Prepared for:

SCCRTC

Santa Cruz County Regional Transportation Commission

Unified Corridor Investment Study

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INTRODUCTION

Three parallel routes - Highway 1[1], Soquel Ave/Soquel Dr/Freedom Blvd, and the Santa Cruz Branch Rail Line - link the communities along the Santa Cruz County coast from Davenport through Watsonville. Highway 1 and Soquel/Freedom are heavily traveled, often congested, and emphasize automobile travel. The 2012 acquisition of the rail right-of-way (ROW) provides a parallel transportation facility along this corridor that has unused capacity. A comprehensive evaluation that examines the performance of potential transportation improvements on all three routes when designed to function together as a single unified corridor has not been explicitly analyzed since the purchase of the rail ROW. The UCS builds on prior studies of individual projects or routes. The objective of the Unified Corridor Investment Study (UCS) is to identify multimodal transportation investments that provide the most effective use of Highway 1, Soquel Ave/Soquel Dr/Freedom Blvd, and the Santa Cruz Branch Rail Line to serve the community's transportation needs.

The passage of Measure D in November 2016 directed RTC to evaluate future transportation uses of the rail right-of-way (ROW). The Unified Corridor Investment Study provides an analysis of the options for the rail ROW consistent with Measure D, in combination with an evaluation of potential transportation projects on Highway 1 and Soquel Ave/Soquel Dr/Freedom Blvd.

The Unified Corridor Investment Study meets the requirements as the Comprehensive Corridor Plan that is needed as part of the application for the Senate Bill 1 Congested Corridors Program Funding. California Streets and Highways Code Sections 2391-2397 state that Congested Corridors Program funding "shall be made available for projects that make specific performance improvements and are part of a *comprehensive corridor plan* designed to reduce congestion in highly traveled corridors by providing more transportation choices for residents, commuters, and visitors to the area of the corridor while preserving the character of the local community and creating opportunities for neighborhood enhancement projects." Performance criteria requirements that are to be evaluated in the corridor plan as applicable are Safety; Congestion; Accessibility; Economic Development and Job Creation and Retention; Air Quality and Greenhouse Gas Emissions Reduction; and Efficient Land Use. The Unified Corridor Investment Study has evaluated performance measures under these criteria.

Triple Bottom Line Framework

The Unified Corridor Study is using a triple bottom line approach as a framework for decision making **(Figure 1)**. This approach evaluates the benefits of various transportation investments in developing a sustainable transportation system that advances triple bottom line goals of economy, environment and social equity. The Santa Cruz County Regional Transportation Commission (RTC) has incorporated triple bottom line sustainability principles in prioritizing projects for funding in the long-range planning process, as well as, programming of funds for project implementation. The legal requirements of Senate Bill 375 to reduce greenhouse gas emissions from transportation and land use, as well as federal requirements in the Moving Ahead for Progress in the 21st Century Act (MAP-21) to improve safety and reduce congestion, and Caltrans Strategic Management Plan target to double pedestrian and transit trips and triple bike trips all necessitate a triple bottom line, performance-based approach for making transportation investment decisions.

[1] Highway 1 and State Route 1 are used interchangeably in this report.

Figure 1: Triple Bottom Line Framework

The Unified Corridor Investment Study is evaluating transportation improvements using a performance-based planning and scenario analysis approach consistent with guidance/policy for evaluating future investment decisions of state/federal transportation discretionary funds. This approach increases decision-maker and community understanding by transparently evaluating the benefits and impacts of transportation investments. Best practice standards for a planning level analysis are being utilized in this study to support a quantitative and qualitative analysis for a more informed decision-making process. The approach follows the steps outlined below, each of which were approved by the RTC during the course of the study.

- Define the project study area **(Figure 2)** and the forecast year to be 2035.
- Develop the goals of the transportation corridor.
- Identify performance measures to assess if goals are being advanced **(Table 1)**.
- Select transportation improvements to evaluate on each of the routes.
- Combine the projects into scenarios **(Table 2)**.
- Perform a two-step Scenario Analysis
    - Step 1 - qualitatively evaluate scenarios based on the Step 1 criteria and eliminate scenarios that do not meet criteria **(Table 2)**
    - Step 2 – quantitatively evaluate remaining scenarios **(Table 3)** based on the Step 2 performance measures
- Identify a preferred scenario

The project study area includes Highway 1 between Davenport and SR 129; Soquel Ave/Soquel Dr/Freedom Blvd from Pacific Ave to Main St; the Santa Cruz Branch Rail Line from Davenport to Pajaro Station outside of Watsonville; and local roadways parallel to the rail right-of-way will be considered as part of the safety analysis. The screenline analysis includes all major arterials that run north-south in the project study area. Goals for the Unified Corridor Study focus on developing a transportation system which seeks to maximize benefits to current and future generations in terms of safety, efficient mobility, environment and health, equity, and economic vitality of the region. The performance measures serve to inform these goals that together promote the triple bottom line framework of economy, environment and healthy communities. Application of the performance measures provides an objective, transparent, data-driven framework for making investment priority decisions. The performance measures are consistent with those described in the 2040 Regional Transportation Plan for Santa Cruz County and were selected based on public input and availability of data that is required for the analysis.

Measure D

Measure D was passed by over 2/3 of Santa Cruz County voters in November 2016. The revenues from this ½-cent sales tax are dedicated to the projects identified in the voter approved expenditure plan. Projects include funding for Highway 1 improvements, neighborhood transportation projects implemented by the local jurisdictions, the trail along the rail right-of-way, transit services provided by Santa Cruz Metro and Lift Line for seniors and people living with disabilities, and rail corridor infrastructure preservation and analysis of options.

The Highway 1 improvements funded by Measure D include auxiliary lanes between three interchanges: Soquel Dr to 41st Ave; Bay Ave/Porter St to Park Ave; and Park Ave to State Park Dr. An auxiliary lane is an extra lane that runs from the on ramp to the off ramp providing drivers a greater distance for merging in and out of the general-purpose lanes. The RTC is currently moving forward with Final Design for the Soquel Dr to 41st Ave auxiliary lanes and construction is estimated to begin in 2020. These projects are not dependent on the decision made by the RTC regarding the UCS and are assumed to be implemented in every UCS scenario evaluated.

The trail project along the rail right-of-way is also funded by Measure D and is assumed to be implemented in every UCS scenario evaluated although with different assumptions. Three options for the trail along the rail right-of-way are being evaluated; a trail only, trail next to rail, or trail next to bus rapid transit. The RTC decision on the UCS will direct staff to use Measure D funds to implement one of the three trail options.

Scenario Analysis

Development of the scenarios is based on establishing groups of complimentary transportation improvements that are multimodal and reflect community expectations that the study corridor will provide a range of transportation options by 2035. The UCS utilizes a scenario analysis to assess how different groups of transportation projects will advance goals for a safe, efficient, reliable, and equitable transportation system that supports economic vitality and minimizes environmental concerns. The transportation improvements are selected for scenarios based on public input from surveys, workshops, email and website solicitations, input from stakeholders and RTC Advisory Committees and comments received on related RTC planning efforts. Through these outreach efforts, the public identified transportation improvements on Highway 1, Soquel Ave/Soquel Dr/Freedom Blvd and the rail right-of-way that would advance their transportation goals. Most of the projects evaluated in the scenarios are included in the 2040 Santa Cruz County Regional Transportation Plan (2040 RTP) (**APPENDIX A**).

The 2040 RTP is a long-term transportation planning effort that identifies the goals of the transportation system, transportation needs, and funding estimates with public, stakeholder and partner agency input. The transportation improvements evaluated in the scenarios are broken out by each route - Highway 1, Soquel Ave/Soquel Dr/ Freedom Blvd, and the rail ROW. More detailed descriptions for each of the projects can be found in **APPENDIX B**. The three auxiliary lane projects funded by Measure D (Soquel to 41st, Bay/Porter to Park, and Park to State Park) are assumed to be constructed in every scenario.

Each scenario or group of projects is designed to include all modes (auto, transit, bike, and walk) consistent with RTC sustainability policies to advance triple bottom line goals of environment, equity and economy. In addition, each scenario presents a range of potential future transportation networks that are well integrated and connect the three parallel routes. Scenario groupings considered where the interaction between projects could produce a combined effect greater than what could be accomplished individually, adding value to each investment. Step 1 of the Unified Corridor Study qualitatively evaluated six scenarios for the study corridor **(Table 2)** based on the following criteria: community support and consistency with applicable plans, ability to address transportation challenges & environmental, economic, and equity goals, compatibility with regulatory requirements, level of public investment, right-of-way and constructability, and technological feasibility. The Step 1 analysis determined two of the scenarios would not likely be feasible and/or were not congruent with community input. These two scenarios were dropped from further consideration. In addition, two of the remaining four scenarios were slightly modified to be more modally balanced. The result of the Step 1 Scenario Analysis is included as **APPENDIX H.**

Input has been encouraged throughout development of the Unified Corridor Investment Study. Participation from diverse sets of transportation interests including members of the public, community organizations, stakeholders, and partner agencies have been solicited at key milestones to provide input in this study. The development of the scenarios, including the projects to evaluate and the grouping of projects into scenarios, considered input from the public, community organizations, stakeholders, RTC Advisory Committees, and the RTC over the course of both Phase 1 and Phase 2 of the UCS and were approved by the RTC at public meetings prior to analysis.

The Step 2 scenario analysis quantitatively evaluates the remaining four scenarios **(Table 3) and is included in the body of this report**. Given the quantitative nature of the Step 2 analysis, evaluation methods were selected/developed considering the available data required for the analysis tools, the various types of projects, and the output needed to inform the performance measures. Since Santa Cruz County's transportation system is made up of a network of routes and services, changes to one aspect of the transportation system often affect other routes in the network. A transportation demand model is typically used to capture these system-wide impacts of changes to the transportation system. Many of the performance measures that are forecasted for 2035 in the UCS are assessed using a travel demand model. Analysis of individual projects requires a significant level of effort for each project, results would not be additive and would not show the system-wide affects. Performance measures that do not rely directly on the travel demand model and where a project level analysis is feasible, such as the number of collisions, the cost of collisions, the level of public investment, and environmentally-sensitive areas, are discussed in the report at the project level as well as in the scenarios. **Table 4** provides a summary of the data sources and analysis methods used to quantify both the baseline existing conditions and the future projections evaluated in the Step 2 analysis.

Step 2 requires an evaluation of the baseline conditions for each of the performance measures to compare against future scenarios and a no-build. Establishment of an accurate baseline condition is critical for determining the change in benefit anticipated from a given scenario. The initial sections of this report will describe in greater detail the baseline data and analysis methods listed in **Table 4**. A subsequent section will focus on the forecasting methodology and relative performance of the four scenarios with project groupings and the no-build under future year 2035 conditions. Completion of the Step 2 analysis is intended to result in a preferred scenario or group of projects recommended for implementation. The UCS performance dashboard **(APPENDIX G)** visually depicts the results of the Step 2 analysis based on the adopted UCS performance measures.

Preferred Scenario

The results of the UCS scenario analysis include identification of a preferred scenario, which is described in the last section of this report. Development of a preferred scenario considered the results of the scenario analysis and public input on the scenarios. Selection of a preferred scenario provides guidance on future funding decisions and informs transportation policy. The preferred scenario is described later in the report and acceptance of the UCS which selects the preferred scenario is described in the adopted RTC resolution **(ATTACHMENT I).**

Figure 2: Study Area

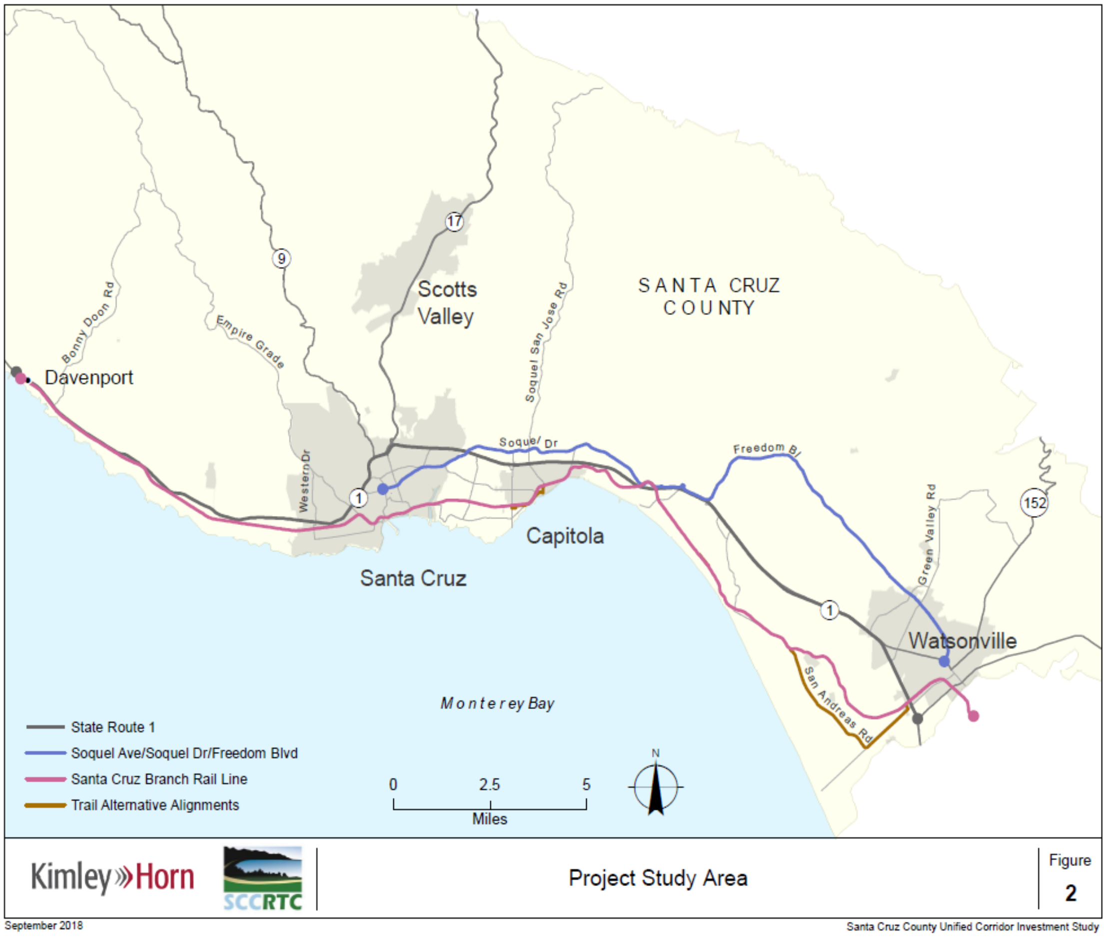

Table 1: Unified Corridor Investment Study: Goal and Performance Measures

Unified Corridor Investment Study

Highway 1, Soquel Ave/Drive & Freedom Blvd, and the Santa Cruz Branch Rail Line

Goals, Criteria and Performance Measures

(RTC Approved - May 4, 2017)

The goals, criteria and performance measures below support a vision for an integrated, multimodal transportation network based on a triple bottom line approach that maximizes the environmental, economic and equity benefits.

Goal	Step 1 Criteria
Promote feasible solutions that address transportation challenges.	Community support and coordination/consistency with local, regional, state and federal plans
	Potential to address transportation challenges and advance environmental, economic and equity goals
	Compatibility with regulatory requirements
	Level of public investment
	Right of way and constructability constraints
	Technological feasibility

Goals	Step 2 Performance Measures
Safer transportation for all modes	Injury and fatal collisions by mode
Reliable and efficient transportation choices that serve the most people and facilitate the transport of goods	Peak period mean automobile travel time
	Peak period mean transit travel time
	Peak period travel time reliability
	Mode share
	Person trips across N-S screenline
Develop a well-integrated transportation system that supports economic vitality	Level of public investment
	Visitor tax revenues
	Cost associated with fatalities and injuries
Minimize environmental concerns and reduce adverse health impacts	Automobile vehicle miles traveled
	Environmentally sensitive areas
	Criteria pollutants
	Greenhouse gas emissions
Accessible and equitable transportation system that is responsive to the needs of all users	Transit Vehicle Miles Traveled
	Household transportation costs
	Benefits and impacts to transportation disadvantaged communities

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Table 2: Step 1 Scenarios for Analysis

Unified Corridor Investment Study - Step 1 Scenarios for Analysis

(RTC Approved - June 15, 2017)

	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F	No Build
Highway 1 Projects							
buses on shoulders		bus transit				bus transit	
high occupancy vehicle lanes (HOV) and increased transit frequency	auto, bus transit				auto, bus transit		
auxiliary lanes to extend merging distance IN ADDITION TO MEASURE D	auto		auto		auto		
metering of on-ramps	auto	auto			auto	auto	
additional lanes on bridge over San Lorenzo River	auto						
Mission St intersection improvements	auto	auto					
rail transit on Hwy 1 between Santa Cruz and Watsonville				rail transit			
self driving cars				auto			
Soquel Avenue/Drive and Freedom Blvd							
bus rapid transit lite (faster boarding, transit signal priority and queue jumps)	bus transit	bus transit	bus transit				
dedicated lane for bus rapid transit and bikes				bus transit, bike/ped		bus transit, bike/ped	
parking moved from Soquel Avenue/Drive to improve bike and transit options	bus transit, bike/ped	bus transit, bike/ped		bus transit		bus transit	
increased frequency of transit with express services	bus transit	bus transit	bus transit				
buffered/protected bike lanes		bike/ped			bike/ped		
intersection improvements for auto	auto		auto				
intersection improvements for bikes/pedestrians		bike/ped			bike/ped	bike/ped	
Rail Corridor							
multiuse trail (bike and pedestrian)		bike/ped	bike/ped		bike/ped	bike/ped	
bike trail separate from pedestrian trail	bike/ped			bike/ped			
local rail transit with interregional connections		rail transit			rail transit	rail transit	
bus rapid transit			bus transit				
freight service on rail					rail transit		
Overall Project Area/Connections between Routes							
improved bike/pedestrian facilities throughout urban area closing gaps in network	These projects will be evaluated in all scenarios.						
additional transit connections							
bike share, bike amenities, transit amenities, park and ride lots							
multimodal transportation hubs							
Transportation Demand and System Management							
employers and residences - incentive programs	These projects will be evaluated in all scenarios.						
education and enforcement - electric vehicle, motorist safety, and bike safety							

(bus icon)	bus transit
(rail icon)	rail transit
(auto icon)	auto
(bike/ped icon)	bike/ped
(rail freight icon)	rail freight

Table 3: Step 2 Scenarios for Analysis

Unified Corridor Investment Study - Step 2 Scenarios for Analysis

(Approved by RTC on December 7, 2017 *)

	Scenario A	Scenario B	Scenario C	Scenario E	No Build
Highway 1 Projects					
buses on shoulders		bus transit	bus transit		
high occupancy vehicle lanes (HOV) and increased transit frequency	auto, bus transit			auto, bus transit	
auxiliary lanes to extend merging distance IN ADDITION TO MEASURE D	auto		auto	auto	
metering of on-ramps	auto	auto		auto	
additional lanes on bridge over San Lorenzo River	auto				
Mission St intersection improvements	auto	auto			
Soquel Avenue/Drive and Freedom Blvd					
bus rapid transit lite (faster boarding, transit signal priority and queue jumps)	bus transit	bus transit	bus transit		
increased frequency of transit with express services	bus transit	bus transit	bus transit		
buffered/protected bike lanes		bike/ped		bike/ped	
intersection improvements for auto	auto		auto		
intersection improvements for bikes/pedestrians	bike/ped	bike/ped	bike/ped	bike/ped	
Rail Corridor					
bike and pedestrian trail	bike/ped	bike/ped	bike/ped	bike/ped	
local rail transit with interregional connections		rail transit		rail transit	
bus rapid transit			bus transit		
freight service on rail			Only Watsonville rail freight	rail freight	
Overall Project Area/Connections between Routes					
improved bike/pedestrian facilities throughout urban area closing gaps in network	These projects will be evaluated in all scenarios.				
additional transit connections					
bike share, bike amenities, transit amenities, park and ride lots					
multimodal transportation hubs					
automated vehicles/connected vehicles					
Transportation Demand and System Management					
employers and residences - incentive programs	These projects will be evaluated in all scenarios.				
education and enforcement - electric vehicle, motorist safety, and bike safety					

*Scenarios D and F were eliminated from evaluation in Step 2

bus transit	bus transit
rail transit	rail transit
auto	auto
bike/ped	bike/ped
rail freight	rail freight

Table 4: Performance Measures and Data Source

Performance Measure	Baseline Data Source	2035 Forecasting Methodology
Injury and fatal collisions by mode	CHP SWITRS dataset, Caltrans TASAS	Federal Highway Administrations CMF Clearinghouse
		Highway Safety Manual Part C Predictive Methods
Peak period mean automobile travel time	NPMRDS Auto and Truck Speed Data (SR 1)	SCC Travel Demand Model
	StreetLight Speed Data (Soquel and Freedom)	HCM 6th Edition
Peak period mean transit travel time	Santa Cruz Metro Schedule Information	SCC Travel Demand Model
Peak period person travel time[2]	Google Maps - origin to destination times based on time of day	Baseline Only
	Santa Cruz Metro Schedule Information	
Peak period travel time reliability	NPMRDS Speed Data (SR 1)	Qualitative forecast based on project increases/decreases in congestion
	StreetLight Speed Data (Soquel and Freedom)	
	Federal National Performance Measurement Rule Guidance	
Mode share	2011-2012 California Household Travel Survey (CHTS)	NCHRP 552 (ped/bike) - modified for Santa Cruz County
	2011-2015 American Community Survey	SCC Travel Demand Model
Person trips across N-S screen line	2016 Motor Vehicle, Bicycle and Pedestrian Traffic Counts collected by RTC	NCHRP 552 (ped/bike) - modified for Santa Cruz County

[2] This performance measure was added to provide a comparison of auto and transit travel times between specific origins and destinations under baseline conditions.

Performance Measure	Baseline Data Source	2035 Forecasting Methodology
	Transit Ridership from 2012 On Board Transit Study	SCC Travel Demand Model
Level of public investment	No baseline data needed for this measure	Project costs estimated by Kimley-Horn, updated from previous studies, or based on cost estimates in the 2040 RTP; Potential funding sources based on 2040 RTP and updated if new information is available and on professional experience
Visitor tax revenue	Sales and Transient Occupancy Tax data from Board of Equalization and Runyan Associates report California Travel Impacts by County, 1992-2016	Based on estimated changes in visitor volumes and relative impacts of scenarios on travel time, vehicle miles traveled and transit and bicycle ridership
Cost associated with fatalities and injuries	Caltrans Economics Analysis Branch Vehicle Operation Cost Parameters; National Highway Traffic Safety Administration	Based on results from "Number of Injury and Fatal collisions" performance measure. Costs per collision by severity will remain in 2016 dollars
Automobile vehicle miles traveled	Caltrans Highway Performance Monitoring System (HPMS)	SCC Travel Demand Model
Environmentally sensitive areas	Multiple sources including USFW, Caltrans, UC Davis, CA Dept of Conservation, FEMA, Monterey Bay Sanctuary Foundation, and the US Geological Survey	GIS analysis of length of overlap of locations with new construction and environmentally sensitive areas
Criteria pollutants	VMT from Highway Performance Monitoring System (HPMS)	SCC Travel Demand Model VMT
	CA Air Resource Board 2014EMFAC model	CA Air Resources Board 2014EMFAC model
	SCC Travel Demand Model - 2015 VMT by speed	SCC Travel Demand Model - VMT by speed
Greenhouse gas emissions	VMT from Highway Performance Monitoring System (HPMS)	SCC Travel Demand Model VMT
	CA Air Resource Board 2014EMFAC model	CA Air Resources Board 2014EMFAC model
	SCCRTC Travel Demand Model - 2015 VMT by speed	SCC Travel Demand Model - VMT by speed
Transit vehicle miles traveled	National Transit Database	SCC Travel Demand Model

Performance Measure	Baseline Data Source	2035 Forecasting Methodology
Household transportation costs	Caltrans Economics Analysis Branch Vehicle Operation Cost Parameters	Based on mode share results; CA Household Travel Survey data on typical travel distances by mode
	AAA 2017 Your Driving Costs	
	EMFAC Fuel Economy for Santa Cruz County	
	Transit Revenue	
	Census Data	
Benefits and burdens to environmental justice communities	SCCRTC 2040 RTP - Definition of Transportation Disadvantaged Communities	GIS analysis to determine projects that are in areas with transportation disadvantaged communities
	U.S Census Bureau data	SCC Travel Demand Model
	AB1550/California Housing and Community Development	

Note:

NPMRDS - National Performance Management Research Data Set

SCC - Santa Cruz County

HCM - Highway Capacity Manual

SWITRS - Statewide Integrated Traffic Records System

CHP - California Highway Patrol

Metro - Santa Cruz Metropolitan Transit District

NCHRP - National Cooperative Highway Research Program

AAA - Automobile Association of America

TASAS - Traffic Accident Surveillance and Analysis System

CMF - Collision Modification Factor

USFW- United States Fish and Wildlife Service

FEMA- Federal Emergency Management Agency

Relationship of the UCS to the Highway 1 EIR

The purpose of the Santa Cruz Route 1 Tier 1 and Tier 2 Environmental Impact Report (EIR) is to disclose the environmental effects of implementing near-term corridor improvements and long-term improvements at a programmatic level on Highway 1 that are a high priority for Caltrans and the SCCRTC. The EIR is being prepared in support of a Project Approval document for the Soquel to 41st Ave Auxiliary Lanes Project (aka Tier 2 project). This Tier 2 project will proceed into the design phase and could start construction in 2020. This EIR provides analysis at a level of detail necessary for project approval of the Tier 2 project and discloses the potential environmental effects of future projects along the State Route 1 (SR 1) corridor to reduce congestion and promote alternative modes of transportation (Tier I HOV/TSM Alternatives). Any action to pursue the Tier 1 improvements in the future will require more detailed analysis as part of a subsequent decision process.

The purpose of the UCS is to analyze the parallel transportation corridors together and to provide information that would establish future priorities for corridor investments beyond the Tier 2 Auxiliary lanes project. The UCS evaluation considers a broad range of scenarios along the parallel network comprised of SR 1, local arterials and the rail line. Any recommendations on a future investment strategy would then be subject to further development, evaluation and a subsequent approval process that would also require environmental review.

While a variety of improvements to SR 1 are considered in both documents (EIR and UCS), these documents each support different decisions for implementation across variable timeframes in an overall transportation investment strategy. To satisfy their unique objectives, the Traffic Studies performed for each document also differ. The performance measures in the HOV/TSM (EIR) analysis are based on a refined and detailed analysis using a number of traffic modeling tools for SR 1, whereas the UCS used a countywide travel demand model to look at much of the roadway network throughout the county including SR 1.

The Tier 2 improvements are presented in the EIR for near-term implementation. The information presented for Tier 1 improvements and the UCS both support future decisions about the type of investments to follow.

SCENARIO ANALYSIS - BASELINE CONDITIONS

Establishing an accurate baseline allows a determination of how much benefit each scenario would provide relative to existing conditions. Baseline conditions were established for each performance measure listed in **Table 3,** with the exception of the level of public investment measure for which no baseline is needed. A description of each performance measure's baseline derivation is provided in the subsequent sections. The baseline conditions for performance measures typically reflect 2015 conditions, unless otherwise noted.

Safety

Safety is a critical measure for community well-being, quality of life, and particularly in the case of active transportation facilities, accessibility. The goal of "Safer Transportation for All Modes" is measured by assessing the number of fatal and injury collisions by mode for baseline conditions compared to 2035 forecasts.

Baseline data for the study area is acquired using the five most recent years (2011-2015) of final collision data from the Statewide Integrated Traffic Records System (SWITRS), SafeTrec's Traffic Injury Mapping System (TIMS) and Caltrans' Traffic Accident Surveillance and Reporting System (TASAS). More recent collision data is considered "provisional" and therefore is not used in this analysis. Each of these datasets provide unique information that serves to inform a safety evaluation. The SWITRS dataset provides the most comprehensive record of collision activity countywide as it tracks fatalities, injuries and property damage only collisions. The TIMS dataset is a geo-coded extract of SWITRS data focused on injury and fatal collisions only. TIMS collision records are precisely geo-located and can therefore be reliably mapped to roadways. TASAS is an aggregated set of collision information available only for state highways. TASAS data provides collision rates (number of collisions/vehicle miles traveled) for roadway corridor segments which can be compared against other similar corridors within California.

SWITRS has 16,980 collision records spanning from 2011 through 2015 in Santa Cruz County. **Figure 3** shows the annual trend of countywide collisions between 2011 and 2015. The countywide collision total has trended slightly upward since 2013, including an increase in collision severity. There is an average of 3,396 collisions per year countywide. The number of collisions for this 5-year time period in each of the jurisdictions are provided below.

- 2,639 – City of Santa Cruz
- 617 – City of Capitola
- 2,619 – City of Watsonville
- 652 – City of Scotts Valley
- 10,453 – Unincorporated

Table 5 provides a detailed breakdown of the collisions in the Unified Corridor Study area by roadway segment and mode. For this metric, the study area also includes roadways parallel to the rail right-of-way that would likely see changes in their use once a bicycle and pedestrian trail is established along the rail right of way.

Between 2011 and 2015, there were 1,989 injury and 17 fatal collisions recorded along study area roadways[3]. Six of the fatal collisions involved bicyclists or pedestrians (three on Soquel Ave/Dr, two on SR 1 along the north coast and one on Mission St.) Eight of the fatal collisions not involving bicyclists or

[3] Four of the collisions involve both bicycles and pedestrians, two of which reported both pedestrian and bicycle injuries and are therefore counted twice in Table 5. The collision total of 2006 is therefore two less than the total number of collisions in Table 5.

pedestrians occurred on SR 1 between SR 129 and SR 17. Motor vehicle collisions involving a bicycle or pedestrian injury or fatality account for 22% of the total injury and fatal collisions in the UCS study area - 130 collisions involved a pedestrian and 304 collisions involved a bicycle. Collisions that did not result in an injury or fatality (property damage only collisions) have not been delineated by roadway segments for the project study area as these collisions do not consistently have their locations specified.

Figure 4 maps the location of injury and fatal collisions along State Route 1 (SR 1), Soquel Avenue/Soquel Drive/Freedom Boulevard and roadways that serve as parallels to the Santa Cruz Branch Rail Line. Bicyclists and pedestrians could relocate from these parallel roadways to the trail on the rail right-of-way and thus, are being evaluated for assessing bicycle and pedestrian collisions in future potential scenarios. **Figure 5** shows just the bicycle and pedestrian collisions in the project study area.

Caltrans' TASAS analytics have indicated several segments, interchanges and intersections of SR 1 that after normalizing for demand usage, are experiencing more collision activity than would be expected based on the performance of similar facilities elsewhere in the state. SR 1 in the project study area for the five-year period from 2011 to 2015 had a collision rate of 0.96 collisions per million vehicle miles traveled (MVMT). For like facilities elsewhere in the State, the expected collision rate is 0.82. **Table 6** lists the segments of SR 1 in the study area and their collision rate performance relative to expected. Segments of SR 1 with more collisions than expected based on peer facility performance are most common along the arterial section (Mission Street) through the City of Santa Cruz and the freeway section near 41st Ave in Capitola.

Figure 3: Countywide Collisions by Severity

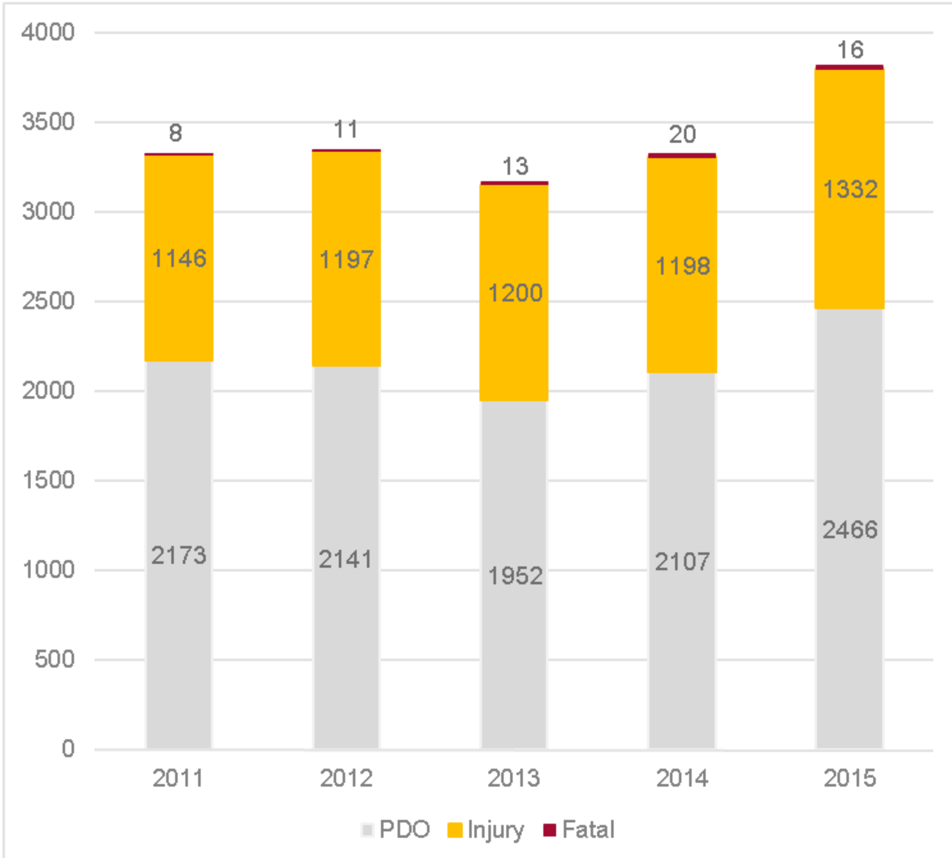

Table 5: Corridor Collision History by Segment

Segment		Vehicle		Bicycle		Pedestrian	
		Injury	Fatal	Injury	Fatal	Injury	Fatal
Highway 1							
SR 129	SR 152/Main Street	30	1			1	
SR 152/Main	San Andreas Road	90	1			1	
San Andreas Road	Freedom Boulevard	31					
Freedom Boulevard	State Park Drive	125	3	1			
State Park Drive	Bay Avenue	151		2		1	
Bay Avenue	Soquel Drive	140		3		3	
Soquel Drive	Morrissey Boulevard	111	1	1			
Morrissey Boulevard	SR 17	61	2			1	
SR 17	Bay Street	101		17		15	
Bay Street	Shaffer Road	31		17		3	1
Shaffer Road	Dimeo Lane	15		3			
Dimeo Lane	Marine View Avenue	27		6	1	3	1
Soquel Drive							
Freedom Boulevard	State Park Drive	14		10		2	
State Park Drive	Porter Street	61		25		4	
Porter Street	41st Avenue	22		8		2	
41st Avenue	Paul Sweet Road	56		20		8	1
Paul Sweet Road	Pacific Avenue	86		61	1	25	1
Freedom Boulevard							
SR 152/Main Street	Buena Vista Drive	123		18		20	
Buena Vista Drive	White Road	17		2		2	
White Road	SR 1	38	2	4			
SR 129							
Walker Street	Lee Road	24					
Beach Street / San Andreas Road Corridor							
Walker Street	SR 1	5				2	
SR 1	San Andreas Road	6					

Segment		Vehicle		Bicycle		Pedestrian	
		Injury	Fatal	Injury	Fatal	Injury	Fatal
Beach Street	Buena Vista Drive	9	1	2			
Buena Vista Drive	Seascape Boulevard	11		1			
Sumner Avenue							
Via Novella	Seascape Boulevard						
Seascape Boulevard	Rio Del Mar Boulevard	2					
McGregor Drive / Park Avenue / Portola Drive / San Lorenzo Boulevard Corridor							
Searidge Drive	Park Avenue	3		3		3	
McGregor Drive	Monterey Avenue	8		4		2	
Park Avenue	Capitola Avenue	2		2		1	
Monterey Avenue	Soquel Wharf Road	5		5		3	
Soquel Wharf Road	7th Avenue	34		22		8	
Cliff Drive	Eaton Street	13		6		2	
7th Avenue	Cliff Drive	15		12			
Capitola Road / Soquel Wharf Road Corridor							
Stockton Street	41st Avenue	7		2		1	
41st Avenue	7th Avenue	59		16		2	
Brommer Street							
41st Avenue	17th Avenue	18		12		6	
Nova Drive							
Portola Avenue	41st Avenue	1				1	
Bay Street							
Beach Street	California Street	4		7		2	
Delaware Avenue / Shaffer Road Corridor							
Bay Street	Shaffer Road	8		10		1	
	Total[1]	**1,564**	**11**	**302**	**2**	**125**	**4**

[1] Motor vehicle collisions involving bicycles or pedestrians are listed under bicycle or pedestrian collisions. Two of the collisions reported both pedestrian and bicycle injuries and are therefore included under both bicycle injury and pedestrian injury collisions in Table 5. The total of 2,008 in this table is therefore two more than the 2,006 total number of collisions in 2011-2015 for the project study area.

Figure 4: SWITRS/TIMS Collision Locations- All Collision Types- 2011-2015

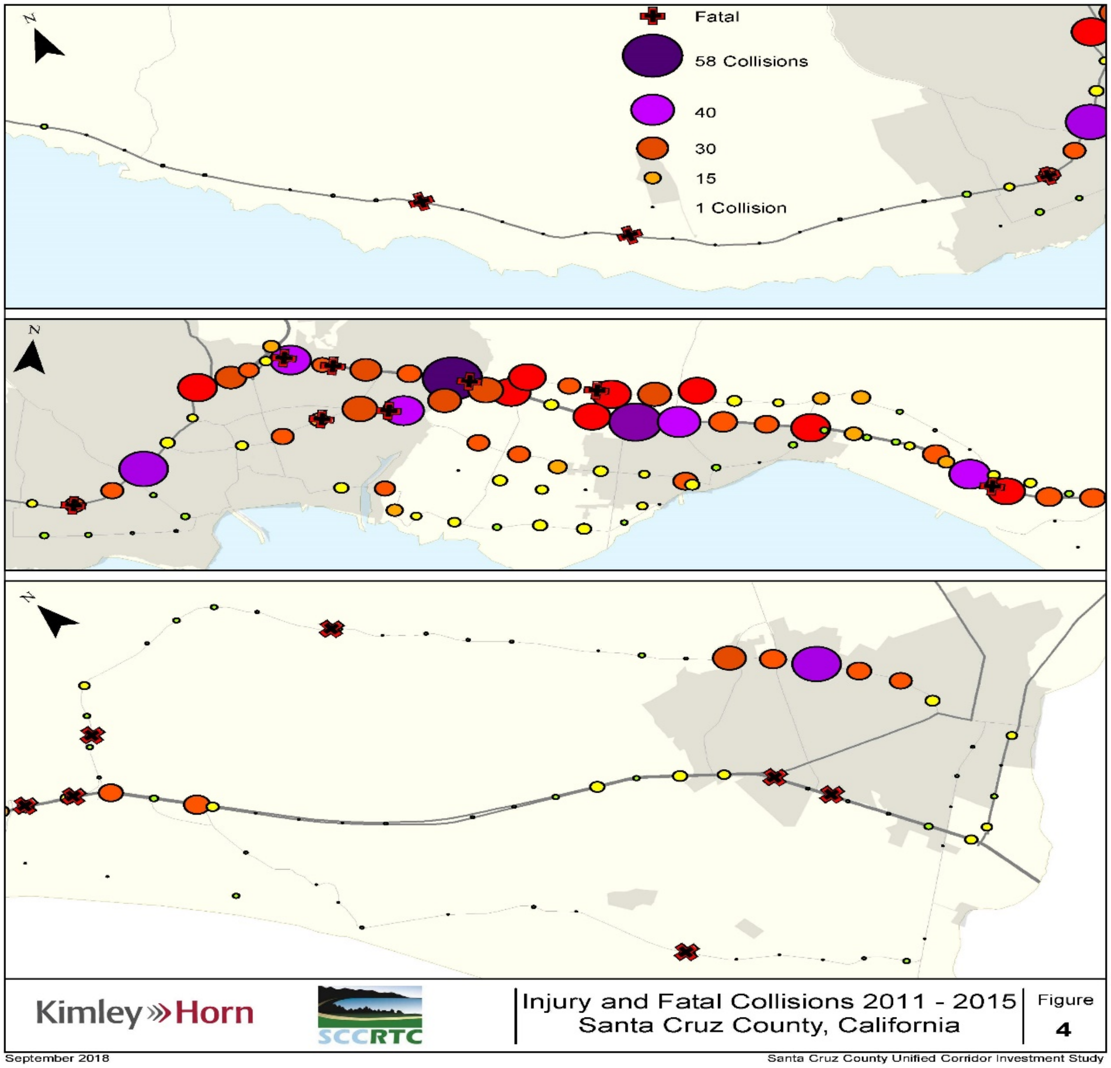

Figure 5: SWITRS/TIMS Bicycle and Pedestrian Collisions 2011-2015

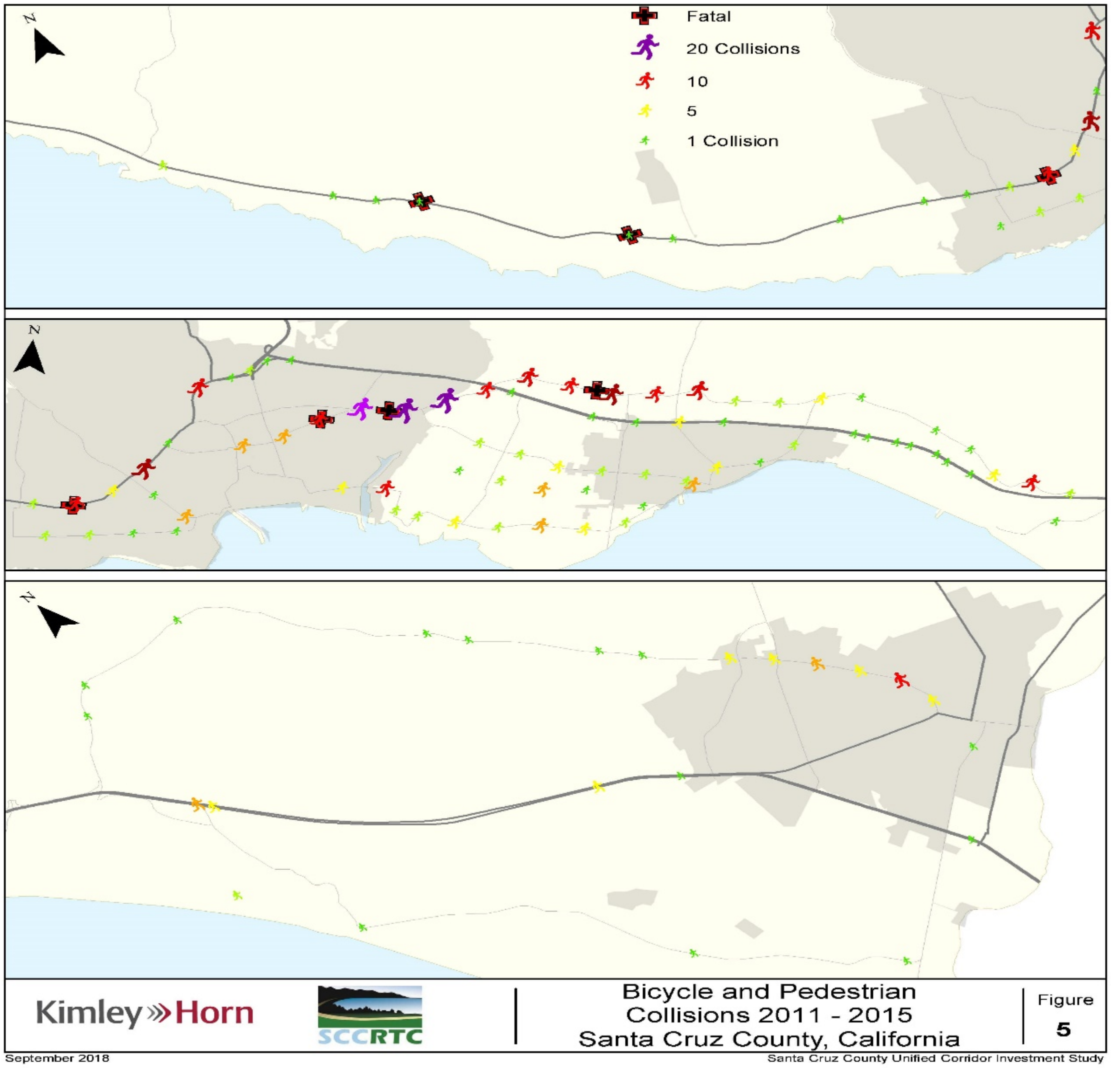

Table 6: Collision Rates for State Route 1 and Comparison to Similar Facilities (2011-2015)

Segment		Observed Rate[1]	Expected Rate[2]	Difference
SR 129 NB Off Ramp	SR 129 NB On Ramp	0.49	0.63	-0.14
SR 129 NB On Ramp	Harkins Slough Rd	0.46	0.48	-0.02
Harkins Slough Rd	Airport Blvd NB On Ramp	0.55	0.7	-0.15
Airport Blvd NB On Ramp	Buena Vista Dr NB Off Ramp	0.57	0.55	0.02
Buena Vista Dr NB Off Ramp	Buena Vista Dr NB On Ramp	0.66	0.41	0.25
Buena Vista Dr NB On Ramp	Mar Monte Ave NB Off Ramp	0.34	0.41	-0.07
Mar Monte Ave NB Off Ramp	Mar Monte Ave NB On Ramp	0.26	0.41	-0.15
Mar Monte Ave NB On Ramp	Larkin Valley Rd	0.74	0.56	0.18
Larkin Valley Rd	Park Ave	0.87	0.75	0.12
Park Ave	Bay Ave	1.44	1.12	0.32
Bay Ave	41st Ave NB Off Ramp	1.69	0.79	0.9
41st Ave NB Off Ramp	41st Ave NB On Ramp	3.15	1.18	1.97
41st Ave NB On Ramp	Soquel Dr NB Off Ramp	1.07	0.78	0.29
Soquel Dr NB Off Ramp	Soquel Dr NB On Ramp	2.7	0.62	2.08
Soquel Dr NB On Ramp	Emeline Ave NB Off Ramp	1.2	0.75	0.45
Emeline Ave NB Off Ramp	River St	1.29	0.94	0.35
River St	Mission St	1.05	1.41	-0.36
Mission St	Locust St	1.33	1.98	-0.65
Locust St	Walnut Ave	0.55	1.41	-0.86
Walnut Ave	Laurel St	1.03	1.98	-0.95
Laurel St	Bay St	1.96	1.41	0.55
Bay St	Almar Ave	1.86	2.09	-0.23
Almar Ave	Swift St	2.49	0.94	1.55
Swift St	Santa Cruz City Limit	1.73	0.63	1.1
Santa Cruz City Limit	400' east of Coast Rd	0.66	0.63	0.03
400 ' east of Coast Rd	400' west of Coast Rd	0	0.63	-0.63
400' west of Coast Rd	2101 Coast Rd	0.4	0.52	-0.12
2101 Coast Rd	Dimeo Ln	0.55	1.03	-0.48
Dimeo Ln	Four Mile Beach Parking	0.38	0.52	-0.14
Four Mile Beach Parking	Rodoni Farms	0.43	1.03	-0.6
Rodoni Farms	Scaroni Road	0.2	0.45	-0.25
Scaroni Road	Marine View Ave	0.73	1.1	-0.37

[1] Collisions per million vehicle miles traveled

[2] Collisions per million vehicle miles traveled, expected rates from TASAS Table B

Safety Baseline Performance Measure

The baseline for injury and fatal collisions performance measure is presented below in **Table 7** is a yearly average of the number of collisions in the study area. These values will be used to compare the safety benefits of the various projects and scenarios compared to the existing baseline.

Table 7: Total Study Area Collisions

	Vehicle Collisions			Bicycle Collisions		Pedestrian Collisions	
	Property Damage Only *	Injury	Fatal	Injury	Fatal	Injury	Fatal
2011-2015	3544	1564	11	302	2	125	4
One Year Average	709	312.8	2.2	60.4	0.4	25	0.8
Baseline Yearly Performance Measure	**709**	**315**		**60.8**		**25.8**	

*Property Damage Only Collisions for the study area were estimated by applying the ratio of countywide property damage only to injury and fatal (1.77) to the study area injury and fatal. It is assumed here that there are no property damage only bicycle and pedestrian collisions.

Reliability and Efficiency

A transportation system that meets the needs of its users provides options for how to travel in a timely and reliable manner. The goal of "Reliable and efficient transportation choices that serve the most people and facilitate the transport of goods" will be evaluated by assessing the following performance measures: peak period mean auto and transit travel time and travel time reliability, mode share and person trips across a screenline for baseline conditions compared to 2035 forecasts. A comparison of auto travel time and transit travel time evaluates the difference in travel time between automobile and transit person trips for select origin -destination pairs within Santa Cruz County and serves as a peak period person travel time performance measure. Peak period person travel time is also used to assess the UCS reliability and efficiency goal for baseline conditions compared to 2035 forecasts.

Peak Period Mean Auto Travel Time

Auto travel time is an indicator of the distance traveled, speeds, and congestion experienced by individuals traveling by automobile. Peak periods provide information about times when travel demand is the highest. The automobile peak period travel time is measured using a combination of data available from the Federal Highway Administration, Caltrans and vendors of cell data. For SR 1 traffic speed, estimates were acquired using the National Performance Measurement Research Data Set (NPMRDS) from the Federal Highway Administration. For Soquel/Freedom, cellular data from StreetLight is used to determine travel time.

Travel times and speeds for Highway 1, Soquel Ave/Dr, and Freedom Blvd are shown in **Tables 8** and **9**, respectively**.** The travel time data from NPMRDS that is used for SR 1 is from February 1, 2017 to September 30, 2017. SR 1 peak traffic hours, as defined by the NPMRDS, are 7:40 AM to 8:40 AM in the morning and 4:40 PM to 5:40 PM in the afternoon. The travel time data for Soquel Ave/Dr and Freedom Blvd from Streetlight is collected from January 1, 2017 to December 31, 2017. StreetLight defines the morning peak period as 6:00 AM to 9:00 AM and the afternoon peak period as 4:00 PM to 7:00 PM.

Consistent with the Federal Performance Measurement Rule, congestion is determined based on average peak period speed at or below 60% of free flow speed. Free flow speed is the average speed during low volume conditions where drivers are free to travel at their desired speed. It is determined from the average speed from midnight to 3 AM. Free flow speed is adjusted to the peak period speed if the data shows free flow slower than peak period speed. Congested segments during peak periods are indicated with highlighting. The travel time index (TTI) is a ratio of the peak period travel time to the free flow travel time and can be used to compare the performance of the various roadway segments. The TTI is calculated for both the AM and PM peak periods. A TTI of 1.0 is where the peak period travel time is equal to the free flow travel time. A TTI of 1.6 or greater (shown in red) indicates areas with more significant variability in daily speed and travel time. In other words, some days will have significantly slower travel time than the average while other days could be faster. The segments of SR 1 that have the most significant congestion are from SR 17 to State Park Drive in the SB direction during the PM peak period and from San Andreas to Bay Ave in the NB direction during the AM peak period. The travel time can be up to six times longer than free flow conditions with speeds as low as 10 mph.

SR 1 has mostly directional traffic congestion during the peak periods. The AM peak experiences congestion in the northbound direction between San Andreas Rd and Bay Ave/Porter Rd. Congestion in the PM peak occurs primarily in the southbound direction between SR 17 and State Park Drive. Traffic on Mission St is typically congested in both directions during both AM and PM peak periods.

Highway traffic in vicinity of Watsonville is generally free of traffic at all times of the day. Southbound traffic south of Freedom Boulevard is generally free of congestion at all times of the day.

Peak Period Mean Heavy-Duty Truck Travel Time (SR 1)

Truck travel times can differ from auto travel times and can impact the time it takes to distribute goods and services. Heavy-duty truck travel time is measured using NPMRDS data during the same time periods as the auto travel time and results are shown in **Table 10**. Heavy-duty truck speeds are typically lower than passenger vehicle speeds due to posted highway speed limits for heavy-duty trucks that are set lower than passenger vehicles and the greater gross vehicle weight affects their operational speed particularly if steep grades are present.

Southbound traffic south of Freedom Boulevard is generally free of congestion at all times of the day. SR 1 truck traffic between Soquel and State Park Drive experiences mostly directional congestion during the peak periods northbound in the AM and southbound in the PM.

Table 8: Auto Travel Time and Speed for State Route 1

Segment		Length (mi)	AM Average Speed (mph)[1,2]	PM Average Speed (mph)[1,2]	Free Flow Speed (mph)[3]	AM Average Travel Time (min)[2]	PM Average Travel Time (min)[2]	AM Travel Time Index[2]	PM Travel Time Index[2]
Northbound									
SR 129	SR 152/Main Street	2	58.85	58.85	58.85	1:55	1:50	1	1
SR 152/Main	San Andreas Rd	5.06	40.91	60.02	60.02	7:25	4:41	1.5	1
San Andreas Rd	Freedom Blvd	0.79	15.13	63.49	63.49	3:08	0:44	4.2	1
Freedom Blvd	State Park Drive	2.19	23.32	59.17	60.85	5:38	2:13	2.6	1
State Park Drive	Bay Avenue	2.58	26.99	58.06	61.24	5:44	2:40	2.3	1.1
Bay Avenue	Soquel Drive	1.7	36.52	55.41	59.5	2:47	1:50	1.6	1.1
Soquel Drive	SR 17	2.05	48.81	52.47	54.93	2:31	2:21	1.1	1
SR 17	Shaffer Road	3.44	21.67	20.37	33.61	9:32	10:08	1.6	1.6
Shaffer Road	Dimeo Lane	2.41	51.07	52.13	54.21	2:50	2:46	1.1	1
Summary Northbound									
SR 129	San Andreas Road	7.05	45.35	59.69	59.69	9:20	6:31	1.3	1
San Andreas Road	SR 17	9.31	28.18	56.92	59.63	19:50	9:49	2.1	1
SR 17	Dimeo Lane	5.85	28.4	27.19	42.09	12:22	12:55	1.5	1.5
Southbound									
Dimeo Lane	Shaffer Road	2.41	50.57	53.23	53.23	2:52	2:36	1.1	1
Shaffer Road	SR 17	3.74	22.22	19.59	35.84	10:06	11:27	1.6	1.8
SR 17	Soquel Drive	1.68	51.93	17.47	57.63	1:57	5:46	1.1	3.3
Soquel Drive	Bay Avenue	1.71	53.48	9.98	60.77	1:55	10:16	1.1	6.1
Bay Avenue	State Park Drive	2.72	58.31	22.17	61.53	2:48	7:22	1.1	2.8
State Park Drive	Freedom Blvd	2.12	59.19	43.3	60.57	2:09	2:56	1	1.4
Freedom Blvd	San Andreas Rd	1.01	61.05	59.87	61.05	0:59	1:01	1	1
San Andreas Rd	SR 152/Main Street	4.74	62.7	62.7	62.7	4:25	4:29	1	1
SR 152/Main Street	SR 129	2.23	62.11	62.11	62.11	2:05	2:05	1	1
Summary Southbound									
Dimeo Lane	SR 17	6.15	28.48	26.25	42.66	12:57	14:03	1.5	1.6
SR 17	San Andreas Road	9.24	56.59	20.26	60.41	9:47	27:21:00	1.1	3
San Andreas Road	SR 129	6.96	62.51	62.51	62.51	6:30	6:34	1	1

[1] Speed data from NPMRDS.

[2] AM peak period is 7:40 to 8:40 AM. PM peak period is 4:40 to 5:40 PM.

[3] Data not available north of Dimeo Lane

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Table 9: Automobile Travel Time and Speed for Soquel Avenue/Drive and Freedom Boulevard

Segment		Length (mi)	AM Average Speed (mph)[2]	PM Average Speed (mph)[3]	Free Flow * Speed	AM Average Travel Time (min)[1,2]	PM Average Travel Time (min)[1,3]	AM Travel Time Index[2]	PM Travel Time Index[3]
Soquel									
Ocean Street	Paul Sweet Road	2.15	17	14	32	8:17	9:52	1.9	2.3
Paul Sweet Road	41st Avenue	1.15	21	13	32	3:29	7:11	1.5	2.5
41st Avenue	Porter Street	0.44	18	8	32	1:37	4:18	1.8	4
Porter Street	State Park Drive	3.02	23	21	28	8:16	9:12	1.2	1.3
State Park Drive	Freedom	2.43	17	21	22	10:32	7:09	1.3	1
Freedom									
SR 1	White Road	4.02	40	41	49	6:26	6:06	1.2	1.2
White Road	Buena Vista Drive	3.03	32	35	49	6:58	6:17	1.5	1.4
Buena Vista Drive	SR 152/Main Street	2.21	27	13	22	4:58	10:35	1	1.7

[1] Speed data from StreetLight archives are reported in whole numbers

[2] AM Peak: 6AM – 9 AM

[3] PM Peak: 4PM – 7PM

* Free flow speeds were not available for some sections and therefore the adjacent section was used.

Note- Buena Vista to White has a free flow speed of 5 mph. This cannot be accurate so used the free flow speed for SR 1 to White Road.

Table 10: Heavy Truck Travel Time and Speed for State Route 1

Segment		Length (mi)	AM Average Speed (mph)[1]	PM Average Speed (mph)[2]	Free Flow Speed (mph)	AM Average Travel Time (min)[1]	PM Average Travel Time (min)[2]	AM Travel Time Index[1]	PM Travel Time Index[2]
Northbound									
SR 129	SR 152/Main Street	2	39.76	41.58	52.95	3:01	2:53	1.33	1.27
SR 152/Main Street	San Andreas Road	5.06	27.12	46.22	53.77	11:18	6:34	1.98	1.16
San Andreas Road	Freedom Boulevard	0.79	11.31	43.71	57	4:13	1:05	5.04	1.3
Freedom Boulevard	State Park Drive	2.19	17.05	43.08	56.64	7:43	3:03	3.32	1.31
State Park Drive	Bay Ave / Porter Street	2.58	19.89	43.92	56.44	7:47	3:00	2.84	1.29
Bay Ave / Porter Street	Soquel Drive	1.7	26.39	44.01	53.37	3:52	2:19	2.02	1.21
Soquel Drive	SR 17	2.05	32.13	37.45	47.49	3:50	3:17	1.48	1.27
SR 17	Shaffer Road	3.44	15.29	18.55	47.49	22:31	11:08	3.1	2.56
Shaffer Road	Dimeo Lane	2.41	37.9	36.04	47.49	3:49	4:01	1.25	1.32
Southbound									
Dimeo Lane	Shaffer Road	2.41	54.13	43.25	51.5	2:40	3:20	1	1.19
Shaffer Road	SR 17	3.74	15.24	15.84	28.28	14:43	14:10	1.86	1.79
SR 17	Soquel Drive	1.68	36.64	13.7	52.95	2:45	7:22	1.45	3.86
Soquel Drive	Bay Ave / Porter Street	1.71	38.34	11.4	54.47	2:40	8:59	1.42	4.78
Bay Ave / Porter Street	State Park Drive	2.72	40.18	20.45	55.72	4:00	7:59	1.39	2.72
State Park Drive	Freedom Boulevard	2.12	40.89	36.46	55.49	3:07	3:29	1.36	1.52
Freedom Boulevard	San Andreas Road	1.01	41.15	47.21	55.45	1:28	1:17	1.35	1.17
San Andreas Road	SR 152/Main Street	4.74	42.68	48	56.26	6:40	5:55	1.32	1.17
SR 152/Main Street	SR 129	0.61	11.72	13.1	57.79	3:09	2:49	4.93	4.41

[1] AM Peak: 6AM – 9 AM

[2] PM Peak: 4PM – 7PM

Peak Period Mean Transit Travel Time

A mean transit travel time performance measure provides a mechanism for assessing whether transit travel times will improve with project implementation. Due to lack of data on real time transit travel times, the mean transit travel time is evaluated by reviewing 2018 published transit schedules. Transit schedules are based on the time that is typically needed for the bus to reach the various locations and thus is representative of baseline conditions. Transit routes serving the SR 1 and Soquel Drive corridors are segmented per their published schedule time points. Travel time is analyzed for Santa Cruz Metro routes 55, 66, 68, 69W, 69A, 71, and 91X. **Table 11** shows the AM peak period travel time, PM peak period travel time, first mile, last mile, and wait time.

Table 11: Peak Period Transit Travel Times

Peak Period Mean Transit Travel Times (Minutes)									
Route	Location	Direction	AM Travel Time	PM Travel Time	AM Round Trip Time	PM Round Trip Time	First Mile[2]	Last Mile[2]	Wait Time[1]
55	Between Capitola Mall and Via Pacifica	Loop	78	78	78	78	5	5	8
66	Between Pacific Station and Capitola Mall	EB	30	40	55	80	5	5	8
		WB	25	40			5	5	8
68	Between Pacific Station and Capitola Mall	EB	25	33	55	68	5	5	8
		WB	30	35			5	5	8
69W	Between Santa Cruz and Watsonville	EB	60	75	120	150	5	5	5
		WB	60	75			5	5	5
69A	Between Santa Cruz and Watsonville	EB	60	75	145	140	5	5	5
		WB	85	65			5	5	5
71	Between Santa Cruz and Watsonville	EB	75	90	164	175	5	5	5
		WB	89	85			5	5	5
91X	Between Santa Cruz and Watsonville	EB	39	60	109	115	5	5	5
		WB	70	55			5	5	5

[1] Wait time calculated as the square root of peak headway

[2] Assumes average of ¼ mile walk between bus stop and origin destination and walking speed of 4.5 feet per second

The PM peak-hour travel times were slightly longer for many of the segments, attributable to higher levels of congestion during this time of day, with two exceptions. On Route 69A, the inbound travel time between the Nielson stop at Watsonville Hospital and the Capitola Mall bus stop is more than 10 minutes higher during the AM peak-hour than during the PM travel times, likely due to high congestion around 8 AM on SR 1 in the northbound direction. The inbound travel time for Route 91X between the Green Valley & Main and Cabrillo College is more than 15 minutes higher during the AM peak-hour, again attributable to higher levels of congestion around the school in the AM peak-hour.

Buses traveling along SR 1 between Watsonville and Aptos are delayed the most by peak period directional congestion. Soquel Drive is most affected by congestion for eastbound traffic during the PM peak period, nearly doubling travel times between Dominican Hospital and 41st Avenue. Areas in Downtown Santa Cruz are also impacted by PM peak congestion.

An overall transit travel time performance measure can best be summarized by a comparison of transit trip's travel times to auto travel times between specific locations. The actual person trip travel time comparison is described in the travel time by origin-destination pair performance measure.

Travel Time Reliability

An important transportation performance metric advocated at both the federal and state levels is travel time reliability which is a measure of the variability of the travel time from day to day during the same time period. How predictable travel time is can be critical for commuters, goods movement, and transit provision. The larger the variability in travel time, the more unreliable the trip time becomes. The primary causes of unreliable travel times are collisions and an imbalance between demand and capacity that causes congestion. Although when congestion is recurring, a congested system can often become "more reliable" as the travel time is more predictably longer than free flow conditions. The federal National Highway System Performance Measure Rule specifically mandates State's and Metropolitan Planning Organizations to measure travel time reliability on the National Highway System.

Given that SR 1 within the study area is federally designated as part of the National Highway System (NHS), travel time reliability is assessed using the Federal Highway Administration's NPMRDS data and use guidance described in the National Performance Measurement Rule. Reliability is measured for each roadway segment that is analyzed for travel time in both the AM and PM. This includes the Study Area portion of SR 1, and Soquel Avenue/Drive and Freedom Blvd. Travel time reliability is reported as the difference (buffer time) and ratio (buffer time index) of the median 50th percentile travel time to the 80th percentile travel time. The 80th percentile travel time is defined as the time when 80% of the trips are shorter than this time.

The travel time data used for assessing travel time reliability on SR 1 is from the same time period (from February 1, 2017 to September 30, 2017) that is used in the travel time analysis. The time from 7:40 to 8:40 AM is considered the AM peak period and 4:40 to 5:40 PM is considered the PM peak period. StreetLight Data is used for analyzing travel time reliability on Soquel Ave/Soquel Dr/Freedom Blvd using the same metrics as described for SR 1. Travel time data on Soquel and Freedom from January 1, 2017 to December 31, 2017 is used for this analysis. The time from 6:00 to 9:00 AM is considered the AM peak period and 4:00 to 7:00 PM is considered the PM peak period. The results for SR 1, Soquel Drive and Freedom Boulevard are shown in **Table 12** and **Table 13**. According to the Federal Highway Administration, a Buffer Time Index less than 25% is considered reliable, a buffer time index between 25% and 50% is mostly reliable, and a buffer time index greater than 50% is considered unreliable. In **Table 12** and **Table 13** green denotes reliable conditions, yellow denotes moderately reliable conditions, and red denotes unreliable conditions.

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Table 12: SR 1 Travel Time Reliability for Passenger Cars

Segment		Length (mi)	AM Average Travel Time (min)	PM Average Travel Time (min)	AM 80th Travel Time (min)	PM 80th Travel Time (min)	AM Buffer Time Index[1]	PM Buffer Time Index[1]	AM Buffer Time (min)	PM Buffer Time (min)
Northbound										
SR 129	SR 152/Main Street	2	1:55	1:50	2:04	1:59	8%	8%	0:09	0:09
SR 152/Main	San Andreas Rd	5.06	7:25	4:41	19:44	4:58	166%	6%	12:20	0:17
San Andreas Rd	Freedom Blvd	0.79	3:08	0:44	6:47	0:49	116%	8%	3:39	0:04
Freedom Blvd	State Park Drive	2.19	5:38	2:13	9:38	2:23	71%	7%	3:59	0:10
State Park Drive	Bay Avenue	2.58	5:44	2:40	9:19	2:51	62%	7%	3:34	0:11
Bay Avenue	Soquel Drive	1.7	2:47	1:50	3:25	2:01	22%	10%	0:38	0:11
Soquel Drive	SR 17	2.05	2:31	2:21	2:48	2:41	11%	14%	0:16	0:20
SR 17	Shaffer Road	3.44	9:32	10:08	14:22	15:36	51%	54%	4:50	5:28
Shaffer Road	Dimeo Lane	2.41	2:50	2:46	3:09	3:05	11%	11%	0:19	0:18
Summary Northbound										
Watsonville	San Andreas Road	7.05	9:20	6:31	21:49	6:56	134%	7%	0.5	0:26
San Andreas Road	SR 17	9.31	19:50	9:49	31:56:00	10:44	61%	9%	12:00	0:56
SR 17	Dimeo Lane	5.85	12:22	12:55	17:31	18:41	42%	45%	5:08	5:46
Southbound										
Dimeo Lane	Shaffer Road	2.41	2:52	2:36	3:13	2:54	12%	11%	0:21	0:17
Shaffer Road	SR 17	3.74	10:06	11:27	15:07	18:02	50%	57%	5:02	6:35
SR 17	Soquel Drive	1.68	1:57	5:46	2:22	16:27	22%	185%	0:26	10:40
Soquel Drive	Bay Avenue	1.71	1:55	10:16	2:09	18:54	12%	84%	0:14	8:38
Bay Avenue	State Park Drive	2.72	2:48	7:22	3:00	10:29	7%	42%	0:12	3:08
State Park Drive	Freedom Blvd	2.12	2:09	2:56	2:20	3:30	8%	19%	0:11	0:34
Freedom Blvd	San Andreas Rd	1.01	0:59	1:01	1:04	1:08	8%	7%	0:05	0:04
San Andreas Rd	SR 152/Main Street	4.74	4:25	4:29	4:43	4:43	7%	5%	0:17	0:14
SR 152/Main Street	SR 129	2.23	2:05	2:05	2:16	2:17	9%	9%	0:11	0:11
Summary Southbound										
Dimeo Lane	SR 17	6.15	12:57	14:03	18:20	20:55	42%	49%	5:23	6:52
SR 17	San Andreas Road	9.24	9:47	27:21:00	10:55	27:13:00	11%	84%	1:07	23:04
San Andreas Road	Watsonville	6.96	6:30	6:34	6:59	6:59	7%	6%	0:29	0:25

[1] A buffer time index of 0-25% is considered reliable, 25-50% is mostly reliable and greater than 50% is unreliable

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Table 13: Soquel and Freedom Travel Time Reliability for Passenger Cars

Segment		Length (mi)	AM Average Travel Time (min)	PM Average Travel Time (min)	AM 80th Travel Time (min)	PM 80th Travel Time (min)	AM Buffer Time Index[1]	PM Buffer Time Index[1]	AM Buffer Time (min)	PM Buffer Time (min)
Soquel										
Ocean Street	Paul Sweet Road	2.15	8:17	9:52	10:16	12:01	24%	30%	1:59	3:00
Paul Sweet Road	41st Avenue	1.15	3:29	7:11	5:40	19:11	63%	167%	2:11	12:01
41st Avenue	Porter Street	0.44	1:37	4:18	2:25	5:26	49%	26%	0:48	1:08
Porter Street	State Park Drive	3.02	8:16	9:12	10:20	13:10	25%	43%	2:04	3:58
State Park Drive	Freedom	2.43	10:32	7:09	29:49:00	10:01	183%	40%	19:17	2:52
Freedom										
SR 1	White Road	4.02	6:26	6:06	9:09	7:02	42%	15%	2:43	0:56
White Road	Buena Vista Drive	3.03	6:58	6:17	11:18	7:14	62%	15%	4:20	1:03
Buena Vista Drive	SR 152/Main Street	2.21	4:58	10:35	6:06	13:28	23%	27%	1:08	2:53

[1] A buffer time index of 0-25% is considered reliable, 25-50% is mostly reliable and greater than 50% is unreliable.

Along SR 1, the AM peak travel times are unreliable in the northbound direction from SR 152 to Bay Avenue, while the PM peak travel times are unreliable in the southbound direction from Shaffer Road to Bay Ave. Shaffer Rd to SR 17 travel times are unreliable in both the NB and SB directions in the AM and PM peak periods. On Soquel, the AM peak is unreliable from State Park to Freedom and both the AM and PM peak is unreliable from Paul Sweet to 41st Avenue. On Freedom Boulevard, the AM Peak is unreliable from SR 1 to White Road and from Buena Vista Drive to Main Street. As seen in the travel time and travel time reliability tables, segments with congested travel times do not always correlate with segments that are unreliable, as some segments with recurring congestion can become "more reliably" congested.

Mode Share

Mode share is a measure of the mode people are using to travel – whether driving alone or sharing a ride, riding a bus, walking or biking. It can be presented as the % of people who travel by the different modes, the percentage of miles that are traveled by different modes, or by the percentage of trips taken by different modes. The percentage of trips taken by different modes is evaluated in the UCS. Existing mode share is estimated using the results of the 2011-2012 California Household Travel Survey (CHTS) and the 2015 American Community Survey 5-year summary estimates. This data represents mode share for the entire county. The typical mode of travel for commuters from the American Community Survey are shown in **Table 14** and the mode share for all trips from the CHTS are shown in **Table 15**.

Table 14: Santa Cruz County Commute Mode Split

Commute Mode	Estimated Number of Commuters	% of Commuters
Drove alone	88,889	69.00%
Carpooled	11,815	9.20%
Public transportation (excluding taxicab)	3,648	2.80%
Bicycle	4,922	3.80%
Walked	5,759	4.50%
Taxicab, motorcycle, or other means	4,108	3.20%
Worked at home	9,752	7.60%

[1] American Community Survey Table S0801 – 2016 5-Year Estimate

Table 15: Santa Cruz County All Trip Weekday Mode Split

Trip Mode	% of Trips
Drive Alone	44.8%
Shared Ride	38.4%
Walk	10.6%
Transit	2.9%
Bike	3.4%

[1] Adjusted 2011-2012 California Household Travel Survey for Santa Cruz County

Driving alone makes up a much smaller proportion of overall trips than it does for commute trips as non-work trips are much more likely to be shared amongst multiple people, reducing the number of single occupancy vehicle trips in general. Many nonwork-related trips in the County are short distances and are done more often on foot than commute trips. Similarly, the baseline mode share will use the All Trip mode share from the 2011-2012 CHTS data set.

Person Trips Across North-South Screen Line

A screenline is an imaginary line on a map that crosses a number of roadways. A screenline analysis can compare a sum of traffic count volumes on the major roadways that cross the screenline to better understand the total flow of traffic at various locations. The baseline screenlines that were evaluated provide an indication of the magnitude and direction of where people are traveling from and to throughout the study area. Pedestrian, bicycle, and vehicle movements were counted across nine north-south screenlines between 4:00 and 6:00 PM on weekdays in October 2016. Data is captured on all key roadways passing through the nine screenlines as shown in **Figure 6**. The data is captured primarily on the same day with a few exceptions. This data coupled with transit ridership information from the 2012 Onboard Transit Study[4] and a vehicle occupancy survey taken in 2014[5] provide an assessment of the current daily transportation throughput at various screenline locations between Santa Cruz and Watsonville at the person level. The daily person throughput is shown in **Table 16**.

[4] Santa Cruz County 2012 On Board Transit Study https://sccrtc.org/wpcontent/uploads/2012/08/SCCRTC_Final_Report-small.pdf

[5] Vehicle Occupancy Counts- October 2014 https://www.sccrtc.org/wp-content/uploads/2010/09/2014-Oct-RTC-Count-Report.pdf

Figure 6: Screenline Locations

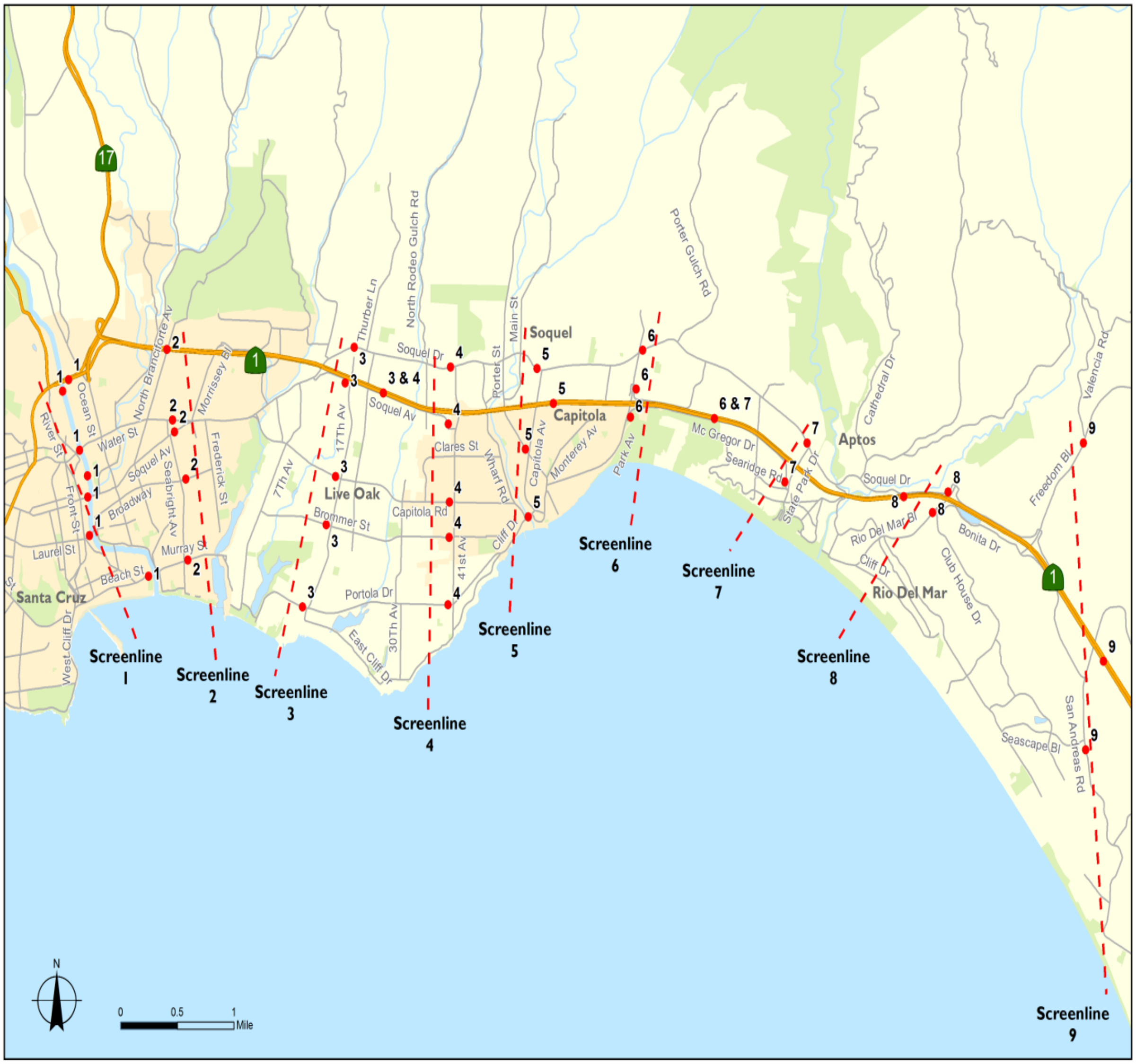


Table 16: Screenline Throughput (4-6 PM Weekday and Daily Auto)

#	Location	Vehicles[1]	Bicycles[2]	Pedestrians[2]	Transit Riders[3]	People (4-6 PM)[4]			Auto (Daily)		
						EB	WB	Total	EB	WB	Total
1	San Lorenzo River	18,555	560	883	389	13,647	12,120	25,767	60,245	59,438	119,683
2	Seabright Avenue	20,618	349	250	419	10,688	16,927	27,615	75,902	80,535	156,437
3	17th Avenue	23,267	246	163	503	17,995	12,931	30,926	90,105	81,290	171,395
4	41st Avenue	20,585	166	207	484	16,595	10,816	27,411	86,300	74,656	160,956
5	Capitola Avenue	19,632	174	300	455	11,396	14,858	26,254	68,851	73,108	141,959
6	Park Avenue	16,234	115	27	441	12,409	9,116	21,525	61,536	60,887	122,423
7	State Park Drive	14,221	49	87	366	11,152	7,696	18,847	54,325	55,817	110,142
8	Rio Del Mar Boulevard	17,054	41	18	334	10,937	11,456	22,393	53,233	52,834	106,067
9	San Andreas/Valencia Road	12,271	11	-	290	8,492	7,952	16,444	40,432	39,558	79,990

[1] Traffic data derived from Automated count stations

[2] Bicycle and pedestrian counts conducted by RTC

[3] Transit ridership from the Santa Cruz County Onboard Ridership Survey (2012)

[4] Assumes a vehicle occupancy of 1.29 per motor vehicle based on counts taken from 4-6 PM on October 2016.

Screenline data shows that person throughput across the screenlines is generally higher in the Santa Cruz to Capitola areas (screenlines 2,3, and 4). Bicycle and pedestrian trips show the steepest decline south of State Park Drive. Excluding UCSC trips, a significant portion of transit ridership is driven by long distance trips between Santa Cruz and Watsonville, with local circulation trips making up a much smaller proportion of transit use.

Peak Period Person Travel Time (Auto Versus Transit Travel Time Comparison)

An origin-destination analysis is performed to evaluate the difference in travel time between automobile and transit person trips for select origin -destination pairs within Santa Cruz County. The origin-destination parings include the locations below.

- Downtown Santa Cruz
- Downtown Watsonville
- UC Santa Cruz
- Dominican Hospital
- Capitola Mall
- Cabrillo College
- Davenport

Google Maps historical travel time analytics were used as the data source for point to point automobile travel times. AM Peak trips were assumed to start at 7:30 AM on a Wednesday in March, while PM Peak trips were assumed to start at 4:30 PM. Where a range of typical travel times is given, the longest time is used for the comparison. Transit travel times are based on the Santa Cruz Metro published schedules and include 5 minutes for first mile, 5 minutes for last mile, and 5 minutes for wait time. Scheduled transfer times were also part of the travel time estimate. AM Peak trips were assumed to start as close to 7:30 AM as the transit schedules allow and PM trips were started at around 4:30 PM. In cases where scheduled service would not allow the trip to be completed with those start times, the closest available start time is used. If this time is not within the typical peak period, it is noted in results table.

For this analysis, the AM peak direction is assumed to be towards downtown Santa Cruz and the PM peak direction is away from Downtown Santa Cruz. **Table 17** shows the AM and PM travel times respectively.

Table 17: Transit vs. Auto Travel Time Comparison

Origin	Destination	Auto Travel Time		Transit Travel Time	Average Difference
		Min	Max	(min)	(min)
AM[1]					
Downtown Watsonville	Downtown Santa Cruz	35	70	85	32.5
	UCSC	40	80	115	55
	Dominican Hospital	30	60	65	20
	Capitola Mall	30	60	60	15
	Cabrillo College	26	50	55	17
UCSC	Downtown Santa Cruz	8	9	37	28.5
Dominican Hospital	Downtown Santa Cruz	10	16	40	27
	UCSC	16	24	58	38
Capitola Mall	Downtown Santa Cruz	12	18	45	30
	UCSC	16	26	70	49
	Dominican Hospital	5	8	57	50.5
Cabrillo College	Downtown Santa Cruz	12	18	45	30
	UCSC	18	26	73	51
	Dominican Hospital	6	9	30	22.5
	Capitola Mall	7	12	35	25.5
PM[2]					
Downtown Santa Cruz	Downtown Watsonville	40	80	75	15
	UCSC	9	12	33	22.5
	Dominican Hospital	10	26	35	17
	Capitola Mall	16	40	48	20
	Cabrillo College	26	55	45	4.5
UCSC	Downtown Watsonville	45	100	102	29.5
	Dominican Hospital	18	40	69	40
	Capitola Mall	26	55	79	38.5
	Cabrillo College	30	70	85	35
Dominican Hospital	Downtown Watsonville	30	60	95	50
	Capitola Mall	10	20	75	60
	Cabrillo College	14	30	40	18
Capitola Mall	Downtown Watsonville	24	45	65	30.5
	Cabrillo College	12	24	35	17
Cabrillo College	Downtown Watsonville	18	35	45	18.5
	Capitola Mall	6	12	35	26

[1] 7:30 AM is used as the departure time in the AM (Google Analytics for Auto, Metro Transit Schedules for Transit)
[2] 4:30 PM is used as the departure time in the PM (Google Analytics for Auto, Metro Transit Schedules for Transit)

Economic Vitality

Transportation projects can generate economic benefits by improving access and reducing costs to transportation system users. Isolating the economic benefits of transportation projects to one economic indicator can be challenging due to the many externalities affecting economic activity. Therefore, the goal of “Developing a well-integrated transportation system that supports economic vitality” is measured by assessing several measures: the level of public investment in transportation projects needed to implement each scenario, changes in costs associated with injury and fatal collisions, changes in visitor tax revenue, and other economic impacts for baseline conditions compared to 2035 forecasts. Other economic impacts are evaluated qualitatively for their relative impacts on property values, business location decisions, development potential, and business performance.

Level of Public Investment

The level of public investment will be determined from the costs of the projects minus the amount of funds that are likely from federal and/or state funding. There is no baseline for this performance measure as costs will only be incurred if project is implemented.

Visitor Tax Revenue

Improved access to destinations and new visitor attractions may encourage additional visitors to come to Santa Cruz County and potentially increase visitor spending. Transient Occupancy Tax, or hotel tax, is generated by visitors when staying overnight at a hotel or similar accommodation **(Table 18)**. Visitors also utilize local services during their stay, which generates sales tax from their purchases. The visitor tax revenue performance measure quantifies annual local transient occupancy tax revenue (also known as “hotel tax” revenue) and visitor-related local sales tax revenue. The countywide hotel tax average for Fiscal Years 2014-2015 and 2015-2016 and 2015 countywide visitor related local sales tax are the baseline for the purpose of the UCS Step 2 analysis. Route-level estimates of these revenues are not possible due to limited data availability. Transient occupancy tax revenue is from the May 2017 report California Travel Impacts by County, 1992-2016p, prepared by Dean Runyan Associates for Visit California.

Table 18: Transient Occupancy Tax Revenue by Jurisdiction, by Fiscal Year

	2011-2012	2012-2013	2013-2014	2014-15	2015-16
Unincorporated	$4,604,800	$4,515,000	$5,514,000	$6,462,300	$6,941,500
City of Capitola	$912,900	$1,074,500	$1,236,600	$1,275,700	$1,451,500
City of Santa Cruz	$4,739,400	$5,558,700	$7,059,000	$8,228,400	$8,255,400
City of Scotts Valley	$712,600	$780,600	$926,200	$1,059,000	$1,011,400
City of Watsonville	$829,700	$872,900	$780,800	$889,100	$990,400
Total	**$11,799,000**	**$12,802,000**	**$15,517,000**	**$17,915,000**	**$18,650,000**

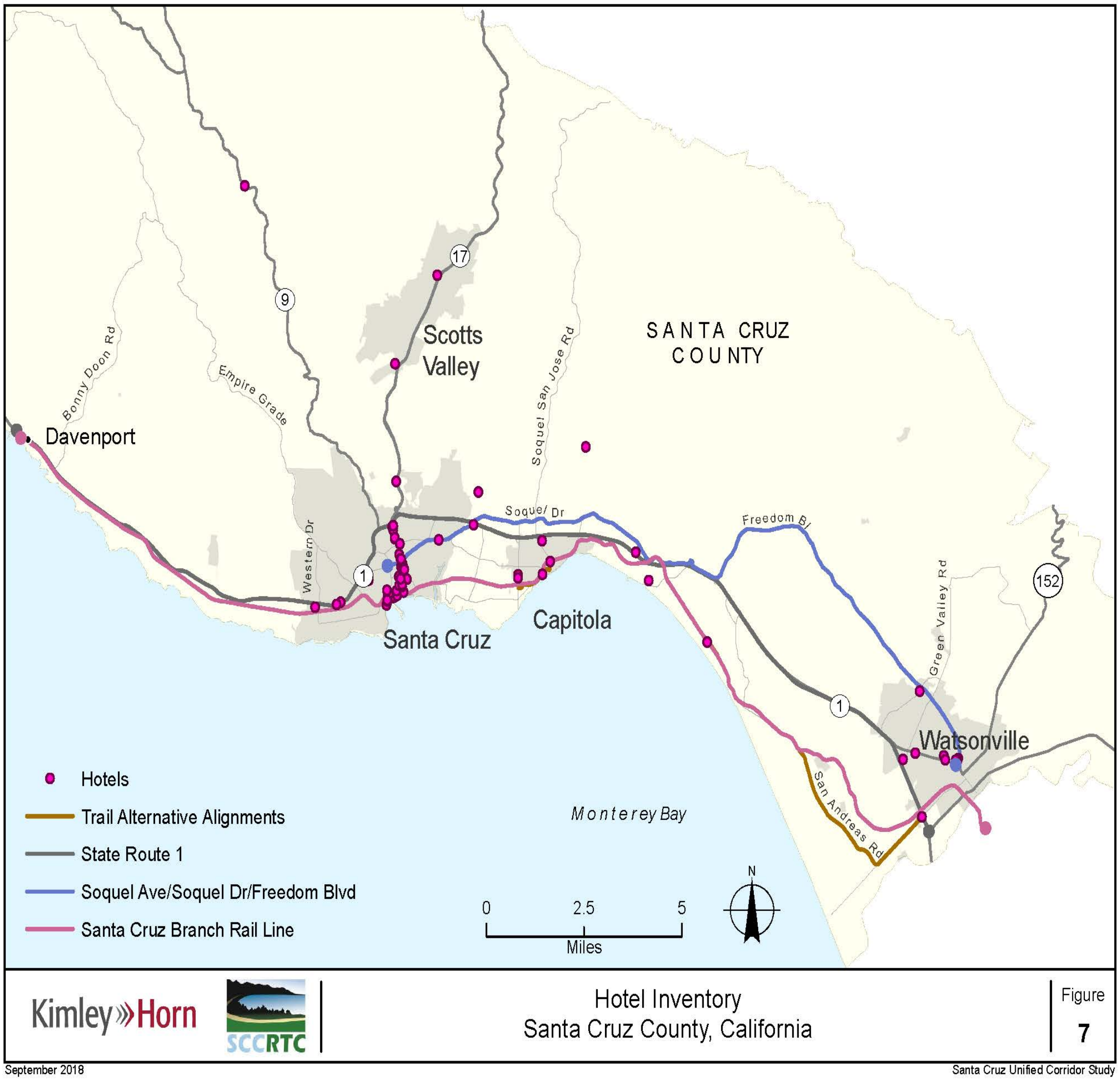
Notes: 2016 data for the City of Santa Cruz is unavailable and therefore gathered directly from the City of Santa Cruz. The transient occupancy tax rate in the City of Santa Cruz increased from 10% to 11% and the Watsonville rate increased from 9.5% to 11% in fiscal year 2013-2014. Jurisdictions do not sum to match the countywide totals due to rounding.

Source: Dean Runyan Associates, May 2017

Hotel inventory data tracked by data service STR Global indicates that hotels in Santa Cruz County are heavily concentrated near the study routes, as shown in **Figure 7**. The concentration of hotels near the study routes indicates that the scenarios' transportation improvements will be relevant to local hotels and, therefore, transient occupancy tax revenue generation.

As of the end of 2017, Visit Santa Cruz County representatives reported hotel occupancy rates of 69.1 percent, based on STR Global market data. As a general rule-of-thumb, potential for additional hotel development typically exists when overall occupancy rates in a market area exceed 65 to 75 percent. Santa Cruz County's high hotel occupancy rate, coupled with recent hotel investments and developments in Santa Cruz and Scotts Valley, indicates long-term potential for adding hotel rooms as visitation to the County increases. However, it is important to note that short-term conditions are less certain, given that hospitality industry performance is cyclical and currently achieving unusually high occupancy rates across the United States.

Figure 7: Santa Cruz Hotel Inventory



The Dean Runyan Associates report California Travel Impacts by County, 1992-2016 also provides estimates of direct countywide visitor spending impacts, as shown in **Table 19**. The Dean Runyan Associates report estimated spending by visitors at businesses in industry sectors associated with travel, such as accommodations, retail sales, and food service. This is accomplished by first estimating visitor volume based on factors such as room demand, visitor surveys, population, use of campsites and second homes, and visitor air arrivals. These visitor volumes were then translated to spending based on accommodation sales, airfares, and visitor spending surveys. Although expressed at the county level, these estimates provide the best available baseline data regarding existing visitor spending and local sales tax revenue impacts in the study area.

