel Dr	3,809	3,830	3,166	3,167	3,828
35347	Between Porter St and 41st Ave	4,195	4,288	3,270	3,286	4,288
45428	Between Park Ave and Porter St	3,645	3,731	3,009	3,009	3,732
35355	Between State Park Dr and Park Ave	3,394	3,473	2,814	2,815	3,473
21450	Between Rio del Mar Blvd and State Park Dr	3,327	3,411	2,737	2,737	3,411
35365	Between Freedom Blvd and Rio del Mar Blvd	3,428	3,517	2,783	2,783	3,517
35367	Between San Andreas Rd and Freedom Blvd	3,214	3,297	2,731	2,731	3,297
34176	Between Mar Monte Ave and San Andreas Rd	3,153	3,235	3,438	3,438	3,235
<b>Southbound HOV</b>						
47776	Between Soquel Dr and Morrissey Blvd	0	0	1,223	1,226	0
47780	Between 41st Ave and Soquel Dr	0	0	1,176	1,177	0
47784	Between Porter St and 41st Ave	0	0	1,493	1,491	0
47788	Between Park Ave and Porter St	0	0	1,195	1,195	0
47792	Between State Park Dr and Park Ave	0	0	1,116	1,116	0
47796	Between Rio del Mar Blvd and State Park Dr	0	0	1,082	1,081	0
47800	Between Freedom Blvd and Rio del Mar Blvd	0	0	1,079	1,079	0
47804	Between San Andreas Rd and Freedom Blvd	0	0	827	827	0
<b>Highway 1/Coast Rd</b>						
33004	West of Shatter Rd	638	644	648	648	644
<b>SR 9</b>						
30320	North of Keystone Way	272	281	274	274	281
<b>Northbound SR 17</b>						
32975	North of Glenwood Dr	1,871	1,895	1,895	1,896	1,894
45385	North of Carbonera Dr	2,295	2,321	2,349	2,351	2,319
<b>Southbound SR 17</b>						
35253	North of Glenwood Dr	2,522	2,536	2,533	2,533	2,535
45382	North of Carbonera Dr	3,669	3,678	3,631	3,633	3,676
<b>SR 152</b>						
45858	North of Holohan Rd	733	738	740	740	738

# Exhibit 2 - Daily, AM Peakhour, and PM Peak-hour Screenline Volumes

ID	Location	PM Volumes				
		2040 Baseline	2040 Proj + Oxing	2040 Proj + HOV Lanes	2040 Project	2040 Proj + HOV + Oxing
<b>41st Ave Screen Lines</b>						
19101	North of Portola Dr	681	701	761	684	745
19136	North of Capitola Rd	2,476	2,457	2,787	2,472	2,748
19405	South of Highway 1 Interchange	4,422	4,409	5,125	4,427	5,095
24360	Between Soquel Dr and Cory St	846	819	764	877	735
<b>Soquel Ave</b>						
22473	Between Chanticleer Ave and Mattison Ln	531	562	361	566	342
31560	South of Highway 1 Interchange	2,023	2,054	2,254	2,080	2,216
<b>Bay Ave</b>						
19319	South of Highway 1 Interchange	1,270	1,281	1,421	1,282	1,422
<b>Brommer St</b>						
24407	Between Chanticleer and 30th Ave	275	276	264	280	261
<b>Capitola Ave</b>						
31315	South of Highway 1	152	170	154	170	154
<b>Capitola Rd</b>						
31322	Between Chanticleer and 30th Ave	1,671	1,659	1,380	1,668	1,370
31565	Between Jose Ave and 7th Ave	1,466	1,470	1,110	1,467	1,098
<b>El Rancho Dr</b>						
45683	North of Carbonera Dr	48	49	49	49	49
<b>Freedom Blvd</b>						
45522	North of Highway 1 Interchange	1,268	1,287	1,480	1,287	1,480
<b>Graham Hill Rd</b>						
27786	Between Westwood Rd and Hidden Creek Ln	1,278	1,300	1,297	1,318	1,283
<b>Holohan Rd</b>						
34339	West of SR 152/E Lake Ave	813	804	819	803	819
<b>Park Ave</b>						
19428	South of Highway 1 Interchange	944	965	787	994	785
<b>Porter St</b>						
31265	North of Highway 1 Interchange	1,598	1,647	1,969	1,634	1,972
<b>Portola Dr</b>						
31363	Between 24th Ave to 26th Ave	740	748	605	752	599
<b>Soquel Ave</b>						
45522	North of Highway 1 Interchange	1,268	1,287	1,480	1,287	1,480
<b>Soquel Dr</b>						
22697	Between Rio del Mar Blvd and Freedom Blvd	98	100	42	100	42
23970	Between Highway 1 and Mission Dr	1,678	1,671	1,381	1,774	1,279
31679	Between Winkle Ave and Stanley St	1,779	1,788	881	1,818	870
34875	Between Park Dr and Aptos Creek Rd	648	654	657	654	657
<b>17th Ave Overcrossing</b>						
47766	17TH AVE OXing	0	272	0	0	286



# Exhibit 2 - Daily, AM Peakhour, and PM Peak-hour Screenline Volumes

ID	Location	PM Volumes				
		2040 Baseline	2040 Proj + Oxing	2040 Proj + HOV Lanes	2040 Project	2040 Proj + HOV + Oxing
<b>Northbound SR 1</b>						
22596	Between Mar Monte Ave and San Andreas Rd	4,160	4,218	4,596	4,218	4,596
35368	Between San Andreas Rd and Freedom Blvd	4,209	4,261	3,543	4,261	3,543
35364	Between Freedom Blvd and Rio del Mar Blvd	4,428	4,481	3,736	4,481	3,736
35353	Between Rio del Mar Blvd and State Park Dr	4,442	4,497	3,782	4,498	3,782
35354	Between State Park Dr and Park Ave	4,524	4,552	3,899	4,549	3,899
24665	Between Park Ave and Porter St	4,888	4,936	4,205	4,912	4,206
19414	Between Porter St and 41st Ave	5,124	5,150	4,498	5,148	4,500
35348	Between 41st Ave and Soquel Dr	4,487	4,493	4,153	4,488	4,162
32663	Between Soquel Dr and Morrissey Blvd	5,047	5,060	4,124	5,061	4,132
35299	Between Morrissey Blvd and Hwy 17	4,508	4,525	4,807	4,515	4,805
<b>Northbound HOV</b>						
47805	Between San Andreas Rd and Freedom Blvd	0	0	1,302	0	1,302
47809	Between Freedom Blvd and Rio del Mar Blvd	0	0	1,489	0	1,488
47813	Between Rio del Mar Blvd and State Park Dr	0	0	1,504	0	1,504
47817	Between State Park Dr and Park Ave	0	0	1,591	0	1,591
47821	Between Park Ave and Porter St	0	0	1,742	0	1,741
47825	Between Porter St and 41st Ave	0	0	1,948	0	1,948
47829	Between 41st Ave and Soquel Dr	0	0	1,909	0	1,906
47833	Between Soquel Dr and Morrissey Blvd	0	0	1,690	0	1,696
<b>Southbound SR 1</b>						
32443	Between Morrissey Blvd and Hwy 17	4,168	4,198	4,567	4,181	4,566
35321	Between Soquel Dr and Morrissey Blvd	4,602	4,633	3,915	4,631	3,915
35344	Between 41st Ave and Soquel Dr	4,262	4,261	3,861	4,248	3,868
35347	Between Porter St and 41st Ave	5,055	5,055	4,350	5,045	4,351
45428	Between Park Ave and Porter St	4,537	4,534	3,923	4,536	3,923
35355	Between State Park Dr and Park Ave	4,229	4,220	3,588	4,221	3,588
21450	Between Rio del Mar Blvd and State Park Dr	4,051	4,035	3,436	4,036	3,437
35365	Between Freedom Blvd and Rio del Mar Blvd	4,030	4,013	3,382	4,013	3,382
35367	Between San Andreas Rd and Freedom Blvd	3,740	3,725	3,122	3,725	3,122
34176	Between Mar Monte Ave and San Andreas Rd	3,526	3,517	3,883	3,517	3,883
<b>Southbound HOV</b>						
47776	Between Soquel Dr and Morrissey Blvd	0	0	1,632	0	1,636
47780	Between 41st Ave and Soquel Dr	0	0	1,683	0	1,683
47784	Between Porter St and 41st Ave	0	0	1,833	0	1,832
47788	Between Park Ave and Porter St	0	0	1,627	0	1,626
47792	Between State Park Dr and Park Ave	0	0	1,497	0	1,497
47796	Between Rio del Mar Blvd and State Park Dr	0	0	1,342	0	1,342
47800	Between Freedom Blvd and Rio del Mar Blvd	0	0	1,311	0	1,311
47804	Between San Andreas Rd and Freedom Blvd	0	0	1,094	0	1,094
<b>Highway 1/Coast Rd</b>						
33004	West of Shatter Rd	980	971	976	971	976
<b>SR 9</b>						
30320	North of Keystone Way	641	648	643	636	651
<b>Northbound SR 17</b>						
32975	North of Glenwood Dr	3,040	3,062	3,055	3,061	3,056
45385	North of Carbonera Dr	4,135	4,106	4,130	4,101	4,138
<b>Southbound SR 17</b>						
35253	North of Glenwood Dr	2,318	2,340	2,340	2,340	2,340
45382	North of Carbonera Dr	3,181	3,197	3,246	3,188	3,251
<b>SR 152</b>						
45858	North of Holohan Rd	924	932	933	932	933

