State Route 4

Corridor System Management Plan

October 2010

CSMP summary

CALTRANS DISTRICT 4

corridor system management plans

4
Richmond
Martinez
Oakland
Concord
242
EXIT
1/2 MILE
Port Chicago
Highway
1/4 MILE
CALL
BOX

state route 4
corridor system management plan

APPROVED BY:

10-25-10

BIJAN SARTIPI, Date
District 4 Director
California Department of Transportation

I accept this Corridor System Management Plan for the State Route 4 Corridor as a document informing the regional transportation planning process.

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10/06/10

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stakeholder acknowledgment

District 4 wishes to acknowledge the time and contributions of stakeholder groups and partner agencies. Current and continuing Corridor System Management Plan (CSMP) development is dependent upon the close participation and cooperation of all major stakeholders. This CSMP represents a cooperative commitment to develop a corridor management vision for the SR-4 Corridor. The strategies evaluated have the potential to impact the local arterial system and the regional and local planning agencies that have the corridor within their jurisdiction. These representatives participated in the Technical Advisory Committee (TAC) and provided essential information, advice and feedback for the preparation of this CSMP. The stakeholders/partners include:

- Metropolitan Transportation Commission
- Contra Costa Transportation Authority
- City of Hercules
- City of Martinez
- City of Concord
- City of Pittsburg
- City of Antioch
- Contra Costa County
- West Contra Costa Transportation Advisory Committee (WCCTAC)
- Transportation Partnership and Cooperation Committee (TRANSPAC)
- East Contra Costa County Transportation Planning Committee (TRANSPLAN)
- Association of Bay Area Governments (ABAG)
- Bay Area Air Quality Management District (BAAQMD)
- Transit Agencies (Bay Area Rapid Transit District, WestCAT, Central Contra Costa Transit Authority, Tri Delta Transit)

A website, **www.corridormobility.org** has been created to support the development of the CSMPs and to provide stakeholders and the public with more information and an opportunity to provide input and review documents.

Disclaimer: The information, opinions, commitments, policies and strategies detailed in this document are those of Caltrans District 4 and do not necessarily represent the information, opinions, commitments, policies and strategies of partner agencies or other organizations identified in this document.

dedication

To Patricia “Pat” Weston (1951-2009)

Caltrans District 4 Planners dedicate this Corridor System Management Plan (CSMP) to the memory of Pat Weston, Chief, Caltrans Office of Advance System Planning, whose seemingly limitless energy and passion for transportation system planning in California has been an inspiration to countless transportation planners and engineers within Caltrans and its partner agencies. Pat's efforts elevated the importance of corridor-based system planning, performance measurement for system monitoring, and the blending of long-range planning with near-term operational strategies. This has resulted in stronger planning partnerships with Traffic Operations in Caltrans and led directly to the requirement to conduct comprehensive corridor planning through CSMP documents. This is but one of a long list of major achievements in Pat's lengthy Caltrans career. She generously shared her knowledge, wisdom and guidance with us over the years. She will be sorely missed as a planner, mentor and friend.

introduction

This Corridor System Management Plan (CSMP) represents a cooperative commitment to develop a corridor management vision for the SR-4 Corridor. The CSMP development process was a joint effort of the Department of Transportation (Caltrans), the Metropolitan Transportation Commission (MTC) and the Contra Costa Transportation Authority (CCTA). This Core Stakeholder Group worked with local planning agencies through a Technical Advisory Committee (TAC) to develop this plan. The goal is to propose strategies to achieve the highest mobility benefits to travelers across all jurisdictions and modes along the SR-4 CSMP Corridor.

PLANNING AND POLICY FRAMEWORK

Since passage of the Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act, known as Proposition 1B, in November 2006, Caltrans has implemented the CSMP process statewide for all corridors with projects funded by the Corridor Mobility Improvement Act (CMIA) Program. The California Transportation Commission (CTC) requires that all corridors with a CMIA-funded project have a CSMP that is developed with regional and local partners. The CSMP recommends how the congestion-reduction gains from the CMIA projects will be maintained with supporting system management strategies. The CTC has also provided guidance in the 2008 Regional Transportation Plan (RTP) Guidelines that the CSMPs are an important input to the development of the RTP.

In the San Francisco Bay Area, Caltrans is completing nine CSMPs. This SR-4 CSMP reflects data and projects from MTC's current RTP, *Change in Motion, Transportation 2035 Plan*, adopted April 2009. The CSMP recommends strategies that could potentially become projects through the regional transportation project development and prioritization process. In the San Francisco Bay Area, the CSMP process has taken place in coordination with the MTC's Freeway Performance Initiative (FPI), which provided the performance assessments and technical analysis for the CSMPs.

This CSMP focuses on highway mobility within the context of the State's most congested urban corridors. While the CSMP describes the arterials and other modes in the corridor, the focus of the recommended strategies is on maximizing the existing infrastructure through coordinated application of system management technologies such as ramp metering, coordinated traffic signals, changeable message signs for traveler information and incident management. It describes the current land use, transit, bicycle/pedestrian facilities, and the Focusing Our Vision (FOCUS) regional blueprint Priority Development and Conservation Areas. These are provided as a backdrop for understanding how the highway corridor works.

THE SR-4 CSMP

The objectives of the SR-4 CSMP are to reduce delay within the corridor (mobility), reduce variation of travel time (reliability), reduce accident and injury rates (safety), restore lost lane miles (productivity), and reduce distressed lane miles (system preservation). The limits of the SR-4 CSMP were determined, in collaboration with MTC, by identifying the key travel corridor in which CMIA-funded projects are located. The CMIA-funded project is:

- SR-4 Widening Somersville Road to SR-160

The SR-4 CSMP addresses State Highways, local parallel roadways, the bicycle and pedestrian network, and regional transit services pertinent to corridor mobility. The CSMP also identifies gaps in the bicycle and pedestrian network and regional transit services and discusses opportunities for the future.

The CSMP makes some recommendations for increasing other modal services that can make the highway operate more efficiently, but the main thrust of the strategies is to enable better system management of the highway. By focusing on more efficient operation of the highway network, the CSMP moves toward optimizing current infrastructure, improving our ability to analyze and identify what leads to congestion in a corridor, and strengthening interagency partnerships to ensure that all parts of the transportation system work together well.

METHODOLOGY

A corridor performance assessment and technical analysis of the SR-4 CSMP Corridor was conducted through the FPI, a partnership between MTC and Caltrans. The performance assessment evaluated the current highway performance along the corridor and determined causes of performance problems.

Simulation modeling was used to forecast future travel conditions along the corridor. Traffic analysis methods were used to identify bottlenecks and to predict the impacts of a variety of operational strategies and investment scenarios. The simulation model was limited to the intersections at each freeway interchange and could not feasibly model the diversion effects outside of their impacts on the surface streets in the immediate vicinity of each interchange.

The comprehensive corridor analysis results consisting of existing and future traffic conditions were first discussed at the SR-4 CSMP TAC meeting in March 2009. The TAC met at regular intervals to provide further input on conclusions and recommendations for short- and long-term corridor management improvement strategies.

The proposed short-term and long-term improvement strategies include:

By 2015, short-term, in addition to programmed improvements:

- Complete and activate the ITS network.
- Implement transportation management and capacity enhancement strategies
- Improve BART access, parking and operations.

By 2030, long-term:

- Implement transportation management and capacity enhancement strategies
- Improve BART access, parking and operations.

FIRST GENERATION CSMP

This CSMP represents the “first generation” of corridor system management plans informing the transportation planning process. This CSMP identifies corridor management strategies applied on a network wide basis. The selected strategies address existing and forecasted mobility, lost productivity, bottlenecks, and reliability problems. The CSMP recognizes that transit services and goods movement are also adversely affected by the same problems. To implement some of these strategies, key capital projects are also identified. This list is not meant to be inclusive of all potential projects in the corridor. The CSMP builds upon the capital project recommendations of the SR-4 Corridor Study, the 2009 Contra Costa Transportation Authority Countywide Transportation Plan and the 2009 MTC RTP (T2035). These recommendations add system management and other strategies to provide additional benefit and efficiencies.

Since Caltrans and the regions launched this first cycle of corridor system management planning in 2007 (called *first generation CSMPs*), the statewide planning policy context has evolved significantly. Assembly Bill (AB) AB 32 policy on reducing greenhouse gas emissions has moved into implementation with passage of Senate Bill (SB) SB 375, landmark legislation requiring the regions to meet state-designated greenhouse gas emissions reduction targets. The CTC has developed guidance on how the regions will develop a Sustainable Community Strategy (SCS) in their next RTP cycle; MTC's next RTP is slated for completion in 2013. The SCS will promote strategies to reduce greenhouse gas emissions through more efficient land use patterns, reduce vehicle travel, support transit, bicycle and pedestrian mode choices, and improve supply and affordability of housing within the Bay Area to reduce commuting into the region.