Visitor related local sales tax revenue is estimated based on the estimates of direct countywide visitor spending impacts, as shown in the final line of **Table 20.** A local sales tax rate of three percent is applied to sales in the “Food Service” and “Retail Sales” categories; unlike the other spending categories, nearly all sales in these categories are typically subject to sales and use tax. The three percent tax rate includes the state-enacted “Bradley-Burns Uniform Local Sales and Use Tax” rate of one percent for local counties or cities and 0.25 percent rate for county local transportation funds, as well as separate levies of 0.25 percent for the county library, 0.5 percent for county transportation, 0.5 percent for the transit district, and typical city-level tax rates of 0.5 percent. The sales tax rate excludes the six percent sales tax levied for state use.

Table 19: Estimated Visitor Spending and Visitor Related Local Sales Tax Revenue in Santa Cruz County

	2014	2015	2016
Visitor Spending by Commodity Purchased (in millions of dollars)			
Accommodations	195.7	214.6	226
Food Service	206.8	216.9	225.7
Food Stores	36.4	41.1	41.2
Local Transportation & Gas	95.2	87.7	80.3
Arts, Entertainment, & Recreation	105	107.6	109.8
Retail Sales	123.7	125.6	126
Total Destination Spending	765.9	793.6	809
Sales Tax Revenue Attributable to Visitor Food Service and Retail Spending (in millions of dollars)			
Visitor Related Local Sales Tax Revenue	9.9	10.3	10.6

Note: Estimates of sales tax revenue from visitor spending are based on the 3 percent local sales tax rate to sales in the taxable categories of food service and retail sales (see text for the rate breakdown). Accommodations spending is subject to previously-described transient-occupancy taxes.

Source: Visitor spending estimates by Dean Runyan Associates, May 2017; sales tax revenue estimates by Strategic Economics, 2018.

Based on the countywide hotel tax and visitor related tax revenues described above, the 2015 baseline total revenue from these sources is approximately 28.6 million dollars, as calculated and shown in the table below.

Table 20: Estimated Visitor Spending and Visitor Related Local Sales Tax Revenue in Santa Cruz County

Tax Source	Amount
Annual Hotel Tax (Average of FY14-15 and FY15-16)	$18,283,000
Visitor Related Local Sales Tax Revenue (2015)	$10,275,000
Total Estimated Visitor Tax Revenue (2015)	$28,558,000

Source: Strategic Economics, 2018.

Other Economic Benefits

Beyond visitor-related local sales tax revenues there are additional economic benefits, that accrue to business owners, property owners, government entities (via other tax revenue sources such as property taxes and resident-generated sales taxes), and users of the transportation itself and that are evaluated and described qualitatively in the UCS. The qualitative UCS Step 2 economic benefits assessment describes the relative potential impacts of the scenarios on:

- business location decisions;
- changes in development potential and property values/rents;
- changes in business performance; and,
- impacts on related sources of tax revenue.

This qualitative approach allows a nuanced discussion of relevant considerations that influence the economic benefits associated with the scenarios such as: earnings potential through enhanced access to employment and education opportunities, business productivity from improved access to the workforce and customers, property values and development potential, and increased tax revenues associated with changes in business activity and property values.

The following data describes relevant existing conditions in order to frame the later UCS Step 2 scenario analysis.

The following maps **(Figures 8, 9, 10, and 11)** depict population density, household incomes, and educational attainment along the routes. These maps indicate the routes' relative effectiveness – and value to transportation users – in connecting existing residential areas with job opportunities and other destinations, particularly when considered in conjunction with the later employment maps.

Figure 8: Santa Cruz County Population Density

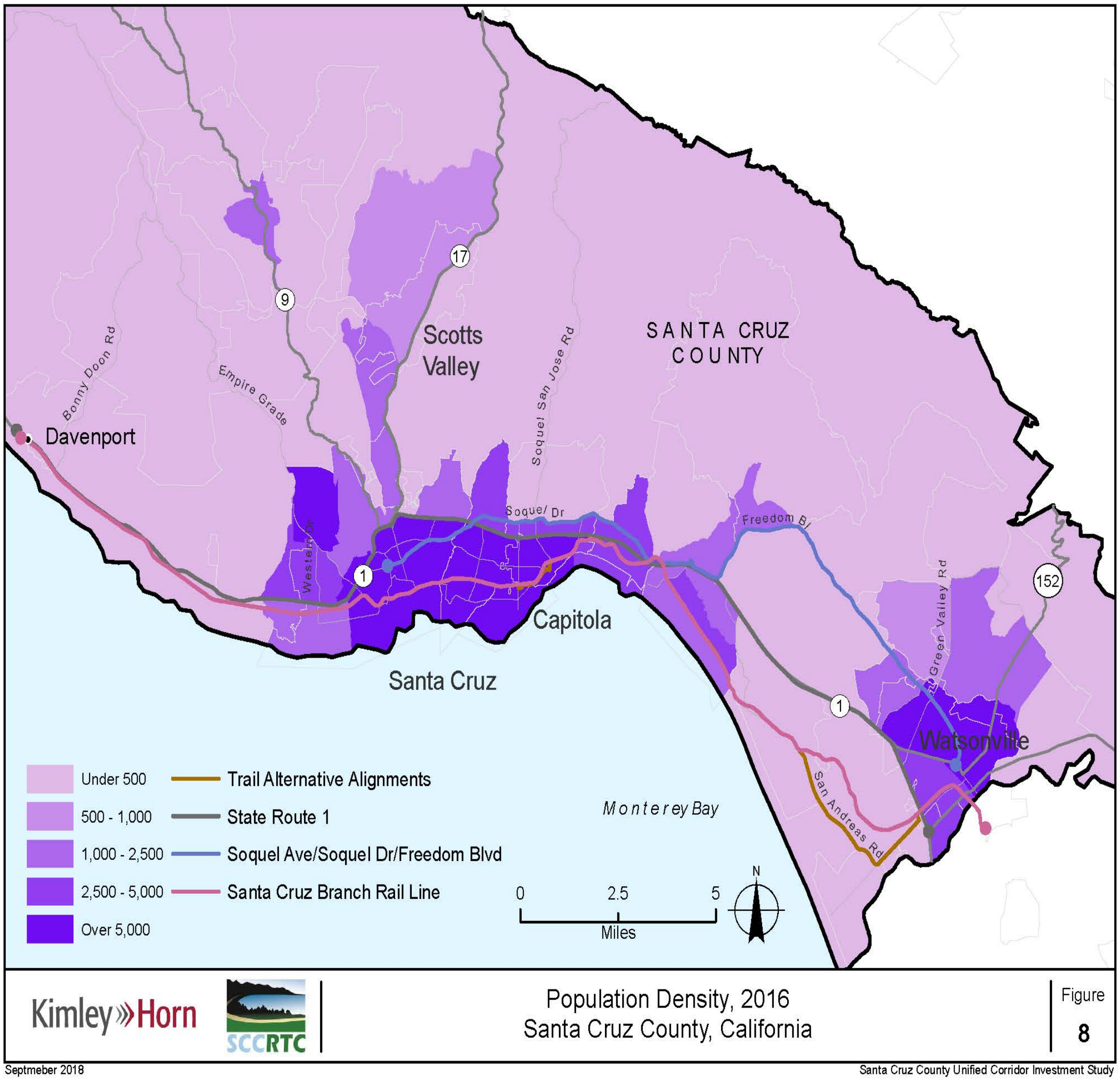


Figure 9: Household Median Income, 2016

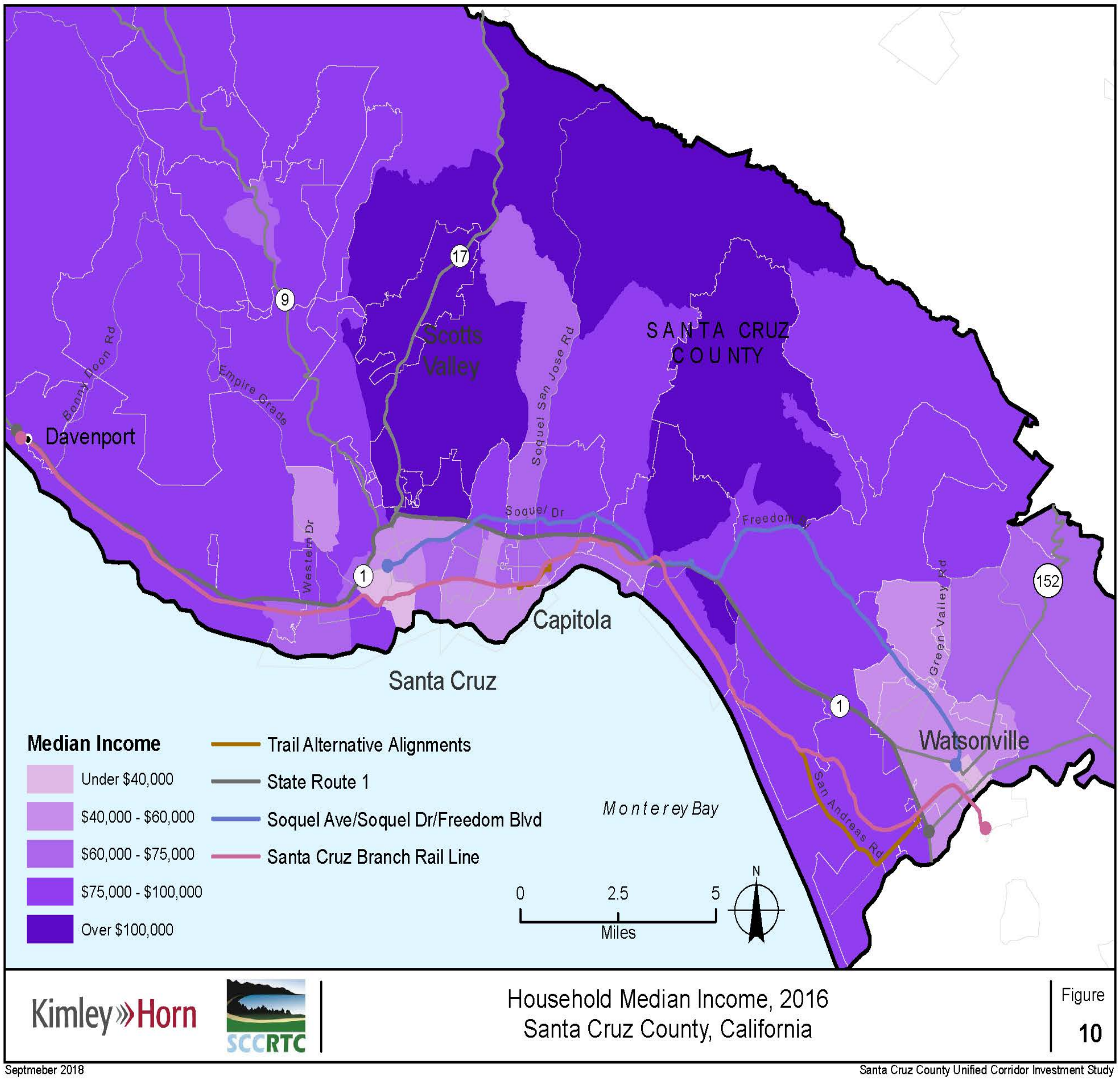


Figure 10: Educational Attainment High School Degree or Less

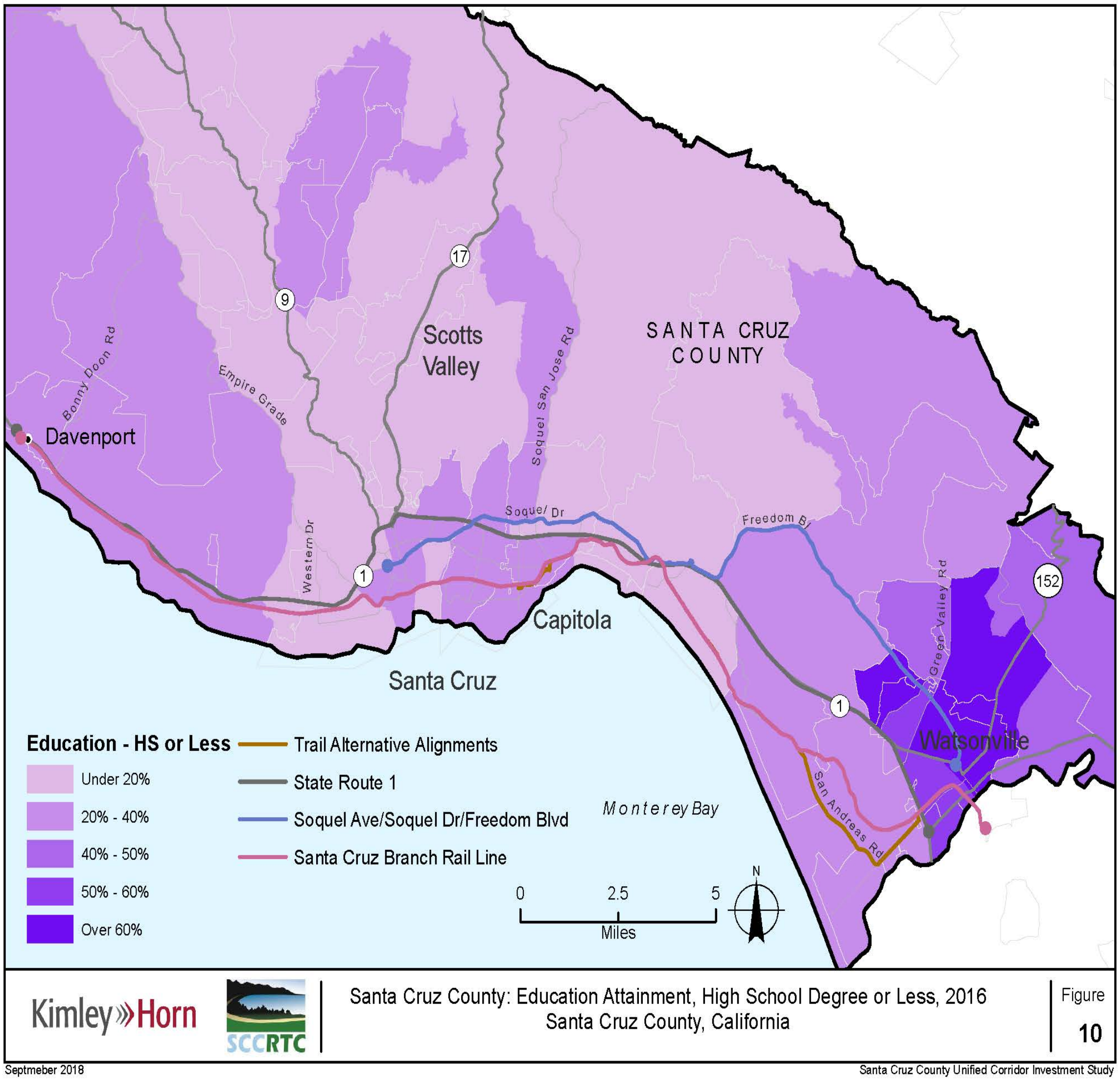
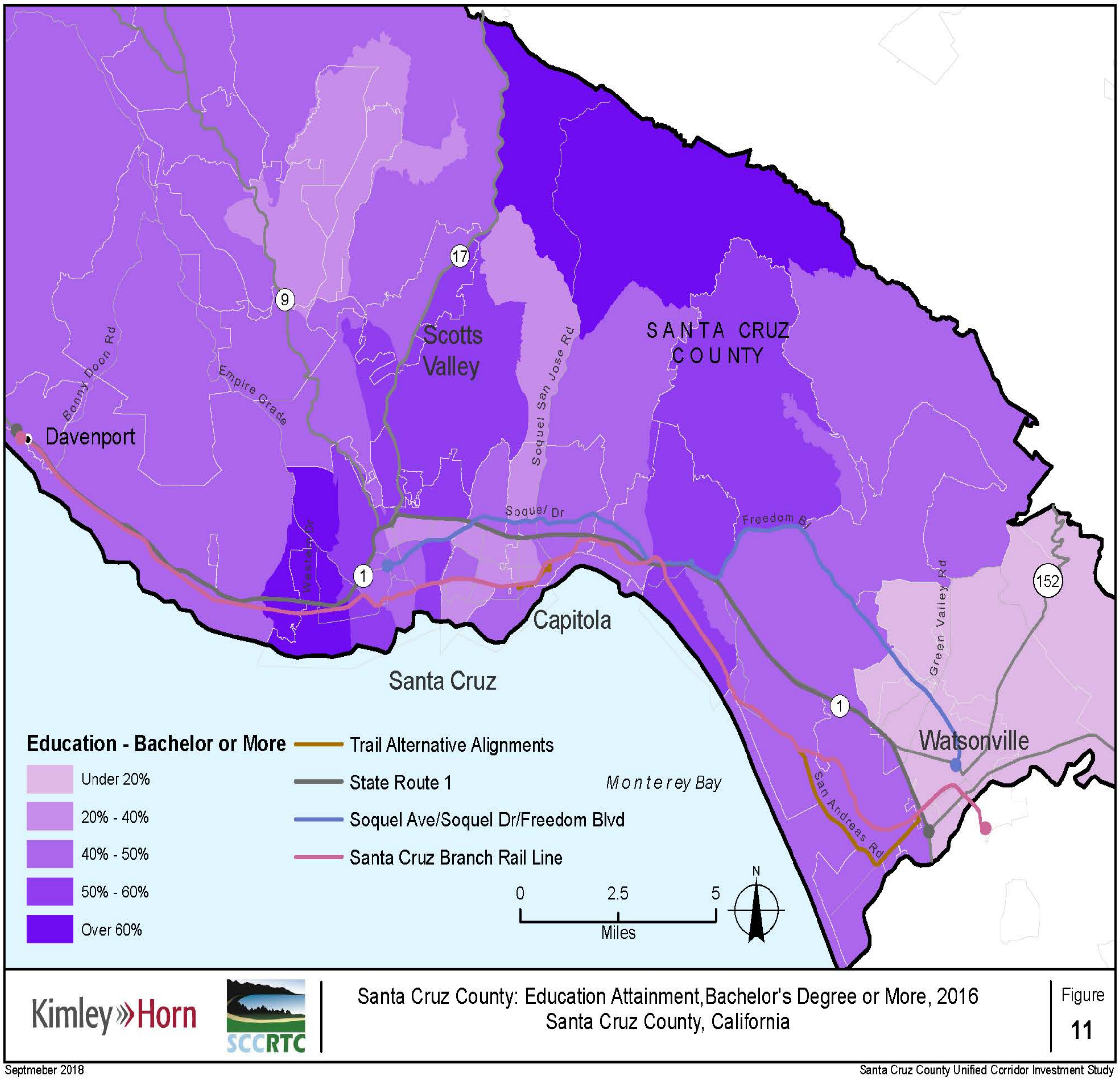
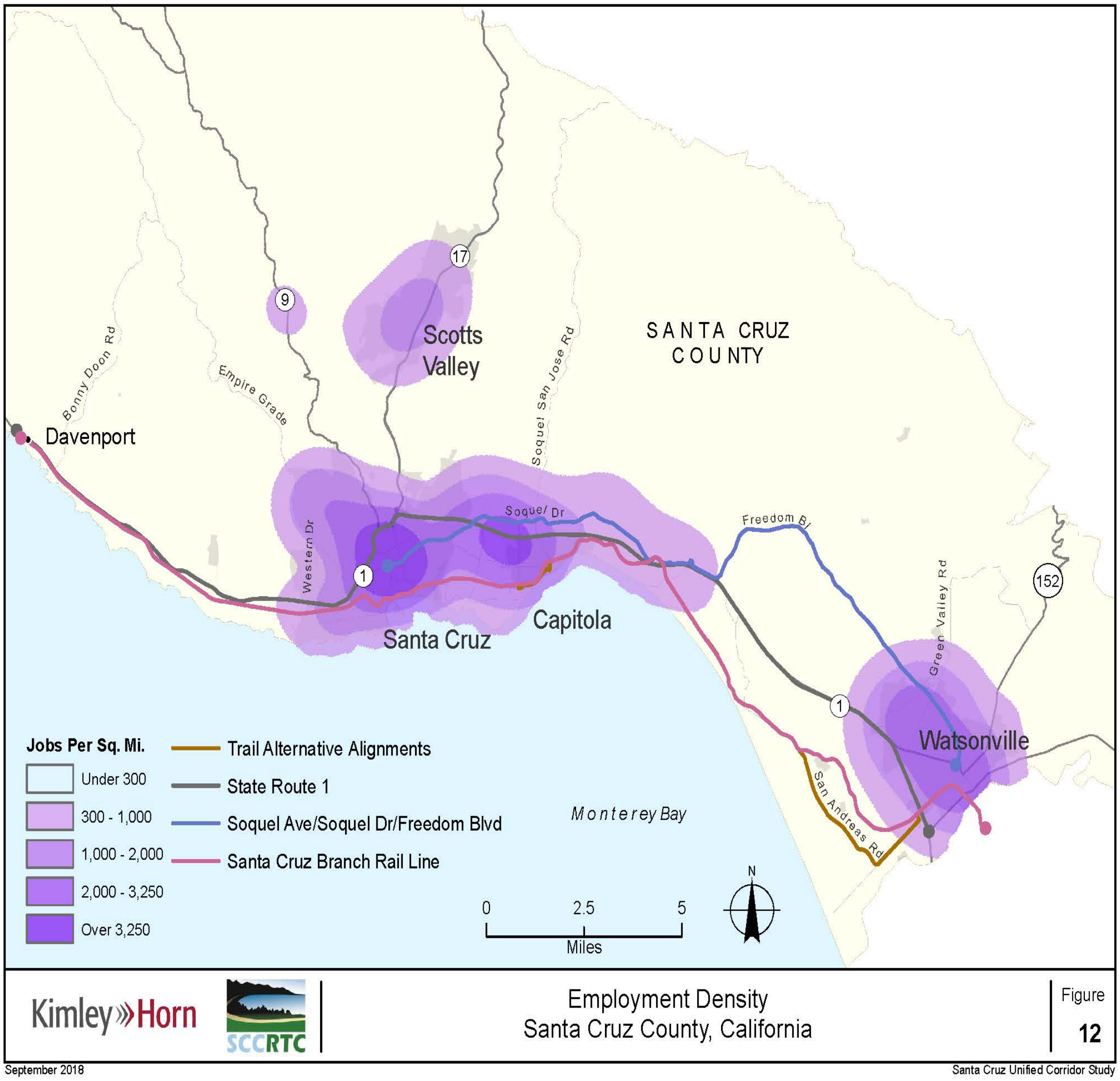


Figure 11: Educational Attainment, Bachelor's Degree or More



Employment location maps illustrate the current distribution of employment and business locations within the study area and their proximity to transportation routes. U.S. Census Longitudinal Employer Household Dynamics (LEHD) data from 2016 is used to generate the map of current job locations in Santa Cruz County (**Figure 12**).

Figure 12: Total Employment Density



Real estate market data provides an understanding of relative market strength and concentrations of different uses in communities along the corridors. This understanding provides a framework for assessing potential impacts on property values and/or rents on a relative basis and clarifies the relative desirability of different locations along the corridors. **Table 21** describes commercial and industrial rental rates, inventory, and vacancy rates, while **Tables 22** and **23** describe residential rental rates and sales prices.

Table 21: Commercial and Industrial Asking Rents per Square Foot, Inventory, and Vacancy Rates, Third Quarter of 2018

	Rent per Sq. Ft.	Inventory (Sq. Ft.)	% Vacant
Office			
Aptos	$2.21	315,140	4.30%
Capitola	$1.58	427,706	1.00%
Davenport	No Data	No Data	No Data
Santa Cruz	$1.53	3,199,408	3.40%
Soquel	$2.32	285,238	2.70%
Watsonville	$1.30	1,521,759	2.80%
Retail			
Aptos	$2.80	522,179	9.40%
Capitola	$3.41	1,643,514	0.20%
Davenport	No Data	No Data	No Data
Santa Cruz	$2.02	4,079,131	1.30%
Soquel	$1.81	535,114	1.30%
Watsonville	$1.66	2,929,504	1.80%
Industrial			
Aptos	No Data	47,139	No Data
Capitola	No Data	28,336	No Data
Davenport	No Data	22,127	No Data
Santa Cruz	$1.22	2,919,663	0.80%
Soquel	$1.64	260,611	2.20%
Watsonville	$0.66	5,066,243	1.00%

Source: CoStar, 2018; Strategic Economics, 2018.

Table 22: Apartment Monthly Asking Rents, Third Quarter of 2018

City/Community	Asking Rent Per Housing Unit	Asking Rent Per Sq. Ft.
Aptos	$1,122	$1.22
Capitola	$2,103	$2.90
Davenport	No Data	No Data
Santa Cruz	$2,157	$3.11
Soquel	$753	$1.54
Watsonville	$1,480	$1.74

Source: CoStar, 2018; Strategic Economics, 2018.

Table 23: Average Residential Sales Prices, August 2017 to July 2018 Period

City/Community	Single-Family Homes		Condominiums	
	Average Sale Price	Average Price per Square Foot	Average Sale Price	Average Price per Square Foot
Aptos	$1,122,601	$559	$674,300	$562
Capitola	$1,212,377	$772	$565,819	$582
Davenport	$1,000,000	$667	No Data	No Data
Santa Cruz	$1,072,261	$638	$525,542	$514
Soquel	$1,077,256	$528	$521,700	$464
Watsonville	$491,024	$330	$365,175	$349

Source: Redfin, August 2017 through July 2018; Strategic Economics, 2018.

Housing, commercial, and industrial development data is collected from discussions with the local jurisdictions in order to illustrate locations attracting investment activity. The maps below show recently built, under construction, and planned major developments **(Figures 13** and **14)**. The maps provide an approximate indication of areas that are currently desirable for development.

Figure 13: Hotel and Development Projects (Santa Cruz)

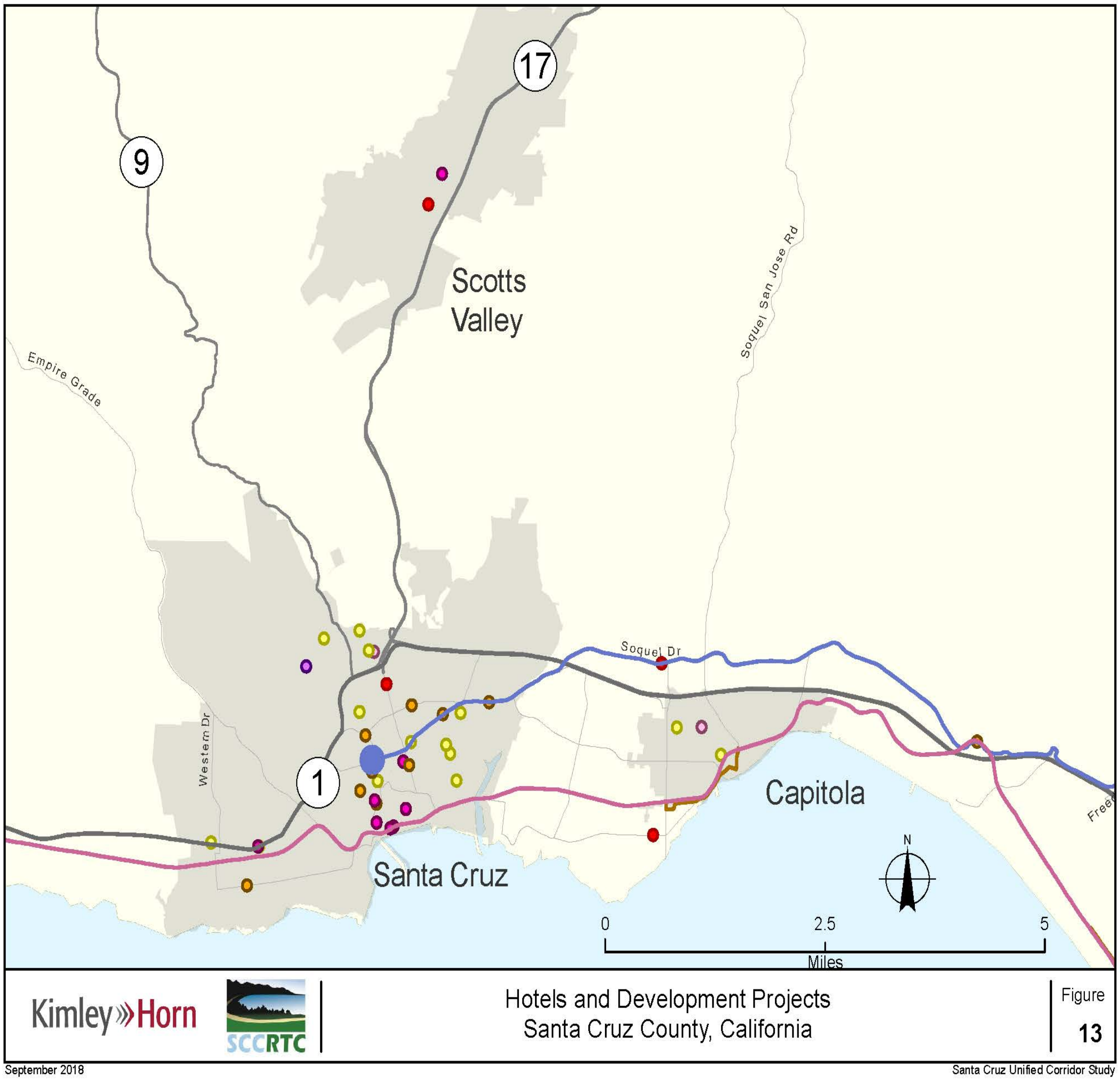
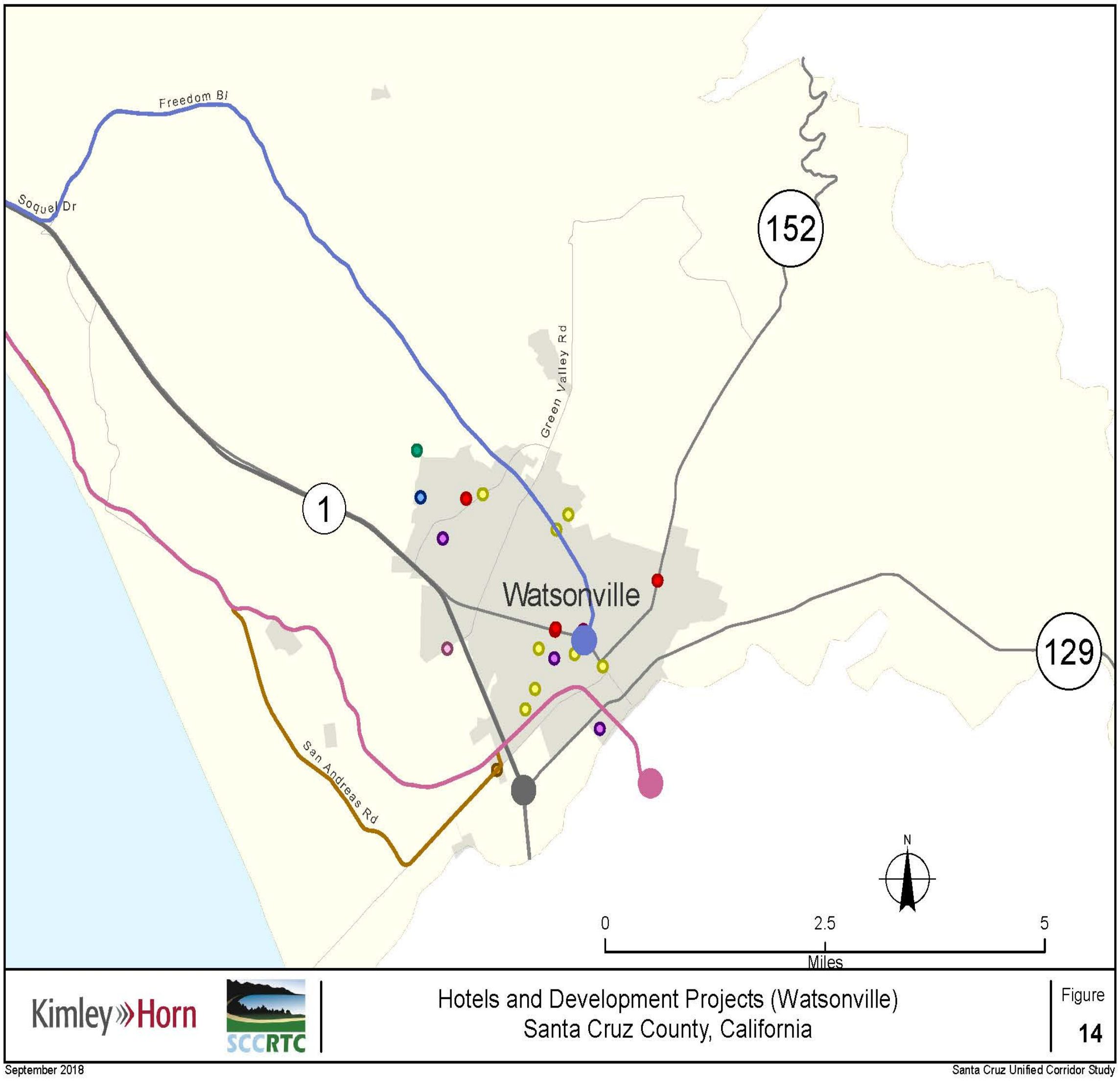


Figure 14: Hotel and Development Projects (Watsonville)



Taxable sales data for Capitola, Santa Cruz, and Watsonville is obtained from the California State Board of Equalization, as shown in **Table 24**, in order to create a basis for providing information about the relative potential impacts of scenarios on changes in business performance.

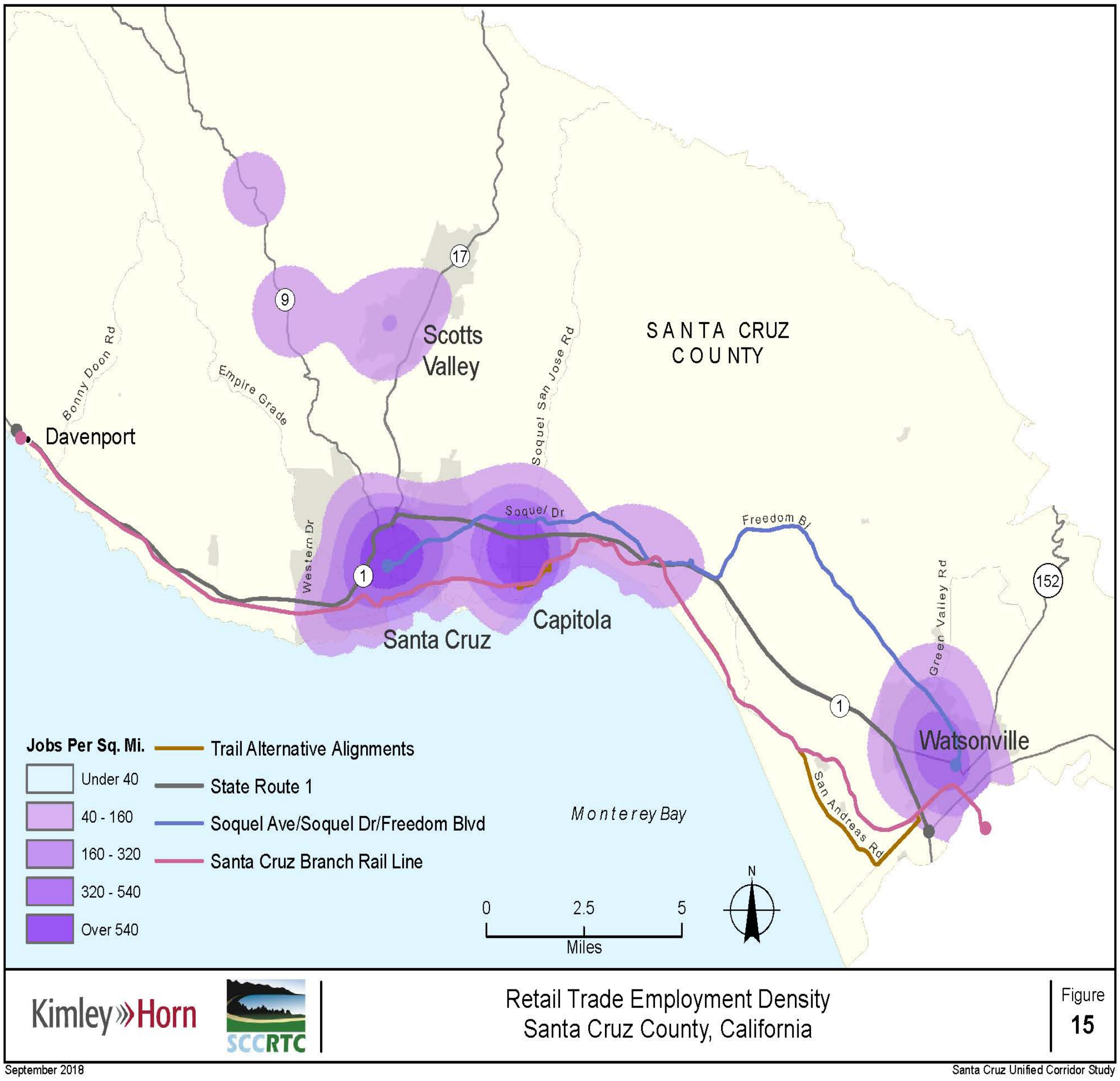
Table 24: Taxable Sales by Local Jurisdictions, 2016

Category	City of Capitola	City of Santa Cruz	City of Watsonville	Unincorporated Santa Cruz County
Motor Vehicle and Parts Dealers	$93,867,535	$86,655,663	$116,654,166	$58,758,017
Home Furnishings and Appliance Stores	$32,322,942	$21,239,359	$10,397,315	$47,157,748
Building Material and Garden Equipment	$14,959,521	$44,047,749	$64,509,782	$178,329,309
Food and Beverage Stores	$38,271,776	$82,738,290	$47,426,403	$83,439,711
Gasoline Stations	$22,030,330	$49,888,509	$57,864,531	$100,115,737
Clothing and Clothing Accessories Stores	$46,368,443	$53,464,953	$21,799,628	$28,125,261
General Merchandise Stores	$66,001,696	$79,904,673	$53,486,380	$3,513,326
Food Services and Drinking Places	$67,162,327	$222,698,081	$84,495,717	$111,004,372
Other Retail Group	$51,293,975	$121,843,066	$44,283,518	$112,806,049
Total Retail and Food Services	**$432,278,545**	**$762,480,343**	**$500,917,440**	**$723,249,530**
All Other Outlets	$59,147,334	$159,745,915	$135,987,447	$208,964,742
Total All Outlets	**$491,425,879**	**$922,226,258**	**$636,904,887**	**$932,214,272**

Source: California State Board of Equalization, 2016; Strategic Economics, 2018.

While the taxable sales data by city provides a baseline understanding of which communities generate the greatest taxable sales, by category of establishment, it does not provide a spatial understanding of retail and restaurant locations along the study area. Instead, **Figure 15**, created with U.S. Census LEHD data from 2016, shows the locations of retail employment in the study area; the distribution of food services employment is found to be similar.

Figure 15: Retail Trade Employment Density



Accessibility improvements can also allow households to more easily access jobs, services, and education, thereby reducing transportation costs. Household transportation costs are considered in the UCS Step 2 analysis under the goal of, “Accessible and equitable transportation system that is responsive to the needs of all users”. Transportation projects can also generate short-term economic impacts from construction spending on new infrastructure; however, the UCS Step 2 analysis evaluates only the economic impacts that are expected to be longer-term and ongoing.

Costs Associated with Fatalities and Injuries

The societal costs associated with motor vehicle collisions are borne not only by the individuals and families involved but by the entire community. The tangible economic costs due to collisions can include lost productivity, medical costs, legal and court costs, emergency service costs, insurance administration costs, congestion costs, property damage and workplace losses. Intangible costs due to lost quality of life from injuries and death are more difficult to evaluate but are critical in quantifying the harmful impacts of motor vehicle collisions. These intangible costs have been defined as Value of a Statistical Life (VSL). Caltrans Transportation Economics Branch utilizes a VSL cost of collisions based on severity levels that are developed by the U.S. Department of Transportation. The National Highway Traffic Safety Administration has quantified the tangible economic costs of motor vehicle collisions by severity. Both the VSL costs and the economic costs are considered when evaluating the costs associated with collisions for the Unified Corridor Study (Table 25). These costs will be combined with the collision data from 2011-2015 SWITRS and TIMS database as described above in the “Safety – Injury and Fatal Collisions by Mode” performance measure to assess the baseline costs for both countywide and study area collisions.

Table 25: Cost of Collisions

Collision Type	Economic Costs**	VSL Costs*	Total
Fatal Collision	$1,700,000	$10,800,000	$12,500,000
Injury Collision	$41,300	$148,800	$190,100
PDO Collision	$5,700	$9,700	$15,400
All Type Average	$38,100	$185,600	$223,700

*Value of a Statistical Life (Lost quality of life)

**Tangible costs such as medical costs, emergency services, productivity loss, congestion, property damage, insurance.

The annual cost of countywide collisions per year is graphed in **Figure 16**. The cost of collisions has increased over the last few years primarily due to an increase in the number of fatalities countywide. Over the five-year analysis period, the total cost of collisions in Santa Cruz County represents approximately $2.2 billion in societal costs, an annual average of $434 million countywide.

The annual average cost of collisions in the study area are provided in **Table 26** based on 2011- 2015 collision data compiled for the safety performance measure discussed above. Study area collision data includes collisions on Highway 1, Soquel Avenue and Drive, Freedom Blvd and roadways parallel to the Santa Cruz Branch Rail Line.

These values indicate that the average annual cost of collisions occurring in the study area is over $126M each year (**Table 26**). While fatalities only represent 0.4% of collisions in the study corridors, they account for over 39.2% of the associated costs. The cost of collisions involving bicycles and pedestrians accounts for 7.2% of the total costs in the study area. **Figure 17** maps the relative cost of collisions by location within the study area. Locations with darker coloring show areas that have had either a higher number and/or greater severity of collisions. **Figure 17** shows the geographical distribution of these 5-year costs.

Figure 16: Annual cost of Collisions in Santa Cruz County (2016 dollars)

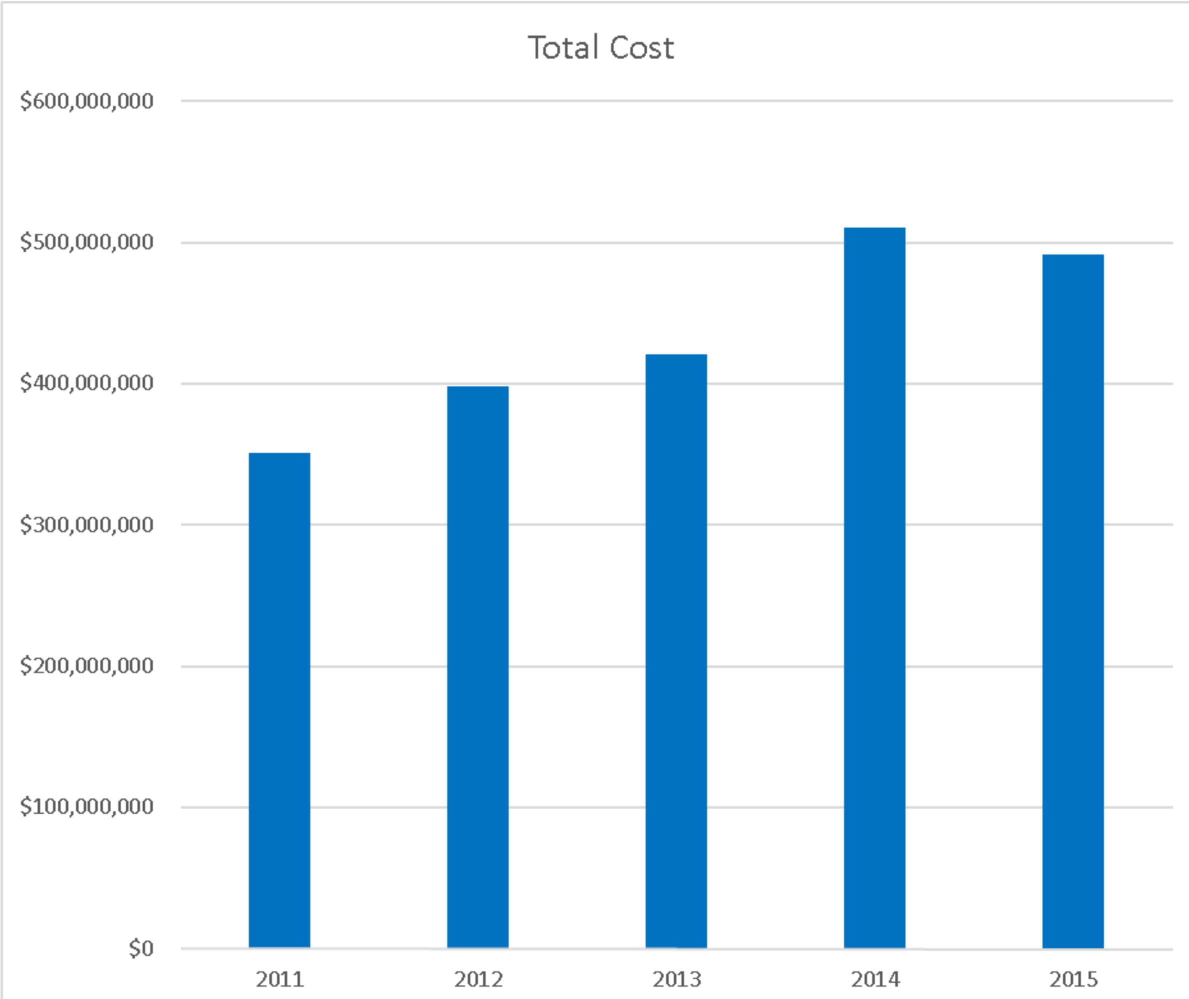
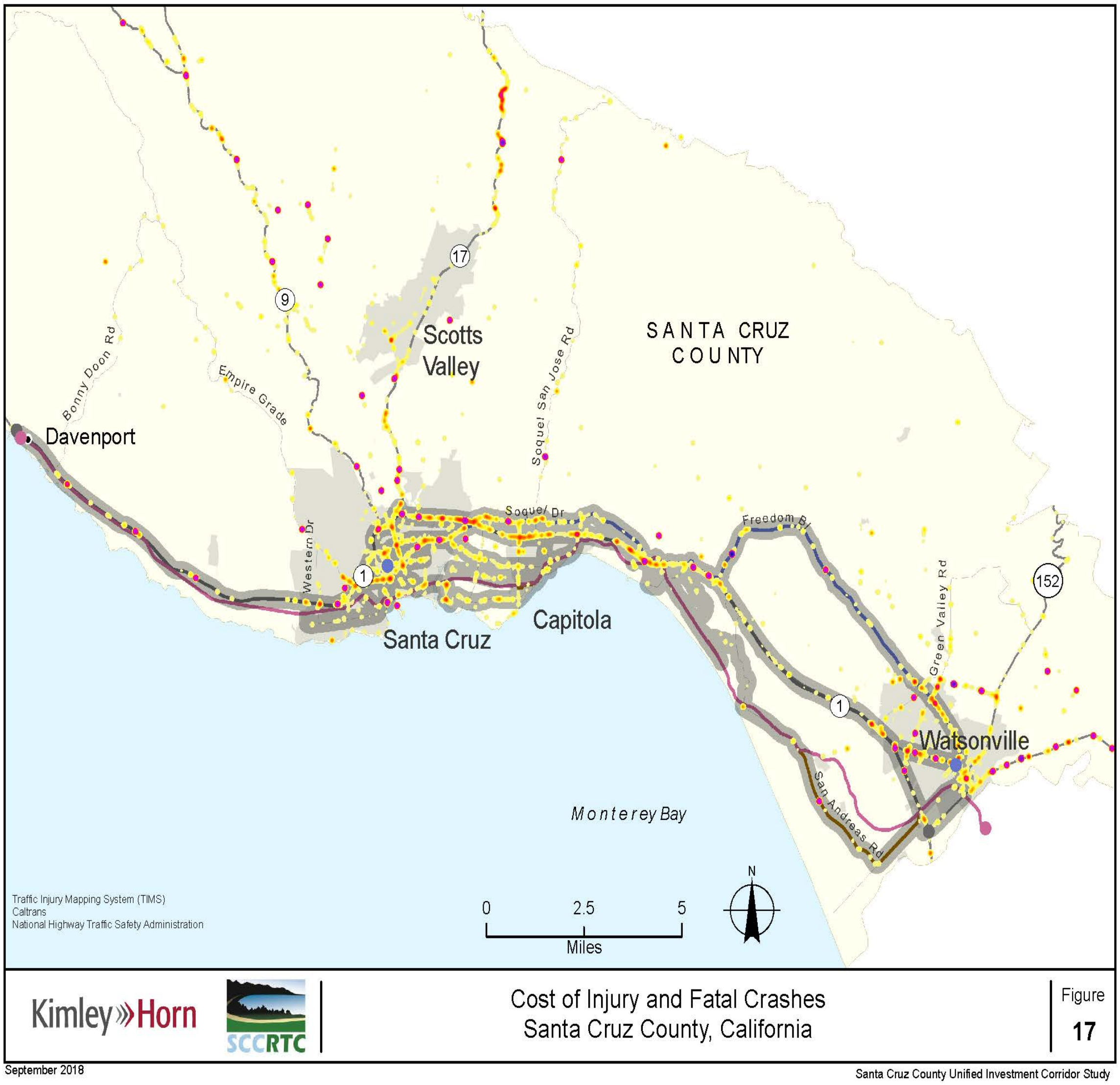


Figure 17: Location of Study Area Collisions by Relative Cost



The collisions represented in **Figure 17** include estimated property damage only collisions based on the countywide proportion of property damage only collisions relative to severe injury or fatal collisions for vehicles collisions, bicycle collisions and pedestrian collisions as shown in **Table 26**.

Table 26: Project Study Area Baseline Annual Average (2011-2015) Collision Types and Costs

	Motor Vehicle	Bicycle	Pedestrian	Cost per Collision	Total Cost
Fatal	2.2	0.4	0.8	$12,500,000	$42,500,000
Injury	312.8	60.4	25	$190,100	$75,697,820
PDO	709			$15,400	$10,916,026
				Baseline Cost of Collisions	**$129,113,846**

*PDO to Fatal Injury Ratio is 1.77

The 2011-2015 annual average vehicle, bicycle, and pedestrian collision costs will be used as the baseline performance measure for comparison in the scenario analysis.

Environment & Health

Located on the California Coast between the Monterey Bay National Marine Sanctuary and the Santa Cruz Mountains, Santa Cruz County's natural environment, climate and clean air are a draw for residents and visitors. Transportation projects can have beneficial or harmful effects on the environment and health through alterations to environmentally sensitive areas or changes in emissions. The goal of "Minimize environmental concerns and reduce adverse health impacts" will be measured by assessing the change in automobile vehicle miles traveled and associated criteria pollutants and greenhouse gas emissions for baseline conditions compared to 2035 forecasts. The effects of projects on environmentally sensitive areas will also be evaluated.

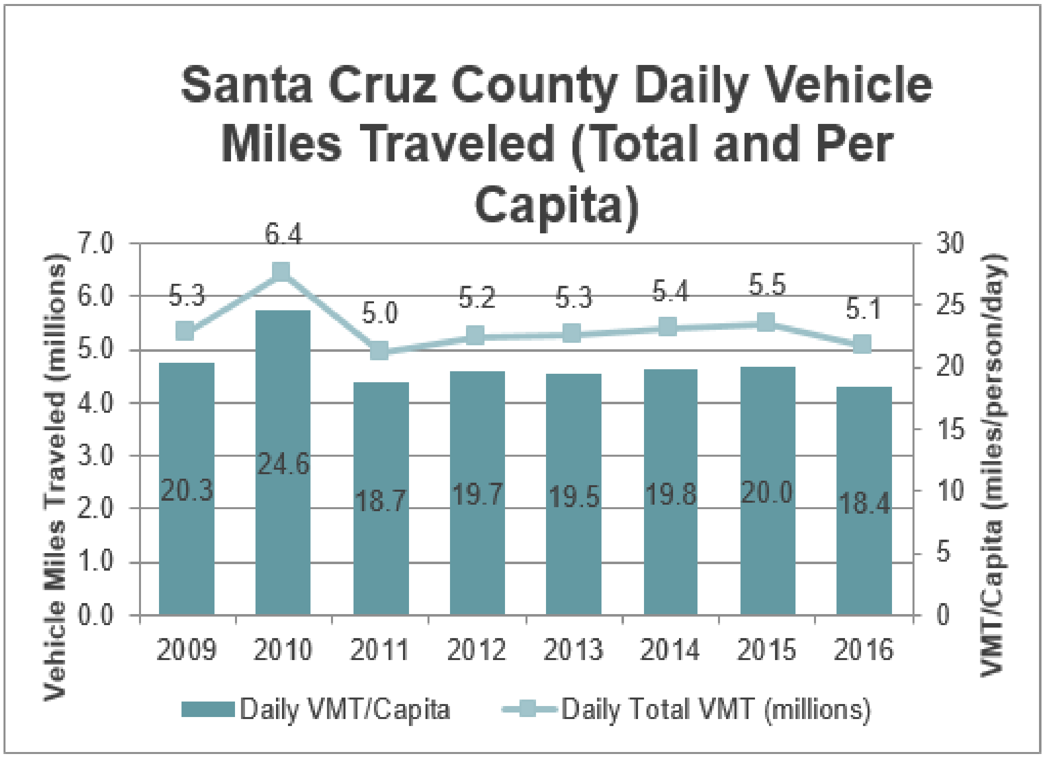
Automobile and Truck Vehicle Miles Traveled (VMT)

Vehicle emissions are the greatest contributor of greenhouse gas emissions in Santa Cruz County. A common measurement for how much travel is occurring in a region is the number of "vehicle miles traveled" (VMT). Vehicle miles traveled is the total number of miles traveled by vehicles in Santa Cruz County where one vehicle traveling one mile constitutes one "vehicle mile." The number of vehicle miles traveled is used in calculating greenhouse gas emissions (GHG) from transportation. For the baseline analysis, Santa Cruz County VMT is derived using VMT estimates developed as part of the Highway Performance Monitoring Program (HPMS) implemented by Caltrans. The baseline VMT presented here is a county-wide estimate of vehicle miles traveled within county borders for both autos and trucks. For a description of the HPMS program see the following websites: http://www.fhwa.dot.gov/policyinformation/hpms.cfm or http://www.dot.ca.gov/hq/tsip/hpms.

The HPMS program estimates VMT by multiplying daily traffic counts by centerline miles of roadway using a sampling of roadways stratified by functional classification. The average daily total VMT for Santa Cruz County has been fairly consistent from year to year with the exception of 2010 data. The 2010 VMT likely represents an error in the counts used to determine the VMT. The VMT per capita is also presented in Figure 18 which is determined by dividing the daily VMT by population estimates from U.S. Census

Bureau and the California Department of Finance. The published[6] 2009 to 2016 HPMS estimates for Santa Cruz County are provided in **Figure 18**.

Figure 18: 2009-2016 VMT for Santa Cruz County



The baseline VMT that will be used for comparison to future scenarios is the 2015 value of 5,477,870 miles/day. The baseline VMT per capita for 2015 is 20.0 miles/person/day.

Environmentally Sensitive Areas

Santa Cruz County is home to diverse habitats, geological features, and land uses. Environmentally sensitive areas in Santa Cruz County are discussed or mapped to provide information about their presence within the study area and serve as a baseline for the environmental analysis. The data provided is based on the most recent data available, which varies between 2009 and 2017 depending on the source of information. Before projects are implemented, projects will undergo a separate environmental review process, conducted by the agency sponsor, as required by the California Environmental Quality Act. Environmental review for the Highway 1 Improvement Project, the Monterey Bay Scenic Sanctuary Trail Master Plan (MBSST), and the North Coast Rail Trail are either completed or underway. Refer to the respective environmental impacts reports for a project level environmental review.

The following section describes the baseline information for the following environmentally sensitive areas:

- Wetlands and streams

[6] Source: 2015 publications of: HPMS California Public Road Data, Transportation System Information, California Department of Transportation

- Natural Habitat
- Agriculture/farmland
- Hazardous materials
- Topography
- Liquefaction potential
- Flood plains and sea level rise

WETLANDS AND STREAMS

Figure 19 depicts the wetlands within the study area, as identified by the US Fish and Wildlife Service's National Wetlands Inventory[7]. The streams were identified using the Streams Spatial Dataset provided by Santa Cruz County[8]. As described on the County website, the streams were mapped from several sources including ortho-imagery and 2010 LiDAR data.

It should be noted that this data provides an overview of areas with identified wetlands and streams. More detailed information on wetlands and streams may be found in environmental studies that have been completed for individual projects. Jurisdiction delineations of wetlands and waters were conducted for several segments along Highway 1 within the UCS project study area, as included in **APPENDIX D** of the Natural Environment Study completed for the Santa Cruz Route 1 High Occupancy Vehicle (HOV) Lane project[9]. The wetlands assessment for the Highway 1 Improvement Project identified wetlands along Highway 1 which are not included in **Figure 19**. Please refer to Natural Environmental Study for more detailed mapping of the wetland boundaries.

Similarly, the Monterey Bay Sanctuary Scenic Trail Network Master Plan Environmental Impact Report (MBSST EIR) identified major watersheds and wetlands in Santa Cruz County, including intermittent and perennial drainages and swales[10]. Those within the project study area include, Davenport, San Vicente Creek, Liddell Creek, Laguna Creek, Majors Creek, Baldwin Wilder, San Lorenzo River, Arana Gulch-Rodeo, Soquel Creek, Aptos Creek, Pajaro River, Watsonville Slough, and San Andreas watersheds. Please refer to the biology section of the MBSST EIR for more detail on the creeks and drainages included in each of these watersheds.

As individual projects move the environmental review process, detailed environmental analysis and survey of onsite wetlands and streams may be necessary.

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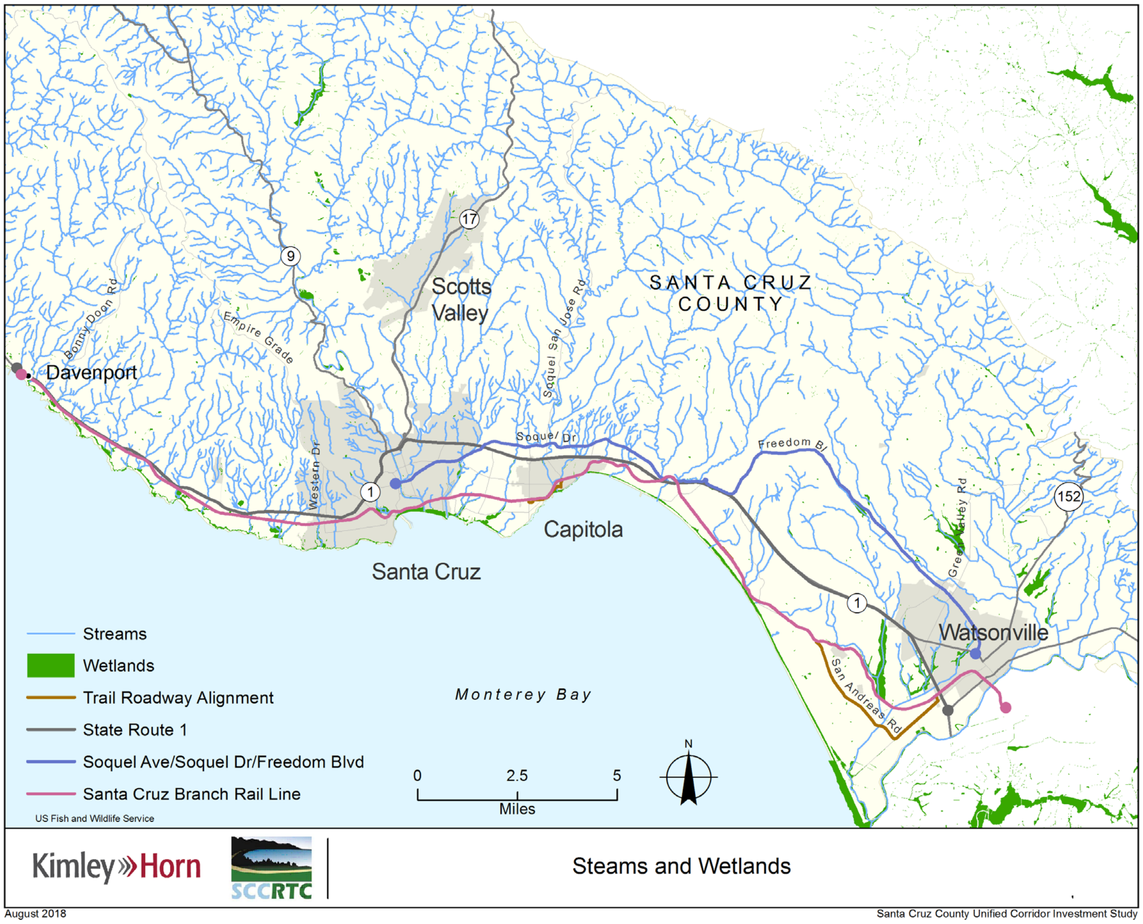
[7] US Fish and Wildlife Service. National Wetlands Inventory. January 2018.
[8] County of Santa Cruz. Streams Spatial Dataset. October 2017.
[9] SWCA Environmental Consultants. Natural Environment Study, Appendix D: Wetland Assessment for the Highway HOV Lane Project, Santa Cruz County, California. July 2010.
[10] Santa Cruz County Regional Transportation Commission, Monterey Bay Sanctuary Scenic Trail Network Master Plan FEIR, November 2013.

Figure 19: Study Area Wetlands and Streams



NATURAL HABITAT

The California Essential Habitat Connectivity Project, commissioned by the California Department of Fish and Wildlife and the California Department of Transportation (Caltrans) identified large blocks of intact habitat (Natural Landscape Blocks) and the important ecological connections between them (Essential Connectivity Areas). This information is included in the GIS dataset created by Caltrans and UC Davis in 2014 and provided by RTC[11]. As shown in **Figure 20,** there are some locations within the study area that play an important role in supporting native biodiversity.

Figure 21 depicts “Critical Habitat Areas” in Santa Cruz County, a US Fish and Wildlife designation referring to "a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection."[12] This data is based on the current US Fish and Wildlife Threatened and Endangered Species Active Critical Habitat Report.[13]

The Highway 1 EIR and the MBSST EIR also document special status species observed near the Highway 1 and MBSST Project Areas. Please refer to the Highway 1 EIR and MBSST EIR for project level information about special status species that are known to occur.

As projects move forward, additional special status species and habitat surveys may be necessary. Note that there could be discrepancies between the UCS critical habitat maps and project specific maps, due to the criteria evaluated and age of information.

[11] Caltrans and UC Davis. GIS Dataset for Various Biological and Agricultural Resources. 2014.
[12] U.S. Fish and Wildlife Service. Critical Habitat. November 2017.
[13] US Fish and Wildlife Service. Threatened and Endangered Species Critical Habitat Report. Updated September 2017.

Figure 20: Habitat Corridors

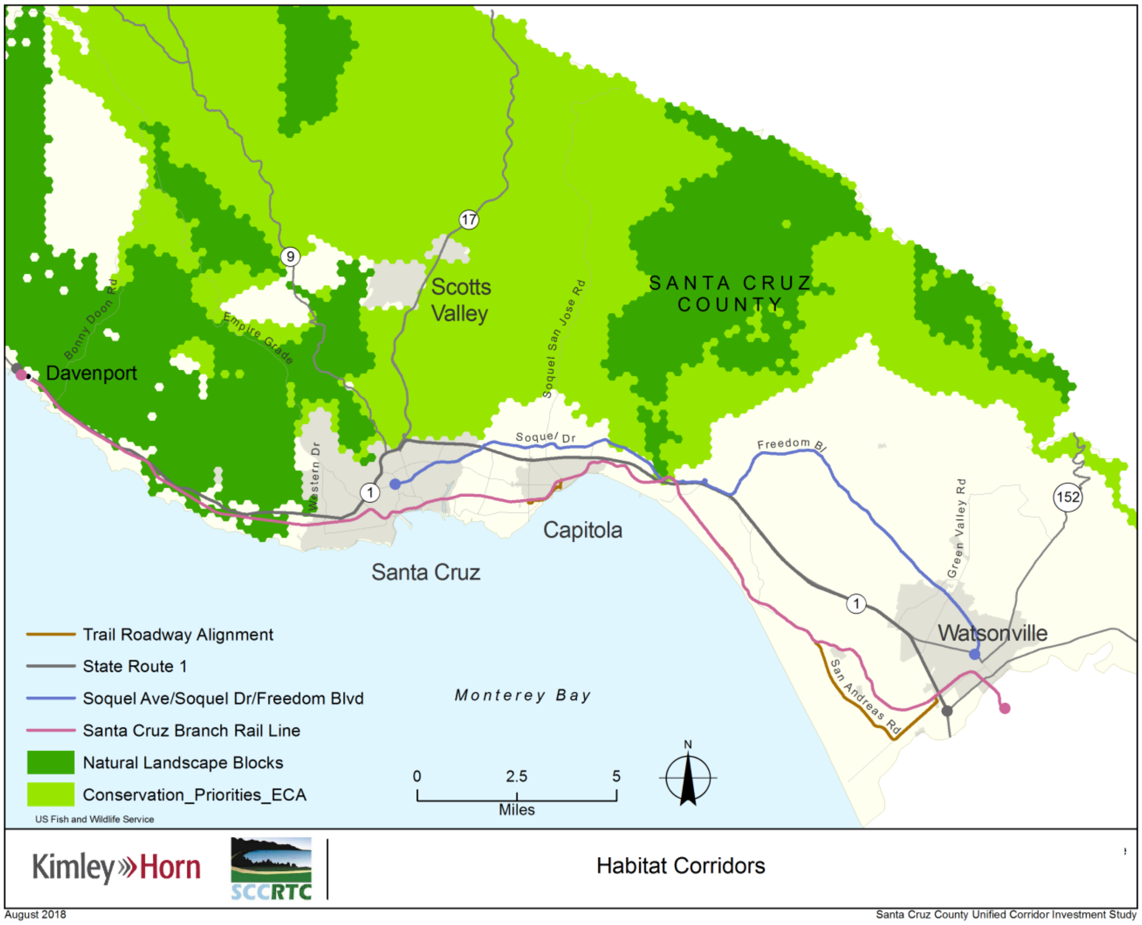
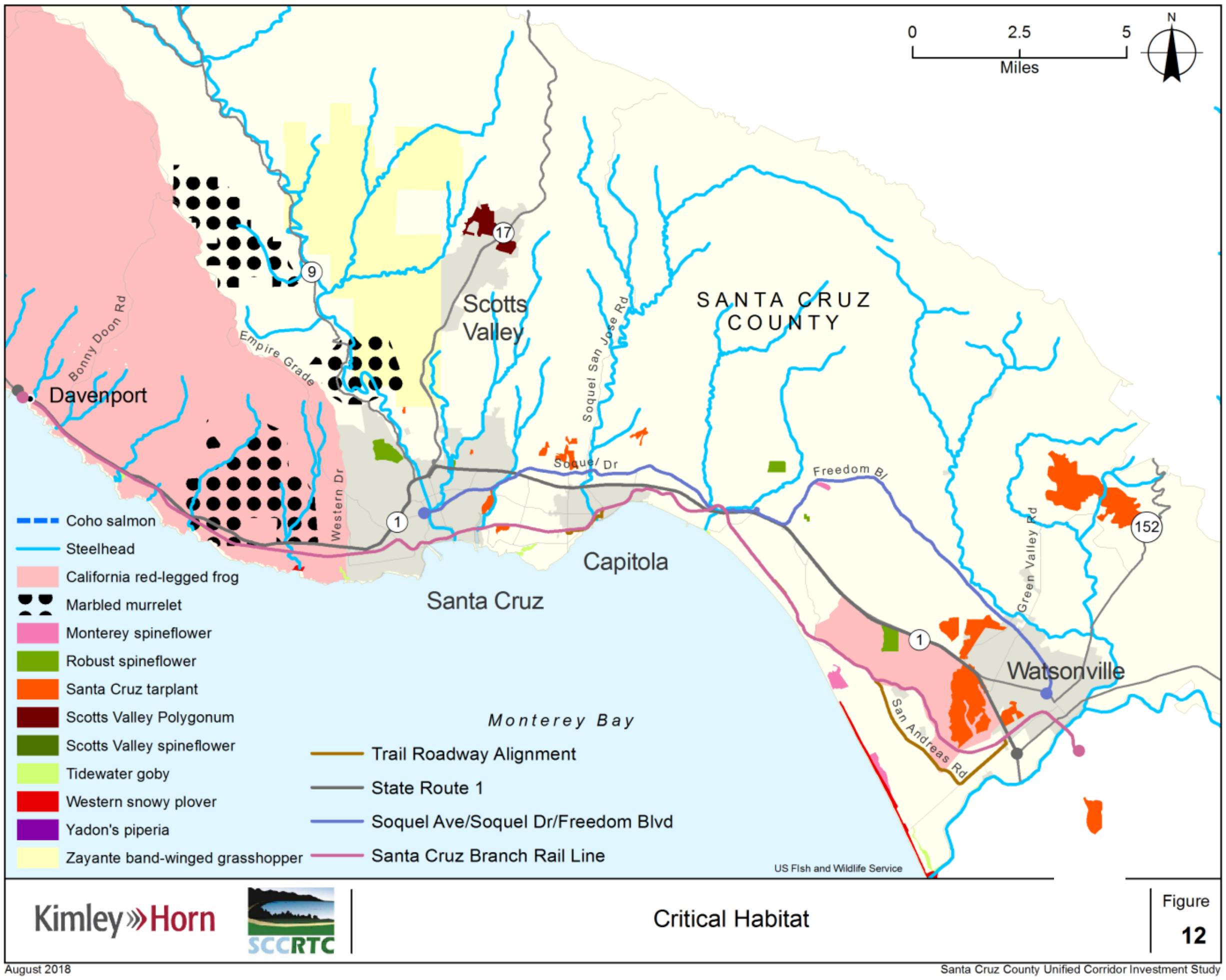


Figure 21: Critical Habitat Areas



AGRICULTURE/FARMLAND

As part of the Farmland Mapping and Monitoring Program, the California Department of Conservation provides information about important agricultural areas, rating land based on the soil quality and irrigation status[14]. **Figure 22** shows the agricultural areas within Santa Cruz County that have been designated as prime farmland, farmland with statewide importance, and unique farmland.

As shown in **Figure 23**, segments of the project run adjacent to agricultural land with Williamson Act contracts.[15] Williamson Act contracts are agreements between local governments and private landowner to keep the land in agricultural or similar open space use.

The MBSST FEIR also provides information on the agricultural areas within the project area, including Williamson Act Land. As projects move forward, additional survey of agricultural land may be necessary. The UCS regional agriculture/farmland maps rely on a data source that is different from the other project maps.

[14] California Department of Conservation. Farmland Mapping and Monitoring Programs. 2014
[15] California Department of Conservation. Williamson Act/Land Conservation Act. 2016.

Figure 22: Agriculture

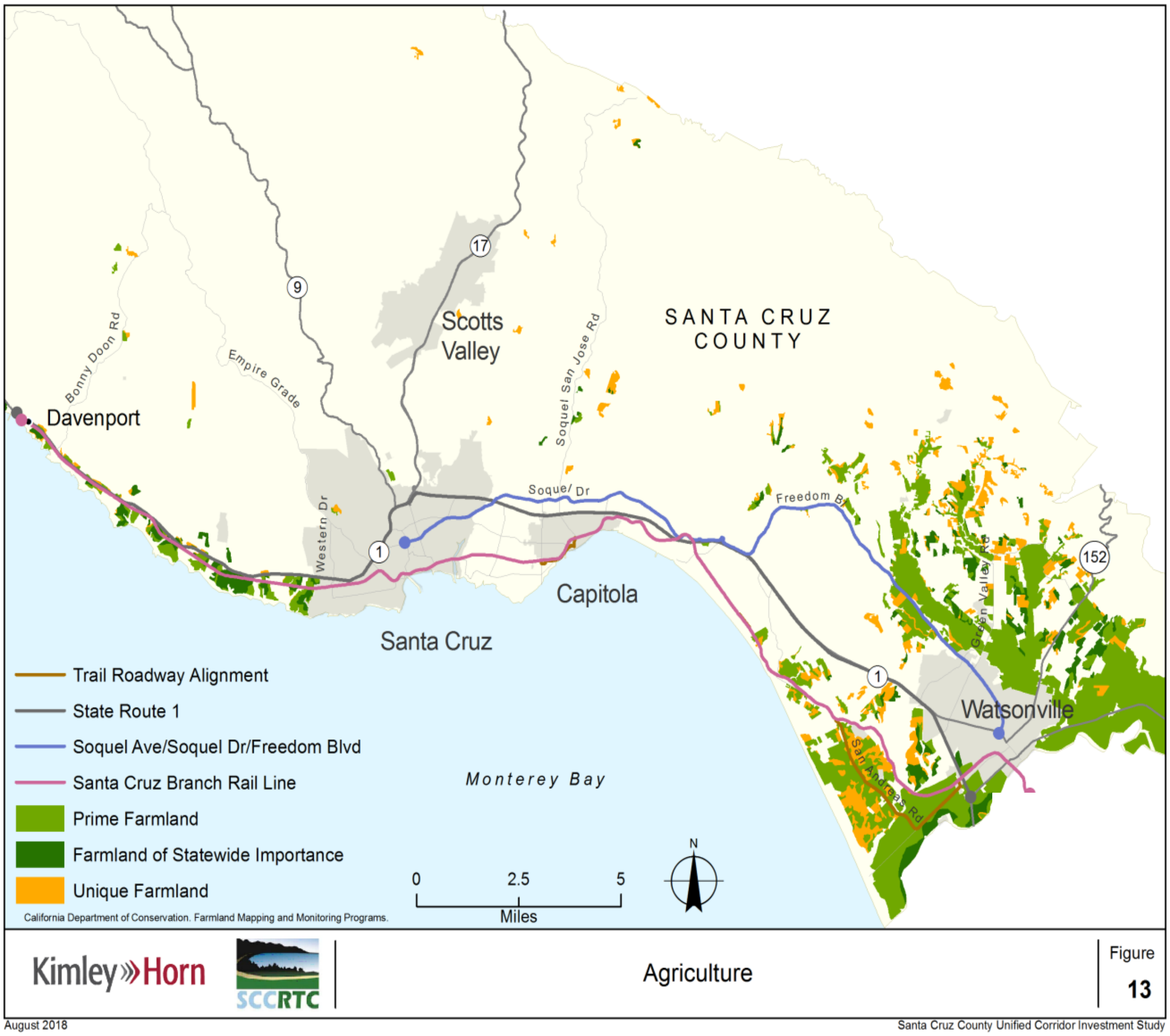
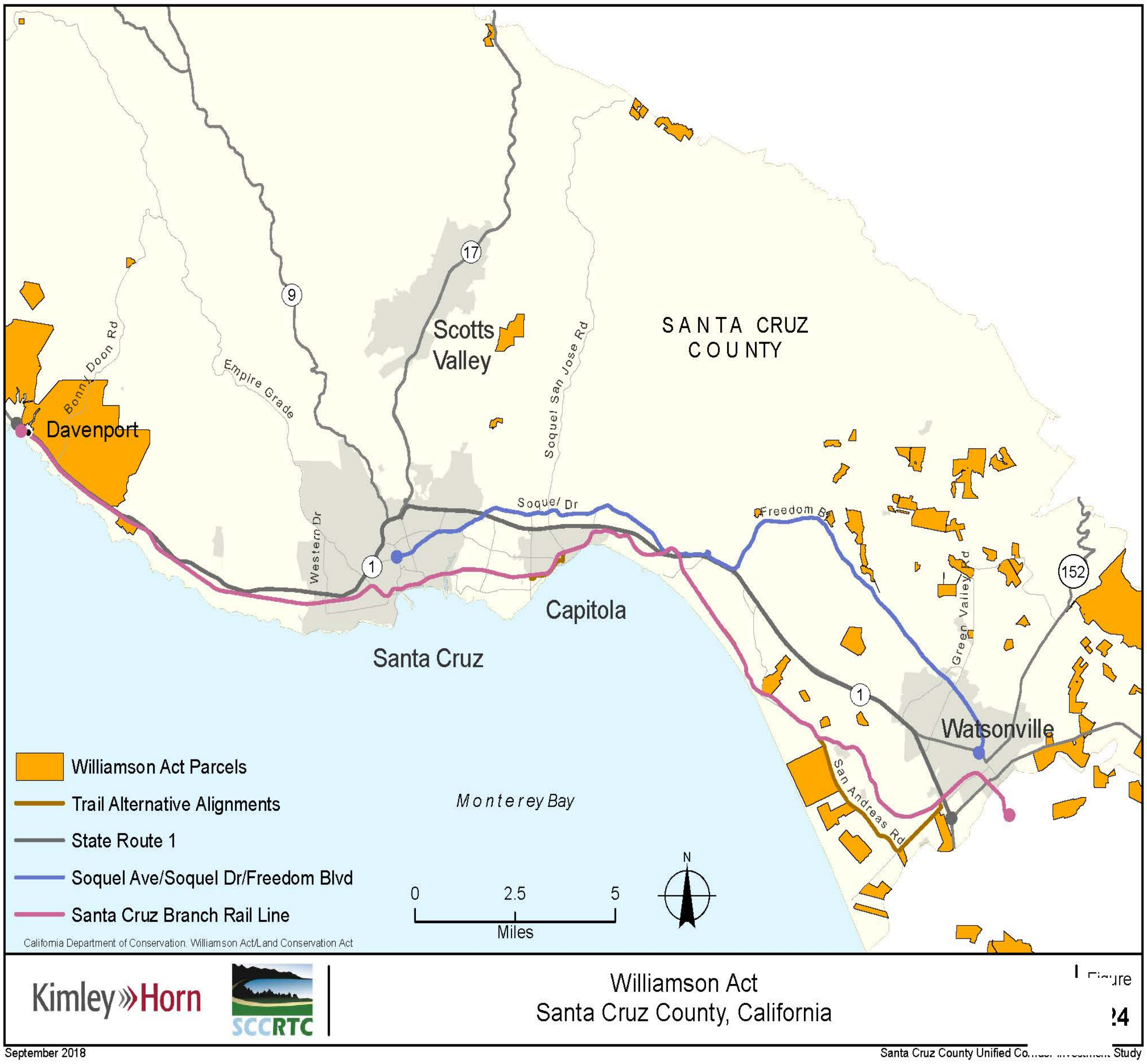


Figure 23: Williamson Act



HAZARDOUS MATERIALS

The environmental impact report (EIR) completed for Highway 1 improvements in 2015[16] and the due diligence report for the rail corridor provide some information on hazardous materials present along the corridor. Information on hazardous materials is not available for Soquel Avenue, Freedom Boulevard or the segments of Highway 1 not included in the Highway 1 EIR.

Highway 1

The following four general Recognized Environmental Conditions were identified for the Highway 1 TEIR I project limits:

1. "Wooden utility poles along the roadside may be coated with creosote.
2. Asbestos-containing materials are suspected to be present in joint compound materials within Route 1 bridges and railroad undercrossing structures.
3. Paint used on existing Route 1 interchange structures, bridges and railroad undercrossings, yellow traffic striping, and pavement marking materials may contain lead-based paint or other hazardous materials and may exceed hazardous criteria under California Code of Regulations Title 22.
4. Aerially deposited lead may be present along the shoulders and median of Route 1."

Recognized Environmental Conditions sites were also identified adjacent to the Tier II project limits as a result of discharged gasoline contaminating soil and groundwater.

1. Former Exxon 7-3604 facility (also listed as Pit Stop Service, Inc.), located at 836 Bay Avenue in Capitola;
2. Redtree Properties, located at 819 Bay Avenue in Capitola;
3. Unocal Station No. 6193, located at 1500 Soquel Drive in Santa Cruz; and
4. BP 11240 facility, located at 2178 41st Avenue in Capitola.

Rail Line

Following a review of potential features that could be associated with hazardous materials located in the rail corridor, targeted soil sampling is conducted along the rail line between 2005 and 2009. Targeted sampling identified elevated levels of arsenic present along the rail line that may be due to historic use of the rail corridor, including vegetation management. Additionally, analysis of the soil samples of the Granite Construction Company facility found petroleum hydrocarbon concentrations exceeding industrial environmental screening levels. The petroleum hydrocarbon impacts to soil extend at least 90 feet laterally along the drainage ditch, thereby impacting the adjacent rail line property. It should also be noted that chromium, lead and pesticides concentrations exceeding the hazardous screening criteria were found in some of the soil samples. As projects move forward, additional analysis to determine the presence of hazardous materials near project sites may be necessary.

Topography

The topography of Santa Cruz County is shown in **Figure 24**. Areas with steep slopes may be more susceptible to erosion and potentially hazardous conditions.

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[16] AMEC Geomatrix, Inc. Phase II Investigation and Human Health Risk Assessment for Arsenic. Santa Cruz Branch Line. Santa Cruz and Monterey Counties, California. December 2009

Liquefaction Potential

Figure 25 shows the liquefaction potential of the areas in Santa Cruz County, along with the nearby fault zones.[17,18] Liquefaction is a phenomenon that can occur in certain types of soils when subject to seismic shaking. The soil can become fluidized, lose its shear strength and be more susceptible to settlement during an earthquake.

[17] County of Santa Cruz. Liquefaction Areas Geospatial Dataset. October 2017.
[18] County of Santa Cruz. Fault Zone Geospatial Dataset. October 2017.

Figure 24: Topography

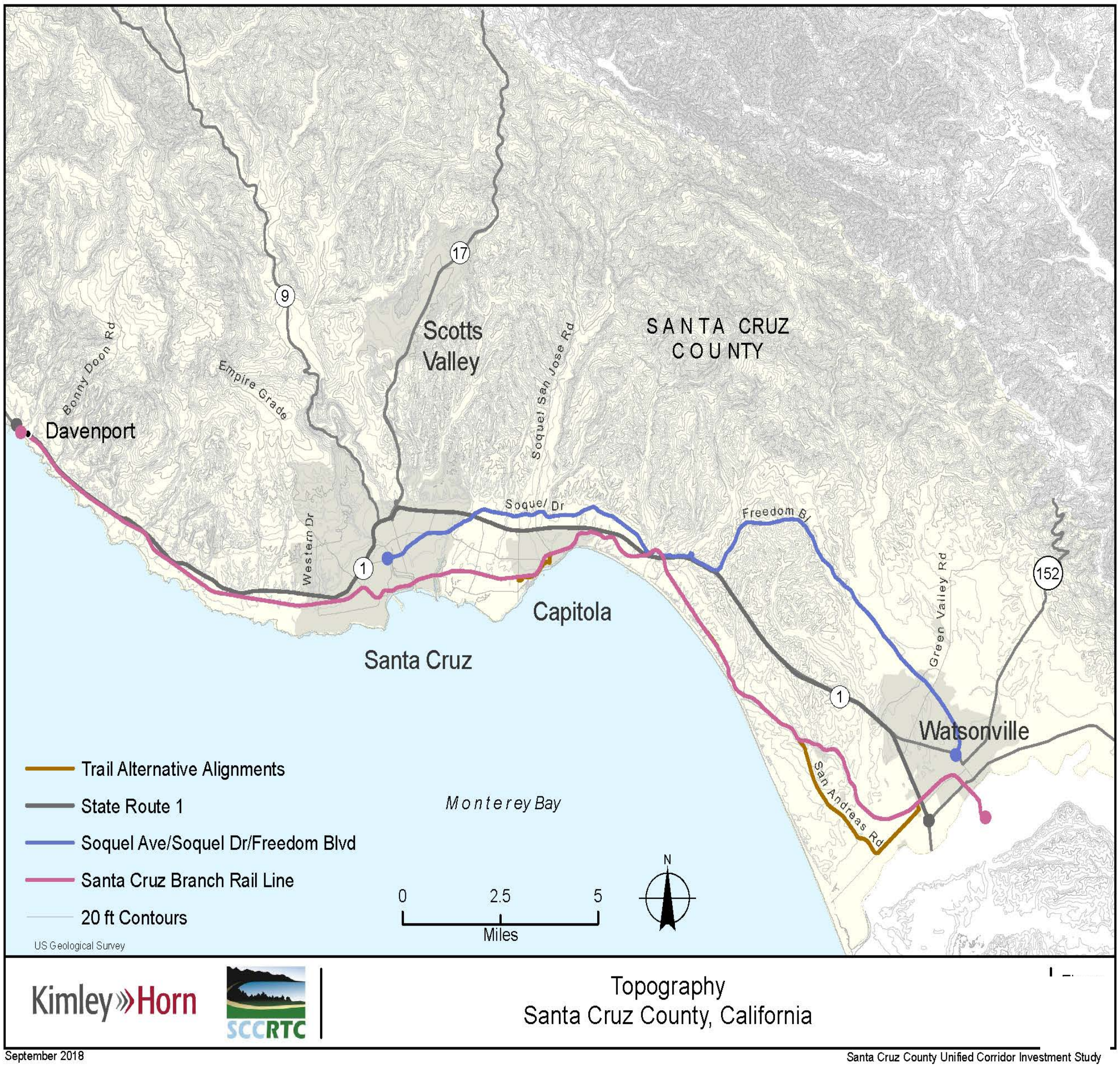
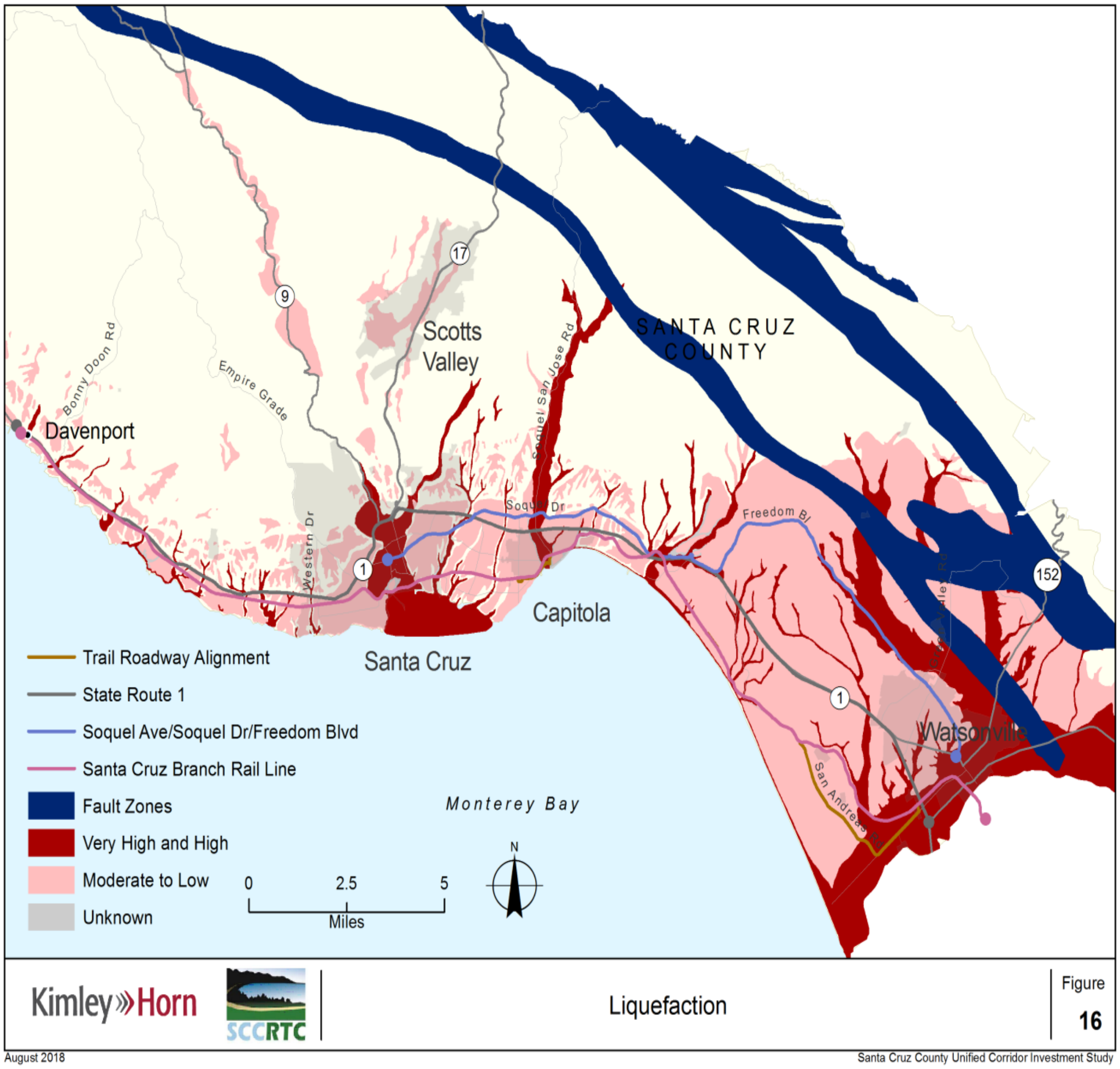


Figure 25: Liquefaction



Erosion, Flood Plains and Sea Level Rise

Federal Emergency Management Agency (FEMA) flood hazard maps are used for the National Flood Insurance Program and present coastal and fluvial flood hazards. Santa Cruz County flood maps for a 100-year coastal inundation flood are shown in **Figure 26**. These flood maps identify current flood zones as identified by FEMA but are assumed to under estimate coastal flood hazards for future years as sea levels continue to rise due to climate change.

Santa Cruz County's vulnerability to potential future impacts of sea level rise is assessed in a report by ESA consultants in 2014 for the Monterey Bay Sanctuary Foundation - The Monterey Bay Sea Level Rise Vulnerability Assessment – Technical Methods Report. This effort developed an online mapping tool that provides a set of maps that integrate the multiple coastal hazards predicted for the Monterey Bay coastline due to climate change. This mapping tool is available for viewing at http://maps.coastalresilience.org/california/.

