C O R R I D O R S Y S T E M
M A N A G E M E N T P L A N

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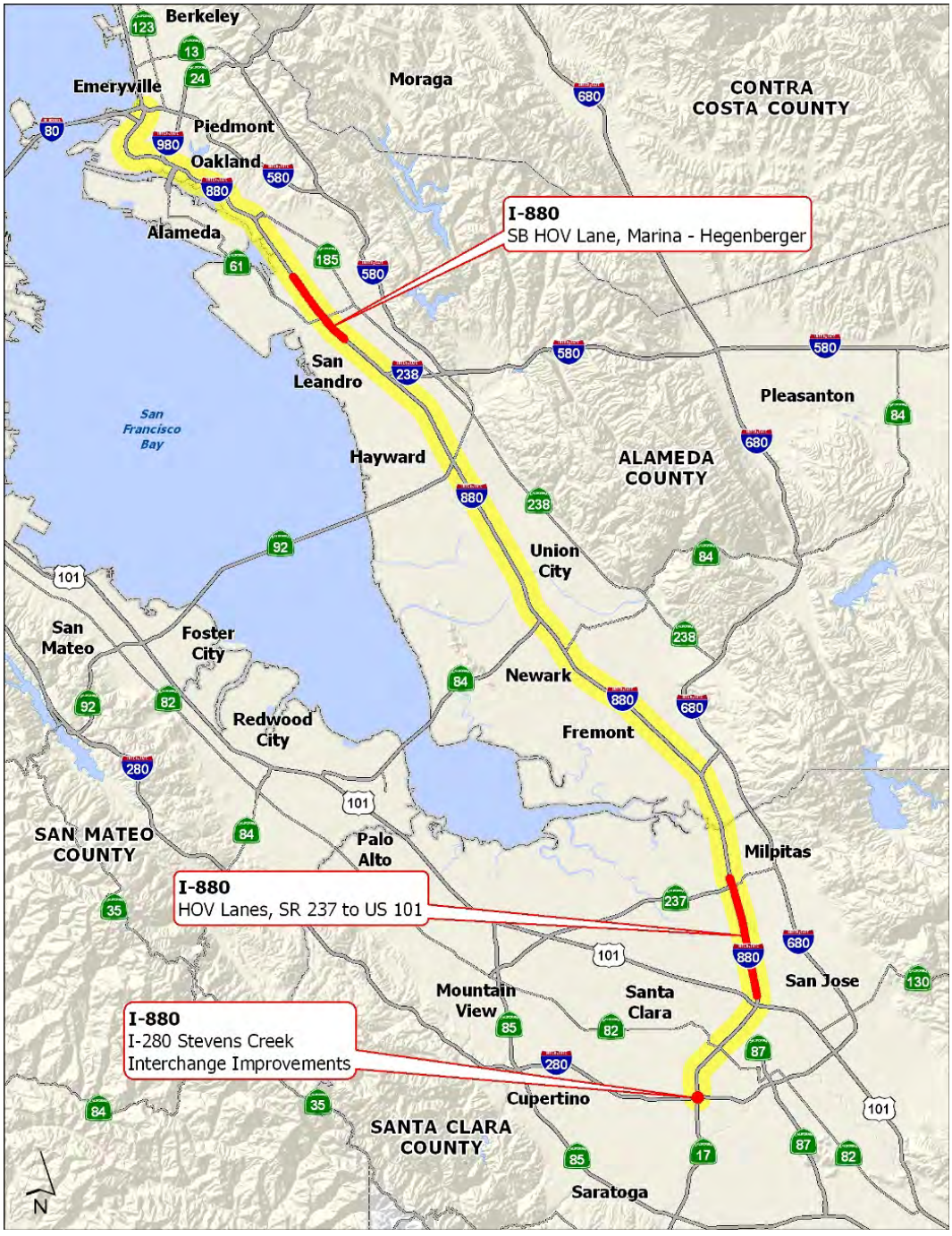
FINAL

10/11/10

CSMP Corridor Limits

The Interstate 880 Corridor in the San Francisco Bay Area is a north/south route beginning at I-280 traversing northward terminating at 7th street in Oakland.



I-880
Corridor System Management Plan

APPROVED BY:

10-11-10

BIJAN SARTIPI, Date
District 4 Director
California Department of Transportation

I accept this Corridor System Management Plan for the I-880 Corridor as a document informing the regional transportation planning process.

ACCEPTED BY:

10/06/10

for STEVE HEMINGER, Date
Executive Director
Metropolitan Transportation
Commission

2.15.10

JOHN RISTOW, Date
Chief CMA Officer
Santa Clara Valley
Transportation Authority

ACCEPTED BY:

09/27/10

ARTHUR L. DAO Date
Executive Director
Alameda County Transportation
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I-880
Corridor System Management Plan

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Stakeholder Acknowledgement

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 its key stakeholders. This CSMP represents a cooperative commitment to develop a corridor management vision for the I-880 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 I-880 Corridor Technical Advisory Committee (TAC) and provided essential information, advice and feedback for the preparation of the I-880 Corridor Management Plan Demonstration and this CSMP. The stakeholders/partners include:

- Metropolitan Transportation Commission
- Alameda County Congestion Management Agency*
- Alameda County Transportation Improvement Authority*
- AC Transit
- Bay Area Rapid Transit District
- City of Oakland
- City of Alameda
- City of San Leandro
- City of Hayward
- City of Union City
- City of Fremont
- Alameda County
- Santa Clara Valley Transportation Authority

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.

*****ACCMA and ACTIA combined to form the Alameda County Transportation Commission in July 2010.

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.

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Appendix I (Supporting Documents)

Appendix II (Technical Documents)

- *I-880 Corridor Management Plan Demonstration*. UC Berkeley California Center for Innovative Transportation with System Metrics Group and Braidwood Associates. January 2010.

- *Freeway Performance Initiative (FPI) Santa Clara I-880 Existing Conditions Analysis*. Metropolitan Transportation Commission with System Metrics Group and Cambridge Systematics. December 2007.

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I-880 CSMP
EXECUTIVE SUMMARY

This Corridor System Management Plan (CSMP) represents a cooperative commitment to develop a corridor management vision for the I-880 Corridor. The CSMP development process was a joint effort of the California Department of Transportation (Caltrans), the Metropolitan Transportation Commission (MTC), the Alameda County Congestion Management Agency (ACCMA) and the Santa Clara Valley Transportation Authority (VTA). This Core Stakeholder Group worked with local planning agencies, through an Interstate 880 (I-880) Corridor Technical Advisory Committee (TAC) and an I-880 CSMP Working Group to develop this plan. The goal is to propose strategies to achieve the highest mobility benefits to travelers along the I-880 CSMP Corridor.

1. Corridor Management Strategy / Recommended Corridor Improvement Projects

The common theme, and resulting recommended strategy for I-880 is **to implement and enhance advanced / adaptive ramp metering throughout the corridor.** This strategy promises to substantially increase freeway efficiency and throughput. From the I-880 Corridor Management Plan Demonstration report "if implemented correctly, this improvement (ramp metering) will provide the highest benefits relative to its costs." The Central Alameda County Freeway Study ranks adaptive ramp metering as its highest project priority. In Santa Clara County, the Valley Transportation Plan (VTP) 2035 states that I-880 Ramp Metering at various interchanges is an important Freeway Performance Initiative (FPI) project included in VTP 2035. Currently, local traffic-responsive metering has already been implemented to some degree on I-880 in both Alameda and Santa Clara County, and commitments exist to further implement this strategy.

The list of recommended improvements shown in Table ES1 will improve operational efficiency to address issues related to identified performance problems. Figure ES1 illustrates the corridor studies utilized linked to their recommended improvements and existing bottleneck locations.

The large list of interchange improvements and auxiliary lanes will provide a reasonable return on investment, along with delay reductions. It will also be necessary to do additional project-specific analysis to provide more specific benefits assessments through the traditional project development process. In addition, the High Occupancy Vehicle (HOV) extensions funded through the Corridor Mobility Improvement Account (CMIA) program should generate a higher return on investment than expected when an expected increase in ridesharing and transit use takes place.

The full benefit of the CMIA funded projects and the CSMP recommended projects will not be realized without ongoing cooperative system management in the I-880 corridor. The CSMP development process has brought the major transportation planning agencies in the corridor (Caltrans, MTC, ACCMA and VTA) together to develop this set of recommendations. The next step should be a continuous improvement process to work together on corridor management, further incorporation of other modes, and enhanced collaboration to develop the Sustainable Community Strategy (SCS) and Priority Development Areas (PDA) in the corridor. This will provide the foundation for the next generation CSMP and future Regional Transportation Plan (RTP) and FPI updates.

Summary of Recommended Projects in I-880 CSMP Corridor

I-880 Corridor Management Plan Demonstration (ALA 880):	**Est. Cost ($M)**	**Existing Commitment to Implement (note 1)**
Short Range Recommended (2012)		
Advanced Ramp Metering	25.0	X
Advanced Traveler Information	(note 2)	X
Long Term Planned (2013-2020)		
TCIF Project (Inc. 23rd and 29th St. Overcrossings)	85.0	
SB HOV Extension from Hegenberger Rd. to Marina Blvd. (CMIA Project)	108.0	
Central County Freeway Study LATIP (I-880 only, in order of priority):	**(note 3)**	
ICM / Adaptive Ramp Metering	32.5	X
I-880 Aux. Lanes, Paseo Grande to Winton Avenue *	32.5	
I-880 Aux. Lanes, Whipple Rd. to Industrial Pkwy. West *	19.5	
I-880 Industrial Pkwy. Interchange	41.0	
I-880 Davis St. Interchange	11.1	
I-880 Marina Blvd. Interchange	24.4	
I-880 / Whipple Road Interchange *	13.5	
I-880 / West A Street Interchange *	27.0	
I-880 / West Winton Avenue Interchange *	25.0	
Extend Northbound HOV Lane	155.5	
I-880 / Washington Interchange	31.0	
SR-84 Study LATIP (I-880 only, in order of priority):	**(note 3)**	
I-880 / Mission Blvd. Interchange Completion (CMIA project candidate)	42.4	
I-880 Aux. Lanes, Dixon Landing to Alvarado-Niles	5.0	
ICM / TOS, I-880 South of SR-92	10.0	X
Valley Transportation Plan 2035 (I-880 only):		
I-880 HOT Lanes, ALA County Line to US-101	20.0	
I-880 / Montague Expressway Interchange Improvement	12.0	
I-880 / I-280 / Stevens Creek Blvd. Interchange Improvement (CMIA Project)	64.0	
I-880 Widening for HOV Lanes, SR-237 to Old Bayshore (CMIA Project)	95.0	X
I-880 NB Aux. Lane, Coleman Ave. to First St.	13.0	
I-880 Ramp Metering, Various Interchanges (FPI)	(note 4)	X
Valley Transportation Authority I-880 Corridor Study:		
Near-Term Projects		
NB Stevens Creek Interchange Reconfiguration	(note 5)	
SB Stevens Creek Interchange Reconfiguration		
Long-Term Improvements		
NB I-280 to NB I-880 Direct Connector	(note 5)	
I-880 HOV Lane Extension, US-101 to I-280	150.0	

** Also listed in I-880 Corridor Management Plan Demonstration*

Table ES1. Short and Long Term Recommended Projects in I-880 CSMP Corridor.

Note 1) Existing Commitment to Implement is defined a programmed project or similar funding commitment.
Note 2) Advanced Traveler Information considered 511, Travel Times on CMS, and other emerging technologies.
Note 3) LATIP projects are listed with current estimated funding need, not necessarily total cost.
Note 4) Estimated cost for SCL 880 Ramp Metering (capital and operating) not precisely quantified in VTP2035; costs often included as part of larger capital projects.
Note 5) Cost included as part of 880/280/Stevens Creek project in VTP2035.

I-880 Corridor Analyses with Recommended Projects and Existing Bottlenecks

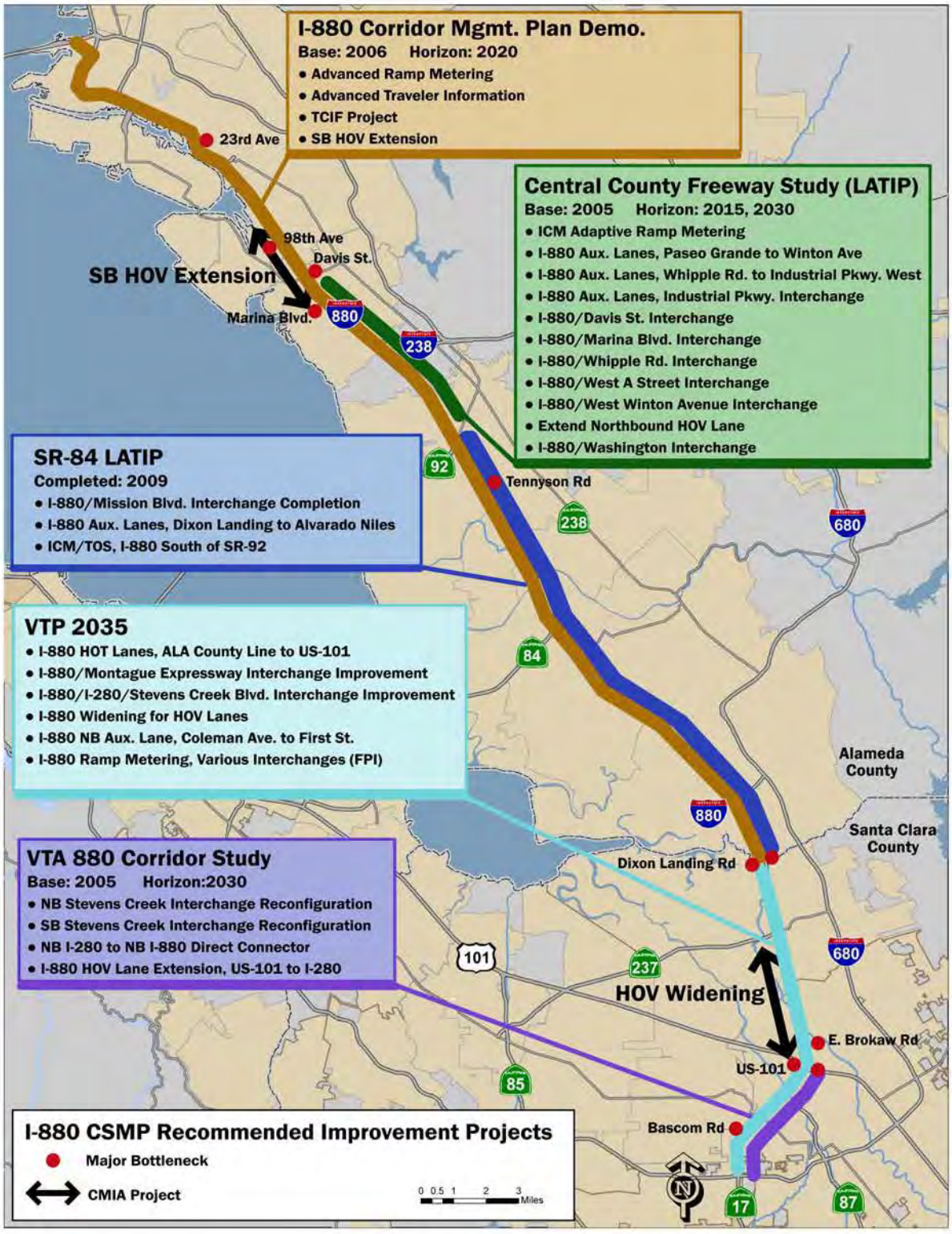

Figure ES1. I-880 Corridor Analyses with Recommended Projects and Existing Bottlenecks.

2. Areas for Further Study

Despite expected corridor performance improvements (should all of the recommended projects and strategies be implemented), some performance problems are expected to continue in the future. The following areas deserve additional study to determine how they would impact corridor performance over and above the CMIA funded projects and CSMP recommended improvements:

- ***Goods Movement*** **-** The high significance of truck traffic on the I-880 corridor requires continual study and monitoring of this vital activity. Of particular interest will be monitoring the effect on corridor mobility by constructing the recommended Trade Corridor Improvement Fund (TCIF) project. Both the Regional Goods Movement Study (2004) and the statewide Goods Movement Action Plan (2007) provide guidance for immediate and future actions related to goods movement efficiency and environmental improvement.

- ***High Occupancy Toll (HOT)/Express Lanes*** **-** MTC's 2009 RTP proposes a Regional Express Lane Network for the Bay Area, which includes Express Lanes on I-880 corridor. Should enabling legislation be signed into law at some point in the future, significant further analysis and consultation with jurisdictions along the corridor will be required to determine the feasibility, cost-effectiveness and appropriateness of converting the HOV lanes to Express Lanes.

- ***I-880 / US-101 Interchange Enhancements*** **-** Improvements to this interchange have been analyzed as part of previous studies, as it is consistently identified as a controlling bottleneck both now and in the future with CSMP recommended improvements. While significant benefits may be achieved through improvements to this major interchange, costs and right-of-way impacts were found to be prohibitive. Additional study will be required to identify feasible solutions.

- ***Bay Area Rapid Transit (BART) Extension to San Jose*** **-** BART's Silicon Valley extension will begin south of the future BART Warm Springs Station in Fremont and proceed alongside the Union Pacific Railroad (UPRR) through Milpitas to San Jose and Santa Clara. The project's purpose is to improve transit service in the Silicon Valley corridor to address growth in corridor travel over the next twenty years. Specific benefits to I-880 include a reduction in travel demand, vehicle miles traveled, improved transit travel times, and a reduction in emissions. Future corridor planning efforts should review opportunities for this transit project to integrate with the broader transportation network.

- ***California High-Speed Rail (CHSR)*** - When this project is built, high speed trains capable of 220 MPH will link San Francisco and Los Angeles in two and one half hours. The planned system would also serve Sacramento, San Jose, Fresno, Bakersfield, Anaheim, Riverside and San Diego. When CHSR is completed and linked to BART, Altamont Commuter Express (ACE) and the VTA light rail system in San Jose, the impact on I-880 should be a reduction in travel demand, coupled with related benefits. Future corridor planning efforts should review integration opportunities of CHSR among the elements of the larger transportation network.

3. I-880 CSMP Corridor Facts

Corridor Limits: I-880 at the I-880/I-280 I/C in Santa Clara County to the I-880/7th Street Exit in Oakland

Corridor Description:

The Interstate 880 Corridor as defined for this Corridor System Management Plan (CSMP) is approximately 42 miles long, beginning at the I-280 interchange in Campbell, and ending in the north at 7th Street in Oakland near the San Francisco-Oakland Bay Bridge approaches. This Corridor is an urban freeway that intersects State Routes 61, 82, 84, 87, 92, 237, 262, US-101, I-238, I-580 and I-980. The existing facility ranges from four to ten mixed flow lanes with bidirectional High Occupancy Vehicle (HOV) lanes in certain segments. There is a robust network of transit services and parallel arterial routes.

Route Designation & Regional Setting:

Functional Classification	Urban Principal Arterial – Freeway
Trucking Designations	STAA Route: Yes Terminal Access Route: Yes SHELL Route: No
Other Designations	Interstate Highway
Interregional Road System	No
Life Line	No
Metropolitan Planning Organization (MPO)	Metropolitan Transportation Commission (MTC)
Air Quality District	Bay Area Air Quality Management District
Commuting Mode Split (City averages)	69% SOV, 11% Rideshare, 11% Transit, 3% Walk, 3% Bike, 3% Other Means

(Mode Split Source: American Community Survey 2007)

Multimodal Service:

Primary bus and rail providers are Alameda-Contra Costa (AC) Transit, Altamont Commuter Express (ACE), Amtrak *Capitol Corridor*, Bay Area Rapid Transit (BART), and the Santa Clara Valley Transportation Authority (VTA).

Interregional Significance:

Interstate 880 connects the San Francisco-Oakland Bay Bridge with Silicon Valley, serving Port of Oakland, Oakland International Airport, Mineta International Airport in San José, and about ten east Bay Area cities. I-880 also provides a critical link for the movement of goods between the Central Valley and Port of Oakland through its connection to the I-580 corridor at the I-238/880 interchange. The corridor is also a major commuter link between major employment centers in Silicon Valley and East Bay.

Corridor Specific Issues:

- Key international trade corridor (Port of Oakland and commercial airports in Oakland & San José)
- Regionally highest 5-axle truck volume
- Commuter link between major employment centers in Silicon Valley/East Bay.
- Urban freeway with corridor-wide traffic generators: event/retail venues, industry and residential areas
- Connects Central Business Districts for two of the largest cities in California at each end
- Transbay traffic collector from three bridges: the Bay (I-80), San Mateo (SR-92), and Dumbarton (SR-84)

Current Performance:

Top Three Congested Locations (2008)

Time/Direction/Location	*VHD*
PM: North – Decoto Road to Tennyson Road	1,990
AM: South –Marina Blvd. to south of Industrial Parkway	1,760
PM: North – Route 237 to south of Auto Mall Parkway	1,410

Bottlenecks and Congestion Queues on I-880 Corridor

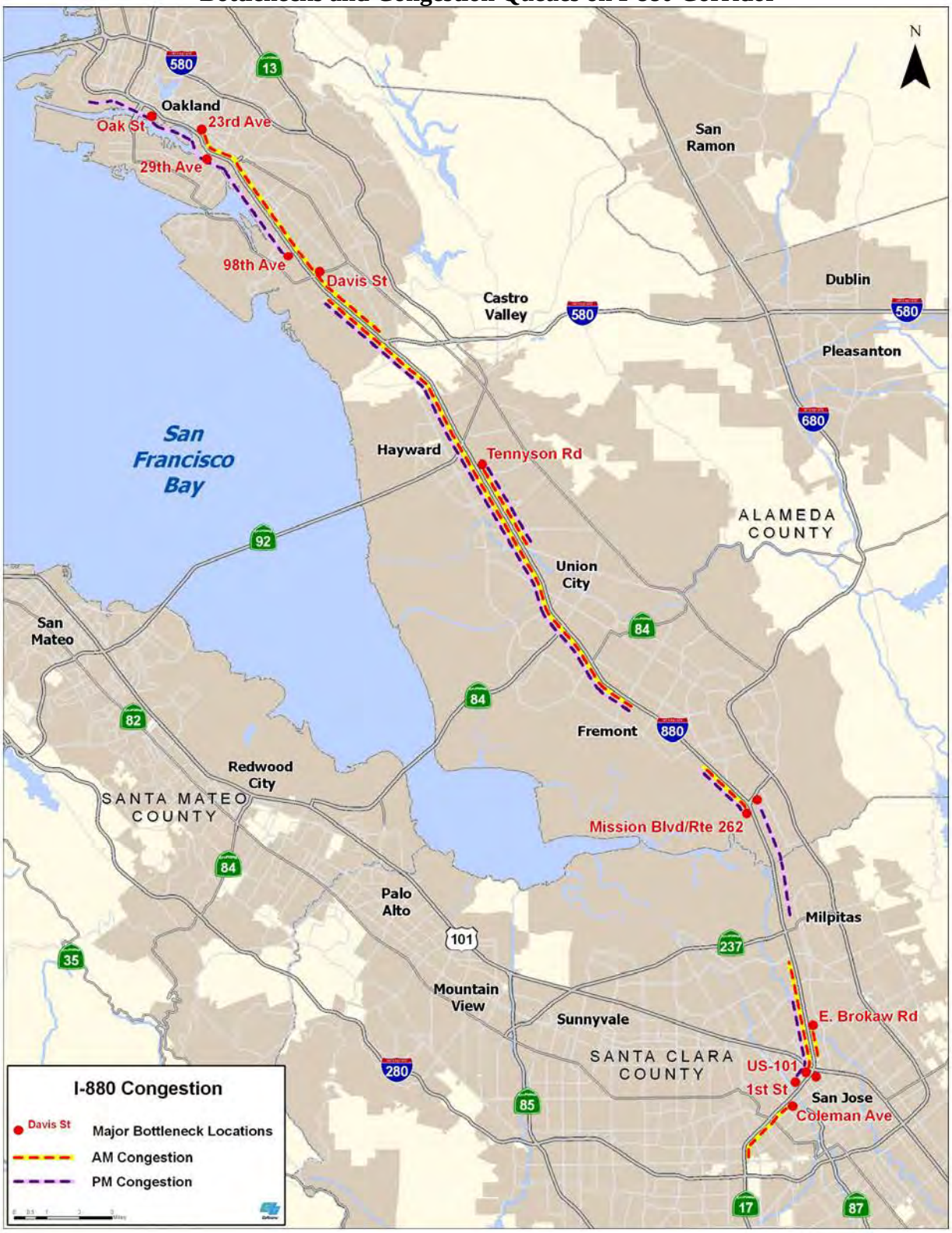

Figure ES2. Bottlenecks and Congestion Queues on I-880 Corridor (2004-2007).