The *second generation CSMPs* will reflect the SCS and the 2013 RTP, and will grapple with the issue of providing mobility and reducing highway congestion within the context of a new regional planning framework. The *second generation CSMP* scope will expand to include integrated land-use and transportation (in the context of SCS required by SB 375) and a more comprehensive look at transit and non-motorized travel strategies and options.

STAKEHOLDER ISSUES AND CONCERNS

Stakeholder concerns following the CSMP development process focused on SB 375 requirements, CSMP analysis scope, and potential impacts to the local arterial network. Stakeholders had concerns that recommended improvements in the CSMP do not emerge from a multimodal and integrated transportation land use planning effort, such as integrating transit, bicycle and pedestrian networks, and demand management. Local jurisdictions are also concerned about the impacts ramp metering could have on local on-ramps and arterials, as well as concern that the operations analysis performed accounted for mainline delay, but not ramp delay. Concern was also expressed that travel forecasts in this corridor analysis did not account for a proposed Concord Naval Weapons Station redevelopment that has yet to be approved or initiated. This represents a summary of the issues and concerns shared by stakeholders during the CSMP development process; a more detailed listing of stakeholder issues and concerns is located in Section 1.7 of the CSMP Overview.

CSMP DOCUMENT

The SR-4 CSMP document is organized into three key volumes. The CSMP Summary serves as a stand-alone document and provides corridor facts and description summaries, key findings and recommended improvements from the technical analysis. The main CSMP document provides the CSMP Overview, Corridor Description, technical analysis memorandum and recommendations. The Appendix contains information about corridor segments, freeway agreements, CMIA projects, maintenance plans, and corridor concept. Within the main CSMP document, the CSMP Overview describes the CSMP purpose and need, consistency and relationship to other plans, the CSMP stakeholder engagement process and the CSMP performance measures and objectives. The CSMP Corridor Description contains a more detailed description of the corridor and its significance within the highway system and other modal systems. The CSMP technical analysis reports present existing and future conditions and trends, corridor management issues and strategies, and a prioritized list of short- and long-term recommendations based on these analyses.

The SR-4 Corridor system will be regularly monitored using identified performance measures and Traffic Operations Systems (TOS) data, and will be reported in subsequent CSMP updates. This information will be used to continually improve system performance.

Contra Loma IC looking East

State Route 4

CSMP Summary

1. SR-4 CSMP Corridor Facts/Segment Data Summary
2. CSMP Overview
3. Corridor Description
4. Comprehensive Corridor Performance Assessment
5. Recommended Corridor Management Improvement Strategies

1. SR-4 CSMP CORRIDOR FACTS

Corridor Limits: *I-80 interchange in Hercules to SR-4/ SR-160 interchange in Antioch*

Corridor Description

The SR-4 CSMP limits are 31.13 miles long beginning in the city of Hercules at I-80 traversing unincorporated Contra Costa County, and the cities of Martinez, Concord, Pittsburg and Antioch before ending at the SR-4/160 interchange. The segments between I-80 and I-680 are functionally classified as Expressway, while the remaining segments are functionally classified as Freeway.

Corridor Concept 2035
4E-10F(2H) *F=Freeway H=HOV or HOT Lane*

Route Designation and Regional Setting

Functional Classification	Urban Principal Arterial - Freeway
Designations	STAA Route: Yes Terminal Access Route: Yes SHELL Route: No
IRRS	Yes – Basic
Lifeline	No
MPO	MTC
Air Quality District	BAAQMD
Average Mode Split	SOV: 69.46% HOV: 16.5% Public: 7.42%, Walk: 1.54%, Other: 1.64%, Tele: 4.3%

Multi-Modal Service

Primary providers of bus and rail: BART, Central Contra Costa Connection Transit Authority and Tri Delta Transit.

Interregional Significance

SR-4 is an east-west route providing interregional travel between the Central Valley and Bay Area for commute, recreational and commercial traffic.

Corridor Specific Issues

- Connects to interstate system via I-80 and I-680.
- Major commuter link between SF/East Bay employment centers and Contra Costa County housing.
- High volumes of commuter, recreational and major regional and interregional freight traffic.

Corridor Objectives

- Reduce reoccurring delay within the corridor.
- Reduce variation of travel time.
- Improve connectivity between modes.
- Reduce distressed lane miles
- Reduce accident and injury rate

Performance Measure	***Desired Outcome***
Mobility	Reduce Delay in Corridor
Reliability	Reduce Travel Time Variation
Safety	Reduce Number of Accidents

Current Performance
Top 3 Congested Locations (2008)

Location	***VHD***
CC4 Somersville Rd. to Loveridge Rd. (WB) AM	2,470
CC4 Loveridge Rd. to Somersville Rd. (EB) PM	2,054
CC4 Willow Pass Rd. to Port Chicago Hwy (WB) AM	1,566

Key Bottlenecks

Location/Direction	**AM/PM**
CC4 Willow Pass Rd. to Port Chicago Hwy	*AM-WB*
CC4 Somersville Rd. to Loveridge Rd.	*AM-WB*
CC4 Loveridge Rd. to Somersville Ave.	*PM-EB*
CC4 SR-242 to Port Chicago Hwy.	*PM-EB*
CC4 I-680 to Solano Way	*PM-EB*

Recommended Corridor Management Strategies

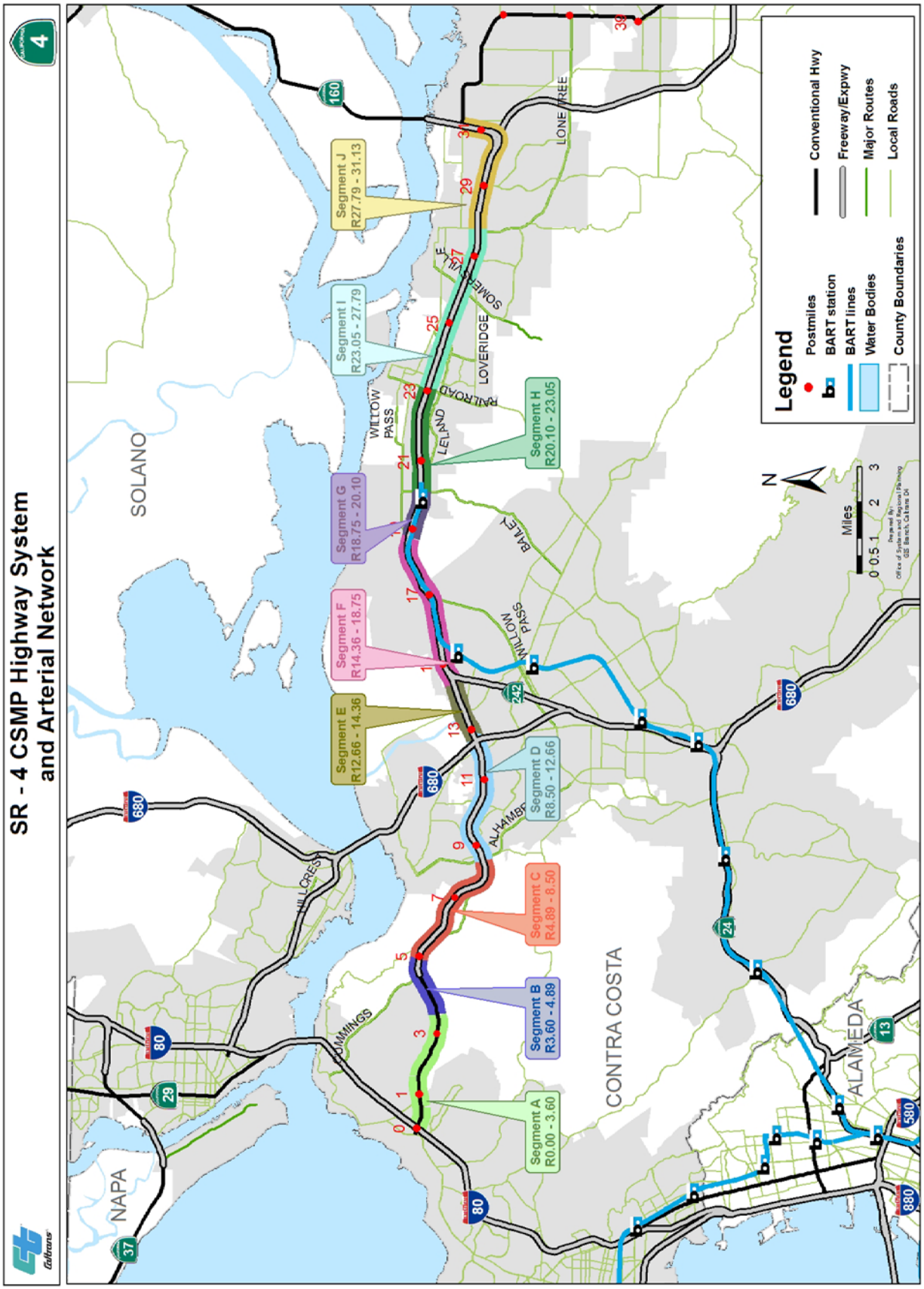
Near-Term (2015)

- Deploy ITS technologies on SR-4 throughout Contra Costa County.
- Address existing and projected bottlenecks by implementing transportation management and capacity enhancement strategies WB between I-680 and Hillcrest Ave.
- Address existing and projected bottlenecks by implementing transportation management and capacity enhancement strategies EB between Pacheco Blvd. and Port Chicago Hwy.
- Implement transit strategies in the SR-4 Corridor (BART parking capacity, bus feeder service and expanded Park & Ride at Pacheco Rd.)

