Statement of Reaffirmation

I-580 East Corridor System Management Plan

District 4

June 2017

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 in California. Since the passage of the Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006, known as Proposition 1B, the California Transportation Commission (CTC) requires that all corridors with a Corridor Mobility Improvement Account (CMIA) funded project have a CSMP that is developed with regional and local partners to preserve the mobility gains from of urban corridor capacity improvements over time and to describe how they intend to do so in project nominations. The CSMP also recommends how the congestion-reduction gains from the CMIA projects will be maintained with supporting system management strategies.

The I-580 East CSMP was developed pursuant to Government Code 65086, conformed to the CMIA requirements and supported then Governor's Strategic Growth Plan. The I-580 East CSMP describes the current land use, transit, bicycle/pedestrian facilities, and the Metropolitan Transportation Commission's (MTC) FOCUS regional blueprint Priority Development and Conservation Areas program that was designed to meet the requirements of Assembly Bill (AB) 32 and Senate Bill (SB) 375 on greenhouse gas emissions reduction. Due to the complexity of the I-580 East Corridor, this CSMP employs a more data-intensive approach than that found in a Transportation Concept Report (TCR). The recommended strategies focus on system management and multimodal improvements.

This CSMP represents a cooperative commitment to develop a corridor management vision for the I-580 East Corridor. The CSMP development process was a joint effort of Caltrans, MTC and Alameda County Congestion Management Agency. This Core Stakeholder Group, that also included multiple functional units from Caltrans and local agencies, worked through a Technical Advisory Committee (TAC) to develop the plan. The resulting document is consistent with both the Regional Transportation Plan and local plans at the time.

The I-580 East CSMP was developed and signed prior to the adoption of the 2012 TCR Guidelines and Template. However, it covers the majority of the topical areas required in the new TCR format and provides a more robust traffic analysis. The document's 25-year Corridor Concept conforms to current laws, regulations, and Caltrans policies and priorities, and therefore still remains valid. While many short-term strategies recommended by the document may have already been or are currently being implemented, the remaining 25-year corridor strategies, especially those long-term recommendations that focus on system management and operations and multimodal improvements, are consistent with Caltrans Mission, Vision, Goals and Objectives as well as the Strategic Management Plan 2015-2020.

This Statement reaffirms the 25-year Corridor Concept as well as the long-term recommended strategies to help achieve the Concept as described in the I-580 East CSMP. During the next phase of Corridor Planning, Caltrans District 4 System and Regional Planning will work with Headquarters Division of

Transportation Planning to revamp the System Planning program, identify new System Planning products and establish new formats/templates for corridor planning documents. The 25-year concept for each corridor will be revisited and updating documents developed prior to 2012 will be one of the high priorities. It is our goal that the new and improved products and formats will strategically accommodate document updates, address new State Highway Operation and Protection Program (SHOPP) Asset Management requirements, and support further enhanced coordination and collaboration with internal and external stakeholders.

CALTRANS MISSION, VISION & GOALS

MISSION:

Provide a safe, sustainable, integrated, and efficient transportation system to enhance California's economy and livability.

VISION:

A performance-driven, transparent and accountable organization that values its people, resources and partners, and meets new challenges through leadership, innovation and teamwork.

GOALS:

Safety and Health - *Provide a safe transportation system for workers and users, and promote health through active transportation and reduced pollution in communities.*

Stewardship and Efficiency – *Responsibly manage California's transportation-related assets.*

Sustainability, Livability and Economy *- Make long-lasting, smart mobility decisions that improve the environment, support a vibrant economy, and build communities, not sprawl.*

System Performance *- Utilize leadership, collaboration and strategic partnerships to develop an integrated transportation system that provides reliable and accessible mobility for travelers.*

Organizational Excellence *- Be a national leader in delivering quality service through excellent employee performance, public communication, and accountability*.

Interstate 580 East

Corridor System Management Plan

May 2010

volume I

CALTRANS DISTRICT 4

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corridor system management plan

APPROVED BY:

5/7/10

BIJAN SARTIPI,
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California Department of Transportation

Date

I accept this Corridor System Management Plan for the Interstate 580 East Corridor as a document informing the regional transportation planning process.

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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 co-operation of all major stakeholders. This CSMP represents a cooperative commitment to develop a corridor management vision for the I-580 East Corridor. The strategies evaluated have the potential to impact the local arterial system and the regional and local planning agencies that have the corridor within their jurisdiction. These representatives participated in the Technical Advisory Committee (TAC) and provided essential information, advice and feedback for the preparation of this CSMP. The stakeholders/partners include:

- Metropolitan Transportation Commission
- Alameda County Congestion Management Agency
- City of Dublin
- City of Livermore
- City of Pleasanton
- Alameda County
- Alameda County Transportation Improvement 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.

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 System Planning, whose seemingly limitless energy and passion for transportation system planning in California has been an inspiration to countless transportation planners 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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introduction

This Corridor System Management Plan (CSMP) represents a cooperative commitment to develop a corridor management vision for the I-580 East Corridor. The CSMP development process was a joint effort of the California Department of Transportation (Caltrans), the Metropolitan Transportation Commission (MTC), and the Alameda County Congestion Management Agency (ACCMA). This Core Stakeholder Group worked with local planning agencies, through a Technical Advisory Committee (TAC) to develop this plan. The goal is to propose strategies to achieve the highest mobility benefits to travelers across all jurisdictions and modes along the I-580 East CSMP Corridor.

PLANNING AND POLICY FRAMEWORK

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

In the San Francisco Bay Area, Caltrans is completing nine CSMPs. This I-580 East CSMP reflects data and projects from MTC's current RTP, *Change in Motion, Transportation 2035 Plan*, adopted April 2009. The CSMP recommends strategies that could potentially become projects through the regional transportation project development and prioritization process. In the San Francisco Bay Area, the CSMP process has taken place in coordination with the MTC's Freeway Performance Initiative (FPI), a commitment to invest $1.6 billion over 25 years to deploy technology to manage congestion on the freeway system. The FPI has provided the technical freeway performance analyses for the CSMPs.

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

and Conservation Areas. These are provided as a backdrop for understanding how the highway corridor works.

THE I-580 EAST CSMP

The objectives of the I-580 East 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-580 East 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:

- Eastbound High Occupancy Vehicle (HOV) Lane, Hacienda to Greenville
- I-580/84 Isabel Interchange
- Westbound HOV Lane, Greenville to Foothill

The I-580 East CSMP addresses State Highways, local parallel roadways, the bicycle and pedestrian network, and regional transit services pertinent to corridor mobility. The CSMP also identifies gaps in the bicycle and pedestrian network and regional transit services and discusses opportunities for the future.

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

METHODOLOGY

A corridor performance assessment and technical analysis of the I-580 East CSMP Corridor was conducted through the FPI, a partnership between MTC and Caltrans. The performance assessment evaluated the current highway performance along the corridor and determined causes of performance problems.

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

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

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

- Intelligent Transportation System (ITS) improvements
- Corridor-wide ramp metering
- Signal optimization
- Augmented Freeway Service Patrol (FSP)
- Accelerated planned auxiliary lane and ramp improvements
- Extend and enhance HOV/High Occupancy Toll (HOT) operations
- Major interchange improvements
- Additional transit and Transportation 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. The CSMP builds upon the capital project recommendations of the Tri-Valley Triangle Study, the Central County Freeway Study, the Countywide Plan and the MTC 2009 RTP (T2035). These recommendations add system management and other strategies to provide additional benefit and efficiencies.

Since Caltrans and the regions launched this first cycle of corridor system management planning in 2007 (called *first generation CSMPs*), the statewide planning policy context has evolved significantly. Assembly Bill (AB) 32 policy on reducing greenhouse gas emissions has moved into implementation with passage of Senate Bill (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.

STAKEHOLDER ISSUES AND CONCERNS

Stakeholder concerns, following the CSMP development process, focused on SB 375 requirements, CSMP analysis scope, and the local arterial network. Stakeholders commented that recommended improvements in the CSMP do not emerge from a multi-modal and integrated transportation land use planning effort, such as integrating transit, bicycle and pedestrian networks, and demand management. Local jurisdictions point out that impacts of poor freeway performance stretch far beyond the Corridor limits. Local jurisdictions want to improve circulation on the local streets without attracting regional and interregional cut-through traffic from the freeway.

This represents a summary of the issues and concerns shared by Stakeholders during the CSMP External Review Process. A full listing of Stakeholder issues and concerns are located in Volume 1, Section 1.16 CSMP Overview.

CSMP DOCUMENT

The CSMP document is organized in two Volumes (Volume 1 and Volume 2). Volume 1 includes the CSMP Summary, the CSMP Overview, and the CSMP technical analysis report. The CSMP Summary serves as a standalone document and provides corridor facts and description summaries, key findings and recommended improvements from the technical analysis. The CSMP Overview contains a more detailed description of the corridor and its significance within the highway system and other modes. The CSMP technical analysis report presents existing conditions and trends, transit service description, corridor management issues and strategies, detailed results of the micro-simulation and operational analysis, and recommendations based on this analysis. Volume 2 includes two Appendices. Appendix I contains information about corridor segments, freeway agreements, CMIA projects, maintenance plans, and corridor concept. Appendix II contains memorandums that further describe methodologies used for the technical analysis.

The I-580 East Corridor system will be continuously 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.

Interstate 580 East

Volume I: CSMP Summary

1. I-580 East CSMP Corridor Facts Segment Data Summary
2. CSMP Overview
3. Corridor Description
4. Comprehensive Corridor Performance Assessment
5. Recommended Corridor Management Improvement Strategies

1. I-580 EAST CSMP CORRIDOR FACTS

Corridor Limits
I-580 at the I-580/I-205 I/C near the San Joaquin/Alameda County line to the I-880/I-238 I/C

Corridor Description
The I-580 East CSMP Corridor is an east/west route in Alameda County that begins at the I-580/I-205 interchange near the San Joaquin / Alameda County line and traverses westward at the I-580/I-238 split, continues along I-238, and ends at the I-880/ I-238 interchange. The corridor is 33 miles long, operates six to ten freeway lanes, and provides direct connections to two major north-south freeways: I-680 and I-880. The corridor also intersects State Route (SR)-84, SR-238, and SR-185.

Corridor Concept (2035)
6F – 12F (3H/1TCL)*
**F=Freeway, H=HOV/ HOT Ln, TCL=Truck Climbing Ln*

Route Designation and Regional Setting

Functional Classification	Principal Arterial – Interstate Freeway
Trucking Designations	STAA National Network Route: Yes Terminal Access Route: Yes SHELL Route: No
Other Designations	Interstate Freeway
Interregional Road System	Yes: High Emphasis Route
Life Line	Yes
MPO	Metropolitan Transportation Commission
Air Quality District	Bay Area Air Quality Management District
Mode-Split*	67% SOV,10% Rideshare, 11% Transit, 4% Walk, 3% Other Means, 5% Wk Home

**2007 American Community Survey*

Multi-Modal Service
There are park-and-ride facilities in Livermore and Castro Valley. Bus transit is provided by Alameda-Contra Costa Transit (AC Transit) and Wheels in the Tri-Valley. Intercity has scheduled service through Greyhound bus lines. Rail transit is provided by Bay Area Rapid Transit (BART) and Altamont Commuter Express (ACE).

Interregional Significance
The I-580 freeway is the primary east/west route connecting the Bay Area with Tri-Valley housing, Central Valley commerce, and access to the I-5 freeway in order to transport goods to Southern California and points beyond. It also serves as a significant regional and interregional commuter route. With connections to the interstate network, I-580 is a major gateway for goods movement into and out of the Bay Area's five seaports (including the Port of Oakland), three commercial airports, and four rail freight terminals, as well as a primary route for eastbound travelers destined for the Sierra Nevada Mountains and Southern California.

Corridor Specific Issues

- Many segments are ranked among the most congested in the Bay Area during peak hours.
- Serves as a major transportation corridor between the Bay Area and Central Valley regions.
- Is a major route for the movement of goods/freight into and out of the Bay Area region.
- High volume of regional and interregional commuter, freight, and recreational traffic creates operational challenges.

Corridor Objectives-Desired Outcomes

- Reduce delay within the corridor
- Reduce variation of travel time
- Reduce accident and injury rate
- Restore lost lane miles (productivity)
- Reduce distressed lane miles

Performance Measure	*Description*
Mobility	Vehicle Hours of Delay (VHD)
Reliability	Travel time
Safety	TASAS data
Productivity	Equivalent lost lane miles
System Preservation	Pavement condition data

Current Performance
Top 3 Congested Locations (2008)

Location	*VHD*
EB PM I-680 to N. Livermore Ave.	5,250
WB AM I-205 to Airway Blvd/Route 84	4,240
WB AM Crow Canyon Rd. to I-580/I-238 off-ramp	2,530

Source: State of the System (MTC)

Key Bottlenecks

Route/Location/Direction	*AM/PM*
I-580/I-205 Merge to Grant Line Rd/WB	AM
I-580/Airway Blvd to Tassajara Rd WB	AM
I-580/Dougherty Rd to I-680 WB	AM
I-580/Santa Rita Rd to Fallon EB	PM
I-238/I-580 to I-880 NB/WB*	AM/PM
I-238/I-880 NB to Lewelling SB/EB*	PM

** Data pending on impact of I-238 widening on bottlenecks*

Recommended Corridor Management Strategies

- Enhance HOV / HOT Operations
- Signal Optimization, ITS Improvements
- Corridor-Wide Ramp Metering
- Augment Freeway Service Patrol
- Accelerate planned freeway capacity improvements
- Preserve transit improvements

Segment Data Summary

CSMP Segment	CO/RTE/ PM Start	VHD (AM/PM)	Peak Period Demands		AADT (2007)	Truck %	Accident Rate (Actual / Statewide Average)	HOV	Aux	Bottleneck Location	
			Eastbound Volume (2008/2035)	Westbound Volumes (2008/2035)						WB	EB
A	ALA/580/ 00.39	5,607 / 4,056	33,596 / 58,205	22,637 / 47,306	41,000-144,000	12.5	.19 / .20	N		X	
B	ALA/580/ 05.98	5,607 / 4,056	32,837 / 57,967	23,098 / 43,818	144,000-153,000	10.4	.27 / .29	N	X	X	
C	ALA/580/ 09.68	5,607 / 4,056	39,323 / 57,606	28,217 / 45,509	182,000-195,000	11.2-12.2	.26 / .31	Y			
D	ALA/580/ 14.20	5,607 / 4,056	39,323 / 54,302	30,443 / 46,561	195,000-212,000	6.7-9.1	.32 / .33	N	X	X	X
E	ALA/580/ 21.43	4,451/7,336	30,027 / 38,954	23,851 / 34,858	182,000	6.7	.18 / .30	N			
F	ALA/580/ 23.72	4,451/7,336	30,312 / 39,664	23,865 / 34,826	181,000-182,000	6.7	.13 / .30	N			
G	ALA/580/ 28.75	4,451 / 7,336	35,362 / 39,916	24,146 / 32,850	180,000-196,000	5.7-6.1	.31 / .30	N	X	X	X
H	ALA/238/ 14.46	301 / 202	20,126 / 32,588	14,653 / 24,787	82,000-133,000	7.6-13.3	.52 / .36	N	X	X	X

Sources:
CO/RTE/PM Start: From CSMP segmentation modified from 2002 TCCR segments. Start of segment only.
VHD: CSMP technical analysis Mobility Trends Tables 40, 41, 42
Volumes, AADT, Truck %: http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/
Accident Rate: Traffic Accident Surveillance and Analysis System (TASAS) Table B (09-01-04 to 08-31-07)
HOV / Auxilliary lane: X in the box if present in the corridor
Bottleneck Location: X in the box per technical analysis report

2. CSMP OVERVIEW

A 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. The corridor management planning strategy is based on the integration of system planning and system management. Each CSMP will address State Highways, local parallel roadways, regional transit services, and other regional modes pertinent to corridor mobility.

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

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

Purpose and Need Statement

On March 15, 2007, the CTC adopted *Resolution CMIS-P-0607-02.* In Sections 2.12 and 2.13 of this resolution, the CTC resolved that "…the Commission expects Caltrans and regional agencies to preserve the mobility gains of urban corridor capacity improvements over time that will be described in CSMPs, which may include the installations of traffic detection equipment, the use of ramp metering, operational improvements, and other traffic management elements as appropriate…" and "…the nominating agencies including the installations 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 for funding. CSMPs are prepared based on the need to efficiently and effectively use all transportation modes and facilities in congested corridors so as to maximize mobility, improve safety and reduce delay costs.

Consistency with Strategic Growth Plan

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

The philosophy of system management is to make the most effective use of the transportation system. The system management pyramid represents a comprehensive range of strategies to improve mobility within a transportation corridor.

It includes system monitoring at its base, followed by maintenance, smart land use, technology and operational strategies, and traditional system expansion. Simply put, the value of any investment decision made higher up in the pyramid is limited without a good foundation from the strategies below.

The System Management Pyramid

Performance Measures

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

- ***Mobility*** describes how well the corridor moves people and freight.
- ***Reliability*** captures the relative predictability of the public's travel time.
- ***Safety*** captures the safety characteristics in the corridor including crashes (fatality, injury, property damage).
- ***Productivity*** captures the loss of capacity due to congestion and resulting reductions in traffic flow rates.

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: Corridor Performance Measures
**Freeway Performance Measurement System*
***Traffic Accident Surveillance and Analysis System*

Relationship to Other Plans

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

System and regional planning documents prepared by other agencies that influence CSMP development included the 2005 RTP and the 2004 *Bay Area Regional ITS Plan.*

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

The FPI corridor-specific documents are noted below:

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

Stakeholder Engagement

Current and continuing CSMP development is dependent upon the close participation and cooperation of all major stakeholders. The strategies evaluated have the potential to impact the local arterial system, the transit service along the corridor, and the regional and local planning agencies 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. Each stakeholder category group has a role during the CSMP development process. The Core Stakeholder Group provides policy and technical guidance throughout the process. Additional planning agency partners are brought in to review and comment at key junctures, and help evaluate corridor improvement strategies.

The stakeholder engagement process framework for the current CSMP considered stakeholders 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.

District 4 CSMP Overview

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

The I-580 East CSMP

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

This CSMP represents a cooperative commitment to develop a corridor management vision for the I-580 East Corridor. The CSMP development process is a joint effort of Caltrans, MTC, and the ACCMA. This Core Stakeholder Group is working with local planning agencies through a TAC. The goal is to achieve the highest mobility benefits to travelers across all jurisdictions and modes along the I-580 East CSMP Corridor.

The I-580 East CSMP addresses State Highways, local parallel roadways/major arterials, the bicycle and pedestrian network, and regional transit services pertinent to corridor mobility. The CSMP also identifies gaps in the bicycle and pedestrian network and regional transit services and discusses opportunities for the future.

The limits of the I-580 East CSMP were determined, in collaboration with MTC, by identifying the key travel corridor in which CMIA-funded projects are located. Figure 2, illustrates the three CMIA-funded projects on the I-580 East CSMP Corridor. The CMIA-funded projects in the I-580 East CSMP Corridor are:

- ALA-580 Eastbound HOV Lane, Hacienda to Greenville
- ALA-580/84 Isabel I/C
- ALA-580 Westbound HOV Lane, Greenville to Foothill

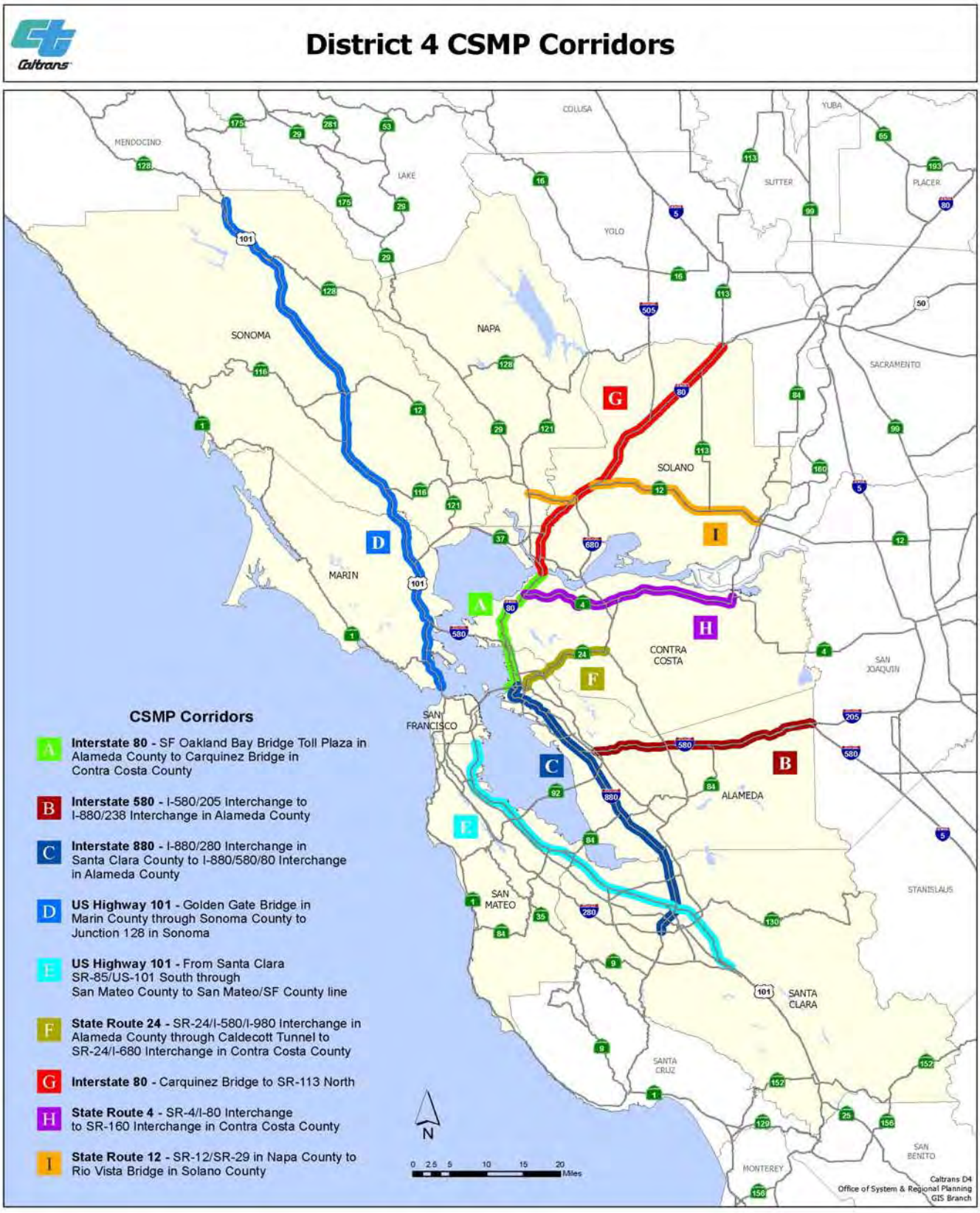

Figure 1: District 4 CSMP Corridors

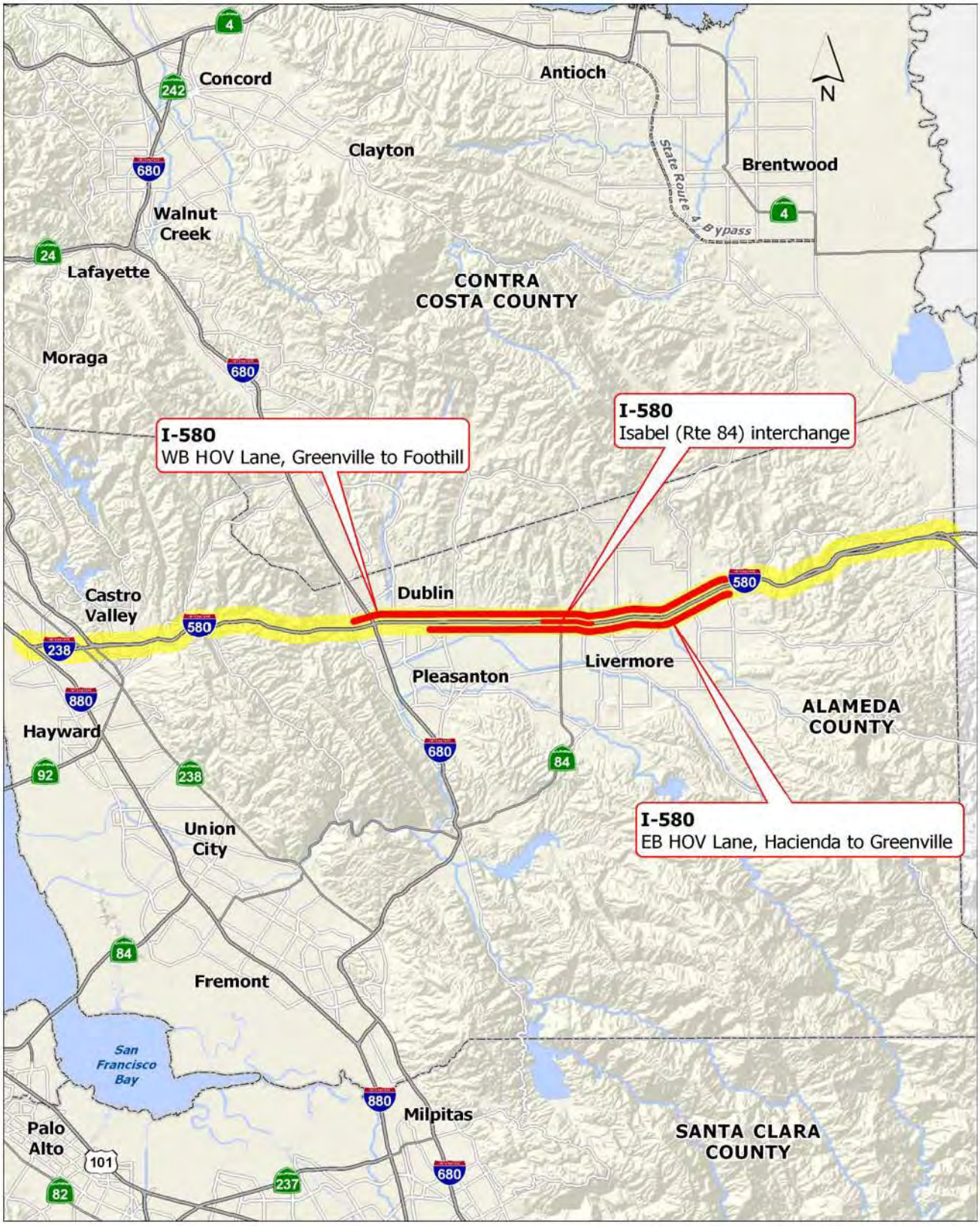

Figure 2: CMIA-Funded Projects on the I-580 East CSMP Corridor

I-580 East CSMP Corridor Team

The Core Stakeholder Group for the I-580 East CSMP Corridor is identified as Caltrans, MTC and ACCMA. Representatives met early in the development process to discuss the goals, objectives and schedule of the CSMP. This group met regularly to review and approve operational and micro-simulation data collection and analysis methodology, technical reports, and identified additional planning agency partners for further CSMP development. This Stakeholder Group and key local jurisdictions along the corridor met as a TAC at regular intervals, and provided valuable input on the recommended improvement strategies for the Corridor. 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

Additional Planning Agency Partners

- City of San Leandro
- City of Hayward
- City of Dublin
- City of Pleasanton
- City of Livermore
- Alameda County
- Alameda County Transportation Improvement Authority
- Transit Agencies (BART, LAVTA-WHEELS, AC Transit)
- Altamont Commuter Express
- Association of Bay Area Governments
- Bay Area Air Quality Management District

3. CORRIDOR DESCRIPTION

The I-580 East CSMP Corridor is the primary east/west route connecting the Bay Area with Central Valley commerce and provides access to the I-5 freeway. Historically, the Corridor was part of old U.S. 50. The Corridor comprises one of the segments in the primary highway path between the San Francisco Bay Area and Southern California metropolitan areas. The Corridor serves the growing number of commuters living outside the Bay Area, provides access for the movement of goods and freight into and out of the region, and serves significant recreational travel during weekends and summer months, to and from the Central Valley, the Sierras and Southern California. The cities of Livermore, Pleasanton, Dublin and the community of Castro Valley are the main urban centers along the Corridor. Livermore, Pleasanton, Dublin are included in what is referred to as the "Tri-Valley" region.

The Corridor is characterized by steep grades from I-205 to the west side of the Altamont Pass then continues through the highly urbanized, Tri-Valley area, including the interchange with I-680. West of the Tri-Valley area, the corridor is again characterized by another steep grade referred to as the Dublin Grade. Finally, the corridor passes through the urbanized area of Castro Valley and closely spaced interchanges including the roughly two-mile segment of I-238 that connects to I-880 in the city of Hayward.

The Corridor is functionally classified as a Principal Arterial – Interstate Freeway. The I-580 freeway segment is primarily an eight-lane freeway facility, with four mixed flow lanes in each direction, from the I-205 Interchange in the east to the I-238 Interchange to the west. Auxiliary lanes are constructed between certain interchanges of the I-580 segment of the Corridor. A new eastbound HOV lane from the Portola Overcrossing to Greenville Rd. was constructed and open to traffic as of Fall of 2009. There is ramp metering along the I-580 facility. The I-238 segment of the Corridor is a six-lane facility with three lanes in each direction (as of Fall 2009). There is no ramp metering along the I-238 segment of the corridor.

Goods Movement

The Corridor is a National Network Route, allowing Surface Transportation Assistance Act (STAA) trucks, and

designated as a High Emphasis Route on the Interregional Road System (IRRS). The Corridor is the primary connection between the Bay Area and the national interstate truck network and experiences the second highest volume of truck traffic in the region, most of it long-haul in nature and involving the heaviest trucks. The Corridor serves as a major conduit for freight being transported to and from the Port of Oakland, other origin and destination points and to manufacturing industries, farms and distribution centers in the Central Valley. Trucks consist of 5.7 to 13.3 percent of the total vehicle volume along the Corridor.

The Corridor includes the Altamont Pass (elevation 755 feet[1]) located in the Diablo Range between the San Joaquin Valley and the Livermore/Pleasanton area and is characterized by steep grades. Trucks traveling through the Altamont Pass are unable to maintain typical freeway speeds on the upgrades, causing congestion. It is also a Union Pacific rail corridor accommodating UP freight traffic. The ACE operates along the corridor on the Union Pacific owned rail line between the San Joaquin Valley and the San Francisco Bay Area.

Trucks over 4.5 tons are prohibited on I-580 between the San Leandro border and Grand Avenue in the City of Oakland (beyond the I-580 East CSMP Corridor limits). These heavy trucks are thus required to take I-238 and I-880 as an alternative route through Oakland. This location is essentially at the Foothill Boulevard off-ramp where westbound trucks must exit I-580.

According to the CSMP technical analysis, the most critical issues for truck movement in the Corridor are the unpredictable levels of congestion in the westbound direction during the morning peak hours and in the eastbound direction during the afternoon peak hours.

Transit

The transit network along the Corridor includes express commuter services connecting the Central Valley to the Bay Area and local transit services that provide connections within the Tri-Valley region, specifically Dublin, Pleasanton and Livermore. The major providers are BART, ACE, and the Livermore Amador Valley Transit Authority (LAVTA) bus service, also known as WHEELS. Transit comprises eleven percent of the mode-share along the Corridor.

Major Arterials

The Corridor intersects with I-680 in the city of Dublin, SR-84 near the City of Livermore, and SR-238 and SR-185 near the cities of San Leandro and Hayward. The I-580 freeway segment of the Corridor has ten full interchanges. The Livermore, Pleasanton and Castro Valley local area arterial network experiences bypass traffic from the Corridor. The use of these alternate routes from the mainline freeway is referred to in the Livermore General Plan as “cut-through” traffic, because the traffic generated does not stop to patronize local business or job center in the area. Stanley Boulevard and Stoneridge Drive are main alternative parallel routes between Livermore and Pleasanton. Other local parallel arterials to the Corridor are Altamont Pass Road, Dublin Boulevard and Castro Valley Boulevard.

Bicycle and Pedestrian Network

Bicycling is prohibited on the I-580 and I-238 facilities. Existing bicycle facilities are located along local arterials and mainly provide access to employment centers, shopping centers, colleges and transit stations. Bicycle facility types include Class 1 (multi-use bikeway), Class 2 (designated bike lanes), and Class 3 (bike route). BART stations along the Corridor have bicycle parking and storage facilities. The Livermore area in particular has many bike paths and hiking trails that permit bicycling, primarily in the major regional parks.

Pedestrian walkways are provided across I-580 at Santa Rita Road, Airway Boulevard and First Street interchanges in the Livermore area. The Isabel Avenue interchange (under construction) will also provide pedestrian walkways. Major gaps in the bicycle and pedestrian network include limited utility across freeway interchanges, the need for continuous, connected facilities and access to transit. Opportunities to improve the bicycle and pedestrian network are addressed in county-wide plans.

[1] United States Geological Survey (USGS) Geographic Names Information System (GNIS) Index

Most general plans for jurisdictions along the Corridor encourage non-motorized transit.

Land Use/Major Traffic Generators

The Alameda County population reached 1.5 million in 2005, making it the second most populous county in the region behind Santa Clara County. Sixty-seven percent of Alameda County workers drive to work alone. Historically, the cities of Livermore, Pleasanton, Dublin, and Hayward are prominent along the I-580 East CSMP Corridor, as well as the community of Castro Valley. Various land uses along the Corridor include a mix of single and multi-family residential, undeveloped residential, commercial, light industrial, recreational, agricultural and open space. Commercial and light industrial uses are clustered around interchange areas. Three publicly owned parks are located adjacent to the Corridor. Major trip generators include: The Lawrence Livermore National Lab (LLNL), the Livermore Municipal Airport, the Stoneridge Regional Shopping Mall, Hacienda Crossings Shopping Center, and Las Positas College.

Environmental Characteristics/Constraints

It is important to note that the CSMP is general in concept; potential environmental and cultural resource issues would need more detailed scoping and coordination when project development activities occur. The natural environment along the I-580 East CSMP Corridor is highly diversified in terms of its resources and related sensitivities. Seven historical bridges and two wetland areas are located along the eastern segments of the Corridor.

Native American archaeological sites, especially frequent in the western portion of the Amador/ Livermore valley area, are likely to be buried beneath the ground surface. Threatened or endangered species are identified in specific areas, and streams along the Corridor have the potential to contain habitat for threatened species such as the California Red-Legged Frog, the California Tiger Salamander and the San Joaquin Kit Fox.

Two major land areas, included in the East Bay Regional Park system are located along or near western segments of the Corridor.

Intelligent Transportation System (ITS) and Detection

Existing ITS infrastructure on the I-580 East CSMP Corridor includes Ramp Metering (RM) stations, Traffic Monitoring Stations (TMS), Wireless Magnetometer Vehicle Detection Stations, Changeable Message Signs (CMS), Highway Advisory Radio (HAR), Extinguishable Message Signs (EMS), and Closed-Circuit Television (CCTV) cameras. Weigh-in-motion (WIM) sensors are in place at both weigh stations located between the Greenville Road/North Frontage Road interchanges and the Vasco Road Interchange; eastbound and westbound directions. Caltrans strives for traffic detection to be located at one-third to one half-mile intervals along the corridor. There is no detection between the I-205 interchange and the North Flynn Road Overcrossing. Key gaps in the detection network exist for approximately 6 miles between Schafer Ranch Road Undercrossing, just west of the I-680 Interchange, to just east of the I-238 split (there is one TMS midway). Figure 3 on the next page illustrates TMS along the Corridor.