I-880 CSMP INTRODUCTION

This Corridor System Management Plan (CSMP) represents a cooperative commitment to develop a corridor management vision for the Interstate 880 (I-880) corridor. The CSMP development process was a joint effort of the California Department of Transportation (Caltrans), the Metropolitan Transportation Commission (MTC), the Alameda County Congestion Management Agency (ACCMA) and the Santa Clara Valley Transportation Authority (VTA). This Core Stakeholder Group worked with local planning agencies, through an (I-880) Corridor Technical Advisory Committee (TAC) and an I-880 CSMP Working Group to develop this plan. The goal is to propose strategies to achieve the highest mobility benefits to travelers along the I-880 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 Account (CMIA). 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 and 2010 Regional Transportation Plan (RTP) Guidelines that CSMPs are an important input to the development of an RTP.

In the San Francisco Bay Area, Caltrans is completing nine CSMPs, with a tenth added in July 2010. This I-880 CSMP reflects data and projects from MTC's current Regional Transportation Plan (RTP), *Change in Motion, Transportation 2035 Plan*, adopted April 2009. The CSMP recommends strategies for consideration in the regional transportation planning process. In the Alameda County portion of the corridor, the CSMP development process has taken place in coordination with University of California (UC) Berkeley's California Center for Innovative Transportation (CCIT). Analysis of the Santa Clara County segment of the Corridor was done in part through MTC's Freeway Performance Initiative (FPI). This work has been tied together through the efforts of an I-880 CSMP Working Group.

The I-880 CSMP

This CSMP focuses on highway mobility within the context of one 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 to enable better system management of the highway. It also describes the current land use, transit, bicycle/pedestrian facilities, and Priority Development Areas (PDAs) identified from the Bay Area's FOCUS regional blueprint program. These are provided as a backdrop for understanding how the highway corridor works. 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.

The objectives of the I-880 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 I-880 CSMP were determined, in collaboration with MTC, by identifying the key travel corridor in which CMIA-funded projects are located. The CMIA-funded projects are:

- I-880 High Occupancy Vehicle (HOV) Lane Widening Project, SR-237 to US-101
- I-880 Southbound HOV Lane Extension, Hegenberger to Marina Boulevard
- I-880 I-280 Stevens Creek Interchange Improvements

In addition, the I-880 Mission Boulevard Interchange Completion project is seeking CMIA funding.

Methodology

A corridor performance assessment and technical analysis of the I-880 CSMP Corridor was conducted on the Alameda County portion of the Corridor by UC Berkeley CCIT through the I-880 Corridor Management Plan Demonstration. A similar performance assessment of the Santa Clara County segment of the Corridor was done through MTC's FPI program. The performance assessment evaluated the current highway performance along the corridor and determined causes of performance problems.

The results of these two I- 880 corridor analysis efforts (as well as the CMIA project analyses) have been incorporated into the I-880 CSMP through the efforts of the I-880 CSMP Working Group. This working group included members of the Core Stakeholder Group of agency partners, whose primary task was to coordinate activities and material necessary for the development of the I-880 CSMP following the completion of the I-880 Corridor Management Plan Demonstration in January 2010. The Working Group members met regularly to review and comment on the synthesis of technical documents, analyses, recommendations and other material necessary to produce the CSMP.

The I-880 Corridor Management Plan Demonstration work took place between 2005 and 2009, engaging stakeholder agencies through the Alameda County Congestion Management Agency's (ACCMA) I-880 Corridor TAC. The TAC has met at irregular intervals since 2005 to provide input on existing and future performance as well as conclusions and recommendations for short and long-term corridor management improvement strategies. Simulation modeling was used to identify future bottlenecks and analyze the impacts of future travel conditions along the corridor under different operational strategies and investment scenarios. The results of the comprehensive corridor analysis were first discussed at the TAC in November 2008.

The CSMP also builds upon the I-880 project recommendations of ACCMA's 2008 Central County Freeway Study (also known as the Central County Local Alternative Transportation Improvement Program (LATIP)), the 2009 Southern Alameda County SR-84 Historic Parkway LATIP, VTA's 2008 I-880 Corridor Study and the Santa Clara Valley Transportation Plan (VTP2035). These recommendations add system management and other strategies to provide additional benefit and efficiencies.

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

- Intelligent Transportation System (ITS) improvements
- Corridor-wide ramp metering
- Construct HOV lanes
- Extend and Construct Auxiliary Lanes
- Additional transit and Travel Demand Management (TDM) improvements

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 identified. This list is not meant to be inclusive of all potential projects in the corridor.

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. AB 32 policy on reducing greenhouse gas emissions has moved into implementation with passage of 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 Sustainable Community Strategies (SCS) in their next RTP cycle; MTC's next RTP is slated for completion in 2013. The SCS will promote strategies to reduce green house 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 s*econd generation CSMP* scope will expand to include integrated land-use and transportation, in the context of Sustainable Community Strategy (SCS) required by SB 375, and a more comprehensive look at transit and non-motorized travel strategies and options.

Stakeholder Issues and Concerns

Through the CSMP development process, stakeholder concerns focused on how non-highway strategies factor into the CSMP analysis scope, SB 375 requirements and how the CSMP recommendations are expected to be used. Stakeholders commented that recommended improvements in the CSMP do not yet emerge from a multi-modal and integrated transportation land use planning effort, such as integrating transit, bicycle and pedestrian networks, and demand management. Stakeholders also noted that the statewide planning policy context has evolved significantly since the CSMP has been developed; the CTC has in its 2010 RTP Guidelines provided guidance on how the regions will develop a SCS in response to SB 375 requirements. In response to questions on how CSMP recommendations will be used, Caltrans noted the role of the CSMP is both as a CMIA funding requirement and as a document informing the transportation planning process. We hope that the results of this collaborative corridor planning effort will help inform future investment choices made through the traditional planning and programming processes. This represents a summary of the issues and concerns shared by stakeholders during the CSMP process.

CSMP Document

The full I-880 CSMP document is organized into three key areas. First is the CSMP Summary, which provides corridor facts and description summaries, as well as key findings and recommended improvements from the technical analysis. The second key area is the main CSMP document, which includes The CSMP Overview, Corridor Description and summaries of the technical analyses. The CSMP technical analyses 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 third key area is the Appendices, containing additional corridor information (corridor segment data, freeway agreements, CMIA projects, maintenance plans, and corridor concept) and supporting documents.

The I-880 Corridor system will be 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. As discussed above, new strategies may emerge as the SCS is implemented to reflect new development and travel patterns that impact the operations of the highway corridor.

SECTION 1
CSMP OVERVIEW
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SECTION 1
CSMP OVERVIEW

1.1 District CSMP Overview

A Corridor System Management Plan (CSMP) is a transportation planning document that provides 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. 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 Focus Our Vision (FOCUS) regional blueprint Priority Development and Conservation Areas. These are provided as a backdrop for understanding how the highway corridor works.

CSMPs are being developed throughout the State for corridors within which funding is being used from the Corridor Mobility Improvement Account (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 Metropolitan Transportation Commission (MTC) and the California Department of Transportation (Caltrans) have committed to assist each other in the development of CSMPs and MTC's related Freeway Performance Initiative (FPI) corridor studies. This cooperation is documented in MTC Resolutions 3792 and 3794. The CSMP transportation network includes State Highways, major arterials, intercity and regional rail service, regional transit services, and regional bicycle facilities. A team of corridor stakeholder agency staff was assembled to provide oversight for ongoing tasks. For the San Francisco Bay Area (Caltrans District 4), nine CSMPs are being developed:

US-101 North (MRN/SON)
US-101 Peninsula/South (SM/SCL)
I-880 (ALA/SCL)
I-80 West (ALA/CC)
I-80 East (SOL)
I-580 East (ALA)
SR-4 (CC)
SR-24 (ALA/CC)
SR-12 (NAP/SOL)

The limits of each CSMP were determined by identifying the key travel corridor in which CMIA-funded projects were located in collaboration with MTC. The CMIA-funded projects in the Interstate 880 (I-880) CSMP Corridor are:

- I-880 High Occupancy Vehicles (HOV) Lane Widening, SR-237 to US-101
- I-880 Southbound HOV Lane Extension, Hegenberger Rd. to Marina Blvd.
- I-880 I-280 Stevens Creek Interchange Improvements

In addition, the I-880 Mission Boulevard Interchange Completion project is a candidate for CMIA funding.

Figure 1.1.1 depicts the corridor limits for the first generation of CSMPs under development in District 4 at the end of 2009.

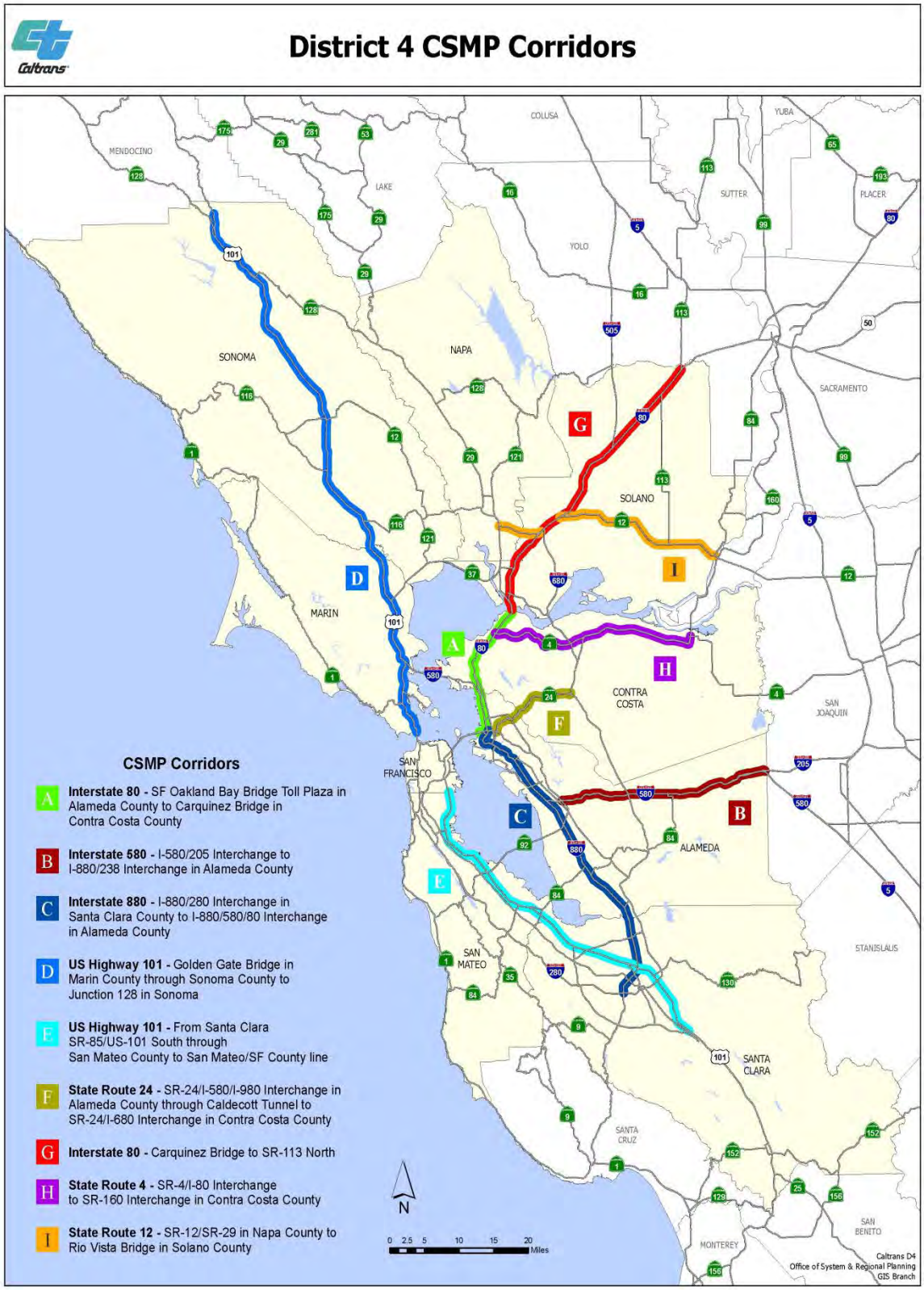


Figure 1.1.1. District 4 CSMP Corridors (2009).

Eight milestones were identified by the California Transportation Commission (CTC) and Caltrans for monitoring the timely development of the required CSMPs:

1. *Define Corridor*
2. *Assemble Corridor Team*
3. *Develop Preliminary Corridor Performance Assessment*
4. *Ensure Adequate Corridor Detection*
5. *Comprehensive Corridor Performance Assessment*
6. *Identify Causality of Corridor Performance Degradation*
7. *Develop Corridor Simulation Model and Test Improvement Scenarios*
8. *Develop Corridor System Management Plan*

This corridor performance assessment began with utilizing existing travel data and traffic detection capabilities within the corridor. The corridor performance assessment served to identify existing system management practices and the causes of performance problems along the corridor using a set of common performance metrics. The travel demand models for Alameda and Santa Clara County were used as a basis to forecast future travel demand along the corridor.

Traffic analysis methods were used to predict the impacts of a variety of operational strategies and investment scenarios, allowing the corridor team to evaluate the potential impacts of a range of operational strategies, capital improvements and opportunities for transportation technology integration. More detailed guidance regarding these CSMP milestones and performance measures is available from the Caltrans *2007 Guidelines for Completing CSMP milestones.*

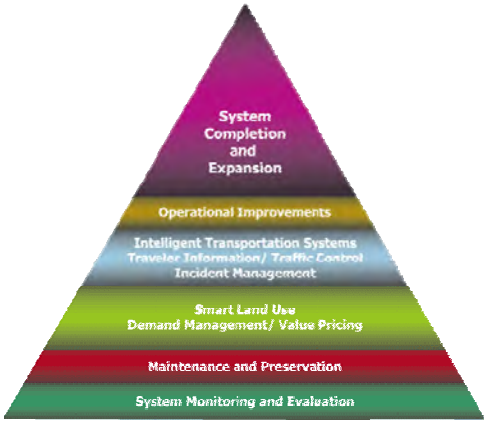
1.2 CSMP Purpose and Need Statement

On March 15, 2007, the CTC adopted *Resolution CMIA-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 installation of traffic detection equipment, the use of ramp metering, operational improvements, and other traffic management elements as appropriate…" and "…the nominating agencies shall report the status of development and implementation of the corridor system management plans, 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. The CTC adopted guidelines and a program of projects required 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.

1.3 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.

1.4 Relationship to Other Plans

There are a number of planning documents and studies that have been used as the foundation for the preparation of this CSMP. System planning documents prepared by Caltrans include the *2006 California Transportation Plan* (CTP2025), the *1998 Interregional Transportation Strategic Plan* (ITSP), and several Caltrans District 4 documents that include the draft *Transportation Corridor Concept Report* (TCCR) for I-880 dated May 20, 2002.

In addition to the above-described planning documents, there are also a number of related Caltrans system management documents that have been utilized in the development of this CSMP. These documents include the 2006 *Strategic Growth Plan* (SGP), 2004 *Transportation Management System Master Plan* (TMSMP) and 2004 *California ITS Architecture and System Plan* (SWITSA).

System and regional planning documents prepared by other agencies that have influenced CSMP development include the *2009 Regional Transportation Plan* (T2035) and the 2004 *Bay Area Regional ITS Plan*. Most notably, the MTC Freeway Performance Initiative (FPI) is a regional program that has provided a foundation for corridor-level performance-based decision making for *T2035*. Important documents in the FPI effort have been the FPI Performance & Analysis Framework, the FPI Prioritization Framework, and the FPI's corridor-specific performance assessment for SCL 880.

Other studies and project documents from local agencies utilized for this I-880 CSMP include:

- *I-880 Corridor Management Plan Demonstration*. University of California (UC) Berkeley California Center for Innovative Transportation (2010).
- *Initial Study for Santa Clara County Southbound I-880 HOV Lane Widening between SR-237 and US-101*. California Department of Transportation (2009).
- *Initial Study for Alameda County Southbound I-880 HOV Lane Widening between Hegenberger to Marina*. California Department of Transportation (2009).

- *Central Alameda County Local Alternative Transportation Program (LATIP) Project Initiation Document*. ACCMA (2009).
- *Southern Alameda County SR-84 Historic Parkway LATIP Project Initiation Document*. ACCMA (2009).
- *Santa Clara I-880 Existing Conditions Analysis*. Metropolitan Transportation Commission Freeway Performance Initiative (2007).
- *I-880 Corridor Study*. Santa Clara Valley Transportation Authority (2005).

The study areas for these key documents are illustrated in Figure 1.4.1.

Corridor Management Plan Demonstration

The I-880 CSMP has close ties with the Caltrans-sponsored Corridor Management Plan Demonstration. Funded and sponsored by Caltrans, the Corridor Management Plan Demonstration was initiated in 2005 to develop best practices and better integration of operational analyses and a system management philosophy into system planning. Among the keys tasks of this initiative was to conduct a corridor performance assessment, technical analysis and strategy evaluation for the Alameda County portion of the I-880 CSMP Corridor. This work was led by UC Berkeley's California Center for Innovative Transportation (CCIT). The technical consultant, System Metrics Group, evaluated the current performance along the corridor to determine the causes of performance problems. Simulation modeling was used to forecast future travel conditions along the corridor. The simulation model aided operational analysis to predict the impacts of different operational strategies and investment scenarios. This work took place between 2005 and 2009, engaging stakeholder agencies through the Alameda County Congestion Management Agency's (ACCMA) I-880 Corridor TAC. The consultants presented data on existing and future traffic conditions, analysis findings and recommendations for phased corridor management improvement strategies to the I-880 Corridor TAC in the Fall of 2008. The final report of the I-880 Corridor Management Plan Demonstration was released in January 2010, and its results incorporated into the I-880 CSMP.

Freeway Performance Initiative

The I-880 CSMP also has close ties with the MTC-sponsored Freeway Performance Initiative (FPI). The FPI program sponsored a performance assessment for the Santa Clara County portion of the I-880 corridor in 2006. This performance assessment was conducted by System Metrics Group (in association with Cambridge Systematics) and was completed in 2007. Its results are also incorporated into the I-880 CSMP.

Central County Freeway Study LATIP

In 2005 the ACCMA began work on the Central Alameda County Freeway Study (CCFS), identified existing and future Study Area traffic deficiencies that in turn were used to define and test a variety of freeway improvements with respect to certain performance measures. The results of these tests were used to identify short- and long-range planning and the sequencing of improvements that will be required to achieve the most practical traffic relief in the I-880, I-580 and I-238 corridors within a fund availability constraint. In 2008 these projects were then translated into a Local Alternative Transportation Improvement Program (LATIP) that was approved by stakeholder agencies in 2009, and was submitted to the California Transportation Commission (CTC) for final approval in July 2010. This approval will make the projects eligible for funding from the sale of excess state-owned properties originally purchased for a freeway or expressway bypass to State Route (SR) 238 in the City of Hayward and in the County of Alameda. The I-880 CSMP utilized the CCFS recommendations as a statement of planning intent among the stakeholder agencies for the portion of I-880 in Alameda County with the study area for the CCFS.

Figure 1.4.1. I-880 CSMP Related Study Efforts.

Southern Alameda County SR-84 LATIP
The 1986 Alameda County Measure B Expenditure Plan included an SR-84 Historic Parkway project to provide an improved link between I-880 and SR-238 in the cities of Fremont, Newark and Union City. Due to local opposition, planning agencies sought to replace the Historic Parkway project with a program of projects and actions intended to relieve congestion in southern Alameda County in the same corridors that would have been affected by the Historic Parkway. This program of projects is documented in the Southern Alameda County LATIP (which includes a number of projects on I-880), which would be funded through the sale of right-of-way originally purchased for the original SR-84 Historic Parkway project.

CMIA Project, Alameda County: I-880 SB HOV Lane Extension, Hegenberger Road to Marina Boulevard
This project will extend the HOV lane on the Southbound Nimitz Freeway (I-880) approximately three miles from Hegenberger Road in Oakland to Marina Boulevard in San Leandro. When the project is completed, a continuous HOV lane will be provided in the southbound direction to Mission Boulevard (SR-262) in Fremont, a distance of over 20 miles.