# Exhibit 2 - Daily, AM Peakhour, and PM Peak-hour Screenline Volumes

ID	Location	PM Volume Difference			2040 Project
		2040 Proj + Oxing	2040 Proj + HOV Lanes	2040 Proj + HOV + Oxing	
<b>41st Ave Screen Lines</b>					
19101	North of Portola Dr	20	80	64	3
19136	North of Capitola Rd	-19	311	272	-4
19405	South of Highway 1 Interchange	-13	703	673	5
24360	Between Soquel Dr and Cory St	-27	-82	-111	31
<b>Soquel Ave</b>					
22473	Between Chanticleer Ave and Mattison Ln	31	-170	-189	35
31560	South of Highway 1 Interchange	31	231	193	57
<b>Bay Ave</b>					
19319	South of Highway 1 Interchange	11	151	152	12
<b>Brommer St</b>					
24407	Between Chanticleer and 30th Ave	1	-11	-14	5
<b>Capitola Ave</b>					
31315	South of Highway 1	18	2	2	18
<b>Capitola Rd</b>					
31322	Between Chanticleer and 30th Ave	-12	-291	-301	-3
31565	Between Jose Ave and 7th Ave	4	-356	-368	1
<b>El Rancho Dr</b>					
45683	North of Carbonera Dr	1	1	1	1
<b>Freedom Blvd</b>					
45522	North of Highway 1 Interchange	19	212	212	19
<b>Graham Hill Rd</b>					
27786	Between Westwood Rd and Hidden Creek Ln	22	19	5	40
<b>Holohan Rd</b>					
34339	West of SR 152/E Lake Ave	-9	6	6	-10
<b>Park Ave</b>					
19428	South of Highway 1 Interchange	21	-157	-159	50
<b>Porter St</b>					
31265	North of Highway 1 Interchange	49	371	374	36
<b>Portola Dr</b>					
31363	Between 24th Ave to 26th Ave	8	-135	-141	12
<b>Soquel Ave</b>					
45522	North of Highway 1 Interchange	19	212	212	19
<b>Soquel Dr</b>					
22697	Between Rio del Mar Blvd and Freedom Blvd	2	-56	-56	2
23970	Between Highway 1 and Mission Dr	-7	-297	-399	96
31679	Between Winkle Ave and Stanley St	9	-898	-909	39
34875	Between Park Dr and Aptos Creek Rd	6	9	9	6
<b>17th Ave Overcrossing</b>					
47766	17TH AVE OXing	272	0	286	0

# Exhibit 2 - Daily, AM Peakhour, and PM Peak-hour Screenline Volumes

ID	Location	PM Volume Difference			
		2040 Proj + Oxing	2040 Proj + HOV Lanes	2040 Proj + HOV + Oxing	2040 Project
<b>Northbound SR 1</b>					
22596	Between Mar Monte Ave and San Andreas Rd	58	436	436	58
35368	Between San Andreas Rd and Freedom Blvd	52	-666	-666	52
35364	Between Freedom Blvd and Rio del Mar Blvd	53	-692	-692	53
35353	Between Rio del Mar Blvd and State Park Dr	55	-660	-660	56
35354	Between State Park Dr and Park Ave	28	-625	-625	25
24665	Between Park Ave and Porter St	48	-683	-682	24
19414	Between Porter St and 41st Ave	26	-626	-624	24
35348	Between 41st Ave and Soquel Dr	6	-334	-325	1
32663	Between Soquel Dr and Morrissey Blvd	13	-923	-915	14
35299	Between Morrissey Blvd and Hwy 17	17	299	297	7
<b>Northbound HOV</b>					
47805	Between San Andreas Rd and Freedom Blvd	0	1,302	1,302	0
47809	Between Freedom Blvd and Rio del Mar Blvd	0	1,489	1,488	0
47813	Between Rio del Mar Blvd and State Park Dr	0	1,504	1,504	0
47817	Between State Park Dr and Park Ave	0	1,591	1,591	0
47821	Between Park Ave and Porter St	0	1,742	1,741	0
47825	Between Porter St and 41st Ave	0	1,948	1,948	0
47829	Between 41st Ave and Soquel Dr	0	1,909	1,906	0
47833	Between Soquel Dr and Morrissey Blvd	0	1,690	1,696	0
<b>Southbound SR 1</b>					
32443	Between Morrissey Blvd and Hwy 17	30	399	398	13
35321	Between Soquel Dr and Morrissey Blvd	31	-687	-687	29
35344	Between 41st Ave and Soquel Dr	-1	-401	-394	-14
35347	Between Porter St and 41st Ave	0	-705	-704	-10
45428	Between Park Ave and Porter St	-3	-614	-614	-1
35355	Between State Park Dr and Park Ave	-9	-641	-641	-8
21450	Between Rio del Mar Blvd and State Park Dr	-16	-615	-614	-15
35365	Between Freedom Blvd and Rio del Mar Blvd	-17	-648	-648	-17
35367	Between San Andreas Rd and Freedom Blvd	-15	-618	-618	-15
34176	Between Mar Monte Ave and San Andreas Rd	-9	357	357	-9
<b>Southbound HOV</b>					
47776	Between Soquel Dr and Morrissey Blvd	0	1,632	1,636	0
47780	Between 41st Ave and Soquel Dr	0	1,683	1,683	0
47784	Between Porter St and 41st Ave	0	1,833	1,832	0
47788	Between Park Ave and Porter St	0	1,627	1,626	0
47792	Between State Park Dr and Park Ave	0	1,497	1,497	0
47796	Between Rio del Mar Blvd and State Park Dr	0	1,342	1,342	0
47800	Between Freedom Blvd and Rio del Mar Blvd	0	1,311	1,311	0
47804	Between San Andreas Rd and Freedom Blvd	0	1,094	1,094	0
<b>Highway 1/Coast Rd</b>					
33004	West of Shatter Rd	-9	-4	-4	-9
<b>SR 9</b>					
30320	North of Keystone Way	7	2	10	-5
<b>Northbound SR 17</b>					
32975	North of Glenwood Dr	22	15	16	21
45385	North of Carbonera Dr	-29	-5	3	-34
<b>Southbound SR 17</b>					
35253	North of Glenwood Dr	22	22	22	22
45382	North of Carbonera Dr	16	65	70	7
<b>SR 152</b>					
45858	North of Holohan Rd	8	9	9	8

# Exhibit 3 - PM Peak-hour Screenline Volumes (41st Avenue Focus)

## Local Streets

ID	Location	PM Volumes				PM Volume Difference				
		2040 Baseline	2040 Proj + Oxing	2040 Proj + HOV Lanes	2040 Project	2040 Proj + Oxing	2040 Proj + HOV Lanes	2040 Proj + HOV + Oxing	2040 Project	
<b>41st Ave Screen Lines</b>										
19101	North of Portola Dr	681	701	761	684	745	20	80	64	3
19136	North of Capitola Rd	2,476	2,457	2,787	2,472	2,748	-19	311	272	-4
19405	South of Highway 1 Interchange	4,422	4,409	5,125	4,427	5,095	-13	703	673	5
24360	Between Soquel Dr and Cory St	846	819	764	877	735	-27	-82	-111	31
<b>Soquel Ave</b>										
22473	Between Chanticleer Ave and Mattison Ln	531	562	361	566	342	31	-170	-189	35
<b>Brommer St</b>										
24407	Between Chanticleer and 30th Ave	275	276	264	280	261	1	-11	-14	5
<b>Capitola Rd</b>										
31322	Between Chanticleer and 30th Ave	1,671	1,659	1,380	1,668	1,370	-12	-291	-301	-3
<b>Portola Dr</b>										
31363	Between 24th Ave to 26th Ave	740	748	605	752	599	8	-135	-141	12
<b>Soquel Dr</b>										
31679	Between Winkle Ave and Stanley St	1,779	1,788	881	1,818	870	9	-898	-909	39

