Chapter 3 California Environmental Quality Act Evaluation

3.1 Determining Significance under the California Environmental Quality Act

The proposed project is a joint project by the California Department of Transportation (Caltrans) and the Federal Highway Administration and is subject to state and federal environmental review requirements. Project documentation, therefore, has been prepared in compliance with both the California Environmental Quality Act and the National Environmental Policy Act. The Federal Highway Administration's responsibility for environmental review, consultation, and any other action required in accordance with the National Environmental Policy Act and other applicable federal laws for this project is being, or has been, carried out by Caltrans under its assumption of responsibility pursuant to 23 U.S. Code 327. Caltrans is the lead agency under the California Environmental Quality Act and the National Environmental Policy Act.

One of the primary differences between the National Environmental Policy Act and the California Environmental Quality Act is the way significance is determined.

Under the National Environmental Policy Act, significance is used to determine whether an environmental impact statement, or some lower level of documentation, would be required. The National Environmental Policy Act requires that an environmental impact statement be prepared when the proposed federal action (project) *as a whole* has the potential to "significantly affect the quality of the human environment." The determination of significance is based on context and intensity. Some impacts determined to be significant under the California Environmental Quality Act may not be of sufficient magnitude to be determined significant under the National Environmental Policy Act. Under the National Environmental Policy Act, once a decision is made regarding the need for an environmental impact statement, it is the magnitude of the impact that is evaluated and no judgment of its individual significance is deemed important for the text. The National Environmental Policy Act does not require that a determination of significant impacts be stated in the environmental documents.

The California Environmental Quality Act, on the other hand, does require Caltrans to identify each "significant effect on the environment" resulting from the project and ways to mitigate each significant effect. If the project may have a significant effect on any

environmental resource, then an environmental impact report must be prepared. Each significant effect on the environment must be disclosed in the environmental impact report and mitigated if feasible. In addition, the California Environmental Quality Act Guidelines list a number of *mandatory findings of significance* that also require the preparation of an environmental impact report. There are no types of actions under the National Environmental Policy Act that parallel the findings of mandatory significance under the California Environmental Quality Act. This chapter discusses the effects of this project and California Environmental Quality Act significance.

3.2 Discussion of Significant Impacts

3.2.1 No Effects

As discussed in Chapter 2, the project would have no impacts on the following resources:

- Farmlands/Timberlands—Although farmland exists in Santa Barbara County and next to the project, the project itself will not affect farmland. The project would be built mostly within the existing right-of-way and would not acquire private property except for temporary construction easements and subsurface easements. There would be no easements required on farmland. No timberlands exist in or near the project.
- Energy—Caltrans incorporates energy efficiency, conservation, and climate change measures into transportation planning, project development, design, operations, and maintenance of transportation facilities, fleets, buildings, and equipment to minimize use of fuel supplies and energy sources and reduce greenhouse gas emissions (see later in Chapter 3). When balancing energy used during construction and operation against energy saved by relieving congestion and other transportation efficiencies, the project would not have substantial energy impacts.
- Wild and Scenic Rivers—There are no federally designated rivers in the project limits.
- Relocations—No businesses or residences would be acquired as part of this project. The project would be built within the existing public right-of-way, except for temporary construction easements and several subsurface easements required for footings related to soundwalls and retaining walls.
- Plant Species—According to the Natural Environment Study (January 2012), no special-status plant species were found in the biological study area for the project.

No critical habitat for federally or state listed plant species occurs within the project limits.

3.2.2 Less than Significant Effects of the Proposed Project

As discussed in Chapter 2, the project would have less than significant impacts on the following resources:

- Consistency with Local Coastal Plans
- Community Character and Cohesion
- Recreation
- Utilities/Emergency Services
- Traffic/Transportation Facilities (including Pedestrian and Bicycle)
- Hydrology/Floodplains
- Hazards and Hazardous Materials
- Geology
- Air Quality

Please refer to the respective subchapters in Chapter 2 for a detailed discussion of these resources.

Noise

When determining whether a noise impact is significant under the California Environmental Quality Act, the baseline noise level is compared with the predicted build noise level. Under the California Environmental Quality Act, evaluating the significance of noise impacts is completely independent of the noise abatement criteria analysis used by Caltrans (based on Federal Highway Administration guidance and the 2006 Noise Protocol) as discussed in detail in Section 2.2.7. The noise evaluation under the California Environmental Quality Act involves looking at the existing noise setting and determining how large or perceptible any noise increase would be in the given area. Key considerations include the uniqueness of the setting, the sensitive nature of the noise receptors, the magnitude of the noise increase, the number of residences affected, and the absolute noise level.

Existing conditions are noisy due to the high traffic volumes passing through the corridor. Traffic volumes through the U.S. 101 corridor have been increasing steadily for over 30 years. Construction of the proposed project would result in minimal increases to noise

levels in the surrounding area. Specifically, the only areas of the project where noise levels increase (slightly) would be in areas where widening occurs to the outside. Comparisons are made looking at existing baseline noise levels and the build noise levels. The Noise Study Report assessed the potential impacts associated with the project. Table 2.36 (see Section 2.2.7) shows the existing and predicted noise level increases for the 104 noise receptors. The maximum increase at any one receptor site (R1 through R104) for any of the build alternatives would be 3 decibels by the year 2040. This 3-decibel increase between the existing noise levels and any of the build alternatives would be barely perceptible to the human ear. The same holds true for any sensitive receptors in the project limits because there are no locations that experience more than a 3-decibel level increase. Therefore, under the California Environmental Quality Act, no significant noise impacts would occur as a result of the project and no mitigation is required. As discussed in Section 2.2.7 (per Caltrans Noise Abatement Criteria), because noise levels at 28 locations would approach or exceed the noise abatement criteria of 67 decibels, noise abatement is recommended.

3.2.3 Significant Environmental Effects of the Proposed Project

Cultural Resources

Caltrans concluded in a Finding of Adverse Effect (February 2011) and in a Revised Finding of Adverse Effect (September 2011) that the proposed project would have an adverse effect on the National Register-eligible Via Real Redeposited Midden. Comprehensive studies suggest that the National Register-eligible portion of the site is not only located below the level of proposed U.S. 101 construction but is also located outside the state right-of-way—and therefore outside the Area of Direct Impact. Although Caltrans does not anticipate impacts to the redeposited midden, we nevertheless deem it prudent to consider the remote possibility of discoveries during construction. In the unlikely event that archaeological resources are encountered during construction, the *Treatment and Data Recovery Plan for the South Coast 101 HOV Lanes Project, Santa Barbara County, California* will be implemented, in accordance with the June 20, 2013 *Programmatic Agreement between the California Department of Transportation and the California State Historic Preservation Officer Regarding the South Coast 101 HOV Lanes Project, U.S. Route 101, Santa Barbara County, California* (see Appendix D, *State Historic Preservation Officer Correspondence*).

Paleontology

Mitigation measures, specifically monitoring, salvage of fossil specimens, and data recovery during construction excavation for this project, would reduce the adverse impact to a less than significant level.

Water Quality/Storm Water Runoff

The project would add 42 acres (Alternative 1—preferred alternative) of impervious surface (pavement). Alternative 2 would have added close to 52 acres. The project is being designed to minimize an increase in storm water discharge by installing appropriate permanent storm water treatment measures and drainage facilities to store and infiltrate the increased runoff within the right-of-way. In addition, there would be measures to reduce potential impacts to stream channels and temporary impacts to water quality (see Sections 2.3.1 and 2.3.2).

Biological Resources

The project would have temporary and permanent impacts on riparian habitat, Coastal Commission-defined wetlands, U.S. Army Corps of Engineers Jurisdictional wetlands, and other waters of the United States. Creek diversion and de-watering during construction could result in incidental take of federally endangered steelhead trout and tidewater goby (see Sections 2.3.1, 2.3.2, and 2.1.1.2). The project includes avoidance, minimization and mitigation measures to reduce impacts to biological resources (see Sections 2.31, 2.32, 2.33, 2.3.4, and 2.3.5). Appendix F of the final environmental document provides a summary of all avoidance, minimization and mitigation measures.

3.2.4 Mandatory Findings of Significance

Given the high scenic value and visual character of the Santa Barbara coastline and surrounding communities, the ongoing cumulative effect of this project, other highway projects, and ongoing urban development continue to reduce the area's visual character. Mitigation would not be effective in reducing visual impacts to a level of insignificance (see below).

3.2.5 Unavoidable Significant Environmental Effects

The project's visual impacts as seen from U.S. 101 and surrounding communities would be significant regardless of the selected alternative. The inclusion of the avoidance, minimization, and mitigation measures listed in Sections 2.1.6, 2.4, 2.5 and 3.3 would reduce the visual impacts, but even with inclusion of these measures the impacts would not be able to be fully mitigated. The measures combined with proposed project features

include the replacement of landscaping where feasible and aesthetic treatments to walls, which would lessen the adverse visual change to the corridor. However, the overall significant impacts would remain due to the inherent alteration of scale, increase of hard surfaces, and loss of vegetative character.