Sea level rise hazards are mapped as areas that are likely to experience tidal inundation, cliff and dune erosion and 100-year coastal storm flooding (**Figure 26**). A year 2030 projection is used for this analysis assuming a "high" level of sea level rise of 8.8 inches by 2030 relative to 2010. Coastal storm flooding mapped here considers wave run up, overtopping, and berm crest but does not consider precipitation events. Flooding due to precipitation events is mapped in **Figure 27** for existing sea level.

Figure 26: Coastal Flooding

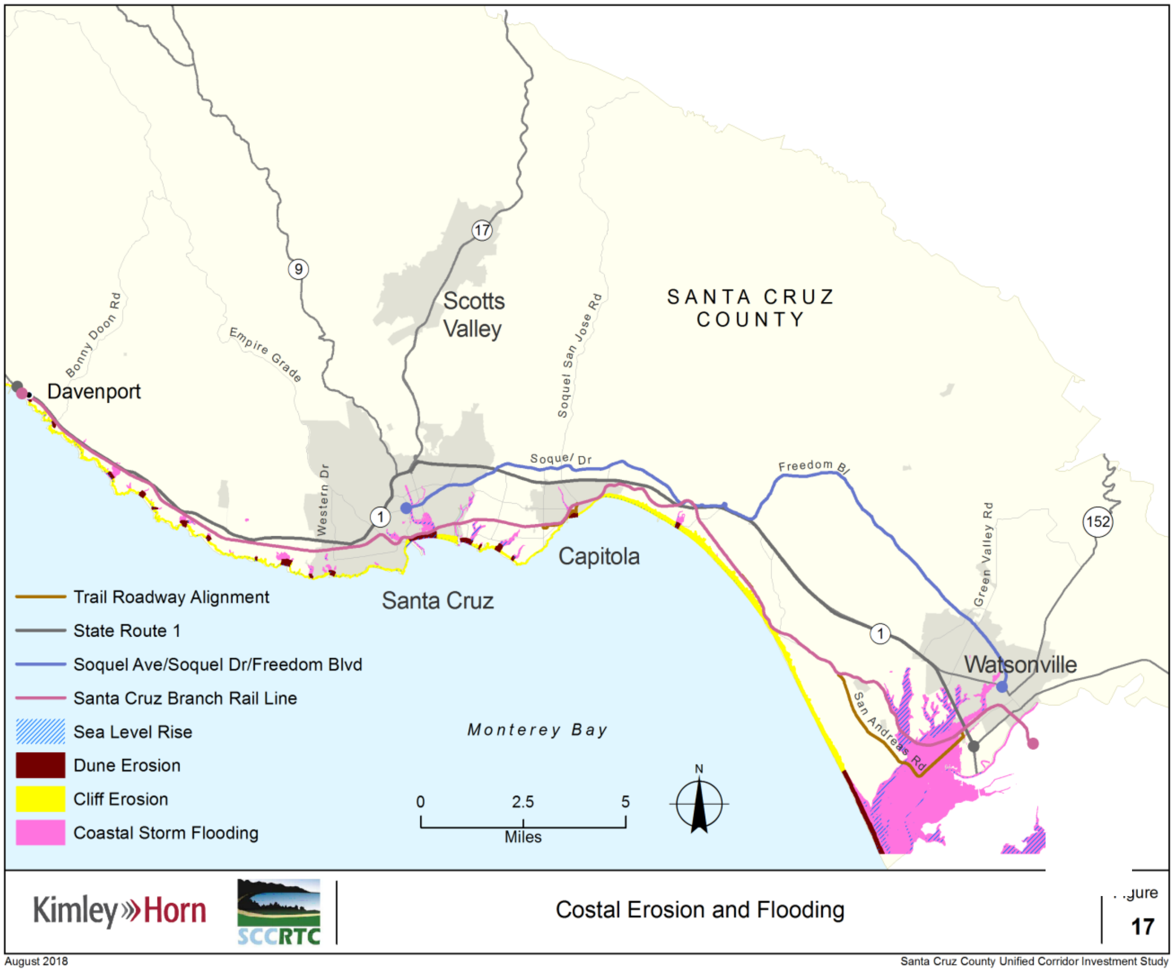
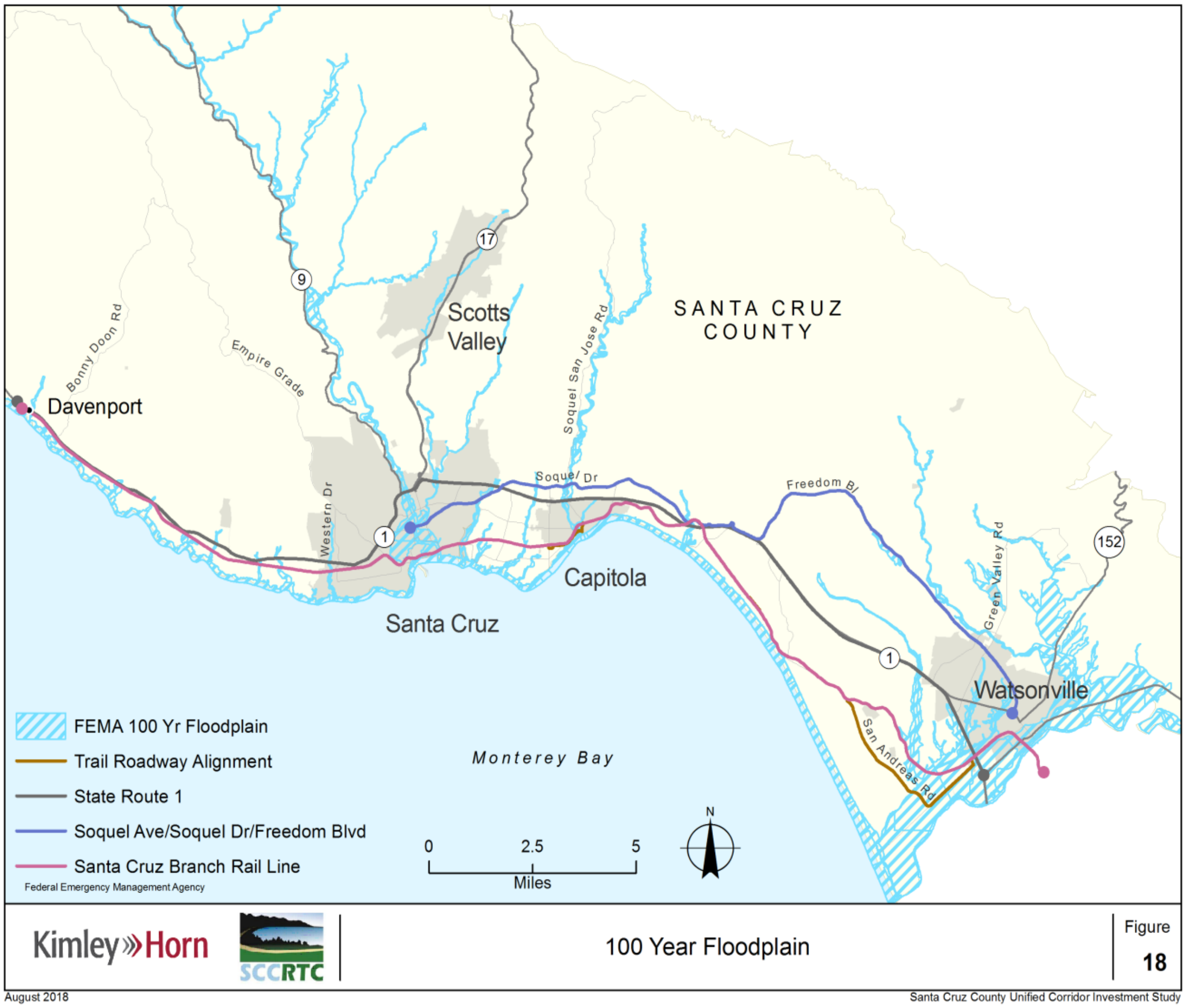


Figure 27: 100 Year Floodplain



Greenhouse Gas and Criteria Pollutants

Greenhouse gas emissions have global environmental effects and air pollutants can affect both the environmental and public health. Greenhouse gas (GHG) and criteria pollutants emitted from on-road mobile sources in 2015 were quantified at the county level using the California Air Resource Board (CARB) Emissions Factor Model 2014 version 1.0.7 (EMFAC.) This model uses data from the California Department of Motor Vehicles to estimate the fleet mix of vehicles (vehicle and fuel type) traveling on Santa Cruz County roadways for past, present and future years. The vehicle types include all on-road vehicles including passenger vehicles, light and heavy-duty trucks, and buses. The fuel types include gas, diesel and electric vehicles. The EMFAC model has a Custom Activity Mode that allows the use of the Santa Cruz County travel demand model output of VMT data distributed hourly and by speed. The 2015 VMT data by hourly speed bin fractions is entered into the EMFAC model to determine the amount of GHG and criteria pollutants from the fleet mix of vehicles for the baseline year. EMFAC2014 is the current version approved by the U.S. EPA and is used to calculate criteria pollutant and CO_2 emissions. Other GHG emissions (i.e., methane [CH_4] and nitrous oxide [N_2O]) were calculated with EMFAC2017 as CH_4 and N_2O are not generated in EMFAC2014 Custom Mode. Mobile off-road emissions are not considered in the EMFAC model. Off-road gasoline vehicles include vehicles such as agriculture, marine craft, all-terrain vehicles, lawn and garden equipment, and construction equipment and trains.

GHG and criteria pollutant emissions for the 2015 baseline data are shown in **Table 27**.

Table 27: 2015 Greenhouse Gas and Criteria Pollutants Emissions

	Daily (Metric Tons)	Annual (Metric Tons)
Greenhouse Gases		
Carbon Dioxide (CO_2)	2496	910,928
Methane (CH_4)	0.24	90
Nitrous Oxide (N_2O)	0.39	142
Carbon Dioxide Equivalent (CO_2e)	2617	955,288
Criteria Pollutants		
Carbon Monoxide (CO)	19.4	7096
Sulfur Oxides (SO_x)	0.03	10
Particulate Matter (PM_{10})	0.34	126
Particulate Matter ($PM_{2.5}$)	0.17	63
Reactive Organic Gases (ROG)	2.5	877
Nitrous Oxides (NO_x)	4.5	1649

[1] CO2e = CO2 + (CH4*25) + (N2O*298)

Equitable Access

Santa Cruz County residents have varied income levels and physical abilities that determine which transportation modes are both affordable and accessible. The provision of transportation services effects resident's access to the services they need to maintain independence and good health. The goal of an "Accessible and equitable transportation system that is responsive to the needs of all users" will be measured by assessing transit vehicles miles traveled, household transportation costs, and the benefits and impacts of projects to transportation disadvantaged communities. Baseline conditions compared to 2035 forecasts will be analyzed.

Transit Vehicle Miles Traveled

Transit services are accessed by a variety of demographic populations and can provide mobility to those without other transportation options. The baseline level of transit service provided throughout Santa Cruz County is measured by the number of revenue vehicle miles covered by Santa Cruz Metropolitan Transit District (METRO) buses as reported in the National Transit Database **(Table 28).** This includes both the local countywide service and the Highway 17 Express Service to San Jose. Any other transit service such as Monterey-Salinas Transit miles in Santa Cruz County, paratransit service miles, excursion trains, were not included in this measure. Transit revenue miles for the years 2013 to 2016 are fairly consistent from year to year. The baseline transit vehicle miles traveled performance measure will use the 2015 total transit revenue miles shown in **Table 28**.

Table 28: Baseline Transit VMT

Historical Annual Transit Revenue Miles				
	2013	**2014**	**2015**	**2016**
Fixed Route Transit Service				
Local Service	2,561,028	2,642,313	2,642,561	2,650,889
Highway 17 Express	610,983	683,000	683,260	686,891
Total	3,172,011	3,325,313	3,325,771	3,337,780
Complementary Paratransit Services				
Liftline	395,554	418,094	493,717	471,020
Subsidized Taxi	39,637	49,324	37,533	16,997

Source: National Transit Database (NTD)

Household Transportation Costs

Transportation costs are one of the top five household expenditures nationwide according to the Bureau of Transportation[19] and can impact where one chooses to live. Household transportation costs are primarily costs associated with driving motor vehicles, owning bicycles and taking transit. Individual household transportation costs can vary by the number of trips taken by a household, the travel mode, the length of trips, and the number and type of vehicles per household. Determining the percentage of income spent on household transportation costs illustrates the burden of transportation costs on households with different incomes. The average daily household transportation costs and percent of

[19] https://www.bts.gov/browse-statistical-products-and-data/transportation-economic-trends/tet-2017-chapter-6-household

median household income spent on transportation are the quantitative measures for the UCS performance measure - household transportation cost. The baseline household transportation costs measure evaluates an average household in Santa Cruz County. Examples of household transportation costs for households with transportation choices that differ from the average household (i.e. mainly transit, auto dependent, multi-modal, mainly bicycle) are also provided.

An average Santa Cruz County household has 2.9 people, drives 21,300[20] miles per year and owns two motor vehicles.[21] Costs for an average Santa Cruz County household owning either one or two vehicles are shown in **Table 29**. When calculating household transportation costs associated with auto trips, the vehicle cost per mile considers all vehicle related costs including fuel costs and costs to finance, license, register, maintain, and repair a vehicle. The Automobile Association of America (AAA) provides a methodology for determining a cost per mile for a typical vehicle based on the annual miles driven and nationwide cost data[22]. This methodology is revised to utilize California fuel costs from CA Economic Parameters provided by Caltrans[23], and fuel economy (mpg) costs for the 2015 fleet mix of vehicles registered in Santa Cruz County from the Air Resources Board EMFAC model.[24]

A household with one vehicle traveling approximately 21,000 miles per year is estimated to cost 0.52 cents per mile.[25] A vehicle cost per mile for households with two vehicles traveling a total of approximately 21,000 miles per year is estimated to be 0.78 cents per mile.[26] The increase in cost per mile is associated with the cost of owning and maintaining an additional vehicle. The daily household transit cost is calculated from the Santa Cruz Metropolitan Transit District (Metro) annual fare revenues[27] divided by the number of households in Santa Cruz County and days in the year and assumes that the cost of transit fares are equally distributed across all households.

The daily household bicycle cost is calculated based on an estimated annual cost to own and maintain a bicycle divided by the number of days in the year and multiplied by the average number of people in a household (2.9)[28] times the percentage of people who own a bicycle (53%.)[29] Walk trips are considered a no cost trip.

When the daily cost of auto trips, bus trips and bike trips are combined, the average daily household transportation cost for a household in Santa Cruz County with one vehicle is $31.26 for an annual household transportation cost of $11,409 (15% of the median income) and the average daily household transportation cost for a household in Santa Cruz County with two vehicles is $46.63, for an annual household transportation cost of $17,019 (24% of the median income.)

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[20] Highway Performance Monitoring System 2015 divided by number of Santa Cruz County Households
[21] California Household Travel Survey 2010-2011
[22] AAA 2017 Your Driving Costs publication
[23] http://www.dot.ca.gov/hq/tpp/offices/eab/benefit_cost/LCBCA-economic_parameters.html
[24] https://www.arb.ca.gov/emfac/2014/
[25] American Automobile Association, https://exchange.aaa.com/automotive/driving-costs/#.W1EU5NVKh0w
[26] American Automobile Association, https://exchange.aaa.com/automotive/driving-costs/#.W1EU5NVKh0w
[27] Santa Cruz Metropolitan Transit District, 2017
[28] Population and number of households in Santa Cruz County from the 2015 American Community Survey
[29] https://www.citylab.com/transportation/2015/04/global-car-motorcycle-and-bike-ownership-in-1-infographic/390777/

Table 29: Baseline Household Transportation Costs for an Average Santa Cruz County Household

Daily Cost for Trip Type	Average SCC Household- 1 Vehicle	Average SCC Household- 2 Vehicles
Auto	$29.76	$45.14
Bus	$0.27	$0.27
Bike (fixed daily cost regardless of number or length of trips)	$1.22	$1.22
Walk	$0.00	$0.00
Household Daily Transportation Cost	**$31.26**	**$46.63**
Household Income	**% of Income Spent on Transportation**	
$50,000	23%	34%
$70,088 – 2015 median household income for Santa Cruz County	16%	**24%**
$100,000	11%	17%
$150,000	8%	11%

Household transportation costs with a range of transportation choices that differ from the average Santa Cruz County household are described as follows:

- mainly transit
- auto dependent
- multi-modal (mix of auto and transit)
- mainly bicycle

Each representative household is assigned a different number of single occupancy, carpool, bus transit, bike and walk trips that totaled to 9.65 trips per day, the same number of total trips taken by average households. The average trip length for single occupancy vehicle, carpool, and transit trips reported by the 2011-2012 California Household Transportation Survey were applied to each trip by mode for the representative households to calculate the cost per day by mode and then summed to determine the household transportation costs (**Table 30**).

Household transportation costs for households that represent a range of travel choices show that household transportation costs increase considerably with the number of vehicles per household. If households can reduce the number of vehicles owned per household (and associated ownership costs) by using transit or active transportation modes for a larger percentage of their trips, household transportation costs can be significantly reduced.

Table 30: Baseline Representative Household Transportation Costs for Santa Cruz County

	Mainly Transit- 0 Vehicles	Auto Dependent- 2 Vehicles	Multi Modal (Auto & Transit)- 1 Vehicle	Mainly Bicycle- 1 Vehicle
% person trips that are drive alone	0%	80%	40%	20%
% person trips by carpool	25%	20%	30%	10%
% person trips by transit	40%	0%	20%	10%
% person trips by train	0%	0%	0%	0%
% person trips by bike	20%	0%	0%	50%
% person trips by walk	15%	0%	10%	10%
total daily person trips per household	9.65	9.65	9.65	9.65
daily cost for drive alone trips	$0.00	$43.72	$20.73	$15.72
daily cost for carpool trips	$5.66	$4.77	$6.79	$2.26
daily cost for bus trips	$6.25	$0.00	$2.17	$1.58
daily cost for bike trips	$1.22	$0.00	$1.22	$1.22
daily cost for walk trips	$0.00	$0.00	$0.00	$0.00
Household daily transportation cost	$13.03	$48.50	$30.91	$20.79
Household annual transportation cost	$4,793	$17,702	$11,283	$7,589
Household income	**% of income spent on transportation**			
$50,000	10%	35%	23%	15%
$70,088- 2015 median household income for Santa Cruz County	7%	25%	16%	11%
$100,000	5%	18%	11%	8%
$150,000	3%	12%	8%	5%

Benefits and Impacts to Transportation Disadvantaged Communities

Transportation disadvantaged communities (DAC) are defined for Santa Cruz County as areas with higher concentrations of low or very low income and minority-based.[30] The UCS includes an analysis of poverty, low income and minority communities to evaluate the distribution of transportation project benefits and of project impacts. Impacts can involve construction and short and long-term reduced accessibility. **Figure 28** shows areas that are home to a significant fraction of poverty, low income or minority households in Santa Cruz County.

Minority areas are defined as census tracts where greater than 65% of the total population is non-white; low income areas are defined as census tracts where greater than 65% of households are low income or where incomes are at or below the low income threshold designated by the California Department of Housing and Community Development's 2016 income limits under AB1550; and poverty areas are defined as census tracts where greater than 20% of households are categorized as poverty.

The poverty, low income and minority census tracts were defined by AMBAG in the 2035 Metropolitan Transportation Plan and Sustainable Communities Strategy using 2010 income and race data from the U.S. Census Bureau. National low income and poverty levels were adjusted by the average housing price in order to take into account the higher cost of living in the AMBAG region relative to the national average. The low income designation by AB1550 is included in the Santa Cruz County definition of transportation disadvantaged through the 2040 Santa Cruz County Regional Transportation Planning process. These census tract areas were translated to the geographic areas used in travel demand models (transportation analysis zones or TAZs) in order to evaluate project benefit and impacts.

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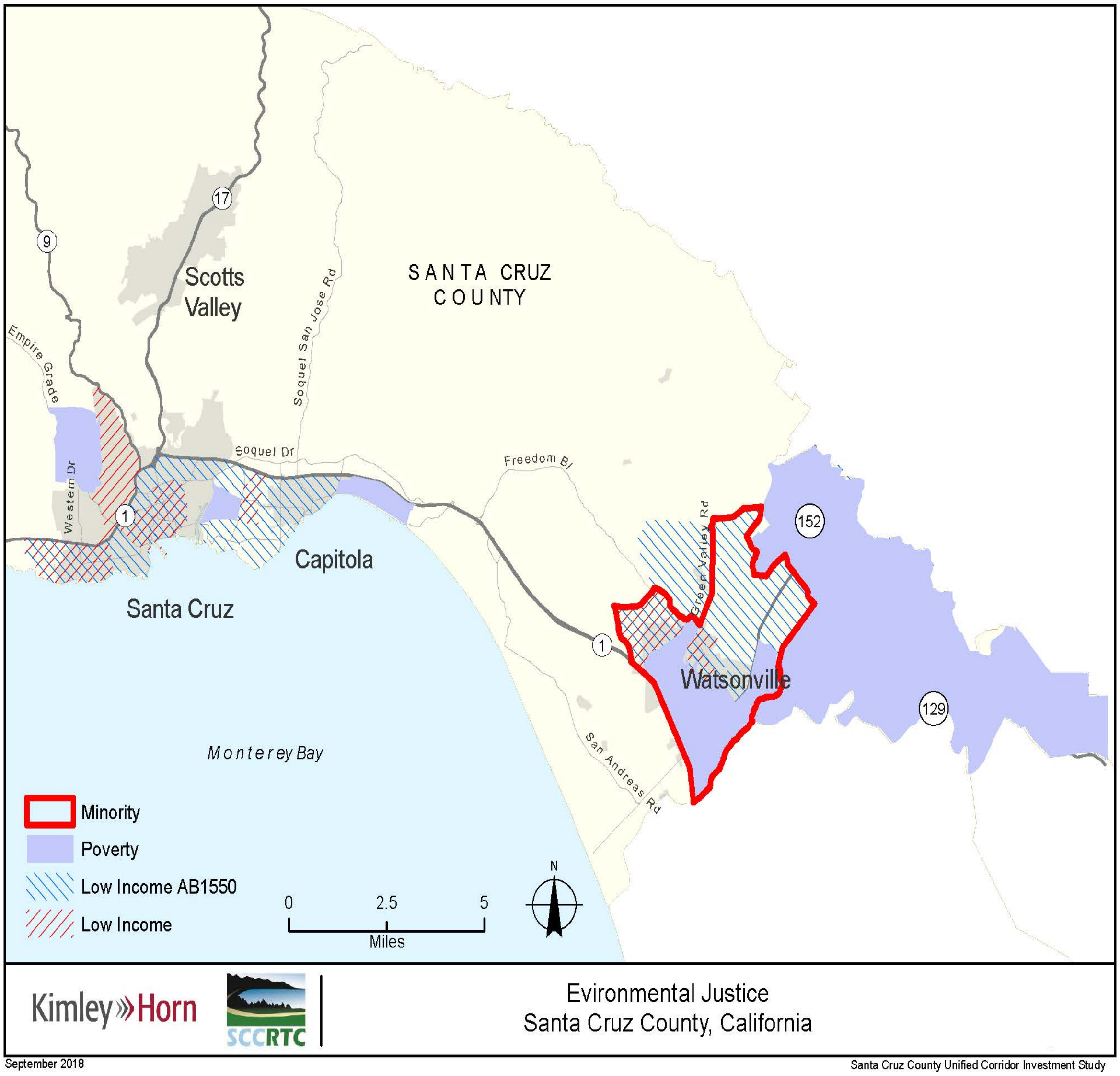
[30] 2040 Santa Cruz County Regional Transportation Plan

Figure 28: Environmental Justice Areas



Source: Santa Cruz County RTC, U.S. Census Bureau, AMBAG, Assembly Bill 1550

SCENARIO ANALYSIS - 2035 FORECASTS

The UCS scenario analysis evaluates groups of transportation projects and provides a forecast of future transportation conditions for 2035. The Unified Corridor Investment Study evaluates four scenarios with project groupings and a No Build scenario for each of the performance measures listed in **Table 1,** included in the introduction section of the report. The results of the scenario analysis allow for a comparison of how much benefit each scenario, when implemented in its entirety by 2035, would provide relative to the baseline conditions. A description of the forecasting methodology and relative change from baseline conditions for each performance measure by scenario is provided in the subsequent sections. The results of the analysis provide data driven information about the benefits of the various transportation options for Santa Cruz County's north-south transportation corridor and is intended to result in a preferred scenario (i.e. group of projects) recommended for implementation.

Travel Demand Model Tool for Forecasting

Travel demand models are one of the primary tools used to forecast future travel conditions. They provide a systematic framework for demonstrating how travel demand changes in response to different input assumptions. Trip based models such as the Santa Cruz County model, or "4-Step" models as they are commonly referred to, are the most common type of travel demand model. They have evolved over several decades, are broadly used across the United States, and have broad acceptance amongst transportation professional as a forecasting tool. The Federal Highway Administration (FHWA) mandates the use of a travel demand model for several planning activities including the development of Regional Transportation Plans (RTP). Travel demand models are used widely used in transportation planning to support regional, sub-regional, and project-level transportation analysis and decision making. A trip-based travel demand model estimates the number of trips produced and attracted, distributes those trips among origins and destinations, determines trip mode, and finally assigns those trips to roadway and transit networks. In order to verify that they are reasonable tools for forecasting, they are first tested against a set of existing known conditions. Their demonstrated ability to estimate existing conditions (commonly referred to as "validation"), through statistical analysis is the basis of determining that they are a reasonable tool to estimate changes to select conditions over time. While the accuracy of travel demand models are limited by our ability to precisely know the location and magnitude of land use changes, transportation network changes or other unexpected societal behavior changes, they have demonstrated their usefulness and represent the best practice for longer term transportation planning horizons.

Safety

Safety is a critical measure for community well-being, quality of life, and particularly in the case of active transportation facilities, accessibility. The goal of "Safer Transportation for All Modes" is measured by assessing the number of fatal and injury collisions by mode for baseline conditions compared to 2035 forecasts.

Injury and Fatal Collisions by Mode

Future collisions in the project study area are forecasted for 2035 for each scenario based on the implementation of projects that are likely to impact safety performance. Crash modification factors (CMF) were identified from the Federal Highway Administrations CMF Clearinghouse.[31] CMFs can be used to estimate the proportion of collisions that may be prevented by implementing specific types of projects that have been shown by research across the United States to reduce collisions.

[31] http://www.cmfclearinghouse.org/

The forecasted collisions for 2035 are related to the future traffic volumes estimates that are forecasted by the travel demand model for 2035. Traffic volume estimates vary by scenario due to the projects included in each scenario and therefore forecasted collisions also vary for each scenario. The CMFs are applied to determine the number of collisions that would be prevented if a project was constructed and to determine the estimated number of collisions per year. The sum of the reduction in collisions for all projects is calculated for each scenario. The future No Build numbers of collisions on a facility are estimated by assuming the same collision rate (collisions per vehicle miles traveled) as the existing rate. With no improvements, as traffic volumes increase, the number of collisions will also increase.

Fatal and injury collisions under baseline conditions for the project study area are mapped by project influence area using the Transportation Injury Mapping System (TIMS)[32] database. This data is shown in detail in **Table 5** in the baseline section of the report and summarized below in **Table 31** and **Figure 29**. Property damage only (PDO) collisions for the project study area are estimated from the ratio of the countywide property damage only to injury and fatal collisions from the Statewide Integrated Traffic Records System (SWITRS) database[33]. Property damage only collisions occur at a ratio of 1.77 for each injury/fatal collision in Santa Cruz County.

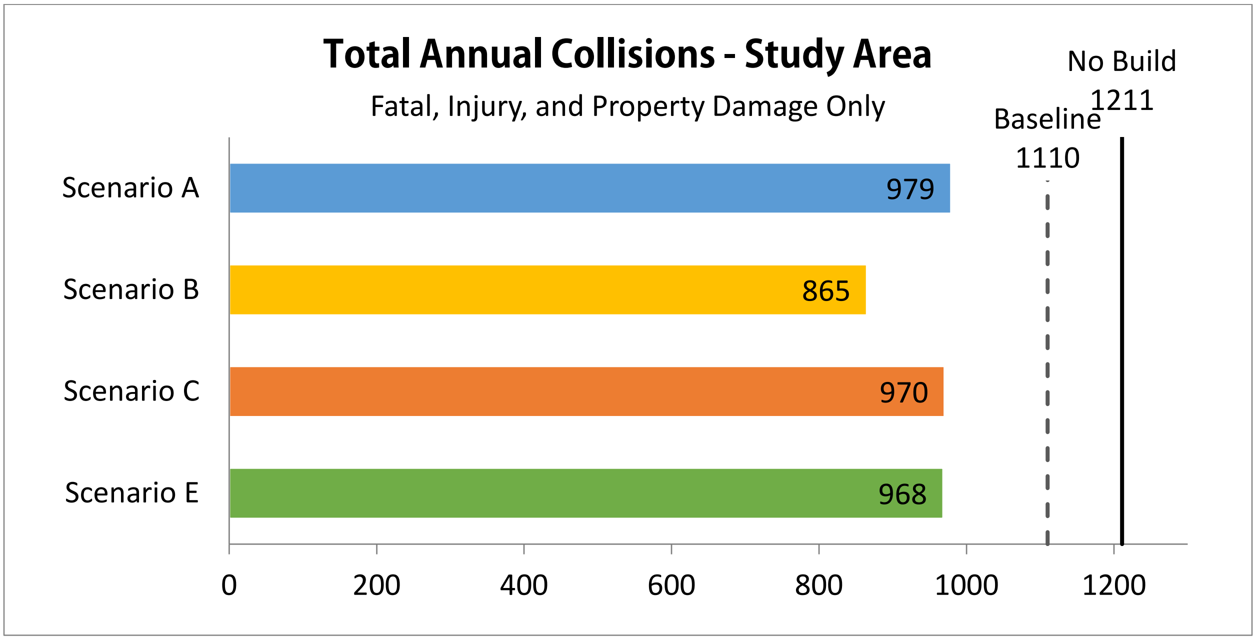
[32] Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, University of California, Berkeley. 2018
[33] http://iswitrs.chp.ca.gov/Reports/jsp/userLogin.jsp

Table 31 shows the anticipated safety benefits in terms of reduced collisions for each project and scenario. The projects that are estimated to provide the greatest reduction in total number of collisions are education and enforcement, ramp metering, the bicycle and pedestrian trail on the rail right of way and buffered bicycle lanes on Soquel Ave/Soquel Dr/Freedom Blvd. Scenario B shows the greatest reduction in number of collisions due to the greatest number of projects that have anticipated safety benefits compared to the No Build.

Table 31: Project Study Area Collision Forecasts by Scenario
(Fatal, Injury, and Property Damage Only)

Location	Annual Average 2011- 2015 Collisions	2035 No Build Annual Collisions	2035 Annual Collision Reductions			
			Scenario A	Scenario B	Scenario C	Scenario E
Highway 1						
HOV lanes (between San Andreas Rd and Morrissey Blvd)	317	297		NA	NA	
SR 1 auxiliary lanes (between State Park Drive and San Andreas Road)	88	92	-34	NA	-18	-37
Ramp metering (between San Andreas Road and Morrissey Blvd)	317	297		-108	-	
San Lorenzo River Bridge Widening	14	14	-3	NA	NA	NA
Mission St Intersections	30	30	-2	-3	0	0
Soquel Ave/Drive and Freedom Blvd						
Buffered bicycle lanes	30	45	NA	-33	NA	-33
Soquel/Morrissey/Poplar, Soquel/Frederick, Soquel/41st, Soquel/Bay-Porter, Soquel/Robertson, Freedom/Green Valley, Freedom/Airport, Freedom/Buena Vista	61	76	-15	NA	-12	NA
Intersection improvements for bicycles and pedestrians	24	36	-14	-5	-14	-5
Rail Right of Way						
Bicycle /Pedestrian Trail with Rail or BRT	33	50	NA	-45	-45	-45
Bicycle /Pedestrian Trail Only	36	53	-48	NA	NA	0
Overall Project Area						
Bicycle and pedestrian Improvements	87	130	-13	-13	-13	-13
Bike share and transit amenities	87	130	-6	-6	-6	-6
Multimodal transportation hubs	263	394	-20	-20	-20	-20
Education and enforcement	1109	1211	-76	-114	-113	-84
Total			**-232**	**-346**	**-241**	**-243**

Figure 29: Comparison of Total Collisions in Study Area by Scenario



Reliability and Efficiency

A transportation system that meets the needs of its users provides options for how to travel in a timely and reliable manner. The goal of "Reliable and efficient transportation choices that serve the most people and facilitate the transport of goods" will be evaluated by assessing the following performance measures: peak period mean auto and transit travel time and travel time reliability, mode share and person trips across a screenline for baseline conditions compared to 2035 forecasts. A comparison of auto travel time and transit travel time evaluates the difference in travel time between automobile and transit person trips for select origin -destination pairs within Santa Cruz County and serves as a peak period person travel time performance measure. Peak period person travel time is also used to assess the UCS reliability and efficiency goal for baseline conditions compared to 2035 forecasts.

Peak Period Mean Auto Travel Time

Auto travel time is an indicator of the efficiency of the transportation system. Three metrics are presented to provide information about traveling by auto during the peak period under future conditions: countywide mean auto speed, countywide vehicle hours of travel and countywide mean auto travel time. Data for 2035 is forecasted for each of the scenarios based on results from the Santa Cruz County travel demand model. The AM peak period considered is between 6 and 9AM and the PM peak period is between 4 and 7 PM.

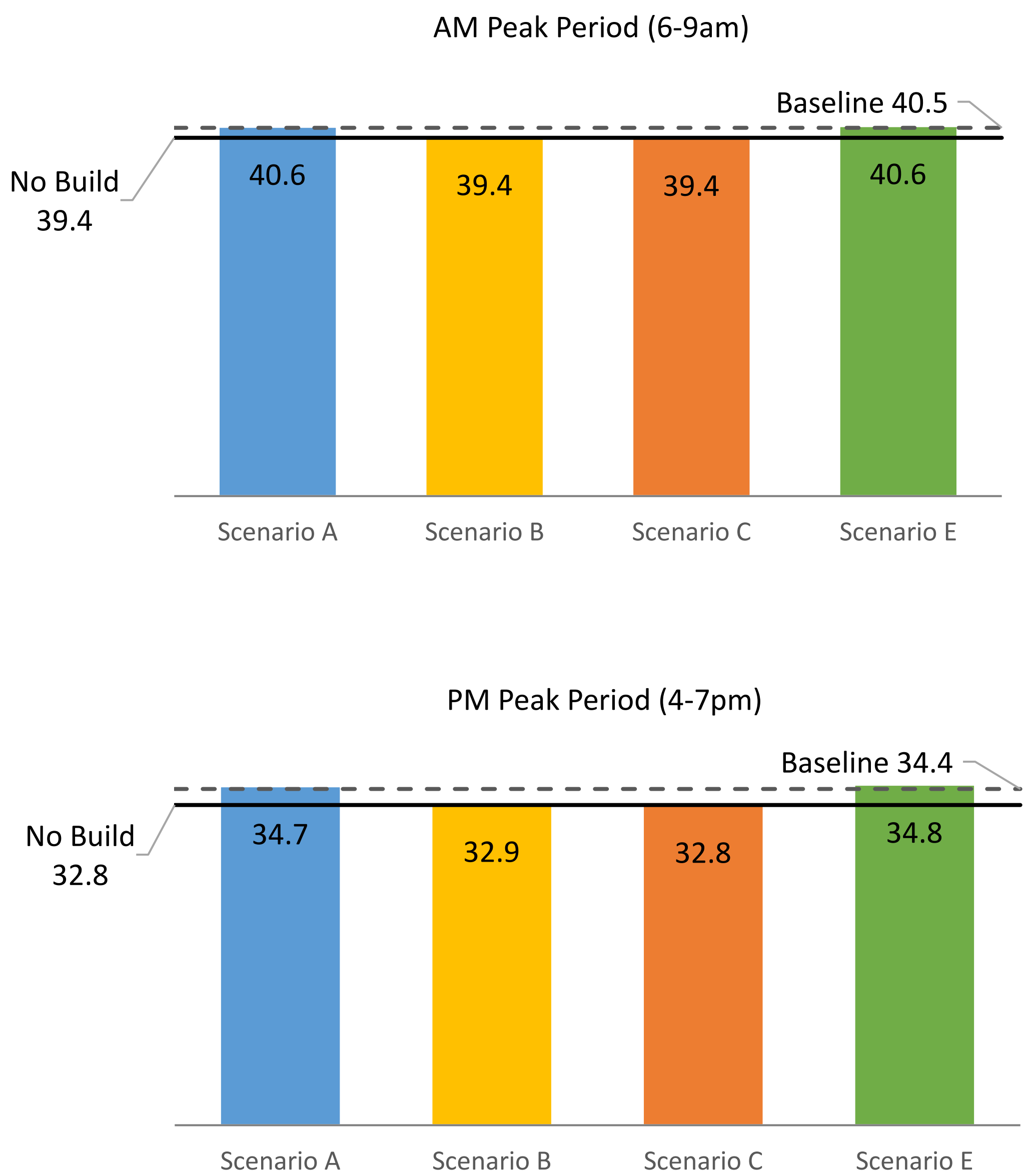
Estimates of countywide mean auto speed **(Table** 32**)** are determined based on the countywide total auto vehicle miles traveled divided by the total auto vehicle hours traveled during the three-hour AM and PM peak periods. This metric provides the best measure of the overall efficiency of the transportation system under future conditions for each scenario. The analysis shows that the countywide mean peak period speeds are greater for the scenarios that include HOV lanes on Highway 1 (A and E) compared to the No Build and the 2015 existing conditions in both AM and PM. Scenarios B and C do not substantially affect the countywide mean auto speed relative to the No Build **(Figure 30)**.

Table 32: Countywide Mean Auto Speed (mph)

	2015	2035*				
		No Build	Scenario A	Scenario B	Scenario C	Scenario E
AM Peak Period (6-9 AM)	40.5	39.4	40.6	39.4	39.4	40.6
PM Peak Period (4-7 PM)	34.4	32.8	34.7	32.9	32.8	34.8

*All 2035 scenarios, including the No Build scenario, assume construction of the three sets of auxiliary lanes on Highway 1 (Soquel Ave to State Park Dr) funded by Measure D.

Figure 30: Countywide Mean Auto Speed (mph)



Countywide vehicle hours traveled is another measure of the efficiency of the transportation system that represents the total hours of auto travel during the peak periods **Table 33**. This measure combines both the effects of any changes in speed as well as changes in the number of trips that are shifted to transit under future conditions for each scenario. Scenario E which includes HOV lanes on Highway 1 and rail transit provides the most significant shift in vehicle hours traveled when compared to the No Build due to both increased speed and a greater shift from auto to transit.

Table 33: Countywide Vehicle Hours Traveled (hours)

	2015	2035 Forecasts*				
		No Build	Scenario A	Scenario B	Scenario C	Scenario E
AM Peak Period (6-9 AM)	20,400	23,500	23,500	23,400	23,500	23,300
PM Peak Period (4-7 PM)	35,700	41,900	41,000	41,500	41,800	40,600

*All 2035 scenarios, including the No Build scenario, assume construction of the three sets of auxiliary lanes on Highway 1 (Soquel Ave to State Park Dr) funded by Measure D.

The countywide mean auto travel time performance measure is presented in **Table 34**. The countywide mean auto travel time is determined by taking the total county peak period auto vehicle hours traveled and dividing by the number of auto trips in the peak period. The mean auto travel time represents the average travel time for all trips between all origin and destinations during the periods evaluated. The mean auto travel time will decrease as speed increases but may increase if the total length of the average trip increases. The mean auto travel time may also increase if the number of shorter length trips that are shifted to transit is significant**. Table 34** shows that the countywide mean auto travel time for the AM peak period does not change substantially from the No build. The PM peak period travel time does show a decrease in mean auto travel time countywide in Scenarios with HOV lanes (A and E).

Table 34: Countywide Mean Auto Travel Time (minutes)

	2015 (minutes)	2035 Forecasts*				
		No Build (minutes)	Scenario A (minutes)	Scenario B (minutes)	Scenario C (minutes)	Scenario E (minutes)
AM Peak Period (6-9 AM)	10.9	11.3	11.3	11.3	11.3	11.3
PM Peak Period (4-7 PM)	11.8	12.7	12.4	12.6	12.7	12.4

*All 2035 scenarios, including the No Build scenario, assume construction of the three sets of auxiliary lanes on Highway 1 (Soquel Ave to State Park Dr) funded by Measure D.

For individual roadways, travel demand models are generally not good predictors of speed and travel time. Additional tools are needed for an operational analysis of travel time and speeds as discussed in the next section.

Travel Speed Along SR 1

The State Route 1 Tier I and Tier II Draft Environmental Impact Report[34] (DEIR) developed by Caltrans in partnership with the RTC presents a more detailed 2035 forecast of travel times and speeds with implementation of an HOV lane alternative and a transportation system management alternative. Scenarios A and E of the UCS include HOV lanes on Highway 1 and thus the speeds forecasted by the Hwy 1 DEIR provide the best available information. Average speeds forecasted for Highway 1 between San Andreas Rd and Branciforte Overcrossing with implementation of HOV lanes can be found in **Table 35** and represent Highway 1 travel speeds for Scenarios A and E.

The Transportation System Management alternative evaluated in the Highway 1 DEIR includes the 6 sets of auxiliary lanes from Soquel Drive to San Andreas Rd and ramp metering. Average speeds forecasted for the TSM alternative are presented in **Table 35**. Scenarios B and C evaluated in the UCS evaluate operational improvements on Highway 1 but are both more limited in the improvements in comparison to the Transportation System Management Alternative in the Hwy 1 DEIR. Scenario B includes the 3 sets of auxiliary lanes funded by Measure D and ramp metering. Scenario C includes the 6 sets of auxiliary lanes from Soquel to San Andreas but no ramp metering. The speeds on Highway 1 forecasted for the Transportation System Management alternative can be considered an estimate of the upper limit for Highway 1 speeds in Scenarios B and C. More details of the results of the transportation study can be found in Section 2.1.5 on SCCRTC website (https://sccrtc.org/projects/streets-highways/hwy1corridor/environmental-documents/).

Table 35: Hwy 1 DEIR HOV and TSM Alternative Project Travel Speed Estimates

Highway 1 Corridor Investment Program Draft Environmental Impact Report 2035 Forecast San Andreas Rd to Branciforte Overcrossing	2035 Forecast with High Occupancy Vehicle Lanes	2035 Forecast with Transportation System Management Alternative
NB AM Peak Hour Average Speed (mph)	39	21
NB PM Peak Hour Average Speed (mph)	42	21
SB AM Peak Hour Average Speed (mph)	52	54
SB PM Peak Hour Average Speed (mph)	33	10

Peak Period Mean Transit Travel Time

Transit travel times for each scenario were calculated for the following route:

- 91X – Route on both Highway 1 and Soquel (11 stops)
- 71 – Route on Soquel and Freedom (73 stops)
- SR 1 Express Bus on Shoulder – Express Bus route that uses the Bus on Shoulder on SR 1 (2 Stops)
- SR 1 Express with HOV Lanes- Express Bus route that uses the HOV lanes on SR 1 (2 Stops)

[34] https://sccrtc.org/projects/streets-highways/hwy1corridor/environmental-documents/

- 91X with HOV Lanes – Same route as 91X but route uses the HOV lanes
- Soquel/Freedom BRT LITE – BRT LITE route on Soquel and Freedom (23 stops)
- Soquel/Freedom Express Overlay – Express service on Soquel and Freedom (6 stops)
- BRT on the Rail Corridor – BRT route that uses the street network and the rail corridor (20 stops)
- BRT on Rail Express Service – BRT express service that uses the street network and the rail corridor (8 stops)
- Passenger Rail – New LRT service on the rail corridor (10 stops)

To determine bus travel times, the 2015 and 2035 TransCAD model was used to calculate auto travel times since transit travel times are not available in TransCAD. The route was then created in Google Maps to determine existing auto travel time data. The difference between 2035 and 2015 was then added to the Google Maps travel time to normalize the TransCAD data.

Since TransCAD can only determine auto travel times, bus dwell times for each stop were added to determine the time for a bus to stop and drop-off/pick-up passengers. Dwell times were taken from the Bus Dwell Time Analysis Using On-Boarding Video (2011) report written by the Transportation Research Board (TRB). In this study, TRB determined that the average dwell time for a bus is around 12.4 seconds per stop. To calculate the total dwell time, the dwell time per stop was multiplied by the number of stops (excluding the first and last stop).

For the Bus on Shoulder and HOV projects, average speeds and average travel times were taken from the Santa Cruz Route 1 Tier I and Tier II Environmental Impact Report/Environmental Assessment (October 2017). In the EIR there are two alternatives TSM and HOV. The TSM alternative included projects such as auxiliary lanes and ramp metering. Bus on shoulder was categorized under the TSM category, while the HOV alternative included the HOV projects on SR 1. The following average peak period speeds were taken from the SR 1 EIR:

- TSM
  - NB AM: 27 MPH
  - SB PM: 21 MPH

- HOV
  - NB AM: 46 MPH
  - SB PM: 42 MPH

While the bus operates on the rail corridor, an assumed average speed of 35 MPH was used. Passenger rail travel times were taken from the Rail Feasibility Study dated December 2015. **Table 36** shows peak period transit travel times for the 2035 horizon year.

Table 36: Peak Period Mean Transit Travel Times (minutes)

Route	Location	Direction	AM Travel Time (min)						PM Travel Time (min)					
			2015	NB	A	B	C	E	2015	NB	A	B	C	E
91X**	Between Santa Cruz & Watsonville	EB	-	-					60.0	92.4				
		WB	70.0	66.7					-	-				
71**	Between Santa Cruz & Watsonville	EB	-	-					90.0	114.4				
		WB	89.0	88.0					-	-				
SR 1 Express HOV Lanes**	Between Santa Cruz & Watsonville e	EB			-			-			33.5			33.5
		WB			32.4			32.4			-			-
SR 1 Express Bus on Shoulders**	Between Santa Cruz & Watsonville	EB				-	-					60.9	44.9	
		WB				53.6	39.9					-	-	
91X with HOV Lanes**	Between Santa Cruz & Watsonville	EB			-			-			59.2			59.2
		WB			55.2			55.2			-			-
Soquel/Freedom BRT LITE**	Between Santa Cruz & Watsonville	EB			-	-	-				107.3	107.8	108.0	
		WB			82.6	83.7	82.5				-	-	-	
Soquel/Freedom Express Overlay**	Between Santa Cruz & Watsonville	EB			-	-	-				98.5	98.1	99.1	
		WB			74.1	74.2	74.1				-	-	-	
BRT on Rail*	Between Santa Cruz & Watsonville	EB					-						55.0	
		WB					65.1						-	
BRT on Rail Express Service*	Between Santa Cruz & Watsonville	EB					-						52.5	
		WB					62.6						-	
Passenger Rail*	Between Santa Cruz & Watsonville	EB				-		-				41.0		41.0
		WB				41.0		41.0				-		-

*Based on Rail Feasibility Study

** Bus Rapid Transit Practitioner's Guide, Transit Cooperative Research Program, Report 118/ V. Vuchic, Urban Transit Systems and Technology, 2007

Travel Time Reliability

Travel time reliability—a measure of the variability of travel time between the same origin and destination from day to day – is an important indicator of transportation service quality. The larger the variability in travel time, the more unreliable the trip time becomes. Travel time reliability (TTR) matters since being late to work, an appointment, or for a delivery have substantial repercussions for both travelers and businesses. The primary causes of unreliable travel times are collisions and an imbalance between demand and capacity that causes congestion.

Travel demand models cannot predict travel time reliability as travel models represent a typical weekday and are not able to show variability from day to day. Travel time reliability is often correlated with travel time to show that as travel time improves so does travel time reliability. Although when congestion is recurring, a congested system can often become “more reliable” as the travel time is more predictably longer than free flow conditions. This study will include a qualitative discussion of travel time reliability and how it may vary between the different scenarios.

Projects in this study that can improve travel time reliability for autos include:

- auxiliary lanes on Highway 1 that allow vehicles more room to merge into traffic, improving the traffic flow,
- ramp metering that improves the traffic flow
- HOV lanes that decrease the travel time and thus improve the overall reliability
- Intersection improvements on Mission St and Soquel Ave/Dr and Freedom Blvd

Projects in this study that can improve the transit travel time reliability for transit include:

- transit signal priority and queue jumps for BRT lite on Soquel and Freedom
- HOV lanes for transit
- Bus on Shoulders
- Rail on the rail right of way
- BRT on the rail right of way

SCENARIO A

Travel time reliability for autos may be increased in this scenario compared to No Build scenario due to implementation of HOV lanes, auxiliary lanes and ramp metering on Highway 1 and intersection improvements on Mission St and Soquel Ave/Dr and Freedom Blvd. Travel time reliability for transit may be increased due to transit in HOV lanes and BRT lite on Soquel and Freedom.

SCENARIO B

Travel time reliability for autos may be increased in this scenario compared to No Build scenario due to ramp metering on the highway and Mission St intersection improvements but will not be as significant as scenario A. Travel time reliability for transit will increase with bus on shoulders on Highway 1, BRT lite on Soquel and Freedom and rail transit on the rail right of way.

SCENARIO C

Travel time reliability for autos will be increased in this scenario compared to no build due to the additional three sets of auxiliary lanes on Highway 1 (beyond the three sets of auxiliary lanes funded by Measure D), intersection improvements for autos on Soquel and Freedom. Transit travel time reliability will be increased due to bus on shoulders on Highway 1, BRT lite on Soquel and Freedom and BRT on the rail right of way.

SCENARIO E

Travel time reliability for autos may be increased in this scenario compared to No Build due to implementation of HOV lanes, auxiliary lanes and ramp metering on Highway 1. Travel time reliability for transit may be increased due to transit in HOV lanes and rail transit on the rail right of way.

Based on a qualitative analysis, under future conditions, auto travel time reliability will likely be greatest for Scenario A compared to the No Build with implementation of the HOV lanes, intersection improvements and increased capacity of San Lorenzo River bridge. Scenario B and E will likely provide the greatest transit travel time reliability with implementation of rail transit as rail transit typically has more predictable travel times in comparison to bus transit.

Mode Share

The modes are divided into drive alone, carpool, transit, bike and walk. The methodologies used to forecast the percentage of trips in 2035 vary depending on the mode. The 2015 Santa Cruz County travel demand model (SCCModel) provides an estimate of trips for drive alone, carpool and transit for each of the scenarios evaluated. The future 2035 mode share is forecasted for each scenario based on percentage of trips traveled throughout the county. The total number of trips per day in Santa Cruz County that are estimated for 2035 are 947,700. Details about the 2015 SCCModel and the mode share results can be found in **APPENDIX E.**

Bike trips were forecasted using the general methodology published in 2006 by National Cooperative Highway Research Program, Guidelines for Analysis of Investments in Bicycle Facilities. The analysis determines the demand for bicycle ridership on a weekday based on the population within a 0.5, 1.0 and 1.5 mile buffer of the new facility being evaluated, the likelihood that people would use the facility for their trip and the increase in bicycle ridership in the future. Estimates of bike ridership were further developed using Santa Cruz County specific information on bike ridership by trip purpose and typical length of trips. Electric bicycles are included in evaluation of bicycle ridership for the trail on the rail right of way. Walk trips were forecasted based on the bike and walk count data collected in Santa Cruz County.[35] Bike and walk trip forecasting for the various trail projects on the rail right-of-way is differentiated by level of service, whether the trail was parallel to moving transit vehicles, whether the trail was diverted onto parallel roadways, and whether the trail provided access to transit for longer trips.

Data that was used in forecasting the 2035 mode share includes the following:

- Santa Cruz County travel demand model output
- 2011-2012 California household survey data for Santa Cruz County (bicycle trip mode share by trip purpose, bicycle trip length by trip purpose)[36]
- U.S Census 2011-2016 5-year summary American Community Survey mode share data[37]
- 2010 U.S. Census data for employment
- 2016 bike and pedestrian intersection count data
- 2016 Community Traffic Safety Coalition bicycle count data at schools
- Rail transit boardings from the 2015 Passenger Rail Feasibility Study
- Bus Rapid Transit Practitioner's Guide[38]

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[35] Arana Gulch 2017 Bike and Walk Count Data
[36] The California Household Travel Survey taken in 2011-2012 provides the percentages of the person trips by mode for all trips taken in Santa Cruz County and was the basis for the mode share used in the UCS.
[37] The American Community Survey also provides mode share data for means of transportation to work by workers 16 years and older. A five-year summary of the American Community Survey data is available at the county and city level.
[38] Transit Cooperative Research Program, 2007, Report 118

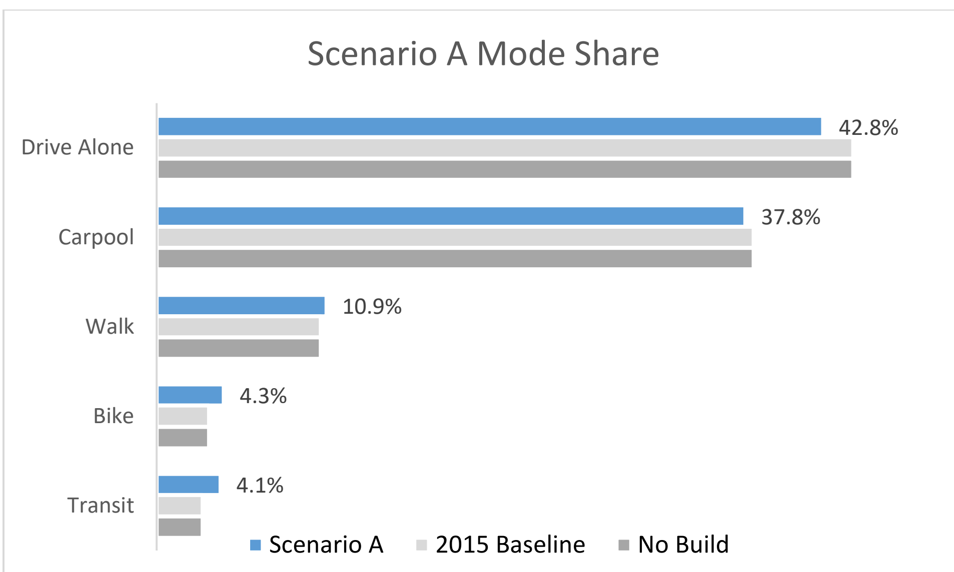
APPENDIX E describes in further detail the methodology that was used for determining the bike and walk trips and transit trips under the various scenarios.

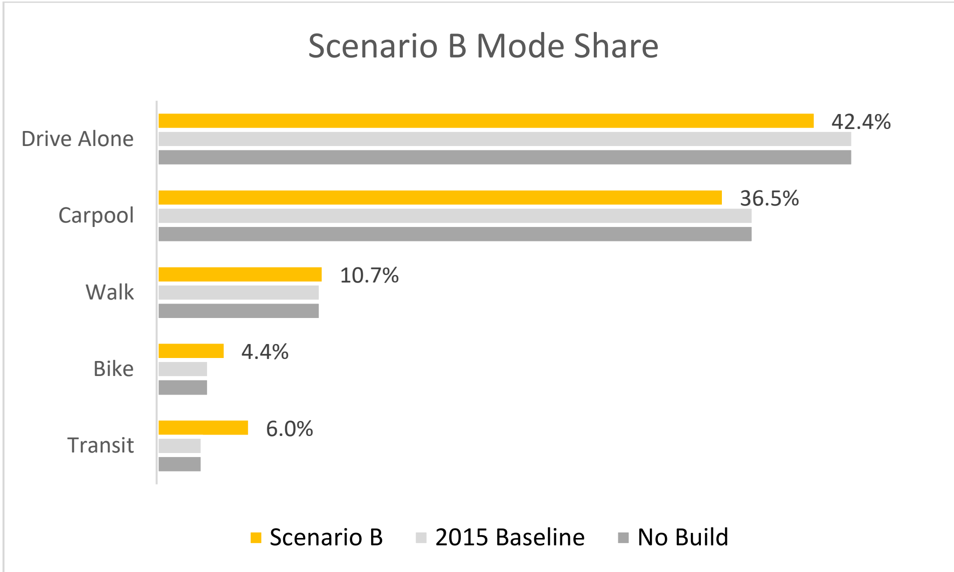
The mode share results are presented in **Table 37** and **Figure 31**. Results show a higher percentage of carpool trips in Scenarios A and E with HOV lanes. Scenarios B and E with rail transit and Scenario C with BRT on the rail ROW all show a higher percentage of transit compared to Scenario A. Scenarios B and E with rail transit have the lowest percentage of drive alone trips and with bike improvements on both the rail right-of-way and buffered bike lanes on Soquel and Freedom have a higher percentage of bike trips. Scenario A has the highest percentage of walk trips due to the trial only on the rail right-of-way.

Table 37: Countywide Mode Share by Person Trips

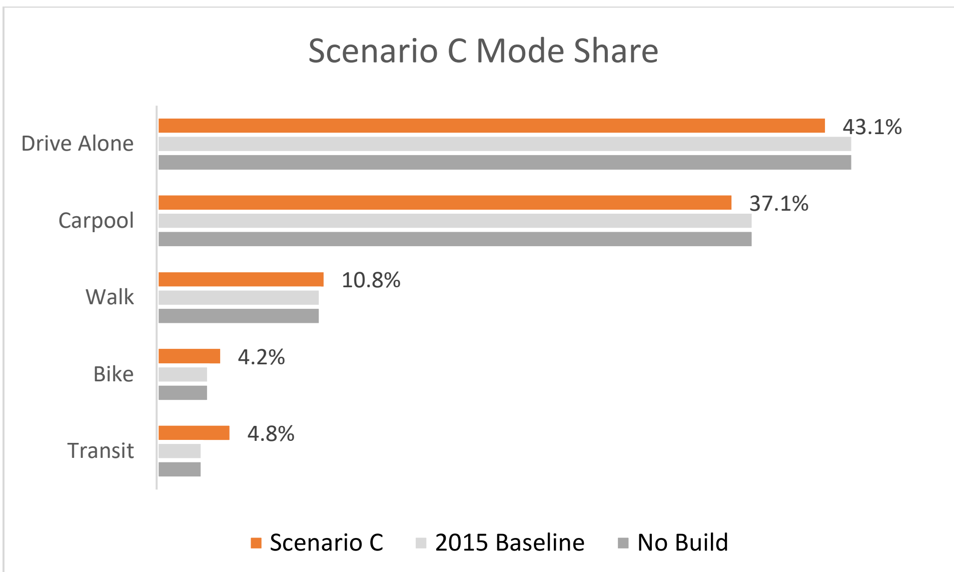
Mode	2015	2035				
		No Build	Scenario A	Scenario B	Scenario C	Scenario E
Drive Alone	44.8%	44.8%	42.8%	42.4%	43.1%	42.3%
Carpool	38.4%	38.4%	37.8%	36.5%	37.1%	37.3%
Transit	2.9%	2.9%	4.1%	6.0%	4.8%	5.3%
Bike	3.4%	3.4%	4.3%	4.4%	4.2%	4.4%
Walk	10.6%	10.6%	10.9%	10.7%	10.8%	10.7%

Figure 31: Countywide Mode Share by Person Trips

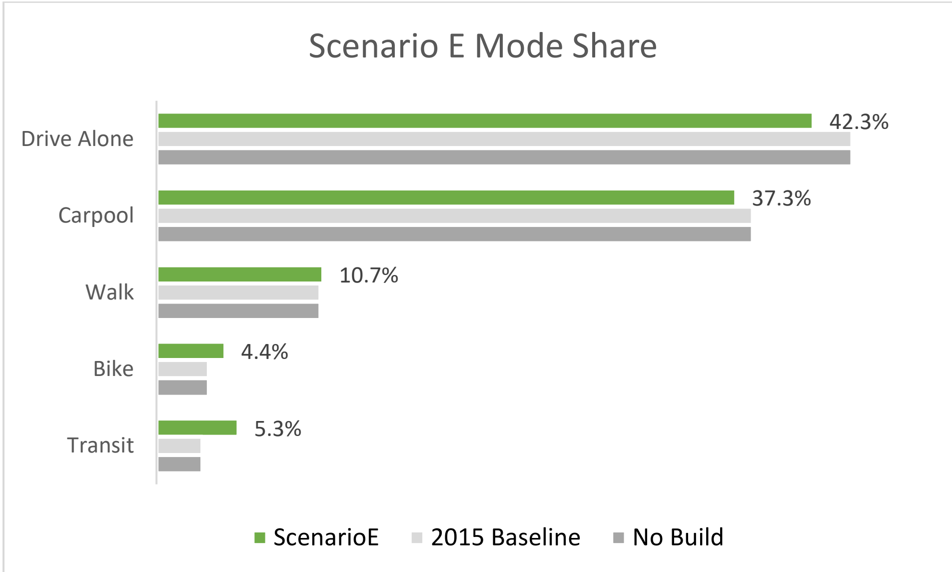




Scenario B Mode Share
Drive Alone
Carpool
Walk
Bike
Transit
42.4%
36.5%
10.7%
4.4%
6.0%
Scenario B
2015 Baseline
No Build



Scenario C Mode Share
Drive Alone
Carpool
Walk
Bike
Transit
43.1%
37.1%
10.8%
4.2%
4.8%
Scenario C
2015 Baseline
No Build



Person Trips Across North-South Screenlines

A screenline is an imaginary line on a map that crosses a number of roadways. A screenline analysis is used to compare the sum of traffic count volumes that cross the screenline. This allows for a comparison of total traffic flow volumes across all major roadways rather than evaluating separate counts on each individual roadway. Screenline data compares the total volume of person trips at different locations along the most congested areas of Santa Cruz County. The future 2035 screenlines are forecasted for each scenario and provide an indication of the magnitude of travel at the various locations within the project study area. The 9 screenline locations are provided on **Figure 6** in the baseline section of the report. The primary source of data is from the Santa Cruz County travel demand model. The model provides traffic volumes for drive alone, shared ride and transit on the key roadways passing through the screenlines. These vehicle volumes were converted to person trips. Bike and walk travel forecasts are based on the ridership projections for the trail projects and the buffered bike lanes. Bike and walk travel elsewhere is assumed to be consistent with existing percentages.

The screenline throughput is shown in **Table 38** for a two hour PM peak period. A comparison of the scenarios shows that the No Build has the least amount of throughput across the screenlines during the two hour PM peak period and Scenario E with HOV lanes and rail transit has the greatest throughput during the two hour time period. The throughput volumes during the PM peak are highest between 41st Ave and Seabright Ave. More detailed information of the screenline data by mode can be found in **APPENDIX F.**

Table 38: Screenline Throughput (Person Trips 4-6 PM)

Screenline #	Location	2016 Person Trips (4-6 PM)	2035 Person Trips (4-6 PM)				
		Baseline	No Build	Scenario A	Scenario B	Scenario C	Scenario E
1	San Lorenzo River	25,767	30,177	33,283	31,955	32,075	33,661
2	Seabright Avenue	27,615	31,191	34,385	32,643	32,216	35,220
3	17th Avenue	30,926	36,655	42,818	38,825	37,953	43,673
4	41st Avenue	27,411	30,918	38,393	32,966	32,137	38,912
5	Capitola Avenue	26,254	29,468	35,920	30,813	30,210	36,454
6	Park Avenue	21,525	24,267	19,764	25,328	24,900	20,236
7	State Park Drive	18,847	21,244	16,083	22,559	22,320	16,480
8	Rio Del Mar Boulevard	22,393	23,606	32,324	24,624	24,063	32,606
9	San Andreas Rd/Freedom Blvd	16,444	18,520	22,933	18,957	19,014	23,112
Total		217,182	246,048	275,903	258,669	254,891	280,354

Economic Vitality

Transportation projects can impact economic activities by providing access to destinations and changing costs to transportation system users. Isolating the economic benefits of transportation projects to one economic indicator can be challenging due to the many externalities affecting economic activity. Therefore, the goal of "Developing a well-integrated transportation system that supports economic vitality" is measured by assessing several measures: the level of public investment in transportation projects needed to implement each scenario, changes in costs associated with injury and fatal collisions, changes in visitor tax revenue, and other economic impacts for baseline conditions compared to 2035 forecasts. Other economic impacts are evaluated qualitatively for their relative impacts on property values, business location decisions, development potential, and business performance.

Public Investment

The "level of public investment" performance measure provides information about the revenues needed to implement each scenario beyond the potential amount of funding from federal, state, and local revenue sources by 2035. The UCS "level of public investment" performance measure is calculated by estimating the cost of each project minus the potential revenue for each project identified in the funding assessment. New revenues to implement scenarios is required if the estimated scenario cost is greater than potential funding. New public investments would come from new state or federal grant programs, or locally generated funding sources, such as a new sales tax, new parcel tax, or new vehicle registration fee. A greater cost than available funding for a project by 2035 could also indicate that a longer time period is needed to implement the project in order to accumulate the needed funds.

COST ESTIMATES

Capital costs for streets, highway and trail projects are estimated using Caltrans' cost estimating template or provided by partner agencies for projects under their purview. Bus transit operating costs are estimated based on Santa Cruz Metropolitan Transit District hourly operating cost and the number of bus transit operating hours per project. Rail transit service operating costs for a light Diesel Multiple Unit (DMU) costs are informed by the Santa Cruz Branch Rail Transit Feasibility Study unit costs and cost estimating template and updated by the UCS project team. Costs for implementing rail transit service using a light Electric Multiple Unit (EMU) reflects per mile cost provided by transportation agencies operating electrified transit services in addition to capital costs for other rail infrastructure improvements. Project costs are shown in 2018 dollars. Scenarios that include rail transit have two scenario costs, one for implementing rail transit using DMU vehicles and one for electrifying the rail and using EMU vehicles. Trail projects also have two scenario costs, one for implementing the trail alignment included in the project description **(APPENDIX B)** and one to implement the trail with the Segment 17 alternative alignment along San Andreas Rd and Beach St in place of the trail along the rail right-of-way between San Andreas Rd/Buena Vista Rd and Beach St/Lee Rd. If needed, prior year construction cost estimates were escalated to 2018 dollars based on Caltrans construction cost index and professional services cost increases of 3% per year**. Table 39** identifies the capital cost estimates for each project and scenario.

Table 40 identifies the annual operations and maintenance costs estimates for each project and scenario. **APPENDIX B** includes the detailed cost estimates.

Most of the projects included in the UCS have less than 30% design completed. Cost estimates will be updated when final project design is complete and unit costs will be updated and escalated to reflect the market conditions (i.e. cost of labor, equipment and materials) in the year the project is implemented. A contingency of 30%-50%, depending on the project, is included to account for the unknowns at this early stage of project development. The exact percentage selected for each project and cost category was based on standard practices and professional experience related to the cost variability typically seen for items of work. Project costs included in the UCS are for the purpose of the UCS planning study and scenario analysis. More refined cost estimates for projects will be developed once the project completes final design.

Projects that affect the overall project area and provide connections between routes are included in every scenario. These include improved bicycle and pedestrian facilities, additional transit connections, bike and transit amenities, park and ride lots, and multimodal transportation hubs. The additional transit connections, and multimodel transportation hubs were included as part of the transit projects evaluated in the UCS. The other projects are considered enhancements to regional and local infrastructure projects. Separate costs for these enhancements were not evaluated in the level of public investment performance measure. Transportation demand and system management projects are focused on low cost strategies that make the best use of the existing infrastructure and are also included in every scenario. Transportation system management projects include traveler information and safety enforcement. Transportation demand management programs include education and incentive programs to employers and residences about transportation options. Transportation system and demand management programs are currently administered through a combination of public agencies, including the RTC and the Community Traffic Safety Coalition, and private non-profit organizations including Ecology Action. Private employers also provide transportation demand management programs specific to an employer or location. Transportation demand management programs and associated revenues are assumed to increase by twice the existing amount for the purpose of the UCS performance measure evaluation.

FUNDING ASSESSMENT

The UCS funding assessment identifies how much funding will likely be available to pay for each scenario based on potential revenues and each project's estimated capital, operation and maintenance needs through 2035. Federal, state and local revenues provide funding for transportation projects and are governed by rules and requirements. This can restrict revenues to specific transportation investments. The UCS funding assessment takes into consideration funding eligibility requirements including: project descriptions, mode, and outcomes and geographic location. The funding assessment also takes into consideration Santa Cruz County's typical share of statewide grants and grant award minimums and maximums. Measure D, passed by Santa Cruz County voters in 2016, provides a locally controlled source of revenue and is an example of a funding source that is restricted to specific transportation projects or project types specified in the Measure D ordinance.

REVENUES

The UCS funding assessment considered the following:

- Funding identified in the Financial Element of the 2040 Regional Transportation Plan (RTP), that could be directed to projects in the UCS scenarios, are assumed as potential revenues for UCS projects. These are funding sources that can be distributed to UCS projects based on mode, outcomes or geographic location. Funds from grant programs for which UCS projects would be strong candidates are also assumed as potential revenues for UCS projects. Approximately $400 million in revenues identified in the RTP, 11% percent of the 2040 RTP revenue projections, meet these criteria and are assumed to be potentially available to UCS projects between 2018 and 2035. Allocating these funds to UCS projects would require shifting funds identified for projects in the RTP action element to new or different projects identified in the UCS scenarios.

- New funds identified as a result of updates to the 2040 RTP revenue projections are assumed as potential revenues for UCS projects resulting from new guidance on grant programs and funding sources including new SB1 programs and BUILD (formerly TIGER) program and/or additional information about potential grant award amounts and project competitiveness.

- Funding sources that could be available if rail or bus rapid transit on a fixed guideway is implemented in Santa Cruz County are assumed as potential revenues in the UCS scenarios with eligible projects.

- Total available revenues by scenario are different in cases where there are federal and state funds that cannot be captured by Santa Cruz County because there are no projects in a scenario that meet the funding requirements. This occurs in scenarios that do not have rail or bus rapid transit on a fixed guideway.

- Funding identified in the Financial Element of the 2040 RTP for Santa Cruz METRO's ongoing capital and operations is not assumed to be available for UCS rail projects, though some UCS projects/expanded bus services are eligible for some of those revenue sources and are assumed in the UCS.

- Measure D-funded auxiliary lanes (Soquel to 41st, Bay/Porter to Park, and Park to State Park) will be funded by Measure D Highway funds and implemented in every UCS scenario. Therefore, the costs and funding for auxiliary lanes from Soquel to 41st, Bay/Porter to Park Avenue and Park Avenue to Park Avenue to State Park Drive are not included in the UCS level of public investment measures since they are assumed to be funded with existing dedicated sources.

- Transit fares revenues for local bus service for each scenario are calculated based on the 2016 total Metro fare revenues multiplied by the estimated increase in ridership for each scenario. For the purpose of estimating rail transit revenues, fares for rail transit assume an average fare of $5.50. This is based on examples of a zone fare structure adopted by some San Francisco Bay Area transit systems and the Sonoma Marin Area Regional Transit System, which apply a lower fare for shorter distance travel and increase the fare for longer distance travel with fares that could range from $3.50 to $7.50, depending on the distance traveled. Fares for Bus Rapid Transit on the rail right-of-way are assumed to be the same as rail transit fares.

- The 2018 California State Trail Plan has identified the Santa Cruz Branch Rail Corridor as part of the future state rail system and will therefore likely be eligible for future state rail funding. The funding sources identified in the California State Rail Plan for transit programs are included in the list of revenue sources assumed in the UCS if considered to be available to Santa Cruz County.

- Total revenues assume 17 years of revenues (2018/19-2034/35) in 2018 dollars.

- A list of revenue sources and estimated amount of funding assumed in the UCS for the purpose of the level of public investment are included in **APPENDIX C** .

FUNDING DISTRIBUTION

Funding sources are distributed to projects in each UCS scenario in order to determine the total funding that is available for each scenario and the additional revenues ("new" public investment) that would need to be generated beyond the potential funding available for each UCS scenario by 2035.

For the purposes of the UCS, funding is distributed within each scenario based on the project's eligibility and competitiveness for grant programs, including mode, geographic location and outcomes, and restrictions for use on capital investments or operations. Projects are fully funded where possible. The assumptions for the distribution of funding to projects for the purpose of the UCS level of public investment performance measure does not program or allocate funds and is evaluated for the sole purpose of identifying the amount of additional funds that would need to be raised to implement scenarios. The process for committing funds to specific projects (i.e. programming) is overseen by the RTC, California Transportation Commission (CTC), local jurisdictions, or Caltrans as funds become available. Funding allocations can depend on actual revenue amounts, project readiness, and competitiveness. A general description of the distribution of revenues for the purpose of informing the UCS level of public investment performance measure is below. **APPENDIX C** identifies the funding sources and eligible projects for specific funding sources.

- Projects in the UCS eligible for Measure D funding, include trail projects, intersection improvements, the Highway 1 Bridge over San Lorenzo River and bus and bike lane investments on Soquel/Freedom. Trail projects would receive 17% of Measure D funding in all UCS scenarios. Intersection improvements, improvements to the Highway 1 Bridge over San Lorenzo River, bus and bike lanes investments on Soquel/Freedom, and Soquel Freedom Bus Rapid Transit (BRT) are assumed to receive some of the Measure D funding allocated to local jurisdictions for the purpose of the UCS assumptions.

- Funding is distributed to the trail projects on the rail right-of-way by first allocating the entire amount of funds available for the trail project from Measure D. Additional funding sources include funding available only for active transportation projects that is distributed primarily to the trail projects. The most flexible source of funds from the Surface Transportation Block Grant (STBG) can be used for a number of different projects. Given the variations in the types and costs for the projects in each scenario, flexible funds such as STBG is distributed to the trail projects in different amounts because of the need to fund other projects such as highway improvements with more limited funding sources. The assumptions for the distribution of funding to projects for the purpose of the UCS level of public investment performance measure does not program or allocate funds and is evaluated for the sole purpose of identifying the amount of additional funds that would need to be raised to implement scenarios.

- Intersection improvements are assumed to receive funding from the City of Santa Cruz, County of Santa Cruz and City of Watsonville sales tax and developer fees that were identified as transportation revenues in the 2040 RTP Financial Element. The SR 1 Bridge over San Lorenzo River is assumed to receive some of this funding available to the City of Santa Cruz. Other funding sources distributed to intersections include SB1 Roadway Maintenance and Rehabilitation Account (RMRA) funds allocated to jurisdictions and Highway Safety Improvement Program funds.

- Buffered bike lanes and Soquel/Freedom BRT projects are assumed to receive some SB1 RMRA funds allocated to jurisdictions, depending on the scenario.

- RTC's regional shares of discretionary funding (i.e. State Transportation Improvement Program and State Transportation Block Grant) are assumed to be distributed to improvements on Highway 1, including some funds to the widening of the Highway 1 bridge over the San Lorenzo River and trail projects. Within the Highway 1 Improvements, auxiliary lanes (beyond the three auxiliary lanes funded by Measure D) are assumed to be funded first if they are in a scenario, followed by either Bus on Shoulder or HOV depending on the scenario. This is based on anticipated sequencing of project construction.

- Senate Bill 1 (SB 1) - funded competitive programs and the portion of the Local Partnership Program allocated by formula to RTC are distributed to Highway 1 improvements or transit improvements on the rail ROW. In some scenarios, a portion is dedicated to Soquel/Freedom BRT.

- Active Transportation Program grant funds are assumed to be distributed to trail projects.

- Federal Rail and Fixed Guideway grant funds are distributed to transit projects on the rail ROW (i.e. bus rapid transit or rail transit), while federal Better utilizing Investment to Leverage Development (BUILD) are distributed to Highway 1 improvements.

- Transit fares generated by UCS projects with new bus service on Highway 1, Soquel/Freedom and bus connections to rail are distributed to operational costs of new bus service associated with these improvements. Transit fares generated by new rail or bus rapid transit service on the rail ROW and new bus connections to rail service are distributed only to operate these new transit services.

- The UCS level of public investment performance measure does not evaluate financing options that would provide more funding for large capital projects earlier and does not include an estimated finance cost.

The cost to implement scenarios varies with Scenario E being the highest cost. Scenario E, includes the most projects including the HOV lanes project and rail transit on the rail right-of-way in addition to the trail on the rail right-of-way, buffered bike lanes, and intersection improvements on Soquel/Freedom. Scenario C is the least costly and includes the cost to implement auxiliary lanes and bus on shoulders on Highway 1 and bus rapid transit on the rail right-of-way in addition to the trail on the rail right-of-way, bus rapid transit and intersection improvements on Soquel/Freedom.

Tables 39 and **40** provide the potential distribution of funding to projects within scenarios for the purposes of estimating the total potential funding available to each scenario. The amount of potential funding available to each scenario for capital investments is approximately the same amount, with the exception of Scenario A, which has less funding available to projects. This is primarily a result of federal revenues available for rail transit and fixed guideway transit projects that would not be implemented in Scenario A. The amount of potential funding available to each scenario for operations and maintenance differs between scenarios and is a reflection of the amount of bus transit services, rail transit services, highway improvements and freight operations.

In some cases, the potential funding identified by projects in each scenario as shown in **Table 39** and **40** may be shifted to other projects within the scenario if another project meets the eligibility requirements for the same funding source. However, the total funding per scenario wouldn't change. New public investment identifies the amount of new revenues that would be needed to fully fund the project. This may include a combination of new taxes and fees, rider fares, and/or new state and federal grants programs. For all scenarios, new public investment is required with scenario E requiring the greatest level of public investment. The amount of new public investment in scenario E is largely related to the cost to construct HOV lanes and provide passenger rail service.

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Table 39: New Public Investments for Capital Costs- Capital Cost Estimates and Potential Funding Amounts by Project and Scenario - In 2018 dollars (1000's)

NEW PUBLIC INVESTMENT - CAPITAL	Scenario A			Scenario B			Scenario C			Scenario E		
	Cost Estimate-Capital	Funding Potential-Capital	NEW Public Investment-Capital	Cost Estimate-Capital	Funding Potential-Capital	NEW Public Investment-Capital	Cost Estimate-Capital	Funding Potential-Capital	NEW Public Investment-Capital	Cost Estimate-Capital	Funding Potential-Capital	NEW Public Investment-Capital
Highway 1 Projects												
Buses on shoulders - (end point varies depending on aux lanes included)				$7,900	$7,900	$0	$8,500	$0	$8,500			
High occupancy vehicle lanes (HOV) & increased transit (incl. ramp metering and interchange reconstruction)	$452,500	$36,000	$416,500							$452,500	$0	$452,500
Auxiliary lanes to extend merging distance	$97,800	$97,800	$0				$97,800	$82,300	$15,500	$141,800	$139,100	$2,700
Metering of on-ramps w/o HOV (including intersection/ramp improvements)				$113,000	$74,400	$38,600						
Additional lanes on bridge over San Lorenzo River	$20,000	$15,400	$4,600									
Mission St intersection improvements	$10,300	$800	$9,500	$10,300	$10,200	$100						
Subtotal- SR 1	$580,600		$430,600	$131,200		$38,700	$106,300		$24,000	$594,300		$455,200
Soquel Avenue/Drive and Freedom Blvd												
Bus rapid transit lite	$68,200	$18,100	$50,100	$68,200	$23,100	$45,100	$68,200	$37,000	$31,200			
Increased frequency of transit with express service												
Buffered/protected bike lanes				$19,700	$11,600	$8,100				$19,700	$11,700	$8,000
Intersection improvements for bikes/ pedestrians/ auto	$30,800	$30,800	$0	$30,800	$30,800	$0	$30,800	$30,800	$0	$30,800	$30,800	$0
Subtotal- Soquel/Freedom	$99,000		$50,100	$118,700		$53,200	$99,000		$31,200	$50,500		$8,000
Rail Right of Way												
Bike and pedestrian trail[1]	$221,500	$179,900	$41,600	$283,000	$197,700	$85,300	$258,400	$209,300	$49,100	$283,000	$186,900	$96,100
Local rail transit with interregional connections [2]				$339,800	$99,000	$240,900				$339,800	$86,000	$255,000
Bus transit connections to rail				$11,700	$0	$11,700				$11,700	$0	$11,700
Bus rapid transit							$264,800	$96,000	$169,300			
Freight service on rail[4]							NA	NA	NA	NA	NA	NA
Subtotal Rail Right-of-Way	$221,500		$41,600	$634,500		$337,900	$523,200		$218,400	$634,500		$362,800
SCENARIO TOTAL- (2018 dollars)	**$901,100**	**$379,000**	**$522,100**	**$884,400**	**$454,700**	**$429,800**	**$728,500**	**$455,400**	**$273,100**	**$1,279,300**	**$454,500**	**$826,000**

[1]For Scenarios A and C, trail project costs would be reduced to $198 million and $240 million respectively, if trail project includes Segment 17 alternative alignment. For Scenario B and E, if trail project includes Segment 17 alternative alignment, the trail project cost would be reduced to $211 million.

[2]For Scenarios B and E with rail transit, costs are for diesel multiple units. The cost for an electrified rail system that utilizes electrical multiple unit vehicles is estimated to cost a total of $549.5 million.

[4]Capital cost for freight service on rail line are the responsibility of the common carrier.

Table 40: New Public Investments for Operation and Maintenance Costs- Cost Estimates and Potential Funding Amounts by Project Scenario – In 2018 dollars (1000's)

NEW PUBLIC INVESTMENT – ANNUAL OPERATIONS & MAINTENANCE (O&M) (IN THOUSANDS)	Scenario A			Scenario B			Scenario C			Scenario E		
	Annual Cost- O&M[1]	Funding Potential- O&M	NEW Public Investment- O&M	Annual Cost- O&M[1]	Funding Potential- O&M	NEW Public Investment- O&M	Annual Cost- O&M[1]	Funding Potential- O&M	NEW Public Investment- O&M	Annual Cost- O&M[1]	Funding Potential- O&M	NEW Public Investment- O&M
Highway 1 Projects												
Buses on shoulders - (end point varies depending on aux lanes included)				$3,500	$3,500	$0	$3,500	$3,500	$0			
High occupancy vehicle lanes (HOV) & increased transit (incl. ramp metering)	$8,400	$2,900	$5,500							$8,400	$6,000	$2,400
Auxiliary lanes to extend merging distance	$1,200	$1,200	$0				$1,200	$1,200	$0	$1,200	$1,200	$0
Metering of on-ramps w/o HOV (including intersection/ramp improvements)				$0	$0	$0						
Additional lanes on bridge over San Lorenzo River	$23	$23	$0									
Mission St intersection improvements	$0	$0	$0	$0	$0	$0						
Subtotal- Hwy 1	$9,600		$5,500	$3,500		$0	$4,700		$0	$9,600		$2,400
Soquel Avenue/Drive and Freedom Blvd												
Bus rapid transit lite	See cell below	See cell below	See cell below	See cell below	See cell below	See cell below	See cell below	See cell below	See cell below			
Increased frequency of transit with express service	$14,300	$6,300	$8,000	$14,300	$2,900	$11,400	$14,300	$3,300	$11,000			
Buffered/protected bike lanes				$170	$170	$0				$170	$170	$0
Intersection improvements for bikes/pedestrians/auto	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal- Soquel/Freedom	$14,300		$8,000	$14,500		$11,400	$14,300		$11,000	$170		$0
Rail Corridor												
Bike and pedestrian trail	$606	$606	$0	$606	$606	$0	$606	$606	$0	$606	$606	$0
Local rail transit with interregional connections[2]				$16,200	$14,500	$1,700				$14,700	$13,300	$1,400
Bus transit connections to rail transit				$12,100	$3,200	$8,900				$12,100	$4,300	$7,800
Bus rapid transit							$10,000	$8,700	$1,300			
Freight service on rail							$275	$275	$0	$1,500	$1,500	$0
Subtotal Rail ROW	$606		$0	$28,900		$10,600	$10,900		$1,300	$28,900	19,693	$9,200
Overall Project Area[3] Transportation System Management and Demand Management	$900	$900	$0	$900	$900	$0	$900	$900	$0	$900	$900	$0
SCENARIO TOTAL[3](2018 dollars)	**$25,400**	**$12,000**	**$13,500**	**$47,800**	**$26,000**	**$21,800**	**$30,800**	**$18,500**	**$12,300**	**$39,600**	**$28,000**	**$11,600**

[1]Annual Operations and Maintenance includes costs for all new transit (rail/bus rapid transit/bus) service vehicle operations and vehicle maintenance. Also includes facility maintenance for trail projects, BRT on the Santa Cruz Branch Rail Line as applicable by scenario and passenger rail service. Rail facility cost maintenance is assumed to be split 50/50 between passenger rail service and freight when freight service is also provided. The annual cost of facility maintenance on state highways are allocated by Caltrans and facility maintenance on local roads are allocated by local jurisdictions. Therefore the annual maintenance cost estimated for projects included in the UCS within Caltrans and local jurisdictions right-of-way are fully funded by the these entities and the new level of public investment is zero for the purpose of the UCS.

[2]For Scenarios B and E with rail transit, costs are for diesel multiple units. Electrifying rail and operating electrical multiple unit vehicles would I be less than maintenance for diesel multiple units and would be $11,800,000 annually.

[3]Projects evaluated for the entire project area, "Overall Project Area", are considered funded by local jurisdictions and non-profit agencies other than the RTC with the exception of Education and Enforcement. Education and Enforcement programs and the Cruz511 Transportation Systems Management resources assumed to be funded in part by RTC with existing funding sources administered by the RTC in combination with non-traditional transportation grant funding sources.

Visitor Tax Revenue and Other Economic Impacts

Access can increase when travel times are reduced, new transportation choices or routes are available, or safety is improved. Santa Cruz County's biggest economic generators: agriculture, tourism, and technology industries rely upon access to markets and services. Santa Cruz County residents rely on access to educational institutions, jobs, and services. The economic benefits resulting from increased access accrue to different stakeholders, such as business owners, property owners, government entities (via additional tax revenue), and users of the transportation system itself. Improved access to visitor destinations and the introduction of new transportation-related visitor amenities – in this case, a new trail and excursion rail service – can also attract visitors, lengthen visits, and expand visitor spending.

While some highway and other road improvements may be necessary to support growth in existing employment centers, transit can be a particularly powerful force in facilitating density and economic growth by serving as a focal point for higher-intensity development and expanding firms' access to a skilled workforce. Since changes in access can enhance the desirability of particular locations – especially in the case of robust transit service – local property owners can benefit from increased property values and development potential. Public agencies can benefit from increased tax revenues associated with changes in business activity and property values.

The factors determining economic benefits for each scenario are described in detail in the following pages. Generally, several common factors are considered:

1. **Area impacted by the transportation improvement:** Projects that generate a corridor-wide benefit for users – such as HOV lanes on Highway 1 – primarily provide an aggregate regional benefit by enabling greater access to destinations. Projects with a more localized impact – such as bike lanes in limited areas or local improvements for automobile circulation – primarily enhance access to local businesses. Despite these differences, all project types do ultimately benefit the region as a whole by enhancing overall accessibility between user destinations.

2. **Who benefits from the improvement:** The different impacts of each improvement must be considered based on the destinations being connected and the timing of a certain group's trips. For example, peak-hour commuters benefit most significantly from improvements that reduce travel times – such as HOV lanes on Highway 1 – or provide new options during periods of significant traffic congestion – such as rail transit. Visitors will primarily benefit from improvements that function on weekends and therefore would be served less well by peak-hour HOV lane restrictions or more limited weekend transit service. Companies requiring freight rail access benefit from inclusion of freight services on the rail right-of-way.

3. **Creation of a new transportation route:** The rail right-of-way projects – whether trail, rail, and/or bus rapid transit – will create an all-new travel route that does not currently exist. As a result, the projects on this route hold significant potential to reorganize resident and visitor travel patterns and support economic activity in destinations with convenient new connections.

4. **Creation of a new amenity:** Rail right-of-way projects include new amenities that serve as both practical transportation and a new amenity that will draw visitors and residents alike. The scenarios include a bicycle and pedestrian trail, rail service (passenger or excursion rail), and bus rapid transit service.

It is important to note that, while numerous studies have established connections between transportation improvement projects and economic benefits, the benefits are often diffuse across the region and between different stakeholders. As a result, it is difficult or even impossible to accurately measure every economic benefit associated with every individual project in the UCS study.

In order to provide information about the relative economic contribution and rank the scenarios related to RTC's goal of "Developing a well-integrated transportation system that supports economic vitality," six categories of economic benefit were evaluated:

- **Visitor Related Tax Revenues:** changes in annual transient occupancy tax (TOT) revenue and sales tax revenue associated with visitor spending;
- **Business Location Decisions:** changes in business location decisions within Santa Cruz County and from outside the County;
- **Changes in Development Potential and Property Values/Rents:** changes in average property values, average rents, and potential impacts on increased development activity;
- **Changes in Business Performance:** impacts on annual retail and restaurant sales growth;
- **Other Tax Revenue:** changes above existing property tax revenue, sales tax revenue, and business license tax revenue; and
- **User Benefits:** impacts on access to jobs, shopping, and other destinations, impacts on household costs, and impacts on quality of life.[39]

Part of the evaluation included an examination of how each of the transportation routes (Highway 1, Soquel/Freedom and the Rail Right of Way) and transportation projects relate to major existing "activity nodes." The areas are shown in **Figure 32**. The nodes represent larger clusters of commercial, industrial, and visitor destinations. Although the criteria are somewhat subjective, "local" activity nodes are generally more likely to attract people from a smaller area. Examples include clusters of local-serving retailers, restaurants, and services. "Regional" activity nodes attract people from a larger area, and include places such as major retail destinations, tourist destinations, large educational institutions, and larger mixed-use downtowns. Regional nodes are likely to benefit significantly from regional transportation improvements impacting their access. Finally, "industrial" activity nodes require automobile and freight access to support their employee and supply chain needs.

[39] Impacts on household transportation costs are analyzed separately from this broader assessment of user benefits.