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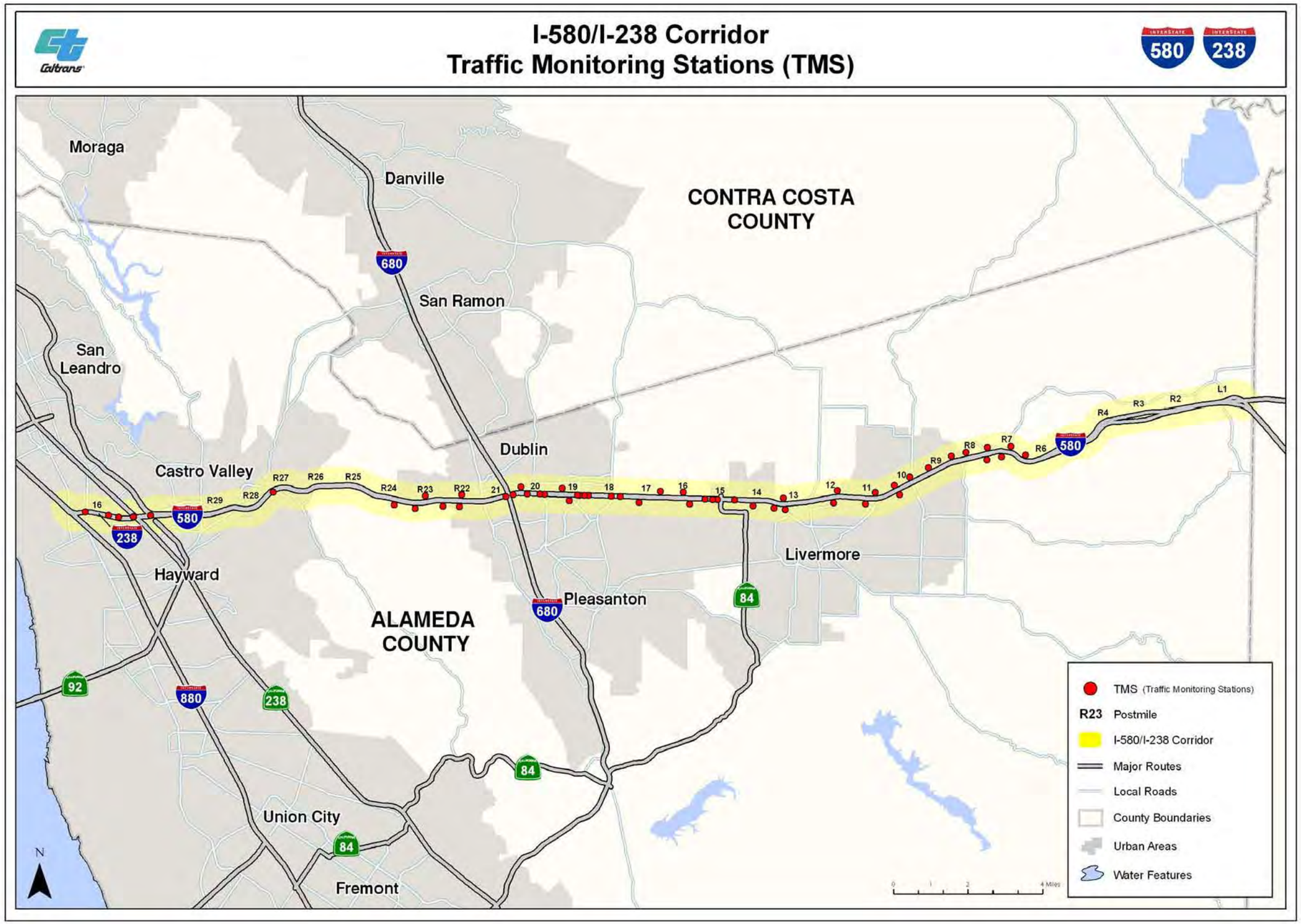


Figure 3: Traffic Monitoring Stations along the I-580 East CSMP Corridor

4. COMPREHENSIVE CORRIDOR PERFORMANCE ASSESSMENT

Freeway Performance Initiative (FPI)

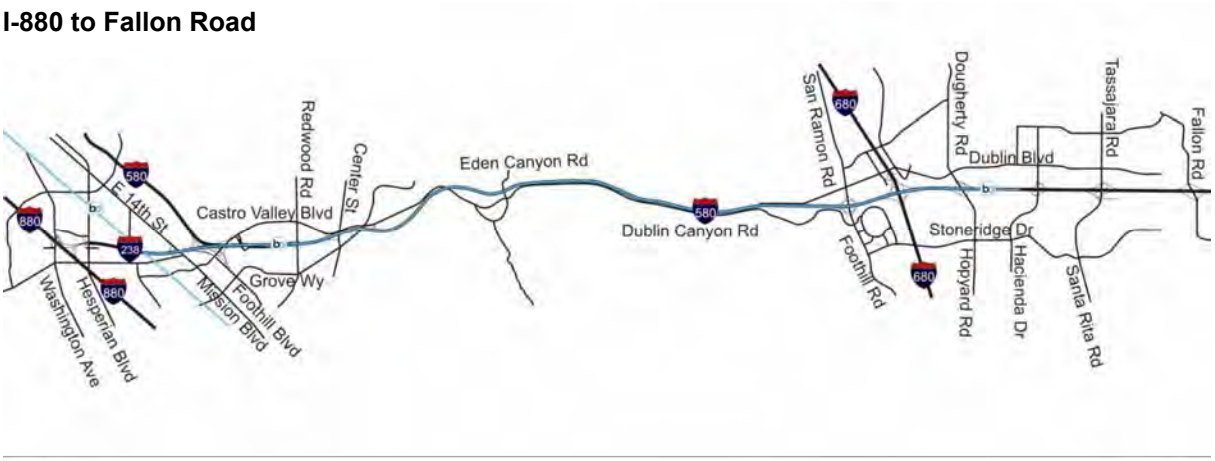
A corridor performance assessment and technical analysis of the I-580 East CSMP Corridor was contracted through the FPI partnership between MTC and Caltrans. The consultant, Dowling Associates, Inc., evaluated the current performance along the corridor and determined causes of performance problems.

Simulation modeling was used to forecast future travel conditions along the corridor. Traffic analysis methods were used to predict the impacts of a variety of operational strategies and investment scenarios. The micro-simulation model was limited to four intersections at each freeway interchange and could not feasibly model the diversion effects outside of their impacts on the surface streets in the immediate vicinity of each interchange. The interaction between corridor improvement strategies and their impacts on parallel surface streets are modeled in the ACCMA demand model, which also takes into account mode shift effects.

The ACCMA model has extensive enough geographic coverage to accurately model impacts on arterials such as Stanley Boulevard, Stoneridge Drive, SR-84 (Isabel Parkway), and Dublin Boulevard.

The consultant presented comprehensive analysis results of existing and future traffic conditions to the TAC in January 2009 and presented conclusions and recommendations for phased corridor management improvement strategies to the TAC in April 2009.

I-880 to Fallon Road



Fallon Road to I-205

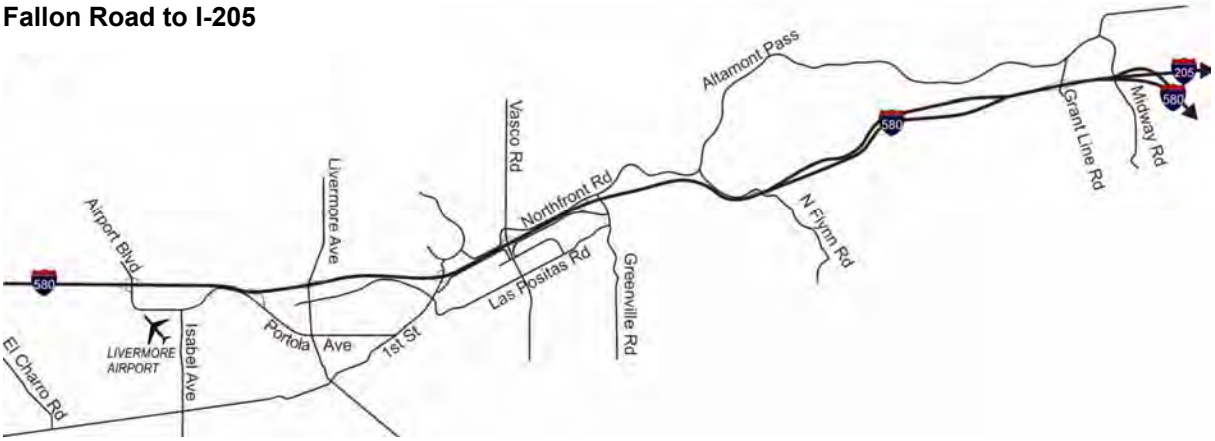


Figure 4: Alameda 580/238 Study Corridor
(from ALA-238/580 Corridor System Management Plan Technical Analysis Report-Volume 1, Section 2, Figure 1, page 9)

Dowling Associates, Inc., completed the tasks and deliverables associated with the FPI from April 2008 to April 2009. The final technical analysis report, *ALA-238/580 Corridor System Management Plan Technical Analysis Report*, dated May 2009, is located in Volume 1. Memorandums related to project schematics and cost estimates, travel demand forecasting and traffic operations analysis methodology, and traffic micro-simulation approached are located in Volume 2, Appendix II.

Key Findings and Conclusions

Baseline conditions and performance trends are presented in *ALA-238/580 Corridor System Management Plan Technical Analysis Report*, in areas of Mobility, Reliability, Safety, Productivity and Preservation. Performance trends are reported for 2008 (existing conditions), 2015 (assuming completion of currently programmed and under construction projects), and 2035 (assuming only improvements up to 2015).

The following existing conditions and trends are summarized in the CSMP technical analysis (Volume 1; Section 2; page 3):

- Current programmed capacity, traffic management, and transit improvements for 2015 will solve much of the existing traffic congestion problems in the corridor by the year 2015.
- New bottlenecks will arise in other locations as a result of increased demand between now and 2015, and the increased ability of traffic to move on the freeway after the existing bottlenecks are resolved.
- Increased demand after 2015 will soon greatly exceed the available capacity of the corridor. Congestion will increase significantly and reliability will deteriorate appreciably.
- Additional capacity, traffic management, demand management, and transit improvement will be required to address post-2015 needs.

The following existing conditions, performance trends and forecasts are extracted from the CSMP technical analysis (Volume 1; Section 2; Chapters 4 and 5, pages 29-87):

- The overwhelming majority of incidents on the Corridor are non-accident incidents. The section of I-580 between I-680 and I-205 experiences the greatest number of incidents (see Table 2).
- Future pavement conditions will be impacted favorably by improvements planned during the next five years along the corridor.
- Daily transit boardings are forecasted to increase by 145% between 2008 and 2035 (see Table 3).

Eastbound				
	I-580 I-205 to I-680	**I-580 I-680 to I-238**	**I-238 I-580 to I-880**	**Entire Corridor**
Accident, Injury	58	9	5	72
Accident, Non-injury	280	58	12	350
Accident, Other	157	39	9	205
Other Incident	768	306	57	1,131
Any Incident	1,263	412	83	1,758
Westbound				
	I-580 I-205 to I-680	**I-580 I-680 to I-238**	**I-238 I-580 to I-880**	**Entire Corridor**
Accident, Injury	71	17	7	95
Accident, Non-injury	299	94	36	429
Accident, Other	188	56	16	260
Other Incident	774	361	75	1,210
Any Incident	1,332	528	134	1,994

Table 2: Summary of Total Incidents I-580 (from ALA-238/580 Corridor System Management Plan Technical Analysis Report-Volume 1, Section 2, Tables 29 and 30, page 38)

Daily Boardings	2008	2015	2035	Growth
BART				
Castro Valley	2,500	2,690	3,950	58%
West Dublin	0	2,400	3,570	infinite
Dublin/Pleasanton	7,800	12,940	19,880	155%
BART Subtotal	10,300	18,030	27,400	166%
Wheels	6,900	7,120	11,560	68%
Tri-Delta Transit	150	155	251	68%
ACE Train	3,750	3,690	11,690	212%
San Joaquin RTD	1,310	1,290	4,090	212%
Total Corridor	**22,410**	**30,285**	**54,991**	**145%**

Table 3: Daily Transit Ridership Trends (from ALA-238/580 Corridor System Management Plan Technical Analysis Report-Volume 1, Section 2, Table 37, page 47)

- Peak period traffic demand on the I-580/I-238 freeways is forecasted to grow by between 32% and 110% between 2008 and 2035.
- The daily vehicle hours of delay (VHD) on the freeways is forecasted to increase by up to 89% in the AM Peak and by up to 38% in the PM Peak in 2015.
- Lost peak period productivity is projected to experience increase along the Corridor.
- 75% increase on I-238; I-880 to I-580 from 3.3% (2008) to 5.7% (2035).
- 41% increase on 580; I-238 to I-680 from 3.3% (2008) to 48% (2035).
- 338% increase on I-580; I-680 to I-205 from 26% (2008) to 114% (2035).
- This corridor experiences the second-highest volume of truck traffic in the region (about 12,000 trucks a day); most of it is long haul and involves the heaviest trucks.

Surface Street Management and Operations (pages 61, 67-69):

The CSMP technical analysis also addresses surface street operational issues on several of the major arterials leading to the I-580 freeway, particularly in the Pleasanton and Hayward areas.

- The daily vehicle-hours of delay on the surface streets are forecasted to increase marginally or even decrease in 2015 due to roadway network improvements. However, by 2035, severe congestion would occur given no additional improvements.
- Key surface street bottlenecks near the I-580 and I-238 freeways are located at Hopyard and Hacienda Roads (at Owen Drive), Santa Rita Road at I-580 EB; Castro Valley Blvd. at Crow Canyon Rd., and Grove Way and Foothill Blvd.
- These bottlenecks at signalized intersections are operating at peak hour volume capacity (V/C) ratios greater that 1.00 or delays greater that LOS "E".*

**According to the Caltrans Highway Capacity Manual, V/C ratio of 0.85 is considered under capacity and over 1.00 is considered over capacity.*

Surface Street Management Improvements (pages 165-169):

The CSMP technical analysis recommends improvements to surface streets and notes that studies of signal timing optimization have shown surface street management to be highly cost-effective.

- Short-term surface street management improvements consist of continued improvement of signal system coordination and optimization with integration as appropriate with freeway operations.
- Long-term surface street management improvements consist of continuing to improve signal coordination, incident detection, and incident management on surface streets.

The CSMP technical analysis also describes the following operations issues, goods movement issues, short-term and long-term forecasted performance, and the causes of existing congestion along the Corridor (source pages are provided):

Existing 2008 Corridor Operations Issues (page 103)

- Insufficient through capacity on I-238 between I-880 and I-580 in San Leandro.
- Insufficient through capacity on I-580 between the Tassajara Road/Santa Rita Road interchange in Dublin/Pleasanton and the Airway Boulevard interchange in Livermore.
- Upgrade operational problems on the approaches to the Altamont Pass between Livermore and Tracy.
- An off-ramp capacity bottleneck for westbound I-580 at the I-680 interchange.

Goods Movement Issues

- Increasingly, regional distribution centers have located in the San Joaquin Valley and trucks providing goods to the Bay Area use this corridor for access (page 86).
- The growing competition between freight rail needs and passenger rail needs in the Altamont Pass Corridor (I-580) (page 87).
- Unpredictable levels of congestion in the westbound direction during the morning peak and in the eastbound direction during the afternoon peak (page 123).

Short Term 2015 Forecasted Performance (pages 103-104)

- Performance along the I-580 East Corridor is forecasted to deteriorate modestly between 2008 and 2015 due to the many projects to be constructed in this time period.
- Many of the bottlenecks currently active in 2008 will dissipate in 2015 due to the widening of I-238, the addition of HOV lanes in the Dublin/Pleasanton, ramp metering, and the construction of the eastbound truck climbing lane east of Greenville Road leading up to the Altamont Pass.
- Some new bottlenecks will result from increased demands expected between 2008 and 2015.

Long-Term 2035 Forecasted Performance (page 104)

- Performance along the I-580 East Corridor deteriorates dramatically after 2015, assuming that no additional projects are built.
- No additional capacity or traffic management improvements past 2015 will result in re-activating all of the existing bottlenecks relieved by the 2015 improvements.

Causes of Existing Congestion

Freeway bottlenecks throughout the I-580 East CSMP Corridor, and associated recurring congestion, cause delay upstream of the bottleneck locations and create various operational challenges.

High traffic volumes occur as two major freeway mainlines join together (I-205 and I-580) at the eastern limit, and at the I-880 connector with I-238 at the western limit. Traffic delays, along the corridor, occur upstream of Greenville Road, Hacienda Drive, I-680, Strobridge Avenue, and Crow Canyon Road. Operational challenges include lane drops near off-ramps, short weaving distances between on- and off-ramps and high diverging off-ramp volumes. Table 4 and Figure 5, from the CSMP technical analysis report, illustrate and describe existing bottleneck locations along the Corridor.

Direction	No.	Bottleneck Location	Peak	Main Cause
I-238 SB*	**A**	I-880 NB on to Lewelling off-ramp	PM	Insufficient capacity lane drop
I-238 NB*	**B**	I-580 EB on to I-880 SB off-ramp	AM	Insufficient capacity
			PM	
I-580 EB	**C**	Santa Rita Road to Fallon off-ramp	PM	Recurring, over-capacity
	G	East of Greenville	PM	Upgrade to pass
I-580 WB	**D**	Dougherty Rd on-ramp to I-680 off-ramp	AM	Recurring, weaving
	E	Airway Blvd on-ramps to Tassajara Rd off-ramp	AM	Recurring, over-capacity
	F	I-205 merge to Grant Line Road	AM	Recurring, major merge

Table 4: Existing Bottleneck Locations
(summarized from ALA-238/580 Corridor System Management Plan Technical Analysis Report-Volume 1, Section 2, Table 50, page 70)

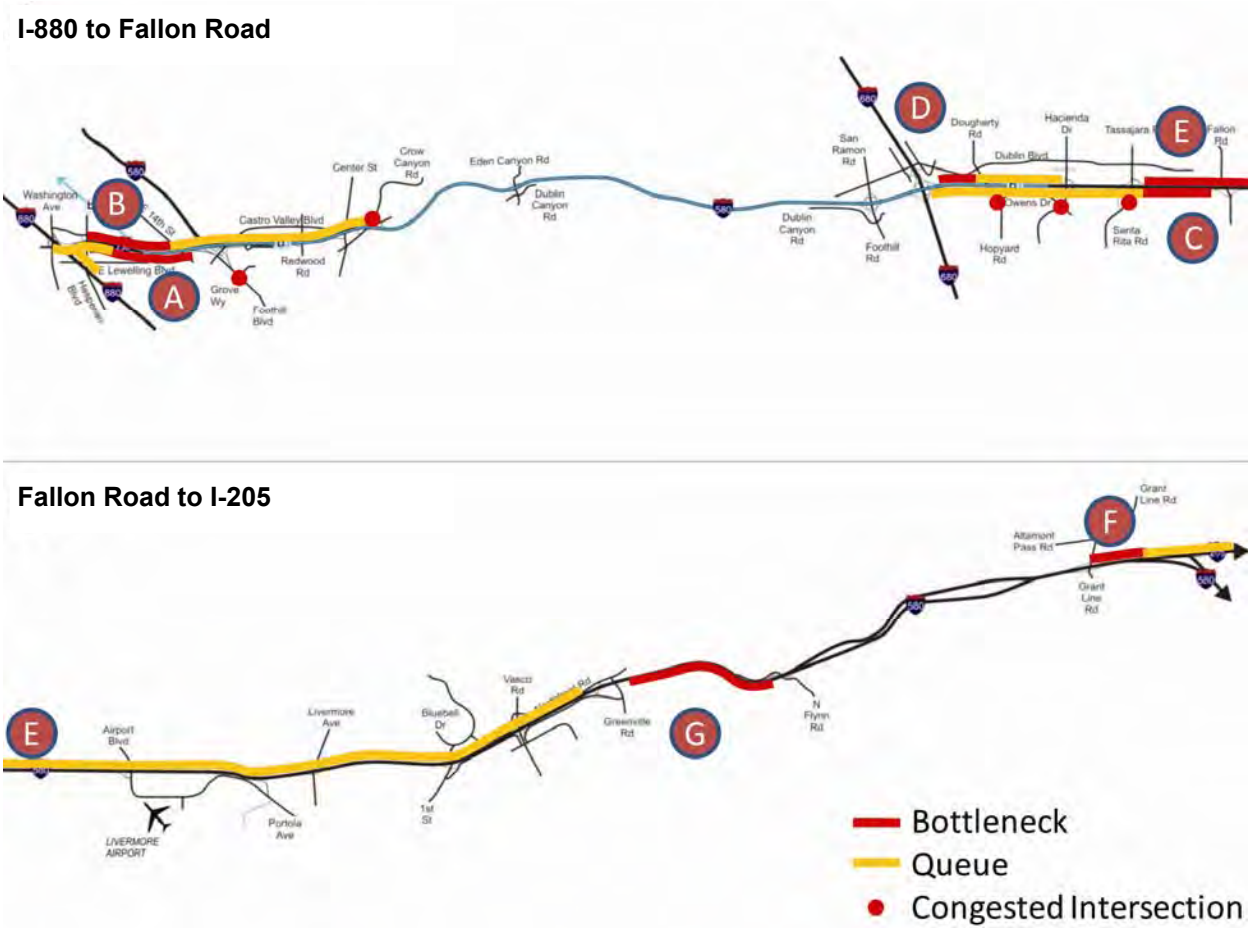


Figure 5: Existing 2008 Recurrent Weekday Congestion on I-580
(from ALA-238/580 Corridor System Management Plan Technical Analysis Report-Volume 1, Section 2, Figure 21, page 69)

5. RECOMMENDED CORRIDOR MANAGEMENT IMPROVEMENT STRATEGIES

The CSMP technical analysis report recommends short-term and long-term improvements in six categories: Freeway Management, Surface Street Management, Freeway Capacity, Surface Street Capacity, Transit, and Additional Demand Management and Other Measures. Recommended ITS improvements are also presented (See Tables 5, 6 and 7). The corridor-wide mobility performance is illustrated in Table 8 for short- and long-term recommended improvements.

Corridor Management Strategies

Corridor management strategies selected for the I-580 East CSMP Corridor address the existing and forecasted mobility, lost productivity, bottleneck, and reliability problems identified in the comprehensive performance assessment.

Transit service and goods movement within the Corridor are also adversely affected by the same problems.

Based on the comprehensive corridor performance assessment and CSMP technical analysis, the following corridor management improvement strategies were presented to the TAC for consideration. These recommended corridor improvement strategies are also illustrated in Figure 6.

- ITS improvements
- Corridor-wide ramp metering
- Signal optimization
- Augmented FSP
- Accelerated planned auxiliary lane and ramp improvements
- Extended and enhance HOV/HOT Operations
- Major interchange improvements
- Additional transit and TDM improvements

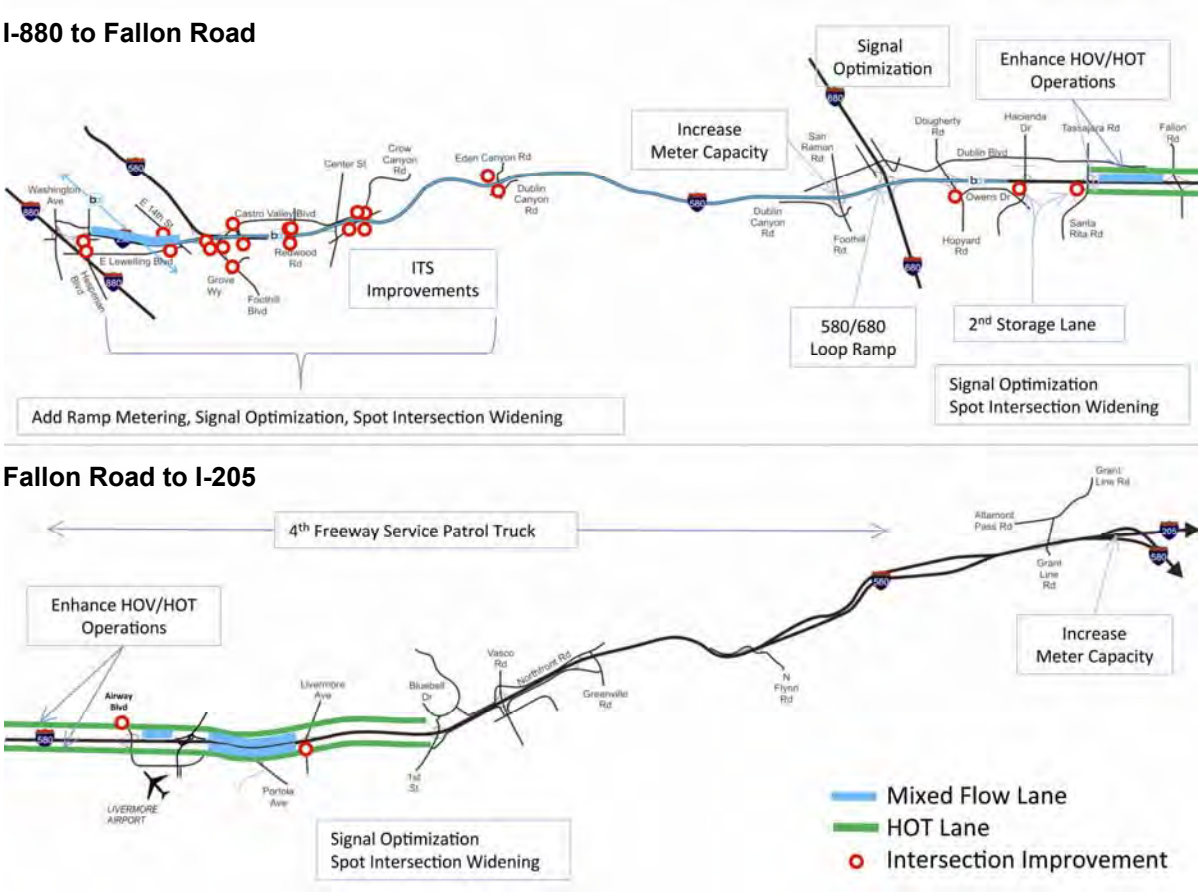


Figure 6: Recommended Corridor Improvement Strategies
(Source: Dowling Associates, Inc. PowerPoint Presentation to the I-580 East CSMP TAC, April 8, 2009)

Recommended Short-Term Improvements

A total of $62.3 million of short-term improvements are recommended in addition to currently programmed projects expected to be in place by 2015. These improvements would preserve corridor mobility at current levels through 2015. The recommended short-term improvements from the CSMP technical analysis are listed in Table 5 below. [2]

Freeway Management Improvements			Construction Cost ($million)*
1	Increase ramp meter capacity above 900 vph at the following metered on ramps:		1.0 (1)
	a.	San Ramon/Foothill Road On	
	b.	I-580 Westbound on-ramp at I-205	
2	Increase storage capacity for following metered on-ramps:		2.6
	a.	Hacienda Loop On to EB 580 (increase storage to 2 lanes)	
	b.	Tassajara Loop On to EB 580 (increase storage to 2 lanes)	
3	Install ramp meters with HOV lanes (where Right of Way allows) at the following on-ramps:		35.0
	a.	Hesperian Blvd. to I-238 SB	
	b.	East 14th Street to I-238 WB	
	c.	East Lewelling Blvd. to I-238 WB	
	d.	Foothill Blvd. to I-238 NB	
	e.	Foothill Blvd. to I-580 EB	
	f.	Strobridge Avenue to I-580 EB	
	g.	Redwood Road to I-580 EB	
	h.	Redwood Road to I-580 WB	
	i.	Grove Way Loop On to I-580 EB	
	j.	Grove Way direct On to I-580 EB	
	k.	East Castro Valley Blvd. to I-580 WB	
	l.	Eden Canyon Road to I-580 EB	
	m.	Eden Canyon Road to I-580 WB	
4	Install ITS Improvements in corridor (see section on Recommended ITS Improvements below).		0.5
5	Improve eastbound HOT lane operations between Santa Rita/Tassajara On and First Street Off to address forecasted capacity shortfall.		3.8 (2)
6	Improve westbound HOT lane operations between First Street On and Santa Rita/Tassajara Off to address forecasted capacity shortfall.		3.8 (2)
7	Add 4th truck to Freeway Service Patrol Beat #22 (I-580: Hacienda to Grant Line) to keep average customer wait time below 10 minutes. Increase operating hours to 5:30 AM to 9:30 AM and 3:30 PM to 7 PM to be consistent with adjacent beat #27.		(3)
Surface Street Management Improvements			
8	Continue Improvement of Signal System Coordination and Optimization with integration as appropriate with freeway operations.		5.0

* The basis for cost estimates are provided in Volume 2, Appendix II, Memorandum: I-580 CSMP Recommended Improvement Projects Schematics and Cost Estimates

continues on next page

[2] ALA-238/580 Corridor System Management Plan Technical Analysis Report, Volume 1, Section 2

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Freeway Management Improvements			Construction Cost ($million)*
Freeway Capacity Improvements			
9	Construct separate off-ramp WB 580 to access SB 680 SB loop ramp.		0.3
10	Accelerate Construction of WB auxilliary lane between N. Livermore and Isabel.		(4)
11	Accelerate Construction of WB auxilliary lane between Isabel direct on and Airway Off.		(4)
12	Accelerate Construction of WB auxilliary lane between Fallon/El Charro Off and Tassajara/ Santa Rita Loop On.[3]		(4)
13	Add 4th lane WB from Mission/East 14th off to I-880 SB off.		5.6
14	Accelerated Construction of EB auxilliary lane between Isabel direct on and N. Livermore off.		(4)
Surface Street Capacity Improvements			
15	Spot Intersection capacity improvements:		4.7
	a.	East Lewelling Blvd. and Hesperian Blvd	
	b.	Castro Valley Blvd. and Foothill Blvd	
	c.	Foothill Blvd. and Grove Way	
	d.	Castro Valley Blvd. and Stanton Avenue	
	e.	Redwood Road and I-580 WB Off-ramp	
	f.	Castro Valley Blvd. and Grove Way/Crow Canyon Road	
	g.	Hopyard Road and Owens Drive	
	h.	Airway Blvd. and North Canyon Parkway	
Transit Improvements			
16	Preserve frequency and number of routes of San Joaquin RTD (SMART), and Modesto (MAX BART) inter-regional express bus service to Dublin/Pleasanton BART Station.		(5)
17	Preserve frequency and number of routes of County Connection and Tri-Delta express bus service to Dublin/Pleasanton BART Station.		(5)
Additional Demand Management and Other Measures			
18	None - Management and capacity improvements are able to reduce congestion below current levels in the corridor.		none
Total			**62.3**

(1) Cost estimate is for adding lane to ramp.

(2) Cost estimate is for adding second HOT lane, but excludes right-of-way costs that might be necessary to preserve BART in median option. Other options available for increasing capacity.

(3) No capital costs if vehicle is leased.

(4) Possible reduction in construction costs if work is moved up to earlier year.

(5) No capital costs involved in preservation of existing routes and services.

Table 5: Recommended Short-Term Improvements
(from ALA-238/580 Corridor System Management Plan Technical Analysis Report-Volume 1, Section 2, Table 4, page 5)

[3] Construction completed December 2009

Recommended ITS Improvements

A total of $500,000 of ITS enhancements is recommended for the corridor. This cost estimate is in addition to the costs of completing implementation of the on-going Caltrans Ramp Meter Deployment Plan (RMDP) and the I-580 Transportation Management Plan (TMP) programs. The recommended ITS improvements from the CSMP technical analysis are listed below.[4]

Item	Description
Caltrans Ramp Meter Deployment Plan (RMDP)	Continue Implementation of Caltrans RMDP for corridor. This involves metering all remaining on-ramps in corridor, and the metering of selected freeway to freeway connectors at I-680/I-580 and I-580/I-205 interchanges.
I-580 TMP	Continue implementation and integration of I-580 Corridor Transportation Management Plan ITS Improvements (see Figure 29 for details).
TMS (Traffic Monitoring stations)	Furnish, install and maintain RTMS units for monitoring 8-lane freeway facility at the following locations:
	• I-580/El Charro
	• I-580/North Flynn
	• I-580/Grant Line
CCTV (Closed Circuit Television)	Furnish, install and maintain CCTV cameras with PTX control, CODEC, camera tower and mounting and utilities at the following locations:
	• I-238/Hesperian
	• I-580/North Flynn
	• I-580/Grant Line
Fixed CMS (Changeable message signs)	Furnish, install and maintain fixed CMS units and utilities for overhead structure spanning one direction of travel at the following locations:
	• I-580 westbound at Eden Canyon Road

Table 6: Recommended I-580/I-238 ITS Improvements
(from ALA-238/580 Corridor System Management Plan Technical Analysis Report-Volume 1, Section 2, Table 5, page 7)

[4] ALA-238/580 Corridor System Management Plan Technical Analysis Report, Volume 1, Section 2

Recommended Long-Term Improvements

A total of $2,394 million of long-term improvements are recommended for the corridor (these long-term improvements are in addition to currently programmed projects expected to be in place by 2015 and the additional short-term improvements recommended in Table 5). These long term improvements would not be sufficient to preserve the mobility of single-occupant vehicles in the corridor, but would greatly enhance mobility for the alternative modes in the corridor (high occupancy vehicles, highway transit, and rail transit). The recommended long-term improvements from the CSMP technical analysis are listed in Table 7 below.[5]

Freeway Management Improvements			**Construction Cost ($million)***
19	Extend Single HOT lanes:		365.3
	a.	Westbound between I-680 and Redwood Road	
	b.	Eastbound between Redwood Road and Hacienda	
	c.	Westbound between I-205/Mountain House Parkway and Greenville Road	
	d.	Eastbound between Greenville Road and I-205/Mountain House Parkway.	
20	Improve operations of HOT lanes to address forecasted capacity shortfalls for following sections:		7.4
	e.	Westbound between Santa Rita and I-680	
	f.	Eastbound between First Street and Vasco Road	
21	Construct Direct Ramp I-580 WB to I-680 SB - w/mixed flow lanes plus 1 HOT lane.		750.0
Surface Street Management Improvements			
22	Signal coordination, incident detection, incident management		5.0
23	Add HOT lanes both directions to SR-84 between I-580 and I-680.		110.0
Freeway Capacity Improvements			
24	Reconstruct San Ramon/Foothill Road Interchange		2.1
25	Reconstruct Hacienda Drive Interchange		20.0
26	Reconstruct First Street Interchange		37.0
27	Reconstruct Vasco Road Interchange		45.0
28	Reconstruct Greenville Road Interchange		43.0
29	(This project number Not Used)		
Surface Street Capacity Improvements			
30	Widen SR-84 to 4 lanes divided expressway I-680 to Isabel Avenue to Stanley (off loads I-680/I-580 Interchange).		129.6
31	Widen SR-84 (Isabel Parkway) to 6-lane expressway Stanley to Jack London.		(1)
32	Widen Byron Highway (SR-239) to 4 lane divided expressway from SR-4 Bypass to I-205 (off loads I-580 over Altamont Pass and Vasco Road).		15.5
33	El Charro Road extension to Stanley Blvd. (off loads Santa Rita interchange)		18.5

* The basis for cost estimates are provided in Volume 2, Appendix II, Memorandum: I-580 CSMP Recommended Improvement Projects Schematics and Cost Estimates

continues on next page

[5] ALA-238/580 Corridor System Management Plan Technical Analysis Report, Volume 1, Section 2

continued from previous page

Freeway Management Improvements		Construction Cost ($million)*
Transit Improvements		
34	Double Track Union Pacific (ACE) rail line Tracy to Livermore.	34.5
35	Increase ACE train service to 7 trains.	12.4
36	Altamont rail Corridor Speed and Safety Improvements (90 mph)	30.0
37	Extend BART to ACE/Livermore Station and I-580/Greenville Road Station.	700.0[6]
38	Cross-Platform transfer BART/ACE at Livermore Station	20.0
39	Cross-Platform transfer ACE/High Speed Rail at San Jose Station	20.0
40	Integrate BART/ACE Monthly Passes.	(2)
41	Bus Rapid Transit between major Livermore employers and BART/ACE train Livermore Station	23.0
Additional Demand Management and Other Measures		
42	Restrict I-580 over Altamont pass to 8 mixed-flow lanes (4 each direction).	(3)
43	Safety Improvements (including signing, striping, signalization, realignments, passing lanes, median barriers, increased speed enforcement) to Altamont Pass Road and Patterson Pass Road to accommodate expected diverted SOV demand.	6.0
Total		**2,394.4**

Notes:

(1) Cost is included in cost estimate for Project #30. Widen SR-84 to 4 lanes divided expressway.
(2) Capital costs would depend on fare reading equipment requirements.
(3) No capital cost for this measure.