CMIA Project, Santa Clara County: I-880 Widening, SR-237 to US-101
This project will add over four miles of carpool (HOV) lane in each direction of I-880 in Santa Clara County, between SR-237 in Milpitas and US-101 in San Jose. The project will extend the carpool system from northern Santa Clara County through Alameda County, a distance of about 20 miles.

VTA I-880 Corridor Study
The I-880 Corridor Study is a highway planning study lead by the Santa Clara Valley Transportation Authority (VTA), in partnership with the City of San Jose and Caltrans. The primary objective of this study was to evaluate potential improvements to enhance freeway operations within the segment of I-880 between US-101 and I-280 in Santa Clara County, with particular emphasis on the area around the Stevens Creek Boulevard interchange. The I-880 I-280 Stevens Creek Interchange Improvements CMIA project was developed as part of the VTA I-880 Corridor Study. The I-880 Corridor Study is intended to provide a master plan or framework for the preferred freeway improvements in this segment of I-880 that would then be considered for inclusion in the Valley Transportation Plan (VTP) 2035.

Regional Blueprint Planning Program
The Regional Blueprint Planning Program supports the smart growth element of the Strategic Growth Plan (SGP) by promoting smart land use choices at the regional and local levels. The Regional Blueprint Planning Program is a voluntary, competitive grant program that supports Metropolitan Planning Organizations (MPOs) and Regional Transportation Planning Agencies (RTPAs) to conduct comprehensive scenario planning. Using consensus-building and a broad-based visioning approach its goal is to envision future land use patterns and their potential impacts on a region's transportation system, housing supply, jobs/housing balance, resource management and other protections.

The Blueprint planning effort in the San Francisco Bay Area is the FOCUS program, which is lead by the Association of Bay Area Governments (ABAG) and the MTC) with support from the Bay Area Air Quality Management District (BAAQMD) the Bay Conservation and Development Commission (BCDC), and Caltrans.

First Generation CSMP

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. AB 32 policy on reducing greenhouse gas emissions has moved into implementation with passage of 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 Sustainable Community Strategies (SCS) in their next RTP cycle; MTC's next RTP is slated for completion in 2013. The SCS will promote strategies to reduce green house 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 s*econd 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.

1.5 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 services along the corridor, and the regional and local planning agencies that have the corridor within their jurisdiction. 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.

The stakeholder engagement process framework has stakeholders placed in two categories:

I. Core Stakeholder Group: Agencies primarily responsible for conducting planning efforts in the corridor.
II. Planning Agency Partners: Additional agencies responsible for implementing and monitoring CSMP strategies.

Each stakeholder category group has a role during the CSMP development process. The Core Stakeholder Group provided policy and technical guidance throughout the process. Additional planning agency partners and other key stakeholder groups were brought in to review and comment at key junctures, and help evaluate corridor improvement strategies.

Representatives of the Core Stakeholder Group met early in the development of the I-880 Corridor Management Plan Demonstration to discuss the goals, objectives and schedule of that ALA 880-focused effort. During that effort the Core Stakeholder Group met regularly to review operational and micro-simulation data collection and analysis methodology and technical reports. Additional planning agency partners were invited to participate in this effort through the I-880 Corridor TAC. These stakeholders provided valuable input on the recommended improvement strategies for the I-880 Corridor Management Plan Demonstration.

While the I-880 Corridor Management Plan Demonstration was in progress, the MTC developed a performance assessment for the Santa Clara County portion of the I-880 corridor through their FPI. This work engaged staff from the Santa Clara VTA to review and comment on the work plan and results of the performance assessment.

The results of these two I-880 corridor analysis efforts (as well as the project analyses from the two CMIA-funded HOV projects) have been incorporated into the I-880 CSMP through the efforts of the I-880 CSMP Working Group. This working group included members of the Core Stakeholder Group of agency partners, whose primary task was to coordinate activities and material necessary for the development of the I-880 CSMP following the completion of the I-880 Corridor Management Plan Demonstration in January 2010. The Working Group members met regularly to review and comment on

the synthesis of technical documents, analyses, recommendations and other material necessary to produce the CSMP. The I-880 Corridor TAC has provided final review and comment as well.

The key stakeholders listed below were identified for involvement in the engagement process.

Key Stakeholders

Core Stakeholder Group

- Caltrans
- Metropolitan Transportation Commission
- Alameda County Congestion Management Agency
- Santa Clara Valley Transportation Authority

Additional Planning Agency Partners

- City of Oakland
- City of San Leandro
- City of Hayward
- City of Union City
- City of Fremont
- Alameda County
- Alameda County Transportation Improvement Authority
- Transit Agencies (BART, AC Transit)

1.6 Corridor Performance Measures and Objectives

Caltrans worked in concert with stakeholders to develop performance measures and objectives that together serve to focus directed action on desired corridor strategies and improvements. The performance measures, descriptions and corresponding objectives used in discussions with stakeholders were: Mobility ─ reduce delay within the corridor; Reliability ─ reduce variation of travel time; Safety ─ reduce accident and injury rate; Productivity ─ restore lost lane miles; and System Preservation ─ reduce distressed lane miles. Performance measures are illustrated in Table 1.6.1.

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
Productivity	Equivalent lost lane miles	Restore lost lane miles
System Preservation	Pavement condition data	Reduce distressed lane miles

Table 1.6.1 CSMP Performance Measures

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

1.7 Stakeholder Issues and Concerns

Through the CSMP development process, stakeholder concerns focused on how non-highway strategies factor into the CSMP analysis scope, SB 375 requirements and how the CSMP recommendations are expected to be used.

Non-Highway Strategies and CSMP Analysis Scope
Stakeholders commented that recommended improvements in the CSMP do not yet emerge from a multi-modal and integrated transportation land use planning effort, such as integrating transit, bicycle and

pedestrian networks, and demand management. This CSMP represents the "*first generation*" of corridor system management plans informing the Transportation Planning process. This CSMP identifies corridor management strategies with a focus on system management and related highway strategies to provide additional benefit and efficiencies to the highway system. The s*econd generation* CSMP scope will expand to include integrated land-use and transportation (in the context of the SCS) and a more comprehensive look at transit and non-motorized travel strategies and options.

SB 375 Requirements

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. AB 32 policy on reducing greenhouse gas emissions has moved into implementation with passage of 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 SCS in their next RTP cycle; MTC's next RTP is slated for completion in 2013. 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.

Use of CSMP Recommendations

The role of the CSMP is both as a CMIA funding requirement and as a document informing the transportation planning process. We hope that the results of this collaborative corridor planning effort will help inform future investment choices made through the traditional planning and programming processes.

SECTION 2
CORRIDOR DESCRIPTION
CONTENTS

SECTION 2
CORRIDOR DESCRIPTION

2.1 Corridor Limits / Route Designations

The I-880 CSMP Corridor is a north-south route, approximately 42 miles long, and runs through Santa Clara and Alameda Counties. For purposes of the CSMP the corridor begins at the I-880/ I-280 interchange in the City of San Jose and terminates in the City of Oakland at 7th Street/Grand Avenue. It provides direct connections to major freeways: I-80, I-980, I-238/I-580, I-680/I-280 and US-101. The Corridor also intersects SR- 82, SR-237, SR-262, SR-84, SR-92 and SR-61.

The I-880 corridor is on the National Highway System, functionally classified as an Urban Principal Arterial Interstate Freeway and is classified as a Basic route on the Interregional Road System (IRRS). I-880 is on the Surface Transportation Assistance Act (STAA) network and serves as a National Network Route providing connections to the Port of Oakland and Oakland International Airport. I-880 falls within the regional jurisdiction of the MTC and BAAQMD.

2.2 Route Significance

I-880 connects the San-Francisco-Oakland Bay Bridge with Silicon Valley, serving the Port of Oakland, Oakland International Airport, San Jose's Mineta International Airport, and about ten East and South Bay Area cities along the way. Most congestion in the corridor is attributed to heavy commuter and truck traffic during weekdays. I-880 is also a critical link for the international movement of goods between the Central Valley and Port of Oakland north of the I-238/580 Corridor interchange. As a result, trucks involved in goods movement comprise 4 to 11 percent of daily traffic on the freeway. According to the Regional Goods Movement Study for the Bay Area, in terms of volume, more than 80 percent of the goods movement in the region involves trucking. The I-880 corridor carries the greatest volume of truck traffic in the region and among the greatest of any highway in California. Truck traffic generators along the corridor are the Port of Oakland, Oakland International Airport, the Joint Intermodal Terminal and San Jose's Mineta International Airport, as well as a major concentration of industrial and warehouse land uses. I-880 provides both an access route for major inter-regional and international shippers and a primary intraregional goods-movement corridor.

The corridor is also a major commuter facility carrying motorists to and from the East Bay and Silicon Valley. To the south, the route passes through San Jose, the "high tech capital of the world," and transitions to SR-17, which is utilized as a recreational route to the coast as well as a commuter route between the Santa Cruz area and Silicon Valley. I-880 is a true urban freeway with major traffic generators corridor-wide, including retail venues, and commercial, industrial and residential centers.

2.3 Highway System

Between I-280 and the Alameda County line, I-880 in Santa Clara County has lane configurations varying between six and ten lanes with HOV lanes north of SR-237. As I-880 traverses Santa Clara County, it intersects with SR-82, SR-87, US-101 and SR-237. I-880 within Alameda County has lane configurations that vary between six and ten lanes with HOV lanes south of Marina Blvd. in San Leandro. As I-880 traverses Alameda County it intersects SR-84, SR-92, I-238, SR-61 and I-980. HOV lanes exist on the segments of I-880 from Hesperian Boulevard north to Marina Boulevard in the City of San Leandro.

This system, including major arterials, is displayed in Figure 2.3.1.

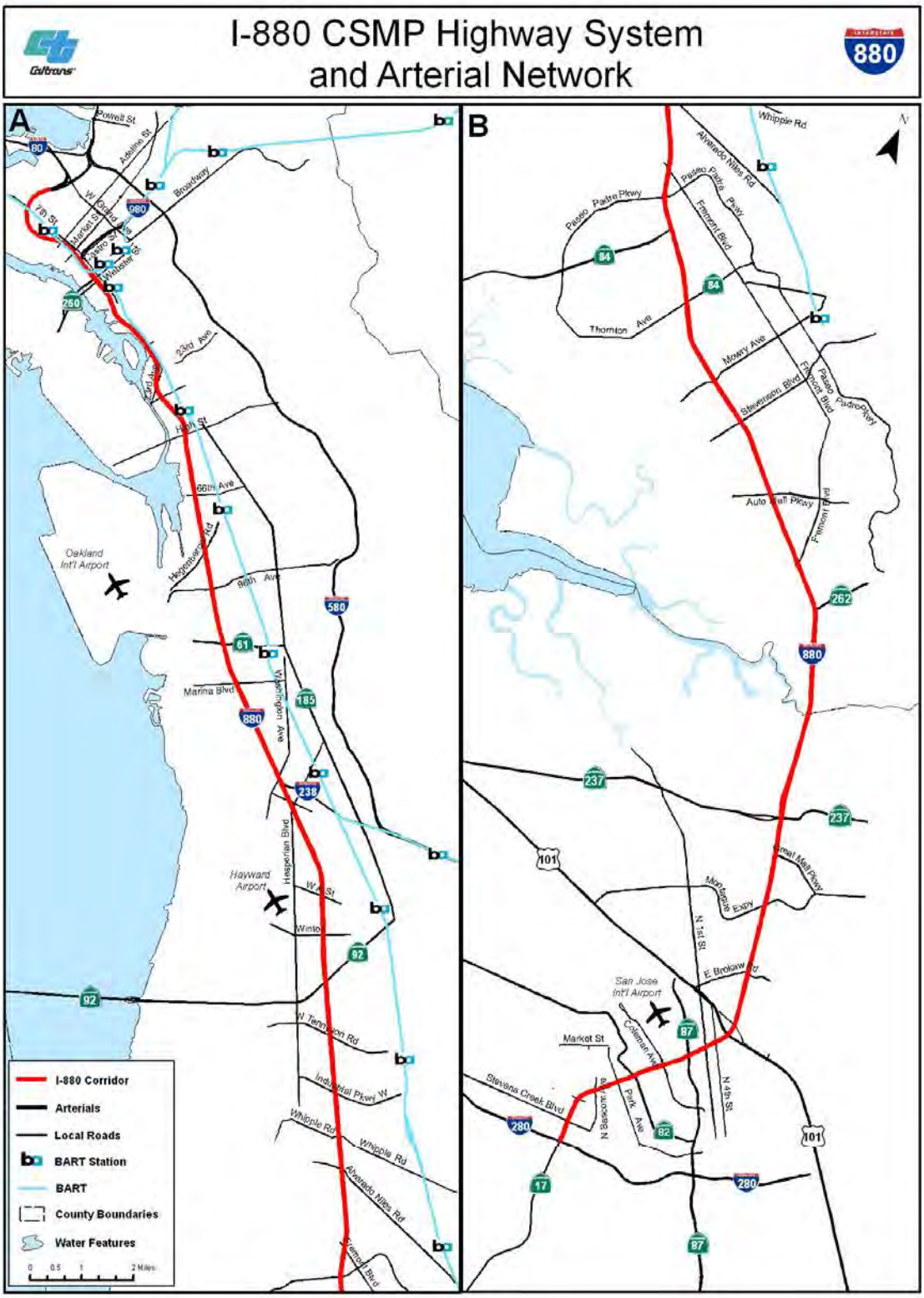


Figure 2.3.1. I-880 CSMP Highway System and Arterial Network.

2.4 Arterial Network

I-880 has parallel arterials on both sides of the corridor in Santa Clara County between I-280 and the Alameda-Santa Clara Co. line:

To the West:

- N. 1St Street beginning in the City of San Jose and terminating in the City of Milpitas @ SR 237. The City of San Jose has plans to increase the density and convert this arterial to a special transit corridor.
- O'Toole/McCarthy Blvd. beginning in the City of San Jose @ Brokaw Rd. and terminating in the City of Milpitas @ SR 237.
- Zanker Road between beginning in the City of San Jose @ E. Brokaw Road and terminating in the City of San Jose @ SR 237. Portions of Zanker Road are four lanes today but the long term plan is to convert the corridor to six lanes. These improvements are related to the densification of N. 1st Street and provide an alternative to using N. 1st Street

To the East:

- N. 13Th. St.-Oakland Rd. beginning in the City of San Jose @ US-101 and then transitioning into S. Main St. and N. Abel St. in the City of Milpitas. If you turn from Abel St. onto N. Milpitas Boulevard, you can continue into Alameda County.
- King Rd.-Lindy Ave. beginning in the City of Santa Clara @ I-280 and terminating in the City of San Jose @ Montague Expressway.

I-880 also has parallel arterials on both sides of the corridor in Alameda County between the Alameda – Santa Clara Co. line and 7th street in the City of Oakland:

To the West:

- Newark Ave.-Ardenwood in the City of Newark which then transitions into Hesperian Blvd. before traversing to the East side of I-880 in the City of San Lorenzo.

To the East:

- Milpitas Blvd. beginning in Milpitas and then transitioning into Warm Springs Rd. in unincorporated Alameda Co., then transitioning into Osgood Rd. before terminating in the City of Fremont.
- SR 238- Mission Blvd. which begins at I-680 in the City of Fremont, SR 238 parallels I-880 and then turns eastward to connect with I-580 at the junction of SR 92/SR 238.
- SR 185 in the City of Hayward. SR 185 parallels I-880 before transitioning into E. 14Th. St in the City of San Lorenzo and finally into International Blvd. before terminating @ Park Blvd. in the City of Oakland.

SMART Corridor Programs

In Alameda County, the East Bay SMART Corridors Program is an advanced transportation management system that also provides real-time traffic conditions to the public. The program gives access to real-time conditions and enables users to make better travel time decisions. The East Bay SMART Program consists of two major arterial corridors in the East Bay one of which is the Hesperian/International/E. 14th Boulevard (I-880) corridor.

In Santa Clara County, the Silicon Valley Smart Corridor (SVSC) Intelligent Transportation System (ITS) Program in the I-880/SR-17 corridor is a traffic management system that enables member agencies to maintain their existing transportation management systems, while allowing for universal communications

between the various systems, active traffic flow management and incident/event coordination. Elements of the SVSC include:

- Software upgrades to enable data exchange between many Silicon Valley Transportation Management Centers (TMC).
- A fiber optic communications network between the TMCs for efficient data and video sharing.
- Traffic-responsive plan selection on Coleman Avenue and DeLa Cruz Boulevard between the City of San Jose and the City of Santa Clara.
- Dynamic message signs and Closed - Circuit Television (CCTV) traffic monitoring for streets.
- Operating procedures and agreements between the agencies.

2.5 Transit Network and Facilities

Regional Express Bus (REB) service in the I-880 corridor is provided by Alameda-Contra Costa Transit (AC Transit) and VTA. AC Transit Transbay routes S, SA, SB, OX operate 5 days a week and its O line operates 7 days a week. These AC Transit lines provide service between Fremont, Hayward, Alameda, San Leandro and the San Francisco Transbay Terminal. Bus Rapid Transit (BRT) service parallel to I-880 and to BART along International Blvd. between the City of Oakland and San Leandro is provided by the AC Transit 1R Rapid. The following VTA routes are regional express bus routes that run on I-880:

- Fremont BART to Lockheed Martin Transit Center / Moffett Industrial Park
- Fremont BART to Mission College and Montague Expressway
- Fremont BART to San Jose Diridon Transit Center

Intercity, regional and interstate rail service providers offering service along and into the I-880 corridor include BART with service from San Francisco and Oakland and Fremont, and connections to the Capitol Corridor/Amtrak in Oakland and Richmond. Altamont Commuter Express (ACE) provides commuter service from Stockton, Fremont and San Jose with connections to VTA light rail and Amtrak's Capitol Corridor. Lastly, Amtrak/Capitol Corridor offers service from Sacramento to Oakland, Fremont and San Jose. BART service operates seven days a week. The BART Fremont line serves the I-880 corridor and provides connectivity to the regional BART system. The ACE operates five days a week, Monday through Friday featuring three AM and three PM trains between Stockton and San Jose with connectivity to BART in Pleasanton and intersecting the I-880 corridor in Fremont. The Amtrak Capitol Corridor provides service between Sacramento and the Bay Area with Auburn, and San Jose as terminus points and connectivity to Caltrain service in San Jose. It also intersects the I-880 corridor with a stop in Fremont.

The park and ride lots along and adjacent to the I-880 corridor operate as collection nodes for carpoolers and provide connectivity to other transit providers such as ACE, AC Transit, Amtrak, BART, Caltrain, Valley Transit Authority and WHEELS depending on their locations and proximity. Table 2.5.1 lists Caltrans, AC Transit, and VTA operated park and ride lots by County. Figure 2.5.1 displays the I-880 Transit/Park and Ride network.

I-880 Alameda County Park and Ride Facilities					
Map Number	***City***	***Location***	***Transit***	***Spaces***	***Bikes***
1	Alameda	Island Dr. at Dolittle Dr	AC	161	Yes
2	Castro Valley	I-580 and Center Ave.	AC	138	Yes
3	Castro Valley	Foothill Blvd. and John Dr.	AC	10	No
4	Fremont	SR84 and Ardenwood	AC	347	Yes
5	Oakland	7th and Linden Ave.	AC/BART	160	No
6	Union City	Union City Blvd. and Horner Blvd.	AC	23	No
I-880 Santa Clara County Park and Ride Facilities					
7	Milpitas	Main St. and Calaveras Blvd.	VTA	36	No
8	Milpitas	Tasman Ave, and Barber Rd.	VTA	275	Yes
9	San Jose	Cahill ave. and Santa Clara Caltrain Station	VTA/Caltrain	597	No
10	San Jose	Fruitdale Ave. and Elizabeth Rd	VTA	25	No
11	San Jose	River Oakes light rail station (W 1st.)	VTA/Caltrain	20	Yes
12	Santa Clara	El Camino Real @ Railroad Ave.	VTA/Caltrain	321	No

Table 2.5.1. I-880 Alameda and Santa Clara County Park and Ride Facilities.

The Oakland/Alameda Ferry provides frequent cross-bay transit service connecting Alameda and Oakland to San Francisco via the San Francisco Bay. Service also includes occasional stops at Angel Island and AT&T Park. The City of Alameda, which runs the public service together with the Port of Oakland, contracts with the privately-run Blue and Gold Fleet to provide the service. In October 2007, State of California legislation initiated a State acquisition of Oakland/Alameda Ferry service, which is now overseen by the San Francisco Bay Area Water Emergency Transportation Authority.

Terminals served by the Oakland/Alameda ferry are:

- Gateway Center, 2991 Main Street, Alameda
- Clay Street Terminal, Jack London Square, Oakland
- Ferry Building, San Francisco
- Pier 41, Fisherman's Wharf, San Francisco
- Alaya Cove Ferry Terminal, (Angel Island)
- China Basin Ferry Terminal, (AT&T Park)

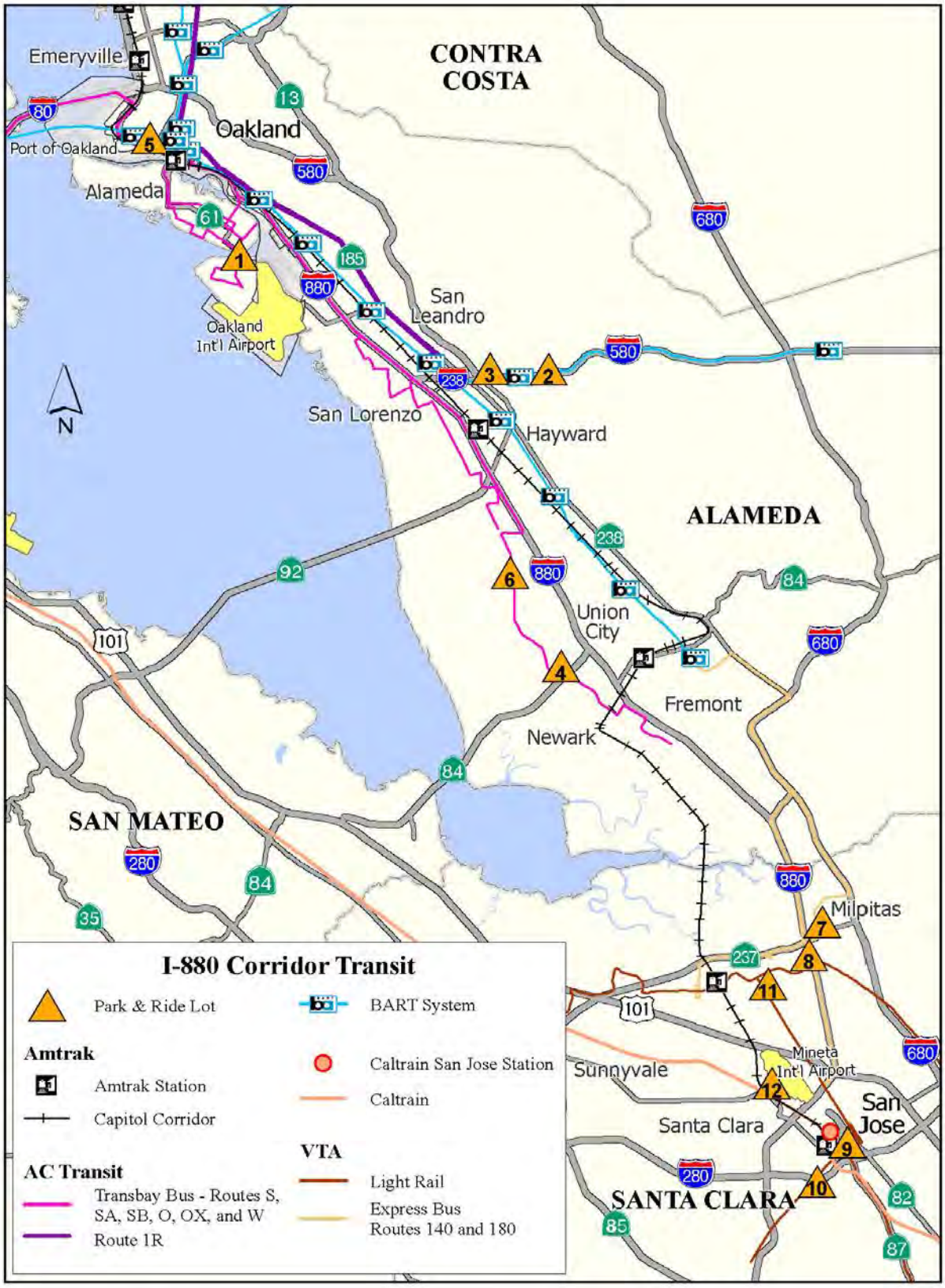


Figure 2.5.1. I-880 Transit & Park and Ride Network.