Figure 32: Major Existing Activity Nodes

Santa Cruz Area
Activity Nodes by Type, and Major Parks

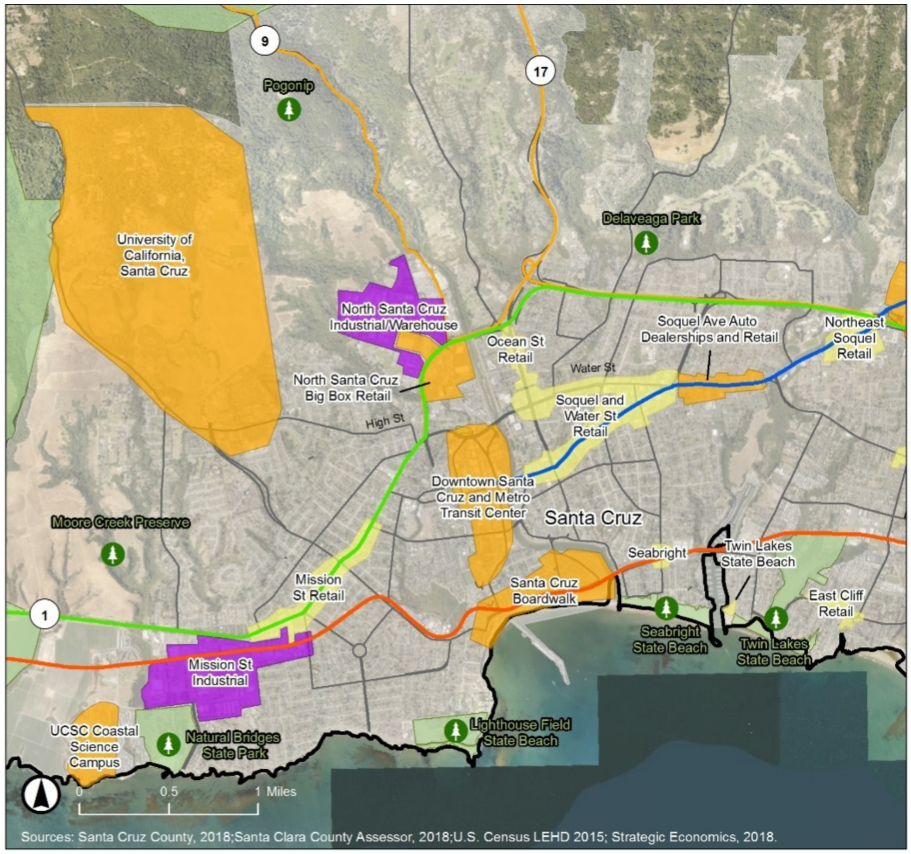
Activity Nodes

- Local
- Regional
- Industrial (Automobile and Freight Oriented)
- Major Parks

Project Corridors

- Highway 1
- Rail Line
- Soquel & Freedom

- Highways
- Major Roads
- State Park Boundaries
- Cities and Census-Designated Places
- Santa Cruz County



STRATEGICECONOMICS

Capitola Area
Activity Nodes by Type, and Major Parks

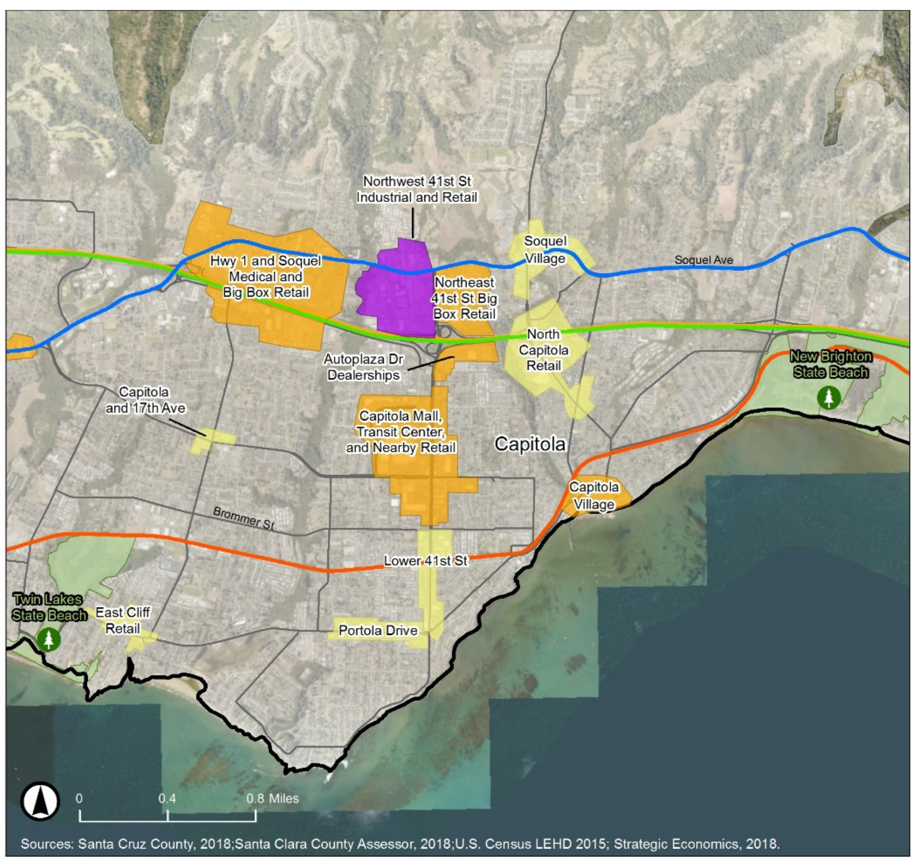
Activity Nodes

- Local
- Regional
- Industrial (Automobile and Freight Oriented)
- Major Parks

Project Corridors

- Highway 1
- Rail Line
- Soquel & Freedom

- Highways
- Major Roads
- State Park Boundaries
- Cities and Census-Designated Places
- Santa Cruz County



STRATEGICECONOMICS

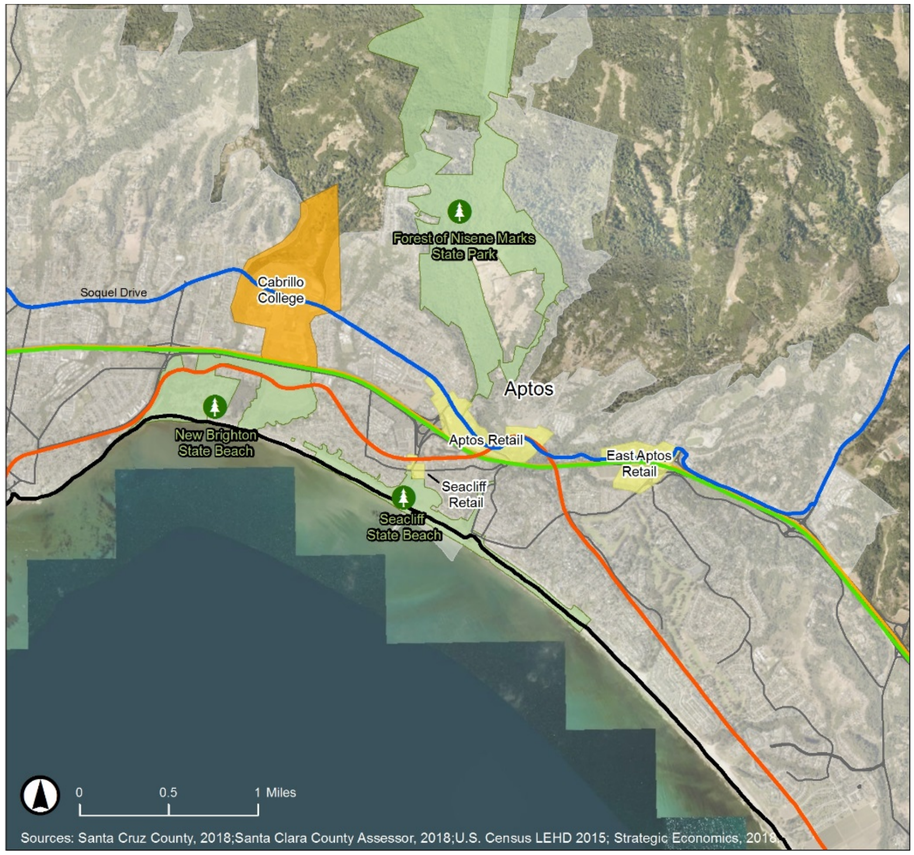
Aptos Area
Activity Nodes by Type, and Major Parks

Activity Nodes
- Local
- Regional
- Industrial (Automobile and Freight Oriented)
- Major Parks

Project Corridors
- Highway 1
- Rail Line
- Soquel & Freedom

- Highways
- Major Roads
- State Park Boundaries
- Cities and Census-Designated Places
- Santa Cruz County

STRATEGICECONOMICS



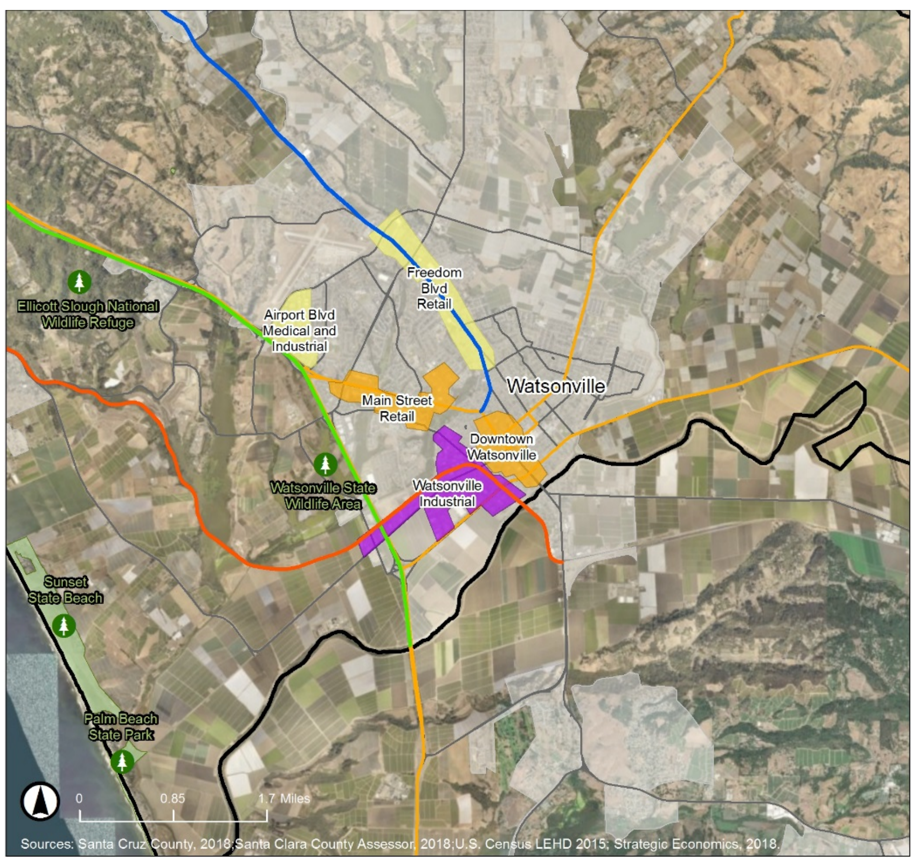
Watsonville Area
Activity Nodes by Type, and Major Parks

Activity Nodes
- Local
- Regional
- Industrial (Automobile and Freight Oriented)
- Major Parks

Project Corridors
- Highway 1
- Rail Line
- Soquel & Freedom

- Highways
- Major Roads
- State Park Boundaries
- Cities and Census-Designated Places
- Santa Cruz County

STRATEGICECONOMICS



VISITOR TAX REVENUE

The 2035 transient occupancy tax (TOT) revenue and visitor related sales tax revenue (**Table 41** and **Figure 33**) are estimated based on overall improvements in visitor access to major destinations, lodging, shopping, and recreational amenities and potential new visitor attractions. This improved access and the amenities can attract additional visitors and encourage visitors to stay more often or longer – resulting in increased hotel demand and room rates/revenues – and increase their overall spending.

The relative impacts of the scenarios on TOT and visitor related sales tax revenue are estimated at the countywide level for each scenario. This approach recognizes that, while each individual transportation project is associated with a benefit to visitors, the overall improvement to the transportation network determines the comprehensive benefits to visitors.

Existing literature demonstrates that positive visitor impacts are associated with the different types of projects and with improved access to destinations. For example, bicycle projects can attract new visitors and increased visitor spending; various studies have found that the average travel party (a group of cyclists traveling together) spent $116 in a typical day trip,[40] that general trail users spent an average of 20 to 30 or more dollars per visit,[41] [42] and that revenue and foot traffic grow in conjunction with new bicycle lanes[43] and infrastructure.[44]

Impacts on TOT and visitor related sales tax revenue are estimated for each scenario based on differences in projected growth rates. The No Build scenario growth rates were based on historic trends. TOT revenues were projected to increase by 49 percent (in constant dollars) from 2015 to 2035 in the No Build scenario, based on a 2 percent annual growth rate reflecting recent trends in annual growth rates of countywide TOT revenue (in constant dollars) and hotel inventory.[45] Visitor related sales tax revenues are projected to increase by 15 percent (in constant dollars) over the same period in the No Build scenario, based on a 0.7 percent annual growth rate. This relatively modest increase reflects historically slow long-term growth in visitor related sales tax revenues in Santa Cruz County, after adjusting for inflation.

The TOT and visitor related sales tax revenue growth rates are adjusted between scenarios based on the anticipated, relative, overall impacts of transportation network enhancements on assisting visitors in circulating within major destination areas and traveling between destinations, as well as attracting new visitors to new projects such as the bicycle and pedestrian trail on the rail right-of-way. The overall magnitude of growth rate differences between the scenarios is relatively modest, since the impacts of the transportation improvement projects are marginal compared to the existing countywide base of activities generating visitor related tax revenue.

The assessment placed particular weight on two factors: the extent to which a scenario's projects assist visitors in reaching visitor destinations, and whether the scenario's projects create a new visitor attraction. Examples of major visitor destinations include the Santa Cruz Beach Boardwalk, Santa Cruz Wharf, Downtown Santa Cruz, Capitola Village, Davenport, beaches, and other major parks and recreation areas. As shown in the preceding maps, many of the projects along Highway 1 and Soquel Avenue/Drive and Freedom Boulevard are located away from these destinations. As a result, these projects' impacts on visitor spending will be diffuse and marginal, as each individual visitor experiences slight improvements in

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[40] Dean Runyan Associates, "The Economic Significance of Bicycle Related Travel in Oregon," *Travel Oregon*, April 2013.
[41] East Central Florida Regional Planning Council, "Economic Impact Analysis of Orange County Trails," 2011.
[42] Trails for Illinois, "Making Trails Count in Illinois," 2013.
[43] Flusche, Darren, "Advocacy Advance: Tools to Increase Biking and Walking," 2012.
[44] Ibid.
[45] The annual growth rate for TOT was adjusted to account for increases to TOT revenue resulting from increases to the TOT rate.

ease of travel. In contrast, projects along the rail right-of-way will significantly benefit visitors by linking multiple visitor-oriented destinations via bicycle, pedestrian access, and/or new transit.

The projects along the rail right-of-way also serve as new visitor attractions themselves, resulting in a further positive impact on visitor spending. All scenarios include a new bike and pedestrian trail, and scenarios B and E include an excursion train from Santa Cruz to Davenport. Many of these visitors will have come to Santa Cruz regardless of these amenities' existence, but these projects will still have a relatively strong impact on drawing new visitors and additional spending.

The more specific factors determining relative differences in visitor related revenue growth rates are described below:

Scenario A: Scenario A focuses heavily on improvements to automobile circulation, which will incrementally enhance visitor access to major destinations (the vast majority of visitors drive while in Santa Cruz County.)[46] However, many of these improvements will be located in areas of Highway 1 that do not directly serve visitor destinations. The trail along the rail right-of-way is projected to experience its highest level of pedestrian and bicyclist trips in Scenario A, which will drive additional visitor spending – although the overall, relative impact on countywide visitor tax revenues will be limited since the projected trail usage only varies slightly between scenarios, and visitors will make up a small share of total trail users. Scenario A TOT revenue and visitor related sales tax revenue annual growth rates were estimated to be 8 percent and 14 percent higher, respectively, compared to the No Build scenario (**Table 40**). These differences in growth result in 2.8 percent greater total visitor related tax revenues compared to the No Build scenario in 2035.

Scenario B: This scenario includes a balanced mix of automobile, bicycle, and transit improvements, including buffered/protected bike lanes on Soquel/Freedom and local rail transit with interregional connections. The inclusion of passenger rail provides significant benefits to visitors since it connects major destinations and potentially enhances visitor access to the county via future regional connections. The addition of excursion rail to Davenport will also create an all-new visitor attraction. Scenario B is estimated to generate the greatest impact on visitor spending due to these factors. Scenario B TOT revenue and visitor related sales tax revenue annual growth rates were estimated to be 9 percent and 15 percent higher, respectively, compared to the No Build scenario (**Table 41**). These differences result in 3.1 percent greater total visitor related tax revenues compared to the No Build scenario in 2035.

Scenario C: Bus rapid transit service on the rail right-of-way would expand visitor travel and spending between destinations in Santa Cruz and Capitola. On balance, however, impacts on visitor spending are likely to be relatively modest in this scenario since it lacks the excursion train to Davenport, provides slower bus rapid transit service between destinations along the rail right-of-way, and lacks many Highway 1 improvements. Scenario C TOT revenue and visitor related sales tax revenue annual growth rates were estimated to be 6 percent and 7 percent higher, respectively, compared to the No Build scenario (**Table 41**). These differences result in 2 percent greater total visitor related tax revenues compared to the No Build scenario in 2035.

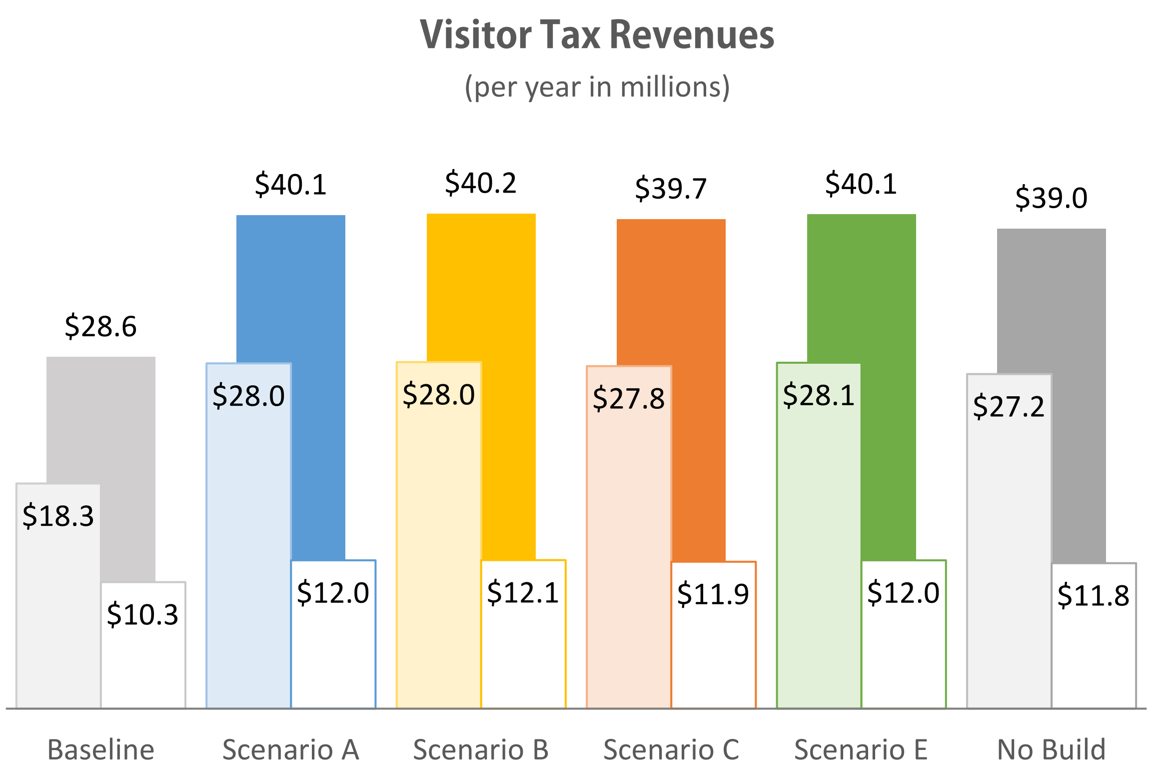
Scenario E: This scenario includes the same passenger rail service, excursion rail to Davenport, and rail corridor trail that were included in Scenario B. As a result, impacts on visitor spending are likely to be similar to Scenario B, although slightly reduced due to the exclusion of Mission Street intersection improvements and transit services on Soquel Avenue/Drive and Freedom Boulevard. Scenario E TOT revenue and visitor related sales tax revenue annual growth rates were estimated to be 8.5 percent and 14 percent higher, respectively, compared to the No Build scenario (**Table 41**). These differences result in 3 percent greater total visitor related tax revenues compared to the No Build scenario in 2035.

[46] Local hotel operators interviewed for this study estimated that 80 to 90 percent of visitors arrive by car, with others typically arriving by charter bus and using rideshare (e.g., Uber and Lyft) or taxi services for local transportation.

Table 41: Visitor Related Tax Revenues by Scenario (2015 dollars)

Tax Revenue	2015	2035				
		No Build	Scenario A	Scenario B	Scenario C	Scenario E
Transient Occupancy Tax	$18,283,000	$27,167,576	$28,032,714	$28,142,678	$27,814,008	$28,087,645
Visitor Related Sales Tax	$10,275,000	$11,813,300	$12,045,370	$12,062,111	$11,928,799	$12,045,370
Total	$28,558,000	$38,980,876	$40,078,084	$40,204,789	$39,742,807	$40,133,015

Figure 33: Visitor Tax Revenues



OTHER ECONOMIC BENEFITS

Based on a review of literature on the economic benefits associated with an array of transportation improvements, this evaluation considers the specific projects included in each of the scenarios and qualitatively evaluates the relative potential impacts (**Table** 42) on each category of benefits as listed above.

CHANGES IN BUSINESS LOCATION DECISIONS

Transit and roadway investments can influence business location decisions by improving access to labor, customers, distributors, raw materials, and professional services. Transportation investments can shift the balance of locations that enjoy more convenient access to these resources. By reducing the access time between people, resources, and businesses, transportation investments support “agglomeration economies” that provide benefits of enhanced proximity or access, such as more efficient sharing of information, suppliers, distributors, and workers.[47]

New transit investments or transportation investments that create an entirely new means of access are likely to generate an outsized impact on business location decisions, since businesses can either access new customers, or locate in an area that was previously too congested to consider. Higher densities have been shown to support increased productivity and economic growth; for example, research by the Federal Reserve has shown that cities with higher employment densities tend to have more patents per capita, all else being equal.[48] Finally, investments that result in reduced congestion, less time spent in traffic, safer roads, or improved environmental quality also contribute to a higher quality of life, an important factor in attracting new households and businesses to a city or region.[49]

Although proximity to transit is increasingly valued as an amenity, freeway-accessibility remains the key factor for office and shopping center locations in most places. For this reason, key improvements to Highway 1 are expected to influence business location decisions for those uses. Similarly, improvements to freight service are expected to influence business location decisions for uses that rely on freight, such as logistics, warehouse, and manufacturing.

Based on the specific projects included in each of the scenarios, the relative potential impacts on business location decisions were evaluated. These findings indicate that scenarios including all new transportation options along the rail right-of-way– particularly those that include new transit such as BRT or light rail – are likely to most significantly impact business location decisions by creating new commute connections. Scenarios with local improvements to bicycle and pedestrian access are also likely to perform well by encouraging clustering of customer-serving businesses in these areas.

Scenario A: This scenario includes several highway and road-related improvements that would be expected to improve automobile access to businesses, but not significantly shift existing business location patterns. Scenario A also includes some improvements prioritizing pedestrian and bicycle traffic, and a new pedestrian/bicycle trail on the rail right-of-way, but other transit commute options are not provided. Impact ranking: High.

Scenario B: This scenario includes significant improvements to bicycle and transit facilities, including buffered/protected bike lanes, a pedestrian/bicycle trail on the rail right-of-way and local rail transit with interregional connections, that would be expected to contribute to shifts in business locations. Scenario B also includes key Highway 1 projects, like Mission St intersection improvements, that would improve auto-access to key locations. Impact ranking: High.

Scenario C: This scenario includes key transit and road-related improvements that would be expected to improve bus and automobile-access to businesses, including the all-new bus rapid transit service on the rail corridor and intersection improvements for automobiles. Scenario C could have an even more significant impact on business location decisions if it included additional bicycle improvements. The inclusion of freight service in Scenario C could influence business location decisions for uses that rely on freight, although the impacts could be limited by the service limitations in this scenario. Impact ranking: Moderate-High.

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[47] Iacono and Levinson, “Case Studies of Transportation Investment to Identify the Impacts on the Local and State Economy,” 2013; Belzer, Srivastava, and Austin, "Transit and Regional Economic Development," 2011.
[48] Carlino, Chatterjee, and Hunt, "Urban Density and the Rate of Invention,” 2007.
[49] Litman, "Evaluating Transportation Economic Development Impacts: Understanding How Transport Policy and Planning Decisions Affect Employment, Incomes, Productivity, Competitiveness, Property Values and Tax Revenues," 2010; Forkenbrock and Weisbrod, "Guidebook for Assessing the Social and Economic Effects of Transportation Projects," 2001.

Scenario E: Like Scenario B, this scenario includes buffered/protected bike lanes and local rail transit with interregional connections that could contribute to changes in business location decisions. Scenario E also includes new HOV lanes on Highway 1, but it lacks other key transit and road-related improvements, such as intersection improvements for automobiles, that would improve bus and automobile-access to businesses and further encourage clustering of businesses at key transit nodes. The inclusion of freight service in Scenario E could influence business location decisions for uses that rely on freight. Impact ranking: Moderate-High.

CHANGES IN DEVELOPMENT POTENTIAL AND PROPERTY VALUES/RENTS

A large body of research has shown that multi-modal transportation investments can help support higher property values, and that transit investments in particular can help attract and enable new, higher-intensity development.[50] Property owners and renters are willing to pay a premium to locate where they can take advantage of the improved accessibility and other benefits provided by transit and bicycle and pedestrian improvements. For example, a recent series of studies on property values around San Diego's rail transit stations found that all else being equal, a condominium located within a quarter-mile of a rail station was worth 16 percent more than a condominium located a mile away from a station, while a single-family home located within a quarter-mile of a rail station was worth 6 percent more than one located a mile away.[51] A 2010 national study showed that commercial properties with high Walk Scores were valued an average of 54 percent higher than those with low Walk Scores.[52] A 2005 study found that homes located near a trail in Austin, Texas, were valued from 6 to 20 percent higher than those further from the trail. Differences in the home values depended on whether they had direct access to the trail.[53]

Property value premiums were generally higher near transit stations located in more pedestrian-oriented neighborhoods[54] and in higher-density zoning districts.[55] In general, transit improvements appear to have the greatest impact on property values and new development when the corridor or system significantly improves residents' access to employment and other destinations; provides frequent, high-quality, regional service; and is combined with local zoning and land use regulations that facilitate transit-oriented development (TOD), especially in walkable, mixed-use neighborhoods.[56]

A recent study of new BRT lines in Cleveland, Ohio, Eugene, Oregon and Kansas City, Missouri concluded that BRT projects with dedicated rights-of-way and other substantial physical infrastructure can serve as focal points for attracting new development, particularly if located near major institutions and/or employment centers and paired with supportive land use policies and development incentives.[57] A comparative study of 21 North American light rail and bus rapid transit lines also found that transit lines

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[50] Wardrip, "Public Transit's Impact on Housing Costs: A Review of the Literature," August 2011.
[51] Duncan, "Comparing Rail Transit Capitalization Benefits for Single-Family and Condominium Units in San Diego, California," December 2008.
[52] Pivo, Gary, and Fisher, Jeff. "Walkability Premium in Commercial Real Estate Investments." (Working Paper) Responsible Property Investment Center, University of Arizona. Benecki Center for Real Estate Studies, Indiana University. 2010.
[53] Nicholls, Sarah, and Crompton. "The Impact of Greenways on Property Values: Evidence from Austin, Texas." Journal of Leisure Research, 2005.
[54] Duncan, "The Impact of Transit-Oriented Development on Housing Prices in San Diego, CA," 2011.
[55] Duncan, "The Synergistic Influence of Light Rail Stations and Zoning on Home Prices," 2011.
[56] Wardrip, "Public Transit's Impact on Housing Costs: A Review of the Literature," 2011; Fogarty and Austin, "Rails to Real Estate: Development Patterns along Three New Transit Lines," 2011; Fogarty et al., "Downtowns, Greenfields, and Places in Between: Promoting Development Near Transit," 2013.
[57] United States Government Accountability Office, "BRT: Projects Improve Transit Service and Can Contribute to Economic Development," 2012.

located adjacent to downtowns or other major destinations had the strongest impact on development, while lines located adjacent to highways or other barriers had a more limited impact.[58]

Based on the specific projects included in each of the scenarios, the relative potential impacts on development and property values were evaluated. These findings indicate that scenarios including significant improvements to local accessibility such as new bicycle, rail, and bus rapid transit facilities are likely to have the most significant impacts on development potential and property values.

Scenario A: This scenario is relatively more highway-oriented than the other scenarios. While Scenario A does include bus rapid transit lite, such incremental improvements to existing facilities are not expected to have significant impact on development potential and property values. Scenario A, like all of the scenarios, does include the new pedestrian/bicycle trail on the rail right-of-way, which is the type of facility likely to improve accessibility and walkability and to have an impact on development potential and property values. Impact ranking: Moderate.

Scenario B: This scenario includes significant improvements to bicycle and transit facilities, including buffered/protected bike lanes and local rail transit with interregional connections. Scenario B, like all of the scenarios, includes the new pedestrian/bicycle trail on the rail right-of-way, which is the type of facility likely to have an impact on development potential and property values. Of the four build scenarios, Scenario B has the highest concentration of projects shown to help attract and enable new, higher-intensity development and support higher property values. Impact ranking: High.

Scenario C: Scenario C, like all of the scenarios, includes the new pedestrian/bicycle trail on the rail right-of-way, which is the type of facility likely to have an impact on development potential and property values. This scenario also includes bus rapid transit, which could be impactful, but lacks some of the other roads and bicycle improvements that would further contribute to accessibility. Impact ranking: Moderate.

Scenario E: Scenario E, like all of the scenarios, includes the new pedestrian/bicycle trail on the rail right-of-way, which is the type of facility likely to have an impact on development potential and property values. Like Scenario B, this scenario also includes buffered/protected bike lanes and local rail transit with interregional connections, but it lacks some of the other roads and transit improvements that would contribute to accessibility and support increased development potential and property values. Impact ranking: Moderate.

CHANGES IN BUSINESS PERFORMANCE

While successful commercial corridors give preference to pedestrian access, automobile access and easily accessible parking are also critical to the success of commercial districts. “Traffic calming” or “sustainable streets” improvements that maintain automobile access while prioritizing pedestrian and bicycle traffic – such as reduced speed limits, narrowed lanes, and new bike lanes – have been shown to increase retail sales. For example, a 2013 study by the New York City Department of Transportation compared business performance in retail districts where the Department had recently implemented sustainable streets improvements, with nearby retail districts that had experienced no improvements. In most instances, the study found that districts with sustainable street improvements saw sales improvements above and beyond either comparison areas or borough averages, with sales in some districts improving by up to 102 percent in three years.[59] A 2003 study of the economic impacts of traffic calming on urban small businesses found that after the installation of bike lanes on Valencia Street in San Francisco, business owners reported an increase in sales, pedestrian and cyclist activity, and new

[58] Hook, Lotshaw, and Weinstock, "More Development for Your Transit Dollar: An Analysis of 21 North American Transit Corridors,” 2013.
[59] New York City Department of Transportation, “Economic Benefits of Sustainable Streets,” New York City Department of Transportation, 2013.

customers from outside the district.[60] Recreational trails that may not be adjacent to commercial corridors have also been shown to increase retail sales. For example, a 2007 study on the Virginia Creeper Rail Trail in south-western Virginia found that visitors to the trail spend about $1.2 million annually in the communities surrounding the trail.[61] A survey of visitors to trails in Illinois found that 35 percent of respondents spent money in restaurants and bars during their visit to the trail.[62]

Based on the specific projects included in each of the scenarios, the relative potential impacts on business performance were evaluated. These findings indicate that scenarios including significant bicycle and pedestrian realm improvements as well as improved automobile-access are likely to have the most significant impacts on performance of commercial districts.

Scenario A: This scenario includes several highway and road-related improvements that would be expected to improve automobile access to businesses and thus contribute to retail sales and business performance. Scenario A also includes some improvements prioritizing pedestrian and bicycle traffic, but it does not include some significant bicycle and transit improvements. Scenario A, like all of the scenarios, includes the new pedestrian/bicycle trail on the rail right-of-way, which is a type of facility shown to have impacts on retail sales. Impact ranking: Moderate-High.

Scenario B: This scenario includes significant improvements to bicycle and transit facilities, including buffered/protected bike lanes and local rail transit with interregional connections, that would be expected to contribute to retail sales and business performance. Scenario B, like all of the scenarios, includes the new pedestrian/bicycle trail on the rail right-of-way, which is a type of facility shown to have impacts on retail sales. Scenario B also includes key highway projects. Because Scenario B includes significant improvements to bicycle, transit, and auto-access, it is ranked highest in this performance measure. Impact ranking: High.

Scenario C: This scenario includes key transit and road-related improvements that would be expected to improve bus and automobile-access to businesses and thus contribute to retail sales and business performance. Scenario C, like all of the scenarios, includes the new pedestrian/bicycle trail on the rail right-of-way, which is a type of facility shown to have impacts on retail sales. Scenario C could have an even more significant impact on business performance if it included additional bicycle and pedestrian improvements. Impact ranking: Moderate-High.

Scenario E: Scenario E includes the new pedestrian/bicycle trail on the rail right-of-way, which is a type of facility shown to have impacts on retail sales. Like Scenario B, this scenario also includes buffered/protected bike lanes and local rail transit with interregional connections that could contribute to business performance, but it lacks other key transit and road-related improvements that would contribute to bus and automobile-access to businesses and thus contribute to business performance. Impact ranking: Low.

LOCAL TAX REVENUE

Local tax revenues are directly influenced by development, changes to property values, and business performance. Higher property values will translate into additional property tax benefit for the local governments in Santa Cruz County. Similarly, increased retail spending in the county will translate into additional sales tax revenue for local governments. And as described in the previous section, increased visitation, hotel demand and higher room rates will translate into higher annual TOT revenue for local governments in Santa Cruz County. Since changes in access can enhance the desirability of particular

[60] Drennen, Emily, "Economic Impacts of Traffic Calming on Urban Small Businesses," San Francisco State University, 2003.
[61] Bowker, J.M., Bergstrom, John, and Gill, Joshua, "Estimating the economic value and impacts of recreational trails: a case study of the Virginia Creeper Rail Trail," Tourism Economics, 2007.
[62] Trails for Illinois and the Rails-to-Trails Conservancy, "Making Trails Count" 2012.

locations – especially in the case of robust transit service – local property owners can benefit from increased property values and development potential, and public agencies can benefit from increased tax revenues associated with changes in business activity and property values. Strong transit corridors can help focus development in more concentrated areas, which supports infill development and provides an important counterbalance to employment sprawl. This focused employment growth also fosters residential neighborhoods close to employment centers and reinforces the region's existing tax base.

A 2014 study of public transit spending found that in the United States, $1 billion of spending on public transit supports 21,800 jobs. This includes direct jobs and economic activity from manufacturing, construction, and operations of public transportation; indirect jobs activity created through purchases of vehicles, equipment, and other supplies; and induced jobs created as workers spend their incomes on goods and services. The economic activity associated with $1 billion in public transit spending also generates approximately $3 billion of added business output (sales), and approximately $432 million in federal, state, and local tax revenues.[63]

Based on the specific projects included in each of the scenarios, the relative potential impacts on local tax revenues were evaluated. Consistent with the preceding findings on other economic benefits, these findings indicate that scenarios including significant improvements to local accessibility such as new bicycle, rail, and bus rapid transit facilities are likely to have the most significant impacts on development potential, property values, and business performance, and thus are likely to have the most significant impacts on local tax revenues.

Scenario A: This scenario is relatively more highway-oriented than the other scenarios. While Scenario A does include bus rapid transit lite, such incremental improvements to existing facilities are not expected to have significant impact on development potential and property values. Scenario A, like all of the scenarios, does include the bike and pedestrian trail, which could have an impact on improving accessibility and walkability. Impact ranking: Moderate-High.

Scenario B: This scenario includes significant improvements to bicycle and transit facilities, including buffered/protected bike lanes and local rail transit with interregional connections. Of the four scenarios, Scenario B has the highest concentration of projects shown to help attract and enable new, higher-intensity development, support higher property values, and contribute to business performance, thus contributing to local tax revenues. Impact ranking: High.

Scenario C: This scenario includes key transit and road-related improvements that would be expected to improve bus and automobile-access to businesses and thus contribute to business performance but lacks some of the other road and bicycle improvements that would contribute to development potential and property values. Scenario C could have an even more significant impact if it included additional bicycle and pedestrian improvements. Impact ranking: Moderate-High.

Scenario E: This scenario includes buffered/protected bike lanes and local rail transit with interregional connections, but it lacks some of the other key roads and transit improvements that would contribute to accessibility and support additional development potential and increased property values, and thus local tax revenues. Impact ranking: Moderate.

User Benefits

Transportation projects have a range of economic benefits to users, including improving access to jobs, shopping, and other destinations, and reducing overall housing and transportation costs. Reduced traffic congestion on roadways can mean less time in traffic for individuals and an improved quality of life.

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[63] Glen Weisbrod, Derek Cutler, and Chandler Duncan, "Economic Impact of Public Transportation Investment: 2014 Update," American Public Transportation Association, May 2014.

Transit investments, especially, can expand access to jobs, healthcare, education, and other critical destinations. This is especially important for low-income households who have limited access to cars. Transit systems that directly connect residential neighborhoods with major job centers can have the greatest impact on job access.[64] Reducing transportation costs can allow households to spend on other housing needs. These savings are particularly important for low-income households, who tend to spend a higher share of their incomes on transportation[65] (additional information is provided in the section on household transportation costs). Research indicates that freight rail can reduce costs for consumers. Some estimates show freight rail costing 1/10th as much as trucking goods, although it's not clear how much of that savings is passed on to consumers.[66] In 2003 the American Association of State Highway and Transportation Officials (AASHTO) estimated that if all freight rail traffic were shifted to trucks, rail customers would have to pay an additional $69 billion per year. [67]

Based on the specific projects included in each of the scenarios, the relative potential impacts on user benefits were evaluated. These findings indicate that all of the scenarios include improvements likely to produce significant user benefits.

Scenario A: This scenario includes several highway and road-related improvements, like new HOV lanes on Highway 1, that would be expected to reduce time spent in traffic and improve access to destinations by automobile for users. Scenario A also includes some improvements prioritizing pedestrian and bicycle traffic. Impact ranking: High.

Scenario B: This scenario includes significant improvements to bicycle and transit facilities, including buffered/protected bike lanes and local rail transit with interregional connections, that would be expected to provide significant user benefits by expand access to jobs, healthcare, education, and other critical destinations. Scenario B also includes key highway projects that could reduce time spent in traffic and improve access to destinations by automobile for users. Impact ranking: High

Scenario C: This scenario includes key transit and road-related improvements that would be expected to provide user benefits by improving access to critical destinations. The inclusion of freight service in Scenario C could potentially reduce costs for some consumer goods, although the extent of the impacts is not clear. Scenario C could have an even more significant impact on users if it included additional bicycle and pedestrian improvements that provide further quality of life improvements. Impact ranking: Moderate-High.

Scenario E: Like Scenario A, Scenario E includes new HOV lanes on Highway 1, which could reduce time spent in traffic and contribute to an improved quality of life for users. The inclusion of freight service in Scenario E could potentially reduce costs for some consumer goods, although the extent of the impacts is not clear. This scenario also includes buffered/protected bike lanes and local rail transit with interregional connections that could provide significant user benefits, but it lacks other key transit and road-related improvements that would contribute to bus and automobile-access for users. Impact ranking: Moderate-High.

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[64] Adie Tomer et al., "Missed Opportunity: Transit and Jobs in Metropolitan America," Brookings Institution, May 2011.
[65] Center for Neighborhood Technology and Virginia Tech, "Housing & Transportation Cost Trade-Offs and Burdens of Working Households in 28 Metros," July 2006.
[66] Federal Highway Administration Department of Transportation, Logistics Costs and U.S. Gross Domestic Product, August 2005, https://ops.fhwa.dot.gov/freight/freight_analysis/econ_methods/lcdp_rep/index.htm.
[67] Association of American Railroads, "Great Expectations: Railroads and U.S. Economic Recovery," February 2010.

Table 42: Summary of Relative Qualitatively-Assessed Economic Benefits

Category of Benefit	Scenario A	Scenario B	Scenario C	Scenario E
Changes in Business Location Decisions	High	High	Moderate-High	Moderate-High
Changes in Development Potential and Property Values/Rents	Moderate	High	Moderate	Moderate
Changes in Business Performance	Moderate-High	High	Moderate-High	Low
Local Tax Revenue	Moderate-High	High	Moderate-High	Moderate
User Benefits	High	High	Moderate-High	Moderate-High

Cost Associated with Collisions

The Federal Highway Administration (FHWA) has developed a methodology for forecasting reductions in collisions associated with implementation of transportation projects using collision modification factors. The FHWA methodology defines whether to apply the factors to the collisions for all severity levels or to one or more severity level. The collision modification factors for the projects evaluated in the UCS were applied to the total number of fatal, injury and property damage only collisions for all modes to show the relative comparison between the scenarios. The forecasted collisions for 2035 are related to the future traffic volumes estimates that are forecasted by the travel demand model for 2035. Traffic volume estimates vary by scenario due to the projects included in each scenario and therefore forecasted collisions also vary for each scenario. Similarly, the proportion of collisions that may be prevented by implementing specific types of projects may vary by scenario due to traffic volume differences in each scenario. An average cost per collision was then used to determine the reduction in collision costs by scenario.

The change in the tangible and intangible costs of motor vehicle collisions in the project study area based on project implementation for each scenario by 2035 is provided in **Table 43**. The tangible economic costs are estimated by the National Highway Traffic Safety Administration (NHTSA) and include lost productivity, medical costs, legal and court costs, emergency service costs, insurance administration costs, congestion costs, property damage and workplace losses. NHTSA estimates that traffic collisions cost an average of $38,100 in material losses. Intangible costs due to lost quality of life from injuries and death are estimated by Caltrans at an average of $185,600 per collision in 2016 dollars. These two estimates suggest that losses from vehicle collisions average out to $223,700 per incident in 2016 dollars. Based on that assumption, the forecast reductions in collisions outlined in the safety section of this report provides an annual cost savings for each project and scenario as shown in **Table 43** and **Figure 34**. The results mirror the results shown in **Table 31** with the estimate of the number of collisions reduced by project and scenario. The projects that are estimated to provide the greatest savings due to a reduction in the number of collisions are education and enforcement, ramp metering, the bicycle and pedestrian trail on the rail right-of-way and buffered bicycle lanes on Soquel Ave/Soquel Dr/Freedom Blvd. Scenario B shows the greatest savings in cost associated with a reduction in collisions due to Scenario B having the least amount of traffic volume increase and the greatest number of projects that have anticipated safety benefits.

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Table 43: Costs Associated with the Number of Collisions in Project Study Area by Project and Scenario (In year 2016 dollars)

Location	2015 Collisions	2035 No Build Collisions	2035 Collisions Scenario A		2035 Collisions Scenario B		2035 Collisions Scenario C		2035 Collisions Scenario E	
			Reductions	Savings	Reduction	Savings	Reduction	Savings	Reduction	Savings
Highway 1										
HOV lanes (between San Andreas Rd and Morrissey Blvd)	317	297			NA	-	NA	-		
SR 1 auxiliary lanes (between State Park Drive and San Andreas Road)	88	92	-34	$7,527,787	NA	-	-18	$4,087,826	-37	$8,193,973
Ramp metering (between San Andreas Road and Morrissey Blvd)	317	297			-108	$24,171,047	NA	-		
San Lorenzo River Bridge Widening	14	14	-3	$767,276	NA	-	NA	-	NA	-
Mission St Intersections	30	30	-2	$456,393	-3	$648,792	NA	-	NA	-
Soquel Ave/Drive and Freedom Blvd										
Buffered bicycle lanes	30	45	0	-	-33	$7,399,549	NA	-	-33	$7,399,549
Soquel/Morrissey/Poplar, Soquel/Frederick, Soquel/41st, Soquel/Bay-Porter, Soquel/Robertson, Freedom/Green Valley, Freedom/Airport, Freedom/Buena Vista	61	76	-15	$3,420,459	NA	-	-12	$2,585,566	NA	-
Intersection improvements for bicycles and pedestrians	24	36	-14	$3,119,810	-5	$1,013,938	-14	$3,119,810	-5	$1,013,938
Rail Right of Way										
Bicycle /Pedestrian Trail with Rail or BRT	33	50	NA	-	-45	$10,026,234	-45	$10,026,234	-45	$10,026,234
Bicycle /Pedestrian Trail Only	36	53	-48	$10,751,022	NA	-	NA	-	NA	-
Overall Project Area										
Bicycle and pedestrian Improvements	87	130	-13	$2,905,863	-13	$2,905,863	-13	2,905,863	-13	$2,905,863
Bike share and transit amenities	87	130	-6	$1,452,932	-6	$1,452,932	-6	$1,452,932	-6	$1,452,932
Multimodal transportation hubs	263	394	-20	$4,409,127	-20	$4,409,127	-20	$4,409,127	-20	$4,409,127
Education and enforcement	1109	1211	-76	$17,060,033	-114	$25,401,517	-113	$27,724,938	-84	$18,846,481
Total			**-232**	**$51,900,000**	**-346**	**$77,500,000**	**-241**	**$53,900,000**	**-243**	**$54,300,000**

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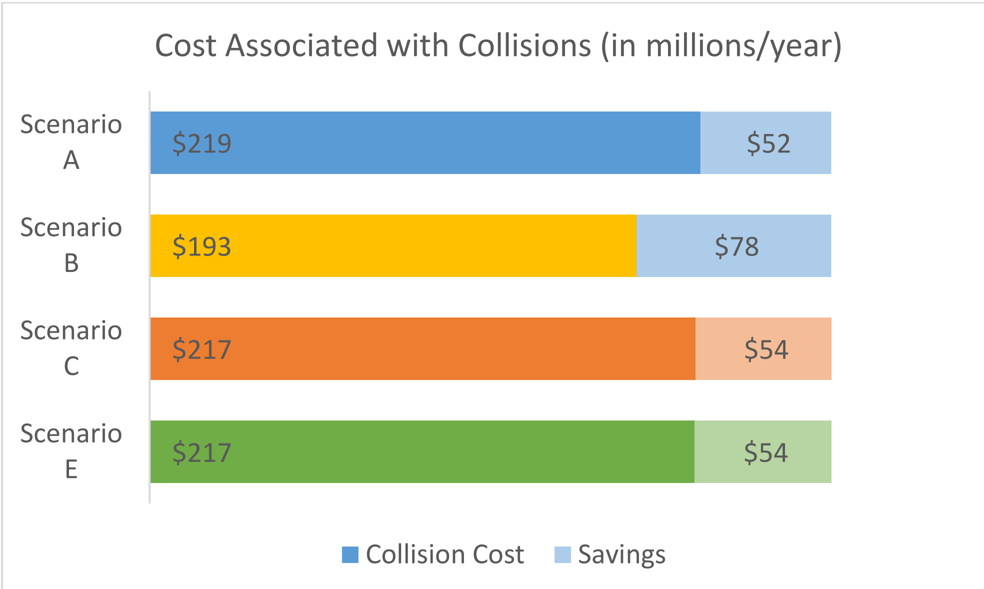
Figure 34: Costs Associated with Collisions in Project Study Area



Environment & Health

Located on the California Coast between the Monterey Bay National Marine Sanctuary and the Santa Cruz Mountains, Santa Cruz County's natural environment, climate and clean air are a draw for residents and visitors. Transportation projects can have beneficial or harmful effects on the environment and health through alterations to environmentally sensitive areas or changes in emissions. A growing body of evidence suggests that the design of our communities influences the likelihood that people will use active transport for their daily travel. The act of walking or biking to school, work, the store, transit or to other places that are a part of our daily routine affect our health. Multiuse trails, bicycle paths, sidewalks, safe street crossings, and availability of public transit are all examples of transportation infrastructure that promote greater physical activity. The goal of "Minimize environmental concerns and reduce adverse health impacts" is measured by assessing the change in automobile vehicle miles traveled and associated criteria pollutants and greenhouse gas emissions and evaluating the effects on environmentally sensitive areas for baseline conditions compared to 2035 forecasts.

Automobile Vehicle Miles Traveled

A countywide measure of daily vehicle miles traveled (VMT) is forecasted for each of the scenarios evaluated in the UCS. Vehicle miles traveled represents the total number of miles traveled by automobiles in one day within Santa Cruz County and thus is a measure of the auto travel exclusive of bicycle, pedestrian and transit travel. VMT is evaluated for each of the scenarios using the Santa Cruz County travel demand model. The VMT from the model output is adjusted based on matching the field estimate of baseline 2015 VMT from the 2015 Highway Performance Monitoring System (HPMS) and the 2015 model output. Adjustments are also made to consider projects in each of the scenarios that cannot be evaluated in the travel demand model. A detailed discussion is below on the adjustments that were made to the VMT. **Table** 44 and **Figure 35** shows the estimated VMT for each of the scenarios. See **Appendix D** for an overview of the Santa Cruz County travel demand model.

When comparing the forecasted VMT for each scenario to the 2015 model results, the analysis forecasts Scenario B with the lowest level of VMT. This is due to a shift of trips away from auto travel to transit, bike and walk trips due to implementation of increased transit options including rail transit and active transportation projects on the rail right-of-way and Soquel and Freedom. Scenario C has the next lowest VMT due to increased transit options including BRT on rail right-of-way. Scenario A has a slightly higher countywide VMT due to an increase in traffic diverting onto Highway 1 to travel a faster route but longer distance with implementation of HOV lanes. Scenario E VMT is slightly lower than Scenario A as Scenario E includes both HOV lanes and rail transit.

Table 44: Daily Countywide Vehicle Miles Traveled (VMT)

2015	2035				
	No Build	Scenario A	Scenario B	Scenario C	Scenario E
5,477,870	5,980,819	6,128,541	5,895,677	5,924,849	6,095,639

The daily countywide average VMT/capita is calculated by dividing the total VMT by the population growth projection **(Table 45)**. These results show that the total VMT per capita decreases with transit and trail projects on the rail right-of-way (Scenarios B and C) in comparison to the No Build. The VMT/capita increases slightly in Scenarios E and A where the traffic is diverted a longer distance to take advantage of the faster route on the highway.

Figure 35: Countywide Vehicle Miles Traveled

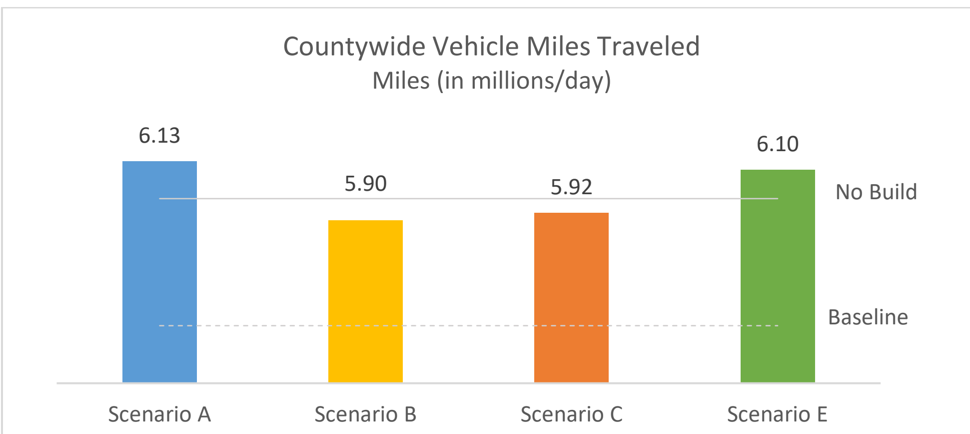


Table 45: Daily Countywide Vehicle Miles Traveled per Capita (VMT/capita)

2015	2035				
	No Build	Scenario A	Scenario B	Scenario C	Scenario E
20.0	19.9	20.4	19.6	19.7	20.3

The VMT mode results were adjusted for the appropriate scenario based on the following assumptions:

- Trail ridership on the rail right-of-way reduced the VMT using the number of new bike and walk trips and the typical length of these trips by trip purpose.

- Bicycle ridership in the buffered bike lanes reduced the VMT using the number of new bike trips and the typical length of these trips by trip purpose.

- The following improvements are included in all scenarios, except the No Build, and thus reductions in VMT were made:
  - bike share – 50 bikes * 20 miles/day *75% of trips replace auto trips. Estimated reduction of 750 miles.
  - bike amenities – assume a 0.75% increase in bike trips. Estimated reduction of approximately 650 miles.
  - multimodal transportation hubs – Assume 15% increase in ridership on routes impacted by hubs, transit trip length estimated at 5.9 miles. Estimates 2800 to 4200 miles reduced.
  - employer and residence incentive programs – TRIMMS analysis estimates 10,412 miles reduced.
  - education and enforcement – assume 5% increase in school bike trips, estimates approximately 86 miles of VMT reduced.

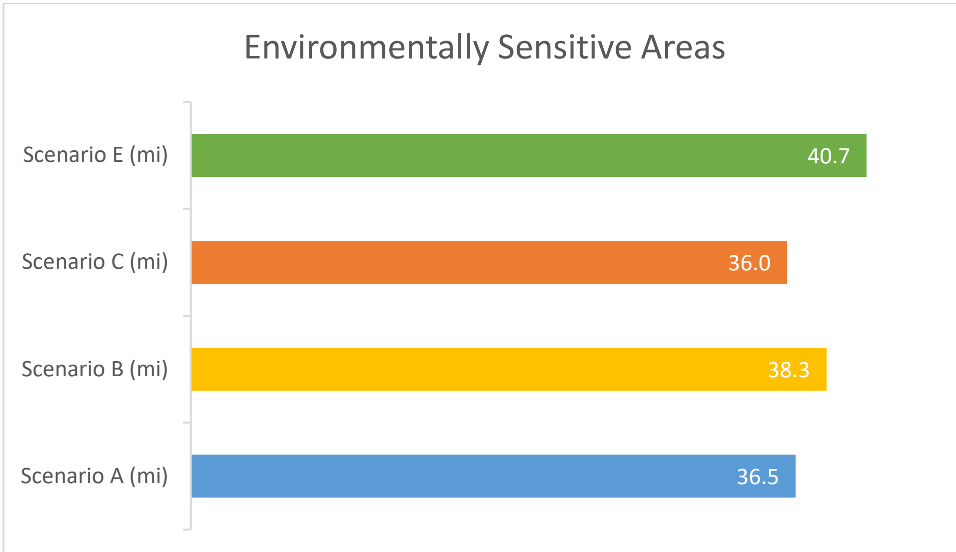
Environmentally Sensitive Areas

The UCS environmental analysis provides a scenario comparison of locations where environmentally sensitive areas along Highway 1, Soquel Avenue/Drive and Freedom Boulevard, and the Santa Cruz Branch Rail Line overlap with locations where new construction is needed to implement UCS projects. For the purpose of the UCS, environmentally sensitive areas are defined as locations where important environmental features may be present including diverse habitats, geological features and land uses. Projects that do not require new construction are assumed to have no new impacts on environmentally sensitive areas. Projects that are assumed to not have new construction impacts include intersection improvements, increased transit frequency, bus rapid transit on Soquel Avenue/Drive and Freedom Boulevard, rail service and metering ramps. New construction evaluated for the Highway1 High Occupancy Vehicle project is located at interchanges. Other new construction locations associated with the Highway 1 HOV project are evaluated as part of new construction needed for auxiliary lanes (State Park to San Andreas). **Table 46** and **Figure** 36 lists the number of miles or locations where there is overlap between new construction associated with implementation of UCS projects and environmentally sensitive areas. This information is evaluated for each project by category and by UCS scenario. Before projects can be implemented, projects will undergo a detailed environmental analysis as part of the state and/or federally required environmental review process.

Table 46: UCS Project with New Construction located in Environmentally Sensitive Areas

	Natural Habitat (mi)	Farm Land (mi)	Liquefaction (mi)	Wetlands (mi)	Erosion, Flooding, and Sea Level Rise (mi)	Stream Overlap with New Construction	Scenario A (mi)	Scenario B (mi)	Scenario C (mi)	Scenario E (mi)
SR 1										
High Occupancy Vehicles	0.10	0	0.06	0	0	0	0.2			0.2
Auxiliary Lanes	0.51	0	1.71	0.01	0.02	2	2.3		2.3	2.3
Additional Lanes over San Lorenzo River	0.07	0	0.18	0.02	0.08	1	0.4			
Soquel and Freedom										
Buffered Bike Lanes	0.12	0.69	1.77	0.21	0.08	1		2.9		2.9
Rail ROW										
Trail Next to Rail	17.63	6.12	6.00	2.13	3.59	41		35.5		35.5
Trail Next to BRT	17.63	4.36	6.00	2.13	3.59	42			33.7	
Trail Only	17.63	4.36	6.00	2.13	3.59	42	33.7			
Rail ROW with Alternative Alignment onto San Andreas Rd and Beach St to Lee Rd										
Trail Next to Rail	14.78	5.09	4.36	0.82	1.86	39		26.9		26.9
Trail Next to BRT	14.78	3.33	4.36	0.82	1.86	40			25.1	
Trail Only	14.78	3.33	4.36	0.82	1.86	40	25.1			
						Scenario Totals with Trail within Rail ROW	36.5	38.3	36.0	40.7
						Scenario Totals with Trail with Segment 17 Alternative Alignment	27.9	29.8	27.4	32.2

Figure 36: Environmentally Sensitive Areas



TOPOGRAPHY

In addition to the environmentally sensitive areas shown in **Table 46**, areas near steep slopes are found at some locations near the transportation routes evaluated in the UCS. Steep slopes are generally found near streams, ravines and coastal bluffs. A description of the topography in locations where new construction could occur with implementation of the UCS scenarios by route is reviewed for the environmental analysis. Locations where there are steep slopes may require engineering solutions such as bridges, excavation, or retaining walls to support the proposed transportation improvements. The UCS cost estimates include the expenses associated with constructing the design solutions that may be required for each project.

Construction of a trail on the rail right of way is included in every UCS scenario, except the No Build. For these scenarios, new construction would occur on the entire Santa Cruz Branch Rail Line and the general topography along the route is discussed here.

Between Davenport and the City of Santa Cruz, the Santa Cruz Branch Rail Line is aligned along the coast, traverses streams and drainages, and is located on coastal bluffs and in ravines. Between the City of Santa Cruz northern boundary and California Avenue, the Santa Cruz Branch Rail Line traverses a flat grade until it turns to the southwest and follows a gradual slope down to Beach Street where a portion of this section is located at the base of a steep slope next to Neary Lagoon. East of Beach Street, the Santa Cruz Branch Rail Line crosses the San Lorenzo River and continues east, crossing additional streams analyzed in **Table 46** and shown in **Figure 19** as well as other drainages until reaching the City of Watsonville. As the Santa Cruz Branch Rail Line enters the City of Capitola, it is near to coastal bluffs and travels across Soquel Creek on the Capitola Trestle. Near New Brighton State Park, the Santa Cruz Branch Rail Line traverses an area with steeper slopes on either side of the right of way and is adjacent to coastal bluffs until entering Aptos where the route crosses steep ravines entering and exiting Aptos Village. Here the Santa Cruz Branch Rail Line is directed southwest where it is located adjacent to Sumner Avenue and is generally surrounded by flat grades until reaching coastal bluffs near La Selva Trestle and Manresa Beach. South of Manresa Beach, the Santa Cruz Branch Rail Line passes the Galligan Slough and in some locations of this section there are steep slopes on both sides of the rail line until the surrounding area becomes flatter at Harkins Slough and remains flat on into the City of Watsonville.

Projects included in the UCS scenarios on Highway 1 would involve construction at the Highway 1 Bridge over San Lorenzo River, interchange improvements to support development of the HOV Lanes Project and construction of auxiliary lanes between State Park Drive to San Andreas Rd. New construction of interchanges are generally located in areas with modest topographical features, however, construction of interchanges will include a bridge structure to maintain below or above grade crossings. New construction of the auxiliary lanes will be located between State Park Drive and San Andreas Rd. In this location just south of Aptos, Highway 1 enters a wide ravine which opens up in a few locations before reaching San Andreas and Larkin Valley.

In a few places on Freedom Boulevard new construction would be required to provide buffered bike lanes. In these locations, Freedom Boulevard is located in a cut with moderate slopes and areas where the grade is flat.

Table 46 calculates the miles of overlap between new construction and environmentally sensitive areas for each scenario, except the No Build. The overlap between new construction and environmentally sensitive areas is similar across the scenarios. This is primarily due to new construction that would be required on the entire length of the rail right of way for the trail project included in every scenario. The overlap between new construction and environmentally sensitive areas is the greatest for natural habitat areas identified on or adjacent to the Santa Cruz Branch Rail Line followed by liquefaction, agriculture and seal level rise. A significant portion of overlap identified in the environmental analysis of UCS project is located north of the City of Santa Cruz and is further analyzed in the North Coast Rail Trail Draft EIR.[68] Together, the projects included in Scenario E have more overlap between locations where new construction would be needed to implement projects evaluated in the UCS and environmentally sensitive areas (40.7 miles) while the projects in Scenario C have the least overlap (36 miles) with environmentally sensitive areas. When the trail is located on the Segment 17 alternative alignment, the length of impact is reduced and overall distance of overlap of new construction and environmentally sensitive areas is also reduced (**Table 46**). Overlap between new construction and environmentally sensitive resources for each scenario are shown on the maps provided in **Figure 37 - Figure 40**.

[68] The North Coast Rail Trail Draft Environmentally Impact Report provides more refined information about potential environmental impacts of trail projects along the Santa Cruz Branch Rail Line.

Figure 37: Scenario A New Construction and Environmentally Sensitive Area Overlap

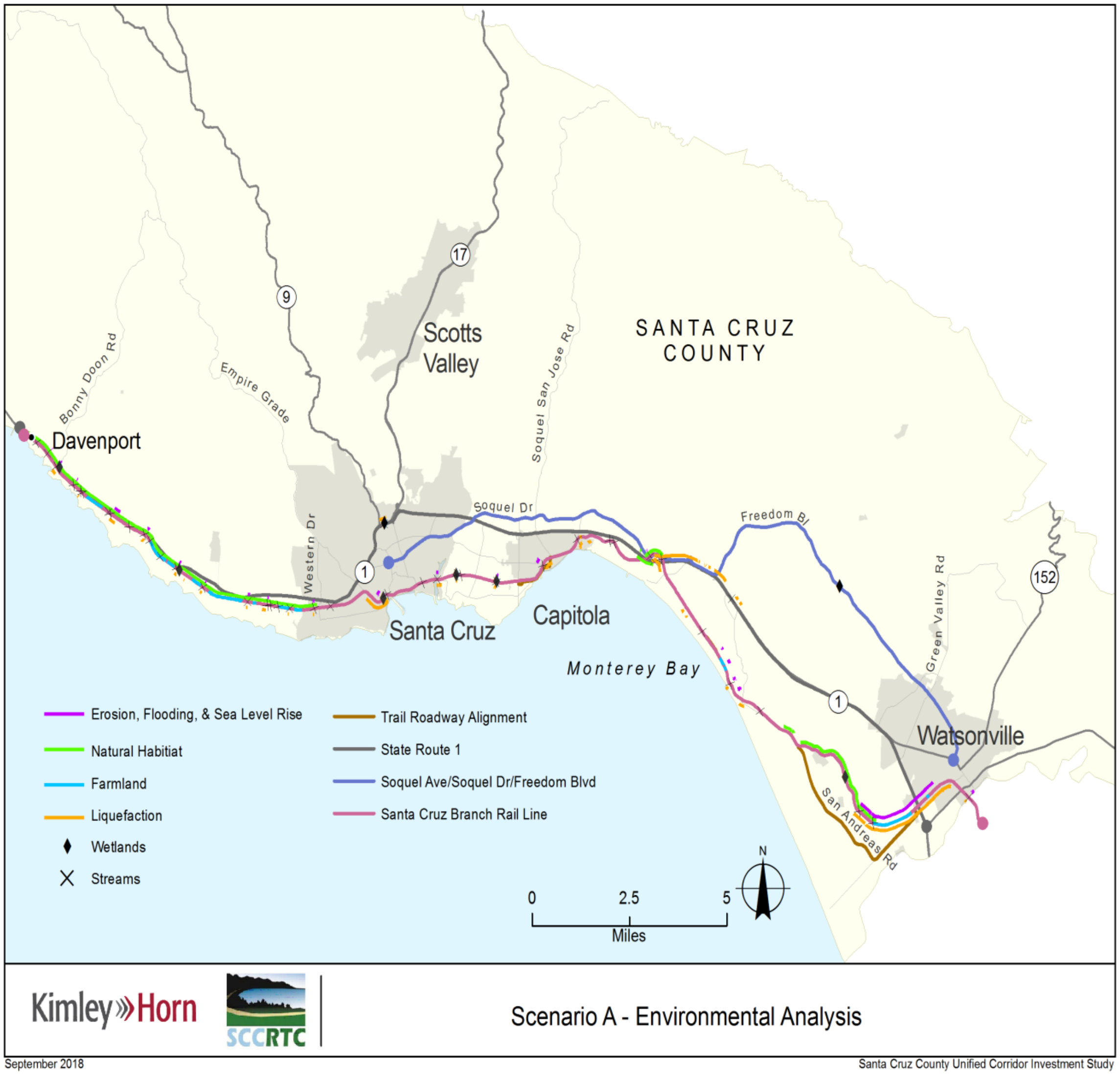


Figure 38: Scenario B New Construction and Environmentally Sensitive Area Overlap

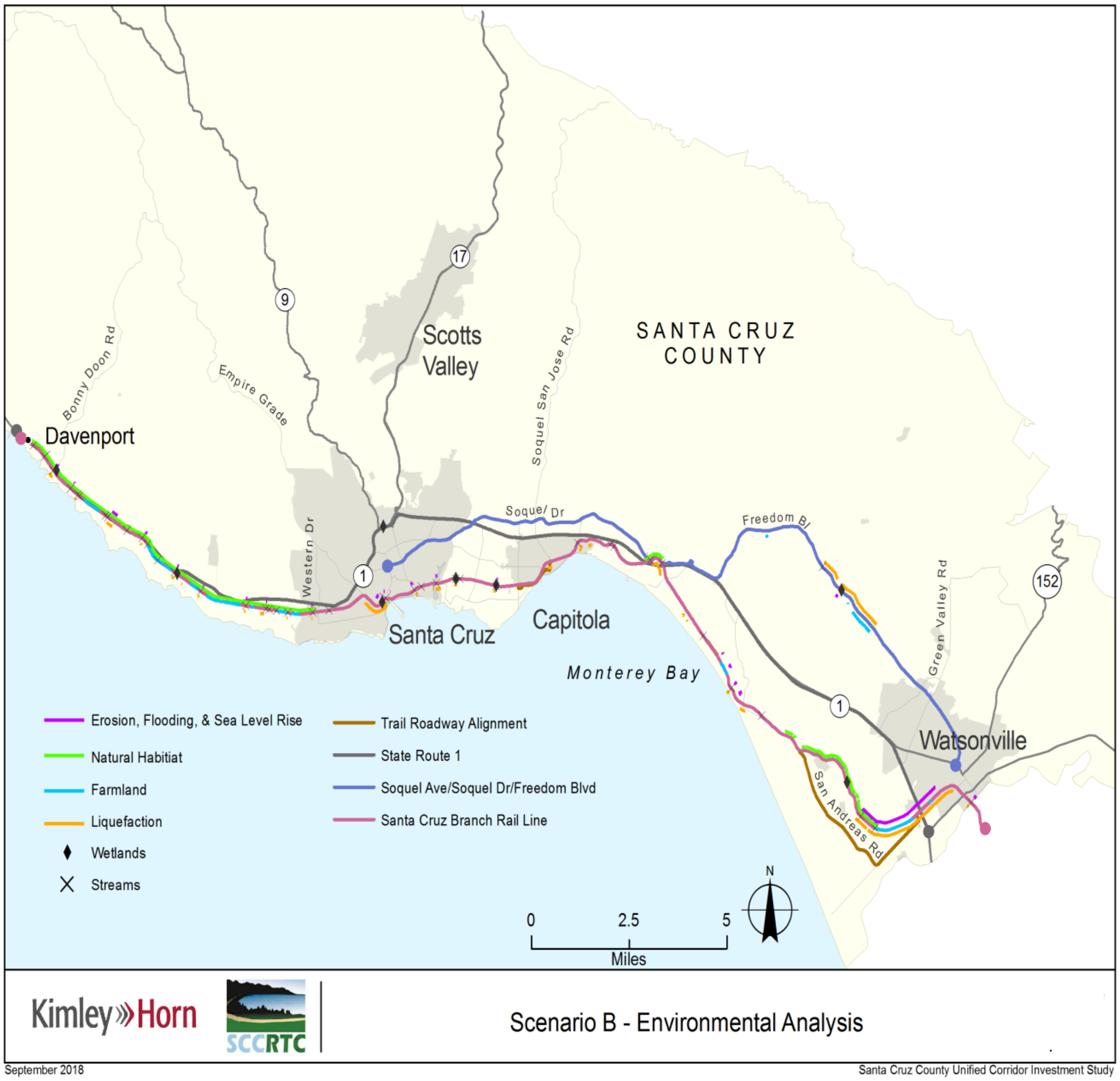


Figure 39: Scenario C New Construction and Environmentally Sensitive Area Overlap

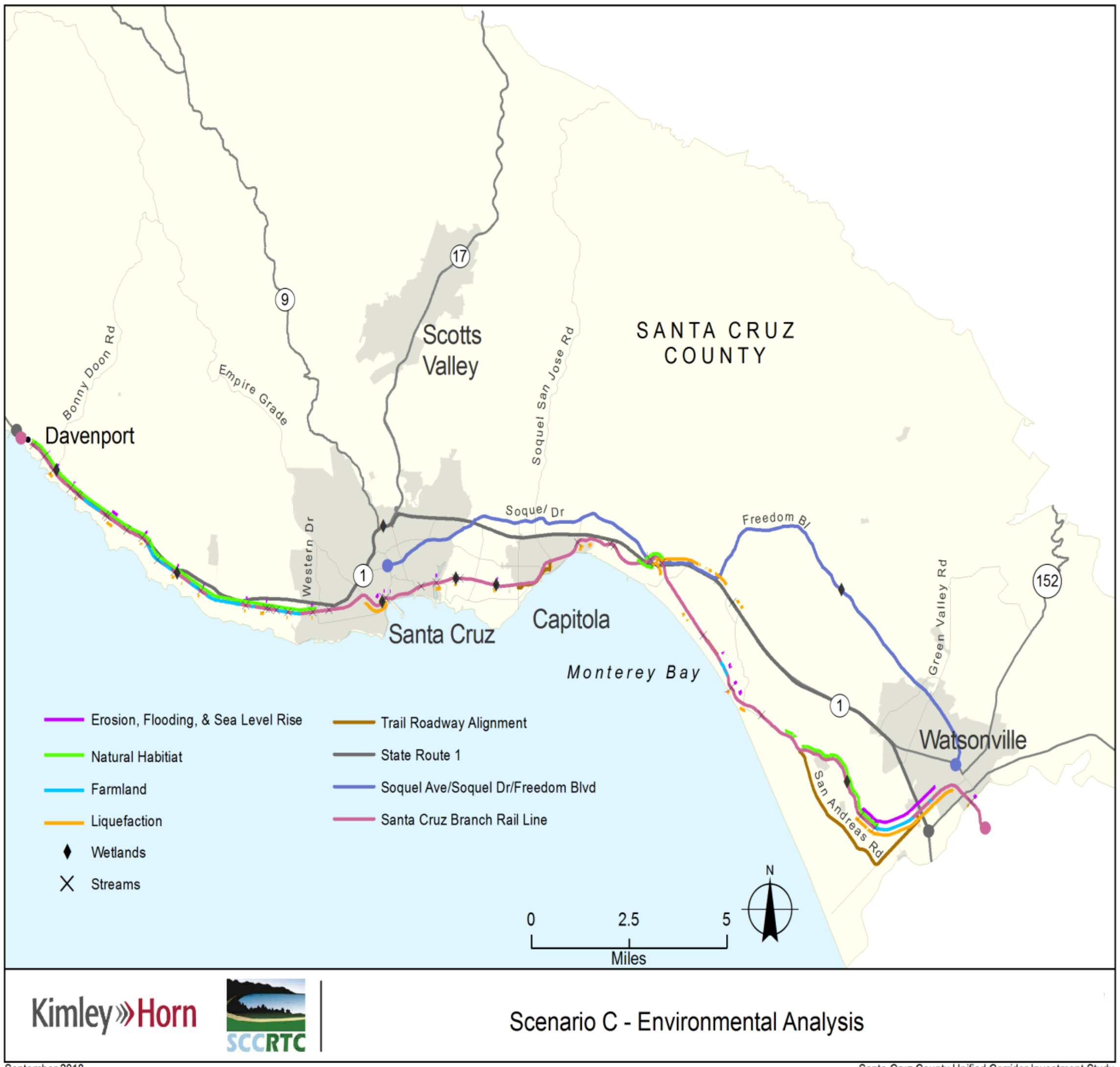


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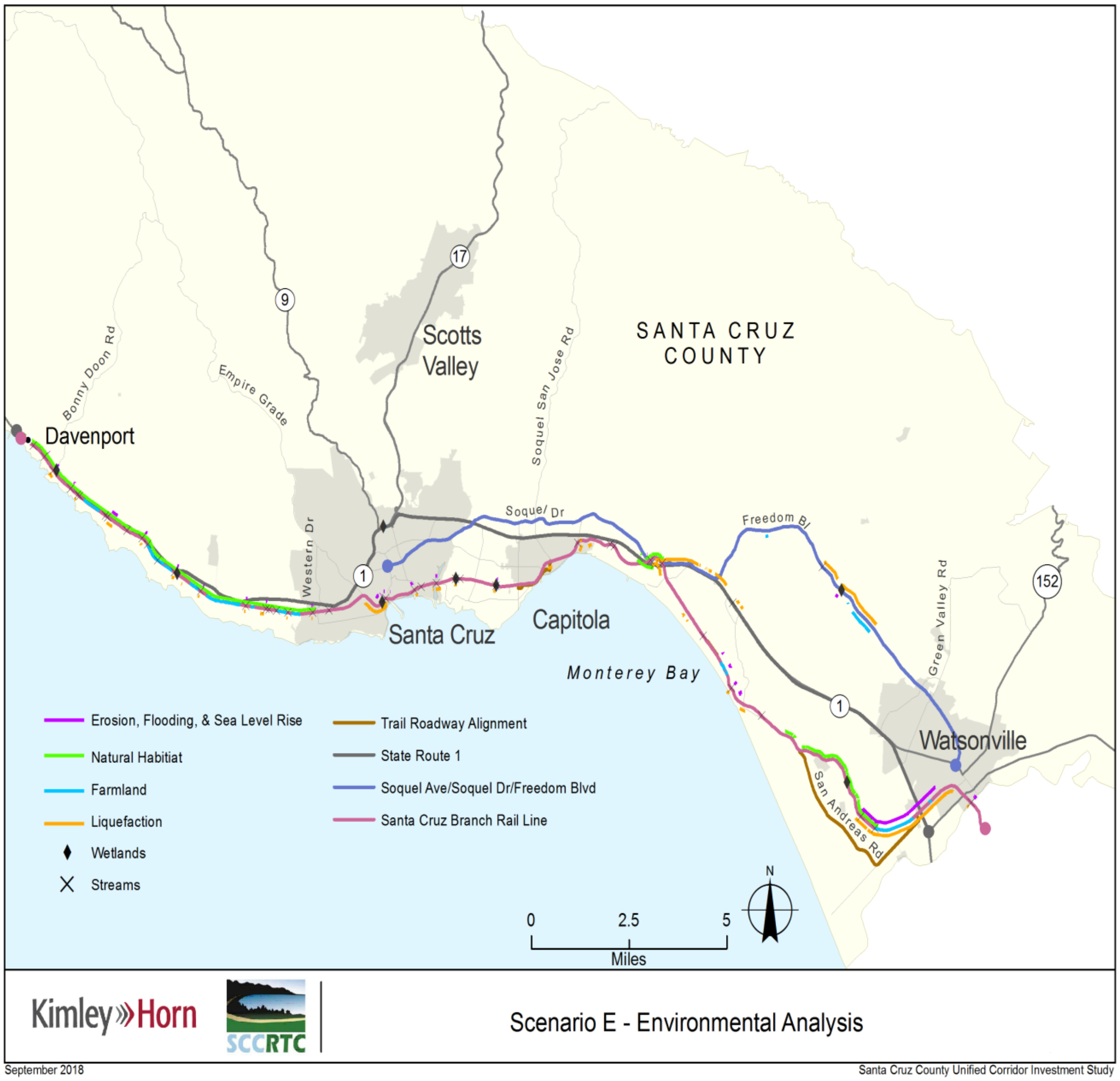
Figure 40: Scenario E New Construction and Environmentally Sensitive Area Overlap



Greenhouse Gas and Criteria Pollutants

Countywide greenhouse gas (GHG) and criteria pollutant emissions were forecasted for 2035 using the vehicle miles traveled data output that was derived from the Santa Cruz County travel demand model then adjusted based on projects implemented that cannot be modeled for each scenario **(Table 47)**. The California Air Resource Board (CARB) Emissions Factor Model 2014 version 1.0.7 (EMFAC) was used to estimate the amount of greenhouse gas and criteria pollutants emissions associated with the VMT for each scenario. This model uses data from the California Department of Motor Vehicles to estimate the fleet mix of vehicles (vehicle and fuel type) traveling on Santa Cruz County roadways for future years. The 2035 VMT data by hourly speed bin fractions is entered into the EMFAC model to determine the amount of GHG and criteria pollutants from the fleet mix of vehicles for the future year. The speed bin data was adjusted based on the off-model VMT adjustments discussed above. EMFAC2014 is the current version approved by the U.S. EPA and was used to calculate criteria pollutant and CO_2 emissions. Other GHG emissions (i.e., methane [CH_4] and nitrous oxide [N_2O]) were calculated with EMFAC2017 as CH_4 and N_2O are not generated in EMFAC2014 Custom Mode.

Forecasts of greenhouse gas emissions and criteria pollutants can vary based on a number of different factors.

- As transit trips increase, overall vehicle miles traveled can decrease although a vehicle may be used to access transit.
- Bike and walk trips will decrease the vehicle miles traveled, reducing the vehicle emissions.
- As vehicle miles traveled increases, vehicle emissions can increase.
- As speed on a roadway increases, emissions can be reduced due to less stop and go traffic but once speeds surpass 55-60 mph, emissions begin to increase.

These various factors will add up to determine the countywide amount of emissions for the various scenarios. The future year No Build emissions are lower than the baseline 2015 conditions due to older vehicles being replaced by a newer, less polluting fleet to meet mile per gallon and electric vehicle regulations. Scenarios B and C have the least amount of emissions compared to the No Build due to the smaller amount of VMT from increased options for transit. Scenario A and E have a slightly higher amount of emissions countywide due to an increase in VMT from diverting traffic onto Highway 1 to travel a faster route but longer distance with implementation of HOV lanes. GHG and criteria pollutant emissions for the No Build and four Scenarios are shown in **Table 47**. One factor that has not been addressed quantitatively is freight service on the rail line. Shifting goods movement from trucks on the roadway system to freight service on the rail right of way would reduce GHG and criteria pollutant emissions. Freight service on the rail right of way is proposed in Scenario E and a more limited freight service in just Watsonville in Scenario C.

Table 47: 2035 Greenhouse Gas and Criteria Pollutant Emissions

	2015 Baseline (Metric Tons/Day)	2015 No Build (Metric Tons/Day)	Scenario A (Metric Tons/Day)	Scenario B (Metric Tons/Day)	Scenario C (Metric Tons/Day)	Scenario E (Metric Tons/Day)
Greenhouse Gases						
Carbon Dioxide (CO_2)	2,496	1,638	1,656	1,612	1,622	1,645
Methane (CH_4)	0.24	0.05	0.05	0.04	0.05	0.05
Nitrous Oxide (N_2O)	0.39	0.92	0.95	0.92	0.92	0.95
Carbon Dioxide Equivalent (CO_2e)	**2,617**	**1,915**	**1,941**	**1,886**	**1,899**	**1,928**
Criteria Pollutants						
Carbon Monoxide (CO)	19	4.26	4.29	4.19	4.22	4.27
Sulfur Oxides (SO_x)	0.03	0.02	0.02	0.02	0.02	0.02
Particulate Matter (PM_{10})	0.34	0.31	0.31	0.30	0.30	0.31
Particulate Matter ($PM_{2.5}$)	0.17	0.13	0.13	0.13	0.13	0.13
Reactive Organic Gases (ROG)	2.5	0.65	0.67	0.64	0.65	0.66
Nitrous Oxides (NO_x)	4.5	0.85	0.85	0.83	0.84	0.84

[1] CO2e = CO2 + (CH4*25) + (N2O*298)

[2] ROG and NOx are the primary precursor pollutants that in the presence of sunlight chemically react to form the secondary pollutant ozone which is a criteria health-based pollutant.

Equitable Access

Santa Cruz County residents have varied income levels and physical abilities that may influence which transportation modes are both affordable and accessible. The provision of transportation services effects resident's access to the services they need to maintain independence and good health. The goal of an "Accessible and equitable transportation system that is responsive to the needs of all users" is measured by assessing transit vehicles miles traveled, household transportation costs and the benefits and impacts to transportation disadvantaged communities for baseline conditions compared to 2035 forecasts.

Transit Vehicle Miles Traveled

Transit can provide mobility to people that may not have other transportation options. The more frequent the transit service, the more accessible and equitable our transportation system becomes. The frequency and coverage of transit can be aggregated into a single number - transit vehicle miles traveled (TVMT), also known as transit revenue miles. One bus traveling one mile while in service is one transit vehicle mile traveled. Transit VMT is a way to assess the overall coverage and frequency of transit service for each scenario.

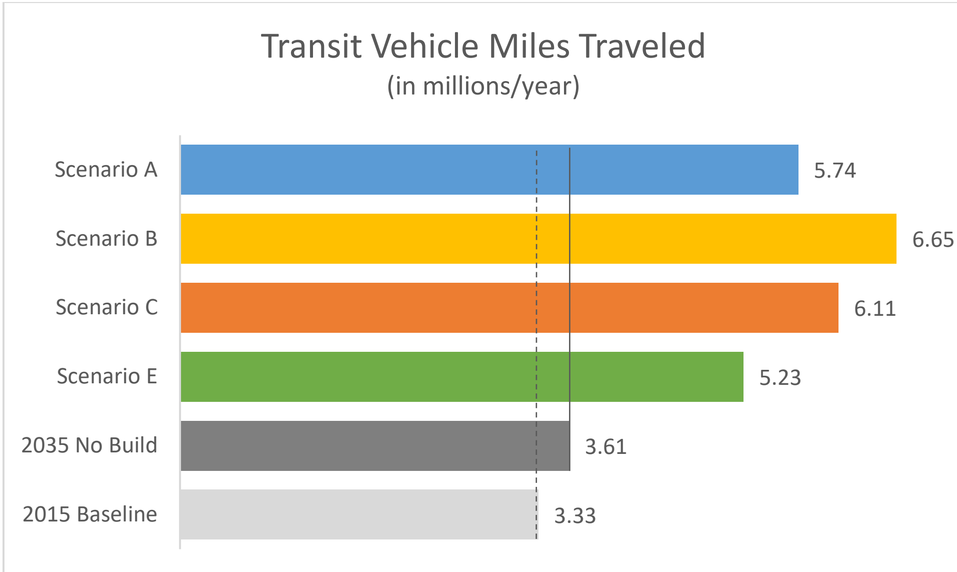
Each of the scenarios include varying levels of transit service through the study area on top of the service that is provided by METRO under the No Build conditions. The No Build transit service was assumed to increase over the baseline service by approximately 9% more TVMT based on the assumptions in the 2040 Santa Cruz County Regional Transportation Plan increasing transit service by approximately 9% by 2035. The new transit services identified in the UCS are in addition to the assumptions for transit in the no build. The transit vehicle miles traveled measure shows the countywide amount of transit presence on the transportation network. While transit stops are also a measure of transit accessibility since the location of stops defines where transit can be accessed, the transit miles traveled provides a measure of both service coverage and frequency.

The transit service for each scenario is evaluated using the Travel Demand Model based on projects evaluated in the UCS that included new transit service and the number of transit miles provided. Model assumptions for the Build Scenarios were adjusted and normalized to the difference between the Baseline and No Build Scenario to ensure consistent headway and route length parameters. Transit miles traveled for each scenario are shown in **Table 48** and **Figure 41.**

Table 48: Annual Transit Vehicle Miles Traveled Scenario Comparison

	2015	No Build	Scenario A	Scenario B	Scenario C	Scenario E
Transit Vehicle Miles Traveled	3,325,771	3,611,451	5,736,938	6,649,956	6,110,177	5,229,875

Figure 41: Annual Transit Vehicle Miles Traveled Scenario Comparison



The following service additions were the primary sources of additional transit vehicle miles for each scenario:

- Scenario A
  - Increased transit frequency along SR 1 in the HOV lane
  - Bus rapid transit lite along the Soquel Drive/Freedom Boulevard corridor
  - Increased express bus frequency

- Scenario B
  - Increased transit along SR 1 utilizing aux lanes and shoulders
  - Bus rapid transit lite along the Soquel Drive/Freedom Boulevard corridor with increased service frequency
  - Passenger rail service between Santa Cruz and Watsonville
  - Increase bus service to connect rail stations to other destinations

- Scenario C
  - Increased transit along SR 1 utilizing aux lanes and shoulders
  - Bus rapid transit lite along the Soquel Drive/Freedom Boulevard corridor with increased service frequency
  - Bus rapid transit along the rail corridor

- Scenario E
  - Increased transit frequency along SR 1 in the HOV lane
  - Passenger rail service between Santa Cruz and Watsonville
  - Increased bus service to connect rail stations to origins and destinations

Scenario B provides the most additional transit coverage and frequency countywide for the County followed by Scenario C which are the alternatives that provide transit service on all three routes.

Household Transportation Cost

How much a household spends on transportation depends primarily on the number of automobiles in the household. Purchasing, operating and maintaining an automobile is more expensive than taking transit and much more expensive than biking or walking. Depending on how many total miles driven per year, the costs of owning and maintaining an automobile are one half to two thirds of the per mile cost of driving compared to the fuel and operating per mile costs. Transit costs have an upper limit on the total costs per household based on the amount of a monthly transit pass that allows an unlimited number of boardings. The cost of biking includes purchase of a bicycle and the amenities needed such as a helmet and lock but the per mile costs are essentially zero. Walking has essentially no cost to the individual.

The household transportation costs were evaluated for each scenario in the UCS based on the mode share differences by scenario (**Table 49**). The mode share percentages incorporate the rail, bus rapid transit and trail ridership estimates discussed in the mode share section above and in **APPENDIX E**. The "average household" for Santa Cruz County is defined as having 2.88 people per household, 9.65 trips per household and the average mode share for each scenario. Roadway transit costs are equivalent to Metro costs at $2.00/boarding or $65 for a monthly pass. Rail transit and BRT on the rail right-of-way were both assumed to cost $5.50/boarding or $200 for a monthly pass.

Results show that the average household transportation costs for a household with 2 vehicles is less for Scenarios B and C that have a greater percentage of transit and bike trips compared to Scenarios A and E with higher percentage of auto trips.

The average household that is evaluated as a measure for comparing the various scenarios may not actually represent any particular household. The range of household travel behaviors and therefore costs for Santa Cruz County may be better represented by the four household types shown in **Table 50.** Households with only one or fewer automobiles and that travel primarily by transit or bicycle have the least transportation costs. Households with two or more vehicles have the largest household transportation costs as owning and operating an automobile is expensive. In summary, the largest difference in household transportation costs depends on if there are enough options for travel that reduce the total number of vehicles that a household owns and maintains. By providing more options for travel, the transportation system becomes more equitable to all users, with potential to significantly reduce transportation costs for low income households. A lower transportation cost frees up money for other activities that could bring greater benefit to the household.