## SR 1

<b>Northbound SR 1</b>										
35348	Between 41st Ave and Soquel Dr	4,487	4,493	4,153	4,488	4,162	6	-334	-325	1
<b>Northbound HOV</b>										
47829	Between 41st Ave and Soquel Dr	0	0	1,909	0	1,906	0	1,909	1,906	0
<b>Southbound SR 1</b>										
35344	Between 41st Ave and Soquel Dr	4,262	4,261	3,861	4,248	3,868	-1	-401	-394	-14
<b>Southbound HOV</b>										
47780	Between 41st Ave and Soquel Dr	0	0	1,683	0	1,683	0	1,683	1,683	0



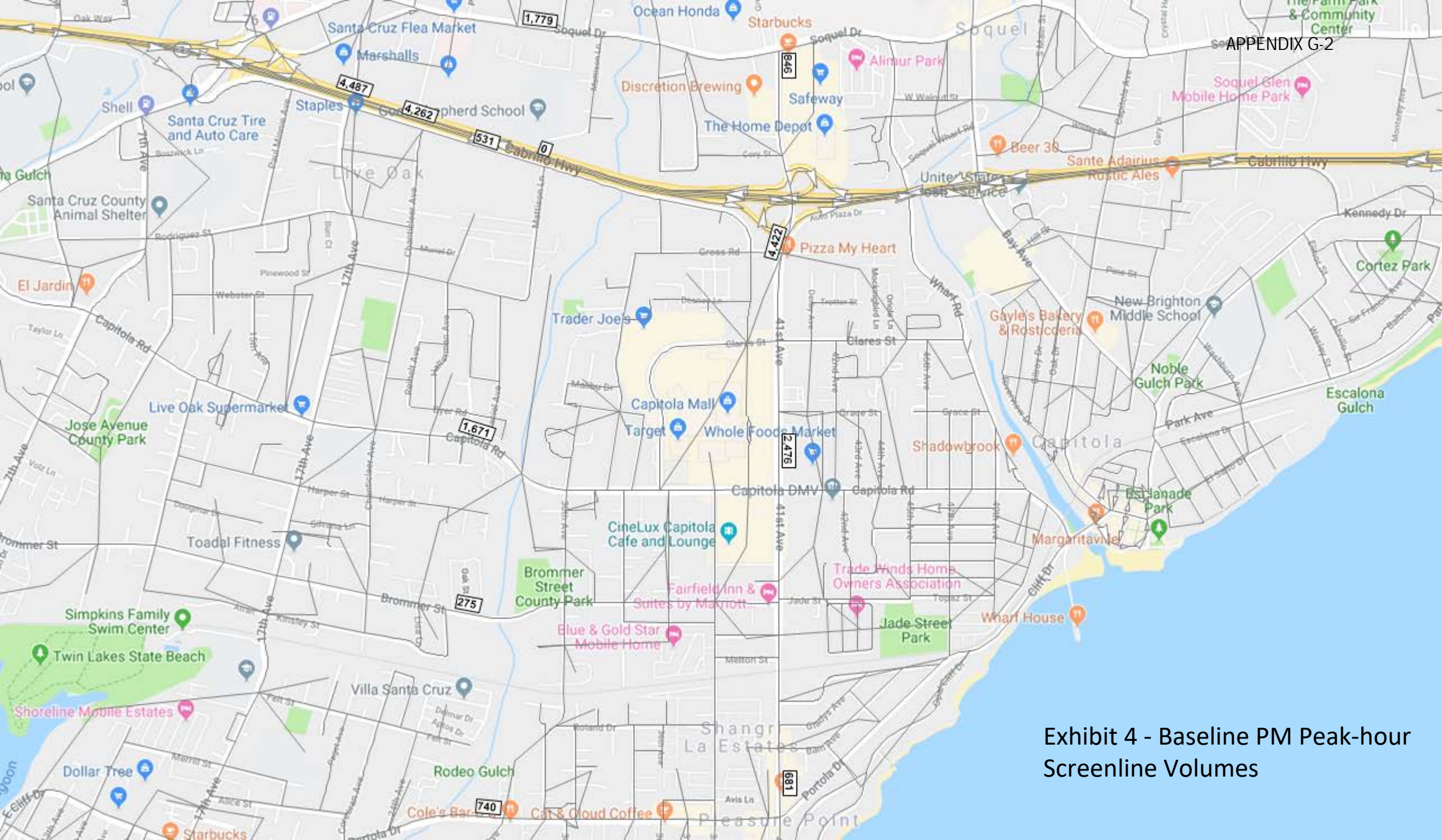


Exhibit 4 - Baseline PM Peak-hour Screenline Volumes



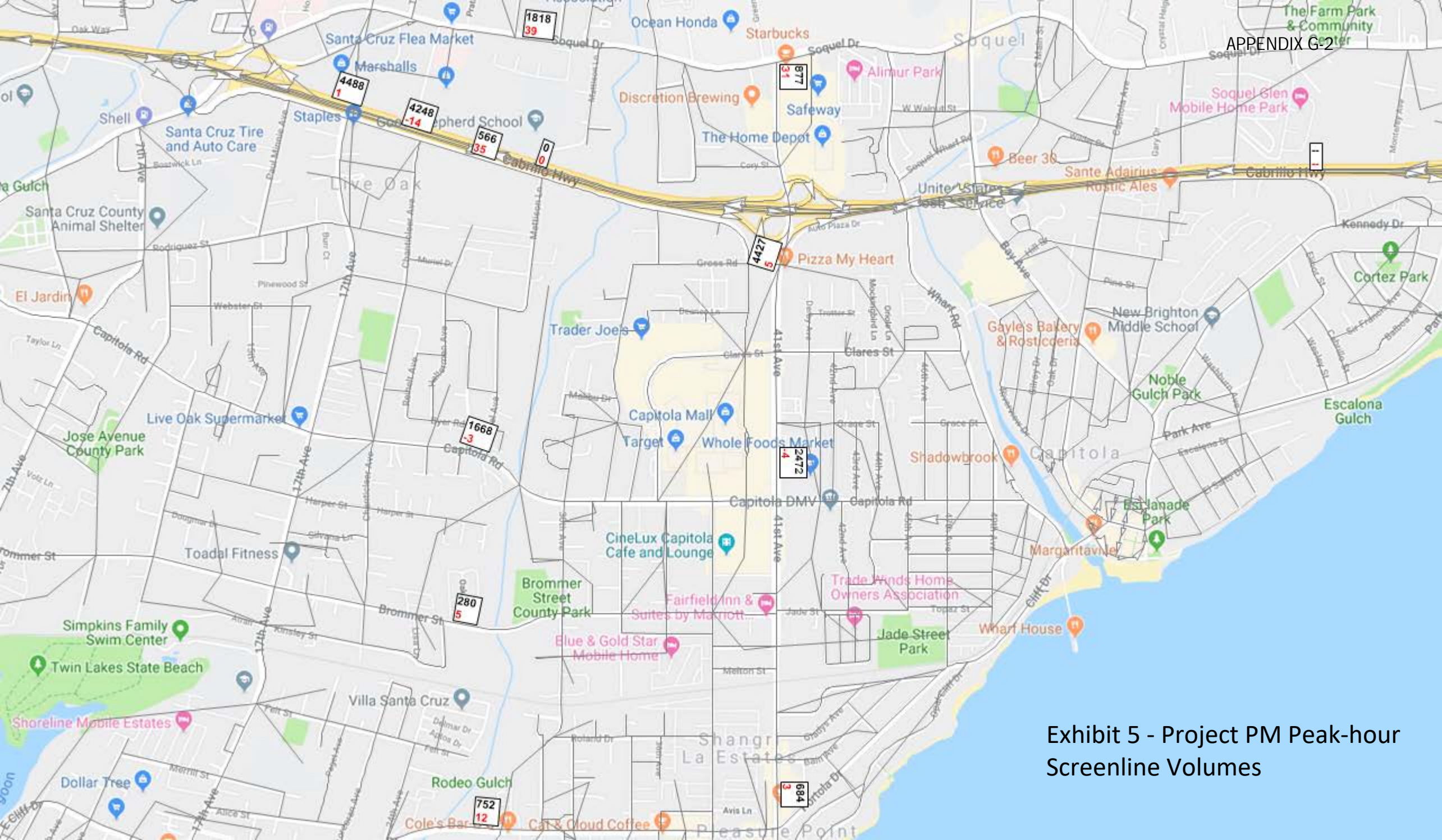


Exhibit 5 - Project PM Peak-hour Screenline Volumes



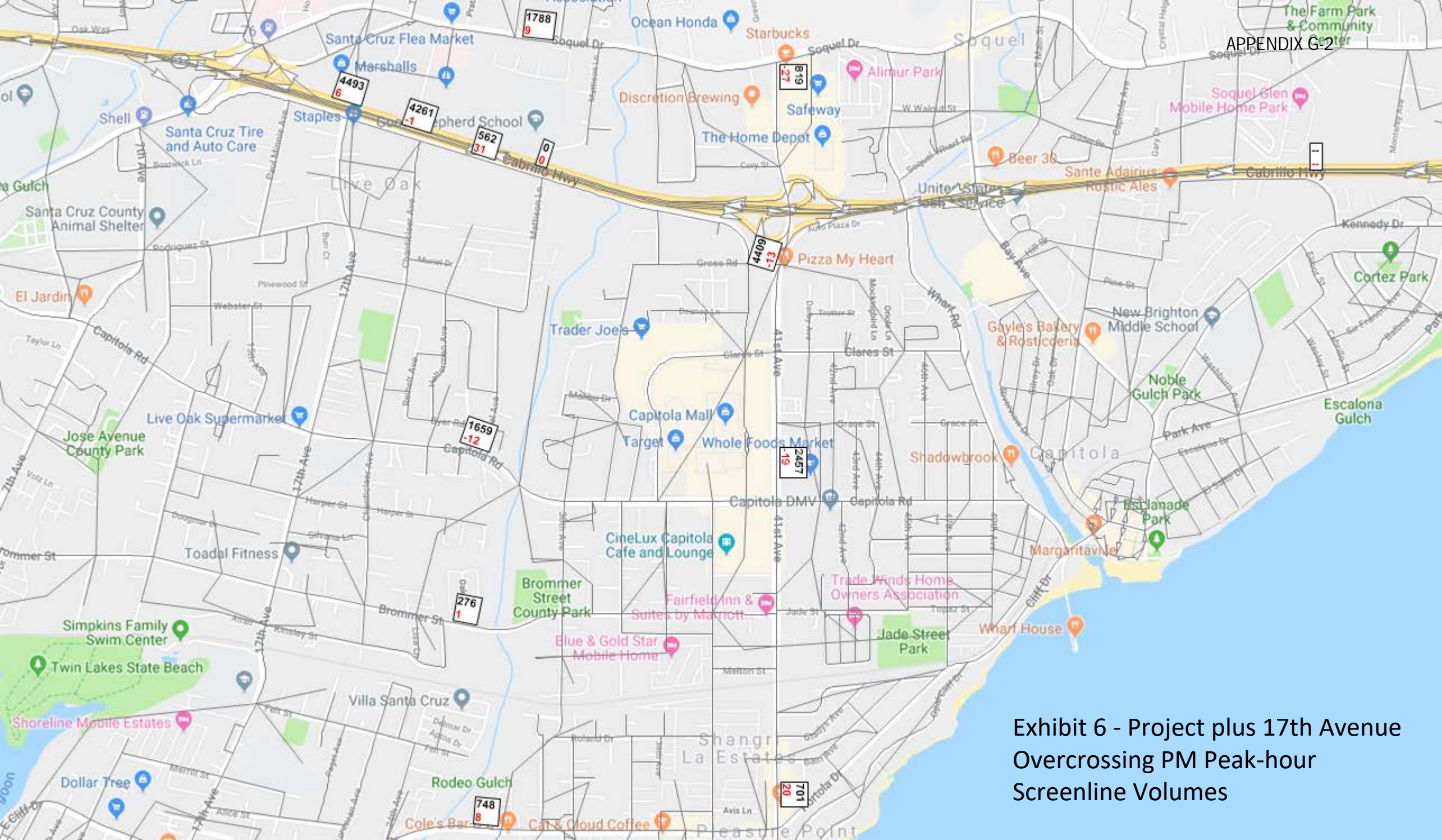


Exhibit 6 - Project plus 17th Avenue  
Overcrossing PM Peak-hour  
Screenline Volumes



