# State Routes 1 & 183
## Corridor System Management Plan

Monterey & Santa Cruz Counties
August 2011

DRAFT

CalTrans

**This Corridor System Management Plan (CSMP) has been developed to support the regional transportation planning process.**

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# Executive Summary

Caltrans and our partners are taking a new direction in transportation planning with the creation of Corridor System Management Plans (CSMPs) for corridors associated with the Corridor Mobility Improvement Account (CMIA) funds. CSMP development recognizes the importance of multi-jurisdictional collaboration, to best support and manage multi-modal transportation services and facilities for the traveling public. Californians rely on transportation facilities and services to get to business, recreational, and service destinations, regardless of which agency may operate or fund a facility or service.

The CSMP approach is consistent with the goals and objectives of the Governor's *Strategic Growth Plan*, including public accountability for bond funded projects. Approved by voters in 2006, Proposition 1B created a funding mechanism for large transportation infrastructure projects. The CSMP outlines a foundation to support partnership based, integrated corridor management of various travel modes (passenger rail, transit, cars, trucks, bicycles, walking) and infrastructure (railroad tracks, stations, roads, highways, information systems, bike routes), to provide mobility in the most efficient and effective manner possible. This approach brings facility operations and transportation service provision together with capital projects into a coordinated system management strategy that focuses on high demand travel corridors such as State Routes 1 & 183. This CSMP directly supports the implementation of two projects in the corridor: 1) a new interchange construction at the intersection of Salinas Road and State Route 1 in Monterey County and 2) the Soquel-Morrissey auxiliary lane project in Santa Cruz County. Additionally, proposed extension and station improvement to the Cal Train system along the SR 183 corridor will facilitate coordination between modes.

The objectives of the CSMP are to reduce travel time or delay on all modes, reduce traffic congestion, improve connectivity between modes and facilities, and expand mobility options along the corridor in a cost effective manner. The CSMP identifies key stakeholders, the managed network, current management strategies, existing travel conditions, major challenges to maintaining and improving mobility, and potential future management strategies and capital improvements. The managed transportation network for this SR 1 & SR183 CSMP includes the segment of SR 1 between the junction of SR 68 West in Monterey County and King Street in the City of Santa Cruz. Due to the proximity of the CMIA Soquel-Morrissey auxiliary lane project, it was agreed at the Interagency Technical Advisory Committee of the Santa Cruz County Regional Transportation Commission that King Street would be the northern terminus for the plan. Future analysis could examine more of SR 1 beyond King Street. The Plan also includes SR 183 from Lincoln Street to the junction of SR 1, as well as select parallel and connecting roadways, transit facilities that include express and regional bus services, and bike routes that are located roughly parallel to the corridor. While the most detailed information and analysis in the CSMP is on the SR 1 mainline, where available, information and analysis has been included on the corridor as well. This is the first iteration of the CSMP and future versions will include further analysis of the corridor as it becomes available. Establishing priorities and developing a funding framework are critical to implementing a successful and competitive plan for the corridor. Funding will be an essential component to the successful implementation of projects and programs in the SR 1 corridor. The CSMP is intended to provide technical information that

would inform the prioritization of projects in the regional transportation plan (RTP) process. The development of the RTP evaluates fiscal constraints.

## *Corridor Characteristics*

The Monterey Bay region is one of the largest generators of economic activity in California and the nation with robust sectors in tourism, agricultural production, education, and high technology.

The SR 1 & SR 183 corridor has a mixed urban and rural character. SR 1 serves as the main connection between the communities of Santa Cruz and Monterey counties. Employment is concentrated near the cities of Santa Cruz, Monterey and Salinas to the east. As a result, in Santa Cruz there is more commute period traffic congestion northbound in the morning and southbound in the evening. In Monterey there is more commute period traffic congestion southbound in the morning and northbound in the evening.

The corridor is also the primary coastal route between the San Francisco Bay Area and the Big Sur Coast and is an important transportation link for long-distance travel for both business and leisure. In addition, it is an important route for freight movement by truck and rail. Truck traffic ranges from 10-15% on SR 1

SR 1 and many of the major parallel streets in each county are at or near capacity during some part of the peak commute periods. Even small variations in traffic volume or incidents can greatly increase congestion and delay. Because of the scenic beauty in the corridor and the attraction of the corridor beaches, the traffic on the weekends, during the summer, or for special events can be much more congested.

There have been significant efforts to provide alternative modes of travel for commute and non-commute travel in the two counties. These include local and express bus service, demand-responsive paratransit services, bicycle routes, multi-use trails, ridesharing services, employer-based flexible work schedules, and other trip reduction programs. Passenger rail service is also provided by Amtrak (the Coast Starlight service between Los Angeles to Seattle via Salinas), but the existing intercity service schedule does not offer a meaningful option for commute travel. Along the SR 183 corridor significant efforts are underway by the Transportation Association for Monterey County (TAMC) to develop and expand the existing Caltrain system from the southern terminus at Gilroy to the City of Salinas rail station with a new station planned in Pajaro.

***Figure E.1 State Route 1 / 183 CSMP in District 5***

## *Corridor Performance*

Traffic congestion on SR 1 in Monterey County is concentrated by time of day with many southbound commuters traveling from Santa Cruz County to work on the Monterey Peninsula during the morning peak and returning home in the northbound afternoon peak. Within Monterey County, the Transportation Agency of Monterey County (TAMC) in its 2010 Regional Transportation Plan (RTP) and the 2008 Regional Development Impact Fee identifies projects that will significantly help to decrease the amount and frequency of projected corridor delay.

Morning congestion northbound along SR 1 in Santa Cruz County is caused mainly by the commute north to jobs in the Santa Cruz urban area and the San Francisco Bay Area via SR 17. Southbound morning traffic is affected by commute travel to the Monterey Peninsula and Salinas and to locations within Santa Cruz County. The improvements recently constructed, anticipated for construction, or planned in Santa Cruz County include the SR1/SR17 Interchange Improvements and the Soquel-Morrissey Auxiliary Lanes Project. In addition, the Santa Cruz County Regional Transportation Commission (SCCRTC) is planning for the addition of high-occupancy vehicle lanes which will reduce the congestion, increase bus use and carpooling. These projects will decrease the amount and frequency of delay within the corridor.

## *Recommendations*

The primary purpose of SR 1 & SR 183 CSMP is to develop strategies to manage the corridor and sustain existing transportation investments. The following management strategies will be used to manage SR 1 & 183 over the next 20 years:

**Maintenance and Preservation:** Continue cost-effective maintenance of the roadway to ensure safe use of the corridor. This would include maintenance and preservation designed to get full return on system investments, as well as reduce traveler costs and delay. Work in this area would include continued identification of pavement needs through the pavement condition survey and addressing those needs through the State Highway Operation and Protection Program (SHOPP). The stakeholder agencies in the corridor should also continue maintenance of local streets and roads.

**Transit/Rail:** The stakeholder agencies in the corridor should continue to support the improvement of transit service. Adding new express bus service and/or frequency could take advantage of the new high occupancy vehicle (HOV) lanes planned for the Santa Cruz corridor. Stakeholder agencies should also consider enhancing the attractiveness and convenience of the passenger rail service along the corridor and between the San Francisco Bay Area and the Monterey Peninsula.

**Land Use & Transportation Connection:** The way communities are planned and designed has an impact on travel behavior. Land use and transportation must be more closely linked. To achieve this strategy, Caltrans will partner with local agencies and participate in the development review process. This process has two main elements: general plans and development projects. An additional opportunity to partner and facilitate a connection between land use and transportation is the development of *Envisioning the Monterey Bay Area: A Blueprint for*

*Sustainable Growth and Smart Infrastructure*, otherwise known as the Blueprint. Regional Blueprint Program: *AMBAG Blueprint Planning*. The program was designed to integrate long-range planning for transportation, land use, housing, environmental resources, and infrastructure into a common vision. Most importantly, *Envisioning the Monterey Bay Area* will lay the foundation for the Sustainable Communities Strategy (SCS) for the Monterey Bay Area, which is planned for adopted in late 2012 or 2013. Each Metropolitan Planning Organization (MPO) in California is responsible, pursuant to statute (SB 375), for developing an SCS that demonstrates how, through more efficient coordination of land use decisions and transportation investments, each region can reduce per capita greenhouse gas emissions from cars and light trucks.

**Transportation Demand Management:** Reduce congestion with programs that increase the use of transit, improve bicycle and pedestrian access and encourage programs such as carpools, ridesharing, telecommuting, flexible work schedules, and park-and-ride facilities to reduce the demand.

**Intelligent Transportation Systems (ITS) /Traveler Information / Traffic Management / Incident Management:** Collisions and incidents can be a major source of delay along a corridor. Reducing the time required to clear these collisions and incidents and restore full flow within the corridor reduces delay and reduces diversion of traffic onto the local arterials. The need for Freeway Service Patrol (FSP) is determined by congestion in an area. Improving system monitoring could provide the necessary information to determine a need for FSP in Monterey County and to evaluate the existing FSP in Santa Cruz County. Local agencies can consider FSP as an option once the need has been identified. In addition, it is recommended to upgrade communication and enable deployment of advanced transportation systems, to improve safety, incident response, and traveler information. 511 planning is already underway and should be lead at the regional level. Real time traveler information allows travelers to make more informed decisions regarding trip planning, route choices and mode selection. Traffic management reduces congestion through the use of technologies such as collision warning systems and advanced traffic management systems. Incidents are the primary cause of unexpected and variable delay. By improving incident management and response time, reductions occur in congestion and travel delay.

**Modal Options:** The focus is to provide viable transportation options for all users. Greater opportunity to use other transportation modes will reduce demand on SR 1 & SR 183. Continued effort that supports the development of the Cal Train system will provide connection to a multi-modal option within the corridor. This includes the design and construction of safe, convenient, and efficient facilities and programs that support the integration of transit, bicycle, and pedestrian transportation into a coordinated multimodal transportation system.

**Ramp Metering:** Ramp metering has the potential to maximize the productivity of the freeway. When combined with other recommended strategies, ramp metering accommodates greater vehicle throughput. A ramp metering plan should identify the capacity of on-ramps and install metering hardware on appropriate ramps while also addressing the potential impact on local roads and funding challenges. A successful ramp metering plan will require a partnership with local agencies. As congestion builds Caltrans would look to its local partners to collaborate.

**Operational Improvements:** Add auxiliary lanes, intersection improvements, and other system refinements at appropriate locations in order to reduce delay, preserve and enhance existing services, while noting that operational improvements alone do not solve corridor capacity needs. Funding challenges for operational improvements will require support at the local level.

**Intersection Upgrades**: Traffic studies demonstrate that the existing intersections are projected to provide lower level of service. The focus is to redesign and modernize the intersections to reduce delay, which would maximize throughput on the State Highway and the parallel routes. These upgrades may include improving the parallel local road network, adding turn-movement storage, deceleration and/or acceleration lanes to the intersection, and converting at-grade intersections to grade-separated interchanges. Such upgrades should be evaluated individually to ensure appropriate cost/benefit to the system.

**Parallel Road Network Development:** Increase the capacity, operational efficiency, and connection on the parallel road network to reduce local traffic demand on SR 1. Emphasis on multimodal east-west connections that have bearing on the SR-1 north-south congestion should be closely monitored through increased detection. East-west connectors, such as SR 68, SR 156, SR 129, SR 183, and County Road G-12 in Monterey County will need detection and system monitoring to understand the causality of bottlenecks in the region.

**System Improvements**: To improve mobility, accessibility, reliability, reduce congestion, and improve safety by improving capacity on the existing system.

## *Implementation*

CSMPs provide guidance for transportation planning efforts. They also promote the integration of all travel modes through a framework of partnership and collaboration with local agencies that have land use authority. Successful implementation of CSMPs depends on effective collaboration in communities that have jurisdiction over sensitive coastal and visual resources so that future transportation improvements are consistent with the goals and policies of those communities. For example, some communities object to the visual changes with additional roadside features and will only accept them under a narrow set of conditions, which may not be practical in all situations. The need for partnership will result in projects that are feasible and sensitive to local concerns.

# Chapter 1 Introduction to the State Routes 1 and 183 Corridor System Management Plan

## *1.1 What is a Corridor System Management Plan?*

A Corridor System Management Plan (CSMP) is a planning tool that analyzes the existing transportation system and maximizes efficient and effective mobility in a corridor. It is partnership-based and integrates management of various travel modes (transit, cars, trucks, bicycles) and infrastructure (roads, highways, information systems, bike routes). The CSMP establishes a process to manage a set of transportation components within a corridor to be managed as a system rather than as independent units. As California shifts towards more performance-based transportation system management, CSMPs will become an essential tool for protecting current and future infrastructure investments as well as coordinating a multi-modal approach to corridor improvements. The CSMP will evolve with changing development patterns, travel demands, and technological innovations. This CSMP is the "first generation CSMP," to be followed by updates as information is collected over time.

The CSMP focuses on strengthening partnerships, gathering and analyzing data, monitoring the transportation system performance, implementing operational strategies, and identifying strategic capital investment. The objectives of the CSMP are to identify strategies that would reduce travel time or delay on all modes, reduce traffic congestion, improve connectivity, and expand mobility options along the corridor in a cost effective manner. The CSMP identifies key stakeholders, the transportation network, current management strategies, existing travel conditions, major challenges to maintaining and improving mobility, and potential future management strategies and capital improvements.

The CSMP is consistent with the Association of Monterey Bay Area Governments' (AMBAG) Metropolitan Transportation Plan (MTP) and current blueprint effort. The CSMP is also consistent with the Regional Transportation Plans (RTP) of the Transportation Agency for Monterey County (TAMC) and the Santa Cruz County Regional Transportation Commission (SCCRTC). The CSMP includes major projects listed in the current RTPs. CSMPs will assist in fulfilling the goals recently enacted by legislation such as Assembly Bill 32 that addressed air quality and greenhouse gas emissions and Senate Bill 375 that addresses land use. The CSMP is also consistent with Caltrans policy such as Deputy Directive (DD) 64, *Complete Streets*.

CSMPs are required for corridors associated with Corridor Mobility Improvement Account (CMIA)-projected funded by the ***Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Ac****t* of 2006, Proposition 1B. The CSMP for State Route 1, Figure 1.1, shows the Proposition 1B funds that have been allocated for the construction of the Soquel-Morrissey auxiliary lane project and the Salinas Road interchange. Maximizing the throughput on the mainline and providing local connectivity will prolong the need for capital investments along the corridor. The total bond funding in the corridor project is $45.4 million.

| Table 1.1 CSMP Projects with Proposition 1B Funding | | | |
|---|---|---|---|
| **Route** | **County** | **Project Description** | **Funding Allocated** |
| 1 | Santa Cruz | Soquel-Morrissey Auxiliary Lanes | $16.2 million |
| 1 | Monterey | Salinas Road Interchange | $29.2 million |

This CSMP is based on technical information that is divided into three chapters:

- Chapter 1: Provide an overview of the corridor system management planning process and CSMPs relate to other state, regional, and local planning documents.

- Chapter 2: Describe existing corridor management activities, including all facilities and services currently in use to maximize mobility within and through the corridor, such as traffic operations system elements, traveler information services, and transportation demand management programs.

- Chapter 3: Provide an assessment of current corridor performance by identifying the major deficiencies inhibiting efficient corridor operations for each element (mode) of the CSMP transportation network. In addition, it provides an assessment of strategies that when implemented would further the current investment within the corridor.

## *1.2 The Importance of the Corridor for Economic Development*

The Monterey Bay region is a key player in the California and national economies with most of the economic activity in the area depending in one way or another on State Route 1 & 183 corridor. The region sits at the northern end of the Salinas Valley, which is home to a $2.5 billion agricultural industry, making it the number one vegetable-producing region in the nation according to the United States Department of Agriculture. The area supplies 80 percent of the nation's lettuces and nearly the same percentage of artichokes. Grape production for wine is also a large cash crop.

Tourism is a significant industry in the Monterey Bay region. In addition to serving as the northern gateway to the scenic Big Sur coastline, Monterey's tourist attractions include Cannery Row, scenic 17-mile drive, and the Monterey Bay Aquarium, which has an average of almost 1.7 million visitors every year. In Santa Cruz, tourist attractions include the area's beaches, boardwalk, and redwood state parks.

Other notable economic drivers in the Monterey Bay region include education and high technology. The largest educational institution is the University of California, Santa Cruz, which has over 16,000 students and employs over 2,500 workers. Other educational institutions include the California State University Monterey Bay, Cabrillo Community College, the Monterey

Institute of International Studies, the Defense Language Institute Foreign Language Center (DLIFLC) and the Naval Postgraduate School. Due to its close proximity to neighboring Silicon Valley, several major high technology companies are based in the Monterey Bay region including Seagate Technology and Plantronics, among others.

## *1.3 Need, Purpose, Goal and Objectives*

The RTPs, the MPO blueprint effort, and local general plans address large geographic areas within a region. Transportation Concept Reports (TCR), transit plans and capital improvement programs do not typically mix operational strategies and capital projects across agencies, inclusive of all modes, along a corridor that extends many miles.

There is a need for a planning approach that coordinates transportation facility operations and service with capital projects to produce a seamless transportation system focusing on high-demand corridors, such as SR 1. The purpose of the CSMP is to create a partnership planning process and resulting guidance document that focuses on system management strategies that coordinate all the individual transportation modes and that includes performance measures to track the effectiveness of the strategies and projects. The goal of the CSMP is to improve mobility along the SR 1 corridor by the integrated management of the transportation network including the selected highway, parallel/connector roadways, transit, bicycle, and travel demand management components of the corridor. Managing the facilities in a multi-modal approach will ensure that the benefits from investments made in the corridor can be sustained over time. The objective of the CSMP is to identify strategies that would improve safety, reduce travel time delay, improve connectivity, and expand mobility options along the corridor in a cost effective manner. Implementation of the CSMP will improve safety on the transportation system and improve connectivity to jobs, housing, and commerce.

## *1.4 Relationship to Other Plans*

### 1.4.1 State Planning

The CSMP approach is consistent with the goals and objectives of the Governor's Strategic Growth Plan (approved 2006), which among other things commits to minimizing increases in traffic congestion. Key elements of the strategy are illustrated in Figure 1.2.

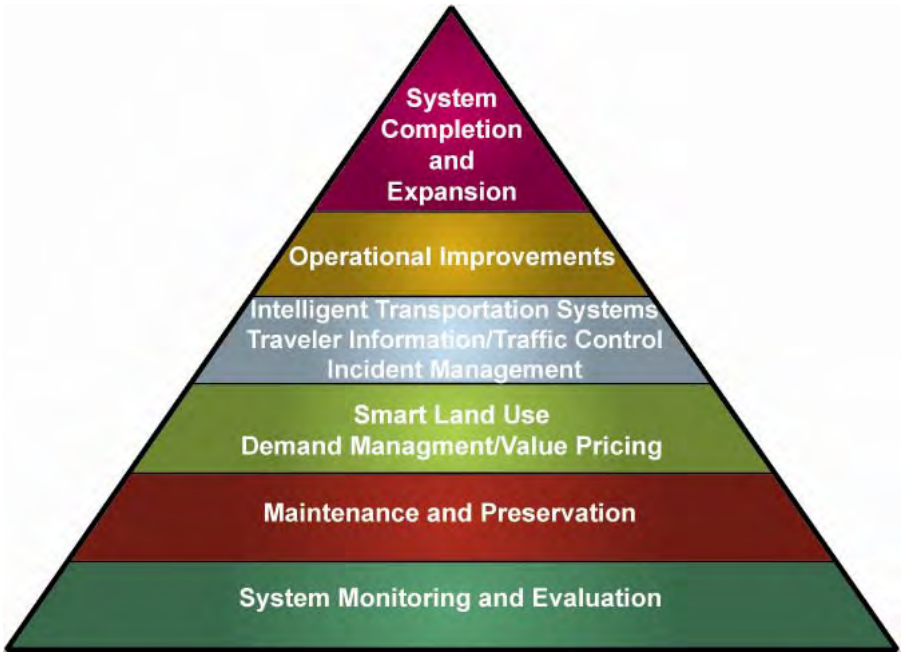



***Figure 1.1 Strategic Growth Plan Mobility Pyramid***

At the base of the pyramid, and the foundation of transportation system management, is system monitoring and evaluation. It is essential to understand what is happening on the transportation system so that the best decisions can be made based on reliable data. The next few layers up the pyramid are focused on making the best use of existing resources and reducing the demand for new transportation facilities, particularly for peak hour travel. The top layer of the pyramid is system expansion. This layer assumes that all the underlying components are being addressed and that system capacity expansion investments are necessary. As a performance-based approach, the CSMP compliments the goals of the Strategic Growth Plan and establishes a process for managing transportation components within the corridor as a system rather than as independent units.

In addition to the Governor's Strategic Growth Plan, there are a number of state planning documents that have been used as the foundation for the preparation of this CSMP. Baseline analysis and state system components were identified and defined using planning documents prepared by Caltrans, which include the *2006 California Transportation Plan*, the *1998 Interregional Transportation Strategic Plan* (ITSP), and several Caltrans District 5 plans that include the *2005 District System Management Plan* (DSMP), the 2*006 State Route 1*

*Transportation Concept Report*. The CSMP is a more comprehensive partnership based approach to corridor analysis.

### 1.4.2 Regional Planning

At the metropolitan planning level, AMBAG is currently in the process of developing its *2035 Regional Blueprint: Envisioning the Monterey Bay Area*, a collaborative effort to develop a regional growth and conservation strategy. The Blueprint focuses on improved mobility, accessibility, and coordinated transportation and local land use that accommodate the region's future population but also preserve the most important agricultural lands and conservation areas. The Blueprint builds upon the existing transportation system and the major projects and programs in progress, while looking toward the future and identifying needs and priorities. The Blueprint is currently in progress and is expected to be completed in early 2011.

At the regional level for Monterey County, TAMC updated its Regional Transportation Plan (RTP) in May of 2010. In Santa Cruz County, SCCRTC updated its RTP in June of 2010. The RTP provides a basis for the planning and programming of local, state, and federal transportation funds to transportation projects in Monterey County for the next 25 years according to state and federal requirements. The RTPs identify existing and future transportation related needs, considers all modes of travel, and identifies what can be completed with anticipated available funding for projects and programs.

The CSMP is consistent with AMBAG's existing Metropolitan Transportation Plan (MTP) and the Regional Transportation Plans (RTP) of SCCRTC and TAMC. In addition, Caltrans will continue to work collaboratively with AMBAG, SCCRTC, and TAMC to ensure that subsequent updates are incorporated and consistent with Caltrans planning efforts.

In Santa Cruz County, SR 1 runs through the unincorporated community planning areas of Aptos, Aptos Hills, LaSelva, Live Oak, Pajaro Valley, San Andreas, and Soquel. In Monterey County, SR 1 runs through the unincorporated community planning areas of North County Coastal, Greater Salinas, Greater Monterey Peninsula, Fort Ord, Castroville, and Moss Landing (See Figure 1.2). Development of these community area plans identifies improvements to adjacent highways to address local access, reduce demand and improve local circulation. Table 1.1 and 1.2 identify recommended improvements to SR 1 and SR 183, however traffic analysis for the listed projects has not been completed. To identify need and/or benefits from implementing the proposed improvements in the general plans and community plans, detailed traffic analysis would be required.

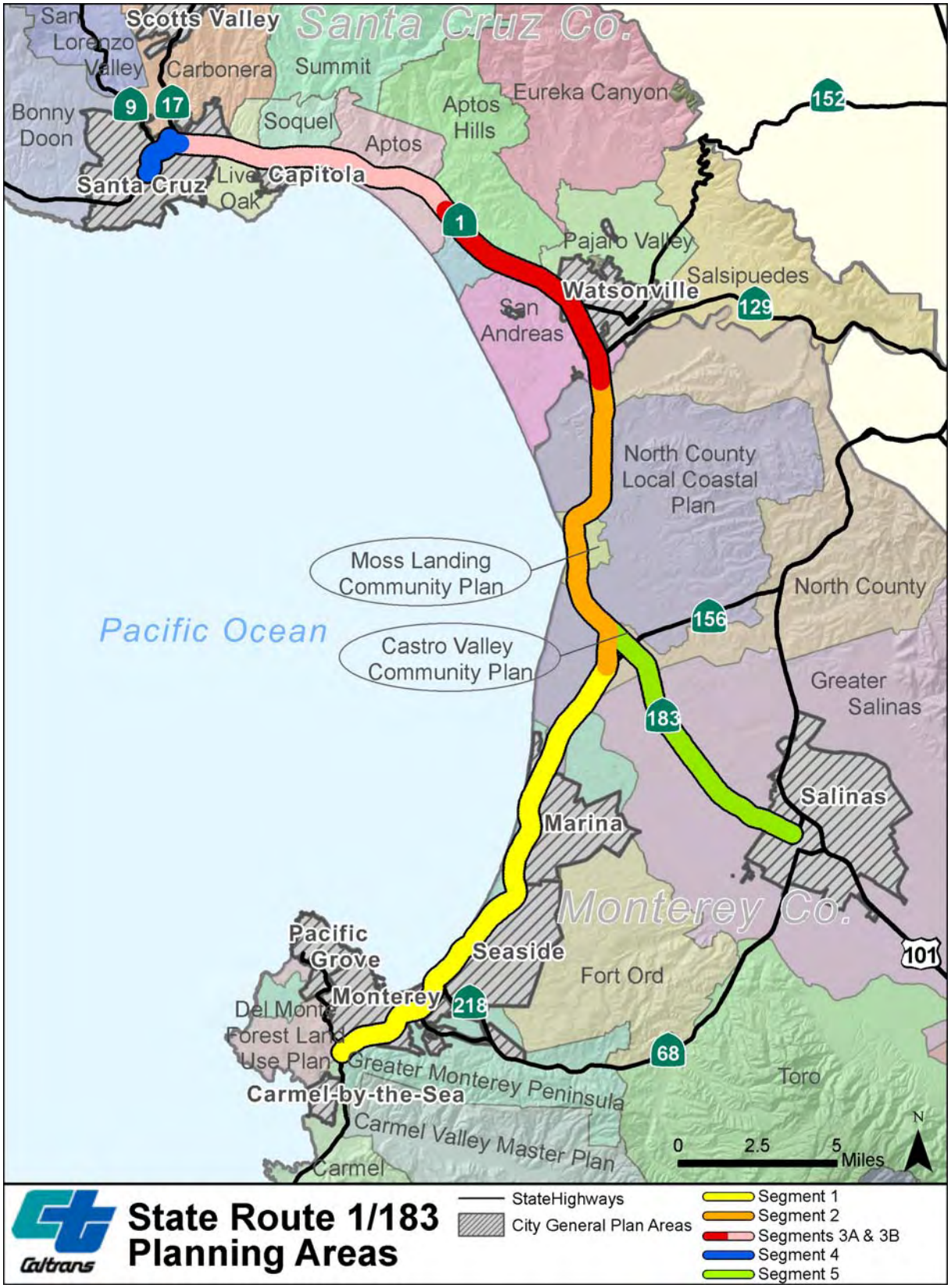



*Figure 1.2 Planning Areas in Monterey and Santa Cruz counties*

| Table 1.1 Monterey County Area Plan Circulation Recommendations to SR 1 / 183 | |
|---|---|
| **Area Plan** | **Recommendations** |
| North County Land Use Plan, 1999 * | Upgrade SR 1 to a four-lane divided scenic highway and limit access points to Jetty Road, Dolan Road, Moss Landing, and Porter Road. |
| Castroville Community Plan, 2007 | • Construct Artichoke Avenue (Phase I) at the SR 1 / Merritt Street (Highway 183) intersection to Mead Street including an off ramp from southbound SR 1 and right turn acceleration from northbound Merritt Street (SR 183) to northbound SR 1<br>• Lengthen the second northbound and southbound through lanes on Merritt Street (SR 183) at the SR 156 interchange<br>• Lengthen the second through lanes on Merritt Street (SR 183) and add another northbound right turn lane onto the eastbound SR 156 on ramp at Merritt Street |
| Moss Landing Community Plan, 1985 | SR 1 should be improved as a four lane divided scenic highway. Access points to SR 1 shall be consolidated and limited to Jetty Road, Dolan Road, Moss Landing Road and Potero Road |
| Greater Salinas Area Plan, 1995 | No proposed recommendation to SR 1 or SR 183 |
| Greater Monterey Peninsula Plan, 1995 | No proposed recommendation to SR 1 or SR 183 |
| Ford Ord Master Plan, 1997 | No proposed recommendation to SR 1 or SR 183 |

**Note: Monterey County is currently updating its Moss Landing Community Plan within the North County Land Use Plan. Recommendations are derived from the approved 1999 North County Land Use Plan.*

| Table 1.2 Santa Cruz County Area Plan Circulation Recommendations to SR 1 / 183 | |
|---|---|
| **Area Plan** | **Recommendations** |
| Carbon era Area Plan, 1993 | Reconstruct SR 17 / SR 1 interchange |
| Live Oak Area Plan, 1993 | Realign Soquel Ave interchange and add HOV lanes to SR 1 |
| Soquel Planning Area, 1993 | Add HOV lanes to SR 1 |
| Aptos Planning Area, 1993 | Widen Rio Del Mar overpass and add HOV lanes to SR 1 |
| Pajaro Valley Planning Area, 1993 | No proposed recommendation to SR 1 or SR 183 |
| Santa Cruz County General Plan, 2003 | • Add HOV lanes to SR 1<br>• Upgrade SR 1 / SR 17 interchange<br>• Widen Del Mar overpass and make intersection improvements |

### 1.4.3 Local Planning

The following cities are located along State Routes 1 and 183: Monterey, Del Rey Oaks, Seaside, Sand City, Salinas, Watsonville, Capitola, and Santa Cruz. The following table indentifies planned improvements to the corridor as listed in the SCCRTC and TAMC RTPs as constrained or unconstrained projects. Table 1.3 identifies recommended improvements to SR 1 and SR 183; however traffic analysis for the listed projects has not been completed for all projects. To identify need and/or benefits from implementing the proposed improvements in the city general plans, detailed traffic analysis would be required.

**Table 1.3 RTP Project Improvements to SR 1 / 183 by City**

| Area Plan | Recommendations |
|---|---|
| Monterey | No proposed recommendation to SR 1 or SR 183 |
| Del Rey Oaks | No proposed recommendation to SR 1 or SR 183 |
| Seaside | No proposed recommendation to SR 1 or SR 183 |
| Sand City | No proposed recommendation to SR 1 or SR 183 |
| Marina | Reconstruct SR 1/12th Interchange |
| Salinas | Pedestrian improvements to SR 183 at Lincoln Street for Salinas Commuter Rail Station |
| Watsonville | Reconstruct current half interchange at Harkins Slough Road to add on and off ramps to the northern side of the interchange in order to relieve congestion at Main Street (Hwy 152)/Green Valley Road intersection. Widen bridge, add bike lanes and sidewalks |
| Capitola | Widen Hwy 1 overpass to 3 lanes in each direction, bike lanes, addition of stacking lanes to SB and NB off-ramps, ramp improvements, ramp metering |
| Santa Cruz | • Install sound wall on Hwy 1: River to Chestnut<br>• SR 1 / SR 9 Intersection modifications including new turn lanes, bike lanes/shoulders<br>• SR 1 / King signalized intersection design modification<br>• Install a Class 1 bicycle facility on freeway overpass at Morrissey<br>• Mission Street (Highway 1) widening – Highland Avenue to Fair Avenue – four through lanes and protected left turns at all signalized intersections<br>• SR 1 / SR 17 interchange realignment<br>• Construction of SR 1 / Mission / Chestnut grade separation<br>• HOV lane project<br>• SR 1 bridge widening over San Lorenzo River<br>• Install concrete median barrier from SR 9 to Mission Street<br>• Construct alternate access ramps at Harvey West Industrial Park |

### 1.4.4 Air Quality Planning

The Monterey County Air Pollution Control District was created by the Monterey County Board of Supervisors in 1965. In 1968 Santa Cruz County joined Monterey County to form a unified district. In 1969 the State designated the counties of Monterey, San Benito, and Santa Cruz as the North Central Coast Air Basin. On July 1, 1974 the Monterey and Santa Cruz County Unified Air Pollution Control District merged with the San Benito County Air Pollution Control District to form the Monterey Bay Unified Air Pollution Control District. The District is governed by a Board of Directors appointed from the elected governing bodies of the member jurisdictions. The Board of Directors appoints citizens to the District's advisory committee as well as to the hearing board.

As required by the California Clean Air Act and Amendments (HSC Section 40910 et seq.) and the Federal Clean Air Act and Amendments (42 U.S.C. Section 7401 et seq.) the District is responsible for air monitoring, permitting, enforcement, long-range air quality planning, regulatory development, education and public information activities related to air pollution. California Health and Safety Code Sections 39002, et seq. and 40000, et seq. require local districts to be the primary enforcement mechanism for air pollution control. Districts must have rules and regulations for the implementation and enforcement for the attainment and maintenance of federal and state ambient air standards. Corridor System Management seeks to create conditions where vehicle flow on state highways and roads occurs at a steady pace and travelers have a range of mobility options that enable them to travel other than by single occupant vehicle. System expansion is focused only where needed when travel demand exceeds the capacity of a well-managed existing system.

## *1.5 Stakeholder Participation*

To achieve the goal of consistency among planning documents, coordination with agencies that have land use authority or funding authority is important. The jurisdictions with decision-making authority for transportation, land use planning and programming responsibilities include::

- Municipalities along the corridor
- Counties of Santa Cruz and Monterey
- Transportation Agency for Monterey County and Santa Cruz County Regional Transportation Commission
- Association of Monterey Bay Area Governments

# Chapter 2 Corridor & Transportation System Characteristics

## *2.1 State Highway System Characteristics*

The SR 1 corridor operates as a route along the crescent of Monterey Bay with both north/south and east/west movement. This plan focuses on the section of the corridor which begins at the junction of SR 68 West in Monterey County and extends approximately 45 miles to the junction of King Street in the city of Santa Cruz. Due to the mutual transportation needs of the corridor, this corridor system management plan also includes SR 183 from Lincoln Avenue in the city of Salinas to the junction of SR 1. These limits capture major inter-regional flows on the Monterey Peninsula and the freeway section of Santa Cruz. The SR 1 and SR 183 corridor serves as the primary connection between cities surrounding the Monterey Bay and the greater Central Coast area. Accommodation includes interregional, regional, rural, and urban commute traffic.

### 2.1.1 Route Segments

To better understand and analyze the corridor, it was necessary to divide the corridor into five segments based on roadway characteristics, operations, or geographic features, the routes were divided into five segments. Segment Three was further divided into subsegments. The SR 1 and SR 183 CSMP is comprised of the following segments:

**Table 2.1 State Route 1 & 183 Segment Summary**

| Segment | PM Begin | PM End | Description |
|---|---|---|---|
| 1 | 75.14 | R91.02 | Junction SR 68 West to Junction SR 156 |
| 2 | R91.02 | R102.03 | Junction SR 156 to Santa Cruz County / Monterey County Line |
| 3A | R0.00 | R7.67 | Santa Cruz / Monterey County Line to Larkin Valley Road Undercrossing |
| 3B | R7.67 | 16.43 | Larkin Valley Road Undercrossing to Branciforte Creek Bridge |
| 4 | 16.43 | 18.26 | Branciforte Creek Bridge to King Street |
| 5 (SR 183) | 0.86 | 9.98 | Lincoln Ave to Junction with SR 1 |

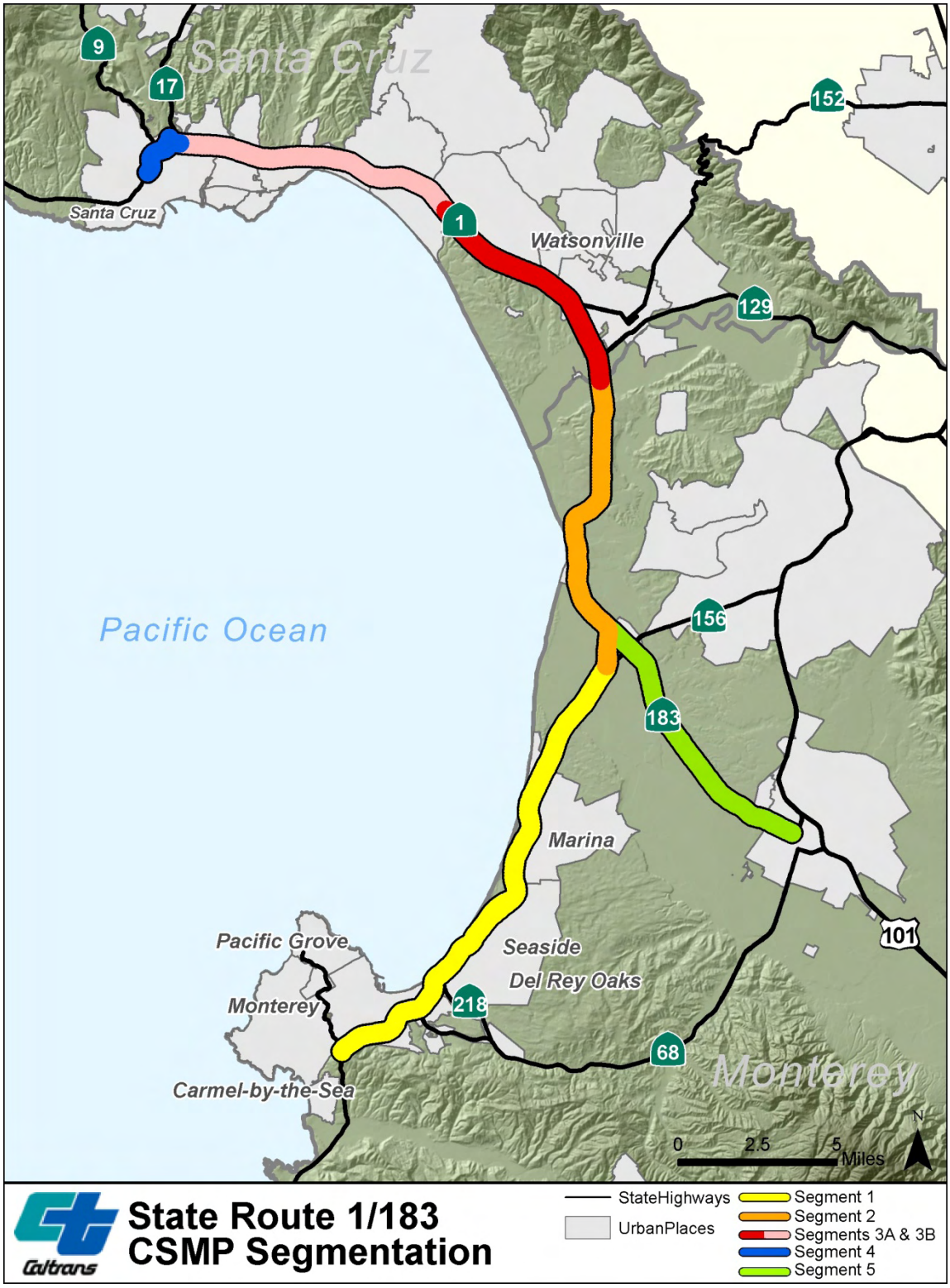



*Figure 2.1 State Route 1/183 CSMP in California*

## State Route 1

### *Segment 1*

Segment 1 begins at the junction of SR 68 West in the city of Monterey. It runs along the Pacific Ocean and heads through the dunes of Marina State Beach and the cities of Seaside and Marina, which bring commercial uses to the corridor including large shopping centers. Public lands of the decommissioned Fort Ord U.S. Army post and the California State University Monterey Bay dot the landscape as the corridor makes its way along the Monterey Bay Sanctuary Scenic Trail. The corridor then turns slightly inland as it winds its way north adjacent to the Salinas River National Wildlife Refuge. The segment continues through prime agricultural lands and concludes at the junction of SR 156.