* The basis for cost estimates are provided in Volume 2, Appendix II, Memorandum: I-580 CSMP Recommended Improvement Projects Schematics and Cost Estimates

Table 7: Recommended Long-Term Improvements
(from ALA-238/580 Corridor System Management Plan Technical Analysis Report-Volume 1, Section 2, Table 6, page 8)

[6] Estimate based on the *BART to Livermore Extension EIR Notice of Preparation* (June 2008). The *BART to Livermore Extension DEIR* (November 2009) estimates various alternatives to cost up to $3.6 billion.

Performance with Recommended Improvements

The recommended strategies and improvements were evaluated using the Paramics micro-simulation model. The I-580/I-238 corridor-wide results are shown in Table 8 and Table 9. See the CSMP technical analysis, Volume 1, Section 2, pages 165 to 179 for more details regarding recommended strategies, program benefits and impacts.

The CSMP technical analysis concluded that the recommended short-term freeway management improvements generally preserve current freeway congestion levels through 2015 with some improvement in average delay per person. The recommended long-term improvements provide as much improvement of congestion problems as feasible, but are insufficient to serve the anticipated growth in travel between the San Joaquin Valley and the San Francisco Bay Area.

Table 8 shows short-term freeway performance results for mobility. The 2008 figures represent existing conditions. The 2015 programmed figures include all programmed improvements for the corridor and compare results with existing conditions. The 2015 recommended figures then show further results with recommended short-term improvements.

Table 9 shows long-term freeway performance results for mobility. The 2035 figures compare results with and without recommended long-term improvements.

Performance Measure	2008	2015	% Change existing to 2015 program		2015	% Change 2015 program to recommend	
	Existing	Programmed			Recommended		
Mobility							
Person Miles of Travel (PMT)	3,849,400	4,369,300	13.5%	↑	4,369,300	0.0%	same
Person Hours of Travel (PHT)	91,900	108,700	18.3%	↑	104,312	-4.0%	↓
Person Hours of Delay (PHD)	30,400	38,500	26.6%	↑	34,112	-11.4%	↓
Mean Person Speed (mph)	42	40	-4.8%	↓	42	5.0%	↑
Mean Delay/Person (mins)	20	24	20.0%	↑	17	-29.2%	↓

Table 8: Short-Term Freeway Performance with Recommended Improvements

2035				
Performance Measure	**w/o Improvements**	**w/ Recommended Long-Term Improvements**	**% Change**	
Mobility				
Person Miles of Travel (PMT)	6,358,700	6,177,000	-2.9%	↓
Person Hours of Travel (PHT)	560,300	462,574	-17.4%	↓
Person Hours of Delay (PHD)	457,500	363,974	-20.4%	↓
Mean Person Speed (mph)	11	13	18.2%	↑
Mean Delay/Person (mins)	284	245	-13.7%	↓

Table 9: Long-Term Freeway Performance with Recommended Improvements

Figure 7 illustrates the comparative impacts of phased recommend improvements on identified bottlenecks along the Corridor. Existing bottlenecks (2008) are compared to bottlenecks in 2015 with programmed improvements, and then with programmed plus recommended improvements. After 2015, increased demand will greatly exceed the available capacity of the corridor. Bottlenecks in 2035 if no further improvements are implemented, are illustrated.

I-880 to Fallon Road

Existing Bottlenecks in 2008

2015 Bottlenecks with Programmed Improvements

2015 Bottlenecks with Programmed plus Recommended Improvements

2035 Bottlenecks if no further Improvements

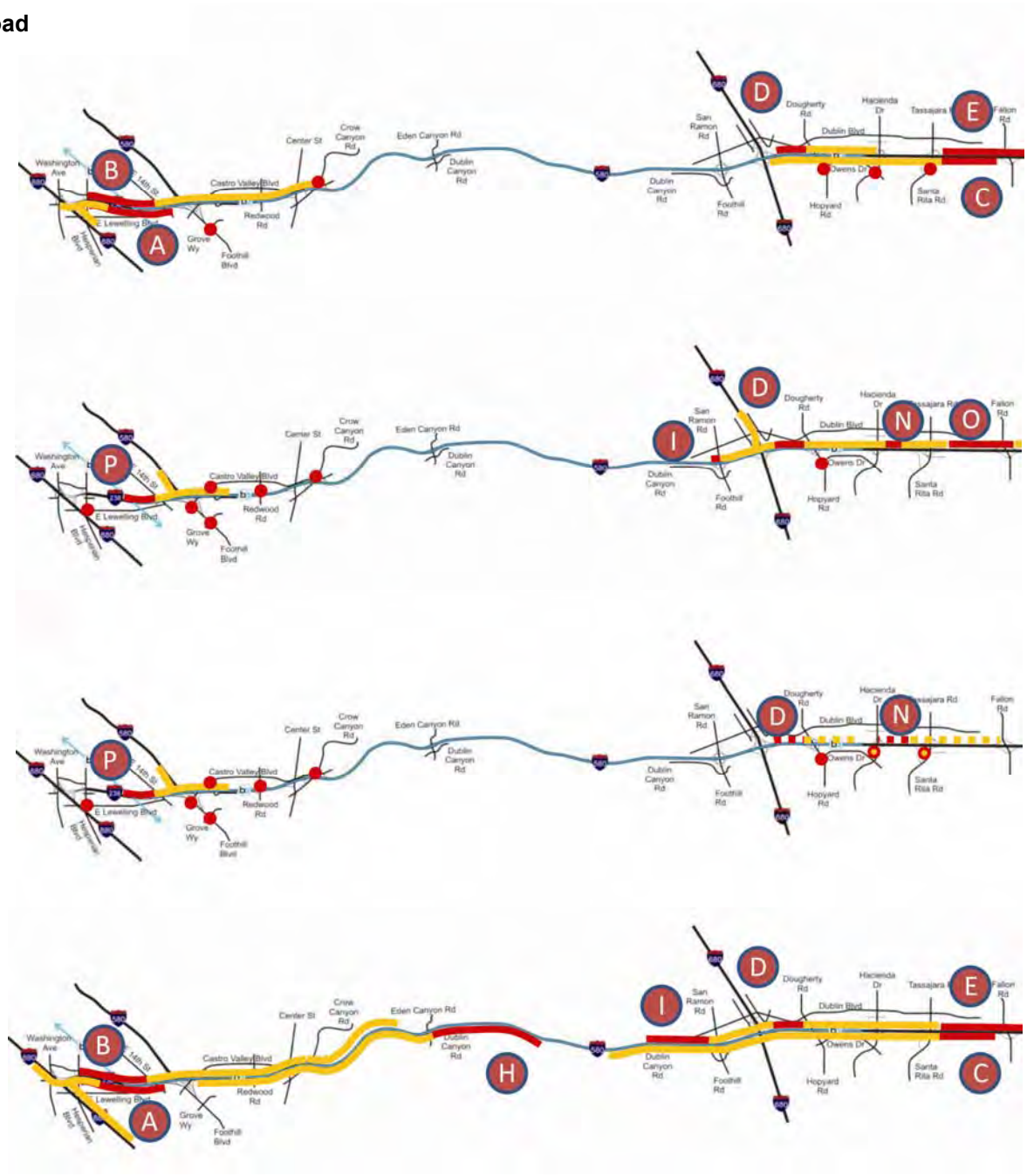
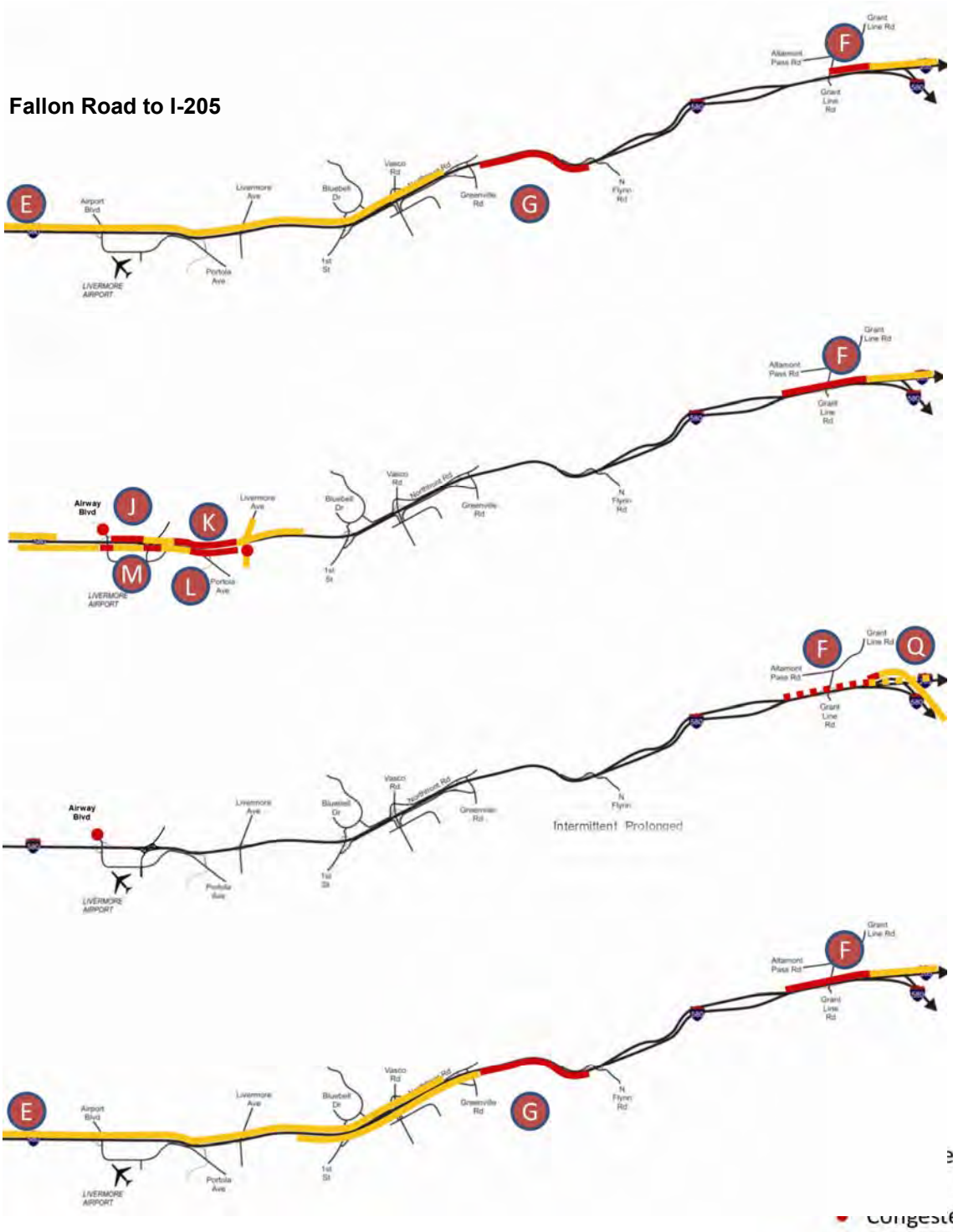


Figure 7: Existing and Future Bottlenecks Comparison
(summarized from ALA-238/580 Corridor System Management Plan Technical Analysis Report-Volume 1, Section 2; Figure 21 page 69, Figure 22 page 73, Figure 23 page 76 and Figure 37 page 148)

Fallon Road to I-205



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Interstate 580 East

Section 1: CSMP Overview

1.1 District CSMP Overview

1.2 CSMP Purpose and Need Statement

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1.14 Land Use/Major Traffic Generators

1.15 Environmental Characteristics/Constraints

1.16 Stakeholder Issues and Concerns

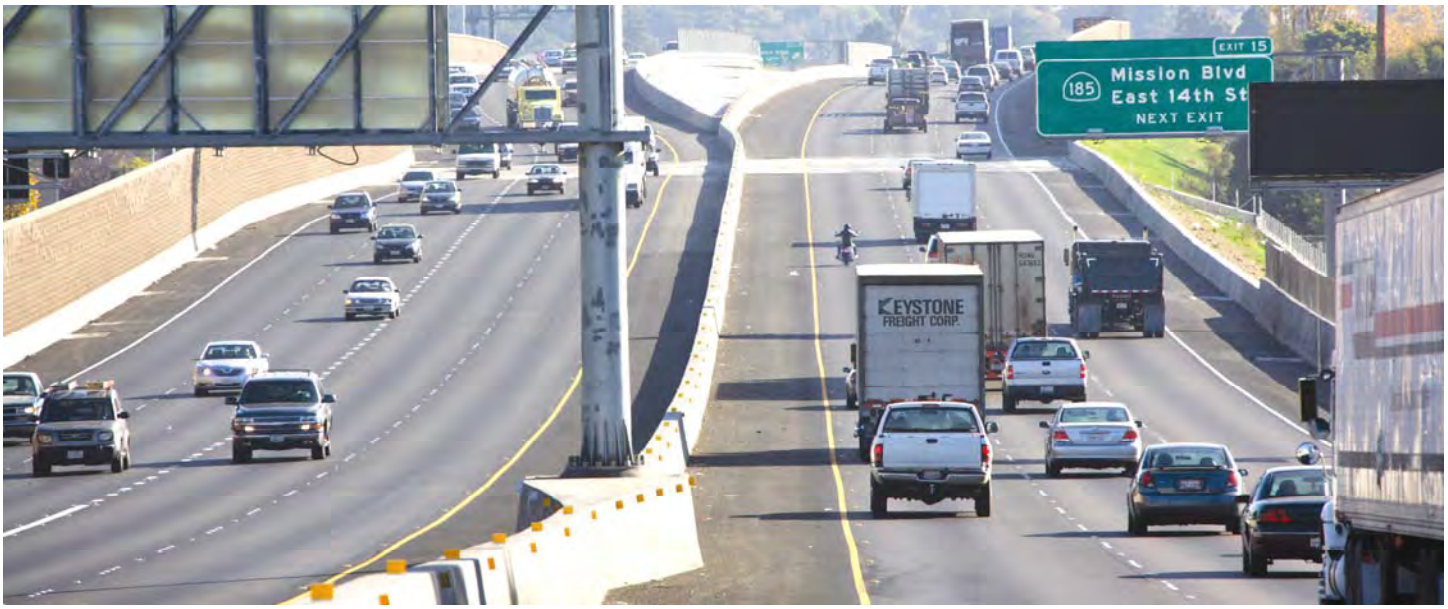
Regional Route Statistics	Interstates
9 Counties	80
101 Cities	205
45 State Routes	238
1 US Highway	280
10 Interstate Rtes	380
	505
US Highways	580
101	680
	780
	880
	980

State Routes				
1	37	112	156	230*
4	61	113	160	237
9	77*	114	179*	238
12	82	116	181*	239*
13	84	121	185	242
17	85	123	205	251*
24	87	128	220	260
25	92	130	221	262
29	93*	131	*unconstructed	

Regional Route Miles	
Freeway	620.37
Expressway	75.13
Conventional	741.04
Total Constructed	1436.54

Interregional Road System (IRRS)	
IRRS Total Miles:	486
Portion which are Focus Route Miles:	200

	POPULATION		# HOUSEHOLDS		# JOBS		MEAN HOUSEHOLD INCOME (in Constant 2005 Dollars)	
COUNTY	**2005**	**2035**	**2005**	**2035**	**2005**	**2035**	**2005**	**2035**
Alameda	1,505,300	1,938,600	543,790	700,090	730,270	1,099,550	$88,800	$121,800
Contra Costa	1,023,400	1,300,600	368,310	485,240	379,030	591,650	$98,400	$135,100
Marin	252,600	283,100	103,180	116,800	135,370	165,180	$121,600	$166,800
Napa	133,700	155,700	49,270	59,650	70,690	98,570	$85,900	$117,900
San Francisco	795,800	956,800	338,320	396,310	553,090	832,860	$97,400	$133,600
San Mateo	721,900	861,600	260,070	312,030	337,350	522,000	$121,700	$167,000
Santa Clara	1,763,000	2,380,400	595,700	806,210	872,860	1,365,810	$97,900	$134,300
Solano	421,600	585,800	142,040	196,220	150,520	227,870	$84,400	$113,400
Sonoma	478,800	568,900	181,800	219,980	220,460	344,290	$82,600	$113,300
Total	**7,096,100**	**9,031,500**	**2,582,480**	**3,292,530**	**3,449,640**	**5,247,780**	**region $97,400**	**$133,100**



1.1 DISTRICT CSMP OVERVIEW

A 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. The corridor management planning strategy is based on the integration of system planning and system management. Each CSMP addresses State Highways, local parallel roadways, regional transit services, and other regional modes pertinent to corridor mobility.

CSMPs are being developed throughout the State for corridors within which funding is being used from the 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 MTC and the Caltrans have committed to assist each other in the development of CSMPs and MTC's related 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 assist in finalizing the corridor definition and provide to 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 I-580 East CSMP Corridor are:

- ALA-580 Eastbound High Occupancy Vehicle (HOV) Lane, Hacienda to Greenville (PM R7.8/19.1)
- ALA-580/84 Isabel Interchange (PM R13.2/R14.9)
- ALA-580 Westbound HOV Lane, Greenville to Foothill (PM R8.29/R21.43)

In most cases the limits from District 4's Transportation Corridor Concept Reports (TCCRs) were used, as well as corridor limits used in the FPI.

Eight milestones were identified by the 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

Preparing this corridor performance assessment began with utilizing existing travel data and additional data collection (additional corridor performance assessment can take place once an adequate traffic detection system is in place along the corridor). The corridor performance assessment served to evaluate existing system management practices and the causes of performance problems along the corridor using a set of common performance metrics. Modeling was also used to forecast future travel conditions 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 and recommend operational strategies, needed capital improvement projects, and opportunities for transportation technology integration.

1.2 CSMP PURPOSE AND NEED STATEMENT

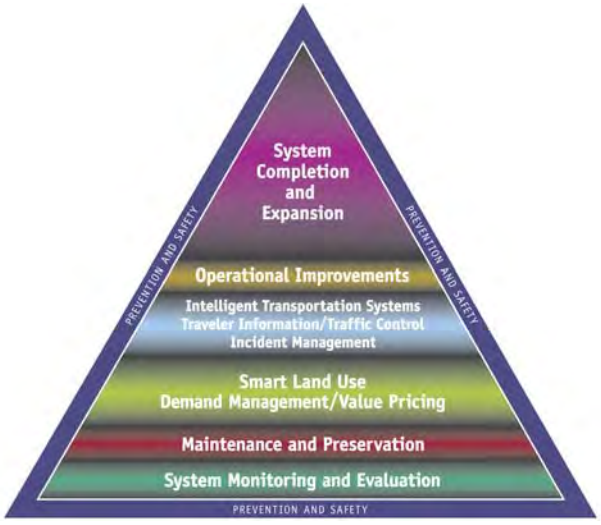
On March 15, 2007, the CTC adopted *Resolution CMIA-P-0607-02.* In Sections 2.12 and 2.13 of this resolution, the CTC resolved that "…the Commission expects Caltrans and regional agencies to preserve the mobility gains of urban corridor capacity improvements over time that will be described in CSMPs, 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 SGP, which calls for an infrastructure improvement program that includes a major transportation component (Go California). 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.



System Management Pyramid

1.4 RELATIONSHIP TO OTHER PLANS

A number of Caltrans system planning documents were used as the foundation for the preparation of the CSMP. These included the 2005 CTP and the 1998 ITSP. Also, a number of related Caltrans system management documents were used, including the 2006 SGP, the 2004 TMSMP, and the 2004 SWITSA.

System and regional planning documents prepared by other agencies that influenced CSMP development included the 2005 *RTP* T2030 and the 2004 *Bay Area Regional ITS Plan*.

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

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

Additional Studies Used

580/Isabel Interchange - CMIA Project PSR	1995
I-580 EB HOV- CMIA Project PSR	2001
I-580/Castro Valley Interchange Improvement Study (Caltrans)	2004
Regional Goods Movement Study for the San Francisco Bay Area (MTC)	2004
Castro Valley Redevelopment Strategic Plan (ACRA)	2005
HOV Lane Master Plan (MTC)	2005
580-680 Tri-Valley "Triangle" Study (ACCMA)	2006
I-580 Corridor Transportation Management Plan (ACCMA)	2006
I-580 EB HOV Lane Environmental Assessment/Initial Study (Caltrans/FHA)	2006
State Route 84 Expressway Widening Project Study (ACTIA/City of Livermore)	2006
Bay Area High Occupancy/Toll (HOT) Network Study Phase I, II (MTC)	2007
Central Alameda County Freeway Study (ACCMA)	2007
Comprehensive Corridor PID-Stage 1 ALA-580 (Caltrans)	2007
I-580/I-680 HOV Direct Connector PSR (ACCMA)	2007
I-580 WB HOV- CMIA Project PSR	2007
Route 238 Corridor Improvement Project (City of Hayward)	2007
Stoneridge Drive Specific Plan Amendment - Staples Ranch Study (City of Pleasanton)	2007
Traffic Study for El Charro Specific Plan (City of Livermore)	2007
2008 Tri-Valley Transportation Plan Action Plan Update (TVTC)	2008
I-580 and I-680 Corridor Express Carpool (HOT) Lanes Before Study (ACCMA)	2008
I-580 EB Auxiliary Lanes - Isabel to N. Livermore to First Street Study (ACCMA)	2008
I-580 Ramp Metering "Before" and "After" Studies (cities: Livermore/Dublin/Pleasanton, CT, MTC)	2008
I-580 WB Auxiliary Lane - Vasco Road to First Street (City of Livermore)	2008
I-580 WB Auxiliary Lane Extension - Fallon Road to Tassajara Road (Caltrans)	2008
I-580 WB HOV Lane Widening Project - Traffic Assessment (ACCMA)	2008
Truck Parking Study (ACCMA)	2008
580/680 Interchange PSR-PDS (Caltrans)	2009
BART Extension to Livermore EIR (BART) on-going	2009
Castro Valley Circulation Study (Alameda County)	2009
Dublin-Livermore Bus Rapid Transit (ACCMA) on-going	2009
I-580 Corridor ITS System Integration (ACCMA)	2009

Freeway Performance Initiative (FPI)

A corridor performance assessment and technical analysis of the I-580 East CSMP Corridor was contracted through the FPI partnership between MTC and Caltrans. The consultant, Dowling Associates, Inc., evaluated the current performance along the corridor and determined causes of performance problems. Simulation modeling was used to forecast future travel conditions along the corridor. Traffic analysis methods were used to predict the impacts of a variety of operational strategies and investment scenarios. The consultant presented comprehensive analysis results of existing and future traffic conditions to the I-580 East CSMP TAC in January 2009 and presented conclusions and recommendations for phased corridor management improvement strategies to the TAC in April 2009.

Dowling Associates, Inc., completed the tasks and deliverables associated with the FPI from April 2008 to April 2009. The final technical analysis report, titled, *ALA-238/580 Corridor System Management Plan Technical Analysis Report*, was finalized in May 2009. The entire CSMP technical analysis report is located in Volume 1, Section 2.

Regional Blueprint Planning Program

The Regional Blueprint Planning Program supports the smart growth element of the 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, the 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 MTC with support from the Bay Area Air Quality Management District (BAAQMD), the Bay Conservation and Development Commission (BCDC), and Caltrans. These agencies and local governments have participated in the Regional Blueprint Planning Program since the programs inception in 2005.

Complete Streets Implementation Action Plan

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

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 these 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 provides policy and technical guidance throughout the process. Additional planning agency partners and other key stakeholder groups are brought in to review and comment at key junctures, and help evaluate corridor improvement strategies.

The Core Stakeholder Group for the I-580 East CSMP Corridor is identified as MTC, ACCMA and Caltrans. Representatives met early in the development process to discuss the goals, objectives and schedule of the CSMP. The Core Stakeholder Group met regularly to review and approve operational and micro-simulation data collection and analysis methodology, technical reports, and identified additional planning agency partners for further CSMP development. Planning Agency Partners provided valuable input on the recommended improvement strategies for the Corridor. 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

Additional Planning Agency Partners

- City of San Leandro
- City of Hayward
- City of Dublin
- City of Pleasanton
- City of Livermore
- Alameda County
- Alameda County Transportation Improvement Authority
- Transit Agencies (BART, LAVTA-WHEELS, AC Transit)
- Altamont Commuter Express
- Association of Bay Area Governments
- Bay Area Air Quality Management District

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

1.6 CORRIDOR PERFORMANCE MEASURES AND OBJECTIVES

Caltrans worked 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.

1.7 CORRIDOR LIMITS / ROUTE DESIGNATIONS

The I-580 East CSMP Corridor is an east/west route in Alameda County that begins at the I-580/I-205 interchange near the San Joaquin/Alameda County line and traverses westward; at the I-580/I-238 split, it continues along I-238, and ends at the I-880/I-238 interchange. The Corridor is 33 miles long and provides direct connections to two major north-south freeways: I-680 and I-880. The Corridor also intersects SR-84, SR-238, and SR-185.

The Corridor is functionally classified as an Urban Principal Arterial – Interstate Freeway. The I-580 freeway segment is primarily an eight-lane freeway facility, with four mixed flow lanes in each direction, from the I-205 Interchange in the east to the I-238/I-880 Interchange to the west. Auxilliary lanes are in place between the I-680, Hopyard, Hacienda Drive and Santa Rita Road interchanges within the City of Pleasanton. A new eastbound High Occupancy Vehicle (HOV) lane from the Portola Overcrossing to Greenville Rd. was constructed, and open to traffic in the Fall of 2009. There is ramp metering along the I-580 facility.

I-238 connects from I-580 to I-880 in the city of Hayward. It is generally three lanes in the northbound (or westbound) direction, and three lanes in the southbound (or eastbound) direction (as of the Fall of 2009). There is no ramp metering along the I-238 segment of the corridor.

Schematic drawings from the CSMP technical analysis presented in Figure 1.7.1 (A, B, C) show the lanes and ramps along the I-580 East CSMP Corridor.

The entire I-580 freeway is classified as a “Lifeline Route” facilitating movement between emergency staging areas and impacted areas following major earthquakes. It is also the main access to the Homeland Security Organization at LLNL. I-580 East is considered a STAA National Network Route. The National Network is primarily comprised of the National System of Interstate and Defense Highways. The I-580 freeway is legislatively designated as part of the IRRS and is a High Emphasis Route.

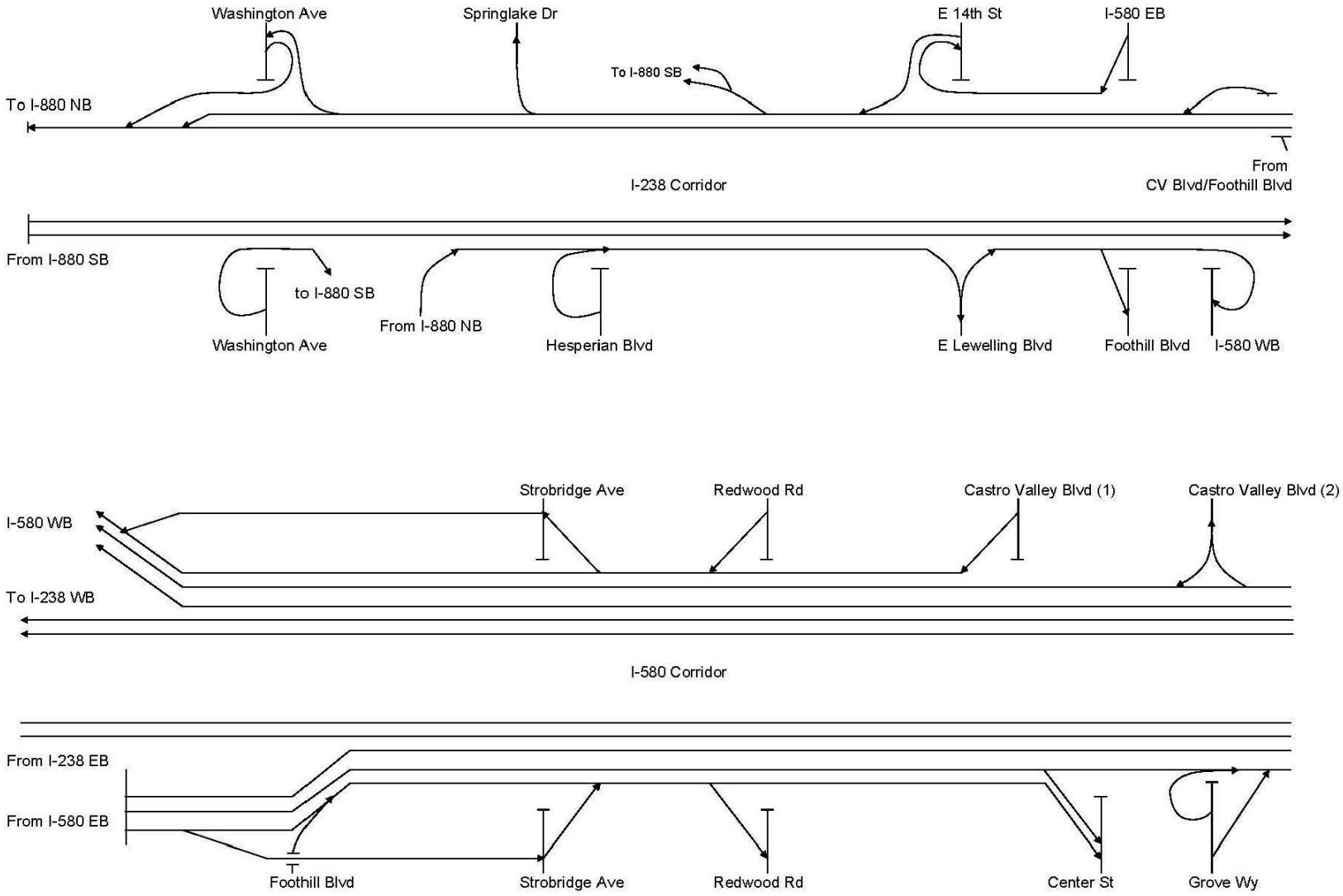


Figure 1.7.1: Alameda 580/238 Study Corridor Schematic Drawing (A) (from CSMP technical analysis, Figure 2, page 12)

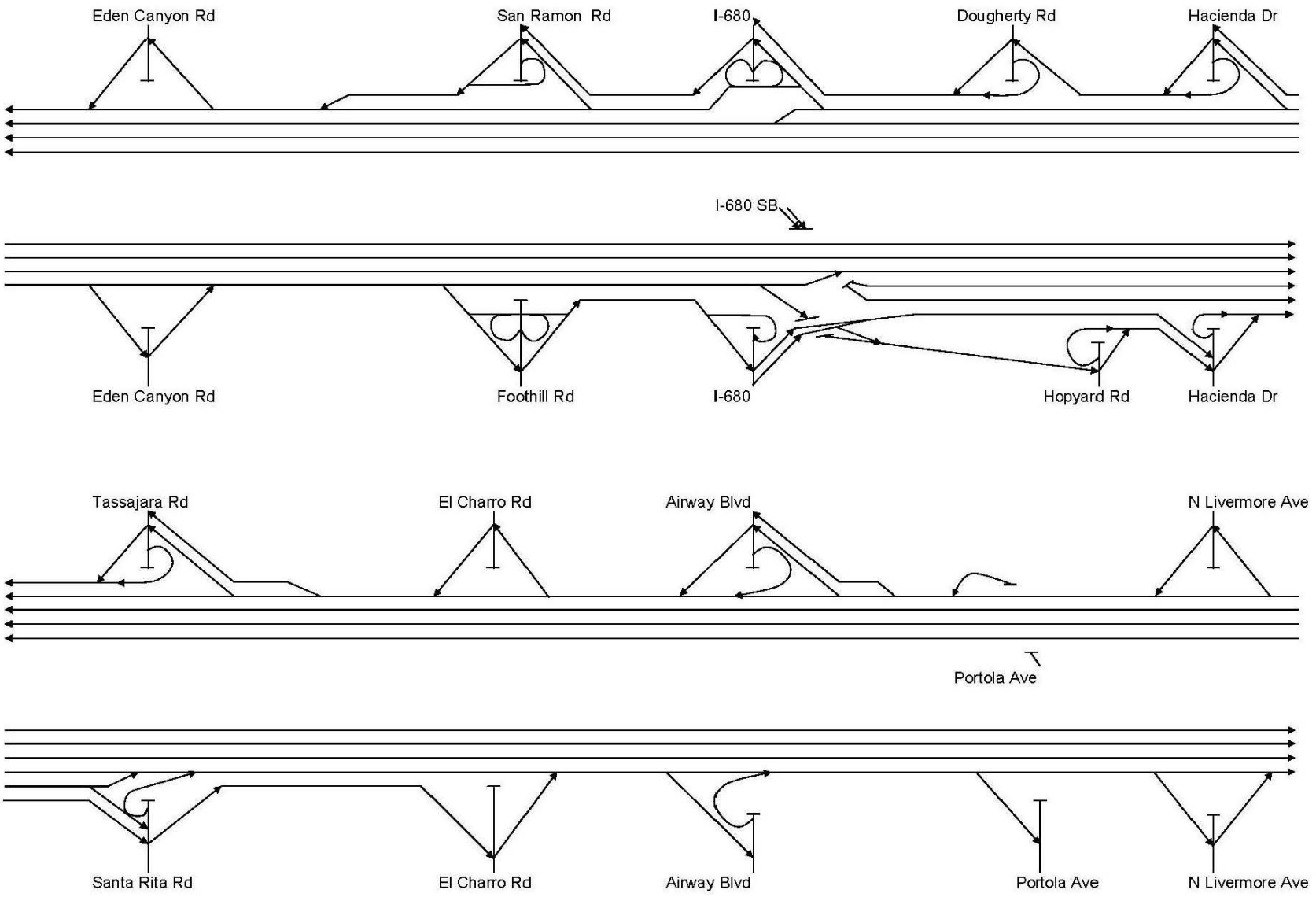


Figure 1.7.1: Alameda 580/238 Study Corridor Schematic Drawing (B) (from CSMP technical analysis, Figure 2B, page 13)

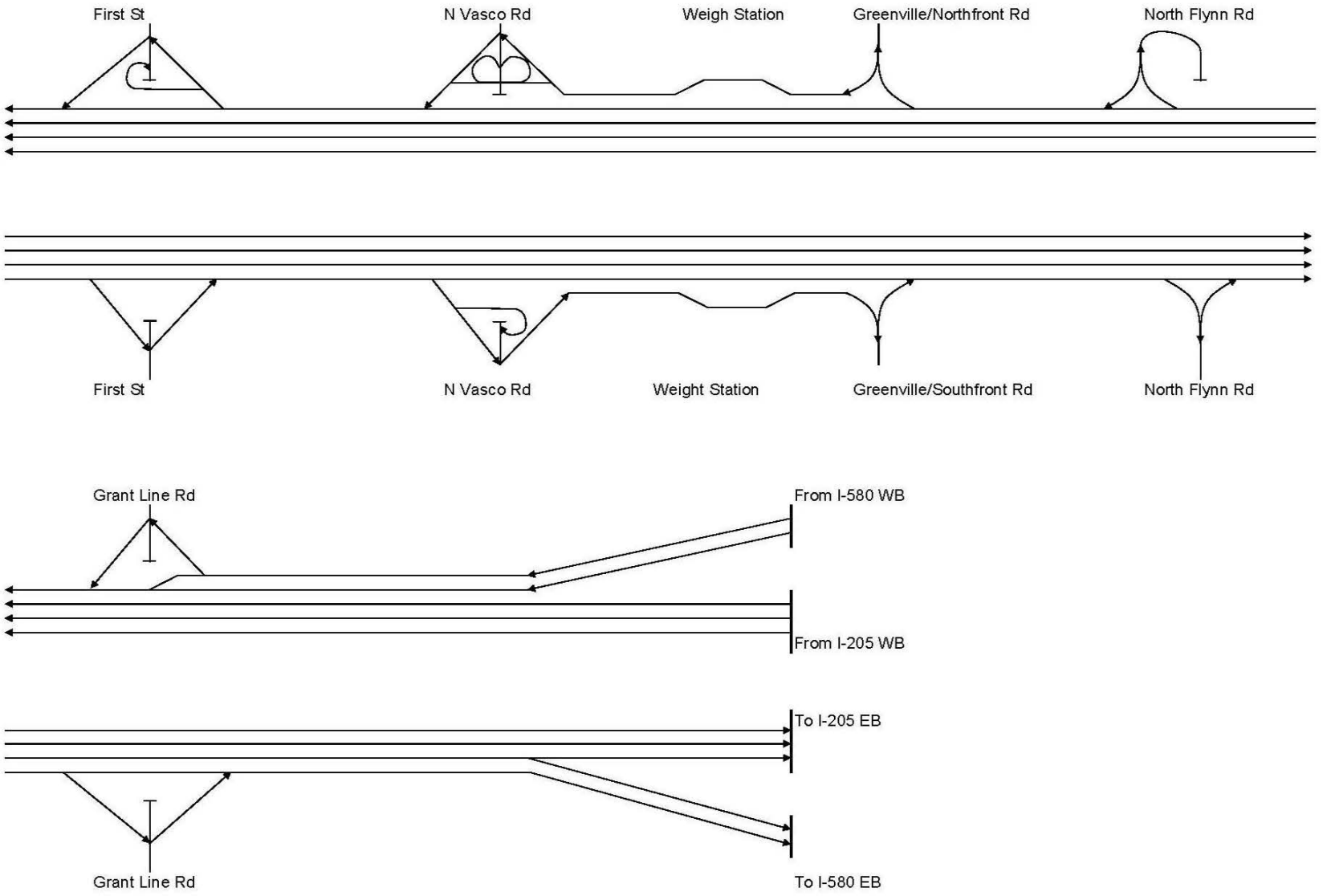


Figure 1.7.1: Alameda 580/238 Study Corridor Schematic Drawing (C) (from CSMP technical analysis, Figure 2C, page 14)

1.8 ROUTE SIGNIFICANCE

The I-580 East CSMP Corridor is the primary east/west route connecting the Bay Area with Central Valley commerce and access to the I-5 freeway. The Corridor serves the growing number of commuters living outside the Bay area, provides access for the movement of goods and freight into and out of the region, and serves significant recreational travel during weekends and summer months, to and from the Central Valley and the Sierras. The cities of Livermore, Pleasanton, Dublin and the community of Castro Valley are the main urban centers along the Corridor. The I-580 and I-238 facilities together function as a major inter-regional freeway serving multiple counties in the Bay Area, including San Joaquin County, Alameda County, Contra Costa County, and Marin County.