Concerning cumulative visual/aesthetics, the U.S. 101 corridor between the City of Goleta and south into Ventura County has several major projects either currently under construction or planned for construction as funding becomes available. The recently constructed Milpas to Hot Springs operational improvement project, the current construction of the Ventura County/Santa Barbara 101 HOV project, the proposed Linden Avenue and Casitas Pass Road interchanges project in Carpinteria, and the recently scoped U.S. 101 Rehabilitation project would increase the visual scale of the highway corridor and its urban character. Although each of the projects would individually minimize or mitigate visual impacts, the cumulative visual effect of those projects combined with the proposed HOV lanes project would be substantial.

3.2.6 Climate Change under the California Environmental Quality Act

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system. An ever-increasing body of scientific research attributes these climatological changes to greenhouse gases (GHG), particularly those generated from the production and use of fossil fuels.

While climate change has been a concern for several decades, the establishment of the Intergovernmental Panel on Climate Change by the United Nations and World Meteorological Organizations in 1988 has led to increased efforts devoted to greenhouse gas emissions reduction and climate change research and policy. These efforts are primarily concerned with the emissions of greenhouse gases (GHG) generated by human activity including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride (SF_6), HFC-23 (fluoroform), HFC-134a (s, s, s, 2 –tetrafluoroethane), and HFC-152a (difluoroethane).

In the U.S., the main source of greenhouse gas emissions is electricity generation, followed by transportation. In California, however, transportation sources (including passenger cars, light-duty trucks, other trucks, buses, and motorcycles make up the largest source of greenhouse gas-emitting sources. The dominant greenhouse gas emitted is CO_2, mostly from fossil fuel combustion.

There are typically two terms used when discussing the impacts of climate change: "Greenhouse Gas Mitigation" and "Adaptation." "Greenhouse Gas Mitigation" is a term for reducing greenhouse gas emissions to reduce or "mitigate" the impacts of climate change. "Adaptation" refers to the effort of planning for and adapting to impacts resulting from climate change (such as adjusting transportation design standards to withstand more intense storms and higher sea levels).

There are four primary strategies for reducing greenhouse gas emissions from transportation sources: 1) improve system and operation efficiencies; 2) reduce growth of vehicle miles traveled; 3) transition to lower greenhouse gas fuels; and 4) improve vehicle technologies. To be most effective, all four should be pursued collectively.

Regulatory Setting

This section outlines both state and federal efforts to comprehensively reduce greenhouse gas emisisons from transportation sources.

State

With the passage of several pieces of legislation including State Senate and Assembly Bills and Executive Orders, California launched an innovative and proactive approach to dealing with greenhouse gas emissions and climate.

Assembly Bill 1493 (AB 1493), Pavley, Vehicular Emissions: Greenhouse Gases, 2002: This bill requires the California Air Resources Board to develop and implement regulations to reduce automobile and light truck greenhouse gas emissions. These stricter emissions standards were designed to apply to automobiles and light trucks beginning with the 2009-model year.

Executive Order S-3-05 (June 1, 2005): The goal of this executive order is to reduce California's greenhouse gas emissions to: 1) year 2000 levels by 2010, 2) year 1990 levels by 2020 and 3) 80 percent below the year 1990 levels 2050. In 2006, this goal was further reinforced with the passage of Assembly Bill 32.

AB 32 (AB 32), Núñez and Pavley, The Global Warming Solutions Act of 2006: AB 32 sets the same overall greenhouse gas emissions reduction goals as outlined in Executive Order S-3-05, while further mandating that the California Air Resources Board create a scoping plan and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases."

Executive Order S-20-06 (October 18, 2006): This order establishes the responsibilities and roles of the Secretary of the California Environmental Protection Agency (Cal/EPA) and state agencies with regard to climate change.

Executive Order S-01-07 (January 18, 2007): This order set forth the low carbon fuel standard for California. Under this executive order, the carbon intensity of California's transportation fuels is to be reduced by at least 10 percent by 2020.

Senate Bill 97 (Chapter 185, 2007, Greenhouse Gas Emissions: This bill required the Governor's Office of Planning and Research to develop recommended amendments to the California Environmental Quality Act guidelines for addressing greenhouse gas emissions. The amendments became effective on March 18, 2010.

Senate Bill 375 (SB 375), Chapter 728, 2008, **Sustainable Communities and Climate Protection:** This bill requires the California Air Resources Board (CARB) to set regional emissions reduction targets from passenger vehicles. The Metropolitan Planning Organization (MPO) for each region must then develop a "Sustainable Communities Strategy" (SCS) that integrates transportation, land-use, and housing policies to plan for the achievement of the emissions target for their region.

Senate Bill 391 (SB 391) Chapter 585, **2009 California Transportation Plan**: This bill requires the State's long-range transportation plan to meet California's climate change goals under AB 32.

Federal

Although climate change and greenhouse gas reduction are a concern at the federal level, currently no regulation or legislation has been enacted specifically addressing greenhouse gas emissions reductions and climate change at the project level. Neither the U.S. Environmental Protection Agency (U.S. EPA) nor the Federal Highway Administration (FHWA) has issued explicit guidance or methods to conduct project-level greenhouse gas analysis.[12] The FHWA supports the approach that climate change considerations should be integrated throughout the transportation decision-making process, from planning through project development and delivery. Addressing climate change mitigation and adaptation up front in the planning process will assist in decision-making and improve efficiency at the program level, and will inform the analysis and stewardship needs of project-level decision-making. Climate change considerations can be integrated into

[12] To date, no national standards have been established regarding mobile source greenhouse gases, nor has U.S. EPA established any ambient standards, criteria or thresholds for greenhouse gases resulting from mobile sources.

many planning factors, such as supporting economic vitality and global efficiency, increasing safety and mobility, enhancing the environment, promoting energy conservation, and improving the quality of life.

The four strategies outlined by FHWA to lessen climate change impacts correlate with efforts that the state is undertaking to deal with transportation and climate change; these strategies include improved transportation system efficiency, cleaner fuels, cleaner vehicles, and a reduction in travel activity.

Climate change and its associated effects are being addressed through various efforts at the federal level to improve fuel economy and energy efficiency, such as the "National Clean Car Program" and Executive Order 13514- *Federal Leadership in Environmental, Energy and Economic Performance.*

Executive Order 13514 (October 5, 2009) is focused on reducing greenhouse gases internally in federal agency missions, programs and operations, but also direct federal agencies to participate in the interagency Climate Change Adaptation Task Force, which is engaged in developing a national strategy for adaptation to climate change.

The U.S. Environmental Protection Agency's (EPA) authority to regulate greenhouse gas emissions stems from the U.S. Supreme Court decision in *Massachusetts v. EPA* (2007). The Supreme Court ruled that greenhouse gases meet the definition of air pollutants under the existing Clean Air Act and must be regulated if these gases could be reasonably anticipated to endanger public health or welfare. Responding to the Court's ruling, the U.S. Environmental Protection Agency finalized an endangerment finding in December 2009. Based on scientific evidence, it found that six greenhouse gases constitute a threat to public health and welfare. Thus, it is the Supreme Court's interpretation of the existing act and EPA's assessment of the scientific evidence that form the basis for Environmental Protection Agency's regulatory actions. The U.S. EPA in conjunction with the National Highway Traffic Safety Administration (NHTSA) issued the first of a series of greenhouse gas emission standards for new cars and light-duty vehicles in April 2010.[13]

The U.S. EPA and the National Highway Traffic Safety Administration are taking coordinated steps to enable the production of a new generation of clean vehicles with reduced greenhouse gas emissions and improved fuel efficiency from on-road vehicles and engines. These next steps include developing the first-ever greenhouse gas

[13] http://www.c2es.org/federal/executive/epa/greenhouse-gas-regulation-faq

regulations for heavy-duty engines and vehicles, as well as additional light-duty vehicle greenhouse gas regulations.

The final combined standards that made up the first phase of this national program apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. The standards implemented by this program are expected to reduce greenhouse gas emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016).

On August 28, 2012, the U.S. EPA and NHTSA issued a joint Final Rulemaking to extend the National Program for fuel economy standards to model year 2017 through 2025 passenger vehicles. Over the lifetime of the model year 2017-2025 standards this program is projected to save approximately four billion barrels of oil and two billion metric tons of greenhouse gas emissions.

The complementary U.S. EPA and NHTSA standards that make up the Heavy-Duty National Program apply to combination tractors (semi trucks), heavy-duty pickup trucks and vans, and vocational vehicles (including buses and refuse or utility trucks). Together, these standards will cut greenhouse gas emissions and domestic oil use significantly. This program responds to President Barack Obama's 2010 request to jointly establish greenhouse gas emissions and fuel efficiency standards for the medium- and heavy-duty highway vehicle sector. The agencies estimate that the combined standards will reduce CO_2 emissions by about 270 million metric tons and save about 530 million barrels of oil over the life of model year 2014 to 2018 heavy-duty vehicles.