This segment is 15.89 miles in length and is designated a freeway with lanes ranging from four to six. Outside shoulders for the entire segment range from six to 13 feet. The segment has four lanes for most of the segment. Between the Fremont Boulevard and Del Monte Boulevard undercrossing the highway expands to six lanes.

The segment includes the following interchanges:

- Junction SR 68 West
- Munras Avenue
- Soledad Drive
- Aguajito Road
- Junction SR 68 East
- Casa Verde Way
- Del Monte Boulevard
- Canyon Del Rey Boulevard (SR 218)
- Fremont Boulevard
- Light Fighter Drive
- Imjin Parkway (12th Street)
- Del Monte Boulevard
- Reservation Road
- Del Monte Boulevard
- Molera Road / Nashua Road
- Junction SR 156

*Figure 2.2 Segment 1 – Interchanges & Intersections*

***Segment 2***

Segment 2 begins at the junction of SR 156 near the community of Castroville. It then bends back toward the Pacific Ocean, where it encounters the estuary of the Elkhorn Slough, which is located in the Elkhorn Slough State Marine Conservation Area, and the maritime community of Moss Landing. The segment then stretches through rich agricultural fields before reaching an end at the Santa Cruz/Monterey County line.

Segment 2 is 11.01 miles in length and is an undivided 2-lane conventional highway for most of the segment. From Salinas Road to the Monterey / Santa Cruz County line the segment extends to 4 lanes. In this segment, outside shoulders range from 7 to 13 feet.

The segment includes the following intersections:

- Junction SR 183
- Moss Landing Road
- Dolan Road
- Jetty Road
- Struve Road
- Jensen Road
- Salinas Road

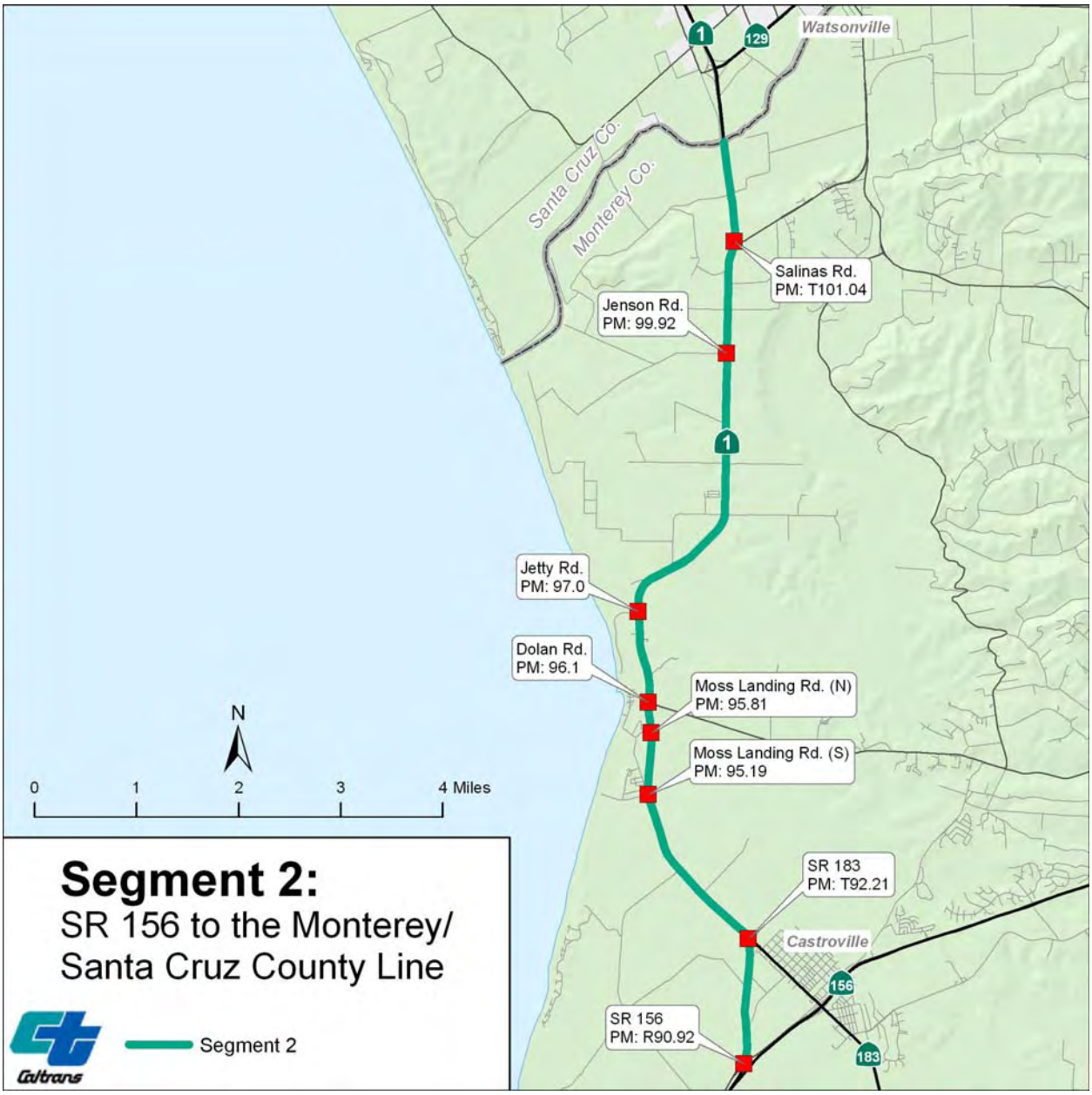



***Figure 2.3 Segment 2 – Interchanges & Intersections***

***Segment 3***

Segment 3 begins at the Santa Cruz/Monterey county line, landmarked by the overcrossing of the Pajaro River. The corridor quickly encounters Watsonville, where several major shopping and office complexes and residential lots are in close proximity to SR 1. As it leaves Watsonville, the corridor is dotted with rich landscape and agricultural lands and passes by the Ellicott Slough National Wildlife Refuge. As the Monterey Bay bends northwestward, the corridor leads through several unincorporated communities including Aptos, Soquel, Live Oak, and the City of Capitola. As it approaches the city of Santa Cruz, land uses along SR 1 turn mostly residential,

school, hospital, and light commercial. The segment is constricted with limited parallel routes due to the mountainous topography to the north and ocean to the south.

Segment 3A extends from the Santa Cruz / Monterey County line to the Larkin Valley Road undercrossing, a distance of approximately 7.7 miles. This segment is a freeway with mostly two lanes in each direction and outside shoulders for the entire segment ranging from eight to 10 feet.

The segment includes the following interchanges:

- Junction SR 129 (Riverside Drive)
- Harkin Slough Road
- Junction SR 152 (Main Street)
- Airport Boulevard
- Buena Vista Drive
- Mar Monte Avenue
- Larkin Valley Road (San Andreas Road)

Segment 3B extends from the Larkin Valley Road (San Andreas Road) interchange in the south to just south of the SR 17 interchange in the north (Branciforte Creek bridge), a distance of approximately 9.2 miles. This segment of SR 1 is a freeway with two travel lanes in each direction and auxiliary lanes at the following locations:

- In the northbound direction, between the Porter Street on-ramp and the 41st Avenue off-ramp
- In the southbound direction, between the 41st Avenue on-ramp and the Bay Street off-ramp

Lanes in this segment are 12 feet wide, with outer shoulders at 10 feet.

The segment includes the following interchanges:

- San Andreas Road/Larkin Valley Road
- Freedom Boulevard
- Rio Del Mar Boulevard
- State Park Drive
- Park Avenue
- Bay/Porter Streets
- 41st Avenue
- Soquel Drive
- Morrissey Boulevard
- SR 17 off-ramp

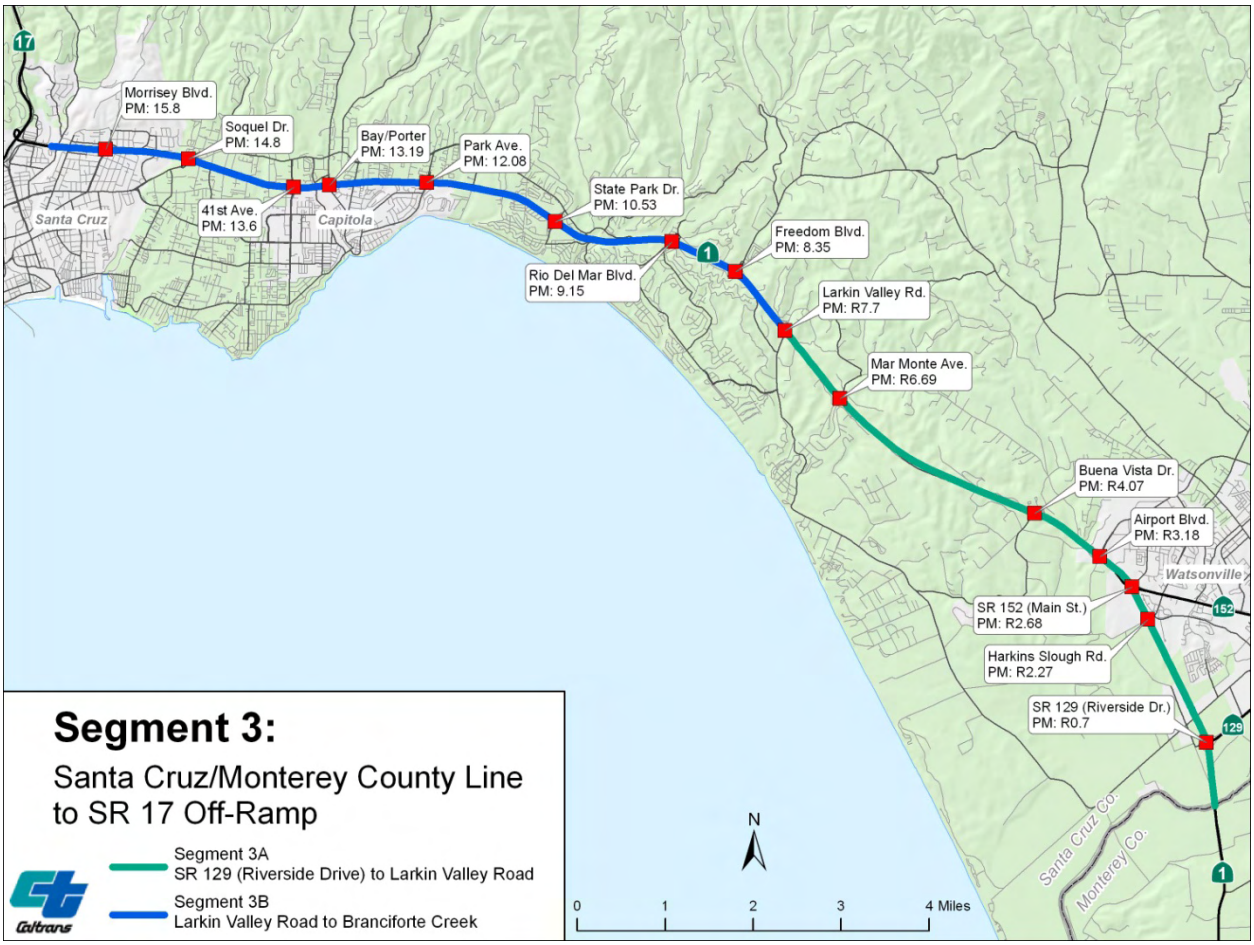



***Figure 2.4 Segment 3 – Interchanges & Intersections***

***Segment 4***

Segment 4 begins just south of the SR 1/SR 17 interchange (Branciforte Creek bridge) to King Street. Beyond the SR 17 interchange, Segment 4 continues as a four-lane freeway to the San Lorenzo River Bridge, where it becomes a conventional highway. A complex, frequently congested, at-grade intersection with SR 9 (north) and River Street (south) lies less than one-tenth mile from the end of the freeway. SR 9 leads to several mountain communities including Felton, Scotts Valley, Ben Lomond, and Boulder Creek while SR 17 is the mountain gateway to San Jose and the San Francisco Bay Area. The Pacific Railway tracks cross the highway approximately one-tenth mile beyond the intersection. Segment 4 continues to the intersection of Chestnut and Mission Streets, where Route 1 veers right along the Mission Street alignment. At Mission Street, the corridor becomes dense with residential and light commercial land uses. Segment 4 carries heavy traffic bound for the UC Santa Cruz campus, regional traffic, and local traffic between downtown Santa Cruz and residential and commercial business areas to the west. From the Chestnut/Mission Streets intersection SR 1 continues as a four-lane conventional highway to the King Street intersection. The segment is 1.83 miles in length. Lanes in this segment are 12 feet wide, with outer shoulders at eight to 10 feet until Chestnut Street where shoulders begin to narrow.

The segment includes the following interchanges and intersections:

- Emeline Ave
- Junction SR 17
- Ocean Street
- River Street
- Mission Street

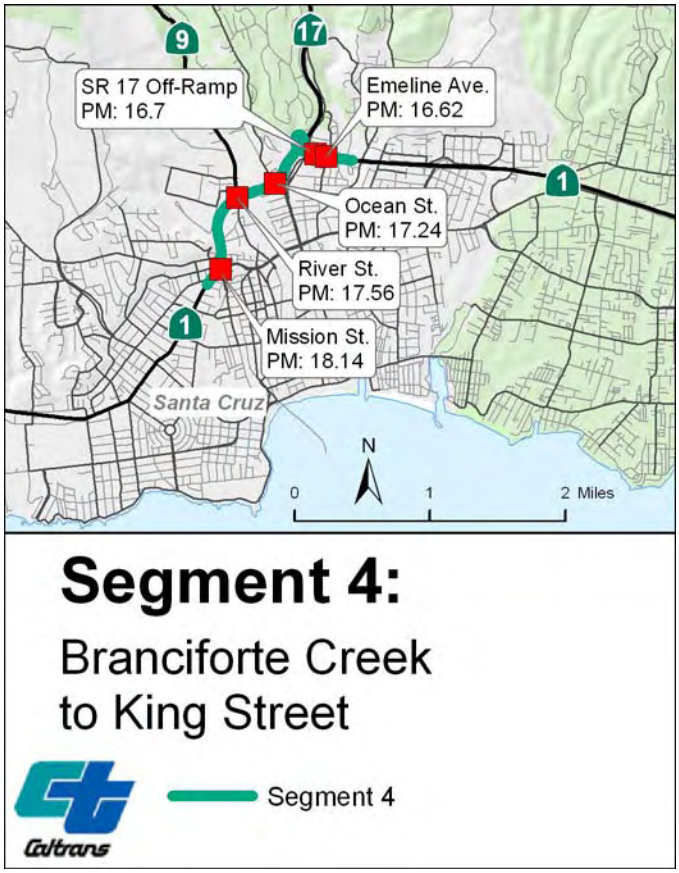



***Figure 2.5 Segment 4 – Interchanges & Intersections***

## State Route 183

### *Segment 5*

The segment of SR 183 for the corridor plan begins at Lincoln Avenue in the city of Salinas, where it is lined by residential and light commercial uses including the Salinas Railroad Station. As the corridor leaves the city, it parallels a railroad line where it leads through agricultural fields, most notably of artichokes. Heading northwestward, the corridor runs through the small community of Castroville, where it functions as a main street through the downtown area. The segment terminates at the junction of SR 1.

For most of Segment 5, SR 183 is a two-lane conventional highway. Lanes in this segment are 12 feet wide with outer shoulders at eight to 10 feet. Segment 5 is 9.13 miles in length.

The segment includes the following interchanges and major intersections:

- Market Street / Lincoln Avenue
- Davis Road
- Blackie Road
- Junction SR 156
- Pajaro Street
- Junction SR 1

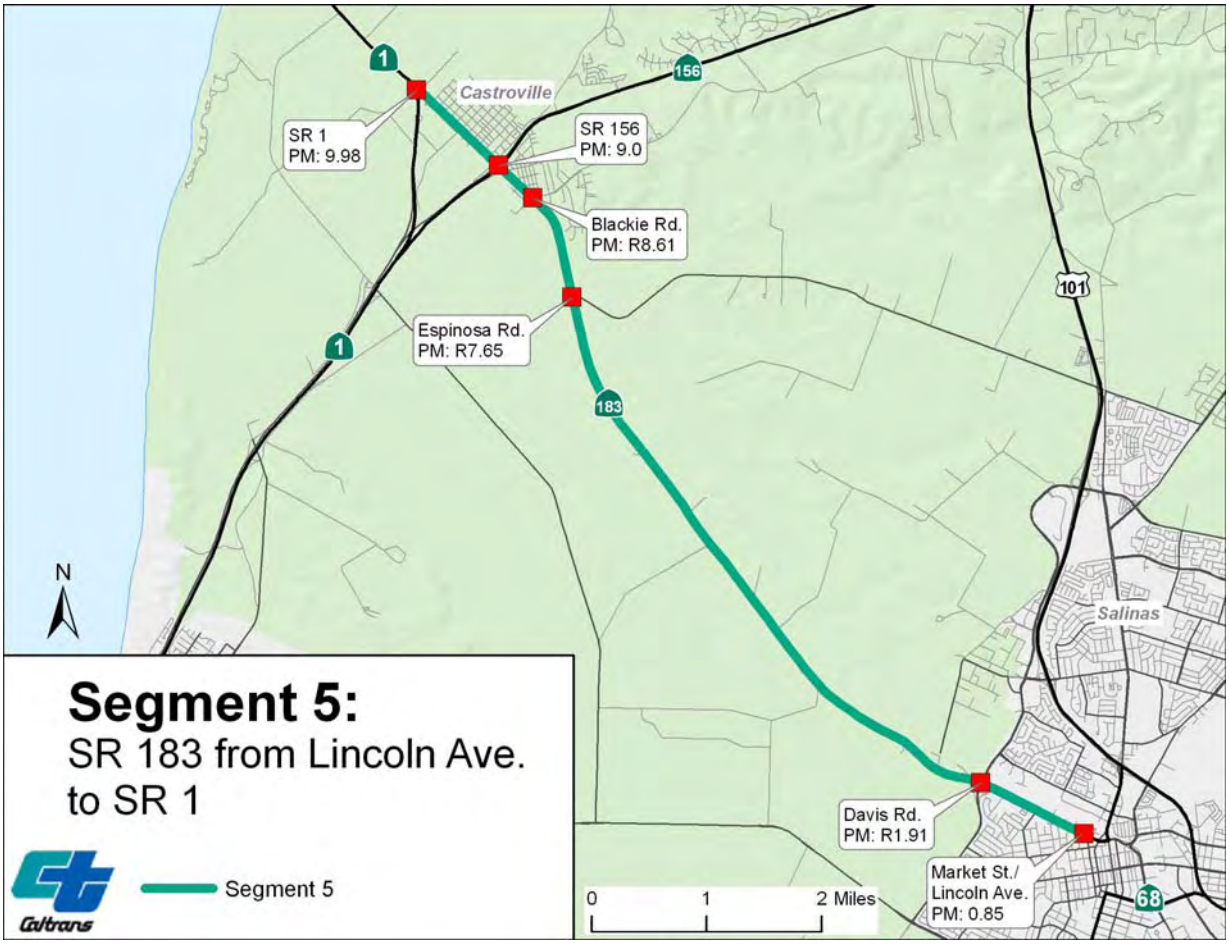



*Figure 2.6 Segment 5 – Interchanges & Intersections*

### 2.1.2 Route Designations

The following designations and classifications provide information regarding the facility itself and its intended use. They also indicate the availability of special purpose funding related to the designation.

The Federal functional classification of SR 1 within the scope of the plan is Principal Arterial and for SR 183 is Principal Arterial and Major Collector. SR 1 within Monterey and Santa Cruz counties is also part of the National Highway System (NHS). The NHS is comprised of the Interstate System and other urban and rural principal arterials that are essential for interstate and regional commerce and travel, national defense, intermodal transfer facilities, and trade.

SR 1 is one of 87 statutorily identified routes on the State's Interregional Road System (IRRS). The section of Route 1 extending from the Carmel Bridge in Monterey County to SR 17 in Santa Cruz County is additionally one of 34 High Emphasis Routes identified in Caltrans' Interregional Transportation Strategic Plan (ITSP). In 1997, California Senate Bill 45 created an Interregional Improvement Program (IIP) for which Caltrans submits projects in specified categories. The IIP funds project components that provide for interregional movement of people and goods, including state highway projects on the IRRS.

Several segments of SR 1 lie within the California Coastal Zone. Development within the zone is subject to compliance with the local coastal program certified under the California Coastal Act, which provides long-term environmental protection for California's 1,100-mile coastline for the benefit of current and future generations.

*Figure 2.7 State Route 1 / 183 Biophysical Setting*

### 2.1.3 Goods Movement

Caltrans District 5 lies within the Central Coast region of California's four Goods Movement Regions. SR 1 and 183 are primary corridors that link the Monterey Bay to the San Francisco Bay Area and beyond California to national and international markets. Agricultural commodities, raw materials, and manufactured goods are transported to, from and through the Central Coast predominately by heavy trucks in which inbound and outbound travel by tonnage is almost evenly split. The local and regional economies depend on these highway linkages for the shipment of goods. It should also be noted that SR 1 serves as an alternative route for traffic in the event of a non-recurring incident, such as a collision or due to weather conditions, which results in a closure on US 101. Depending on the location, a closure on US 101 could redirect north/south travel to SR 1.

Union Pacific Railroad provides rail freight service on the coast line, which parallels the corridor along SR 183 from Salinas through Castroville. It continues northward through the Elkhorn Slough before turning east, where it parallels US 101, connecting with the city of Gilroy. Rail freight shipments often include farm products, clays, concrete, stone, scrap, waste, recyclables, paper, lumber, and military implements. The Union Pacific Railroad operates four through freight trains a day, two northbound and two southbound, according to the TAMC 2010 Regional Transportation Plan.

As the Monterey Bay region continues to grow, it will be faced with the challenge of providing mobility for people and goods throughout the region. Growth in population will bring with it increased freight transportation demand that will create issues that need to be addressed in the transportation and land use planning process. The Salinas Valley is promoted as the nation's "Salad Bowl", where 80% of the nation's lettuce is produced, according to the Salinas Valley Chamber of Commerce. SR 1 and SR 183 serve as the primary farm-to-market connectors within the transportation network and provide produce to domestic and international markets. Monterey and Santa Cruz counties have also become premium grape and berry growing regions in California. In the future, both corridors will serve an ever growing range of purposes. In order to accommodate the projected growth in population and goods movement, additional investment in these facilities will be required.

While goods movement brings economic benefits to the region, it also has an adverse impact on air quality, noise, congestion, and public health. Goods movement transportation contributes to higher percentages of nitrogen oxide (NOx) emissions and particulate matter 2.5 (PM2.5) emissions than passenger vehicles. With legislation such as Assembly Bill (AB) 32, known as the Global Warming Solutions Act, and Senate Bill (SB) 375, transportation and land use planning will need to examine the impacts that goods movement has on air quality. Several initiatives are underway that will have a major influence on the options for reducing truck emissions over the next decade. The California Air Resources Board (CARB) is in the process of adopting in-use truck rules that would apply to heavy vehicles already on the road. As currently envisioned, the rules would be phased in to require that all truck engines meet the 2007 U.S. EPA emission standard by 2013, and all truck engines meet the 2010 U.S. EPA emission standards by 2021. It is essential that transportation planning along our highway corridors take into consideration strategies that are consistent with the intent of AB 32 and SB 375.

Addressing goods movement issues requires examining all the components of the goods movement system including streets, highways, rail, ports as well as the underlying commodity flows and freight generators. The Association of Monterey Bay Area Governments (AMBAG), in partnership with Caltrans and the regional transportation agencies of Santa Barbara County, San Luis Obispo County, San Benito County and Santa Cruz County, have embarked on a commodity flow study to analyze commodity flows within the Central Coast region. The AMBAG study is scheduled for completion in winter 2010.

## *2.2 Corridor Characteristics*

### 2.2.1 Environmental Setting

To ensure a proper analysis of a corridor and provide strategies for the future, planning must take in to account the scenic, aesthetic, and cultural resources of an area along with air quality needs. A more thorough analysis of the environmental setting can be found in the Environmental Impact Reports from the RTPs and AMBAG's MTP.

***Scenic and Aesthetic Resources***

SR 1 is designated as a California Scenic Highway from the San Luis Obispo / Monterey County line to the junction of SR 68W. The corridor study area lies within the California Coastal Zone except for an area near the City of Santa Cruz and the southern portion of SR 183 (see Figure 2.7). Monterey and Santa Cruz counties enjoy beautiful landscapes along the SR 1 and 183 corridor. From the City of Monterey to the Monterey / Santa Cruz County line, the coast is dotted with cypress groves, sandy beaches, and sand dunes as it makes its way north and traverses through the Moro Coho and Elkhorn Sloughs. North of the county line, the corridor encounters the Ellicott Slough before reaching several coastal communities such as Aptos, Capitola, and finally, the city of Santa Cruz, which feature views of the ocean on one side and forest-lined hillsides on the other.

Most of SR 183 features agricultural views with the exception of the southern portion where it encounters the more urban context of the City of Salinas.

***Cultural Resources***

The Ohlone, otherwise known as the Costanoan people, were early inhabitants of the corridor. They designate a linguistic family of eight languages and are known to have occupied the region for several thousand years. It is believed that their range extended along a narrow strip of coastal territory from what is now known as San Francisco Bay in the north to Big Sur and the Salinas River in the south. Areas of cultural sensitivity have been identified at numerous locations along the SR 1 and 183 corridor.

***Biological Resources***

Projects on SR 1 and SR 183 have the potential to impact biological resources and habitats within the project limits. In addition, there is potential to disrupt landscape-level connectivity that affects movement and dispersal patterns of animals and plants.

***Air Quality***
The three counties of Monterey, Santa Cruz, and San Benito are designated as the North Central Coast Air Basin, a single region sharing mutual air pollution problems. The air basin is a nonattainment area for the State Ambient Air Quality Standards for both ozone and inhalable particulate matter (PM10). The Monterey Bay Unified Air Pollution Control District has prepared an air quality attainment plan as required under the California Clean Air Act (CAA). Transportation plans, programs and projects must conform to the attainment plan.

### 2.2.2 Community Demographics

To ensure a proper analysis of a corridor and provide strategies for the future, planning must take in to account the setting and context of the area including information on where jobs and industry are located and the nexus to housing and services.

***Demographics***
The communities that are adjacent to the SR 1 and 183 corridor are comprised of the coastal portion of Santa Cruz county and northern Monterey county.

**Santa Cruz County –** The planning areas of SR 1 in Santa Cruz County include San Andreas, Aptos Hills, Aptos, La Selva, Soquel, and Live Oak.

For the 2000 census, Santa Cruz County had a population of 256, 695 and Monterey County had a population of 404,031. Santa Cruz County has a slower rate of growth than Monterey County, with an estimated population increase of just below 19 percent, adding approximately 47,770 residents over a 30 year forecast period. Decreases are anticipated in young children and school-age populations, comprising a five percent loss by 2035. Population growth among working-age residents is also slow at about eight percent. According to the Watsonville Land Use Element of 2006, from 1980 to 2000 Watsonville grew at a faster rate than the other cities in the county with a population of 46,468 in 2000. According to U.S. Census data, Santa Cruz is the largest city in the county and had a population of 54,593 (2000) while the population of Santa Cruz County had 256,695 (2000). Santa Cruz is the county seat and is also home to the University of California, Santa Cruz. Incorporated communities along the SR 1 corridor in the Santa Cruz County region include the cities of Capitola, Watsonville, Capitola, and Santa Cruz.

**Monterey County –** SR 1 lies within the Greater Monterey Peninsula and North County planning areas as well as the North County Land Use Plan, and the Moss Landing Community Plan. SR 183 lies within the North County and Greater Salinas planning areas.

Monterey County's population is projected to increase by over 30 percent by 2030. While ages 85 years and older will only make up two percent of the county's total population, the Monterey Bay Area 2008 Regional Forecast anticipates a doubling of the 85+ population between 2005 and 2035. The 64-84 year old population will also double to about 70,700 residents by 2035. Working-age and school-age populations are both expected to decrease in their share of the county's total population, with school-age children showing a decline by three percent.

Several municipalities are clustered around the Monterey Peninsula area. Along SR 1, the cities of Del Rey Oaks, Seaside, Marina, and Sand City have undergone significant growth due to the closure of the Fort Ord military base and the establishment of California State University Monterey Bay.

Along SR 183 sits the unincorporated community of Castroville, where the highway serves as a main street in a downtown context. Castroville had a population of 6,724 as of the 2000 Census and is the self-proclaimed Artichoke Capitol of the World, producing 80 percent of the country's supply of the commodity. The southern terminus of SR 183 lies in the City of Salinas with a 2000 population of 143,920, which serves as the county seat and agricultural hub for the rich Salinas Valley.

**Table 2.2 Growth Projection Comparison**

| Year | 2000 | 2010 | 2030 | % Change (2000-2030) |
|---|---|---|---|---|
| Monterey County | 404,031 | 433,283 | 529,145 | 30.97% |
| Santa Cruz County | 256,695 | 268,016 | 304,465 | 18.61% |
| California | 34,105,437 | 39,135,676 | 49,240,891 | 44.38% |

*Population projections from the California Department of Finance*

According to data from the 2007 U.S. Economic Census, Monterey and Santa Cruz Counties share both similarities and differences in categories of occupation. Both counties rank "educational services, and health care and social assistance" as the largest sector. However, "agriculture, forestry, fishing and hunting, and mining" rank second in Monterey County at 14 percent, while in Santa Cruz County "professional, scientific, and management, and administrative and waste management services" take the second position at 11 percent. Santa Cruz ranks higher in "manufacturing" although both counties show similar rankings in "retail trade".

The 2009 median household income according to the American Communities Survey is $59,693 in Monterey County and $64,349 in Santa Cruz County. The California median household income is$60,392.

SR 1 and SR 183 is a major corridor between jobs and housing. Traditionally, the Salinas Valley has been based in agriculture but is now growing as a place for housing. The trend has been affected by the growing jobs and housing imbalance in communities surrounding the City of Monterey, Santa Cruz, and Santa Clara County. According to the Monterey Bay Area 2008 Regional Forecast, the city of Watsonville, Santa Cruz, Sand City and many cities in the Salinas Valley are growing in population, while the cities of Monterey, Pacific Grove, Seaside, and Carmel-by-the-Sea are undergoing a stabilizing or downward trend. The cities of Santa Cruz Future planning along the SR 1 and SR 183 corridor will need to account for more mobility to and from these growing cities.

## *2.3 Regional & Local Transportation Characteristics*

### 2.3.1 Parallel Routes and Local Connections

As a primary component of the State Highway System, SR 1 and 183 serve critical roles in providing regional and interregional mobility and accommodating many aspects of travel including: job and education commuting, tourism, retail shopping, goods movement, business, and emergency services.

Within the region, there are few comparable parallel north-south routes that can serve as an alternative to help alleviate traffic congestion along the corridor or in case of a natural disaster or national security emergency. Furthermore, a closure or incident on a parallel route can create congestion on the corridor and vice versa. The most significant parallel route is US 101. Connections to US 101 include SR 68 through Salinas, SR 156 and County Road G-12 through the community of Prunedale, SR 129 near San Juan Bautista, SR 152 through Gilroy, and SR 17 through San Jose via SR 880. West-east parallel routes include SR 68 and Reservation Road in Monterey County and Soquel Drive and Water Street in Santa Cruz County.

Utilizing local road connections that intersect the SR 1 and 183 corridor can also serve as a method for reducing traffic demand on the highway. Primary local roads are indicated in Figures 2.3 and 2.4. Enhancements to these local facilities may result in improved circulation and alleviate congestion along the entire SR 1 and 183 corridor by providing options to the local and regional traveler.