The Corridor includes the Altamont Pass (elevation 755 feet[1]) located in the Diablo Range and traverses the Tracy area in the San Joaquin Valley. The Corridor is characterized by steep grades from I-205 to the west side of the Altamont Pass, and then continues through the highly urbanized Tri-Valley area, including the interchange with I-680. West of the Tri-Valley area, the corridor is again characterized by another steep grade referred to as the Dublin Grade. Finally, the corridor passes through the urbanized area of Castro Valley with closely spaced interchanges, including the roughly two-mile segment of I-238 that connects I-580 to I-880 in the city of Hayward.

Congestion in the Corridor is attributed to heavy commuter and truck traffic during the weekday. An increase in congestion and delay is expected along with continued projected growth in the region. MTC travel projections show that commutes to and from the Bay Area will nearly double over the next 20 years. One of the largest increases will be from the Central Valley via San Joaquin, Stanislaus, and Merced counties.

The Corridor is a National Network Route, STAA trucks, and designated as a High Emphasis Route on the Interregional Road System (IRRS).

The Corridor is the primary connection between the Bay Area and the national interstate truck network and experiences the second-highest volume of truck traffic in the region, most of it long-haul in nature and involving the heaviest trucks. The ACE also operates along the corridor on the Union Pacific owned rail line between the San Joaquin Valley and the San Francisco Bay Area.

The Corridor serves as a major conduit for freight being transported to and from the Port of Oakland, other origin and destination points and to manufacturing industries, farms, and distribution centers in the Central Valley. Trucks traveling through the Altamont Pass are unable to maintain typical freeway speeds on the upgrades, causing congestion. Although freight traffic is increasing on Union Pacific and Burlington Northern Santa Fe (BNSF) Railway main lines as the railroads see a near ten percent per year growth in container traffic through the Port of Oakland, the majority of goods being distributed will continue to be transported by truck. According to the Regional Goods Movement Study for the San Francisco Bay Area, in terms of volume, more than 80 percent of the goods movement in the Bay Area involves trucking. In addition to many support facilities being located in the Central Valley, a lack of adequate truck parking facilities in the Bay Area region also contributes to an increase in truck travel during morning and evening commuter peak periods.

1.9 HIGHWAY SYSTEM

The I-580 East CSMP Corridor intersects with I-680 in the city of Dublin, SR-84 near the city of Livermore, and SR-238 and SR-185 near the cities of San Leandro and Hayward. The I-580 freeway segment has ten full interchanges within the 13.6 mile segment in the Livermore, Pleasanton and Dublin areas. Full interchanges are located at Greenville Road, Vasco Road, First Street, North Livermore Avenue, Airway Boulevard, El Charro Road/Fallon Road, Tassajara Road/Santa Rita Road, Hacienda Drive, Dougherty Road/Hopyard Road, and San Ramon Road/Foothill Road.

1 United States Geological Survey (USGS) Geographic Names Information System (GNIS) Index http://geonames.usgs.gov/ (accessed February 9, 2010)

ACE operates along the corridor on the Union Pacific owned rail line between the San Joaquin Valley and the San Francisco Bay Area. Trucks over 4.5 tons are prohibited on I-580 between the San Leandro border and Grand Avenue in the City of Oakland (beyond the Corridor limits). Trucks are thus required to take I-238 and I-880 as an alternative route through Oakland. This location is essentially at the Foothill Boulevard off-ramp where westbound trucks must exit I-580. A weigh station is operational between the Greenville Road/North Frontage Road Interchanges and the Vasco Road Interchange, in eastbound and westbound directions.

There are two bridges along the Corridor: the Tassajara Creek Bridge and the Arroyo Las Positas Bridge.

1.10 ARTERIAL NETWORK

Bypass traffic from the I-580 East CSMP Corridor occurs within the Livermore, Pleasanton and Castro Valley local area arterial network. The use of these alternate routes from the mainline freeway is referred to in the Livermore General Plan as “cut-through” traffic, because the traffic generated does not stop to patronize local business or job centers in the area. Stanley Boulevard and Stoneridge Drive are main alternative parallel routes between Livermore and Pleasanton. Other local parallel arterials to the Corridor are Altamont Pass Road, Dublin Boulevard and Castro Valley Boulevard.

Some of the local arterials, parallel to the Corridor, are discussed below. Local parallel arterials specific to the Livermore/Pleasanton/Dublin area are illustrated in Figure 1.10.1.

Altamont Pass Road

The Altamont Pass Road is a two-lane rural highway that parallels the I-580 freeway to the north. The road has far less elevation change than I-580, and provides a bypass for traffic diverting from the freeway during congested conditions. Altamont Pass Road, is the original alignment of U.S. 50 before it was bypassed by the present I-580.

Stanley Boulevard via First Street

Stanley Boulevard is a four-lane arterial that continues for approximately 8 miles. This parallel route begins at First Street at the I-580 interchange in Livermore, traverses on the south side of I-580, briefly becomes Railroad Avenue, and continues as East Stanley Boulevard. Subsequently, Stanley Boulevard, connects with Valley Avenue which continues toward the I-580 interchange via Santa Rita Road in Pleasanton.

Stoneridge Drive

Stoneridge Drive traverses on the south side of I-580, parallel to I-580, for approximately 3.5 miles between the Santa Rita Road Interchange and continues to Foothill Road. Stoneridge Drive combined with Stanley Boulevard can be used as an alternate route to the I-580 freeway in the Livermore-Pleasanton area.

Dublin Boulevard

Dublin Boulevard, on the north side of I-580 traverses, parallel to I-580, for approximately 3.5 miles between the I-580/Tassajara Road Interchange and San Ramon Road. This alternate route bypasses the I-580/I-680 interchange.

Castro Valley Boulevard

Castro Valley Boulevard is the primary east-west local arterial in the Castro Valley area traversing parallel to the I-580 corridor. Combined with other local arterials, this route can be used to bypass the I-580/I-238 split.

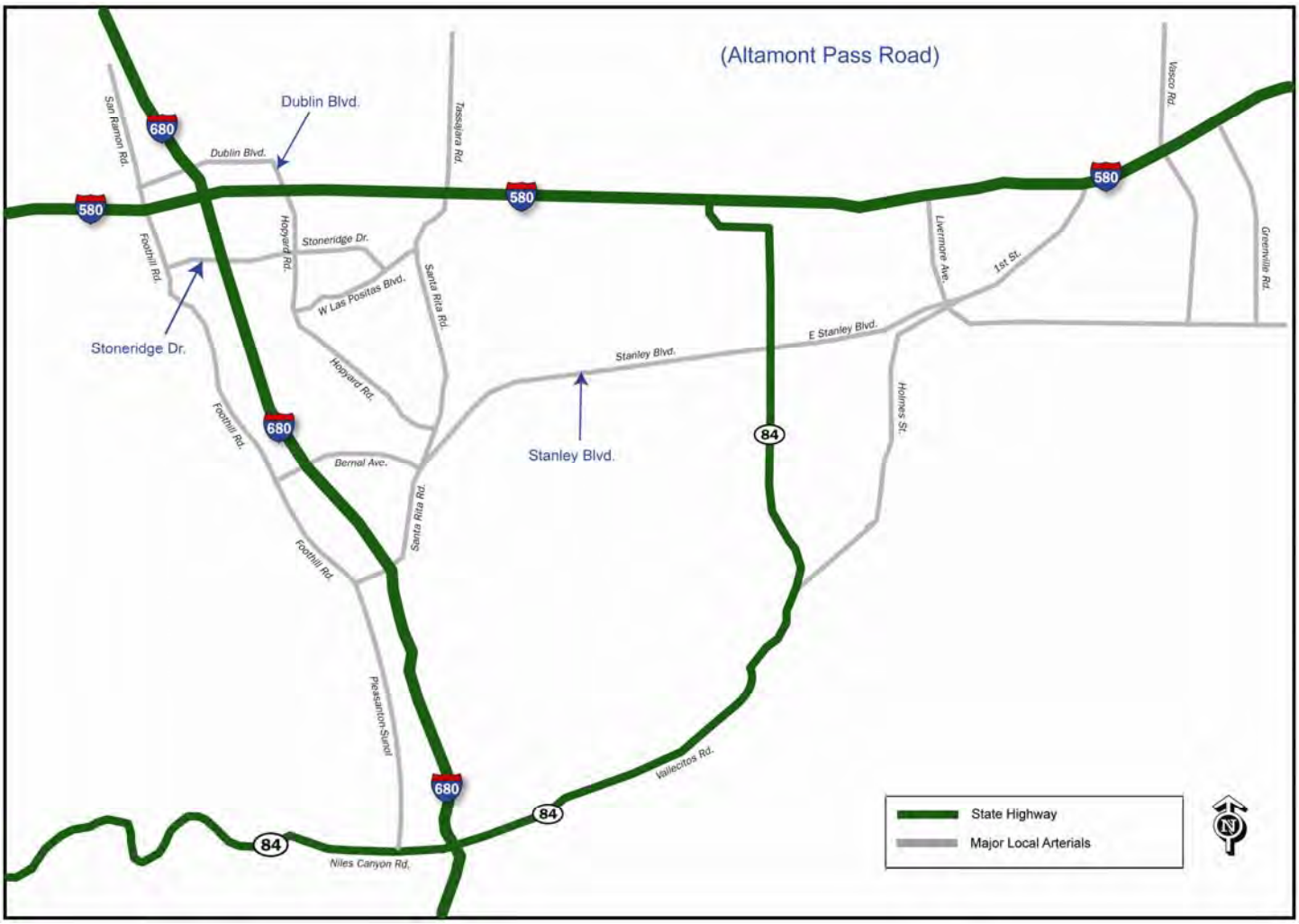


Figure 1.10.1 Local Parallel Arterials along the I-580 East CSMP Corridor Livermore/Pleasanton/Dublin Area

1.11 TRANSIT NETWORK

The transit network along the I-580 East CSMP Corridor includes express commuter services connecting the Central Valley to the Bay Area and local transit services that provide connections within the Tri-Valley region, specifically Dublin, Pleasanton and Livermore. The major providers are BART, ACE, and the LAVTA bus service, also known as WHEELS. Transit comprises eleven percent of the mode-share along the Corridor. Additional information about transit services along the Corridor is located in the CSMP technical analysis, Section 2.

1.12 BICYCLE AND PEDESTRIAN NETWORK

The Bicycle Network, for the purposes of the I-580 East CSMP Corridor, is local arterial bicycle facilities that intersect, or are parallel (within approximately one mile radius) to the Corridor. Existing bicycle facilities in the Livermore, Pleasanton, and Dublin areas are located along local arterials, and mainly provide access to employment centers, shopping centers, colleges, and transit stations. The Livermore area in particular has many bike paths and hiking trails, primarily in the major regional parks. The Iron Horse Regional Trail, a north-south trail, traverses 12 cities, connecting Alameda and Contra Costa Counties.

Bicycle facility types include Class 1 (multi-use bikeway), Class 2 (designated bike lane), and Class 3 (bike route). Bicycles are prohibited on the I-580 and I-238 freeways. North/south bicycle crossings along the Corridor are limited to the Dublin/Pleasanton BART location where Iron Horse Regional Trail crosses underneath the I-580 freeway. Pedestrian walkways are provided across I-580 at Santa Rita Road, Airway Boulevard and First Street interchanges in the Livermore area. The Isabel Avenue interchange (under construction) will also provide pedestrian walkways.

Bicycle Network

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 takes 15 minutes or less. The Countywide Bicycle Plan presents *existing* and *proposed* bicycle facilities, as the Financially Constrained Bicycle Network, to illustrate the desired, completed and connected network. Many of the proposed bicycle facilities in the Countywide Bicycle Plan and the Alameda County Bicycle Master Plan for Unincorporated Areas focus on closing gaps and improving connectivity to transit and bus services.

The Bicycle Network along the I-580 East CSMP Corridor begins, along I-580, in the area east of the SR-84/Isabel Interchange and continues along parallel local roads on the north side of the Corridor where it crosses to the south side at the Stoneridge Mall (west of I-680). The Bicycle Network continues along local roads crossing at two points (Vallereal Drive and Crow Canyon Road), then splits away to different areas in Castro Valley and Hayward. The Bicycle Network then comes back again to the Corridor at the I-580/I-238 split and continues along I-238 beyond the CSMP limits.

Pedestrian Network

According to the Alameda County Transportation Improvement Authority (ACTIA) /ACCMA Alameda Countywide Strategic Pedestrian Plan (2006); In Alameda County, over 500,000 trips are made on foot daily, representing 12 percent of all trips. The Strategic Pedestrian Plan describes *existing* and *proposed* pedestrian facilities along the Corridor in the *East Planning Area* known as the Tri-Valley. Trails in this area along the Corridor include the Iron Horse Trail, the Tassajara Creek Trail, and the Alamo Canal Trail.

Major gaps in the bicycle and pedestrian network:

- For cyclists, there is a gap between Tassajara Rd. and Canyon Parkway, at the north side of the freeway, from the Dublin/Pleasanton BART Station to Las Positas College.
- For pedestrians, I-580, I-680, and Union Pacific Railroad (UPRR) tracks are the three major barriers to travel in the Dublin, Pleasanton, and Livermore area.
- Limited bicycle and pedestrian north/south access to cross the Corridor at interchanges.
- Bicycle and pedestrian facilities need connectivity and continuity.
- Opportunities to improve the bicycle and pedestrian network:
- Improve freeway interchanges at specific locations for bicycle and pedestrian utility (the Countywide Bicycle Plan identifies projects in the Isabel Avenue area as a high priority).
- Extend the Iron Horse Trail south to Pleasanton with a future eastward connection to San Joaquin County.
- Provide continuous, connected bicycle and pedestrian facilities and access to transit.
- Most general plans for the jurisdictions already encourage the use of non-motorized transit.
- Future pedestrian improvements for the East Planning Area focus on pedestrian facilities around BART stations and downtown districts.

1.13 MODE SPLIT

Single Occupancy Vehicle (SOV) use is prevalent at 80 percent in the Livermore-Pleasanton area along the I-580 East CSMP Corridor. Transit use is highest at 12 percent in the San Leandro area according to the 2006-2008 American Community Survey (ACS) 3-year Estimate. Table 1.13.1 illustrates the modal split for means of transportation to work for cities along the Corridor.

Cities	SOV %	Rideshare %	Transit %	Walk %	Other Means %	Wk at Home %
Livermore	80.9	7.5	3.0	1.3	2.3	4.9
Pleasanton	79.0	5.7	5.6	1.7	2.6	5.4
Dublin	76.4	8.1	7.4	1.3	2.3	4.6
Hayward	69.1	15.1	7.9	0.9	3.1	3.9
San Leandro	70.6	9.8	12.1	2.2	1.8	3.5
Castro Valley	72.0	9.8	9.2	2.2	2.3	4.5
Corridor	66.5	10.4	11.2	3.6	3.3	5.0

Source: 2008 American Community Survey http://factfinder.census.gov/servlet/ADPGeoSearchByListServlet?ds_name=ACS_2008_3YR_G00_&_lang=en&_ts=283874622328 (accessed February 10, 2010)

Table 1.13.1 Mode Split for cities along the I-580 East CSMP Corridor

1.14 LAND USE / MAJOR TRAFFIC GENERATORS

The Alameda County population reached 1.5 million in 2005, making it the second most populous county in the region behind Santa Clara County. By 2030, Alameda County is projected to have nearly 1.9 million residents. This is an increase of nearly 400,000 people over the next 25 years. The majority of the 560,000 housing units in Alameda County consist of single-unit structures (62 percent). Multi-unit housing structures comprise thirty-seven percent and mobile homes comprise one percent.

Based on the ABAG projections, the total number of jobs in Alameda County is expected to increase by 45 percent between 2000 and 2030. Job growth will be higher in the cities of Dublin and Livermore. The leading industries in Alameda County are educational, health care, and social assistance services (20 percent) and professional, scientific, management, administrative and waste management services (15 percent). Sixty-eight percent of Alameda County workers drive to work alone. For those who commute to work, it takes on average 27.5 minutes to get to work (U.S. Census: 2005-2007 ACS 3-Year Estimates).

Historically, the cities of Livermore, Pleasanton, Dublin, and Hayward are prominent along the I-580 East CSMP Corridor, as well as the community of Castro Valley. The city-centered growth in the Tri-Valley cities of Livermore, Pleasanton, and Dublin focuses on developing compact neighborhoods within walking distance of schools, stores, services, and public transit, while preserving the open space and natural features of the Tri-Valley area.

Various land uses along the CSMP Corridor include a mix of single-family residential, undeveloped residential, commercial, light industrial, recreational, agricultural and open space. There is a large industrial area from Altamont Pass Road near the City of Livermore including the UPRR on the south side. Much of the terrain on the north side of the Corridor, particularly in the Livermore, Pleasanton, Dublin area is rural and varies from flat to rolling hills. The eastern portion of the Corridor, on the south side, includes a scenic view of the Arroyo Las Positas.

Commercial and light industrial uses are clustered around interchange areas. Three publicly owned parks are located adjacent to the Corridor. The Livermore Municipal Airport is located on the south side of the Corridor.

Major Trip Generators

Lawrence Livermore National Lab

The LLNL is located off Vasco Road approximately five miles from the I-580/680 Interchange. LLNL is one square mile in size, with a workforce of more than 7,800 people. Because much of LLNL's mission involves national security, entry is strictly regulated. The public is invited to tour the Discovery Center, located just outside the Laboratory's gates off Greenville Road.

Livermore Municipal Airport
Livermore Municipal Airport (LVK) is a General Aviation airport, located three miles northwest of the City of Livermore. LVK is owned and operated by the City of Livermore and serves private, business, and corporate tenants and customers. LVK is designated a key disaster relief air transportation hub in the event of a catastrophe such as a major earthquake.

Hacienda Crossings Shopping Center
Hacienda Crossings Shopping Center is located in the City of Dublin near the junction of I-580 and I-680. The center is accessed via Hacienda Drive from I-580 (westbound and eastbound). The center contains 37 businesses that provide various shopping, dining and entertainment opportunities. It is also home to the areas largest theater complex, the Hacienda Crossings 20 plus IMAX.

Stoneridge Regional Shopping Mall
Stoneridge Regional Shopping Mall is a 1.3-million-square-foot indoor shopping mall located in the City of Pleasanton near the I-580/I-680 Interchange. The mall is accessed via Foothill Road south from I-580 or from Stoneridge Drive west from I-680. The mall contains five major department stores and 165 specialty stores and restaurants. This strategic location draws shoppers in from other areas in the East Bay.

Las Positas College
Las Positas College is an accredited community college, located on 147 acres in Livermore. The College enrolls approximately 8,100 day and evening students and offers a two-year curriculum for students seeking career preparation, college transfer or personal enrichment.

Priority Development Areas
The Focus Our Vision (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 Priority Development Area (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. A *planned area* is part of an existing plan that is more specific than a general plan, such as a specific plan or an area plan. A *potential area* may be envisioned as a potential planning area that is not currently identified in a plan or may be part of an existing plan that requires changes.

PDA along the I-580 East CSMP Corridor in Alameda County is listed in Table 1.14.1 on the next page.

Sustainable Communities Strategy (SB 375)

The next update of the RTP in 2013 will include a SCS, as required by SB 375. The SCS will lay out how Green House Gas (GHG) emissions reduction targets will be met for cars and light trucks. This strategy will identify areas within the region sufficient to effectively house the population of the region, identify the network to better serve the transportation needs of the region, and forecast an effective development pattern for the region. This will not just be a land-use forecast, but a preferred development pattern integrated with the transportation network and with transportation measures and policies. Regional transportation funding decisions are required to be consistent with this plan, joining regional transportation planning and housing efforts. The result will be a comprehensive land-use and transportation plan for the region and serve as an integral part of a *second generation* CSMP.

PDA	Designation
Livermore, Downtown	Planned
Pleasanton, Hacienda	Potential
Dublin, Town Center	Planned
Dublin, West Dublin BART	Planned
Dublin, Dublin Transit Center	Planned
Hayward, Downtown	Planned
San Leandro, E14th Street	Planned
San Leandro, Bay Fair BART	Potential
San Leandro, Downtown	Planned

Source: www.bayareavision.org/initiatives/PDFs/PDA-List.pdf (accessed February 9, 2010)

Table 1.14.1 Priority Development Areas along the I-580 East CSMP Corridor

1.15 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 U.S. Army Corps of Engineers, US Fish and Wildlife Service, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, California Department of Fish and Game, 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 GHG emissions, assess any potential impacts, identify appropriate and feasible alternatives and recommend mitigation where appropriate.

Historical properties could be in the sphere of influence, (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-580 East CSMP Corridor is highly diversified in terms of its resources and related sensitivities. Seven historic bridges and two wetland areas are located along the eastern segments of the Corridor. 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. Two major land areas included in the East Bay Regional Park system are located along or near western segments of the Corridor, and are considered protected open space.

Segment	Historic Bridges	Wetlands	Species of Concern	Protected Open Space
Segment A - (PM ALA 0.39/R5.98):	X	X	X	
Segment B - (PM ALA R5.98/9.68):	X	X	X	
Segment C - (PM ALA 9.68/14.2):	X	X	X	X
Segment D - (PM ALA 14.2/R21.43):	X	X	X	
Segment E - (PM ALA R21.43/R23.72):	X		X	X
Segment F - (PM ALA R23.72/R28.75):		X	X	X
Segment G - (PM ALA R28.75/R30.8):			X	
Segment H - (PM ALA I-238 R14.46/16.69):			X	

Table 1.15.1 Summary of Environmental Factors by Segment for the I-580 East CSMP Corridor[2]

The Bushy Creek Regional Preserve is also located along the eastern segment of the Corridor, off North Vasco Road. Table 1.15.1 and Figure 1.15.1 illustrate these environmental factors by segment.

[2] Caltrans Statewide Historical Bridge Inventory (2009) www.dot.ca.gov/hq/structur/strmaint/hs_state.pdf (accessed February 9, 2010); CA Natural Diversity Database (CNDDB) http://imaps.dfg.ca.gov/viewers/cnddb_quickviewer/app.asp (accessed February 9, 2010); National Wetlands Inventory

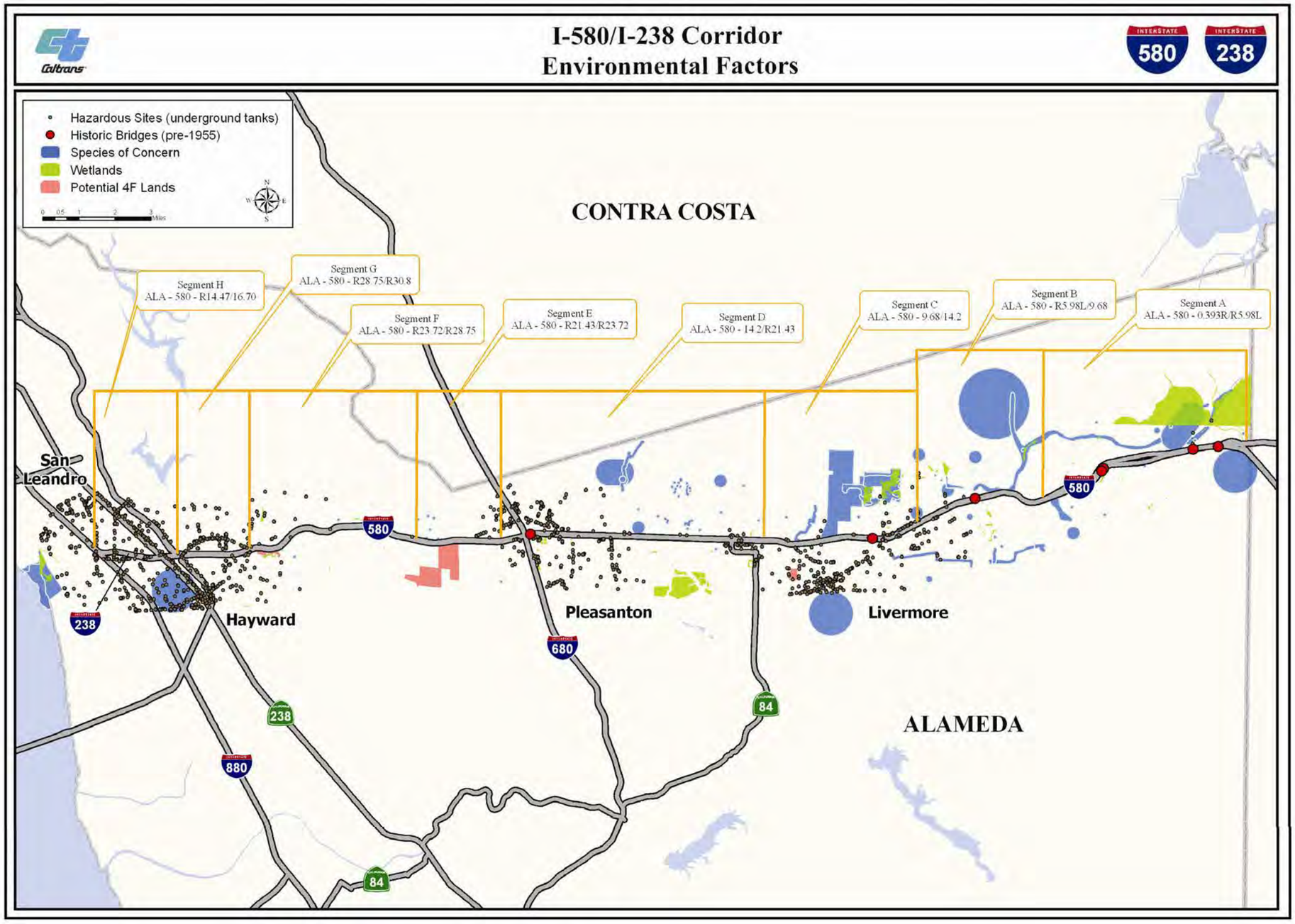


Figure 1.15.1 Environmental Factors by Segment

Federal and State Regulations

Table 1.15.2 below, references federal and state regulations related to environmental factors and potential environmental issues along the I-580 East 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) Bay Conservation and Development Commission (BCDC) and California Coastal Commission	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. 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.

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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 1.15.2 Environmental Federal and State 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) 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 (O3) precursors of (Nitrogen Oxides (NOx) 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 O3 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.[3]

	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 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.

[3] California Air Resources Board: http://www.arb.ca.gov/adam/cgi-bin/db2www/adamtop4b.d2w/start accessed February 10, 2010; Air Quality Status Summary: http://pd.dot.ca.gov/env/air/html/areadesig/SummAQStatMPORTA.htm (accessed February 10, 2010). A Report from: Bay Area Air Quality Management District. *Bay Area 2005 Ozone Strategy* (January 2006) http://www.baaqmd.gov/Divisions/Planning-and-Research/Plans/Bay-Area-Ozone-Strategy/2005-Bay-Area-Ozone-Strategy.aspx (accessed February 10, 2010)

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[4]. 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).

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.

Source: http://www.arb.ca.gov/cc/newletter/climate_newletter?fall2009.pdf accessed 11/30/09

Sustainable Community Strategy (SB 375)

The next update of the RTP in 2013 will include a Sustainable Community Strategy (SCS), as required by SB 375. The SCS will lay out how Green House Gas (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 approach 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 impacts 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 27 miles of State Highway facilities in Alameda County would be at risk given a 55-inch sea level rise in the year 2100. This includes 0.5 lane miles of Interstate 580.

Habitat and Biological Resource Issues

Substantial flooding has occurred in the Amador and Livermore Valleys in the past. Areas subject to a 100-year flood[6] along the I-580 East CSMP Corridor (Livermore, Pleasanton, Dublin area) are identified as: Tassajara Creek Crossing, Arroyo Mocho Crossing, Arroyo Las Positas-First Street Crossing, Arroyo Las Positas-North Livermore Crossing, Arroyo Las Positas-Airway

[4] A Report from: California Air Resources Board. *Climate Change Scoping Plan a framework for change.* December 2008. http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf (accessed February 10, 2010)

[5] A Report from: California Department of Transportation and Business, Transportataion and Housing Agency. California's Changing Climate Assessing Potential Risks and Adaptation Strategies for the State Transportation Infrastructure Preliminary Report, Final Draft (February 2009)

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

Boulevard Crossing and Arroyo Seco Crossing. Two wetland areas are located along the Corridor (see Figure 1.15.1).

Vegetation along the I-580 East CSMP Corridor includes ornamental plantings, non-native annual grasses, and non-native rural vegetation. Some trees along the edge of the I-580 right-of-way in the City of Livermore may be considered ancestral trees under the city of Livermore Street Trees, Shrubs, and Ancestral Trees ordinance. Alamo Canal crosses under I-580 to parallel I-680 on the east side, flowing north. Tassajara Creek, Cottonwood Creek, a tributary to Arroyo Mocho, Collier Canyon Creek, Cayetano Creek, Arroyo Seco, and Arroyo Las Positas cross I-580 between the City of Dublin and the City of Livermore. These streams have the potential to contain habitat for the threatened California red-legged frog and California tiger salamander. They may also be habitat for the western pond turtle, a State species of concern. Alamo Canal is tributary to Alameda Creek, whose lower reaches are habitat for the federally threatened Central California coastal steelhead. Rainbow trout are resident in Arroyo Mocho. The endangered San Joaquin kit fox and the western burrowing owl (a Sate species of concern) also have the potential to occupy any burrow habitat in the area.

Table 1.15.3 below, indicates threatened and endangered species (T/E) on Federal and/or California (FED/CAL) 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.

COMMON NAME	SCIENTIFIC NAME
Fauna	
Alameda whipsnake	*Masticophis lateralis euryxanthus (T-FED/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 draytonii (T-FED)*
California Tiger Salamander	*Ambystoma californiense (T-FED)*
San Joaquin kit fox	*Vulpes macrotis mutica (E-FED, T-CAL)*
Salt-marsh harvest mouse	*Reithrodontomys raviventris (E-FED/CAL)*
Western snowy plover	*Charadrius alexandrinus nivosus (T-FED)*
Flora	
California seablite	*Suaeda californica (E-FED)*
Contra Costa goldfields	*Lasthenia conjugens (E-FED)*
Large-flowered fiddleneck	*Amsinckia grandiflora (E-FED/CAL)*
Palmate-bracted bird's beak	*Cordylanthus palmatus (E-FED/CAL)*
Robust Spineflower	*Chorizanthe robusta var. robusta (E-FED)*
Santa Cruz tarplant	*Holocarpha macradenia (T-FED, E-CAL)*

Source: California Natural Diversity Database (CNDDB)

Table 1.15.3: Threatened and Endangered Species (Fauna and Flora) along the I-580 East CSMP Corridor

Historic and Cultural Resources

There are known historic properties located within and around the I-580 East CSMP Corridor. Native American archaeological sites, especially frequent in the western portion of the Amador/Livermore Valley area, are likely to be buried 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 seven historic bridges (pre-1955) that cross the Corridor. 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, however, one bridge (#33 0123L) located near the San Joaquin/Alameda County line (built in 1938) has not been individually evaluated for eligibility. Table 1.15.4, identifies parks and/or open space in the corridor listed by jurisdiction.