Long-Term (2030)

- Further address existing and projected bottlenecks by implementing transportation management & capacity enhancement strategies WB between I-680 and Hillcrest Ave
- Further address existing and projected bottlenecks by implementing transportation management & capacity enhancement strategies EB between I-80 and SR-160.
- Implement transit strategies in the SR-4 Corridor (BART parking capacity, bus feeder service and an expanded Park & Ride network).

SR-4 CSMP HIGHWAY SYSTEM AND ARTERIAL NETWORK



CORRIDOR SYSTEM MANAGEMENT PLAN STATE ROUTE 4

Segment Data Summary

CSMP Segment	CO/RTE/PM	Vehicle Hours of Delay (VHD) (AM/PM)		EB PM Peak Volumes		WB AM Peak Volumes		AADT (2007)	2008 Truck %	Accident Rate (Actual/ Statewide Average)		HOV	Aux	Bottleneck Location (AM/PM)	
		AM	PM	2007	2030	2007	2030			Actual	Avg			EB	WB
A	CC-4 0.00 -3.60			2,128	3,402	1,574	2,253	38,000	6.23	0.26	0.46				
B	CC-4 3.60-4.89			2,128	3,402	1,574	2,253	44,000	6.23	0.19	0.22				
C	CC-4-4.89-8.50			2,309	3,071	1,761	2,364	49,000	6.23	0.17	0.19				
D	CC-4-8.50-12.66			3,797	5,049	3,547	5,935	65,000	5.09	0.28	0.25		X		
E	CC-4-12.66-14.36			4,110	5,495	4,877	8,410	86,000	6.76	0.30	0.28	X	X		
F	CC-4-14.36-18.75	1,566 (WB)	318 (EB)	7,828	9,475	8,327	11,359	90,000	5.17	0.25	0.29	X		PM	AM
G	CC-4-18.75-20.10			6,424	8,253	6,637	9,750	142,000	5.52	0.25	0.31	X	X		
H	CC-4-20.10-23.05			5,474	7,471	5,578	9,201	131,000	4.60	0.34	0.37	X	X		
I	CC-4-23.05-27.79	2,470 (WB)	2,064 (EB)	4,311	7,674	4,976	8,946	114,000	4.60	0.46	0.46			PM	AM
J	CC-4-27.79-31.13			4,208	7,674	2,715	5,652	82,000	5.37	0.29	0.29				

Sources:

CO/RTE/PM:CSMP segmentation modified from 2002 TCCR segments.

VHD:SR-4 Final Existing Conditions Technical Memorandum (ECT). PBS&J Consultants dated February 17, 2009

Volumes:SR-4 Final Future Conditions Technical Memorandum (FCT). PBS&J Consultants dated July 17, 2009

AADT:http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/

Truck %:http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/

Accident Rate:TASAS Table B

2. CSMP OVERVIEW

A CSMP is a transportation planning document that plans for the safe, efficient and effective mobility of people and goods within the most congested transportation corridors. Each CSMP presents an analysis of existing and future traffic conditions and proposes traffic management strategies and capital improvements to maintain and enhance mobility within each corridor. The corridor management planning strategy is based on the integration of system planning and system management. Each CSMP will address State Highways, local parallel roadways, regional transit services, and other regional modes pertinent to corridor mobility.

CSMPs are being developed throughout the State for corridors within which funding is being used from the CMIA and Highway 99 Bond Programs created by the passage of the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006, approved by the voters as Proposition 1B in November 2006. The intent is to eventually develop CSMPs for all urban freeway corridors.

The CSMP transportation network is defined to include, but is not limited to, State Highways, major arterials, intercity and regional rail service, regional transit services, and regional bicycle facilities.

Purpose and Need Statement

On March 15, 2007, the CTC adopted *Resolution CMIS-P-0607-02.* In Sections 2.12 and 2.13 of this resolution, the CTC resolved that "…the Commission expects Caltrans and regional agencies to preserve the mobility gains of urban corridor capacity improvements over time that will be described in CSMPs, which may include the installations of traffic detection equipment, the use of ramp metering, operational improvements, and other traffic management elements as appropriate…" and "… the nominating agencies including the installation of detection equipment and other supporting elements, to the project delivery council on a semiannual basis…."

The immediate purpose of preparing CSMPs is to satisfy the requirements to qualify for funding highway improvements under the CMIA and Highway 99 Bond programs, and to preserve the mobility gains of highway improvements funded through this program. The CTC adopted guidelines and a program of projects for funding. CSMPs are prepared based on the need to efficiently and effectively use all transportation modes and facilities in congested corridors so as to maximize mobility, improve safety and reduce delay costs.

Consistency with Strategic Growth Plan

CSMPs support the Governor's Strategic Growth Plan (SGP), which calls for an infrastructure improvement program that includes a major transportation component (GoCalifornia). The CMIA and other elements of the November 2006 transportation infrastructure bond are a down payment toward funding the most important of these infrastructure needs. The objectives of these investments are to decrease congestion, improve travel times and safety, and accommodate expected growth in the population and economy. The SGP is based on the premise that investments in mobility throughout the system will yield significant improvements in congestion relief.

The philosophy of system management is to make the most effective use of the transportation system. The system management pyramid represents a comprehensive range of strategies to improve mobility within a transportation corridor. It includes system monitoring at its base, followed by maintenance, smart land use, technology and operational strategies, and traditional system expansion. Simply put, the value of any investment decision made higher up in the pyramid is limited without a good foundation from the strategies below.

The System Management Pyramid

CSMP Performance Measures

Caltrans worked with stakeholders to develop performance measures that together serve to focus directed action on desired corridor strategies and improvements. Performance Measures are illustrated in Table 1 below and were used in discussions with stakeholders.

Table 1: CSMP Performance Measures

Performance Measure	Performance Measure Description	Objective/ Desired Outcome
Mobility	Vehicle Hours of Delay (PeMS*, Probe Vehicles)	Reduce delay within the corridor
Reliability	Travel Time (PeMS, Buffer Index)	Reduce variation of travel time
Safety	TASAS** Data	Reduce accident and injury rate

*Freeway Performance Measurement System
**Traffic Accident Surveillance and Analysis System

Relationship to Other Plans

A number of Caltrans system planning documents were used as the foundation for the preparation of the CSMP. These included the 2005 *California Transportation Plan* (CTP), and the 1998 *Interregional Transportation Strategic Plan* (ITSP). Also, a number of related Caltrans system management documents were used including the 2006 *Strategic Growth Plan* (SGP), 2004 *Transportation Management System Master Plan* (TMSMP), and the 2004 *California ITS Architecture and System Plan* (SWITSA).

System and regional planning documents prepared by other agencies that influence CSMP development included the 2009 *RTP* (T2035) and the 2004 *Bay Area Regional ITS Plan.*

Most notably, the MTC FPI, a regional program, has influenced corridor-level performance-based decision making for the 2009 RTP (*T2035*). Important documents in this effort are the 2007 *FPI Performance & Analysis Framework* and the 2007 *FPI Prioritization Framework.*

The FPI corridor-specific documents are noted below:

- US-101 North (MRN/SON)
- US-101 Peninsula/South (SM/SCL)
- I-580 East (ALA)
- I-880 (ALA/SCL)
- SR-4 (CC)
- I-80 East (SOL)
- I-680 North (SOL/CC)
- I-680 South (ALA/SCL)

Complete Streets Implementation Action Plan

Caltrans policy through Deputy Directive 64 (Complete Streets*) is to view all transportation improvements (new and retrofit) as opportunities to improve safety, mobility and access for all travelers, including transit users, bicyclists and pedestrians. Such projects are coordinated with community goals, plans and values. Providing complete streets increases travel options, enabling environmentally sustainable alternatives to single-driver car trips. Implementing Complete Streets also supports local agency efforts required by the 2008 California Complete Streets Act (AB 1358), as well as expected efforts toward SB 375 goals to reduce greenhouse gas emissions through sustainable community strategies.