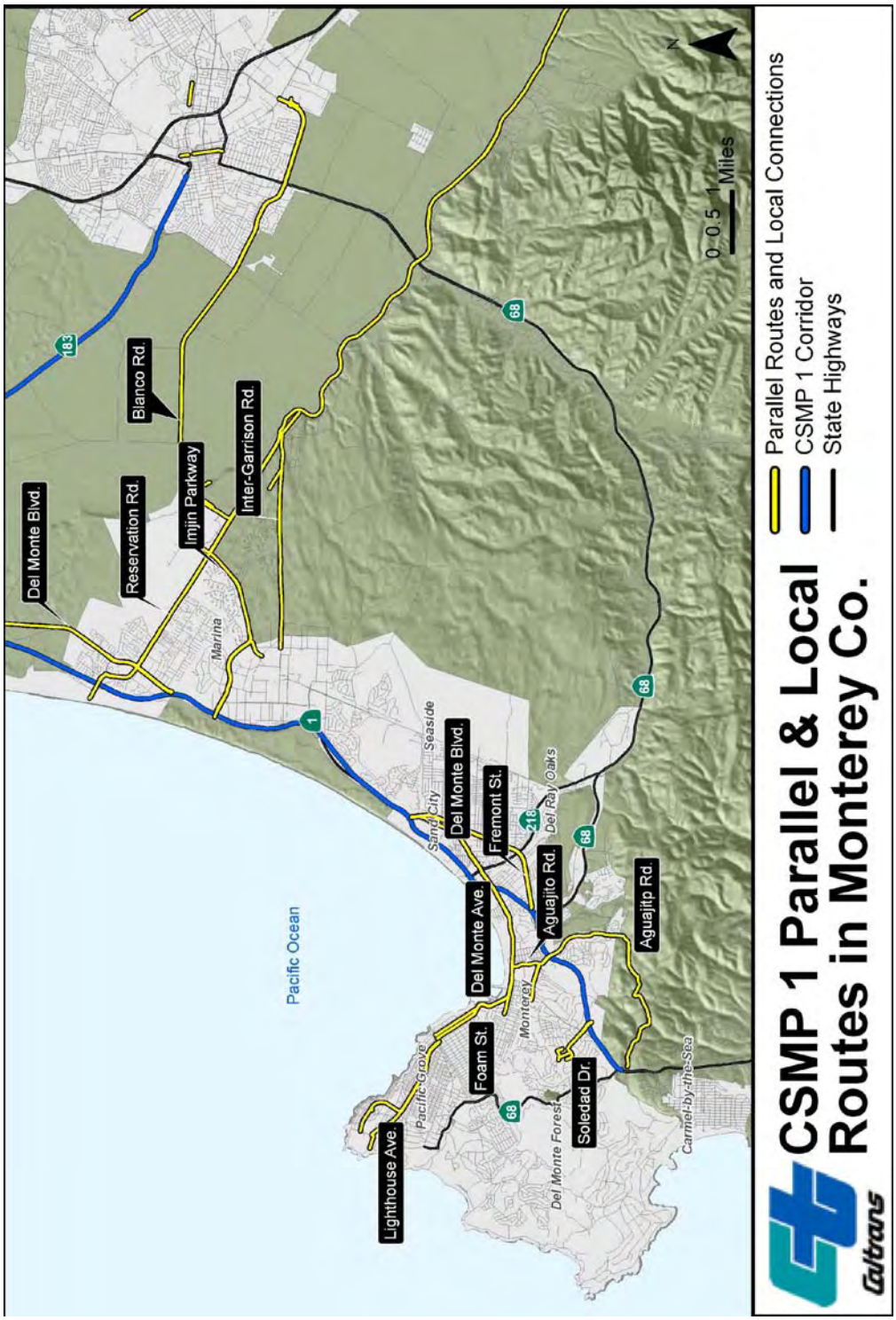



*Figure 2.8 Parallel and Local Routes in Monterey County*

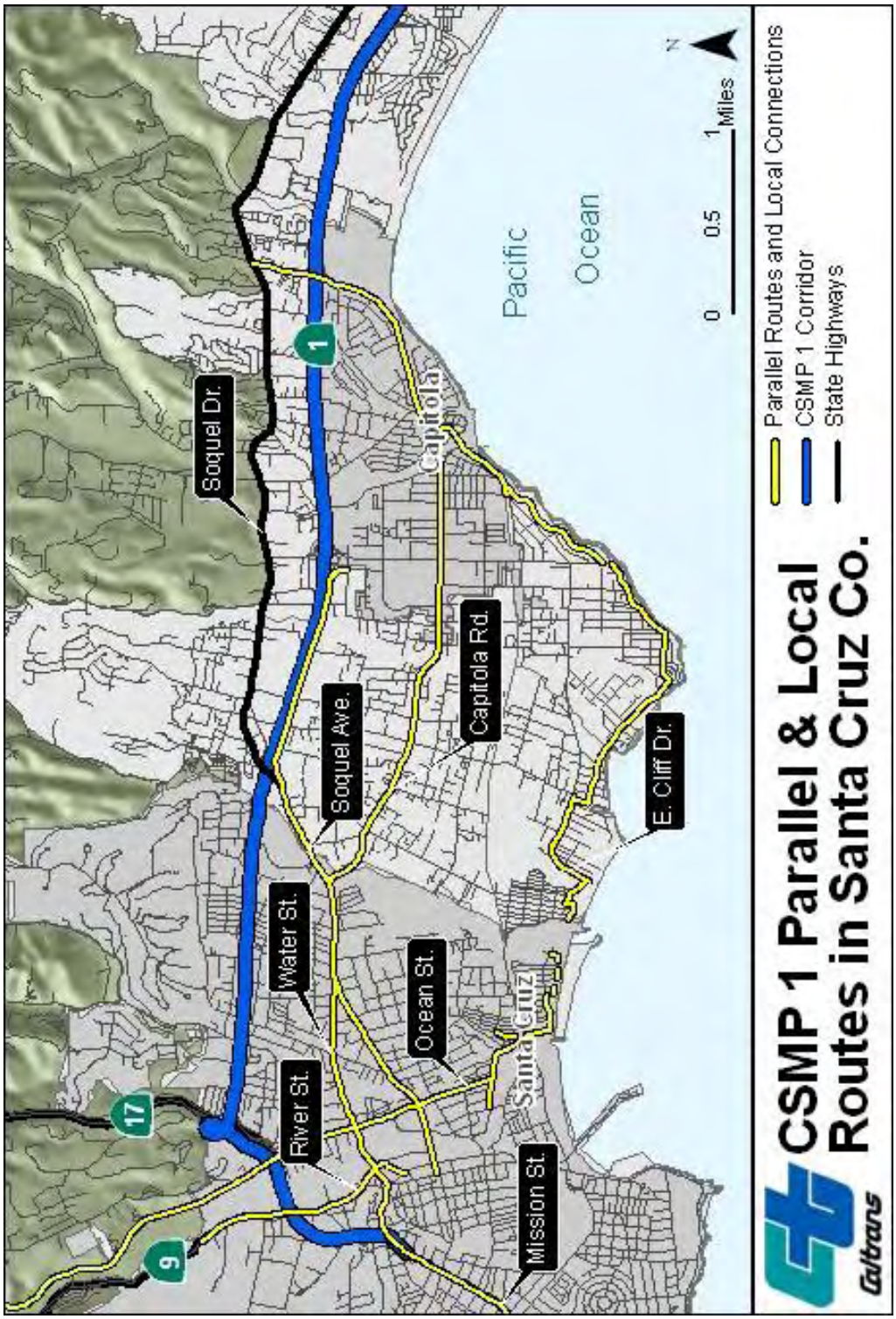



*Figure 2.9 Parallel and Local Routes in Santa Cruz County*

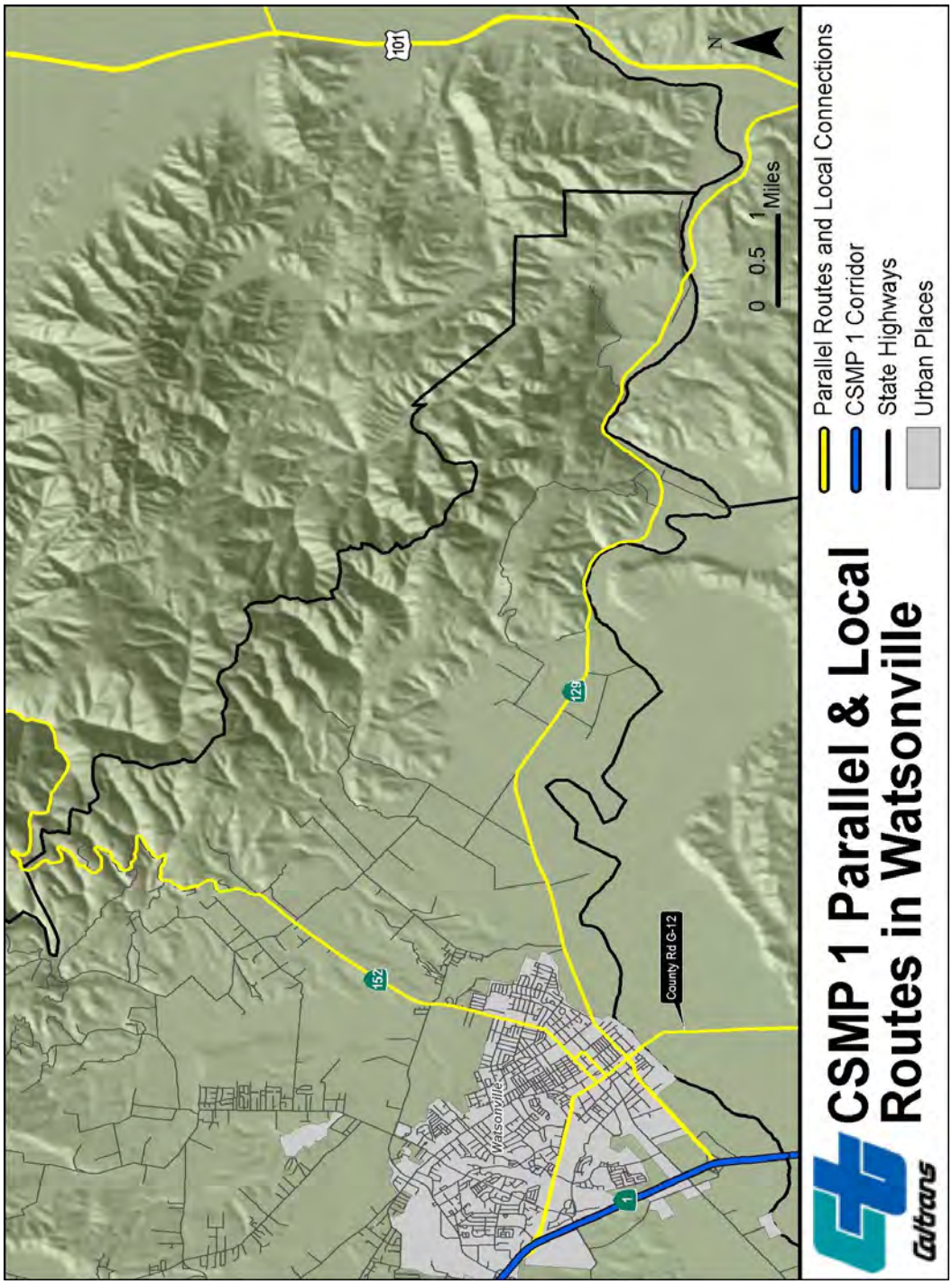



*Figure 2.10 Parallel and Local Routes in Watsonville*

### 2.3.2 Bicycle Access

In California, bicycles are defined as vehicles and as such may operate on any street, road, or highway where they are not specifically prohibited. Bicycle access is prohibited on SR 1 within the limits of the corridor except between Molera Road and Salinas Road in northern Monterey County. Bicycles are not prohibited on SR 183.

The Monterey Bay Sanctuary Scenic Trail runs parallel to SR 1 and is a tourism and commuter bikeway that will link existing and new trail segments into a continuous coastal trail around the Monterey Bay from Wilder Ranch in the County of Santa Cruz to Lovers Point in the City of Pacific Grove. In Monterey County portions of trail exist from the City of Monterey to near the Salinas River and in Moss Landing. In Santa Cruz County the trail is a proposed facility.

The 2005 TAMC General Bikeways Plan identifies connections to SR 1 that would provide connectivity within the corridor:

- Proposed Class II facility on Dolan Road between SR 1 (near Moss Landing) and San Miguel Canyon Road
- Proposed Class III facility in northern Monterey County on Bluff Road at SR1, heading west where the facility continues on Trafton Road and loops back to intersect with SR 1.
- Proposed Class II facility on SR 183 between Davis Street in Salinas and SR 1.
- Proposed Class I facility along SR 183 from Salinas city limits to SR 1.

The 2008 Monterey County General Bikeways Plan proposes the following improvement to the corridor:

- Install Monterey Bay Coastal Trail between South and North County Lines (not including completed trails).

The 2005 Santa Cruz County Bicycle Plan identifies the following improvements to the corridor:

- Proposed Class II facility on Rio Del Mar Boulevard from SR 1 to beach
- Proposed bicycle facility (class not identified) on Harkin Sough Road from SR 1 to Buena Vista Drive

The 2008 City of Santa Cruz Bicycle Transportation Plan proposes the following improvements to the corridor:

- Class I facility between River Street and west San Lorenzo River levee
- Class I bridge facility over the San Lorenzo River from the west levee at Gateway Plaza to east levee at Felker Street
- Class I bridge facility over SR 1 (Trevethan Bridge)
- Class II bridge facility at La Fonda Avenue

- Class II facility on Grant Street from Plymouth Street to Elk Street
- Class II facility on Market Street / Branciforte Drive from Avalon Street to northern city limits
- Class II facility on Goss Avenue between Market Street to Elk Street
- Class II facility on Rooney Street from Gilbert lane to Pacheco Avenue
- Class II facility on Fairmount Avenue from Branciforte Avenue to Morrissey Boulevard
- Class II facility on Morrissey Boulevard from Marnell Avenue to Prospect Heights
- Class II facility on Prospect Heights from Morrissey Boulevard to Brookwood Drive

The corridor plan also parallels the Pacific Coast Bike Route and the California Coastal Trail, which are officially designated state routes.

Other public agencies along the corridor with bicycle transportation plans include the City and County of Santa Cruz, the City and County of Monterey, and the Cities of Capitola, Marina, and Scotts Valley.

### 2.3.3 Transit

## Local Transit

Both Santa Cruz and Monterey have relatively high transit ridership, with a combined total of about 10 million annual trips, but this constitutes roughly 2-3% of trips on all modes of transportation. While a majority of riders are transit dependent, about a third have household incomes over $50,000/year--a good indicator of ridership that chooses to use transit over another mode.

Two major public transit systems operate on the SR 1 Comprehensive System Management Corridor. These are the Santa Cruz Metropolitan Transit District (METRO) and the Monterey-Salinas Transit District (MST). This service may be part of the fixed route systems including both regional and inter-regional buses, special programs for disabled persons, or special interest shuttling.

Santa Cruz Metropolitan Transit District (METRO).

The Santa Cruz Metropolitan Transit District provides fixed route service in Santa Cruz County. Ridership on the fixed route service was 5,745,945 during fiscal year 2010, which translates to about 19,000 rides per weekday (10,000 per Saturday; 7,600 per Sunday) on eight inter-city routes. Transit centers exist in Felton, Scotts Valley, Santa Cruz, Capitola and Watsonville. See Figure 2.5. Connecting buses between Santa Cruz, Capitola, and Watsonville impact SR 1 most directly. In all, METRO offers service on 39 routes, with 8 that use SR 1 and 16 that serve the same corridor without entering onto the freeway.

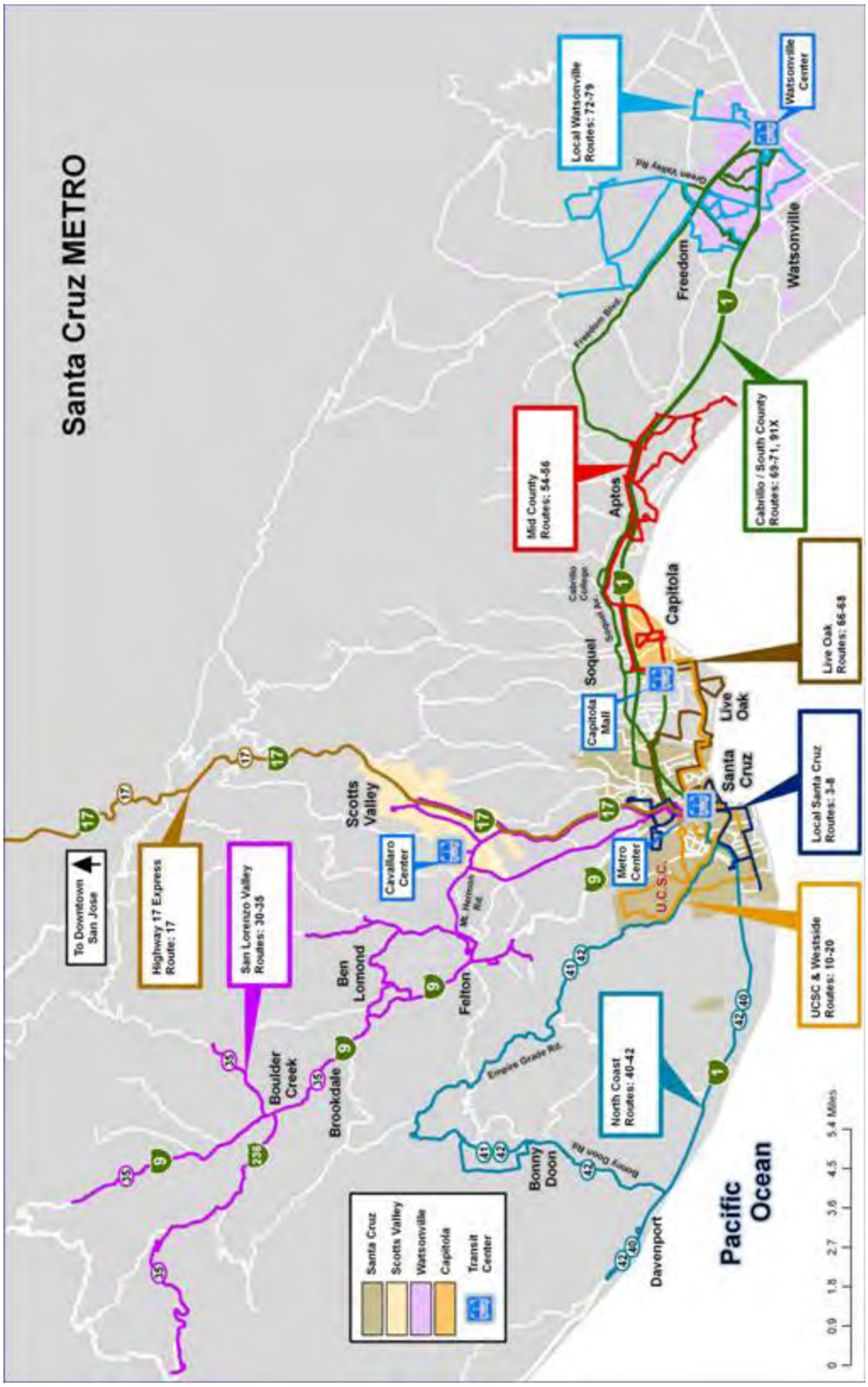



*Figure 2.11 Transit Centers in Santa Cruz County*

Students attending University of California Santa Cruz are responsible for about 5,000 trips daily, while Cabrillo College, east of Capitola, is a secondary student attractor. The UCSC Comprehensive Transit Study (2003) reported an expected 36-63 percent increase in internal peak hour demand transit ridership and an increase of 10-20 percent external peak hour transit demand by 2020. Most of this increase will not directly affect transit lines on SR 1. Cabrillo College has a student population of 13,000, with many who use METRO for access. Student ridership and its growth will play a role in corridor planning. Continuing attention to student bus use should be a part of managing the load on the SR 1 Corridor.

Monterey-Salinas Transit (MST)

Monterey – Salinas Transit (MST) serves a 280 square-mile area of Monterey County and southern Santa Cruz County. Fifty routes serve an estimated population of 352,000 based upon an area of within 0.75 mile of established routes within the county with a focus chiefly in the Monterey Peninsula and the Salinas Valley. Intercity service is provided via SR 68 and SR 1.

MST provides service throughout Monterey County and includes the Line 55 Monterey to San Jose Express. The bus route travels on SR 1 from Monterey to the SR 156 junction, running three times each day from downtown Monterey to San Jose Diridon Station. Line 55 stops at the park-and-ride lot adjacent to the US 101/SR 156 West junction in Prunedale and connects with Caltrain in Gilroy and Morgan Hill. It also serves as the Amtrak Thruway bus for the San Jose-Monterey route when making a train connection with the Capitol Corridor intercity passenger rail service (San Jose to Sacramento and Auburn).

By far the most significant runs occur on Route 20, which carried 556,735 passengers in 2010. It connects Salinas, Marina, Sand City and Monterey. The service is primarily along parallel routes to SR 1, such as Del Monte Avenue, but it uses SR 1 for a short time just north of Sand City. The ridership provides some relief to SR 1 traffic, allowing residents to choose transit rather than drive. Thirty four trips run each way on weekdays and on Saturday.

Other key routes include 9 and 10, connecting Monterey, Seaside and Sand City, providing 314,233 and 382,544 rides respectively for 2010. Route 11 serves Monterey, Seaside, and Sand City, serving 169,835 passenger trips in 2010, while route 16 also serves the three aforementioned cities as well as Marina with a ridership of 169,835 in 2010. Nine other routes directly use SR 1, for a total ridership on some portion of SR 1 of 231,551 passengers in 2010. In addition, route 28, which travels on both SR 1 and SR 183, serves Salinas, Castroville, Moss Landing and Watsonville with an annual ridership of 111,321.

The heavy usage in the Marina/Monterey corridor has prompted MST to plan for a Bus Rapid Transit service for this segment, along the Fremont Street corridor. Ten minute headways would be provided by buses, with signal priority, operating between Sand City, Seaside and Monterey. A 6.75-mile corridor is envisioned, with 24 stations (12 each direction) about one-half mile apart. Some of the proposed system attributes are:

- Low floor, clean diesel transit vehicles that are branded to reflect the BRT system image.
- Station facilities with increased passenger amenities including shelter, real-time route and scheduling information, security features, and a designated BRT image.
- Signal priority to reduce travel time.
- Mixed-flow travel lanes with queue jump lanes at signalized intersections.
- Stations target major trip generators and attractors, and the corridor is located along transit-supported, mixed-use land uses.

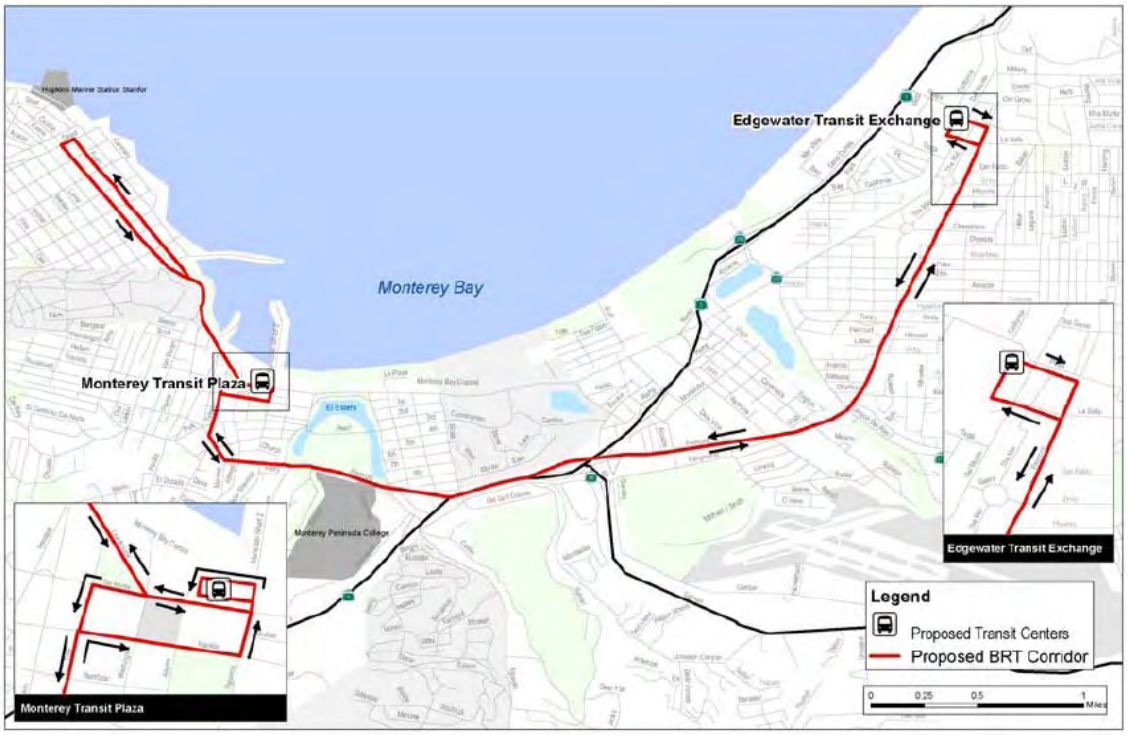



***Figure 2.12 Transit Centers along SR 1 on the Monterey Bay Peninsula***

The BRT service is under development to complement plans for long-term, major investment fixed guideway projects currently under investigation by TAMC. Initial cost projections are about $3 million for capital costs, less buses, and about $1.6 million annually for operations. It would cut the trip time roughly in half, and build capacity for future growth of the area.

## Paratransit

The MST Rides program provides curbside-to-curbside paratransit transportation services for eligible persons whose physical or cognitive disability prevents them from using MST's fixed route bus service. The service is available whenever MST's regular fixed route bus service is in operation and is provided either in lift-equipped mini-vans, mini-buses, sedans, or by local taxicab through a reimbursement program.

The MST Rides service is provided within a service corridor that extends 3/4 of a mile from any of MST's regular bus routes. Both the point of departure and the destination of each trip must be within the service corridor.

In Santa Cruz County, door-to-door service is available for those who are functionally unable to ride fixed-route buses due to physical, cognitive, and psychiatric limitations and who live or are traveling to areas within the service area defined as the three quarter mile around any fixed route. The service, called ParaCruz, is operated directly by METRO and to a lesser degree by private sub-contractors.

## Intercity Transit / Rail

**Existing Services**

*Coast Starlight*
Amtrak provides the only regular rail passenger service in the region, known as the "Coast Starlight", the most popular long distance passenger train in the United States. The Coast Starlight links Los Angeles and Seattle with one daily northbound and one daily southbound train, with bus connections to San Francisco from Oakland and to Monterey from Salinas. Service can be obtained directly from the Salinas Amtrak station or indirectly from Gilroy, by way of Caltrain service, making a connection with Amtrak in San Jose. In addition, the Highway 17 Express Bus offers service from locations in Santa Cruz County to San Jose. Out of 83 Amtrak stations in California, the Salinas station is ranked 26$^{th}$ in ridership. MST operates a transit center approximately two blocks from the Amtrak station and provides both scheduled connections and on-call service to the Salinas Amtrak station. Rail passengers in Watsonville, Salinas, California State University Monterey Bay, and four locations within the City of Monterey can ride the Amtrak bus to connect to the Capitol Corridor train service, which runs daily between San Jose and Sacramento.

*Caltrain*
Caltrain is an interregional commuter rail service serving San Francisco to San Jose on the San Francisco peninsula with frequent bidirectional service, with three commute-hour unidirectional trains to Gilroy.

*Bus-Rail Connections*
Caltrans discontinued "Capitol Corridor" feeder bus service from San Jose to Monterey in June 2005 due to low ridership. The following year, Monterey-Salinas Transit (MST) took over the former feeder bus connection and created Line 55, the "Monterey to San Jose Express." Also, an Amtrak feeder bus service is available connecting the Central Coast to Merced for rail passengers riding on the "San Joaquins." The service offers two daily round trips from Merced to Salinas with stops in Hollister and San Juan Bautista using State Routes 152 and 156.

*Greyhound*
Greyhound offers several bus lines per day to destinations throughout California. In the Monterey Bay region, Greyhound has stops in Salinas, Watsonville, and the city of Santa Cruz.

## Planned Services

*Coast Daylight*
New rail service is planned for an Amtrak service named the "Coast Daylight" which will offer service between Los Angeles and San Francisco. The Coast Rail Coordinating Council is the lead proponent for this service and is made up of Amtrak, Caltrans, and the coastal county transportation planning agencies.

*Monterey Branch Line Light Rail*
The Monterey Branch Line Light Rail Service will provide light rail transit service using the existing Monterey Branch Line alignment, which was purchased by the TAMC in 2003 for $9.3 million. The 16-mile corridor extends between Monterey and Castroville on the publicly-owned tracks adjacent to SR 1. The first phase of the project will run between Monterey and north Marina with key stations in Monterey, Seaside, Sand City, Marina/CSUMB, and with connecting bus service to Pacific Grove and Carmel to the south and Salinas to the east. Later phases will extend service to the planned commuter rail station in Castroville and increase the frequency of trains. TAMC is currently in the environmental review process for this project.

TAMC has conducted a number of studies on train service options between San Francisco and Monterey using the Monterey Branch rail line. The San Francisco-Monterey Intercity Rail Service Implementation Plan was completed in 1998. In 2003, TAMC completed the Monterey Intercity Rail Project Study, which included conceptual engineering, initial cost estimates, and environmental screening for the project.

In the near term, TAMC is planning a new service to link Monterey to San Francisco through a combination of local service on the Monterey Branch rail line and commuter rail service on the Coast Main Line. Starting in 2015, local light rail service is planned to connect Monterey and Marina, and later extend to Castroville, with bus connections to Salinas. TAMC is working to ensure that the local service on the Monterey Branch Rail Line will connect with the commuter rail service in Castroville. Bus connections to work and visitor destinations as well as transit-oriented developments are planned at key locations along the way in Monterey County to maximize the usage of both services.

In the longer term, TAMC is keeping open the option for future intercity rail service between Monterey and San Francisco. The intercity service could have stops in Monterey, Marina, Castroville, Pajaro, San Jose, San Francisco Airport, and downtown San Francisco, with a possible stop in Palo Alto. TAMC envisions two roundtrips on weekdays and three on weekends. No funding for this service is included in the Department's ten-year operating plan, as the start date of this route is uncertain at this time.

*Commuter Rail Extension to Monterey County*
TAMC is concurrently working to extend commuter rail service from Gilroy to Salinas by 2014. The extension of commuter rail service to Monterey County would also serve new stations in Pajaro/ Watsonville and Castroville. This service would use the existing Class I Union Pacific Railroad (UPRR) rail line. Steps towards realizing this service include interagency agreements

between TAMC and UPRR and between TAMC and the service operator, the construction of a layover facility in Salinas and upgrades to the Salinas Amtrak station, and construction of new stations in Pajaro/ Watsonville and Castroville. UPRR operates as one of two Class I railroads in California with 3,708 miles of track. In Monterey County, freight rail utilizes the main north-south rail-line connecting Oakland and Los Angeles. Most of the rail traffic is throughput; that is, there are no regular significant operations in Monterey County. Freight rail and the interrelated usage of UPRR main lines and spur lines is an issue of concern for transportation planners. Interregional freight operations are provided by the UPRR on the same main rail line as passenger rail, i.e., generally within the US 101-SR 1 north-south corridor.

*Santa Cruz Branch Line*

Since 1999, the Santa Cruz Regional Transportation Commission (SCCRTC) has been acting to acquire a 31.8 mile length of railroad known as the Santa Cruz branch line from Union Pacific Railroad, stretching along the coast from Pajaro in Monterey County to Davenport in north Santa Cruz County. The line travels through the urban core of Santa Cruz County and is immediately adjacent to Watsonville, Aptos Village, Capitola Village and the Santa Cruz Beach area.

In January of 2011, the California Transportation Commission approved the purchase of the branch line property for $14.2 million. Funding for the purchase comes from Proposition 116 funds, the region's share of the State Transportation Improvement Program (STIP) and other sources. Possible uses of the facility include passenger service in the Capitola/Aptos area, trails paralleling the rail for bicyclists and walkers, and eventually the connection of bicycle paths from Davenport to Monterey (Monterey Bay Sanctuary Scenic Trail Network and California Coastal Trail). Each of these improvements would provide choices for commuters within the corridor.

*California High-Speed Rail*

In November 2008, a state ballot initiative was passed by the voters to provide almost $10 million in bond funding for High-Speed Rail. The proposed system would eventually extend from Sacramento to San Diego and allow trains to go up to 220 mph. The first segment, from San Francisco to Los Angeles, could in theory allow for a travel time of two-and-a-half hours between the two cities. Recently, a preferred route through the San Francisco Bay Area was chosen that would put the tracks through the Pacheco Pass into the South Bay. The nearest high-speed rail station to Monterey County would be a station in Gilroy. The proposal also includes a high level of integration with local and regional transit and rail services, and $950 million of the bond measure would go toward improvements to commuter rail systems, for which the connecting rail projects planned for Monterey County could be eligible.

### 2.3.4 Aviation

The Monterey Bay has four publicly owned civil airports: the Monterey Peninsula, the Salinas Municipal, the Marina Municipal, and the Watsonville Municipal. Of these four, only the Monterey Peninsula Airport (MPA) has scheduled air carrier service and is a major regional airport, serving commercial freight, passenger, military, and general aviation needs. The facility is located north of SR 68 east of the City of Monterey. SR 1 and SR 68 provide the primary

ground access to MPA for both people and freight. Transit service to the airport from Monterey and Salinas is provided by Monterey-Salinas Transit as well as limousine, taxi, and shuttle services from the local hospitality industry.

***Figure 2.13 Multi-Modal Facilities State Routes 1 / 183***

### 2.3.5 Transportation Demand Management

Transportation Demand Management (TDM) is the application of strategies and policies to reduce single-occupancy automobile travel demand and facilitate diversified transportation options. It will be necessary to both propose new TDM programs and enhance existing programs, such as transit facilities, ridesharing programs, and park and ride lots, to reduce demand on SR 1 and 183. New TDM strategies such as bike/pedestrian facilities and employer-based programs would need to be developed concurrently with identified funding sources.

## Commuter Programs

Monterey County's Commute Alternatives and the Commute Solutions program lead by the Santa Cruz Regional Transportation Commission manage the TDM services of the Monterey Bay area. Both agencies work in tandem with local employers, the media, non-profit organizations such as Ecology Action, and other public agencies in promoting more diverse transportation options. Partner agencies have included the Monterey Bay Unified Air Pollution Control District, which has funded regional outreach efforts and special events. Some of the TDM services provided include:

- The Rideshare Rewards Club: An incentive program that rewards commuters for using other options to get to and from work besides driving alone. For each day of using carpool, vanpool, bicycle, walking, riding the bus or telecommuting instead of driving alone, the participant is eligible to win monthly cash prizes.
- Emergency Guaranteed Ride Home Program: Provides a free, emergency ride home to commuters who are committed to other transportation choices than driving alone. To be eligible for this service, employees must register and commute to work some way other than driving alone at least one day per week.
- 511 Ridematching: Through www.ridematch.511.org, provides an instant online service to help commuters find carpool or vanpool partners.
- Bicycle Loan Program: Allows qualified participants to borrow up to $750 interest-free for one year to purchase a bicycle and related equipment.
- Bike Week, Clean Air Month, Rideshare Week: Increase awareness about the benefits of using diversified transportation options such as carpooling, vanpooling, riding the bus, bicycling, walking, and telecommuting. Commuters are asked to make a commitment to using these forms of transportation and often receive prizes, free breakfast, peer encouragement, and other incentives.
- Bike Rack Subsidies
- Bikeway Maps

## Park and Ride Lots

Park and ride lots encourage commuters to take advantage of ridesharing, transit, and bicycling for short trips, to combine trips, and reduce the distance of driving alone. Increasing the number of park and ride lots has the potential to reduce single-occupant vehicle trips along the corridor. The following table shows the locations of Park and Ride lots along the corridor.

**Table 2.3 Existing Park and Ride Lots Along the SR 1/183 CSMP Corridor**

| Locations* |
|---|
| Messiah Lutheran Church, High St./Spring St. Intersection |
| SR 17 & Pasatiempo Dr., west side of interchange |
| Quaker Meeting House Church on Rooney Ave., near Morrissey Ave. and SR 1 |
| SR 1/Soquel Dr. at Paul Sweet Rd., near Dominican Hospital |
| K-Mart, SR 1 and 41st Ave |
| McGregor Drive Beach Shuttle, Capitola |
| Resurrection Church, SR 1 and Seacliff/State Park Drive exit |
| Salinas Rd. and SR 1 |
| Dolon Road and US 101 |

Due to recent staffing and funding reductions statewide, cooperative use agreements for Park and Ride lots that are outside of Caltrans right of way will not be renewed. Caltrans will focus on maintaining Park and Ride lot facilities on Caltrans right of way.

Future Park and Ride lots will be a collaborative planning effort with local partners to assess the best locations that can ensure maximum use along commuter routes.

### 2.3.6 Intelligent Transportation System (ITS) Strategies

Intelligent Transportation Systems (ITS) are a broad range of diverse technologies which, when applied to the current transportation system, can help improve safety, reduce congestion, enhance mobility, minimize environmental impacts, save energy, and promote economic productivity. ITS technologies are varied and include information processing, communications, control, and electronics. Examples of ITS technologies include changeable message signs and closed-circuit television.

The following district-wide ITS components are within the corridor:

1. **Closed-Circuit Television (CCTV)**: Is used to continuously monitor road conditions, verify changeable message sign function, and detect/verify incidents for more effective response. CCTV will improve online communications with motorists about freeway

conditions in order to allow them to make routing choices before they enter a congested zone.

2. **Incident Management System:** Directly links regional information with emergency service agencies and resources. The incident management system employs a computer-aided dispatch system to alert local resources to incidents. **Synchronized Signals: Operat**e in a similar way as ramp meters, however the focus is on local road intersections adjacent to State highways.
3. **Changeable Message Signs (CMS):** Convey important information to motorists in a timely manner pertaining to road conditions, weather, traffic incidents, etc. They are controlled from the TMC or remote locations.
4. **Vehicle Detection System (VDS)**: These systems monitor roadways, providing the most accurate, real-time vehicle volume, occupancy and speed data needed for traveler information systems.