2.6 Bicycle and Pedestrian Network

Alameda County

According to the ACCMA 2006 Countywide Bicycle Plan, 1.2 percent of Alameda County residents commute to work on bicycle. Forty-four percent of existing bicycle trips take 15 minutes or less.

The Countywide Bicycle Plan presents *existing* and *proposed* bicycle facilities, as the Vision and Financially Constrained Bicycle Network (Bicycle Network), to illustrate the desired completed and connected network. The network is composed of 22 corridors that are divided into 60 projects. For the purposes of the I-880 CSMP Corridor, the Bicycle Network consists of local arterial bicycle facilities that intersect, or are parallel (within approximately one mile radius) to the Corridor.

Many of the proposed bicycle facilities in the Countywide Bicycle Plan and the Alameda County Bicycle Master Plan for Unincorporated Areas (County Bicycle Master Plan) focus on closing gaps and improving connectivity to transit and bus services. Bicycle facility types include Class 1 (multi-use bikeway), Class 2 (designated bike lanes), and Class 3 (bike route). The I-880 freeway itself does not allow pedestrian or bicycle travel.

Two of the 22 Cross-County Bicycle Corridors identified in the Countywide Bicycle Plan run roughly parallel to the I-880 CSMP Corridor. These corridors are No.5—Bay Trail and No. 25—I-880. They are composed of roadway and trail segments of varying geometries and traffic conditions.

Running from north to south, Corridor No. 5 begins north of the CSMP limits and starts to parallel I-880 beginning near the Bay Bridge Maze. From there it runs southwest on surface streets as a Class 2 or 3 corridor, crosses under I-880 at the West Oakland BART station, and continues south along the Bay shoreline. At the High Street Bridge connecting Oakland and Alameda, the Bay Trail corridor becomes Class 1 and continues south to SR 92 (the Hayward-San Mateo Bridge) where it currently terminates. Another segment of this trail traverses Coyote Hills Regional Park and ends at SR 84. A Class 1 link is proposed to be constructed to connect the Coyote Hills portion to the remainder of the Bay Trail. This corridor also connects with several east-west corridors, including No. 10--Fruitvale/Joaquin Miller, No. 20—Hegenberger/73rd, No. 30—Estudillo/Crow Canyon, No. 40—SR-92/Dublin Blvd. and No. 80—SR 84/ Niles Canyon/Vallecitos. The Bay Trail is highly popular with bicyclists and pedestrians alike, providing scenic vistas along the way. It is a multi-use bikeway facility using a regional trail for most of its alignment.

Corridor No. 25—I-880 is aptly named as it runs parallel to I-880 east of the freeway beginning in Oakland and ending in south Fremont. Throughout its entire length many segments of the corridor have not been upgraded to Class 1 or 2 status. From the north, it runs on Market and 14th Streets from 36th Street to Oak Street/Lakeside Drive. It then traverses south on Ea. 12th Street from 2nd Ave. to Fruitvale Ave. From Fruitvale Ave. to Sunset Blvd. the trail utilizes the Union Pacific/BART right of way. In San Leandro the trail moves onto Hesperian Blvd at Halcyon Dr. and runs to the A St./Hayward city limits. From there it takes various Hayward city streets to Alameda Creek/Union City limits. Moving south, the corridor runs along Union City Blvd. in Union City and Ardenwood Blvd. in Fremont to the SR 84 interchange. Using Newark Blvd. and Cherry St., the corridor crosses Newark and back into Fremont at Stevenson Blvd. Most segments in this portion of the corridor have been constructed to Class 2 specifications. From Stevenson Blvd. the corridor traverses Auto Mall Parkway and Warm Springs Blvd. until its termination at the Santa Clara County line. Existing bicycle facilities along the corridor provide access to employment centers shopping centers, transit facilities and recreation facilities. BART stations along the corridor have bicycle parking and storage facilities.

Among the bike network issues identified in the Countywide Bicycle Plan are major gaps in the bicycle network such as bicycles have limited east/west access to cross the Corridor at interchanges and bicycle

facilities need more connectivity and continuity. Opportunities to improve the bicycle network identified in the plan include improving freeway interchanges at specific locations for bicycle utility. The Countywide Bicycle Plan identifies projects in the Fruitvale Avenue to Hesperian Blvd. area as high priority. Also, provide for continuous, connected bicycle facilities and access to transit. Most general plans for the jurisdictions encourage the use of non-motorized transit.

Santa Clara County

The 2008 Santa Clara Countywide Bicycle Plan states that 1.2 percent of Santa Clara County residents commute via bicycle (U.S. Census data), the same percentage as in Alameda County. This percentage has declined from 1.4 percent in 1990 and 1.9 percent in 1980.

The Countywide Bicycle Plan focuses on bikeway projects that have regional or countywide significance. These are defined as being:

- The Cross County Bicycle Corridor (CCBC) network
- Bike routes to major transit stations and centers
- Non-motorized crossings of a major barrier, i.e. freeway, railroad or waterway

The purpose of the Cross County Bicycle Corridor (CCBC) network is to provide continuous connections between Santa Clara county jurisdictions and to adjacent counties, and to serve major regional attractors in the County. The Plan identifies three types of CCBCs:

- CCBC Roadways: Twenty four roadway corridors totaling 580 miles comprise the roadway network.
- CCBC Trails: The County Parks and Recreation Department regional and sub regional trails comprise the CCBC trail network.
- CCBC Expressways: The 62-mile expressway system is incorporated into this plan. Expressways are attractive to bicyclists for the same reasons motorists are: They are direct and continuous, have very few driveways and intersections are spaced widely apart which collectively reduce travel time.

Two of the 24 Cross-County Bicycle Roadway Corridors identified in the 2008 Santa Clara Countywide Bicycle Plan run roughly parallel to the I-880 CSMP Corridor. These corridors are No.17—I-880/680 Corridor and No. 19—I-880 Corridor.

From north to south, Corridor No. 17 starts at the Alameda County line and runs along Warm Springs Blvd., No. Milpitas Blvd., No. Abel St. and Old Oakland Road roadways to I-680 (which becomes I-280 to the west).

Corridor No. 19 parallels I-880 closely from the Alameda County line, south along McCarthy Blvd., to SR 237 bike path where it runs west to Zanker Blvd. From there it runs south on Zanker, along Old Bayshore Highway and continues on North 10Th Street. The corridor terminates at E. Taylor Street in downtown San Jose.

The following bicycle paths (CCBC Trails) run roughly parallel to, or cross, the I-880 CSMP Corridor in Santa Clara County:

- SR 237 Bike Path (crosses)
- Coyote Creek Trail from Milpitas to Anderson County Park (parallel)
- Bay Trail (parallel)

The only CCBC Expressway to cross the I-880 CSMP Corridor is the Montague Expressway.

2.7 Corridor Mode Split

Information on Corridor Mode Split was provided by the 2007 American Community Survey (ACS) for the San Francisco Bay Area, which compares data from the ACS with data from the 2000 Census, both provided by the U.S. Census Bureau. The geographic focus for the ACS is the nine-county San Francisco Bay Area. Table 2.7.1 below illustrates the modal split for means of transportation to work for larger cities along the I-880 Corridor.

Mode Split: City (%)	SOV	HOV	Transit	Bike	Walk
Oakland	57.8	10.0	15.8	3.7	5.2
San Leandro	70.9	9.4	10.6	2.7	3.7
Hayward	71.0	12.4	9.0	3.4	0.9
Milpitas	80.9	12.0	2.2	2.3	0.7
Fremont	76.1	11.3	6.4	1.9	1.0
San Jose	77.6	10.2	3.9	2.7	1.9
Average	72.4	10.9	7.9	2.8	2.2

Table 2.7.1. Mode Split for cities along the I-880 CSMP Corridor.
Source: 2007 American Community Survey

2.8 Land Use / Major Traffic Generators

I-880 is a vital travel corridor for commuters moving between East and South Bay communities and established job centers in Oakland, San Jose and San Francisco. Along the corridor, I-880 serves Norman Y. Mineta and Oakland International airports and the Port of Oakland. In addition there are large entertainment and retail facilities along the corridor such as HP Pavilion in San Jose, Oracle Coliseum / Arena in Oakland, Pacific Commons in Fremont, as well as regional malls in San Leandro, Hayward, Newark and Milpitas. When combined, these land uses generate a large number of auto and truck trips within the corridor.

Major trip generators in the Alameda County segment of I-880 include the Port of Oakland with its ten container terminals and two intermodal rail facilities (Burlington Northern-Santa Fe's Joint Intermodal Terminal aka Oakland International Gateway and Union Pacific's Railport-Oakland yard), and Amtrak-Capital Corridor rail facilities and industrial/commercial facilities in downtown Oakland and San Jose. The Oracle Coliseum / Arena and the Oakland-Alameda County Coliseum is home to the Oakland Athletics, Oakland Raiders and the Golden State Warriors. Many entertainment events are also held at the Arena. Other institutional, retail, special events and recreational trip generators include Oakland International and Hayward General Aviation Executive Airports, Laney College, California State University East Bay, Auto Mall Plaza, and the Fremont Auto Mall.

The Santa Clara County portion of I-880 has several major traffic generators along the corridor. HP Pavilion is a large sports and entertainment center located in downtown San Jose. It is adjacent to the Diridon train station which provides rail service on Amtrak (Capitol Corridor and Coast Starlight service), Caltrain and ACE. The stadium seats 17,500 and is the home of the San Jose Sharks. It is also the site of large concerts and other entertainment events. Three major universities are located near the corridor. They are San Jose State University, Santa Clara University, and San Jose City College having a combined enrollment of nearly 50,000 students. Two medical facilities are on the corridor—the Santa Clara Valley Medical Center and O'Conner Hospital. Major shopping malls along I-880 are the Great Mall of the Bay Area in Milpitas and the Westfield Valley Fair Mall near the I-880 / I-280 interchange in San Jose. Other major trip generators include Santana Row, the Cisco Systems campuses in both Milpitas and San Jose

and large employment areas within the Golden Triangle (the cities of Milpitas, Santa Clara, Sunnyvale, Mountain View, Palo Alto and San Jose) and the N. 1st Street corridor.

Priority Development Areas
The FOCUS Program seeks to work with local governments and others in the Bay Area to collaboratively address issues such as high housing costs, traffic congestion, and protection of natural resources. As the Regional Blueprint Planning Program for the Bay Area, the primary goal of FOCUS is to encourage future growth near transit and in the existing communities that surround the San Francisco Bay. The goal is to enhance existing neighborhoods and provide housing and transportation choices for all residents.

In the summer of 2007, local governments in the Bay Area were invited to apply for regional designation of an area within their community as a PDA. PDAs are infill development opportunities within existing communities. These communities welcome more residents; they are committed to creating more housing choices in locations easily accessible to transit, jobs, shopping and services. To be eligible to become a PDA, an area had to be within an existing community, near existing or planned fixed transit or served by comparable bus service, and planned for more housing.

In late 2007 ABAG adopted a listing of Planned or Potential PDAs. Potential PDAs will be changed to the Planned category upon the jurisdiction's adoption of the applicable land use plan and resolution.

The following PDAs are planned within the I-880 CSMP Corridor area:
- San Leandro, E. 14th Street
- San Leandro, Downtown
- Hayward, The Cannery
- Hayward, Downtown
- Hayward, South Hayward BART
- Union City, Intermodal Station District
- Fremont, Centerville
- Fremont, Central Business District
- Fremont, Irvington District
- San Jose, Evergreen
- San Jose, Communications Hill

The following is a listing of potential PDAs within the I-880 CSMP Corridor area:
- Oakland
- San Leandro, Bay Fair BART
- Alameda County, Urban Unincorporated
- Newark, Dumbarton Transit
- Newark, Old Town

2.9 Environmental Characteristics / Constraints

Environmental Setting
It is important to note that the CSMP is general in concept. Potential environmental issues affecting soil and air characteristics, storm water drainages, sensitive habitats (such as designated creeks, wetlands, coastal and delta areas, as well as cultural resources) would need more detailed scoping and coordination when project development activities occur. Studies would have to be initiated to see if any potential resources would be disturbed or affected. To ensure compliance with environmental regulations, project developers should also seek consultation for any potential impact to endangered species, especially since

mitigation costs for impacts to these species' habitats are high and the limited availability of mitigation sites may impose additional constraints to any corridor-specific improvements. Consultation with regulatory and permitting agencies, when required, can affect project scheduling. These agencies can include, but are not limited to, the US Army Corps of Engineers, US Fish and Wildlife Service, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, California Department of Fish and Game, Bay Conservation and Development Commission (BCDC) and the California Coastal Commission.

Community impact, including environmental justice and relocations, growth-inducing/indirect effects, cumulative impacts, Caltrans' emphasis on Context Sensitive Solutions and farmland conversion impacts must be considered. Caltrans and partner agencies will need to consider evolving state policy on assumed Sea Level Rise as an impact of global climate change. The Caltrans Office of Planning and Research, Technical Advisory dated June 19, 2008 provides guidance to California Environmental Quality Act (CEQA) lead agencies by suggesting they identify potential Green House Gas (GHG) emissions, assess any potential impacts, identify appropriate and feasible alternatives and recommend mitigation where appropriate.

Historical properties could be in the general area (within ½ mile) of the Corridor, and possible impacts to other historic architectural resources, that are more distant to the Corridor, may also need to be evaluated. Every attempt is made to identify culturally significant resources during project planning stages. Native American monitors observe archaeological excavations or construction activity in areas that have been mutually agreed upon to be sensitive. Transportation project field elements such as poles, sign structures, etc. within the freeway right of way, could represent a visual intrusion within a scenic corridor. These elements may have little overall visual impact in the urbanized setting, but the need for visual impact assessment would be determined if and when such elements were specifically proposed.

Environmental Factors

The natural environment of the I-880 CSMP Corridor is highly diversified in terms of its resources and related sensitivities. Twenty three historical bridges are located along the Alameda County segments of the I-880 CSMP Corridor and one is located in Santa Clara County. Hazardous sites (underground tanks) are also identified in specific clusters along the Corridor. Threatened or endangered species are identified in specific areas along the entire Corridor. Table 2.9.1 and Figure 2.9.1 illustrate these environmental factors by segment.

Segment	Historic Bridges	Wetlands	Species of Concern	Protected Open Space
Segment A - (PM SCL 0.57/2.67):				
Segment B - (PM SCL 2.67/4.20):				
Segment C - (PM SCL 4.20/6.75):	X			
Segment D - (PM SCL 6.75/10.50, ALA 0.0/2.70):	X	X		
Segment E - (PM ALA 2.70/10.50):		X	X	X
Segment F - (PM ALA 10.50/13.10):		X		X
Segment G - (PM ALA 13.10/16.96):		X		
Segment H - (PM ALA 16.96/19.96):	X			
Segment I – (PM ALA 19.96//22.84)	X	X	X	
Segment J – (PM ALA 22.84/31.68)	X	X	X	X
Segment K – (PM ALA 31.68/R34.1L)		X		

Table 2.9.1. Summary of Environmental Factors by Segment along the I-880 CSMP Corridor.[1]

[1] Sources: National Register of Historic Places (NRHP), National Wetlands Inventory, CA Natural Diversity Database (CNDDB), CA Protected Areas Database (CPAD)

Figure 2.9.1. Environmental Factors by Segment in the I-880 CSMP Corridor.

Federal and State Regulations

Table 2.9.2 below, references federal and state regulations related to environmental factors and potential environmental issues along the I-880 CSMP Corridor.

Federal/State Regulation	Description/Purpose
Clean Air Act (latest amendment 2004) (federal)	Reduction of smog and air pollution; enforces clean air standards. Defines Environmental Protection Agency (EPA) responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer.
(Specific to Permits) Clean Water Act of 1977 and 1987 - Section 401, 402, 404 (federal)	401: Permit required for discharge of pollutants into waters of the U.S. and is issued by the Regional Water Quality Control Board. 402: Restore and maintain the chemical, physical, biological integrity of the Nation's waters through prevention and elimination of pollution. Oversees National Pollutant Discharge Elimination System (NPDES) permit program; regulates storm water; 404: Permits required for dredging or fill into water of the U.S. including wetland issued by U.S. Army Corps of Engineers.
Bay Conservation and Development Commission (BCDC) and California Coastal Commission	California's two designated coastal management agencies that administer the federal Coastal Zone Management Act (CZMA) in California. Involves federal activities and federally licensed, permitted or assisted activities, wherever they may occur (i.e., landward or seaward of the respective coastal zone boundaries fixed under state law) if the activity affects coastal resources.
Department of Transportation Act of 1966, Section 4(f) of USC 49 Section 303 (federal)	Preserve publicly owned public parklands, recreation areas, waterfowl and wildlife refuges, and significant historic sites.
Endangered Species Act of 1973 (federal)	Protect critically imperiled species from extinction as a "consequence of economic growth and development untempered by adequate concern and conservation".
Executive Order 11988, Floodplain Management (1977) (federal)	Refrain from conducting, supporting or allowing actions in floodplains unless it is the only practicable alternative.
Executive Order 11990, Protection of Wetlands (1977) (federal)	Avoid adverse impacts on wetlands wherever there is a practicable alternative.
Executive Order 13112, Invasive Species (1999) (federal)	Prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause (plant species).
Executive Order 12898 (1994) - Environmental Justice (federal)	Avoid disproportionately high and adverse impacts on minority and low-income populations with respect to human health and environment.
Farmland Protection Policy Act of 1981 (federal)	Minimize impacts on farmland and maximize compatibility with state and local farmland programs and policy.

National Environmental Policy Act (NEPA) (federal)	Established a U.S. national policy promoting the enhancement of the environment; Procedural requirements for Environmental Assessments (EAs) and Environmental Impact Statements (EISs) that contain statements of the environmental effects of proposed actions. Law applies to any project, federal, state or local, that involves federal funding or work performed by the federal government.
National Historic Preservation Act of 1966, as amended – Section 106 (federal)	Declares national policy and procedures regarding historic properties, defined as districts, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places.
Resource Conservation and Recovery Act of 1976 (federal); CA Health and Safety Code Hazardous Waste	Regulates the handling of hazardous waste sites for protection of human health and the environment.
Title VI of the Civil Rights Act of 1964, as amended (federal)	Prohibits discrimination, on grounds of race, color, national origin, age, sex, or disability, under any program or activity receiving federal funds.
The California Environmental Quality Act (CEQA) *Guidelines* 15355, 40 CFR 1508.7, 15358(a)(2)	Requires cumulative impacts be mitigated where identified and requires mitigation for reasonably foreseeable indirect or secondary effects related to changes in the pattern of land use, population density or growth rate and effects on air, water and other natural systems.
California Department of Conservation, Natural Resource Conservation Service (NRCS)	Regulates farmlands or Farmlands of Local Importance in California.
California Fish and Game Code, Section 1602	Any action from a public project that substantially diverts stream, or lake or uses material from a streambed must be previously authorized by the Department of Fish and Game (DFG).
Global Warming Solutions Act of 2006 (AB 32) (California)	Reduce California's greenhouse gas emissions to 1990 levels by 2020, and emissions to 80 percent below 1990 emission levels by 2050.
Senate Bill 375 (California)	Requires greenhouse gas emission targets for automobiles and light trucks for 2020 and 2035. Must accurately account for the environmental benefits of more compact development and reduced vehicle miles traveled.

Table 2.9.2. Federal and State Environmental Regulations.

Air Quality

The San Francisco Bay Area Air Basin covers California's second largest metropolitan area. The counties in the air basin include: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, the southern half of Sonoma County and the southwestern portion of Solano County. The unifying feature of the Basin is the San Francisco Bay which is oriented north-south and covers about 400 square miles of the Basin's total 5,545 square miles. Approximately 20 percent of California's population resides in this air basin.

- Carbon Monoxide (CO) emissions have been declining in the basin over the last 25 years, and this trend is expected to continue. Motor vehicles and other mobile sources are the largest sources of CO emissions in the air basin. Due to stringent control measures, CO emissions from motor vehicles have been declining.

- Particulate Matter (PM 2.5) consists of very small liquid and solid particles suspended in the air, and includes fine particles smaller than 2.5 microns in diameter (PM 2.5). U.S. Environmental Protection Agency (EPA) lowered the federal 24-hour PM 2.5 standard from 65 µg/m 3 to 35 µg/m 3 in 2006 and subsequently designated the Bay Area as nonattainment for the 35 µg/m 3 PM 2.5 standard in 2008.

- Emissions of Ozone (O_3) precursors of (Nitrogen Oxides (NO_x) and Total Organic Gasses (TOG), have decreased over the years and are projected to continue declining. This is primarily the result of strict motor vehicle controls.