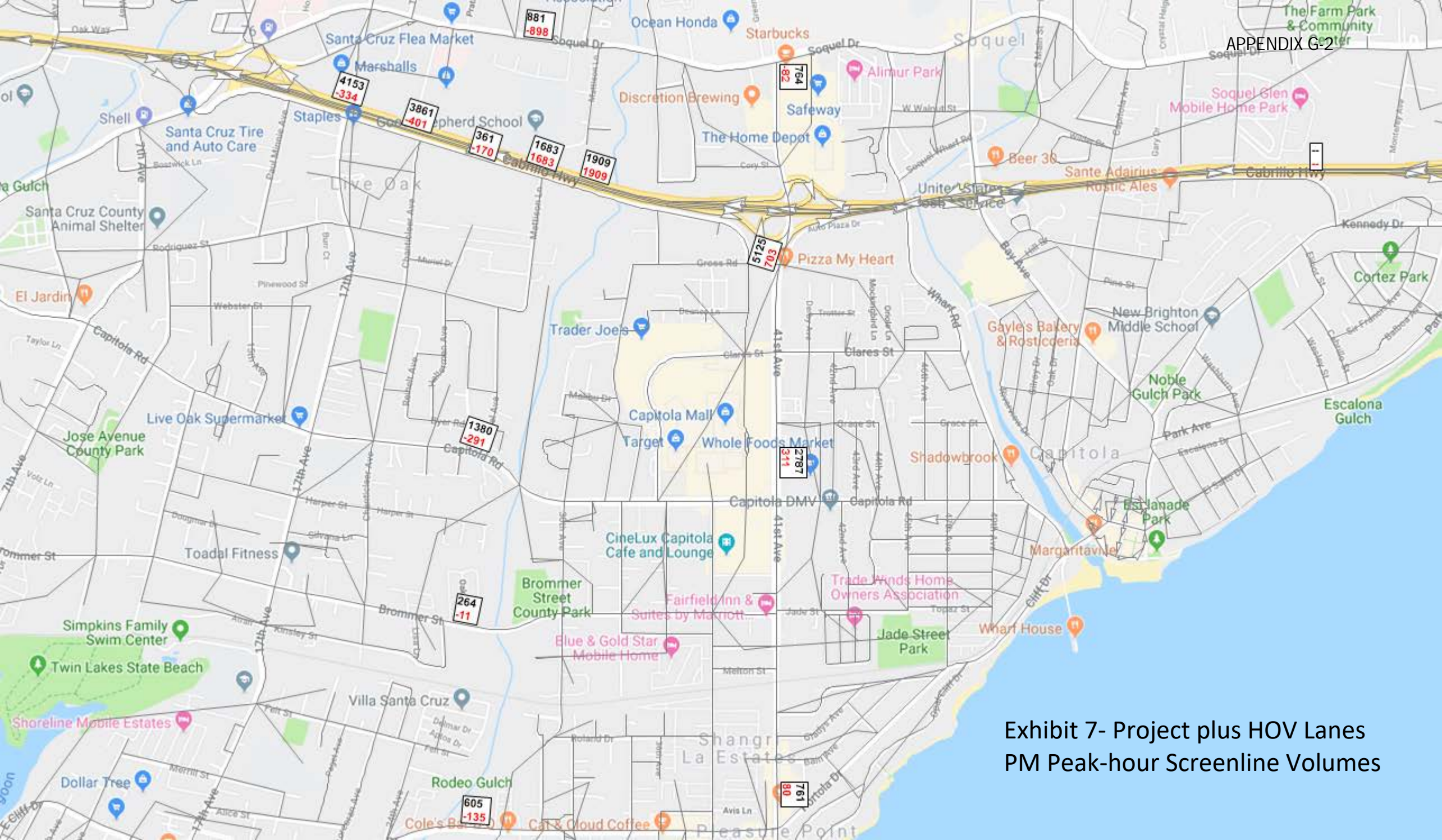


Exhibit 7- Project plus HOV Lanes  
PM Peak-hour Screenline Volumes



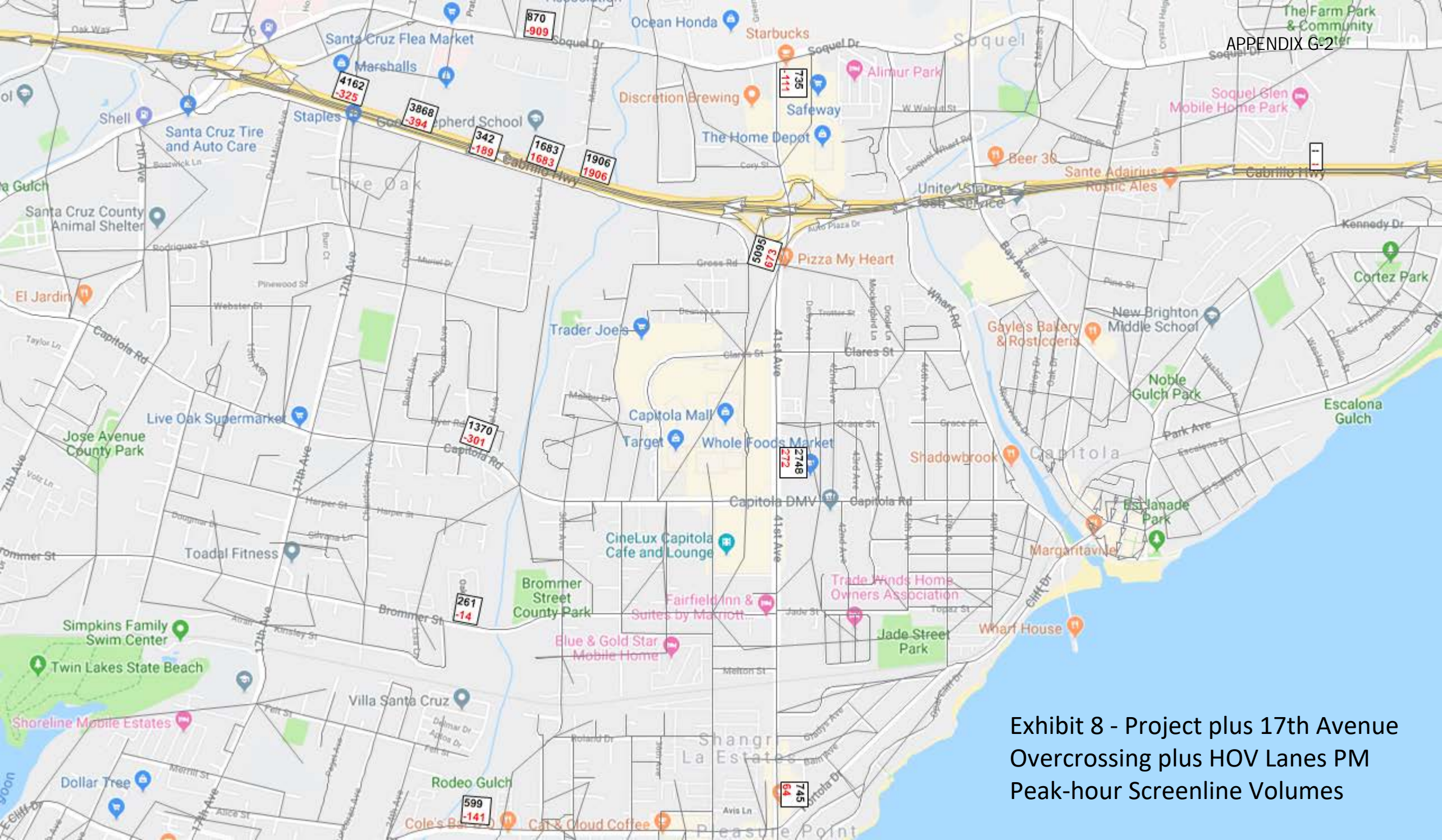


Exhibit 8 - Project plus 17th Avenue Overcrossing plus HOV Lanes PM Peak-hour Screenline Volumes



## APPENDIX G-3: LEVEL OF SERVICE ANALYSIS

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Traffic conditions are measured by average daily traffic (ADT), peak hour traffic volumes, level of service (LOS), average delay, and 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).

### AVERAGE DAILY TRAFFIC AND TRAFFIC VOLUMES

ADT in the urban area of the county varies. Some roadway segments, such as Brommer Street between Darlene Drive and 20th Avenue, carry fewer than 20,000 vehicles per day. Others, such as several segments along Soquel Drive, 41st Avenue, and State Park Drive, carry between 20,000 and 40,000 vehicles per day. The annual averaged daily traffic on Highway 1 at the 41st Avenue interchange is 95,300 vehicles (Caltrans 2019). Based on the most recent and complete (2019) Caltrans Traffic Census Program (Caltrans 2019) data, the annual average daily traffic (AADT) on state highways within Santa Cruz is as follows:

- *Highway 1:* AADT within Santa Cruz County ranges from 5,000 trips at the Santa Cruz/San Mateo County line, to 95,300 trips at the 41<sup>st</sup> Avenue interchange in Capitola. The highest amount of peak hour trips ranges from 850 peak hour trips at the Santa Cruz/San Mateo County Line, to 6,900 peak hour trips at the Park Avenue interchange in Capitola.
- *Highway 9:* AADT within Santa Cruz County ranges from 2,600 trips at the northern junction to Highway 236, to 24,600 trips at the Highway 1 junction. The highest amount of peak hour trips ranges from 360 peak hour trips at the northern junction to Highway 236, to 2,800 peak hour trips at the Highway 1 junction.
- *Highway 17:* AADT within Santa Cruz County ranges from 49,500 trips at the Granite Creek Road interchange, to 84,700 trips at the Pasatiempo Drive interchange. The highest amount of peak hour trips ranges from 4,700 peak hour trips at the Granite Creek Road interchange, to 7,400 peak hour trips at the Mt. Hermon Road interchange.
- *Highway 35:* AADT within Santa Cruz County ranges from 400 trips at the Bear Creek Road interchange, to 1,200 trips at the Santa Clara/Santa Cruz County line. The highest amount of peak hour trips ranges from 80 peak hour trips at the Santa Cruz/Santa Clara County line, to 380 peak hour trips at the Santa Clara/Santa Cruz County line.
- *Highway 152:* AADT within Santa Cruz County ranges from 7,400 trips at the Santa Clara/Santa Cruz County line, to 34,100 trips at the Green Valley Road interchange. The highest amount of peak hour trips ranges from 820 at the Santa Clara/Santa Cruz County line, to 4,400 trips at the Green Valley Road interchange.





- *Highway 236:* AADT within Santa Cruz County ranges from 280 trips at eastern boundary of Big Basin Redwoods State Park, to 8,400 trips at the Highway 9 junction. The highest amount of peak hour trips ranges from 820 at eastern boundary of Big Basin Redwoods State Park, to 940 trips at the Highway 9 junction.
- *Highway 129:* AADT within Santa Cruz County ranges from 10,300 trips at the San Benito/Santa Clara County Line, to 26,900 trips at the Main Street interchange. The highest amount of peak hour trips ranges from 920 at the San Benito/Santa Clara County Line, to 3,200 trips at the Main Street interchange.

Caltrans manages the state highway system and implements highway maintenance and safety projects. However, SCCRTC often implements highway improvements and is critical to helping fund state highway improvements within the county; see Section 4.15.1.3.

The SCCRTC, in cooperation with Caltrans and the Federal Highway Administration (FHWA), is analyzing alternative investments to relieve congestion on Highway 1 in Santa Cruz County. For purposes of environmental analysis, the project is divided into two components:

- Tier I – 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).
- Tier II – Project level analysis of a smaller incremental project within the Tier I corridor which would move forward based on available funding. Each of the Tier II projects would have independent utility and benefit to the public and Highway 1 operations (SCCRTC 2021).