## Existing ITS Elements

The following tables describe existing ITS features along the corridor.

| Table 2.4 Existing ITS Features | | |
|---|---|---|
| **Type of ITS** | **Location** | **Post mile** |
| **Santa Cruz County – SR 1** | | |
| CCTV and MVDS | South of Riverside Drive & SR 129/SR 152 | R0.47 |
| CCTV and MVDS | North of Riverside Drive & SR 129 | R1.00 |
| CCTV and MVDS | South of Green Valley &Harkins Slough Roads | R2.05 |
| CCTV and MVDS | South of Airport Boulevard | R3.03 |
| CCTV and MVDS | North of Buena Vista Drive | R4.13 |
| CCTV and MVDS | North of Buena Vista Drive | R4.92 |
| CCTV and MVDS | South of Mar Monte Avenue | R6.30 |
| CCTV and MVDS | North of Mar Monte Avenue | R7.19 |
| CCTV and MVDS | South of San Andreas & Larkin Valley Roads | R7.63 |
| MVDS | Freedom Boulevard | 8.12 |
| CCTV | Freedom Boulevard | 8.36 |
| MVDS | Freedom Boulevard | 8.73 |
| MVDS | Rio Del Mar | 9.01 |
| CCTV | Rio Del Mar | 9.15 |
| MVDS | Rio Del Mar | 9.56 |
| MVDS | State Park Drive | 10.32 |
| CCTV | State Park Drive | 10.54 |
| MVDS | State Park Drive | 10.86 |
| MVDS | Mar Vista Drive | 11.50 |
| MVDS | Park Avenue | 11.90 |
| CCTV | Park Avenue | 12.09 |
| MVDS | Park Avenue | 12.49 |
| MVDS | Bay Avenue | 13.05 |
| CCTV | Bay Avenue | 13.20 |
| MVDS | Bay Avenue | 13.37 |
| CCTV and MVDS | 41st Avenue | 13.57 |
| CCTV | 41st Avenue | 13.92 |
| MVDS | 41st Avenue | 13.98 |
| CMS | 41st Street | 14.15 |
| CCTV | Soquel Avenue | 14.86 |
| MVDS | Soquel Avenue | 15.06 |
| CCTV and MVDS | Morrissey Boulevard | 15.66 |
| CCTV and MVDS | Morrissey Boulevard | 15.96 |
| MVDS | N Branciforte Avenue | 16.35 |
| CCTV and MVDS | Emeline Avenue | 16.73 |
| MVDS | Ocean Street | 17.09 |

| Existing ITS Features | | |
|---|---|---|
| **Type of ITS** | **Location** | **Post mile** |
| **Monterey County – SR 1** | | |
| CCTV and MVDS | North of Carpenter Street (SR 68) | 75.00 |
| MVDS | South of Munras Avenue | R75.60 |
| CCTV and MVDS | North of Munras Avenue | R76.23 |
| MVDS | South of Aquajito Road | R76.98 |
| CCTV and MVDS | Aquajito Road | R77.63 |
| CCTV and MVDS | South of Fremont Street | R78.05 |
| MVDS | South of Casa Verde Way | R78.38 |
| MVDS | North of Casa Verde Way | R78.63 |
| CCTV and MVDS | North of Del Monte Avenue | R79.03 |
| MVDS | North of Auto Center Parkway (SR 218) | R79.55 |
| MVDS | South of Fremont Boulevard | R80.53 |
| MVDS | North of Fremont Boulevard | R80.92 |
| MVDS | North of Fremont Boulevard | R81.60 |
| MVDS | South of Fort Ord Main Entrance Road (Light Fighter Drive) | R82.81 |
| MVDS | South of 12th Street | R84.36 |
| MVDS | South of Reservation Road | R85.00 |
| MVDS | North of Reservation Road | R86.73 |
| MVDS | South of Del Monte Boulevard | R88.60 |
| CMS | Salinas River Bridge | R89.45 |
| MVDS | South of Nashua Road | R90.38 |
| CMS | Molera Rd | R90.50 |
| MVDS | SR 156 | R90.75 |
| CCTV and MVDS | SR 156 | R90.98 |
| CCTV and MVDS | South of SR 183 | T92.16 |
| MVDS | Molera Road | 94.21 |
| MVDS | Potero Rd/Moss Landing Road | 95.01 |
| CCTV and MVDS | South of Moss Landing Road | 95.60 |
| MVDS | North end of Elkhorn Slough Bridge | 96.55 |
| MVDS | North Struve Road | 98.17 |
| MVDS | South of Jensen Road | 99.30 |
| CCTV and MVDS | Salinas Road | T101.01 |
| MVDS | North of Trafton Road | R101.56 |

# Chapter 3 Comprehensive Corridor Performance Assessment

The Comprehensive Corridor Performance Assessment (CCPA) is an analysis of the existing conditions, future conditions, and deficiencies based on measurable performance within the corridor. Performance measures are basic to corridor management and improvements. To identify the current and projected deficiencies within the corridor, identify locations for investment, and develop a range of solutions, Caltrans and the partners have identified **Mobility** and **Traffic Safety** as performance measures to analyze the corridor. Performance measures such as **Reliability** and **Productivity** require detection and/or extensive count data. The SR 1 and SR 183 corridor currently has numerous detection projects in planning, design, or construction. However, currently the data are not available for inclusion in this document. It was determined that reliability and productivity were not performance measures that could be estimated for this corridor. Described below are the performance measures that were used to analyze the existing and future conditions of SR1 and SR 183:

**Mobility:** Describes how well people and freight move along the corridor. Mobility is easily forecast, which is useful for future comparisons.

**Traffic Safety**: Provides an overview of collisions along the corridor and highlights locations of high concentrations of collisions or readily apparent patterns. California State TASAS (Traffic Accident Surveillance Analysis System) data can be used to determine the number of collisions, collision rates and locations for collisions along a corridor.

## 3.1 Mobility

Mobility performance measures indicate if a transportation facility is operating well to move traffic either along the mainline or through an intersection. These measures take into account the traffic volumes, the queues created due to congestion, and the time and money lost due to delay within the system. One mobility performance measure is Level of Service (LOS). LOS considers the flow of traffic, roadway geometrics (for example, number of lanes), capacity, and other characteristics to describe operating conditions a typical driver will experience on a typical day. Like a report card, LOS is defined in categories ranging from A to F and is illustrated in Figure 3.1. LOS A represents the best traffic flow while LOS F represents the worst congestion. Table 3.8 indentifies LOS associated with each segment of the corridor for existing conditions and projected future conditions. Table 3.1 summarizes the Average Annual Daily Traffic (AADT) per segment.

**LEVELS OF SERVICE**
for Freeways

| Level of Service | Flow Conditions | Operating Speed (mph) | Technical Descriptions |
|---|---|---|---|
| A | | 70 | Highest quality of service. Traffic flows freely with little or no restrictions on speed or maneuverability. **No delays** |
| B | | 70 | Traffic is stable and flows freely. The ability to maneuver in traffic is only slightly restricted. **No delays** |
| C | | 67 | Few restrictions on speed. Freedom to maneuver is restricted. Drivers must be more careful making lane changes. **Minimal delays** |
| D | | 62 | Speeds decline slightly and density increases. Freedom to maneuver is noticeably limited. **Minimal delays** |
| E | | 53 | Vehicles are closely spaced, with little room to maneuver. Driver comfort is poor. **Significant delays** |
| F | | <53 | Very congested traffic with traffic jams, especially in areas where vehicles have to merge. **Considerable delays** |

*Figure 3.1 Levels of Service Summary for Freeways*

| Table 3.1 SR 1 Level of Service (LOS) Summary | | | |
|---|---|---|---|
| Segment | Segment Limits | Peak LOS Data | |
| | | Existing | Future |
| | | 2007 | 2030 |
| 1 | Junction 68 to Junction 156 | C - F | C - F |
| 2 | Junction 156 to Santa Cruz County / Monterey County Line | C - F | C - F |
| 3A | Santa Cruz / Monterey County Line Larkin Valley Road | B – D | C - E |
| 3B | Larkin Valley Road to Branciforte Creek Bridge | E – F* | F* |
| 4 | Branciforte Creek Bridge to King Street | D – E | E - F |
| 5 (SR 183) | Lincoln Ave to Junction with SR 1 | E | E |

** LOS for Years 2003 and 2035*

| Table 3.2 Average Annual Daily Travel (AADT) Summary | | | |
|---|---|---|---|
| Segment | Segment Limits | 2007 (Existing) | 2030 (Future) |
| 1 | Junction 68 to Junction 156 | 24,500-86,000 | 56,000-104,000 |
| 2 | Junction 156 to Santa Cruz County / Monterey County Line | 24,000-38,000 | 38,000-45,500 |
| 3A | Santa Cruz / Monterey County Line Larkin Valley Road | 32,500-63,000 | 45,000-90,000 |
| 3B | Larkin Valley Road to Branciforte Creek Bridge | 68,000-108,000 | 98,000-158,000** |
| 4 | Branciforte Creek Bridge to King Street | 54,000 (2008) | 60,000 (2025) |
| 5 (SR 183) | Lincoln Ave to Junction with SR 1 | 12,000-27,500 | 12,000-33,021 |

*** For Year 2035*

### 3.1.1 Methodology

In preparing the SR 1 CSMP, Caltrans District 5 staff drew on multiple resources and methodologies. For Segments 1, 2, 3A, 4, and 5, 2007 daily and peak hour count data were obtained from the Traffic Data Branch at Caltrans headquarters. Future year volumes were projected using growth rates from the Association of Monterey Bay Area Governments (AMBAG) regional travel demand model, version April 2007, applied to 2007 counts. Terrain, roadway geometrics, and peak hour factor inputs were obtained from Caltrans' 2000 Highway Segment Inventory. Level of Service was analyzed using Highway Capacity Software version 2000 (HCS) based on Highway Capacity Manual 2000 methodology. Freeway and Multi-lane Highway modules from HCS were used for the corresponding segments. Assumptions in the analysis include a constant flow of traffic, no weaving, and no signal interference. More detailed traffic data, such as specific turn movements and 15-minute increment speed and volume data would be needed for more detailed analysis. Caltrans District 5 currently has projects programmed or in construction for system detection in the corridor. Future placement of loop detectors and remote monitoring systems will provide significant data for future versions of CSMPs in the corridor. Segment 4 summarizes results from the *2006 State Route 1 Transportation Concept Report*, prepared by Caltrans District 5 Planning staff. Additional counts and tachometer runs were conducted for Segment 1 to support northbound FREQ macrosimulation modeling for current conditions. Counts conducted in the southbound direction were not sufficient to calibrate the FREQ model. Future CSMPs will include southbound FREQ results.

For Segment 3B, which extends from Larkin Valley Road in the south to the Branciforte Creek Bridge just south of the SR17/SR 1 interchange in the north, the primary source of information was the *State Route 1 HOV Lane Widening Project (from Morrissey Boulevard to San Andreas Road), Traffic Operations Report*, prepared for the Santa Cruz County Regional Transportation Commission by Wilbur Smith Associates, July 2007. Traffic counts and tachometer runs were conducted in spring 2001, summer 2001, and fall 2003 and formed the basis of a *FREQ* macrosimulation analysis of the segment. In addition, intersection operations analyses were performed using Synchro/SimTraffic microsimulation software. The AMBAG regional travel demand model (version 1.1, April 2005) provided growth projections to evaluate travel conditions in 2035 with and without improvements. The simulation tools provided various measures of effectiveness to evaluate future traffic operations along Segment 3B including average travel time, travel speed, vehicle volume and delay, vehicle and person trips, total travel distance, queue length, and Level of Service (LOS). While the discussion below focuses on LOS and travel time, all measures are reported in Appendix B.

Over the past year, a hybrid meso-microsimulation model has been under development for the entire SR 1 CSMP corridor. The model not only includes the corridor itself but also a large area surrounding the corridor in order to capture the parallel arterials and possible diversion routes. Within the time frame of the SR 1 CSMP, the calibration issues faced during hybrid model development could not be resolved. These issues are

described in Appendix C. As new detection, an updated AMBAG model, and other resources become available, Caltrans District 5 staff plans to continue work on the hybrid model for use in future, updated CSMPs and other project evaluation.

### 3.1.2 Corridor Analysis

## Segment 1

***Segment 1 (PM 75.14 / R81.20)***

Segment 1 operates as a divided four-lane freeway from the junction of SR 68 West (PM 75.14) to just north of Freemont Boulevard. (PM R81.20) and then as a divided six-lane freeway to Del Monte Boulevard (PM R85.27), after which it operates as a divided four-lane freeway to SR 156 (PM R91.02.). The Route Concept for this segment of SR 1 is a six-lane Freeway.

Trucks along Segment 1 vary from 3-4% but increase to 9% from just north of Reservation Road (PM R87.00) to SR 156. Terrain is rolling. The posted speed limit is 65 mph. The entirety of Segment 1 has 12 ft lanes and 8+ ft outside shoulders. There are fifteen interchanges along Segment 1, all of which are listed in Chapter 2.

***Operational Analysis***

Segment 1 experiences heavy traffic during the peak hours. Most of the traffic is concentrated by time of day, with commuters traveling from Santa Cruz County to work on the Monterey Peninsula during the morning peak period, and vice versa during the afternoon peak period. 2007 traffic volume ranges between 24,500 and 86,000. This concentration of traffic makes Segment 1 operate mostly at LOS E. Future volumes are projected to reach between 56,000 to 104,000 with LOS mostly at E and F by 2030. The Measures of Effectiveness for Segment 1 are summarized below in Tables 3.3 and 3.4.

Since congestion exists in the northbound direction of Segment 1 in the PM peak period between SR 68 West and Reservation Road, an analysis of existing conditions using FREQ and travel time studies was undertaken to determine the duration, extent and causality of this congestion. Based on these studies, traffic operations of this segment can be described as follows.

Beginning at the junction of SR 1 and SR 68 West, the mainline facility is two lanes. SR 68 West enters the flow of northbound SR 1 as an un-metered loop on-ramp with a heavy flow during the peak period. This appears to be commuters leaving jobs in Pacific Grove and the Pebble Beach area to head to shopping and housing somewhere in the north. Moving north, SR 1 meets the on- and off-ramp for Soledad/Munras and the off-ramp for Aguajito. These seem to have little effect on the overall flow of the mainline with the on-ramp traffic being well tolerated by the mainline flow. Then the mainline facility widens to four lanes to accommodate both the heavy flow of traffic entering the roadway via the two-lane on-ramp at Aguajito and the traffic preparing to exit SR 1 for SR 68 East and Freemont Street in Monterey. There is a lot of traffic weaving going on in the weave area, with traffic moving right to get off the freeway to connect to SR 68 East and Freemont

Street and traffic merging left from the heavy two-lane on-ramp at Aguajito to continue north on SR 1. However, this weave area seems to work until about 5:30 PM when mainline traffic backs up into this area from congestion further north, discussed in the next stretch. At that time, traffic flow north becomes stop-and-go until the congestion begins to clear around 5:45 PM and the queue moves north. A weaving analysis should be completed to further evaluate operation of this weave area.

The next stretch of SR 1 continues north from the SR 68/SR1 interchange to Freemont Boulevard (Seaside) and is the stretch of roadway with the most congestion during the PM peak period. Congestion was found to start around 3:30 PM and builds till 5:30 PM, when it starts to slowly decrease, achieving free flow around 6:30 PM. This segment has two through lanes and auxiliary lanes between on- and off-ramps. The distance between interchanges is short thus making the weave areas short. The heavy traffic that is continuing north past the interchange of SR 68 is joined by on-ramp traffic at Casa Verde and at Del Monte which further loads the system. When traffic reaches the SR 218 interchange, traffic exiting the SR 218 off-ramp allows mainline speed to pick up slightly only to encounter the weave section between the SR 218 on-ramp and Freemont Boulevard off-ramp. The total demand of the northbound through traffic combined with the addition of the SR 218 on-ramp traffic exceeds the capacity of the two-lane section of SR 1 between the Freemont Boulevard off- and on-ramps. At the same time traffic slows as weaving conflicts occur. This combination of weave area effects and mainline capacity constraints seems to be the cause of the bottleneck. The Freemont Boulevard off-ramp does not cause a problem itself as the off-ramp traffic does not back up onto the freeway. Once the mainline breaks down, congestion continues to extend upstream till it reaches the SR 68 East interchange. At times, the end of the queue and slowing for the end of queue can extend into or affect the weaving area between the Aguajito two-lane on-ramp and SR 68 East, the four-lane section discussed earlier.

Since the cause of congestion in this area appears to be a combination of a lack of mainline capacity coupled with heavy weave sections, recommended analyses could include the effects of ramp metering and of adding a lane to achieve greater capacity for mainline traffic. A weaving analysis would also contribute to further evaluation of the weave areas.

Moving north of the Freemont interchange, the last stretch of SR 1 in Segment 1 widens to three lanes and remains so until the off-ramp to Del Monte at Marina, when it returns to two lanes for the rest of Segment 1. There are no traffic problems in this stretch at this time. However, the lane drop at Del Monte in Marina could be a potential bottleneck should the volume of traffic headed north increase in the future. The FREQ study ended at Reservation Road as there are no known existing issues in the remainder of Segment 1 from Reservation Road to SR 156.

In response to growing congestion and operational deficiencies, portions of this segment have been the focus of special studies:

- AMBAG's *1990 State Route 1 Corridor Study* through Monterey and Seaside

- Sand City's 1998 *Traffic Operation Study – Route 1 Corridor*
- *2008 Nexus Study for a Regional Development Impact Fee* prepared for the Transportation Agency for Monterey County (TAMC).

TAMC's *2010 Regional Transportation Plan* and Regional Development Impact Fee include projects to widen the highway between Fremont Street and Del Monte Avenue; construct improvements at the Fremont Street and Del Monte Avenue; and construct a new Monterey Road interchange between Fremont Street and Light Fighter Drive. In addition, the City of Marina proposes in conjunction with TAMC and Caltrans to study modifications to the interchange at Imjin Parkway (12th Street) to accommodate future demand. Based on a Project Study Report of SR 1 from Canyon Del Rey to Light Fighter Drive from 2002, average annual daily traffic (AADT) volumes from Canyon Del Rey to Fremont Boulevard to Light Fighter Drive are 71,000-83,000. This study identifies traffic congestion during the weekday afternoon period beginning at about 3 p.m. and continuing to about 6 p.m. The congestion is primarily due to close proximity of California Avenue and Fremont Boulevard and inadequate storage capacity.

| Table 3.3 Segment 1 Existing Measures of Effectiveness (2007) | | | | | | | |
|---|---|---|---|---|---|---|---|
| PM Begin | PM End | Location Description | 2007 VMT* | 2007 Peak Hour | 2007 ADT | 2007 Speed mph | 2007 LOS |
| 74.92 | R75.73 | NB Off To Rte 68W - Monterey SCL | 4,480 | 5,600 | 61,000 | 57 | D |
| R75.73 | R77.38 | Monterey SCL - Aguajito Rd UC | 9,075 | 5,500 | 59,000 | 57 | D |
| R77.38 | R78.12 | Aguajito Rd UC - Jct 68,E | 5,920 | 8,000 | 86,000 | <35 | F |
| R78.12 | R78.88 | Jct 68,E - Del Monte OH | 4,484 | 5,900 | 61,750 | 56 | D |
| R78.88 | R79.10 | Del Monte OH - N of Del Monte Ave IC | 1,474 | 6,700 | 72,000 | 52 | E |
| R79.10 | R80.68 | N of Del Monte Ave IC – Fremont Blvd OH | 10,428 | 6,600 | 71,250 | 53 | E |
| R80.68 | R81.20 | Fremont Blvd OH – N of Fremont Blvd IC | 4,420 | 8,500 | 86,000 | <35 | F |
| R81.20 | R82.89 | N of Fremont Blvd IC - Light Fighter Dr OC | 14,169 | 8,500 | 86,000 | 55 | E |
| R82.89 | R84.48 | Light Fighter Dr OC – 12th St OC | 13,197 | 8,300 | 83,000 | 57 | E |
| R84.48 | R85.14 | 12 Street OC - Del Monte Blvd OH | 4,752 | 7,200 | 71,000 | 57 | E |
| R85.14 | R85.27 | Del Monte Blvd OH – N of Del Monte Blvd IC | 663 | 5,100 | 48,000 | 62 | C |
| R85.27 | R86.48 | N of Del Monte Blvd IC – Reservation Rd UC | 6,171 | 5,100 | 48,000 | <35 | F |
| R86.48 | R87.00 | Reservation Rd UC – 1/2 mile N of Res. Rd IC | 2,626 | 5,050 | 47,500 | 59 | D |
| R87.00 | R88.64 | 1/2 mile N of Res. Rd IC – Del Monte Blvd OC | 8,282 | 5,050 | 47,500 | 57 | E |
| R88.64 | R89.18 | Del Monte Blvd OC - Salinas River Bridge | 2,309 | 4,300 | 47,000 | 57 | E |
| R89.18 | R90.39 | Salinas River Bridge - Molera Rd OC | 4,609 | 3,800 | 47,000 | 56 | E |
| R90.39 | R90.98 | Molera Road OC -Jct SR 156 | 3,009 | 5,100 | 49,000 | 56 | E |

* Vehicle miles of travel (VMT) is the total of miles driven by all vehicles during a given time period along a given section of roadway (s). The VMT reported refer to travel in the peak hour between the indicated post miles. The source for peak hour volumes and ADT is the Caltrans Traffic Operations web site: http://ww.dot.ca.gov/hq/traffops/saferesr/trafdata/index.htm

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| R90.98 | R91.02 | Jct SR 156 – N of Jct SR 156 | 110 | 2,750 | 24,500 | 61 | C |

**Table 3.4 Segment 1 Projected Measures of Effectiveness (2030)**

| PM Begin | PM End | Location Description | 2030 VMT | 2030 Peak Hour | 2030 ADT | 2030 Speed mph | 2030 LOS |
|---|---|---|---|---|---|---|---|
| 74.93 | R75.73 | NB Off To Rte 68W to Monterey SCL | 4,859 | 6,073 | 65,008 | 56 | E |
| R75.73 | R77.38 | Monterey SCL to Aquajito Rd UC | 9,797 | 5,938 | 63,668 | 57 | D |
| R77.38 | R78.12 | Aquajito Rd UC to Junction 68E | 6,219 | 8,404 | 90,893 | <35 | F |
| R78.12 | R78.88 | Junction 68E to Del Monte Overcrossing | 4,562 | 6,003 | 63,191 | 56 | E |
| R78.88 | R79.10 | Del Monte Overcrossing to North of Del Monte Ave IC | 1,515 | 6,887 | 73,319 | 50 | E |
| R79.10 | R80.68 | North of Del Monte Ave IC to Fremont Blvd Overcrossing | 12,449 | 7,879 | 79,479 | <35 | F |
| R80.68 | R81.2 | Fremont Blvd Overcrossing to North of Fremont Blvd IC | 5,357 | 10,302 | 103,962 | <35 | F |
| R81.2 | R82.89 | N of Fremont Blvd IC to Light Fighter Dr Overcrossing | 17,174 | 10,302 | 103,962 | 52 | E |
| R82.89 | R84.48 | Light Fighter Dr OC – 12th St OC | 14,204 | 8,933 | 92,235 | 52 | E |
| R84.48 | R85.14 | 12 Street OC - Del Monte Blvd OH | 5,524 | 8,369 | 84,225 | 57 | E |
| R85.14 | R85.27 | Del Monte Blvd OH – N of Del Monte Blvd IC | 852 | 6,556 | 55,396 | 62 | D |
| R85.27 | R86.48 | N of Del Monte Blvd Interchange to Reservation Rd UC | 7,933 | 6,556 | 55,396 | <35 | F |
| R86.48 | R87.00 | Reservation Rd UC – 1/2 mile N of Res. Rd IC | 3,427 | 6,591 | 55,956 | <35 | F |
| R87.00 | R88.64 | 1/2 mile N of Res. Rd IC – Del Monte Blvd OC | 10,810 | 6,591 | 55,956 | <35 | F |
| R88.64 | R89.18 | Del Monte Blvd OC - Salinas River Bridge | 3,110 | 5,791 | 55,285 | <35 | F |
| R89.18 | R90.39 | Salinas River Bridge - Molera Rd OC | 6,558 | 5,406 | 56,996 | 53 | E |
| R90.39 | R90.98 | Molera Road OC -Jct SR 156 | 3,957 | 6,706 | 58,996 | <35 | F |
| R90.98 | R91.02 | Jct SR 156 – N of Jct SR 156 | 136 | 3,410 | 33,890 | 61 | C |

## Segment 2

***Segment 2 (Mon SR-1 PM R91.02/R102.03)***

Segment 2 transverses Moss Landing and functions as a two-lane divided conventional highway between SR 156 (PM R91.02) and Molera Road (PM 94.40) and then as a two-lane undivided conventional highway to Salinas Road (PM T101.04.), after which it becomes a four-lane freeway up to the Monterey/Santa Cruz county line (PM R102.03.) The route concept for this segment is a four-lane expressway.

Trucks are 9% of total traffic, and increase to 10% between Jensen Road and the Santa Cruz County line. Terrain is mostly rolling but flattens out after Jensen Road. The posted speed limit is between 45 mph and 55 mph. The entirety of Segment 2 has 12 ft lanes and 7+ foot outside shoulders. Access is limited with around one access point per mile from SR-156 to Molera Road, and from Molera Road to Jensen Road, access increases to approximately six access points per mile. There are seven intersections along Segment 2, all of which are listed in Chapter 2.

**Operational Analysis**

Segment 2 is classified as a rural highway. However, the demand is mostly urban commute in nature with commuters traveling southbound from Santa Cruz County to work on the Monterey Peninsula during the morning peak period, and vice versa during the afternoon peak period. In addition, a high percentage of trucks travel along this facility, and there are seven at-grade intersections that cause additional delay and conflict. Total Daily Traffic is high and ranges between 24,500 and 38,000. Segment 2 is classified as a rural principal arterial. Future volumes are projected to reach 38,800 to 45,500 with mostly LOS F by 2030.

The section of Segment 2 between PM T101.04 and PM R102.03 experiences LOS C, with average speeds of 66 mph. This section performs better than the two-lane section because of its increased capacity. The Salinas Road Interchange project (PM 100.5 to PM R101.5) is currently under construction and will help mitigate southbound congestion and address safety concentrations at this location. The measures of effectiveness for Segment 2 are summarized in Table 3.5 and Table 3.6.

| Table 3.5 Segment 2 Existing Measures of Effectiveness (2007) | | | | | | | |
|---|---|---|---|---|---|---|---|
| PM Begin | PM End | Location | 2007 VMT | 2007 Peak Hour | 2007 ADT | 2007 Speed mph | 2007 LOS |
| R91.02 | T92.21 | North of Junction SR 156 to Junction SR 183 | 3,273 | 2,750 | 24,500 | <35 | F |
| T92.21 | 93.70 | Junction SR 183 to 0.08 PM North of Junction SR 183 | 307 | 3,700 | 32,000 | <35 | F |
| 93.70 | 94.40 | 0.08 PM North of Junction SR 183 to Molera Rd | 2,590 | 3,700 | 32,000 | <35 | F |
| 94.40 | 96.10 | Molera Rd to Dolan Rd | 6,502 | 3,825 | 33,000 | <35 | F |
| 96.10 | 99.92 | Dolan Rd. to Jensen Rd. | 16,808 | 4,400 | 38,000 | <35 | F |
| 99.92 | T101.04 | Jensen Rd to Begin 4 Lane Section north of Salinas Rd. | 5,550 | 3,750 | 35,000 | <35 | F |
| T101.04 | R102.03 | Begin 4 Lane Section North. of Salinas Rd. to Mon Co. Line | 2,110 | 3,350 | 35,000 | 66 | C |

| Table 3.6 Segment 2 Projected Measures of Effectiveness (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| PM Begin | PM End | Location | 2030 VMT | 2030 Peak Hour | 2030 ADT | 2030 Speed mph | 2030 LOS |
| R91.02 | T92.21 | North of Junction SR 156 to Junction SR 183 | 4,057 | 3,410 | 43,820 | <35 | F |
| T92.21 | 93.70 | Junction SR 183 to 0.08 PM North of Junction SR 183 | 327 | 3,940 | 38,774 | <35 | F |
| 93.70 | 94.40 | 0.08 PM North of Junction SR 183 to Molera Rd | 2,758 | 3,940 | 38,774 | <35 | F |
| 94.40 | 96.1 | Molera Rd to Dolan Rd | 6,820 | 4,012 | 38,812 | <35 | F |
| 96.10 | 99.92 | Dolan Rd. to Jensen Rd. | 17,259 | 4,518 | 43,820 | <35 | F |
| 99.92 | T101.04 | Jensen Rd to Begin 4 Lane Section north of Salinas Rd. | 5,745 | 3,882 | 41,355 | <35 | F |
| T101.04 | R102.03 | Begin 4 Lane Section North. of Salinas Rd. to Mon Co. Line | 2,264 | 3,594 | 45,468 | 66 | C |

## Segment 3A & 3B

***Segment 3A (SCr SR-1 PM R0.00/ R7.67)***

Segment 3A extends from the Santa Cruz and Monterey County line (SCr PM R0.00) to the Larkin Valley Road undercrossing (PM R7.67) in Santa Cruz County. Between the Santa Cruz-Monterey County line and SR 152 (PM R2.68) Segment 3A functions as a four-lane freeway. From SR 152 to Mar Monte Avenue (PM R6.69) the route functions as a five-lane freeway with three lanes in the northbound direction and two lanes in the southbound direction. The route then returns to a four-lane freeway between Mar Monte Avenue to Larkin Valley Road. This segment of SR 1 has a Route Concept as a six-lane freeway.

Trucks are 8-9% of total traffic, and decrease to 5% from SR 152 to Larkin Valley Road. The posted speed limit is 65 mph. Terrain is flat from the county line to SR 152 and from there it becomes rolling to Larkin Valley Road, with a steep 5% northbound three-lane upgrade (including one truck climbing lane) just south of Larkin Valley Road (PM 4.10 to PM 4.80.) The entirety of Segment 3A has 12 foot lanes and 8+ foot outside shoulders. Access is controlled by interchanges separated at least one mile apart from each other. There are seven interchanges along Segment 3A, all of which are listed in Chapter 2.

**Operational Analysis**

Morning congestion northbound along Segment 3A is affected mainly by Santa Cruz County residents commuting north to the Santa Cruz urban area and to San Jose and the San Francisco Bay Area via Highway 17. Morning congestion southbound is affected by commute travel within the region. The transition from a four-lane to a two-lane highway in Segment 2 just north of Salinas Road is the source of a bottleneck which is amplified by the Salinas Road intersection (PM R101.50.) A 5% northbound incline just south of Larkin Valley Road (PM R4.10 to PM R4.80) with heavy truck traffic slows traffic down at this location. Currently there are three lanes (including one truck climbing lane) traveling in the northbound direction. This segment is operating at near capacity during peak periods. The Measures of Effectiveness for Segment 3A are summarized in Table 3.7 and Table 3.8. See Table 3.9 for average travel times, speeds, delay, and LOS.

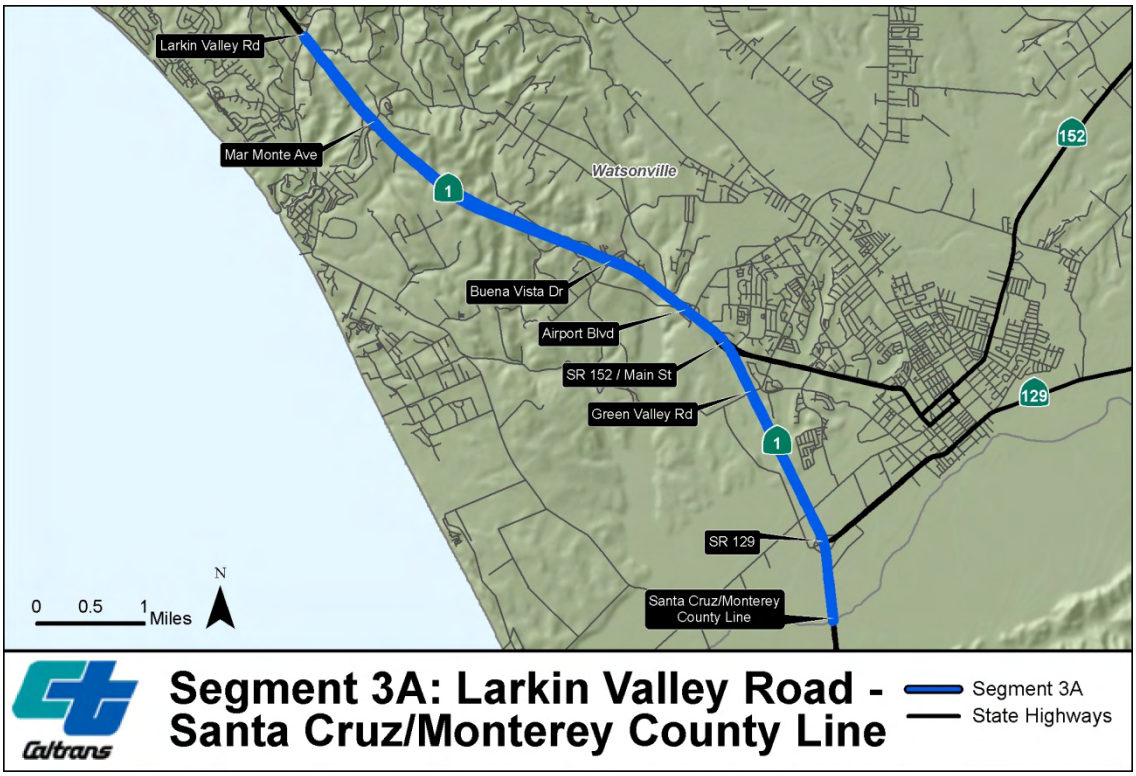



*Figure 3.2 Segment 3A Map*

| Table 3.7 Segment 3A Existing Measures of Effectiveness (2007) | | | | | | | |
|---|---|---|---|---|---|---|---|
| PM Begin | PM End | Location | 2007 VMT | 2007 Peak Hour | 2007 ADT | 2007 Speed mph | 2007 LOS |
| R0.00 | R0.44 | SCR Co. Line – Jct SR 129 | 1,474 | 3,350 | 35,000 | 63 | C |
| R0.44 | R0.62 | Jct SR 129 - 0.176 N of Jct SR 129 | 590 | 3,350 | 35,000 | 63 | C |
| R0.62 | R2.27 | 0.176 N Jct SR 129 - Harkins Slough OC | 6,161 | 3,725 | 41,750 | 59 | C |
| R2.27 | R2.68 | Harkins Slough OC – Jct. SR 152 | 1,218 | 2,950 | 32,500 | 63 | B |
| R2.68 | R3.18 | Jct. SR 152 – Jct Airport Blvd | 2,410 | 4,850 | 56,000 | 63 | C |
| R3.18 | R4.07 | Jct Airport Blvd – Buena Vista Dr UC | 5,073 | 5,700 | 63,000 | 63 | C |
| R4.07 | R4.39 | Jct Buena Vista - SB Off To Buena Vista Dr | 1,760 | 5,500 | 61,000 | 60 | D |
| R4.39 | R6.69 | SB Off To Buena Vista Dr – Jct Mar Monte Ave | 12,650 | 5,500 | 61,000 | 63 | C |
| R6.69 | R7.67 | Jct Mar Monte Ave – Jct Larkin Valley Rd | 5,432 | 5,600 | 62,000 | 62 | D |

| Table 3.8 Segment 3A Projected Measures of Effectiveness (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| PM Begin | PM End | Location | 2030 VMT | 2030 Peak Hour | 2030 ADT | 2030 Speed mph | 2030 LOS |
| R0.00 | R0.44 | SCR Co. Line – Jct SR 129 | 1,581 | 3,594 | 45,468 | 63 | C |
| R0.44 | R0.62 | Jct SR 129 - 0.176 N of Jct SR 129 | 632 | 3,594 | 45,468 | 63 | C |
| R0.612 | R2.27 | 0.176 N Jct SR 129 - Harkins Slough OC | 7,320 | 4,425 | 59,592 | 59 | C |
| R2.27 | R2.68 | Harkins Slough OC – Jct. SR 152 | 1,607 | 3,892 | 53,109 | 63 | C |
| R2.68 | R3.18 | Jct. SR 152 – Jct Airport Blvd | 2,803 | 5,640 | 75,803 | 63 | C |
| R3.18 | R4.07 | Jct Airport Blvd – Buena Vista Dr UC | 5,785 | 6,500 | 83,719 | 63 | C |
| R4.07 | R4.39 | Jct Buena Vista - SB Off To Buena Vista Dr | 2,091 | 6,535 | 86,870 | 62 | C |
| R4.39 | R6.69 | SB Off To Buena Vista Dr – Jct Mar Monte Ave | 15,030 | 6,535 | 86,870 | 63 | C |
| R6.69 | R7.67 | Jct Mar Monte Ave – Jct Larkin Valley Rd | 6,510 | 6,711 | 89,572 | 55 | E |

*Segment 3B (PM R7.67 /16.43)*

Segment 3B extends from the Larkin Valley Road interchange (PM R7.67) in the south to the Branciforte Creek Bridge (PM 16.43) just south of the SR 17 interchange in the north (a distance of approximately 9.0 miles). This section of SR 1 is a freeway with two travel lanes in each direction and auxiliary lanes at the following locations:

- In the northbound direction, between the Porter Street on-ramp and the 41st Avenue off-ramp
- In the southbound direction, between the 41st Avenue on-ramp and the Bay Street off-ramp.

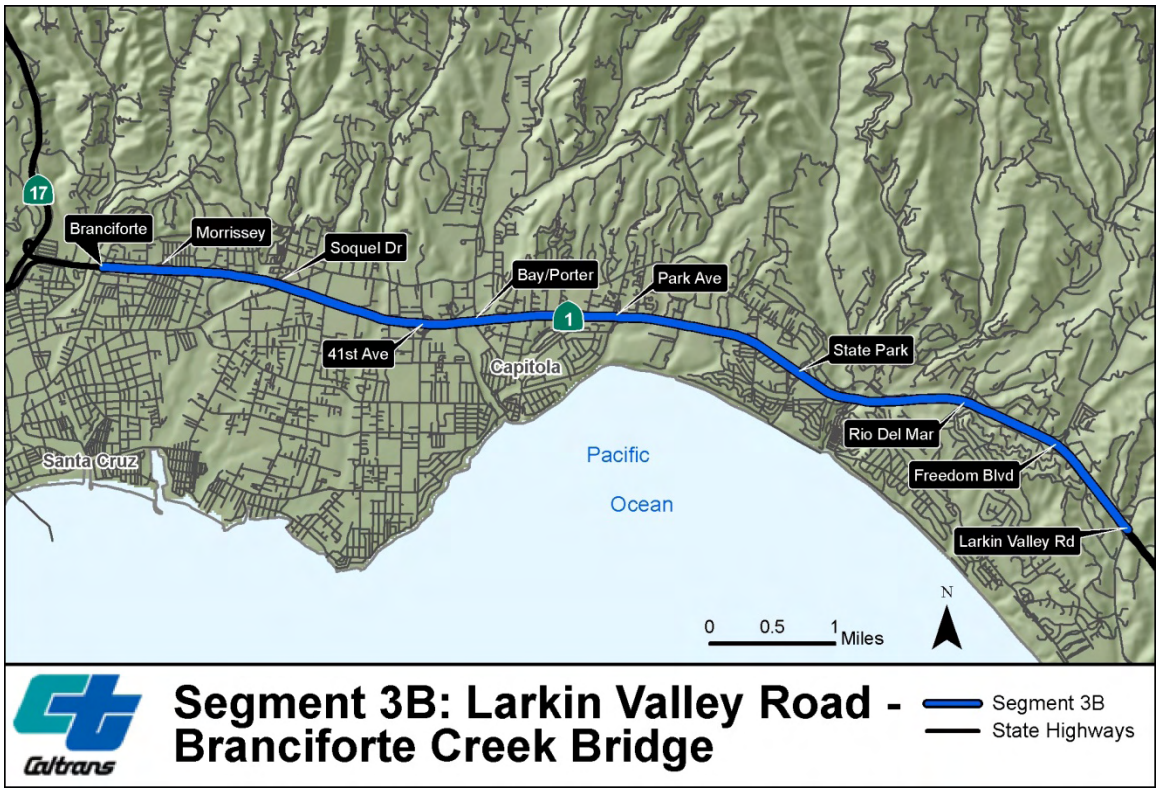



***Figure 3.3 Segment 3B Map***

In 2007, trucks represented 4.7% of total traffic at the southern end of the segment, decreasing to 2.3% of total traffic at the northern end of the segment. The facility passes through flat to gently rolling terrain, with posted speeds of 65 mph. Lane and shoulder widths meet current standards, with lanes at 12 feet and outer shoulders at eight feet.