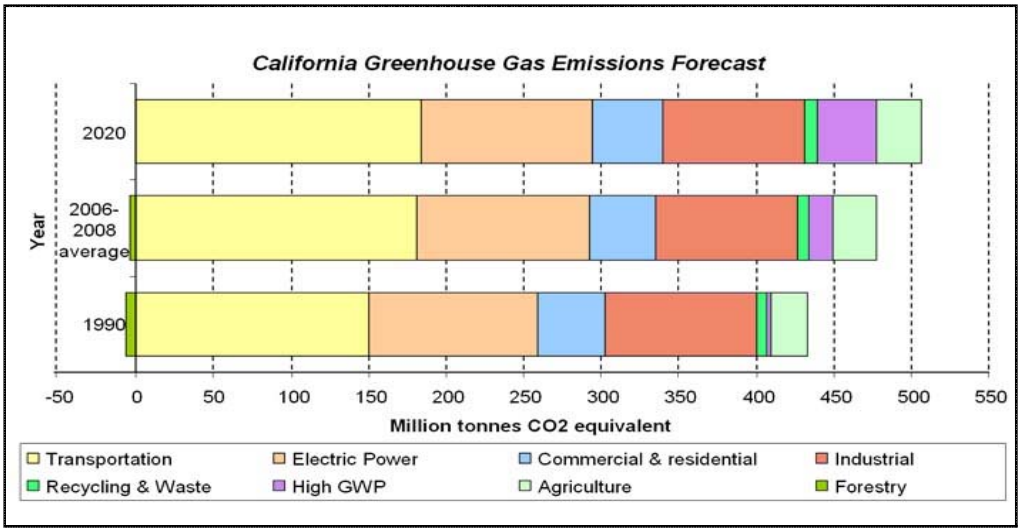
Project Analysis

An individual project does not generate enough greenhouse gas emissions to significantly influence global climate change. Rather, global climate change is a cumulative impact. This means that a project may participate in a potential impact through its incremental change in emissions when combined with the contributions of all other sources of greenhouse gases.[14] In assessing cumulative impacts, it must be determined if a project's incremental effect is "cumulatively considerable." See California Environmental Quality Act Guidelines sections 15064(h)(1) and 15130. To make this determination the incremental impacts of the project must be compared with the effects of past, current, and

[14] This approach is supported by the AEP: *Recommendations by the Association of Environmental Professionals on How to Analyze GHG Emissions and Global Climate Change in CEQA Documents* (March 5, 2007), as well as the SCAQMD (Chapter 6: : The CEQA Guide, April 2011) and the U.S. Forest Service (Climate Change Considerations in Project Level NEPA Analysis, July 13, 2009).

probable future projects. To gather sufficient information on a global scale of all past, current, and future projects in order to make this determination is a difficult if not impossible task.

The AB 32 Scoping Plan mandated by AB 32 includes the main strategies California will use to reduce greenhouse gas emissions. As part of its supporting documentation for the draft Scoping Plan, the California Air Resources Board released the greenhouse gas inventory for California (forecast last updated: October 28, 2010, see Figure 3-1). The forecast is an estimate of the emissions expected to occur in the year 2020 if none of the foreseeable measures included in the Scoping Plan were implemented. The base year used for forecasting emissions is the average of statewide emissions in the greenhouse gas inventory for 2006, 2007, and 2008.



Source: http://www.arb.ca.gov/cc/inventory/data/forecast.htm

Figure 3-1 California Greenhouse Gas Forecast

Caltrans and its parent agency, the Transportation Agency, have taken an active role in addressing greenhouse gas emission reduction and climate change. Recognizing that 98 percent of California's greenhouse gas emissions are from the burning of fossil fuels and 40 percent of all human made greenhouse gas emissions are from transportation, Caltrans has created and is implementing the Climate Action Program that was published in December 2006 (see Climate Action Program at Caltrans (December 2006)).[15]

[15] Caltrans Climate Action Program is located at the following web address: http://www.dot.ca.gov/hq/tpp/offices/ogm/key_reports_files/StateWideStrategy/CaltransClimateActionProgram.pdf

One of the main strategies in the Caltrans Climate Action Program to reduce greenhouse gas emissions is to make California's transportation system more efficient. The highest levels of carbon dioxide from mobile sources, such as automobiles, occur at stop-and-go speeds (0-25 miles per hour) and speeds over 55 miles per hour; the most severe emissions occur from 0-25 miles per hour (see Figure 3-2). To the extent that a project relieves congestion by enhancing operations and improving travel times in high congestion travel corridors greenhouse gas emissions, particularly carbon dioxide (CO_2), may be reduced.

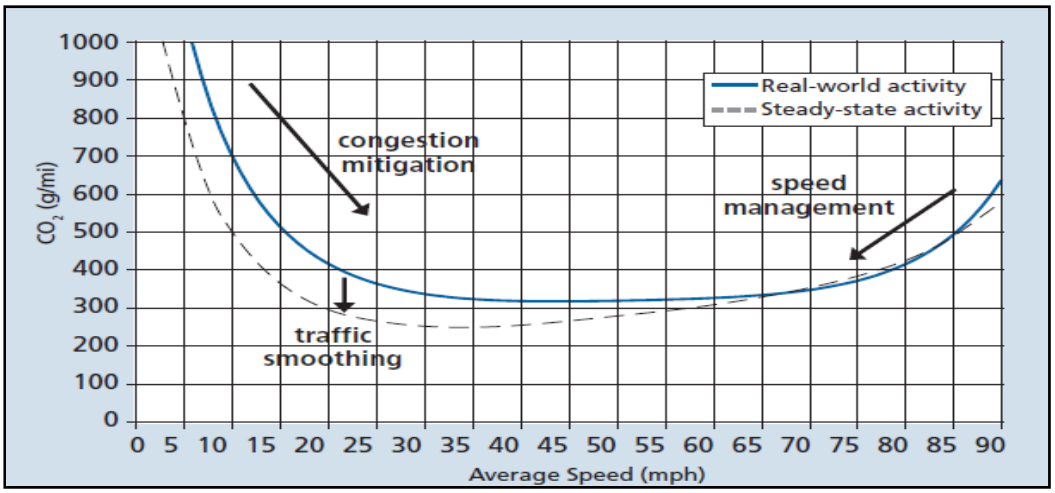


Figure 3-2 Possible Effect of Traffic Operation Strategies in Reducing CO_2 Emission[16]

The proposed project is part of an overall package known as *101 In Motion* (see Section 1.1, Background), which consists of five elements that, together, will implement a multi-modal strategy to accommodate future travel demand while facilitating a modal shift to carpooling, transit, and passenger rail. The project is consistent with and included within the Santa Barbara County Association of Governments approved 2040 Regional Transportation Plan and Sustainable Communities Strategy adopted August 15, 2013. The purpose of the project is specifically to facilitate modal shift to carpooling by adding HOV lanes that provide travel time incentives for carpools. The project would increase roadway capacity as well as vehicle speeds from existing conditions as shown in Section 2.1.5 (Traffic and Transportation) and Tables 2.15 through 2.17.

[16] Traffic Congestion and Greenhouse Gases**:** Matthew Barth and Kanok Boriboonsomsin (TR News 268 May-June 2010)<http://onlinepubs.trb.org/onlinepubs/trnews/trnews268.pdf>

An analysis was conducted for greenhouse gases. The dominant pollutant in greenhouse gases is carbon dioxide (CO_2), which makes up more than 80 percent of these pollutants. Estimated annual carbon dioxide emissions were modeled using CT-EMFAC 2007. Average daily traffic was the same for the No-Build Alternative and the build alternative. Annual average daily traffic includes 8 percent truck traffic.

The results indicate only a rough estimate of emissions based on projected daily vehicles miles traveled. Table 3.1 displays carbon dioxide emissions in tons per year for the build and no-build alternatives.

Table 3.1 Estimated Carbon Dioxide Emissions in Tons per Year for Build and No-Build Alternatives

Scenario	CO_2 (Tons per Year)
2009	4,715.80
2040 Build	7,902.20
2040 No-Build	6,570.40

Based on full Average Daily Traffic
Source: Caltrans Central Region Environmental Engineering

According to the EMFAC modeling results, both the build and no-build alternatives would create more greenhouse gases (CO_2) than the existing condition. In addition, the above numbers indicate the no-build alternative would result in less carbon dioxide than the build alternative. This is due to higher predicted traffic volumes and speeds allowed by the two additional lanes that the project would add to the highway. The lowest emission factors for carbon dioxide occur at about 45 to 50 miles per hour. As speeds both increase and decrease from this point, emission factors for carbon dioxide increase, so even if the traffic volumes for the build and no-build conditions were the same, the project would still show an apparent increase in carbon dioxide emissions.

Based on the project-specific peak-period analysis, the proposed project would have a negligible impact on air quality and relieve a great deal of congestion on the existing through-lanes of the highway while also improving low-speed and idling emissions. Increases in the 2040 build-condition emissions versus the 2040 no-build condition with respect to carbon dioxide is attributable to the addition of the HOV lanes, which allow

higher traffic volumes (re-directed trips back onto the highway system) throughout the corridor and improvement in average vehicle speeds. Optimum vehicle speeds for the combustion of fossil fuels and the subsequent release of emissions occurs at 45 miles per hour. Carbon dioxide emission curves increase from that point as vehicles travel faster.