The San Francisco Bay Area air quality attainment status based on state and federal standards for CO, PM2.5, and O_3 are listed below. These are three criteria pollutants that the region is designated Nonattainment or Maintenance status based on state or federal air quality standards.[2]

	National Standard	**State Standard**
CO	Maintenance	Attainment
PM2.5	Nonattainment	Nonattainment
O_3	Marginal nonattainment	Nonattainment 1 hour

Plan and Program (regional) and project-level air quality conformity is demonstrated through interagency consultation. Regional conformity analysis is conducted by MTC during the Regional Transportation Plan process. Project-level conformity is usually demonstrated by showing that a project comes from a conforming Plan and Program (the regional conformity analysis) with substantially the same "design concept and scope." The project must show it will not cause localized exceedances of CO, PM2.5 and/or PM10 standards.

Greenhouse Gas Emission Measures

California passed the Global Warming Solutions Act of 2006 (AB 32) which seeks to reduce California's greenhouse gas (GHG) emissions to 1990 levels by 2020, and emissions to 80 percent below 1990 emission level by 2050. Senate Bill 375, Statutes of 2008 (SB 375) builds on AB 32 by requiring GHG emissions targets for California's automobiles and light trucks for 2020 and 2035.

A Climate Action Team was established with representatives from key State agencies responsible for implementing reduction strategies. AB 32 will establish a program of regulatory and market mechanisms to achieve quantifiable reductions of GHG and dictates that the California Air Resources Board (CARB) be responsible for monitoring and planning for GHG reductions. The California Environmental Protection Agency (CALEPA) is required to prepare a greenhouse gas emission reduction report card describing State agency actions to reduce GHG.

The transportation sector, at 38 percent, is the largest contributor of California's gross GHG emissions.[3] The State's strategy to lower emissions from transportation will likely focus on working with Congress to allow California to set higher vehicle efficiency and mileage standards, lower the levels of carbon in transportation fuels and transition the state to cleaner-burning alternative and renewable fuels. Other strategies could include a multi-state cap- and -trade program, or regional initiatives to focus development in transit- rich corridors (i.e. priority development areas).

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[2] Sources: California Air Resources Board: http://www.arb.ca.gov/adam/cgi-bin/db2www/adamtop4b.d2w/start ,
Air Quality Status Summary: http://pd.dot.ca.gov/env/air/html/areadesig/SummAQStatMPORTA.htm,
Bay Area 2005 Ozone Strategy (January 2006)

[3] *Climate Change Scoping Plan: A Framework for Change*. California Air Resources Board (December 2008).

On June 30, 2009, the EPA granted a waiver that enables California authority to adopt and implement greenhouse gas emissions standards for new motor vehicles overturning the previous administration's ruling prohibiting such actions. ARB has subsequently approved a regulation that will implement a Low Carbon Fuel Standard calling for the reduction of greenhouse gas emissions from California's transportation fuels by 10 percent by 2020.[4]

The next update of the RTP in 2013 will include a SCS, as required by SB 375. The SCS will lay out how GHG emissions reduction targets will be met for cars and light trucks.

Sea Level Rise

Sea level rise and storm surge, along with frequency and severity of heat waves, and multiple changes concerning precipitation, are among the three anticipated climate changes of particular significance to the transportation system. Caltrans emphasizes a dual approached to managing climate risks with measures to reduce GHG emissions from transportation and minimizing the impacts on the essential transportation infrastructure through adaptation strategies.[5] Adaptation strategies related to corridor planning include:

- Prioritize long-term improvements needed to reduce vulnerability
- Identify at-risk facilities on particular route segments
- Evaluate climate impact on travel, modes, and emergency response
- Integrate information on climatic events into transportation operational systems.

According to the Caltrans *Vulnerability to Transportation Systems to Sea Level Rise Preliminary Assessment* (February 2009), up to 10.7 miles of I-880 in Alameda County would be at risk given a 55-inch sea level rise by the year 2100. None of I-880 is classified as at risk in the Santa Clara county portion of the CSMP corridor.

Habitat and Biological Resource Issues

Several floodplains exist close to the I-880 CSMP Corridor. Areas subject to a 100-year flood[6] along the I-880 corridor include: Eden Creek, Palomares Creek, San Lorenzo Creek, Sulphur Creek, Arroyo Viejo, Arroyo De La Laguna, Agua Caliente Creek, Stonehurst Creek, San Leandro Creek, Alameda Creek, Scott Creek, Ward Creek and Coyote Creek. Large areas of wetlands are also located along the Corridor (see Figure 2.9.1).

Vegetation along the I-880 CSMP Corridor includes ornamental plantings, non-native annual grasses, non-native vegetation as well as native vegetation. The floodplains mentioned above have the potential to contain habitat for the threatened California Red-legged Frog and California Tiger Salamander. They may also be habitat for the Salt-marsh Harvest Mouse, a federal and state endangered species. Alameda Creek's lower reaches are habitat for the federally threatened Central California Coastal Steelhead. The endangered San Joaquin Kit fox and the Bank Swallow (a state species of concern) also have the potential to occupy any burrow habitat in the area.

Table 2.9.3 indicates threatened and endangered species on Federal and/or California lists from a general query of the California Natural Diversity Database (CNDDB), quadrants within the corridor segments. In addition, the California Department of Fish and Game considers all bat species as species of special concern.

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[4] Source: California Air Resources Board - http://www.arb.ca.gov/fuels/lcfs/lcfs.htm

[5] *California's Changing Climate Assessing Potential Risks and Adaptation Strategies for the State Transportation Infrastructure Preliminary Report, Final Draft* (February 2009).

[6] A flooding event that has a one per percent or greater annual chance of occurring in any given year, or one every 100 years.

COMMON NAME	SCIENTIFIC NAME
Fauna	
Alameda Whipsnake	*Masticophis lateralis euryxanthus (T-FED/CAL)*
Bank Swallow	*Riparia riparia (T-CAL)*
Bay Checkerspot Butterfly	*Euphydryas editha bayensis (T-FED)*
California Black Rail	*Laterallus jamaicensis cotumiculus (T-CAL)*
California Clapper Rail	*Rallus longirostris obsoletus (E-FED/CAL)*
California Least Tern	*Sternula antillarum browni (E-FED/CAL)*
California Red-Legged Frog	*Rana aurora draytoni (T-FED)*
California Tiger Salamander	*Ambystoma californiense (T-FED)*
Salt-marsh Harvest Mouse	*Reithrodontomys raviventris (E-FED/CAL)*
San Joaquin Kit Fox	*Vulpes macrotis mutica (E-FED, T-CAL)*
Steelhead –central California coast-ESU	*Oncorhynchus mykiss irideus (T-FED)*
Tidewater Goby	*Eucyclogobius newberri (E-FED)*
Vernal Pool Tadpole Shrimp	*Lepidurus packardi (T-FED)*
Western Snowy Plover	*Charadrius alexandrinus nivosus (T-FED)*
Flora	
Beach Layia	*Layia camosa (E-FED/CAL)*
California Seablite	*Suaeda californica (E-FED)*
Contra Costa Goldfields	*Lasthenia conjugens (E-FED)*
Pallid Manzanita	*Arctostaphylos pallida (T-FED, E-CAL)*
Presidio Clarkia	*Clarkia franciscana (E-FED/CAL)*
Robust Spineflower	*Chorizanthe robusta var. robusta (E-FED)*
San Francisco Popcorn-flower	*Plagiobothrys diffuses (E-CAL)*
Santa Cruz Tarplant	*Holocarpha macradenia (T-FED, E-CAL)*

Table 2.9.3. Threatened and Endangered Species (Fauna and Flora) along the I-880 CSMP Corridor. Source: California Natural Diversity Database (CNDDB).

Historic and Cultural Resources

There are known historic properties located within and around the I-880 CSMP Corridor. Native American archaeological sites are likely to be found beneath the ground surface. Archaeological sites dating to the historic period within the Corridor are typical of those found in rural settings where homesteads, ranches, or farms were once present. Architectural properties located within the Corridor will most likely be associated with the agricultural history of the area. There are no historical resources eligible for the National Register of Historic Places (NRHP) along the Corridor. There are 21 historical bridges (pre-1955) that cross the Corridor in Alameda County. One historical bridge crosses the Corridor in Santa Clara County. A review of the recent update to the Caltrans Statewide Historic Bridge Inventory Update (2006) found that no bridges within the Corridor are eligible for the NRHP.

Table 2.9.4 identifies parks and/or open space in the corridor listed by county.

Major Parks / Open Space-Alameda County	Major Parks / Open Space-Santa Clara County
Ardenwood Park	**Alviso Marina and Park**
Birch Grove Park	**Don Edwards Natl. Wildlife Refuge**
Brookfield Park	
Coyote Hills Regional Park	
Don Edwards Natl. Wildlife Refuge	
Hayward Reg. Shoreline Park	
Lakeshore Park	
M. L. King Shoreline Park	
Oyster Bay Regional Park	
Robert Crown State Beach	
Washington Manor Park	

Table 2.9.4. Parks /Open Space in I-880 Corridor.

Visual/Aesthetics

The I-880 corridor in Alameda and Santa Clara counties is not a State Scenic Highway nor is it eligible for designation as a scenic highway. Most segments of the corridor are urban in nature. Many businesses and other commercial properties are visible from the freeway. There is currently no corridor aesthetics master plan in place for the Corridor or any of its segments.

2.10 Maintenance

Pavement and roadside maintenance are critical components of protecting and preserving the investment in the State Highway System, including I-880 in Alameda and Santa Clara Counties.

Pavement Maintenance

The maintenance of pavement at Caltrans is managed as two distinctive programs, maintenance and rehabilitation. Pavement Maintenance activities include: routine maintenance (day to day maintenance of roadway), major maintenance (planned work which is generally done by contract) and preventive maintenance (treatments applied when pavement distress is minimal, to extend the pavement life). Pavement Rehabilitation improves the facility and is designed to provide an additional ten years of service life. Maintenance activities keep the facility safe and serviceable until rehabilitation is needed.

Existing Pavement Conditions

Several tools have been developed to monitor the condition of existing pavement:

- State of the Pavement Report
- PCR-Pavement Condition Report
- GIS Based Mapping

The State of the Pavement Report is updated every two years and describes pavement condition by District. More detailed data is contained in the Pavement Condition Report including pavement condition by post mile segment in specific corridors.

GIS based mapping depicts corridor pavement status throughout the state and is based on the Pavement Condition Report. The map in Figure 2.10.1 below depicts current I-880 pavement condition by Damage Priority Group. The DPG legend for those shown on the map is:

- RED: Major Damage—Rehab is scheduled.
- GREEN: Minor Damage—Rehab is needed, not yet scheduled.
- BLUE: Bad Ride Only—Surface is rough, but repair not required.

Figure 2.10.1 I-880 Corridor Pavement Conditions (2008).

Pavement Management Plans
District 4 has developed detailed 10 year pavement management plans for all the principal routes in the District. Future pavement conditions will be impacted favorably by this plan. Listed in Table 2.11.1 are the pavement related projects planned during the next five years in the I-880 CSMP corridor.

Year	Location	Project Description
2011	San Jose: PM 0.0/4.3	Unprogrammed--CAPM
2012	Oakland: PM 27.6/31.0	In planning--Rehab
2014	Oakland: PM 31.0/34.5	In planning--CAPM
2015	San Jose: PM 4.3/6.7	In planning--CAPM

Table 2.11.1 I-880 Planned Pavement Management Projects.

The complete 10-Year Pavement Management Plan for I-880 is located in Appendix I.

Other Maintenance Tasks
In addition to pavement management, District 4 Division of Maintenance performs other important functions in the I-80 East corridor. Major activities in the corridor include:

- Vegetation control--A significant portion of the roadside management and maintenance effort is devoted to activities associated with vegetation control. The need for vegetation control is driven primarily by safety issues such as minimizing fire concerns, promoting visibility of traffic and promoting good drainage.
- Landscaping upkeep--The maintenance of landscape vegetation includes irrigation, planting, plant removal and replacement. A fully landscaped planted area provides traffic screening and improves both aesthetic value and the stability of roadside slopes.
- Litter control—Maintenance workers remove litter, debris, and sediment to maintain traffic safety (for both motorized and non-motorized travelers), protect water quality, ensure drainage, and provide an attractive facility for travelers and local communities. Graffiti is also removed from signs and other structures "as soon as reasonably possible." (Streets and Highways Code Section 96).
- Drainage control—Maintenance includes the repair, replacement and cleaning of drainage features.
- Bridges—Bridge maintenance includes work such as repairing damage or deterioration in various bridge components. Although there are no moveable span bridges in the I-880 corridor, maintenance of electrical and mechanical equipment on moveable span bridges, and operation of this type of bridge are parts of Maintenance duties.
- Safety devices—Safety devices are provided and maintained for the protection and guidance of the traveling public. These devices include Roadside Delineator Posts, Guardrail, Median Barriers and Vehicle Energy attenuators (energy dissipaters).
- Lighting—Highway lighting and sign illumination is provided to improve visibility and to promote safe and efficient use of special roadway facilities. Maintenance of highway lighting and sign illumination includes all work performed on highway electrical facilities used for control of traffic with traffic signal systems, highway and sign lighting systems, Traffic Management System (TMS) Field Elements, Intelligent Transportation Systems (ITS), count stations, and other related systems.
- Signs -- The maintenance of signs typically includes work such as the placement of signs, identification of damaged or inadequate signs, cleaning of dirty signs and general inspection duties.
- Weigh station maintenance—District 4 Maintenance, along with the California Highway Patrol (CHP), operates and maintains the truck weighing station in the I-880 corridor (Fremont) to ensure truck safety and prevent excessive pavement damage from overweight vehicles.

SECTION 3
CURRENT PERFORMANCE ASSESSMENT

3.1 Section 3 Organization

Section 3 presents material from two key sources:

- The I-880 Corridor Management Plan Demonstration (January 2010). A comprehensive performance assessment was part of the Corridor Management Plan Demonstration sponsored by Caltrans and led by CCIT.
- The Santa Clara I-880 Corridor Existing Conditions FPI Report (December 2007).

The limits of the I-880 Corridor Management Plan Demonstration are from 7th Street in Oakland to Dixon Landing Road. The limits of the Santa Clara I-880 Corridor Existing Conditions Report are from near Dixon Landing Road to I-280. Together these documents provide an existing conditions performance assessment for the length of the I-880 CSMP Corridor.

3.2 Data Summary

Each of these reports provides varying information on existing conditions along their respective corridor segments. Combined, these studies provide a reasonable understanding of current freeway performance measures, along with arterial performance where available. Performance data compare reasonably well between the two reports, especially in the Mobility category. There is some variation in the years covered in the Mobility category, but there are years common to both studies, so a valid picture of Vehicle Hours of Delay (VHD) for the length of the Corridor can be constructed. The other categories, Reliability, Safety, and Productivity present some challenges mostly because of variations in metric descriptions and time periods measured.

Vehicle Hours of Delay

A key measure of mobility is VHD, the purpose of which is to monitor the level of delay experienced by the traveling public. Using the most recent years in each report for comparison of VHD, results are shown in Table 3.2.1:

Average Daily Vehicle Hours of Delay (VHD) by Peak Period, 2004 through 2007

Page[1]		Northbound AM	Northbound PM	Southbound AM	Southbound PM
45	CCIT Report (ALA 880)	6:00 AM-9:00 AM	3:00 PM-7:00 PM	6:00 AM-9:00 AM	3:00 PM-7:00 PM
	2004	1,124	2,317	1,728	2,375
	2005	1,331	2,351	1,678	2,444
	2006	1,436	2,644	1,988	3,367
	2007	1,251	2,804	1,976	2,477
25	FPI Report (SCL 880)	7:00 AM-9:00 AM	4:00 PM-6:00 PM	7:00 AM-9:00 AM	4:00 PM-6:00 PM
	2004	62	1,380	41	1,625
	2005	150	969	41	970
	2006	313	1,500	41	1,125

Table 3.2.1. Comparison of Average Vehicle Hours of Delay (VHD) in Corridor Segments.

[1] Refers to the page number in the respective reports.

In the ALA segment of the corridor VHD increased consistently in both directions and peak periods during the 2004-2006 timeframe. In 2007, however, the only increase was in Northbound PM. The SCL segment is characterized by the following trends during the three years measured:

- SB AM VHD remained the same
- SB PM VHD trended slightly lower
- NB AM VHD increased
- NB PM VHD decreased in 2005 but increased in 2006

Travel Time

Another measure of mobility is travel time. This metric is defined as how long it takes to drive the length of the corridor at various times of the day. The typical travel time is the historical average driving time between a starting and ending point for a particular day of the week and time of day. It is expressed in average minutes. The CCIT Study utilized the Performance Measurement System (PeMS) tool to determine travel time on I-880 in Alameda County. In the Santa Clara County portion of I-880, travel time estimates developed by the Bay Area 511 Predict-a-Trip system were used. The Statewide Highway Congestion Monitoring Program (HICOMP), along with PeMS, was used to validate the SCL estimates.

Average travel time estimates for peak periods in 2007 are shown in Table 3.2.2:

Estimated Average Travel Time (Minutes) for Peak Periods, 2007

Page		Northbound AM	Northbound PM	Southbound AM	Southbound PM
53	CCIT Report (ALA 880) 33mi	8:00-9:00 AM	5:00-6:00 PM	8:00-9:00 AM	5:00-6:00 PM
	2007	45	44	48	45
21	FPI Report (SCL 880) 11mi	7:00-10:00 AM	3:30-7:30 PM	Free-Flow	3:30-7:30 PM
	2007	14	16	11	22

Table 3.2.2. Estimated Travel Time for Peak Periods (2007) by Corridor Segment.

In the Alameda County portion of the corridor, Southbound AM has the highest travel time. In Santa Clara County, Southbound PM has the highest travel time.

Safety

Safety data is expressed differently in the two reports.[2] CCIT reports accidents by average daily collisions. However, the FPI study displays the number of accidents by monthly totals. The information for both reports is based on the Caltrans Traffic Accident Surveillance and Analysis System (TASAS).

In the ALA portion of the corridor, the number of daily collisions generally ranged from five to 15 over a five year period (2002 to 2006). Such collisions add to congestion, particularly when they occur during peak commute periods. Early in 2002, a downward trend in average number of collisions began. At about the same time Caltrans started metering the corridor after working with stakeholders to agree on a metering approach. While the data does not prove that metering was the direct cause for the reduction in collisions, it is consistent with federal and State studies such as the Minnesota Ramp Metering Study[3] that imply that such a correlation does exist.

Northbound and southbound monthly accidents are tracked during the 2004 through 2006 time period in the SCL FPI report. On average, the northbound direction has around 28 accidents per month and the

[2] The discussion of safety results begins on Page 57 of the CCIT report and Page 42 of the FPI report.
[3] "Ramp Metering for the 21st Century: Minnesota's Experience", ITS America, Washington, D.C., 1997

southbound direction averages just over 25 accidents per month. In both directions, weekdays account for over 75 per cent of all accidents per month. In the northbound direction, there has been a clear increase in accidents since September 2005. Southbound, the number of accidents rose between November 2004 and June 2005, but dropped again after June 2005.

Table 3.2.3 compares accident rates by CSMP segment and actual rates to statewide average rates. Actual rates exceed statewide averages in only three segments, A, H and K. The corridor was relatively safe compared to statewide averages in similar segments during the measurement period.

Accident Rates by I-880 CSMP Segment, 2004 to 2007

CSMP Segment	CO/RTE/PM Start	AADT (2007)	Accident Rate (Actual / Statewide Average)[4]
A	SCL-880-0.57	75,000-77,000	.95 / .94
B	SCL-880--2.67	79,000-81,000	.97 / 1.17
C	SCL-880-0.4.20	78,000-82,000	.79 / 1.70
D	SCL-880-6.75-10.50/ALA-880-0.0-2.7	94,000-95,000	.64 / 1.19
E	ALA-880-2.7	98,000-100,000	.79 / 1.27
F	ALA-880--10.50	115,000-118,000	.85 / 1.00
G	ALA-880-13.10	117,000-120,000	.79 / 1.09
H	ALA-880-16.96	131,000-134,000	1.26 / 1.11
I	ALA-880-19.96	128,000-130,000	1.06 / 1.20
J	ALA-880-22.84	110,000-112,000	0.96 / 1.12
K	ALA-880-31.68	68,000-69,000	1.29 / 1.14

Table 3.2.3. Accident Rates by I-880 CSMP Segment, 2004 to 2007.

Productivity

Productivity is a system efficiency measure, the purpose of which is to analyze the capacity of the corridor at any given time. It is defined as vehicle throughput during peak congestion conditions, and is expressed in Lost Lane Miles (LLM). As congestion occurs, flow rates on the freeway decline due to merging, weaving and queuing, resulting in lower freeway capacity.

Using the most recent years covered in each report for comparison of LLM results in Table 3.2.4.:

[4] Source: Traffic Accident Surveillance and Analysis System (TASAS) Table B (09-01-04 to 08-31-07)

Average Lost Lane Miles (LLM) by Peak Period, 2004 through 2006

Page		Northbound AM	Northbound PM	Southbound AM	Southbound PM
56	CCIT Report (ALA 880)				
	2004	2.80	3.80	4.00	3.30
	2005	3.60	4.50	4.90	5.40
	2006	3.90	4.70	6.10	6.60
	2007	3.60	4.90	5.60	4.70
46	FPI Report (SCL 880)				
	2004	0.15	1.93	0.15	0.49
	2005	0.14	1.80	0.20	0.95
	2006	0.14	0.70	0.31	0.85

Table 3.2.4. Average Lost Lane Miles (LLM) by Peak Period, 2004 Through 2006.

The peak period LLM in Alameda County has steadily increased in both directions during the 2004 through 2006 period. However, 2007 data, available in the CCIT report only, show significant declines in both AM and PM Southbound peak period LLM. The Santa Clara County segment data is mixed. Southbound peak periods show a slight increase, while Northbound LLM is static or gradually declining.

Problem Identification

Several techniques have been developed to identify and measure congestion problems, or bottlenecks, along the length of the I-880 CSMP Corridor. Bottlenecks are defined simply as a location where traffic demand exceeds capacity.

Both reports identify and analyze the cause of bottlenecks in their respective segments. Table 3.2.5 is a directional list of bottlenecks in both Counties of the I-880 Corridor.