Stakeholder Engagement

Current and continuing CSMP development is dependent upon the close participation and cooperation of all major stakeholders. The strategies evaluated have the potential to impact the local arterial system, the transit service along the corridor, and the regional and local planning agencies within the corridor. The goal of the stakeholder engagement process is consensus among key stakeholder groups to develop the CSMP. The CSMP follows a workplan unique to the needs of the CSMP corridor and identified stakeholders. Each stakeholder category group has a role during the CSMP development process. The Core Stakeholder Group provides policy and technical guidance throughout the process. Additional planning agency partners review and comment at key junctures through the corridor TAC to provide additional guidance and help evaluate corridor improvement strategies.

*A "Complete Street" is a transportation facility that is planned, designed, operated and maintained to provide safe mobility for all users.

The stakeholder engagement process framework for the current CSMP considered stakeholders in two key categories:

I. Core Stakeholder Group: Agencies primarily responsible for conducting planning efforts on behalf of the corridor.

II. Planning Agency Partners: Additional agencies responsible for implementing and monitoring CSMP strategies.

District 4 CSMP Overview

Caltrans and MTC are committed to assisting each other in the development of CSMPs and MTC's related FPI corridor studies. This cooperation is documented in MTC Resolutions 3792 and 3794. For the San Francisco Bay Area, Caltrans District 4, nine CSMPs were being developed as of May 2010. Figure 1 on the following page illustrates these nine CSMPs.

The SR-4 CSMP

This CSMP represents a cooperative commitment to develop a corridor management vision for the SR-4 corridor. The CSMP development process is a joint effort of Caltrans, MTC, and the Contra Costa Transportation Authority (CCTA). This Core Stakeholder Group is working with local planning agencies, through a corridor TAC. The goal is to achieve the highest mobility benefits to travelers across all jurisdictions and modes along the SR-4 CSMP Corridor.

The SR-4 CSMP addresses State Highways, local parallel roadways/major arterials, the bicycle and pedestrian network, and regional transit services pertinent to corridor mobility. The CSMP also identifies gaps in the bicycle and pedestrian network and regional transit services and discusses opportunities for the future.

The limits of the SR-4 CSMP were determined, in collaboration with MTC, by identifying the key travel corridor segments in which CMIA-funded projects are located. Figure 2 illustrates the SR-4 corridor limits and the scope of the CMIA-funded the SR-4 Widening from Somersville Road to SR-160 project.

SR-4 CSMP Corridor Team

The Core Stakeholder Group for the SR-4 CSMP Corridor is identified as MTC, CCTA and Caltrans. Representatives met early in the CSMP development process to discuss the goals, objectives and schedule. This group met regularly to review and approve operational and simulation data collection and analysis methodology, technical reports, and identified additional planning agency partners for further CSMP development. This Stakeholder Group, and key planning agency partners along the corridor, met as a TAC at regular intervals, providing valuable input on the analysis and recommended improvement strategies for the SR-4 CSMP Corridor. The key stakeholders listed below were identified for involvement in the engagement process.

Key Stakeholders

Core Stakeholder Group

- Caltrans
- Metropolitan Transportation Commission
- Contra Costa Transportation Authority

Additional Planning Agency Partners

- City of Hercules
- City of Martinez
- City of Concord
- City of Pittsburg
- City of Antioch
- Contra Costa County
- West Contra Costa Transportation Advisory Committee (WCCTAC)
- Transportation Partnership and Cooperation Committee (TRANSPAC)
- East Contra Costa County Transportation Planning Committee (TRANSPLAN)
- Association of Bay Area Governments (ABAG)
- Bay Area Air Quality Management District (BAAQMD)
- Transit Agencies (BART, WestCAT, CCCTA, TrI-Delta Transit)

Figure 1. Caltrans District 4 CSMP Corridors (May 2010).

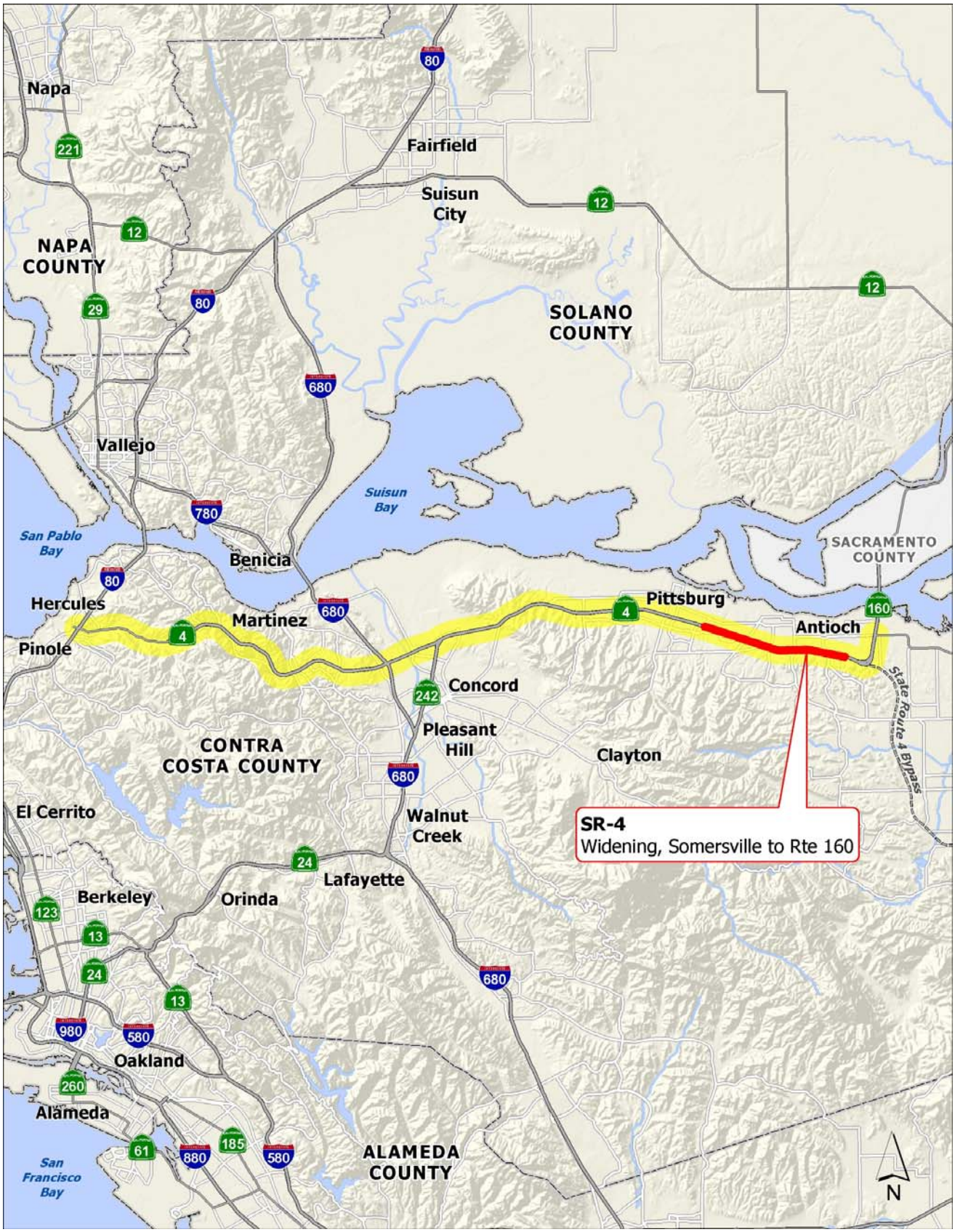


Figure 2. SR-4 CSMP Corridor Limits and CMIA Project Location.

3. CORRIDOR DESCRIPTION

The SR-4 CSMP corridor is an east-west route approximately 31 miles in length providing interregional travel between the Central Valley and Bay Area for commute, recreational and commercial traffic. It also serves a significant level of locally generated demand from the cities located along the corridor such as Hercules, Martinez, Concord, Pittsburg, Antioch, Brentwood and Unincorporated Contra Costa County.

The SR-4 CSMP Corridor is characterized by its rolling topography between I-80 and I-680 and its suburban land uses east toward I-680.