Limitations and Uncertainties with Modeling

EMFAC

Although EMFAC can calculate carbon dioxide emissions from mobile sources, the model does have limitations when it comes to accurately reflecting carbon dioxide emissions due to impacts on traffic. According to the National Cooperative Highway Research Program report, *Development of a Comprehensive Modal Emission Model* (April 2008) and a 2009 University of California study[17], brief but rapid accelerations, such as those occurring during congestion, can contribute significantly to a vehicle's CO_2 emissions during a typical urban trip. Current emission-factor models are insensitive to the distribution of such modal events (i.e., cruise, acceleration, deceleration, and idling) in the operation of a vehicle and instead estimate emissions by average trip speed. This limitation creates an uncertainty in the model's results when compared to the estimated emissions of the various alternatives with baseline in an attempt to determine impacts. Although work by EPA and the CARB is underway on modal-emission models, neither agency has yet approved a modal emissions model that can be used to conduct this more accurate modeling.

The California Air Resources Board (CARB) is currently not using EMFAC to create its inventory of greenhouse gas emissions. It is unclear why the CARB has made this decision. Its website states only the following:

> REVISION: Both the EMFAC and OFFROAD Models develop CO_2 and CH_4 [methane] emission estimates; however, they are not currently used as the basis for [CARB's] official [greenhouse gas] inventory which is based on fuel usage information. However, ARB is working towards reconciling the emission estimates from the fuel usage approach and the models.[18]

Other Variables

With the current science, project-level analysis of greenhouse gas emissions has limitations. Although a greenhouse gas analysis is included for this project, there are

[17] Matthew Bartha, Kanok Boriboonsomsin. 2009. *Energy and emissions impacts of a freeway-based dynamic eco-driving system.* Transportation Research Part D: Transport and Environment Volume 14, Issue 6, August 2009, Pages 400–410

[18] http://www.arb.ca.gov/msei/offroad.htm

numerous key greenhouse gas variables that are likely to change dramatically during the design life of the proposed project and would thus dramatically change the projected CO_2 emissions.

First, vehicle fuel economy is increasing. The EPA's annual report, "Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012 ," which provides data on the fuel economy and technology characteristics of new light-duty vehicles including cars, minivans, sport utility vehicles, and pickup trucks, confirms that average fuel economy has improved each year beginning in 2005, and is now at a record high.[19] Corporate Average Fuel Economy (CAFE) standards remained the same between model years 1995 and 2003 and subsequently began setting increasingly higher fuel economy standards for future vehicle model years. The EPA estimates that light-duty fuel economy rose by 16 percent from 2007 to 2012. Table 3.2 shows the increases in required fuel economy standards for cars and trucks between model years 2012 and 2025 as available from the National Highway Traffic Safety Administration for the 2012-2016 and 2017-2025 CAFE Standards.

Table 3.2 Vehicle Fuel Economy—Required Miles Per Gallon by Year

	2012	2013	2014	2015	2016	2018	2020	2025
Passenger Cars	33.3	34.2	34.9	36.2	37.8	41.1-41.6	44.2-44.8	55.3-56.2
Light Trucks	25.4	26	26.6	27.5	28.8	29.6-30.0	30.6-31.2	39.3-40.3
Combined	29.7	30.5	31.3	32.6	34.1	36.1-36.5	38.3-38.9	48.7-49.7
Source: EPA 2013, http://www.epa.gov/fueleconomy/fetrends/1975-2012/420r13001.pdf								

Second, near-zero carbon vehicles will come into the market during the design life of this project. According to the 2013 Annual Energy Outlook (AEO2013):

[19] U.S. EPA 2013c. Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2012. Available:< http://www.epa.gov/fueleconomy/fetrends/1975-2012/420r13001.pdf>. Accessed: February 12, 2014.

> "LDVs that use diesel, other alternative fuels, hybrid-electric, or all-electric systems play a significant role in meeting more stringent GHG emissions and CAFE standards over the projection period. Sales of such vehicles increase from 20 percent of all new LDV sales in 2011 to 49 percent in 2040 in the AEO2013 Reference case."[20]

The greater percentage of alternative fuel vehicles on the road in the future will reduce overall greenhouse gas emissions as compared to scenarios in which vehicle technologies and fuel efficiencies do not change.

Third, California has recently adopted a low-carbon transportation fuel standard in 2009 to reduce the carbon intensity of transportation fuels by 10 percent by 2020. The regulation became effective on January 12, 2010 (codified in title 17, California Code of Regulations, Sections 95480-95490). Beginning January 1, 2011, transportation fuel producers and importers must meet specified average carbon intensity requirements for fuel in each calendar year.

Lastly, driver behavior has been changing as the U.S. economy and oil prices have changed. In its January 2008 report, "Effects of Gasoline Prices on Driving Behavior and Vehicle Market, the Congressional Budget Office found the following results based on data collected from California (U.S. Congressional Budget Office 2008):[21]

1. Freeway motorists have adjusted to higher gas prices by making fewer trips and driving more slowly;

2. The market share of sports utility vehicles is declining; and

3. The average prices for larger, less-fuel-efficient models have declined from 2003 to 2008 as average prices for the most-fuel-efficient automobiles have risen, showing an increase in demand for the more fuel-efficient vehicles. More recent reports from the Energy Information Agency[22] and Bureau of Economic Analysis[23] also show slowing re-growth of vehicle sales in the years since its dramatic drop in 2009 due to the Great Recession as gasoline prices continue to climb to $4 per

[20] http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf
[21] U.S. Congressional Budget Office. 2008. Effects of Gasoline Prices on Driving Behavior and Vehicle Market. January 2008. Available: < http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/88xx/doc8893/01-14-gasoline prices.pdf>. Accessed: February 12, 2014.
[22]http://www.eia.gov/oiaf/aeo/tablebrowser/aeo_query_server/?event=ehExcel.getFile&study=AEO2013&region=0-0&cases=ref2013-d102312a&table=114-AEO2013&yearFilter=0
[23] Historical Vehicle Sales: www.bea.gov/national/xls/gap_hist.xls

gallon and beyond (U.S. Energy Information Administration 2013: Table 53, U.S. Bureau of Economic Analysis 2014).

Limitations and Uncertainties with Impact Assessment

Taken from pages 5-22 of the National Highway Traffic Safety Administration Final Environmental Impact Statement for MY2017-2025 CAFE Standards (July 2012), Figure 3-3 illustrates how the range of uncertainties in assessing greenhouse gas impacts grows with each step of the analysis:

> "Moss and Schneider (2000) characterize the "cascade of uncertainty" in climate change simulations (see Figure 3-3). As indicated in Figure 3-3, the emission estimates used in this EIS have narrower bands of uncertainty than the global climate effects, which are less uncertain than regional climate change effects. The effects on climate are, in turn, less uncertain than the impacts of climate change on affected resources (such as terrestrial and coastal ecosystems, human health, and other resources. Although the uncertainty bands broaden with each successive step in the analytic chain, all values within the bands are not equally likely; the mid-range values have the highest likelihood." (National Highway Traffic Safety Administration 2012:5-21)[24]

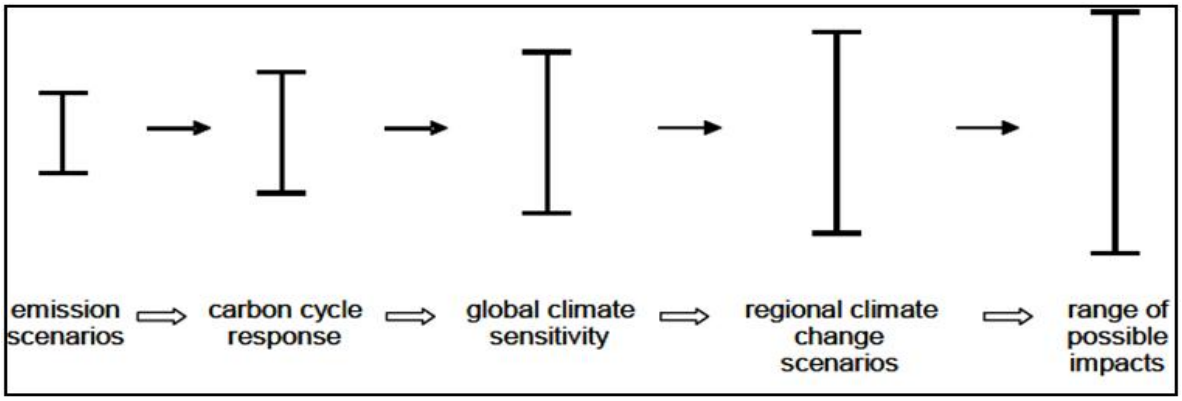


Figure 3-3 Cascade of Uncertainties

[24] National Highway Traffic Safety Administration. 2012. Corporate Average Fuel Economy Standards: Passenger Cars and LIght Trucks Model Years 2017-2025. Final Environmental Impact Statement. July 2012. Docket No. NHTSA-2011-0056. Available:<http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/FINAL_EIS.pdf>. Accessed: February 12, 2014.