There are nine interchanges in Segment 3B, with the following spacing:

- San Andreas Road/Larkin Valley Road and Freedom Boulevard – 0.7 mile
- Freedom Boulevard and Rio Del Mar Boulevard – 0.8 mile
- Rio Del Mar Boulevard and State Park Drive – 1.4 miles

- State Park Drive and Park Avenue – 1.5 miles
- Park Avenue and Bay/Porter Streets – 1.1 miles
- Bay/Porter Streets and 41st Avenue – 0.4 mile
- 41st Avenue and Soquel Drive – 1.2 miles
- Soquel Drive and Morrissey boulevard – 1.0 mile
- Morrissey Boulevard and SR 17 off-ramp – 1.0 mile.

**Operational Analysis**

This section reports results from the *State Route 1 HOV Lane Widening Project (from Morrissey Boulevard to San Andreas Road), Traffic Operations Report*, prepared by Wilbur Smith Associates for the Santa Cruz County Regional Transportation Commission, July 2007.

Existing Year 2003 Conditions

Mainline: In 2003, annual average daily traffic (AADT) along Segment 3B ranged from 66,000 to 114,000.[1] AADT was lower in the southern portion of Segment 3B than in the northern portion, which is home to more attractions (e.g., jobs, recreational facilities, and retail) and is a gateway via SR 17 to San Jose and the San Francisco Bay area. Seasonally, average daily traffic volumes are generally higher in the summer than in other seasons due to tourist travel. Segment 3B is currently highly congested and operating below optimal conditions. Figure 3.2 shows Level of Service (LOS) in the 2003 AM and PM peak hours along the segment.

In 2003, the AM peak hour was characterized by heavy northbound traffic, with volumes ranging from approximately 3,100 to 4,600 vehicles per hour. As shown in Figure 3.4, the facility operated at LOS F along almost the entire segment, with high levels of congestion between the SR 17/SR 1 interchange in the north and the Freedom Boulevard interchange in the south. Note that the SR 17/SR 1 merge lane project is not included in the existing year 2003 analysis but is included in future year analyses. In the southbound direction, AM peak hour volumes ranged from 3,000 to 3,400 vehicles per hour, with LOS varying from C to D. The directional nature of the AM peak hour traffic reflects the greater number of jobs, schools, and other attractions in the Santa Cruz urban area and the San Jose/San Francisco Bay Area. See Table 3.9 for average travel times in peak periods.

[1] Caltrans Traffic Ops web site: http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/

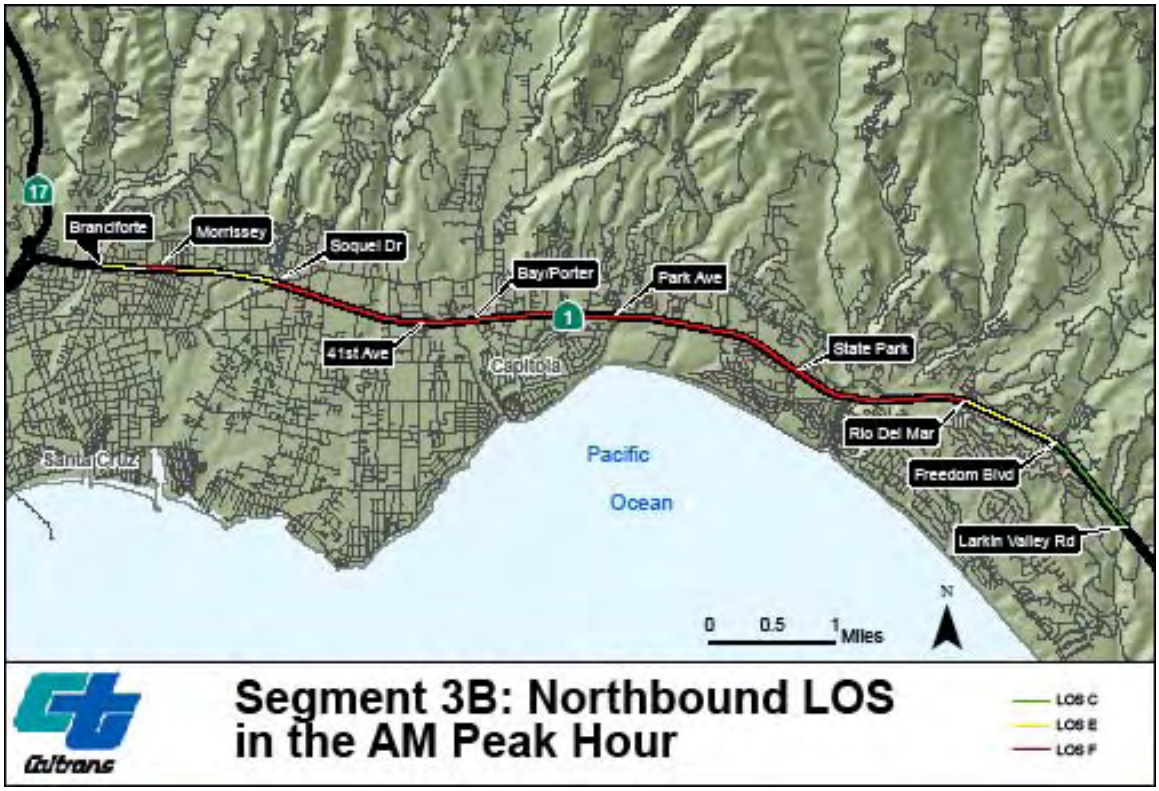



*Figure 3.4 Segment 3B Level of Service (LOS) in 2003 AM Peak Hour*

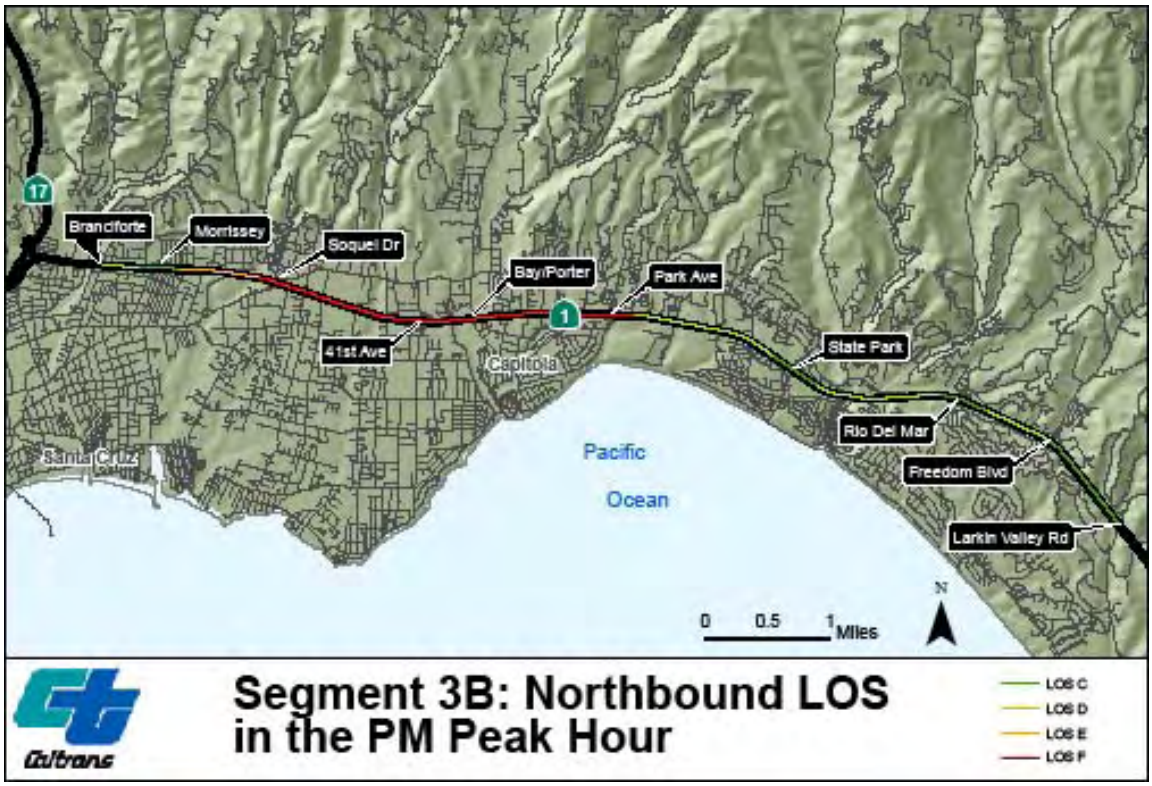



*Figure 3.5 Segment 3B Level of Service (LOS) in 2003 PM Peak Hour*

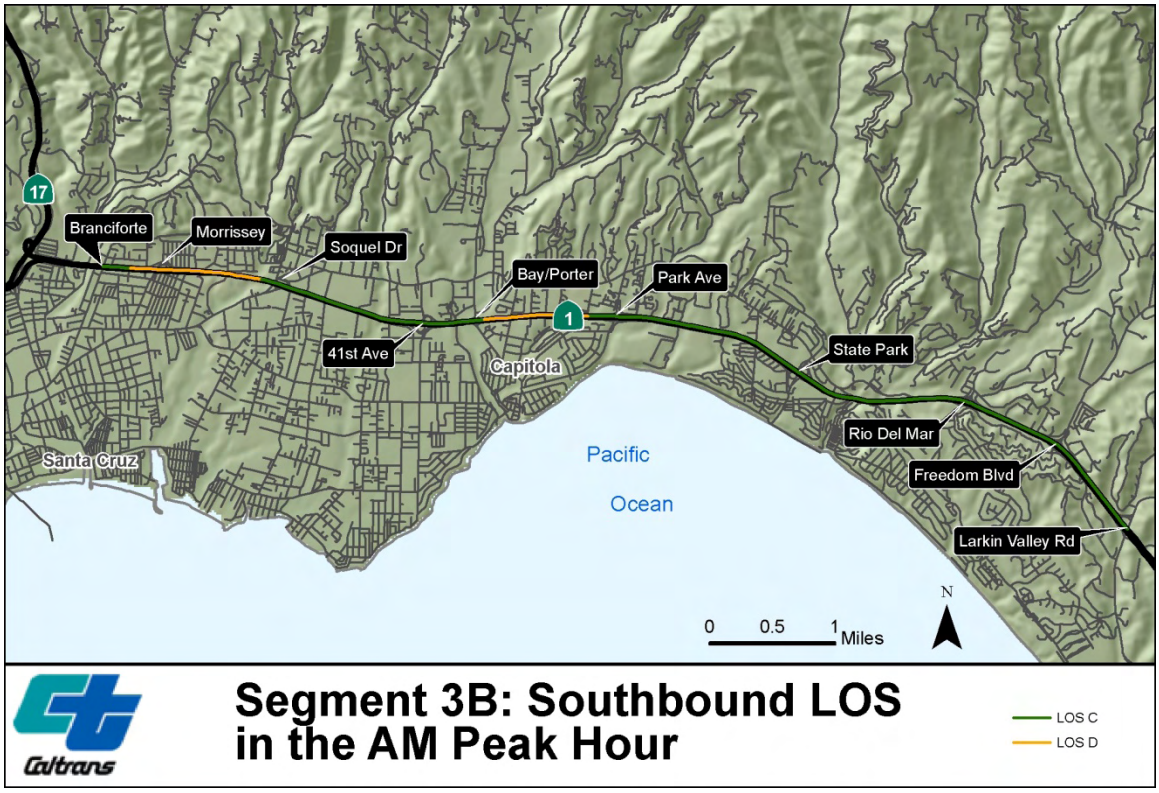



*Figure 3.6 Segment 3B Level of Service (LOS) in 2003 AM Peak Hour*

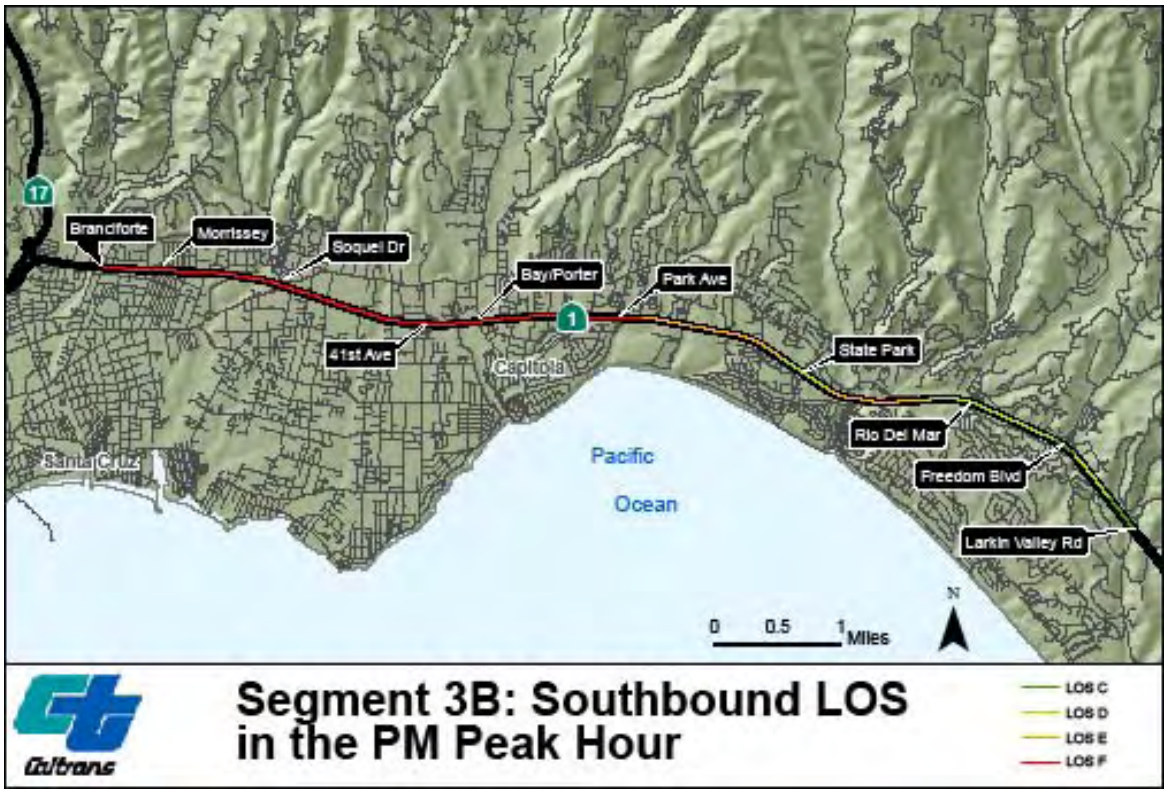



*Figure 3.7 Segment 3B Level of Service (LOS) in 2003 PM Peak Hour*

In the afternoon, 2003 peak hour volumes were relatively high in both directions, with more congestion in the southbound direction. The northern end of the segment continued to attract trips, including commuters returning home from jobs in the Monterey region. The southbound direction reflected the commute home from jobs in the Santa Cruz urban area and the San Jose/San Francisco Bay Area. In the northbound direction, volumes ranged from 3,100 to 4,000 vehicles per hour, while in the southbound direction, volumes ranged from 3,300 to 4,400 vehicles per hour. In both directions, LOS was in the E to F range at the northern end of Segment 3B. As traffic eased between State Park and Larkin Valley Road, LOS improved to the C to D range.

Further, in 2003, the afternoon was already characterized by a peak period in the southbound direction, with congestion beginning at about 3 PM and continuing till 7 PM. LOS was below targeted levels and was at E in the 2 PM to 8 PM peak period used for the analysis.

Intersections: Of 25 studied locations at or near ramp and local street intersections, most intersections in the AM and PM peak hours operated at acceptable levels of service. Similarly, most ramps had available storage. Figure 3.8 shows locations with possible deficiencies.

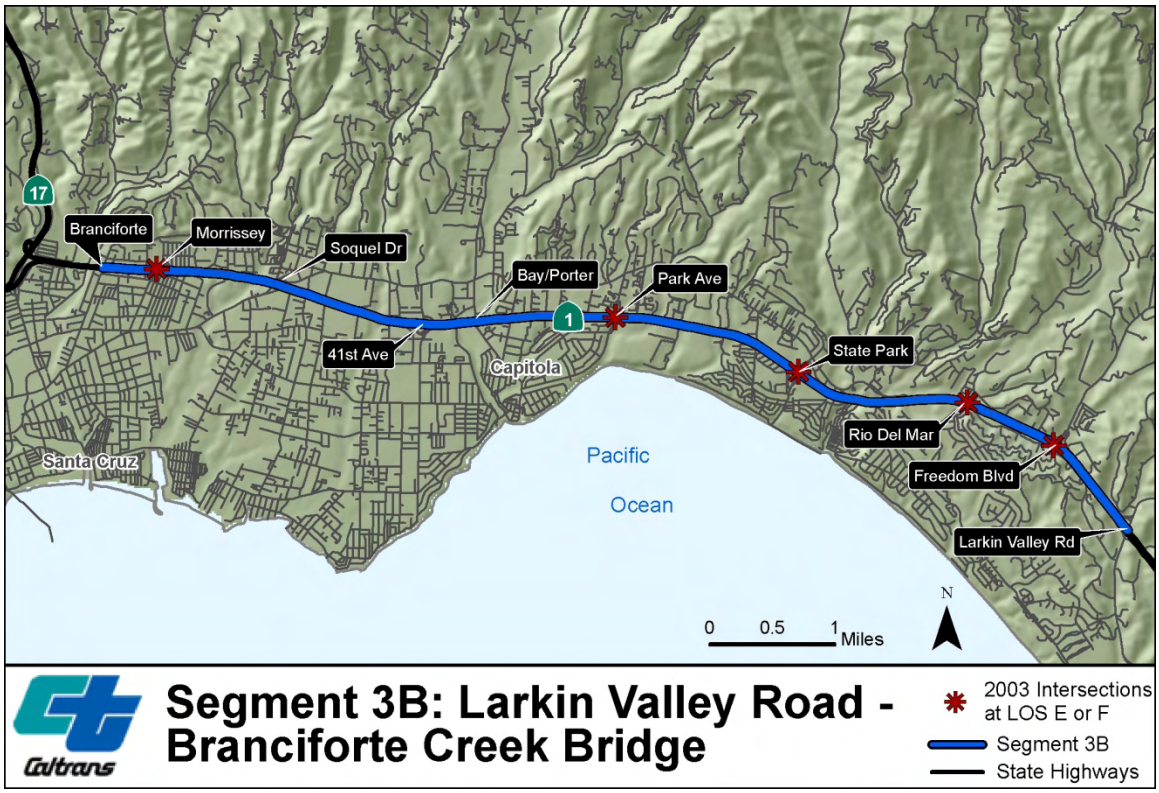



***Figure 3.8 Intersections at LOS E or F in 2003 Peak Hours***

Those intersections operating at LOS E or F in the AM peak hour were:

- Fairmount Avenue/SR 1 southbound ramps
- Park Avenue/SR 1 northbound ramps
- Park Avenue/Kennedy Drive/McGregor Drive
- State Park Drive/McGregor Drive
- Rio Del Mar Boulevard/Soquel Drive
- Freedom Boulevard/SR 1 northbound ramps
- Freedom Boulevard/SR 1 southbound ramps

In the PM peak hour, most intersections also operated at an acceptable LOS. Intersections operating at LOS E or F were:

- Fairmount Avenue/SR 1 southbound ramps
- Park Avenue/Kennedy Drive/McGregor Drive
- State Park Drive/McGregor Drive
- Rio Del Mar Boulevard/Soquel Drive
- Freedom Boulevard/SR 1 southbound ramps

Most of the studied off-ramps also operated adequately under existing year conditions. The SR 1 HOV report evaluated 18 off-ramps. In the AM peak hour, 16 of the 18 off-ramps had enough storage to accommodate traffic. Two ramps were near capacity (the Porter Street/Bay Avenue SB off-ramp and the Park Avenue SB off-ramp).

In the PM peak hour, 17 of the 18 off-ramps could accommodate existing traffic. Only the Porter Street/Bay Avenue SB off-ramp operated near capacity.

Future Year 2035 No Build Conditions

Mainline. Without improvements to the corridor, traffic conditions are expected to worsen considerably by 2035. AADT is projected to increase and range from 97,600 to 158,000.

In the AM and PM peak hours, throughput is expected to decrease as traffic experiences stop-and-go conditions. This will add to the peak spreading that is already occurring. With this additional peak spreading and with increased future demand, the total number of trips in the peak periods is expected to increase. However, demand is forecasted to be so high compared to the available capacity that peak spreading is not expected to alleviate congestion. On average, LOS will be E or F in both the peak hours and peak periods

Given the above, the average time it takes to travel from one end of the corridor to the other is therefore expected to increase in both directions. Travel times in the peak periods are shown in Figure 3.9

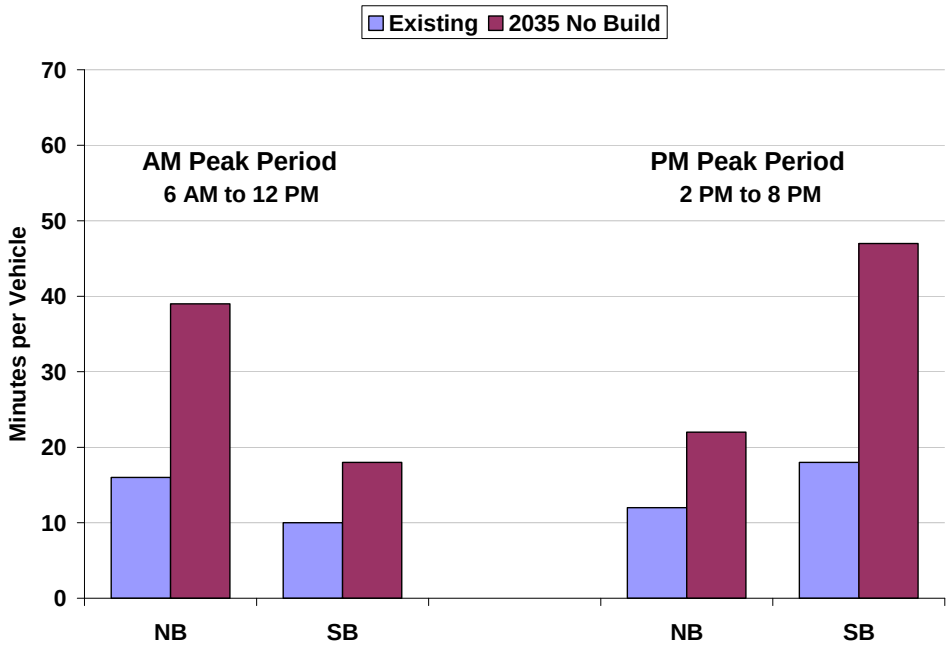



***Figure 3.9 Segment 3B Average Travel Times in Peak Period***

In the AM peak period, comparing the 2035 No Build case with existing conditions, average travel time along Segment 3B is expected to increase from 16 minutes to 39 minutes in the northbound direction and from 10 minutes to 18 minutes in the southbound direction. In the PM peak period, average travel time is expected to increase from 12 minutes to 22 minutes in the northbound direction and from 18 minutes to 47 minutes in the southbound direction. This and other comparisons of segment performance between 2003 and 2035 are shown in Figure 3.10 below and in Appendix B. The performance measures indicate a considerable worsening of congestion and performance by 2035.

| Table 3.9 Segment 3B Selected Measures of Effectiveness | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Measures of Effectiveness* | Peak Period** | | | | | | | |
| | Existing AM (6AM-12PM) | | 2035 AM (6AM-12PM) | | Existing PM (2PM-8PM) | | 2035 PM (2PM-8PM) | |
| | NB | SB | NB | SB | NB | SB | NB | SB |
| Average Travel Time (minutes) | 16 | 10 | 39 | 18 | 12 | 18 | 22 | 47 |
| Average Speed (mph) | 44 | 61 | 18 | 35 | 52 | 39 | 28 | 15 |
| Average Delay (minutes per vehicle) | 4 | 0 | 28 | 8 | 2 | 6 | 12 | 35 |
| LOS | D | C | F | E | D | E | F | F |

*Source*: State Route 1 HOV Lane Widening Project (from Morrissey Boulevard to San Andreas Road), Traffic Operations Report*, prepared by Wilbur Smith Associates for the Santa Cruz County Regional Transportation Commission, July 2007. Note that the 2035 No Build scenario includes the SR 17/SR 1 merge lane project and the Soquel-Morrissey auxiliary lane project.
**The table is an average and represents an entire six hour peak period.

Intersections: Intersections along the segment are also expected to be impacted by the high demand in 2035. Most intersections are projected to operate at LOS F, and all studied intersections are expected to operate below desired levels, operating at LOS D or below. As traffic attempts to divert onto local streets to avoid freeway congestion, nearby ramps, intersections, and local streets are expected to be impacted.

## Segment 4

***Segment 4 (PM 16.43 / 18.26)***

Segment 4 extends from the SR 1/SR 17 interchange to the King Street/SR 1 Intersection. Beyond the fishhook interchange, Segment 4 continues as a four-lane freeway to the San Lorenzo River Bridge, where it becomes a conventional highway. An at-grade intersection with SR 9 (north) and River Street (south) lies less than one-tenth mile from the end of the freeway. The Pacific Railroad tracks cross the highway approximately one-tenth mile beyond the intersection. Segment 4 continues to the intersection of Chestnut and Mission Streets, where Route 1 veers right along the Mission Street alignment. Segment 4 carries heavy traffic bound for the UC Santa Cruz campus, regional traffic, and local traffic between downtown Santa Cruz and residential areas to the west. From

the Chestnut/Mission Streets intersection SR 1 continues as a four-lane conventional highway. Segment 4 is presently operating at peak LOS D/E and is projected to fall to LOS E/F by the year 2025. See Table 3.10

**Table 3.10 SR 1 Level of Service (LOS)* Segment 4 Intersections**

| Intersection | Projected Peak LOS Data | | | |
|---|---|---|---|---|
| | 2002 | 2004 | 2009 | 2025 |
| SR 9 | D | - | - | F |
| Chestnut | - | D | F | - |
| King | - | F | E | - |

**Source 2006 SR 1 Transportation Concept Report.*
*Note: The AMBAG regional model*

**Operational Analysis**

Currently there are two projects that are analyzing traffic congestion and safety in this segment of SR 1:

San Lorenzo Bridge Project – This project proposes to improve safety and to address the heavy congestion caused by traffic weaving on the bridge during peak hours of most weekdays. The project proposes to widen the SR 1 bridge over the San Lorenzo River by adding capacity in both directions.. Currently, the San Lorenzo Bridge widening project is in the scoping phase (PID Project Initiation Document). The project is in the conceptual stage with no secure funding. The PSR (Project Study Report) will be completed, and the project will await funding to move forward. The city of Santa Cruz is the project sponsor.

SR 1/9 Intersection Improvement Project – Currently in the Environmental Review phase (PA&ED), the project proposes to relieve this heavily congested intersection. The City of Santa Cruz is the project sponsor. The existing signal at SR 1/SR 9 is causing queues to back up beyond the left-turn pockets, blocking access to the left turn lanes in all directions. The existing left-turn lanes cannot accommodate the number of vehicles making these movements. The alternative being studied for the project consists of adding a southbound left-turn lane to SR 1 and a through lane and a shoulder to accommodate cyclists on northbound SR 9 from SR 1 to Encinal Street. The intersection of SR 9 and Fern Street would be signalized. A raised median would be extended to Coral Street on NB SR 9.

## Segment 5

***Segment 5 (Mon SR-183 PM 0.86/9.98)***

SR 183 is an important commuter route that connects Santa Cruz travelers to Salinas, but it is also a goods movement route for agricultural products coming to and from processing facilities in Castroville and Salinas for distribution throughout the world. As a commuter route, residents living in Santa Cruz and Monterey Counties use SR 183 to go

to and from work in Salinas. It also connects multi-modal travelers from Santa Cruz and Monterey Counties to the rail station in Salinas.

Segment 5 extends from Lincoln Avenue (PM 0.86) in Salinas to Junction SR1/SR183 (PM 9.98) near Castroville. Segment 5 is considered a four-lane conventional highway from Lincoln Avenue to the North Davis Road southbound off-ramp (PM 2.06) and has approximately 50 access points, making it an urban facility through Salinas. Starting at Davis Road SR 183 is a two-lane conventional highway with access limited to six access points. SR 183 enters Castroville at Jackson Street (PM R8.61) and continues to the SR 1/SR 183 Junction, and access points increase again to approximately 50 access points. This segment has a Route Concept as a four-lane Expressway.

While trucks are 1% of total traffic between Jackson Street and SR 156 (PM R8.96) in Castroville, they range between 10% and 17% between Lincoln Avenue in Salinas and Jackson Street in Castroville and again in Castroville between SR 156 and the junction of SR 1/SR 183. Terrain is flat throughout the segment. There are two interchanges and many intersections along Segment 5, all of which are listed in Chapter 2.

**Operational Analysis**

Segment 5 is mostly a two-lane conventional highway with limited capacity. The junction of SR 1/SR 183 and Davis Road in Salinas are the only two interchanges along Segment 5. We suspect that the many at-grade intersections, particularly in the urban environments of Salinas and Castroville, cause Segment 5 to operate almost exclusively at LOS E or F. The rural sections of Segment 5 between PM R2.06 and PM R8.61 operate at LOS E. LOS was not calculated for the urban section of Segment 5 due to a lack of turning counts. By expanding the capacity of Segment 5 and limiting access to SR 183, LOS could be improved considerably. The Measures of Effectiveness for Segment 5 are summarized in Table 3.11 and Table 3.12.

| Table 3.11 Segment 5 Existing Measures of Effectiveness (2007) | | | | | | | |
|---|---|---|---|---|---|---|---|
| PM Begin | PM End | Location | 2007 VMT | 2007 Peak Hour | 2007 ADT | 2007 Speed mph | 2007 LOS |
| 0.22 | R1.82 | Junction at Casentini St to NB Davis Rd Ramp | 4,203 | 2,625 | 27,500 | n/a | n/a |
| 1.82 | 2.06 | NB Davis Rd Ramp to SB Davis Rd Ramp | 430 | 1,800 | 17,000 | n/a | n/a |
| 2.06 | R7.63 | SB Davis Rd Ramp to Espinosa Rd | 10,062 | 1,800 | 17,000 | 38 | E |
| R7.63 | R8.61 | Espinosa Rd to Jackson St | 1,824 | 1,900 | 19,500 | 31 | E |
| R8.61 | R8.95 | San Miguel St. / Blackie Rd. to Haro St. | 682 | 1,900 | 19,500 | n/a | n/a |
| R8.95 | 9.00 | Haro St. to Jct. Rte. 156/183 Ramps | 67 | 1,350 | 12,000 | n/a | n/a |
| 9.00 | 9.81 | Jct. Rte. 156/183 to Washington St | 1,107 | 1,350 | 12,000 | n/a | n/a |
| 9.81 | 9.98 | Washington St to Jct. Rte 1/183 | 203 | 1,350 | 12,000 | n/a | n/a |

| Table 3.12 Segment 5 Projected Measures of Effectiveness (2030) | | | | | | | |
|---|---|---|---|---|---|---|---|
| PM Begin | PM End | Location | 2030 VMT | 2030 Peak Hour | 2030 ADT | 2030 Speed mph | 2030 LOS |
| 0.22 | 1.82 | Junction at Casentini St to NB Davis Rd Ramp | 5362 | 3349 | 33021 | n/a | n/a |
| 1.82 | 2.06 | NB Davis Rd Ramp to SB Davis Rd Ramp | 603 | 2524 | 22521 | n/a | n/a |
| R2.06 | R7.63 | SB Davis Rd Ramp to Espinosa Rd | 14111 | 2524 | 22521 | 31 | E |
| R7.63 | R8.61 | Espinosa Rd to San Miguel St./Blackie Rd. | 2221 | 2313 | 23654 | 33 | E |
| R8.61 | R8.95 | San Miguel St./Blackie Rd. to Haro St. | 830 | 2313 | 23654 | n/a | n/a |
| R8.95 | 9.00 | Haro St. to Jct. Rte. 156/183 | 76 | 1527 | 13201 | n/a | n/a |
| 9.00 | 9.81 | Jct. Rte. 156/183 to Washington St | 1107 | 1350 | 12000 | n/a | n/a |
| 9.81 | 9.98 | Washington St to Jct. Rte. 1/183 | 203 | 1350 | 12000 | n/a | n/a |

## 3.2 Bottlenecks

Bottlenecks appear at several locations along the SR 1 corridor as shown in Table 3.13. The bottlenecks are discussed in detail below.

A bottleneck reflects a condition where traffic demand exceeds the capacity of the roadway. Bottlenecks can be caused by a number of factors, e.g., increased demand due to merging traffic from an on-ramp, decreased carrying capacity due to a lane drop, or a combination of demand and capacity such as merging and weaving.

The locations and causality of the bottlenecks along the SR 1 corridor were identified by various methods. For Segment 1 in the northbound direction and Segment 3B, congestion plots from FREQ analyses identified bottleneck locations, which were then verified by local knowledge. For Segments 2, 3A, and 4, bottlenecks were verified through a combination of local knowledge and the mobility analyses above. For Segment 5, tools were not available to identify bottlenecks. Recommended next steps include moving forward with a more thorough study of bottleneck locations based on more detailed count and speed data and improved modeling tools.

<u>Segment 1</u>

As shown by FREQ model runs and field observations, a bottleneck occurs on northbound SR 1 at the Fremont Boulevard off-ramp. The cause of congestion in this area appears to be a combination of a lack of mainline capacity coupled with a heavy weave section from the SR 218 on-ramp to the Freemont Boulevard off-ramp. For a full description of the operation of this bottleneck, see the Operational Analysis section for Segment 1.

A potential bottleneck exists at the lane drop at Del Monte Boulevard in the city of Marina. In the future, increasing volumes that exceed capacity would cause congestion at this point.

<u>Segment 3B</u>

The primary cause of high levels of congestion along Segment 3B is demand that is higher than available capacity. In addition, in the northbound direction, the SR17/SR 1 interchange is a bottleneck location. With few alternate routes, especially in the northern portion of Segment 3B, SR 1 is the only viable travel route to reach SR 17. This leads to high volumes and congestion that extend south to Freedom Boulevard in the peak period. It is likely that hidden bottlenecks exist upstream of the SR 17/SR 1 interchange and that these will be revealed with future analyses.

On the other hand, for the southbound portion of Segment 3B, options exist for using parallel arterials to avoid the congestion beginning north of the SR 17/SR 1 interchange. Thus, bottlenecks are more likely to occur in the mid- to southern ends of the segment in

the PM peak hour and period. With the Porter Street/Bay Avenue SB off-ramp operating near capacity in the PM peak hour, the primary bottleneck in the southbound direction is at the Porter Street/Bay Avenue interchange, leading to congestion that extends upstream to north of the SR 17/SR 1 interchange. Note that while parallel arterials provide options for avoiding congestion on southbound SR 1, these parallel routes are also congested in the PM peak hour.[2]

In the future and without improvements, additional bottlenecks may appear along Segment 3B as nearby intersections reach low levels of service, storage capacity on the ramps is unable to handle demand, and weaving causes additional delays. Future studies are recommended to identify such bottlenecks and to look at improvements that will reduce the length of the peak period and/or reduce delay in the segment.

Segment 4

This segment is also characterized by congestion due to heavy demand that exceeds the capacity of the roadway. Two major bottlenecks occur in Segment 4.

At the San Lorenzo River Bridge, SR 1 transitions from freeway to conventional highway. In addition, less than one-tenth mile from the end of the freeway, SR 1 meets SR 9 at an at-grade intersection. As northbound traffic maneuvers to get to the desired lane at the intersection, heavy weaving results on the bridge, causing a bottleneck.