The SR-4 CSMP corridor is on the National Highway System (NHS) as a basic route. It is functionally classified as both an Urban Principal Arterial and as expressway-freeway in different segments due to changes in access along its 31 mile stretch. The corridor lane configuration varies between four and seven mixed-flow lanes and approximately four miles of bi-directional High-Occupancy Vehicle (HOV) lanes.

Major Arterials

There is an extensive network of arterial roadways and local streets that provide access to SR-4 and serve local travel throughout the corridor. These include Willow Pass Road in Concord, the Pittsburg-Antioch Highway, West Leland Road and Buchanan Road in Pittsburg, and 18th Street in Antioch. These arterials may also unofficially serve as alternative routings during major incidents on SR-4.

Goods Movement

The SR-4 corridor serves local and intercity truck and heavy vehicle travel for surrounding communities such as Hercules, Martinez, Concord, Pittsburg, Antioch, Oakley, and Brentwood. Additionally, it provides access to I-80, the second longest interstate route in the U.S., and a major route for interstate commerce.* Truck and heavy vehicle traffic makes up four to seven percent of daily vehicle trips along the SR-4 corridor.**

Transit

The SR-4 CSMP corridor includes interstate and regional rail, express and local bus service within Contra Costa County (specifically Antioch, Brentwood, Concord, Hercules, Martinez, and Pittsburg). The major providers are Amtrak, Bay Area Rapid Transit District (BART), West-CAT, Central Contra Costa Transit Authority (CCCTA) and Tri Delta Transit.

Bicycle and Pedestrian Network

The SR-4 CSMP corridor allows bicycle shoulder access between San Pablo Avenue and Cummings Skyway and Port Chicago Highway and Willow Pass Road, but no pedestrian access. Bicyclists and pedestrians may travel parallel to SR-4 on the remaining segments of SR-4 using local arterials. These provide access to local job centers, shopping centers, K-12 schools, colleges, and transit stations. Bicycle facility types include Class-I (multi-use). Class-II (bicycle lane) and Class-III (bicycle route). BART stations and Park and Ride lots within the corridor provide bicycle parking and storage facilities. Pedestrian walkways are present across SR-4 at Bailey Road, Railroad Avenue and Hillcrest Avenue in Pittsburg and Antioch.

Intelligent Transportation System (ITS) and Detection

Current ITS infrastructure within the SR-4 CSMP corridor includes Ramp Metering (RM) Stations, Traffic Monitoring Stations (TMS), Wireless Magnetometer Vehicle Detection Stations, Changeable Message Signs (CMS), Highway Advisory Radio (HAR), Extinguishable Message Signs (EMS), and Closed-Circuit Television (CCTV) cameras. Caltrans strives for traffic detection to be located at one-third to one half-mile intervals along the corridor. This has been recently achieved with the filling of key gaps in the detection network between I-80 and SR-242, and between Loveridge Road and SR-160. Figure 3 illustrates existing TMS along the SR-4 CSMP corridor.

*The Dwight D. Eisenhower National System of Interstate and Defense Highways. Federal Highway Administration (FHWA). November 2002. http://www.fhwa.dot.gov/reports/routefinder/index.htm

**2007 Truck AADT. Traffic Data Branch. Caltrans. http://www.dot.ca.gov/hq/traffops/saferesr/trafdata

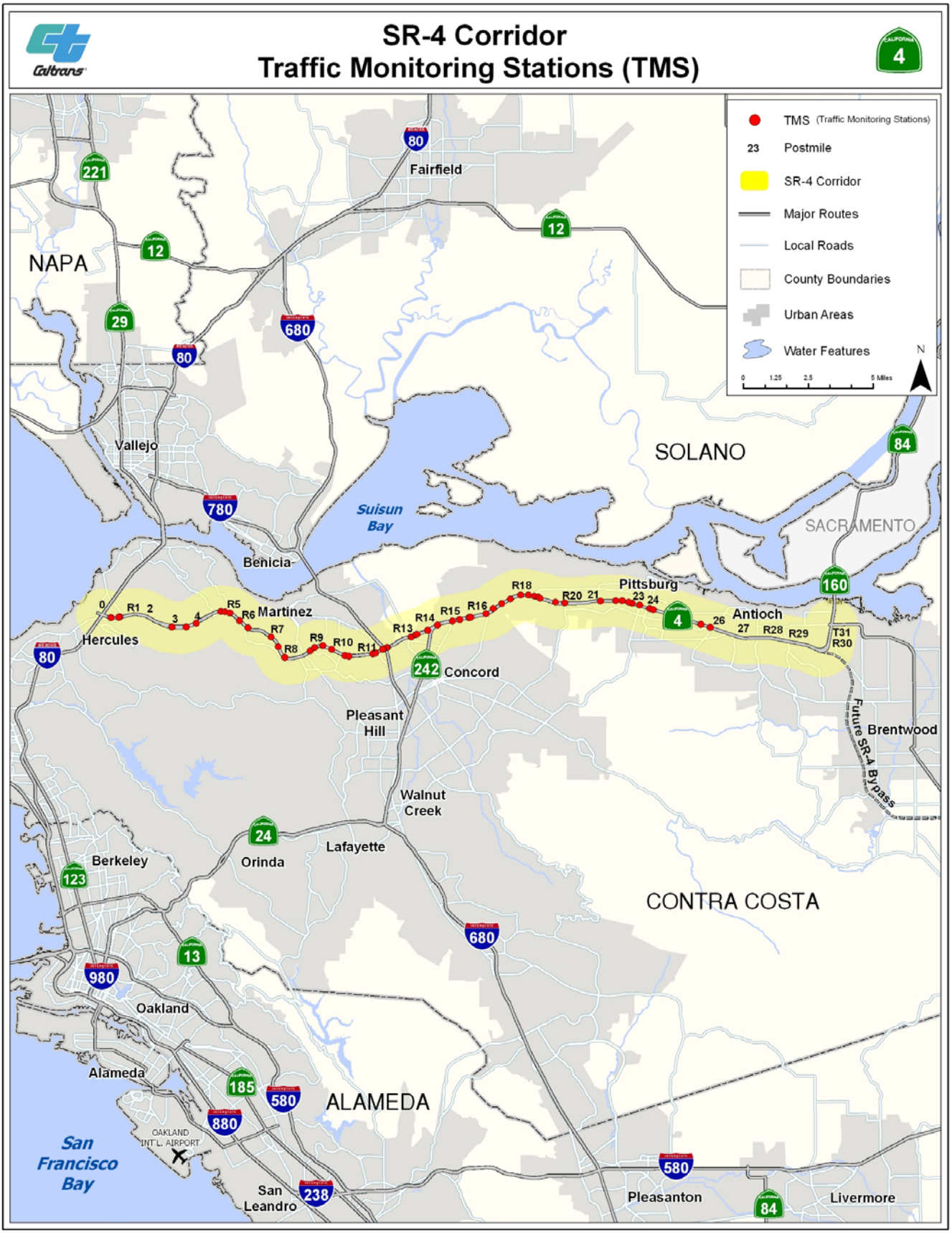


Figure 3. SR-4 Existing Traffic Monitoring Stations along the SR-4 CSMP Corridor.

SR-4 looking East towards 4 BP/160

Land Use/Major Traffic Generators

The SR-4 CSMP Corridor illustrates a variety of land uses traveling between the Cities of Hercules and Antioch. Low-intensity commercial and residential land uses are present throughout the suburban landscape of Hercules. As you travel east the landscape fluctuates between watershed, open space, and recreational uses before transitioning to low to moderate levels of residential, commercial and retail environments.

The SR-4 corridor is critical in accommodating longer vehicle trips through Contra Costa County. A larger proportion of vehicle trips along the corridor originate in the suburbs of east Contra Costa County with destinations outside the corridor. Destinations include job centers, airports and entertainment centers located in central Contra Costa County, Oakland and San Francisco. Land uses featuring educational institutions, local and regional shopping centers and low-density commercial and retail along and adjacent to the corridor provide significant trip generation along the corridor. Other contributing factors to travel demand in the corridor include interregional and local routes providing network connectivity and access.

Environmental Constraints/Factors

Portions of SR-4 are in a 100-year floodplain, limiting activities unless SR-4 is the only practicable alternative. The SR-4 CSMP Corridor traverses many resource-rich areas over its 31 miles. Nine historic bridges are identified along the corridor with a majority of them existing in the older eastern segments of the corridor. Hazardous sites (underground tanks) are also identified along the corridor with the majority clustered around the refinery complexes found near the center and eastern segments of the corridor. Numerous habitats supporting threatened or endangered species are present throughout the corridor, with the largest concentrations found near the eastern segments of the corridor nearest the Delta. The Carquinez Strait Regional Shoreline Park and the Black Diamond Mines Regional Preserve are adjacent to the central and eastern segments of the corridor and are considered protected open space. Figure 4 illustrates key SR-4 environmental factors.