Table 49: Forecasted Average Household Transportation Cost (2018 dollars)

	Baseline PM		No Build		Scenario A		Scenario B		Scenario C		Scenario E	
	Average Household-1 Vehicle	Average Household-2 Vehicles	Average Household-1 Vehicle	Average Household-2 Vehicles	Average Household-1 Vehicle	Average Household-2 Vehicles	Average Household-1 Vehicle	Average Household-2 Vehicles	Average Household-1 Vehicle	Average Household-2 Vehicles	Average Household 1 Vehicle	Average Household 2 Vehicles
Person Trips Drive Alone			44.80%		42.8%		42.3%		43.1%		42.30%	
Person Trips by Carpool			38.40%		37.8%		36.4%		37.1%		37.30%	
Person Trips by Transit			2.90%		4.1%		5.1%		4.3%		4.50%	
Person Trips by Train or BRT			0.00%		0.0%		0.9%		0.5%		0.80%	
Person Trips by Bike			3.40%		4.3%		4.5%		4.2%		4.40%	
Person Trips by Walk			10.60%		10.9%		10.8%		10.8%		10.70%	
Daily Cost for Drive Alone Trips	$29.76	$45.14	$23.20	$35.18	$22.19	$33.64	$21.94	$33.27	$22.32	$33.85	$21.90	$33.21
Daily Cost for Carpool Trips			$8.68	$13.17	$8.56	$12.98	$8.25	$12.51	$8.39	$12.72	$8.44	$12.79
Daily Cost for Bus Trips	$0.27	$0.27	$0.57	$0.57	$0.79	$0.79	$0.98	$0.98	$0.83	$0.83	$0.87	$0.87
Daily Cost for Train/BRT Trips	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.49	$0.49	$0.28	$0.28	$0.42	$0.42
Daily Cost for Bike Trips	$1.22	$1.22	$1.22	$1.22	$1.22	$1.22	$1.22	$1.22	$1.22	$1.22	$1.22	$1.22
Daily Cost for Walk Trips	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Daily Household Transportation Cost	**$31.26**	**$46.63**	**$33.68**	**$50.14**	**$32.76**	**$48.64**	**$32.89**	**$48.48**	**$33.04**	**$48.90**	**$32.85**	**$48.52**
Median Household Income is $70,088	**% of Income Spent on Transportation**											
$50,000	23%	34%	25%	37%	24%	36%	24%	35%	24%	36%	24%	35%
$70,088	**16%**	**24%**	**18%**	**26%**	**17%**	**25%**	**17%**	**25%**	**17%**	**25%**	**17%**	**25%**
$100,000	11%	17%	12%	18%	12%	18%	12%	18%	12%	18%	12%	18%
$150,000	8%	11%	8%	12%	8%	12%	8%	12%	8%	12%	8%	12%

Figure 42: Household Transportation Cost

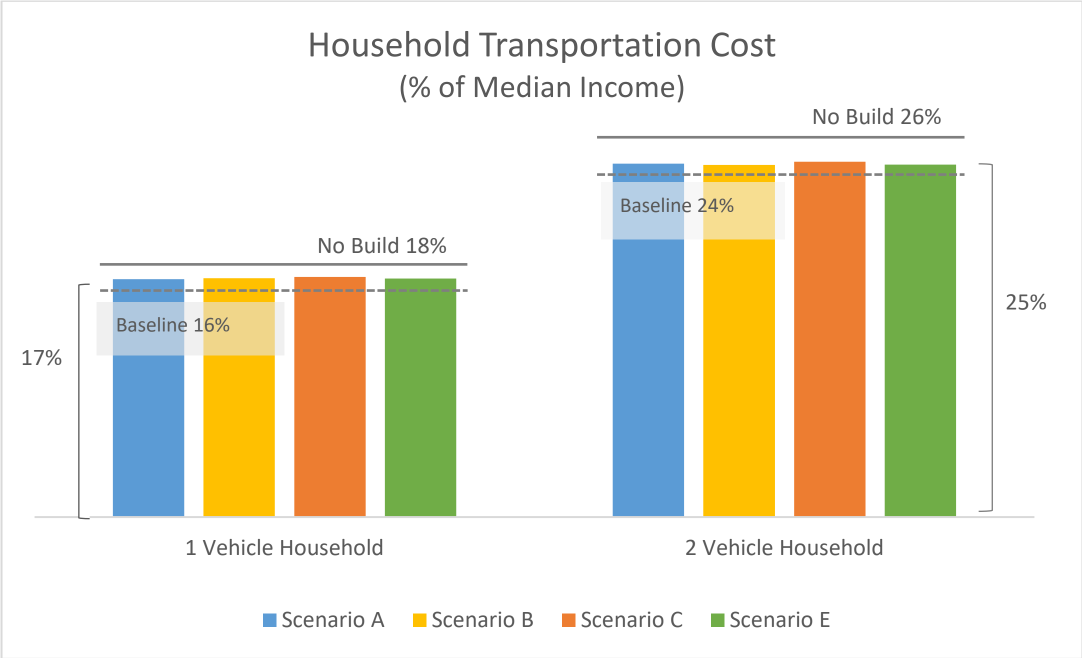


Table 50: 2035 Representative Households (2018 dollars)

	2035- Representative Households			
	Mainly Transit- 0 Vehicles	Auto Dependent- 2 Vehicles	Multi Modal (Auto & Transit)- 1 Vehicle	Mainly Bicycle- 1 Vehicle
Person Trips that are Drive Alone	0%	80%	40%	20%
Person Trips by Carpool	25%	20%	30%	10%
Person Trips by Transit	30%	0%	10%	5%
Person Trips by Train or BRT	10%	0%	10%	5%
Person Trips by Bike	20%	0%	0%	50%
Person Trips by Walk	15%	0%	10%	10%
Daily Cost for Drive Alone Trips	$0.00	$43.72	$20.73	$15.72
Daily Cost for Carpool Trips	$5.66	$4.77	$6.79	$3,43
Daily Cost for Bus Trips	$6.25	$0.00	$1.93	$0.96
Daily Cost for Train/BRT trips	$5.31	$0.00	$5.31	$2.65
Daily Cost for Bike Trips	$1.22	$0.00	$1.22	$3.53
Daily Cost for Walk Trips	$0.00	$0.00	$0.00	$0.00
Household Daily Transportation Cost	$18.44	$48.50	$35.98	$26.30
Household Annual Transportation Cost	$6,730	$17,702	$13,134	$9,600
Household Income	**% of Income Spent on Transportation**			
$50,000	13%	35%	23%	19%
$70,088 *2015 Median Household Income for Santa Cruz County	10%	25%	19%	14%
$100,000	7%	18%	13%	10%
$150,000	4%	12%	9%	6%

[1] Daily cost for bus trips includes a monthly transit pass for all household members.

[2] Daily cost for bus trips includes a monthly transit pass for 1 household member.

Benefits to Transportation Disadvantaged Communities

The UCS evaluates the benefits of the proposed scenarios on transportation disadvantaged communities. The 2040 Santa Cruz County Regional Transportation Plan defines transportation disadvantaged communities as census tracts where greater than 65% of the total population is non-white, 65% of households are low income, or greater than 20% of households are in poverty.

The benefits of the proposed scenarios on transportation disadvantaged communities is evaluated as the share of investment benefit for the transportation disadvantaged population. These results can then be compared to the proportion of the population that are considered transportation disadvantaged to evaluate the equity of the proposed scenarios. To analyze the benefits of the projects on these communities, a geospatial study was undertaken. First, the Traffic Analysis Zones (TAZ) were overlaid with census tract information to geospatially identify the disadvantaged community areas and their relation to the proposed projects. TAZ's were identified by the following categories:

- Minority
- Poverty
- Low Income AB 1550
- Low Income

The location of the proposed projects, by scenarios, were then mapped. Using data from the Santa Cruz County travel demand model, each scenario was analyzed by identifying trip origins/destinations in transportation disadvantaged communities that utilize the roadways with the new projects. **Table 51** represents the proportional benefit that scenario projects would likely have for transportation disadvantaged communities weighted by level of investment. The weighted average therefore represents the proportion of investment dollars that would directly benefit the transportation disadvantaged population.

Projects were grouped according to the three routes evaluated in this study. Projects along the rail corridor could not be modeled directly in this analysis as the travel demand models is primarily focused on vehicle trips. Transit trips on the rail corridor would serve more regional scale trips,and are therefore most comparable to the services and user group that is served by SR 1, so for this study, rail transit was assumed to have the same relative benefit for transportation disadvantaged communities as those on SR 1. In the case of bicycle and pedestrian trips related to the trail on the rail right of way and buffered bicycle lanes on Soquel Drive and Freedom Boulevard, the ratio of transportation disadvantaged population and non-transportation disadvantaged population within ½ mile of the facilities were used.

Table 51: Share of Investment Benefit for Transportation Disadvantaged Population

	Scenario A	Scenario B	Scenario C	Scenario E
SR 1	21.2%	22.1%	22.1%	21.1%
Soquel / Freedom	27.2%	27.0%	22.4%	27.1%
Rail Corridor	31.0%	27.0%	27.0%	26.5%
Average Share of Investment Benefit	**24.0%**	**25.2%**	**25.2%**	**23.5%**

The estimated 2035 population for Santa Cruz County as derived from the TransCAD model totaled 302,555 with a transportation disadvantaged population of 41,353 (or 13.7% of the total population). All four scenarios provide benefits to a higher proportion of transportation disadvantaged population relative to their representation in the county population as a whole.

Transportation Technologies

In the last few years, there has been a significant increase in the introduction of new transportation technologies. This has included the introduction of smart phone apps to secure on-demand transportation services, mainstream adoption of electric vehicles, the introduction of autonomous vehicles to roadways, as well as a variety of online route and trip planning services. These emerging transportation technologies are resulting in a myriad of complex benefits and challenges that are just beginning to be fully understood. The changes to our travelling system will happen incrementally in the short and long term and will vary between infrastructure and vehicle operations.

The Institute of Transportation Studies at the University of California at Davis broadly identifies these technology trends as the “3 Revolutions” in transportation. The 3 Revolutions include:

- Shared – This includes a myriad of on-demand vehicle-sharing arrangements including Transportation Network Companies (TNCs) such as Uber and Lyft, car sharing services such as Zipcar, and increasing number of rideable share options.
- Automated – While there are varying degrees of automation already available on many new vehicles (adaptive cruise control, land departure and collisions warning systems, etc.), many car manufacturers have publicly shared that their self-driving cars will be available in a few years. The US Society of Automotive Engineers (SAE) have indicated that level 4 (the car can operate without human input for many roadway types and conditions) driverless cars appear on track to begin entering commercial fleets by the early 2020s. Large scale changes in automated vehicles on dedicated lanes will likely not occur until the market is saturated. Predictions range from a few years to 30 years or more.
- Electric – Electric vehicles use one or more electric motors for propulsion. Often that only applies to cars and trains, but increasingly bike and scooter options are available.

It is understood that these changes are interrelated and that both positive and negative outcomes could result from the forms and combinations of these technology pairings. There is still uncertainty as to how many of these technologies will affect transportation systems and there are not broadly accepted ways to evaluate and interpret their impacts. Many jurisdictions are working on new transportation forecasting methods and tools to better predict their impacts, however in the absence of accepted tools a qualitative assessment as to their impact is still useful for planning purposes. Major trends discussed in the following sections include:

- Transportation Network Company (TNC) Congestion and Transit Impacts
- Autonomous Vehicle Adoption
- Shared Mobility
- Electric Vehicle Adoption

TNC Congestion and Transit Impacts

The rapid growth of new mobility services, in particular TNCs, is affecting how local agencies are beginning to plan for the future of their transportation networks. Emphasizing their extreme growth, TNCs have more than doubled in number in the United States since 2012. TNCs transported 2.61 billion passengers in 2017, a 37 percent increase from 1.90 billion passengers in 2016. When combined with taxi service, the for-hire transportation sector is projected to have experienced a 241 percent increase over the past six years, surpassing the ridership of local bus services in the United States[69]. A recent study concluded that TNC services results in the addition of 2.8 new vehicle miles for each mile of personal driving removed.[70] This impact is significant when you consider that in an urban location like San Francisco, TNCs account for more than 20 percent of weekday local vehicle miles traveled (VMT).[71] The impact to transit has also been an increasing area of research and a recent University of California at Davis report also found that "Ride-hailing attracts Americans away from bus services (a 6% reduction) and light rail services (a 3% reduction)".[72]

If regulatory changes or market conditions do not change this trend, it is likely that TNCs may add additional congestion and reduce transit ridership in urban areas. As such it can be expected that congestion may be worse than forecast and there may be less transit ridership for all scenarios considered in the UCS.

Autonomous Vehicle Adoption

It is anticipated that the impacts of Autonomous vehicles may be similar to TNCs - namely that they will increase congestion and result in a reduction in traditional transit ridership. Congestion impacts from autonomous vehicles may be greater than TNCs given the ability of drivers to use the time for tasks other than driving) and that some individuals (children, elderly, disabled, others) may begin to make trips they previously could not give their reliance on others for mobility.

Autonomous vehicles are expected to significantly improve safety outcomes given the preponderance of human error as the primary cause of accidents. Multiple assessment of AV and Automated Driving Systems (ADSs) have suggested that they could reduce crashes by more than 90 percent by mid-century and the National Highway Traffic Safety Administration has said it believes these technologies "have the potential to significantly improve roadway safety".[73]

As such, in the absence of regulatory changes for autonomous vehicles or unforeseen market conditions, it is likely that the congestion may be worse than forecast and there may be less transit ridership for all scenarios considered in the UCS. It is also likely that under circumstances where there was broad adoption there would be a marked improvement in safety, so crash rate estimates likely understate potential crash reduction from AV and ADSs technologies.

Shared Mobility

Shared mobility has dramatically expanded from cars to include other modes in the last couple of years. Major forms of shared mobility that are in use in California include:

- TNCs and Taxis – TNCs and taxis provide flexible on-demand transportation services that connect drivers with passengers at the request of passenger. The anticipated impact to the scenarios is discussed in the prior section on TNCs.

- Car Sharing - Car sharing allows people to rent shared vehicles for short periods of time, typically by the hour or minute. Car sharing, depending on the circumstances, likely does not impact the Scenario evaluations presented herein.

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[69] The New Automobility: Lyft, Uber and the Future of American Cities, Schaller Consulting, July 25, 2018.
[70] https://www.sfcta.org/tncstoday
[71] https://www.sfcta.org/tncstoday
[72] Clewlow, Regina R. and Gouri S. Mishra (2017) Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the United States. Institute of Transportation Studies, University of California, Davis, Research Report UCD-ITS-RR-17-07
[73] AUTOMATED DRIVING SYSTEMS 2.0: A VISION FOR SAFETY, U.S. Department of Transportation, 2017

- Bike/Scooter Sharing - Bike/Scooter sharing allows people to rent shared mobility devices for short periods of time—typically by the hour or minute—and short-distance point-to-point trips. Bike and scooter share systems are often seen as an extension of the transit system, allowing users to easily and inexpensively complete the first or last mile of their trip. These types of systems could have a positive impact on Scenarios which emphasize transit options.

- Dynamic Carpooling - Dynamic carpooling is a real-time carpooling arrangement, typically made through mobile smartphone applications, that does not require pre-scheduling or a long-term participation commitment. Waze Carpool, a dynamic carpooling service, operates throughout California. To find a carpool match, commuters download the app, enter their origin, destination, and departure time. Riders have the flexibility to adjust their pick-up time each day to accommodate their schedule. While the diversion to pick up riders could have a localized VMT increase like TNCs, it is likely they would have a positive system wide impact on congestion and VMT.

- Dynamic Transit - Dynamic transit provides on demand, shared ride vehicles operated publicly or privately, typically with vans or small buses, that provide service on dynamically generated routes. Many transit agencies are beginning to test on-demand systems. These systems could positively impact transit ridership both by attracting new riders and as a method for addressing last mile trips.

As discussed above, depending on the specifics of the mode and circumstances, shared mobility options can reduce VMT and extend the reach of transit as is the case of bike/scooter sharing, or as is the case with TNCs, as discussed previously, they could negatively impact congestion and transit ridership for each of the scenarios.

Electric Vehicle Adoption

The transportation sector is responsible for approximately 36 percent of California's Green House Gas (GHG) emissions (50 percent when you include refineries) and more than 80 percent of NOx and particulate emissions. In conjunction with the continued addition of renewable energy sources as the basis for electrification, the positive impact of air quality will be significant. As the locations of charging stations continues to expand electric vehicles will also become increasingly easy to own and operate.

As of October 2017, California had 337,482 zero-emission vehicles (ZEV) representing 4.5% of the state's total fleet. Analysis indicates that state is on track to exceed its goal to have 1.5 million ZEV's on the road by 2025.[74]

Broader adoption of EVs than anticipated could dramatically improve air quality outcomes over those estimated for each of the scenarios. However, the transportation system would likely need to provide additional charging station locations to accommodate a significant increase in electric vehicles.

Future Transportation Needs

New transportation options will continue to change the way we get around, and different modes will continue to be needed for different types of trips and different types of users. The scenarios included in this study were designed to provide multi-modal enhancements to the transportation system in Santa Cruz County that improve mobility for all users. Consideration of evolving technologies should be weighed when evaluating project scenarios and the ultimate design of the system. It stands to reason that a

[74] The Road Ahead for Zero-Emission Vehicles in California: Market Trends & Policy Analysis, Beacon Economics, January 2018

transportation system that has been developed with evolving conditions in mind will have the resilience to last and serve for a much longer span of time.

Summary

The analysis presented in this report examines how each of the scenarios would impact the transportation system in Santa Cruz County from the perspective of the UCS goals of Safety, Efficiency, Economics, Environmental Sustainability, and Social Equity. This is the second[75] in a two step analysis to identify groups of complimentary multimodal transportation investments that provide the most effective use of Highway 1, Soquel Ave/Soquel Dr/Freedom Blvd, and the Santa Cruz Branch Rail Line to serve the community's transportation needs. The evaluation of sixteen performance measures for each of the scenarios and a comparison to a no build and baseline conditions is designed to increase decision-maker and community understanding of transportation project benefits by transparently evaluating their impacts and lead to effective investments in the corridor. This study includes an economic and environmental analysis that is consistent with Measure D to evaluate future potential transportation uses of the rail right-of-way to better serve the residents and visitors of Santa Cruz County.

A summary of the draft performance measure results can be found on the performance dashboard that is included in **APPENDIX G**. The results are presented for each scenario and then by each performance measure for a graphical comparison. Best standard practices for a planning level analysis are being utilized in this study. Projects can only be implemented as local, state or federal funds become available and will undergo separate design and environmental processes.

[75] Step 1 of the Unified Corridor Study qualitatively evaluated six scenarios for the study corridor. The Step 1 analysis determined two of the scenarios would not likely be feasible and these two scenarios did not advance to the Step 2 analysis.

PREFERRED SCENARIO

Already challenged by significant congestion along many of its primary travel routes, Santa Cruz County's population is forecast to grow approximately 10% to over 300,000[76] residents by 2035. Responding to transportation challenges within Santa Cruz County is exacerbated by land scarcity and use restrictions that make transportation improvements prohibitively costly in many locations. Recognizing the need to address both mounting existing transportation problems and future needs of Santa Cruz County, the Unified Corridor Investment Study (UCS) has been undertaken to consider transportation options between Santa Cruz and Watsonville along three of the most important north to south transportation routes in the County: Highway 1, Soquel/Freedom and the Rail Right-of-Way (ROW). The forecast year for the study is 2035.

A 2035 Preferred Scenario has been developed based on the results of the UCS and extensive public and stakeholder input. The preferred scenario is designed to promote the development of a sustainable transportation system that is reliable and efficient, to protect the natural environment, and to provide for economic vitality, and to improve access for all users. **Table 52** provides a graphical representation of the Preferred Scenario alongside the Unified Corridor Study Scenarios on which it is based.

The Preferred Scenario establishes a commitment from RTC to respond to a frequently expressed public desire that "people need a range of transportation options" with meaningful auto, transit, bike and pedestrian improvements that are integrated together as part of an overall transportation system. The Preferred Scenario emphasizes regional projects that include highway improvements, bus service enhancements, and public high capacity transit service along with significant bike and pedestrian improvements including a multi-use pedestrian and bicycle facility within the existing rail right-of-way **(Figure 43)**.

Approximately 100,000 people per day will benefit directly from improvements to Highway 1, the most heavily traveled roadway in Santa Cruz County. South county residents who commute to north county for employment face congested conditions in the AM northbound peak period on a daily basis, often taking 2 to 3 or more times longer to get to work compared to off peak times. Even more congested, the southbound PM peak period commute home for south county residents from Santa Cruz to Watsonville can often take 3 or more times longer than during off peak times. The Preferred Scenario includes the six sets of auxiliary lanes and ramp metering between San Andreas Rd and Soquel Drive by 2035 to improve safety and traffic flow and will make room between the interchanges for the addition of High Occupancy Vehicle Lanes (also known as carpool lanes) in the future. Three of the six sets of auxiliary lanes are moving forward as directed by voters through Measure D. Following the addition of auxiliary lanes and ramp metering and beyond the 2035 timeframe of the UCS, the High Occupancy Vehicle (HOV) lanes would add a lane for carpools and transit, which requires widening all the interchanges to accommodate the additional lanes. Full implementation of HOV lanes on Highway 1 will require seeking a significant level of funding at a time when state and federal funding for highway capacity increasing projects is extremely limited and therefore will not likely be implemented until after 2035.

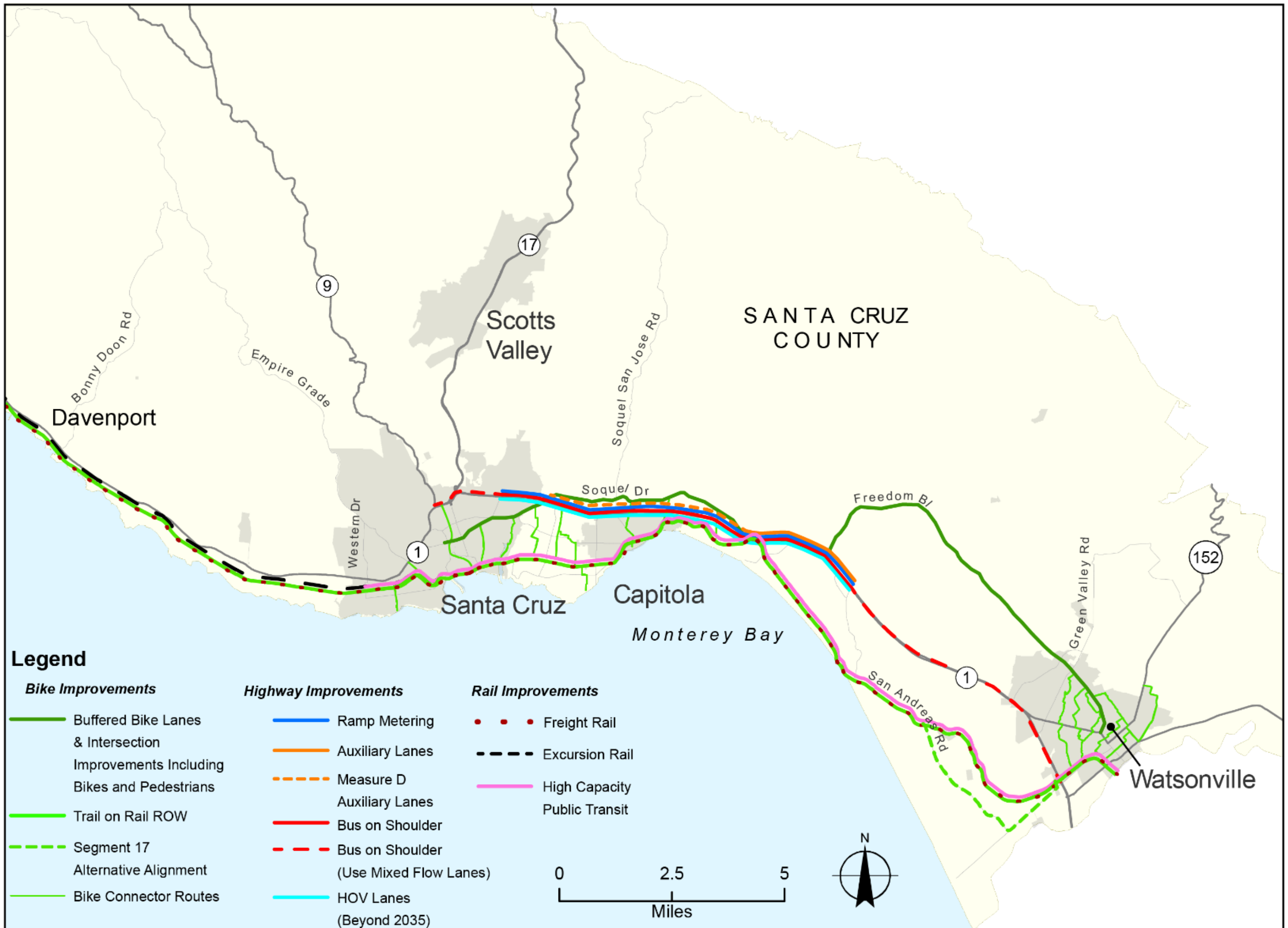
The existing and planned auxiliary lanes projects along Highway 1 included in the UCS preferred scenario offer an opportunity for bus on shoulder operations to deliver a faster transit travel time service during peak congested periods. A Feasibility Study was conducted by the Santa Cruz County Metropolitan Transit District (Metro) and partner agencies in Monterey County to provide the opportunities, constraints and a financial analysis for bus on shoulders along Highway 1. Metro and the RTC are working with Caltrans to develop an operating concept and to receive formal Caltrans approval and environmental clearance for the bus on shoulder operations.

[76] AMBAG 2018 Regional Growth Forecast

Table 52: All Scenarios Comparison with Preferred Scenario

	2035 Preferred	Beyond 2035	Scenario A	Scenario B	Scenario C	Scenario E
Highway 1 Projects						
Buses on shoulders						
High occupancy vehicle lanes (HOV) and increased transit frequency						
Auxiliary lanes to extend merging distance IN ADDITION TO MEASURE D						
Metering of on-ramps						
Additional lanes on bridge over San Lorenzo River						
Mission St intersection improvements						
Soquel Avenue/Drive and Freedom Blvd						
BRT lite (faster boarding, transit signal priority and queue jumps)						
Increased frequency of transit with express services						
Buffered/protected bike lanes						
Intersection improvements for auto						
Intersection improvements for bikes/pedestrians						
Rail Corridor						
Bike and pedestrian trail						
High-capacity public transit service						
Local rail transit with interregional connections						
Bus rapid transit						
Freight service on rail					Only Watsonville	
Overall Project Area/Connections between Routes						
Improved bike/pedestrian facilities throughout urban area closing gaps in network	These projects are evaluated in all scenarios.					
Additional transit connections						
Bike share, bike amenities, transit amenities, park and ride lots						
Multimodal transportation hubs						
Automated vehicles/connected vehicles						
Transportation Demand and System Management						
Employers and residences - incentive programs	These projects are evaluated in all scenarios.					
Education and enforcement - electric vehicle, motorist safety, and bike safety						

Figure 43: Map of Preferred Scenario Projects



Kimley»Horn SCCRTC

Preferred Scenario Project Map
Unified Corridor Investment Study

November 2018

The Preferred Scenario includes protection of the rail right-of-way for a high-capacity public transit service and facility. Transit on the rail right-of-way provides an equitable option for both south county and north county residents to avoid traffic congestion in commuting to work. The UCS studied two potential high-capacity public transit service projects, passenger rail service and bus rapid transit in the rail corridor. Passenger rail service between Santa Cruz and Watsonville with local stops and an interregional connection at Pajaro Station is forecasted to serve approximately 3,500 people per day (approximately 7,000 boardings per day) with capital and operating costs estimated at $325 million and $15 million/per year, respectively. Bus Rapid Transit between Watsonville and Santa Cruz on the rail right-of-way with portions of route on parallel roadways including Highway 1 south of State Park Drive is forecasted to serve approximately 2,000 people per day (approximately 4,000 boardings per day) with operating and maintenance costs estimated at $265 million and $10 million /per year, respectively. Passenger Rail travel time was projected to be 41 minutes for peak hour travel between Santa Cruz and Watsonville, whereas BRT on the rail right-of-way with portions of the route on parallel roadways including Highway 1 south of State Park Drive is projected to have travel times of 63 -minutes for Bus Rapid Transit Express northbound in the am peak period and 53 minutes for Bus Rapid Transit Express southbound in the pm peak period. The ability to deliver an integrated countywide system that meets the needs will require additional funding that is yet to be completely identified. Funding availability for transit capital projects at the state level, particularly rail transit, is on an upward trend due to ability of transit to provide a new transportation option, equitable access for transportation disadvantaged, and ability to reduce greenhouse gas emissions. Implementation of transit service has the potential to leverage opportunities identified in the State Rail Plan as discussed below, if passenger rail options are pursued. Technologies for both rail and bus transit are evolving at a rapid pace, and the preferred alternative will provide flexibility in determining the most appropriate high-capacity public transit service for the rail corridor.

Establishing a connected multimodal system with two new main line transit routes between Watsonville and Santa Cruz via a high-capacity public transit service on the rail line and bus on shoulders on Highway 1 would provide for faster transit service on dedicated facilities separate from motor vehicles. Transit on Soquel/Freedom is envisioned to continue to provide for local service to the many origins and destinations on this route. Where feasible, transit signal priority and bypass lanes at intersections on Soquel/Freedom will be provided. Bus feeder routes will connect the main line transit routes to major origins and destinations in the county as well as other first and last mile solutions such as bike share and the multi-use trail on the rail right-of-way. A more detailed evaluation of the transit route structure which includes local bus transit connections to transit on the rail right-of-way would be undertaken during future studies. The preferred scenario helps protect the rail right-of-way for future potential high-capacity public transit service in part by keeping freight and excursion (non-commuter) passenger service on the rail line.

The trail in the rail right-of-way, along with buffered/protected bike lanes on Soquel/Freedom and bike connections via neighborhood routes, support an integrated walk/bike/transit network. The preferred scenario is consistent with a multi-use bicycle and pedestrian trail as envisioned in the Monterey Bay Sanctuary Scenic Trail Network Master Plan[77] to not preclude future rail transit services. The multi-use trail on the rail right-of-way is forecasted to serve approximately 7,000 cyclists and another 3,500 pedestrians daily. In addition to transportation benefits, the trail will provide recreation benefits, and will add to the tourism attractiveness of the area. Bicycle ridership is forecasted to increase on the Soquel/Freedom corridor to as many as 4,500 cyclists per day with implementation of buffered/protected

[77] The Monterey Bay Sanctuary Trail Master Plan developed the planning work for the trail and entailed extensive outreach and engagement with stakeholders and community groups. A program-level Environmental Impact Report (EIR) was also prepared. All local jurisdictions through which the trail will traverse have also adopted the Master Plan.

bike lanes. Bicycle access is expanded by bike connections that link neighborhoods to the trail. Bicycle and pedestrian improvements to intersections on Soquel/Freedom will also improve safety and access. Multiuse trails and buffered/protected bicycle lanes are examples of safe, comfortable, transportation infrastructure that promote greater physical activity. The act of walking or biking to school, work, or to other places that are a part of our daily routine improve our health and quality of life.

By promoting a full complement of transportation options, the Preferred Scenario will be best positioned to take advantage of the changing transportation landscape both in terms of new regional and state programs/plans and the rapidly evolving state of transportation technologies. As discussed above, the available funding programs from state and federal agencies are trending away from financing roadway capacity improvements that would likely encourage more people to drive single occupant vehicles and are increasingly favoring projects that provide enhancements to multimodal mobility (such as carpool, transit, bike and walk trips), safety, efficiency, and extending the life of existing facilities. Funding for highway, transit, and bike/walk projects are often available from different sources. By prioritizing a mix of projects and being “shovel ready” with environmental review and project design completed, Santa Cruz County can be in a much more competitive position to be awarded funding. Measure D is a valuable tool for Santa Cruz County to use those locally generated funds to compete more effectively for grants and funding programs, making each dollar generated worth much more. The projects in the preferred scenario are all good candidates for funding based on current trends.

Emerging vehicle technologies will change mobility options in the future and may result in reductions in greenhouse gas emissions, but not necessarily vehicle miles traveled. The technologies will impact all modes of transportation including rail, bus, bicycle, and automobile. Prioritizing regional projects that will benefit from vehicle technology improvements such as Highway 1 and passenger rail service will allow Santa Cruz County to best take advantage of these new technologies. Automated vehicles on a dedicated regional facility can make much more impact than if mixed with other vehicles. The transportation industry is currently in a research mode to develop methodologies to forecast the impacts of emerging vehicle technologies and what they mean for future mobility options. Staying apprised of and anticipating these changes will be critical as projects step forward towards implementation.

Protect the Rail Right of Way

Rail corridors often have complex land ownership histories that lead to a delicate balance of conditions that allow the rail line to persist. One example is that portions of the Santa Cruz Branch Rail line are owned by private entities that have granted easement rights for rail services. If and when rail services were discontinued, the easements may revert back to the adjacent landowners by operation of law, or those land owners may have the right to terminate the railroad rights, fracturing the rail corridor and potentially making it impossible or very expensive to restore to a continuous corridor in the future.

Federal legislation was enacted in 1983 (the “National Trails Act”) to allow railbanking, a method by which freight rail lines proposed for abandonment can be preserved for future freight rail use while allowing for interim conversion to trail or other uses. Although railbanking is part of the federal abandonment process administered by the U. S. Surface Transportation Board (STB), if a line is railbanked, under the National Trails Act, the corridor is treated as if it had not been abandoned since rail service could be restored in the future. As a result, the integrity of the corridor can be maintained, and any reversions that could break it up into small pieces are prevented.

Some of the challenges with railbanking include:

- The STB has jurisdiction over freight railroad rate and service issues and rail restructuring transitions including mergers, line sales, line construction, and line abandonments. (The STB also has some limited jurisdiction over interstate passenger rail operations.)
- As part of the abandonment process, the STB provides procedures for petitioners, as well as for those who would like to purchase the line and assume the common carrier freight obligation to provide service over the line, and also procedures that allows for the acquisition of the right of

way for railbanking and interim trail use if no one offers to acquire the line for continued freight rail use.

- If the STB allows for railbanking, the decision does not stop adjacent landowners who have provided easements for the rail corridor from suing the United States claiming that the trails represent a new use of their land which entitles them to compensation. The Federal Government has been sued numerous times and courts have ruled in favor of property claims of adjacent landowners depending on the nature and quality of title of the landowners. Neither the RTC nor the railroad operator SPP would be liable for damages to the adjacent landowners.
- The STB has the authority to require the rail line be reactivated for freight rail use at any time even if the line is railbanked and/or actively being used for a trail if there is a need to use the line for freight rail service.
- Some costs associated with converting the trail back to rail use could fall on the agency responsible for the trail depending on the terms of the interim trail use agreement that would be negotiated between the agency and the railroad.
- Funds from the California Transportation Commission from Proposition 116 and the State Transportation Improvement Program (STIP) Public Transportation Account (PTA) are tied to rail service. According to the funding agreement with the State, the funding is subject to repayment requirements if there is no rail service on the rail line. Railbanking would likely not prevent the State from requesting repayment of the funds.
- The legislation was first enacted in 1983 to allow for railbanking. The RTC is unaware of any paved trails that have been converted back to rail once it has been railbanked.
- To develop a trail under the railbanking concept, the RTC or trail agency would need to look for alternative funding. Such funding may be more difficult to obtain than the funding for a trail adjacent to the rail line, given the requirement for potential reactivation for rail service. Funding for a trail under the railbanking concept may require repayment if reactivation of the rail line were to occur.

As projects move into the implementation phase, it is critical that the RTC remain mindful of its obligations to maintain the rail right-of-way in accordance with the various land ownership agreements that are in effect to avoid loss of right-of-way that could jeopardize both future rail service and construction of a trail.

Next Steps

In recognition of the timing and availability of funding, project development requirements, and the desire, to the extent possible, to begin immediately addressing the communities' transportation needs, the Preferred Scenario has been structured into Near Term (through 2027), Mid-Term (through 2035), and Long Term (beyond 2035) timeframes for delivery. **Table 53** provides preliminary detail regarding the timing and sequencing of projects in the Preferred Scenario. As shown, the Preferred Scenario begins advancing regional projects on all three routes immediately, with a focus on delivering sooner those projects that have a lower cost and/or those projects that are further along in their development.

Infrastructure projects similar in nature to the UCS projects have a typical schedule that can vary from 7-10 or more years. The focus should thus be on phasing of the UCS projects due to constructability and funding schedules, and to mitigate the impacts of construction on daily commutes.

Table 53: Timeframe for Project Completion

	Time frame for Project Completion		
	Near Term (2027)	Mid Term (2035)	Long Term (Beyond 2035)
Highway 1 Projects			
buses on shoulders			
3 sets of auxiliary lanes - Soquel Dr to State Park Dr			
3 additional sets of auxiliary lanes - State Park Dr to San Andreas Rd			
metering of on-ramps			
interchange improvements and high occupancy vehicle lanes (HOV)			
Soquel Avenue/Drive and Freedom Blvd			
buffered/protected bike lanes			
intersection improvements for bikes/pedestrians			
Rail Right-of-Way			
bike and pedestrian trail			
Capitola trestle repair/replacement for rail/bike/walk[1]			
High-capacity public transit service			
freight and excursion train service on rail			

1-Results of a structures evaluation on the Capitola Trestle will be available in 2019. The result of the evaluation will inform the timing for repair/replacement of the Capitola Trestle.

Fulfillment of the Preferred Scenario consistent with **Table 53** involves specific project considerations on each route, which include:

Highway 1 Improvements

- Continue to advance development of the three sets of auxiliary lanes between Soquel Avenue/Drive and State Park Drive as authorized by voters through the Measure D Expenditure Plan, which could be completed within the next 6-8 years.
- Utilize Measure D funds as matching funds to compete for and secure state and federal competitive grant funds for construction of these auxiliary lanes. This may enable some of the Measure D funds to be shifted to the additional three sets of auxiliary lane projects from State Park Drive to San Andreas Rd to be implemented by 2035.
- Integrate bus on shoulder with the construction of the auxiliary lanes in Measure D from Soquel Avenue/Drive to State Park Drive and in the longer term will include State Park Drive to San Andreas Road. When the HOV lanes are constructed in the long term beyond the study period, transit services could move to the HOV lanes.
- Increase transit frequency (express service) as part of the bus on shoulders project to provide short term faster transit options between Watsonville and Santa Cruz.
- Prioritize development of the additional 3 sets of auxiliary lanes between State Park Drive and San Andreas Drive once complete funding plans for the first three auxiliary lanes are finalized.
- Preparation for ramp metering such as on-ramp widening will occur where feasible with the delivery of the initial Highway 1 projects. Implement ramp metering when feasible to improve freeway flows and extend period of acceptable flow during the peak hours.
- The HOV lanes project is a long-term project that will require substantial improvements to the interchanges between Soquel Drive and San Andreas Rd and will likely occur beyond the study timeframe sometime after 2035.

Rail ROW

- Protect the Rail corridor for high-capacity public transit use and an adjacent bicycle and pedestrian facility, by maintaining the railway tracks and allowing freight and excursion (non-commuter) passenger service on the railway.

- Continue the development of the trail from along the rail right-of-way as presented in the Monterey Bay Sanctuary Scenic Trail (MBSST) Master Plan and EIR, which could be completed within the next 10 years.[78] Prioritize funding and implementation of trail segments that are most competitive for grant programs, which will allow the fastest possible implementation of the trail.
- Continue to consider passenger rail service options on the rail right-of-way consistent with Prop 116 [79] requirements, with consideration of other high-capacity public transit options.
- Collaborate with the Santa Cruz Metropolitan Transit District to develop a proposal to evaluate transit alternatives on the Santa Cruz Branch Rail Line.
- Results of a structures evaluation on the Capitola Trestle will be available in 2019. The result of the evaluation will inform the timing for repair/replacement of the Capitola Trestle. Determine feasibility of designing a structure to replace the Capitola trestle that would accommodate both a trail and rail or other transit options.
- Support development of an integrated transit network, which includes a dedicated transit facility on the rail right-of-way that incorporates the latest technologies.

Soquel/Freedom

- Prioritize the construction of buffered/protected bike lanes along Soquel Drive and Freedom Boulevard. Many segments can be either protected or buffered indicated with striping to accommodate pedestrians and bicycles. Buffer widths will vary along the corridor. In urban settings with multiple driveways, protected bike lanes will be limited.
- Prioritize pedestrian and bicycle improvements to intersections and if feasible, the addition of right turn pockets or bypass lanes for bus service and transit priority.

Goals and Performance Measures

Based on the similarity of many aspects of the Preferred Scenario to other Scenarios evaluated in the UCS, an estimate of the Performance Measures for the Preferred Scenario was developed based on information previously included in the UCS Step 2 Analysis. **Table 54** provides the results of the Performance Measures analysis for the Preferred Scenario if passenger rail service as defined in the UCS is implemented. Using passenger service for quantifying the goals and performance measures is for comparison purposes only and is not a bias against any other potential high-capacity public transit alternative on the rail corridor.

[78] Final design of segments of this trail next to rail are in progress, construction of segment 7 is scheduled to begin in 2019.
[79] There have been numerous decisions by the many commissioners at the RTC starting in the early 1990's to purchase the rail right-of-way using voter-approved Proposition 116 funds that were available for passenger rail projects in Santa Cruz County.

Table 54: Performance Measures Results for Preferred Scenario if Passenger Rail Service as defined in UCS is Implemented

Goals and Performance Measures	2015 Baseline	2035 Preferred	Beyond 2035
Safety			
Fatal, Injury and Property Damage Only Collisions	1110	865	965
Reliability and Efficiency			
AM Peak Period Countywide Mean Automobile Speed (mph)	40.5	39.4	40.6
AM Peak Hour Hwy 1 Mean Automobile Speed (San Andreas to Branciforte Overcrossing)[1] (mph)	28.2	21	39
Peak Period AM Mean Transit Travel Time Watsonville to Santa Cruz (minutes)	70	Bus on Shoulders: 40 Rail Transit: 41	HOV Transit: 32 Rail Transit: 41
Peak Period Travel Time Reliability	Less Reliable	More Reliable	Most Reliable
Mode Share (% trip by car)	83.2%	79.4%	79.6%
Person Trips across N-S Screenline (41st Ave) 4-6PM	27,411	33,000	38,912
Economic Vitality			
Level of Public Investment - Capital Cost Estimate/Funding Potential	-	$948 million/$455 million	$1.28 billion/TBD
Level of Public Investment - Annual Operations & Maintenance Cost Estimate/Funding Potential	-	$35 million/$26 million	$40 million/TBD
Visitor Tax Revenue ($1,000,000)	$28.6	$40.1	$40.1
Other Economic Impacts	-	Moderate	Moderate
Cost Reductions Associated with Collisions ($/year)	-	-$77,500,000	-$55,000,000

Environment and Health			
Automobile VMT (daily)	5,477,870	5,925,500	6,095,639
Environmentally Sensitive Areas (miles of impact)	-	40.6	40.7
Greenhouse Gas Emissions (CO2e metric tons/day)[2]	2,617	1,899	1,928
Criteria Pollutants (metric tons/day)	27	6.15	6.23
Equitable Access			
Transit VMT (million miles per year)	3.33	5.03	5.23
Household Transportation Costs	24%	25%	25%
Benefits and Impacts to Transportation Disadvantaged Communities	-	24.4%	23.5%

1-Data from Hwy 1 Final Environmental Impact Report (https://sccrtc.org/projects/streets-highways/hwy1corridor/environmental-documents/)

2-Highly dependent on extent of electric vehicle use and other vehicle technology changes

The Preferred Scenario meets the specific goals of the UCS by:

- Increasing **Equity** by increasing transit vehicle miles, serving transportation disadvantaged populations and providing options that could provide some households with the option of decreasing the number of cars owned.
- Promoting **Economic Vitality** by increasing access to businesses and affecting business location decisions through highway improvements and improved bicycle and transit connections and by way of creating new access to businesses through local rail transit and trail investments on the rail right-of-way. Increases opportunities for increasing property values and rents by including projects that attract visitors and enable higher intensity development.
- Providing **Reliable and Efficient** transportation system by implementing improvements on Highway 1 and integrating bus and rail transit services to improve transit travel speeds and time and reliability and provide a range of transportation options.
- Advancing **Safety** by implementing projects that are documented to reduce the opportunities for collisions such as a multi-use trail and ramp metering.
- Further **Environment and Health** goals by offering more transit and safer bike and walk options. Operational improvements on the highway could reduce GHG emissions by reducing stop and go traffic. HOV lane implementation beyond 2035 could increase vehicle miles traveled (VMT) by redirecting traffic onto a faster highway (longer route but shorter time). A substantial increase in zero-emission vehicles on Santa Cruz County roadways by 2035 could negate any increase in GHG emissions due to an increase in VMT. It is also possible that in the future, as gas taxes become ineffective as a source of transportation funding, a tax imposed on VMT will minimize increases in VMT.

Regional/State Rail Priorities

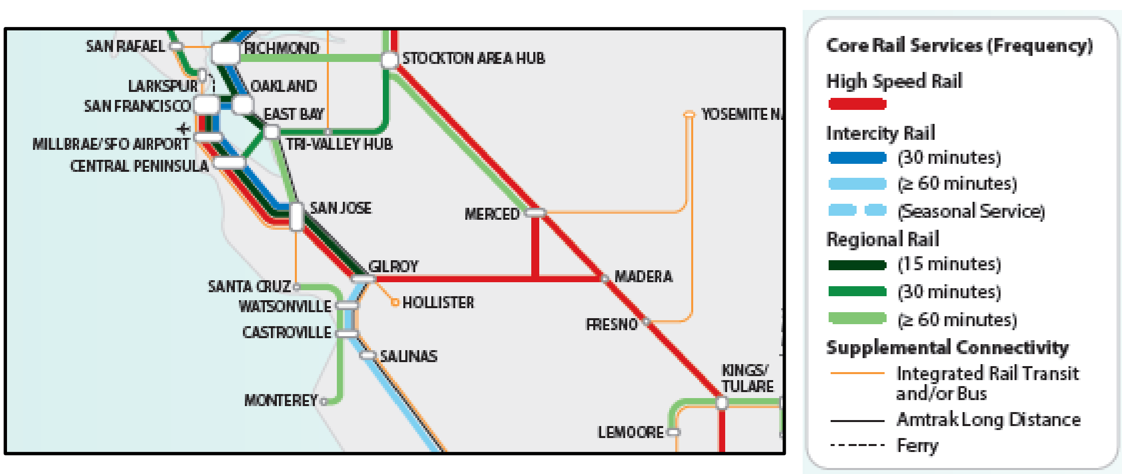
The 2018 California State Rail Plan identifies the Santa Cruz Branch Rail line as part of the state rail system with direct passenger service connectivity with Monterey. The Transportation Agency for Monterey County has studied passenger rail service along its portion of the corridor as well and has expressed interest in introducing passenger rail service in that county. Expansion of the passenger rail service studied as part of this report into one connected system with Monterey County rail transit would likely provide further increases to system ridership, would provide a broader regional benefit, and would in turn be more competitive for state and federal funding programs. Providing service in both counties under a single operator would reduce operating overhead cost, simplify fare structures and provide even more opportunity for future system expansion to other nearby communities and integration into the larger state rail system.

Continuing to consider Local Rail Transit with Regional Connections along the Santa Cruz Branch Line is an element of the Preferred Scenario. The proposed transit service, extending from Watsonville to approximately Natural Bridges Drive northwest of downtown Santa Cruz, is shown to have independent utility, generating approximately 7,000 passenger trips (3500 people/day) on a typical weekday in the horizon year of the Unified Corridor Study (2035). This service would connect with rail service at its southern terminus at Pajaro Junction, providing interregional transit access to nearby communities served by existing and proposed passenger rail service along the Union Pacific Railroad corridor. Existing service includes Amtrak Coast Starlight intercity passenger. Future service includes commuter rail under development between San Jose and Salinas and intercity rail service along the coast with planned implementation of a Coast Daylight service. Regional connectivity benefits ridership on local rail transit along the Santa Cruz Branch Line, albeit the analysis for this study has attempted to be conservative and not overstate these potential additional benefits in the ridership forecasts.

It is nevertheless relevant to point out that should interregional connections to the Santa Cruz Branch Line be enhanced to the extent other studies have proposed, ridership benefits would be significantly greater than assumed in this study. This is an area for more study.

The recently adopted California State Rail Plan, 2040, for instance, proposes a major expansion of intercity and regional passenger (and freight) rail services throughout California, including Santa Cruz County. The objective of the plan, prepared by Caltrans, is to expand the capacity, efficiency, and effectiveness of the state rail network to better accommodate the mobility needs of California's projected population of 47 million by 2040, reducing reliance on the private automobile and mitigating the congestion and emissions problems that follow from increasing auto vehicle miles of travel. The plan proposes a unified statewide rail network that (1) integrates passenger and freight rail, (2) connects passenger rail service to other modes, and (3) supports "smart" mobility goals established by the state legislature and local communities. While there are approximately 115,000 trips per day currently on intercity and regional rail services in the state, the target is 1.3 million by 2040. The required investment is considerable—an estimated $40.8 billion for upgrading existing and constructing new services. Not just infrastructure improvements for high speed, intercity and regional rail are envisioned; more frequent and higher speed services in existing rail corridors are planned. The operating improvements are intended to be delivered in the near term wherever practicable, from 2022 to 2027.

The figure below, excerpted from the State Rail Plan, shows intended improvements in northern California. In the vicinity of the Santa Cruz Branch Rail Line, higher frequencies on intercity and regional rail lines and infrastructure investments to support the increased service, faster train speeds, and intermodal connections are important elements of the plan. Continuous passenger rail service between Santa Cruz and Monterey is anticipated. While finding the funds to fully implement the State Rail Plan will be a challenge, the far-reaching vision is established. The service and speed improvements and enhanced intermodal connections are likely to receive priority, which is promising. Individuals in Santa Cruz County will greatly benefit from this interregional rail connection to the Bay Area, the rest of California and beyond.



APPENDIX A – UCS PROJECTS AND RELATION TO PROJECTS IN 2040 RTP

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APPENDIX B – PROJECT DESCRIPTIONS AND COST ESTIMATES

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APPENDIX B - PROJECT DESCRIPTIONS AND COST ESTIMATES

Project descriptions and total cost estimates for the projects evaluated in the Unified Corridor Investment Study (UCS) are provided below. Project costs included in the UCS are planning level estimates of the total project capital and operation and maintenance (O&M) costs. Costs estimates are provided for the purpose of the UCS scenario analysis level of public investment performance measure. Prior cost estimates for projects included in the UCS have been re-evaluated and escalated to 2018 dollars to provide the best available information including consideration of unit costs for similar projects. More refined cost estimates for projects will be developed once the projects complete final design. Project costs totals may not sum due to rounding.

A contingency of 30%-50%, depending on the project, is included to account for the unknowns at this early stage of project development. The exact percentage selected for each project and cost category is based on standard practices and professional experience related to the cost variability typically seen for items of work.

Annual Operations and Maintenance costs include costs to operate new transit service (rail/bus rapid transit/bus) and vehicle maintenance. Annual Operations and Maintenance also includes facility maintenance for trail projects, bus rapid transit, and passenger rail service on the Santa Cruz Branch Rail Line, as applicable by scenario. Facility maintenance for passenger rail service is assumed to be split between RTC and the passenger service rail operator when freight rail service is provided. The annual cost for facility maintenance on the rail right-of-way within the rail envelope for freight rail service is assumed to be the responsibility of the common carrier. The annual cost of facility maintenance on state highways are allocate by Caltrans and facility maintenance on local roads are allocated by local jurisdictions, and no additional costs are assumed for the UCS public level of investment performance measure.

For projects with bus transit services, route #'s (i.e. Route 57, Route 66) refer to Metro existing transit route alignments. The number of transit revenue hours per day is calculated by multiple the number of transit trips per day by the length of the trip.

Project	Table B-1: Bus on Shoulders			
Limits	Santa Cruz Metro Center to Watsonville Transit Center			
Description	A Bus on Shoulder Feasibility Study was released in Summer 2018. The study evaluated four alternatives for Bus on Shoulders: interim bus on shoulders south bound, bus on shoulder north and south bound, hybrid bus on shoulder and auxiliary lanes, and bus on shoulder with a portion of the High Occupancy Vehicle Lanes. See Figure on following page. The bus on shoulder with auxiliary lanes is identified as the operationally superior alternative.			
Scope	For Scenario B, the bus would run on the auxiliary lanes/shoulders between Morrissey Blvd and State Park Drive in order to utilize the existing and Measure D funded auxiliary lanes. The cost for Scenario B includes widening and paving of shoulders near interchanges between Morrissey to State Park Drive. Scenario C also includes construction of auxiliary lanes from State Park to Freedom Boulevard and therefore the bus could run on the auxiliary lanes/shoulders between Morrissey and Freedom Blvd. Widening and pavement of shoulders between Morrissey Blvd and Freedom Blvd near the interchanges would be needed to support Bus on Shoulders in Scenario C. The Bus on Shoulders project adds 33 new weekday revenue hours and 45 new weekend revenue hours per day of bus transit service for express bus service between Santa Cruz and Watsonville and extends the Highway 17 to a stop in mid-county.			
CAPITAL COSTS				
			Scenario B	Scenario C
Construction Costs			$1,443,800	$1,925,067
Right of Way			$ -	$ -
Bus Vehicles			$5,900,000	$5,900,000
Support Costs (36%)			$519,000	$692,000
TOTAL PROJECT COSTS- CAPITAL			**$7,900,000**	**$8,500,000**
OPERATION COSTS				
		New Revenue Hours	Operating Cost per Hour	Annual Operating Cost
91x SC-Wats Weekday		18	$200	$918,000
91x SC-Wats Weekend		45	$200	$990,000
HWY 17 Mid County Weekday		15	$200	$765,000
Contingency (30%)				$801,900
TOTAL PROJECT COST-OPERATIONS				**$3,500,000**

Project	Table B-2: High Occupancy Vehicle (HOV) Lanes and Increased Transit Service
Limits	Morrissey Boulevard to San Andreas Rd
Description	The High Occupancy Vehicle Lanes (HOV) project includes construction of nine miles of HOV lanes from Morrissey to San Andreas Rd in both the north and southbound directions. A high occupancy vehicle lane, also known as carpool or diamond lanes, is a restricted traffic lane reserved for use by vehicles with two or more people including transit buses and vanpools.
Scope	Reconstruction of Morrissey, Soquel, Bay/Porter and 41st, Park, State Park, Rio Del Mar, Freedom and San Andreas Rd. interchanges. Interchange reconstruction includes reconfiguration of ramps and intersections to allow for ramp metering. Assumes construction of auxiliary lanes from State Park to San Andreas Rd. Auxiliary lanes could be constructed as separate project and therefore the cost for the auxiliary lane projects is listed separately in the UCS. The Highway 1 HOV Lane project adds 51 new weekday revenue hours and 72 new weekend revenue hours per day of bus transit service for express bus service between Santa Cruz and Watsonville and extends the Highway 17 to a stop in mid-county.

CAPITAL COSTS			
Reconstruct Morrissey interchange			$48,400,000
Reconstruct Soquel Interchange			$71,200,000
Reconstruct Bay/Porter & 41st interchange			$120,300,000
Reconstruct remaining interchanges			$134,500,000
Construction of HOV lanes			$65,500,000
Bus Vehicles (30% contingency)			$12,500,000
TOTAL PROJECT COSTS- CAPITAL (contingency included in cost estimate)			**$452,500,000**
OPERATION COSTS			
	New Revenue Hours	Operating Cost per Hour	Annual Operating Cost
91x SC-Wats Weekday	18	$200	$918,000
91x SC-Wats Weekend	45	$200	$990,000
HWY 17 Mid County Weekday	18	$200	$918,000
HWY 17 South County Weekday	15	$200	$765,000
HWY 17 South County Weekend	27	$200	$594,000
Contingency (30%)			$1,255,500
TOTAL PROJECT COST-OPERATIONS			**$5,400,000**

Project	Table B-3: Auxiliary Lanes (in addition to the auxiliary lanes funded by Measure D)
Limits	State Park Drive to San Andreas Road
Description	The auxiliary lane project includes construction of auxiliary lanes between State Park Dr to San Andreas Rd with the exception of the southbound auxiliary lane from Freedom to San Andreas Rd as it already exists. An auxiliary lane is an extra lane that runs from the on ramp to the off ramp providing drivers a greater distance for merging in and out of the general purpose lanes.
Scope	The cost for auxiliary lanes included in Measure D (Soquel to 41st, Porter to Park Ave, and Park Avenue to State Park Drive) are not included in the UCS cost estimates. Measure D funded auxiliary lanes are assumed in all UCS scenarios. Auxiliary lanes are constructed in both the northbound and southbound directions except between Freedom Boulevard to San Andreas Rd. Auxiliary lane costs also include costs for widening of any bridge structures between the interchanges. Scenarios A & C do not include cost of reconstructing 2 rail bridges over Highway 1 and include costs to remove 2 rail bridges.

CAPITAL COSTS			
		Scenario A & C	Scenario B & E
Auxiliary Lane State Park to Rio Del Mar		$70,800,000	$114,800,000
Auxiliary Lane Rio Del Mar to Freedom		$17,700,000	$17,700,000
Auxiliary Lane Freedom to San Andreas		$9,300,000	$9,300,000
TOTAL PROJECT COSTS- CONSTRUCTION		**$97,800,000**	**$141,800,000**

Project	Table B-4: Ramp Metering
Limits	Morrissey Boulevard to San Andreas Rd
Description	Ramp metering will control entry onto the highway through use of meter lights during peak periods. On-ramps may require widening and/or lengthening of the on-ramps to allow room for queuing to limit backup onto local streets.
Scope	Installs ramp meters at Morrissey, Soquel, Bay/Porter and 41st, Park, State Park, Rio Del Mar, Freedom and San Andreas Rd interchanges. Separates lanes for SOV and HOV and provides faster metering rates for HOV. Scenario A also includes construction of HOV lanes from Morrissey to San Andreas Rd and the cost for reconfiguration of on-ramps and local streets intersection improvements is included with the HOV lane project. Scenario B includes ramp metering without the HOV lanes project and a separate cost estimate to implement ramp metering, including intersection improvements, is shown for Scenario B to install ramp metering without full reconstruction of interchanges.

CAPITAL COSTS			
			Scenario B
Construction Cost			$45,300,000
ROW Cost			$24,300,000
Support Costs (43%)			$17,400,000
Contingency (30%)			$26,100,000
TOTAL PROJECT COSTS- CONSTRUCTION			**$113,000,000**

Project	Table B-5: Widen Highway 1 Bridge at San Lorenzo River
Limits	Highway 1 San Lorenzo Bridge
Description	Widen Highway 1 bridge at San Lorenzo River
Scope	Expand bridge to seven lanes, three southbound and four north bound. Existing bridge is four lanes, two southbound and two northbound. Update the bridge up to seismic safety standards. Could include removal of center pier from the middle of the river to reduce environmental impact.
TOTAL PROJECT COSTS- CONSTRUCTION	**$20,000,000**

Project	Table B-6: Mission Street Intersection Improvements		
Limits	Various locations on Mission St		
Description	Improve intersections for automobiles, bikes, and pedestrians		
Scope	Intersection improvements include modifying and adding automobile lanes at Highway 1/Mission/Chestnut/King intersection, widening the Mission/Bay intersection, adding right turn lanes at Mission/Laurel and Mission/Swift and a new traffic signal at Mission/Schaffer.		
CAPITAL COSTS			
Hwy 1 / Mission / Chestnut / King			$4,900,000
Mission / Bay			$3,200,000
Mission / Laurel			$1,100,000
Mission / Swift			$500,000
Hwy 1 / Shaffer			$500,000
TOTAL PROJECT COSTS- CONSTRUCTION			**$10,300,000**

Project	Table B-7: Soquel Avenue and Freedom Boulevard Intersection Improvements		
Limits	Various locations between Soquel at Front Street and Freedom at Main St		
Description	Improve intersections for automobiles, bikes, and pedestrians		
Scope	Intersection improvements vary at each location. Intersection improvements could include enhancements to or the addition of: sidewalks, pedestrian crossings, bike facilities (such as buffered and/or painted bike lanes, bike boxes, bike signals), transit turn lanes and left and right turn lanes.		
CAPITAL COSTS			
Soquel at Ocean St			$4,700,000
Soquel at Water St and Morrissey Blvd			$3,500,000
Soquel at Frederick St			$3,600,000
Soquel at Winkle Ave			$11,000,000
Other Projects on Soquel			$8,000,000
TOTAL PROJECT COSTS- CONSTRUCTION			**$30,800,000**

Project	Table B-8: Buffered Bike Lanes on Soquel/Freedom
Limits	Soquel/Pacific Avenue to Freedom/Main Street
Description	Eliminate gaps in the existing bike lane network and widen bicycle lanes up to 5 feet. Add two-foot buffer zone next to lanes with either striping or physical barrier in some locations.
Scope	Modify roadways by way or restriping, modifying medians, moving parking or minor widening of the roadways to obtain a minimum 5-foot bicycle lane and a 2-foot buffer, where possible. Bollards are provided to create protected bike lanes where a 5-foot bicycle lane and a 2-foot buffer are provided. Bike boxes could be provided at signalized intersections where lanes are shared.

CAPITAL COSTS			
Restriping			$5,400,000
Restriping/Minor Widening			$7,800,000
ROW Cost			$-
Soft Costs (19%)			$2,500,000
Contingency (30%)			$4,000,000
TOTAL PROJECT COSTS- CONSTRUCTION			**$19,700,000**

Project	Table B-9: Bus Rapid Transit Lite on Soquel / Freedom
Limits	
Description	Bus Rapid Transit Lite includes branded express bus service where buses are given priority at intersections without a dedicated bus lane.
Scope	Reconfigures all (47) intersections to have transit signal priority intersections and installs transit que jumps at several locations including where Soquel intersects with Branciforte, Seabright, Morrissey, Daubenbiss, and Porter, plus 2 additional locations to be determined. Adds electronic or off-board fare collection to allow for faster boarding. Provides 216 new hours of weekday bus service between City of Watsonville and City of Santa Cruz including increased frequency for existing local service 71, new bus rapid transit service on Soquel/Freedom with 15 minute headways and additional BRT Lite express service to Cabrillo and Dominican with 30 minute frequencies.

CAPITAL COSTS			
	Quantity		Cost
Platforms	48		$9,000,000
Signal Priority	47		$1,800,000
Queue Jumps	7		$8,000,000
Soft Costs (39%)			$7,300,000
Contingency (40%)			$10,400,000
Bus Vehicles (30% contingency)			$31,700,000
TOTAL PROJECT COSTS- CAPITAL			**$68,200,000**
OPERATION COSTS			
	New Daily Revenue Hours	Operating Cost per Hour	Annual Operating Cost
Route 71 – increase service Weekday	68	$200	$3,500,000
BRT Lite Service Weekday	112	$200	$5,700,000
BRT Lite-Express Overlay Wats-Cabrillo-Dominican-SC Weekday	36	$200	$1,800,000
Contingency (30%)			$3,300,000
TOTAL PROJECT COST-OPERATIONS			**$14,300,000**

Project	Table B-10: Passenger Rail Service
Limits	Natural Bridges Drive to Pajaro Station
Description	Passenger rail transit service provided between the Westside of Santa Cruz and Pajaro Station just south of the Santa Cruz County border in Monterey County. The costs for a diesel multiple unit (DMU) vehicle train service and the cost to electrify rail service are both evaluated.
Scope	Replacement of all rail on portions of the line between Santa Cruz with continuously welded rail using good-quality second-hand rail. Replacement of 2/3 of rail ties, improve or replace turnouts and switches. Implement new signal and positive train control system to monitor and control train movements. Install new active warning devices at nineteen crossings and quiet zones at all thirty-three public at grade crossings. Construct stations with platforms, ticketing machines, parking, bicycle racks and lockers and shelter similar to a bus shelter. Implement recommended improvements to structures as identified in 2012 JL Patterson Report. Provide forty-two hours of passenger rail transit revenue hours per day with thirty-minute headway during the weekday from 6am to 9pm and weekends serving ten primary stations (Westside Santa Cruz, Bay Street/California, Downtown Santa Cruz, Seabright, 17th, 41st, Monterey Avenue, Aptos Village and Downtown Watsonville in Santa Cruz County) and one station at Pajaro in Monterey County. The Passenger Rail Service project adds 163 new weekday and 102.5 new weekend revenue hours of bus transit service connecting to rail stations.

CAPITAL COSTS

Track			$30,700,000
Signal			$16,400,000
Train Control			$60,400,000
Structures[1]			$5,100,000
Stations / Maintenance Facility			$27,800,000
Rail Vehicles			$62,500,000
Soft Costs (30%)			$60,900,000
Contingency (30%)			$60,900,000
TOTAL PROJECT COSTS- CAPITAL [2]			**$324,700,000 [2]**

[1] The cost estimates for local rail transit provided for the UCS assume the cost for structure repairs identified in the JL Patterson Structures Assessment, 2012. An evaluation of structures within the rail right-of-way is underway and recommendations for repair/replacement of structures will be available in 2019. The anticipated use of the structures varies for each scenario identified in the UCS, and understanding the future use of the corridor will inform the recommendations for repairs/replacements of structures.

[2] The Total Project Cost for Electric Multiple Unit (EMU) passenger rail service between Santa Cruz and Pajaro is estimated to cost a total of $474.4 million. If passenger rail service were to be implemented in the future, additional analysis would be performed to assess the type of vehicle that would be most beneficial based on the latest technological improvements.

OPERATION & MAINTENANCE COSTS- RAIL TRANSIT

	Daily Revenue Hours	Operating Cost per Hour	Annual Operating Cost
Rail Transit Service (weekday)	42	$573	$6,100,000

Rail Transit Service (weekend and holiday)	26	$573	$1,700,000
Vehicle O&M – Soft Costs (40%)			$3,100,000
Vehicle O&M – Contingency (20%)			$2,200,000
		Scenario B	Scenario E
Maintenance of Rail Right-of-Way		$2,200,000	$1,100,000
Maintenance - Contingency (15%)		$300,000	$100,000
TOTAL PROJECT COST-OPERATIONS (RAIL)		**$15,600,000**	**$14,300,000**
Operating electrical multiple unit vehicles is estimated to cost $13.2 million annually.			
CAPITAL COSTS – NEW LOCAL BUS TRANSIT CONNECTION TO RAIL			
Bus Vehicle (30% Contingency)			$11,700,000
TOTAL PROJECT COST – CAPITAL (BUS)			**$11,700,000**
OPERATION COSTS- NEW LOCAL BUS TRANSIT CONNECTION TO RAIL			
	New Daily Revenue Hours	Operating Cost per Hour	Annual Operating Cost
Route 55 - Increase Service Weekday	16	$200	$800,000
Route 55 - Increase Service Weekend	20	$200	$440,000
Route 66 - Realign & increase service Weekday	15	$200	$765,000
Route 68 - Increase service Weekday	15	$200	$765,000
Route 19 - Increase service Weekday	12	$200	$612,000
Route 22 - Increase service School Term Weekday	15	$200	$510,000
Route 22 - Add year-round service Weekday	30	$200	$510,000
Route 22 - Increase service Weekend	30	$200	$660,000
Route 57- Increase service Weekday	45	$200	$2,300,000
Route 57 - increase service Weekend	45	$200	$990,000
Route 65 - Increase service Weekday	15	$200	$765,000
Route 65 - Increase service Weekend	7.5	$200	$165,000
Contingency (30%)			$2,800,000
TOTAL PROJECT COST-OPERATIONS (BUS)			**$12,100,000**

Project	Table B-11: Excursion Rail Service
Limits	Davenport to Santa Cruz
Description	Excursion rail service between Santa Cruz and Davenport seasonally on weekends and holidays.
Scope	Adds new excursion passenger service on weekend and holidays between Santa Cruz and Davenport with four round trips per day. Rail transit cars used for passenger rail service from Santa Cruz to Pajaro will also be used for excursion rail service. Positive Train Control is not assumed for this section of track.

CAPITAL COSTS			
Track			$4,800,000
Signal			$1,500,000
Train Control			N/A
Structures [1]			$721,000
Stations / Maintenance Facility			$2,500,000
Rail Vehicles			N/A
Soft Costs (30%)			$2,900,000
Contingency (30%)			$2,900,000
TOTAL PROJECT COSTS- CAPITAL [2]			**$15,300,000 [1]**

[1] An evaluation of structures within the rail right-of-way is underway and recommendations for repair/replacement of structures will be available in 2019. The anticipated use of the structures varies for each scenario identified in the UCS, and understanding the future use of the corridor will inform the recommendations for repairs/replacements of structures.

[2] The Total Project Cost for Electric Multiple Unit (EMU) excursion rail service between Santa Cruz and Davenport is estimated to cost a total of $75.1 million.

OPERATION & MAINTENANCE COSTS- EXCURSION RAIL TRANSIT			
	New Daily Revenue Hours	Operating Cost per Hour	Annual Operating Cost
Rail Transit Service (weekday)	0	$490	$-
Rail Transit Service (weekend and holiday)	16	$490	$78,000
Vehicle O&M – Soft Costs (38%)			$30,000
Vehicle O&M – Contingency (20%)			$22,000
		Scenario B	Scenario E
Maintenance Rail Right-of-Way		$400,000	$200,000
Maintenance Rail Right-of-Way – Contingency (15%)		$20,000	$10,000
TOTAL PROJECT COST-OPERATIONS		**$600,000**	**$400,000**

Project	Table B-12: Bus Rapid Transit Watsonville to Santa Cruz on Rail Right of Way with portions of route on parallel roadways
Limits	Watsonville Transit Center to Shaffer Rd on West side of Santa Cruz
Description	Two-directional bus rapid transit between Watsonville Transit Center and Shaffer Rd on Westside of Santa Cruz utilizing a combination of the rail right-of-way, Highway 1, and local streets. BRT on rail right of way from State Park Dr. in Aptos to Shaffer Rd on west side of Santa Cruz with portions of route on parallel street network.
Scope	BRT buses would travel on Highway 1 between Watsonville Transit Center and State Park Drive. Buses utilize the rail ROW between State Park Dr. and Shaffer Rd for two directional travel where feasible or one-directional travel on rail ROW with reverse direction on parallel local streets. Bus Rapid Transit is on 8.5 miles of the rail ROW with a combination of two-way (2.4 miles) and one-way (6.1 miles) with reverse direction on parallel local streets. Service on bridges is one way and transit signals are utilized on the rail bridges to hold one direction of travel while transit in the other direction travels through. Buses are prioritized at at-grade roadway crossings. Bus Rapid Transit service will be branded and transit service and vehicle amenities are designed to be equivalent to those provided by rail transit to the extent possible. Provide 122 hours of new weekday bus transit service and 60 hours of new weekend bus transit service between Santa Cruz and Watsonville at fifteen-minute frequency's during peak periods to stations on the rail ROW and on parallel streets. Includes signal, on-street improvements and communication/lighting/electrical.

CAPITAL COSTS			
Earthwork and Pavement			$18,000,000
Drainage			$5,000,000
Retaining Wall & Fencing			$15,000,000
Rail Removal			$2,000,000
Platforms & Stations			$25,000,000
Signals, Signal Priority & Que Jumps			$17,000,000
Amenities			$11,000,000

Contingency (50%) [1]			$58,800,000
Structures [2]			$4,000,000
Bus Vehicles			$16,800,000
Other [3]			$25,000,000
Soft Costs (30%)			$67,100,000
TOTAL PROJECT COSTS- CONSTRUCTION			**$265,000,000**

[1] The costs for the trail projects and the bus rapid transit on the rail right-of-way have contingency costs of 50% due to unknown costs associated with the handling and disposal of excavated soil from the rail right-of-way that may contain contaminants and would be required to be addressed.

[2] An evaluation of structures within the rail right-of-way is underway and recommendations for repair/replacement of structures will be available in 2019. The anticipated use of the structures varies for each scenario identified in the UCS, and understanding the future use of the corridor will inform the recommendations for repairs/replacements of structures.

[3] Includes traffic control, mobilization, supplemental work, state furnished materials, and structure mobilization.

OPERATION & MAINTENANCE COSTS			
	New Daily Revenue Hours	Operating Cost per Hour	Annual Operating Cost
Route 66 - Increase service Weekday	17	$200	$900,000
Route 68 - Increase service Weekday	12	$200	$600,000
BRT (all stops peak) Weekday	30	$200	$1,500,000
BRT (express) Weekday	18	$200	$900,000
BRT (all stops off-peak) Weekday	45	$200	$2,300,000
BRT all stops Weekend	60	$200	$1,300,000
Maintenance	8.5 miles	$25,000	$200,000
Contingency (30%)			$2,300,000
TOTAL PROJECT COST OPERATION & MAINTENANCE			**$10,100,000**

Project	Table B-13: Trail Only
Limits	Davenport to Pajaro Station
Description	The trail only option on the rail right of way is 26 feet wide in urban areas where there are no grade constraints, 16 feet wide in urban areas with grade constraints, 14 feet wide in rural areas. In urban areas, defined as Shaffer Rd in the City of Santa Cruz to San Andreas Rd at Manresa State Beach and Lee Rd in in the City Watsonville to Pajaro Station. All trail widths referenced include 2ft buffers that could be paved or unpaved. Over rail bridges, the trail is assumed to be 12ft.
Scope	The total trail length is 30.2 miles with 8.6 miles of 26 foot wide trail, 5.4 miles of 16 foot wide trail, 14.0 miles of 14 foot wide trail, 1.4 miles of 12 foot wide bridges, and 0.7 miles parallel to roadway. All trail widths referenced are inclusive of 2ft buffers that could be paved or unpaved. For the purposes of the UCS, bicyclists are considered separate from pedestrians using pavement markings where the trail is 16 feet or wider. Trail is located on the rail ROW for it's entirely although there are two sections of the ROW that are along the street network. Assumptions made here are for the purpose of evaluation in the UCS. Pavement widths and treatments for separation of bicycle and pedestrians would be determined during future design phases. Construction of a trail only option involves removal of the tracks and ties and establishment of an aggregate base layers. Rail ballast is the support base for the railroad ties and rails and is meant to allow water to properly drain away from the rails and ties. Rail ballast, as it lies in its current application, would not be a suitable aggregate base layer for pavement because it does not meet the gradation and compaction requirements.

CAPITAL COSTS			
Earthwork and Pavement			$35,800,000
Drainage			$2,000,000
Fencing			$600,000
Rail Removal (includes salvage value)			$8,300,000
Trail Crossing and Roadway Treatments			$5,600,000
Landscaping			$1,500,000
Amenities			$7,100,000
Other			$18,700,000
Contingency (50%) [1]			$39,000,000
Bridge Structures (with 10% contingency and mobilization) [2]			$15,500,000
Soft Costs (39%)			$46,400,000
cost to reverse policy (pay back and loss of funding, staff resources to implement policy reversal) [3]			$41,000,000
TOTAL PROJECT COSTS- CONSTRUCTION			**$221,500,000** [4]

[1] The costs for the trail projects and the bus rapid transit on the rail right-of-way have contingency costs of 50% due to unknown costs associated with the handling and disposal of excavated soil from the rail right-of-way that may contain contaminants and would be required to be addressed.
[2] An evaluation of structures on the rail corridor is underway and recommendations for repair/replacement of structures will be available in 2019. The anticipated use of the structures varies for each scenario identified in

the UCS, and understanding the future use of the corridor will inform the recommendations for repairs/replacements of structures.

[3] Cost to Reverse Policy:

- $11 million repayment to California Transportation Commission (CTC)
- $10 million from State Transportation Improvement Program, Public Transportation Account for additional rail right-of-way purchase costs and bridge improvement costs that are required to be used for transit
- $7.8 million escalation of property value of rail right-of-way to repay CTC
- $10.6 million loss of funds from Central Federal Lands for Segment 5 of Monterey Bay Sanctuary Scenic Trail due to inability to meet deadline of construction start in 2020
- $1.6 million staff costs for working with federal and state agencies to reverse use of rail right-of-way

[4] Trail Only with alternative alignment onto San Andreas Rd/Beach St between San Andreas Rd and Lee Road is estimated to cost $198 million. The reduction in cost from the Trail Only on the rail ROW between San Andreas Rd and Walker Street is associated with less cost for earthwork, pavement and drainage work.

MAINTENANCE COSTS			
	Miles	Cost per Mile	Annual Maintenance Cost
Trail	30.2	$20,000	$604,000
Roadway[1]	0.7	$-	$-
TOTAL PROJECT COST- OPERATIONS		**$20,000**	**$604,000**

[1]Facility maintenance for local roads are allocated by local jurisdictions.

Project	Table B-14: Trail Next to Rail		
Limits	Davenport to Pajaro Station		
Description	The trail next to rail on the rail right of way is 12 feet wide except for Segment 7 on the west side of Santa Cruz and Segment 5 along north coast from Wilder Ranch to Davenport, trail is 16 feet wide.		
Scope	The project length is a total of 30.5 miles with 19.3 miles of 12 foot wide trail, 8.9 miles of 16 foot wide trail and 2.4 miles parallel to roadway. All trail widths referenced are inclusive of 2ft buffers that could be paved or unpaved. The trail is routed onto Nova Street between 41st Street and 47th Street and sharrows will be marked on the neighborhood street. The trail is routed onto Cliff Dr/Stockton Ave/Capitola Ave/Monterey Avenue and back onto Rail ROW south of Park Ave. Protected bike lanes will be provided where feasible and sharrows on narrower roadways. For the purposes of the UCS, the trail is assumed to be a “multi-use” trail shared between bicyclists and pedestrians. Pavement widths and treatments for separation of bicycle and pedestrians would be determined during future design phases.		
CAPITAL COSTS			

Earthwork and Pavement [1]			$16,000,000
Drainage			$2,000,000
Retaining Wall (estimated at 26,000 ft) & Fencing			$31,400,000
Rail Removal			$-
Trail Crossing and Roadway Treatments			$4,900,000
Landscaping			$1,300,000
Amenities			$7,300,000
Other			$17,600,000
Contingency (50%) [2]			$40,400,000
Structures (with 10% contingency and mobilization) [3]			$60,200,000
Soft Costs (39%)			$67,200,000
Monterey Bay Scenic Sanctuary Trail Cost- Segment 5 and Segment 7 costs			$34,000,000
TOTAL PROJECT COSTS- CONSTRUCTION			**$283,000,000** [4]

[1] Earthwork costs on this line do not include the cost of earth work for Segment 5 and 7 for which more refined cost estimates are available, Costs for Segment 5 and Segment 7 are included in the total cost for Trail Next to Rail and shown as a separate line item,.

[2] The costs for the trail projects and the bus rapid transit on the rail right-of-way have contingency costs of 50% due to unknown costs associated with the handling and disposal of excavated soil from the rail right-of-way that may contain contaminants and would be required to be addressed.

[3] An evaluation of structures on the rail corridor is underway and recommendations for repair/replacement of structures will be available in 2019. The anticipated use of the structures varies for each scenario identified in

the UCS, and understanding the future use of the corridor will inform the recommendations for repairs/replacements of structures. [4] Trail Next to Rail with alternative alignment onto San Andreas Rd/Beach St between San Andreas Rd and Lee Road is estimated to cost $211 million. The reduction in cost from the Trail Next to Rail in the rail ROW between San Andreas Rd and Walker Street is associated with less cost for earthwork, pavement, drainage, retaining walls, structures, and amenities.

MAINTENANCE COSTS			
	Miles	Cost per Mile	Annual Maintenance Cost
Trail	30.2	$20,000	$604,000
Roadway[1]	2.4	$-	$-
TOTAL PROJECT COST- MAINTENANCE		**$20,000**	**$604,000**

[1] Facility maintenance for improvements to local roads are allocated by local jurisdictions.

Project	Table B-15: Trail Next to BRT
Limits	Davenport to Pajaro Station
Description	Trail next to Bus Rapid Transit (BRT) between State Park Dr and Shaffer Rd with remaining sections Trail Only from Shaffer to Davenport and from State Park Dr to Pajaro Station. The trail next to BRT is 12 feet wide in areas next to BRT and where trail only, the trail is 26 feet wide in urban areas where there are no grade constraints, 16 feet wide in urban areas with grade constraints, and 14 feet wide in rural areas.
Scope	The project length is a total of 30.5 miles with 1.9 miles of 26 foot wide, 2.2 miles of 16 foot wide, 14.0 miles of 14 foot wide, 10.8 miles of 12 foot wide trail, and 1.6 miles parallel to roadway. All trail widths referenced are inclusive of 2ft buffers that could be paved or unpaved. For the purposes of the UCS, where the trail is 16 feet wide or wider, bicyclists are considered separate from pedestrians using pavement markings. Assumptions made here are for the purpose of evaluation in the UCS. Pavement widths and treatments for separation of bicycle and pedestrians would be determined during future design phases.

CAPITAL COSTS			
Earthwork and Pavement			$31,000,000
Drainage			$4,000,000
Retaining Wall (estimated at 13,000 total ft) & Fencing			$15,400,000
Rail Removal (includes salvage value)			$5,400,000
Trail Crossing and Roadway Treatments			$2,900,000
Landscaping			$1,400,000
Amenities			$7,900,000
Other			$19,200,000
Contingency (50%) [1]			$43,600,000
Structures (with 10% contingency and 10% mobilization) [2]			$27,8i00,000
Soft Costs (39%) [3]			$58,800,000
cost to reverse policy (pay back and loss of funding, staff resources to implement policy reversal)-			$41,000,000
TOTAL PROJECT COSTS- CAPTIAL			**$258,400,000** [4]

[1] The costs for the trail projects and the bus rapid transit on the rail right-of-way have contingency costs of 50% due to unknown costs associated with the handling and disposal of excavated soil from the rail right-of-way that may contain contaminants and would be required to be addressed.

[2] An evaluation of structures on the rail corridor is underway and recommendations for repair/replacement of structures will be available in 2019. The anticipated use of the structures varies for each scenario identified in the UCS, and understanding the future use of the corridor will inform the recommendations for repairs/replacements of structures.

[3] The costs for the trail projects and the bus rapid transit on the rail right-of-way have contingency costs of 50% due to unknown costs associated with the handling and disposal of excavated soil from the rail right-of-way that may contain contaminants and would be required to be addressed.

[4]Trail next to Bus Rapid Transit with alternative alignment onto San Andreas Rd/Beach St between San Andreas Rd and Lee Road is estimated to cost $238 million. The reduction in cost from the Trail Only on the rail ROW between San Andreas Rd and Walker Street is associated with less cost for earthwork, pavement and drainage.

MAINTENANCE COSTS			
	Miles	Cost per Mile	Annual Maintenance Cost
Trail	30.2	$20,000	$604,000
Roadway[1]	1.6	$-	$-
TOTAL PROJECT COST- MAINTENANCE		**$20,000**	**$604,000**

[1] Facility maintenance for improvements to local roads are allocated by local jurisdictions.

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APPENDIX C – UCS POTENTIAL FUNDING SOURCES 2018-2035

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APPENDIX D – 2015 SANTA CRUZ COUNTY TRAVEL DEMAND MODEL OVERVIEW

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APPENDIX D - 2015 SANTA CRUZ COUNTY TRAVEL DEMAND MODEL OVERVIEW

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 SCC Model was originally developed as a 2010 base year by Fehr & Peers. The model was updated to a 2015 base year by Kimley-Horn. The 2015 base year model was used in the Unified Corridor Investment Study.

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.
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.

MODEL INPUT DATA

The input data for the SCC Model comes from a multitude of sources including the Census 2010 data, the American Community Survey data, the Association of Monterey Bay Area Governments (AMBAG) travel demand model, the 2012 California Household Travel Survey (CHTS), the 2012 Transit On-Board Survey and numerous traffic count studies.

LAND USE DATA

Transportation Analysis Zones or TAZs are the fundamental land use building block structure for travel demand models and, therefore, require a focused effort and consideration in development and review. 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 inputs for the 2015 SCCModel were developed for each TAZ from a number of different sources. The Decennial 2010 census data at the census block level are aggregated to the model TAZ level and updated to a 2015 base year to create household and population information. 2012 American Community Survey (ACS) data was used as the inputs for the socio-demographic information. Employment data for the SCC Model was determined from the AMBAG model input data. AMBAG purchased 2010 employment data from InfoUSA and updated this information for their 2015 base year model. The data was used to populate the TAZs based on the various employment types. AMBAG compared this data set to the 2010 Employment Development Department data and the 2012 Dunn & Bradstreet employment data. Manual adjustments were made if needed to correct for inconsistencies. The 2035 land use data was developed by AMBAG for the Metropolitan Transportation Plan regional planning effort. AMBAG worked closely with local jurisdictions to develop future land use assumptions consist with existing General Plans and current planning efforts.

ROADWAY AND TRANSIT NETWORK

The 2015 base year highway network and network attributes for the Santa Cruz County model are directly extracted from the AMBAG 2015 base year highway network, by excluding the network outside Santa Cruz County. In the highway network, the critical attributes of functional class, number of lanes, and posted speed were reviewed by SCCRTC and local jurisdiction staff and revised as necessary to correct for accuracy.

The 2015 base year transit network for the Santa Cruz County model is based on current available 2018 METRO transit data which included only slight variations from the 2015 base year.

TRAVEL MODEL ESTIMATION, 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 **Table D-1** and **D-2**. 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.

Table D-1: Static Model Validation

Static Model Validation								
Criteria	Target	Daily	AM (6AM-9AM)	MID (9AM-4PM)	PM (4PM-7PM)	OFF (7PM-6AM)	AM Peak Hour (7AM-8AM)	PM Peak Hour (5PM-6PM)
Model/Count Ratio	0.90-1.10	0.99	0.97	0.97	0.97	0.82	0.91	0.98
Percent Within Caltrans Maximum Deviation	> 75%	79%	71%	80%	76%	59%	65%	60%
Percent Root Mean Square Error	< 40%	34%	58%	41%	51%	70%	61%	63%
Correlation Coefficient	> 0.88	0.97	0.86	0.88	0.82	0.74	0.90	0.91

Table D-2: Static Model Validation (Screenline)

Static Model Validation (Screenline)				
Criteria	Target	Daily	AM Peak Hour (7AM-8AM)	PM Peak Hour (5PM-6PM)
Model/Count Ratio	0.90-1.10	0.93	0.85	0.83
Percent Within Caltrans Maximum Deviation	> 75%	75%	66%	60%
Percent Root Mean Square Error	< 40%	39%	48%	59%
Correlation Coefficient	> 0.88	0.96	0.95	0.90

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

The scale at which data is aggregated and summarized can, as in the case of the speed data presented within the UCS report, potentially create the false impression that a relatively small change in a Countywide indicator is not indicative of significant differences between the scenarios analyzed. For instance, a 1 mph reduction from an approximate operating speed of 40, affecting over 5.5 million daily vehicle miles traveled (VMT) (approximate existing estimate of VMT in Santa Cruz County), equates to a daily time savings of more than 3,000 hours of vehicle delay daily. Based on Caltrans' value of travel time ($18.65 per hour), this travel time savings would equate to an annual weekday savings of more than $15 million. This underscores an important consideration when considering the magnitude of change, which is scale. If the same change for example were to be aggregated at the state or even national level the difference would look to be even smaller (it would be a small fraction of 1 mph) even though the difference would still equate to the same 3,000 plus hours of travel time savings.

While statistical significance of experimental output is a common technique for determining importance, there is not an appropriate way to similarly test a travel demand model's output. To determine if an outcome is statistically valid, the validity and level of certainty in that output needs to have a determinable confidence interval or similar statistical measure. Travel Demand Models conduct a precise series of mathematical functions using pre-determined input variables that are set by the user, and do not incorporate random elements that would cause one output with a given set of input parameters to differ from another. For instance, if households are increased in a specific location within the travel demand model, they result in traffic volume being added to the network. If you repeat this process you will get the same result, so there is no discernable difference that can be tested for significance.

Travel Demand Models do depend on estimated input data that is subject to uncertainty, particularly demographic forecasts. For the purposes of UCS, however, which focuses on transportation improvements and not demographics changes these inputs were held consistent for all Scenarios ensuring that changes to results can be attributed to transportation improvements rather than other unanticipated interactions. As such Scenarios can be compared against each other with a high degree of confidence, even when the resulting impact changes at the system level seem very small. The changes shown in project performance measures are typically a cumulative result from many smaller calculations that would show greater localized variation. While travel demand models are dependent on uncertain forecasts, they have proven to be effective tools for providing generalized estimates of how projects are likely to impact the system in the future and are the best tools available to evaluate potential project impacts to the transportation system at the time of this study.

APPENDIX E – BIKE, WALK AND TRANSIT MODE SHARE CALCULATIONS

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APPENDIX E - BIKE AND WALK & TRANSIT MODE SHARE CALCULATIONS

The mode share performance measure is dependent on an estimate of the bicycle and pedestrian usage of the trail along the rail right of way for the various scenarios. Scenario A includes a trail only on the rail right of way, Scenario B and E includes a trail next to rail and Scenario C evaluates a trail next to a Bus Rapid Transit system. Similarly, buffered bike lanes along Soquel Ave/Drive and Freedom Blvd evaluated in Scenarios B and E, will promote increased bicycle ridership. Estimating the mode share of the various scenarios based on the implementation of the various trails on the rail right of way and the buffered bike lanes on Soquel Ave/Dr and Freedom Blvd is described below.

The mode share data forecasted for 2035 in the Unified Corridor Study considers the impact of projects on bicycling trips made countywide. The bicycling projects that are considered in the UCS are the trail along the rail right-of-way, buffered/protected bike lanes and bike/walk intersection improvements on Soquel/Freedom. The bike mode share for areas within 1.5 miles of these facilities increases significantly but for a typical weekday, the bike mode share percentage is not forecasted to increase beyond a distance of 1.5 miles from the bike improvements.

TRAIL ON THE RAIL RIGHT OF WAY

- Determine the percentage of daily weekday bike trips and the average trip length for various purposes from the CHTS, American Community Survey and CTSC school bike counts. The total bike trip percentage equals 3.37% of all trips where the average number of total trips per person per day is 3.15.
    - Commute – 0.93% of total trips; average length is 3.5 miles
    - college – 0.15% of total trips; average length is 3.8 miles
    - school (K to 12) - 0.43%; average length is 1.4 miles
    - other utilitarian- 1.35%; average length is 1.4 miles
    - recreation -0.51%; average trip length is 3.5 miles; exercise loop trips are out and back trips for a total of 7 miles in length

- Divide the trail into 1 mile segments

- Determine the population within 0.5 mile, 0.5-1.0 mile, and 1.0 to 1.5 mile buffers of each 1 mile segment with no overlap of population from segment to segment. A maximum buffer of 1.5 miles was used based on CHTS data that over 96% of bicycle trips in the Santa Cruz, Monterey and San Benito tri-county region had a total trip length of 2 miles or less. The 1.5 mile population buffer considered is 0.5 miles further than recommended in the Guidelines for Analysis of Investments in Bicycle Facilities[80].

- Determine the percentage of the population that will bike for each trip purpose

- Determine the likelihood factors for the 3 buffers surrounding the trail based on trip length distribution for bicycling trips from the CHTS. Multiply by the increase in bicycle ridership based on the mode share target from the 2040 SCC Regional Transportation Plan (3.14) and by the increase in population by 2035 (9.9%).

- A multiplier was not used in calculating future recreational trips as it is assumed that the percentage of recreation trips will not increase. It is possible that as people use active transportation for more of their trips, less recreation/exercise trips will be taken.

- Likelihood factors and multipliers for each buffer

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[80] NCHRP Report 552

- 0.5 mile – 0.88*3.14*1.099=3.03
- 0.5 to 1.0 mile – 0.28 *3.14*1.099=0.96
- 1.0 to 1.5 mile – 0.13*3.14*1.099=0.45

- Calculate the number of bike trips accessing the trail on each per mile segment based on trip purpose to assess **total number of bicycle trips on a reference trail**.