The second bottleneck occurs at the SR 9/SR 1 intersection. The existing left-turn pockets cannot accommodate the number of vehicles wishing to make these movements. This leads to queues backing up beyond the left-turn pockets, blocking access to the left-turn lanes in all directions and thus causing bottlenecks on SR 1 in both directions.

For more detail, see Section 3.1, Segment 4.

[2] Caltrans, *Project Study Report (Project Development Support), Widening on Route 1 in Santa Cruz County in and near Capitola and Santa Cruz*, June 2002.

| Table 3.13 Bottlenecks along the SR 1 Corridor | | | | | | |
|---|---|---|---|---|---|---|
| | Segment | Bottleneck Location | Causality | Period | | Location Post mile |
| | | | | AM | PM | |
| Northbound | 1 | Between SR 218 On-ramp and Fremont Blvd Off-ramp | High demand combined with heavy weaving and merging | | x | 80.55 |
| | 3B | SR 17/SR 1 Interchange | Heavy merge | x | x | 16.80 |
| | 4 | San Lorenzo River Bridge | High demand combined with heavy weaving due to the close spacing with the SR 9/SR 1 intersection | x | x | 17.41 |
| | 4 | SR 9/SR 1 Intersection | Left-turn pockets unable to accommodate all demand | x | x | 17.56 |
| | Segment | Bottleneck Location | Causality | Period | | Location Post mile |
| | | | | AM | PM | |
| Southbound | 2 | North of Salinas Road | Capacity reduction due to lane drop from four to two lanes | x | | T101.04 |
| | 3B | Porter Street/Bay Avenue Interchange | SB Off-ramp near capacity; mainline demand greater than capacity | | x | 13.20 |
| | 4 | San Lorenzo River Bridge | Demand greater than capacity | | x | 17.41 |
| | 4 | SR 9/SR 1 Intersection | Left-turn pockets unable to accommodate all demand; close spacing to nearby intersections | x | x | 17.56 |

## *3.3 Safety*

The collision history for the corridor was derived from the most recent three years of data available (January 1, 2006 to December 31, 2009). The actual collision rates are those that are recorded based on data for a specific route and then compared to the statewide average collision rates for similar facilities. Table 3.14 and Figure 3.10 summarize the SR 1 and SR 183 mainline rates.

Several potential elements contribute to the causes of traffic collisions: human factors, the vehicle, and the roadway and its related environment. Areas of higher actual collision rates compared to statewide average collision rates do not necessarily indicate the need for roadway safety improvements as a percentage of the collisions may be directly attributed to the vehicle or human factors.

| Table 3.14 Mainline Collision Data for SR 1 & SR 183 | | |
|---|---|---|
| **Segment** | **Actual Collision Rate*** | **Statewide Average Collision Rate** |
| 1 | 0.66 | 0.71 |
| 2 | 0.76 | 0.74 |
| 3A | 0.47 | 0.61 |
| 3B | 1.15 | 1.12 |
| 4 | 1.40 | 1.24 |
| 5 (SR 183) | 1.25 | 1.38 |

** Rates are incidents per million vehicle miles for 3-year period from: 1/01/2006 to 12/31/2009*

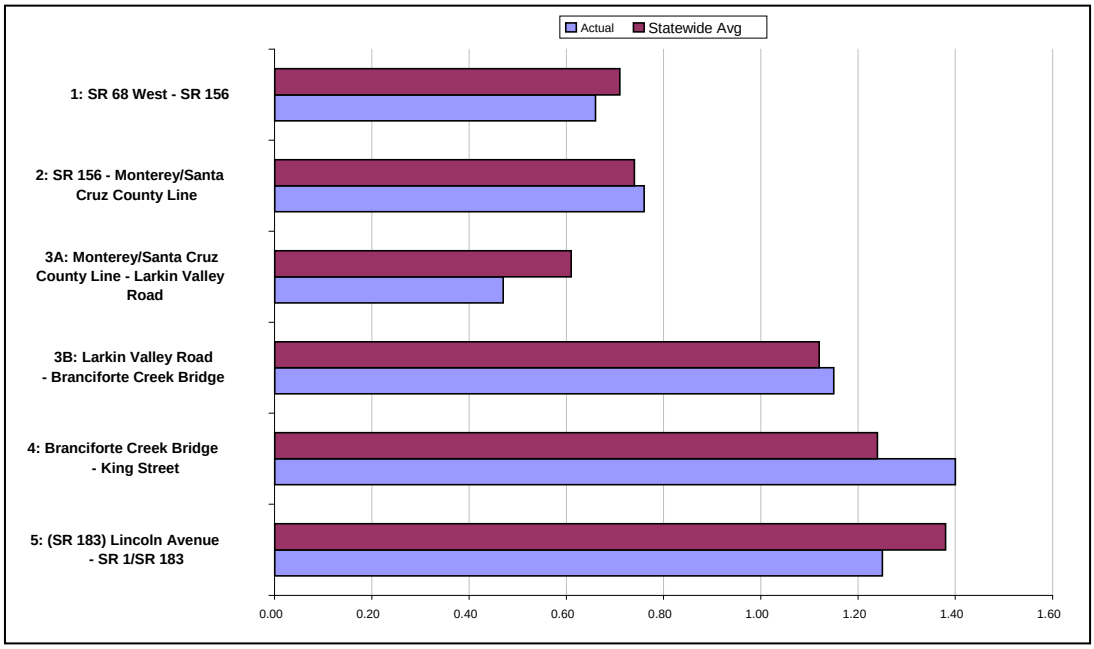



***Figure 3.10 Mainline Collision Data for SR 1 and SR 183***

Several of the actual rates for the five segments are less than the statewide average; however the following segments exceed the statewide average:

- Segment 2, from the junction of SR 156 to the Monterey / Santa Cruz County line
- Segment 3B, from the Larkin Valley Road undercrossing to the Branciforte Creek bridge
- Segment 4, from the Branciforte Creek bridge to King Street

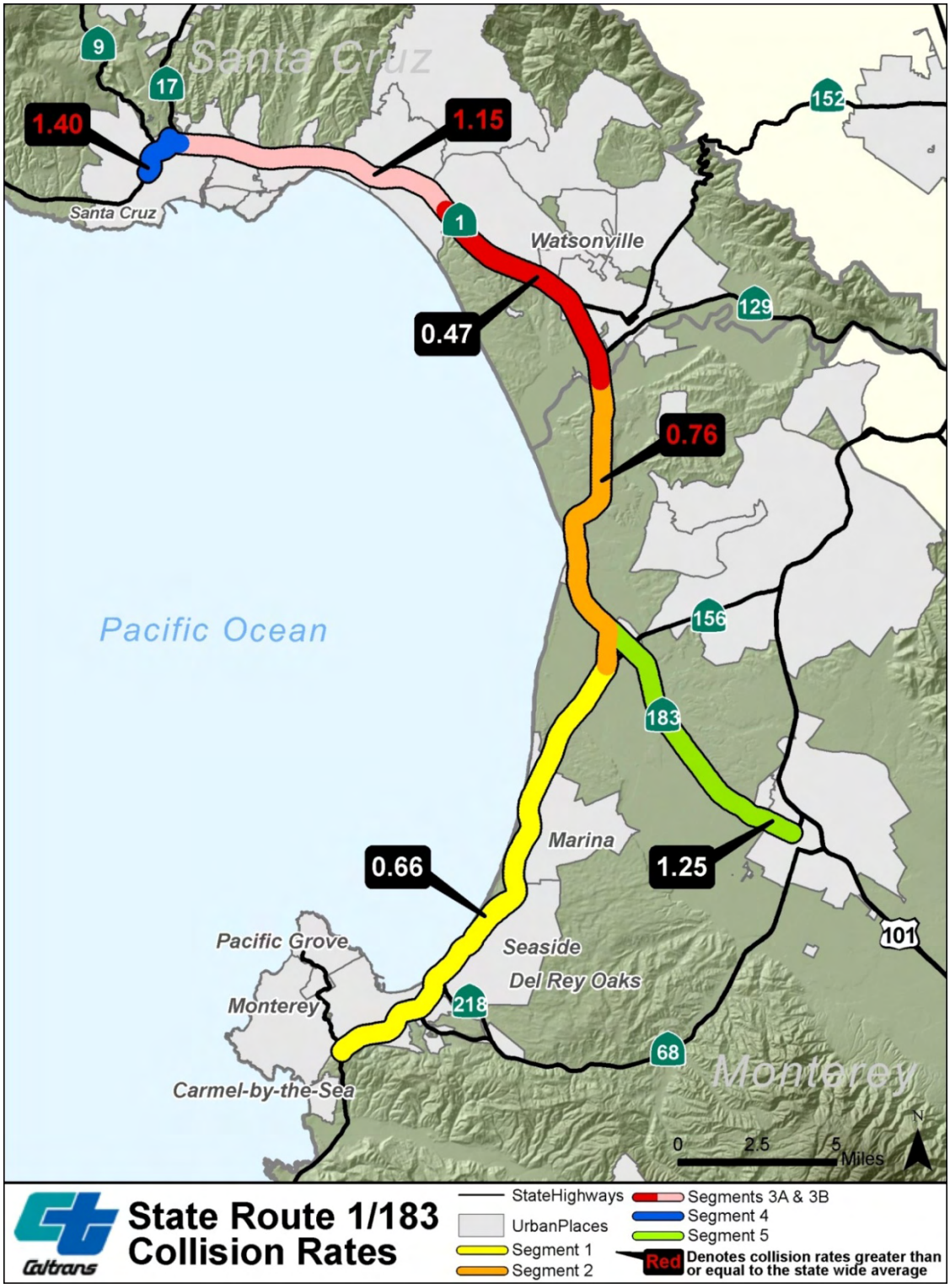



*Figure 3.11 Collision Rates SR 1 & 183 Corridor*

**Intersections & Ramps**

The following table identifies the locations where intersection collision data is near or exceeds the statewide average along Segment 1.

**Table 3.15 Intersection and Ramp Collision Data for Segment 1**

| Intersection | Actual Collision Rate* | Statewide Average Collision Rate |
|---|---|---|
| South Bound On-ramp @ SR 1 / 68 W Interchange | 1.01 | 1.00 |
| South Bound Off-ramp @ Munras / Soledad | 3.18 | 1.20 |
| North Bound On-ramp @ Munras / Soledad | 0.71 | 0.75 |
| North Bound On-ramp @ Aguajito | 1.49 | 0.75 |
| South Bound Off-ramp @ SR 68 E | 1.26 | 0.75 |
| North Bound On-ramp @ SR 68 E | 2.48 | 0.35 |
| North Bound Off-ramp @ Casa Verde | 1.46 | 1.20 |
| North Bound Off-ramp @ English / Del Monte | 1.19 | 1.20 |
| South Bound On-ramp @ Del Monte | 1.59 | 0.75 |
| South Bound On-ramp @ Fort Ord Main Entrance | 0.42 | 0.45 |
| North Bound On-ramp @ Fort Ord North Entrance | 4.58 | 0.75 |
| South Bound Off-ramp @ Fort Ord North Entrance | 3.42 | 1.20 |
| South Bound On-ramp @ Reservation | 1.08 | 0.75 |
| North Bound Off-ramp @ Neponset | 1.32 | 1.20 |
| North Bound Off-ramp @ Molera | 2.49 | 1.20 |
| South Bound On-ramp @ Molera | 2.11 | 0.60 |
| North Bound On-ramp @ Molera Loop | 0.67 | 0.55 |
| South Bound Off-ramp @ Molera | 2.40 | 1.60 |

** Rates are incidents per million vehicle miles for 3-year period from: 1/01/2006 to 12/31/2009*

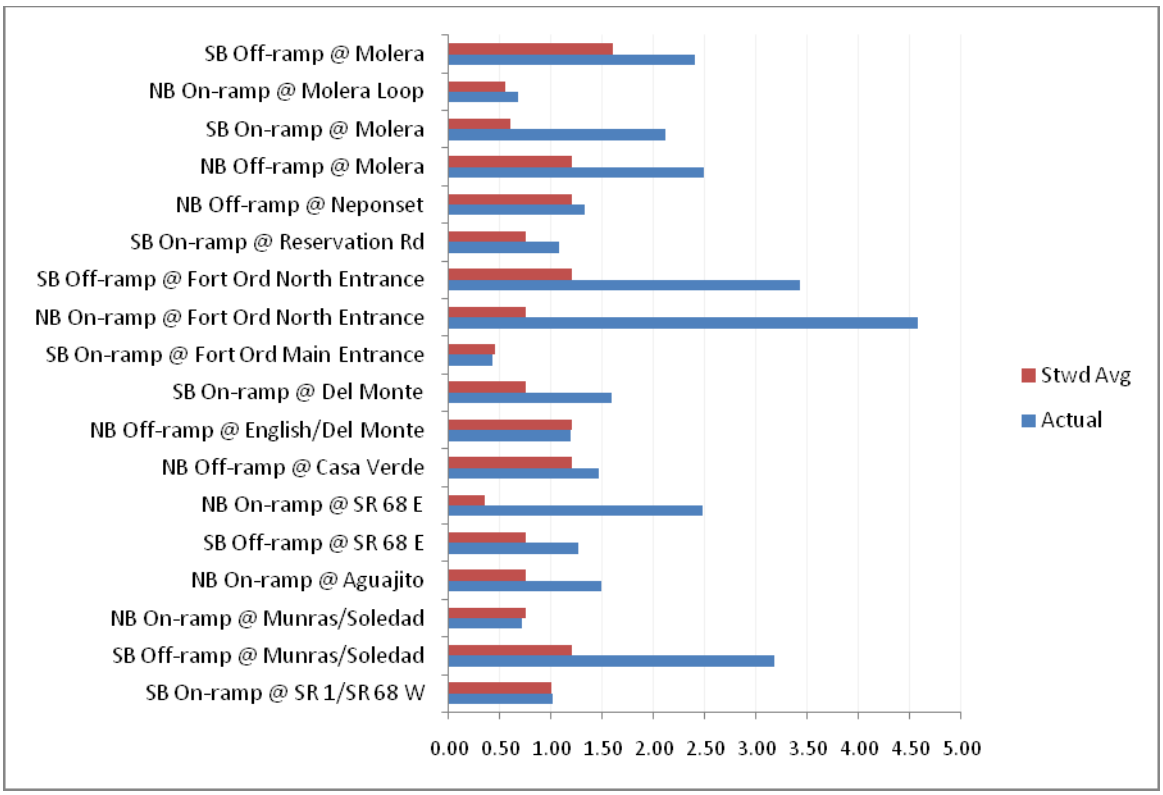



***Figure 3.12 Intersection and Ramp Collision Data for Segment 1***

The following table identifies the locations where intersection collision data is near or exceeds the statewide average along Segment 2.

**Table 3.16 Intersection Collision Data for Segment 2**

| Intersection | Actual Collision Rate* | Statewide Average Collision Rate |
|---|---|---|
| Junction at SR 1 and SR 183 | 0.78 | 0.20 |
| Molera | 0.18 | 0.20 |
| Dolan | 0.66 | 0.20 |
| Struve (South, Left turn) | 0.19 | 0.20 |
| Struve (North) | 0.37 | 0.20 |
| Jensen | 0.29 | 0.20 |
| Salinas | 0.70 | 0.25 |

** Rates are incidents per million vehicle miles for 3-year period from: 1/01/2006 to 12/31/2009*

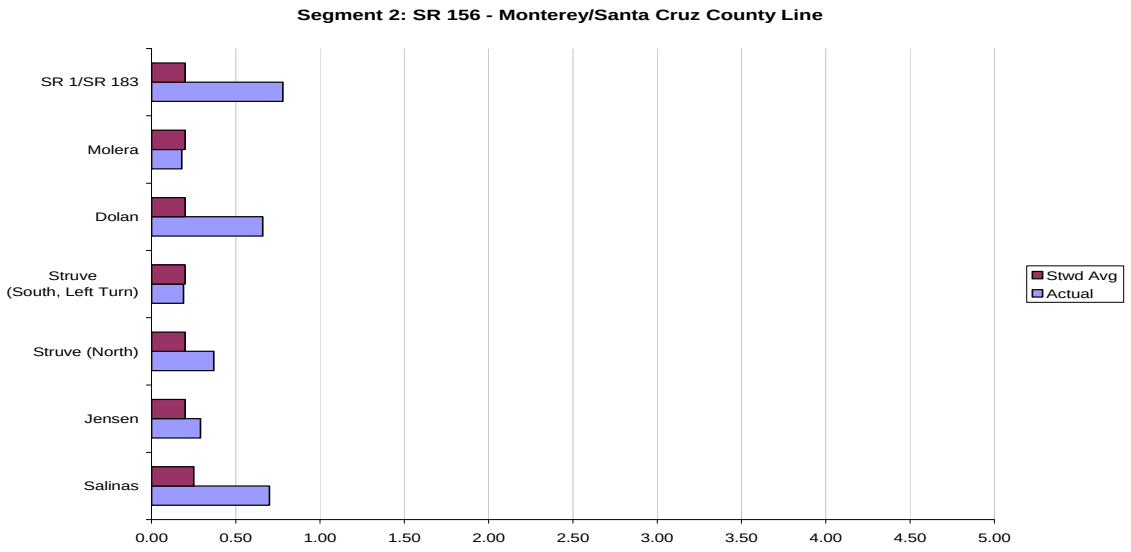



***Figure 3.13 Intersection Collision Data for Segment 2***

The following table identifies the locations where intersection collision data is near or exceeds the statewide average along Segment 3A.

**Table 3.17 Intersection and Ramp Collision Data for Segment 3A**

| Intersection | Actual Collision Rate* | Statewide Average Collision Rate |
|---|---|---|
| South Bound On-ramp @ Riverside / Junction SR 129 | 0.22 | 0.20 |
| South Bound Off-ramp @ Riverside / Junction SR 129 | 1.72 | 1.20 |
| South Bound Off-ramp @ Buena Vista | 1.24 | 1.20 |
| South Bound On-ramp @ Roadside Rest Stop | 2.88 | 0.55 |
| South Bound Off-ramp@ Frontage | 1.77 | 1.50 |

** Rates are incidents per million vehicle miles for 3-year period from: 1/01/2006 to 12/31/2009*

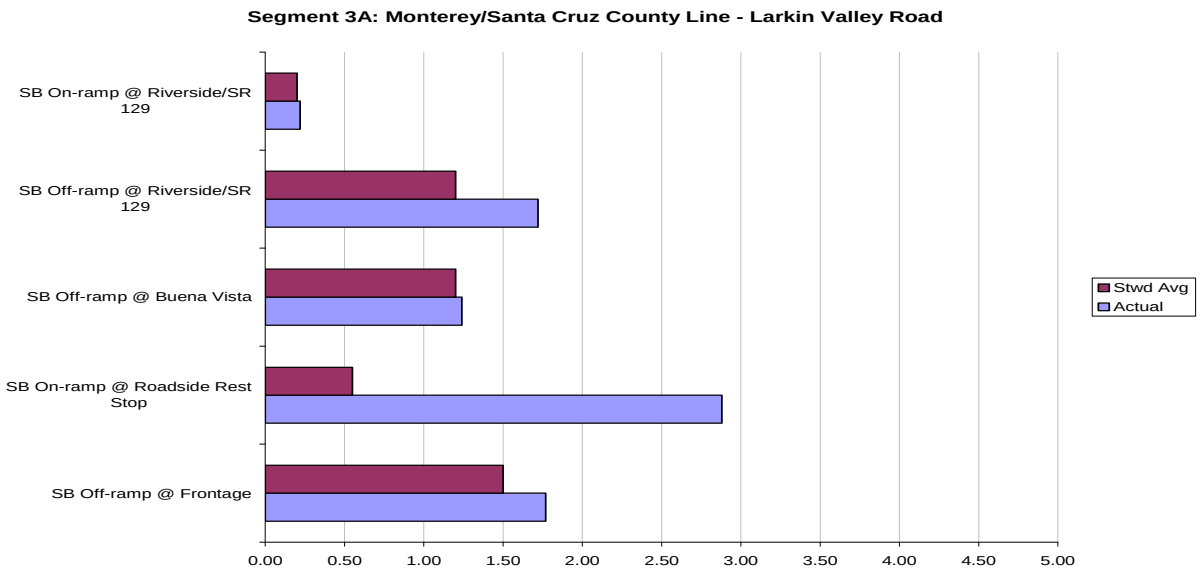



Figure 3.14 Intersection and Ramp Collision Data for Segment 3AThe following table identifies the locations where intersection collision data is near or exceeds the statewide average along Segment 3B.

**Table 3.18 Intersection and Ramp Collision Data for Segment 3B**

| Intersection | Actual Collision Rate* | Statewide Average Collision Rate |
|---|---|---|
| North Bound Off-ramp @ Freedom | 3.87 | 1.20 |
| North Bound On-ramp @ Rio Del Mar | 1.17 | 0.75 |
| South Bound On-ramp @ State Park | 1.17 | 0.65 |
| North Bound Off-ramp @ Park | 1.27 | 1.20 |
| South Bound Off-ramp @ Bay / Porter | 1.16 | 1.20 |
| South Bound On-ramp @ 41st | 1.07 | 0.70 |
| South Bound Off-ramp @ 41st | 1.28 | 1.20 |
| South Bound On-ramp @ Soquel | 0.87 | 0.55 |
| South Bound Off-ramp @ Soquel | 1.15 | 0.95 |
| North Bound Off-ramp @ Morrissey | 0.70 | 0.60 |
| South Bound Off-ramp @ Morrissey | 1.76 | 0.95 |

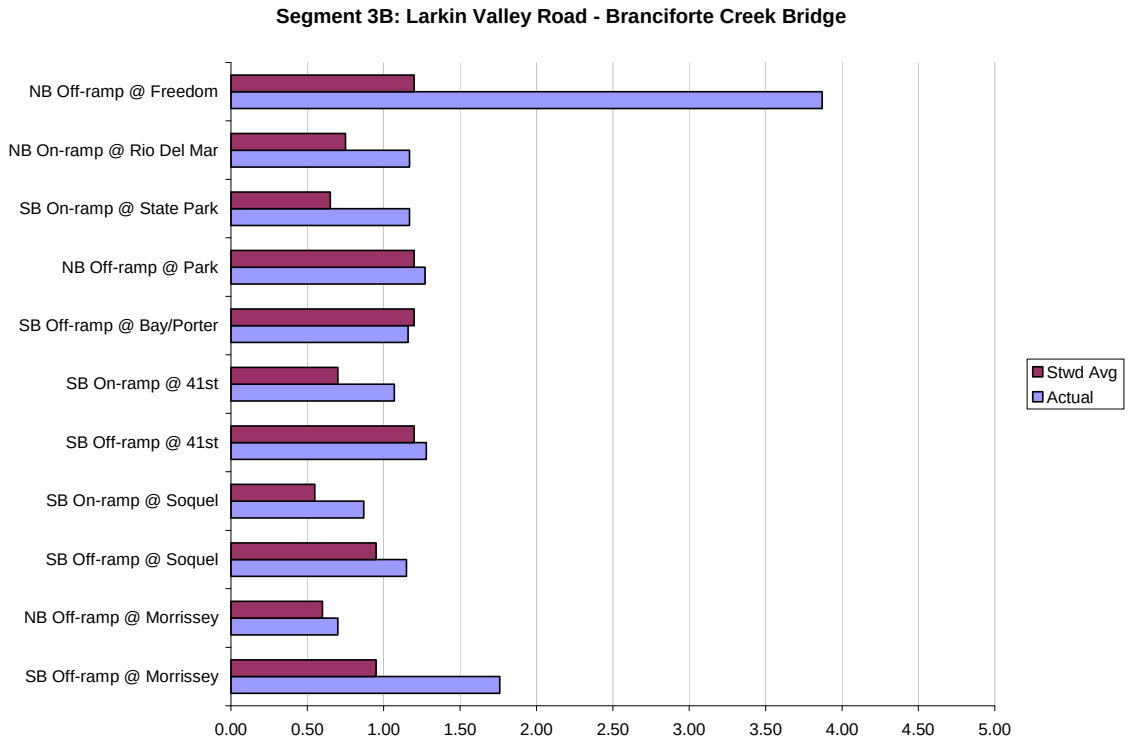



***Figure 3.15 Intersection and Ramp Collision Data for Segment 3B***

The following table identifies the locations where intersection collision data is near or exceeds the statewide average along Segment 4.

**Table 3.19 Intersection and Ramp Collision Data for Segment 4**

| Intersection | Actual Collision Rate* | Statewide Average Collision Rate |
|---|---|---|
| South Bound On-ramp @ Ocean / Plymouth | 0.53 | 0.45 |
| North Bound Off-ramp @ Ocean | 0.93 | 0.60 |
| North Bound On-ramp @ Ocean | 1.08 | 0.75 |
| South Bound Off-ramp @ Ocean | 1.73 | 1.20 |
| Junction SR 9 / River | 0.67 | 0.35 |
| Mission | 0.35 | 0.35 |

** Rates are incidents per million vehicle miles for 3-year period from: 1/01/2006 to 12/31/2009*

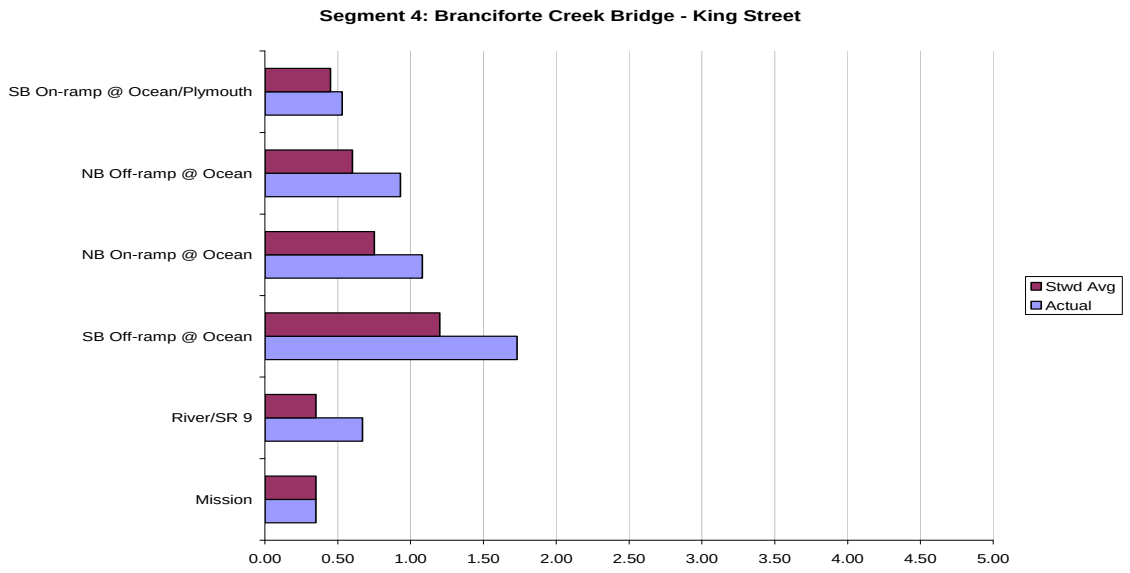



***Figure 3.16 Intersection and Ramp Collision Data for Segment 4***

The following table identifies the locations where intersection collision data exceeds the statewide average along Segment 5.

**Table 3.20 Intersection and Ramp Collision Data for Segment 5**

| Intersection | Actual Collision Rate* | Statewide Average Collision Rate |
|---|---|---|
| Menke | 0.16 | 0.15 |
| Clark | 0.23 | 0.15 |
| Davis (Ramp intersection left turn) | 0.69 | 0.55 |
| Espinosa (Right turn) | 0.40 | 0.20 |
| Oak (Left turn) and Blackie / Jackson (Right turn) | 0.64 | 0.30 |
| Walsh | 0.18 | 0.15 |
| Wood / Haro | 0.38 | 0.30 |
| Junction SR 156 (Eastbound) | 0.57 | 0.55 |
| Salinas | 0.65 | 0.30 |
| Pajaro | 1.59 | 0.15 |
| Pool | 0.37 | 0.15 |
| Crane | 1.22 | 0.30 |
| Preston | 0.67 | 0.30 |
| Junction SR 1 | 0.78 | 0.20 |

** Rates are incidents per million vehicle miles for 3-year period from: 1/01/2006 to 12/31/2009*

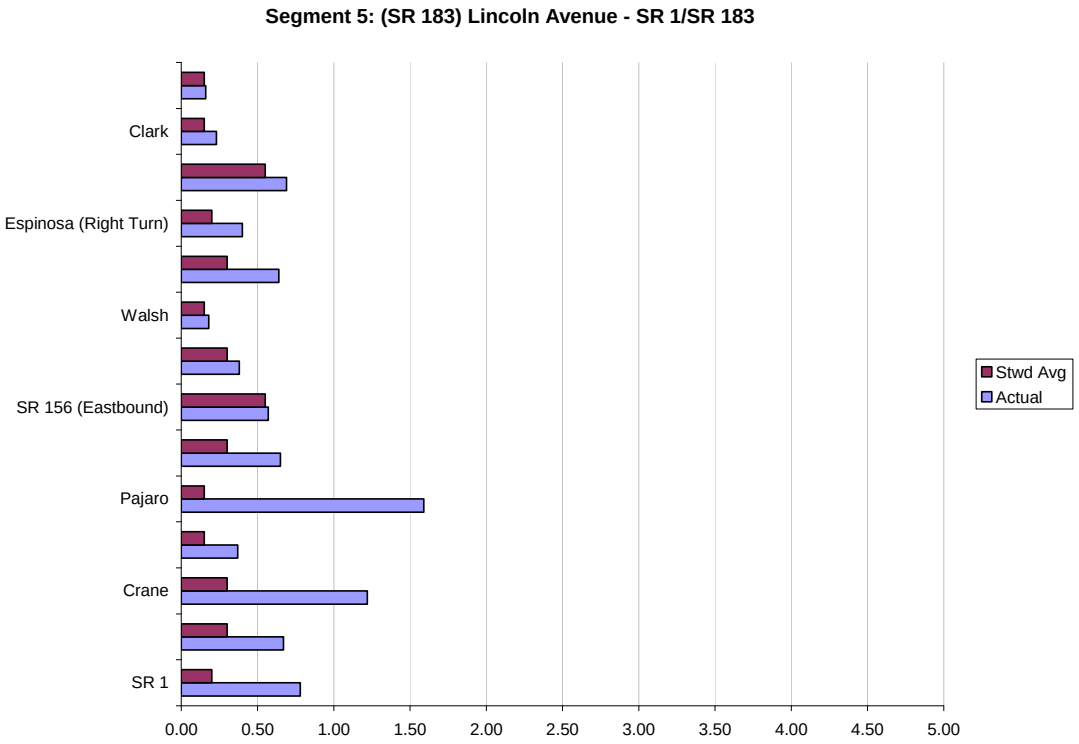



***Figure 3.17 Intersection and Ramp Collision Data for Segment 5***

## *3.4 Incident Management*

Caltrans is dedicated to improving incident clearing on all state highways within District 5, including SR 1 & SR 183. A recent California Highway Incident Management Summit was held with various agency partners to discuss a goal of clearing highway incidents within 90 minutes. Some top solutions were to implement technical interoperable communication systems (systems that operate between more than one agency), establish Caltrans/CHP communication centers, train with consistent terminology within the departments, and revise laws to allow quick clearing activities. Integrating a communication strategy that notifies the agencies responding to the incident and providing accurate information to the public is a priority in District 5.

The Santa Cruz County Regional Transportation Commission and the Transportation Agency for Monterey County, both designated as the Service Authority for Freeway Emergencies (SAFE) in their respective counties, own and operate a roadside network of call boxes along SR 1. The call box program provides assistance to motorists who find themselves in need while on the highway. Motorists simply pick up the handset to be automatically connected to an operator. The operator may call an auto club, such as AAA, the CHP, a tow truck company, a relative or a friend to ensure assistance for a motorist whose vehicle has broken down. The call boxes may also be used to report collisions or other highway incidents and obtain the necessary services.

Additionally both SCCRTC and TAMC are currently working on a feasibility study for a "511" program to assist motorists. The 511 program is a one-stop phone and web source for up-to-the-minute traffic, transit, rideshare, and bicycling information. Users simply call 511 or visit: www.511.org.

# Chapter 4 Recommendations

The primary purpose of SR 1 & SR 183 CSMP is to develop strategies to manage the corridor and sustain existing transportation investments. The following management strategies will be used to manage SR 1 & 183 over the next 20 years:

**Maintenance and Preservation:** Continue cost-effective maintenance of the roadway to ensure safe use of the corridor. This would include maintenance and preservation designed to get full return on system investments, as well as reduce traveler costs and delay. Work in this area would include continued identification of pavement needs through the pavement condition survey and addressing those needs through the State Highway Operation and Protection Program (SHOPP). The stakeholder agencies in the corridor should also continue maintenance of local streets and roads.

**Transit/Rail:** The stakeholder agencies in the corridor should continue to support the improvement of transit service. Adding new express bus service and/or frequency could take advantage of the new high occupancy vehicle (HOV) lanes planned for the Santa Cruz corridor. Stakeholder agencies should also consider enhancing the attractiveness and convenience of the passenger rail service along the corridor and between the San Francisco Bay Area and the Monterey Peninsula.

**Land Use & Transportation Connection:** The way communities are planned and designed has an impact on travel behavior. Land use and transportation must be more closely linked. To achieve this strategy, Caltrans will partner with local agencies and participate in the development review process. This process has two main elements: general plans and development projects. An additional opportunity to partner and facilitate a connection between land use and transportation is the development of *Envisioning the Monterey Bay Area: A Blueprint for Sustainable Growth and Smart Infrastructure*, otherwise known as the Blueprint. Regional Blueprint Program: *AMBAG Blueprint Planning*. The program was designed to integrate long-range planning for transportation, land use, housing, environmental resources, and infrastructure into a common vision. Most importantly, *Envisioning the Monterey Bay Area* will lay the foundation for the Sustainable Communities Strategy (SCS) for the Monterey Bay Area, which is planned for adopted in late 2012 or 2013. Each Metropolitan Planning Organization (MPO) in California is responsible, pursuant to statute (SB 375), for developing an SCS that demonstrates how, through more efficient coordination of land use decisions and transportation investments, each region can reduce per capita greenhouse gas emissions from cars and light trucks.

**Transportation Demand Management:** Reduce congestion with programs that increase the use of transit, improve bicycle and pedestrian access and encourage programs such as carpools, ridesharing, telecommuting, flexible work schedules, and park-and-ride facilities to reduce the demand.

**Intelligent Transportation Systems (ITS) /Traveler Information / Traffic Management / Incident Management:** Collisions and incidents can be a major source

of delay along a corridor. Reducing the time required to clear these collisions and incidents and restore full flow within the corridor reduces delay and reduces diversion of traffic onto the local arterials. The need for Freeway Service Patrol (FSP) is determined by congestion in an area. Improving system monitoring could provide the necessary information to determine a need for FSP in Monterey County and to evaluate the existing FSP in Santa Cruz County. Local agencies can consider FSP as an option once the need has been identified. In addition, it is recommended to upgrade communication and enable deployment of advanced transportation systems, to improve safety, incident response, and traveler information. 511 planning is already underway and should be lead at the regional level. Real time traveler information allows travelers to make more informed decisions regarding trip planning, route choices and mode selection. Traffic management reduces congestion through the use of technologies such as collision warning systems and advanced traffic management systems. Incidents are the primary cause of unexpected and variable delay. By improving incident management and response time, reductions occur in congestion and travel delay.

**Modal Options:** The focus is to provide viable transportation options for all users. Greater opportunity to use other transportation modes will reduce demand on SR 1 & SR 183. Continued effort that supports the development of the Cal Train system will provide connection to a multi-modal option within the corridor. This includes the design and construction of safe, convenient, and efficient facilities and programs that support the integration of transit, bicycle, and pedestrian transportation into a coordinated multimodal transportation system.

**Ramp Metering:** Ramp metering has the potential to maximize the productivity of the freeway. When combined with other recommended strategies, ramp metering accommodates greater vehicle throughput. A ramp metering plan should identify the capacity of on-ramps and install metering hardware on appropriate ramps while also addressing the potential impact on local roads and funding challenges. A successful ramp metering plan will require a partnership with local. As congestion builds Caltrans would look to its local partners to collaborate.

**Operational Improvements:** Add auxiliary lanes, intersection improvements, and other system refinements at appropriate locations in order to reduce delay, preserve and enhance existing services, while noting that operational improvements alone do not solve corridor capacity needs. Funding challenges for operational improvements will require support at the local level.

**Intersection Upgrades**: Traffic studies demonstrate that the existing intersections are projected to provide lower level of service. The focus is to redesign and modernize the intersections to reduce delay, which would maximize throughput on the State Highway and the parallel routes. These upgrades may include improving the parallel local road network, adding turn-movement storage, deceleration and/or acceleration lanes to the intersection, and converting at-grade intersections to grade-separated interchanges. Such upgrades should be evaluated individually to ensure appropriate cost/benefit to the system.

**Parallel Road Network Development:** Increase the capacity, operational efficiency, and connection on the parallel road network to reduce local traffic demand on SR 1. Emphasis on multimodal east-west connections that have bearing on the SR-1 north-south congestion should be closely monitored through increased detection. East-west connectors, such as SR 68, SR 156, SR 129, SR 183, and County Road G-12 in Monterey County will need detection and system monitoring to understand the causality of bottlenecks in the region.