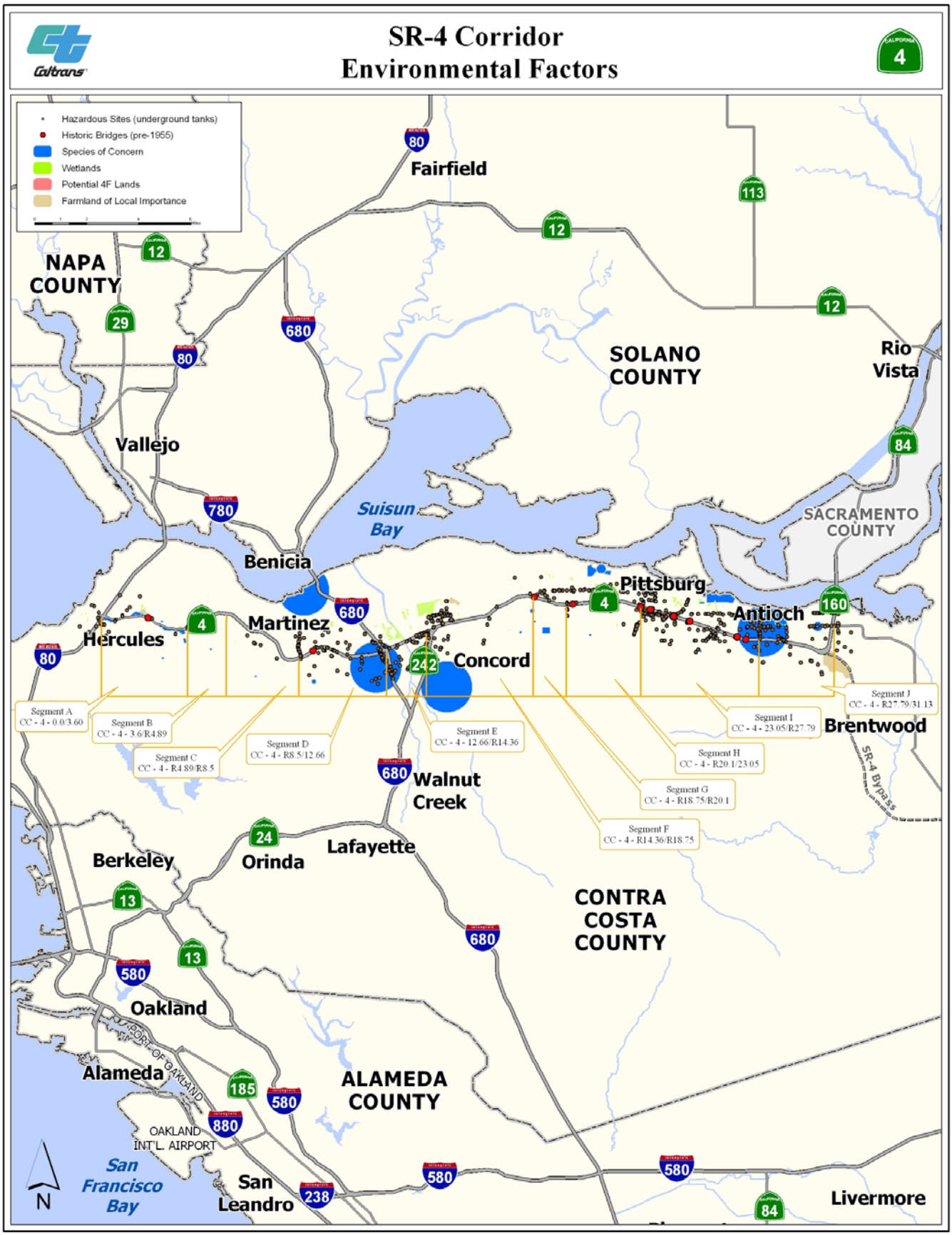


Figure 4. SR-4 CSMP Corridor Environmental Factors.

4. COMPREHENSIVE CORRIDOR PERFORMANCE ASSESSMENT

Freeway Performance Initiative (FPI)

A corridor performance assessment and technical analysis of the SR-4 CSMP Corridor was conducted through the FPI partnership between MTC and Caltrans. Current performance along the corridor, traffic bottlenecks and causes of performance problems were identified. Simulation modeling was used to forecast future travel conditions along the corridor, as well as analyze a variety of operational strategies and investment scenarios. Each scenario's performance was evaluated based on quantifiable criteria of mobility, reliability and safety.

Key Findings-Current Conditions

The traffic analysis of the SR-4 CSMP Corridor existing conditions concludes that existing congestion along the SR-4 CSMP Corridor is the result of a lack of corridor-wide traffic management strategies, implementation of ITS, and segments with inadequate capacity and weave-merge sections. Delay and congestion occur upstream of Willow Pass Road, Port Chicago Highway, Somersville Road, Loveridge Road and the I-680 and SR-242 interchanges. Table 2 lists and Figure 5 illustrates SR-4 AM bottlenecks and the resulting queues while Table 3 lists and Figure 6 illustrates SR-4 PM bottlenecks and the resulting queues.

Table 2. SR-4 AM Bottleneck Locations.

Location	Bottleneck-Queue	Direction	Cause	VHD
1	Willow Pass Rd. to Port Chicago Hwy	WB	Insufficient Capacity - Merge	1,566
2	Somersville Rd. to Loveridge Rd.	WB	Insufficient Capacity	2,470

Source: SR-24 Final Existing Conditions Technical Memorandum. PBS&J February 17, 2009.

Figure 5. SR-4 AM Bottleneck Locations 2008.
Source: SR-4 Final Existing Conditions Technical Memorandum. PBS&J February 17, 2009.

Table 3: SR-4 PM Bottleneck Locations, 2008

Location	Bottleneck-Queue	Direction	Cause	VHD
3	Loverridge Rd. to Somersville Rd.	EB	Insufficient Capacity	2,054
4	SR-242 to Port Chicago Hwy.	EB	Reduced mixed flow capacity	318
5	I-680 to Solano Wy.	EB	Merge-Weave	N/A

Source: SR-4 Final Existing Conditions Technical Memorandum. PBS&J February 17, 2009.

Figure 6. SR-4 PM Bottleneck Locations 2008.
Source: SR-4 Final Existing Conditions Technical Memorandum. PBS&J February 17, 2009.

Future Conditions (2015-2030)

The findings of the future year analysis are based on forecasts of travel demand in the SR-4 corridor and committed improvements that are assumed to be in place by 2015, which, for this corridor, consists of the SR-4 East Widening Project (Loveridge Road to SR-160) and the SR-4 Bypass Project. The 2015 and 2030 forecasts findings suggest that increases in population and employment will be accompanied by corresponding increases in traffic demand along the SR-4 corridor. During the morning peak (westbound), the highest peak travel demands are expected to increase 31 percent or the equivalent of more than one additional lane of traffic demand.

Key Findings

- The Location 2 Westbound (WB) and Location 3 Eastbound (EB) bottlenecks between Somersville Road and Loveridge Road will be completely mitigated in 2015 with completion of the SR-4 East Widening Project.
- In 2015, the Location 1 WB and Location 4 and 5 EB bottlenecks and queues between I-680 and Willow Pass Road will continue, due to future demand exceeding capacity in the peak direction.
- In 2015 and 2030 an EB bottleneck from Port Chicago Highway to SR-242 continues due to a complicated weave section, a reduction in capacity and a HOV lane extension in this segment.
- By 2030, bottlenecks and congestion will be largely focused on the section of SR-4 between I-680 and Willow Pass Road, due to demand outpacing capacity.

2015 Conditions

- A WB bottleneck between I-680 and Solano Way, Location 1, emerges with queues approaching Willow Pass Road.
- The WB bottleneck between Port Chicago Highway and Willow Pass Road, Location 2, continues with queues approaching L Street.
- The EB bottleneck between Willow Pass Road and Port Chicago Highway, Location 3, continues with queues approaching Morello Avenue.

Figure 7 summarizes the locations of recurrent congestion in 2015.