- In order to differentiate the trail only, trail next to rail and trail next to BRT, the level of service was determined on the trail by estimating both bike and pedestrian volume on the trail based on the number of bike trips that access the trail on each one mile segment. Volume data determines the number of people who pass a location on the trail which is different than the number of trips on the trail.

- Commute, college and recreation trips that are on average approximately 3.5 miles in length are distributed onto the trail either in the eastbound (EB) or westbound (WB) direction. The percentage EB or WB is based on the number of employment positions from census data in the neighboring segments in each direction. The trips extend various lengths of the trail based on the following trip length distribution for an average of 3 miles on the trail per trip with 10% of trips 1 mile in length, 20% of trips 2 miles long, 40% of trips 3 miles long, 20% of trips 4 miles long and 10% of trips 5 miles long.

- A total count of bicyclists per mile segment is determined. A ratio of pedestrian to bicycle counts from data collected in October 2016 on locations nearby the rail right of way is used to determine the pedestrian counts on the trail. The ratio of pedestrian to bicycle count data varies along the length of the trail based on the observed count data. This pedestrian to bicyclist ratio was applied to the number of bicycle trips generated from the population within the 0.5 mile buffer. Given the average length of a walk trip is less than a mile, pedestrian trips along the trail during the commute weekday peak hour were assumed to be one mile long plus the distance to and from the trail (a high assumption relative to Santa Cruz County data).

- The daily bicycle and pedestrian volumes is converted to a PM peak hour count (peak hour =10.6 % of daily) based on data from the automatic counter at Arana Gulch.

- Peak hour volume data for bicycle and pedestrians is then used to determine the level of service (LOS) for each of the trail options using the Shared Use Path Level of Service Calculator produced by the Federal Highway Administration.

- If the LOS on the trail is D or less, the trail usage may be discouraged and a reduction of 10% is applied on that 1 mile segment and surrounding segments due to a reduced level of service. Trail usage next to rail or BRT may also be discouraged due to proximity to moving transit vehicles, a reduction of 5% was applied. Ridership is also reduced for the trail next to rail and trail next to BRT on segments and surrounding segments by 20% where the trail is routed onto roadways. Trail ridership next to rail or BRT is increased by 5% due to increased access to transit for longer trips.

- LOS for a trail only is A throughout the length of the rail right of way with exceptions on Beach St in the City of Santa Cruz where the existing cycle track is assumed to remain. The trail only bridges would retrofit the existing rail bridges and, in some locations, would have a reduced LOS as these bridges are typically 12 foot wide. Any reduction in LOS across the bridges for trail only was not considered in determining the ridership for trail only.

- The LOS for a trail next to transit (rail or BRT) is A and B throughout most of the rail right-of-way with the exception of the trail between the San Lorenzo River Bridge and Park Ave in Capitola where the LOS is C or D during the peak commute period due to a higher population density. The reduction in the trail use for trail next to transit relative to trail only is due primarily to the lower LOS in this section. The LOS for trail next to transit in downtown Watsonville is estimated to be C during the peak evening commute period.

- Electric bicycles were taken into consideration on the trail for lengthening the commute, college and other utilitarian trips from an average length of 3 miles to 5 miles. Electric bicycle trip length distribution used in this analysis is 5% are 1 mile long, 10% are 2 miles, 15% are each 3, 4, 5, 6 and 7 miles long and 10% are 8 miles long.

Table E-1: Trail Usage

Weekday Bike & Walk Trips on Rail ROW	2035 Forecast	2035 New Trips	2035 Forecast with Segment 17 Alternative Alignment	2035 New Trips with Segment 17 Alternative Alignment
Trail Only - Bike trips	15,050	9,591	14,976	9,517
Trail Only - Walk trips	7,468	4,759	7,462	4,723
Trail with Rail - Bike trips	13,980	8,521	13,906	8,447
Trail with Rail - Walk trips	6,930	4,224	6,924	4,187
Trail with BRT - Bike trips	13,986	8,527	13,912	8,453
Trail with BRT - Walk	7,126	4,345	7,120	4,307

Buffered Bike Lanes on Soquel Ave/Dr and Freedom Blvd

A similar analysis was performed to determine the bike ridership for the buffered bike lanes on Soquel Ave/Dr and Freedom Blvd based on the populations within a 0.5 mile, 0.5 to 1.0 mile and 1.0 to 1.5 mile buffers. The same percentage of trips by trip purpose were used as in the analysis for the trail on the rail right of way. The likelihood factors of 1.5 were lower based on the facility being on the street rather than a facility with greater separation from automobiles.

- Likelihood factors and multipliers for each buffer
  - 0.5 mile – 0.88*1.5*1.099=1.45
  - 0.5 to 1.0 mile – 0.28 *1.5*1.099=0.46
  - 1.0 to 1.5 mile – 0.13*1.5*1.099=0.21

Given the lower forecasted ridership, the bicycling facility being separate from pedestrians and the opposing directions of bike travel being on opposite sides of street, it is anticipated that the level of service will be good and was not evaluated for this facility. Total daily bike trip projections for Soquel Ave/Dr and Freedom Blvd are a total 9071 trips where 2625 of these trips are new. The mode share calculations included the estimates of bicycle and pedestrian trips on the rail right of way and Soquel Ave/Dr and Freedom Blvd in the analysis.

Transit Ridership

The mode share performance measure is dependent on an estimate of the transit trips in each scenario. Projects that include transit service include:

- High Occupancy Vehicle (HOV) Lanes (33 new weekday revenue hours and 45 new weekend revenue hours per day of bus transit service for express bus service between Santa Cruz and Watsonville)
- Bus on Shoulders (51 new weekday revenue hours and 72 new weekend revenue hours per day of bus transit service for express bus service between Santa Cruz and Watsonville)
- Bus Rapid Transit Lite (BRT lite) on Soquel/Freedom (216 new hours of weekday bus service between Santa Cruz and Watsonville)
- Rail Transit Service (forty-two hours of weekday and 26 hours of weekend revenue hours of rail transit service between Santa Cruz and Pajaro)
- Bus Connections to Rail (163 new weekday and 102.5 new weekend revenue hours of bus transit service connecting to rail stations)
- Bus Rapid Transit (BRT) on the rail right-of-way (122 hours of new weekday bus transit service and 60 hours of new weekend bus transit service between Santa Cruz and Watsonville)

Scenario A includes the addition of bus transit service as part of the High Occupancy Vehicle Lanes project and Bus Rapid Transit lite on Soquel/Freedom project, Scenario B includes the addition of bus transit service as part of the Bus On Shoulder project and Bus Rapid Transit lite on Soquel/Freedom project, as well as local rail transit with interregional connections on the rail right-of-way and the association bus connections to rail. Scenario C includes the addition of bus transit service as part of the Bus On Shoulder project, Bus Rapid Transit lite on Soquel/Freedom project, and Bus Rapid Transit on the rail right-of-way project. Scenario E includes the addition of bus transit service as part of the High Occupancy Vehicle Lanes project, as well as local rail transit with interregional connections on the rail right-of-way and the association bus connections to rail.

The forecasted transit ridership for the 2035 scenarios is shown in the below table. Local bus transit was calibrated in the travel demand model based on the existing ridership and forecasted for 2035 based on the projected population increase and the additional transit service offered for each scenario. The rail transit boardings were calibrated in the travel demand model based on the analysis performed for the 2015 Rail Transit Feasibility Study, which considered origin and destination travel flow data, demographic and other built environment data from the EPA Smart Location Database (e.g. population density, employment density, land uses, walkability). The BRT boardings were projected based on research that shows that a BRT service, that if offering the same level of service and amenities as rail, could provide a similar level of ridership as rail transit. The difference in the level of service provided by BRT and rail transit in the UCS resulted in adjustments downward from rail transit ridership projections to BRT ridership projections. The main factors that reduced ridership is that BRT between Watsonville and Santa Cruz is not a dedicated facility for the entire length in both directions and that the travel time for BRT is longer than for rail.

Table E-2: Transit Ridership

	Transit on Roadways (Daily Ridership)	Rail Transit on Rail Right-of-Way (Daily Ridership)	Bus Rapid Transit on Rail Right-of-Way (Daily Ridership)	Total Transit (Daily Ridership)
Baseline	20,160	-	-	20,160
2035 No Build	22,924	-	-	22,924
2035 Scenario A	32,319	-	-	32,319
2035 Scenario B	40,443	7396	-	47,839
2035 Scenario C	34,038	-	3949	37,987
2035 Scenario E	35,472	6571	-	42,043

Countywide transit ridership data was used to develop the transit portion of the countywide mode share performance measure which includes the bus rapid transit service or rail transit service on the rail right-of-way. There was not an analysis in the UCS of the ridership by route besides the forecasts for the rail and BRT on the rail right-of-way.

The California Household Travel Survey (CHTS) data collected in 2011-2012 for Santa Cruz County shows a higher level of transit trips above Santa Cruz County Metropolitan Transit District ridership numbers and thus the travel demand model results. The mode share data presented in the 2035 forecasts are based on the CHTS as the baseline using the travel demand model results to obtain the relative increase in transit ridership for the 2035 scenarios in comparison to the 2015 model results.

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APPENDIX F – PERSON TRIPS BY SCREENLINE AND MODE

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APPENDIX F - PERSON TRIPS BY SCREENLINE AND MODE

The north-south throughput of the transportation corridor can be evaluated by modeling the number of person trips across a screenline. The screenlines evaluated in the UCS are shown in **Figure F-1**. Person trips by mode during the 4-6PM peak period are detailed in the following tables.

Figure F-1: Traffic Count Screenline Locations

Table F-1: Person Trips Across Screenlines by Model

2016 Baseline

Screenline #	Location	Vehicles	Bicycles	Pedestrians	Transit Riders	Person Trips*
1	San Lorenzo River	18,555	560	883	389	25,767
2	Seabright Avenue	20,618	349	250	419	27,615
3	17th Avenue	23,267	246	163	503	30,926
4	41st Avenue	20,585	166	207	484	27,411
5	Capitola Avenue	19,632	174	300	455	26,254
6	Park Avenue	16,234	115	27	441	21,525
7	State Park Drive	14,221	49	87	366	18,847
8	Rio Del Mar Boulevard	17,054	41	18	334	22,393
9	San Andreas/Freedom Blvd	14,123	12	0	290	18,520

*Assumes a vehicle occupancy of 1.29 people per motor vehicle based on counts taken from 4-6 PM in October 2016.

No Build

Screenline #	Location	Vehicles	Bicycles	Pedestrians	Transit Riders	Person Trips*
1	San Lorenzo River	21,726	615	970	565	30,177
2	Seabright Avenue	23,178	384	275	633	31,191
3	17th Avenue	27,598	270	179	605	36,655
4	41st Avenue	23,218	182	227	557	30,918
5	Capitola Avenue	22,087	191	330	455	29,468
6	Park Avenue	18,339	126	30	454	24,267
7	State Park Drive	16,059	54	96	378	21,244
8	Rio Del Mar Boulevard	17,990	45	20	334	23,606
9	San Andreas/Freedom Blvd	14,123	12	0	290	18,520

*Assumes a vehicle occupancy of 1.29 people per motor vehicle based on counts taken from 4-6 PM in October 2016.

Scenario A

Screenline #	Location	Vehicles	Bicycles	Pedestrians	Transit Riders	Person Trips*
1	San Lorenzo River	21,813	1571	1907	793	33,283
2	Seabright Avenue	23,879	1150	666	809	34,385
3	17th Avenue	30,557	830	449	898	42,818
4	41st Avenue	27,364	651	536	812	38,393
5	Capitola Avenue	25,539	617	713	622	35,920
6	Park Avenue	14,078	411	83	546	19,764
7	State Park Drive	11,413	253	206	444	16,083
8	Rio Del Mar Boulevard	23,869	153	48	378	32,324
9	San Andreas/Freedom Blvd	16,913	50	1	386	22,933

*Assumes a vehicle occupancy of 1.33 people per motor vehicle based on counts taken from 4-6 PM in October 2016.

Scenario B

Screenline #	Location	Vehicles	Bicycles	Pedestrians	Transit Riders	Person Trips*
1	San Lorenzo River	20,038	2331	1899	1,876	31,955
2	Seabright Avenue	22,039	1550	634	2,028	32,643
3	17th Avenue	26,489	1106	425	3,123	38,825
4	41st Avenue	22,209	810	513	2,993	32,966
5	Capitola Avenue	21,214	825	703	1,918	30,813
6	Park Avenue	17,745	563	83	1,791	25,328
7	State Park Drive	15,736	308	205	1,747	22,559
8	Rio Del Mar Boulevard	17,774	206	48	1,441	24,624
9	San Andreas/Freedom Blvd	13,995	62	1	840	18,957

*Assumes a vehicle occupancy of 1.29 people per motor vehicle based on counts taken from 4-6 PM in October 2016.

Scenario C

Screenline #	Location	Vehicles	Bicycles	Pedestrians	Transit Riders	Person Trips*
1	San Lorenzo River	21,271	1485	1897	1,253	32,075
2	Seabright Avenue	22,723	1024	629	1,250	32,216
3	17th Avenue	27,132	735	421	1,797	37,953
4	41st Avenue	22,764	560	510	1,702	32,137
5	Capitola Avenue	21,783	563	699	848	30,210
6	Park Avenue	18,137	390	81	1,032	24,900
7	State Park Drive	15,911	242	205	1,347	22,320
8	Rio Del Mar Boulevard	17,927	148	48	741	24,063
9	San Andreas/Freedom Blvd	14,121	48	1	749	19,014

*Assumes a vehicle occupancy of 1.29 people per motor vehicle based on counts taken from 4-6 PM in October 2016.

Scenario E

Screenline #	Location	Vehicles	Bicycles	Pedestrians	Transit Riders	Person Trips*
1	San Lorenzo River	20,466	2331	1899	2,212	33,661
2	Seabright Avenue	23,165	1550	634	2,225	35,220
3	17th Avenue	29,891	1106	425	2,387	43,673
4	41st Avenue	26,823	810	513	1,914	38,912
5	Capitola Avenue	25,009	825	703	1,664	36,454
6	Park Avenue	13,727	563	83	1,334	20,236
7	State Park Drive	11,214	308	205	1,053	16,480
8	Rio Del Mar Boulevard	23,617	206	48	941	32,606
9	San Andreas/Freedom Blvd	16,739	62	1	786	23,112

*Assumes a vehicle occupancy of 1.33 people per motor vehicle based on counts taken from 4-6 PM in October 2016.

APPENDIX G – PERFORMANCE DASHBOARD

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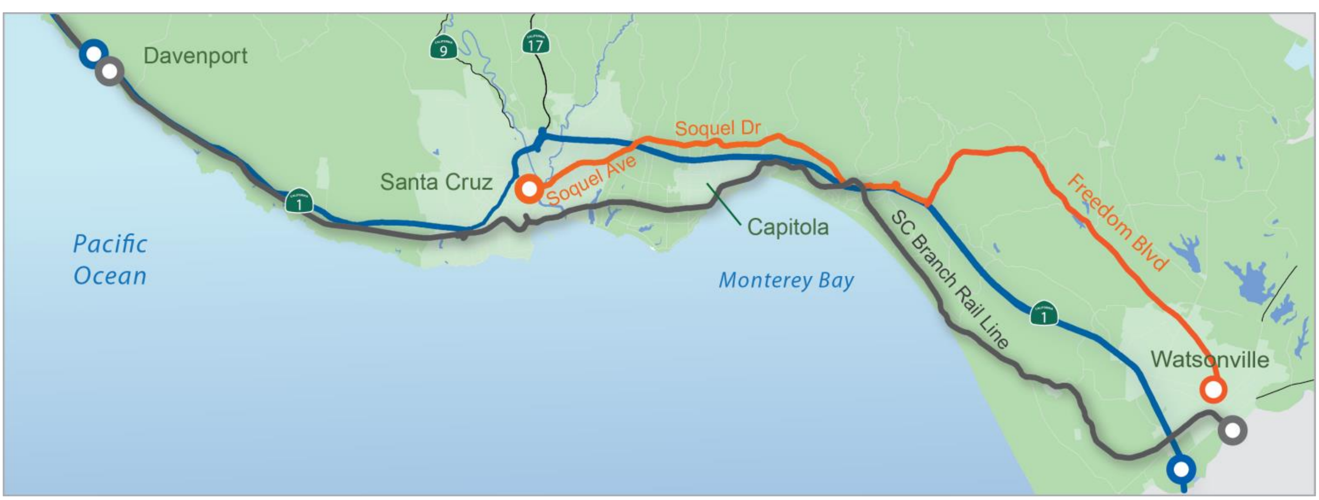
Unified Corridor Investment Study

Performance Dashboard



SCCRTC

Kimley»Horn

STRATEGICECONOMICS

Project Description

Three parallel routes - Highway 1, Soquel/Freedom and the Santa Cruz Branch Rail Line - link the communities along the Santa Cruz County coast from Davenport through Watsonville. The Unified Corridor Study examines how well complimentary transportation improvements on all three routes - when designed to function together as a single unified corridor – perform to meet the community’s transportation needs.

The Unified Corridor Study performance dashboard presents the result of the second, in a two step analysis and the preferred scenario. The Step 2 Analysis groups projects into scenarios and compares how each of the scenarios address the study goals of Safety, Efficiency, Economics, Environmental Sustainability, and Social Equity by 2035.

The evaluation of 16 performance measures for each of the scenarios and a comparison to a no build and baseline conditions is designed to increase understanding of transportation project benefits by transparently evaluating their impacts and lead to effective investments in the corridor.

Goals & Performance Measures

Approved by RTC on May 4, 2017

The goals and performance measures below support a vision for an integrated, multimodal transportation network based on a triple bottom line approach that maximizes the environmental, economic and equity benefits.

Goal 1: Safer transportation for all modes

- ✓ Injury and fatal collisions by mode

Goal 2: Reliable and efficient transportation choices that serve the most people and facilitate the transport of goods

- ✓ Peak period mean automobile travel time
- ✓ Peak period mean transit travel time
- ✓ Peak period travel time reliability
- ✓ Mode share
- ✓ Person trips across N-S screenline

Goal 3: Develop a well-integrated transportation system that supports economic vitality

- ✓ Level of public investment
- ✓ Visitor tax revenues
- ✓ Cost associated with fatalities and injuries

Goal 4: Minimize environmental concerns and reduce adverse health impacts

- ✓ Automobile vehicle miles traveled
- ✓ Criteria pollutants
- ✓ Greenhouse gas emissions
- ✓ Environmentally sensitive areas

Goal 5: Accessible and equitable transportation system that is responsive to the needs of all users

- ✓ Transit Vehicle Miles Traveled
- ✓ Household transportation costs
- ✓ Benefits and impacts to transportation disadvantaged communities

Step 2 Scenarios for Analysis

Approved by RTC on December 7, 2017

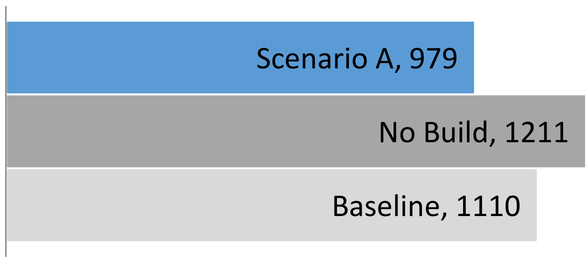
	Scenario A	Scenario B	Scenario C	Scenario E	No Build
Highway 1 Projects					
Buses on shoulders					
High occupancy vehicle lanes (HOV) and increased transit frequency					
Auxiliary lanes to extend merging distance IN ADDITION TO MEASURE D					
Metering of on-ramps					
Additional lanes on bridge over San Lorenzo River					
Mission St intersection improvements					
Soquel Avenue/Drive and Freedom Blvd					
BRT lite (faster boarding, transit signal priority and queue jumps)					
Increased frequency of transit with express services					
Buffered/protected bike lanes					
Intersection improvements for auto					
Intersection improvements for bikes/pedestrians					
Rail Corridor					
Bike and pedestrian trail					
Local rail transit with interregional connections					
Bus rapid transit					
Freight service on rail			Only Watsonville		
Overall Project Area/Connections between Routes					
Improved bike/pedestrian facilities throughout urban area closing gaps in network	These projects will be evaluated in all scenarios.				
Additional transit connections					
Bike share, bike amenities, transit amenities, park and ride lots					
Multimodal transportation hubs					
Automated vehicles/connected vehicles					
Transportation Demand and System Management					
Employers and residences - incentive programs	These projects will be evaluated in all scenarios.				
Education and enforcement - electric vehicle, motorist safety, and bike safety					

Scenario A

Step 2 Performance Measures

PM: Total Collisions

(Fatal, Injury, and Property Damage Only per year)



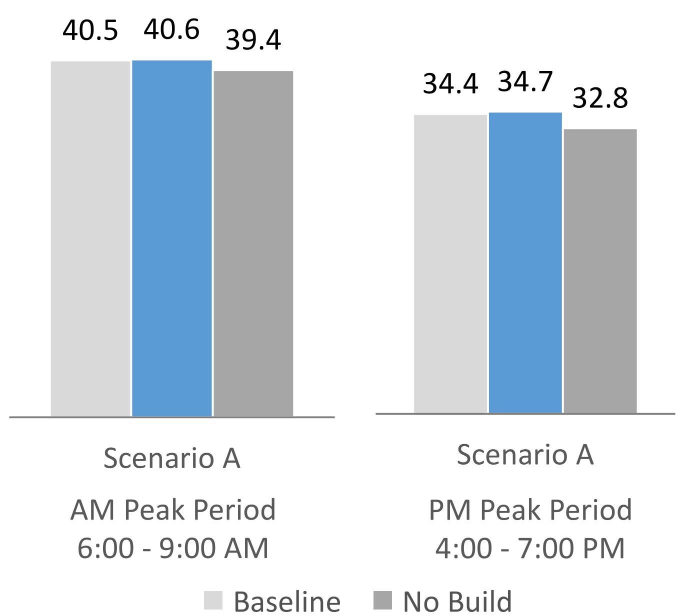
Highway 1 Projects
- HOV and auxiliary lanes, ramp meters, San Lorenzo bridge widening, multimodal intersection improvements

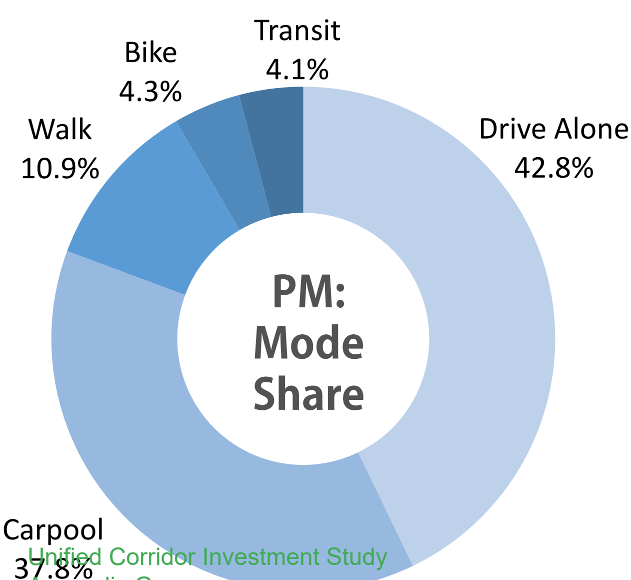
Soquel / Freedom
- BRT Lite with increased transit frequency, multimodal intersection improvements

Rail ROW
- Bike and pedestrian trail

Goal 1 Safer transportation for all modes.

PM: Countywide Mean Auto Speed (mph)

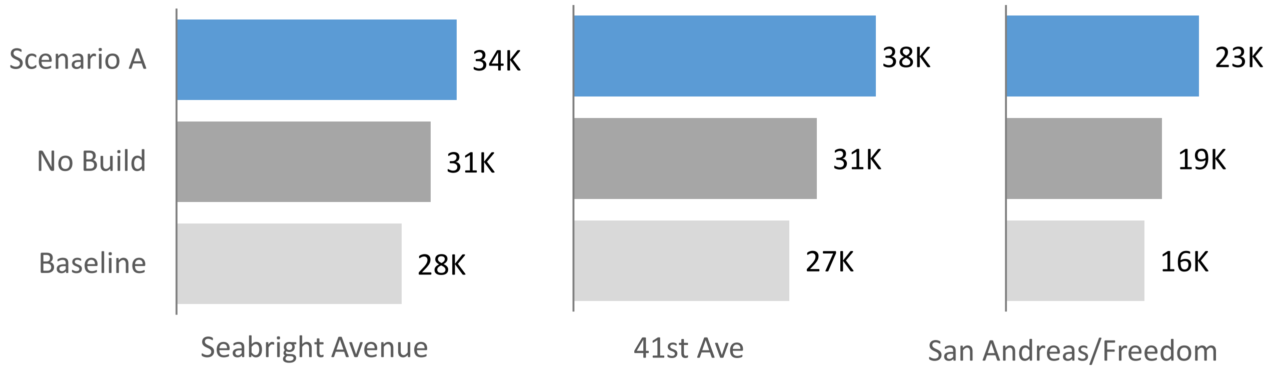




Goal 2 Reliable and efficient transportation choices that serve the most people and facilitate the transport of goods.

PM: Person trips across N-S Screenline 4:00-6:00 PM

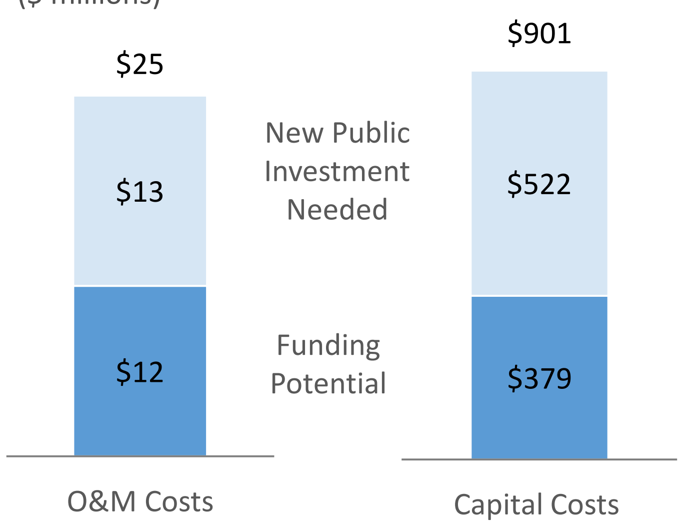
(In thousands)



Goal 3 Develop a well-integrated transportation system that supports economic vitality.

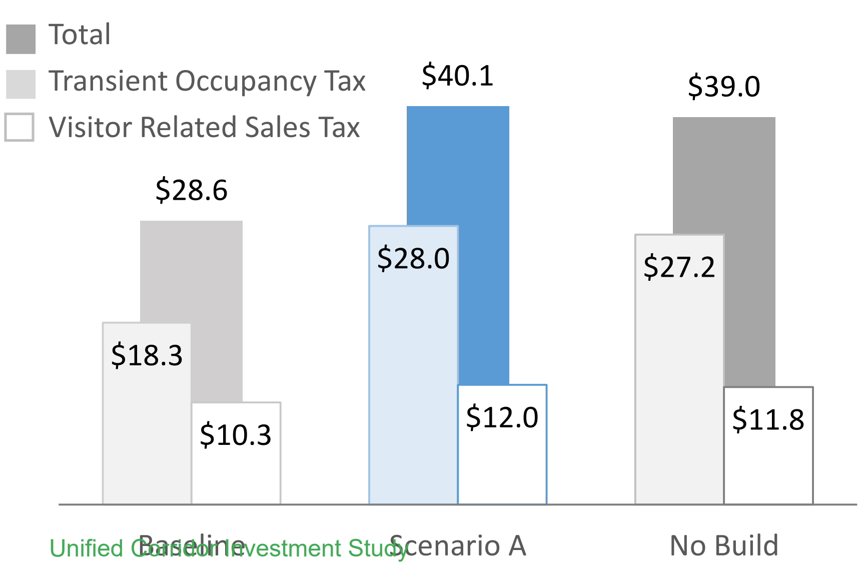
PM: Level Of Public Investment

($ millions)



PM: Visitor Tax Revenues

(per year in millions)



PM: Cost Associated with Collisions

(per year)

Cost per **$224 K** Collision × No Build **1,211** Collisions = No Build **$271 M** Collision Cost

Cost per **$224 K** Collision × Scenario A **979** Collisions = Scenario A **$219 M** Collision Cost → Cost **-$52 M** Savings

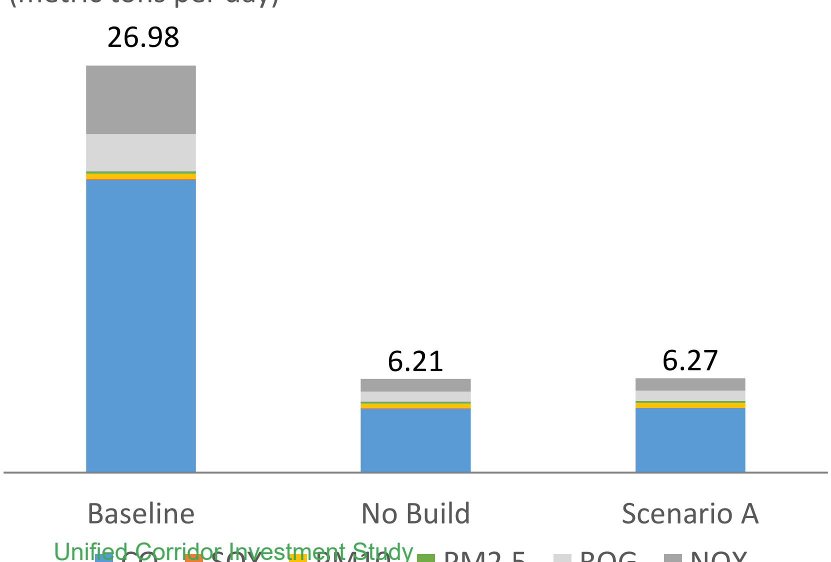
PM: Automobile Vehicle Miles Traveled

(Countywide VMT per day in millions)

Goal 4 Minimize environmental concerns and reduce adverse health impacts.

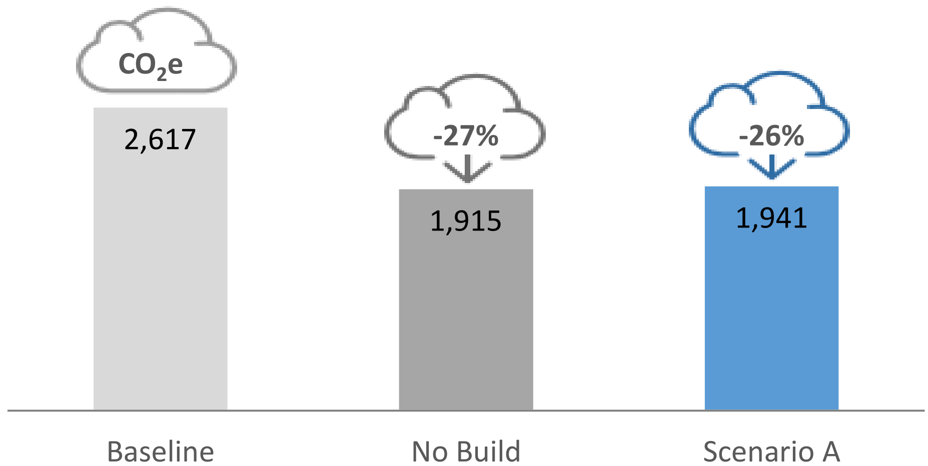
PM: Total Criteria Pollutants

(metric tons per day)



PM: Greenhouse Gas Emissions

CO_2e Emissions (metric tons per day) and Percentage Reduction from 2015 Baseline



PM: Environmentally Sensitive Areas

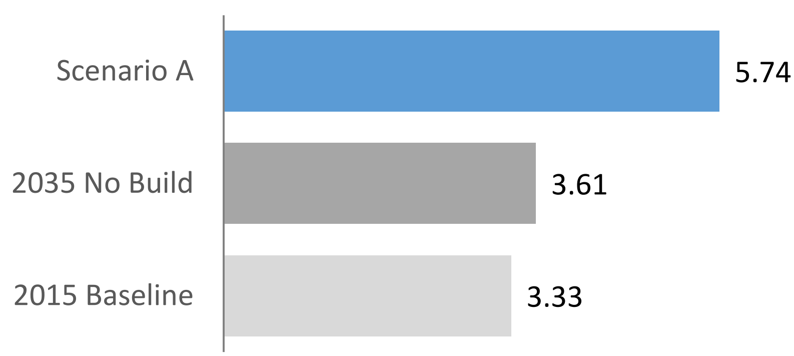
(# linear miles along 3 routes)

36.5 2nd lowest score

Goal 5 Accessible and equitable transportation system that is responsive to the needs of all users.

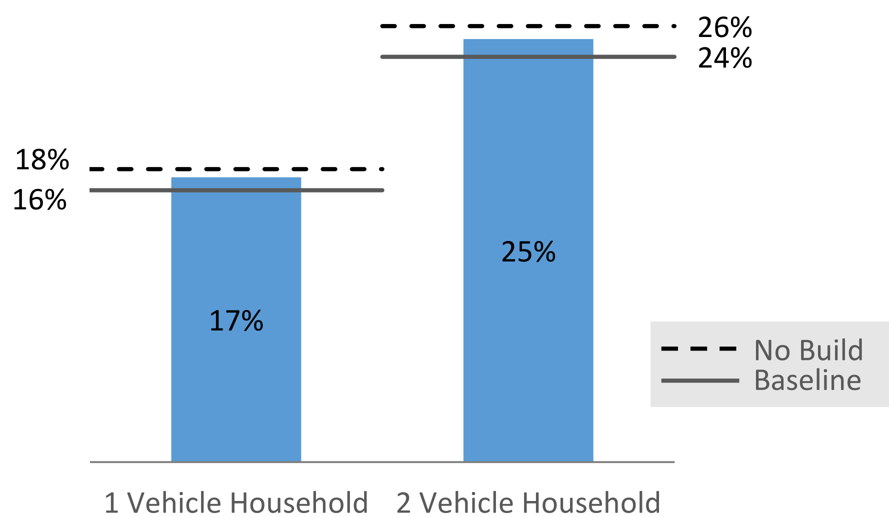
PM: Transit Vehicle Miles Traveled

(per year in millions)



PM: Household Transportation Cost

Percentage of Income Spent on Transportation
(by median income households per year)



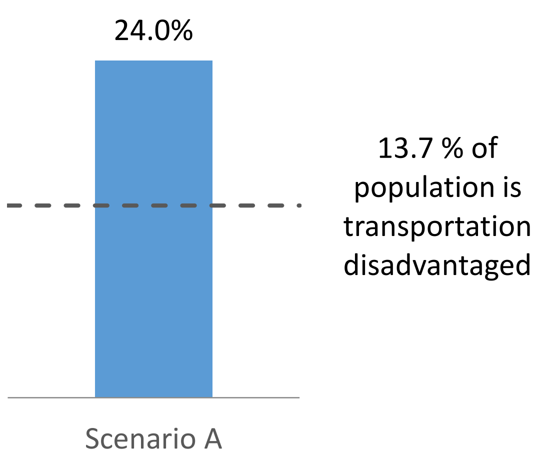
Daily Costs for 2-Vehicle Households

Scenario A
$48.64

2015 Baseline
$46.63 ▼$2.01

2035 No Build
$50.14 ▲$1.50

PM: Share of Investment Benefit for Transportation Disadvantaged Population

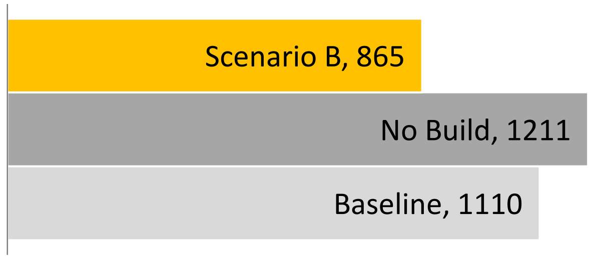


Scenario B

Step 2 Performance Measures

PM: Total Collisions

(Fatal, Injury, and Property Damage Only per year)



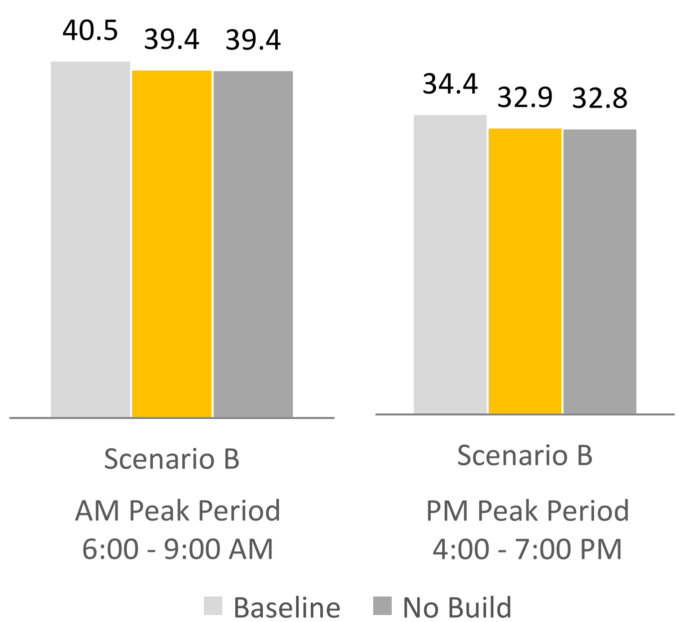
Highway 1 Projects
- Bus on shoulder, ramp metering, Mission St. intersection improvements

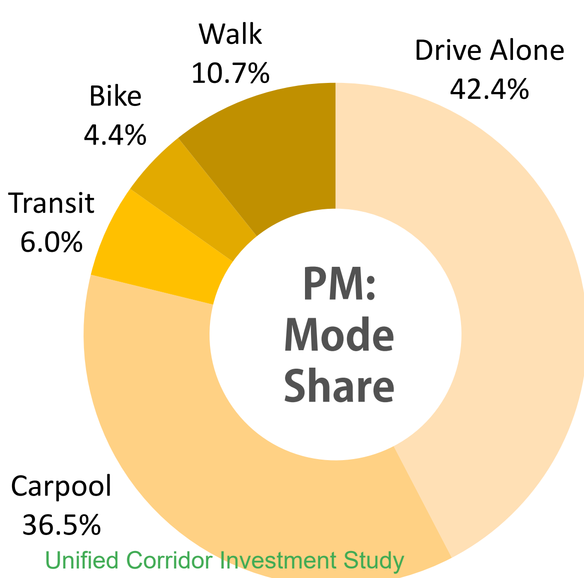
Soquel / Freedom
- BRT Lite with increased transit frequency, buffered/protected bike lanes, bike/ped intersection improvements

Rail ROW
- Bike and pedestrian trail, rail transit

Goal 1 Safer transportation for all modes.

PM: Countywide Mean Auto Speed (mph)

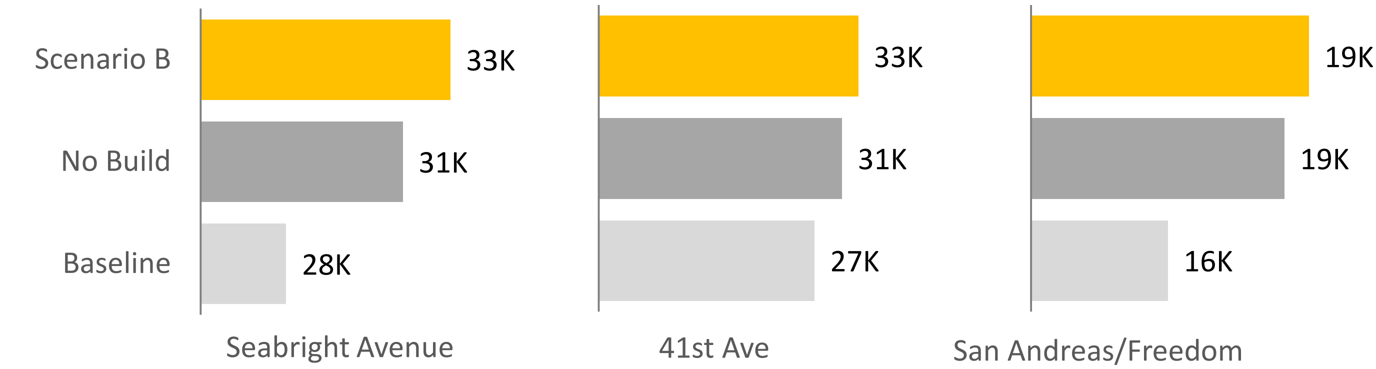




Goal 2 Reliable and efficient transportation choices that serve the most people and facilitate the transport of goods.

PM: Person trips across N-S Screenline 4:00-6:00 PM

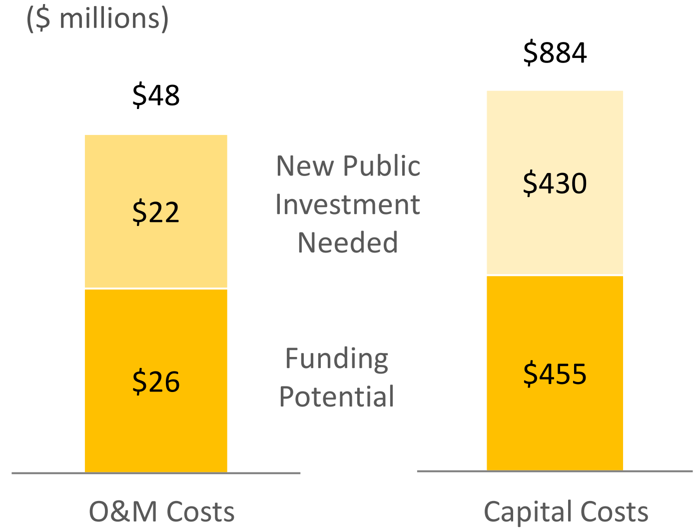
(In thousands)



Goal 3 Develop a well-integrated transportation system that supports economic vitality.

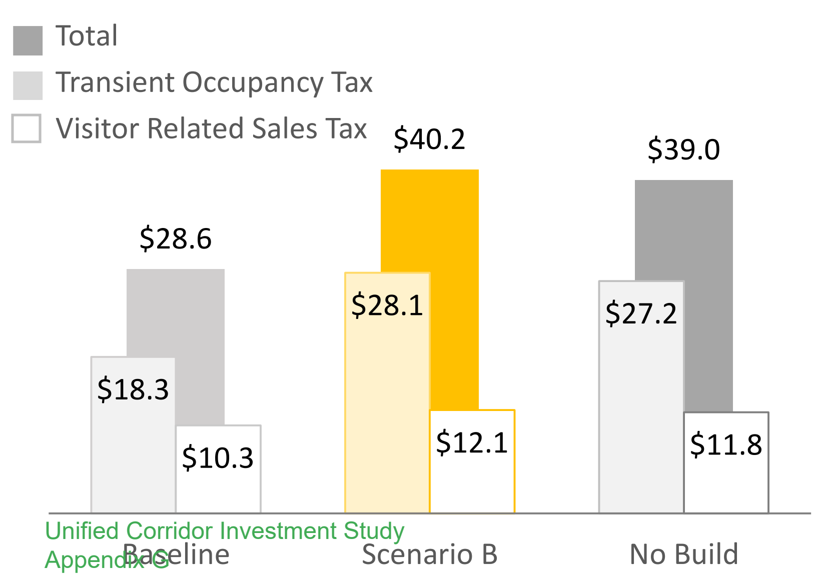
PM: Level Of Public Investment

($ millions)



PM: Visitor Tax Revenues

(per year in millions)



PM: Cost Associated with Collisions

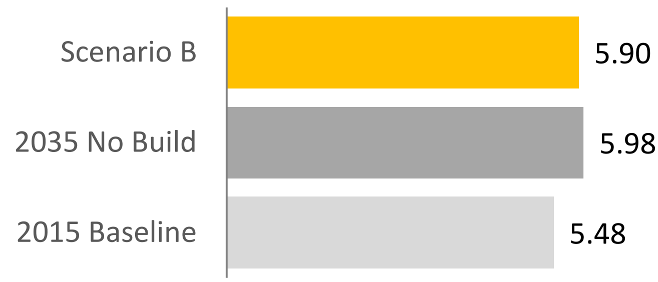
(per year)

Cost per		No Build		No Build	
$224 K Collision	x	1,211 Collisions	=	$271 M Collision Cost	
Cost per		Scenario B		Scenario B	Cost
$224 K Collision	x	865 Collisions	=	$192 M Collision Cost	→ -$78 M Savings

Goal 4 Minimize environmental concerns and reduce adverse health impacts.

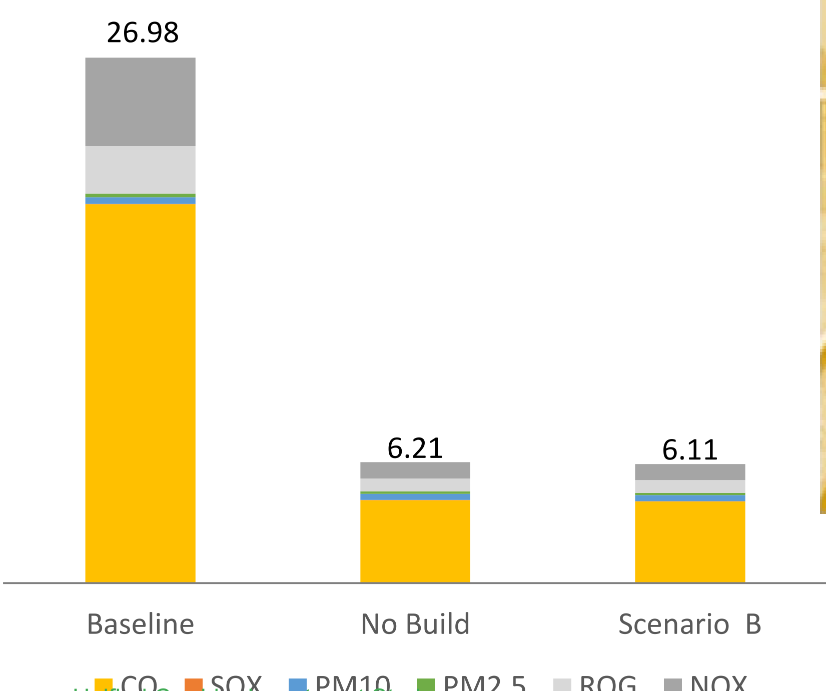
PM: Automobile Vehicle Miles Traveled

(Countywide VMT per day in millions)



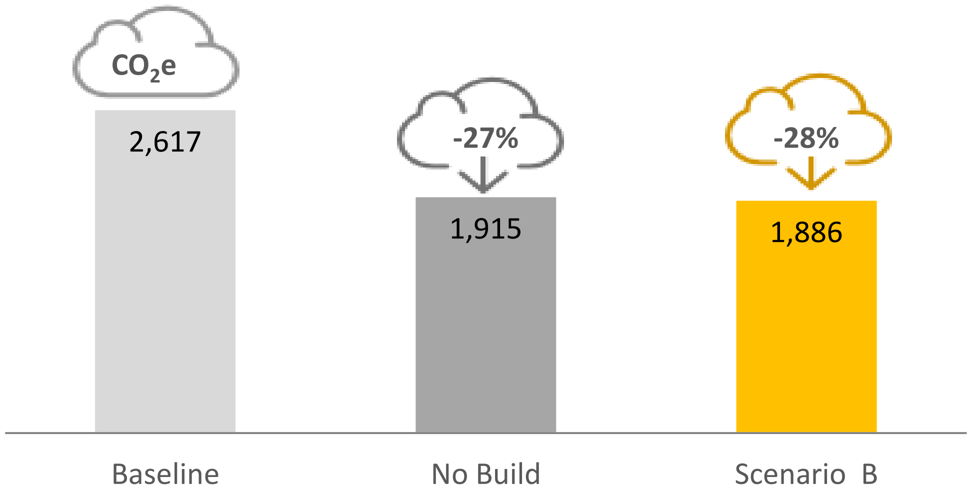
PM: Total Criteria Pollutants

(metric tons per day)



PM: Greenhouse Gas Emissions

CO_2e Emissions (metric tons per day) and Percentage Reduction from 2015 Baseline



PM: Environmentally Sensitive Areas

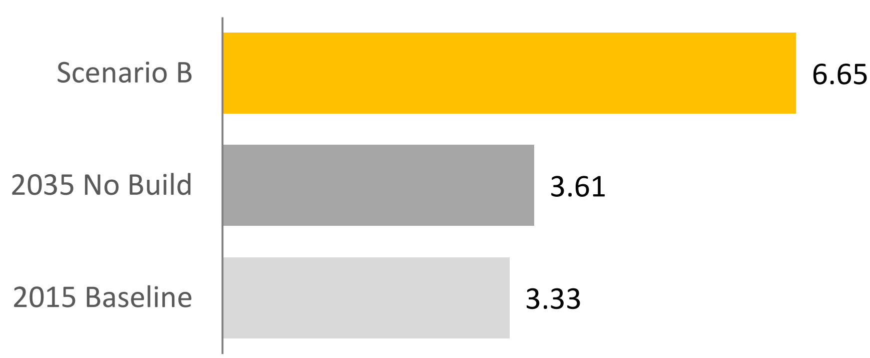
(# linear miles along 3 routes)

38.3 2nd highest score

Goal 5 Accessible and equitable transportation system that is responsive to the needs of all users.

PM: Transit Vehicle Miles Traveled

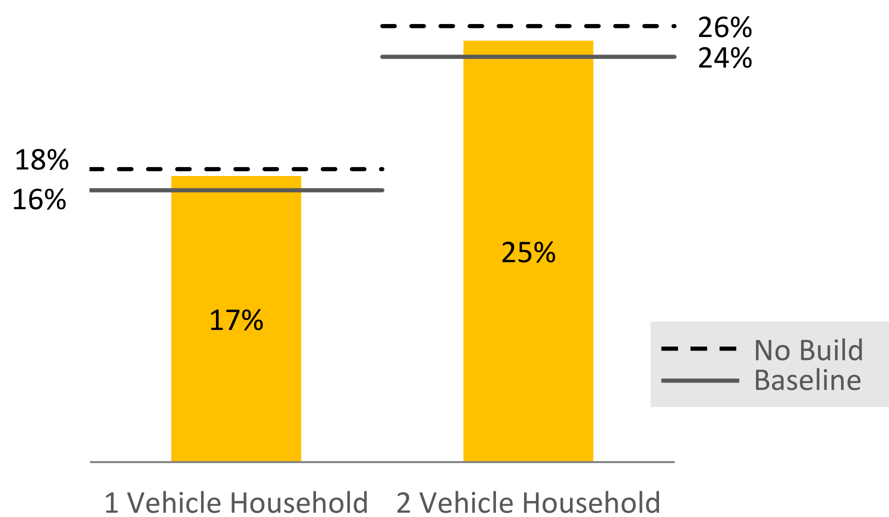
(per year in millions)

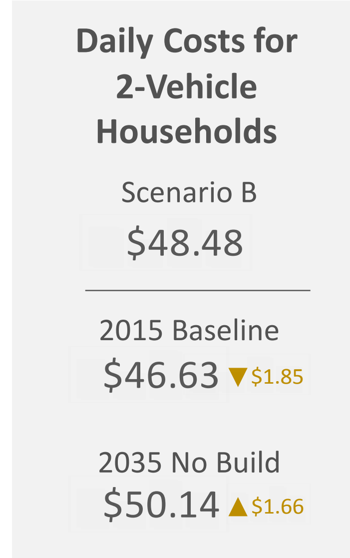


PM: Household Transportation Cost

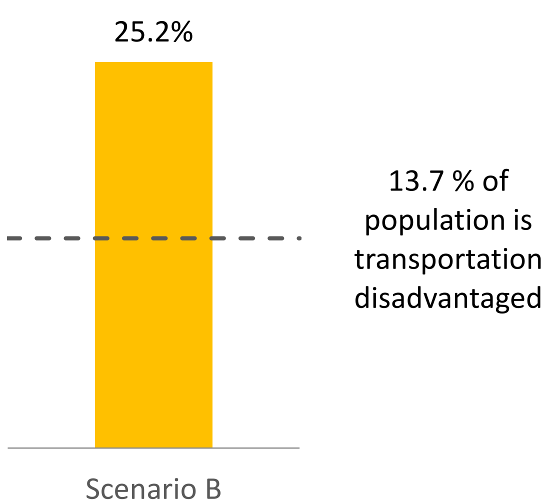
Percentage of Income Spent on Transportation

(by median income households per year)





PM: Share of Investment Benefit for Transportation Disadvantaged Population



Scenario C

Step 2 Performance Measures

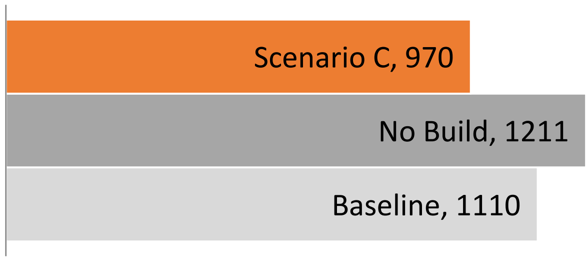
Highway 1 Projects
- Bus on shoulders, auxiliary lanes

Soquel / Freedom
- BRT Lite with increased transit frequency, multimodal intersection improvements

Rail ROW
- Bike and pedestrian trail, bus rapid transit, freight service (in Watsonville)

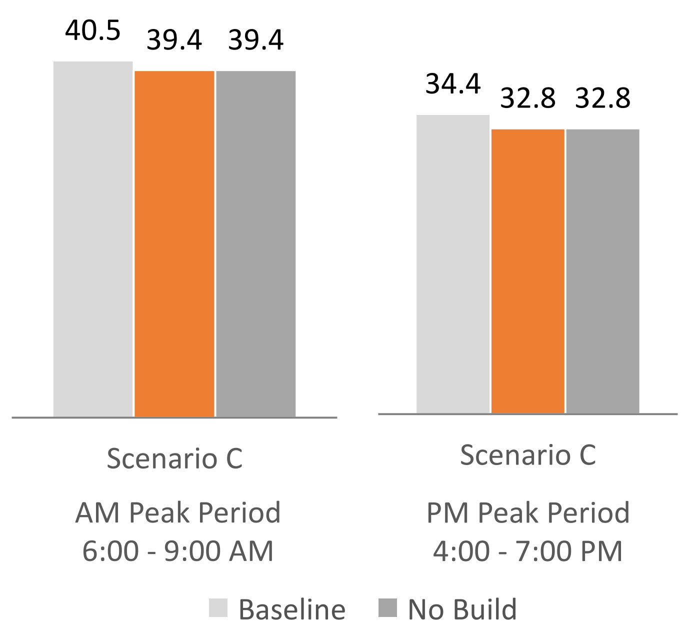
PM: Total Collisions

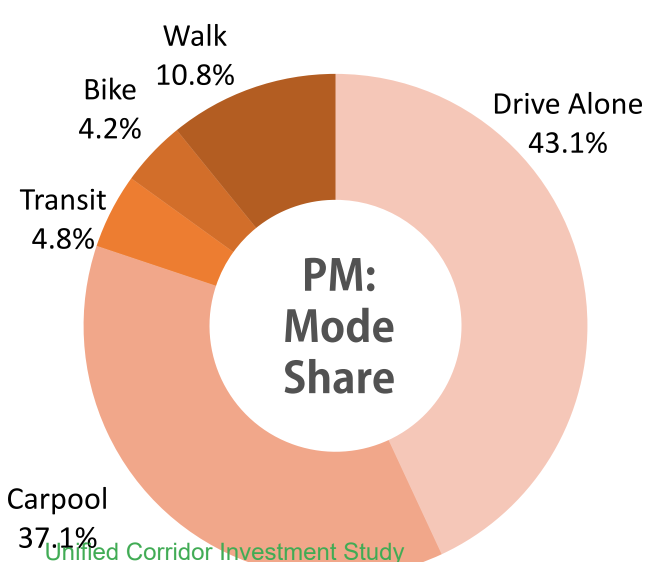
(Fatal, Injury, and Property Damage Only per year)



Goal 1 Safer transportation for all modes.

PM: Countywide Mean Auto Speed (mph)

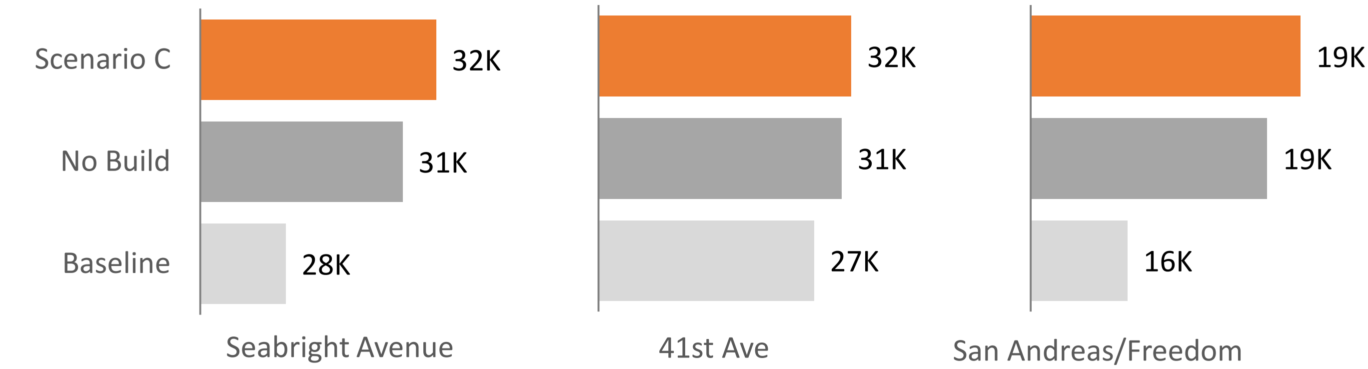




Goal 2 Reliable and efficient transportation choices that serve the most people and facilitate the transport of goods.

PM: Person trips across N-S Screenline 4:00-6:00 PM

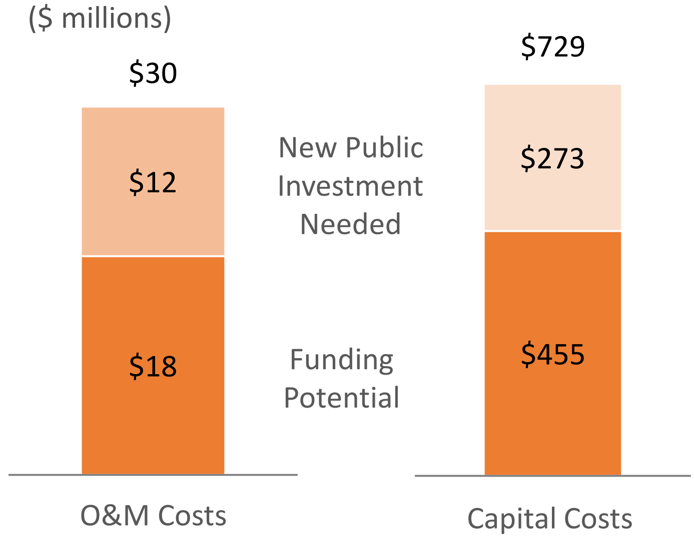
(In thousands)



Goal 3 Develop a well-integrated transportation system that supports economic vitality.

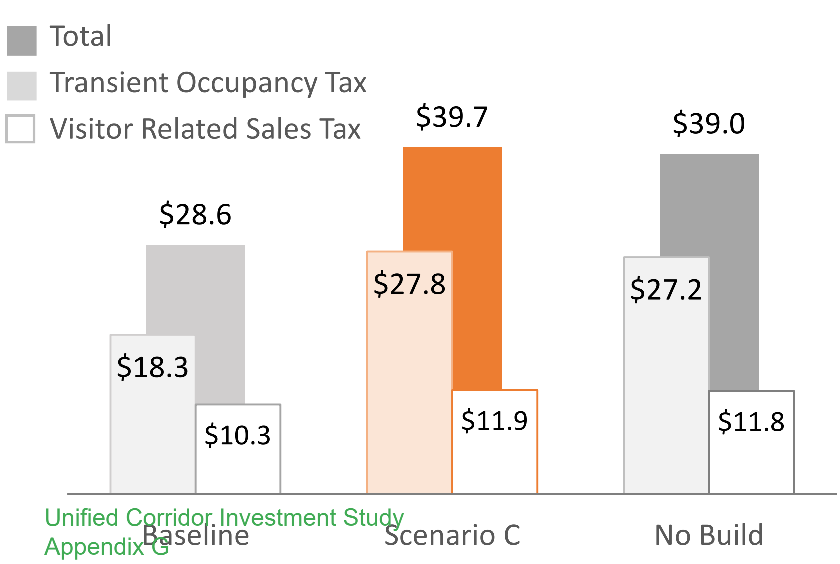
PM: Level Of Public Investment

($ millions)



PM: Visitor Tax Revenues

(per year in millions)



PM: Cost Associated with Collisions

(per year)

Cost per
$224 K
Collision

x

No Build
1,211
Collisions

=

No Build
$271 M
Collision Cost

Cost per
$224 K
Collision

x

Scenario C
970
Collisions

=

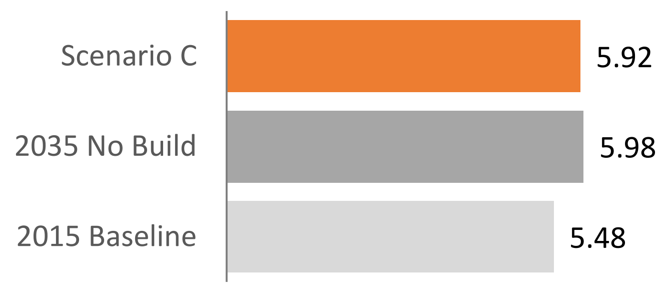
Scenario C
$217 M
Collision Cost

→

Cost
-$54 M
Savings

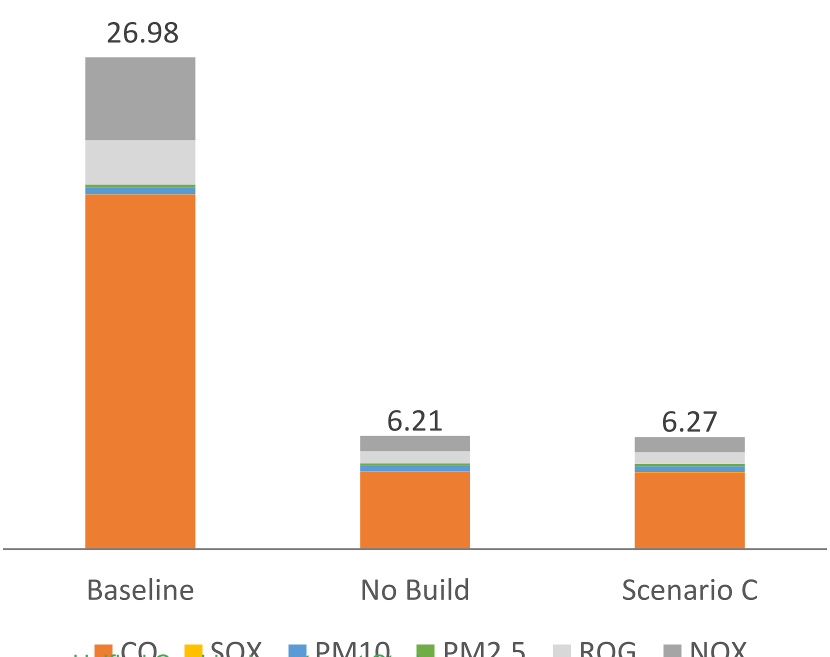
Goal 4 Minimize environmental concerns and reduce adverse health impacts.

PM: Automobile Vehicle Miles Traveled



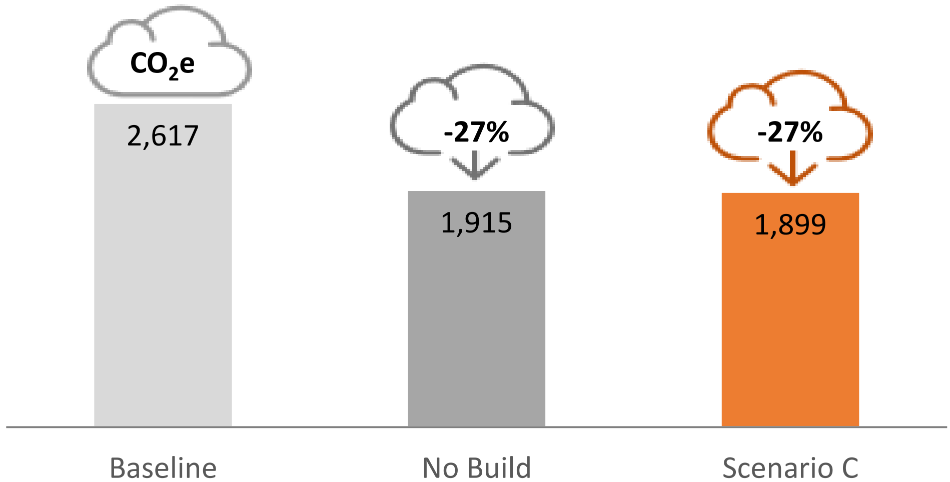
PM: Total Criteria Pollutants

(metric tons per day)



PM: Greenhouse Gas Emissions

CO_2e Emissions (metric tons per day) and Percentage Reduction from 2015 Baseline



PM: Environmentally Sensitive Areas

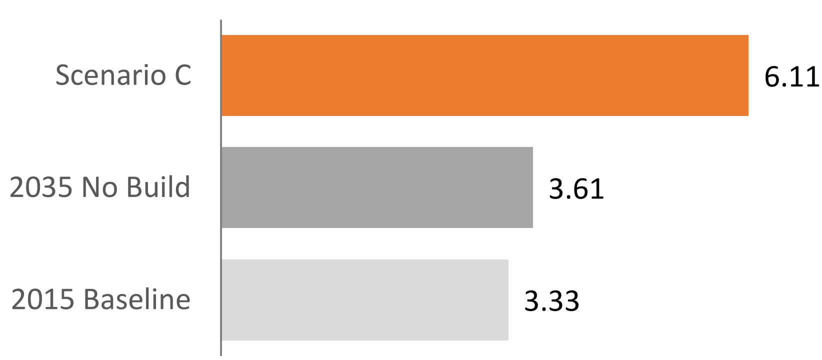
(# linear miles along 3 routes)

36.0 Lowest score

Goal 5 Accessible and equitable transportation system that is responsive to the needs of all users.

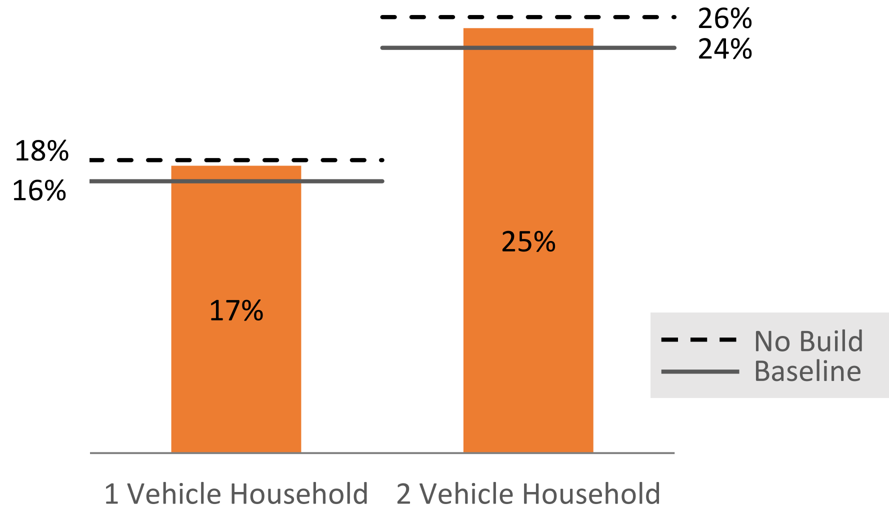
PM: Transit Vehicle Miles Traveled

(per year in millions)



PM: Household Transportation Cost

Percentage of Income Spent on Transportation
(by median income households per year)



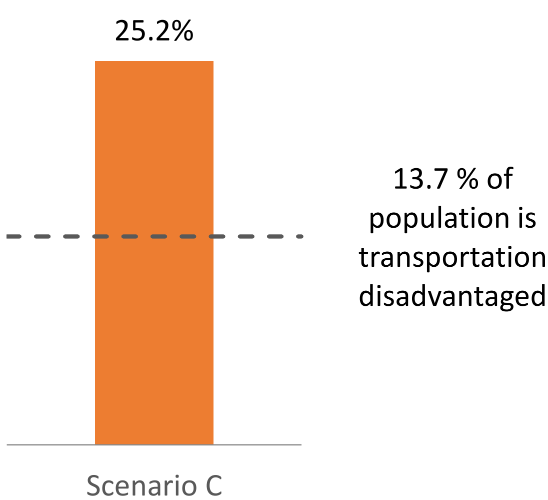
Daily Costs for 2-Vehicle Households

Scenario C
$48.90

2015 Baseline
$46.63 ▼$2.27

2035 No Build
$50.14 ▲$1.25

PM: Share of Investment Benefit for Transportation Disadvantaged Population



Scenario E

Step 2 Performance Measures

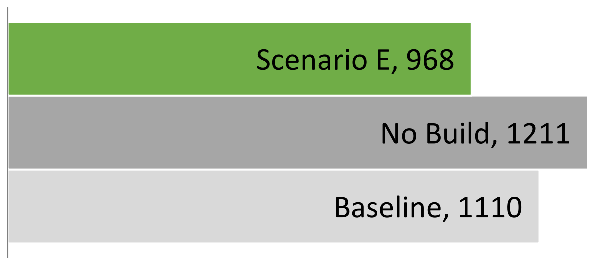
Highway 1 Projects
- HOV and auxiliary lanes, ramp meters

Soquel / Freedom
- Buffered/protected bike lanes, bike/pedestrian intersection improvements

Rail ROW
- Bike and pedestrian trail, rail transit, freight service

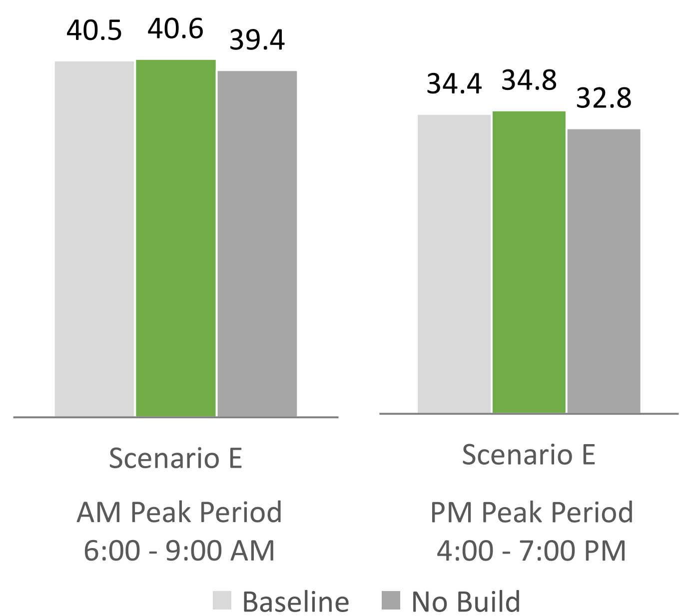
PM: Total Collisions

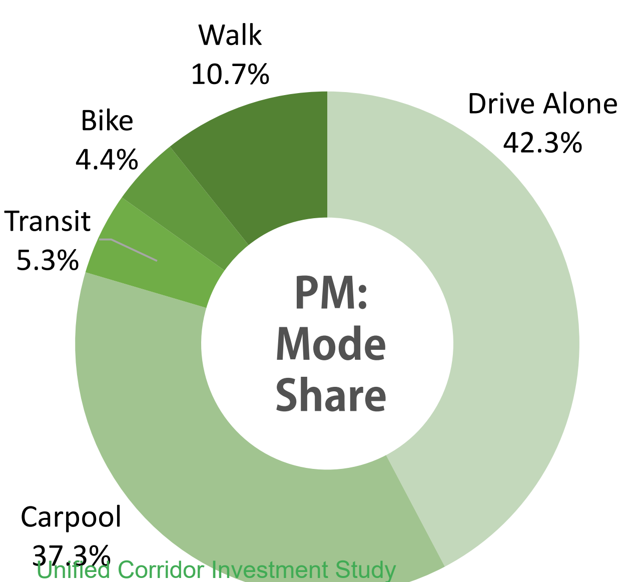
(Fatal, Injury, and Property Damage Only per year)



Goal 1 Safer transportation for all modes.

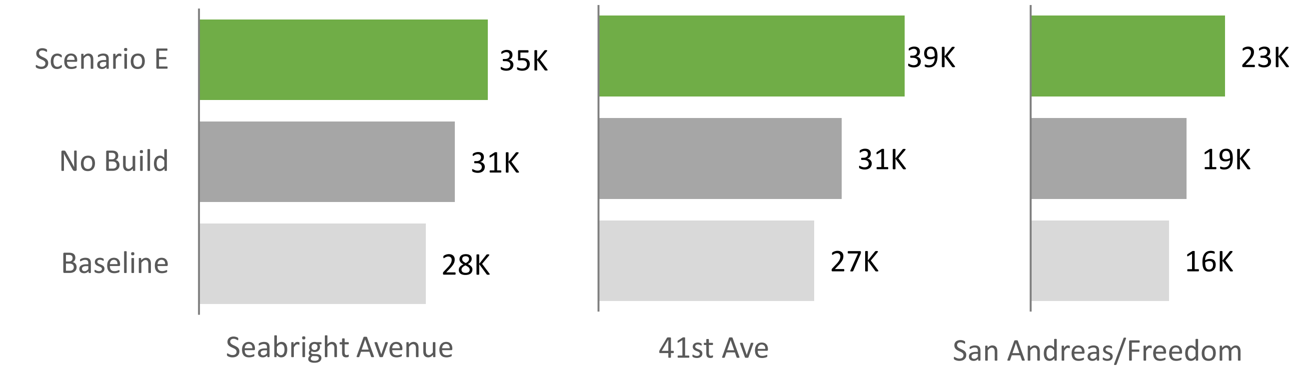
PM: Countywide Mean Auto Speed (mph)





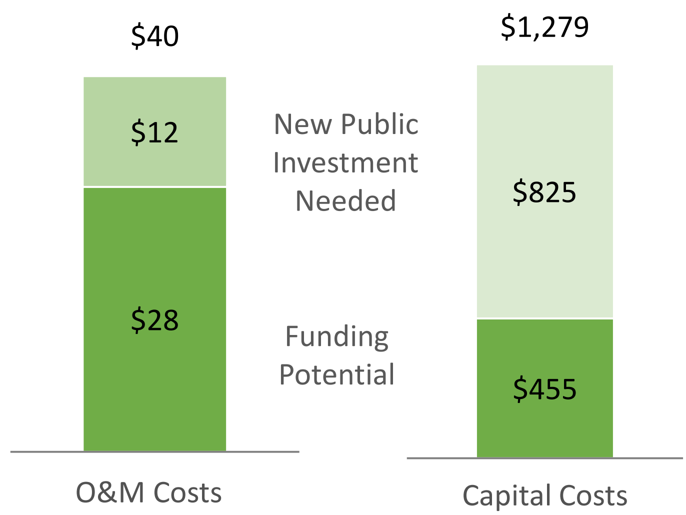
Goal 2 Reliable and efficient transportation choices that serve the most people and facilitate the transport of goods.

PM: Person trips across N-S Screenline 4:00-6:00 PM
(In thousands)

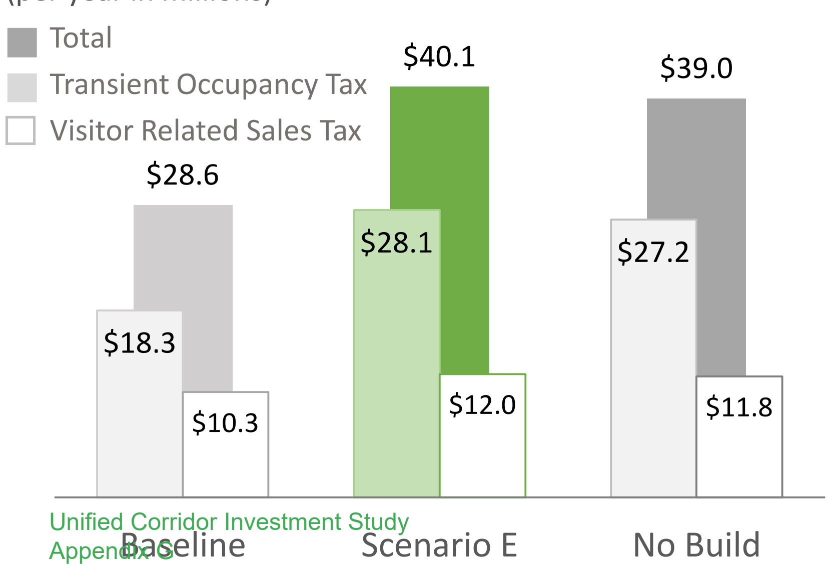


Goal 3 Develop a well-integrated transportation system that supports economic vitality.

PM: Level Of Public Investment
($ millions)



PM: Visitor Tax Revenues
(per year in millions)



PM: Cost Associated with Collisions
(per year)

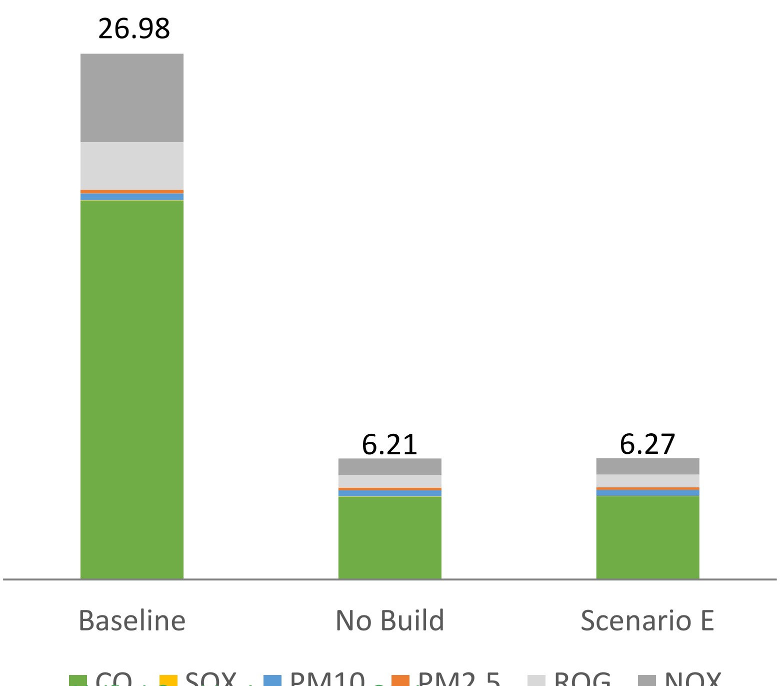
Cost per **$224 K** Collision x No Build **1,211** Collisions = No Build **$271 M** Collision Cost

Cost per **$224 K** Collision x Scenario E **968** Collisions = Scenario E **$217 M** Collision Cost → Cost **-$54 M** Savings

Goal 4 Minimize environmental concerns and reduce adverse health impacts.

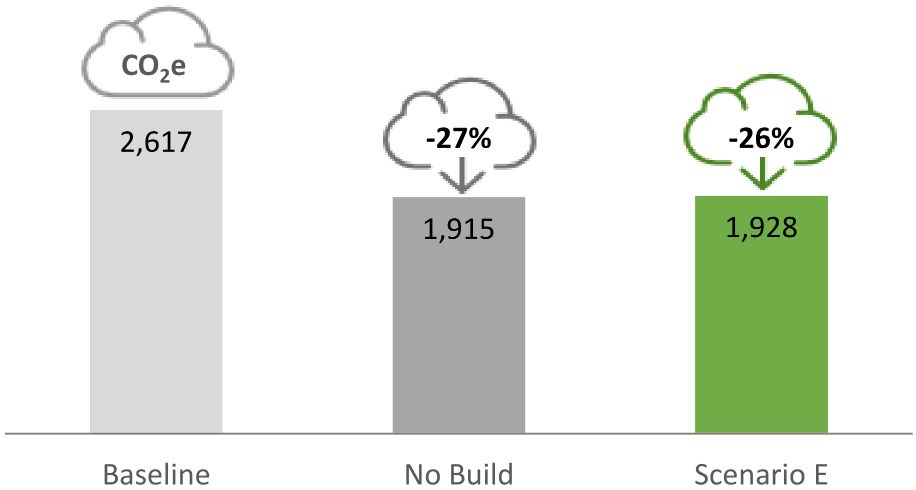
PM: Automobile Vehicle Miles Traveled
(Countywide VMT per day in millions)

PM: Total Criteria Pollutants
(metric tons per day)



PM: Greenhouse Gas Emissions

CO_2e Emissions (metric tons per day) and Percentage Reduction from 2015 Baseline



PM: Environmentally Sensitive Areas

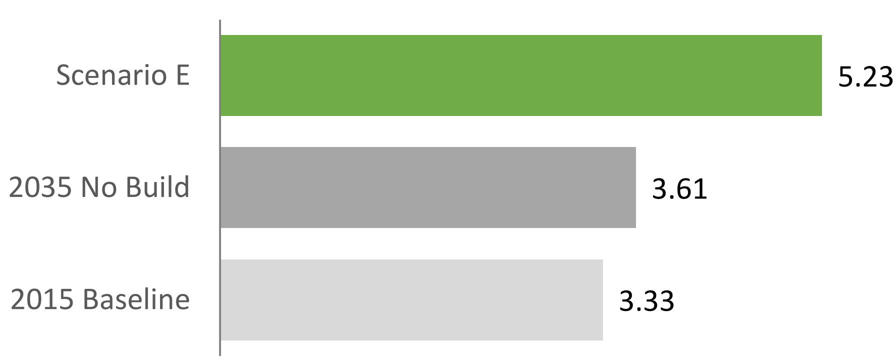
(# linear miles along 3 routes)

40.7 Highest score

Goal 5 Accessible and equitable transportation system that is responsive to the needs of all users.

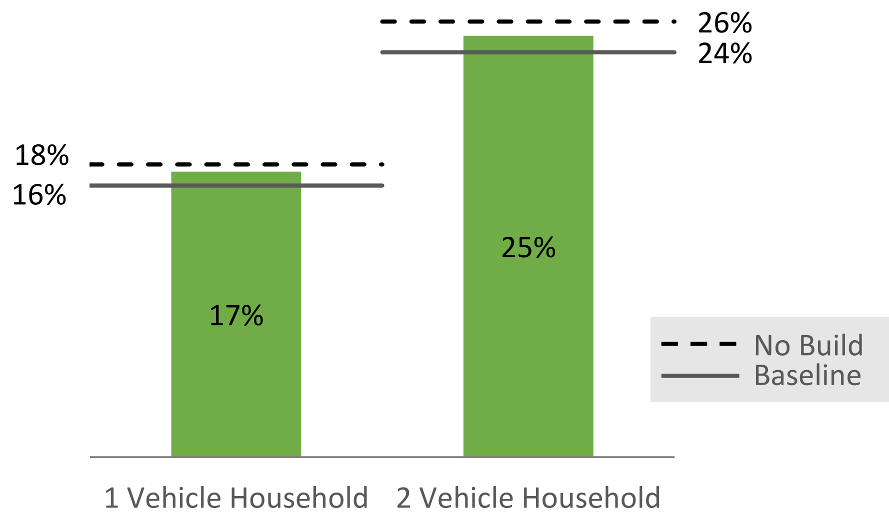
PM: Transit Vehicle Miles Traveled

(per year in millions)



PM: Household Transportation Cost

Percentage of Income Spent on Transportation
(by median income households per year)



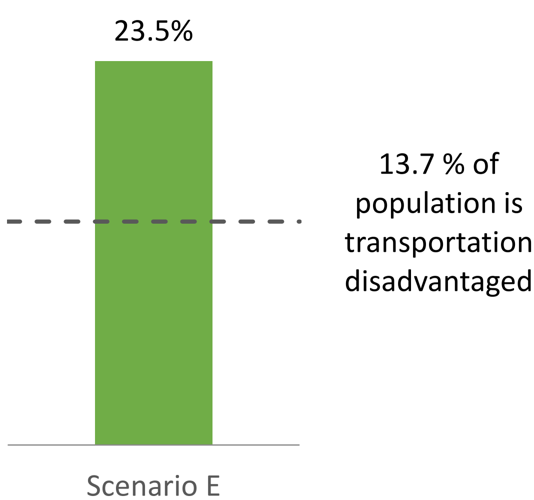
Daily Costs for 2-Vehicle Households

Scenario E
$48.52

2015 Baseline
$46.63 ▼$1.89

2035 No Build
$50.14 ▲$1.62

PM: Share of Investment Benefit for Transportation Disadvantaged Population



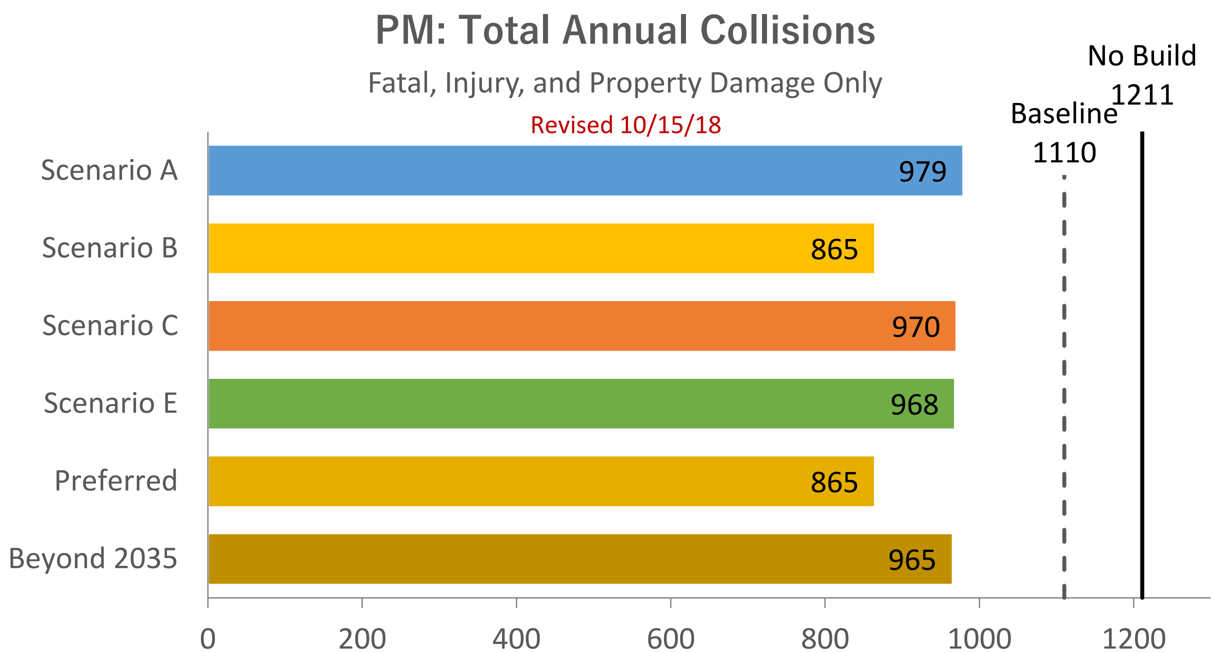
All Scenarios Comparison

Including Preferred Scenario

	2035 Preferred	Beyond 2035	Scenario A	Scenario B	Scenario C	Scenario E
Highway 1 Projects						
Buses on shoulders	🚌			🚌	🚌	
High occupancy vehicle lanes (HOV) and increased transit frequency		🚗 🚌	🚗 🚌			🚗 🚌
Auxiliary lanes to extend merging distance IN ADDITION TO MEASURE D	🚗	🚗	🚗		🚗	🚗
Metering of on-ramps	🚗	🚗	🚗	🚗		🚗
Additional lanes on bridge over San Lorenzo River			🚗			
Mission St intersection improvements			🚗	🚗		
Soquel Avenue/Drive and Freedom Blvd						
BRT lite (faster boarding, transit signal priority and queue jumps)			🚌	🚌	🚌	
Increased frequency of transit with express services			🚌	🚌	🚌	
Buffered/protected bike lanes	🚲	🚲		🚲		🚲
Intersection improvements for auto			🚗		🚗	
Intersection improvements for bikes/pedestrians	🚲 🚶	🚲 🚶	🚲 🚶	🚲 🚶	🚲 🚶	🚲 🚶
Rail Corridor						
Bike and pedestrian trail	🚲 🚶	🚲 🚶	🚲 🚶	🚲 🚶	🚲 🚶	🚲 🚶
High-capacity public transit service	🚆 / 🚌	🚆 / 🚌				
Local rail transit with interregional connections				🚆		🚆
Bus rapid transit					🚌	
Freight service on rail	🚆	🚆			🚆 Only Watsonville	🚆
Overall Project Area/Connections between Routes						
Improved bike/pedestrian facilities throughout urban area closing gaps in network	These projects are evaluated in all scenarios.					
Additional transit connections						
Bike share, bike amenities, transit amenities, park and ride lots						
Multimodal transportation hubs						
Automated vehicles/connected vehicles						
Transportation Demand and System Management						
Employers and residences - incentive programs	These projects are evaluated in all scenarios.					
Education and enforcement - electric vehicle, motorist safety, and bike safety						

The performance measure results for the preferred scenario reflect projections if passenger rail service is implemented for comparison purposes only and is not bias against other potential high-capacity transit alternatives on the rail corridor.