The first Tier II project currently in project-level environmental review is northbound and southbound auxiliary lanes between 41st Avenue and Soquel Drive and a pedestrian/bicycle overcrossing of Highway 1 at Chanticleer Avenue. Preliminary design and environmental analysis has begun on a second Tier II project for the construction of a pedestrian/bicycle overcrossing of Highway 1 at Mar Vista Drive in Aptos (SCCRTC 2021).

## LEVEL OF SERVICE ANALYSIS

### Level of Service

Level of Service (LOS) is used to identify the magnitude of traffic congestion and delay at intersections. 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 identifies the operational characteristics associated with each LOS category for signalized and unsignalized intersections. Table 1 provides a description of each LOS and corresponding delay in seconds at both signalized and unsignalized intersections.

The signalized intersection LOS methodology addresses the capacity, LOS, and other performance measures for lane groups and intersection approaches. 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). The signalized intersection LOS methodology addresses the LOS for the intersection as a whole, whereas LOS methodology for unsignalized intersections computes delay only for the minor movements. The critical V/C ratio 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.

**Table 1. Intersection Level of Service Definitions**

Level of Service	Description	Signalized (sec/veh.)	Unsignalized (sec/veh.)*
A	Describes operations with a control delay of 10 s/veh or less and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If LOS A is the result of favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.	< 10.0	< 10.0
B	Describes operations with control delay between 10 and 20 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.	> 10.0 to < 15.0	> 10.0 to < 20.0
C	Describes operations with control delay between 20 and 35 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when progression is favorable or the cycle length is moderate. Individual cycle failures (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.	> 15.0 to < 25.0	> 20.0 to < 35.0
D	Describes operations with control delay between 35 and 55 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.	> 25.0 to < 35.0	> 35.0 to < 55.0
E	Describes operations with control delay between 55 and 80 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.	> 35.0 to < 50.0	> 55.0 to < 80.0
F	Describes operations with control delay exceeding 80 s/veh or a volume-to-capacity ratio greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.	> 50.0	> 80.0

\*Stop-controlled intersections.

**SOURCE:** Transportation Research Board, *Highway Capacity Manual 6<sup>th</sup> Edition* 2016.



The 1994 County of Santa Cruz General Plan/LCP indicates that LOS C is the objective, but states that LOS D is the minimum acceptable LOS standard at intersections and roadways (existing Policy 3.12.1). However, Policy 3.12.1 also states that a lower level of service may be acceptable where costs, right-of-way requirements, or environmental impacts of maintaining LOS under this policy are excessive, capacity enhancement may be considered infeasible (Policy 3.12.1). The Sustainability Update's proposed Access + Mobility (AM) Element also seeks to maintain LOS D or better at signalized intersections (AM-3.1.3), but 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 (AM-3.1.4).

## Approach to Level of Service Analysis

The Santa Cruz County Travel Demand Model (SCCTDM) was updated by Kimley-Horn (2021b) as part of the preparation of the Sustainability Update and for the purposes of performing transportation impact analyses for this Environmental Impact Report (EIR) as explained in Appendix G-1. The updated model was used to develop five scenarios for the transportation LOS analysis as follows: Existing, Existing with Project, 2040 Baseline, 2040 with Project, and 2040 Cumulative).

- **Existing:** Conditions that existed at the time the transportation analysis began in 2019. As discussed in Section 4.0, existing conditions are defined as the physical environmental conditions as they exist at the time the EIR Notice of Preparation (NOP) is published. The NOP for this EIR was published on July 1, 2020. However, because transportation-related activities were substantially altered in 2020 due to the global Covid-19 pandemic, traffic conditions for 2019 are used (Kimley-Horn 2020).
- **Existing With Project:** Existing conditions with potential development accommodated by the proposed Sustainability Update. Methods used to estimate growth for the project are summarized in Section 4.0.2 and described further in Appendix C.
- **2040 Baseline:** The 2040 Baseline scenario reflects known development projects and transportation improvements that are expected to be completed by the year 2040 and existing adopted plans and forecasts to the year 2040 in the unincorporated and incorporated areas of the county without the addition of the proposed project as summarized in Table 4.0.1 in Section 4.0.
- **2040 with Project:** This scenario reflects the 2040 baseline scenario described above with the addition of estimated potential growth accommodated by the proposed project and proposed transportation improvements as further explained below.
- **Cumulative:** Year 2040 with Project conditions and other known and reasonably foreseeable growth, development projects, and transportation improvements, which are not currently approved.

The methodologies used to perform the analyses are consistent with the County policies using HCM methods. All LOS calculation worksheets are on file with the County Community Development and Infrastructure Department.



## Level of Service Analysis Results

### Existing Scenario

Intersection turning movement counts were gathered at 20 representative intersections throughout the county as part of the traffic modeling conducted for this EIR. Data for the intersection counts used 2018 counts collected prior to COVID that were factored up based on historical growth trends. For intersections where turning movement counts were not available new count data was collected between 2019 and 2021, during typical non-holiday conditions and outside of COVID-19 shelter-in place periods. The intersection counts provide information during the AM peak period (7 AM to 9 AM) and the PM peak period (4 PM to 6 PM). LOS for each intersection was calculated utilizing methods defined in the Highway Capacity Manual, 6th Edition (2016) and used Synchro 10 traffic analysis software for both AM and PM peak hours. The existing peak hour LOS and corresponding average vehicle delay for each intersection is shown in Table 4.15-3.

As shown in Table 2, under the Existing scenario, existing conditions, all of the study area intersections operate at levels of service consistent with County standards, except for the intersections of:

- Soquel Drive/Porter Street in the PM peak hour (LOS E)
- Soquel Drive/Rio Del Mar Boulevard in the AM peak hour (LOS F)
- Portola Drive/41<sup>st</sup> Avenue in the PM peak hour (LOS E)

### 2040 Without Project Scenario

Table 3 displays the results of the LOS analysis for the 2040 Baseline scenario. As shown, under 2040 Baseline scenario, all of the studied intersections are forecast to operate at levels of service consistent with County LOS standards, except at the following intersections:

- Soquel Drive/Chanticleer Avenue in the PM peak hour (LOS E)
- Capitola Road/17<sup>th</sup> Avenue in the PM peak hour (LOS E)
- Soquel Drive/Porter Street in the PM peak hour (LOS F)
- Soquel Drive/Park Avenue in the PM peak hour (LOS F)
- Soquel Drive/Rio Del Mar Boulevard in the AM peak hour (LOS F) and PM peak hour (LOS F)
- Portola Drive/41<sup>st</sup> Avenue in the PM peak hour (LOS F)
- Portola Drive/30<sup>th</sup> Avenue in the PM peak hour (LOS E)



Table 2. Existing Peak Hour Intersection Levels of Service

Intersection	LOS Method	Existing				Consistent with County LOS Standard	
		AM Peak		PM Peak		AM	PM
		Delay <sup>1</sup>	LOS <sup>2</sup>	Delay <sup>1</sup>	LOS <sup>2</sup>		
Capitola Road/Soquel Avenue	HCM Signal	32.1	C	29.6	C	Yes	Yes
Capitola Road/7th Avenue	HCM Signal	18.4	B	21.2	C	Yes	Yes
Capitola Road/17th Avenue	HCM Signal	19.2	B	26.1	C	Yes	Yes
Soquel Drive/Soquel Avenue	HCM Signal	35.4	D	36.7	D	Yes	Yes
Soquel Drive/Thurber Lane	HCM Signal	9.9	A	8.7	A	Yes	Yes
Soquel Drive/Chanticleer Avenue	HCM TWSC	17.4	C	25.0	D	Yes	Yes
Soquel Drive/41st Avenue	HCM Signal	23.5	C	35.0	D	Yes	Yes
Soquel Avenue/Chanticleer Avenue	HCM TWSC	19.7	C	24.2	C	Yes	Yes
Rodriguez Street/17th Avenue	HCM AWSC	11.8	B	19.0	C	Yes	Yes
Soquel Drive/Porter Street	HCM Signal	33.2	C	<b>57.2</b>	<b>E</b>	Yes	<b>No</b>
Soquel Drive/Park Avenue	HCM Signal	11.7	B	13.9	B	Yes	Yes
Soquel Drive/State Park Drive	HCM Signal	14.8	B	17.5	B	Yes	Yes
Soquel Drive/Rio Del Mar Blvd	HCM Signal	<b>107.8</b>	<b>F</b>	15.9	B	<b>No</b>	Yes
Soquel Drive/Freedom Blvd	HCM Signal	10.8	B	9.3	A	Yes	Yes
Brommer Street/17th Avenue	HCM Signal	20.3	C	26.2	C	Yes	Yes
Portola Drive/41st Avenue	HCM AWSC	18.4	C	<b>37.4</b>	<b>E</b>	Yes	<b>No</b>
Portola Drive/38th Avenue	HCM AWSC	10.4	B	16.3	C	Yes	Yes
Portola Drive/30th Avenue-Samuel Street	HCM AWSC	9.5	A	13.9	B	Yes	Yes
Green Valley Road/Airport Blvd	HCM Signal	20.4	C	26.6	C	Yes	Yes
Graham Hill Road/ Mount Hermon Road	HCM Signal	16.1	B	23.4	C	Yes	Yes

**Notes:** HCM = Highway Capacity Manual; TWSC = Two-Way Stop-Controlled; AWSC = All-Way Stop-Controlled; **BOLD** = exceeds County LOS D Standard.