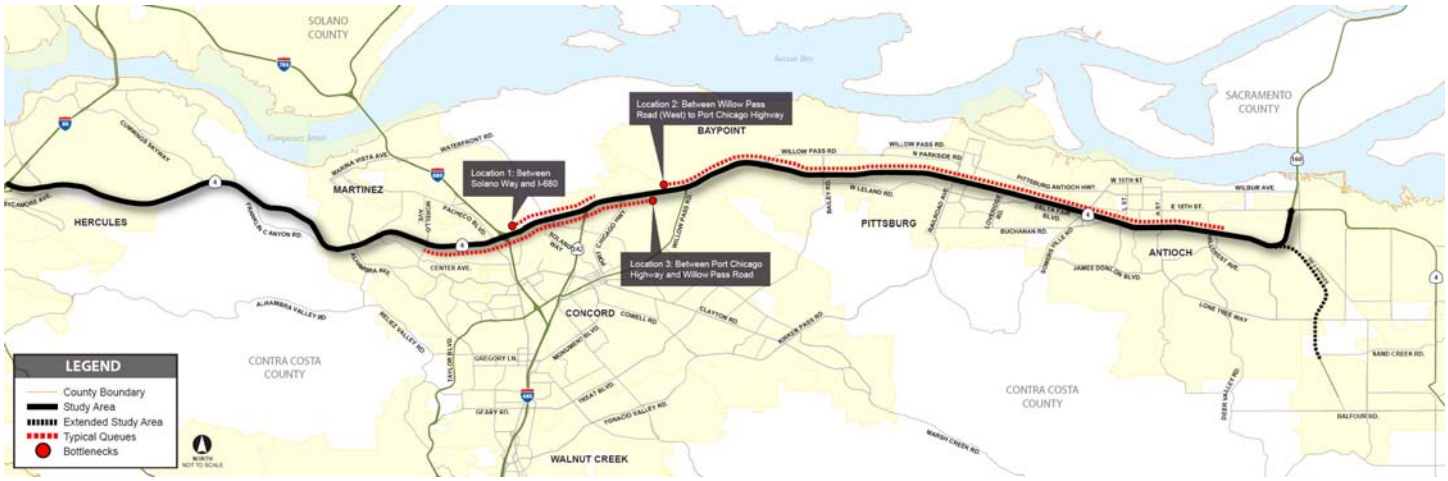


Figure 7. SR-4 2015 Locations of Recurrent Congestion.
Source: SR-4 Final Future Conditions Technical Memorandum (FCT). PBS&J July 17, 2009.

2030 Conditions

- The WB bottleneck between Solano Way and I-680, Location 1, will continue and join the upstream WB bottleneck from Port Chicago Highway to Willow Pass Road, Location 2.
- The WB bottleneck between Port Chicago Highway to Willow Pass Road, Location 2 will continue and increase with queues approaching Lone Tree Way.
- An EB bottleneck between Solano Way and I-680 emerges and joins the queue from the EB bottleneck between Port Chicago Highway and Willow Pass Road.
- The EB bottleneck queue from the bottleneck between Port Chicago Highway and Willow Pass Road, and the EB between Solano Way and I-680, is projected to extend to I-80.

Figure 8 summarizes the locations of recurrent congestion in 2030.

Figure 8. SR-4 2030 Locations of Recurrent Congestion.
Source: SR-4 Final Future Conditions Technical Memorandum (FCT). PBS&J July 17, 2009.

5. RECOMMENDED CORRIDOR MANAGEMENT IMPROVEMENT STRATEGIES

The improvement strategies recommended for the SR-4 CSMP Corridor address the existing and forecasted Mobility, Reliability, and Safety concerns identified through the comprehensive analysis. The recommended Mitigation Strategies include auxiliary lanes, ramp metering, and increasing capacity of existing lanes. The recommended transit improvement strategies for the SR-4 CSMP Corridor are listed separately. Figure 9 summarizes the proposed improvement strategies.

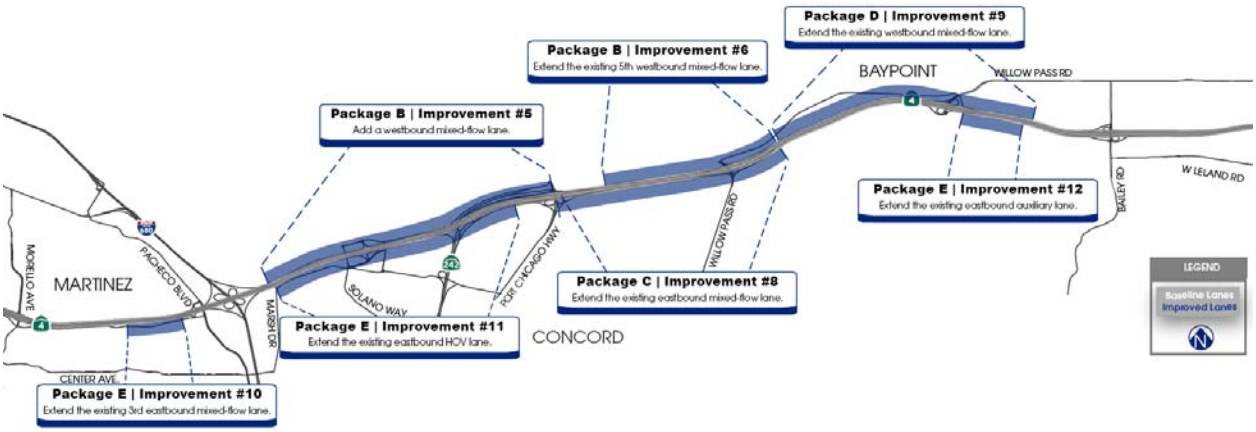


Figure 9. SR-4 CSMP Proposed Priority Mitigation Strategies.
Source: SR-4 Prioritized Congestion Mitigation Strategies Technical Memorandum. PBS&J November 9, 2009. Recommended Short-Term Operations and Capacity Improvements.

Recommended Short-Term Operations and Capacity Improvements

The performance assessment analysis identified approximately $140 million in short-term improvement packages (in addition to currently programmed projects expected to be in place by 2015). The short-term improvement packages are intended to preserve corridor mobility for single and high occupancy and highway transit into 2015. The recommended short-term mitigation strategies are listed in Table 4. The reduction in peak direction delay as a result of the short-term mitigation strategies are illustrated in Figure 10.

Table 4. SR-4 CSMP 2015 Recommended Short-Term Mitigation Strategies.

Pkg.	Year	Dir.	2015 Mitigation Improvement Strategies	Rank	Cost*
B	2015	WB	Implement Ramp Metering in the WB direction between SR-160 and I-680.	1	$58 M
			Add a mixed-flow lane from east of SR-242 off-ramp to the I-680 NB off-ramp. (Improvement # 5)		
			Extend the existing mixed-flow lane from the Willow Pass Rd. (West) off-ramp to the lane-add located 4,200 ft. west of the Willow Pass Rd. (West) on-ramp. (Improvement # 6)		
C	2015	EB	Implement Ramp Metering in the EB direction between Alhambra Blvd. and Willow Pass Rd. (east)	2	$31 M
			Add a mixed-flow lane from the lane drop 1,500 ft. west of Port Chicago Hwy. on-ramp to Willow Pass Rd. (west) on-ramp. (Improvement # 8)		
A	2015	WB+ EB	Activate existing ITS installations that currently are not fully operational.	3	$28 M
			Fill gaps in the current and programmed ITS installations as needed.		

Source: SR-4 Prioritized Congestion Mitigation Strategies Technical Memorandum. PBS&J November 9, 2009.

* The total costs associated with the proposed mitigation improvements to the corridor are capital costs (also known as construction costs or upfront costs) and operation and maintenance (O&M) costs (also known as ongoing costs). These costs are all presented in 2007 dollars using a discount rate of 4% per year, to convert future values to present values.