Much of the uncertainty in assessing an individual project's impact on climate change surrounds the global nature of the climate change. Even assuming that the target of meeting the 1990 levels of emissions is met, there is no regulatory or other framework in place that would allow for a ready assessment of what any modeled increase in CO_2 emissions would mean for climate change given the overall California greenhouse gas emissions inventory of approximately 430 million tons of CO_2 equivalent. This uncertainty only increases when viewed globally. The IPCC has created multiple scenarios to project potential future global greenhouse gas emissions as well as to evaluate potential changes in global temperature, other climate changes, and their effect on human and natural systems. These scenarios vary in terms of the type of economic development, the amount of overall growth, and the steps taken to reduce greenhouse gas emissions. Non-mitigation IPCC scenarios project an increase in global greenhouse gas emissions by 9.7 up to 36.7 billion metric tons CO2 from 2000 to 2030, which represents an increase of between 25 and 90 percent. (Intergovernmental Panel on Climate Change 2007b)[25]

The assessment is further complicated by the fact that changes in greenhouse gas emissions can be difficult to attribute to a particular project because the projects often cause shifts in the locale for some type of greenhouse gas emissions, rather than causing "new" greenhouse gas emissions. It is difficult to assess the extent to which any project level increase in CO_2 emissions represents a net global increase, reduction, or no change; there are no models approved by regulatory agencies that operate at the global or even statewide scale.

Construction Emissions

Greenhouse gas emissions for transportation projects can be divided into those produced during construction and those produced during operations. Construction greenhouse gas emissions include emissions produced as a result of material processing, emissions produced by onsite construction equipment, and emissions arising from traffic delays due to construction. These emissions will be produced at different levels throughout the construction phase; their frequency and occurrence can be reduced through innovations in plans and specifications and by implementing better traffic management during construction phases.

In addition, with innovations such as longer pavement lives, improved traffic management plans, and changes in materials, the greenhouse gas emissions produced

[25] Intergovernmental Panel on Climate Change (IPCC). February 2007. Climate Change 2007: The Physical Science Basis: Summary for Policy Makers. http://www.ipcc.ch/SPM2feb07.pdf.

during construction can be mitigated to some degree by longer intervals between maintenance and rehabilitation events.

Measures to address construction emissions have been included into the project, including:

- All portable construction equipment should be registered with the state's portable equipment registration program or permitted by the District by September 18, 2008.
- Diesel construction equipment meeting the California Air Resources Board's Tier 1 emission standards for off-road heavy-duty diesel engines should be used. Equipment meeting Tier 2 or higher emission standards should be used to the maximum extent feasible.
- The engine size of construction equipment should be the minimum practical size.
- The number of construction equipment vehicles operating simultaneously should be minimized through efficient management practices to ensure that the smallest practical number is operating at any one time.
- Construction equipment should be maintained in tune per the manufacturer's specifications.
- Construction equipment operating onsite should be equipped with 2 to 4 degree engine timing retard or pre-combustion chamber engines.
- Catalytic converters shall be installed on gasoline-powered equipment, if feasible.
- Diesel catalytic converters, diesel oxidation catalysts and diesel particulate filters as certified and/or verified by the Environmental Protection Agency or California Air Resources Board should be installed on equipment operating onsite.
- Diesel powered equipment should be replaced by electric equipment whenever feasible.
- Idling of heavy-duty diesel trucks during loading and unloading should be limited to 5 minutes; auxiliary power units should be used whenever possible.
- To the extent possible, route and schedule construction traffic to reduce congestion and related air quality impacts caused by idling vehicles along local roads during peak travel times.

- Gasoline-dispensing equipment must have local air district permits, be certified by the California Air Resources Board, and operated in accordance with local air district rules and the Air Board certification requirements. Periodic maintenance and testing are specified under the California Air Resources Board executive order that was issued for the certification and by many local air district rules. Equipment repairs and testing must be performed by trained personnel with proper certifications by the manufacturers and, depending on the air pollution control district, by the International Code Council. In addition, local air pollution control districts generally require records of all repair and testing activities to be maintained onsite.

California Environmental Quality Act Conclusion

As discussed above, both the future with-project and future no-build show increases in carbon dioxide emissions over the existing levels, the future build carbon dioxide emissions are higher than the future no-build emissions. In addition, as discussed above, there are also limitations with EMFAC and with assessing what a given carbon dioxide emissions increase means for climate change. Therefore, it is Caltrans' determination that in the absence of further regulatory or scientific information related to greenhouse gas emissions and California Environmental Quality Act significance, it is too speculative to make a determination regarding significance of the project's direct impact and its contribution on the cumulative scale to climate change. However, Caltrans is firmly committed to implementing measures to help reduce the potential effects of the project. These measures are outlined in the following section.

Greenhouse Gas Reduction Strategies

Caltrans continues to be actively involved on the Governor's Climate Action Team as the California Air Resources Board works to implement Executive Orders S-3-05 and S-01-07 and help achieve the targets set forth in Assembly Bill 32. Many of the strategies Caltrans is using to help meet the targets in AB 32 come from then-Governor Arnold Schwarzengger's Strategic Growth Plan for California. The Strategic Growth Plan targeted a significant decrease in traffic congestion below 2008 levels and a corresponding reduction in greenhouse gas emissions. The Strategic Growth Plan proposes to do this while accommodating growth in population and the economy. The Strategic Growth Plan relies on a complete systems approach to attain carbon dioxide reduction goals: system monitoring and evaluation; maintenance and preservation; smart land use and demand management; and operational improvements as shown in Figure 3-4.

Figure 3-4 Mobility Pyramid

Caltrans is supporting efforts to reduce vehicle miles traveled by planning and implementing smart land use strategies: job/housing proximity, developing transit-oriented communities, and high density housing along transit corridors. Caltrans is working closely with local jurisdictions on planning activities; however, Caltrans does not have local land use planning authority. Caltrans supports efforts to improve the energy efficiency of the transportation sector by increasing vehicle fuel economy in new cars, light and heavy-duty trucks; Caltrans is doing this by supporting ongoing research efforts at universities, by supporting legislative efforts to increase fuel economy, and by participating on the Climate Action Team. It is important to note, however, that control of the fuel economy standards is held by the U.S. Environmental Protection Agency and the California Air Resources Board.

Caltrans is also working toward enhancing the State's transportation planning process to respond to future challenges. Similar to requirements for regional transportation plans under Senate Bill (SB) 375 (Steinberg 2008), SB 391(Liu 2009) requires the State's long-range transportation plan to meet California's climate change goals under Assembly Bill (AB) 32.

The California Transportation Plan is a statewide, long-range transportation plan to meet our future mobility needs and reduce greenhouse gas emissions. The California Transportation Plan defines performance-based goals, policies, and strategies to achieve our collective vision for California's future, statewide, integrated, multimodal transportation system.

The purpose of the California Transportation Plan is to provide a common policy framework that will guide transportation investments and decisions by all levels of government, the private sector, and other transportation stakeholders. Through this policy framework, the California Transportation Plan 2040 will identify the statewide transportation system needed to achieve maximum feasible greenhouse gas emission reductions while meeting the state's transportation needs.

Table 3.3 summarizes statewide efforts that Caltrans is implementing to reduce greenhose gas emissions. More detailed information about each strategy is included in the Climate Action Program at Caltrans (December 2006).

Table 3.3 Climate Change/CO_2 Reduction Strategies

Strategy	Program	Partnership		Method/Process	Estimated CO_2 Savings (MMT)	
		Lead	Agency		2010	2020
Smart Land Use	Intergovernmental Review (IGR)	Caltrans	Local Governments	Review and seek to mitigate development proposals	Not Estimated	Not Estimated
	Planning Grants	Caltrans	Local and regional agencies & other stakeholders	Competitive selection process	Not Estimated	Not Estimated
	Regional Plans and Blueprint Planning	Regional Agencies	Caltrans	Regional plans and application process	0.975	7.8
Operational Improvements & Intelligent Trans. System (ITS) Deployment	Strategic Growth Plan	Caltrans	Regions	State ITS; Congestion Management Plan	.007	2.17
Mainstream Energy & GHG into Plans and Projects	Office of Policy Analysis & Research; Division of Environmental Analysis	Interdepartmental effort		Policy establishment, guidelines, technical assistance	Not Estimated	Not Estimated
Educational & Information Program	Office of Policy Analysis & Research	Interdepartmental, CalEPA, CARB, CEC		Analytical report, data collection, publication, workshops, outreach	Not Estimated	Not Estimated
Fleet Greening & Fuel Diversification	Division of Equipment	Department of General Services		Fleet Replacement B20 & B100	0.0045	0.0065 0.45 .0225
Non-vehicular Conservation Measures	Energy Conservation Program	Green Action Team		Energy Conservation Opportunities	0.117	.34
Portland Cement	Office of Rigid Pavement	Cement and Construction Industries		2.5 % limestone cement mix 25% fly ash cement mix > 50% fly ash/slag mix	1.2 036	4.2 3.6
Goods Movement	Office of Goods Movement	Cal EPA, CARB, BT&H, MPOs		Goods Movement Action Plan	Not Estimated	Not Estimated
Total					2.66	18.67

Caltrans Director's Policy 30 (DP-30) Climate Change (June 22, 2012) is intended to establish a Department policy that will ensure coordinated efforts to incorporate climate change into Departmental decisions and activities.