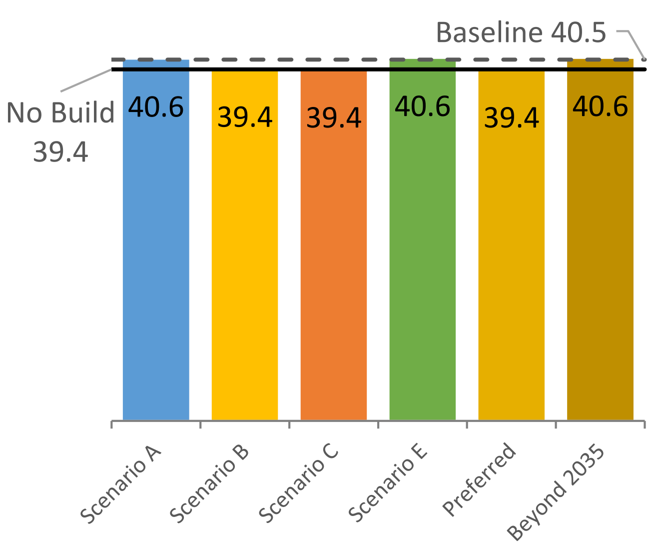
GOAL 1 Safer transportation for all modes.



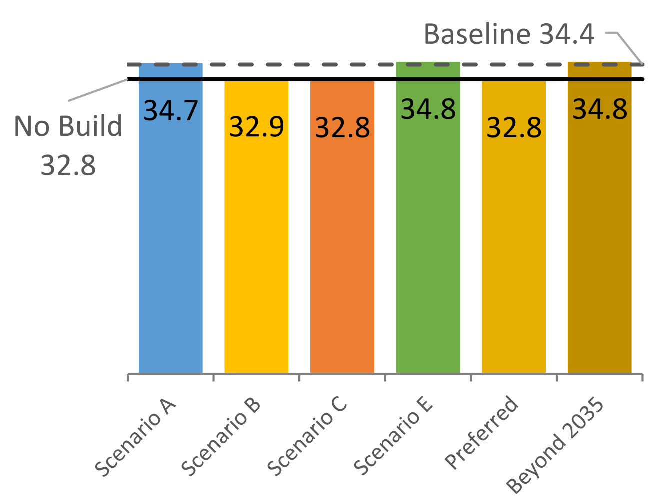
GOAL 2 Reliable and efficient transportation choices that serve the most people and facilitate the transport of goods.

Countywide Mean Auto Speed (MPH)

Revised 11/02/18

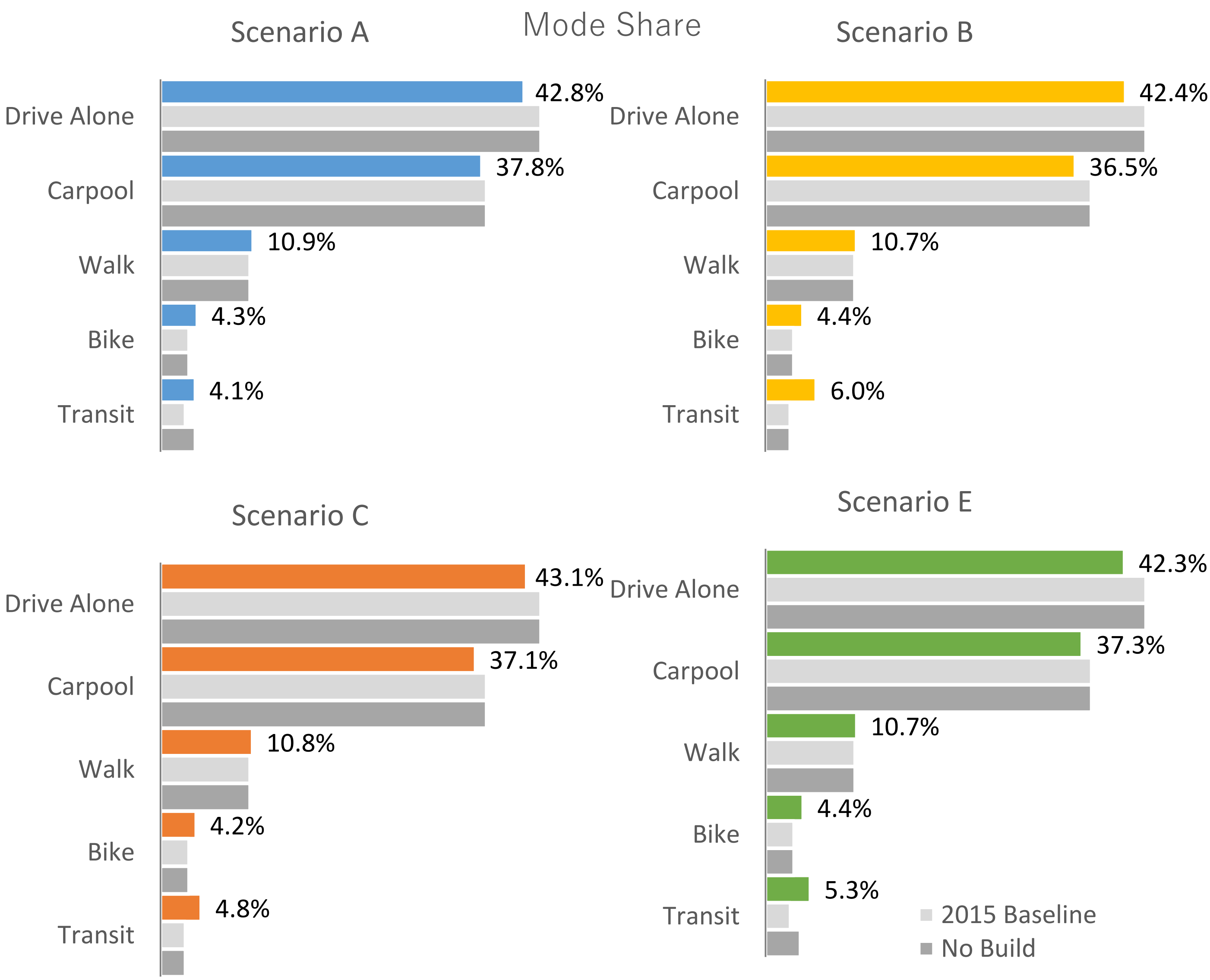


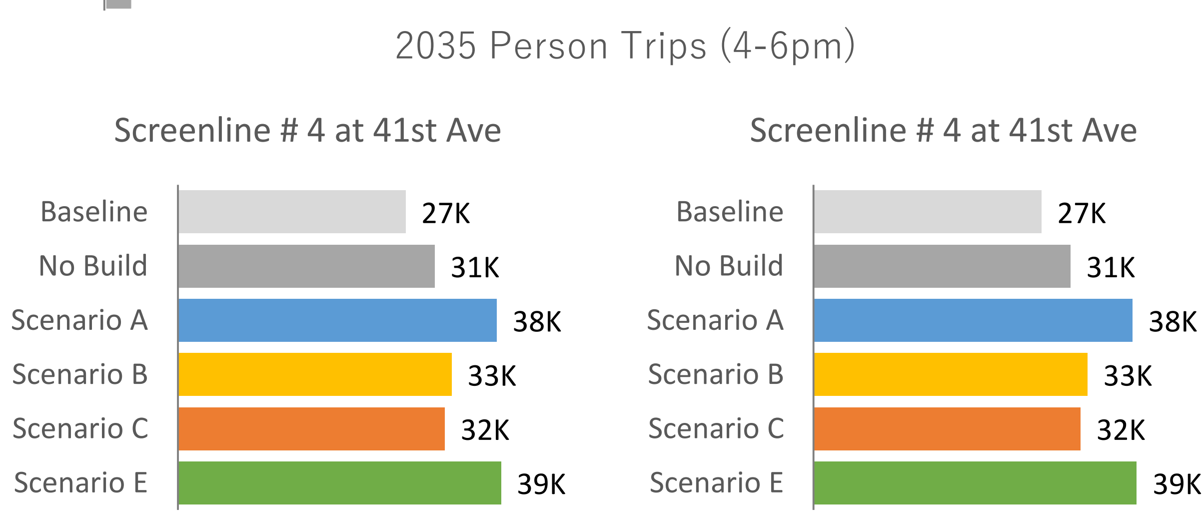
AM Peak Period (6-9am)



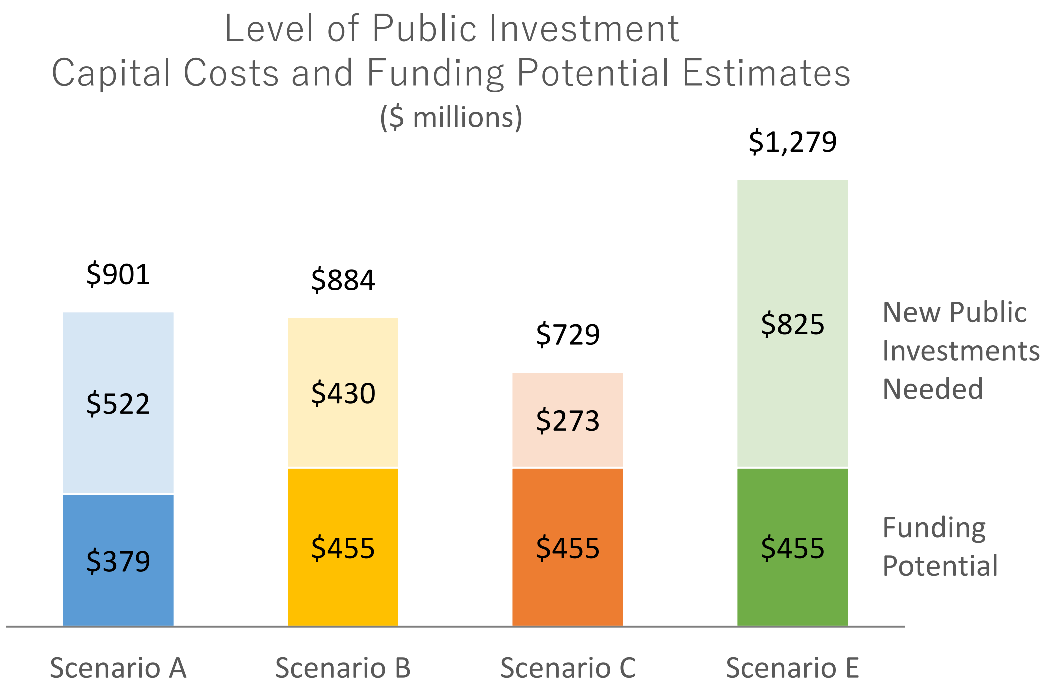
PM Peak Period (4-7pm)

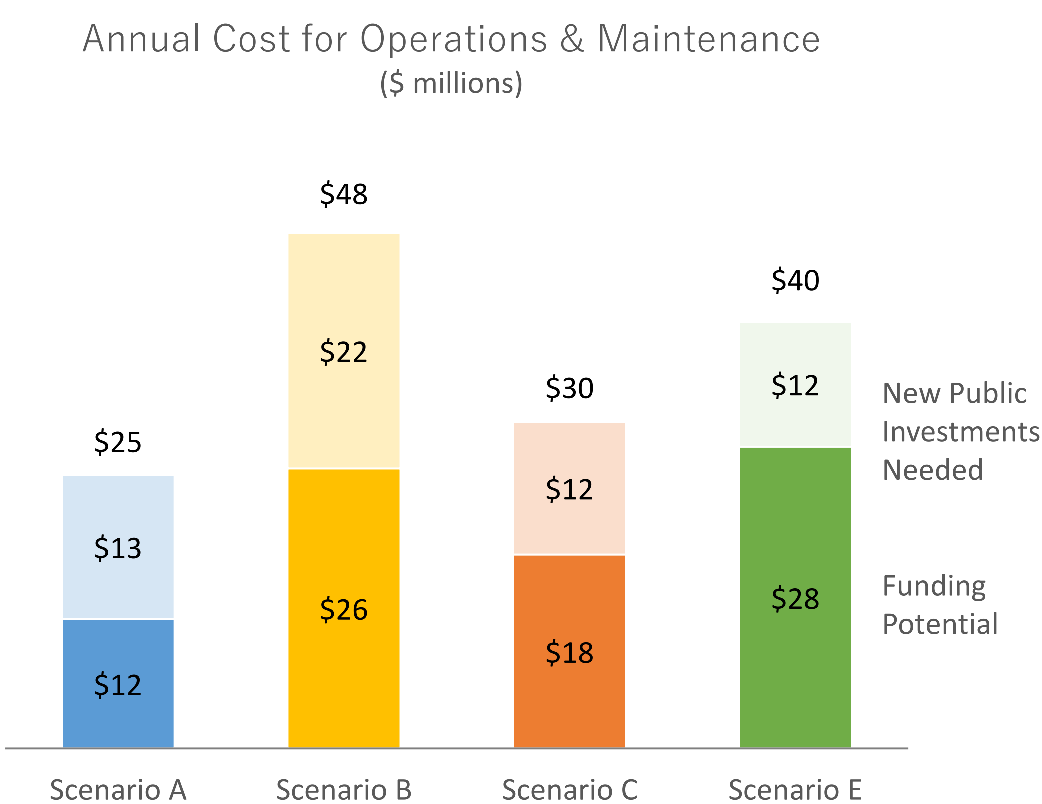
GOAL 2 Reliability and Efficiency (continued)



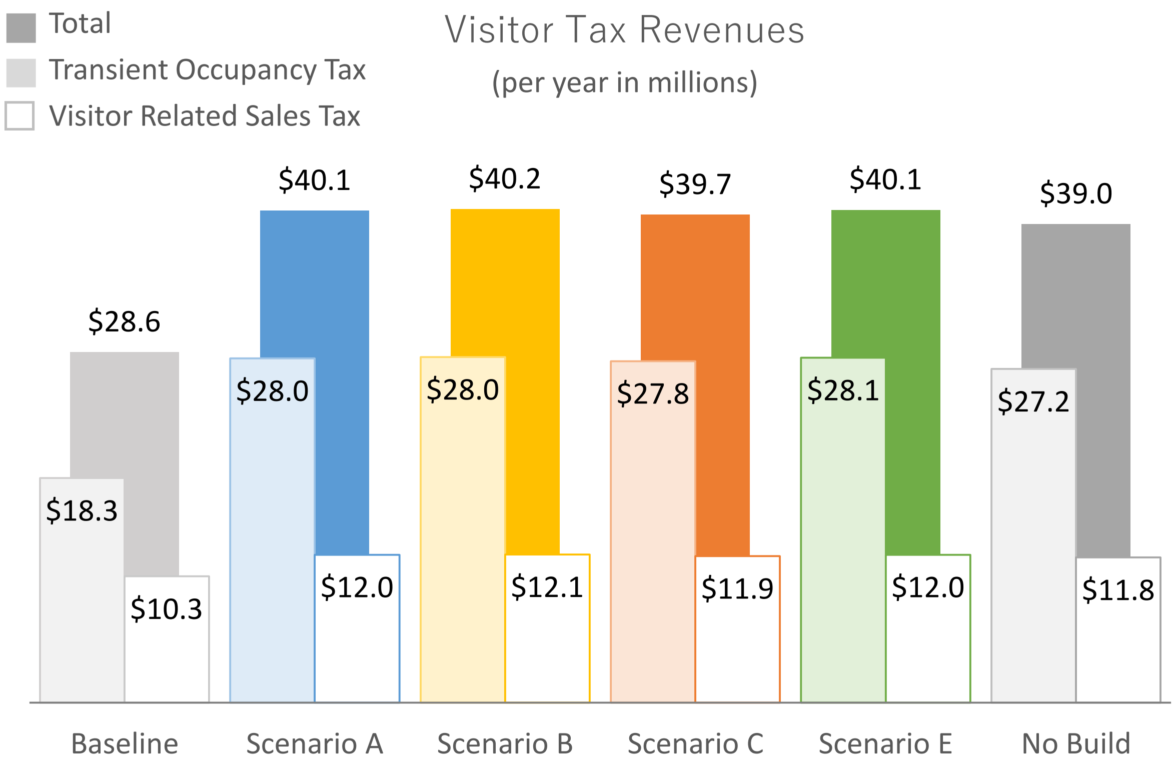


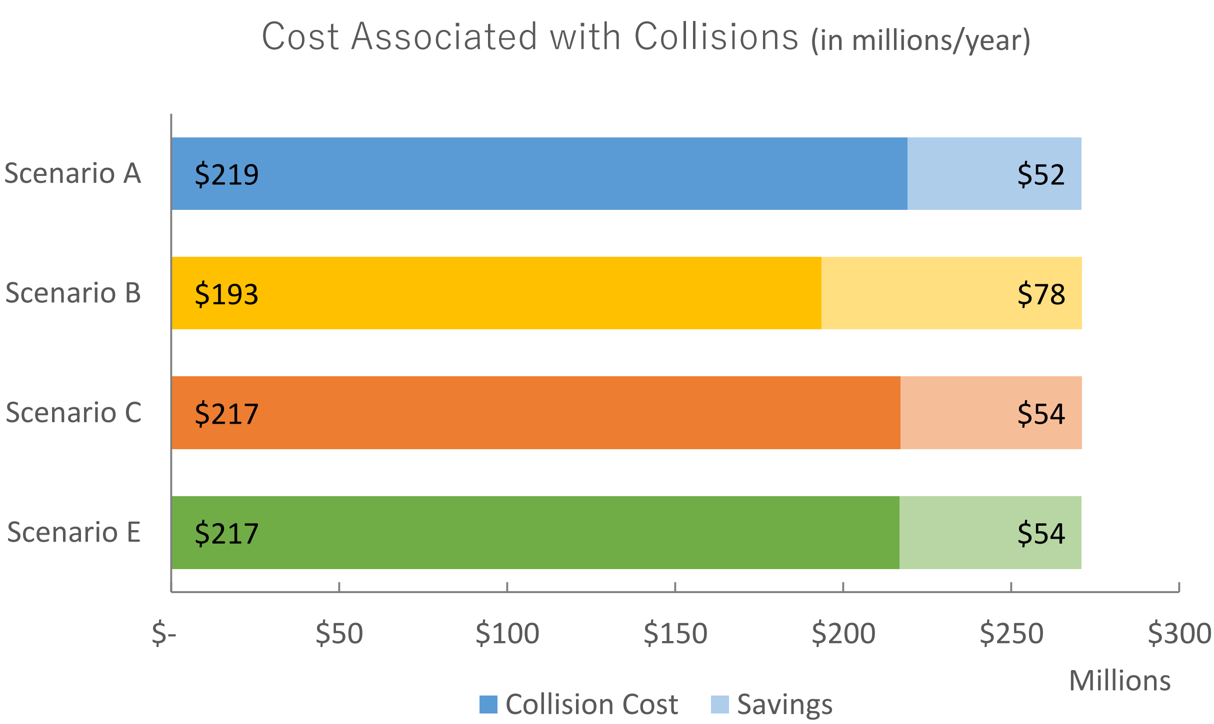
GOAL 3 Develop a well-integrated transportation system that supports economic vitality.



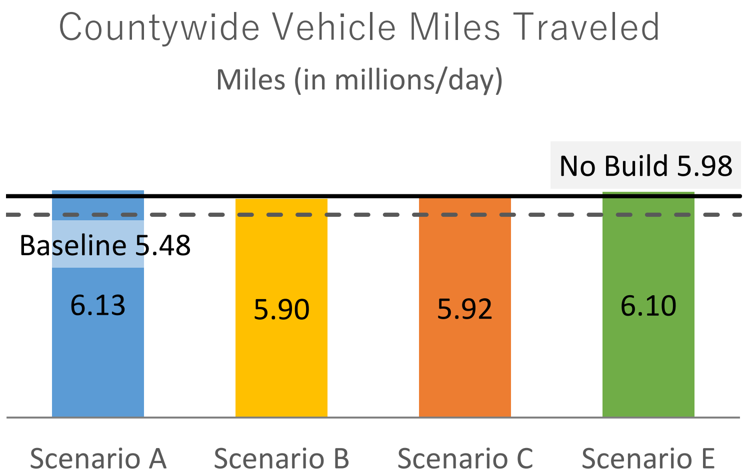


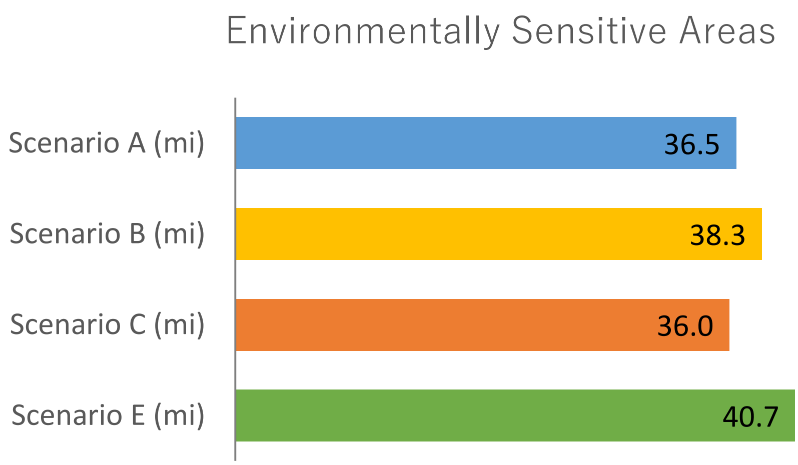
GOAL 3 Economic Vitality (continued)

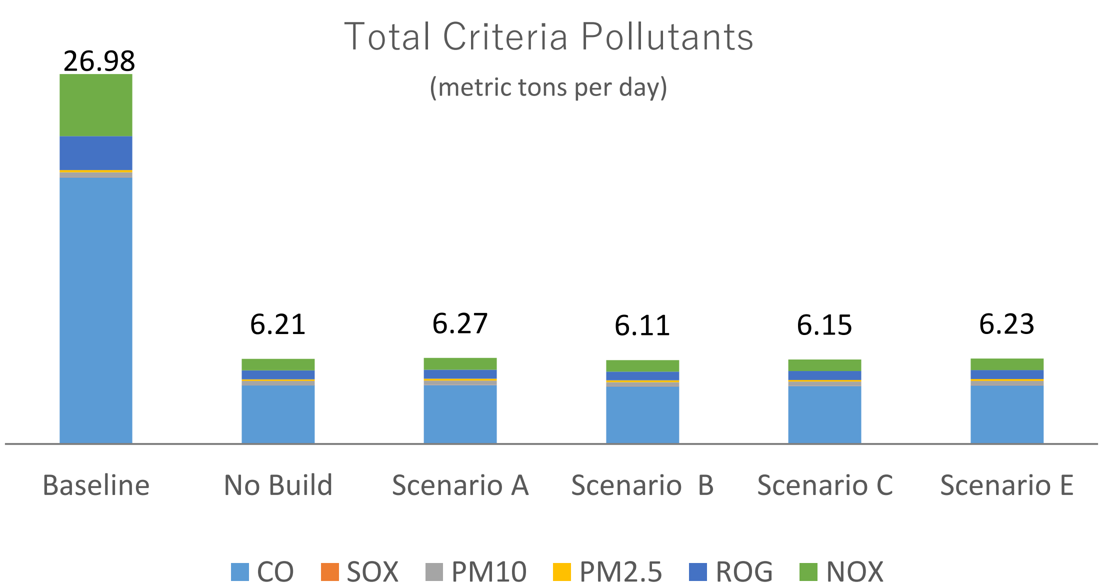




GOAL 4 Minimize environmental concerns and reduce adverse health impacts.

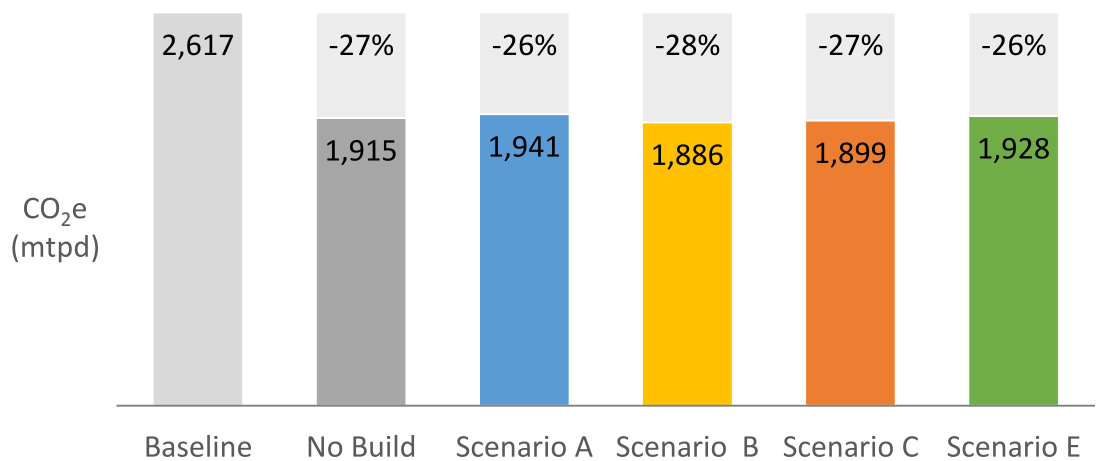






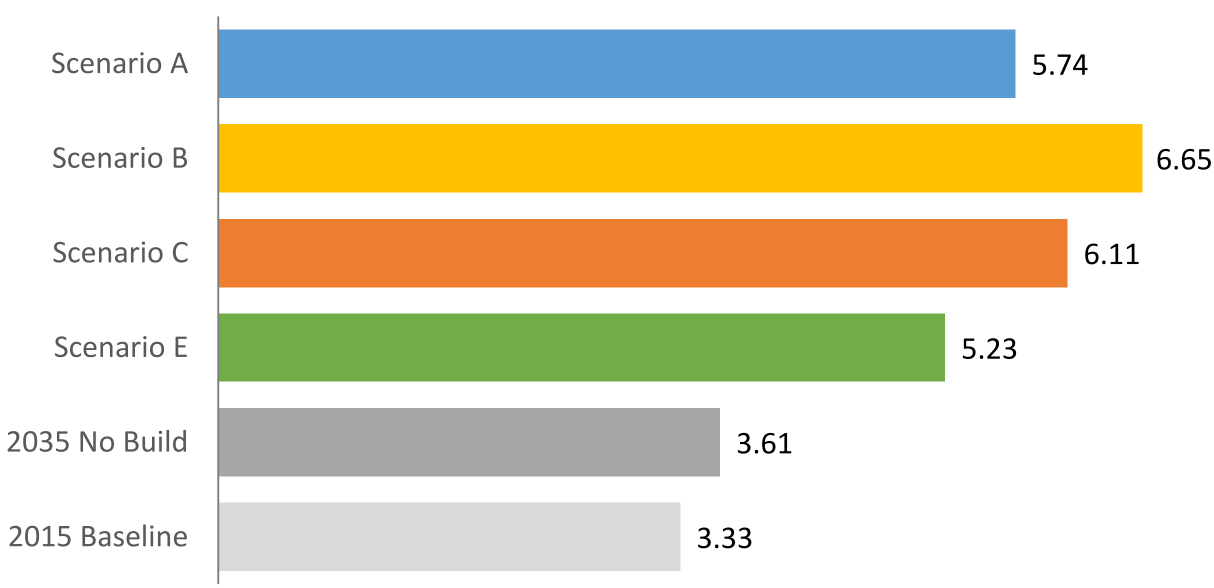
GOAL 4 Environment (continued)

CO_2e Emissions (metric tons/day)
and % Reduction from 2015 Baseline

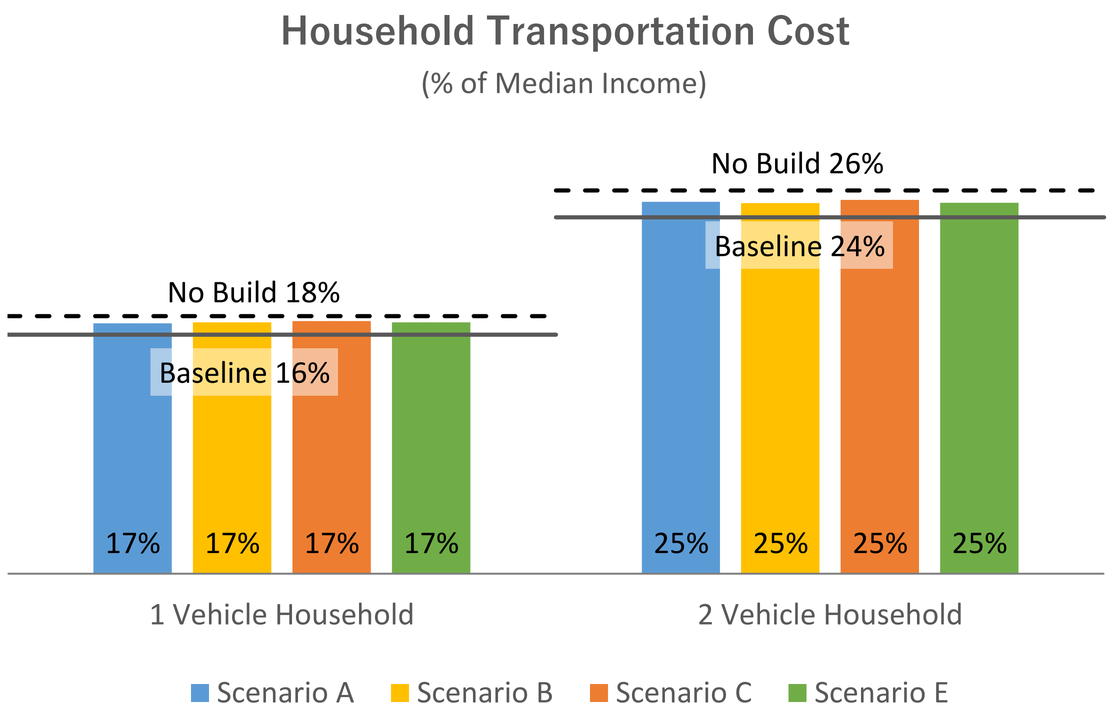


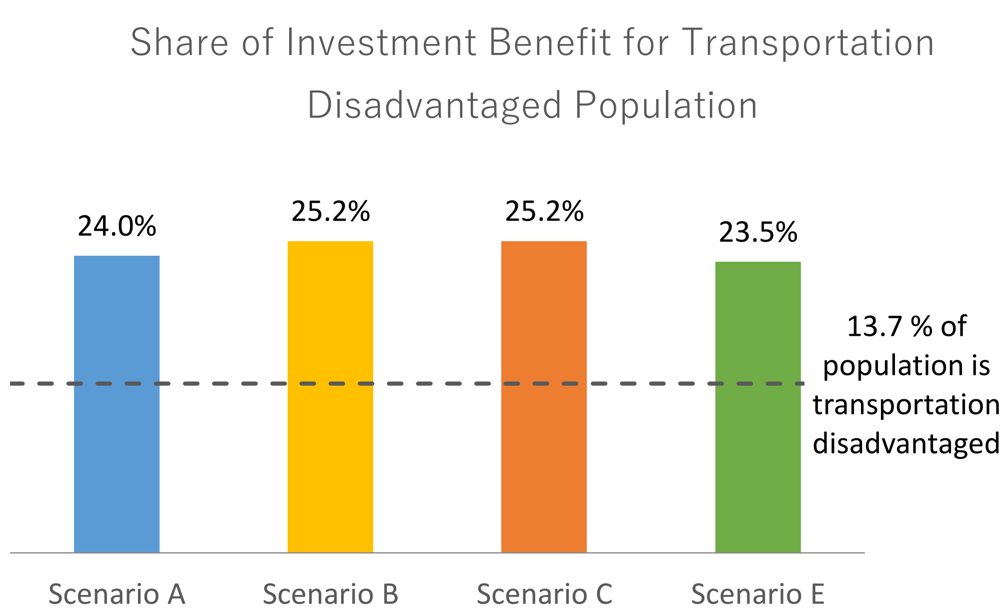
GOAL 5 Accessible and equitable transportation system that is responsive to the needs of all users.

Annual Transit Vehicle Miles Traveled
(in millions)



GOAL 5 Equity (continued)





APPENDIX H – UCS STEP 1 SCENARIO ANALYSIS

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Unified Corridor Investment Study

Step 1 Scenario Analysis

The objective of the Unified Corridor Investment Study (UCS) is to identify multimodal transportation investments that provide the greatest potential benefit and most effective use of Highway 1, Soquel Avenue/Drive and Freedom Blvd, and the Santa Cruz Branch Rail Line. See the project area map in **Attachment 1**. The Step 1 analysis aims to evaluate the feasibility of the various projects and scenarios (Step 1 Criteria is shown in **Attachment 2**) in order to help direct the discussion on what projects will provide the greatest potential benefit and if there is benefit from the project, indicate if there are barriers that would make this project infeasible.

Questions that are posed in this step of the analysis include:

- Will this project help Santa Cruz County address its transportation challenges? For example, will it reduce congestion on Highway 1, will it help to meet the requirements for GHG emission reductions, will it improve safety, will it improve access for people who do not drive, will it improve health, social equity and economic vitality.
- Is there community support for the project? Have agencies previously conducted planning efforts in support of this project?
- How much will it cost the residents of Santa Cruz County to implement this project? What is the potential for other funding sources to be available?
- What are the right-of-way needs?
- Are there potential environmental impacts that may make the project less feasible?
- Are there regulatory requirements for this project that will be challenging to meet? Or, how does this project help to address regulatory requirements?

The projects were evaluated using a standard set of indicators that were developed for each criterion as well as a narrative providing an explanation of the opportunities and challenges that affect the feasibility of the project (**Attachment 3**). Each project was given a rating for each criterion based on a five level rating system as shown in Table 2. An overall rating was also given for each project.

Ratings	***Rating Definition***
👍 👍	Indicates a greater level of potential opportunities within the criteria
👍	Indicates more potential opportunities than challenges within the criteria
Neutral	Indicates a balance of opportunities and challenges within the criteria
👎	Indicates more potential challenges than opportunities within the criteria
👎 👎	Indicates a greater level of potential challenges within the criteria

Table 2. Step 1 Project Rating System

The cost information provided on the project tables (**Attachment 3**) is order of magnitude estimates that will be further refined in Step 2. Minor cost is considered < $50 million, moderate cost is $50 million to $200 million, and major cost is greater than $200 million. **Attachment 4** includes a summary of the feasibility and transportation benefits and challenges of each scenario based on the project evaluations and the grouping of projects within each scenario. **Attachment 5** is the projects and scenarios approved by the RTC on December 7, 2017 to be evaluated in Step 2 of the scenario analysis.


Davenport
Santa Cruz
Soquel Ave
Soquel Dr
Aptos
Capitola
Freedom Blvd
SC Branch Rail Line
Watsonville
Pacific Ocean
Monterey Bay
9
17
1
1
Unified Corridor Investment Study
Project Limits

Unified Corridor Investment Study

Highway 1, Soquel Ave/Drive & Freedom Blvd, and the Santa Cruz Branch Rail Line

Goals, Criteria and Performance Measures

(RTC Approved - May 4, 2017)

The goals, criteria and performance measures below support a vision for an integrated, multimodal transportation network based on a triple bottom line approach that maximizes the environmental, economic and equity benefits.

Goal	Step 1 Criteria
Promote feasible solutions that address transportation challenges.	Community support and coordination/consistency with local, regional, state and federal plans
	Potential to address transportation challenges and advance environmental, economic and equity goals
	Compatibility with regulatory requirements
	Level of public investment
	Right of way and constructability constraints
	Technological feasibility

Goals	Step 2 Performance Measures
Safer transportation for all modes	Injury and fatal collisions by mode
Reliable and efficient transportation choices that serve the most people and facilitate the transport of goods	Peak period mean automobile travel time
	Peak period mean transit travel time
	Peak period travel time reliability
	Mode share
	Person trips across N-S screenline
Develop a well-integrated transportation system that supports economic vitality	Level of public investment
	Visitor tax revenues
	Cost associated with fatalities and injuries
Minimize environmental concerns and reduce adverse health impacts	Automobile vehicle miles traveled
	Environmentally sensitive areas
	Criteria pollutants
	Greenhouse gas emissions
Accessible and equitable transportation system that is responsive to the needs of all users	Transit Vehicle Miles Traveled
	Household transportation costs
	Benefits and impacts to transportation disadvantaged communities

Route	**Highway 1**
Project Title	Bus On Shoulders
Project Description	A Bus on Shoulders Feasibility Study is currently underway to investigate the possibility of express bus service utilizing the shoulders on Highway 1 between Santa Cruz Metro Center and Watsonville Transit Center. Options being considered include use of either inside or outside shoulders and potential use of the existing/future (funded by Measure D) auxiliary lanes between Morrissey Blvd and State Park Dr (approximately 6 miles). The Bus on Shoulders Feasibility Study is scheduled to be finalized in spring 2018. Frequency of transit service on Highway 1 would remain the same as existing service but would utilize the shoulders/auxiliary lanes and therefore would require minor or no change in operating costs.
Overall Rating	
Summary	Bus on Shoulders is a potentially low (minor) cost option that could improve transit travel time and reliability. Decreases in transit travel time could increase transit ridership, reducing VMT and therefore greenhouse gas emissions. The available right-of-way along shoulders is being investigated in the BOS Feasibility Study.

Step 1 Criteria		Rating	**Evaluation**	**Narrative**
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**		✓ Project specific planning effort (Bus on Shoulders Feasibility Study) ✓ Consistent with long range planning effort with public input (approved draft 2040 RTP project list)	▫ Monterey Salinas Transit/Metro/Caltrans District 5/CHP are working in cooperation on a feasibility study for bus on shoulders. The feasibility study is scheduled to be finalized in spring 2018. ▫ The approved draft project list for the 2040 Regional Transportation Plan (RTP) includes the bus on shoulders project. Partner agency, public and stakeholder input are solicited at key milestones of the RTP development.
	Negatives			
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**		<u>Economic</u> ✓ Improves transit travel time ✓ Improves transit travel time reliability ✓ Improves access to jobs, education and services <u>Environmental</u> ✓ Mode shift to transit ✓ Reduces VMT and GHG <u>Health & Equity</u> ✓ Improves access for people who do not drive ✓ Reduces household transportation costs	▫ Bus on shoulders has the potential to improve transit travel times and travel time reliability between Watsonville and Santa Cruz Metro Center providing improved access to jobs, education centers, and services. ▫ Transit in the auxiliary lanes (with minimal time on shoulders) may still provide operational improvements but may not improve travel times as significantly as transit travel on a dedicated shoulder. ▫ Bus on shoulders could improve travel time for local service if use outside shoulders or auxiliary lanes with direct access to on- and off-ramps. ▫ Faster and more reliable transit service could encourage people to shift from driving to transit, reducing VMT and GHG emissions. Transit improvements support lower cost transportation options which can reduce household transportation costs and benefit people who do not drive including youth, seniors, people with disabilities, low income, and minorities. ▫ Bus on shoulders may have additional safety and transit travel time benefits when combined with ramp metering on Highway 1.

Step 1 Criteria		Rating	Evaluation	Narrative
	Negatives		Economic × Increases auto travel time (on ramps) Environmental × Environmentally sensitive areas may be impacted × Traffic impacts (at highway ramps due to bus priority) Equity × Potential Safety conflicts (with emergency response vehicles, law enforcement and disabled vehicles) × Potential Safety conflicts (between buses and autos at entry and exit ramps)	▫ Highway shoulders have typically been used for emergency and traffic law enforcement. As required by legislation (AB 1746) emergency and traffic law enforcement use is still the priority for highway shoulders. ▫ Highway 1 ramp metering to benefit transit may have a negative effect on auto travel time as transit would be given priority over autos. ▫ Potential conflict points between buses and autos at entry and exit ramps could affect motorist safety
Compatible with Regulatory Requirements	**Positives/ Neutral**		✓Consistent with legislation (AB 1746, SB 375, SB 32) ✓Consistent with design standards (Caltrans)	▫ AB 1746 provides the authority for Metro to use highway shoulders for bus-only traffic during congested periods with approval from Caltrans and CHP. ▫ Greenhouse gas reduction legislation (SB 375, SB 32) requires reductions in GHG from transportation in order to slow climate change.
	Negatives		× Approvals required (Caltrans and CHP)	▫ Approvals will be required from Caltrans and CHP to assess any increase in conflict points between buses and autos at entry and exit ramps and affects on motorist safety
Level of Public Investment	**Positives/ Neutral**		✓ Minor new investment for capital costs may be required ✓ Minor new investment for operations required ✓ Existing funding sources could cover cost of operations ✓ Some funding sources (federal, state or local) may be available for capital costs	▫ Once the auxiliary lane projects between State Park Dr and Soquel that have been funded by Measure D have been constructed, the cost for BOS on the auxiliary lanes will be minor. Minimal amounts of paving may be required near the interchanges where bus will travel on shoulders. ▫ Frequency of transit service on Highway 1 would remain the same as existing service but would utilize the shoulders/auxiliary lanes, and therefore would require minor or no change in operating costs. Some new investment in buses and operations would be needed if transit service is expanded as a result of this project.
	Negatives			
Right-of-Way and Constructability Constraints	**Positives/ Neutral**		✓Minor amounts of right-of-way may need to be acquired	▫ Bus on shoulder transit services are expected to be accommodated primarily within existing Highway 1 right-of-way. Some additional right-of-way may need to be acquired for widening at ramps and widening of over and under-crossings.
	Negatives		× Construction challenges may require significant additional funds or alternative designs	▫ Limited shoulder width at a number of over-crossings and under-crossings along Highway 1 may make project infeasible in the near term due to cost required to widen these structures. Any widening necessary for BOS would be consistent with the Highway 1

Step 1 Criteria		Rating	Evaluation	Narrative
				Corridor Investment Program DEIR. The BOS Feasibility Study is scheduled to be final in spring 2018 which will provide information on feasibility and cost.
Technological Feasibility	**Positives/ Neutral**	👍 👍	✓Technologically feasible ✓Could accommodate future technologies	▫ BOS and any associated widening requirements are all technologically feasible. New technologies could be implemented to improve bus flow through ramp meters. Design could allow for implementation of self-driving buses in future.
	Negatives			

Route	Highway 1
Project Title	Additional lanes for high occupancy vehicles (HOV) and increased transit frequency
Project Description	The project would construct HOV lanes for a nine mile section between San Andreas Rd and Morrissey Blvd in both the north and southbound directions. Project includes construction of new HOV lanes, auxiliary lanes (in addition to those included in Measure D) and reconstruction of the interchanges and ramps, and over and under-crossings along this nine mile section. Interchange improvements include enhanced bicycle and pedestrian treatments. Express transit service in the HOV lanes is also considered here with 15 minute headways between Watsonville and Santa Cruz. Stops at Cabrillo and Capitola will be more limited.
Overall Rating	👍
Summary	Highway 1 is a principle transportation route for Santa Cruz County residents with traffic volumes as high as approximately 97,000 vehicles per day. Commuters, visitors, residents and businesses rely on Highway 1 for accessing their destinations. The HOV lanes project is a major cost capacity increasing project which could relieve congestion on Highway 1 and may provide travel time improvements for transit, carpooling and single occupancy vehicle (SOV) motorists. Project could promote carpooling and transit use as a means to further increase transportation system capacity. Economic vitality of the region could be increased and access between north and south county could be improved. There could be potentially significant environmental impacts for all interchange improvements and over and under-crossings along this 9 mile stretch of Highway 1.

Step 1 Criteria		Rating	Evaluation	Narrative
Community Support and Consistency with Applicable Plans	Positives/ Neutral	👍	✓ Project specific planning effort with public input (Hwy 1 Corridor Investment Program Draft EIR) ✓ Consistent with long range planning effort (2014 RTP) ✓ Multi-agency support (RTC, City of Capitola General Plan)	▫ The RTC is working in cooperation with Caltrans and FHWA on the draft Highway 1 Corridor Investment Program environmental review. The draft EIR has gone through the public comment period and responses to comments are being generated. ▫ The HOV Lane Project is included in the 2014 Regional Transportation Plan. Partner agency, public and stakeholder input are solicited at key milestones of the RTP development.
	Negatives		× May have some public opposition	▫ Concern has been expressed that increasing highway capacity will make traveling by automobile easier, increasing the number or length of trips people take, and thus will increase VMT and GHG emissions. Some members of the public are represented by advocacy groups that oppose improvements to Highway 1.
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	Positives/ Neutral	👍	Economic ✓ Improves auto travel time ✓ Improves auto travel time reliability ✓ Improves transit travel time ✓ Improves transit travel time reliability ✓ Improves access to jobs,	▫ Travel time for HOV, SOV and transit could be reduced which could improve access to jobs, education centers and services and promoting business development and associated economic vitality for the region. Travel time improvements could also benefit emergency vehicles. ▫ Faster and more reliable transit travel times could increase transit ridership although transit in HOV lanes would primarily be beneficial for express services due to time it takes to move in and out of the HOV lanes when entering and exiting highway for local service. ▫ HOV lane travel times could increase carpooling. HOV lanes would help to decrease the

Step 1 Criteria		Rating	**Evaluation**	**Narrative**
			education and services ✓ Potential to increase land use development, business activity, employment and tax revenues Environmental ✓ Mode shift to transit ✓ Mode shift to carpooling Health & Equity ✓ Improves access for people who do not drive (transit) ✓ Improves safety	"cut-through" traffic on local streets by adding capacity to the highway. Auxiliary lanes can improve traffic flow and safety of the highway by extending the merging area between off and on ramps.
	Negatives		Environmental × Environmentally sensitive areas may be impacted × Potential to increase GHG emissions Health & Equity × Potential for safety conflicts (between HOVs/buses and SOVs)	▫ The HOV lane project extending over a 9 mile section of highway with reconfiguration of the interchanges may impact environmentally sensitive areas. ▫ The goal of adding HOV lanes is to reduce congestion and increase the speed of travel. Increasing travel speeds and making it easier to travel can increase the number or length of trips but the extent of any induced demand would need to be evaluated. GHG could be increased if the number or length of trips is increased due to induced demand. Alternatively, GHG could be reduced if speeds are in the most optimal range (30-50 mph) for GHG emission reductions. ▫ Safety conflicts could arise as high occupant vehicles and buses entering and exiting the HOV lanes and general purpose lanes as HOVs enter and exit the highway
Compatible with Regulatory Requirements	**Positives/ Neutral**		✓ Standard permitting process ✓ Consistent with legislation (FAST Act)	▫ Permitting of any roadway project can be a time and resource intensive endeavor. Hwy 1 HOV lanes will be required to go through the standard permitting process although the large scale of the project, geography and natural resources potentially within the project area, may increase the amount of coordination needed with federal and state agencies may require significant effort to obtain the required permits. However, the length of the project (9 miles), geography and natural resources potentially in the area may increase the amount of coordination with federal and state agencies and increase the level of effort required to obtain the necessary permits. ▫ FAST Act legislation will require AMBAG to meet regional targets for safety and travel time reliability. Targets are currently being determined by the state for the MPOs and may need to be met in the next few years. HOV lanes and associated auxiliary lanes may improve safety and travel time reliability to help meet regional targets.
	Negatives		× Design exceptions required	▫ Requests for design exceptions are anticipated on the HOV Lane project to avoid sensitive resources such as protected plant, animal and wetland habitat areas and to minimize impacts to residential, commercial and existing infrastructure.
Level of Public Investment	**Positives/ Neutral**		✓ Some funding sources may be available for capital costs (STIP, STBG, SB1 -LPP & CC, TIGER, trade corridor funds but	▫ With the passage of Senate Bill 1 (SB 1) earlier this year, additional funds for transportation investments in Santa Cruz County may be available through both formula funding and grant programs. The congested corridors program, a grant program through SB 1 designed to provide funds for congested commute corridors could provide funds for Highway 1 HOV

Step 1 Criteria		Rating	Evaluation	Narrative
			unlikely) ✓ Minor new investment for operations required ✓ Existing funding sources could cover cost of operations (Caltrans SHOPP and maintenance budget)	lanes. STIP funds have been a source of funds for SCC over the years although even the STIP funds dropped within the last few years. STIP funds will be restored by SB 1 although they still may be lower than historic levels. ▫ Opportunities arise from time to time from federal infrastructure investment programs, road user fees, and special grants to fund projects that are essentially "one-time" events. ▫ Currently, highway maintenance operation costs are paid for by the state. In future, Caltrans may require local agencies to cover costs of maintenance for projects that increase capacity.
	Negatives		× Major new investment for capital costs required	▫ Cost to implement HOV lanes on Highway 1 is significant (major) due to the interchange and crossing improvements that are needed to eliminate the constrictions that limit widening of the highway.
Right of Way and Constructability Constraints	**Positives/ Neutral**		✓ Can be built in phases	▫ Project can be implemented in phases with independent utility as funding becomes available. One of the several auxiliary lane projects that are needed to accommodate the additional HOV lane has already been built and three more are funded through Measure D.
	Negatives		× Moderate amounts of ROW will need to be acquired × Construction challenges may require significant additional funds or alternative design	▫ The project can generally be accomplished within the existing Caltrans highway right-of way, but some additional right-of-way acquisition will be required to expand some interchanges to accommodate HOV lanes. Geometrically challenged structures at interchanges and bridges may require additional funds or alternative designs.
Technological Feasibility	**Positives/ Neutral**		✓ Technologically feasible ✓ Could accommodate future technologies	▫ The HOV lanes project is feasible with current day technology. Technologies such as autonomous vehicles could be accommodated in future that may increase the capacity of the facility, safety and operational efficiencies such as fuel economies and emissions
	Negatives		x Planning for future technologies has not been initiated	▫ The effect of automated vehicles on the future transportation system is still unknown. Roadway capacity may increase as vehicles can travel more closely together but there will likely be increases in travel due to ease of taking more and longer trips. Regulations related to automated vehicles are still in their infancy. Larger MPOs are beginning to take steps to plan for future technologies. The smaller RTPAs such as RTC will be following their lead in planning for future technologies.

Route	**Highway 1**
Project Title	Auxiliary lanes to extend merging distance *(in addition to Measure D auxiliary lanes)*
Project Description	This project would construct auxiliary lanes along Highway 1 between interchanges from State Park Dr to San Andreas Rd. The three sets of auxiliary lanes are State Park Dr to Rio Del Mar Blvd, Rio Del Mar to Freedom, Freedom to San Andreas Rd (northbound only as southbound auxiliary is already in place). The auxiliary lanes between State Park Dr and Rio Del Mar Blvd would require reconstruction of the two overcrossings of the Santa Cruz Branch Rail Line in Aptos, and widening of the Aptos Creek Bridge. Measure D provides funds for 3 sets of auxiliary lanes between Soquel and 41st Ave, Bay-Porter and Park Ave, and Park to State Park Dr not included in this project. The Measure D projects with identified funding will be assumed in all scenarios.
Overall Rating	
Summary	Moderate cost operational improvement to improve traffic flow and safety of the highway by extending the merging area between off and on ramps.

Step 1 Criteria		Rating	Evaluation	Narrative
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**		✓ Project specific planning effort with public input (Highway 1 Corridor Investment Program and DEIR) ✓ Consistent with long range planning effort with public input (2014 RTP)	▫ The RTC is working in cooperation with Caltrans and FHWA on the draft Highway 1 Corridor Investment Program Environmental Documents. The draft EIR has gone through the public comment period and responses to comments are being generated. The auxiliary lane projects being considered here between State Park Dr and San Andreas are included in the Highway 1 Corridor Investment Program. Other auxiliary lane projects along Highway 1 (between Soquel and State Park Dr) have been supported by voters through passage of Measure D. ▫ Auxiliary lanes projects are included in the 2014 Regional Transportation Plan as stand-alone projects with independent utility. Partner agency, public and stakeholder input are solicited at key milestones of the RTP development.
	Negatives		× May have some public opposition	▫ Concern has been expressed that increasing highway capacity will make traveling by automobile easier, increasing the number or length of trips people take, and thus will increase VMT and GHG emissions. Some members of the public are represented by advocacy groups that oppose improvements to Highway 1.
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**		Economic ✓ Improves auto travel time ✓ Improves auto travel time reliability Health & Equity × Improves safety	▫ The auxiliary lanes projects could improve traffic flow and safety of the highway by extending the merging area between off and on ramps. Some travel time benefits may be realized due to improvements in traffic flow and fewer traffic incidents.
	Negatives		× Environmentally sensitive areas may be impacted	▫ The auxiliary lane project extending a 3 mile section from State Park Dr to San Andreas Rd may impact environmentally sensitive areas.

Step 1 Criteria		Rating	Evaluation	Narrative
Compatible with Regulatory Requirements	**Positives/ Neutral**		✓ Consistent with legislation (FAST Act) ✓ Consistent with design standards (Caltrans) ✓ Standard permitting process	▫ Permitting of any roadway project can be a time and resource intensive endeavor. Auxiliary lanes will be required to go through the standard permitting process however the length of the project (3 miles), geography and natural resources potentially in the area, may increase the amount of coordination with federal and state agencies and increase the level of effort require to obtain the necessary permits. ▫ FAST Act legislation will require AMBAG to meet regional targets for safety and travel time reliability. Targets are currently being determined by the state for the MPOs and may need to be met in the next few years. Auxiliary lanes could improve safety and travel time reliability to help meet regional targets.
	Negatives			
Level of Public Investment	**Positives/ Neutral**		✓ Moderate new investment for capital costs required ✓ Some funding sources may be available for capital costs (STIP, STBG, SB1 -LPP & CC, TIGER, trade corridor funds but unlikely) ✓ Minor new investment for operations required ✓ Existing funding sources could cover cost of operations (Caltrans SHOPP and maintenance budget)	▫ Amoderate amount of funds are needed to implement auxiliary lanes on Highway 1. The cost of constructing auxiliary lanes between State Park and Rio Del Mar is greater due to the need to replace two rail road bridges in Aptos. With the passage of Senate Bill 1 (SB 1) earlier this year, additional funds for transportation investments in Santa Cruz County will be available through both formula funding and grant programs. The congested corridors program, a grant program through SB 1 designed to provide funds for congested commute corridors, could provide funds for Highway 1 auxiliary lanes, although it is uncertain at this time whether Highway 1 will be competitive for these funds. STIP and STBG funds have been a source of formula funds for SCC over the years although even the STIP funds dropped within the last few years. STIP funds will be restored by SB 1 although they still may be lower than historic levels. ▫ Opportunities arise from time to time from federal infrastructure investment programs, road user fees, and special grants to fund projects that are essentially "one-time" events. ▫ Currently, highway maintenance operation costs are paid for by the state. In future, Caltrans may require local agencies to cover costs of maintenance for projects that increase capacity.
	Negatives			
Right-of-Way and Constructability Constraints	**Positives/ Neutral**		✓ Can be built in phases ✓ Minor amounts of ROW may need to be acquired	▫ Project can be implemented in phases with independent utility as funding becomes available. One auxiliary lane project has already been built on Highway 1 and three more are funded through Measure D. This project would construct 3 more sets of auxiliary lanes phased over time. The project can generally be accomplished within the existing Caltrans highway right-of-way, but some additional right-of-way acquisition may be required to for under and over-crossings through this area.
	Negatives		× Design exceptions required	▫ Requests for design exceptions are anticipated on the Auxiliary Lane project to avoid sensitive resources such as protected plant, animal and wetland habitat areas and to minimize impacts to residential, commercial and existing infrastructure.
Technological Feasibility	**Positives/ Neutral**		✓ Technologically feasible ✓ Could accommodate future technologies	▫ The auxiliary lanes project is feasible with current day technology. Technologies such as autonomous vehicles could be accommodated in future.
	Negatives			

Route	**Highway 1**
Project Title	Ramp Metering
Project Description	Reconfiguration of on-ramps and local streets to allow for ramp metering and installation of ramp meters at interchanges between San Andreas Rd and Morrissey Blvd. Ramp metering will control entry onto the highway through use of meter lights during peak periods. The metering rate will be traffic responsive based on actual traffic conditions of the mainline flow in the vicinity of the ramp. Reconfiguration of on-ramps may require widening and/or lengthening of the on-ramps to allow room for queuing to limit backup onto local streets. Separate lanes for SOV and HOV would be installed with faster metering rates for HOV.
Overall Rating	
Summary	Highway 1 is a principle transportation route that serves Santa Cruz County residents with traffic volumes up to approximately 97,000 vehicles per day. Commuters, visitors, residents making local trips and businesses rely on Highway 1 for accessing their destinations. The economy of Santa Cruz County is dependent on a functioning transportation system where Highway 1 is the backbone. Ramp metering on Highway 1 has the potential to make significant near term operational efficiencies at a relatively minor project cost. Benefits from ramp metering include safety improvements from spacing vehicles as they merge onto highway and less stop and go traffic; improvements to travel time and travel time reliability; and reductions in GHG emissions. With the improved efficiencies of the highway, cut through traffic through the neighborhoods will be reduced. Ramp metering loses effectiveness when demand is significantly greater than capacity.

<u>**Step 1 Criteria**</u>		<u>Rating</u>	<u>**Evaluation**</u>	<u>**Narrative**</u>
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**		✓Project specific planning effort with public input (Highway 1 Corridor Investment Program DEIR) ✓Consistent with long term planning effort (2014 RTP)	▫ The RTC is working in cooperation with Caltrans and FHWA on the draft Highway 1 Corridor Investment Program Environmental Documents. The Highway 1 Corridor Program includes ramp metering in both alternatives being evaluated. The draft EIR has gone through the public comment period and responses to comments are being generated. The ramp metering project being considered here between Morrissey Blvd and San Andreas Rd are included in the 2014 Regional Transportation Plan as a stand-alone project with independent utility.
	Negatives		× May have some public opposition	▫ Ramp metering could result in queue overflow on local streets impacting traffic but this could be limited with ramp design, detector placement and timing design. Motoring public and businesses could express opposition.
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**		<u>Economic</u> ✓Improves auto travel time ✓Improves auto travel time reliability ✓Improves access to jobs, education and services ✓Potential to increase land use development, business activity, employment and tax revenues	▫ The ramp metering project could improve operational efficiencies by metering the flow of vehicles onto the highway during peak periods. Ramp metering has also been shown to increase capacity of the highway. Speeds could increase on the freeway and congestion could be reduced, decreasing travel time and improving travel time reliability. A short wait on the on-ramp could allow motorists to increase their average freeway speed and shorten overall freeway travel times. Ramp metering loses effectiveness when demand is significantly greater than capacity. ▫ Greater operational efficiencies on the highway will relieve cut through traffic through the neighborhoods.

Step 1 Criteria		Rating	Evaluation	Narrative
			Environmental ✓Potential to reduce GHG Equity ✓Improves safety	▫ Ramp metering has also been shown to improve safety by spacing the vehicles as they merge onto the highway and by reducing the stop and go traffic thereby reducing the number of collisions. ▫ Vehicles traveling at speeds between 30 to 50 mph emit fewer GHG emissions per mile than vehicles in stop and go traffic.
	Negatives		Environmental × Environmentally sensitive areas may be impacted × Traffic Impacts (on local streets)	▫ Widening of ramps where needed for queuing capacity may have an impact on environmentally sensitive areas ▫ Ramp metering could result in queue overflow on local streets impacting traffic but this could be managed with detector placement and timing design.
Compatible with Regulatory Requirements	**Positives/ Neutral**	👍👍	✓Consistent with legislation (FAST Act, SB 375, SB 32) ✓Consistent with design standards (Caltrans) ✓Standard permitting process	▫ FAST Act legislation requires AMBAG to meet regional targets for safety and travel time reliability. Targets are currently being determined by the state for the MPOs and may need to be met in the next few years. Ramp metering can improve both safety and travel time reliability. ▫ Greenhouse gas reduction legislation (SB 375, SB 32) requires reductions in GHG from transportation in order to slow climate change.
	Negatives			
Level of Public Investment	**Positives/ Neutral**	👍	✓Minor new investment for capital costs required ✓Minor new investment for operations required ✓Some funding sources may be available for capital costs (STIP, STBG, SB1 -LPP & CC, TIGER, trade corridor funds but unlikely) ✓Some funding sources may be available for operations (Caltrans SHOPP and maintenance budget)	▫ The level of investment needed for ramp metering still needs to be determined in detail based on how much effort will be needed to provide the queuing capacity on the on-ramps. The amount of investment may be relatively small compared to increase in operational efficiencies and the safety benefits. The 3 sets of auxiliary lane projects funded through Measure D could potentially include reconfiguration of on-ramps for ramp metering which would reduce the amount of additional funds needed for this project.
	Negatives			
Right-of-way and Constructability Constraints	**Positives/ Neutral**	👍	✓Some right-of-way may need to be acquired	▫ Some additional right-of-way may need to be acquired for widening at ramps to accommodate queuing as shoulder widths may be limited.
	Negatives		× Design exceptions required	▫ Requests for design exceptions are anticipated on the ramp metering project to minimize impacts to residential, commercial and existing infrastructure.
Technological Feasibility	**Positives/ Neutral**	👍👍	✓Technologically feasible ✓Could accommodate future technologies	▫ Current technology exists for implementation that would allow the metering rate to be responsive to actual traffic conditions of the mainline flow in the vicinity of ramp. Additional technology also exists to determine the metering rate based on overall traffic conditions of highway and major arterials which will likely improve over time.

Route	**Highway 1**
Project Title	Additional lanes on Highway 1 bridge over San Lorenzo River
Project Description	The project would widen the bridge at the San Lorenzo River overcrossing from 2 lanes in each direction to 3 lanes southbound and 4 lanes northbound to improve traffic flow through the Highway 1/9 intersection and bring the bridge up to seismic safety standards.
Overall Rating	👍
Summary	The project could help to improve traffic flow through the Hwy 1/9 intersection, one of the most utilized intersections in the county at a moderate cost. Safety improvements include increasing the distance for automobiles to merge on/off Highway 1 from Ocean Street and River Street/Highway 9. Bridge replacement would be completed to meet seismic safety standards and could also decrease environmental impacts by removing the center pier from the middle of the river channel.

Step 1 Criteria		Rating	**Evaluation**	**Narrative**
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**	👍	✓ Consistent with long range planning effort (2014 RTP) ✓ Consistent with other planning efforts (City of Santa Cruz CIP and General Plan)	▫ Project is included in the 2014 RTP. Partner agency, public and stakeholder input are solicited at key milestones of the RTP development. ▫ Approved Caltrans Project Study Report
	Negatives			
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**	👍	Economic ✓ Improves auto travel time ✓ Improves auto travel time reliability ✓ Improves access to jobs, education and services ✓ Potential to increase land use development, business activity, employment and tax revenues Health & Equity ✓ Improves safety Environmental ✓ Impacts to environmentally sensitive areas may be reduced	▫ The Highway 1 bridge over the San Lorenzo River is part of the bottleneck for automobiles accessing the west side of the City of Santa Cruz and the Harvey West business area. Widening San Lorenzo Bridge in coordination with the Highway 1/9 intersection improvements will improve traffic operations in this area. The degree to which travel time and reliability improve may not be significant. ▫ Safety may improve by increasing length of merge lanes northbound from Ocean St onto Highway 1 and southbound from River Street/Hwy 9 onto Highway 1 and providing a shoulder for increased maneuverability to avoid collisions. ▫ Widening the bridge over San Lorenzo River may improve the riverine habitat, reduce impacts to associated species, and reduce flooding. ▫ Bridge replacement would improve seismic resistance and upgrade substandard structure.
	Negatives			
Compatible with Regulatory	**Positives/ Neutral**	👍👍	✓ Consistent with design standards ✓ Standard permitting process	▫ Project includes seismic retrofit of bridge as required by the Caltrans Seismic Retrofit Program. ▫ The San Lorenzo Bridge Widening will be required to go through the standard permitting process although the need for construction near the waterway may require significant effort

Step 1 Criteria		Rating	Evaluation	Narrative
Requirements				to obtain the required permits.
	Negatives			
Level of Public Investment	Positives/ Neutral	👍	✓ Existing funding sources could cover cost of operations ✓ Moderate new investment for capital costs required ✓ Some funding sources may be available for capital costs (HBRR, STIP, STBG, CC, Measure D – local)	▫ Currently, highway maintenance operation costs are paid for by the state. In future, Caltrans may require local agencies to cover costs of maintenance for projects that increase capacity. ▫ Funding sources available for capital costs of project include the Highway Bridge replacement and Rehabilitation Program
	Negatives			
Right-of-Way and Constructability Constraints	Positives/ Neutral	👍	✓ Right of way is sufficient	
	Negatives		× Construction challenges due to environmentally sensitive areas	▫ Designs will consider impacts on traffic during construction and impacts to environmentally sensitive areas.
Technological Feasibility	Positives/ Neutral	👍 👍	✓ Technologically feasible ✓ Could accommodate future technologies	
	Negatives			

Route	**Highway 1**
Project Title	Mission Street Intersection Improvements
Project Description	The project would improve intersections along Mission Street in Santa Cruz including modifying design and adding lanes at Hwy1/Mission/Chestnut/King intersection, widening at Mission and Bay, right turn lanes at Swift and Laurel, and installation of a traffic signal at Shaffer Rd. Intersection improvements are needed to reduce conflicts between autos, transit, bicyclists and pedestrians and to improve traffic flow.
Overall Rating	
Summary	Mission Street on the west side of Santa Cruz has many roles to perform. It functions as State Route 1 for through traffic connecting the north coast to the City of Santa Cruz and destinations to the south. It also serves as the "main street" for the City of Santa Cruz's upper and lower westside neighborhoods and is the primary automobile and transit route serving UCSC. The Mission Street intersection improvements could improve access for through traffic and local destinations, improve traffic operations and travel time reliability and improve safety for autos, bicyclists and pedestrians.

Step 1 Criteria		Rating	**Evaluation**	**Narrative**
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**		✓ Consistent with long range planning effort (2014 RTP, City of SC General Plan and 2015-2017 CIP) ✓ Multi-agency support (City of SC, RTC)	▫ Intersection improvement projects on Mission Street are included in the 2014 RTP. Partner agency, public and stakeholder input are solicited at key milestones of the RTP development. ▫ Hwy 1/Mission/Chestnut/King and Mission/Bay projects are listed in the most recent City of Santa Cruz CIP. ▫ Improving safety for bicyclists on Mission Street was the focus of recent bicycle safety campaigns.
	Negatives			
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**		Economic ✓ Improves auto travel time ✓ Improves auto travel time reliability ✓ Improves transit travel time ✓ Improves transit travel time reliability ✓ Improves access to jobs, education and services ✓ Potential to increase land use development, business activity, employment and tax revenues Equity ✓ Improves safety	▫ The intersection improvements could improve traffic flow on Mission Street to destinations on the westside of SC including UCSC, commercial areas and residences. Safety, travel time and travel time reliability for autos and transit could be improved. Commuters, businesses, residents making local trips, visitors and students could benefit from these improvements. ▫ Improvements for auto and transit must consider effects on bicyclists and pedestrians and their ability to navigate safely through intersections.
	Negatives			

Step 1 Criteria		Rating	Evaluation	Narrative
Compatible with Regulatory Requirements	**Positives/ Neutral**	👍	✓ Consistent with design standards (Caltrans) ✓ Consistent with legislation (FAST Act)	▫ Coordination with Caltrans required for work on state highways. ▫ FAST Act legislation requires AMBAG to meet regional targets for safety and travel time reliability. Targets are currently being determined by the state for the MPOs and may need to be met in the next few years. Mission St. intersection improvements can improve both safety and travel time reliability.
	Negatives		× Design exceptions required	▫ Request for design exceptions are anticipated for intersection improvements on Mission St. to minimize impacts to residential, commercial and existing infrastructure.
Level of Public Investment	**Positives/ Neutral**	👍 👍	✓ Minor new investment for capital costs required ✓ No new investment for operational costs required ✓ Some funding may be available for capital costs (STIP, STBG, SB1 -LPP & CC, TIGER, trade corridor funds but unlikely)	▫ Funding may be available for these projects from a number of different sources including the traditional sources (STIP, STBG) and a couple of new sources of funds due to passage of SB 1 (LPP and CC). Operational costs would not likely need to be increased based on these intersection improvements.
	Negatives			
Right-of-Way and Constructability Constraints	**Positives/ Neutral**	👍	✓ Minor amounts of ROW may need to be acquired	▫ Intersection improvements to accommodate all modes (auto, transit, biking and walking) may require some additional right-of-way.
	Negatives			
Technological Feasibility	**Positives/ Neutral**	👍 👍	✓ Technologically feasible	▫ Intersection improvements can be designed to accommodate future technologies.
	Negatives			

Route	**Highway 1**
Project Title	Provide rail transit along the Highway 1 alignment
Project Description	Rail transit service would travel primarily along Highway 1 between Santa Cruz and Watsonville. Rail transit service would be bidirectional and extend from Depot Park in Santa Cruz along Chestnut St to Highway 1 at Mission St, continue on Highway 1 until north of Beach St in Watsonville where rail transit service would continue on the Santa Cruz Branch Rail Line to Pajaro Station. Rail transit along Highway 1 would occur in the median in order to limit the number of points where the highway and rail cross. Portions of the rail transit service are expected to be elevated and other sections constructed in tunnels as a result of insufficient space in the median for bidirectional tracks and platforms, proximity of the project to the built environment, and changes in grade along Highway 1. Station locations would include Depot Park, Emeline Ave, Soquel Ave, 41st Ave, Park Ave and downtown Watsonville. Parking would be needed to serve the station stops.
Overall Rating	👎
Summary	Rail transit service on a combination of new rail transit facilities along Highway 1 and existing Santa Cruz Branch Line rail ROW and Roaring Camp ROW is a major cost capacity increasing improvement that would provide a new transit route along Santa Cruz County's most heavily traveled route connecting north and south county. Rail transit service along Highway 1 would improve transit travel time and transit travel time reliability and provide an alternative to congestion on Highway 1 and Soquel/Freedom. By improving travel time and travel time reliability, transit ridership could increase, reducing VMT and therefore greenhouse gas emissions. Rail transit increases options for those who do not drive including seniors, youth, people with disabilities, and low-income.

Step 1 Criteria		Rating	Evaluation	Narrative
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**	👎 👎		
	Negatives		× Project is not included in any planning document.	▫ A rail transit service alignment along Highway 1 has not previously been investigated by the RTC and community input has not been solicited on project concepts. However, RTC policy supports consideration of passenger rail service.
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**	Neutral	Economic ✓Improves transit travel time ✓Improves transit travel time reliability ✓ Improves access to jobs, education and services ✓ Potential to increase land use development, business activity, employment and tax revenues Environmental ✓Mode shift to transit ✓Improves safety ✓Reduces VMT and GHG	▫ Rail transit service on Highway 1 between Watsonville and Santa Cruz has the potential to significantly improve transit travel times and travel time reliability between Santa Cruz and Watsonville by providing a separate continuous right of way dedicated to rail transit along Highway 1. This new direct transit connection between Watsonville and Santa Cruz will improve access to jobs, education centers and services and promote business development and associated economic vitality for the region. A new transit alternative to congested automobile travel on Highway 1 may increase ridership, encourage people to shift from driving to transit, reducing VMT and GHG emissions. ▫ Access to jobs, education and services may improve but may be limited. Rail ridership has been shown to correlate with the number of jobs within ¼ mile of rail stops (approximately a 5 minute walk) and the intensity of land use near the stations. Much of this ¼ mile distance (approximately 1/10 mile) is taken up by the highway/interchange structure limiting the amount of jobs that can be accessed within a 5 minute walk from the stations. The distance between rail stations along this rail line will also limit ridership.

Step 1 Criteria		Rating	Evaluation	Narrative
			Health & Equity ✓ Improves access for people who do not drive	▫ Access for people who do not drive (youth, seniors, people with disabilities, low income, minority) can be improved by a rail transit option. Although rail transit on Highway 1 does not provide easy access to UCSC for staff and students but does provide direct access to Cabrillo College. UCSC student ridership currently accounts for approximately 50% of Metro ridership when school is in session.
	Negatives		Environmental × Environmentally sensitive areas may be impacted × Traffic impacts (near rail stations)	▫ A passenger rail project extending approximately 20 miles and requiring construction of new structures along the route may impact environmentally sensitive areas. Elevating or tunneling rail service would have more extensive environmental impacts. ▫ Traffic impacts near rail stations will be significant as station locations will be located in areas that are already congested during peak periods. Alternatively, rail along highway will not cross roadways at grade and thus will not have traffic or safety impacts at roadway intersections.
Compatible with Regulatory Requirements	**Positives/ Neutral**	Neutral	✓ Consistent with legislation (SB 375, SB 32) ✓ Consistent with design standards (Caltrans, CPUC, and rail operator)	▫ Greenhouse gas reduction legislation (SB 375, SB 32) requires reductions in GHG from transportation in order to slow climate change. Rail on Highway 1 could result in a significant mode shift to transit, thereby reducing VMT and GHG emissions.
	Negatives		× Complex permitting process	× Federal regulatory requirements for rail are challenging to meet
Level of Public Investment	**Positives/ Neutral**		✓ Some funding sources may be available for capital costs (FTA5309-New/Small Starts, TIGER, STIP, STBG, SB 1-LPP & CC, LCTOP, TIRCP, Section 130)	▫ Capital funds may be available from Federal Transit Agency New/Small Starts program and other federal, state and local sources.
	Negatives		× Major new investment for capital costs required × Major new investment for operations required × New funding source required for operations	▫ Significant expense related to construction, provision of stations and rail operations. Costs would include interchange improvements to make room for rail transit in the median as well as parking requirements. A rail transit system that includes elevated sections as well as tunneled sections would require a major cost investment.
Right of Way and Constructability Constraints	**Positives/ Neutral**			
	Negatives		✓ Moderate amounts of ROW may need to be acquired ✓ Construction challenges may require significant additional funds or alternative design	▫ The project can generally be accomplished within the existing Caltrans highway right-of way, but some additional right-of-way acquisition may be required to reconstruct interchanges to accommodate station stops. ▫ A design for rail transit along Highway 1 has not been initiated. An initial project design would need to consider right of way, terrain and station locations. Building new structures in locations where Highway 1 right of way is already constrained may present construction challenges. Interchanges would need to be reconstructed to remove column structures in median to allow for rail transit travel. Elevating or tunneling rail transit service along Highway 1 may be required due to geographical constraints and result in significant

Step 1 Criteria		Rating	Evaluation	Narrative
				construction challenges.
Technological Feasibility	**Positives/ Neutral**	👍 👍	✓ Technologically feasible ✓ Could accommodate future technologies (battery electric multiple units)	▫ Future technologies could provide battery electric multiple units for noise reduction and for reduced GHG.
	Negatives			

Route	**Highway 1**
Project Title	Automated vehicles
Project Description	Automated vehicles (AVs) are defined by the ability of the vehicle to control a safety-critical function such as steering, throttle, or braking without direct driver input. Driver-assistance automation is already included in many vehicles where the driver is assisted with acceleration through adaptive cruise control, assisted parking and other features. Improvements in these technologies are rapidly advancing. There is much debate in the field about the timeline for implementation of fully automated vehicles. The need for regulatory agencies to address ethical questions on maneuvering around obstacles including other vehicles, bicyclists, pedestrians, and animals is an area of uncertainty that may delay introduction of fully automated vehicles onto our roadways even after the technology is readily available. Based on historic vehicle purchasing and turnover rates as well as the infancy of the regulatory decision making process for automated vehicles, market saturation of fully automated vehicles are estimated for around the years 2050 - 2060. It is assumed that by 2035, the horizon for this study, fully automated vehicles with human presence (auto and transit) will be operating on the roadways, but they will constitute less than 20 percent of the fleet vehicle mix. This assumption relies on a number of factors including the adoption of state regulatory guidance, the realization of cost efficiencies, and consumer acceptance. Roadway infrastructure to support automated vehicles will be minimal in 2035. Traffic signals will include technology for detecting the presence of vehicles at intersections and communicating some data, but will not fully replace present day loop-detectors. Additional infrastructure that may be implemented prior to 2035 would include devices to provide vehicles with safety information such as warnings about work zones, sharp curves, or other hazards. As fully automated vehicles become a larger portion of the fleet vehicle mix, smart infrastructure such as traffic signals with wifi communication to vehicles, pedestrians, and bicyclists will be required.
Overall Rating	
Summary	The effects of automated vehicles on future transportation systems are under much debate. This new technology has the ability to make vast improvements to safety, access and mobility or conversely, the potential to drastically increase traffic congestion and vehicle miles traveled. The effect of AV technology on the transportation system is dependent on the regulatory system that is developed and the ability of government agencies to implement equitable solutions that serve the community's mobility needs and simultaneously reduce vehicle miles traveled. The cost for automated vehicles is mostly taken on by the individual consumer as the public infrastructure needs for AV will be minimal by 2035. By 2035, automated vehicles, including transit, may still be mixed with conventional vehicles on all roadways. Improvements to travel time and travel time reliability for autos and transit will likely be slight as the increased density at which vehicles can operate only becomes significant when there is at least 40% AVs in the flow. More significant traffic flow benefits could be achieved once there is 75% or greater AVs in the flow which may not occur prior to 2035. Safety benefits could be significant with AV technology, reducing the number of collisions on roadways which in turn reduces non-recurring congestion.

Step 1 Criteria		Rating	**Evaluation**	**Narrative**
Community Support and Consistency	**Positives/ Neutral**		✓Consistent with other planning efforts (Federal and State)	▫ The research, development and manufacturing of automated vehicle technology have increased substantially over the last decade. Efforts at the state and federal level to regulate manufacturing and use of AVs on roadways are challenged to keep pace with advancements in technology.

Step 1 Criteria		Rating	Evaluation	Narrative
with Applicable Plans				▫ Community support can be shown by individual purchasing of these vehicles.
	Negatives		× May have some public opposition	▫ Lower income individuals may not support government expenditures on infrastructure for AVs. Results from the UCS survey expressed significant concern from a number of survey responders that AVs are for the wealthy and they do not see benefit for themselves or the community.
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	Positives/ Neutral		Economic ✓Improves auto travel time ✓Improves auto travel time reliability ✓Improves transit travel time ✓Improves transit travel time reliability Environmental ✓Reduces GHG Health & Equity ✓Improves safety	▫ Improvements to safety from level 5 automated vehicles (AV5s) can be realized through use of sensing technology to detect obstructions in vehicle path and respond efficiently. Concerns have been raised about reliance on programmed systems rather than human response but overall safety is considered one of the main benefits to AV5s. ▫ Improvements to travel time and reliability for both autos and transit may occur as simulations have found that a small percentage of HAVs among human-driven cars on a lane reduces congestion. An AV5 will not sit idle after the car in front has started moving improving the traffic flow. AV5s will also systematically adhere to a closer distance to the car in front in comparison to human-driven which significantly increases the density of vehicles. This improvement will become more significant as the number of AV5s increases and human-driven vehicles are decreased. Others debate that any significant improvements to increased capacity and thus travel time improvements will only be realized in lanes dedicated to HAVs as mixed flows will not show much improvement to roadway capacity. ▫ Once AV technology is advanced to the point where human presence is not required in vehicles, vehicle miles traveled and thus travel time will likely increase substantially as vehicles will be sent to run errands and take other trips without regard for costs of travel time on people. This assumption is not being made here as this will likely occur after 2035. ▫ AV5s in 2035 will likely be primarily electric vehicles and thus will reduce GHG. Improved driving efficiencies from fuel powered AV5s will also reduce GHG. ▫ Fully autonomous vehicles may be able to operate much earlier on a dedicated facility but limited land and resources will limit the feasibility of this occurring by 2035. Once the market is saturated with HAVs, transit HAVs could provide increased local mobility at a low cost, for which private vehicles may be forfeited but this occurrence is likely further in the future than 2035.
	Negatives		Health & Equity × Increases household transportation costs	▫ The expense of purchasing AVs is greater than the average costs for automobiles and thus will increase household transportation costs. Many people may not be able to afford AVs prior to 2035.
Compatible with Regulatory Requirements	Positives/ Neutral		✓Consistent with legislation (FAST Act)	▫ FAST Act legislation requires AMBAG to meet regional targets for safety and travel time reliability. Targets are currently being determined by the state for the MPOs and may need to be met in the next few years. Automated vehicles can improve safety and potentially travel time reliability.
	Negatives		× Standards currently under development	▫ Federal and State regulations determining the new requirements for both auto manufacturers and roadway users may take a while to catch up with the advancements in

Step 1 Criteria		Rating	Evaluation	Narrative
				AV technology.
Level of Public Investment	**Positives/ Neutral**		✓Minor new investment for capital costs required ✓Minor new investment for operations required	▫ The amount of public infrastructure needed in the short term for vehicle-to-vehicle technology for AVs will be minimal since AVs can operate in mixed traffic on existing roadways shared with conventional vehicles. Vehicle-to-infrastructure technology would require more significant investments but will likely not be utilized on a large scale until there is market saturation of HAVs. Examples include curve speed warning to vehicles that speed is too high to safely negotiate the curve; pedestrian in crosswalk warning that alerts vehicles that a pedestrian is in a crosswalk; work zone warnings to alert vehicles that a work zone is approaching; and transit signal requests for extended green when approaching intersection.
	Negatives		× Unknown sources of funding for capital and operational costs	▫ Sources of funding for capital and operational costs for infrastructure technology associated with AVs are unknown at this time but will likely become available over time as more AVs are on the roadways.
Right of Way and Constructability Constraints	**Positives/ Neutral**		✓Right of way is sufficient	▫ The right of way is sufficient in the near term for AVs but if dedicated facilities are required for HAVs in future, ROW needs will be substantial particularly while there is a shift from conventional vehicles to AVs.
	Negatives			
Technological Feasibility	**Positives/ Neutral**		✓Emerging technology	▫ Automated vehicles are an emerging technology that is rapidly advancing. The debate for when and exactly how HAVs will affect the transportation system is ongoing with large differences in opinions. Despite these differences, it is clear that highly automated vehicles will become an integral part of the transportation system in the future.
	Negatives			

Route	**Soquel Ave/Dr and Freedom Blvd**
Project Title	Bus Rapid Transit lite (BRT lite)
Project Description	A branded bus rapid transit lite on Soquel Ave/Dr and Freedom Blvd would reconfigure intersections where feasible for transit queue jumps and transit signal priority to provide faster and more reliable service. Faster boarding could also be implemented through platform level boarding and electronic or off-board fare collection. Frequency of buses would remain same as existing service. Bus stops would be located to promote fast bus service and travel time, preferably at the far side of intersections.
Overall Rating	
Summary	BRT lite is a low (minor) cost operational improvement to improve transit travel time along Soquel Ave/Dr and Freedom Blvd, two of the main arterials through Santa Cruz County. By improving transit travel time and travel time reliability, transit ridership could increase, reducing VMT and therefore greenhouse gas emissions. BRT lite can be implemented incrementally as each intersection that is reconfigured for BRT lite can reduce transit travel times. As transit is prioritized, auto travel time may be increased.

Step 1 Criteria		Rating	**Evaluation**	**Narrative**
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**		✓ Consistent with long range planning effort (2014 RTP) ✓ Agency support (Metro staff) ✓ Consistent with other planning efforts (2015 Sustainable Santa Cruz County, Santa Cruz Corridors Plan)	▫ This project is consistent with recent planning efforts focused on improving transportation options on Soquel Ave/Dr by the County and City of Santa Cruz and is listed in the 2014 Regional Transportation Plan.
	Negatives		× May have some public opposition	▫ Traffic impacts due to transit priority at intersections and moving on-street parking to alternate locations in some sections could be opposed by motoring public and some businesses. ▫ Members of the public, some represented by advocacy groups, oppose parking being relocated from Soquel Ave and have signature gathering efforts in progress.
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**		Economic ✓ Improves transit travel time ✓ Improves transit travel time reliability ✓ Improves access to jobs, education and services Environmental ✓ Mode shift to transit ✓ Reduces VMT and GHG.	▫ The reason for implementing bus rapid transit lite would be to decrease transit travel times and improve transit travel time reliability by allowing transit to have priority at intersections and decrease boarding times. Faster and more reliable transit travel times will promote increased ridership, reducing VMT and GHG emissions. Transit improvements enhance lower cost transportation options which can reduce household transportation costs and benefit people who don't drive including, but not limited to, youth, seniors, people with disabilities, low income, and minorities.

Step 1 Criteria		Rating	Evaluation	Narrative
			Health & Equity ✓ Improves access for people who do not drive ✓ Reduces household transportation costs	
	Negatives		Economic × Increases auto travel time Environmental × Traffic impacts (at intersections)	▫ Intersection improvements for transit may have a negative effect on auto travel time as autos will need to wait for transit to move through the intersection.
Compatible with Regulatory Requirements	**Positives/ Neutral**	👍👍	✓ Consistent with legislation (SB 375, SB 32) ✓ Consistent with design standards (local transit standards)	▫ SB 375 and SB 32 require reductions in GHG emissions. Faster transit travel times could make transit a more convenient alternative to driving and encourage a shift from driving to transit.
	Negatives			
Level of Public Investment	**Positives/ Neutral**	👍👍	✓ Minor new investment for capital costs required ✓ No new investment for operations costs required ✓ Some funding sources may be available for capital costs (FTA5309-New/Small Starts, TIGER, STIP, STBG, SB 1-LPP & CC, LCTOP, TIRCP)	▫ Capital costs include new traffic signals with transit signal priority, reconfiguration of the intersection for a transit queue jump lane and electronic board payment or boarding platforms. ▫ Existing transit services on Soquel Ave/Dr and Freedom Blvd would continue and benefit from faster travel times. No additional transit service is planned as part of the BRT lite project and thus no additional operational costs are required.
	Negatives			
Right-of-Way and Constructability Constraints	**Positives/ Neutral**	👍	✓ Minor amounts of right of way may need to be acquired ✓ Project is readily constructible ✓ Could be built in phases	▫ BRT lite could be built in phases to work towards a continuous BRT lite system for the entire Soquel and Freedom route. Intersections with enough right of way could be reconfigured to incorporate transit priority initially. Intersections with limited right of way could be reconfigured over time as right of way is acquired.
	Negatives		× Parking may need to be moved	▫ On-street parking still exists on certain areas of Soquel Ave/Dr & Freedom Blvd. Prioritizing transit on the current right of way may require moving parking to alternate locations.
Technological Feasibility	**Positives/ Neutral**	👍👍	✓ Technologically feasible	▫ Transit signal priority, transit queue jumps and faster boarding strategies are common uses of technology applied as a means for improving transit travel times.
	Negatives			

Route	**Soquel Ave/Dr and Freedom Blvd**
Project Title	Dedicated Lanes for Bus Rapid Transit and Biking
Project Description	A branded bus rapid transit system on Soquel Ave/Dr and Freedom Blvd with dedicated lanes in each direction where feasible shared with biking. The dedicated lanes would occupy the existing right hand general purpose lane at the expense of car lanes in segments where there are a minimum of 2 lanes in each direction. The existing bike lanes would also be eliminated where the dedicated bus-bike lanes are feasible. Intersections would be reconfigured for transit signal priority. Transit queue jumps would be provided where dedicated lanes are not feasible. Faster boarding would also be implemented through platform level boarding and electronic or off-board fare collection. Frequency of buses would be increased to 10 minute headways. Bus stops would be located to promote fast bus service and travel time, preferably at the far side of intersections.
Overall Rating	Neutral
Summary	BRT on dedicated lanes could significantly improve transit travel time along Soquel Ave/Dr and Freedom Blvd, two of the main arterials through Santa Cruz County. By improving travel time and travel time reliability, transit ridership could increase, reducing VMT and therefore greenhouse gas emissions. BRT can be implemented in phases with priority in sections with the greatest congestion. A dedicated lane shared between buses and bikes exists in some communities although there is potential conflict between these modes. Research on the safety of bicyclists in these facilities has not been found. As transit is prioritized, auto travel time will be increased.

Step 1 Criteria		Rating	Evaluation	Narrative
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**		✓ Consistent with long range planning effort (2014 RTP) ✓ Agency support (Metro staff) ✓ Consistent with other planning efforts (2015 Sustainable Santa Cruz County, Santa Cruz Corridors Plan)	▫ This project is consistent with recent planning efforts focused on improving transportation options on Soquel Ave/Dr by the County and City of Santa Cruz and is listed in the 2014 Regional Transportation Plan.
	Negatives		× May have some public opposition	▫ Traffic impacts due to transit priority at intersections, reducing the existing two general purpose travel lanes to one travel lane and moving on-street parking to alternate locations in some sections could be opposed by motoring public and some businesses.
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**	Neutral	Economic ✓ Improves transit travel time ✓ Improves transit travel time reliability ✓ Improves access to jobs, education and services Environmental ✓ Mode shift to transit ✓ Reduces VMT and GHG. Health & Equity	▫ The reason for implementing bus rapid transit is to decrease transit travel times and improve transit travel time reliability by allowing transit to travel unrestricted by auto traffic. Faster and more reliable transit travel times will promote increased ridership, reducing VMT and GHG emissions. Transit improvements support lower cost transportation options which can reduce household transportation costs and benefit people who don't drive including youth, seniors, people with disabilities, low income, and minorities. Access to jobs, education and services would be improved for transit riders but decreased for autos.

Step 1 Criteria		Rating	Evaluation	Narrative
			✓ Improves access for people who do not drive ✓ Reduces household transportation costs	
	Negatives		Economic × Increases auto travel time Environmental × Traffic impacts ealth & Equity × Potential for conflicts between modes (bus and bike)	▫ Converting a general purpose lane to a dedicated lane for transit and biking will have significant traffic impacts and a substantial negative effect on auto travel time and travel time reliability. ▫ A dedicated lane shared between buses and bikes exists in some communities although research on the safety of bicyclists in these facilities has not been found.
Compatible with Regulatory Requirements	Positives/ Neutral	👍 👍	✓ Consistent with legislation (SB 375, SB 32, FAST Act) ✓ Consistent with design standards (local transit standards)	▫ SB 375 and SB 32 require reductions in GHG emissions. Faster transit travel times could make transit a more convenient alternative to driving and encourage a shift from driving to transit. Increased bicycle ridership will also contribute to reductions in VMT. ▫ FAST Act legislation will require AMBAG to meet regional targets for safety. Targets are currently being determined by the state for the MPOs and may need to be met in the next few years. A designated lane shared between buses and bicyclists can improve safety to help meet regional targets.
	Negatives			
Level of Public Investment	Positives/ Neutral	👍 👍	✓ Minor new investment for capital costs required ✓ Minor new investment for operational costs required ✓ Some funding sources may be available for capital costs (FTA5309-New/Small Starts, TIGER, STIP, STBG, SB 1-LPP & CC, LCTOP, TIRCP, ATP) ✓ Some funding sources may be available for operational cost (Fares, STA, TDA, LCTOP, TIRCP)	▫ Capital costs include new traffic signals with transit signal priority, reconfiguration of the intersection for a transit queue jump lane, electronic board payment or boarding platforms and restriping dedicated lanes. Frequency of transit services on Soquel and Freedom would increase and benefit from faster travel times.
	Negatives			
Right-of-Way and Constructability Constraints	Positives/ Neutral	👍	✓ Minor amounts of right-of-way may need to be acquired ✓ Project is readily constructible ✓ Could be built in phases	▫ BRT could be built incrementally over time to work towards a more complete BRT system. Roadway segments with 2 general purpose lanes in each direction in congested areas could be prioritized first for converting to BRT. Intersections with enough right-of-way could be reconfigured to incorporate transit priority initially. ▫ For a dedicated bus-bike lane the length of Soquel and Freedom, significant amounts of right of way would be needed which is not being considered as part of this project.