I-880 Bottlenecks by County and Direction

Alameda County I-880			
	Location	**Period**	**Cause**
Northbound:			
Tennyson Bottleneck (N1)	Tennyson Ave.	AM & PM	Two side by side onramps
Davis Bottleneck (N2)	Davis St.	AM only	Two side by side onramps
23rd Bottleneck (N3)	23rd Ave.	AM only	Too closely spaced onramps
Southbound:			
98th Ave. Bottleneck (S1)	98th Ave.	PM only	EB and WB onramps too close
Multiple Bottleneck (S2)	Marina Blvd.	AM & PM	Onramp traffic merges
Fremont and Mission/Rte. 262 Bottleneck (S3)	Dixon Landing Rd.	AM & PM	Onramp traffic merges
Santa Clara County I-880			
	Location	**Period**	**Cause**
Northbound:			
Dixon Landing Rd.	North of Dixon Landing	AM & PM	Roadway geometry and traffic weaving
Brokaw Rd.	Brokaw Interchange	AM only	Ramp merge at crest of grade
US-101	US-101 Interchange	AM only	Lane drop from four to three
Southbound:			
US-101	US-101 Interchange	PM only	Short weaving section
Bascom Ave.	Bascom Interchange	PM only	Auxiliary lane drop

Table 3.2.5. I-880 Bottlenecks by County and Direction.
Sources: I-880 Corridor Management Plan Demonstration and SCL 880 FPI Report.

The map in Figure 3.2.1 depicts these bottlenecks and congestion by direction and peak period.

Figure 3.2.1. I-880 Bottlenecks and Congestion (2004-07).

Sources: I-880 Corridor Management Plan Demonstration and SCL 880 FPI Report.

SECTION 4
EXPECTED FUTURE PERFORMANCE

4.1 Section 4 Organization

This Section describes the future I-880 corridor performance associated with completion of the two CMIA-funded HOV projects on the I-880 Corridor[1]. The information in this section is derived from the following reports:

- I-880 Southbound HOV Lane Extension Initial Study with Proposed Mitigated Negative Declaration/Environmental Assessment dated November 2009. The project limits are on southbound I-880 from the Hegenberger Road Interchange to the Marina Boulevard Interchange. This report was prepared by Caltrans District 4 Environmental and references traffic operations memorandum prepared by Dowling Associates Inc in November 2008 and August 2009.
- I-880 HOV Lane Widening Project, Initial Study with Proposed Mitigated Negative Declaration/Environmental Assessment dated January 2009. Project limits are from SR-237 to the First Street Interchange. This report was prepared by Caltrans and VTA, with traffic operations input from DKS Associates.

4.2 Expected Performance of I-880 Southbound HOV Lane Extension Project in Alameda County

An environmental report was prepared for the I-880 CMIA funded project to extend the existing southbound HOV lane on I-880, from the Marina Boulevard Interchange to the Hegenberger Road Interchange. This report includes traffic operations for near term 2012 and long term 2035 forecast years. The components of the CMIA project, referenced as Build Alternative, include:

- Construct HOV Lane for southbound I-880 from Hegenberger Road to Marina Boulevard (includes reconstructing bridges at Davis Street and Marina Boulevard)
- Replace I-880/Davis Street interchange and add additional travel lanes on Davis Street
- Improve I-880/Marina Boulevard interchange (includes on- and off-ramp improvements, overcrossing modification, and street improvements)

Traffic counts included in the Traffic Forecast Memorandum prepared by Dowling Associates, Inc. (November 2008) reflect that the number of vehicles using the I-880 corridor within the project limits will increase by 30 percent by the year 2035.

This stretch of highway is heavily congested during the peak morning and evening commute hours due in part to merging traffic downstream of the project limits at Washington Avenue and SR-238. The existing backup at times extends north to the Hegenberger Road interchange. The extension of the southbound HOV lane to Hegenberger Road would improve traffic conditions by facilitating the movement of high-occupancy vehicles around this queue. This in turn would reduce congestion in this section of the freeway and decrease travel time for HOV traffic, especially during the morning and evening peak hours.

Ramp metering is currently operational in this segment of the I-880 corridor and is reflected in both the existing and future operating conditions.

[1] The future performance of the third CMIA-funded project (I-880 I-280 Stevens Creek Interchange Improvement project) was one of a number of improvements investigated as part of VTA's I-880 Corridor Study (March 2008). Section 5 includes discussion of this particular study.

Table's 4.2.1 and 4.2.2 show a comparison of individual travel time between the 2012 and 2035 Build (With CMIA Project) and No-Build (No CMIA Project) Alternatives. Addition of the HOV lane in the Build Alternative increases the capacity of the freeway for high occupancy vehicles, and as a result of these vehicles traveling in the new lane, both mainline congestion and freeway travel times are reduced. Year 2012 results show that the Build condition travel times would generally result in slight improvements when compared to the No-Build condition.

Peak Period	Vehicles (travel lane)	15 Minute Time Slice	Existing (Calibration runs)	Year 2012 Individual Travel Time[1]			Year 2035 Individual Travel Time		
				No Build	Build	Change	No Build	Build	Change
		--	minutes	minutes	minutes	minutes	minutes	minutes	minutes
AM	HOV	1	6.9	7.0	6.9	0.0	7.0	6.9	0.0
		2	6.9	7.0	6.9	0.0	7.0	6.9	**-0.1**
		3	7.0	7.0	6.9	**-0.1**	7.1	7.0	**-0.1**
		4	7.0	7.0	7.0	**-0.1**	7.1	7.0	**-0.1**
		5	7.0	7.0	7.0	**-0.1**	7.2	7.0	**-0.2**
		6	7.0	7.1	7.0	**-0.1**	7.5	7.1	**-0.4**
		7	7.0	7.1	7.0	**-0.2**	8.4	7.1	**-1.4**
		8	7.0	7.1	7.0	**-0.1**	9.3	7.0	**-2.3**
		9	6.9	7.0	7.0	0.0	9.5	7.0	**-2.5**
		10	7.0	6.9	6.9	0.0	9.0	7.0	**-2.1**
		11	7.0	6.9	6.9	0.0	8.0	7.0	**-1.0**
		12	7.0	6.9	6.9	0.0	7.2	7.0	**-0.2**
		13	6.9	6.9	6.9	0.0	7.1	7.0	**-0.1**
		14	6.9	6.9	6.9	0.0	7.0	7.0	**-0.1**
		15	7.0	6.9	6.9	0.0	7.1	7.0	**-0.1**
		16	6.9	6.9	6.9	0.0	7.1	7.0	**-0.1**
	Non-HOV	1	6.9	7.0	6.8	**-0.2**	7.0	7.1	**0.2**
		2	6.9	7.0	6.8	**-0.2**	7.0	7.5	**0.4**
		3	7.0	7.0	6.8	**-0.2**	7.2	8.3	**1.2**
		4	7.0	7.0	6.8	**-0.2**	7.1	8.4	**1.3**
		5	7.0	7.0	6.8	**-0.2**	7.3	8.5	**1.3**
		6	7.1	7.1	6.8	**-0.3**	7.6	9.9	**2.4**
		7	7.1	7.1	6.8	**-0.3**	8.5	10.5	**2.0**
		8	7.0	7.1	6.8	**-0.3**	9.3	10.7	**1.3**
		9	6.9	7.0	6.8	**-0.2**	9.5	9.8	**0.3**
		10	7.0	7.0	6.8	**-0.2**	9.0	8.5	**-0.6**
		11	7.0	7.0	6.8	**-0.2**	8.0	7.9	**-0.1**
		12	7.0	7.0	6.8	**-0.2**	7.3	8.4	**1.2**
		13	6.9	7.0	6.8	**-0.2**	7.1	8.4	**1.3**
		14	6.9	6.9	6.8	**-0.2**	7.0	7.7	**0.7**
		15	7.0	7.0	6.8	**-0.2**	7.1	7.2	**0.1**
		16	6.9	7.0	6.8	**-0.2**	7.1	7.0	**-0.1**

Table 4.2.1. I-880 AM Southbound Freeway Performance Measures (2012 & 2035) with Southbound HOV Widening Project Completed.

Source: I-880 Southbound HOV Lane Extension Initial Study with Proposed Mitigated Negative Declaration/Environmental Assessment, Table 1.2.2-1.

Note 1: Time taken to travel 7.82 miles.

Peak Period	Vehicles (travel lane)	15 Minute Time Slice	Existing (Calibration runs)	Year 2012 Individual Travel Time			Year 2035 Individual Travel Time		
				No Build	Build	Change	No Build	Build	Change
		--	minutes	minutes	minutes	minutes	minutes	minutes	minutes
PM	HOV	1	7.0	7.1	7.0	**-0.1**	8.0	7.0	**-1.0**
		2	7.5	7.2	7.0	**-0.2**	10.0	7.2	**-2.8**
		3	8.1	7.3	7.0	**-0.3**	13.6	7.1	**-6.5**
		4	8.4	7.2	7.0	**-0.2**	17.5	7.0	**-10.5**
		5	8.4	7.1	7.0	**-0.1**	20.2	7.0	**-13.2**
		6	8.7	7.2	7.0	**-0.3**	21.2	7.0	**-14.1**
		7	9.2	7.2	7.0	**-0.2**	20.5	7.0	**-13.5**
		8	10.3	7.5	7.0	**-0.5**	23.5	7.1	**-16.5**
		9	12.7	8.0	7.0	**-1.1**	27.5	7.1	**-20.4**
		10	14.8	8.6	7.0	**-1.6**	29.4	7.3	**-22.0**
		11	15.4	8.9	7.0	**-1.9**	35.5	7.1	**-28.4**
		12	14.4	8.0	7.0	**-1.1**	29.9	7.2	**-22.7**
		13	14.1	7.1	7.0	**-0.2**	29.1	7.0	**-22.0**
		14	13.2	7.1	7.0	**-0.1**	26.5	7.2	**-19.3**
		15	10.6	7.0	6.9	0.0	24.9	7.0	**-17.9**
		16	8.3	7.0	6.9	0.0	23.4	7.0	**-16.4**
	Non-HOV	1	7.1	7.2	6.9	**-0.3**	8.2	7.1	**-1.1**
		2	7.6	7.4	6.9	**-0.4**	11.1	7.3	**-3.8**
		3	8.3	7.6	7.1	**-0.5**	17.3	7.7	**-9.6**
		4	8.5	7.3	7.0	**-0.4**	22.8	8.5	**-14.3**
		5	8.6	7.3	6.9	**-0.3**	27.4	8.9	**-18.5**
		6	8.8	7.4	6.9	**-0.5**	29.2	9.2	**-20.0**
		7	9.3	7.4	7.0	**-0.4**	31.3	9.6	**-21.7**
		8	10.5	7.7	7.1	**-0.6**	36.5	10.7	**-25.9**
		9	12.9	8.4	7.3	**-1.1**	38.8	12.8	**-25.9**
		10	15.0	9.0	7.3	**-1.7**	40.6	14.1	**-26.5**
		11	15.5	9.2	7.1	**-2.0**	46.2	15.2	**-31.0**
		12	14.6	8.2	6.9	**-1.4**	39.1	15.3	**-23.9**
		13	14.2	7.2	6.9	**-0.3**	38.0	15.6	**-22.4**
		14	13.3	7.2	6.9	**-0.4**	34.8	15.9	**-18.9**
		15	10.7	7.0	6.8	**-0.2**	32.9	12.5	**-20.3**
		16	8.3	7.0	6.8	**-0.2**	29.4	9.8	**-19.7**

Table 4.2.2. I-880 PM Southbound Freeway Performance Measures (2012 & 2035) with Southbound HOV Widening Project Completed.

Source: I-880 Southbound HOV Lane Extension Initial Study with Proposed Mitigated Negative Declaration/Environmental Assessment, Table 1.2.2-2.

Note 1: Time taken to travel 7.82 miles.

Under Year 2035 PM peak period conditions, there would be a significant improvement in travel time for both HOV and mixed-flow lane users. The improvement in travel time for HOV lane users would be up to 30 minutes, while travel time improvement for mixed-flow lane users would exceed 30 minutes. The AM peak hour period would experience minor benefits under the Build condition when compared to the PM peak hour period because it is typically less congested than the PM peak hour period. Forecast volumes for the PM peak hour are approximately 20 percent higher than for the AM peak hour. Favorable results

are more readily observed for the PM peak hour period due to the heavier demand and the significantly higher baseline (No Project) traffic volumes when compared to the AM peak hour period.

Table 4.2.3 compares basic measures of project effectiveness for future years 2012 and 2035, for both the Build and No Build conditions. It indicates that the CMIA project will provide the following benefits:

- The average speed of southbound freeway traffic and the level of service would be significantly improved for the 2012 PM peak hour. The HOV lane would experience the most benefit as a result of the project; however, mixed flow lanes would also experience noticeable benefits.
- In 2035, the project would provide significant average travel speed benefits in the southbound direction of the freeway for HOV and general purpose lanes during both the AM and PM peak hours.
- Overall vehicle delay in the southbound direction of the freeway would be significantly reduced by the project in the 2012 and 2035 PM peak hour periods.

Condition	Lanes	Average Speed (mph)		Avg. Density (veh/lane/mile)		Highest V/C[1] Ratio		Worst Level of Service (LOS)[2]	
		No Build	Build	No Build	Build	No Build	Build	No Build	Build
2012 AM	Gen. Purp.	64	65	20	19	0.95	0.90	D	D
	HOV	65	65	11	14	0.42	0.58	B	C
2012 PM	Gen. Purp.	59	63	26	23	1.00	0.99	F	E
	HOV	65	65	12	17	0.44	0.70	B	C
2035 AM	Gen. Purp.	23	53	24	30	1.00	1.00	F	F
	HOV	65	65	13	20	0.50	0.80	B	D
2035 PM	Gen. Purp.	12	42	87	38	1.00	1.00	F	F
	HOV	65	64	17	20	0.63	0.87	C	D

Source: Dowling Associates, Inc. August 2009

[1] Vehicle-to-capacity ratio (V/C): is the ratio of the expected or actual volume of traffic on the freeway segment (usually expressed in vehicles per hour) to the capacity of that freeway segment. For example, if it is determined that a four-lane freeway has (because of its geometric characteristics) a capacity of 2,000 vehicles per hour per lane, then the total capacity would be 8,000 vehicles per hour. If the volume is 6,000 vehicles per hour, then the v/c ratio is 0.75.

[2] Level of Service (LOS): is a qualitative measure used to describe operational conditions within a traffic stream, generally in terms of service measures such as speed and travel time, freedom to maneuver, traffic interruptions and delay, and comfort and convenience. Six levels of service are defined by the 2000 Highway Capacity Manual (HCM). A letter designates each level of service—from LOS A (indicating traffic flows with little or no delay) to LOS F (indicating oversaturated conditions where traffic flow exceeds freeway capacity, generally resulting in long queues and delays).

Table 4.2.3. Comparison of Basic Measures of Effectiveness for SB HOV Project (Build/No Build).

4.3 Expected Performance of I-880 HOV Lane Widening Project in Santa Clara County

The I-880 HOV Lane Widening Project, a CMIA funded project, adds an HOV lane on both directions of I-880 between SR-237 and the First Street Interchange in Santa Clara County. The Traffic Operations Report for this HOV Project provides 2035 future year corridor conditions assuming these HOV lanes have been completed.

The 2035 Travel Demand was developed using the VTA 2035 Travel Demand Model, while FREQ and Synchro simulation models were developed to represent the 2035 freeway and local road operations within this segment of the I-880 corridor.

Ramp metering is not currently operational within this segment of I-880 in SCL County, but will be implemented in the near-term. The 2035 future conditions evaluation assumes that ramp metering is operational throughout this segment of the corridor and on-ramps have been evaluated for adequate storage and metering.

SCL 880 Freeway Performance in 2035

The I-880 HOV Lane Widening Project improves the segment average speed on both the HOV lane and general purpose lanes. Overall, the HOV Project provides travel time savings for the HOV vehicles versus single-occupancy vehicles (SOVs), and will result in increases in the volume served, person throughput, and miles of travel on the study segment of I-880. Table 4.3.1 summarizes expected 2035 performance within the project area.

Performance Measure		Northbound (1)		Southbound (1)	
		AM	PM	AM	PM
Peak Hour					
Travel Time in minutes	SOV	9.7	10.7	19.2	44.3
	HOV	9.6	8.3	11.7	15.9
Average Travel Time Delay in minutes (2)	SOV	2.0	2.9	7.8	32.8
	HOV	1.9	0.6	0.2	4.5
Average Speed	SOV	51.9	47.3	38.8	16.8
	HOV	52.4	60.6	63.8	46.8
Peak Period					
Miles of Travel	Vehicle- Miles	202099	244370	387279	346129
	Passenger-Miles	243022	294572	457573	425218
Vehicle Hours of Delay (3)	Freeway	2725	4667	1886	6416
	Ramps	332	1595	1516	2683

Table 4.3.1. I-880 Freeway Performance Measures (2035) with HOV Widening Project Completed.

Source: I-880 HOV Lane Widening Project, 2035 Freeway Performance Measures; Table 2.4-8, Table 2.4-10, Table 2.4-12 & Table 2.4-14

Notes:
1. AM Peak Period from 6AM to 10AM, PM Peak Period from 3PM to 7PM.
2. Reflects additional travel time above that expected under free-flow conditions with average speed of 65 mph.
3. Reflects additional vehicle hours of travel incurred, given the number of miles traveled, above that expected under free flow conditions with average speed of 65 mph.

2035 Northbound AM Peak Period
The major northbound bottleneck continues to be the lane drop to the northbound US-101 on-ramp. During the AM peak hour (8 – 9 AM) the northbound mixed-flow lanes are expected to operate at a 51.9 mph average speed, but is projected to have queuing beginning at the lane drop and extending to the First Street on-ramp.

2035 Southbound AM Peak Period
Addition of the HOV lane and associated increase in demand on I-880 would move the bottleneck, in the mixed-flow lanes, downstream from the Brokaw Road on-ramp merge to the northbound US-101 on-ramp/southbound US-101 off-ramp weave. During the AM peak hour (8 – 9 AM), the southbound mixed-flow lanes are expected to operate at a 38.8 mph average speed and projected to have queuing from this US 101 off-ramp weave bottleneck section to the Tasman Interchange.

2035 Northbound PM Peak Period
The major northbound bottleneck continues to be the lane drop to the northbound US-101 on-ramp. During the PM peak hour (5 – 6 PM), the northbound mixed-flow lanes are expected to operate at a 47.3 mph average speed and are projected to have queuing beginning at the lane drop and extending to the First Street on-ramp.

2035 Southbound PM Peak Period
The primary southbound bottleneck is at the First Street on-ramp. During the PM peak hour (5 – 6 PM), the southbound mixed-flow lanes are expected to operate at a 16.8 mph average speed and the queuing will extend past the SR-237 Interchange.

SCL 880 - Intersection Level of Service (LOS) in 2035

The AM and PM peak hour LOS at 11 intersections were determined using the Synchro analysis tool. In 2008, all intersections studied between SR-237 and 1st Street, operate at LOS E or better in both AM and PM peak hours, except for Tasman/Great Mall Parkway at Alder Drive during the PM peak and Montague Expressway at Old Oakland Road.

In the 2035 AM peak period, a total of four additional intersections studied would operate at LOS F.
- Tasman/Great Mall at Alder Drive
- Tasman/Great Mall and I-880 NB ramps
- Montague Expressway and McCarthy Boulevard
- Old Bayshore Highway and I-880 NB on-ramps/North10th Street

In the 2035 PM peak period, a total of six additional intersections would operate at LOS F.
- Tasman/Great Mall at Alder Drive
- Montague Expressway and McCarthy Boulevard
- Brokaw Road and I-880 NB off-ramps
- Calaveras Boulevard and I-880 NB off-ramps
- Tasman/Great Mall and I-880 NB off-ramps
- Old Bayshore Highway and I-880 NB on-ramps/North 10th Street

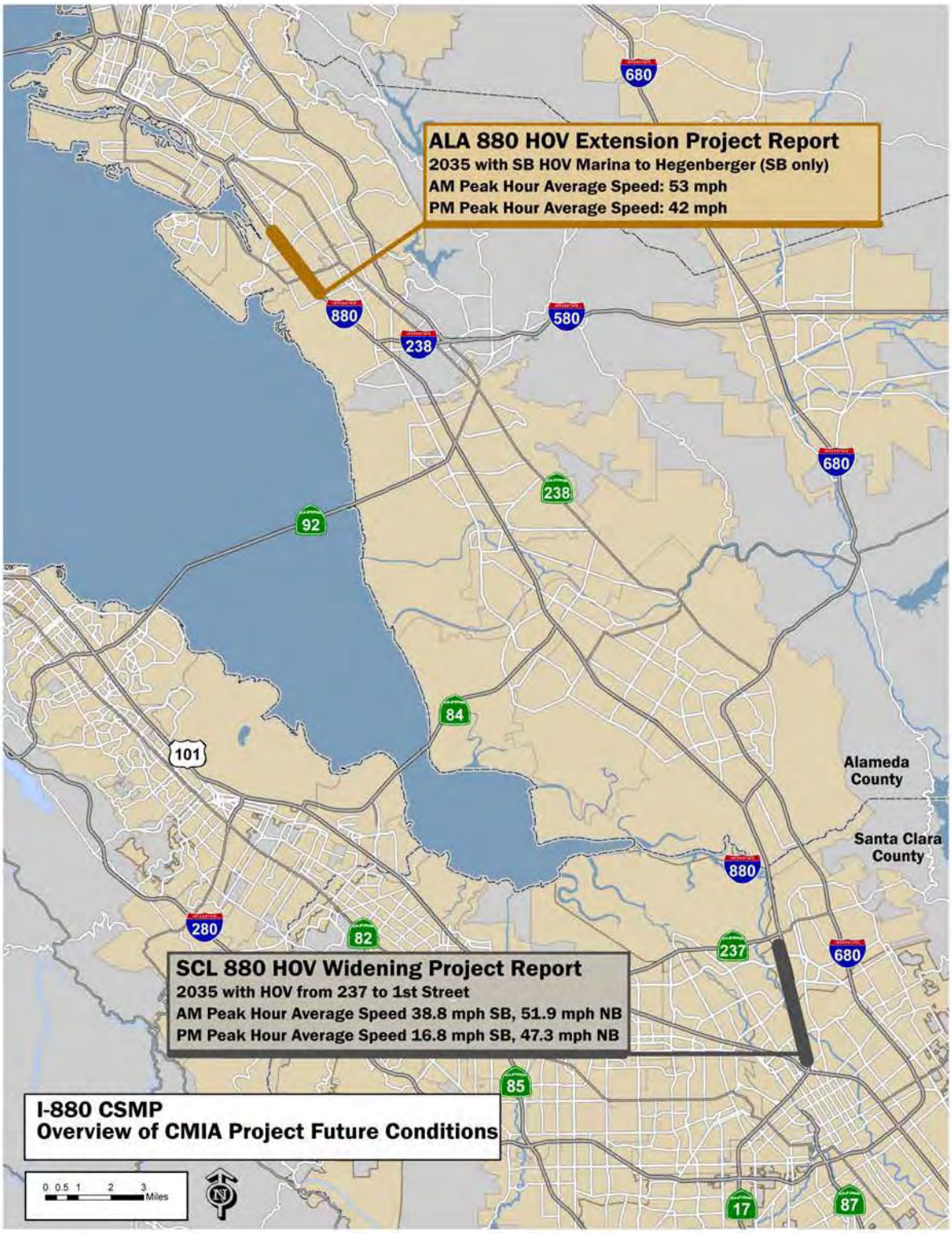

Figure 4.4.1. Overview of I-880 CMIA HOV Project Future Conditions (2035).
Sources: Initial Studies of SB HOV Lane Extension and HOV Lane Widening Projects.