<sup>1</sup> Delay in seconds per vehicle

<sup>2</sup> Level of Service (LOS)



## 2040 Project Scenario

As shown in Table 3, under the 2040 Project scenario all of the studied intersections are forecast to operate at levels of service consistent with County standards, except at seven intersections:

- Capitola Road/Soquel Avenue in the PM peak hour (LOS F)
- Soquel Drive/Chanticleer Avenue in the PM peak hour (LOS E)
- Soquel Drive/41<sup>st</sup> Avenue in the PM peak hour (LOS F)
- Soquel Drive/Porter Street in the PM peak hour (LOS F)
- Soquel Drive/Park Avenue in the PM peak hour (LOS F)
- Soquel Drive/Rio Del Mar Boulevard in the AM peak hour (LOS F) and PM peak hour (LOS F)
- Portola Drive/38<sup>th</sup> Avenue in the AM peak hour (LOS F) and PM peak hour (LOS F).

It is noted that the proposed project would improve LOS at three intersections over the Existing scenario (Capitola Road/17th Avenue, Portola Drive/41st Avenue, and Portola Drive/30th Avenue) as result of proposed improvements. Four intersections that are forecasted to operate at a LOS standard that is below the County standard of D in 2040 Baseline scenario would continue to operate at a LOS below County standards in the 2040 Project scenario: Soquel Drive intersections at 41<sup>st</sup> Avenue, Porter Street, Park Avenue, and Rio Del Mar Boulevard. Three of these intersections also operate LOS E or F under existing conditions. Three additional intersections would operate at unacceptable LOS in the 2040 Project scenario that operate at acceptable LOS in the 2040 Baseline scenario: Capitola Road/Soquel Avenue, Soquel Drive/Chanticleer Avenue, and Portola Drive/38th Avenue. Operations along Portola Drive are discussed in the next subsection.

Therefore, development and growth indirectly resulting from the proposed Sustainability Update could lead to LOS operations at three intersections in addition to four intersections in the 2040 Baseline scenario that would not achieve the County's LOS standard of D. The LOS analyses conducted for the proposed project determined that signalization of the Portola Drive/38<sup>th</sup> Avenue intersection would improve operations to LOS B (Dudek 2022). Reviews of the other intersections identify potential lane improvements at Soquel Drive/41<sup>st</sup> and signal phasing changes at the Soquel Drive/Rio Del Mar Boulevard intersections (Kimley-Horn 2021c).

Proposed General Plan/LCP policy AM-6.2.1 allows a lesser LOS to be accepted by the County pursuant to the criteria specifically identified in the proposed AM Element, including locations where there are only marginal deficiencies on a portion of the road, where ROW requirements for additional travel lanes would adversely affect existing development, where impacts require a regional solution, and/or where improvements to a LOS of D would result in adverse biological or cultural impacts. When development is proposed on roads where a LOS E or F standard has been accepted, the policy further requires that development provide feasible mitigation in the form of road improvements, a fair share contribution to a road improvement program, or other in-lieu mitigation for the transportation system. Thus, a lower LOS could be accepted and/or intersection improvements, such as signalization, could be implemented. Therefore, implementation of this proposed policy in conjunction with improvements and required payment of transportation improvement fees that would be required of future development projects, would ensure that future development resulting from the proposed project does not result in conflicts with County policies regarding LOS.





Table 3. 2040 Peak Hour Intersection Levels of Service

Intersection	2040 Baseline				2040 with Project				Project Consistent with County LOS Standard	
	AM Peak		PM Peak		AM Peak		PM Peak		AM	PM
	Delay <sup>1</sup>	LOS <sup>2</sup>	Delay <sup>1</sup>	LOS <sup>2</sup>	Delay <sup>1</sup>	LOS <sup>2</sup>	Delay <sup>1</sup>	LOS <sup>2</sup>		
Capitola Road/Soquel Avenue	46.9	D	40.3	D	47.4	D	580.1	F	Yes	<b>No</b>
Capitola Road/7th Avenue	19.9	B	22.8	C	20.0	C	23.2	C	Yes	Yes
Capitola Road/17th Avenue	20.7	C	56.1	E	20.8	C	54.9	D	Yes	Yes
Soquel Drive/Soquel Avenue	34.9	C	35.3	D	36.1	D	35.1	D	Yes	Yes
Soquel Drive/Thurber Lane	26.5	C	31.3	D	25.3	C	34.3	C	Yes	Yes
Soquel Drive/Chanticleer Avenue	19.1	C	35.7	E	19.3	C	36.3	E	Yes	<b>No</b>
Soquel Drive/41st Avenue	29.2	C	45.4	D	28.9	C	89.4	F	Yes	<b>No</b>
Soquel Avenue/Chanticleer Avenue	10.3	B	13.3	B	10.1	B	29.4	C	Yes	Yes
Rodriguez Street/17th Avenue	11.9	B	19.4	C	12.3	B	20.2	C	Yes	Yes
Soquel Drive/Porter Street	36.3	D	109.0	F	36.1	D	100.6	F	Yes	<b>No</b>
Soquel Drive/Park Avenue	11.8	B	95.9	F	11.8	B	95.0	F	Yes	<b>No</b>
Soquel Drive/State Park Drive	19.5	B	22.9	C	19.6	B	22.5	C	Yes	Yes
Soquel Drive/Rio Del Mar Blvd	124.6	F	173.0	F	123.1	F	188.9	F	<b>No</b>	<b>No</b>
Soquel Drive/Freedom Blvd	11.5	B	18.8	B	11.4	B	20.5	C	Yes	Yes
Brommer Street/17th Avenue	21.0	C	31.7	C	21.1	C	33.4	C	Yes	Yes
Portola Drive/41st Avenue	25.0	C	76.6	F	6.4	A	9.9	A	Yes	Yes
Portola Drive/38th Avenue	17.0	C	27.1	D	9.0	A	11.7	B	Yes	Yes
Portola Drive/30th Avenue-Samuel Street	9.7	A	15.6	C	6.5	A	8.4	A	Yes	Yes
Green Valley Road/Airport Blvd	18.1	B	22.9	C	21.7	C	29.8	C	Yes	Yes
Graham Hill Road/ Mount Hermon Road	16.4	B	23.5	C	16.5	B	23.5	C	Yes	Yes

**Notes:** HCM = Highway Capacity Manual; TWSC = Two-Way Stop-Controlled; AWSC = All-Way Stop-Controlled; **BOLD** = exceeds County LOS D Standard.

<sup>1</sup> Delay in seconds per vehicle

<sup>02</sup> Level of Service (LOS)



## Cumulative Scenario

Each city would be required to review projects for conflicts with their local General Plan and regional plans, and thus, the proposed project would not contribute to potential cumulative projects related to conflicts with transportation policies, plans or programs. Likewise, provision of safe transportation systems and adequate emergency access would be implemented within each jurisdiction and would not result in cumulative impacts.