**System Improvements**: To improve mobility, accessibility, reliability, reduce congestion, and improve safety by improving capacity on the existing system.

## *Implementation*

Successful implementation of the CSMP recommendations will require support and funding at the local level, including acquisition of applicable permits and approvals. In coastal corridors Caltrans has been challenged to gain these approvals. For example, some communities object to the visual changes with additional roadside features and will only accept them under a narrow set of conditions, which may not be practical in all situations.

| Table 4.1 Proposed Highway Projects on the SR 1 & SR 183 Corridor | | | | |
|---|---|---|---|---|
| **Segment** | **Location** | **Project Description** | **Phase** | **Project Begin Construction** |
| 1 | Carmel River to Monterey / Santa Cruz County line | Construct TMS | Construction | Under construction |
| 1-2 | Various locations in Monterey County | Install changeable message signs and CCTV cameras | Construction | Under construction |
| 1-2 | Junction SR 68 W to Castroville | Guardrail upgrade | Construction | Under construction |
| 2 | Salinas Road | Construct interchange | Construction | Under construction |
| 1-2 | Monterey County line to Salinas Road | Construct median barrier | Environmental Review / Preliminary Design | 2012 |
| 3A | Harkins Slough | Revise interchange | Environmental Review / Preliminary Design* | TBD |
| 3A-3B | Pajaro River to North Aptos | Pavement rehabilitation | Environmental Review / Preliminary Design | 2012 |
| 3A-3B | Monterey County line to Freedom Boulevard | Construct TMS | Construction | Under construction |
| 3B-4 | Freedom Boulevard to Ocean Street | Install CCTV and signs | Environmental Review / Preliminary Design | 2015 |
| 3B-4 | State Park Drive to Morrissey Boulevard | Congestion Management Study (install HOV lane in each direction) | Environmental Review / Preliminary Design | 2016 |
| 3B-4 | Soquel Avenue to Morrissey Boulevard | Operational improvements | Environmental Review / Preliminary Design | 2014 |

* Programmed through Environmental Review / Preliminary Design only. No construction or right-of-way funding currently programmed.

| | | | | |
|---|---|---|---|---|
| 4 | Junction of SR 17 | Install merge lanes landscaping | Construction | Under construction |
| 4 | San Lorenzo River | Construct bridge widening | Candidate | TBD |
| 4 | Junction of SR 9 | Interchange improvements | Environmental Review / Preliminary Design | 2013 |
| 4 | San Lorenzo River to Laguna Road | Install guardrail and crash cushions | Environmental Review / Preliminary Design | 2014 |
| 4 | SR 9 to Mission Street | Construct concrete median barrier | Environmental Review / Preliminary Design | 2013 |
| 3A-4 | From Santa Cruz / Monterey County line to Junction of SR 17 | Construct guardrail upgrades | Environmental Review / Preliminary Design | 2014 |
| 5 (SR183) | Salinas Street to Clark Street | Constructing landscaping and planting | Construction | Under construction |
| 5 | Salinas city limit to Del Monte Avenue | Install asphalt / concrete overlay | Project Initiation Document | TBD |

# Appendix A Glossary

| | |
|---|---|
| **Arterial** | A general term denoting a highway primarily for through traffic usually on a continuous route. |
| **Collector** | Surface street providing land access and traffic circulation within residential, commercial, and industrial areas. |
| **Expressway** | An arterial highway with at least partial control of access, which may or may not be divided or have grade separations at intersections. |
| **Freeway** | A divided arterial highway with full control of access and with grade separations at intersections. |
| **Functional Classifications** | A grouping of streets and highways sorted as to the character of service they are intended to provide. |
| **Level of Service (LOS)** | Term used to describe the quality of operation of a highway facility. It is a qualitative measure of the effect of such factors as speed, travel time, traffic interruptions, freedom to maneuver, driving comfort, convenience, safety and operation cost. In this report, LOS is based on peak traffic hours. On urban street systems, the quality of flow is most frequently controlled by traffic conditions at signalized intersections. The flow characteristics are defined in six levels of service. |
| **LOS A** | Describes a condition of free flow, with low volumes and high speeds. Traffic density is low, with speeds controlled by driver desires, speed limits, and physical roadway conditions. |
| **LOS B** | Is in the zone of stable flow, with operating speeds beginning to be restricted somewhat by traffic conditions. Drivers still have reasonable freedom to select their speeds and lanes of operation. |
| **LOS C** | Is still in the zone of stable flow, but speeds and maneuverability are more closely controlled by the higher volumes. Most of the drivers are restricted in their freedom to select their own speed, change lanes, or pass. |
| **LOS D** | Approaches unstable flow, with tolerable operating speeds being maintained though considerably affected by changes in operating conditions. Fluctuations in volumes and temporary restrictions to flow may cause substantial drops in operating speeds. |
| **LOS E** | Is not described by speed alone but represents operations at even lower operating speeds than in level D, with volumes at or near the capacity of the highway. Flow is unstable, and there may be stoppages for brief periods of time. |
| **LOS F** | Describes forced flow operation at low speeds, where volumes are below capacity. These conditions usually result from vehicles backing up from a restriction downstream. Speeds are reduced substantially and stoppages may occur for short or long periods of time because of the downstream congestion. In the extreme, both speed and volume can drop to zero. |

| | |
|---|---|
| **Rural** | An area of under 5,000 population |
| **Local** | Serves primarily to provide access to adjacent land; and provides service to travel over relatively short distances as compared to collectors or other highway systems. |
| **Major Collector** | 1. Provides service to any county seat not on an arterial route, to the larger towns not directly served by the higher systems, and to other traffic generators of equivalent intra-county importance, nearby larger towns or cities, or with routes of higher classification.<br>2. Serves the more important intra-county travel corridors. |
| **Minor Arterial** | 1. Links cities and larger towns with major traffic generators that are capable of attracting travel over similarly long distances and forms an integrated network providing interstate and inter-county service.<br>2. Are spaced at such intervals, consistent with population density, so that all developed areas of the state are within a reasonable distance of an arterial highway.<br>3. Provides service to corridors with trip lengths and travel density greater than those predominantly served by rural collector or local systems. These routes should be expected to provide for relatively high overall travel speeds, with minimum interference to through movement. |
| **Minor Collector** | 1. Is spaced at intervals, consistent with population density, to collect traffic from local roads and bring all developed areas within a reasonable distance of a collector road.<br>2. Provides service to the remaining smaller communities.<br>3. Links the locally important traffic generators with their rural hinterland. |
| **Principal Arterial** | All non-Interstate Principal Arterials.<br>1. Serves corridor movements having trip length and travel density characteristics indicative of substantial statewide or interstate travel.<br>2. Serves all urban areas of 50,000 and over population and a large majority of those with populations of 25,000 and over.<br>3. Provides an integrated network without stub connections except where unusual geographic or traffic flow conditions dictate otherwise. |
| **Principal Arterial – Interstate** | The Interstate system consists of all presently designated routes of the federally-designated Interstate System. |
| **Urban** | An area of 5,000 to 50,000 population. |
| **Urbanized** | An area with population greater than 50,000. |

# Appendix B Technical Analysis

**Segment 3B: Larkin Valley Road to Branciforte Creek Bridge to SR 17-SR 1 Interchange**

This appendix provides more detailed technical information to Chapter 3.

Segment 3B up to the SR17/SR 1 interchange extends from the Larkin Valley Road – SR 1 interchange (PM R7.67) in the south to the SR 17 / SR 1 interchange (PM 16.80) in the north, a distance of approximately 9.3 miles. This section of SR 1 is a freeway with two travel lanes in each direction and auxiliary lanes in each direction between Bay/Porter Streets and 41st Avenue.

Figure B-1 illustrates this section of the SR 1 study corridor.

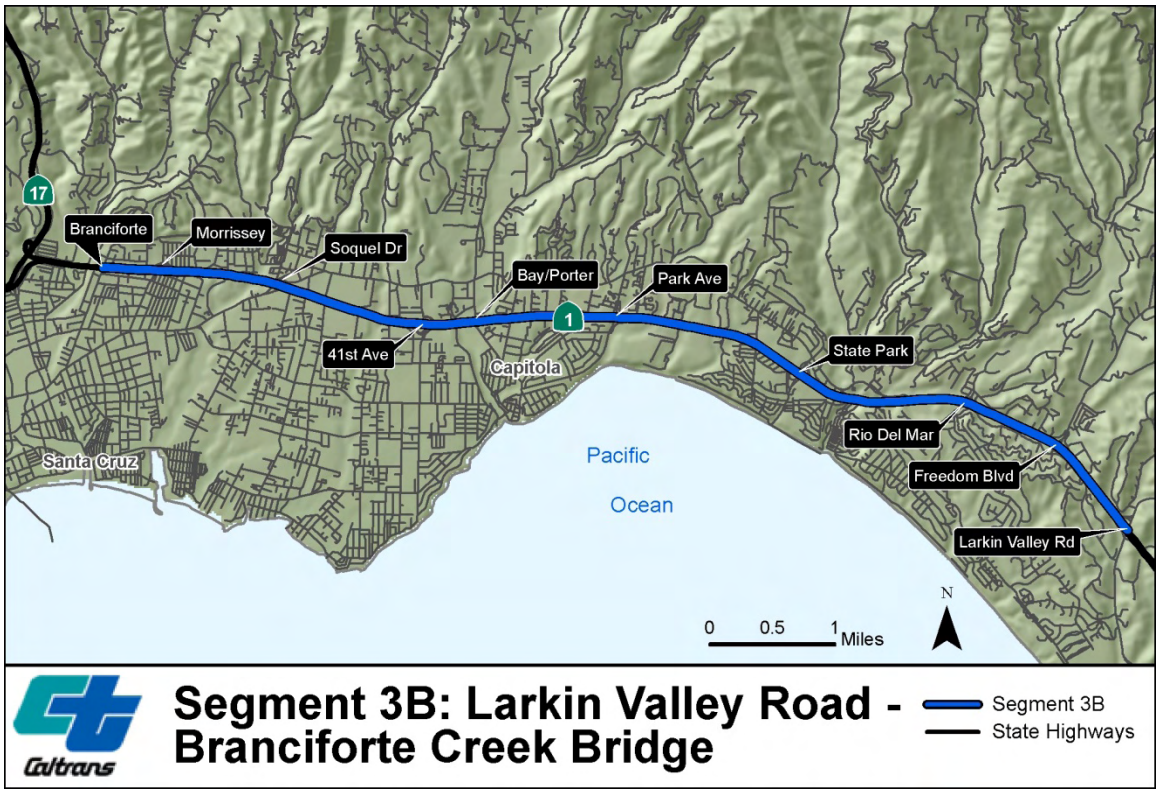



***Figure B-1 Segment 3B***

There are nine interchanges in Segment 3B, with the following spacing:

- San Andreas Road/Larkin Valley Road and Freedom Boulevard – 0.7 mile
- Freedom Boulevard and Rio Del Mar Boulevard – 0.8 mile
- Rio Del Mar Boulevard and State Park Drive – 1.4 miles
- State Park Drive and Park Avenue – 1.5 miles

- Park Avenue and Bay/Porter Streets – 1.1 miles
- Bay/Porter Streets and 41st Avenue – 0.4 mile
- 41st Avenue and Soquel Drive – 1.2 miles
- Soquel Drive and Morrissey Boulevard – 1.0 mile
- Morrissey Boulevard and SR 17 off-ramp – 1.0 mile

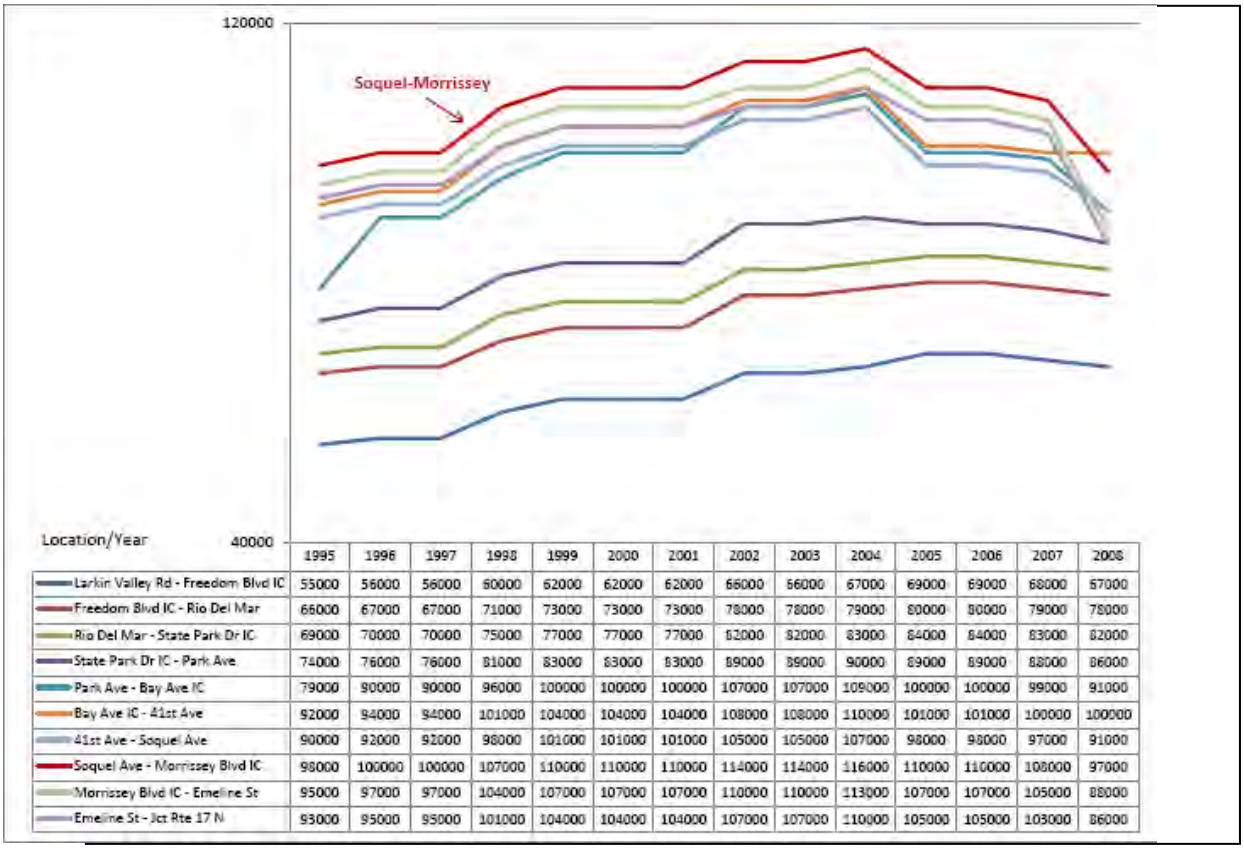
**Current Conditions – Volumes**

In 2008, annual average daily traffic (AADT) along Segment 3B ranged from 67,000 to 100,000 according to the Caltrans Traffic Ops web site[3]. AADT is lower in the southern portion of Segment 3B, with increasing volumes moving north. At the northern end of the corridor, SR 1 provides a gateway to jobs, housing, and recreation in the Santa Cruz urban area, thus attracting more traffic than the southern end. The northern end also connects with SR 17 and is a gateway to San Jose and the San Francisco Bay Area. Seasonally, average daily traffic volumes are generally higher in the summer than in other seasons due to tourist travel.

Figure B-2 shows the pattern of AADT in Segment 3B from 1995 to 2008. AADT along Segment 3B increased in the period 1995 to 2005. Average annual growth rates in AADT in this period were about 2% per annum (p.a.), with the auxiliary lane section growing at about 3.5% p.a. From 2005 to 2008, AADT decreased along many sub-sections of this segment. The decline in the economy played a role as did construction of the SR 17- SR 1 merge lane project at the northern end of Segment 3B. AADT in the southern sections of Segment 3B decreased at average annual growth rates of about -1% p.a. between 2005 and 2008, with the auxiliary lane section decreasing at -3% p.a., the Soquel Drive and Morrissey Avenue section decreasing at about -4% p.a., and the Morrissey Avenue and SR 17 section decreasing at about -6% p.a.

Figure B-2 also shows that the heaviest traffic volumes in Segment 3B have been between Soquel Drive and Morrissey Boulevard. This is the location of the CMIA auxiliary lane project.

[3] http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/




| Location/Year | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larkin Valley Rd - Freedom Blvd IC | 55000 | 56000 | 56000 | 60000 | 62000 | 62000 | 62000 | 66000 | 66000 | 67000 | 69000 | 69000 | 68000 | 67000 |
| Freedom Blvd IC - Rio Del Mar | 66000 | 67000 | 67000 | 71000 | 73000 | 73000 | 73000 | 78000 | 78000 | 79000 | 80000 | 80000 | 79000 | 78000 |
| Rio Del Mar - State Park Dr IC | 69000 | 70000 | 70000 | 75000 | 77000 | 77000 | 77000 | 82000 | 82000 | 83000 | 84000 | 84000 | 83000 | 82000 |
| State Park Dr IC - Park Ave | 74000 | 76000 | 76000 | 81000 | 83000 | 83000 | 83000 | 89000 | 89000 | 90000 | 89000 | 89000 | 88000 | 86000 |
| Park Ave - Bay Ave IC | 79000 | 90000 | 90000 | 96000 | 100000 | 100000 | 100000 | 107000 | 107000 | 109000 | 100000 | 100000 | 99000 | 91000 |
| Bay Ave IC - 41st Ave | 92000 | 94000 | 94000 | 101000 | 104000 | 104000 | 104000 | 108000 | 108000 | 110000 | 101000 | 101000 | 100000 | 100000 |
| 41st Ave - Soquel Ave | 90000 | 92000 | 92000 | 98000 | 101000 | 101000 | 101000 | 105000 | 105000 | 107000 | 98000 | 98000 | 97000 | 91000 |
| Soquel Ave - Morrissey Blvd IC | 98000 | 100000 | 100000 | 107000 | 110000 | 110000 | 110000 | 114000 | 114000 | 116000 | 110000 | 110000 | 108000 | 97000 |
| Morrissey Blvd IC - Emeline St | 95000 | 97000 | 97000 | 104000 | 107000 | 107000 | 107000 | 110000 | 110000 | 113000 | 107000 | 107000 | 105000 | 88000 |
| Emeline St - Jct Rte 17 N | 93000 | 95000 | 95000 | 101000 | 104000 | 104000 | 104000 | 107000 | 107000 | 110000 | 105000 | 105000 | 103000 | 86000 |

***Figure B-2 AADT along Segment 3B***

Only limited count data for Segment 3B have been available for the SR 1 CSMP. One source has been the Caltrans Traffic Census Program count stations. Counts are available from stations near Rio Del Mar Boulevard, between the off-and on-ramps at 41st Avenue, and on SR 1 south of Park Avenue. This latter station is expected to represent Segment 3B better than the other two stations. However, once the new detection projects are in place along the entire SR 1 corridor in Santa Cruz, Segment 3B descriptions and conclusions will have to be re-visited.

Based on Census Program counts for 2002, 2005, and 2008, on SR 1 south of Park Avenue, volumes show the expected seasonal tendency. Volumes are slightly higher in the spring and summer than in the fall and winter, though there is less seasonal difference in 2008. This variation is likely the result of increased recreational traffic in the summer months.

The highest volumes tend to occur on Fridays, followed by the next highest volumes on the commute days of Tuesday, Wednesday, and Thursday. Based on averages of Tuesday-Wednesday-Thursday volumes, the morning peak occurs between 7 and 8 AM

in the northbound (NB) direction. Approximately 3500 vehicles travel on NB SR 1 south of Park Avenue in the morning peak hour, representing about 55-60% of total traffic.

The afternoon is characterized by a peak period rather than a peak hour and reflects the congested, urban nature of traffic in the area. The peak period is generally from 3 PM to 6 PM, with slightly heavier traffic in the southbound (SB) direction. SB afternoon peak period volumes are in the 3,400-3,800 vehicles per hour range, representing about 50-55% of total traffic. There is thus also heavy traffic in the NB direction. While the SB direction clearly shows an afternoon peak with a minor peak in the AM peak hour, the NB direction has two peaks of similar size, one in the morning and one in the afternoon. This is illustrated in Figure B-3.

In addition, in the summer, there is also heavy midday traffic, particularly in the NB direction. As mentioned above, recreational traffic may explain this traffic pattern.

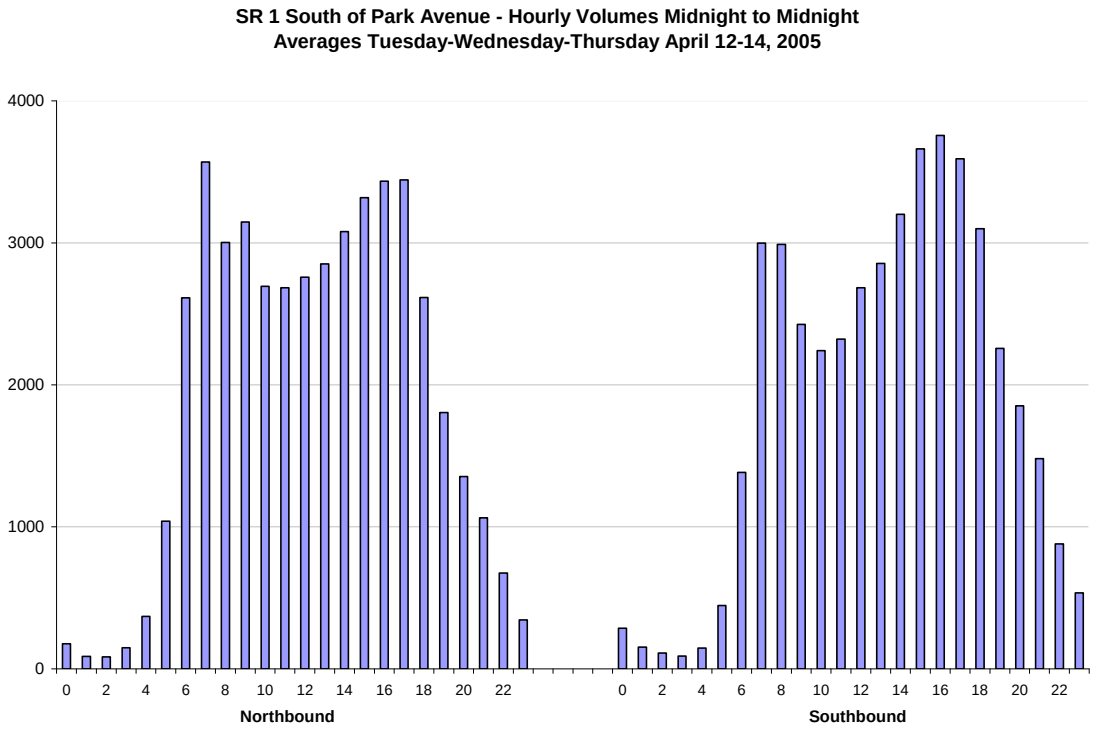



***Figure B-3 Typical Weekday Hourly Volume Profiles on SR 1 South of Park Avenue***

**Operating Conditions – Existing Year – Mainline**[4]

Table B-1 summarizes the existing operating conditions for Segment 3B. Measures of effectiveness (MOE) are presented for both the peak hours and the peak periods. The long peak periods were determined based on existing and future year conditions.

**Table B-1 Freeway Performance – Existing Year Conditions**

| **Peak Hour** | **AM Peak Hour (8-9 AM)** | | **PM Peak Hour (5-6 PM)** | |
|---|---|---|---|---|
| **Measure of Effectiveness** | **NB** | **SB** | **NB** | **SB** |
| Average Travel Time (minutes) | 23 | 10 | 15 | 27 |
| Average Speed (mph) | 30 | 60 | 39 | 26 |
| Delay (minutes per vehicle) | 14 | 0 | 6 | 15 |
| Number of Vehicle Trips per Hour | 2,932 | 2,918 | 3,235 | 3,101 |
| Number of Person Trips per Hour | 3,308 | 3,385 | 4,024 | 3,664 |
| Freeway Travel Time (VHT) | 1,274 | 507 | 823 | 1,391 |
| Travel Distance (VMT) | 38,517 | 30,348 | 32,349 | 35,661 |
| LOS | F | C | E | F |
| | | | | |
| **Peak Period** | **AM Peak Period (6 AM – 12 PM)** | | **PM Peak Period (2 – 8 PM)** | |
| **Measure of Effectiveness – average per hour** | **NB** | **SB** | **NB** | **SB** |
| Average Travel Time (minutes) | 16 | 10 | 12 | 18 |
| Average Speed (mph) | 44 | 61 | 52 | 39 |
| Delay (minutes per vehicle) | 4 | 0 | 2 | 6 |
| Number of Vehicle Trips per Hour | 3,045 | 2,332 | 2,805 | 2,885 |
| Number of Person Trips per Hour | 3,447 | 2,705 | 3,489 | 3,405 |
| Freeway Travel Time (VHT) | 821 | 400 | 544 | 858 |
| Travel Distance (VMT) | 35,933 | 24,251 | 28,045 | 33,182 |
| LOS | D | C | D | E |

**Operating Conditions – Future Year 2035**

An estimate of volumes for the future year 2035 is necessary to understand how the SR 1 facility might operate in the future. The basis for estimating this volume growth was the

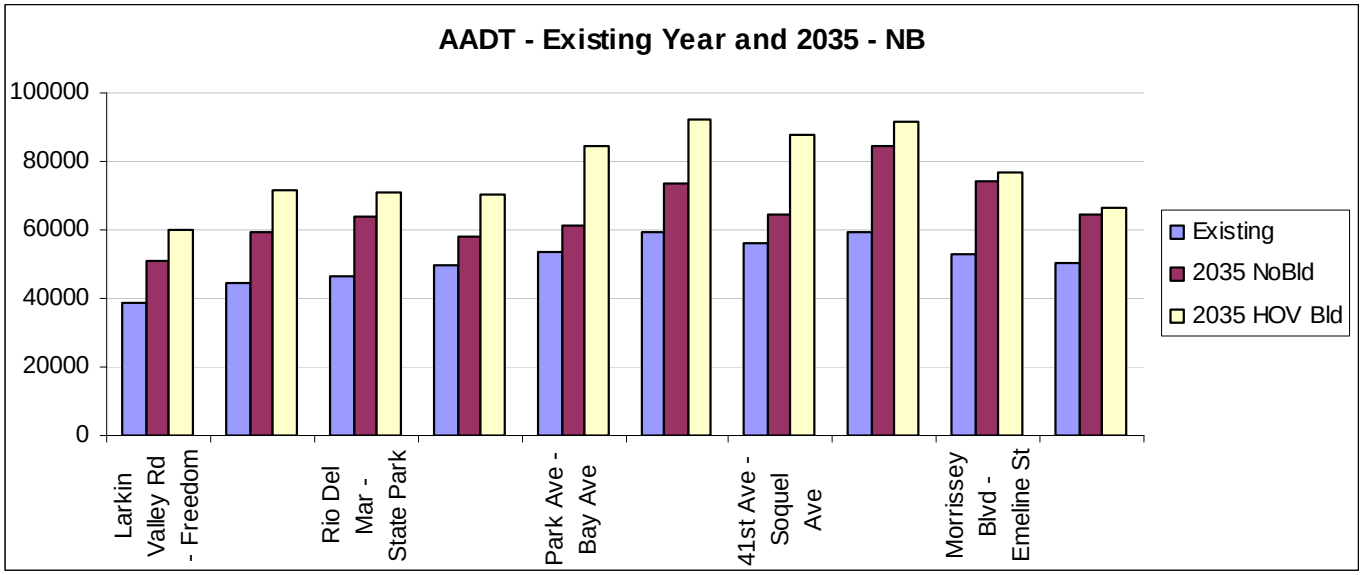
[4] These and the following tables are reformatted tables from the *State Route 1 HOV Lane Widening Project (from Morrissey Boulevard to San Andreas Road), Traffic Operations Report*, prepared for Santa Cruz County Regional Transportation Commission by Wilbur Smith Associates, July 2007.

count data sets used for the existing year analysis and the AMBAG regional travel demand model (TDM), April 2005, version 1.1. This version provided models for daily, AM peak hour, and PM peak hour traffic, with changes between the baseline year 2000 and future year 2030 volumes reflecting underlying changes in land use, demographics, and regional travel patterns. The AMBAG TDM was assessed for its ability to reflect baseline conditions in the study area, the difference between year 2000 model volumes and counts was applied to model outputs for 2030, and the resulting volumes were extrapolated to 2035. Since demand was expected to outpace capacity in the future year, a "bottleneck" analysis was also performed. Where the travel forecasts exceeded capacity on the corridor, traffic was either shifted to time periods outside of the peak hour or to arterials where additional capacity was available. Finally, intersection volumes were estimated based on AMBAG model volumes and a balancing routine that ensured consistency with on- and off-ramp volumes.

The future year AMBAG model was run twice: once to reflect No Build conditions and once to reflect Build conditions. The No Build conditions consisted of existing year conditions and programmed projects such as the SR 17 – SR 1 merge lane project and the Soquel–Morrissey auxiliary lane project. The Build conditions consisted of the No Build conditions plus ramp metering, auxiliary lane and intersection improvements, and High Occupancy Vehicle (HOV) construction. The No Build and Build scenarios will be discussed in more detail below.

The average annual daily traffic (AADT) mainline forecasts for the 2035 Build and No Build conditions are shown in Figure B-4. For the No Build case, AADT in the northbound direction is expected to range from 50,700 north of Larkin Valley Road to 84,500 between Soquel Drive and Morrissey Boulevard to 64,400 just south of SR 17. In the southbound direction, volumes are expected to range from about 66,300 north of Fairmount Avenue to 74,800 between 41st Avenue and Bay/Porter Streets to 46,900 north of Larkin Valley Road.

Forecasted AADT for the Build case is also shown in Figure B-4. In the northbound direction, future volumes are expected to be higher than in the No Build case and range from 59,900 north of Larkin Valley Road to 92,000 between Bay/Porter Streets and 41st Avenue to 66,300 just south of SR 17. In the southbound direction, volumes are expected to range from 68,800 just north of Fairmount Avenue to 84,500 between 41st Avenue and Bay/Porter Streets to 56,400 north of Larkin Valley Road. Addition of the HOV lanes in the Build case will accommodate greater flows through the corridor.



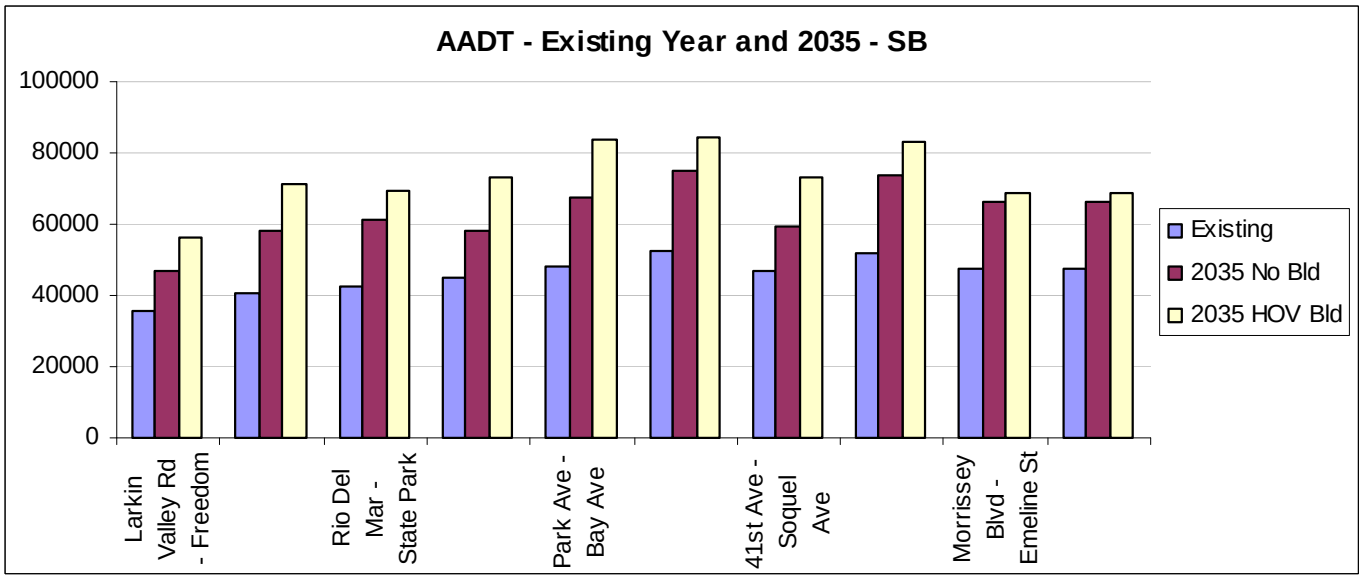




***Figure B-4 Existing and 2035 AADT***

**Operating Conditions – 2035 No Build**

Without improvements to the corridor, traffic conditions are expected to worsen considerably by 2035. For all peak hours and all directions, the facility would operate at LOS F. For all peak periods and directions, the facility would also be unable to serve the higher future demand and would operate at LOS E or F on average. Table B-2 displays the MOEs for the future No Build condition and provides a comparison with the Existing Conditions case.

Except for the southbound AM peak hour, peak hour throughput decreases in 2035 compared to existing conditions. Volumes decline about 5% in the AM peak hour, 4% in the northbound PM peak hour, and 20% in the southbound PM peak hour. The facility serves fewer vehicles in the peak hours as demand exceeds capacity and vehicles travel at stop-and-go conditions. This inability to serve the higher future demand during the peak hour leads to peak spreading, and Table B-2 shows that peak period throughput in fact increases.

However, even with peak spreading, demand remains high relative to capacity, and the facility operates below its optimal levels of performance. In the AM peak period, comparing the 2035 No Build case with existing conditions, average travel times increase from 16 minutes to 39 minutes in the northbound (NB) direction and from 10 minutes to 18 minutes in the southbound (SB) direction as average speeds decrease from 44 mph to 18 mph and from 61 mph to 35 mph in the NB and SB directions, respectively. In the PM peak period, the corresponding changes are:

- Travel times NB: from 12 minutes to 22 minutes
- Travel times SB: from 18 minutes to 47 minutes
- Average travel speed NB: from 52 mph to 28 mph
- Average travel speed SB: from 39 mph to 15 mph.

Travel times through the corridor thus increase as does the corresponding delay. As seen from Table B-2, serious congestion characterizes the 2035 No Build condition in the peak hours and in the peak periods.

Intersections. Intersections in the study area are also impacted by the high demand. Most intersections are expected to operate at LOS F, and all studied intersections operate below acceptable levels (LOS D or below). As traffic attempts to divert onto local streets to avoid freeway congestion, nearby ramps, intersections, and local streets would be impacted.

## Table B-2 Measures of Effectiveness – Existing Year and Year 2035 No Build

| **Peak Hour** | **Existing Year AM Peak Hour** | | **Year 2035 No Build AM Peak Hour** | | **Existing Year PM Peak Hour** | | **Year 2035 No Build PM Peak Hour** | |
|---|---|---|---|---|---|---|---|---|
| **Measure of Effectiveness** | **NB** | **SB** | **NB** | **SB** | **NB** | **SB** | **NB** | **SB** |
| Average Travel Time (minutes) | 23 | 10 | 59 | 29 | 15 | 27 | 34 | 61 |
| Average Speed (mph) | 30 | 60 | 12 | 22 | 39 | 26 | 17 | 11 |
| Delay (minutes per vehicle) | 14 | 0 | 48 | 19 | 6 | 15 | 25 | 49 |
| Number of Vehicle Trips per Hour | 2,923 | 2,918 | 2,767 | 3,101 | 3,235 | 3,101 | 3,114 | 2,475 |
| Number of Person Trips per Hour | 3,308 | 3,385 | 3,132 | 3,597 | 4,024 | 3,664 | 3,874 | 2,911 |
| Freeway Travel Time (VHT) | 1,274 | 507 | 2,749 | 1,498 | 823 | 1,391 | 1,784 | 2,523 |
| Travel Distance (VMT) | 38,517 | 30,348 | 32,646 | 32,248 | 32,349 | 35,661 | 31,138 | 28,956 |
| LOS | F | C | F | F | E | F | F | F |
| | | | | | | | | |
| **Peak Period** | **Existing Year AM Peak Period** | | **Year 2035 No Build AM Peak Period** | | **Existing Year PM Peak Period** | | **Year 2035 No Build PM Peak Period** | |
| **Measure of Effectiveness – average per hour** | **NB** | **SB** | **NB** | **SB** | **NB** | **SB** | **NB** | **SB** |
| Average Travel Time (minutes) | 16 | 10 | 39 | 18 | 12 | 18 | 22 | 47 |
| Average Speed (mph) | 44 | 61 | 18 | 35 | 52 | 39 | 28 | 15 |
| Delay (minutes per vehicle) | 4 | 0 | 28 | 8 | 2 | 6 | 12 | 35 |
| Number of Vehicle Trips per Hour | 3,045 | 2,332 | 3,129 | 2,968 | 2,805 | 2,885 | 3,157 | 2,696 |
| Number of Person Trips per Hour | 3,447 | 2,705 | 3,542 | 3,443 | 3,489 | 3,405 | 3,927 | 3,168 |
| Freeway Travel Time (VHT) | 821 | 400 | 2,053 | 884 | 544 | 858 | 1,138 | 2,101 |
| Travel Distance (VMT) | 35,933 | 24,251 | 36,922 | 30,863 | 28,045 | 33,182 | 31,568 | 31,544 |
| LOS | D | C | F | E | D | E | F | F |

Note: Year 2035 No Build includes the SR17/SR1 merge lane project and the Soquel-Morrissey auxiliary lane project.