Caltrans Activities to Address Climate Change (April 2013) provides a comprehensive overview of activities undertaken by Caltrans statewide to reduce greenhouse gas emissions resulting from agency operations.

The following measures will also be included in the project to reduce the greenhouse gas emissions and potential climate change impacts from the project:

- Caltrans Standard Specification Provisions restricts idling time for lane closure during construction to 10 minutes in each direction; in addition, the contractor must comply with Santa Barbara County Air Pollution Control District's rules, ordinances, and regulations in regard to air quality restrictions.
- The project would incorporate the use of energy efficient lighting, such as LED (light-emitting diode) traffic signals.
- Initially, mature landscaping will be removed where necessary to construct the project. However, planting will occur to offset this removal.
- Disturbed areas will be planted with a variety of native and drought-tolerant trees and shrubs in ratios sufficient to replace the air quality and cooling benefit of trees removed by construction of the project. Any native trees removed as part of the project will be replaced at a 3:1 ratio resulting in continued increases to the biomass within the project limits. Additional trees will be planted as space allows to further increase those benefits. Street trees will be planted from large-sized containers to accelerate reestablishment of the greenhouse gas sink and to shade the pavement. Riparian planting will also be included to maintain shade along creek corridors.
- Slope, drainage channels, and other disturbed areas will be seeded with native and drought-tolerant shrubs, perennials and grasses.

To the extent that it is applicable or feasible, the following measures will be incorporated into the project:

- Compost and soil amendments derived from recycled wood products and green waste materials
- Fiber produced from recycled pulp such as newspaper, chipboard, cardboard

- Wood mulch made from green waste and/or clean manufactured wood or natural wood
- Native and drought-tolerant seed and plants species
- Irrigation controllers with "smart" irrigation technology for plants dependent on actual climate conditions
- Pesticide use and reduction goals restriction
- Fly ash in all concrete poured on the project
- Recycled water for irrigation within the Santa Barbara city limits (and elsewhere if available)

Adaptation Strategies

"Adaptation strategies" refer to how Caltrans and others can plan for the effects of climate change on the state's transportation infrastructure and strengthen or protect the facilities from damage. Climate change is expected to produce increased variability in precipitation, rising temperatures, rising sea levels, storm surges and intensity, and the frequency and intensity of wildfires. These changes may affect the transportation infrastructure in various ways, such as damaging roadbeds by longer periods of intense heat; increasing storm damage from flooding and erosion; and inundation from rising sea levels. These effects will vary by location and may, in the most extreme cases, require that a facility be relocated or redesigned. There may also be economic and strategic ramifications as a result of these types of impacts to the transportation infrastructure.

At the federal level, the Climate Change Adaptation Task Force, co-chaired by the Council on Environmental Quality (CEQ), the Office of Science and Technology Policy (OSTP), and the National Oceanic and Atmospheric Administration (NOAA), released its interagency task force progress report on October 28, 2011[26], outlining the federal government's progress in expanding and strengthening the nation's capacity to better understand, prepare for, and respond to extreme events and other climate change impacts. The report provides an update on actions in key areas of federal adaptation, including: building resilience in local communities, safeguarding critical natural resources such as freshwater, and providing accessible climate information and tools to help decision-makers manage climate risks.

Climate change adaptation must also involve the natural environment as well. Efforts are underway on a statewide level to develop strategies to cope with impacts to habitat and

[26] http://www.whitehouse.gov/administration/eop/ceq/initiatives/adaptation

biodiversity through planning and conservation. The results of these efforts will help California agencies plan and implement mitigation strategies for programs and projects.

On November 14, 2008, then-Governor Arnold Schwarzenegger signed Executive Order S-13-08, which directed a number of state agencies to address California's vulnerability to sea level rise caused by climate change. This executive order set in motion several agencies and actions to address the concern of sea level rise.

In addition to addressing projected sea level rise, the California Natural Resources Agency (Resources Agency) was directed to coordinate with local, regional, state, and federal public and private entities to develop the California Climate Adaptation Strategy (Dec. 2009), which summarizes the best-known science on climate change impacts to California, assesses California's vulnerability to the identified impacts, and then outlines solutions that can be implemented within and across state agencies to promote resiliency.

The strategy outline is in direct response to Executive Order S-13-08 that specifically asked the Resources Agency to identify how state agencies can respond to rising temperatures, changing precipitation patterns, sea level rise, and extreme natural events. Numerous other state agencies were involved in the creation of the Adaptation Strategy document, including the California Environmental Protection Agency; Business, Transportation and Housing; Health and Human Services; and the Department of Agriculture. The document is broken down into strategies for different sectors that include: Public Health; Biodiversity and Habitat; Ocean and Coastal Resources; Water Management; Agriculture; Forestry; and Transportation and Energy Infrastructure. As data continues to be developed and collected, the state's adaptation strategy will be updated to reflect current findings.

The National Academy of Sciences was directed to prepare a Sea Level Rise Assessment Report[27] to recommend how California should plan for future sea level rise. The report was released in June 2012 and included:

- Relative sea level rise projections for California, Oregon and Washington taking into account coastal erosion rates, tidal impacts, El Niño and La Niña events, storm surge and land subsidence rates.
- The range of uncertainty in selected sea level rise projections.

[27] *Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* (2012) is available at: http://www.nap.edu/catalog.php?record_id=13389.

- A synthesis of existing information on projected sea level rise impacts to state infrastructure (such as roads, public facilities and beaches), natural areas, and coastal and marine ecosystems.
- A discussion of future research needs regarding sea level rise.

In 2010, interim guidance was released by the Coastal Ocean Climate Action Team (CO-CAT) as well as Caltrans as a method to initiate action and discussion of potential risks to the state's infrastructure due to projected sea level rise. Subsequently, CO-CAT updated the Sea Level Rise guidance to include information presented in the National Academy of Sciences Study.

All state agencies that are planning to construct projects in areas vulnerable to future sea level rise are directed to consider a range of sea level rise scenarios for the years 2050 and 2100 to assess project vulnerability and, to the extent feasible, reduce expected risks and increase resiliency to sea level rise. Sea level rise estimates should also be used in conjunction with information on local uplift and subsidence, coastal erosion rates, predicted higher high water levels, storm surge and storm wave data.

Executive Order S-13-08 also directed the Business, Transportation, and Housing Agency to prepare a report to assess vulnerability of transportation systems to sea level rise affecting safety, maintenance and operational improvements of the system, and economy of the state. The Department continues to work on assessing the transportation system vulnerability to climate change, including the effect of sea level rise.

Currently, Caltrans is working to assess which transportation facilities are at greatest risk from climate change effects. However, without statewide planning scenarios for relative sea level rise and other climate change effects, the Department has not been able to determine what change, if any, may be made to its design standards for its transportation facilities. Once statewide planning scenarios become available, Caltrans will be able review its current design standards to determine what changes, if any, may be needed to protect the transportation system from sea level rise.

Climate change adaptation for transportation infrastructure involves long-term planning and risk management to address vulnerabilities in the transportation system from increased precipitation and flooding; the increased frequency and intensity of storms and wildfires; rising temperatures; and rising sea levels. The Department is an active participant in the efforts being conducted in response to Executive Order S-13-08 and is mobilizing to be able to respond to the National Academy of Science Sea Level Rise Assessment Report.

Sea Level Rise

Sea level rise poses a serious threat to residents and the built environments (including transportation assets) along the California coast. In an effort to better understand potential amounts of rise and the associated impacts, then-Governor Arnold Schwarzenegger signed Executive Order S-13-08. The former Governor called for a proactive approach by directing agencies, who are planning construction projects in areas vulnerable to sea level rise, to begin planning for potential impacts by considering a range of sea level rise scenarios for the years 2050 and 2100. Although Executive Order S-13-08 allowed for some exemptions for routine maintenance projects and for projects programmed for construction through 2013, the intent was to plan ahead to assess project vulnerability and reduce anticipated risks associated with sea level rise. Other California state agencies, commissions and climate action teams are already moving forward to implement guidance on how to address this issue.

Planning for potential impacts to California's infrastructure due to sea level rise requires addressing and including in our planning documents, the cost, scope and schedule of including these measures in our projects. Items that will need to be considered (in addition to enhancing the design of structures) include the potential increased costs of permit fees and mitigation to implement the enhanced designs. It is important to include these considerations in current project planning to reduce the cost and impacts to future project delivery.

Impacts of Sea-Level Rise on the California Coast

The Ocean Protection Council adopted statewide sea level rise guidelines and developed interim guidance in March 2011 from published sea level rise scenarios from a 2010 National Research Council study. Using these adopted guidelines, the statewide sea level rise scenarios were developed by the California Climate Action Team. This team included Caltrans, California Coastal Commission, and 14 other state agencies whose efforts led to the Caltrans "Guidance on Incorporating Sea Level Rise" (March 2011). This common set of values allows all California state agencies to plan for sea level rise with the same assumptions.

The sea level rise projections developed from this effort estimate a 40- to 55-inch increase in mean sea level by 2100 from 2000 levels, using the March 2011 guidelines.

Assuming a 55-inch sea level rise, Caltrans prepared mapping to show those areas at risk[28].