Reduction in Peak-Direction Delay	Vehicle Hours	12,900 hrs. – 11,010 hrs = 1,890hrs	85% reduction
	Person Hours	14,800 hrs. – 12,820 hrs = 1,980 hrs	87% reduction

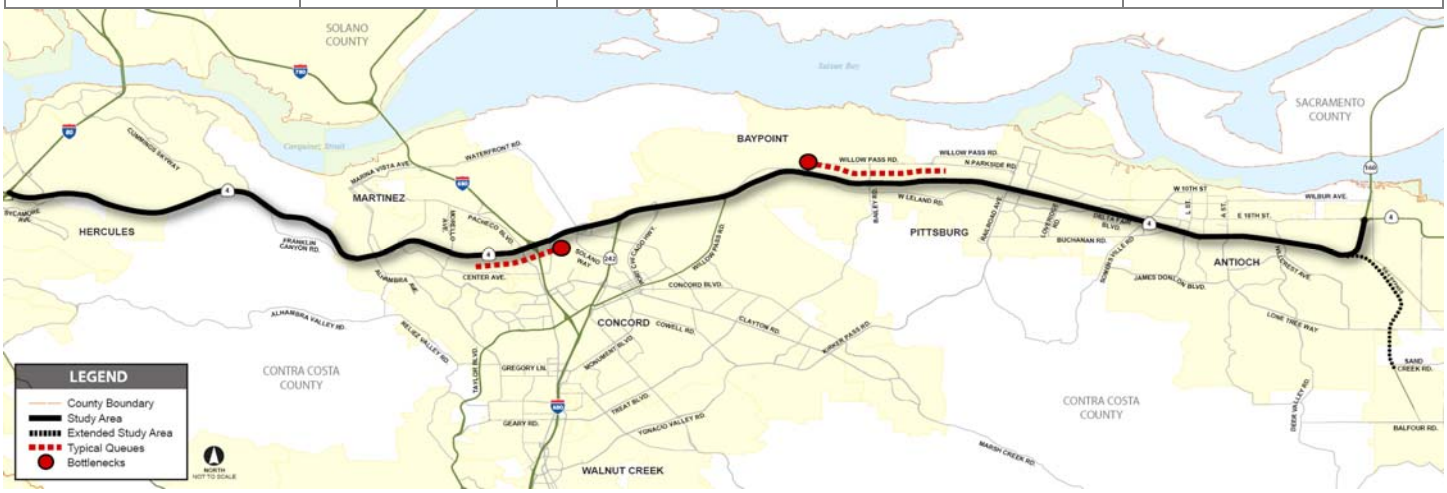


Figure 10. SR-4 CSMP Short-Term Mitigation Strategies Reduction in Peak Direction Delay.
Source: SR-4 Prioritized Congestion Mitigation Strategies Technical Memorandum. PBS&J November 9, 2009.

Recommended Long-Term Operations and Capacity Improvements

The performance assessment analysis identified approximately $70 million in long-term improvement packages (in addition to those improvements expected to be in place by 2015). The combined short- and long-term improvement packages are intended to extend corridor mobility for single and high occupancy and highway transit into 2030. The recommended long-term mitigation strategies are listed in Table 5. The reduction in peak direction delay as a result of the long-term mitigation strategies are illustrated in Figure 11.

Table 5. SR-4 CSMP 2030 Recommended Long-Term Mitigation Strategies.

Pkg	Yr	Dir	2030 Mitigation Improvement Strategies	Rank	Cost*
G	2030	EB	Implement ramp metering in the EB direction between I-80 and Alhambra Blvd, between Willow Pass Rd. (east) and SR-160 and the SR-4 Bypass.	1	$10 M
E	2030	EB	Extend the existing EB mixed-flow lane from the lane drop located 1,500 ft. west of the Pacheco Blvd. off-ramp to the Pacheco Blvd. off-ramp. (Improvement # 10)	2	$32 M
			Extend the existing EB HOV lane from the I-680 NB off-ramp to its start 1,500 ft. west of the Port Chicago Hwy. on-ramp. (Improvement # 11)		
			Extend the existing EB mixed-flow lane from the Willow Pass Rd. (east) on-ramp to the lane add located 4,000 ft. east of the Willow Pass Rd. (east) on-ramp. (Improvement #12)		
D	2030	WB	Extend the existing WB mixed-flow lane from the lane drop located 3,500 ft. east of the Willow Pass Rd. (east) off-ramp to the Willow Pass Rd. (west) off-ramp. (Improvement # 9)	3	$22 M
F	2030	WB	Implement ramp metering in the WB direction on the SR-4 Bypass and on SR-4 between I-680 and I-80.	4	$5 M

Source: SR-4 Prioritized Congestion Mitigation Strategies Technical Memorandum. PBS&J November 9, 2009.

* The total costs associated with the proposed mitigation improvements to the corridor are capital costs (also known as construction costs or upfront costs) and operation and maintenance (O&M) costs (also known as ongoing costs). These costs are all presented in 2007 dollars using a discount rate of 4% per year, to convert future values to present values.

Reduction in Peak-Direction Delay	Vehicle Hours	24,900 hrs. – 17,500 hrs. = 7,400 hrs.	70% reduction
	Person Hours	28,600 hrs. – 20,830 hrs. = 7,770 hrs.	73% reduction

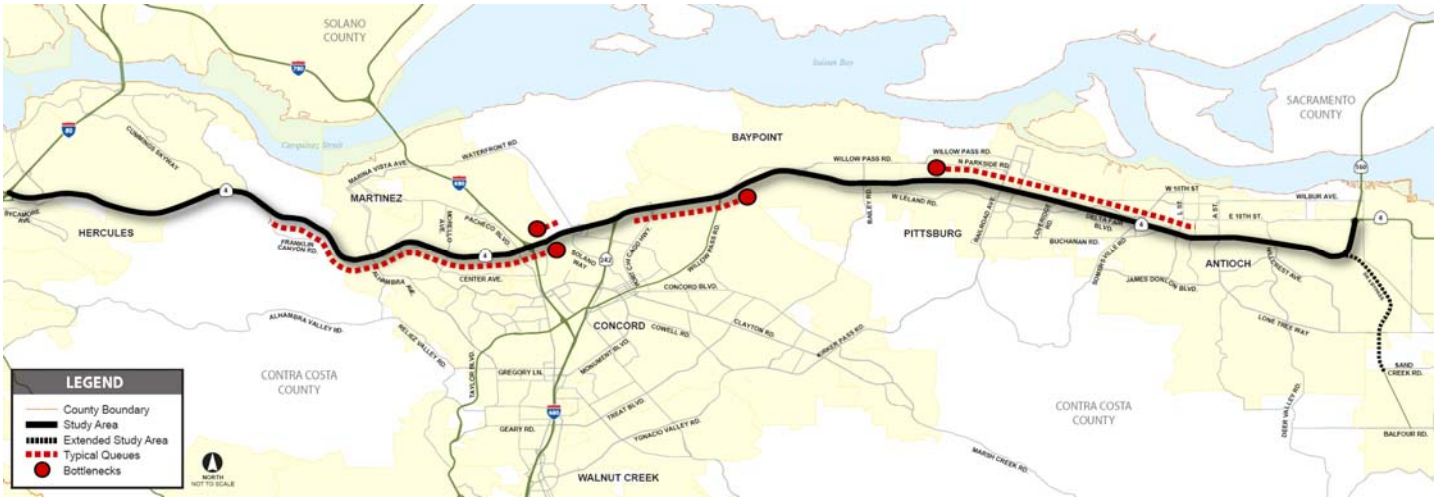


Figure 11. 2030 SR-4 CSMP Recommended Short- and Long-Term Mitigation Strategies Reduction in Peak Direction Delay.
Source: SR-4 Prioritized Congestion Mitigation Strategies Technical Memorandum. PBS&J November 9, 2009.

Recommended Short- and Long-Term Transit Improvements

While the FPI analysis and CSMP development processes focus on freeway mitigation strategies, improved transit service was discussed by stakeholders along the SR-4 corridor. These recommended services related to transit include a general package of increased transit access strategies, including additional parking at BART stations along the corridor, enhanced bus feeder services, and operational enhancements to BART at a system-wide level that could accommodate ridership increases of 10 to 20 percent.

The transit mitigation strategies in Package H include both short-term and long-term strategies. Transit cost effectiveness could not be estimated for this report, and thus these transit mitigation strategies cannot be ranked against other mitigation strategies for which life-cycle benefits and costs were available. For this reason, no prioritized recommendations are offered on this set of transit strategies by this analysis. The recommended short- and long-term transit improvements are listed in Table 6.

Table 6. SR-4 CSMP Recommended Transit Improvement Strategies.

Package	Recommended Transit Improvement Packages (2015-2030)
H	• Additional BART Parking Capacity • Increased bus transit access to the BART Stations • An expanded Pacheco Rd. Park & Ride facility • BART system-wide operational improvements

Source: SR-4 Prioritized Congestion Mitigation Strategies Technical Memorandum. PBS&J November 9, 2009.

SR-4 at Bailey-BART overlooking east

Express Lanes

In addition to the short and long-term freeway and transit prioritized mitigation strategies, a strategy, not within the scope of this analysis is the strategy of converting the HOV lanes on SR-4 to Express Lanes. MTC's 2009 RTP proposes a Regional Express Lane Network for the Bay Area, which includes Express Lanes on SR-4 between I-680 and SR-160. Legislation to authorize the creation of an 800-mile express lane network on Bay Area freeways is pending in the State Legislature. Should Express Lane-enabling legislation be signed into law in the future, significant further analysis and consultation with affected jurisdictions along the corridor will be required to determine the feasibility, user benefits, cost-effectiveness and appropriateness of converting HOV lanes to Express Lanes in the SR-4 Corridor. This process will inform whether and how (e.g., timing and phasing, design and operations policies) Express Lanes might be implemented in the corridor.