4.4 Summary of I-880 CMIA Project Expected Performance

The two CMIA-funded projects in Alameda County and in Santa Clara County provide improvements to the I-880 Corridor, although performance problems will remain. These projects and key future conditions metrics are illustrated in Figure 4.4.1. It is important to note that these two CMIA HOV projects are expected to attract demand to I-880 and consequently, the demand and congestion on alternative routes should decrease. These benefits are not captured in the future conditions analysis.

The CMIA southbound HOV project in Alameda County helps mitigate an existing southbound bottleneck at Marina Boulevard, while the CMIA project for the SCL I-880 HOV lane widening project will eliminate the existing northbound bottleneck at Brokaw Road.

Section 5 of this CSMP will investigate projects to mitigate bottlenecks and congestion that are identified in Section 3 under Existing Conditions and that will continue to exist after completion of the CMIA projects. In addition, projects or strategies will be investigated to preserve the benefits achieved by the CMIA HOV projects.

SECTION 5
STRATEGY EVALUATION AND RECOMMENDATIONS

5.1 Section 5 Purpose

The purpose of Section 5 is to:

- Describe how the recommended corridor management strategy was developed, including what studies, plans, and collaborative partnership discussions it was built on.
- Discuss and recommend corridor management strategy.
- Summarize the nature and location of the performance problems addressed by the recommendations.
- Summarize evaluation results and performance expectations from the various I-880 Corridor studies
- List specific elements supporting overall strategy.
- Identify areas for further study.
- Summarize key recommendations and existing commitments to implement.

5.2 Description of Corridor Management Strategy Development Process

Following are the five primary studies used for development of the I-880 Corridor Management Strategy:

- *I-880 Corridor Management Plan Demonstration*. UC Berkeley CCIT, January 2010.
- *Central Alameda County Local Alternative Transportation Program LATIP Project Initiation Document*. ACCMA, May 2009.
- *Southern Alameda County SR-84 Historic Parkway LATIP Project Initiation Document*. ACCMA, October 2009.
- *Santa Clara Valley Transportation Plan (VTP 2035).* SCTVA, December 2008.
- *I-880 Corridor Study*. SCVTA, March 2008.

Each of these studies is the product of collaboration between partner agencies in the I-880 corridor.

5.3 Corridor Management Strategy

The common theme, and resulting recommended strategy, from the five studies mentioned above is: **to implement and enhance advanced / adaptive ramp metering throughout the I-880 CSMP Corridor.** This strategy promises to substantially increase freeway efficiency and throughput. From the I-880 Corridor Management Plan Demonstration report[1]: "If implemented correctly, this improvement (ramp metering) will provide the highest benefits relative to its costs." The Central Alameda County Freeway Study ranks adaptive ramp metering as its highest project priority. In Santa Clara County, VTP 2035 states that I-880 Ramp Metering at various interchanges is an important FPI project included in VTP 2035. Currently, this strategy has already been implemented to some degree in both county segments of the corridor.

I-880 currently deploys local traffic-responsive metering which uses traffic conditions on the freeway mainline adjacent to the on-ramp to determine when to start metering, stop metering and at what rate to continue metering. In the absence of a system-wide advanced ramp metering algorithm, each ramp meter currently operates using local-traffic responsive operation based upon time-of-day and day-of-week. System-wide ramp metering takes into account conditions beyond those adjacent to the ramp when determining metering rates for an individual ramp. Also, system-wide ramp metering control can be used for a freeway segment, an entire corridor, or several freeway corridors. Figure 5.3.1 identifies the location of existing and proposed ramp metering in the I-880 corridor.

[1]" I-880 Corridor Management Plan Demonstration," P. 27

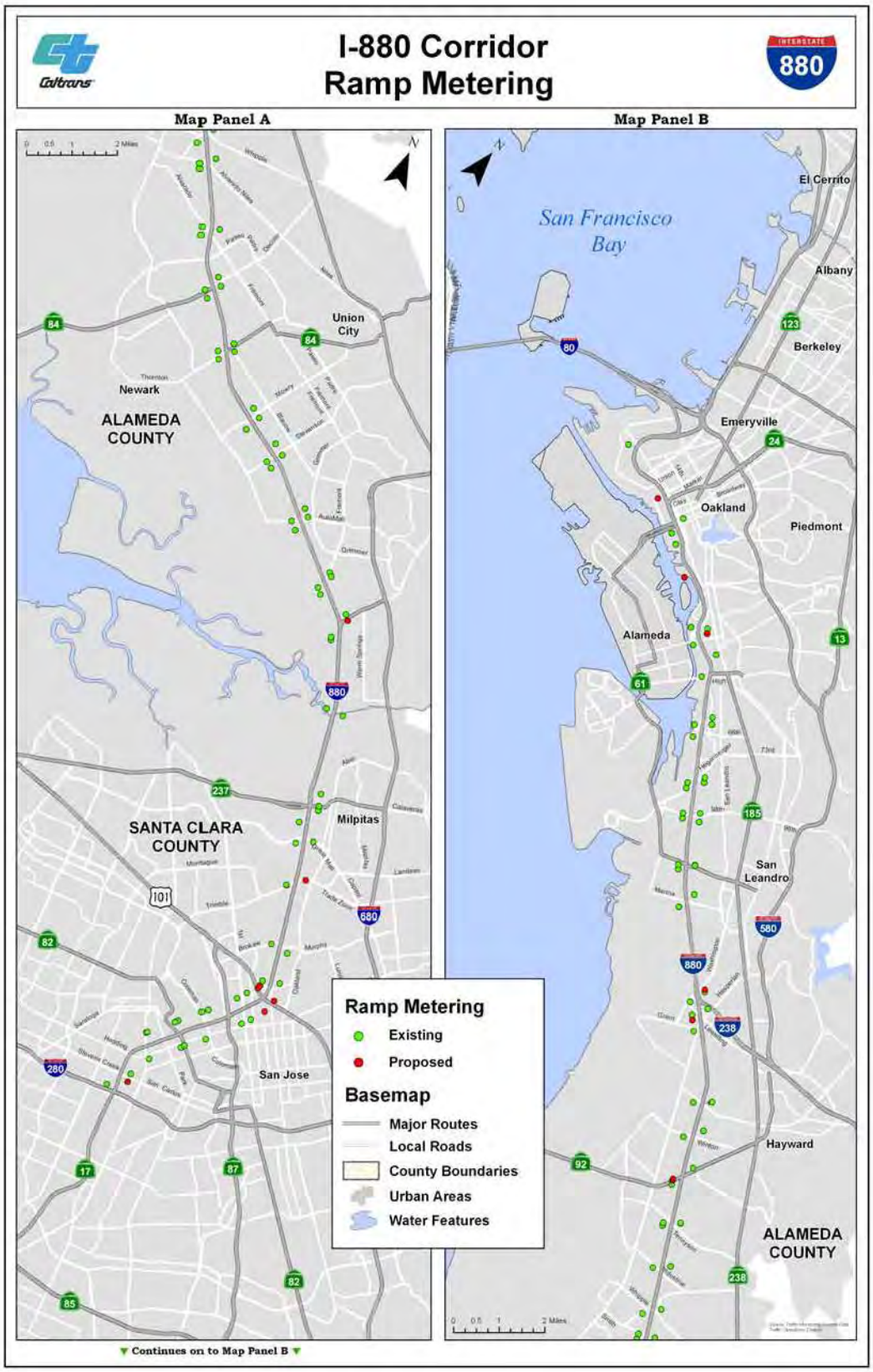

Figure 5.3.1. Existing and Proposed Ramp Metering in the I-880 Corridor (2009).

5.4 Recommended Corridor Improvement Projects

Most of the performance problems in the I-880 CSMP corridor can be linked to bottlenecks listed in Section 3 (Performance Assessment). Bottlenecks are defined as points where freeway demand exceeds capacity. While implementation of ramp metering along the corridor will improve efficiency at relatively low cost, other elements of the recommended corridor strategy (recommended short- and long-term projects) will also have a significant impact on I-880 operating performance. This includes other infrastructure improvements such as the addition of auxiliary lanes and interchange improvements.

The list of recommended improvements shown in Table 5.4.1 and 5.4.2 will improve operational efficiency to address issues related to previously identified bottlenecks. The common theme of enhanced ramp metering as an overall corridor strategy is highlighted in both Tables 5.4.1 and 5.4.2.

Short and Long Term Recommended Projects: Alameda County

Page[2]	**CCIT Report (ALA 880):**
28	***Short Range Recommended (2012)***
	5A-Advanced Ramp Metering 6A-Advanced Traveler Information
28	***Long Term Planned (2013-2020)***
	7A-TCIF Project (Inc. 23rd and 29th St. Overcrossings) 8A-I-880 Aux. Lanes, Paseo Grande to Winton Avenue* 8A-I-880 Aux. Lanes, Whipple Rd. to Industrial Pkwy. West* 8A-I-880 / West A Street Interchange* 8A-I-880 / West Winton Avenue Interchange* 8A-I-880 / Whipple Road Interchange* 9A-HOV Extension from Hegenberger Rd. to Marina Blvd. (CMIA Project)
Table 23	**Central County Freeway Study LATIP (I-880 only, in order of priority):**
	ICM / Adaptive Ramp Metering HOV Project Development (Projects A, B and C) I-880 Industrial Pkwy. Interchange I-880 Davis St. Interchange I-880 Marina Blvd. Interchange
20	**SR-84 Study LATIP (I-880 only, in order of priority):**
	I-880 / Mission Blvd. Interchange Completion (CMIA project candidate) I-880 Aux. Lanes, Dixon Landing to Alvarado-Niles ICM / TOS, I-880 South of SR-92

Table 5.4.1. Short and Long Term Recommended Projects: Alameda County.

* Project is also listed the Central County Freeway Study LATIP

[2] Refers to the page number in the respective reports.

Short and Long Term Recommended Projects: Santa Clara County

Page	**Valley Transportation Plan 2035 (I-880 only):**
35, 38, 85	***Fiscally Constrained Projects in Order***
	I-880 HOT Lanes, ALA County Line to US-101 I-880 / Montague Expressway Interchange Improvement I-880 / I-280 / Stevens Creek Blvd. Interchange Improvement (CMIA Project) I-880 Widening, HOV Lanes, SR-237 to Old Bayshore (CMIA Project) I-880 NB Aux. Lane, Coleman Ave. to First St. I-880 Ramp Metering, Various Interchanges (FPI)
	Valley Transportation Authority I-880 Corridor Study:
6-2	***Near-Term Projects***
	NB Stevens Creek Interchange Reconfiguration SB Stevens Creek Interchange Reconfiguration
6-2	***Long-Term Improvements***
	NB I-280 to NB I-880 Direct Connector I-880 HOV Lane Extension, US-101 to I-280

Table 5.4.2. Short and Long Term Recommended Projects: Santa Clara County.

5.5 Summary of Performance Benefit Expectations

This section summarizes the performance benefits from the five primary studies utilized.

I-880 Corridor Management Plan Demonstration
Implementation of the improvement scenarios modeled as part of the I-880 Corridor Management Plan Demonstration (CCIT Study) would yield the following performance benefits compared with the "no project/do minimum" scenario:[3]

- Delay reductions
- Travel time reductions
- Vehicle operating cost reductions
- Reduction in vehicle emissions
- Excellent benefit cost ratio for ramp metering implementation
- Acceptable benefit cost ratios for other strategy components

Table 5.5.1 is a listing and description of the scenarios modeled as part of the I-880 Corridor Management Plan Demonstration project. The table describes the scenarios shown in Figures 5.5.1 and 5.5.2; the improvements within each scenario contain the improvements from the previous scenario plus an additional element for analysis. Each figure shows the greatest benefits being achieved by implementing Scenario 9A, which consists of the combined improvements from each previous scenario analyzed. Daily vehicle hours of delay are substantially reduced and the percentage of delay reduction is increased.

[3] I-880 Corridor Management Plan Demonstration, Pages 21-26.

Improvement Scenarios Modeled Listed by Number

Scenario Number	Description
3AA (2020)	No Project Horizon Year-2020 (also referred to as the Do Minimum Horizon Year 2020)
4A (2020)	Scenario 3AA + Mobility Related and Fully Funded Programmed Projects to be delivered by 2012
5A (2020)	Scenario 4A + ALINEA
6A (2020)	Scenario 5A + Traveler Information (Discarded)
7A (2020)	Scenario 5A + Trade Corridor Improvement Fund (TCIF) Project
8A (2020)	Scenario 7A + Aux Lanes and Interchange Improvements Defined in the CCFS[4]
9A (2020)	Scenario 8A + HOV Extension and Related Interchange Improvements

Table 5.5.1. Improvement Scenarios Modeled Listed by Number.

Source: I-880 Corridor Management Plan Demonstration, Pages 13-16.

2020 Horizon Model Scenario Results

(Daily Vehicle Hours of Delay)

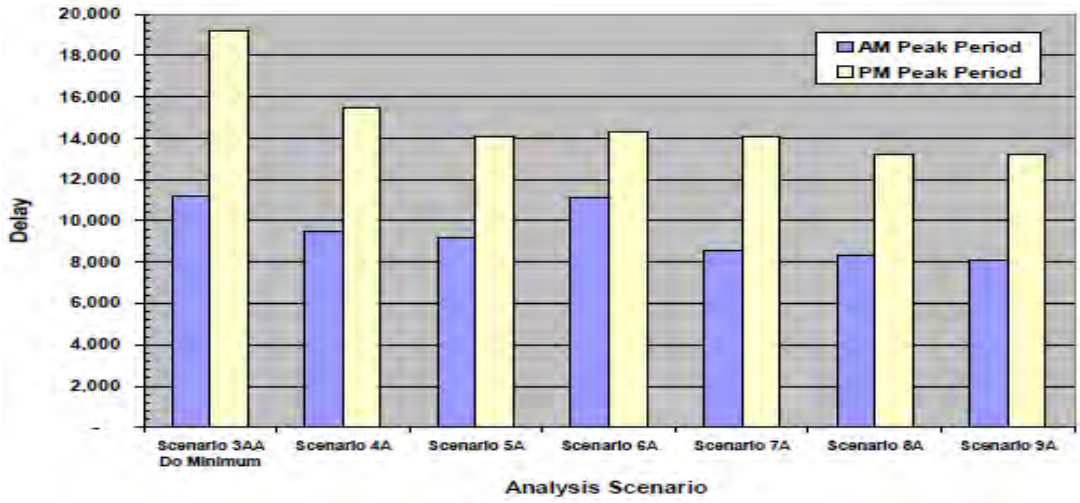

Figure 5.5.1. 2020 Horizon Model Scenario Results.

[4] Alameda County Central Freeway Study LATIP (2009).

Percent Delay Reductions Compared to 2020 Do Minimum Scenario
(% Delay Reductions)

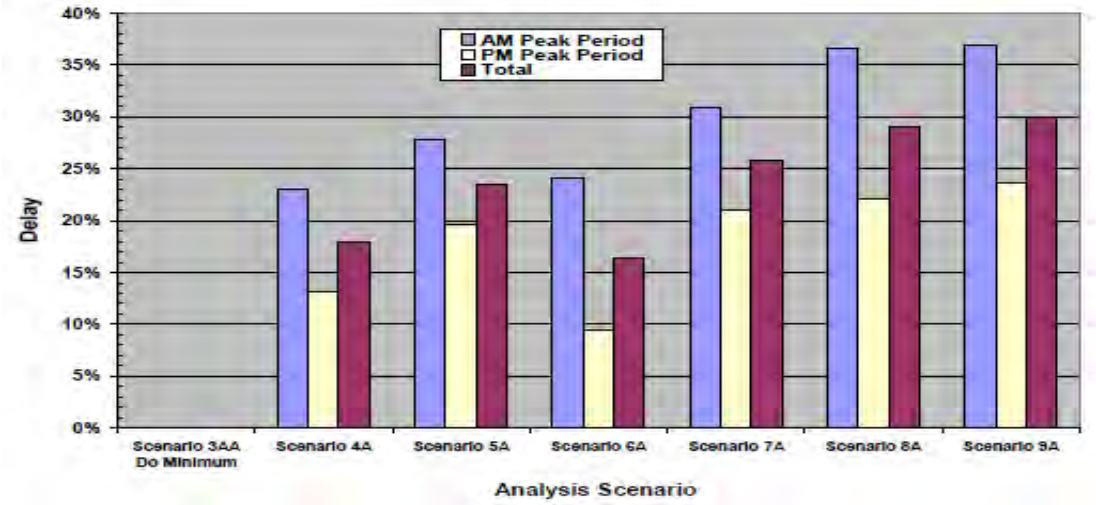

Figure 5.5.2. Percent Delay Reductions Compared to 2020 Do Minimum Scenario.

Tables 5.5.2, 5.5.3 and 5.5.4 present the expected benefits of each improvement scenario.

Monetized Delay Reductions Compared to 2020 Do Minimum Scenario

Benefit Category	Short Term Programmed Projects	+ ALINEA	+ TCIF Projects	+ Interchange and Auxiliary Lane Projects	+ HOV Extension
Travel Time Savings	$315	$440	$477	$535	$550
Veh. Op. Cost Savings	($20)	$14	$6	$17	$17
Emission Cost Savings	$5	$9	$8	$11	$12
TOTAL BENEFITS	$299	$464	$491	$563	$579

Benefits are in $2007 millions

Table 5.5.2. Monetized Delay Reductions Compared to 2020 Do Minimum Scenario.
Source: I-880 Corridor Management Plan Demonstration, Page 25.

Aggregated GHG Emission Benefits (Reductions) by Scenario

	Short Term Programmed Projects	+ ALINEA	+ TCIF Projects	+ Interchange and Auxiliary Lane Projects	+ HOV Extension
Additional CO_2 Emissions (tons)	186,911	317,112	293,577	398,916	419,163
Additional CO_2 Benefits (mil. $)	$4.8	$8.4	$7.8	$10.3	$10.7

Table 5.5.3. Aggregated GHG Emission Benefits (Reductions) by Scenario.
Source: I-880 Corridor Management Plan Demonstration, Page 25.

Benefit Cost Ratios for Scenario Components

	Short Term Programmed Projects	ALINEA	TCIF Projects	Interchange and Auxiliary Lane Projects	HOV Extension
BENEFIT COST RATIO (OVER 20 YEARS)	1.30	7.12	0.47	1.16	0.15

Table 5.5.4. Benefit Cost Ratios for Scenario Components.
Source: I-880 Corridor Management Plan Demonstration, Page 26.

In all three tables, ALINEA is meant as a proxy for a more advanced adaptive ramp metering scenario. As noted in the I-880 Corridor Management Plan Demonstration report, ramp metering yields the highest benefit cost ratio by far of all the scenarios. Scenario component costs, compiled from Caltrans and the Central County Freeway Study, are presented in Table 5.5.5. The CCIT report estimated the adaptive ramp metering implementation to cost $25 Million (between 7th Street in Oakland to SR-237).

Scenario Component Costs as Estimated (in Mil. $)

	Project Costs
Short Term Programmed Projects	$ 267.60
ALINEA	$ 25.00
TCIF Projects	$ 85.00
Interchange and Auxiliary Lane Projects	$ 92.50
HOV Extension	$ 155.50

Table 5.5.5. Scenario Component Costs as Estimated (in Mil. $)
Source: I-880 Corridor Management Plan Demonstration, Page 24.

Central County Freeway Study (Central County LATIP)

The improvements identified by the Central County LATIP were utilized by the I-880 Corridor Management Plan Demonstration, with added interchange improvements at Marina Boulevard, Davis Boulevard, and Industrial Parkway.

This study used Paramics microsimulation to evaluate proposed improvements and grouped the improvement strategies as follows:

- Capacity Expansion
  - Northbound HOV Lane
  - ICM and Adaptive Ramp Metering
- Mainline Improvements 1
  - I-880 Auxiliary Lanes, Paseo Grande to Winton
  - I-880 Auxiliary Lanes, Whipple Road to Industrial Parkway West
  - I-880/Davis Street Interchange
  - I-880/Marina Interchange
  - I-880/SR-92 Reliever – Clawaiter/Whitesell Interchange
  - ICM & Adaptive Ramp Metering
- Mainline Improvements 2
  - I-880 Auxiliary Lanes, Paseo Grande to Winton
  - I-880 Industrial Parkway West Interchange
  - I-880 Auxiliary Lanes, Whipple Road to Industrial Parkway West
  - I-880/Davis Street Interchange
  - ICM & Adaptive Metering

Performance Measures	Capacity Expansion	% Change from Baseline	Improvements to Mainline 1	% Change from Baseline	Improvements to Mainline 2	% Change from Baseline
Mobility Performance Measures						
Vehicle-Hours of Delay (VHD) , Corridor -Wide						
AM Peak	12,630	-15%	11,476	-22%	10,596	-29%
PM Peak	9,913	-14%	9,613	-17%	10,277	-11%
Vehicle-Hours of Delay (VHD), Freeway						
AM Peak	6,693	-5%	6,728	-4%	6,688	-5%
PM Peak	5,463	-3%	5,536	-1%	5,451	-3%
Average Speed in mph, Corridor -Wide						
AM Peak	24.2	8%	25.3	13%	26.3	18%
PM Peak	26.9	7%	27.2	8%	26.5	5%
Average Speed in mph, Freeway						
AM Peak	30.3	2%	30.4	2%	30.5	3%
PM Peak	33.3	1%	33.2	1%	33.4	1%
Productivity Performance Measures						
Vehicle Miles Traveled (VMT), Links with V/C > 0.9	255,476	-12.5%	290,192	-0.6%	255,476	-3.0%
AM Peak	248,959	-1.8%	251,342	-0.8%	248,959	-3.1%
PM Peak						

Table 5.5.6. Corridor –Wide Performance Measures by Package, 2015.
Source: Central County Freeway Study (Central County LATIP), Table 21, Page 31.