The 100-year flood elevations base flood elevation from flood insurance studies published by the Federal Emergency Management Agency were used as the base elevations for comparisons against additional sea level rise projections.

It is important to note that these maps were not the result of detailed site studies and were created to quantify potential risk over a large geographic area and should not be used to assess actual coastal hazards. In addition, the mapping did not include localized uplift or subsidence, bathymetry, or geological conditions as part of the analysis. However, there is currently no officially accepted mapping available to date. Therefore, this mapping was generated as a rough estimate of potential sea level rise impacts to the infrastructure being proposed with this project assuming that the Public Interest Energy Research numbers are correct for the worst-case scenario.

Impacts from 55-Inch Sea Level Rise in 2100

Mapping prepared by Caltrans is based on data used by the California Climate Action Team that developed interim sea level rise scenarios for the state. The mapping determined three locations within the project limits that would be at risk with a 55-inch sea level rise and no areas at risk of coastal erosion predicted to occur by 2100 (see Figures 3-5, 3-6, and 3-7).

The first location is within the City of Carpinteria centered along the Carpinteria Salt Marsh (post mile 3.0 to post mile 4.8). Because the bulk of the potential flooding is expected to be in the salt marsh and within limited neighborhoods, relocating the freeway is not feasible. The freeway would need to be raised about 6 feet by a viaduct to prevent additional flooding upstream and profile transitions on each end would need to be 0.2 of a mile long. A viaduct could be proposed for the freeway to raise it above the anticipated sea level but would be prohibitively expensive. Raising the freeway using earthen fill would be less expensive than building a viaduct. However, raising the road with earthen fill would likely act like a dam and result in upstream flooding, plus additional impacts.

[28] Caltrans acknowledges that an update to this guidance was released in March 2013 which uses updated analysis from the 2012 National Research Council study (http://www.opc.ca.gov/2013/04/update-to-the-sea-level-rise-guidance-document/). The March 2013 OPC update cited a 16.6 to 65.8 inch increase in mean sea level by 2100 from 2000 levels. As the impacts were estimated here for a 55 inch sea level rise and given the range of uncertainty of future sea-level rise estimates, Caltrans has decided to keep the original sea-level rise analysis using the 55 inch rise estimates.

In this scenario, the following existing ramps in Carpinteria would need to be closed: Santa Monica northbound ramps, Carpinteria Avenue southbound off-ramp, and Santa Claus southbound off-ramp. Constructing a viaduct in this area would have substantial temporary impacts to wetlands and riparian habitat.

The second location that may be subject to additional flooding risk is where Arroyo Paredon Creek crosses the freeway from post mile 5.5 to post mile 5.7. This location is an extremely short section of freeway that would need additional profile transition lengths on each approach to the flooded section to match the raised viaduct creek crossing.

The third location that may be subject to additional flooding risk is near the Andrée Clark Bird Refuge in the City of Santa Barbara (post mile 11.6 to post mile 12.3). In this location, the freeway would need a raised viaduct. The existing Salinas ramps would need to be closed and the Los Patos ramps would also need to be closed.

In addition to the potential impact to the highway, local streets, neighborhoods, farmland, park and recreational areas, Union Pacific Railroad tracks, numerous businesses, and bird refuge and salt marsh may be affected by projected sea level rise. In Carpinteria, nearly all of the neighborhoods southeast of 7th Street to the salt marsh could be inundated by sea level rise. In addition to these areas, homes and businesses along Carpinteria's beachfront north to the farmland across U.S. 101 along Via Real may also be affected by sea level rise. In Montecito, a few homes along the coastline and the stretch between Fernald Point Lane and the area just east of Posilipo Lane could be affected.

Beachfront homes from west of the Four Seasons Resort to about Eucalyptus Lane may be affected by sea level rise. North of U.S. 101 in Santa Barbara, portions of the Montecito Country Club and Municipal Tennis Court could be affected by sea level rise.

The Andrée Clark Bird Refuge could overflow on the sections of East Cabrillo Boulevard, Santa Barbara Zoological Gardens, and over the Union Pacific Railroad tracks.

On Los Patos Way, a few businesses may also be affected if sea water spreads from the refuge (see Table 3.4).

Table 3.4 Impacts to U.S. 101 from a 55-Inch Sea Level Rise

Reconstruction Post Mile to Post Mile	Proposed Additional Construction	Estimated Additional 2011 Cost at $500 per square foot
2.8 to 5.0 Carpinteria	118-foot-wide viaduct/bridge	$685 million
5.3 to 5.9 Arroyo Paredon Creek	118-foot-wide viaduct/bridge	$187 million
11.4 to 12.5 Andrée Clark Bird Refuge	118-foot-wide viaduct/bridge	$343 million

Impacts from 16-Inch Sea Level Rise in 2050

According to California Energy Commission's Public Interest Energy Research Climate Change Research Program and the U.S. Geological Survey, there is potential for up to 16 inches of sea level rise by 2050. However, there is currently no mapping available to indicate areas at risk from flooding and erosion resulting from a 16-inch sea level rise. Assumptions give a general approximation of inundation elevations—such as the 2100 geophysical information system data from Pacific Institute Organization provided in Figures 3-5, 3-6, and 3-7—relative to freeway improvements for 2050 (see Table 3.5).

New flooding limits are projected are centered along the Carpinteria Salt Marsh (post mile 4.3 to post mile 4.6). A viaduct/bridge could be built with profile transitions on each end. The Carpinteria Avenue southbound off-ramp could be raised; however, Carpinteria Avenue just beyond the ramp could be under a foot of water or more and would need to be raised.

Constructing a viaduct/bridge would increase environmental impacts to wetland and riparian habitat. No additional flooding on U.S 101 at the Arroyo Parida (Paredon) or Cabrillo undercrossing is expected with a 16-inch sea level rise. The Los Patos ramps would be underwater.

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**GIS data obtained from the Pacific Institute Organization

Figure 3-5 Sea Level Rise by 2100

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**GIS data obtained from the Pacific Institute Organization

Figure 3-6 Sea Level Rise by 2100

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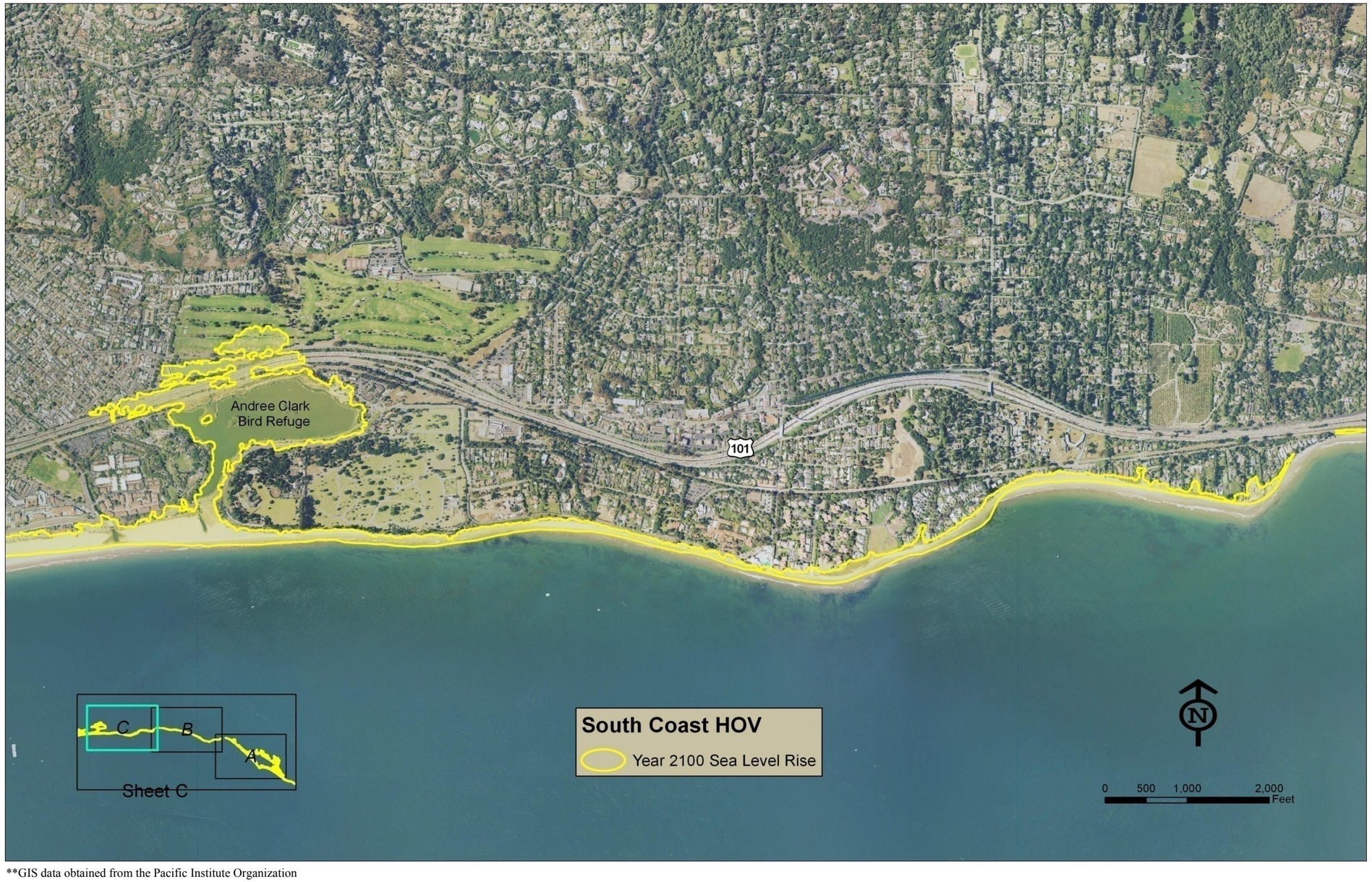