East Bay Regional Parks	City Parks	Preserves	State Parks
Pleasanton Ridge Regional Park, Pleasanton/Livermore Valley, 5,271 acres Don Castro Regional Recreation Area, between Hayward and Castro Valley, 101 acres	Dublin Sports Grounds, Dublin Blvd & Civic Center, 22.8 acres	Brushy Peak Regional Preserve; Off N. Vasco Road, 1,833 acres	None

Table 1.15.4: Parks and/or Open Space along the I-580 East Corridor

Visual/Aesthetics

The I-580 East CSMP Corridor in Alameda County is not a State Scenic Highway nor is it eligible for designation as a scenic highway. Major segments of the corridor are urban in nature. Often 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.

1.16 STAKEHOLDER ISSUES AND CONCERNS

Stakeholders expressed the following issues and concerns during the CSMP External Review Process. Their concerns focused on SB 375 requirements, CSMP analysis scope, and the local arterial network.

Sustainable Communities Strategy (SB 375)

The next update of the RTP in 2013, will include a SCS, as required by SB 375. Stakeholders want the CSMP to include integrated land-use and transportation, in the context of the SCS, and take a more comprehensive look at transit and non-motorized travel strategies and options. This will make the CSMP more useful for input to the RTP.

Additional issues and concerns related to concepts of SCS in the CSMP are:

- Projects recommended through the CSMP are limited primarily to highway operations projects and may not be the priorities that would emerge from a multi-modal and integrated transportation land use planning effort.

- Conclusions recommend major improvements, primarily highway, to address "inefficient capacity" without discussion of the potential for land use planning and zoning to impact demand for driving. It is important to develop projects considering development patterns, rather than an assumption of increasing numbers of inbound commuters.
- The CSMP includes improvements to transit such as BART to ACE/Livermore and I-580/Greenville Road Station but no proposals to support increased densities in PDAs or around the ACE/BART transit stations through improved non-auto access, improvements to pedestrian or bicycling networks or amentities. Demand management is limited to safety improvements on Altamont and Patterson.
- The CSMP lists highway investments already planned for the corridor, noting that while they will solve much of the existing traffic congestion problems in the corridor by 2115, new bottlenecks will arise due to increased demand and the amelioration of the current bottlenecks, such that increased demand will soon again greatly exceed the highway capacity, resulting in significantly increased congestion and reduced reliability.

CSMP Analysis Scope

This *First Generation* CSMP is considered a highway operational improvement plan focusing on system management strategies to address the congestion and delay of vehicles, primarily through projects that affect highway operations. Stakeholders are concerned that the performance measures for the CSMP are highway oriented (ie: vehicle hours of delay, travel speed by car, accident rates by car, pavement conditions), rather than multimodal land use and transportation measures such as housing accessibility to jobs, and modal choices for residents. Stakeholders want the CSMP to meaningfully incorporate Vehicle Miles Traveled (VMT) reductions, GHG reduction, SB 375 directives, RTP objectives and performance measures.

Additional issues and concerns related to analysis and scope of the CSMP:

- The impacts of poor freeway performance to the local jurisdictions stretch far beyond the Corridor limits. To limit the scope and view to a short distance north and south of the freeway doesn't adequately identify all of the regional roadway network deficiencies.
- Newer projection data reporting can direct more development into the region, which is very important for this particular corridor. While there is always a timing delay between projections and studies, the major changes regarding land use planning should be used to direct the next round of transportation project commitments.

Local Arterial Network

Poor corridor performance adversely affects local arterials. Stakeholders want to reduce interregional and regional traffic impacts to local arterial networks in adjacent jurisdictions. Local jurisdictions want to improve circulation on the local streets without attracting regional and interregional cut-through traffic from the freeway. Local jurisdictions stress that signal optimization strategies involve an interregional effort, including regular state and local agency communication and signal timing coordination.

Additional issues and concerns related to the local arterial network:

- Widening of surface streets to accommodate additional traffic flow, as proposed, is typically faster and creates a worse environment for pedestrians and bicyclists.
- Consider additional demand management approaches if more cost effective.
- Consider improvement strategies on parallel facilities that could ease freeway demand.


238 TO 880
LEFT LANES
Strobridge
Avenue
Oakland
San Francisco
bai
Bella

Section 2: CSMP Technical Analysis Report

The following technical analysis report presents the results of a comprehensive performance assessment, analysis and evaluation for the I-580 East CSMP Corridor in Alameda County. This report was developed through a series of milestones that included an extensive corridor data collection effort for the preliminary performance assessment, identification of improvement strategies, technical evaluation of strategies and recommendations based on this evaluation. The final report summarizes existing conditions and corridor management issues, identifies bottleneck trends, and presents short and long-term management strategies and recommended improvements along the corridor.

Attached Document

ALA-238/580 Corridor System Management Plan Technical Analysis Report
Final - May 2009
Prepared by Dowling Associates, Inc. under FPI contract with Metropolitan Transportation Commission

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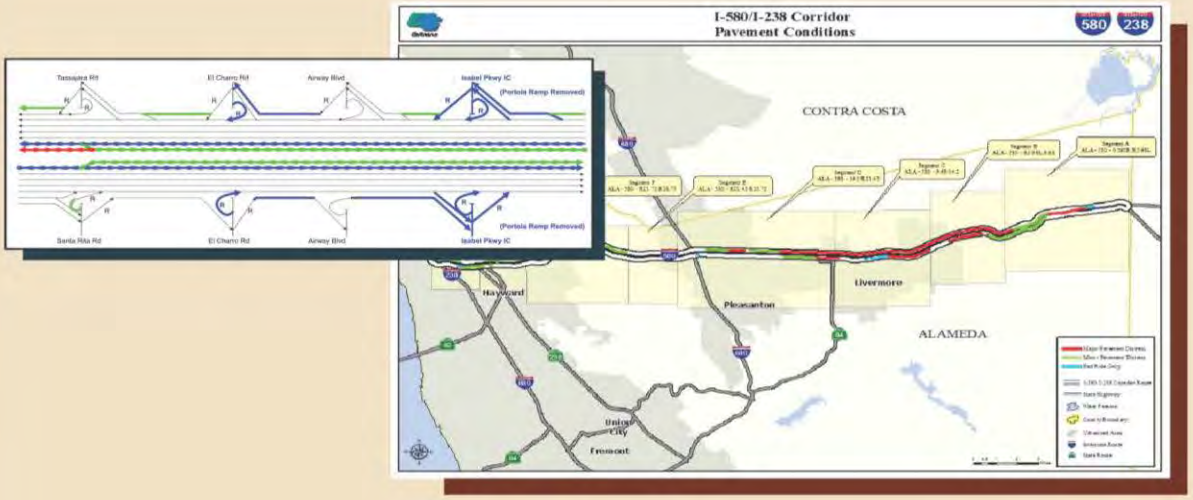
ALA-238/580
Corridor System Management Plan
Technical Analysis Report



Prepared For:
ALA-238/580 CSMP Corridor Team

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May 2009

Dowling Associates, Inc.
Transportation Engineering • Planning • Research • Education

Dowling Associates, Inc.

Transportation Planning, Engineering, and Research

May 29, 2009

Mr. Albert Yee
Mr. Erik Alm
ALA-580 Corridor System Management Plan Team
Metropolitan Transportation Commission
101 Eighth Street
Oakland, CA

Subject: **ALA-580 Corridor System Management Plan** P06106.008
Technical Analysis Report

Dear Mr. Yee and Mr. Alm:

Dowling Associates is pleased to present this technical report in support of your Alameda-238/580 Corridor System Management Plan effort for 2009. This is deliverable 4G of Task Order 5.

I would like to thank the ALA-580 CSMP Corridor Team and the corridor stakeholders for their many contributions and suggestions.

Our subconsultants: Dave Melis, and Jihyoung Kim of Mark Thomas & Company, and Ron Mikalson and Richard Shinn of TransCore developed the improvement schematics, cost estimates, and ITS infrastructure recommendations.

I would like to give credit to several engineers and planners at Dowling Associates who contributed greatly to this effort: Kevin Chen, Burhan Kocaman, Shusuke Iida, Kym Sterner, Senanu Ashiabor, Pratyush Bhatia.

Please give me a call at extension 120 if you have any questions.

Sincerely,
Dowling Associates

Richard G. Dowling, Ph.D., P.E.
Principal

\c:\work\proj\06106_08 mtc ala580 csmp\task order 5 analysis\task 4 evaluation\4g final report\ala580 final rep3.doc

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1. INTRODUCTION & EXECUTIVE SUMMARY

The report presents the results of the technical analysis in support of the Alameda I-238/I-580 Corridor System Management Plan being co-developed by the Metropolitan Transportation Commission, Caltrans District 4, the Alameda Congestion Management Agency and the various corridor stakeholders.

1.1. Background

The I-580/I-238 CSMP study corridor consists of the I-580 and I-238 freeways and parallel arterials extending 32 miles from the I-580/I-205 interchange to the I-580/I-238 interchange and then on to the I-238/I-880 interchange (Post mile: ALA 238 14.47/16.69, ALA 580 0.393/R30.807) (see Figure 1).

The purpose of a Corridor System Management Plan is to "Preserve the mobility gains of urban corridor capacity improvements over time and to describe how they intend to do so in project nominations" (CTC CMIA Program Guidelines, Nov. 8, 2006).

The CSMP is developed through a series of milestones (see Table 1): An extensive corridor data collection effort was undertaken in May 2008 for the performance assessment (milestones 3 and 5). The preliminary performance assessment was completed in September 2008. The more comprehensive performance assessment (Milestone 5) was completed in January, 2009.

Table 1: I-580/I-238 CSMP Milestone Schedule

Milestone 1: Definition of Corridor	Completed June 2007
Milestone 2: Corridor Team Assembled	Completed January 2008
Milestone 3: Preliminary Performance Assessment	Completed September 2008
Milestone 4: Improved Traffic Detection in Place	Scheduled for August 2009
Milestone 5: Performance Assessment	Completed January 2009
Milestone 6: Improvement Strategies Identified	Completed February 2009
Milestone 7a: Technical Evaluation of Strategies	Completed April 2009
Milestone 7b: Stakeholder Evaluation of Strategies	July 2009
Milestone 8: Plan Complete/Adopted	September 2009/December 2009

This final report is a compilation and summary of the intermediate products which were delivered as part of this technical analysis in support of the Corridor System Management Plan (see Table 2).

Table 2: Schedule of CSMP Technical Analysis Deliverables

Task Order/Deliverable	Schedule
Task Order 1 – Field Data Collection Plan	Initiated: April 25, 2008 Completed May 30, 2008
Task Order 2 – Field Data Collection	Initiated April 22, 2008 Field data collection May 13-14, 2008 Deliverable 1C (Data) delivered June 4, 2008
Task Order 3 – Data Collection Plan and Scope	Initiated June 12, 2008
Deliverable 1A – Information and Data Collection Plan	Draft delivered July 14, 2008 Final delivered August 13, 2008
Deliverable 1B – Detailed Workscope, Schedule, Budget	Draft: July 14, 2008 Final: August 13, 2008
Task Order 4 – Model Methodology	Initiated: August 19, 2008
Deliverable 2B – Analysis Method	Draft: August 25, 2008 Final: October 5, 2008
Deliverable 2C – Preliminary Performance Assessment	Draft: September 12, 2008 Final: October 9, 2008
Deliverable 2D – Microsimulation Method	Draft: August 25, 2008 Final: October 5, 2008
Task Order 5 – Technical Analysis	Initiated October 8, 2008
Deliverable 2E – Microsimulation Validation	Template: October 27, 2008 Draft: November 29, 2008 Final: December 15, 2008
Deliverable 2F – Existing Conditions and Trends	Draft: January 15, 2009 Final: February 8, 2009
Corridor Team Meet	January 5, 2009
Deliverable 3A – Initial Strategies List	Draft/Final: December 15, 2008
Deliverable 3B – Mitigation Strategies	Draft: January 17, 2009 Final: February 13, 2009
Corridor Team Meet	January 26, 2009
Stakeholders Meet	January 27, 2009
Deliverable 4A – Prioritization Scheme	Draft: February 25, 2009 Final: April 10, 2009
Deliverable 4B – Schematic Layouts	Draft: April 1, 2009 Final: April 10, 2009
Deliverable 4C – Cost Estimates	Draft: April 1, 2009 Final: April 10, 2009
Deliverable 4D – Alternatives Analysis	Draft: March 8, 2009 Final: April 10, 2009
Deliverable 4E – Model Files	Draft: April 1, 2009 Final: April 10, 2009
Deliverable 4F – Data Files	Draft: April 1, 2009 Final: April 10, 2009
Deliverable 4G – Final Results & Prioritization	Draft: April 1, 2009 Final: April 10, 2009
Corridor Team Meet	April 7, 2009
Stakeholders Meet	April 8, 2009

1.2. Summary of Existing Conditions and Trends

The existing conditions and trends are summarized in Table 3 for the I-580/I-238 freeways

1. The currently programmed capacity, traffic management, and transit improvements for 2015 will solve much of the existing traffic congestion problem in the corridor by the year 2015.

2. Increased demand between now and 2015, and the increased ability of traffic to move on the freeway after the existing bottlenecks are resolved, will result in new bottlenecks of traffic arising elsewhere (See Chapter 4 for details on new bottleneck locations and causes).

3. Increased demand after 2015 will soon again greatly exceed the available capacity of the corridor. Congestion will increase significantly and reliability will deteriorate appreciably. Additional capacity, traffic management, demand management, and transit improvements will be required to address post 2015 needs.

Table 3: Summary of Freeway Mobility Trends

	2008 Existing	2015 Program	2035 Plan
VMT (AM)	1,263,752	1,456,186	1,943,100
VMT (PM)	1,662,204	2,078,294	2,530,400
Total VMT	2,925,956	3,534,480	4,473,500
Change	0%	21%	53%
VHT (AM)	24,763	27,305	226,100
VHT (PM)	30,810	41,253	737,300
Total VHT	55,573	68,559	963,400
Change	0%	23%	1634%
VHD (AM)	6,815	6,355	198,341
VHD (PM)	5,572	12,141	701,151
Total VHD	12,387	18,496	899,493
Change	0%	49%	7162%
MPH (AM)	51.0	53.3	8.6
MPH (PM)	54.0	50.4	3.4
Total MPH	52.7	51.6	4.6
Change	0%	-2%	-91%

VMT = vehicle-miles travelled during peak period
VHT = Vehicle-hours expended during peak period
VHD = Vehicle-hour of delay incurred during peak period
MPH = Average speed of traffic (miles per hour)
Change is compared to 2008 values.
2015 results include all programmed improvements for the corridor.
2035 results include all long-term planned and short-term programmed improvements for the corridor.
Sources: Microsimulation for 2008, 2015, sketch planning model for 2035

1.3. Recommended Short Term Improvements

A total of $62.3 million of short term improvements are recommended in addition to currently programmed projects expected to be in place by 2015. These improvements would preserve corridor mobility at current levels through 2015. The recommended short term improvements are listed Table 4.

1.4. Recommended ITS Improvements

A total of $500,000 of ITS enhancements is recommended for the I-580/I-238 corridor (see Table 5) (These are short term improvements, consequently this amount is included above in the Short Term Improvements Table). This cost estimate is in addition to the costs of completing implementation of the on-going Caltrans RMDP and the I-580 TMP programs.

1.5. Recommended Long Term Improvements

A total of $2,394 million of long term improvements are recommended (see Table 6). These long term improvements are in addition to currently programmed projects expected to be in place by 2015 and the additional short term improvements recommended above. These long term improvements would not be sufficient to preserve the mobility of single-occupant vehicles in the corridor, but would greatly enhance mobility for the alternative modes in the corridor (high occupancy vehicles, highway transit, and rail transit).

Table 4: Recommended Short Term Improvements

Freeway Management Improvements	Construction Cost (millions$)
1. Increase ramp meter capacity above 900 vph at the following metered on ramps a. San Ramon/Foothill Road On b. I-580 Westbound on-ramp at I-205	1.0 (1)
2. Increase storage capacity for following metered on-ramps a. Hacienda Loop On to EB 580 (increase storage to 2 lanes) b. Tassajara Loop On to EB 580 (increase storage to 2 lanes)	2.6
3. Install ramp meters with HOV lanes (where Right of Way allows) at the following on-ramps a. Hesperian Blvd. to I-238 SB b. East 14th Street to I-238 WB c. East Lewelling Blvd. to I-238 SB d. Foothill Blvd. to I-238 NB e. Foothill Blvd. to I-580 EB f. Strobridge Avenue to I-580 EB g. Redwood Road to I-580 EB h. Redwood Road to I-580 WB i. Grove Way Loop On to I-580 EB j. Grove Way Direct On to I-580 EB k. East Castro Valley Blvd. to I-580 WB l. Eden Canyon Road to I-580 EB m. Eden Canyon Road to I-580 WB	35.0
4. Install ITS improvements in corridor (see section on Recommended ITS Improvements below)	0.5
5. Improve eastbound HOT lane operations between Santa Rita/Tassajara On and First Street Off to address forecasted capacity shortfall.	3.8 (2)
6. Improve westbound HOT lane operations between First Street On and Santa Rita/Tassajara Off to address forecasted capacity shortfall	3.8 (2)
7. Add 4th truck to Freeway Service Patrol Beat #22 (I-580: Hacienda to Grant Line) to keep average customer wait time below 10 minutes. Increase operating hours to 5:30 AM to 9:30 AM and 3:30 PM – 7 PM to be consistent with adjacent beat #27.	(3)
Surface Street Management Improvements	
8. Continue Improvement of Signal System Coordination and Optimization with integration as appropriate with freeway operations.	5.0
Freeway Capacity Improvements	
9. Construct separate off-ramp WB 580 to access SB 680 SB loop ramp.	0.3
10. Accelerate Construction of WB auxiliary lane between N. Livermore and Isabel.	(4)
11. Accelerate Construction of WB auxiliary lane between Isabel direct on and Airway Off	(4)
12. Accelerate Construction of WB auxiliary lane between Fallon/El Charro Off and Tassajara/Santa Rita Loop On	(4)
13. Add 4th lane WB from Mission/East 14th off to I-880 SB off.	5.6
14. Accelerate Construction of EB auxiliary lane between Isabel direct on and N. Livermore off.	(4)

Surface Street Capacity Improvements	
15. Spot Intersection capacity improvements: a. East Lewelling Blvd. and Hesperian Blvd. b. Castro Valley Blvd. and Foothill Blvd. c. Foothill Blvd. and Grove Way d. Castro Valley Blvd. and Stanton Avenue e. Redwood Road and I-580 WB Off-ramp f. Castro Valley Blvd. and Grove Way/Crow Canyon Road g. Hopyard Road and Owens Drive h. Airway Blvd. and North Canyon Parkway	4.7
Transit Improvements	
16. Preserve frequency and number of routes of San Joaquin RTD (SMART), and Modesto (MAX BART) inter-regional express bus service to Dublin/Pleasanton BART Station	(5)
17. Preserve frequency and number of routes of County Connection and Tri-Delta express bus service to Dublin/Pleasanton BART Station	(5)
Additional Demand Management and Other Measures	
18. None - Management and capacity improvements are able to reduce congestion below current levels in the corridor.	None
Total	**62.3**

Notes:

(1) Cost estimate is for adding lane to ramp.
(2) Cost estimate is for adding second HOT lane, but excludes right-of-way costs that might be necessary to preserve BART in median option. Other options available for increasing capacity.
(3) No capital costs if vehicle is leased.
(4) Possible reduction in construction costs if work is moved up to earlier year.
(5) No capital costs involved in preservation of existing routes and services.

Table 5: Recommended I-580/I-238 ITS Improvements

Item	Description
Caltrans Ramp Meter Deployment Plan (RMDP)	Continue implementation of Caltrans RMDP for corridor. This involves metering all remaining on-ramps in corridor; and the metering of selected freeway to freeway connectors at I-680/I-580, and I-580/I-205 interchanges.
I-580 TMP	Continue implementation and integration of I-580 Corridor Transportation Management Plan ITS improvements (see Figure 29 for details).
TMS (Traffic Monitoring stations)	Furnish, install and maintain RTMS units for monitoring 8-lane freeway facility at following locations: • I580/El Charro • I-580/North Flynn • I-580/Grant Line
CCTV (Closed Circuit Television)	Furnish, install and maintain CCTV cameras with PTX control, CODEC, camera tower and mounting and utilities at the following locations: • I-238/Hesperian • I-580/North Flynn • I-580/Grant Line
Fixed CMS (Changeable message signs)	Furnish, install and maintain fixed CMS units and utilities for overhead structure spanning one direction of travel at the following locations: • I-580 westbound at Eden Canyon Road

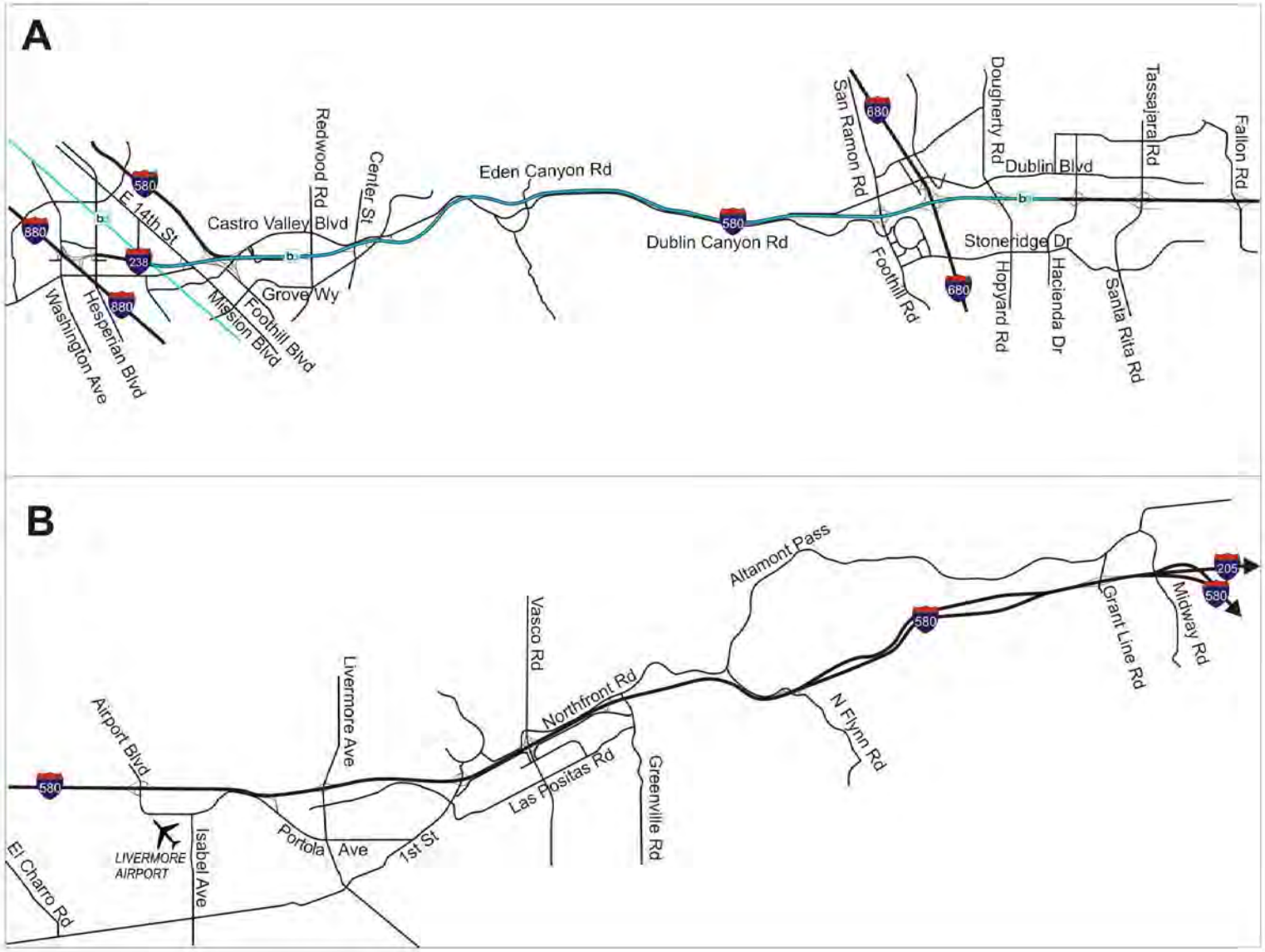
Table 6: Recommended Long Term Improvements

Freeway Management Improvements	Construction Cost (millions$)
19. Extend Single HOT lanes: a. Westbound between I-680 and Redwood Road. b. Eastbound between Redwood Road and Hacienda. c. Westbound between I-205/Mountain House Parkway and Greenville Road d. Eastbound between Greenville Road and I-205/Mountain House Parkway	365.3
20. Improve operations of HOT lanes to address forecasted capacity shortfalls for following sections: e. Westbound between Santa Rita and I-680 f. Eastbound between First Street and Vasco Road.	7.4
21. Construct Direct Ramp I-580 WB to I-680 SB – 2 mixed flow lanes plus 1 HOT lane.	750.0
Surface Street Management Improvements	
22. Signal coordination, incident detection, incident management.	5.0
23. Add HOT lanes both directions to SR 84 between I-580 and I-680.	110.0
Freeway Capacity Improvements	
24. Reconstruct San Ramon/Foothill Road Interchange	2.1
25. Reconstruct Hacienda Drive Interchange	20.0
26. Reconstruct First Street Interchange	37.0
27. Reconstruct Vasco Road Interchange	45.0
28. Reconstruct Greenville Road Interchange	43.0
29. (This project number Not Used)	
Surface Street Capacity Improvements	
30. Widen SR 84 to 4 lanes divided expressway I-680 to Isabel Avenue to Stanley (off loads I-680/I-580 interchange)	129.6
31. Widen SR 84 (Isabel Parkway) to 6-lalne expressway Stanley to Jack London	(1)
32. Widen Byron Highway (SR 239) to 4 lane divided expressway from SR 4 Bypass to I-205 (off loads I-580 over Altamont Pass and Vasco Road)	15.5
33. El Charro Road extension to Stanley Blvd. (off loads Santa Rita interchange)	18.5
Transit Improvements	
34. Double Track Union Pacific (ACE) rail line Tracy to Livermore	34.5
35. Increase ACE train service to 7 trains.	12.4
36. Altamont Rail Corridor Speed and Safety Improvements (90 mph)	30.0
37. Extend BART to ACE/Livermore Station and I-580/Greenville Road Station	700.0
38. Cross-Platform transfer BART/ACE at Livermore Station	20.0
39. Cross-Platform transfer ACE/High Speed Rail at San Jose Station	20.0
40. Integrate BART/ACE Monthly Passes	(2)
41. Bus Rapid Transit between major Livermore employers and BART/ACE train Livermore Station	23.0
Additional Demand Management and Other Measures	
42. Restrict I-580 over Altamont Pass to 8 mixed-flow lanes (4 each direction).	(3)
43. Safety Improvements (including signing, striping, signalization, realignments, passing lanes, median barriers, increased speed enforcement) to Altamont Pass Road and Patterson Pass Road to accommodate expected diverted SOV demand.	6.0
Total	2,394.4

Notes:

(1) Cost is included in cost estimate for Project #30, Widen SR 84 to 4 lanes divided expressway.
(2) Capital costs would depend on fare reading equipment requirements.
(3) No capital cost for this measure.

Figure 1: Alameda 580/238 Study Corridor



2. EXISTING INFRASTRUCTURE

Alameda I-580 and I-238 together function as a major inter-regional freeway serving multiple counties in the Bay Area, including San Joaquin County, Alameda County, Contra Costa County, and Marin County. The two freeways serve as a corridor for the movement of goods and freight into and out of the region. They also provide an essential corridor for everyday commute travel, as well as for recreational travel during weekends and summers.

The study section of I-580 extends from the I-238/I-580 interchange to the I-205 interchange. In addition a short section of I-238 is included in the study corridor, extending from the I-880 interchange to the I-580 interchange.

2.1. Geometry

Within the study corridor limits, I-580 is primarily an eight-lane (8-lane) freeway facility, with four mixed flow lanes in each direction, from I-205 interchange in the east to I-238 interchange to the west. Auxiliary lanes are in place between the I-680, Hopyard, Hacienda Drive and Santa Rita Road interchanges in this corridor within the City of Pleasanton. There are currently no HOV lanes along the I-580 and I-238 study corridors. Figure 2 presents a schematic line drawing of the study freeway corridor showing the lanes and ramps.

BART operates in the median of I-238 and I-580 between Mission Blvd in Hayward/San Leandro and Hacienda Drive in Pleasanton.

The I-238 freeway connects the I-580 freeway to the I-880 freeway. It is generally two (2) lanes in the northbound/ westbound direction, and two (2) lanes in the southbound/eastbound direction with an auxiliary lane through most of this section of the corridor.

The study corridor freeway has the following major grade sections:

- I-580 between Greenville Road and North Flynn Road – 4% grade (eastbound upgrade, westbound downgrade)
- I-580 between North Flynn Road and Grant Line Road – 2% grade (westbound upgrade, eastbound downgrade)
- I-580 west of San Ramon/Foothill Road interchange to near Hollis Canyon Road – 3% (westbound upgrade, eastbound downgrade)

The other sections of the study corridor are relatively flat.

The posted speed limit on I-238 and I-580 study corridor is 65 miles per hour.

Figure 2: Alameda 580/238 Study Corridor Schematic Drawing (A)

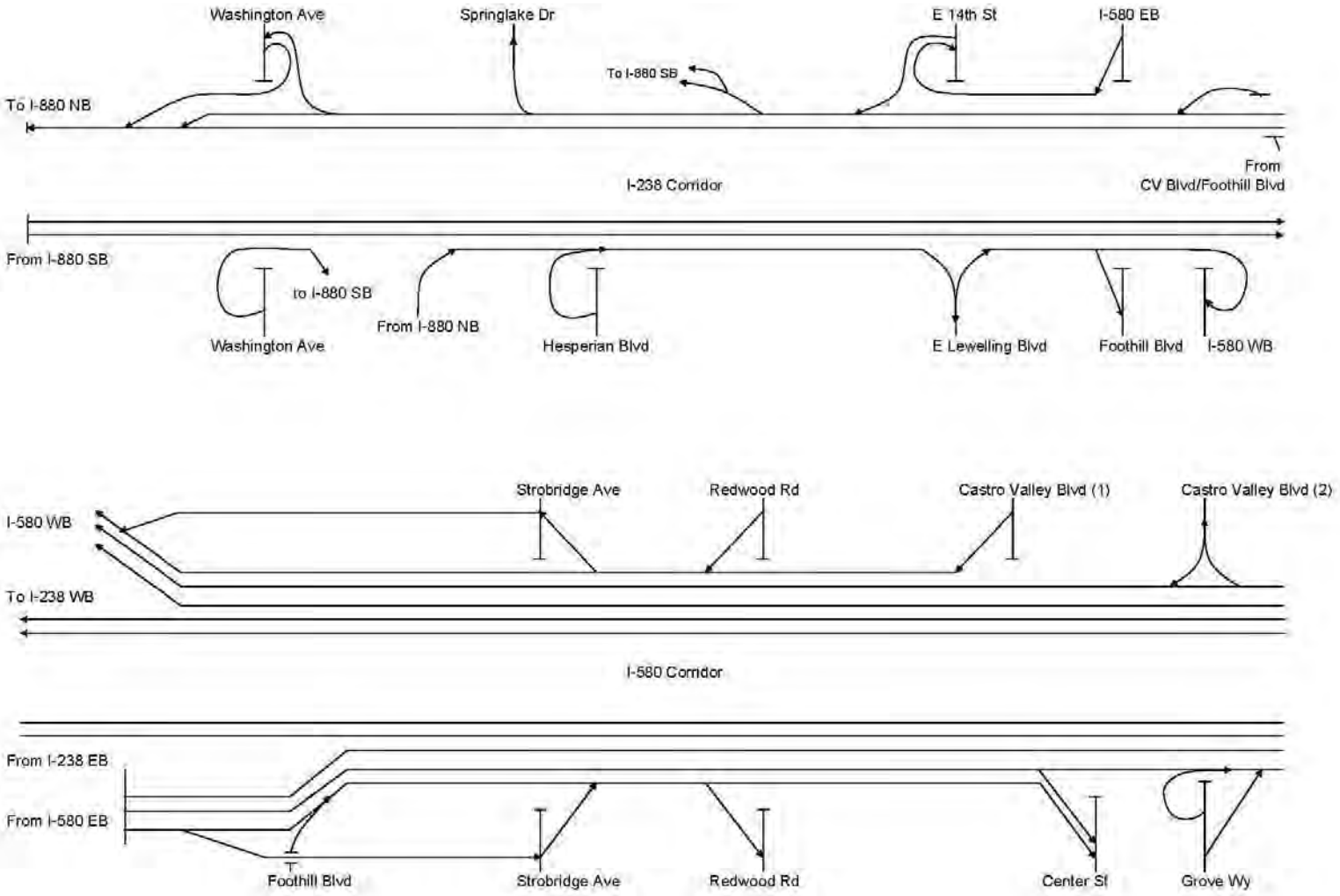


Figure 2B: Alameda 580/238 Study Corridor Schematic Drawing (B)