Source: *State Route 1 HOV Lane Widening Project (from Morrissey Boulevard to San Andreas Road), Traffic Operations Report*, prepared for Santa Cruz County Regional Transportation Commission by Wilbur Smith Associates, July 2007.

**Operating Conditions – 2035 Transportation System Management (TSM) Build**

The Transportation System Management (TSM) Build scenario was proposed and analyzed to determine its effect on alleviating the congestion expected to occur under the No Build conditions described above. The TSM scenario consisted of ramp metering to control the flow of traffic onto the SR 1 facility, geometric improvements, and the addition of auxiliary lanes at the following locations:

In the northbound direction, between:

- Soquel Drive and Morrissey Boulevard
- 41st Avenue and Soquel Drive
- State Park Road and Park Avenue

In the southbound direction, between:

- 41st Avenue and Bay/Porter Streets
- State Park Road and Park Avenue

Table B-3 shows the effects of the proposed changes. While overall freeway operations improve, the high demand and accompanying densities leave the freeway mostly operating at highly congested levels.

In both the peak hours and peak periods, throughput on Segment 3B increases with the TSM improvements except for the SB AM peak period, where throughput remains about the same compared to the existing conditions case. Combined with ramp metering, the extra capacity provided by the auxiliary lanes allows the facility to serve more traffic.

Measured by decreased travel times, decreased delay, and increased average travel speeds, overall freeway operations improve under the TSM scenario, with the exception of the SB PM peak hour. In the AM peak hour, travel times decrease from 59 minutes to 34 minutes in the NB direction and from 29 minutes to 12 minutes in the SB direction. In the PM peak hour, travel times decrease from 34 minutes to 29 minutes in the NB direction but increase from 61 minutes to 62 minutes in the SB direction. Peak period travel times show improvements in all periods and all directions.

In the SB PM peak hour, the TSM improvements allow additional traffic to travel on the corridor. However, since conditions are already congested along the entire corridor, with few alternate route choices at the southern end, the additional traffic causes operations to worsen slightly. In contrast to other directions and peak periods, average travel speed for the SB PM peak hour decreases slightly from 11 mph to 10 mph and delay increases from 49 minutes per vehicle to 50 minutes per vehicle.

## Table B-3 Measures of Effectiveness – Year 2035 No Build and Year 2035 TSM Build Scenarios

| **Peak Hour** | **2035 No Build AM Peak Hour** | | **Year 2035 TSM Build AM Peak Hour** | | **2035 No Build PM Peak Hour** | | **Year 2035 TSM Build PM Peak Hour** | |
|---|---|---|---|---|---|---|---|---|
| **Measure of Effectiveness** | **NB** | **SB** | **NB** | **SB** | **NB** | **SB** | **NB** | **SB** |
| Average Travel Time (minutes) | 59 | 29 | 34 | 12 | 34 | 61 | 29 | 62 |
| Average Speed (mph) | 12 | 22 | 21 | 54 | 17 | 11 | 21 | 10 |
| Delay (minutes per vehicle) | 48 | 19 | 22 | 2 | 25 | 49 | 19 | 50 |
| Number of Vehicle Trips per Hour | 2,767 | 3,101 | 3,986 | 3,873 | 3,114 | 2,475 | 3,858 | 3,091 |
| Number of Person Trips per Hour | 3,132 | 3,597 | 4,847 | 4,623 | 3,874 | 2,911 | 4,870 | 3,750 |
| Freeway Travel Time (VHT) | 2,749 | 1,498 | 2,260 | 756 | 1,784 | 2,523 | 1,871 | 3,165 |
| Travel Distance (VMT) | 32,646 | 32,248 | 47,030 | 40,278 | 31,138 | 28,956 | 38,582 | 36,169 |
| LOS | F | F | F | D | F | F | F | F |
| | | | | | | | | |
| **Peak Period** | **2035 No Build AM Peak Period** | | **2035 TSM Build AM Peak Period** | | **2035 No Build PM Peak Period** | | **2035 TSM Build PM Peak Period** | |
| **Measure of Effectiveness – average per hour** | **NB** | **SB** | **NB** | **SB** | **NB** | **SB** | **NB** | **SB** |
| Average Travel Time (minutes) | 39 | 18 | 27 | 11 | 22 | 47 | 18 | 33 |
| Average Speed (mph) | 18 | 35 | 27 | 59 | 28 | 15 | 33 | 21 |
| Delay (minutes per vehicle) | 28 | 8 | 15 | 1 | 12 | 35 | 9 | 21 |
| Number of Vehicle Trips per Hour | 3,129 | 2,968 | 3,645 | 3,050 | 3,157 | 2,696 | 3,546 | 3,479 |
| Number of Person Trips per Hour | 3,542 | 3,443 | 4,441 | 3,638 | 3,927 | 3,168 | 4,474 | 4,216 |
| Freeway Travel Time (VHT) | 2,053 | 884 | 1,612 | 540 | 1,138 | 2,101 | 1,080 | 1,903 |
| Travel Distance (VMT) | 36,922 | 30,863 | 43,009 | 31,715 | 31,568 | 31,544 | 35,455 | 40,707 |
| LOS | F | E | F | C | F | F | E | F |

Note: Year 2035 No Build includes the SR17/SR1 merge lane project and the Soquel-Morrissey auxiliary lane project.

Source: *State Route 1 HOV Lane Widening Project (from Morrissey Boulevard to San Andreas Road), Traffic Operations Report*, prepared for Santa Cruz County Regional Transportation Commission by Wilbur Smith Associates, July 2007

In all cases, even though densities improve slightly, they still remain high. LOS on the facility remains at F for the peak hours except for the SB AM peak hour, where LOS improves to D compared to the No Build case. For the peak periods, the facility also operates at sub-optimal LOS E or F levels except for the SB AM peak period, which improves to LOS C.

Overall, TSM measures are not expected to substantially improve traffic operations in Segment 3B. Since the 2035 traffic demand is so much greater than available supply, the TSM strategies do not relieve congestion on the corridor.

Intersections. All studied intersections operate at LOS E or F for both the AM and PM peak hours. Traffic operations would worsen marginally as ramp metering leads to increases in delay on the ramps and at corresponding intersections.

**Operating Conditions – 2035 HOV Build**

The High Occupancy Vehicle (HOV) Build scenario was proposed and analyzed to determine its effect on alleviating the congestion expected to occur under the No Build conditions described above. The HOV scenario consisted of ramp metering to control the flow of traffic onto the SR 1 facility, geometric improvements at interchanges, and the addition of auxiliary and acceleration lanes at the following locations:

In the northbound direction:

- Auxiliary lane between Freedom Boulevard and Rio Del Mar Boulevard
- Auxiliary lane between Rio Del Mar Boulevard and State Park Road
- Acceleration lane at State Park Road On-ramp
- Deceleration Lane at Park Avenue Off-ramp
- Extension of the proposed HOV lane to terminate at Branciforte Avenue

In the southbound direction:

- Auxiliary lane between State Park Road and Rio Del Mar Boulevard
- Auxiliary lane between Soquel Avenue and 41st Avenue

Table B-4 shows the effects of the proposed HOV scenario changes. Overall, the proposed improvements enhance the ability of the facility to accommodate future travel demand mainly due to the addition of the HOV lanes. However, while Segment 3B operating conditions would generally improve, the demand would still be high compared to available capacity, and the facility would remain very congested in the peak hours and in the southbound PM peak period.

The addition of capacity to Segment 3B in the form of auxiliary and HOV lanes draws vehicles from parallel arterials onto SR 1, thus increasing throughput on the facility. In addition, the HOV lanes encourage commuters to carpool, increasing the average vehicle occupancy and person throughput in the study area. In the AM peak hour, person trips would increase by 83 percent from 3,132 to 5,742 persons per hour in the northbound peak direction. In the PM peak hour, person trips would almost double from 2,911 to 5,684 persons per hour in the southbound peak direction. To a lesser degree, the reverse commutes and the peak periods also experience increases in vehicle and person throughput. The exception is the southbound PM peak period, which experiences a 72 percent increase in person trips, from 3,168 to 5,443.

The addition of the HOV lanes and other measures improves facility operations substantially, especially on the HOV lanes. Even during peak hours, the vehicles on the HOV lanes would operate at or near free-flow speeds. Carpool commuters traveling at speeds as low as 11 mph under the 2035 No Build Scenario would be able to travel at free-flow speeds (approximately 60 mph) on the HOV lanes. Overall, considering both HOV and mixed-flow lanes, average travel times on the corridor would range from 12 minutes to 19 minutes in the peak hours and from 10 minutes to 15 minutes in the peak periods, a considerable decrease from 2035 No Build conditions.

Despite these improvements in operating conditions, the facility will continue to experience heavy congestion. While the HOV lanes will operate at LOS A to LOS C, the mixed-flow lanes will not fare as well. In the northbound AM peak hour and for both directions in the PM peak hour, the mixed-flow lanes will operate at LOS E or F, reflecting highly congested conditions. Only the southbound AM peak hour mixed-flow lanes will improve to an acceptable level, namely LOS D. For the peak periods, the mixed-flow lanes operate at LOS C or D except for the southbound PM peak period, when they operate at LOS E. Because demand is so high relative to available capacity, even with the HOV and auxiliary lanes, congestion remains considerable.

Intersections. Under the HOV Build scenario, improvements in intersection geometries and better throughput on the freeway, i.e. less congestion on the parallel arterials, lead to better intersection operation. Whereas all intersections are expected to operate below acceptable levels (per the presiding jurisdiction) in the 2035 No Build case, many intersections show improvements in the 2035 HOV Build scenario. However, the following intersections are expected to operate at LOS E or F in the 2035 HOV Build scenario.

In the AM peak hour:

- Soquel Drive/Paul Sweet Road/SR 1 NB Ramps
- 41st Avenue/SR 1 NB Ramps
- Park Avenue/SR 1 NB and SB Ramps
- Park Avenue/Kennedy Drive/McGregor Drive
- State Park Drive/McGregor Drive
- Rio Del Mar Boulevard/SR 1 NB Ramps
- Rio Del Mar Boulevard/Soquel Drive
- Soquel Drive/Soquel Avenue/SR 1 SB Off-ramp

In the PM peak hour:

- Morrissey Boulevard/Pacheco Avenue/SR 1 NB Ramps
- Morrissey Boulevard/Fairmount Avenue
- Soquel Drive/Paul Sweet Road/SR 1 NB Ramps
- 41st Avenue/SR 1 NB and SB Ramps
- Porter Street/SR 1 NB Ramps
- Park Avenue/SR 1 NB and SB Ramps
- Park Avenue/Kennedy Drive/McGregor Drive
- State Park Drive/SR 1 SB Ramps
- State Park Drive/McGregor Drive

- Rio Del Mar Boulevard/SR 1 NB Ramps
- Rio Del Mar Boulevard/Soquel Drive
- Soquel Drive/Soquel Avenue/SR 1 SB Off-ramp

A queuing analysis of 16 off-ramps indicates that in the AM peak hour, eight of the off-ramps would have 95$^{th}$ percentile queue lengths within their storage lengths. The other eight off-ramps would have queues extending onto the freeway mainline. These off-ramps are:

- Morrissey Boulevard Northbound Off-ramp
- Soquel Drive Northbound Off-ramp
- 41$^{st}$ Avenue/Porter Street/Bay Avenue Southbound Off-ramp
- Park Avenue Northbound Off-ramp
- Park Avenue Southbound Off-ramp
- State Park Drive Northbound Off-ramp
- State Park Drive Southbound Off-ramp
- Rio Del Mar Boulevard Northbound Off-ramp

In the PM peak hour, 10 off-ramps would have queues extending on the freeway mainline. These off-ramps include the eight off-ramps listed above and:

- Soquel Drive Southbound Off-ramp
- Freedom Boulevard Southbound Off-ramp

The SR 1 HOV report recommends monitoring these off-ramps and conducting separate studies when spillback is observed. Also, the report recommends modifying the appropriate signal timing plans to provide additional green time to the off-ramp traffic.

## Table B-4 Measures of Effectiveness – Year 2035 No Build and Year 2035 HOV Build Scenarios

| **Peak Hour** | **2035 No Build AM Peak Hour** | | **Year 2035 HOV Build AM Peak Hour** | | **2035 No Build PM Peak Hour** | | **Year 2035 HOV Build PM Peak Hour** | |
|---|---|---|---|---|---|---|---|---|
| **Measure of Effectiveness** | **NB** | **SB** | **NB** | **SB** | **NB** | **SB** | **NB** | **SB** |
| Average Travel Time (minutes) | 59 | 29 | 16 | 12 | 34 | 61 | 13 | 19 |
| Average Speed (mph) | 12 | 22 | 39 | 52 | 17 | 11 | 42 | 33 |
| Delay (minutes per vehicle) | 48 | 19 | 6 | 2 | 25 | 49 | 4 | 9 |
| Number of Vehicle Trips per Hour | 2,767 | 3,101 | 4,510 | 4,253 | 3,114 | 2,475 | 4,898 | 4,431 |
| Number of Person Trips per Hour | 3,132 | 3,597 | 5,742 | 5,181 | 3,874 | 2,911 | 6,276 | 5,684 |
| Freeway Travel Time (VHT) | 2,749 | 1,498 | 1,285 | 834 | 1,784 | 2,523 | 1,126 | 1,502 |
| Travel Distance (VMT) | 32,646 | 32,248 | 50,360 | 43,081 | 31,138 | 28,956 | 47,555 | 49,038 |
| LOS | F | F | E (B) | D (A) | F | F | E (C) | F (B) |
| | | | | | | | | |
| **Peak Period** | **2035 No Build AM Peak Period** | | **2035 HOV Build AM Peak Period** | | **2035 No Build PM Peak Period** | | **2035 HOV Build PM Peak Period** | |
| **Measure of Effectiveness – average per hour** | **NB** | **SB** | **NB** | **SB** | **NB** | **SB** | **NB** | **SB** |
| Average Travel Time (minutes) | 39 | 18 | 13 | 10 | 22 | 47 | 11 | 15 |
| Average Speed (mph) | 18 | 35 | 46 | 59 | 28 | 15 | 52 | 42 |
| Delay (minutes per vehicle) | 28 | 8 | 3 | 1 | 12 | 35 | 2 | 5 |
| Number of Vehicle Trips per Hour | 3,129 | 2,968 | 4,213 | 3,369 | 3,157 | 2,696 | 4,118 | 4,294 |
| Number of Person Trips per Hour | 3,542 | 3,443 | 5,271 | 4,090 | 3,927 | 3,168 | 5,271 | 5,443 |
| Freeway Travel Time (VHT) | 2,053 | 884 | 1,025 | 584 | 1,138 | 2,101 | 773 | 1,144 |
| Travel Distance (VMT) | 36,922 | 30,863 | 47,269 | 34,179 | 31,568 | 31,544 | 40,048 | 47,692 |
| LOS | F | E | D (B) | C (A) | F | F | D (B) | E (B) |

Note: LOS for the HOV Build Scenario is shown as LOS for the mixed-flow lanes and (LOS for the HOV lanes). Year 2035 No Build includes the SR17/SR1 merge lane project and the Soquel-Morrissey auxiliary lane project.

Source: *State Route 1 HOV Lane Widening Project (from Morrissey Boulevard to San Andreas Road), Traffic Operations Report*, prepared for Santa Cruz County Regional Transportation Commission by Wilbur Smith Associates, July 2007.

**Summary**

The SR 1 freeway from Larkin Valley Road in the south to the SR 17 ramps in the north is currently highly congested and operating below optimal conditions. The 2003 AM peak hour is characterized by heavy northbound traffic, with volumes ranging from approximately 3,100 to 4,600 vehicles per hour, and the facility operates at LOS F. In the afternoon, the 2003 peak is characterized by a peak period as high demand has already led to peak spreading. Volumes range from 3,100 to 4,000 in the northbound direction and from 2,900 to 4,400 in the southbound direction. In the PM peak period, the facility operates at LOS D in the northbound direction and LOS E in the southbound direction.

Without improvements to the corridor, traffic conditions are expected to worsen considerably by 2035. For all peak hours and all directions, the facility would operate at LOS F. For all peak periods and all directions, the facility would also be unable to serve the higher future demand and would operate at LOS E or F.

Throughput is expected to decrease in the peak hours as traffic experiences stop-and-go conditions. This will lead to further peak spreading. However, even with peak spreading, congestion will remain high throughout the peak periods. In the AM peak period, comparing the 2035 No Build case with existing conditions, average travel time along the corridor is expected to increase from 16 minutes to 39 minutes in the northbound direction and from 10 minutes to 18 minutes in the southbound direction. In the PM peak period, average travel time is expected to increase from 12 minutes to 22 minutes in the northbound direction and from 18 minutes to 47 minutes in the southbound direction.

Two improvement scenarios were analyzed to determine their ability to alleviate congestion along Segment 3B. The Traffic System Management (TSM) Build scenario included ramp metering, geometric improvements, and the addition of auxiliary lanes at three locations in the northbound direction and two locations in the southbound direction. With TSM improvements, additional capacity increases the throughput in both the peak hours and the peak periods compared to a No Build scenario. Except for the southbound AM peak hour, travel times through the corridor also improve. This is displayed in Figures B-5 through B-8. In the AM peak period, average travel time along the corridor improves from 39 minutes to 27 minutes in the northbound direction and from 18 minutes to 11 minutes in the southbound direction. In the PM peak period, average travel time improves from 22 minutes to 18 minutes in the northbound direction and from 47 minutes to 33 minutes in the southbound direction. However, despite these improvements, demand outpaces capacity, and the facility is expected to experience heavy congestion and to operate at LOS E or F in both the peak hours and periods, except for the southbound direction in the AM peak period, when the facility is expected to operate at LOS C.

The second scenario, HOV Build scenario, added auxiliary lanes, acceleration and deceleration lanes, geometric improvements, and HOV lanes to the existing facility. Overall, the proposed improvements enhanced the ability of the facility to accommodate

future travel demand mainly due to the addition of the HOV lanes. However, while operating conditions generally improve, demand would still be high compared to available capacity, and the facility would remain very congested in the peak hours and in the southbound PM peak period.

Under HOV Build conditions, throughput would increase in both the peak hours and peak periods. In particular, the combination of high demand and HOV lane availability would encourage carpooling, and person trips increase significantly under this scenario. Average travel times along the corridor also improve compared to the No Build condition. In the AM peak period, average travel time is expected to decrease from 39 minutes to 13 minutes in the northbound direction and from 18 minutes to 10 minutes in the southbound direction. In the PM peak period, average travel time is expected to decrease from 22 minutes to 11 minutes in the northbound direction and from 47 minutes to 15 minutes in the southbound direction.

While the HOV Build scenario provides significantly greater operational improvements compared to the TSM Build scenario, the facility will continue to experience heavy congestion, and the mixed-flow lanes will continue to operate at low LOS. In the peak hours, the mixed-flows lanes will operate at LOS E or F except for the southbound AM peak hour, where LOS D is expected. In the peak periods, LOS improves compared to the No Build case, with the mixed-flow lanes operating at LOS D in the northbound direction, LOS C in the southbound AM peak period, and LOS E in the southbound PM peak period.

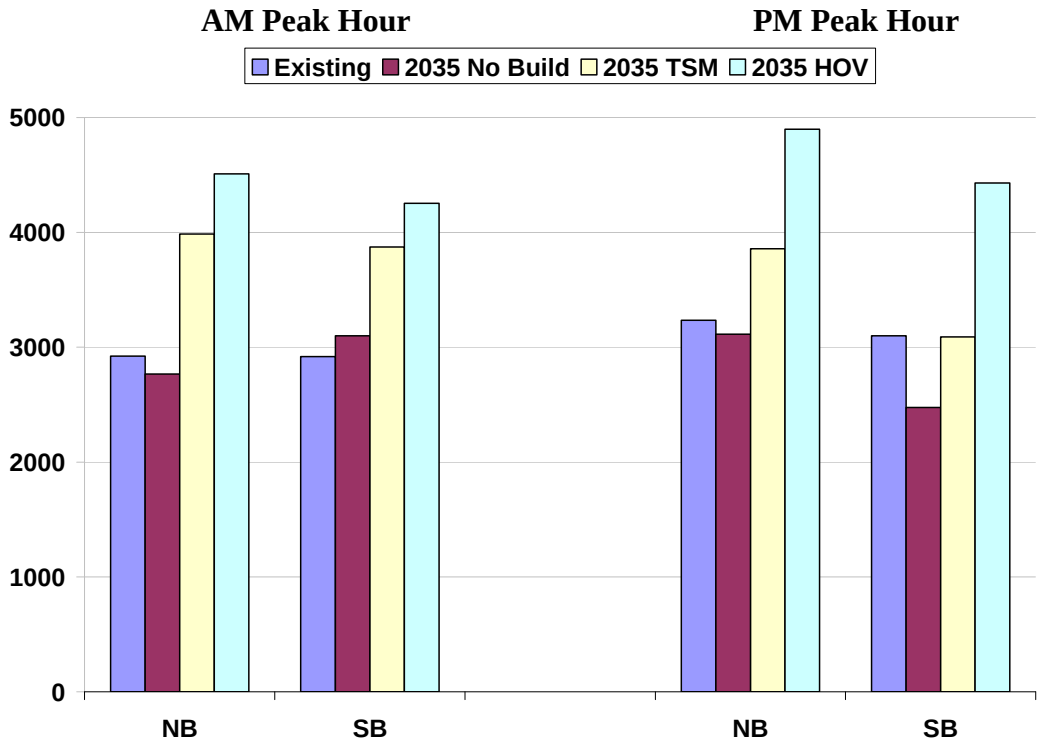



*Figure B-5 Vehicle Trips per Hour*

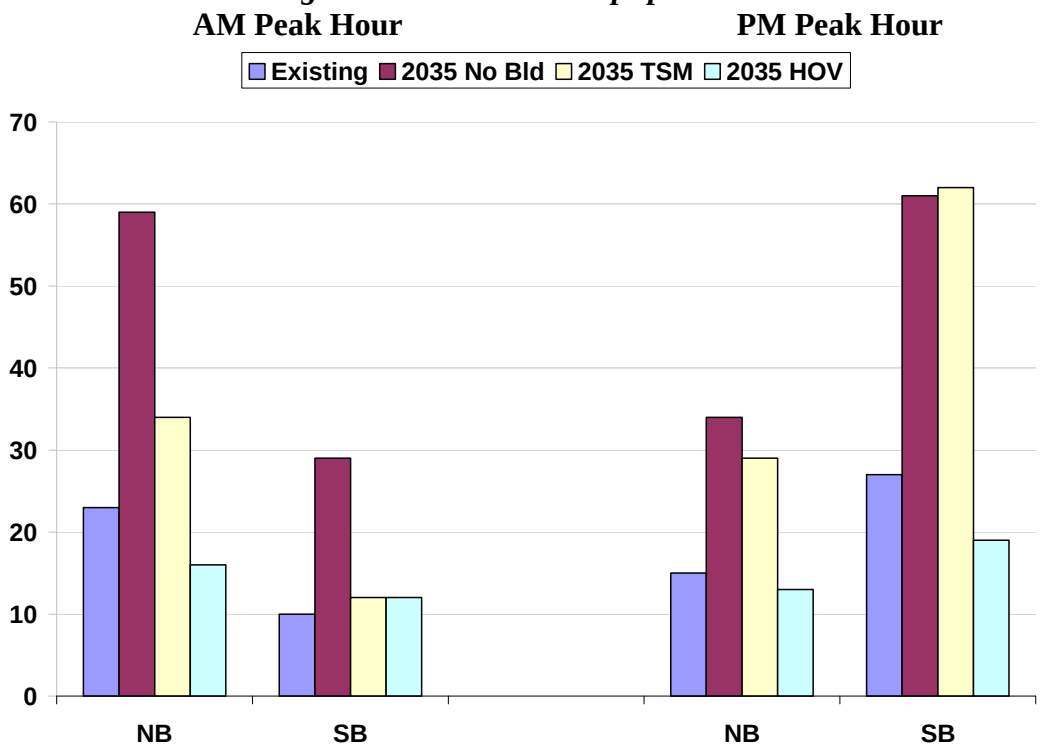



*Figure B-6 Average Travel Time (Minutes)*

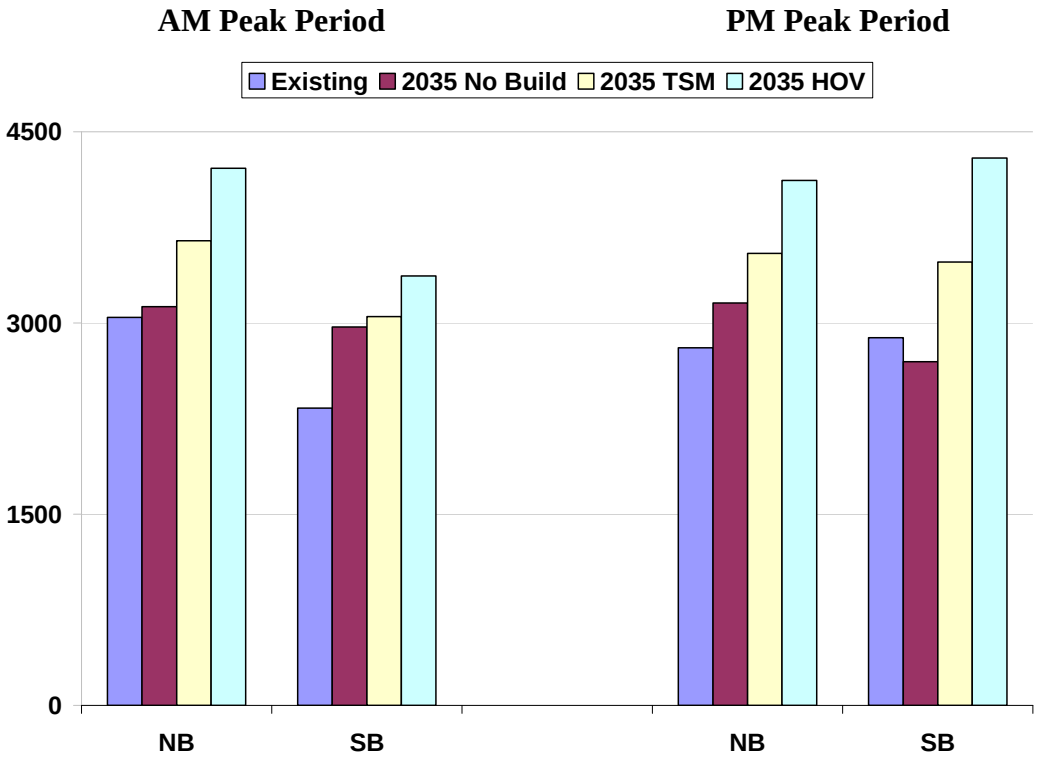



*Figure B-7 Average Vehicle Trips per Hour*

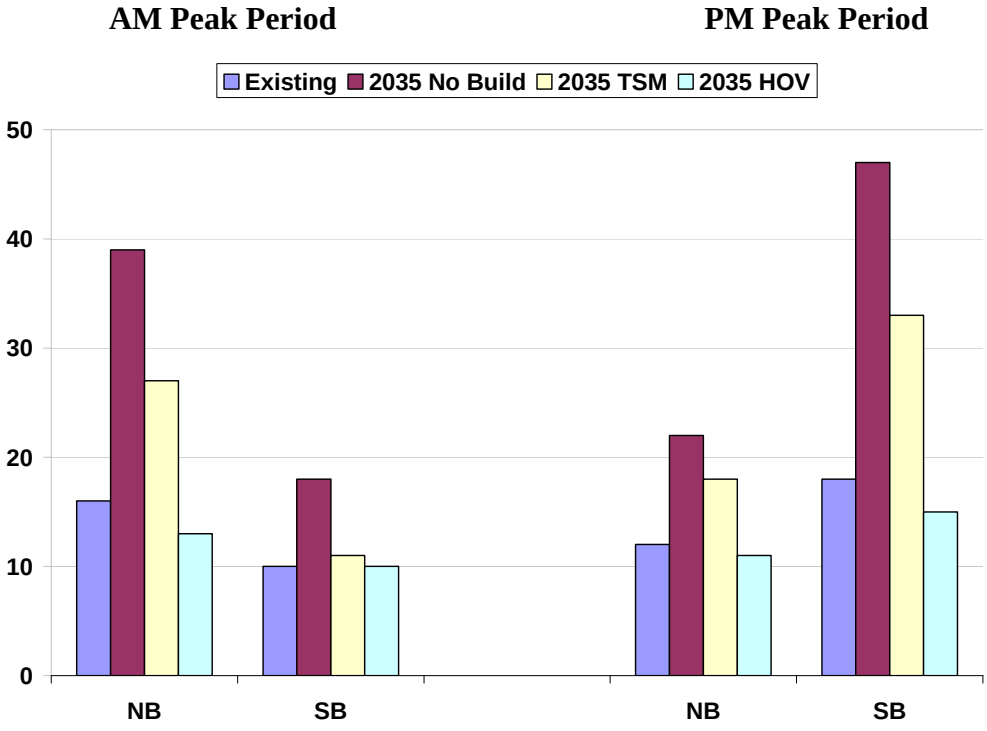



*Figure B-8 Average Travel Time (Minutes)*

# Appendix C Modeling

FREQ Analysis:

Current conditions for Segment 1 –Delay and Bottlenecks

A FREQ analysis completed for northbound SR 1 from the junction of State Route 68 West to Reservation Road in the afternoon/evening peak period showed that congestion is present from the junction of State Route 68 East to the Fremont Off-ramp. The congestion starts around 3:30 p.m., builds to a peak around 5:30 p.m., and then tapers off quickly to free-flow at sometime after 6:00 p.m. During this period LOS drops from Level B-C to Level F starting at the Fremont Interchange and working its way back to SR 68 East by 5:30 p.m.

Delay:

Total Vehicle Hours of delay is estimated at 670 hours of delay for the period 3:30 p.m. to 6:00 p.m. with a maximum delay of 2 minutes per individual driver. Refer to Table C-1.

Bottlenecks:

Congestion that is the result of a reduction or constraint in a roadway's capacity, such as a lane drop or where an additional lane is needed, is called a bottleneck. A "potential" or "hidden" bottleneck has the potential to result in congestion if traffic volumes increase. Two bottlenecks exist in Segment 1 in the northbound direction.

The first is within the two-lane section of SR 1 between the Junction of SR 1/SR 68 East and the Freemont interchange. This area experiences congestion in the afternoon/evening peak period due to the volume of commuter traffic that is leaving work in the Monterrey peninsula and heading north to go home. Also a contributing factor is traffic heading to major shopping centers off of SR 218 and Fremont Boulevard. This segment of SR 1 is also used by commuters using Fremont Boulevard and SR 218 as routes to bypass congestion on SR 68 East. The congestion starts at 3:30 p.m. at the Fremont Interchange when the traffic volumes start to exceed the capacity of the two through lanes. Congestion continues to back up till it reaches SR 68 East around 5:30 p.m. as traffic volumes remain high. Once northbound traffic reaches the three lane section north of the Fremont Interchange the added capacity allows congestion to clear and traffic speed increases.

The second bottleneck is a potential bottleneck that is located at the Del Monte Off-ramp to the City of Marina. At this location, one of the three through lanes becomes an off-ramp lane and exits the roadway, thus narrowing the roadway to two through lanes. At present traffic volumes, congestion does not exist at this potential bottleneck as there is enough traffic exiting the freeway at the Light Fighter, 12$^{th}$ Street and Del Monte

interchanges upstream. However, a future increase in traffic volumes might cause congestion at this location.

Recommendations to address deficiencies:

Possible actions to address deficiencies include an increase in capacity by adding a lane along SR 1 between the Junction of SR 1/68 East and the Fremont interchange or a reduction in traffic volumes during the peak period by a traffic management method such as ramp metering. These and other possible improvements will be evaluated at a later date when sufficient volume and speed data and modeling tools are available.

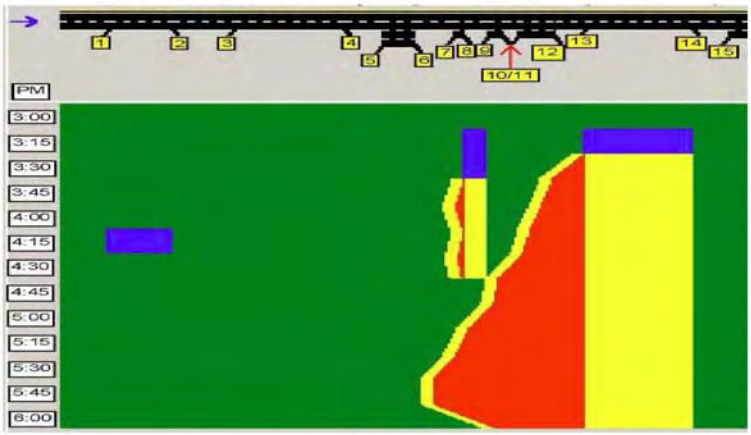
Methodology

Caltrans District 5 staff used FREQ12 Version 3.01 to model existing conditions. FREQ12 is a macroscopic deterministic simulation model based on demand-supply relationships. The model was used to simulate traffic for a typical weekday between 3:00 p.m. to 6:00 p.m.

The model network was developed to accurately reflect SR 1 geometrics. Lengths were determined by using the post mile sequence listing from the TASAS (Traffic Accident Surveillance and Analysis System) highway data base. Roadway cross-section was determined using data from aerials and the California State Highway Log. The network limits were SR 68 West in the south to Reservation Road Interchange in the north.

Demands were modeled based on traffic counts collected by Caltrans District 5 staff especially for this project. Data were collected at every on- and off-ramp between SR 68E and SR 156. The data were collected using either Hi-Star “Card” counters or hose counters on freeway on- and off-ramps and hoses or loop stations on the mainline freeway. Data used for the model were from Wednesday, May 14, 2008.

The model was calibrated using tachometer runs collected by Caltrans District 5 staff. Tachometer runs were made using the “floating car method” from 3:15 p.m. to 5:15 p.m. at half hour increments. Modeled speeds were compared against field speed data, and the model was adjusted until both modeled and observed speeds were within an acceptable range.




Delay in Veh-Hrs by FREQ Subsection

| PM TIME | North Bound SR 1 Mainline FREQ Subsections | | | | | | | | | | | | | | | Total Delay Veh-Hrs | Avg Delay Min/Veh |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | |
| 3:00 | | | | | | | | | | | | | | 1 | | 0.8 | >.5 |
| 3:15 | | 0.5 | | 0.2 | | | 0.1 | | 0.3 | | 0.1 | | 0.1 | 2 | | 3.8 | >.5 |
| 3:30 | | | | | | | 0.1 | | 0.6 | | 0.1 | 0.4 | 5.9 | 4 | | 10.5 | >.5 |
| 3:45 | | 0.5 | | | 0.1 | | 0.2 | 3.4 | 0.6 | | 0.1 | 5.9 | 9.4 | 4 | | 23.8 | >.5 |
| 4:00 | | | | | | | 0.1 | 2.9 | 0.5 | | 0.1 | 15.9 | 10 | 4 | | 33.4 | 1 |
| 4:15 | | 1.0 | | 0.3 | | | 0.3 | 2.3 | 0.6 | | 0.1 | 24.8 | 9.8 | 4 | | 42.7 | 0.75 |
| 4:30 | | | | | | | | 2.2 | 0.3 | 0.5 | 2.7 | 34.6 | 11 | 4 | | 55.1 | 1 |
| 4:45 | | | | | | | | | | 6.2 | 6.4 | 36.4 | 10 | 4 | | 63.1 | 1.2 |
| 5:00 | | | | | | | | | 1.5 | 13.9 | 7.5 | 39.4 | 13 | 4 | | 79.0 | 1.7 |
| 5:15 | | | | | | | | 3.4 | 8.4 | 16.6 | 7.7 | 39.2 | 12 | 4 | | 91.1 | 2 |
| 5:30 | | | | | | | 2.5 | 13.2 | 6.3 | 15.6 | 6.3 | 35.9 | 9.9 | 4 | | 93.3 | 1.8 |
| 5:45 | | | | | | | 8 | 14.6 | 4.8 | 14.9 | 5.7 | 34.6 | 9.1 | 4 | | 95.5 | 1.8 |
| 6:00 | | | | | | | 0.9 | 6.1 | 3.4 | 14.1 | 5.3 | 35.6 | 9.1 | 4 | | 78.0 | 1.5 |
| | | | | | | | | | | | | | | | | 669.9 | 1.4 |

1- SR 68 West On
2- Munras Ave Off
3- Soledad Dr On
4- Aguajito Rd Off
5- Fremont St On
6- SR 68 E/Fremont St Off
7- SR 68 East On
8- Casa Verde Way Off
9- Casa Verde Way On
10- Del Monte Blvd Off
11- Del Monte Blvd
12- SR 218 Off
13- SR 218 On
14- Fremont Blvd Off
15- Fremont Blvd On

- Free Flow
- Near Capacity .9 <= V/C < 1.00
- V/C = 1.00
- Congested Flow

***Figure C-1 FREQ Model Results***