As stated previously, the LOS analysis presented within this EIR is for informational purposes only and includes county intersections that have been deemed critical for the functioning of the greater county roadway network. Therefore, not all intersections in the county have been analyzed. Table 4.15-10 displays the Cumulative LOS analysis. As shown in Table 4, all of the study area intersections are forecast to operate at levels of service consistent with County LOS standards under cumulative conditions, except for the following six intersections:

- Soquel Drive/Soquel Avenue in the AM peak hour (LOS F) and in the PM peak hour (LOS F)
- Soquel Drive/41<sup>st</sup> Avenue in the PM peak hour (LOS F)
- Capitola Road/17<sup>th</sup> Avenue in the PM peak hour (LOS E)
- Soquel Drive/Porter Street in the PM peak hour (LOS F)
- Soquel Drive/Rio Del Mar Boulevard in the AM peak hour (LOS F) and in the PM peak hour (LOS F)
- Portola Drive/41<sup>st</sup> Avenue in the PM peak hour (LOS F)

Analysis of additional intersections for the County Community development and Infrastructure Department also determined that the Soquel Drive/Trout Gulch Drive and 7<sup>th</sup> Avenue/Eaton Avenue intersections also would operate at LOS F in the Cumulative scenario (Kimley-Horn 2021c).

The intersections depicted are shown for informational purposes only. Any recommended improvements and changes to the configuration of study intersections would be evaluated separately as roadway improvement projects are added to the County CIP. Implementation of proposed General Plan/LCP policies and implementation strategies that address the coordination of land use and transportation planning, corresponding amendments to the SCCC regarding land use and TDM measures for future development, would serve to reduce vehicular trips. Because LOS is no longer a CEQA threshold for transportation impacts, no additional mitigation measures are required for CEQA analysis.



Table 4. Cumulative Peak Hour Intersection Levels of Service

Intersection	LOS Method	Cumulative				Consistent with County LOS Standard	
		AM Peak		PM Peak		AM	PM
		Delay <sup>1</sup>	LOS <sup>2</sup>	Delay <sup>1</sup>	LOS <sup>2</sup>		
Capitola Road/Soquel Avenue	HCM Signal	39.9	D	29.8	C	Yes	Yes
Capitola Road/7th Avenue	HCM Signal	20.3	C	26.0	C	Yes	Yes
Capitola Road/17th Avenue	HCM Signal	19.9	B	60.6	E	Yes	No
Soquel Drive/Soquel Avenue	HCM Signal	405.3	F	826.9	F	No	No
Soquel Drive/Thurber Lane	HCM Signal	24.3	C	12.3	B	Yes	Yes
Soquel Drive/Chanticleer Avenue	HCM TWSC	17.4	C	25.0	D	Yes	Yes
Soquel Drive/41st Avenue	HCM Signal	24.4	C	95.0	F	Yes	No
Soquel Avenue/Chanticleer Avenue	HCM TWSC	22.3	C	34.8	C	Yes	Yes
Rodriguez Street/17th Avenue	HCM AWSC	12.7	B	25.5	D	Yes	Yes
Soquel Drive/Porter Street	HCM Signal	31.8	C	<b>118.9</b>	F	Yes	No
Soquel Drive/Park Avenue	HCM Signal	12.0	B	15.9	B	Yes	Yes
Soquel Drive/State Park Drive	HCM Signal	19.6	B	21.5	C	Yes	Yes
Soquel Drive/Rio Del Mar Blvd	HCM Signal	<b>118.8</b>	F	133.7	F	No	No
Soquel Drive/Freedom Blvd	HCM Signal	11.8	B	9.7	A	Yes	Yes
Brommer Street/17th Avenue	HCM Signal	20.8	C	28.2	C	Yes	Yes
Portola Drive/41st Avenue	HCM AWSC	25.9	D	<b>88.1</b>	F	Yes	No
Portola Drive/38th Avenue	HCM AWSC	17.0	C	24.3	C	Yes	Yes
Portola Drive/30th Avenue-Samuel Street	HCM AWSC	14.3	B	34.2	D	Yes	Yes
Green Valley Road/Airport Blvd	HCM Signal	21.8	C	29.8	C	Yes	Yes
Graham Hill Road/ Mount Hermon Road	HCM Signal	16.4	B	23.4	C	Yes	Yes

**Notes:** HCM = Highway Capacity Manual; TWSC = Two-Way Stop-Controlled; AWSC = All-Way Stop-Controlled;

**BOLD** = exceeds County LOS D Standard.

<sup>1</sup> Delay in seconds per vehicle

<sup>2</sup> Level of Service (LOS)



## Portola Corridor Improvements

Streetscape concepts for the Portola Drive corridor were developed in 2018 (County of Santa Cruz 2018), which identify targeted roadway improvement recommendations along Portola Drive that are included in the proposed project. The concepts consist of reconfiguration of Portola Drive between 26<sup>th</sup> Avenue and 41<sup>st</sup> Avenue to include reducing Portola Drive to one driving lane in each direction with a center turn lane, new and reconfigured pedestrian crossings, new pavement markings for Class II bicycle lanes, and overall safety improvements to enhance the main street character of the neighborhood and to provide for safe access for pedestrians and bicyclists. New/improved crosswalks, bus stops, stop signs and other improvements also are suggested. Conceptual designs are shown on Figures 3-5A through 3-5C in Chapter 3, Project Description, of this EIR. The improvements include recommendations for near-term and long-term concepts depending on the amount of funding available. All recommendations and roadway improvements along Portola Drive would be studied further as funding is secured.

Without the proposed improvements along Portola Drive (Baseline Conditions) the intersections of Portola Drive / 38<sup>th</sup> Avenue and Portola Drive 41<sup>st</sup> Avenue operate at below the County's LOS standard in the PM peak. Improvements along Portola Drive, in addition to indirect vehicle trips resulting from implementation of the proposed Sustainability Update, would result in LOS at both the Portola Drive/30<sup>th</sup> Avenue – Samuel Street and Portola Drive/41<sup>st</sup> Avenue intersections below the County's LOS standards in the PM peak hour in the Project 2040 scenario, while the Portola Drive/38<sup>th</sup> Avenue is forecast to operate below the County's LOS standards in both peak hours; see Table 5. However, signalization at all three intersections would result in improved operations of A and B as shown on Tables 3 and 5. It is noted that the intersection of Portola Drive/41<sup>st</sup> Avenue was analyzed with a roundabout option as well. However, due to a lack of right-of-way, it was determined that this intersection would not be a suitable candidate for a roundabout.

It is also noted that the County implemented a test trial of reduced vehicle lanes and protected bicycle lanes for approximately one month in the summer of 2021, although not in the same configuration that was recommended in the Portola Drive study which would have required permanent change. Vehicle, pedestrian, and bicycle counts were taken before and during the trial installation. The data showed that temporary changes did not alter typical vehicle patterns in the area. However, there was a minor decrease in overall vehicle speed, an increase travel times, and a minor decrease in bicycle trips (Kimley-Horn 2021a).



Table 5. Portola Drive Intersections Level of Service

Intersection	LOS Method	2040 Baseline				2040 Project				Consistent with County LOS Standards		2040 Project with Improvements			
		AM Peak		PM Peak		AM Peak		PM Peak				AM Peak		PM Peak	
		Delay <sup>1</sup>	LOS <sup>2</sup>	Delay <sup>1</sup>	LOS <sup>2</sup>	Delay <sup>1</sup>	LOS <sup>2</sup>	Delay <sup>1</sup>	LOS <sup>2</sup>	AM	PM	Delay <sup>1</sup>	LOS <sup>2</sup>	Delay <sup>1</sup>	LOS <sup>2</sup>
Portola Drive/30th Avenue – Samuel Street	HCM AWSC	9.7	A	15.6	C	12.2	B	<b>50.2</b>	<b>F</b>	Yes	No	--	--	--	--
	HCM Signal	--	--	--	--	--	--	--	--	--	--	6.5	A	8.4	A
Portola Drive/38th Avenue	HCM AWSC	17.0	C	27.1	D	<b>91.1</b>	<b>F</b>	<b>130.2</b>	<b>F</b>	No	No	--	--	--	--
	HCM Signal	--	--	--	--	--	--	--	--	--	--	9.0	A	11.7	B
Portola Drive/41 <sup>st</sup> Avenue	HCM AWSC	25.0	C	<b>76.6</b>	<b>F</b>	25.9	D	<b>85.4</b>	<b>F</b>	Yes	No	--	--	--	--
	HCM Signal	--	--	--	--	--	--	--	--	--	--	6.4	A	9.9	A
	HCM Roundabout	--	--	--	--	--	--	--	--	--	--	7.9	A	12.8	B

**Notes:** HCM = Highway Capacity Manual; AWSC = All-Way Stop-Controlled; **BOLD** = exceeds County LOS D Standard.

<sup>1</sup> Delay in seconds per vehicle

<sup>2</sup> Level of Service (LOS)



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