**GIS data obtained from the Pacific Institute Organization

Figure 3-7 Sea Level Rise by 2100

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Table 3.5 Impacts to U.S. 101 from a 16-inch Sea Level Rise

Reconstruction Post Mile to Post Mile	Proposed Additional Construction	Estimated Additional 2011 Cost at $500/square foot
4.1 to 4.7 Carpinteria	118-foot-wide viaduct	$373 million
5.3 to 5.9 Arroyo Paredon Creek	none	$0
11.4 to 12.5 Andrée Clark Bird Refuge	none	$0

Design Life of the Proposed Project

The project would be built in phases based on funding availability. Assuming bridge construction would be completed by 2030, the design life of bridges built as part of this project is 50 years. Using the predicted change in sea level rise along the project limits, the design life of the built bridges would exceed the useful life by 2100.

Redundancy of Routes

In general, the state highway system is limited in its adaptive capacity because of its longitudinal nature and its hard infrastructure. Looking at the state highways as a system, however, some locations are served by multiple routes such as State Route 99 and Interstate 5 in Central and Northern California and Interstate 5 and Interstate 405 in Southern California. However, even in cases where the state highway system does have parallel routes, it is important to keep in mind that the need to move travelers and goods was the reason for building parallel routes.

In the project vicinity, U.S. 101 does not have a comparable parallel route in the event U.S. 101 is inundated from sea level rise. The only other alternative highway that runs parallel to existing U.S. 101 within the project limits is State Route 192. Two-lane State Route 192 is about 0.2 mile to 1.8 miles north of U.S. 101 and crosses the base of the Santa Ynez Mountain Range. Beyond State Route 192, the nearest comparable route is Interstate 5 about 60 miles east of the project site. Other routes leading to the interior portion of the Central Valley from the southern edge of Santa Barbara are State Route 150, State Route 33, and State Route 126. State Route 154 intersects U.S. 101 about 6.5 miles north of the project limits and travels over the San Marcos Pass and through the Santa Ynez Valley. From the U.S. 101 and State Route 154 intersection in Santa Barbara, State Route 154 extends about 33 miles before it reconnects with U.S. Route 101 in Los Olivos.

Goods Movement and Interstate Commerce

U.S. 101 is a critical highway for the movement of commercial goods and travelers. There is no other comparable route that serves the coastal community along the Central Coast. Although State Route 192 runs parallel to U.S. 101, the two-lane highway does not have the traffic capacity, is not feasible for truck traffic due to the winding nature of the highway, has a multitude of stop lights, and would not provide adequate movement of goods and services. No other comparable route or highway exists within the project area.

Evacuations and Emergency Services

U.S. 101 is vital for the efficient movement of emergency service providers. As previously discussed, the alternate route does not provide the ability and capacity to allow emergency service providers to effectively navigate State Route 192 in a timely manner. The other limiting conditions on the route are the following: minimal number of shoulders wide enough to accommodate vehicles pulling over and a minimal amount of queuing (lining up) space at intersections. These conditions would cause a huge increase in emergency response times resulting in substantial delay and would not be effective in the event of emergency evacuations. No other suitable alternative exists for U.S. 101 if the freeway were inundated by flooding or sea level rise within the project area.

Long-Term Coordination and Other Considerations

Sea level rise is far from the only predicted climatic or weather-induced change to the physical environment. Various scenarios of future climate also include higher temperatures, more intense storms that could lead to increased storm surge and wave heights as well as changes to precipitation patterns and intensities.

Sea level rise would likely lead to multiple changes to the physical environment beyond a simple increase in elevation. Higher water levels could also do the following: increase coastal bluff erosion rates; change environmental characteristics that affect material durability such as pH and chloride concentrations; lead to increased groundwater levels; and change sediment movement both along the shore and at estuaries and river mouths.

Currently, the level of uncertainty regarding these other aspects of future climate change is too great to assess with any degree of confidence. As such, Caltrans is continuing to partner with other state, federal, and research entities to better understand and predict magnitudes and severity. Without statewide planning

scenarios for relative sea level rise and other climate change impacts, Caltrans is not able to determine what change, if any, is needed in design standards for its transportation facilities. Once statewide planning scenarios become available, Caltrans will review its current design standards to determine what changes, if any, may be warranted to protect the transportation system from sea level rise.

Ongoing, long-term coordination with local, state, and federal agencies would need to occur to ensure a comprehensive approach to addressing sea level rise. Caltrans recognizes that its facilities are not entities unto themselves. Where Caltrans facilities connect or interface with local agency facilities, there must be effective long-term coordination on sea level rise impacts and means of addressing those impacts as the science surrounding sea level rise continues to develop. Caltrans will continue to coordinate with affected local agencies to determine whether any planning efforts or future improvements are being considered to accommodate sea level rise.

As planning efforts move forward, it will be important to identify which sea level rise scenarios are included in that planning process so that effective negotiations can be undertaken to meet common objectives.

3.3 Mitigation Measures for Unavoidable Significant Impacts under the California Environmental Quality Act

Visual

To maintain the visual quality of the U.S. 101 corridor and to provide a project consistent with community visual resource objectives, the following actions are recommended:

- All soundwalls would include aesthetic treatment such as texture and/or color to blend with the community character.
- To avoid blocking prime ocean views, it is recommended the following soundwalls not be constructed in Summerland:
    - Along northbound U.S. 101 about 200 feet west of Greenwell Road to the Summerland Fire Station
    - Along northbound U.S. 101 from the Evans Avenue undercrossing to the Evans Avenue northbound on-ramp
    - Along northbound U.S. 101 from the beginning of the Evans Avenue northbound on-ramp to about 50 feet west of the beginning of the Evans Avenue northbound on-ramp

  - Along northbound U.S. 101 from the beginning of the northbound Evans Avenue off-ramp to the Evans Avenue undercrossing
  - Along northbound U.S. 101 about 50 feet west of the beginning of the Evans Avenue northbound on-ramp to about 500 feet west of the beginning of the Evans Avenue northbound on-ramp

- All proposed concrete median barrier would include aesthetic treatment such as texture and/or color appropriate for the setting.
- Drainage structures visible from public areas would be designed to visually blend in with the setting as much as possible.
- Modifications to existing bridge structures would reflect the visual character of the existing structures in terms of materials, color, style, and the existing human scale of the area.
- Open-style bridge railing would be used on all new or modified bridge structures.
- If new traffic management system elements such as radar, cameras, and other equipment are added to the project, all visible components would be located in the least obtrusive locations possible and colored to reduce visibility.
- Aesthetic treatments and design such as textured surfaces, architectural relief, and color application would be incorporated into all new bridge structures.
- Any new signage would be located so that it minimizes blocking the view of the Pacific Ocean to the greatest extent feasible, considering the necessary function of the sign.
- All new lighting would minimize excess light and glare by careful placement of the poles, height and position of luminaires (complete lighting units), and the use of shielded lenses where feasible.
- All areas where existing ramps and other paved surfaces are removed and new landscaping is proposed would be made suitable for planting.
- Existing trees and shrubs would be preserved to the greatest extent possible.
- Existing healthy palm trees that would be affected by the project would be transplanted to other areas within the project where feasible.
- Planting would be included with all soundwalls to the greatest extent possible.

- Planting would be included with all retaining walls to the greatest extent possible.
- New landscaping would minimize view blockage of the Pacific Ocean to the greatest extent possible.
- Plants with the potential of becoming skyline trees should be used as much as possible without blocking views of the Pacific Ocean.
- Existing Memorial Oaks would be preserved to the greatest extent feasible, respective of the selected project alternative.
- All new oak trees planted as part of this Memorial Oak tree mitigation measure would be propagated from the existing Memorial Oak trees.
- All new non-oak planting in the vicinity of the Memorial Oaks would be species that are easily differentiated from the Memorial Oaks in terms of their visual character (form, size, color, and or texture).
- Concrete median barriers and new soundwalls in the immediate vicinity of the Memorial Oaks would include aesthetic treatment unique to the Memorial Oaks area.
- The landscaping plan would include historically successful plant species throughout the corridor.
- All aesthetic planting would use larger-container-size plant material. Trees would be planted from, at minimum, 15-gallon containers.
- All permanent storm water treatment measures would be designed to visually fit with the ornamental or natural landscaped roadsides to the greatest extent feasible considering their intended function. Swales, ditches and basins should appear as natural as possible. Built structures would be architecturally treated, colored or hidden from view with planting.

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