Table 5.5.6 provides year 2015 performance measures for the three package groups compared to No Build Baseline Conditions and these performance measures include VMT, VHD, and average speeds. The packages provide up to a 5% reduction in freeway daily VHD and up to 29% reduction in corridor-wide VHD. Note that even with these improvements the average freeway speed will be about 33 mph in the PM peak hour and 30 mph in the AM peak hour.

Based on the 2015 performance measures, Table 5.5.7 provides the estimated package benefits per $1 million dollars invested.

	Capacity Expansion		Improvements to Mainline 1		Improvements to Mainline 2	
	Change from 2015 Baseline	Benefit per $1 Million in Project Costs	Change from 2015 Baseline	Benefit per $1 Million in Project Costs	Change from 2015 Baseline	Benefit per $1 Million in Project Costs
Vehicle-Hours of Delay (VHD), Freeway						
AM Peak	(325)	2.09	289	1.83	329	2.24
PM Peak	(148)	0.95	75	0.47	160	1.09
Vehicle Miles Traveled (VMT), Links with V/C > 0.9	36578	235.23	1862	11.78	8743	59.44
AM Peak	4461	28.69	2078	13.15	7759	52.75
PM Peak						

Estimated Costs:
Capacity Expansion = $155.5 M
Improvements to Mainline 1 = $158.1 M
Improvements to Manline 2 = $147.1 M

Table 5.5.7. Estimated Package Benefits per $1M Invested (Based on 2015 Performance Measures).
Source: Central County Freeway Study (Central County LATIP), Page 35.

Finally, Table 5.5.8 provides the final prioritized list of LATIP projects along with the proposed cost in 2007 dollars for each of the individual improvement strategies.

Improvement Name	Location	LATIP ID	Total Funding Needed (2007 $)
Integrated Corridor Management / Adaptive Ramp Metering	I-880 Corridor	I, J	$32.5M
I-880 Auxiliary Lanes, Paseo Grande to Winton Ave.	West A Street Interchange to Winton Interchange	D	$32.5M
I-880 Auxiliary Lanes, Whipple Rd. to Industrial Parkway West	Whipple Road to Industrial Parkway West	F	$19.5M
HOV Project Development	County and San Leandro	A, B, C	$10M
I-880/Industrial Parkway West Interchange	Industrial Parkway West	E	$41M
I-880/Davis Street Interchange	Davis Street	K	$11.1M
I-880/Marina Blvd. Interchange	Marina Blvd.	L	$24.4M
I-880/Whipple Rd. Interchange	Whipple Rd.	G	$13.5M
I-880/West A St. Interchange	A St.	M	$27M
I-880/West Winton Ave. Interchange	Winton Ave.	N	$25M
Extend Northbound I-880 HOV Lanes	County and San Leandro	C	$155.5M
I-880/Washington Interchange	Washington Interchange	B	$31M

Table 5.5.8. Prioritized List of LATIP Projects (I-880 only).
Source: Central County Freeway Study (Central County LATIP), Table 23, Page 38.

Southern Alameda County LATIP
The 1986 Alameda County Measure B Expenditure Plan included an SR-84 Historic Parkway project to provide an improved link between I-880 and SR-238 in the cities of Fremont, Newark and Union City. Due to local opposition, planning agencies sought to replace the Historic Parkway project with a program of projects and actions intended to relieve congestion in southern Alameda County in the same corridors that would have been affected by the Historic Parkway. This program of projects is documented in the Southern Alameda County LATIP (which includes a number of projects on I-880), which would be funded through the sale of right-of-way originally purchased for the original SR-84 Historic Parkway project.

Existing and future deficiencies were identified with the current regional traffic model, and were discussed with a TAC comprised of key staff from Caltrans, ACTA, ACCMA and the Cities of Fremont, Newark and Union City. The prioritized LATIP project list was approved by the TAC in September 2008 after a series of meetings to identify and prioritize eligible projects. It reaffirmed its approval of the LATIP and endorsed it in February 2009.

The I-880 improvements identified by the Southern Alameda County LATIP are as follows:
- I-880 / Mission Blvd. Interchange Completion
- I-880 Aux. Lanes, Dixon Landing to Alvarado-Niles
- ICM/TOS I-880 South of SR-92

The Southern Alameda County LATIP projects on I-880 will help mitigate the existing bottlenecks on northbound I-880 at Tennyson, and southbound and northbound I-880 at Dixon Landing Road.

Santa Clara VTA Valley Transportation Plan (VTP) 2035
VTP 2035 is the long range vision for transportation in Santa Clara County. The VTP is prepared and updated by the VTA on a cycle coinciding with the update of the Bay Area's RTP. It includes system management strategies as well as capacity-increasing projects to address identified performance problems. The recommended projects on I-880 within Santa Clara County are included in VTP 2035. These projects consist of ramp metering and roadway improvements along the route, and are listed in Table 5.7.1. VTP 2035 was adopted in early 2009.

Santa Clara VTA I-880 Corridor Study
The I-880 Corridor Study Final Report identifies an "ultimate alternative" of recommended improvements on the I-880 Corridor, between the Old Bayshore Interchange and the I-280 Interchange. These recommended improvements include:
- Extension of the HOV lanes in both directions of I-880 from US-101 to I-280;
- Reconfiguration of the northbound portion of the I-880/I-280/Stevens Creek interchange to a partial cloverleaf configuration;
- Reconfiguration of the southbound portion of the I-880/Stevens Creek interchange to a diamond configuration;
- Construction of a new direct flyover connection between northbound I-280 and northbound I-880.

In this segment of I-880, ramp metering is currently operational in the southbound PM direction, from US-101 to the Bascom Interchange. The remaining ramp meters within this segment of I-880 are anticipated for implementation upon completion of an ongoing FPI funded project. The "ultimate alternative" evaluation for Future Year 2030 assumes ramp metering is operational throughout this section. Based on completion of this "ultimate alternative", the I-880 Corridor Study forecasts 2030 future year freeway operations within this segment of the I-880 corridor.

The VTA financially-constrained scenario for VTP 2030[5] was used to generate forecasted changes in travel demand. A CORSIM simulation model was used to evaluate weekday AM and PM peak hour weekday conditions. The CORSIM model included the I-880 freeway, along with segments of I-280 and parallel arterial corridors.

Performance Measures from the CORSIM Future Year 2030 model are shown in Table 5.5.9.

I-880 SCL Performance Measures (2030-Ultimate Alternative)

Performance Measures	AM Peak Period *	PM Peak Period *
Network Wide (includes all freeway, ramp, and arterial)		
VMT (Veh-Miles)	435,900	425,900
Delay (Veh-Hr)	7,550	12,800
VHT (Veh-Hr)	15,400	20,700
Average Speed (mph)	28	21
I-880 Freeway Only		
Average Speed (mph) - Northbound	47	54
VMT (Veh-Miles) - Northbound	131,100	113,800
Average Speed (mph) - Southbound	38	20
VMT (Veh-Miles) - Southbound	139,100	141,700

Table 5.5.9. I-880 SCL Performance Measures (2030 -Ultimate Alternative).

Source: VTA I-880 Corridor Study, Measure of Effectiveness Summary, Tables 6.3 & 6.4.
* AM Peak Period from 7AM to 10AM, PM Peak Period from 4PM to 7PM.

During the AM peak, the ultimate alternative would eliminate each of the existing major bottlenecks on I-880 northbound between I-280 and US 101. A minor bottleneck would still exist between US 101 and Bayshore, and some slowing would occur due to merging at the I-280 connector and Coleman Avenue on-ramp.

In the southbound direction, the introduction of an HOV lane through the US-101 junction by conversion of an existing lane would reduce the capacity of this freeway segment. Combined with the increased demands in 2030, this condition results in the development of a major bottleneck with significant queues occurring throughout the peak period and extending as far as the Brokaw interchange. This represents a significant deterioration in corridor operating conditions.

During the PM peak, the addition of the northbound I-880 HOV lane would eliminate a minor bottleneck between Coleman Avenue and First Street. Some minor slowing is projected at the transition to the HOV lane near the I-280 junction and between First Street and US-101.

Also in the PM peak, the combination of the increased demands in 2030 and the reduced capacity (due to conversion of one mixed flow lane to HOV) through the US-101 junction greatly increases the severity of this bottleneck on southbound I-880. The ultimate scenario is forecast to produce low average speeds and

[5] Valley Transportation Plan 2030 prepared by Santa Clara Valley Transportation Authority and adopted February 2005

high total delays. Queues are estimated to extend beyond Montague starting around 4:30 PM and through the end of the analysis period.

Alternatives for extending the southbound HOV lane through the US-101 junction that do not involve conversion of an existing lane will greatly reduce or eliminate the severity of both the AM and PM southbound congestion.

Overall Corridor Findings
We expect that the magnitude of advanced adaptive ramp metering benefits in the Santa Clara County portion of the I-880 corridor to roughly approximate the benefits reported above for the Alameda County portion of the corridor as reported by the I-880 Corridor Management Plan Demonstration.

It is important to note that the improvement scenarios evaluated do not take into account the reduced demand and improved conditions expected on alternative freeway and arterial routes. Higher demand and HOV use can be expected on I-880 as a result of improvements. In doing so, the travel demand on alternative routes may decrease thereby improving the operating conditions of these alternative freeway and arterial facilities.

The CSMP team noted that safety benefits cannot be measured effectively in a simulation model, so improvements in traffic safety from recommended improvements are not estimated in this CSMP. For example, the TCIF project that is providing geometric upgrades at 23rd and 29th Avenues are expected to result in some mobility improvements, but its primary purpose is to improve safety. As a result, the potential benefits of recommended projects are understated with regard to improved safety.

Another significant benefit of these recommendations is reductions in GHG emissions. GHG emission reductions resulting from recommended improvements on the I-880 corridor from 7th Street to SR-237 alone could add up to an average of 20,000 tons per year. This demonstrates that operational improvements can, and should, contribute to the attainment of GHG emission targets mandated by AB 32 and SB 375.

5.6 Areas for Further Study

Despite expected corridor performance improvements (should all of the recommended projects and strategies be implemented), some performance problems are expected to continue in the future. The following areas deserve additional study to determine how they would impact corridor performance over and above the CMIA funded projects and CSMP recommended improvements. They are briefly discussed below.

Goods Movement
The high significance of truck traffic on the I-880 corridor requires continual study and monitoring of this vital activity. Of particular interest will be monitoring the effect on corridor mobility by constructing the recommended (and currently programmed) Trade Corridor Improvement Fund (TCIF) project. This project will remove and reconstruct the 29th Avenue overcrossing and the two 23rd Avenue overcrossings of I-880. Reconstruction of the overcrossings will provide room to widen the existing I-880 mixed flow lanes to the Caltrans standard width of 12 feet. Additional guidance into future goods movement issues in the I-880 corridor include:

- The statewide Goods Movement Action Plan (GMAP) was developed in 2007 to address the state's goods movement-related congestion, environmental and community impacts, port security and economic issues. Although the I-880 corridor is not mentioned specifically in the plan (except for the

23rd and 29th Avenue TCIF project), it provides a blueprint for immediate and future actions related to goods movement efficiency and environmental improvement.

- The Regional Goods Movement Study in 2004, which provided guidance to decision makers that would help determine appropriate investment strategies and policies for improving regional goods movement. This was accomplished by evaluating the economic significance of goods movement, analysis of land-use and goods-movement issues, air quality issues related to goods movement and identified project and policy options.

High Occupancy Toll (HOT)/Express Lanes

MTC's 2009 RTP proposes a Regional Express Lane Network for the Bay Area, which includes Express Lanes on I-880 corridor. The conversion of HOV lanes to Express Lanes on I-880 would increase the total number of vehicles using the HOV lanes, provided those lanes have available "vacant" capacity that can be "bought" by single-occupant drivers who are willing to pay a toll in exchange for a faster trip in the HOV lane. Should enabling legislation be signed into law at some point in the future, significant further analysis and consultation with jurisdictions along the corridor will be required to determine the feasibility, cost-effectiveness and appropriateness of converting the HOV lanes to Express Lanes.

I-880 / US-101 Interchange Enhancements

Improvements to this interchange have been discussed as part of previous studies (including the VTA I-880 Corridor Study), as it is consistently identified as a controlling bottleneck both now and in the future with CSMP recommended improvements. While significant benefits may be achieved through improvements to this major interchange, costs and right-of-way impacts were found to be prohibitive for current consideration. Additional study will be required to identify feasible solutions.

BART Extension to San Jose

BART's Silicon Valley extension will begin south of the future BART Warm Springs Station in Fremont and proceed alongside the Union Pacific Railroad (UPRR) through Milpitas to San Jose and Santa Clara. The 16 mile project will be delivered through a phased approach. On September 9, 2009 ground was broken on the subway portion of the Warm Springs extension. Engineering work on the remainder of the project is advancing and full construction activities are scheduled to begin in late 2012. The project's purpose is to improve transit service in the Silicon Valley corridor to address growth in corridor travel over the next twenty years. Specific benefits to I-880 include a reduction in traffic demand, vehicle miles traveled, improved transit travel times, and a reduction in emissions. Future corridor planning efforts should review opportunities for this transit project to integrate with the broader transportation network.

California High-Speed Rail

The proposed California High Speed Rail (CHSR) project was given a boost when voters approved the passage of Proposition 1A authorizing the issuance of $9.95 Billion in general obligation bonds for the project. When built, high speed trains capable of 220 mph will link San Francisco and Los Angeles in two and one half hours. The planned system would also serve other major cities such as Sacramento, San Jose, Fresno, Bakersfield, Anaheim, Riverside and San Diego. When CHSR is completed and linked to BART, ACE and the VTA light rail system in San Jose, the impact on I-880 should be a further reduction in travel demand, coupled with related benefits. Future corridor planning efforts should review integration opportunities of CHSR among the elements of the larger transportation network.

5.7 Summary of CSMP Recommendations

This evaluation recommends that Caltrans and its partners in the I-880 corridor focus on implementation of adaptive ramp metering on the full I-880 CSMP Corridor to support the mobility benefits of the CMIA projects currently being developed and support the further development of overall corridor mobility improvements. If implemented fully within the cooperative performance-based system management envisioned in the CMIA Program, the adaptive ramp metering operational strategy would provide the highest mobility benefits in the corridor relative to costs.

The large list of interchange improvements and auxiliary lanes that were tested together will provide a reasonable return on investment, along with delay reductions. It will also be necessary to do additional project-specific analysis to provide more specific benefits assessments through the traditional project development process. In addition, the HOV extensions funded through the CMIA program should generate a higher return on investment than expected when an expected increase in ridesharing and transit use takes place.

The I-880 CSMP Corridor partners are also committed to improving mobility through future studies (such as future conversion of HOV to express lanes, goods movement improvements, I-880/ US 101 Interchange options) and future projects identified through the traditional transportation planning process and local transportation plans (such as the pair of LATIPs in Alameda County). The MTC Integrated Corridor Management (ICM) program on I-880 is a prime example of a recent commitment to implement recommended corridor system management improvements.

The full benefit of the CMIA funded projects and the CSMP recommended projects will not be realized without ongoing cooperative system management in the I-880 corridor. The CSMP development process has brought the major players in the corridor (Caltrans, MTC, ACCMA and VTA) together to develop this set of recommendations. The next step should be a continuous improvement process to work together on corridor management, further incorporation of other modes, and enhanced collaboration to develop the SCS and PDAs in the corridor. This will provide the foundation for the next generation CSMP and future RTP and FPI updates.

Table 5.7.1 summarizes recommended CSMP improvements along with estimated cost and existing commitment to implement. Figure 5.7.1 illustrates these recommended improvements.

Summary of Recommended Projects in I-880 CSMP Corridor

I-880 Corridor Management Plan Demonstration (ALA 880):	**Est. Cost ($M)**	**Existing Commitment to Implement (note 1)**
Short Range Recommended (2012)		
Advanced Ramp Metering	25.0	X
Advanced Traveler Information	(note 2)	X
Long Term Planned (2013-2020)		
TCIF Project (Inc. 23rd and 29th St. Overcrossings)	85.0	
SB HOV Extension from Hegenberger Rd. to Marina Blvd. (CMIA Project)	108.0	
Central County Freeway Study LATIP (I-880 only, in order of priority):	**(note 3)**	
ICM / Adaptive Ramp Metering	32.5	X
I-880 Aux. Lanes, Paseo Grande to Winton Avenue *	32.5	
I-880 Aux. Lanes, Whipple Rd. to Industrial Pkwy. West *	19.5	
I-880 Industrial Pkwy. Interchange	41.0	
I-880 Davis St. Interchange	11.1	
I-880 Marina Blvd. Interchange	24.4	
I-880 / Whipple Road Interchange *	13.5	
I-880 / West A Street Interchange *	27.0	
I-880 / West Winton Avenue Interchange *	25.0	
Extend Northbound HOV Lane	155.5	
I-880 / Washington Interchange	31.0	
SR-84 Study LATIP (I-880 only, in order of priority):	**(note 3)**	
I-880 / Mission Blvd. Interchange Completion (CMIA project candidate)	42.4	
I-880 Aux. Lanes, Dixon Landing to Alvarado-Niles	5.0	
ICM / TOS, I-880 South of SR-92	10.0	X
Valley Transportation Plan 2035 (I-880 only):		
I-880 HOT Lanes, ALA County Line to US-101	20.0	
I-880 / Montague Expressway Interchange Improvement	12.0	
I-880 / I-280 / Stevens Creek Blvd. Interchange Improvement (CMIA Project)	64.0	
I-880 Widening for HOV Lanes, SR-237 to Old Bayshore (CMIA Project)	95.0	X
I-880 NB Aux. Lane, Coleman Ave. to First St.	13.0	
I-880 Ramp Metering, Various Interchanges (FPI)	(note 4)	X
Valley Transportation Authority I-880 Corridor Study:		
Near-Term Projects		
NB Stevens Creek Interchange Reconfiguration	(note 5)	
SB Stevens Creek Interchange Reconfiguration		
Long-Term Improvements		
NB I-280 to NB I-880 Direct Connector	(note 5)	
I-880 HOV Lane Extension, US-101 to I-280	150.0	

** Also listed in I-880 Corridor Management Plan Demonstration*

Table 5.7.1. Summary of Recommended Projects in I-880 CSMP Corridor.

Note 1) Existing Commitment to Implement is defined a programmed project or similar funding commitment.
Note 2) Advanced Traveler Information considered 511, Travel Times on CMS, and other emerging technologies.
Note 3) LATIP projects are listed with current estimated funding need, not necessarily total cost.
Note 4) Estimated cost for SCL 880 Ramp Metering (capital and operating) not precisely quantified in VTP2035; costs often included as part of larger capital projects.
Note 5) Cost included as part of 880/280/Stevens Creek project in VTP2035.

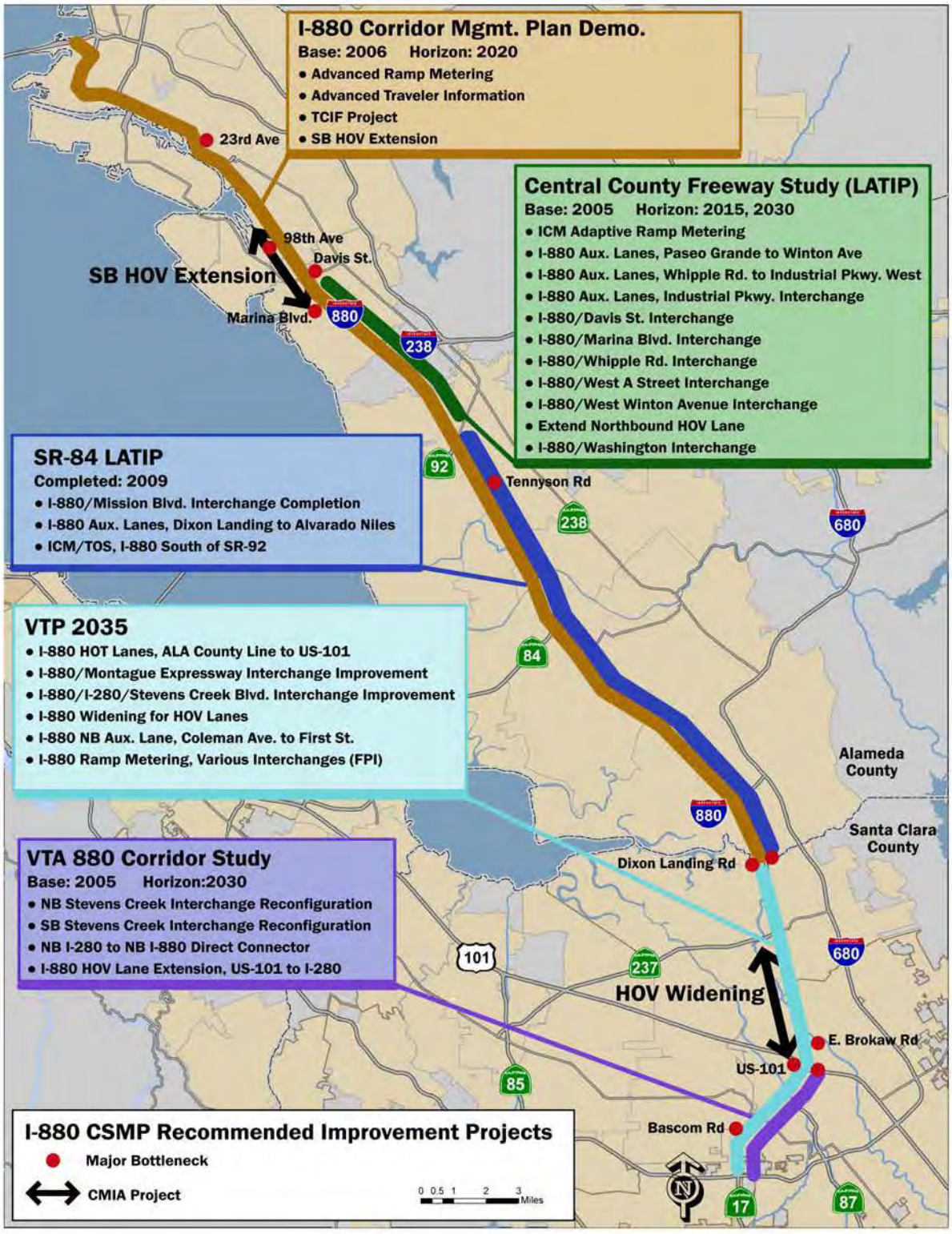

Figure 5.7.1. I-880 CSMP Recommended Improvement Projects.