Step 1 Criteria		Rating	Evaluation	Narrative
	Negatives		× Parking may need to be moved	▫ On-street parking still exists along certain areas of Soquel Ave/Dr and Freedom Blvd. Utilizing the current right of way for dedicated lanes for transit and bicyclists may require moving parking to alternate locations.
Technological Feasibility	**Positives/ Neutral**	👍👍	✓ Technologically feasible ✓ Could accommodate future technologies	▫ Dedicated transit lanes, transit signal priority, transit queue jumps and faster boarding strategies are common uses of technology as a means for improving transit travel times. Autonomous transit could utilize dedicated lanes in future.
	Negatives			

Route	Soquel Ave/Dr and Freedom Blvd
Project Title	Increased Transit Frequency with Express Service
Project Description	Increased bus frequency on Soquel Ave/Dr and Freedom Blvd to increase headways to every 10 minutes along Soquel Ave/Dr, every 10 minutes along Freedom Blvd within the City of Watsonville and every 15 minutes on Freedom Blvd in rural areas.
Overall Rating	
Summary	Increased frequency of transit service along Soquel Ave/Dr and Freedom Blvd is a minor cost operational improvement to increase transit ridership along two of the major arterials connecting Watsonville to City of Santa Cruz. Increased frequency of service has been shown to increase ridership although without reductions in transit travel time, the increase in ridership may not be significant. Increased transit frequency will improve access for people who do not drive including youth, seniors, people with disabilities, low income and minorities. An increase in ridership will reduce VMT and therefore greenhouse gas emissions.

Step 1 Criteria		Rating	Evaluation	Narrative
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**		✓ Consistent with long range planning effort (2014 RTP) ✓ Agency support (Metro staff) ✓ Consistent with other planning efforts (2015 Sustainable Santa Cruz County, Santa Cruz Corridors Plan)	▫ Public expressed support for increases in transit service when Metro restructured service in 2016 due to budget shortfalls. ▫ Increasing transit frequency is included in the 2014 Regional Transportation Plan. Partner agency, public and stakeholder input are solicited at key milestones of the RTP development. ▫ This project is consistent with recent planning efforts focused on improving transportation options on Soquel Ave/Dr by the County and City of Santa Cruz.
	Negatives			
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**	Neutral	Economic ✓ Improves access to jobs, education and services Environmental ✓ Mode shift to transit ✓ Reduces VMT and GHG. Health & Equity ✓ Improves access for people who do not drive ✓ Reduces household transportation costs	▫ Increasing transit frequency makes it easier for people to take transit and thus could promote increased ridership, reducing VMT and GHG emissions. However, increasing frequency may attract few new riders if transit travel times are not also improved in congested areas. Transit improvements enhance lower cost transportation options which can reduce household transportation costs and benefit people who don't drive including youth, seniors, people with disabilities, low income, and minorities.
	Negatives			
Compatible	**Positives/**		✓ Consistent with legislation (SB	▫ SB 375 and SB 32 require reductions in GHG emissions. More frequent transit service could

Step 1 Criteria		Rating	Evaluation	Narrative
with Regulatory Requirements	Neutral		375, SB 32)	encourage a shift from driving to transit.
	Negatives			
Level of Public Investment	Positives/ Neutral	👍	✓ Minor new investment for capital costs required ✓ Minor new investment for operations costs required ✓ Some funding sources may be available for capital costs (STIP, STBG, LCTOP)	▫ Capital costs include new buses to support more frequent service. Capital costs could be funded from a number of sources including STIP, STBG and LCTOP).
	Negatives		× Few funding sources may be available for operational costs (Fares, STA, TDA, LCTOP, TIRCP)	▫ Operational costs could be funded from a number of sources including Fares, STA, TDA, LCTOP, and TIRCP although recent budget cuts reduced the level of transit service in 2016.
Right-of-Way and Constructability Constraints	Positives/ Neutral	👍 👍	✓ Right of way is sufficient ✓ Project is readily implemented ✓ Could be implemented in phases	▫ There are no ROW or constructability constraints for this project.
	Negatives			
Technological Feasibility	Positives/ Neutral	👍 👍	✓ Technologically feasible ✓ Could accommodate future technologies	▫ Autonomous vehicles could be accommodated in future.
	Negatives			

Route	**Soquel Ave/Dr and Freedom Blvd**
Project Title	Buffered/protected bike lanes
Project Description	Bike lanes currently exist along much of Soquel Ave/Dr and Freedom Blvd. Where feasible, this project would eliminate the gaps in the existing bike lane network and widen the bicycle lanes up to 5 feet and if possible provide up to a 2 feet buffer zone next to the lanes with either striping or a physical barrier to clearly mark the area for bicycle travel. Bike boxes can be provided at signalized intersections where shared lanes are required.
Overall Rating	👍👍
Summary	Buffered/protected bike lanes are a low (minor) cost solution to improve safety for bicyclists if the right-of-way is available. The added width of the bicycle lanes with the additional buffer from high volume and high speed traffic would likely increase bicycle ridership as people feel more comfortable with the increased spacing from fast moving traffic. The right-of-way on Soquel and Freedom is limited and thus the feasibility to reconfigure the roadway design to accommodate buffered/protected bike lanes still needs to be determined. If right-of-way needs are substantial, environmentally sensitive areas may be impacted and permits may be required.

Step 1 Criteria		Rating	**Evaluation**	**Narrative**
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**	👍	✓ Consistent with other planning efforts (2015 Sustainable Santa Cruz County) ✓ Consistent with long range planning effort (2014 RTP)	▫ There is considerable support for bicycle facilities throughout Santa Cruz County, especially protected ones. RTC policy supports safe multimodal transportation options especially for the most vulnerable users.
	Negatives		× May have some public opposition	▫ Right-of-way may be a challenge to accommodate the motor vehicle general purpose lanes and the additional width required for a protected bicycle lane. Parking may need to be moved to alternate locations to accommodate improved bicycle facilities. ▫ Members of the public, some represented by advocacy groups, oppose parking being relocated from Soquel Ave and have signature gathering efforts in progress. ▫ Some members of the public may oppose buffered bike lanes if there are impacts to auto travel.
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**	👍👍	Economic × Improves access to jobs, education and services × Potential to decrease individual and community health care costs Environment × Mode shift to biking × Reduces VMT and GHG	▫ A buffered/protected bike lane on Soquel Ave/Dr and Freedom Blvd will provide a more comfortable and safer facility for bicyclists. Buffered/protected bike lanes could encourage people to shift from driving to biking, reducing VMT and GHG emissions. Additional benefits include increased physical activity (resulting in decreased health care costs) and improved access using active transportation, which can reduce transportation costs, and benefit people who don't drive including youth, some seniors, and low income individuals.

Step 1 Criteria		Rating	Evaluation	Narrative
			Health & Equity × Improves health × Improves safety × Improves access for people who do not drive × Reduces household transportation costs	
	Negatives		Environmental × Traffic Impacts	▫ Traffic may be impacted by reducing the width of the general purpose lanes slightly to accommodate the wider bicycle facilities. ▫ Moving parking to alternate locations to accommodate a wider bicycling facility may impact nearby businesses ▫ If right-of way is required, environmentally sensitive areas may be impacted including agricultural lands and soil characterization and remediation may be required
Compatible with Regulatory Requirements	**Positives/ Neutral**	👍 👍	✓ Consistent with legislation (SB 375, SB 32, FAST Act) ✓ Consistent with design standards (Caltrans standards, NACTO and AASHTO guidelines)	▫ SB 375 and SB 32 require reductions in GHG emissions. A comfortable and safer active transportation facility could encourage people to shift from driving to biking, reducing VMT and GHG emissions. ▫ The buffered/protected bike lanes can be designed to Caltrans standards and AASHTO best practices. The new tools available within the regulatory context encourage this application. ▫ FAST Act legislation will require AMBAG to meet regional targets for safety. Targets are currently being determined by the state for the MPOs and may need to be met in the next few years. Protected bike lanes can improve safety to help meet regional targets.
	Negatives			
Level of Public Investment	**Positives/ Neutral**	👍 👍	✓ Minor new investment for capital costs required ✓ Minor new investment for operational costs required ✓ Several funding sources may be available for capital costs (ATP, Measure D LJ allocation, SRTS) ✓ Some funding sources may be available for operating costs (STIP, STBG, Measure D -local, ATP, HUTA)	▫ Funding may be available for capital costs through several sources including ATP, Measure D allocation to local jurisdictions, HUTA, SRTS, STIP and STBG. If right-of-way needs are substantial, cost for project will escalate.
	Negatives			
Right-of-Way and Constructability Constraints	**Positives/ Neutral**	Neutral	✓ Minor amounts of right-of-way may need to be acquired ✓ Could be built in phases ✓ Project is readily constructible	▫ Additional right-of-way may be needed to accommodate a fully protected bike lane. Project could be built incrementally since there are significant benefits as incremental improvements are made. ▫ If right-of-way needs are substantial, cost for project will escalate, environmentally sensitive

Step 1 Criteria		Rating	Evaluation	Narrative
				areas may be impacted and associated permits may be required
	Negatives		× Parking may need to be moved	▫ On-street parking still exists along segments of Soquel Ave/Dr and Freedom Blvd. Utilizing the current right-of-way to include a wider bicycling facility may require moving parking to alternate locations.
Technological Feasibility	Positives/ Neutral		✓ Technologically feasible	▫ Buffered/protected bicycle facilities are currently technologically feasible and are becoming more and more common throughout the country.
	Negatives			

Route	Soquel Ave/Dr and Freedom Blvd
Project Title	Intersection Improvements for autos
Project Description	The project would improve intersections along Soquel Ave/Dr and Freedom Blvd for auto travel. Improvements include modifying design and adding turn lanes in numerous locations including Soquel/Morrissey/Poplar and Soquel/Frederick in the City of SC and Soquel/41st, Soquel/Bay-Porter, and Soquel/Robertson in the county. Intersection improvements along Freedom Blvd in the City of Watsonville include Freedom/Green Valley, Freedom/Airport and Freedom/Buena Vista. Widening of Soquel between Branciforte and Morrissey is also being considered here.
Overall Rating	
Summary	The intersection improvements are a low (minor) cost option that will improve traffic operations, travel time and reliability, safety, and access to local destinations.

Step 1 Criteria		Rating	Evaluation	Narrative
Community Support and Consistency with Applicable Plans	Positives/ Neutral		✓ Consistent with long range planning effort (2014 RTP, City of SC General Plan, County of SC General Plan, Watsonville General Plan) ✓ Multi-agency support (City of Santa Cruz, County of Santa Cruz, Watsonville, RTC)	▫ Numerous intersection improvement projects on Soquel and Freedom are included in the 2014 RTP. These projects are consistent with local planning goals and policies.
	Negatives			
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	Positives/ Neutral		Economic ✓ Improves auto travel time ✓ Improves auto travel time reliability ✓ Improves transit travel time ✓ Improves transit travel time reliability ✓ Improves access to jobs, education and services ✓ Potential to increase land use development, business activity, employment and visitor tax revenues Health & Equity ✓ Improves safety	▫ The intersection improvements will improve traffic flow on Soquel Ave/Dr and Freedom Blvd improving safety, travel time and travel time reliability to destinations all along the route. Commuters, commerce, and emergency vehicles will benefit from these improvements.
	Negatives			
Compatible	Positives/		✓ Consistent with design	▫ FAST Act legislation will require AMBAG to meet regional targets for safety and travel time

Step 1 Criteria		Rating	Evaluation	Narrative
with Regulatory Requirements	Neutral		standards (Caltrans) ✓ Standard permitting process ✓ Consistent with legislation (FAST Act)	reliability. Targets are currently being determined by the state for the MPOs and may need to be met in the next few years. Auto intersection improvements can improve safety and travel time reliability for motorists to help meet regional targets.
	Negatives			
Level of Public Investment	Positives/ Neutral	👍	✓ Minor new investment for capital costs required ✓ No new investment for operational costs required ✓ Some funding may be available for capital costs (STIP, STBG, Measure D -local, HUTA)	▫ Funding may be available for capital costs through a number of sources including the Measure D allocation to local jurisdictions, HUTA, STIP and STBG.
	Negatives			
Right-of-Way and Constructability Constraints	Positives/ Neutral	👍	✓ Minor amounts of ROW may need to be acquired ✓ Project is readily constructible	▫ Intersection improvements to add turn lanes may need additional ROW.
	Negatives			
Technological Feasibility	Positives/ Neutral	👍 👍	✓ Technologically feasible	▫ Improvements are technologically feasible
	Negatives			

Route	**Soquel Ave/Dr and Freedom Blvd**
Project Title	Bike and Pedestrian Intersection Improvements
Project Description	Project would improve intersections for bicyclists and pedestrians along Soquel Ave/Dr and Freedom Blvd using a variety of best practices including bike boxes, green lane treatments, bulb outs, islands, crosswalks, flashing beacons, and bicycle and pedestrian priority at intersections.
Overall Rating	👍👍
Summary	Bicycle and pedestrian improvements at intersections are a low (minor) cost solution to improve safety for the most vulnerable transportation users. Safety improvements at intersections are the most critical as the majority of collisions occur at intersections. As safety for bicyclists and pedestrians is improved, people become more comfortable with choosing walking or biking as a way to access their destinations.

Step 1 Criteria		Rating	**Evaluation**	**Narrative**
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**	👍👍	✓ Consistent with other planning efforts (2015 Sustainable Santa Cruz County) ✓ Consistent with long range planning effort (2014 RTP)	▫ There is considerable support for bicycle facilities throughout Santa Cruz County, especially improvements that promote safety of bicyclists and pedestrians. RTC policy supports safe multimodal transportation options especially for the most vulnerable users.
	Negatives			
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**	👍👍	Economic ✓ Improves job and education access ✓ Decreases individual and community health care costs Environment ✓ Mode shift to biking ✓ Mode shift to walking ✓ Reduces VMT and GHG Equity ✓ Improves access for people who do not drive ✓ Reduces household transportation costs ✓ Improves safety ✓ Improves health	▫ Intersection improvements for bicyclists and pedestrians on Soquel Ave/Dr and Freedom Blvd will have the ability to greatly improve safety and help to shift people from driving to biking and walking. This in turn reduces VMT and GHG emissions. Additional benefits include decreased health care costs; improved active transportation access for youth, some seniors and people who do not drive a car; and a reduction in transportation costs.
	Negatives		Environmental × Traffic Impacts	▫ Traffic may be impacted by reconfiguring intersections to accommodate bicycle and pedestrian safety improvements.

Compatible with Regulatory Requirements	**Positives/ Neutral**		✓ Consistent with legislation (SB 375, SB 32) ✓ Consistent with design standards (Caltrans standards, NACTO and AASHTO guidelines) ✓ No additional permits required	▫ SB 375 and SB 32 require reductions in GHG emissions. Intersection improvements for bicyclists and pedestrians on Soquel Ave/Dr and Freedom Blvd would help reduce GHG by providing safer active transportation facilities. ▫ Bike and pedestrian intersection improvements will follow design standards or best practices although some treatments for bicycles and pedestrians at intersections are newer to the county, though many neighboring regions employ them extensively.
	Negatives			
Level of Public Investment	**Positives/ Neutral**		✓ Minor new investment for capital costs required ✓ Minor new investment for operational costs required ✓ Several funding sources may be available for capital costs (STIP, STBG, Measure D -local, ATP, HUTA, SRTS) ✓ Some funding sources may be available for operating costs (Measure D-local, HUTA, general funds)	▫ Funding may be available for capital costs through a number of sources including the ATP, Measure D allocation to local jurisdictions, HUTA, SRTS, STIP and STBG.
	Negatives			
Right of Way and Constructability Constraints	**Positives/ Neutral**		✓ Minor amounts of right of way may need to be acquired ✓ Could be built incrementally ✓ Project is readily constructible	▫ Additional right of way may be needed to accommodate intersection improvements. Project could be built incrementally since there are significant benefits as incremental improvements are made.
	Negatives			
Technological Feasibility	**Positives/ Neutral**		✓ Technologically feasible ✓ Could accommodate future technologies	▫ Bicycle and pedestrian intersection improvements are currently technologically feasible and are becoming more and more common throughout the country.
	Negatives			

Route	Rail Right-of-Way (ROW)
Project Title	Bike and Pedestrian Trail
Project Description	A bicycling and pedestrian trail along the rail right-of-way will span the 32-mile distance from Davenport on the north coast to Watsonville in south county and across the county line to Pajaro Station. Exceptions to the trail location when combined with transit in the rail ROW will occur at the Capitola trestle that crosses Soquel Creek. Bicyclists and pedestrians will be routed onto bike lanes and sidewalks in the local street network to cross the creek over the Stockton Ave Bridge. Two trail alignments for all options will be evaluated for Segment 17 with one alignment along the rail ROW and an alternate alignment where bicyclists/pedestrians will be routed along San Andreas Rd and West Beach St to Lee Rd. The trail will serve transportation, recreation and interpretive uses for walkers, joggers, bicyclists, people with mobility impairments, and families. Bicyclists on pedal assist electric bikes will be included in the analysis of the trail. The trail will pass within 1 mile of half of the County's population and will provide access to 44 schools and 92 parks including several beaches along the Monterey Bay. For the purpose of the UCS analysis, the width of the trail will vary depending on if the trail is the only transportation facility on the rail right of way, if the trail is alongside rail transit or if the trail is alongside bus rapid transit. Rail transit requires between 17 and 20 feet of right of way (including buffers). Width requirements for bus rapid transit will be assumed to be 16 feet of right of way for one lane and 28 feet of right of way for 2 lanes (including buffers). The width of the trail in the various options will also depend on the available right of way (ROW), the grade constraints (grade of slope either up or down perpendicular to the tracks) within the ROW, and construction assumptions. A 12-15 foot wide trail (including 2 ft buffers that are paved or unpaved) will be assumed a shared "multiuse" trail for bicyclists and pedestrians. A 16 foot wide trail or greater (including buffers) will allow for separation of bicyclists and pedestrians. For trail alignments along street network, bike lanes will be assumed to be 4-5 ft wide with sidewalks for pedestrian access in Capitola but no sidewalks along San Andreas Rd and West Beach St. The "urban area" of the rail right of way is defined as between Shaffer Rd in the City of Santa Cruz to San Andreas Rd at Manresa State Beach and between Lee Rd in Watsonville and Pajaro Station. "Rural area" is defined as north of Shaffer Rd in the City of Santa Cruz to Davenport and between Manresa State Beach and Lee Rd in Watsonville. All widths discussed below include buffers which could be paved or unpaved. The assumptions for the widths of the trail used for this study are described below. These assumptions will be used to determine how the projects/scenarios advance the goals of the UCS including cost, mode share, economic benefit etc. as shown through the performance measures. Design solutions for implementation of any of these trail projects will depend on more detailed evaluation of constraints, engineering solutions, and the amount of funding available. **Trail alongside Rail:** In urban areas, where the grade is flat and the right of way allows, the width of the trail alongside the rail will be assumed to be 16 feet wide. This includes from Natural Bridges Dr to California Ave where the trail will be 16 feet wide based on completion of final design. In urban areas, where the grade is sloped either up or down perpendicular to the tracks or the ROW is constrained, the trail will be assumed to be 12 – 15 feet in width. This may require curbs or retaining walls in sections where the flat grade available for the trail is less than 12 feet wide. This includes from California Ave to the Santa Cruz Wharf, where the trail

	will be 12 feet wide based on preliminary design and from Lee Rd to Walker St, where the trail will be 12 ft wide based on preliminary design. In the rural areas, the trail width is assumed to be 12 feet wide with the exception of the rural area north of Wilder Ranch, the trail will be assumed to be 16-20 feet wide based on preliminary design. Over the bridges, trail will be assumed to be 12 feet wide (including buffers). For trail alignments in street, width of trail will be **Trail Only**: In urban areas, where the grade is flat and the right of way allows, the trail will be assumed to be 26 feet wide (including the buffers). In the urban areas, where the grade is sloped either up or down perpendicular to the tracks, the trail will be assumed to be a minimum of 16 feet wide. This may require curbs or retaining walls in sections where the flat grade is less than 16 feet wide. In urban areas, where flat grade of the rail right of way is between 16 feet and 26 feet, trail width will be defined by the width of the flat area. In rural areas, this study will assume a trail width of 12-15 feet (including buffers). Over the rail bridges, the width will be assumed to be the width of the existing rail bridges. **Trail alongside BRT:** In the scenario where the rail right-of-way is shared between trail and BRT, BRT is utilizing the ROW between Shaffer Rd on the west side of Santa Cruz and State Park Dr. in Aptos and the remaining segments on rail ROW north and south of this urban area are trail only. In urban areas, where the grade is flat and the right of way allows, the width of the trail alongside BRT will be assumed to be 16 feet wide. In urban areas, where the grade is sloped either up or down perpendicular to the tracks or the ROW is constrained, the trail will be assumed to be 12 – 15 feet wide. This may require curbs or retaining walls in sections where the flat grade available for the trail is less than 12 feet wide. In the urban area of the City of Watsonville from Lee Road to Walker Rd, the trail will be 12 feet wide next to rail that will accommodate freight service. In rural areas, this study will assume a trail width of 12-15 feet (including buffers). Over the bridges, trail will be assumed to be 12 feet wide (including buffers).
Overall Rating	👍 👍
Summary	A biking and walking trail along the rail corridor, separated from motor vehicle traffic, will provide a new, safe, and more comfortable active transportation facility which could encourage people to shift from driving to biking and walking. Benefits include safety and health improvements, greenhouse gas emission reductions, and economic benefits from a trail facility that will attract both residents and visitors. A trail will improve access for people who do not drive including youth, low income, and minorities as well as some seniors and people with disabilities. A bike and pedestrian trail could be combined with rail or bus transit on the rail right-of-way or the trail could be the only facility in the rail right-of-way. Walking and biking are typically travel options for shorter trips but if combined with transit can extend travel distances significantly.

Step 1 Criteria		Rating	Evaluation	Narrative
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**	👍 👍	✓ RTC policy ✓ Project specific planning effort with public input (Monterey Bay Sanctuary Scenic Trail Master Plan (MBSST)) ✓ Project specific planning	▫ Voters approved Measure D in November 2016 which allocates funds for trail within the rail right-of-way. Trail with Rail ▫ The Monterey Bay Sanctuary Scenic Trail (MBSST) Master Plan establishes the alignment and a set of design standards for a bike and pedestrian trail within the rail right-of-way alongside the existing railroad track. The MBSST Master Plan went through a 3 year

Step 1 Criteria		Rating	Evaluation	Narrative
			effort (Completing the California Coastal Trail) ✓ Consistent with long range planning effort (2014 RTP) ✓ Environmental Impact Report completed (MBSST EIR) ✓ Multi-agency support (Cities of Santa Cruz, Capitola and Watsonville; County of Santa Cruz; Coastal Conservancy) ✓ Supported by voters through passage of Measure D	comprehensive and inclusive public and stakeholder outreach process and was adopted by the RTC in November 2013 and a revision in February 2014. Each of the local jurisdictions that the trail passes through (Cities of Watsonville, Santa Cruz, Capitola and Santa Cruz County) also adopted the MBSST Master Plan. A policy that was adopted in the Master Plan states "Develop trails in such a way so that future rail transit services along the corridor are not precluded." Trail Only ▫ Members of the public, some represented by advocacy groups, support a trail only option and have campaigns and/or signature gathering efforts in progress.
	Negatives		× May have some public opposition	▫ Some farmers in the vicinity of Harkins Slough are concerned about the impacts of a trail on crop production. Restrictions on spraying of crops to times when people are not in the vicinity, fecal matter from pets, farm equipment restrictions over the trail and other issues have raised concerns. Trail with Rail ▫ Farmers on north coast oppose trail if trail is not located in rail bed. Trail-Only or Trail with BRT ▫ Trail-only and trail with BRT options have not gone through a comprehensive public process. If the community decides to use the rail right-of-way only for a trail or for trail with BRT, it would require a new planning effort to solicit public input and more fully assess impacts and costs.
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**		Economic ✓ Improves access to jobs, education and services ✓ Decreases individual and community health care costs ✓ Potential to increase property values ✓ Recreational asset with potential to increase business activity and visitor tax revenues Environmental ✓ Mode shift to biking ✓ Mode shift to walking ✓ Reduces VMT and GHG Health & Equity	▫ A trail separated from motor vehicles will provide a more comfortable and safer facility for people to ride bicycles and walk. This in turn encourages people to shift from driving to biking and walking for transportation, reducing VMT and GHG emissions. Novice bicycle riders and people who are interested in bicycling but concerned about safety will be more apt to shift their trips from driving to bicycling. Additional benefits include increased physical activity (resulting in decreased health care costs) and increased visitor revenues associated with recreation on the trail. Properties along a trail separated from automobiles have been shown in other communities to increase in value. A trail on the rail right-of-way will provide new access to a low cost transportation option for shorter trips, which can reduce transportation costs and benefit people who don't drive including, youth, seniors, people with disabilities, low income, and minorities. Trail with Rail or Trail with BRT ▫ If trail use is combined with transit, the new facility will support longer trips for communities of south county who work in the Santa Cruz area or for north county commuters who work in Aptos or Watsonville.

Step 1 Criteria		Rating	Evaluation	Narrative
			✓ Improves health ✓ Improves safety ✓ Improves access for people who do not drive ✓ Reduces household transportation costs	
	Negatives		<u>Economic</u> × Potential agricultural impacts <u>Environmental</u> × Environmentally sensitive areas may be impacted × Soil sampling, testing and/or remediation of contaminated soils may be needed × Traffic impacts (at roadway crossings) <u>Health & Equity</u> × Potential conflicts between modes (BRT and trail users- fencing could reduce conflicts; people riding bikes and people walking - separation could reduce the potential conflicts). × Potential conflicts between modes (bicyclists/pedestrians and motor vehicles where routes other than rail ROW are utilized)	▫ Increased rail corridor use may impact agricultural lands that have been encroaching on the ROW. ▫ The trail may impact environmentally sensitive areas that have been found along the rail corridor as part of the MBSST EIR. ▫ Soil contaminants have been found along the rail corridor. Soil along rail corridor may need to be assessed for contaminants and possibly remediated. Construction of a paved surface over the bare soil could serve as the remediation for some of the contaminants. <u>Trail with Rail or Trail with BRT</u> ▫ A trail alongside transit in the rail corridor will provide numerous opportunities for separating biking and walking. If trail is not separated by use, potential safety conflicts could occur between bicyclists and pedestrians. ▫ Potential safety conflicts with autos where bicyclists and pedestrians are routed off trail onto the street network ▫ More vegetation would likely need to be removed to accommodate a trail next to transit. ▫ Fencing between trail and rail is included in the MBSST trail design to reduce conflicts and utilize best practices for safety. Fencing may be recommended between trail and BRT for reducing conflicts and best practices for safety. Fencing between trail and transit may limit access to some destinations along the rail ROW. <u>Trail Only</u> ▫ A trail-only option will allow for separation of bicyclists and pedestrians along a greater portion of the rail line. The rail bridges and other constrained locations may not allow separation. ▫ Fencing may not be needed for a trail only option. ▫ Less vegetation would need to be removed for trail-only option and may be able to avoid environmentally sensitive areas.
Compatible with Regulatory Requirements	**Positives/ Neutral**		✓ Consistent with legislation (SB 908, SB 375, SB 32, FAST Act) ✓ Consistent with state law (Trail and Rail -Proposition 116) ✓ Consistent with design standards (Caltrans, AASHTO,	▫ Senate Bill 908 requires the State Coastal Conservancy to complete a plan to develop the California Coastal Trail. The entire MBSST project and trail along the rail right-of-way will serve as the California Coastal Trail through Santa Cruz County, as agreed to by the California Coastal Commission and the California Coastal Conservancy. ▫ SB 375 and SB 32 require reductions in GHG emissions. A comfortable and safer active transportation facility could encourage people to shift from driving to biking and walking, reducing VMT and GHG emissions.

Step 1 Criteria		Rating	**Evaluation**	**Narrative**
			MUTCD) ✓ Standard permitting process	▫ FAST Act legislation will require AMBAG to meet regional targets for safety. Targets are currently being determined by the state for the MPOs and may need to be met in the next few years. A bike and pedestrian trail separated from auto traffic can improve safety to help meet regional targets. ▫ Any trail that is designed for the rail corridor can be designed to meet trail design standards. Trail with Rail ▫ The Santa Cruz Branch Rail Line was purchased using Proposition 116 funds which were allocated for passenger rail capital projects. Trail with rail would meet these requirements.
	Negatives		× Not consistent with state law (Trail Only and Trail with BRT - Proposition 116)	Trail Only or Trail with BRT ▫ If rail right-of-way will not be used for passenger rail service, at least $11 million and possibly up to $25 million or more in funds will need to be returned to CTC because Proposition 116 requirements will not be met and the project will not be consistent with the funding application for purchase and rehabilitation of right-of-way.
Level of Public Investment	**Positives/ Neutral**		✓ Some funding already allocated for capital costs (Measure D – all Trail options) ✓ Some funding already allocated for capital costs (FLAP, ATP, Land Trust – Trail with Rail) ✓ Some funding sources may be available for capital costs (Measure D, ATP, STIP, STBG, FLAP, HSIP) ✓ Some funding already allocated for maintenance costs (Measure D) ✓ Some funding sources may be available for maintenance costs (HUTA, general funds) ✓ Minor new investment for maintenance required ✓ Moderate new investment for capital costs required	Trail with Rail ▫ Funding that has been acquired from FLAP, ATP and Land Trust for capital costs initially assumed the trail alongside rail tracks. It is unknown how funding will be affected if decision is made for a trail only or a trail with BRT. Trail Only ▫ Constructing the trail-only option could potentially require less capital costs than trail with transit due to ability to use current rail bridges and need for less retaining walls.
	Negatives		× Potential to lose funds (FLAP, ATP, Land Trust – Trail Only or Trail with BRT) × Additional funds/time needed	Trail Only or Trail with BRT ▫ If rail right-of-way will not be used for passenger rail service, at least $11 million and possibly up to $25 million or more in funds may need to be returned to CTC because Proposition 116 requirements are not met and the project will not be consistent with the

Step 1 Criteria		Rating	Evaluation	Narrative
			(to revise current direction – Trail Only and Trail with BRT)	funding application for purchase and rehabilitation of right-of-way. ▫ Funds currently allocated for trail from FLAP and ATP will not meet deadline for use of funds and thus will likely be lost. ▫ Costs and time to revise current direction are unknown (additional costs include new public outreach process, negotiations with CTC and Iowa Pacific, applying for abandonment of rail to Surface Transportation Board, soil contaminants assessment and mitigation, legal fees)
Right-of-way and Constructability Constraints	**Positives/ Neutral**	👍 👍	✓ ROW is sufficient (for Trail Only) ✓ Can be constructed in phases	▫ Project can be implemented in phases with independent utility as funding becomes available. ▫ A trail only option for the rail right-of-way can be accommodated within the existing right-of-way.
	Negatives		× Construction challenges may require additional funds or alternative design × Minor amounts of ROW may need to be acquired (trail with transit)	Trail with Rail or Trail with BRT ▫ Trail with transit will require more retaining walls than a trail only option. ▫ Additional ROW may be needed for stations and rail sidings when trail is combined with rail. ▫ Some ROW may be needed from adjacent properties that are publicly owned. ▫ Alternative alignments to on-street facilities may be required where the rail right-of-way is constrained or at rail bridges. Trail Only ▫ Rock ballast under rails may need to be removed or leveled in order to construct a trail in rail right-of-way as ballast does not provide compaction or gradation requirements for a base layer under pavement.
Technological Feasibility	**Positives/ Neutral**	👍 👍	✓ Technologically feasible ✓ Could accommodate future technologies	▫ Construction of trail is technologically feasible. ▫ Present and future pedal assist electric bicycle technologies could potentially be accommodated based on speed limitations.
	Negatives			

Route	**Rail Right-of-Way**
Project Title	Local rail transit with inter-regional connections
Project Description	Rail transit along the rail right-of-way would provide passenger rail transit service between the Westside of Santa Cruz and downtown Watsonville with service to approximately 10 stations along the corridor. Service would run on a frequency of every 30 minutes during the weekdays in each direction. Additional sidings will be needed to accommodate passing of trains due to single set of tracks. Recreational rail service would also be provided between the Westside of Santa Cruz and Davenport seasonally on weekends and holidays. Freight vehicles analyzed will include both diesel multiple units (DMUs) and electric multiple units (EMUs).
Overall Rating	
Summary	Rail transit would increase transportation choices, provide an alternative to congestion, and has the potential to shift people from driving to taking transit, thereby reducing vehicle miles traveled (VMT) and greenhouse gas emissions. Rail transit increases options for seniors, youth, people with disabilities, low-income, and those who cannot or do not drive. Rail transit is a major operational cost option that can improve transit travel time and travel time reliability. Rail transit can carry many bicycles to help increase the range for bicyclists and encourage greater bicycle use for longer trips in combination with transit. Rail transit also encourages more intensive and compact use of land surrounding stations (transit oriented development) making more efficient use of limited land, ensuring greater levels of open space and helping to reduce automobile traffic, environmental impacts and GHG emissions.

Step 1 Criteria		Rating	Evaluation	Narrative
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**		✓ Project specific planning effort with public input (Rail Transit Feasibility Study) ✓ Consistent with RTC policy (MBSST, policy 1.2.4) ✓ Consistent with long range planning effort (2014 RTP) ✓ Consistent with other planning efforts (MBSST Master Plan, 2013 California State Rail Plan) ✓ Advocacy groups in support of project	▫ The current RTC policy is for a trail to be developed along the rail corridor so that future rail transit is not precluded. Rail transit along the Santa Cruz Branch Rail Line could provide not only local transit but also interregional connections through Pajaro Station to Gilroy to connect to the high speed rail line that is currently being developed as well as the planned extension of Capitol Corridor service to Salinas and planned extension of the Coast Daylight to run between Los Angeles and San Francisco along the coast. ▫ Members of the public, some represented by advocacy groups, support rail with trail and have campaigns and/or signature gathering efforts in progress.
	Negatives		× May have some public opposition	▫ Horn noise from trains as required at roadway crossings has raised concerns. Horn noise could be mitigated with "quiet zone" designations that provide adequate crossing improvements and approval by the Federal Railroad Administration (FRA.) ▫ Members of the public, some represented by advocacy groups, support a trail only option

Step 1 Criteria		Rating	Evaluation	Narrative
				and have campaigns and/or signature gathering efforts in progress.
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**		Economic ✓ Improves transit travel time ✓ Improves transit travel time reliability ✓ Improves access to jobs, education and services ✓ Potential to increase land use development, business activity, employment and tax revenues ✓ Recreational asset with potential to increase visitor tax revenues and benefit businesses (north coast section) Environmental ✓ Mode shift to transit ✓ Reduces VMT and GHG Health & Equity ✓ Improves access for people who do not drive ✓ Reduces household transportation costs	▫ Rail transit on the rail corridor could provide another option for how Santa Cruz County residents and visitors travel through the county. It could improve access to jobs and education centers by providing an alternative to congested roadways and provide a faster transit connection between Santa Cruz and Watsonville. Rail transit could increase the transit mode share which will reduce VMT and GHG emissions. Transit oriented developments will likely occur along the rail corridor that will help to reduce VMT. ▫ Rail transit service could provide both local and express service within the county and regional service to the Bay Area via Gilroy and beyond bringing economic benefits to the county. ▫ Recreational rail transit on the north coast could be used by residents and visitors to access the newly acquired San Vicente Redwoods and Cotoni Coast Dairies National Monument as well as provide economic vitality to the town of Davenport. ▫ Rail transit also encourages more intensive and compact use of land surrounding stations making more efficient use of limited land, ensuring greater levels of open space and helping to reduce automobile traffic, environmental impacts and GHG emissions. ▫ Transit improvements support lower cost transportation options which can reduce household transportation costs and benefit people who don't drive including youth, seniors, people with disabilities, low income, and minorities.
	Negatives		Environmental × Environmentally sensitive areas may be impacted (biological, cultural, aesthetic - noise) × Soil sampling, testing and/or remediation of contaminated soil may be needed × Traffic impacts at roadway crossings × Less adaptable to flooding from climate change Health & Equity × Potential for conflicts between modes (rail with bikes and pedestrians and with autos at	▫ Increased rail service along the rail corridor could impact environmentally sensitive areas. Noise from horns could impact neighborhoods but quiet zones could be pursued that would reduce this impact. ▫ Any change in use of rail corridor will require characterization and possibly remediation of any soil contaminants. ▫ There may be increased safety conflicts between rail transit and autos at intersections and between rail transit and bikers/pedestrians on corridor that reduce comfort. Fencing can be constructed to minimize these safety concerns. There are greater opportunities to eliminate crossing conflicts at railroad rights-of-way than at roadways by making improvements that prevent automobiles, bicyclist and pedestrians from entering the railroad right-of-way when trains are coming. Fencing between trail and transit may limit access through neighborhoods. ▫ Rail right-of-way crosses areas that may be impacted by flooding due to climate change such as Harkins Slough area in south county. Rail is less adaptable to flooding from climate change as trains cannot readily shift onto alternate roadways where and when necessary

Step 1 Criteria		Rating	Evaluation	Narrative
			intersections)	due to temporary or permanent flooding on rail corridor. Railbed may need to be raised in areas that could be affected by climate change.
Compatible with Regulatory Requirements	**Positives/ Neutral**	👍 👍	✓ Consistent with legislation (Proposition 116, SB 375, SB 32) ✓ Consistent with design standards (CPUC) ✓ Standard permitting process	▫ The Santa Cruz Branch Rail Line was purchased using Proposition 116 funds which were allocated for passenger rail capital projects. Rail transit on the rail corridor would meet Prop 116 requirements. ▫ Rail transit is consistent with requirements of SB 375 and SB 32 to reduce greenhouse gas emissions.
	Negatives			
Level of Public Investment	**Positives/ Neutral**	👎	✓ Moderate new investment for capital costs required ✓ Some funding sources may be available for capital costs (FTA5309-New/Small Starts, TIGER, STIP, STBG, SB 1-LPP & CC, LCTOP, TIRCP, Prop 1A)	▫ Capital funds may be available from Federal Transit Agency New/Small Starts program and other federal, state and local sources as identified in the Rail Transit Feasibility Study. ▫ New capital funding for both inter-city and commuter rail was created by the state in passage of SB-1.
	Negatives		× Major new investment for operations required × New funding source required for operations	▫ Operational costs may be high and funding sources are limited. A tax measure would likely be needed to cover operational costs.
Right-of-way and Constructability Constraints	**Positives/ Neutral**	👍	✓ Minor amounts of ROW may need to be acquired	▫ The existing estimates of the ROW can accommodate a rail way track with a trail along most of the rail right of way. Standard ROW requirements for the rail line are 20 feet in width with an absolute minimum of 17 feet in width or 8.5 ft in both directions from the centerline of the tracks. ▫ Additional ROW may be needed for sidings for the trains to pass and for some station locations. The number and locations of sidings will depend on the desired rail transit service frequency. ▫ Tracks may need to be laid for some sidings
	Negatives			
Technological Feasibility	**Positives/ Neutral**	👍 👍	✓ Technologically feasible ✓ Could accommodate future technologies (battery electric multiple units)	▫ Future technologies could provide battery electric multiple units for noise reduction and for reduced GHG emissions.
	Negatives			

Route	**Rail Right-of-Way**
Project Title	Freight service on the rail line
Project Description	Freight service on the rail line between Davenport and Pajaro Station, with connection to the Harvey West industrial area and Felton via the Big Trees line, as needed primarily during nighttime to not conflict with weekday and weekend passenger rail schedules.
Overall Rating	
Summary	Freight service is a moderate cost option that has been occurring on the rail line for nearly 140 years although currently not many businesses are utilizing this service. Rail freight provides an alternative option for goods movement as opposed to travel on a congested highway, reduces GHG emissions, and can increase safety by reducing the number of trucks on the highway. Noise impacts from freight can be challenging for residents in the vicinity of the rail corridor especially if freight occurs during night time to avoid a passenger rail schedule.

Step 1 Criteria		Rating	**Evaluation**	**Narrative**
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**		✓ RTC policy ✓ Consistent with long range planning effort (2014 RTP) ✓ Supported by voters through passage of Measure D	▫ Freight service on the rail line has been more or less active since its inception. Freight service is the current RTC policy and is included in the agreement with the rail operator, Iowa Pacific. Upgrades to the rail line for freight service are included in the 2014 RTP. Voters approved Measure D in November 2016 which allocates funds for rail corridor infrastructure preservation.
	Negatives		× May have some public opposition	▫ Horn noise from trains as required at roadway crossings has raised concerns although horn noise can be mitigated with “quiet zone” designations that provide adequate crossing improvements and approval by the Federal Railroad Administration (FRA.) ▫ Members of the public, some represented by advocacy groups, support a trail only option and have campaigns and/or signature gathering efforts in progress.
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**		Economic ✓ Alternative option for goods movement to/from businesses Environmental ✓ Reduces GHG Health & Equity ✓ Improves safety (by removing trucks off roadways)	▫ Freight service on the rail line would provide an alternative option for goods movement in SCC with less congestion and reduce the number of trucks on Highway 1, improving safety. Rail freight uses significantly less fuel and thus reduces GHG emissions. ▫ Environmental impact assessment is not required since freight service has been ongoing for decades and there has not been a change in use.
	Negatives			
Compatible with Regulatory	**Positives/ Neutral**		✓ Consistent with legislation (SB 32) ✓ Consistent with design standards	▫ Rail freight is consistent with SB 32 to reduce GHG emissions.

Step 1 Criteria		Rating	Evaluation	Narrative
Requirements			✓ No additional permits required	
	Negatives			
Level of Public Investment	Positives/ Neutral		✓ Minor new investment for capital costs required ✓ Some funding sources may be available for capital costs (Trade corridor grants, TIGER, leases, operator funds, Section 130/crossing, RRIF) ✓ Minor new investment for operations required ✓ Some funding sources may be available for operations (Measure D, leases, operator funds/fees)	▫ Rail freight due to increased weight of loads, may require a greater level of bridge repair and maintenance if passenger rail service is not also provided. Measure D provides some funds for maintenance costs of tracks for good movements of the rail line. Private businesses who utilize rail corridor for freight can pay for use providing funds for rail operations.
	Negatives			
Right-of-way and Constructability Constraints	Positives/ Neutral		✓ ROW is sufficient ✓ Project is readily constructible	▫ The existing ROW is sufficient for freight service and can accommodate a rail way track and a trail. Standard ROW requirements for the rail line are 20 feet in width or 10 feet in both directions from the centerline of tracks although exceptions can be made to reduce requirements to 17 feet in width or 8.5 ft in both directions from the centerline of the tracks on straight track. A 20 foot ROW width is required at curves. ▫ Additional ROW may be needed for sidings for trains to pass if freight service increases significantly. ▫ Freight has been operational since inception of rail service and thus only maintenance of tracks is required.
	Negatives			
Technological Feasibility	Positives/ Neutral		✓ Technologically feasible ✓ Could accommodate future technologies (autonomous trains for goods movement)	▫ Future technologies for improved goods movement could be accommodated.
	Negatives			

Route	**Rail Right-of-Way**
Project Title	Bus rapid transit (BRT)
Project Description	Two-directional bus rapid transit between Watsonville Transit Center and Shaffer Rd on Westside of Santa Cruz could utilize a combination of the rail right-of-way, Highway 1, and local streets. Buses could travel on Highway 1 or the local street network between Watsonville Transit Center and State Park Drive, utilize the rail ROW between State Park Dr and Shaffer Rd for two-directional travel where feasible or one-directional travel on rail ROW with reverse direction on parallel local streets. The local street network that could be used for BRT in combination with the rail ROW include McGregor Dr, Park Ave, Brommer St, Murray St, and Bay St. Two directional BRT could be considered on the rail ROW between Shaffer Rd and California Ave, between Seabright Ave and 7th Ave, 47th Ave and Wharf Rd, Capitola Ave to Park Ave, and Mar Vista Dr to State Park Dr. On rail bridges and other constrained sections, transit signals could be utilized to hold one direction of travel while transit in other lane travels through. Connections to Capitola Transit Center, Santa Cruz Metro Center, UCSC, Cabrillo College and other locations could be made using local streets. Rail bridges in some locations could potentially be shared between buses and bikes/pedestrians using signals. Frequency of travel between Watsonville and Santa Cruz could be as often as every 15 minutes during peak periods. Local bus service between Capitola/Live Oak and Santa Cruz could also be enhanced by bus service on the rail ROW. Electric buses could be utilized and buses would be prioritized at roadway crossings. Rail right-of-way south of State Park Drive and north of Shaffer Rd could be used solely for trail. One exception could be rail with trail from Lee Rd to Pajaro Station to continue freight service to and from Watsonville.
Overall Rating	
Summary	Bus rapid transit on a combination of the rail ROW, Highway 1 and local streets is a moderate cost capacity increasing improvement that would provide a new transit route connecting north and south county, improve transit travel time and transit travel time reliability and provide an alternative to congestion on Highway 1 and Soquel Ave/Dr. By improving travel time and travel time reliability, transit ridership could increase, reducing VMT and therefore greenhouse gas emissions. Electric vehicles would further reduce GHG emissions and reduce noise impacts along the rail right-of-way. BRT increases options for those who do not drive including seniors, youth, people with disabilities, low-income and minorities. BRT on rail right-of-way could require a shift from current RTC policy to not preclude rail transit.

Step 1 Criteria		Rating	Evaluation	Narrative
Community Support and Consistency with Applicable Plans	**Positives/ Neutral**		✓ Consistent with long range planning effort (2014 RTP) ✓ Consistent with other planning efforts (1999 MTIS) ✓ Agency support (Metro staff)	▫ Bus rapid transit for Santa Cruz County without a specified location is included in the 2014 RTP ▫ The 1999 MTIS study recommended two lane bus way between Westside Santa Cruz and Aptos next to the tracks. The 1999 MTIS report was not limited by current understanding of ROW. ▫ Residents adjacent to the rail corridor may be more supportive of bus on right-of-way as it may be a quieter option (no noise from train horns, less noise from rubber wheels and electric motor).
	Negatives		× May have some public opposition	▫ BRT on the rail corridor has not gone through a comprehensive public process. If rail corridor was used for BRT and trail, it would require a new planning effort to solicit public input. ▫ Members of the public, some represented by advocacy groups, support a trail only option and have campaigns and/or signature gathering efforts in progress.
Addresses Transportation Challenges & Environmental, Economic, and Equity Goals	**Positives/ Neutral**		<u>Economic</u> ✓ Improves transit travel time ✓ Improves transit travel time reliability ✓ Improves access to jobs, education and services ✓ Potential to increase land use development, business activity, employment and tax revenues <u>Environmental</u> ✓ Mode shift to transit ✓ Reduces VMT and GHG <u>Health & Equity</u> ✓ Improves access for people who do not drive ✓ Reduces household transportation costs	▫ Bus rapid transit on the rail corridor will provide a new transit route connecting north and south Santa Cruz County. A new transit connection with competitive travel times could improve access to jobs, education centers and services by providing an alternative to congested roadways. Faster transit travel times could also make transit more convenient and encourage people to shift from driving to transit, reducing VMT and GHG emissions. Utilizing electric buses could decrease GHG emissions further. BRT would allow more flexibility in route and network structure than rail transit service on the rail ROW with potential to have greater ridership. ▫ The potential to encourage more intensive land use development as a result of investment in bus rapid transit is less than rail transit service due to the limited capacity of BRT when compared to rail transit, and the potential for bus rapid transit routes to change, unless bus rapid transit is seen as a precursor to rail transit. ▫ Transit improvements support lower cost transportation options which can reduce household transportation costs and benefit people who don't drive including youth, seniors, people with disabilities, low income, and minorities.
	Negatives		<u>Environmental</u> × Environmentally sensitive areas may be impacted × Soil sampling, testing and/or remediation of contaminated soil may be needed × Traffic impacts (at roadway crossings)	▫ Improvements to support BRT on the rail right-of-way may impact environmentally sensitive areas but less so when compared to impacts of rail transit service on the rail ROW from Santa Cruz to Watsonville. This is attributed to the fact that BRT would only utilize about nine miles of the 32-mile rail right-of-way and would not utilize the rail ROW in the vicinity of the sloughs to the west of Watsonville. ▫ Noise impact from bus rapid transit will likely be less than rail due to horns not being required for BRT at intersections. ▫ Soil contaminants have been found along the rail ROW. Soil along rail ROW may need to be assessed for contaminants and possibly remediated. Construction of a paved surface over

Step 1 Criteria		Rating	Evaluation	Narrative
			Health & Equity × Potential for conflicts between modes (buses with bikes and pedestrians and with autos at intersections)	the bare soil could serve as the remediation for some of the contaminants. ▫ There may be conflicts between BRT and autos at intersections and between BRT and trail on rail ROW. Fencing may be recommended between BRT and trail for safety best practices. Fencing between trail and transit may limit access through neighborhoods.
Compatible with Regulatory Requirements	**Positives/ Neutral**	Neutral	✓ Consistent with legislation (SB 375, SB 32) ✓ Consistent with design standards (AASHTO, local transit standards) ✓ Standard permitting process	▫ BRT is consistent with requirements of SB 375 and SB 32 to reduce greenhouse gas emissions. ▫ BRT would be designed to follow design standards and best practices.
	Negatives		× Not consistent with regulations (Proposition 116)	▫ The Santa Cruz Branch Rail Line was purchased using Proposition 116 funds which were allocated for passenger rail capital projects. If rail right-of-way will not be used for passenger rail service, at least $11 million and possibly up to $25 million or more in funds will need to be returned to CTC because Proposition 116 requirements will not be met and the project will not be consistent with the funding application for purchase and rehabilitation of right-of-way. ▫ It is unknown what the requirements would be if the rail line was railbanked for rail in future with BRT and trail constructed in the near term.
Level of Public Investment	**Positives/ Neutral**	Neutral	✓ Some funding sources may be available for capital costs (FTA5309-New/Small Starts, TIGER, STIP, STBG, SB 1-LPP & CC, LCTOP, TIRCP, Section 130) ✓ Some funding sources may be available for operating costs (Fares, new sales tax for transit, STA, TDA, LCTOP, TIRCP) ✓ Moderate new investment for capital costs required ✓ Moderate new investment for operations required	▫ Capital funds may be available from federal, state and local sources. BRT is a typical starter project for a light rail or heavy passenger rail project. FTA funding will support this approach. Funds available from SB 1 may also be available for this project. ▫ Could be operated by existing operator (Metro)
	Negatives		× Potential to lose funds	▫ If rail right-of-way will not be used for passenger rail service, at least $11 million and possibly up to $25 million or more in funds will need to be returned to CTC because Proposition 116 requirements will not be met and the project will not be consistent with the funding application for purchase and rehabilitation of right-of-way. A new planning effort would be needed to solicit public input. Funds currently allocated for trail from FLAP and ATP may not meet deadline for use of funds and thus may be lost. ▫ Costs and time to revise current direction are unknown (additional costs include new public

Step 1 Criteria		Rating	Evaluation	Narrative
				outreach process, negotiations with CTC and Iowa Pacific, applying for abandonment of rail to Surface Transportation Board, hazardous material assessment and mitigation, legal fees).
Right-of-way and Constructability Constraints	**Positives/ Neutral**		✓ Minor amounts of right-of-way may need to be acquired (along some constrained sections and at station stops) ✓ Could be built in phases ✓ Project is readily constructible	▫ The existing ROW could potentially accommodate two lanes for bus movement alongside a trail for the majority of the length between State Park Dr and Seabright Ave. ROW requirements for two-directional BRT are approximately 24 ft plus 2 feet buffer zones on either side. ▫ Additional ROW may be needed along constrained sections and for some station stop locations.
	Negatives		× Construction challenges may require additional funds or alternative design	▫ Rock ballast under rails may need to be removed or leveled in order to construct BRT lane in rail right-of-way as ballast does not provide compaction or gradation requirements for a base layer under pavement.
Technological Feasibility	**Positives/ Neutral**	 	✓ Technologically feasible ✓ Could accommodate future technologies (autonomous and evolving electric buses)	▫ Electric buses along the rail right-of-way are currently feasible and will likely become even more efficient in future. New technologies could be implemented to improve bus flow at rail ROW and roadway intersection crossings. BRT on dedicated lanes along the rail corridor could allow for implementation of self-driving buses sooner than they could be implemented in traffic mixed with conventional vehicles.
	Negatives			

Scenario A

Highway 1

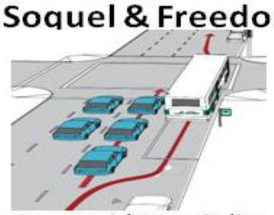
HOV and auxiliary lanes

Ramp metering

Widen Bridge over San Lorenzo River

Mission St Intersection Improvements

Soquel & Freedom



Bus rapid transit lite – (transit priority)

Increased frequency of transit

Intersection improvements

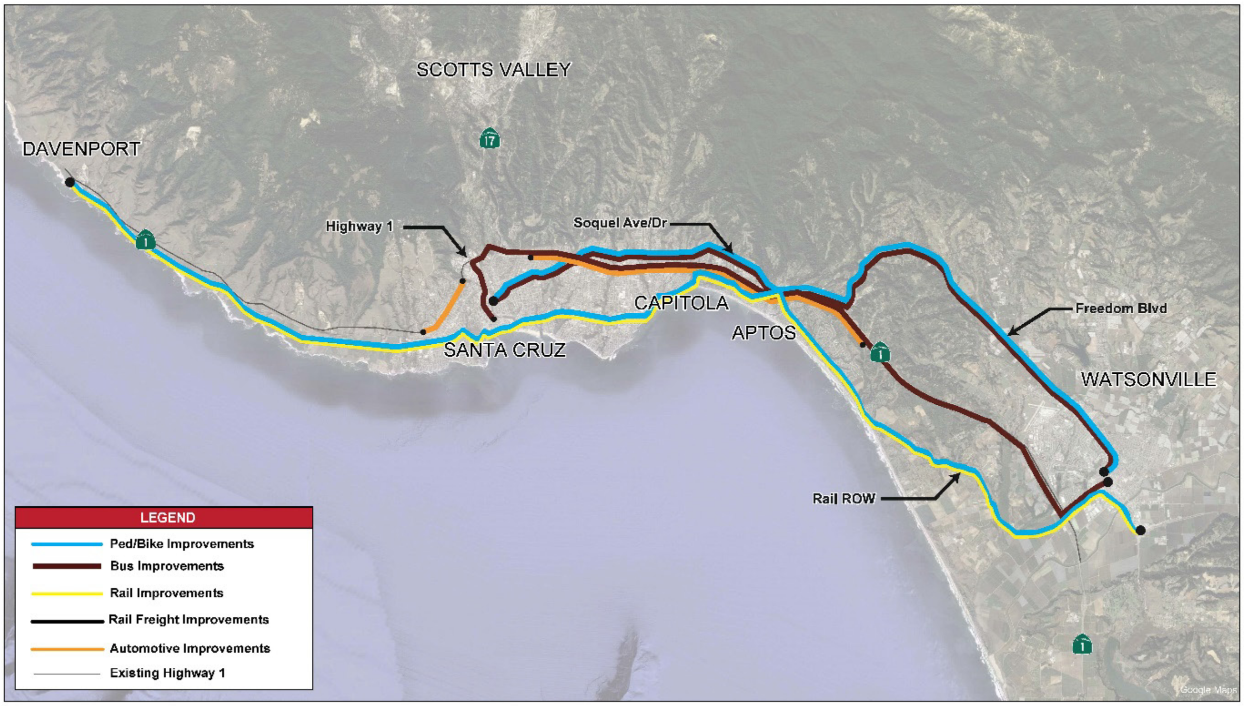
Rail Right of Way

Bike and Pedestrian Trail

Scenario A	Highway 1	Soquel/ Freedom	Rail ROW
Projects	HOV Lanes, Auxiliary Lanes, Ramp Meters, San Lorenzo Bridge Widening, Mission St. Intersection Improvements	BRT Lite, Increased Transit Frequency, Auto Intersection Improvements	Bike & Pedestrian Trail
Increasing Capacity	Auto, Express Bus Transit (using HOV)	Local Bus Transit	Biking, Walking
Operational Improvements	Auto, Bus Transit	Auto, Local Bus Transit	
Cost	Major	Minor	Moderate
Potential Significant Benefits	Auto & Transit Travel Time/Reliability and Auto Safety	Transit Travel Time/Reliability, Equity, Reduction in VMT/GHG	Bike/Ped Safety, Health, Reduction in VMT/GHG
Potential Significant Challenges	ROW, Environmental		Regulatory

Scenario A includes major transportation investments for auto and transit on Highway 1, low cost auto and transit improvements on Soquel/Freedom and a bike and pedestrian trail solely on the rail ROW. The Highway 1 projects include construction of high occupancy vehicle lanes (and associated auxiliary lanes and ramp metering) for improvements to travel time, travel time reliability and safety for carpools, transit and single occupant vehicles on Santa Cruz County's primary transportation route. Scenario A includes operational improvements on Soquel/Freedom through implementation of bus priority strategies at intersections, increased transit frequency and intersection improvements for autos. The transit investments on Soquel/Freedom will improve transit travel time, improve access, support lower cost transportation options and benefit people who don't drive. The primary improvement for bicycles and pedestrians included in Scenario A is construction of a bike and pedestrian trail only on the rail ROW, which has potential to improve safety and health and promote a shift from driving to bicycling and walking for short trips and in turn, reduce VMT and GHG emissions.

Scenario B



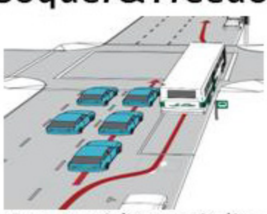
Highway 1


Bus on shoulders


Ramp metering

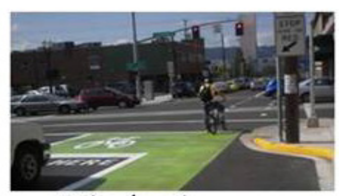

Mission St Intersection Improvements

Soquel & Freedom


Bus rapid transit lite (transit priority)


Increased frequency of transit


Buffered/protected bike lanes


Bike/ped Intersection improvements

Rail Right of Way


Rail Transit

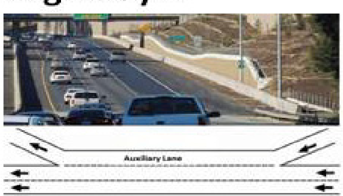

Bike and Pedestrian Trail

Scenario B	Highway 1	Soquel/ Freedom	Rail ROW
Projects	Bus On Shoulder, Ramp Metering, Mission St. Intersection Improvements	BRT Lite, Increased Transit Frequency, Buffered/ Protected Bike Lanes, Bike/Pedestrian Intersection Improvements	Bike & Pedestrian Trail, Rail Transit
Increasing Capacity		Bus Transit, Biking	Biking, Walking, Local and Regional Rail Transit
Operational Improvements	Auto, Bus Transit	Biking, Walking, Local Bus Transit	
Cost	Minor	Minor	Major
Potential Significant Benefits	Auto & Transit Travel Time/Reliability	Bike & Pedestrian Safety, Health, Transit Travel Time/Reliability, Equity, Reduction in VMT/GHG	Equity, Bike/Pedestrian Safety, Health, Transit Travel Time/Reliability Reduction in VMT/GHG, Transit Oriented Development
Potential Significant Challenges	Regulatory, Traffic Impact on local roads	Traffic & Parking Impacts	Environmental

Scenario B projects support transit improvements on each of the three routes. Projects include low cost improvements for auto and transit on Highway 1, buffered/protected bike lanes and low cost transit improvements for Soquel/Freedom and significant increases in transit capacity with a major investment in rail transit on the rail ROW, along with a bike and pedestrian trail in the rail ROW. The Highway 1 bus on shoulders and ramp metering projects could provide some operational improvements for autos and transit including travel time/reliability improvements. The feasibility of bus on shoulders is currently being investigated. The Soquel/Freedom projects will provide some improvement to transit travel time/reliability, increase transit frequency, and improve bicycle and pedestrian safety. A bike and pedestrian trail and rail transit on the rail ROW could improve access to jobs, education and services, increase the potential for shifting trips from auto to transit and biking and walking, improve safety, reduce VMT and GHG emissions, support lower cost transportation options and benefit people who don't drive. Rail transit from Watsonville to Santa Cruz also encourages more intensive and compact use of land surrounding stations and the potential for future regional transit connections to Monterey, the Bay Area and beyond. Together, the trail on the rail ROW and buffered bicycle lanes on Soquel provide significant safety improvements for bicyclists that will promote a shift from driving to bicycling and in turn, a reduction in VMT and GHG.

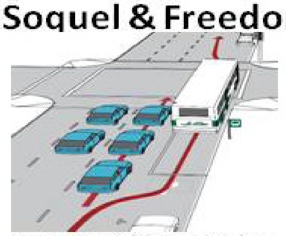
Scenario C

Highway 1



Auxiliary lanes

Soquel & Freedom



Bus rapid transit lite – (transit priority)

Increased frequency of transit

Intersection improvements for auto

Rail Right of Way

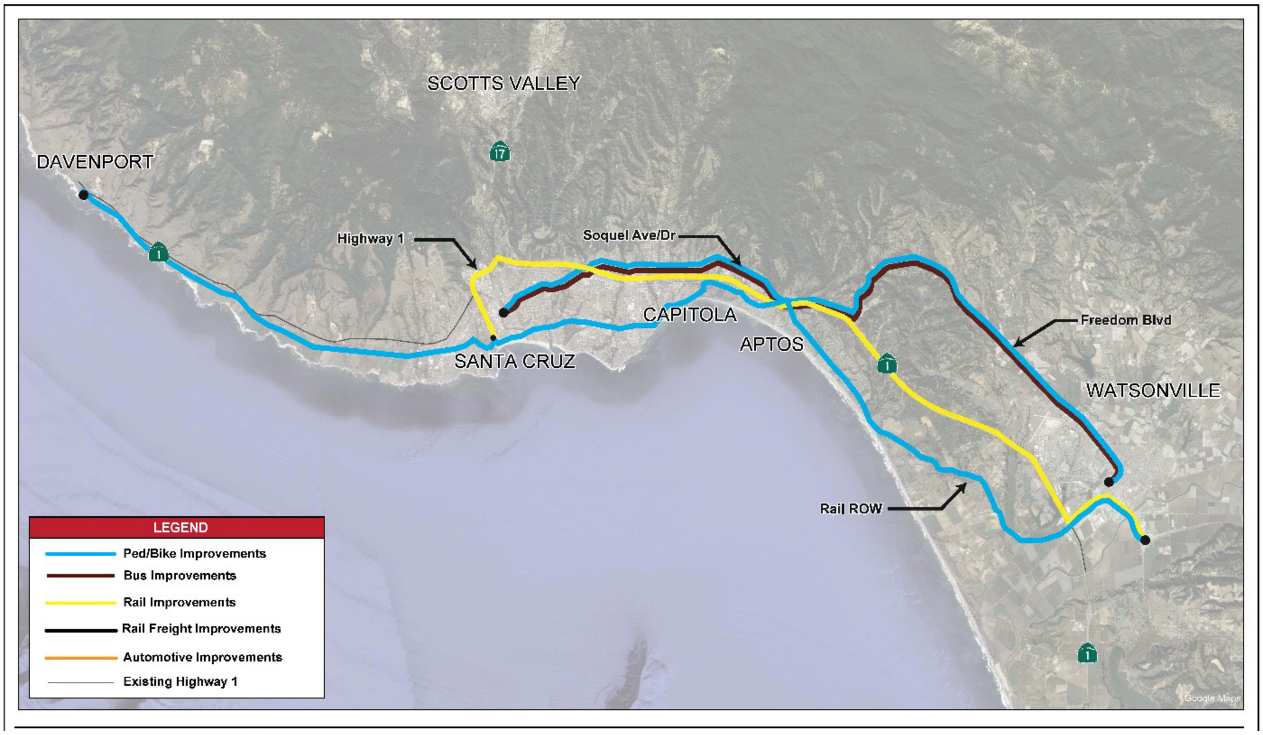
Bus Rapid Transit

Bike and Pedestrian Trail

Scenario C	Highway 1	Soquel/ Freedom	Rail ROW
Projects	Auxiliary Lanes	BRT Lite, Increased Transit Frequency, Auto Intersection Improvements	Bike & Pedestrian Trail, Bus Rapid Transit
Increasing Capacity		Local Bus Transit	Biking, Walking, Local Bus Transit
Operational Improvements	Auto	Auto, Bus Transit	
Cost	Moderate	Minor	Major
Potential Significant Benefits	Safety, Improves Traffic Flow	Transit Travel Time/Reliability, Equity, Reduction in VMT/GHG	Equity, Bike/Pedestrian Safety, Transit Travel Time/Reliability Reduction in VMT/GHG
Potential Significant Challenges	Environmental		Environmental, Regulatory

Scenario C offers a scenario with moderate auto improvements on Highway 1, transit and auto improvements on Soquel and major bus transit, bike and pedestrian improvements on the rail ROW. Construction of auxiliary lanes on Highway 1 between State Park Dr. and San Andreas Rd could improve traffic flow and safety for autos on Highway 1. Projects on Soquel/Freedom improve transit operations through implementation of bus priority strategies at intersections, an increase in transit frequency and improvements to intersections for autos. Bus rapid transit on the rail ROW is a major cost investment that significantly increases transit capacity. Bus rapid transit and a bike and pedestrian trail on the rail ROW could improve access to jobs, education and services, increase the potential for shifting trips from auto to transit and biking and walking, improve safety, reduce VMT and GHG emissions, support lower cost transportation options and benefit people who don't drive. Implementing bus rapid transit utilizing only the rail ROW north of Aptos and south of Natural Bridges Dr in the City of Santa Cruz would allow for trail and transit services between Aptos and Westside of Santa Cruz with only a bike and pedestrian trail south of Aptos (with exception of freight service in Watsonville) and north of the City of Santa Cruz up to Davenport.

Scenario D



Highway 1

Rail Transit between Santa Cruz and Watsonville

Automated vehicles (Self driving cars)

Soquel & Freedom

Dedicated lane for bus rapid transit and bikes

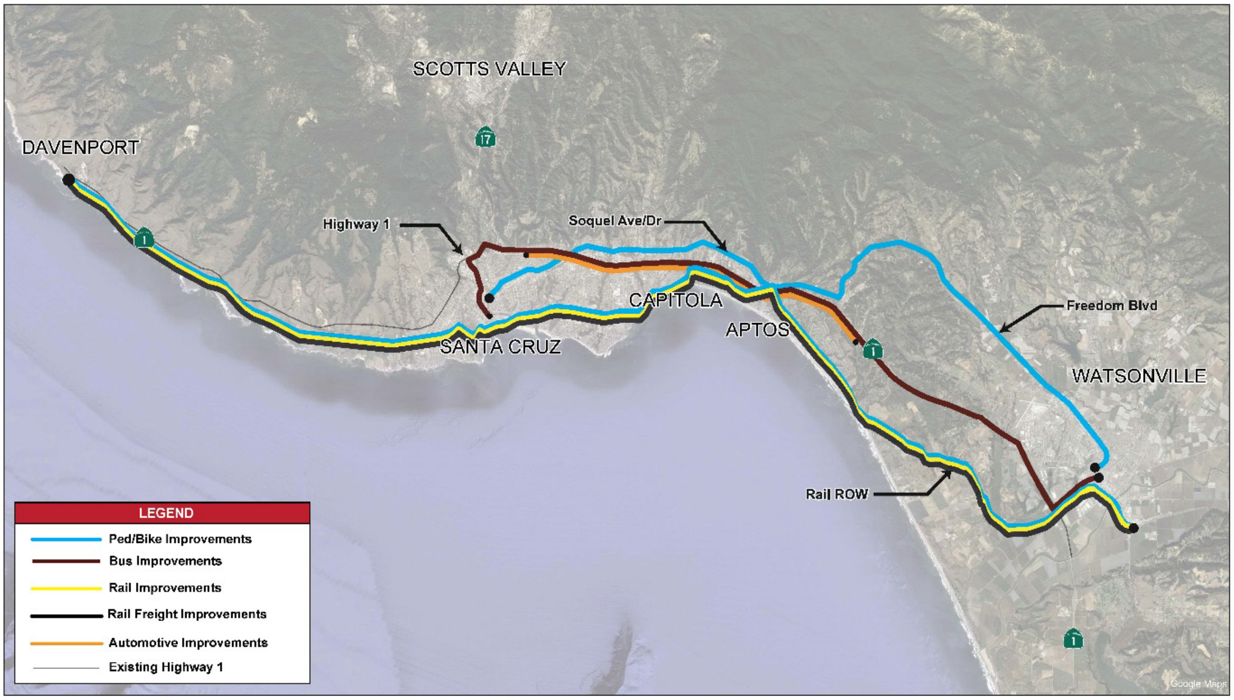
Rail Right of Way

Bike and Pedestrian Trail

Scenario D	Highway 1	Soquel/ Freedom	Rail ROW
Projects	Rail Transit, Automated Vehicles	Dedicated Lane for BRT and Bike	Bike & Pedestrian Trail
Increasing Capacity	Rail Transit	Bus Transit, Biking	Biking, Walking
Operational Improvements	Auto		
Cost	Major	Minor	Moderate
Potential Significant Benefits	Transit Travel Time/ Reliability, Auto Safety*, Reduction in VMT/GHG , Equity	Transit Travel Time/Reliability, Reduction in VMT/GHG, Equity	Bike/Pedestrian Safety, Health. Reduction in VMT/GHG
Potential Significant Challenges	ROW, Environmental, Regulatory	Traffic Impacts	Regulatory

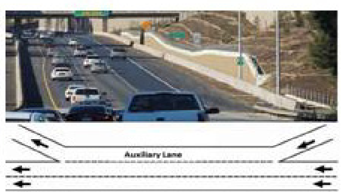
Scenario D significantly increases transit capacity in the corridor by implementing rail transit on the highway and replacing a general purpose lane on Soquel/Freedom with dedicated lanes for bus rapid transit shared with biking. The rail ROW is used solely for a bike and pedestrian trail. The rail transit investment along the highway would require a major cost investment with limited benefits and significant environmental impacts. The percentage of highly automated vehicles on the highway by 2035 would not create a significant increase in capacity or improvements to auto travel time although safety improvements will be likely. A dedicated lane for bus rapid transit and biking that would occupy a general purpose lane will likely have substantial traffic impacts with negative effects on auto travel time but would improve transit travel time and reliability significantly. A bicycle and pedestrian trail on the rail ROW has potential to improve safety and health and promote a shift from driving to bicycling and walking for short trips and in turn, reduce VMT and GHG emissions. Together, the trail on the rail ROW and the dedicated lanes for bus and bike on Soquel/Freedom provide significant improvements for bicyclists that will promote a shift from driving to bicycling and in turn, a reduction in VMT and GHG.

Scenario E

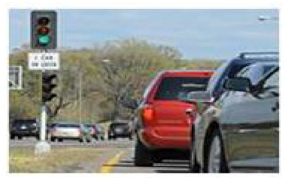


Highway 1

High occupancy vehicle lanes



Auxiliary lanes



Ramp metering

Soquel & Freedom

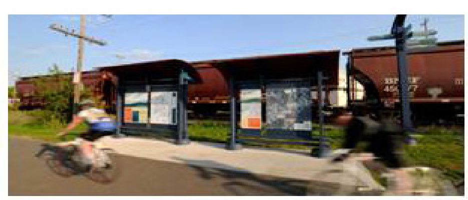
Buffered/protected bike lanes

Bike/ped Intersection improvements

Rail Right of Way

Rail Transit

Bike and Pedestrian Trail

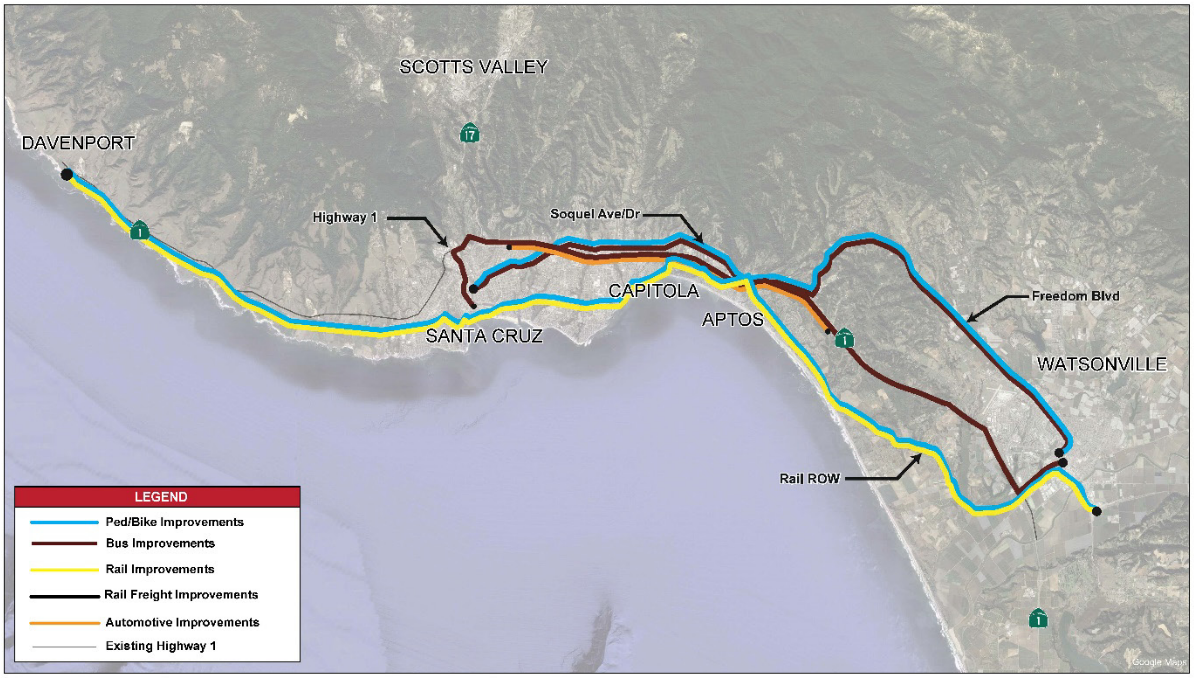


Freight Service

Scenario E	Highway 1	Soquel/ Freedom	Rail ROW
Projects	HOV Lanes, Auxiliary Lanes, Ramp Metering	Buffered/Protected Bike Lanes, Bike/Pedestrian Intersection Improvements	Bike & Pedestrian Trail, Rail Transit, Freight Service
Increasing Capacity	Auto, Bus Transit (using HOV lanes)	Biking	Biking, Walking, Rail Transit
Operational Improvements		Biking, Walking	Rail Freight
Cost	Major	Minor	Major
Potential Significant Benefits	Auto & Transit Travel Time/Reliability, Auto Safety , Equity	Bike/Pedestrian Safety, Health, reduction in VMT/GHG	Equity, Bike/Pedestrian Safety, Health, Transit Travel Time/Reliability Reduction in VMT/GHG, Transit Oriented Development , Goods Movement
Potential Significant Challenges	ROW, Environmental	Traffic & Parking Impacts	Environmental

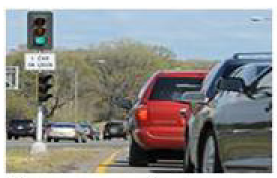
Scenario E includes major transportation investments for auto and transit on Highway 1, buffered/protected bike lanes for Soquel/Freedom and significantly increases transit capacity with a major investment in rail transit, along with freight service and bike and pedestrian trail in the rail ROW. The construction of high occupancy vehicle lanes is expected to provide improvements to travel time, travel time reliability and safety for carpools, transit and single occupant vehicles. Soquel/Freedom projects prioritize bicycle and pedestrian facilities for safety benefits through buffered/protected bicycle lanes. Trail and rail transit on the rail ROW could improve access to jobs, education and services, increase the potential for shifting trips from auto to transit and biking and walking, improve safety, reduce VMT and GHG emissions, support lower cost transportation options and benefit people who don't drive. Rail transit from Watsonville to Santa Cruz also encourages more intensive and compact use of land surrounding stations and the potential for future regional transit connections to Monterey, the Bay Area and beyond. Freight service on the rail line would provide an alternative option with less congestion for goods movement in Santa Cruz County and improve safety by reducing the number of trucks on Highway 1. Together, the trail on the rail ROW and buffered bicycle lanes on Soquel provide significant safety improvements for bicyclists that will promote a shift from driving to bicycling and in turn, a reduction in VMT and GHG.

Scenario F



Highway 1

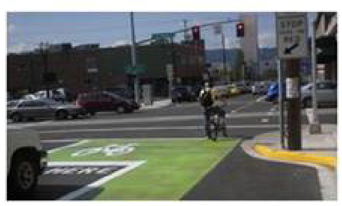
Bus on shoulders



Ramp metering

Soquel & Freedom

Dedicated lane for bus rapid transit and bikes



Bike/ped Intersection improvements

Rail Right of Way

Rail Transit

Bike and Pedestrian Trail

Scenario F	Highway 1	Soquel/Freedom	Rail ROW
Projects	Bus on Shoulders, Ramp Metering	Dedicated lane for BRT & Bike, Bike/Pedestrian Intersection Improvements	Bike & Pedestrian Trail, Rail Transit
Increasing Capacity		Bus Transit, Biking	Biking, Walking, Rail Transit
Operational Improvements	Auto, Bus Transit	Biking, Walking	
Cost	Minor	Minor	Major
Potential Significant Benefits	Auto & Transit Travel Time/Reliability, Equity	Transit Travel Time/Reliability, Health, Reduction in VMT/GHG, Equity	Equity, Bike/Pedestrian Safety, Health, Transit Travel Time/Reliability Reduction in VMT/GHG, Transit Oriented Development
Potential Significant Challenges	Regulatory, Traffic Impacts on local	Traffic Impacts	Environmental

Scenario F significantly increases transit capacity through the corridor by implementing bus on shoulders on the highway, converting a general purpose lane on Soquel/Freedom to dedicated lanes for bus rapid transit shared with biking, and with a major investment in rail transit and bike and pedestrian trail in the rail ROW. The Highway 1 bus on shoulders and ramp metering projects will provide some operational improvements for autos and transit including travel time and travel time reliability improvements. The feasibility of bus on shoulders is currently being investigated. A dedicated lane for bus rapid transit and biking on Soquel/Freedom that would occupy a general purpose lane will likely have substantial traffic impacts with negative effects on auto travel time but would improve transit travel time and reliability significantly. Trail and rail transit on the rail ROW could improve access to jobs, schools and services and supports lower cost transportation options and benefit people who don’t drive. Rail transit from Watsonville to Santa Cruz also encourages more intensive and compact use of land surrounding stations and the potential for future regional transit connections to Monterey, the Bay Area and beyond. Together, the trail on the rail ROW and the dedicated lanes for bus and bike on Soquel/Freedom provide significant improvements for bicyclists that will promote a shift from driving to bicycling and in turn, a reduction in VMT and GHG.

Unified Corridor Investment Study - Step 2 Scenarios for Analysis

(Approved by RTC - December 7, 2017)

	Scenario A	Scenario B	Scenario C	~~Scenario D~~	Scenario E	~~Scenario F~~	No Build
Highway 1 Projects							
buses on shoulders		bus transit	bus transit			bus transit	
high occupancy vehicle lanes (HOV) and increased transit frequency	auto, bus transit				auto, bus transit		
auxiliary lanes to extend merging distance IN ADDITION TO MEASURE D	auto		auto		auto		
metering of on-ramps	auto	auto			auto	auto	
additional lanes on bridge over San Lorenzo River	auto						
Mission St intersection improvements	auto	auto					
rail transit on Hwy 1 between Santa Cruz and Watsonville				rail transit			
Soquel Avenue/Drive and Freedom Blvd							
bus rapid transit lite (faster boarding, transit signal priority and queue jumps)	bus transit	bus transit	bus transit				
dedicated lane for bus rapid transit and bikes				bus transit, bike/ped		bus transit, bike/ped	
increased frequency of transit with express services	bus transit	bus transit	bus transit				
buffered/protected bike lanes		bike/ped			bike/ped		
intersection improvements for auto	auto		auto				
intersection improvements for bikes/pedestrians	bike/ped	bike/ped	bike/ped		bike/ped	bike/ped	
Rail Corridor							
bike and pedestrian trail*	bike/ped	bike/ped	bike/ped	bike/ped	bike/ped	bike/ped	
local rail transit with interregional connections		rail transit			rail transit	rail transit	
bus rapid transit			bus transit				
freight service on rail			Only Watsonville, rail freight		rail freight		
Overall Project Area/Connections between Routes							
improved bike/pedestrian facilities throughout urban area closing gaps in network	These projects will be evaluated in all scenarios.						
additional transit connections							
bike share, bike amenities, transit amenities, park and ride lots							
multimodal transportation hubs							
automated vehicles/connected vehicles**							
Transportation Demand and System Management							
employers and residences - incentive programs	These projects will be evaluated in all scenarios.						
education and enforcement - electric vehicle, motorist safety, and bike safety							

* "multiuse trail" and "bike trail separate from pedestrian trail" was combined into "bike and pedestrian trail" until more information was available to better define the ability to separate bikes from pedestrians in a trail only, a trail with rail, and a trail with BRT. See project tables in Attachment 1 for staff recommendations of the project descriptions for the various trail options.

** Qualitative evaluation for all scenarios

Oval represents projects that are recommended to be added to scenarios for analysis in Step 2

	bus transit
	rail transit
	auto
	bike/ped
	rail freight

SCCRTC Kimley»Horn

APPENDIX I – UCS RESOLUTION

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RESOLUTION NO.

Adopted by the Santa Cruz County Regional Transportation Commission
on the date of January 17, 2019
on the motion of Commissioner
duly seconded by Commissioner

A RESOLUTION ACCEPTING THE UNIFIED CORRIDOR INVESTMENT STUDY, WHICH SELECTS A PREFFERED SCENARIO, DETERMINING THIS ACTION TO BE EXEMPT FROM CEQA, AND AUTHORIZING A TRANSPORTATION EASEMENT WITH PROGRESSIVE RAIL

WHEREAS, the Unified Corridor Investment Study identified multimodal transportation investments that provide the greatest potential benefit and most effective use of Highway 1, Soquel Avenue/Drive and Freedom Boulevard, and the Santa Cruz Branch Rail Line;

WHEREAS, the Unified Corridor Investment Study goals focus on creating a sustainable transportation system which seeks to maximize benefits in terms of safety, efficient mobility, health and equity, the natural environment, and economic vitality;

WHEREAS, the Unified Corridor Investment Study used a performance-based planning approach to identify investments that help to meet the transportation needs of current and future generations;

WHEREAS, the Unified Corridor Investment Study analyzed future transportation use options for the rail right-of-way consistent with the Measure D Expenditure Plan including trail next to passenger rail, trail next to bus rapid transit, trail only, excursion rail and freight service;

WHEREAS, the Unified Corridor Investment Study referenced project specific studies completed by the RTC and partner agencies including the 2040 Regional Transportation Plan approved in 2018, the Monterey Bay Scenic Sanctuary Trail Master Plan adopted in 2013, the Santa Cruz Rail Transit Feasibility Study accepted in 2015, and the Bus on Shoulder Feasibility Study accepted in 2018;

WHEREAS, input from the public, stakeholders, RTC advisory committees, and RTC has been solicited at key milestones of the Unified Corridor Investment Study development;

WHEREAS, the Unified Corridor Investment Study - Preferred Scenario emphasizes regional projects that support an integrated auto, bike, walk and transit transportation network;

WHEREAS, the Unified Corridor Investment Study - Preferred Scenario is consistent with the certified Monterey Bay Scenic Sanctuary Trail Master Plan Environmental Impact Report and the Highway 1 Final Environmental Impact Report;

WHEREAS, the Unified Corridor Investment Study - identified benefits of auxiliary lanes and metering of on-ramps on Highway 1 to improve safety and traffic flow;

WHEREAS, the Unified Corridor Investment Study recognizes the long-term benefits of High Occupancy Vehicle Lanes on Highway 1 to travel times and envisions implementation of High Occupancy Vehicles Lanes beyond 2035 due to funding constraints;

WHEREAS, the Unified Corridor Investment Study recognizes that development of near-term and mid-term projects on Highway 1 will not preclude the future construction of Highway Occupancy Vehicles Lanes;

WHEREAS, the Unified Corridor Investment Study identified benefits from buffered bicycle lanes and intersection improvements on Soquel/Freedom to improve safety and access, reduce greenhouse gas (GHG) emission, and provide equitable transportation options;

WHEREAS, the Unified Corridor Investment Study – Preferred Scenario identified the benefits of a trail on the Santa Cruz Branch Rail Line to improve safety and access, provide equitable transportation options, and reduce GHG emissions;

WHEREAS, the Unified Corridor Investment Study- Preferred Scenario identified the benefits of providing high-capacity public transit on the Santa Cruz Branch Rail Line to provide equitable transportation options, improve transit travel times and reduce GHG emissions;

WHEREAS, by promoting a full complement of transportation options, the Unified Corridor Investment Study - Preferred Scenario positions Santa Cruz County to leverage State and Federal funding and adapt to the evolving state of transportation technologies;

WHEREAS, the Unified Corridor Investment Study - Preferred Scenario provides a recommendation for an approach to future transportation investments and action on the Unified Corridor Study does not approve a project or commit to a definite course of action for project implementation;

WHEREAS, projects selected for the preferred scenario of the Unified Corridor Investment Study will undergo environmental review as required by federal and state requirements;

WHEREAS, in 2012, the Santa Cruz County Regional Transportation Commission (RTC) purchased the Santa Cruz Branch Rail Line (Branch Line), an operating freight rail line with common carrier designation under the jurisdiction of the Surface Transportation Board (STB) serving a number of local businesses who depend on freight rail service;

WHEREAS, State Proposition 116 funding for the acquisition of the Santa Cruz Branch Rail Line was intended for the preservation of the rail line for transportation purposes, including continuation of existing freight and recreational rail service, and a potential bicycle and pedestrian path adjacent to the rail line where feasible;

WHEREAS, the previous owner, Union Pacific, retained a freight easement on the Branch Line and transferred it to the new operator, Santa Cruz & Monterey Bay (SC&MB) Railway, who was selected by the RTC through a competitive process and designated as the common carrier for the Branch Line by the STB;

WHEREAS, after SC&MB Railway could no longer fulfill all of its obligations as the freight rail operator for the Branch Line, the RTC selected St. Paul & Pacific Railroad (SPPR) as the new operator through a competitive process and SPPR was designated the common carrier by the STB;

WHEREAS, the RTC entered into a two-phased administration, coordination and license (ACL) agreement with SPPR to allow for the completion of the RTC's unified corridor investment study (UCS) prior to initiating the second phase of the ACL agreement; and,

WHEREAS, the staff recommendation for the UCS was presented to the RTC on November 15, 2018 which designates the "completion of the study" as defined in the ACL agreement, which allows 120 days from the completion of the study for the RTC to grant SPPR a license for phase two of the agreement otherwise SPPR may terminate the agreement and seek to transfer or abandon Freight Service, if the STB approves such transfer or abandonment, potentially leaving local businesses without the freight rail service on which they depend.

BE IT RESOLVED BY THE SANTA CRUZ COUNTY REGIONAL TRANSPORTATION COMMISSION TO:

1. Find and determine this action to be exempt from CEQA pursuant to CEQA Guideline 15262, approve the Notice of Exemption (Exhibit A) presented on this date and direct staff to file the Notice of Exemption in accordance with law, and accept the Unified Corridor Investment Study which selects a preferred scenario (Exhibit B);
2. Continue to seek funding, advance development and implement construction of Highway 1 auxiliary lanes between Soquel Avenue/Drive and State Park Drive as a first priority of Highway 1 improvements;
3. Continue to seek funding, advance development and implement construction of auxiliary lanes from State Park Drive to San Andreas Rd;
4. Continue to seek funding, advance development and implement construction of bus on shoulder/auxiliary lanes concurrent with the construction of future auxiliary lanes and support increased transit frequency on Highway 1 when bus on shoulder is implemented, as feasible;
5. Continue to seek funding, advance development and implement construction of Highway 1 ramp metering, where feasible, with the construction of auxiliary lanes and support implementation of ramp metering once auxiliary lanes are constructed;
6. Work with partner agencies to advance development of buffered/protected bike lanes along Soquel/Freedom and pedestrian and bicycle improvements to intersections and if feasible, right turn pockets or bypass lanes for bus service and transit priority;
7. Continue to seek funding, advance development and implement construction of a bicycle and pedestrian trail on the rail right-of-way next to the tracks as planned in the Monterey Bay Sanctuary Scenic Trail Master Plan and associated EIR;
8. Protect the rail right-of-way for a high-capacity public transit service and facilities next to a bicycle and pedestrian trail, and continue to consider passenger rail service options on the rail right-of-way consistent with Prop 116 requirements;
9. Work jointly with the Santa Cruz Metropolitan Transit District to develop of a scope of work for additional analysis of high-capacity public transit alternatives on the Santa Cruz Branch Rail Line including their cost, operations, and funding plans and a plan to protect METRO's current funding sources; and,
10. Authorize the Executive Director to execute a license for Phase II Railway Transportation Services (Excursion Trains) in accordance with section 2.4 of the Administration, Coordination and License Agreement (ACL) dated July 16, 2018 between the RTC and Saint Paul and Pacific Railroad (SPPR).

AYES: COMMISSIONERS

NOES: COMMISSIONERS

ABSTAIN: COMMISSIONERS

ABSENT: COMMISSIONERS

____
Ed Botorff, Chair

ATTEST:

____
Guy Preston, Secretary

Distribution:

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