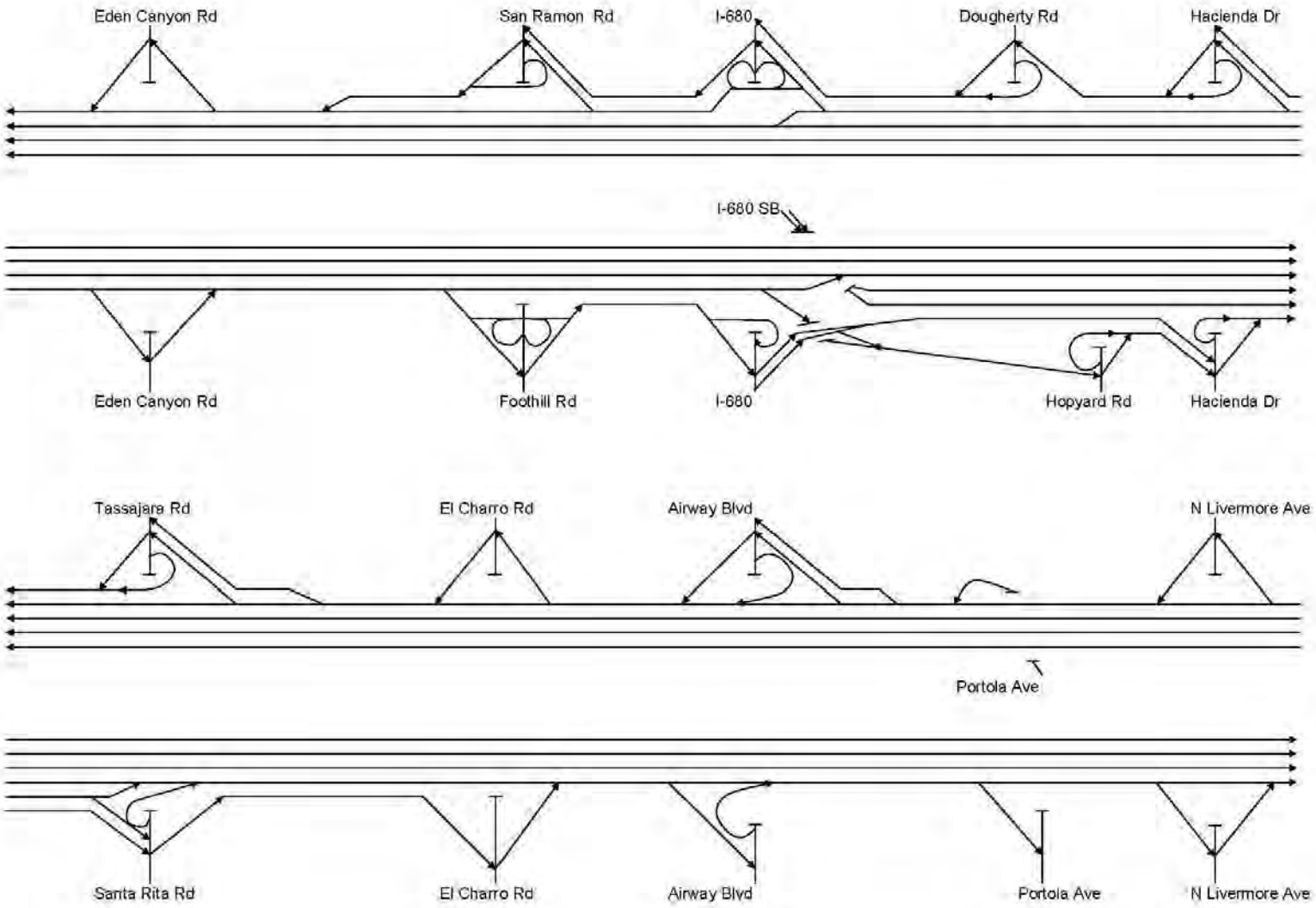
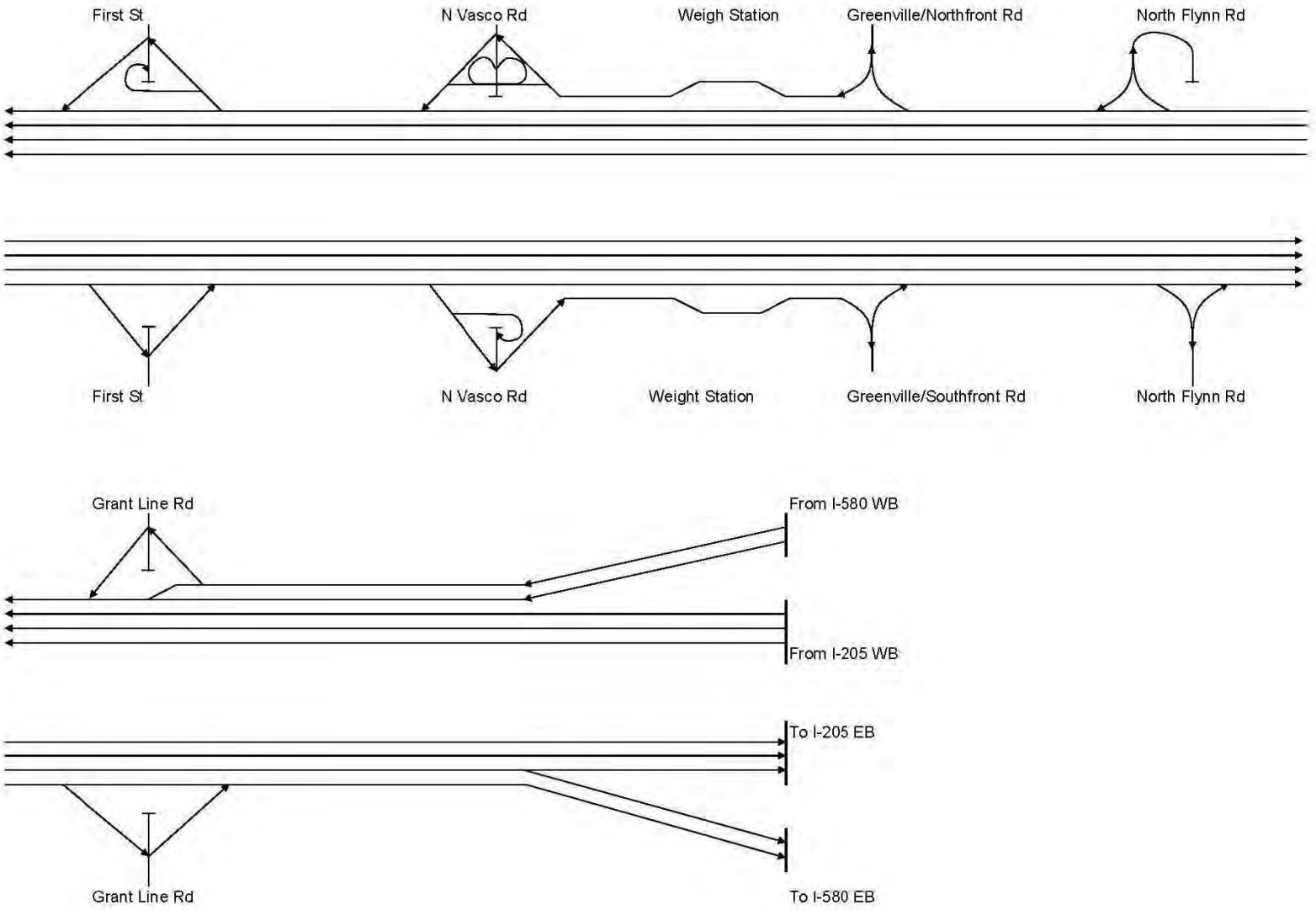


Figure 2C: Alameda 580/238 Study Corridor Schematic Drawing (C)



2.2. ITS Infrastructure

Caltrans District 4's existing ITS infrastructure on the corridor includes ramp metering (RM) stations, Traffic Monitoring Stations (TMS), Wireless Magnetometer Vehicle Detection Stations, Changeable Message Sign (CMS), Highway Advisory Radio (HAR), Extinguishable Message Sign (EMS), and Closed-Circuit Television (CCTV) cameras. Table 7 below provides a summary of ITS field elements that are in place or in various stages of construction.

Traffic monitoring stations in the I-580/I-238 corridor tend to be concentrated between San Ramon Road in Dublin and Santa Rita Road in Pleasanton. TMS coverage is sparse outside of this section of I-580. TMS stations are not currently reliable on I-238 due to on-going construction.

Weigh stations are in place between the Greenville Road/North Frontage Road interchanges and the Vasco Road interchange, in both the eastbound and westbound directions. Weigh-in-motion (WIM) sensors are in place at both of these stations
I-580 currently has ramp metering installed and operational in the eastbound direction, between the Hopyard Road interchange in Pleasanton and Dublin, to Greenville Road interchange in Livermore. Ramp metering was implemented and began operation on September 16, 2008 in the westbound direction between Grant Line Road and San Ramon Road in Dublin. Table 8 provides a summary of the existing ramp metering operations. There is currently no ramp metering along the I-238 segment of the corridor.
The I-580 ITS infrastructure is further described in the Regional ITS Architecture, recently updated in 2008. The Regional ITS Architecture is the ITS planning framework for the Bay Area that was developed and currently maintained by MTC in cooperation with partner agencies (including Caltrans). This architecture was developed and maintained in compliance with the FHWA ITS Final Rule (23 CFR 940). A Regional ITS Architecture is the ITS planning framework for integrated ITS project development in a region specified by its stakeholders.

Similarly, The California Statewide ITS Architecture and System Plan (SWITSA) references the existing and developing regional ITS plans and architectures from all over the state. It focuses on interregional coordination and state-level needs, and identifies common transportation challenges and services. It also includes a 10-year system plan that describes the blueprint for deployment of specific projects that fall within the statewide and interregional services category.[1]

Table 7: Existing or Under Construction ITS Elements

ITS Infrastructures	Count
Ramp Meters (RM)	32
Traffic Monitoring Stations (TMS)	41
Wireless Magnetometer Vehicle Detection Stations	50
Changeable Message Sign (CMS)	9
Highway Advisory Radio (HAR)	1
Extinguishable Message Sign (EMS)	4
Closed-Circuit Television (CCTV)	13

[1] http://www.dot.ca.gov/hq/tpp/offices/opar/CAarchitecture/index.htm

2.3. I-580 Smart Corridor

The ACCMA, along with Cities of Dublin, Pleasanton, and Livermore have implemented a SMART Corridor on the local street network along Rte 580. According to information on the I580 info website.2

"There are five existing TMCs [Transportation Management Centers] that serve the Tri-Valley area. Dublin, Pleasanton, and Livermore each have one in their respective cities. Caltrans District 4 TMC and the ACCMA TMC are located in Oakland."

"The Caltrans District 4 TMC is located in Oakland off Grand Avenue. It is staffed full-time and includes 19 operator workstations and a large video wall; as well as equipment rooms, a computer room, emergency management room, and a visitor area. The TMC receives information from California Highway Patrol (CHP) as well as the other smart corridors in the District. The information is displayed on a map in the Caltrans TMC."

"ACCMA's TMC is a managed server in Oakland. It provides 24 hour network monitoring and support. This virtual TMC receives all of the information from the East Bay SMART Corridors without the added expense of a physical TMC."

"Each City's TMC has Naztec Streetwise monitoring for congestion and incident information. This information is placed on the web server via ftp. Each Streetwise system has its own stand alone database. Access is restricted by user Id and Password."

2.4. Freeway Service Patrols

The I-580 freeway is covered by 2 freeway service patrol (FSP) beats (#22 and #27). Beat #4 covers I-880 and I-238 up to the I-238/I-580 interchange. Table 9 provides the operating hours, service areas and performance statistics for these FSP beats.

[2] Source: http://www.i580.info/technology.php

Table 8: Ramp Metering In Place on I-580

Eastbound	Lanes	Hours of Operation	Min. Rate	Max Rate
Foothill/San Ramon Loop	1	2:30-7:30 PM	180 vph	900 vph
Foothill/San Ramon Diagonal	1+HOV	2:30-7:30 PM	180 vph	900 vph
I-680 SB		Unmetered		
I-680 NB		Unmetered		
Hopyard/Dougherty Rd. Loop	1+HOV	2:30-7:30 PM	180 vph	900 vph
Hopyard/Dougherty Rd. Diagonal	1	2:30-7:30 PM	180 vph	900 vph
Hacienda Drive Loop	1	2:30-7:30 PM	180 vph	900 vph
Hacienda Drive Diagonal	1+HOV	2:30-7:30 PM	180 vph	900 vph
Santa Rita/Tassajara Rd. Loop	1	3:00-7:00 PM	180 vph	900 vph
Santa Rita/Tassajara Rd. Diagonal	2	3:00-7:00 PM	180 vph	900 vph
El Charro/Fallon Road	1	2:30-7:30 PM	180 vph	360 vph
Airway Blvd. Loop	1+HOV	2:30-7:30 PM	180 vph	900 vph
N. Livermore Avenue	2	2:30-7:30 PM	180 vph	900 vph
First Street	1	2:30-7:30 PM	180 vph	900 vph
Vasco Road	1	2:30-7:30 PM	180 vph	900 vph
Greenville Road	1	2:30-7:30 PM	180 vph	900 vph
North Flynn Road		Unmetered		
Grant Line Road		Unmetered		
Westbound	**Lanes**	**Hours of Operation**	**Min. Rate**	**Max Rate**
Grant Line Road	1	5:00-10:00 AM	180 vph	900 vph
North Flynn Road	1	5:00-10:00 AM	180 vph	900 vph
Greenville Road	1	5:00-10:00 AM	180 vph	900 vph
Vasco Road Loop	1	5:30-10:00 AM	180 vph	900 vph
Vasco Road Diagonal	1	5:30-10:00 AM	180 vph	900 vph
First Street	2	5:00-10:00 AM	180 vph	900 vph
North Livermore Avenue	2	5:00-10:00 AM	180 vph	900 vph
Portola Avenue	1	5:00-10:00 AM	180 vph	900 vph
Airway Blvd. Loop	1+HOV	5:00-10:00 AM	180 vph	900 vph
Airway Blvd. Diagonal	1+HOV	5:00-10:00 AM	180 vph	900 vph
Fallon/El Charro Rd.	1	Unmetered		
Tassajara/Santa Rita Rd. Loop	1	5:00-10:00 AM	180 vph	900 vph
Tassajara/Santa Rita Rd. Diagonal	1+HOV	5:00-10:00 AM	180 vph	900 vph
Hacienda Dr. Loop	1+HOV	5:00-10:00 AM	180 vph	900 vph
Hacienda Dr. Diagonal	1+HOV	5:00-10:00 AM	180 vph	900 vph
Dougherty/Hopyard Rd. Loop	1+HOV	5:00-10:00 AM	180 vph	900 vph
Dougherty/Hopyard Rd. Diagonal	1+HOV	5:00-10:00 AM	180 vph	900 vph
NB I-680	1	Unmetered		
SB I-680	1	Unmetered		
San Ramon Rd. Loop	1	5:00-10:00 AM	180 vph	900 vph
San Ramon Rd Diagonal	1+HOV	5:00-10:00 AM	180 vph	900 vph

As of January 1, 2009. All ramp meters are programmed to meter on-ramp traffic according to the percent occupancy on the right two lanes on the freeway.

Table 9: I-580/I-238 Freeway Service Patrol Beats

Beat Number:	# 4[3]	# 22	# 27
Service Area:	I-880/I-238 High Street to I-238 to I-580	I-580 Hacienda to Grant Line Road	I-580 I-238 to Hacienda
Hours of Operation:	M-F 6:00-10:00 AM, 3:00-7 PM Sun 1pm-7pm	M-F 6:00-9:30 AM, 3:30-6:30 PM Sun 1pm-7pm	M-F 5:30-9:30 AM, 3:30-7 PM Sun 1pm-7pm
Trucks per peak hour	3	3	2
Truck-hours per month	456	454	355
Incidents per month	371	421	327
Customer Satisfaction (% "excellent")	90%	96.6%	100%
Avg Wait Time (minutes)	8.3	9.7	7.5

Source: http://www.fsp-bayarea.org/statistics.htm, as of November 2008.

[3] Beat 4 is mostly on I-880 and only a small portion is on 238 (The statistics are not broken out for portions of beats).

3. CORRIDOR TRAVEL DEMAND CHARACTERISTICS

This chapter describes the existing travel demand characteristics for the I-238/580 corridor.

3.1. Existing Traffic Peaking Patterns

I-580 freeway currently carries between 180,000 and 220,000 ADT (see Table 10). Peak period volumes range from 25,000 to 70,000 vehicles (see Table 11). The 4-hour AM peak period volumes are typically 24% of daily traffic. The 5-hour PM peak period typically accounts for 32 % of daily traffic. The peak hour volumes are equal to about 7% of daily traffic.

Traffic peaking patterns vary on I-580 between the western and eastern sections of the study corridor.

West of the I-680 freeway, I-580 freeway mainline traffic shows the typical double horned peaking pattern with surges in demand during both the AM and PM peak hours (see Figure 3 and Figure 4). Saturday and Sunday peak hour demands never reach levels typical of weekdays. Peak hour volumes reach similar levels all five days of the week.

The AM and PM peak period directional splits on I-580, west of I-680 are typically 52%:48%.

East of the I-680 freeway, the I-580 freeway peaking pattern is much more directional (single horned). One peak is significantly greater than the other peak. In fact Saturday and Sunday peak hour volumes can exceed the weekday peak hour volumes in the off-peak direction (see Figure 5 and Figure 6).

The AM and PM peak period directional splits on I-580 east of I-680 are range between 55%:45% and 62%:38%.

Table 10: Daily Traffic Counts I-580 Mainline

	West of Eden Canyon Road			West of Airway Blvd.		
Day	EB	WB	Total	EB	WB	Total
Fri(5/02/08)	98,288	95,906	194,194	119,892	95,216	215,108
Sat(5/03/08)	80,812	78,200	159,012	108,776	84,044	192,820
Sun(5/04/08)	67,093	70,503	137,596	90,660	78,784	169,444
Mon(5/05/08)	86,960	89,365	176,325	106,289	85,530	191,819
Tue(5/06/08)	89,667	90,621	180,288	109,446	86,691	196,137
Wed(5/07/08)	91,332	92,083	183,415	108,719	87,223	195,942
Thu(5/08/08)	92,085	94,069	186,154	111,200	89,862	201,062
Fri(5/09/08)	98,732	97,815	196,547	119,423	96,817	216,240
Sat(5/10/08)	84,492	81,818	166,310	112,991	88,489	201,480
Sun(5/11/08)	74,402	76,222	150,624	98,984	86,682	185,666
Mon(5/12/08)	87,189	90,633	177,822	107,744	88,603	196,347
Tue(5/13/08)	90,163	91,210	181,373	110,075	87,282	197,357
Wed(5/14/08)	92,112	92,780	184,892	112,948	88,674	201,622

Source: PeMS (2008)

Table 11: Weekday Peak Period Mainline Traffic Volumes, May 2008

Facility	Location	AM	PM
I-238	East of I-880 Freeway	25,400	37,100
I-580	West of Eden Canyon Road	43,300	57,900
I-580	East of Hopyard Road	51,900	69,100
I-580	East of El Charro Road	46,600	63,000
I-580	East of Greenville Road	30,600	47,600
I-580	West of I-205 Freeway	32,500	48,400

AM Peak Period = 5-9 AM (4 hours)
PM Peak Period = 2:30-7:30 PM (5 hours)
Source: Dowling Associates, Estimates from Mainline and Ramp Counts, May 2008

Figure 3: I-580 EB: West of Eden Canyon

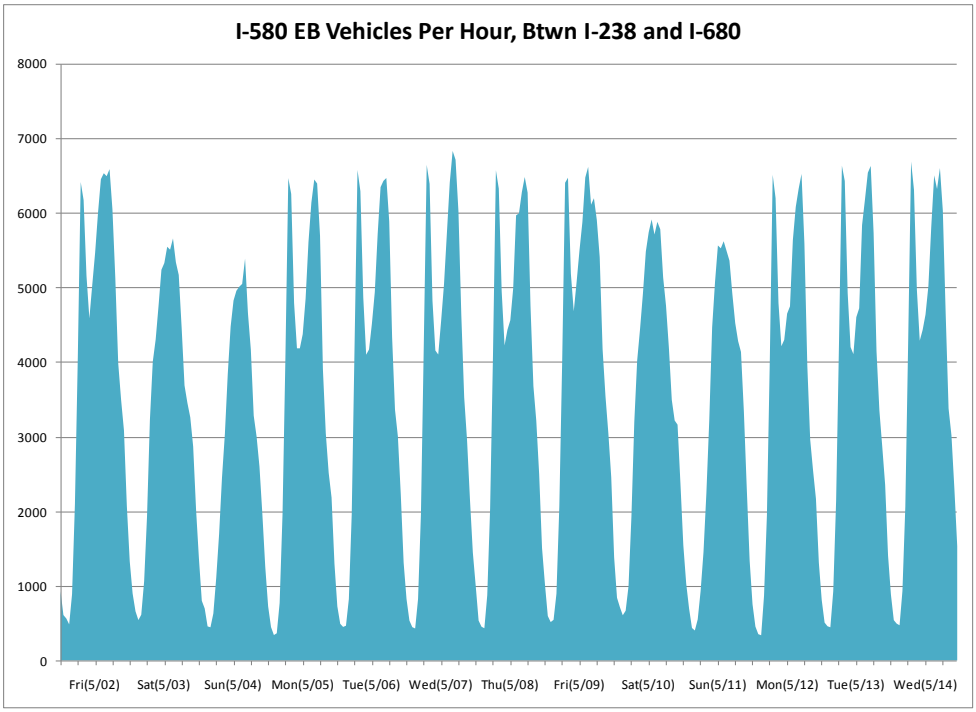


Figure 4: I-580 WB: West of Eden Canyon

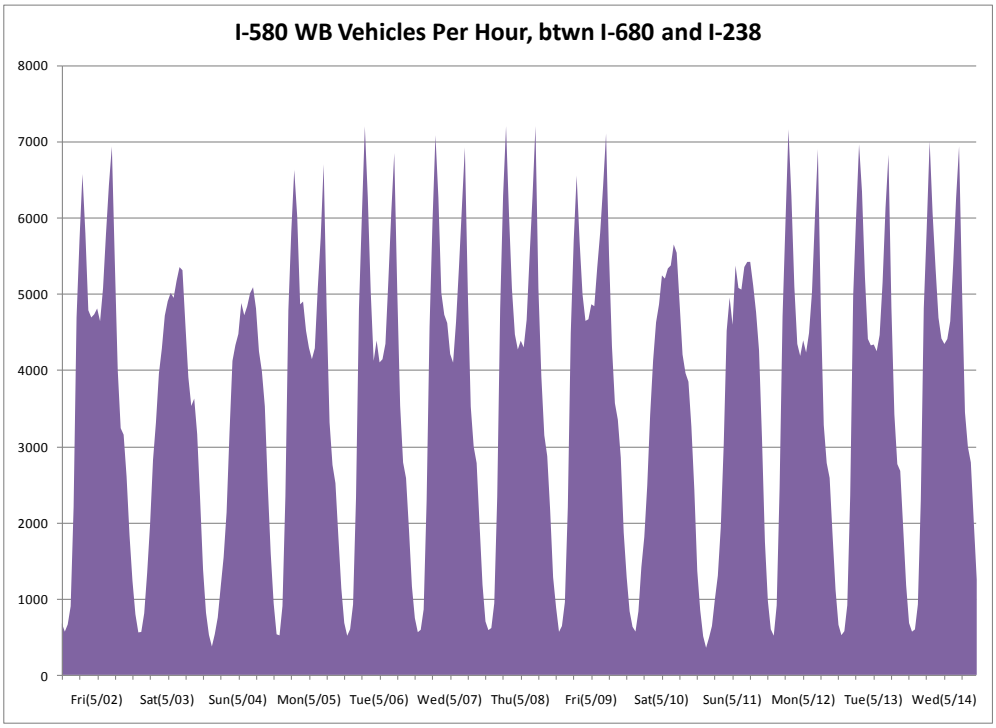


Figure 5: I-580 EB: West of Airway Blvd.

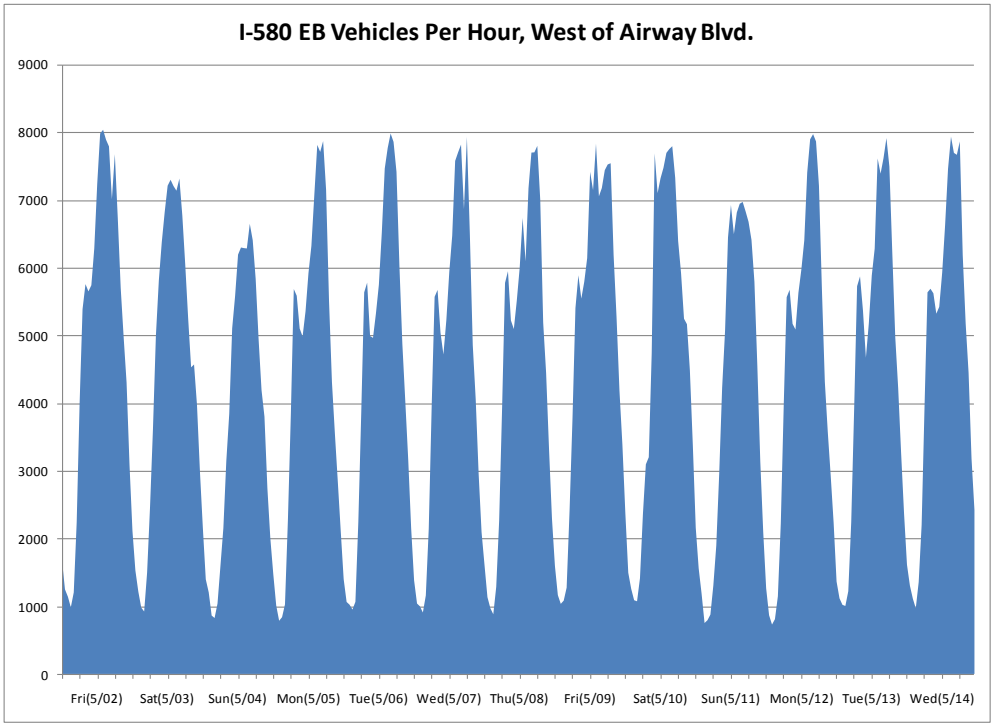
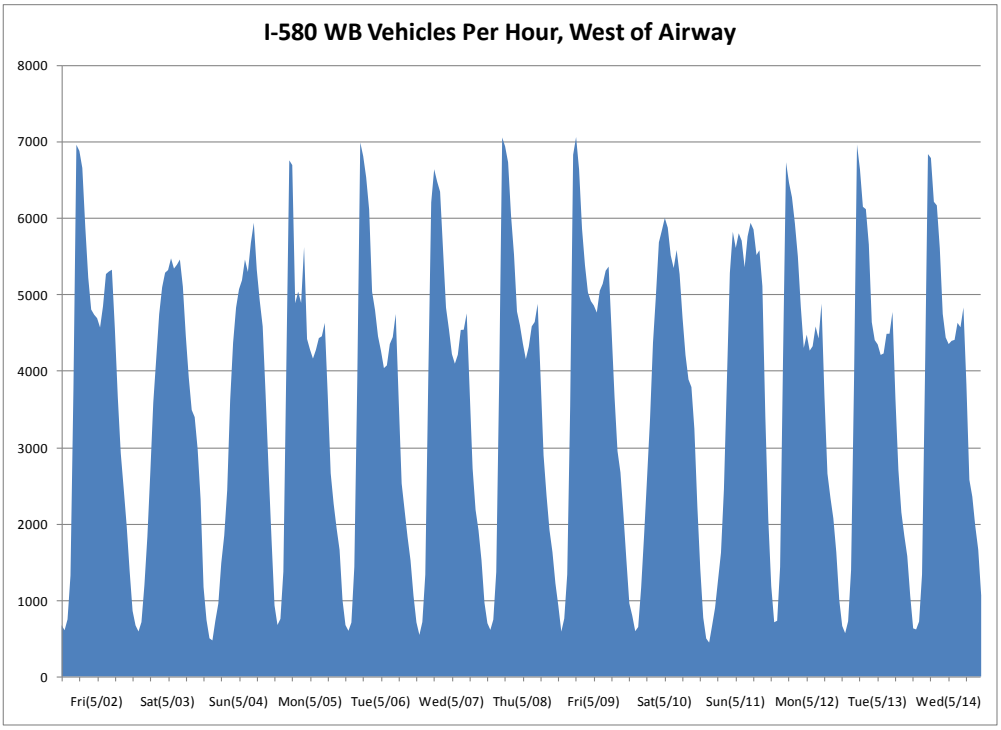


Figure 6: I-580 WB: West of Airway Blvd.



3.2. Monthly Traffic Patterns

Traffic volumes on the I-580 freeway vary from month to month. This seasonality of traffic demand is summarized in Table 12 and Table 13, which summarize the average daily traffic volumes by month in 2008 at count stations near the Tassajara Road and Eden Canyon Road interchanges, respectively. The peak month of traffic for I-580 at Tassajara Road occurs in August when the traffic volume is 104% of the annual daily average. At Eden Canyon Road, the peak month of traffic is April when traffic volume is 103% of the annual daily average.

Table 12: Average Daily Traffic Counts by Month on I-580 at Tassajara

	Average Daily Volume			
Month	Eastbound	Westbound	Total	% of AADT
January	94,035	98,099	192,134	94.0%
February	100,737	103,486	204,223	100.0%
March	103,363	106,401	209,764	103.0%
April	102,233	106,435	208,668	102.0%
May	100,408	106,740	207,148	101.0%
June	98,173	106,705	204,878	100.0%
July	100,719	106,293	207,012	101.0%
August	104,717	106,967	**211,684**	104.0%
September	100,899	103,726	204,625	100.0%
October	101,602	103,264	204,866	100.0%
November	98,037	98,972	197,009	96.0%
December	99,891	101,570	201,461	99.0%
Average	100,401	104,055	204,456	
Max	104,717	106,967	211,684	

Table 13: Average Daily Traffic Counts by Month on I-580 at Eden Canyon

Month	Average Daily Volume			% of AADT
	Eastbound	Westbound	Total	
January	80,657	81,808	162,465	96.0%
February	85,024	85,653	170,677	101.0%
March	86,320	87,281	173,601	102.0%
April	87,442	88,084	**175,526**	103.0%
May	86,925	87,275	174,200	103.0%
June	86,613	87,564	174,177	103.0%
July	85,792	85,855	171,647	101.0%
August	86,219	86,167	172,386	102.0%
September	84,031	85,189	169,220	100.0%
October	85,013	82,965	167,978	99.0%
November	81,466	78,723	160,189	94.0%
December	83,799	80,536	164,335	97.0%
Average	84,942	84,758	169,700	
Max	87,442	88,084	175,526	

3.3. Trip Length and Distribution

Peak period freeway drivers on the I-580 freeway tend to be exceptionally long distance and long duration commuter. While the average commute trip length in the Bay Area is 11.8 miles[4], the average trip length for I-580 users ranges from 24 to 45 miles with durations of from 75 minutes to 110 minutes.

I-238 commuters also tend to be long distance commuters. I-238 commute period trips tend to be closer to 60 minutes (ranging from 50 to 77 minutes) and between 26 and 35 miles in length.

Travel characteristics of existing traffic on the Alameda I-580 corridor were estimated using the Alameda County Congestion Management Agency (ACCMA) subregional travel demand model.

Table 14 presents the average travel time (for total trip length) for all trips that use one or more freeway segments of the study corridor for the peak direction. Average travel times are shown for the single peak hour and the peak periods of 5:00 to 9:00 AM and 2:30 to 7:30 PM. The average travel time for the peak 1-hour exceeds 60 minutes because the average travel time is calculated to be the time taken to complete the entire trip. The results indicate the average travel time during the peak hour is in most cases significantly longer than during the remainder of the peak period.

[4] Transportation 2035 Change in Motion, Travel Forecasts for the San Francisco Bay Area, 2009 Regional Transportation Plan, Vision 2035 Analysis, Data Summary, MTC, November 2007.

Table 14: Average Trip Duration for Freeway Drivers

	Westbound AM		Eastbound PM	
	1 Peak Hour	4 Peak Hours	1 Peak Hour	5 Peak Hours
Between I-680 and I-205	110.0	93.4	85.7	74.6
Between I-580 and I-680	97.3	75.3	102.1	90.3
Between I-880 and I-580	76.7	53.0	60.7	50.6

Note: Average travel times shown in minutes.

Table 15 presents the average trip length for all trips on each segment of the study corridor for the peak direction. Average trip lengths are shown for the single peak hour and the peak periods of 5:00 to 9:00 AM and 2:30 to 7:30 PM. The trip lengths during the peak period are longer than during the single peak hour.

Table 15: Average Trip Length of Freeway Drivers (miles)

	Westbound AM		Eastbound PM	
	1 Peak Hour	4 Peak Hours	1 Peak Hour	5 Peak Hours
Between I-680 and I-205	31.3	39.4	36.8	44.6
Between I-580 and I-680	26.1	36.3	23.8	27.8
Between I-880 and I-580	26.2	35.9	27.2	32.7

Note: Average trip lengths shown in miles.

The ACCMA Countywide model was used to estimate the origin and destination of trips on the study corridor during peak hours. Table 16 presents the summary of county origins and destinations for AM peak period vehicle trips on westbound I-580/SR-238 summed for three freeway segments between (I-205 to I-680, I-680 to SR-238, and I-580 to I-880). Table 17, presents similar origin-destination information for PM peak period trips.

Table 16: AM Peak Period OD for I-580 WB

WB AM Peak	SF	SM	SC	AL	CC	NB	SJ	Total
San Francisco	0%	0%	0%	0%	0%	0%	0%	0%
San Mateo	0%	0%	0%	0%	0%	0%	0%	0%
Santa Clara	0%	0%	0%	0%	0%	0%	0%	1%
Alameda	10%	4%	2%	38%	3%	0%	1%	58%
Contra Costa	1%	1%	1%	11%	0%	0%	0%	15%
North Bay	0%	0%	0%	0%	0%	0%	0%	0%
San Joaquin	4%	3%	3%	11%	2%	2%	0%	25%
Total	15%	9%	6%	61%	6%	2%	2%	100%

Source: 2008 ACCMA Model

Table 17: PM Peak Period OD for I-580 EB

EB PM Peak	SF	SM	SC	AL	CC	NB	SJ	Total
San Francisco	0%	0%	0%	8%	2%	0%	3%	13%
San Mateo	0%	0%	0%	3%	2%	0%	2%	7%
Santa Clara	0%	0%	0%	2%	1%	0%	2%	5%
Alameda	0%	0%	0%	47%	10%	0%	8%	66%
Contra Costa	0%	0%	0%	5%	0%	0%	1%	7%
North Bay	0%	0%	0%	0%	0%	0%	1%	1%
San Joaquin	0%	0%	0%	0%	0%	0%	0%	0%
Total	0%	0%	0%	66%	16%	0%	18%	100%

Source: 2008 ACCMA Model

Between 38% and 47% of the peak period traffic on the I-580 freeway comes from and stays within Alameda County. Another 43% to 38% of the traffic either enters or leaves Alameda County.

San Joaquin County accounts for 18% to 27% of the peak period traffic on I-580.

Contra Costa County accounts for 21% to 23% of the peak period traffic on I-580.

3.4. Mode Choice Characteristics

The peak period travel demand in the I-580 corridor has the mode split shown in Table 18.

Table 18: Mode Split Characteristics of I-580 Freeway

Time	SOV	HOV2	HOV3+	Bus	Van-pool	Motor-cycle	Trucks
Morning 7-9 AM	12,788	2,508	140	46	56	122	1,901
Afternoon 3-7 PM	24,112	6,312	490	65	150	277	2,128
Total Vehicles	36,900	8,820	631	111	207	399	4,029
Vehicle Split	72.2%	17.3%	1.2%	0.2%	0.4%	0.7%	7.9%
Person Split	57.4%	27.5%	3.0%	3.5%	1.6%	0.6%	6.4%

Source: Dowling Associate, 2008 Occupancy surveys. Average of three locations: Santa Rita Road, Airway Boulevard, and Vasco Road.

The I-580 freeway has higher HOV percentages and lower drive alone (SOV) percentages than average for the Bay Area (see Table 19).

Table 19: San Francisco Region Average Daily Mode Split

Mode	Percent of Work Trips	Percent of Total Trips
SOV:	71%	70%
SR 2:	11%	10%
SR 3+:	4%	3%
Transit:	10%	5%
Bicycle:	1%	2%
Walk:	3%	10%
Total:	100%	100%

Source: Table E.10, Table E.12, 2009 Regional Transportation Plan, 2035 Regional Transportation Analysis, Data Summary, MTC, November 2007

Transit ridership as a percentage of the peak period traffic on the I-580 freeway (east of the Pleasanton BART station) is significantly lower than for the rest of the Bay Area (compare Table 19 and Table 18).

4. CORRIDOR-WIDE PERFORMANCE TRENDS

This chapter describes the existing conditions in the corridor as well as the likely future conditions if current trends are continued into the future.

The corridor-wide performance measures include mobility, reliability, safety, and productivity:

- Mobility – Delay, Travel Time
- Reliability – Variation of travel time or the Buffer Index5
- Safety – Accidents, accident rates
- Productivity – Lost lane miles

4.1. Existing Conditions

Performance assessment is completed based on the field data collected. These results illustrates the existing corridor conditions, and will also serve as reference data during the calibration and validation process of developing the traffic models, which will be used for testing traffic management strategies.

Data Collection

Data on existing traffic and transit operations was assembled from several resources, including field data collection, Caltrans District 4, 511.org website, as well as the PeMS (Freeway Performance Measurement System) database[6]. Details of the data collection effort are provided in the Data Collection Results memo (Deliverable 1C) dated June 2, 2008.

Field data was collected on Tuesday, May 13 and Wednesday May 14, 2008. The data included:

- 24-hour freeway ramp counts for two days, of a majority of the study area on-ramps and off-ramps.
- Aerial photography snapshots of queuing during AM (5 AM – 9 AM) and PM (2:30 PM- 7:30 PM) peak periods.
- Floating car travel time and speed survey during AM (5 AM – 9 AM) and PM (2:30 PM- 7:30 PM) peak periods
- PeMS VDS station reported mainline flow rates and speeds
- PeMS CHP incident logs.
- 511.org reported Fastrak toll tag vehicle travel times.

Caltrans supplemented the data collection effort with 35 ramp counts collected in the westbound direction between I-205 and San Ramon Road in Dublin.

Aerial photos were taken of mile-long sections of the freeway (and ½ mile each side of the freeway) every 30 minutes between 5 AM and 9 AM and between 2:30 PM and 7:30 PM on Tuesday May 13, 2008 and Wednesday May 14, 2008. The photos were utilized to observe the buildup and dissipation of freeway congestion, and to assist in the identification of bottleneck locations and queues associated with those. These aerial photos were also utilized to identify queues at the freeway off-ramp and on-ramp intersections, queues due to the ramp metering, or ramp terminal intersection operations.

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[5] The Buffer Index is the amount of extra time that the traveler must budget in order to be confident of arriving on-time. It is expressed as a percentage of the free-flow travel time.

[6] https://pems.eecs.berkeley.edu/

511.org provided travel time data for several pre-defined segments of the corridor. Measurements were obtained by utilizing the FasTrak toll tag readers. Measurements were provided every minute, for each travel time segment. Based on this information, the amount of delay times were estimated.

Three sources of data were used to obtain traffic counts for the freeway mainline, and ramps. Caltrans collected traffic counts at a number of freeway mainline and ramp locations during the same two days in May as for the rest of the data collection effort. Caltrans mainline counts were used to establish a set of balanced traffic volumes during the peak periods (4-hour AM, 5-hour PM) for the entire corridor.

PeMS freeway mainline volume and speed data were extracted for May 13, 2008. These data were used to check for consistency with other Caltrans counts, and to establish the complete corridor freeway volumes. In addition, the PeMS database was used to extract reported incidents during the same two days in May as the rest of the data collection effort.

Existing Mobility

An effective measurement of the corridor's mobility is through evaluation of travel times and delay times. Data is presented for the freeway and then for the surface street system

Mobility of the Freeway System

Data gathered from 511.org provides comprehensive range of data of the pre-defined segments of the freeway (see Table 20). Minute by minute mean travel times were provided.

Table 20: Freeway VMT/VHT in Study Corridor

Segment	Length (Miles)	Directional ADT	Daily VMT	Daily VHT
Eastbound				
I-238 SB(EB) from I-880 to I-580	2.0	45,135	90,270	1,693
I-580 EB from I-238 to I-680	10.5	90,163	946,712	14,576
I-580 EB from I-680 to I-205	20.5	89,872	1,842,376	32,379
Westbound				
I-238 NB (WB) from I-580 to I-880	2.0	58,491	116,982	3,769
I-580 WB from I-680 to I-238	10.5	91,210	957,705	14,644
I-580 WB from I-205 to I-680	20.5	104,195	2,135,998	40,376
Total	**66.0**	**479,066**	**6,090,042**	**107,437**

ADT = average daily traffic for section measured May 13, 2008
VMT = vehicle-miles traveled
VHT = vehicle-hours traveled

The travel time data was tallied for the period 0:00 May 2, 2008 to 23:59 May 15, 2008.
Table 21 provides a summary of the average travel time through the 24-hour period, AM 4-hour and PM 5-hour peak period, both the average and the maximum travel time values are presented for each section of the freeway corridor.

Table 21: Average Travel Times (in seconds)

Freeway	Travel Time Segment	Average Travel Time Through 24-Hr Period	Maximum Travel Time During AM Peak Period	Average Travel Time During AM Peak Period	Maximum Travel Time During PM Peak Period	Average Travel Time During PM Peak Period
I-580 EB	I-680 to I-205	1297	1327	1235	2003	1546
	I-238 to I-680	582	701	601	783	594
I-580 WB	I-205 to I-680	1395	2593	1852	1396	1274
	I-680 to I-238	578	931	618	695	555
I-238 NB	I-580 WB to I-880 SB	232	390	264	455	270
I-238 SB	I-880 SB to I-580 EB	135	136	152	149	135

Source: 511.org toll-tag data, traffic reports

Table 22 shows the estimated free-flow conditions travel time, based on the off-peak hour average travel time. Average delay time is computed based on the difference between free-flow travel times and average travel times.

Table 22: Average Delay Times (in seconds)

Freeway	Travel Time Segment	Estimated Free-Flow Travel Time During off-peak	Average Delay Time Through 24-Hr Period	Maximum Delay Time During AM Peak Period	Maximum Delay Time During PM Peak Period
I-580 EB	I-680 to I-205	1186	111	141	817
	I-238 to I-680	555	27	146	228
I-580 WB	I-205 to I-680	1272	123	1321	124
	I-680 to I-238	563	15	368	132
I-238 NB	I-580 WB to I-880 SB	202	30	188	253
I-238 SB	I-880 SB to I-580 EB	134	1	2	15

Source: 511.org toll-tag data, traffic reports

There were construction activities on Route 238 during the time of data collection and field observations. Construction equipment and materials stored at the roadside, as well as temporary pavement delineation that was not to design standards (e.g. narrow lanes during construction) may have affected normal driver behavior. Therefore, the results presented here may not reflect a typical condition without construction.

Mobility of the Surface Street System

This section reports the surface street system performance measures for streets in the immediate vicinity of the freeway interchanges for 2008 AM and PM peak hours (see Table 23).

Table 23: Surface Street Performance 2008

Measure	AM Peak Hour	PM Peak Hour
VMT – vehicle-miles traveled	55,844	59,839
VHT – vehicle-hours traveled	3,692	5,830
VHD – vehicle- hours of delay	2,055	4,076
Mean Delay/Vehicle (sec)	86.4	161.8

Source: SimTraffic Model. Includes only streets at freeway interchanges leading to one signal either side of the freeway. The intersections bounding the street segments are listed in Table 49.

Existing Reliability

Reliability of the freeway system is measured by the amount of variation of travel times and the buffer index (see Table 24). The buffer index is computed according to the following equation:

Buffer Index = (95% Travel Time – Mean Travel Time) / (Mean Travel Time)

Table 24: Travel Time Reliability on I-238 and I-580

Segment	Stretch	Miles	Peak	Mean (min.)	Standard Deviation	95 Percentile	Buffer Index
I-238 WB	I-580 to I-880	2	5-9 AM	4.3	0.8	6.6	55%
I-238 WB	I-580 to I-880	2	2:30-7:30 PM	4.4	2.4	11.7	164%
I-238 EB	I-880 to I-580	2	5-9 AM	2.2	0.1	2.7	19%
I-238 EB	I-880 to I-580	2	2:30-7:30 PM	3.2	10.0	33.0	947%
I-580 EB	I-238 to I-680	10	5-9 AM	9.7	0.4	10.9	12%
I-580 EB	I-238 to I-680	10	2:30-7:30 PM	11.2	2.9	19.8	77%
I-580 WB	I-680 to I-238	10	5-9 AM	10.1	1.3	14.1	40%
I-580 WB	I-680 to I-238	10	2:30-7:30 PM	9.3	0.5	10.7	15%
I-580 EB	I-680 to I-205	21	5-9 AM	20.5	0.5	21.9	7%
I-580 EB	I-680 to I-205	21	2:30-7:30 PM	27.3	4.4	40.5	48%
I-580 WB	I-205 to I-680	21	5-9 AM	29.4	6.2	48.0	63%
I-580 WB	I-205 to I-680	21	2:30-7:30 PM	21.4	0.6	23.3	9%

Mean, Standard Deviation and 95 Percentile entries are in minutes.
Source: 511.org toll tag vehicle readers, May 2-23, 2008.

The I-238 freeway between I-580 and I-880 shows the lowest reliability (highest Buffer Indices, highest standard deviations, and highest mean travel times).

The figures below (see Figure 7 to Figure 10) show how the mean travel time and the standard deviation of the travel time vary by hour of the day, days of the week (Tuesday-Thursday, Monday-Friday, and Saturday-Sunday), direction of travel, and section of freeway.

Figure 7. Travel Time Variations of I-580 EB (I-680 to I-205)

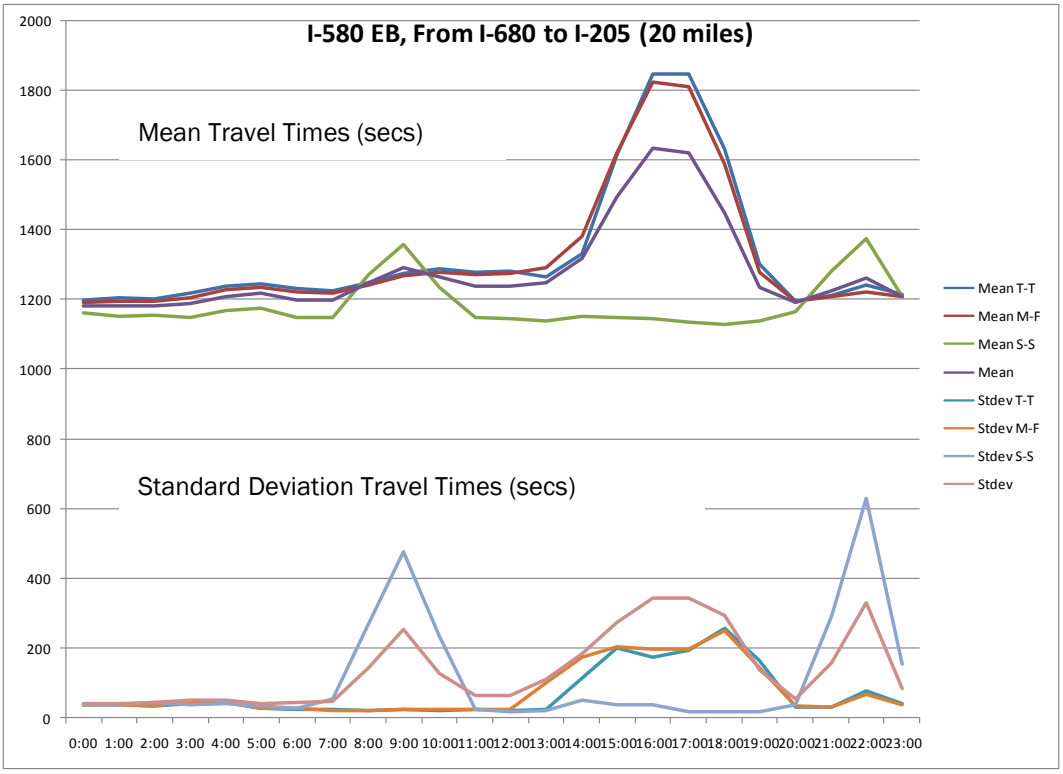


Figure 8. Travel Time Variations of I-580 EB (I-238 to I-680)

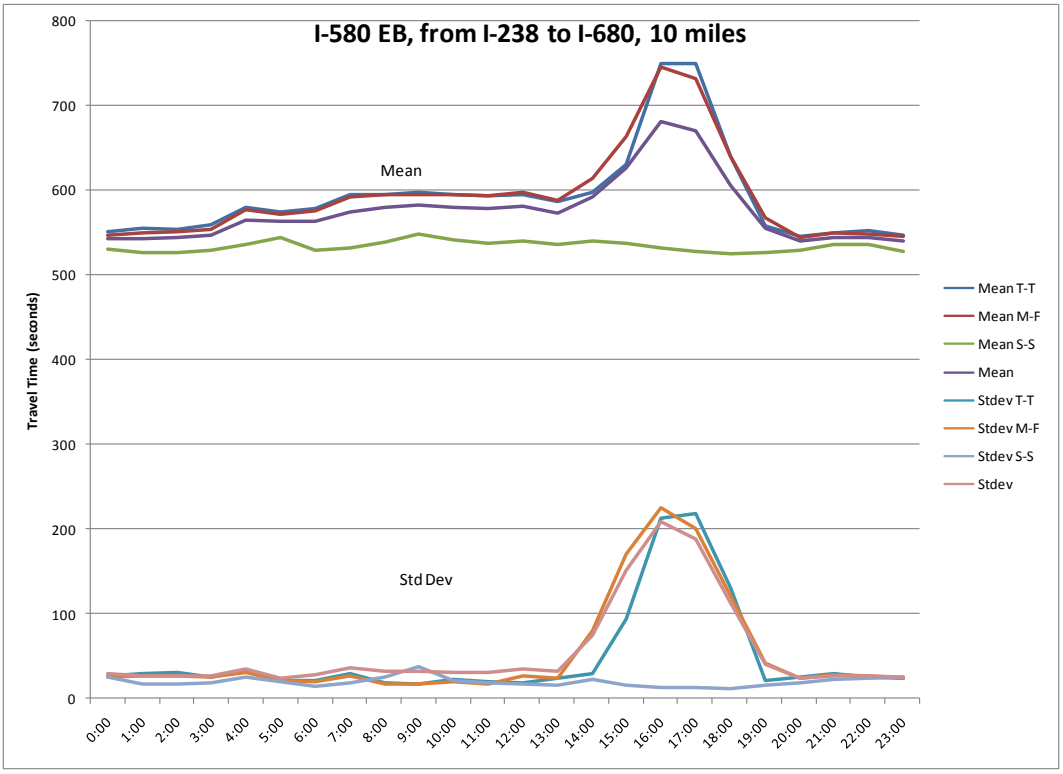


Figure 9. Travel Time Variations of I-580 WB (I-205 to I-680)

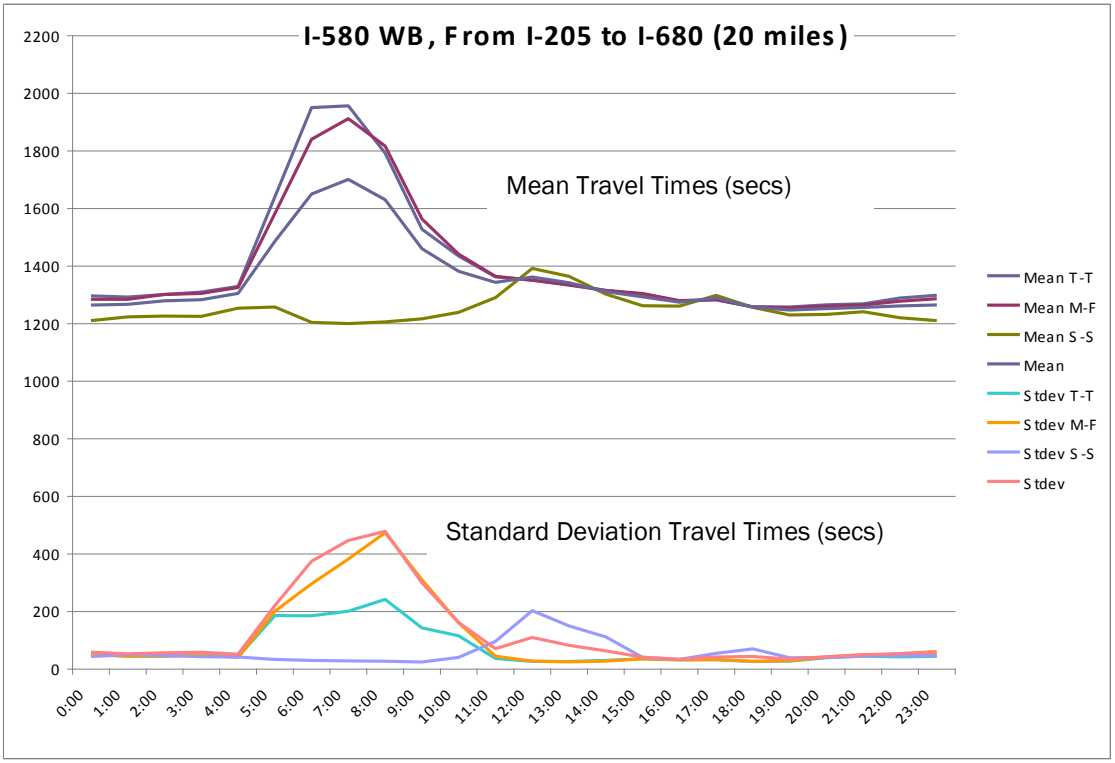
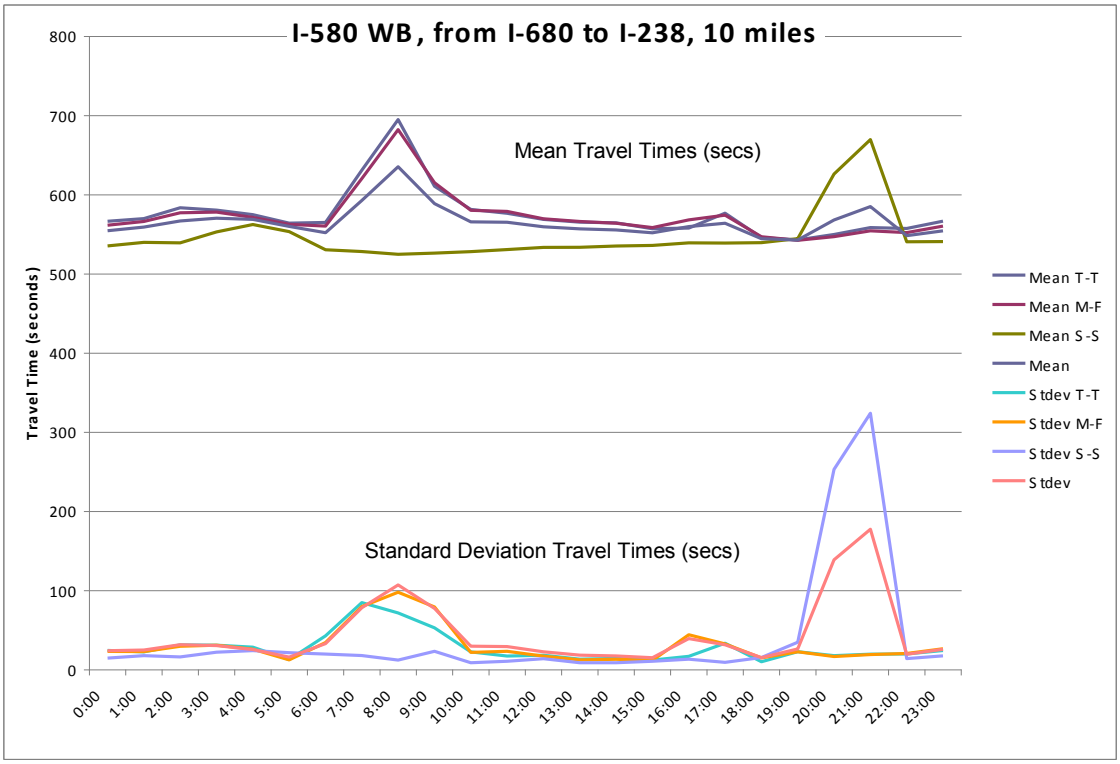


Figure 10. Travel Time Variations of I-580 WB (I-680 to I-238)



Existing Safety

The collision history for the I-238 and I-580 freeways was obtained from Caltrans Traffic Accident Surveillance and Analysis System (TASAS) and provided by Caltrans District 4. The results are shown in Table 25 and Table 26 for the westbound direction. The collision rates have shown no particular trend, with rates increasing on some sections in some years and rates decreasing in other years on other sections. The collision rates are higher or lower than the state average for each facility type depending on the section and the year.

Data on the frequency of incidents in the corridor was obtained from California Highway Patrol incident logs for the year 2007. Table 27 and Table 28 show the number of days for which at least one incident of each type occurred for I-580 eastbound and westbound, respectively. Of the 261 weekdays in 2007, a peak-period incident occurred somewhere on the corridor on 255 of these days in the eastbound direction and 254 days in the westbound direction.

The overwhelming majority of incidents are non-accident incidents. Table 29 and Table 30 show the total number of incidents for the year 2007 for each section by type of incident. The section of I-580 between I-680 and I-205 experiences the greatest number of incidents.

Table 25: Eastbound Freeway Collision History

Eastbound I-580 and I-238		2005								
		Number of Collisions			Collision Rates					
					Actual			Average		
Location (EB / SB)	Rate Group	Total	Fatal	Injury	Fatal	F + I	Total	Fatal	F + I	Total
Alameda / I-580 / PM 0.39-L0.987	0.598 Mi / H 54 / R	3	0	1	0.000	0.06	0.19	0.020	0.29	0.66
Alameda / I-580 / PM 0.808-R8.27	7.424 Mi / H / NA	110	7	45	0.048	0.36	0.76	0.009	0.22	0.58
Alameda / I-580 / PM R8.27-20.73	12.490 Mi / H / NA	329	0	83	0.000	0.20	0.78	0.005	0.31	0.97
Alameda / I-580 / PM 20.73-R28.97	8.241 Mi / H / NA	127	0	39	0.000	0.15	0.48	0.008	0.30	0.87
Alameda / I-580 / PM R28.97-R30.81	1.723 Mi / H / S	18	1	4	0.017	0.09	0.31	0.007	0.31	0.93
Alameda / SR-238 / PM R14.47-16.695	2.226 Mi / H / NA	55	0	22	0.000	0.48	1.19	0.013	0.35	0.97

		2006								
		Number of Collisions			Collision Rates					
					Actual			Average		
Location (EB / SB)	Rate Group	Total	Fatal	Injury	Fatal	F + I	Total	Fatal	F + I	Total
Alameda / I-580 / PM 0.39-L0.987	0.598 Mi / H 54 / R	3	0	2	0.000	0.13	0.19	0.020	0.29	0.66
Alameda / I-580 / PM 0.808-R8.27	7.424 Mi / H / NA	123	2	39	0.014	0.28	0.85	0.009	0.22	0.58
Alameda / I-580 / PM R8.27-20.73	12.490 Mi / H / NA	299	0	69	0.000	0.16	0.69	0.005	0.31	0.98
Alameda / I-580 / PM 20.73-R28.97	8.241 Mi / H / NA	129	0	38	0.000	0.14	0.49	0.008	0.30	0.87
Alameda / I-580 / PM R28.97-R30.81	1.723 Mi / H / S	22	0	7	0.000	0.12	0.38	0.007	0.31	0.93
Alameda / SR-238 / PM R14.47-16.695	2.226 Mi / H / NA	46	0	13	0.000	0.26	0.93	0.014	0.36	1.01

		2007								
		Number of Collisions			Collision Rates					
					Actual			Average		
Location (EB / SB)	Rate Group	Total	Fatal	Injury	Fatal	F + I	Total	Fatal	F + I	Total
Alameda / I-580 / PM 0.39-L0.987	0.598 Mi / H 54 / R	2	0	2	0.000	0.13	0.13	0.020	0.29	0.66
Alameda / I-580 / PM 0.808-R8.27	7.424 Mi / H / NA	115	4	42	0.029	0.34	0.84	0.008	0.21	0.56
Alameda / I-580 / PM R8.27-20.73	12.490 Mi / H / NA	283	1	85	0.002	0.20	0.66	0.005	0.31	0.98
Alameda / I-580 / PM 20.73-R28.97	8.241 Mi / H / NA	138	1	43	0.004	0.16	0.51	0.009	0.31	0.89
Alameda / I-580 / PM R28.97-R30.81	1.723 Mi / H / S	23	0	7	0.000	0.12	0.39	0.007	0.31	0.95
Alameda / SR-238 / PM R14.47-16.695	2.226 Mi / H / NA	51	0	18	0.000	0.37	1.04	0.014	0.36	1.00

Source: California Department of Transportation, Traffic Accident Surveillance and Analysis System - Transportation Systems Network Reports, January 2005-March 2008

Table 26: Westbound Freeway Collision History

Westbound I-580 and I-238		2005								
		Number of Collisions			Collision Rates					
					Actual			Average		
Location (WB / NB)	Rate Group	Total	Fatal	Injury	Fatal	F + I	Total	Fatal	F + I	Total
Alameda / I-580 / PM 0.39-L1.101	0.711 Mi / H 54 / R	5	0	3	0.000	0.15	0.26	0.020	0.29	0.66
Alameda / I-580 / PM 0.808-R8.27	7.463 Mi / H / NA	131	0	40	0.000	0.27	0.90	0.009	0.22	0.58
Alameda / I-580 / PM R8.27-20.73	12.490 Mi / H / NA	561	0	193	0.000	0.46	1.33	0.005	0.31	0.97
Alameda / I-580 / PM 20.73-R28.97	8.241 Mi / H / NA	128	2	41	0.008	0.16	0.49	0.008	0.30	0.87
Alameda / I-580 / PM R28.97-R30.81	1.723 Mi / H / S	102	0	33	0.000	0.57	1.77	0.007	0.31	0.93
Alameda / SR-238 / PM R14.47-16.695	2.226 Mi / H / NA	99	0	26	0.000	0.56	2.14	0.013	0.35	0.97

		2006								
		Number of Collisions			Collision Rates					
					Actual			Average		
Location (WB / NB)	Rate Group	Total	Fatal	Injury	Fatal	F + I	Total	Fatal	F + I	Total
Alameda / I-580 / PM 0.39-L1.101	0.711 Mi / H 54 / R	4	0	0	0.000	0.00	0.21	0.020	0.29	0.66
Alameda / I-580 / PM 0.808-R8.27	7.463 Mi / H / NA	99	1	31	0.007	0.22	0.68	0.009	0.22	0.58
Alameda / I-580 / PM R8.27-20.73	12.490 Mi / H / NA	566	3	162	0.007	0.38	1.31	0.005	0.31	0.98
Alameda / I-580 / PM 20.73-R28.97	8.241 Mi / H / NA	125	0	36	0.000	0.14	0.47	0.008	0.30	0.87
Alameda / I-580 / PM R28.97-R30.81	1.723 Mi / H / S	86	0	25	0.000	0.43	1.48	0.007	0.31	0.93
Alameda / SR-238 / PM R14.47-16.695	2.226 Mi / H / NA	98	0	28	0.000	0.56	1.97	0.014	0.36	1.01

		2007								
		Number of Collisions			Collision Rates					
					Actual			Average		
Location (WB / NB)	Rate Group	Total	Fatal	Injury	Fatal	F + I	Total	Fatal	F + I	Total
Alameda / I-580 / PM 0.39-L1.101	0.711 Mi / H 54 / R	7	0	3	0.000	0.15	0.36	0.020	0.29	0.66
Alameda / I-580 / PM 0.808-R8.27	7.463 Mi / H / NA	125	0	43	0.000	0.31	0.91	0.008	0.21	0.56
Alameda / I-580 / PM R8.27-20.73	12.490 Mi / H / NA	568	0	170	0.000	0.40	1.32	0.005	0.31	0.98
Alameda / I-580 / PM 20.73-R28.97	8.241 Mi / H / NA	88	0	33	0.000	0.12	0.32	0.009	0.31	0.89
Alameda / I-580 / PM R28.97-R30.81	1.723 Mi / H / S	106	0	31	0.000	0.52	1.79	0.007	0.31	0.95
Alameda / SR-238 / PM R14.47-16.695	2.226 Mi / H / NA	141	2	36	0.041	0.78	2.89	0.014	0.36	1.00

Source: California Department of Transportation, Traffic Accident Surveillance and Analysis System - Transportation Systems Network Reports, January 2005-March 2008

Table 27. Summary of Days With Incident I-580 Eastbound

	I-580 I-205 to I-680	I-580 I-680 to I-238	I-238 I-580 to I-880	Entire Corridor
Accident, Injury	49	7	5	59
Accident, Non-injury	157	49	12	176
Accident, Other	113	33	9	136
Other Incident	233	167	52	250
Any Incident	249	188	70	255

Table 28. Summary of Days With Incident I-580 Westbound

	I-580 I-205 to I-680	I-580 I-680 to I-238	I-238 I-580 to I-880	Entire Corridor
Accident, Injury	58	13	7	76
Accident, Non-injury	165	67	31	196
Accident, Other	122	40	15	149
Other Incident	242	190	67	249
Any Incident	251	216	104	254

Table 29. Summary of Total Incidents I-580 Eastbound

	I-580 I-205 to I-680	I-580 I-680 to I-238	I-238 I-580 to I-880	Entire Corridor
Accident, Injury	58	9	5	72
Accident, Non-injury	280	58	12	350
Accident, Other	157	39	9	205
Other Incident	768	306	57	1,131
Any Incident	1,263	412	83	1,758

Table 30. Summary of Total Incidents I-580 Westbound

	I-580 I-205 to I-680	I-580 I-680 to I-238	I-238 I-580 to I-880	Entire Corridor
Accident, Injury	71	17	7	95
Accident, Non-injury	299	94	36	429
Accident, Other	188	56	16	260
Other Incident	774	361	75	1,210
Any Incident	1,332	528	134	1,994

Note: Other incidents include debris, breakdowns, and other non-accident incidents.

Existing Productivity

The lost lane-miles of productivity are computed according to the following equation. The results are shown in Table 31.

Lost Lane Miles = { 1 – (Observed Lane Throughput)/2000 vphpl} * Lanes * Congested Miles

Lost Lane-Miles = (Proportion lost throughput) * (Congested Lane-Miles)

Table 31: Existing Lost Productivity

Facility	Stretch	Peak Period	Congested Lane-Miles	Lost Lane-Miles
I-238	I-880 to I-580	AM	2.80	1.54
		PM	3.20	1.76
I-580	I-238 to I-680	AM	29.30	16.12
		PM	32.40	17.82
I-580	I-680 to I-205	AM	28.80	15.84
		PM	18.70	10.29
Streets	West of Eden	AM	2.90	2.18
		PM	3.80	2.85
Streets	East of Eden	AM	1.00	0.75
		PM	1.00	0.75

Source: ACCMA model (2008), peak period results, lost throughput estimated at 75% for surface streets, 55% for freeways.

Existing Pavement Condition

[This section on pavement conditions was provided by Caltrans District 4]

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. This is also planned work and generally done by contract. Maintenance activities keep the facility safe and serviceable until rehabilitation is needed.

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

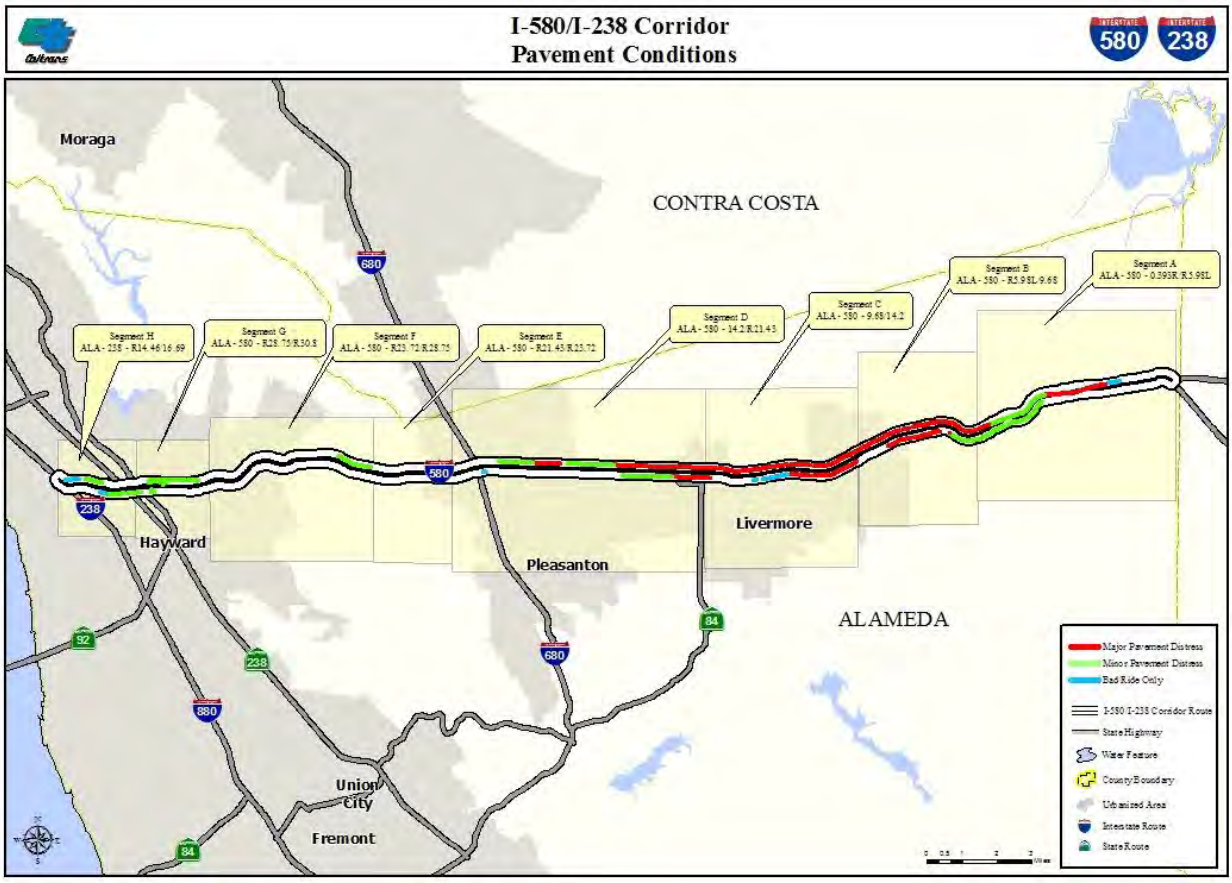
- 2007 State of the Pavement Report
- PCR-Pavement Condition Report
- GIS Based Mapping

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. Distressed pavement is defined as lane-miles with poor structural condition or poor ride quality.

GIS based mapping depicts corridor pavement status throughout the state and is based on the Pavement Condition Report. The map in Figure 11 depicts current I-580 East CSMP Corridor 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 11: Existing Pavement Conditions I-580



Source: Caltrans District 4, Office of System & Regional Planning GIS & Technical Support Branch. July 2008

Pavement Management Plans

Future pavement conditions will be impacted favorably by improvements along the corridor. Listed in Table 32 are the pavement related projects planned during the next five years in the I-580 East CSMP corridor.

Table 32: I-580 Planned Pavement Management Projects

Year	Location	Project Description
2009	Livermore: PM R9.3/10.1	Modify interchange
2009	Livermore: PM 13.4/14.9	Construct new interchange
2010	Livermore/ Pleasanton: PM 8.3/21.4	Construct WB HOV lane, new interchange, and auxiliary lane
2010	PM R27.8/29.4	Construct new ramps
2011	Livermore/ Pleasanton: PM 8.2/21.4	Construct WB HOV lane and auxiliary lane
2012	Livermore/ Pleasanton: PM 7.8/19.1	Rehab WB lanes
2013	Altamont Pass: PM 0.0/7.8	Construct EB truck climbing lane

Source: 10 Year Pavement Management Plan, Caltrans District 4 Maintenance, 2008

4.2. Baseline Trends

This section presents the baseline trends in Travel Demand, Mobility, Reliability, Safety, Productivity, and Preservation for the study corridor. The trends are reported for 2008 (existing conditions), 2015 (assuming completion of currently programmed and under construction projects), and 2035 (assuming only improvements up to 2015). These three analysis years provide a baseline against which to compare the performance (to be completed in a later task) of various improvement strategies for the corridor.

Forecast Methodology

The baseline 2015 and 2035 trends forecasts were developed using the October 20, 2008 version of the ACCMA model. This version of the model uses ABAG projections 2007 socioeconomic forecasts. This model has land use and networks for 2005, 2015, and 2035.

Since the intent is to compare the proposed strategies to a "do nothing" baseline the highway and transit improvements assumed by ACCMA for its 2015 and 2035 forecast years were stripped down to just programmed and under construction improvement projects.

Table 33 shows the regional baseline highway projects assumed in place for both the 2015 and 2035 forecasts.

Table 34 shows the local road and street projects assumed to be in place for both the 2015 and 2035 forecasts.

Table 35 shows the transit projects assumed to be in place for both the 2015 and 2035 forecasts.

Figure 12 shows the road improvements for the western section of the corridor. Figure 13 shows the road improvements for the eastern section of the corridor.

The ACCMA model was re-run for 2015 and 2035 with only the baseline 2015 projects in place. The longer term projects planned by ACCMA and other agencies for beyond 2015 have been added to the list of improvement strategies being evaluated for the corridor in the Corridor System Management Plan.

Table 33: 2015 Baseline Regional Projects

Project Name	Description	
I-580 WB Ramp Metering	Ramp meters turned on September 2008 for all westbound on-ramps between Grant Line Road and San Ramon Road, with exception of I-205/ I-580 connector, El Charro, and I-680 on-ramps.	
I-580/Castro Valley Interchange Improvements – Castro Valley to Grove	New ramps at Redwood and Grove, remove WB on ramp to Castro Valley Blvd, EB auxiliary lane between Redwood and Grove	
I-580/El Charro Road Interchange Improvements	Modify to partial clover leaf interchange	
I-580/Isabel Ave/SR 84/Portola IC Interchange Improvements	New interchange (partial cloverleaf), remove Portola ramps	
Eastbound Aux Lane - Tassajara to Airway	Widen WB from 4 lanes to 5 (auxiliary lane)	
Eastbound Aux Lane - Airway to Isabel	Widen EB from 4 lanes to 5 (auxiliary lane)	
Eastbound Aux Lane - First to Vasco	Widen EB from 4 lanes to 5 (auxiliary lane)	
Truck Climbing Lane - Altamont Summit – Greenville to North Flynn	Widen from 4 lanes to 5 (truck climbing lane)	
I-580 EB HOV Lane – Tassajara to Greenville/Southfront	New HOV/HOT lane	
I-580 WB HOV/HOT Lane – Northfront on-ramp to Tassajara	New HOV/HOT lane	
I-580 WB HOV/HOT Lane – Tassajara to San Ramon Rd	New HOV/HOT lane	
Westbound Aux Lane - Airway to Tassajara	Widen WB from 4 lanes to 5 (auxiliary lane)	
Westbound Aux Lane - Vasco to First	Widen from 4 lanes to 5	
I-680 Sunol Grade NB HOV Lane – Vargas Rd. to Stoneridge Dr.	New HOV lane	
I-238 Widening – I-580 to Hesperian	Widen from 2 lanes to 3 lanes, widen ramp to I-880 from 1 lane to 2	
I-238 Widening, I-880 SB Aux Lane – A Street to I-580	Widen from 2 lanes to 3 at the I580 interchange, 5th lane added to I-880	
Hayward 238 Project – Miniloop –	Mattox to City Center	Widen 6 lanes to 8
	City Center to A Street	Widen 6 lanes to 10
	A Street to Mission	Make one way NB (Mission to A)
	E Street to Highland	Widen 6 lanes to 8
	Highland to Industrial	Widen 4 lanes to 6
I-880 Washington Ave I/C Reconfig	Interchange reconfig, widen intersection and SB on/off ramps	
Rt 84 4 Lane Expwy on new alignment – Alvarado/Niles to Mission	New 6-lane expressway	

Note: Cost estimates from the MTC "Draft Transportation 2035 Plan: Change in Motion";

Table 34: 2015 Baseline Local Projects

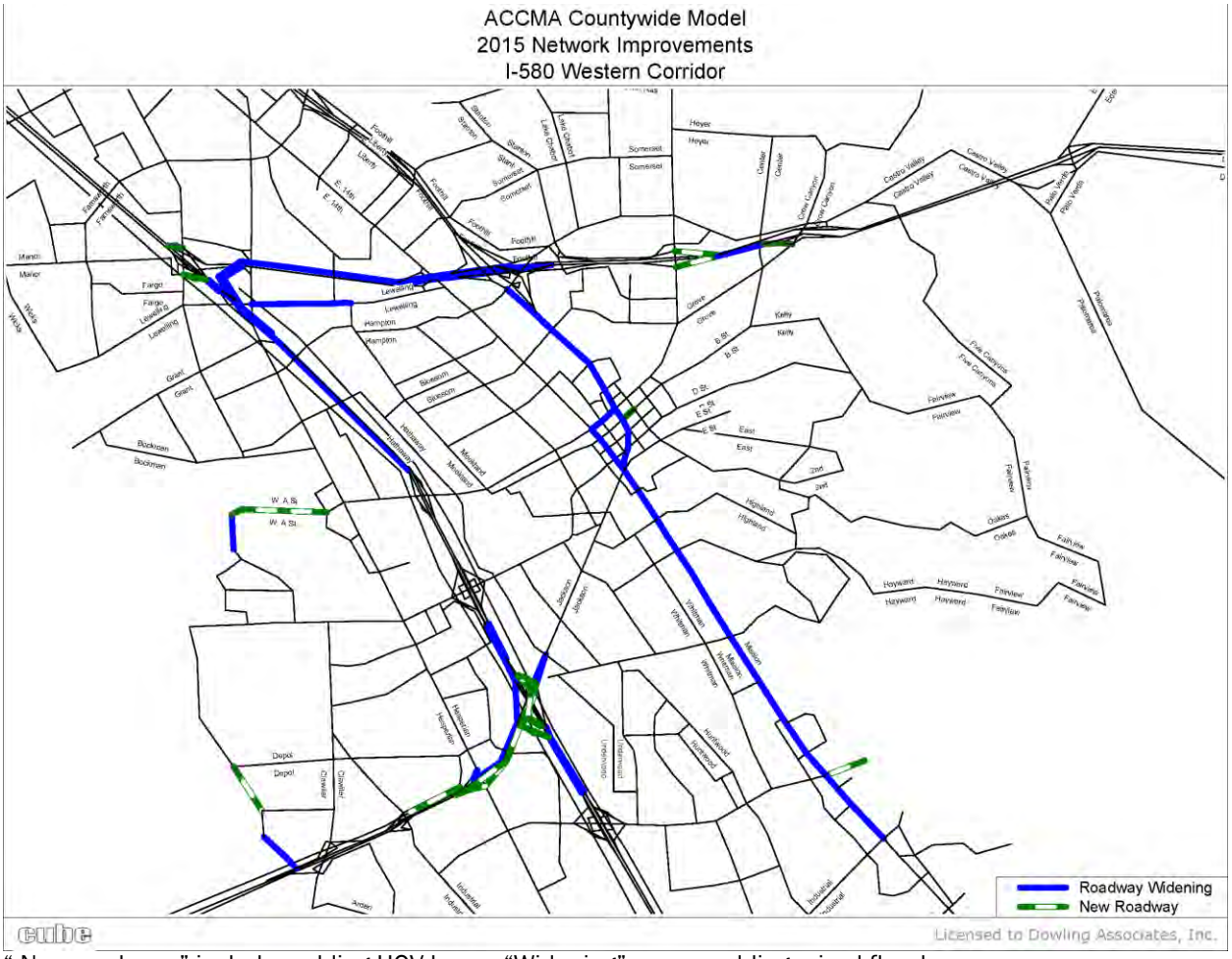
Street	Juris.	From	To	Description
Dougherty Rd	Dublin	Amador Valley Blvd	county line	widen from 4 lanes to 6
Dougherty Rd	Dublin	Dublin Blvd	Amador Valley Blvd	widen from 4 lanes to 6
Dublin Blvd	Dublin	Hansen Dr *	Silvergate Dr	widen from 2 lanes to 4
Dublin Blvd	Dublin	Tassajara Rd	Terminus	widen from 4 lanes to 6
Dublin Blvd Ext	Dublin	Croak Rd	Doolan Rd	new 4 lane roadway
Dublin Blvd Ext	Dublin	Lockhart St	Croak Rd	new 6 lane roadway
Foothill Rd	Dublin	Deodar Way	I580 EB ramps	widen from 6 lanes to 8
St Patrick Way	Dublin	west of I680 ramp		new 2 lane roadway
St Patrick Way	Dublin	west of I680 ramp		new 2 lane roadway
Scarlett Dr	Dublin	Houston Pl	Dublin Blvd	new 4 lane roadway
Isabel (new road)	Livermore	North Canyons Pkwy	new 580 interchange	new 4 lane roadway
Portola Avenue	Livermore	Murrietta Blvd.	Isabel Avenue	new 2 lane roadway
W Jack London Blvd	Livermore	terminus	El Charro Rd	new 2 lane roadway
Bernal Ave	Pleasanton	Foothill Rd	I680 SB ramps	widen from 2 lanes to 4
El Charro Rd	Pleasanton	I580 EB ramps	Staples Ranch Dr	widen from 2 lanes to 6
El Charro Rd	Pleasanton	Staples Ranch Dr	farm road	widen from 2 lanes to 4
North Canyons Pkwy	Pleasanton	new road	Collier Canyon Rd	new 6 lane roadway
Stoneridge Dr	Pleasanton	Belleza Dr	Santa Rita Rd	widen from 4 lanes to 6
Lewelling Blvd	San Leandro	Hesperian Blvd	Meekland Ave	widen from 2 lanes to 4

Source: ACCMA Model 2008, the 2015 network. Las Positas Road and North Canyon Road improvements dropped, Portola Avenue added at request of City of Livermore.

Table 35: 2015 Baseline Transit Projects I-580/238 Corridor

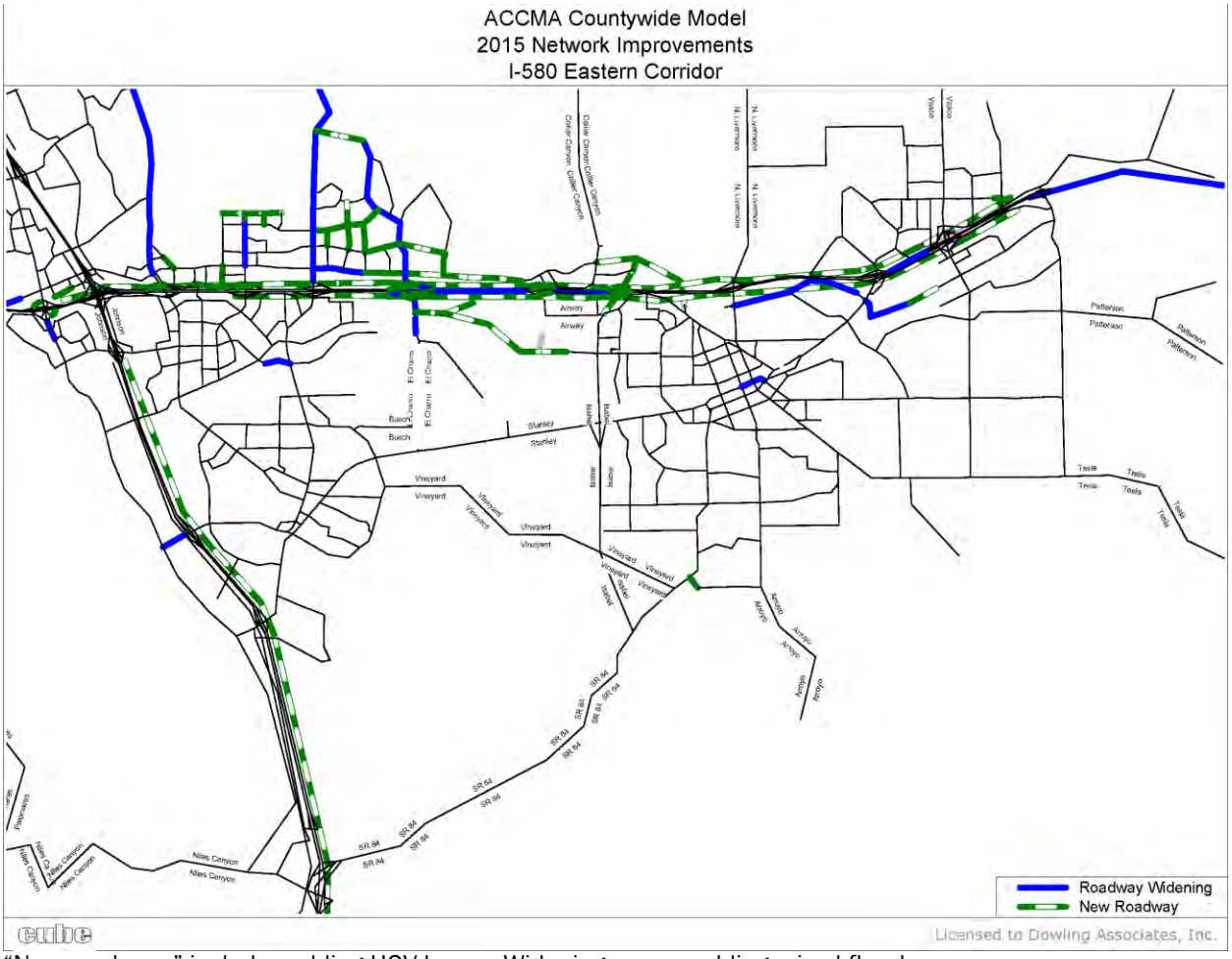
Project Name	Description
West Dublin BART station	New station in I-580 median south of Foothill Blvd interchange
Livermore-Dublin BRT	LAVTA Route 10 bus rapid transit between Lawrence Livermore Laboratory and Pleasanton/Dublin BART station

Figure 12: 2015 Baseline Highway Improvements (West)



" New roadways" includes adding HOV lanes. "Widening" means adding mixed flow lanes.

Figure 13: 2015 Baseline Highway Improvements (East)



"New roadways" includes adding HOV lanes. Widening means adding mixed flow lanes.

Travel Demand Trends

Peak period traffic demand on the I-580/I-238 freeways is forecasted to grow by between 32% and 110% between 2008 and 2035 (see Table 36). Daily transit boardings are forecasted to increase by 145% between 2008 and 2035 (see Table 37). Much of the forecasted increase in transit ridership for the ACE Train and the San Joaquin RTD is driven by the large increase in congestion forecasted for the Altamont Pass in 2035 under the baseline (no improvements beyond 2015) alternative.

Table 36: Peak Period Freeway Traffic Volume Trends

		AM Peak Period Vol. (5-9 AM)				PM Peak Period Vol. (2:30-7:30 PM)			
Facility	Location	2008	2015	2035	Growth	2008	2015	2035	Growth
I-238	E. of I-880	25,400	31,900	40,400	59%	37,100	39,900	51,600	39%
I-580	W. of Eden Cnyn	43,300	47,800	63,300	46%	57,900	63,700	77,700	34%
I-580	E. of Hopyard	51,900	58,900	75,600	46%	69,100	76,900	91,100	32%
I-580	E. of El Charro	46,600	52,300	76,900	65%	63,000	70,400	98,500	56%
I-580	E. of Greenville	30,600	34,000	60,800	99%	47,600	54,300	89,400	88%
I-580	W. of I-205	32,500	36,500	68,100	110%	48,400	54,800	91,900	90%

Source: ACCMA model (2008)

Table 37: Daily Transit Ridership Trends

Daily Boardings	2008	2015	2035	Growth
BART				
Castro Valley	2,500	2,690	3,950	58%
West Dublin	0	2,400	3,570	infinite
Dublin/Pleasanton	7,800	12,940	19,880	155%
BART Subtotal	10,300	18,030	27,400	166%
Wheels	6,900	7,120	11,560	68%
Tri-Delta Transit	150	155	251	68%
ACE Train	3,750	3,690	11,690	212%
San Joaquin RTD	1,310	1,290	4,090	212%
Total Corridor	22,410	30,285	54,991	145%

Ridership is for subset of service within I-580 corridor.
Source: ACCMA model (2008)

Trends in Mobility

The section presents the trends in baseline mobility for three different levels of aggregation:

1. The I-580/I-238 Basin: This consists of city streets, county roads, and state highways located in the I-580/I-238 basin (see Figure 14).
2. The I-580/I-238 freeway Mainline Only.

3. Critical local street intersections at the I-580/I-238 freeway interchanges. This consists of the intersections at the foot of the ramps plus one intersection away each direction from the freeway, if the additional intersection is signalized and located within one-half mile of the freeway ramps.

Mobility Trends in the I-580/I-238 Basin

The subsection presents the trends in baseline mobility for the city streets, county roads, and state highways located in the I-580/I-238 basin (see). Later subsections present mobility results for just the I-580/I-238 freeway and for just the local street intersections in the immediate vicinity of the I-580/I-238 freeway interchanges.

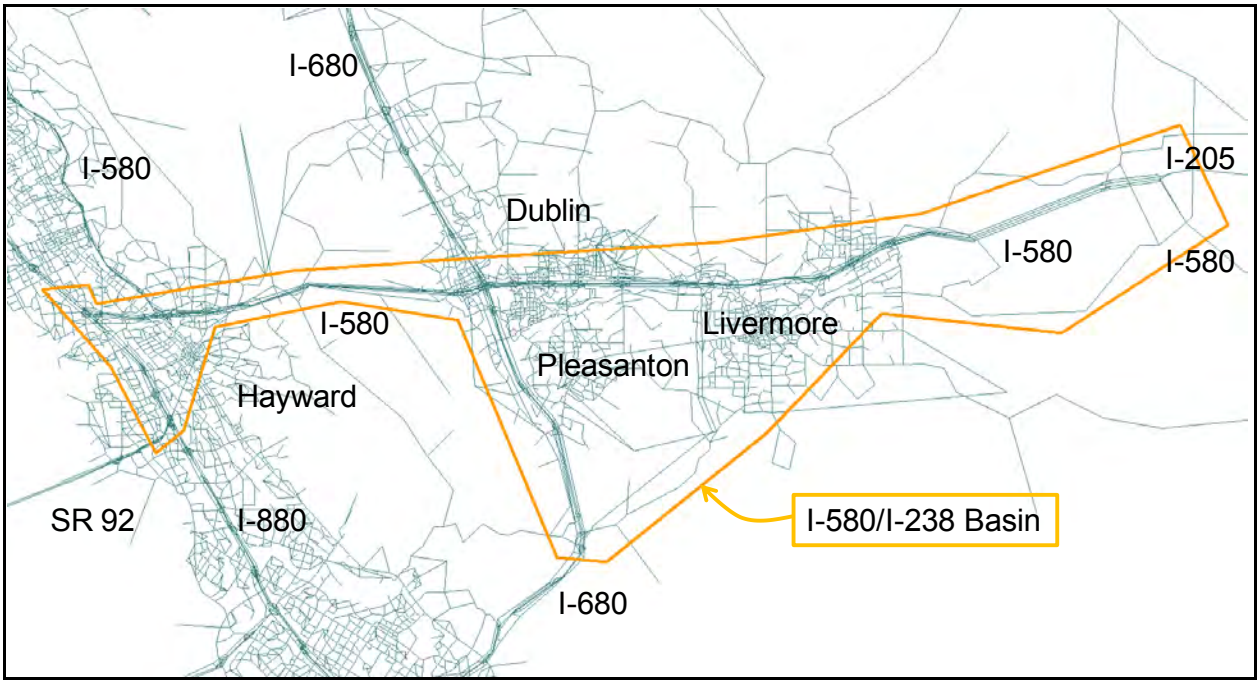
Table 38 shows the trends in performance measures for the I-580/I-238 basin. Demand is forecasted to increase, travel times will increase, delays will increase significantly, and speeds will decrease significantly under the baseline trends conditions (no further improvements to corridor after 2015).

Table 38: I-580/I-238 Basin Performance Measures

Freeways and Surface Streets	2008	2015	2035
AM 4-Hour Peak Period			
Vehicle Miles of Travel (VMT)	2,895,403	3,266,777	5,157,370
Vehicle Hours of Travel (VHT)	84,083	95,184	632,081
Vehicle Hours of Delay (VHD)	20,727	24,265	513,368
Average Vehicle Speed (mph)	34.4	34.3	8.2
Person Miles of Travel (PMT)	3,832,030	4,316,573	7,061,079
Person Hours of Travel (PHT)	110,570	125,619	884,734
Person Hours of Delay (PHD)	28,231	33,450	725,417
Average Person Speed (mph)	34.7	34.4	8.0
PM 5-Hour Peak Period			
Vehicle Miles of Travel (VMT)	4,029,873	4,524,565	6,807,971
Vehicle Hours of Travel (VHT)	119,666	127,217	603,173
Vehicle Hours of Delay (VHD)	28,592	25,991	444,595
Average Vehicle Speed (mph)	33.7	35.6	11.3
Person Miles of Travel (PMT)	5,122,531	5,763,720	8,841,273
Person Hours of Travel (PHT)	149,733	158,836	769,443
Person Hours of Delay (PHD)	35,029	31,329	567,024
Average Person Speed (mph)	34.2	36.3	11.5

Source: 2008 ACCMA Model

Figure 14: I-580/I-238 Basin



Mobility Trends in the I-580/I-238 Freeway

This section presents the trends in baseline mobility for 2008, 2015, and 2035. The mobility performance measures reported here are: delay and travel time for travel on the freeway corridor. Table 40, Table 41, and Table 42 summarize the peak period mobility trends for the segment of I-238 between I-880 and I-580, I-580 between I-238 and I-680, and I-580 between I-680 and I-205, respectively. Table 39 provides an overall summary of growth trends. The daily vehicle-hours of delay on the freeways is forecasted to increase by up to 89% in the AM Peak and by up to 38% in the PM Peak in 2015. By 2035, the vehicle-hours of delay would increase significantly, ranging from a five fold increase on I-238 to a 24-fold increase on I-580 between I-680 and I-205.

Table 39: Summary of Freeway VMT Trends

Period	Freeway	Stretch	2008	2035	Growth
AM	I-238	I-880-I-580	41,315	71,961	74%
AM	I-580	I-238 to I-680	410,907	601,009	46%
AM	I-580	I-680 to I-205	755,254	1,367,198	81%
Subtotal			1,207,476	2,040,168	69%
PM	I-238	I-880-I-580	68,184	102,006	50%
PM	I-580	I-238 to I-680	611,954	810,487	32%
PM	I-580	I-680 to I-205	944,424	1,685,982	79%
Subtotal			1,624,562	2,598,475	60%
Total			2,832,038	4,638,643	64%

Source: ACCMA model (2008)

Table 40: Mobility Trends on I-238 Freeway between I-880 and I-580

	2008	2015	2035
AM 4-Hour Peak Period			
Vehicle Miles of Travel (VMT)	41,315	54,869	71,961
Vehicle Hours of Travel (VHT)	1,071	1,408	2,945
Vehicle Hours of Delay (VHD)	301	379	1,578
Mean Vehicle Speed (mph)	38.6	39.0	24.4
Mean Delay/Vehicle (mins)	3.7	3.5	11.2
Congested Lane-Miles	2.8	2.7	5.6
Person Miles of Travel (PMT)	53,586	71,788	94,772
Person Hours of Travel (PHT)	1,405	1,855	3,970
Person Hours of Delay (PHD)	407	508	2,174
Mean Person Speed (mph)	38.1	38.7	23.9
Mean Delay/Person (mins)	3.9	3.6	11.7
PM 5-Hour Peak Period			
Vehicle Miles of Travel (VMT)	68,184	75,161	102,006
Vehicle Hours of Travel (VHT)	1,481	1,596	4,021
Vehicle Hours of Delay (VHD)	202	185	2,085
Mean Vehicle Speed (mph)	46.0	47.1	25.4
Mean Delay/Vehicle (mins)	1.5	1.3	10.4
Congested Lane-Miles	3.2	0.1	4.9
Person Miles of Travel (PMT)	91,555	101,787	139,786
Person Hours of Travel (PHT)	1,988	2,161	5,390
Person Hours of Delay (PHD)	275	254	2,742
Mean Person Speed (mph)	46.1	47.1	25.9
Mean Delay/Person (mins)	1.5	1.3	10.0

Source: ACCMA Model (2008)

Table 41: Mobility Trends on I-580 Freeway between I-238 and I-680

	2008	2015	2035
AM 4-Hour Peak Period			
Vehicle Miles of Travel (VMT)	410,907	459,526	601,009
Vehicle Hours of Travel (VHT)	11,083	15,844	61,778
Vehicle Hours of Delay (VHD)	4,451	8,427	52,073
Mean Vehicle Speed (mph)	37.1	29.0	9.7
Mean Delay/Vehicle (mins)	18.9	32.9	155.4
Congested Lane-Miles	29.3	32.0	42.8
Person Miles of Travel (PMT)	542,704	602,093	810,629
Person Hours of Travel (PHT)	14,913	21,311	86,912
Person Hours of Delay (PHD)	6,169	11,607	73,839
Mean Person Speed (mph)	36.4	28.3	9.3
Mean Delay/Person (mins)	19.8	34.6	163.4
PM 5-Hour Peak Period			
Vehicle Miles of Travel (VMT)	611,954	663,272	810,487
Vehicle Hours of Travel (VHT)	17,264	20,717	50,755
Vehicle Hours of Delay (VHD)	7,336	9,957	37,591
Mean Vehicle Speed (mph)	35.4	32.0	16.0
Mean Delay/Vehicle (mins)	20.9	26.7	83.2
Congested Lane-Miles	32.4	35.7	44.5
Person Miles of Travel (PMT)	775,975	816,615	1,007,224
Person Hours of Travel (PHT)	22,031	25,437	62,646
Person Hours of Delay (PHD)	9,457	12,201	46,302
Mean Person Speed (mph)	35.2	32.1	16.1
Mean Delay/Person (mins)	21.3	26.6	82.4

Source: ACCMA Model (2008)

Table 42: Mobility Trends on I-580 Freeway between I-680 and I-205

	2008	2015	2035
AM 4-Hour Peak Period			
Vehicle Miles of Travel (VMT)	755,254	870,347	1,367,198
Vehicle Hours of Travel (VHT)	17,471	18,769	157,963
Vehicle Hours of Delay (VHD)	5,607	5,012	136,256
Mean Vehicle Speed (mph)	43.2	46.4	8.7
Mean Delay/Vehicle (mins)	25.4	24.4	461.1
Congested Lane-Miles	28.8	29.2	104.0
Person Miles of Travel (PMT)	1,105,936	1,272,070	2,006,290
Person Hours of Travel (PHT)	25,867	27,918	238,050
Person Hours of Delay (PHD)	8,545	7,780	206,045
Mean Person Speed (mph)	42.8	45.6	8.4
Mean Delay/Person (mins)	26.5	25.9	475.1
PM 5-Hour Peak Period			
Vehicle Miles of Travel (VMT)	944,424	1,112,512	1,685,982
Vehicle Hours of Travel (VHT)	18,959	22,080	119,353
Vehicle Hours of Delay (VHD)	4,056	4,494	92,424
Mean Vehicle Speed (mph)	49.8	50.4	14.1
Mean Delay/Vehicle (mins)	14.7	17.9	274.0
Congested Lane-Miles	18.7	6.0	103.9
Person Miles of Travel (PMT)	1,279,636	1,504,996	2,299,979
Person Hours of Travel (PHT)	25,661	30,000	163,353
Person Hours of Delay (PHD)	5,515	6,150	126,404
Mean Person Speed (mph)	49.9	50.2	14.1
Mean Delay/Person (mins)	14.7	18.1	274.7

Source: ACCMA Model (2008)

AM Peak Congestion Trends

The figures below show the congestion trends in terms of peak period volume/capacity ratios for 2008, 2015, and 2035. Red bars indicate highway segments (by direction) where peak period demands are forecasted to exceed peak period capacity for the entire 4 hour (for AM) or 5 hour (for PM) peak period. Yellow bars indicate highway segments where peak period demand is expected to fall between 80% and 100% of peak period capacity.

Figure 15 shows significant 2008 AM peak period backups feeding NB I-238 from westbound at I-580 junction. The AM peak westbound flows on the Dublin Grade (Foothill Road in Dublin to Crow Canyon Road in Castro Valley) are approaching capacity.

The 2015 forecast shows that AM peak period demands on westbound I-580 will exceed capacity between Foothill Road, Crow Canyon Road, and the I-238 interchange.

The 2035 forecast shows extensive and continuous peak period backups on westbound I-580 and northbound I-238 for the AM peak period. This forecast shows that the current I-238 widening project will not provide sufficient capacity by 2035.

Figure 16 shows the observed 2008 congestion on I-580 westbound between Santa Rita Road and Airway Blvd. It also shows observed 2008 congestion on SR 84 (Pigeon Pass) between Livermore and I-680, and on southbound I-680.

The 2015 forecast shows an increase in southbound I-680 congestion and on SR 84 southbound. Congestion is forecasted to decrease on westbound I-580 due to the HOV lane project and ramp metering.

The 2035 forecast shows that further demand increases will greatly exceed the available capacity I-580 westbound, I-680 southbound, and SR 84 southbound.

Figure 17 shows 2008 congestion on southbound Vasco road. The 2015 forecast shows I-205 westbound congestion and continuing Vasco southbound congestion. The 2035 forecast shows demand exceeding capacity on I-580 westbound, I-205 westbound, with the excess demand spilling over and congesting parallel county roads (Altamont Pass and Patterson Pass Roads).

PM Peak Congestion Trends

Figure 18 shows that 2008 eastbound PM peak period demands on I-580 over the Dublin Grade (between Crow Canyon Road in Castro Valley and Foothill Road in Dublin) are approaching capacity. Interstate 238 demands currently exceed peak period capacity in the westbound direction during the PM peak period.

The 2015 forecast shows not much change from 2008. The 2035 forecast shows demand exceeding capacity on I-580 eastbound and I-238 southbound.

The 2035 forecast also shows congestion on the northbound I-680 freeway.

Figure 19 shows 2008 PM peak period congestion on northbound I-680 feeding Sunol Blvd. in Pleasanton. Congestion is also shown in 2008 on SR 84 northbound feeding Livermore and I-580 eastbound between Santa Rita and Airway Blvd.

The 2015 forecast shows eastbound 580 PM peak period congestion going away thanks to HOV lanes and current ramp metering.

The 2035 forecast however shows PM peak period demand exceeding capacity on I-680 northbound, the full length south of I-580. It also shows SR 84 northbound congested. The 2035 demand exceeds capacity for eastbound I-580 even with the HOV lanes and ramp metering.

Figure 20 shows Vasco Road northbound congested during the PM peak period in 2008. The 2015 forecast shows similar congestion on Vasco Road. PM peak period demand on I-580 eastbound comes closer to critical levels in 2015. The 2035 forecasts shows demands exceeding capacity on I-580 eastbound. The diverted 2035 PM peak period traffic causes congestion on the parallel county roads, Altamont Pass Road and Patterson Pass Road.

Figure 15: AM Peak Congestion Trends (West)

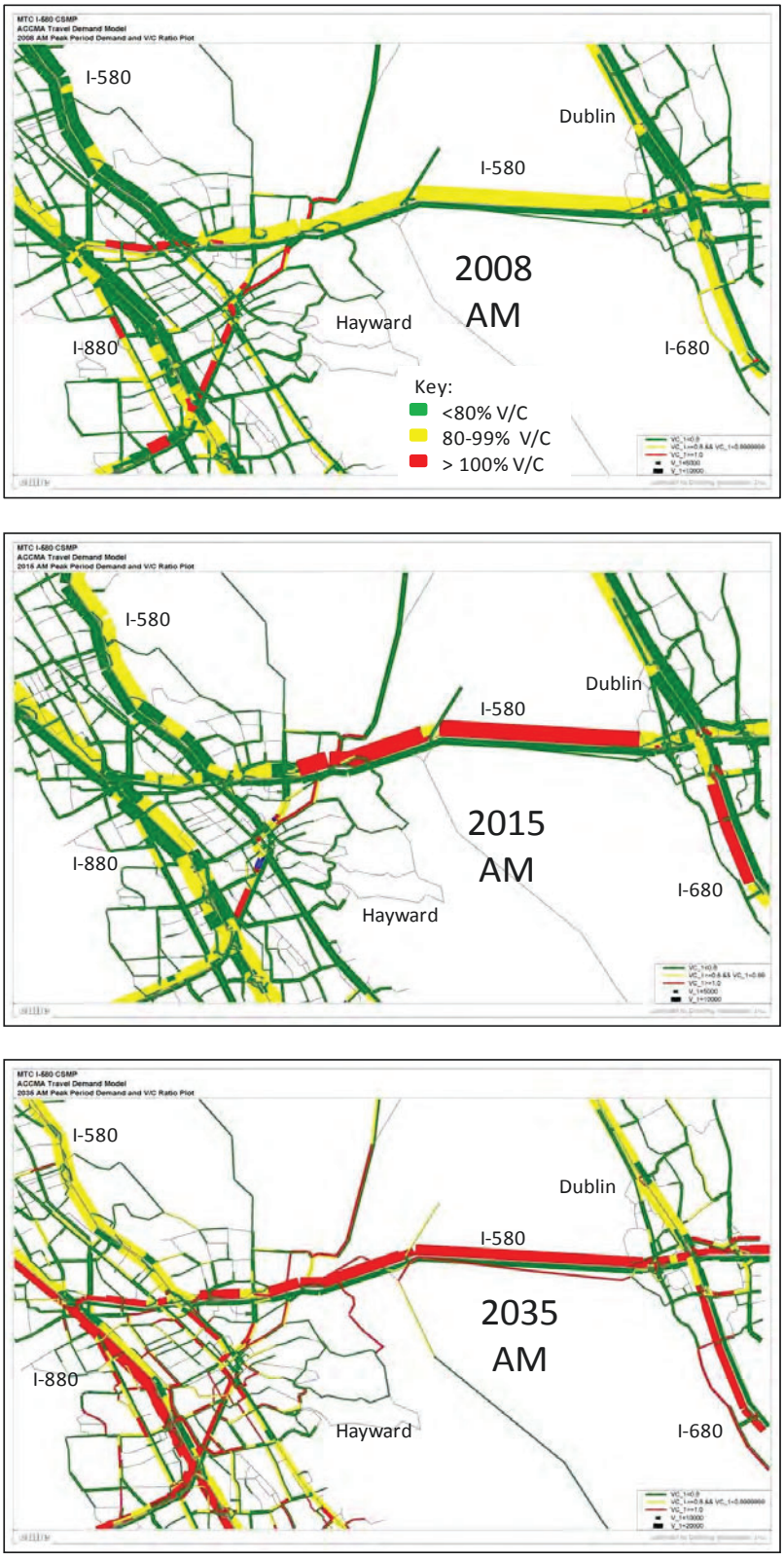


Figure 16: AM Peak Congestion Trends (Central)

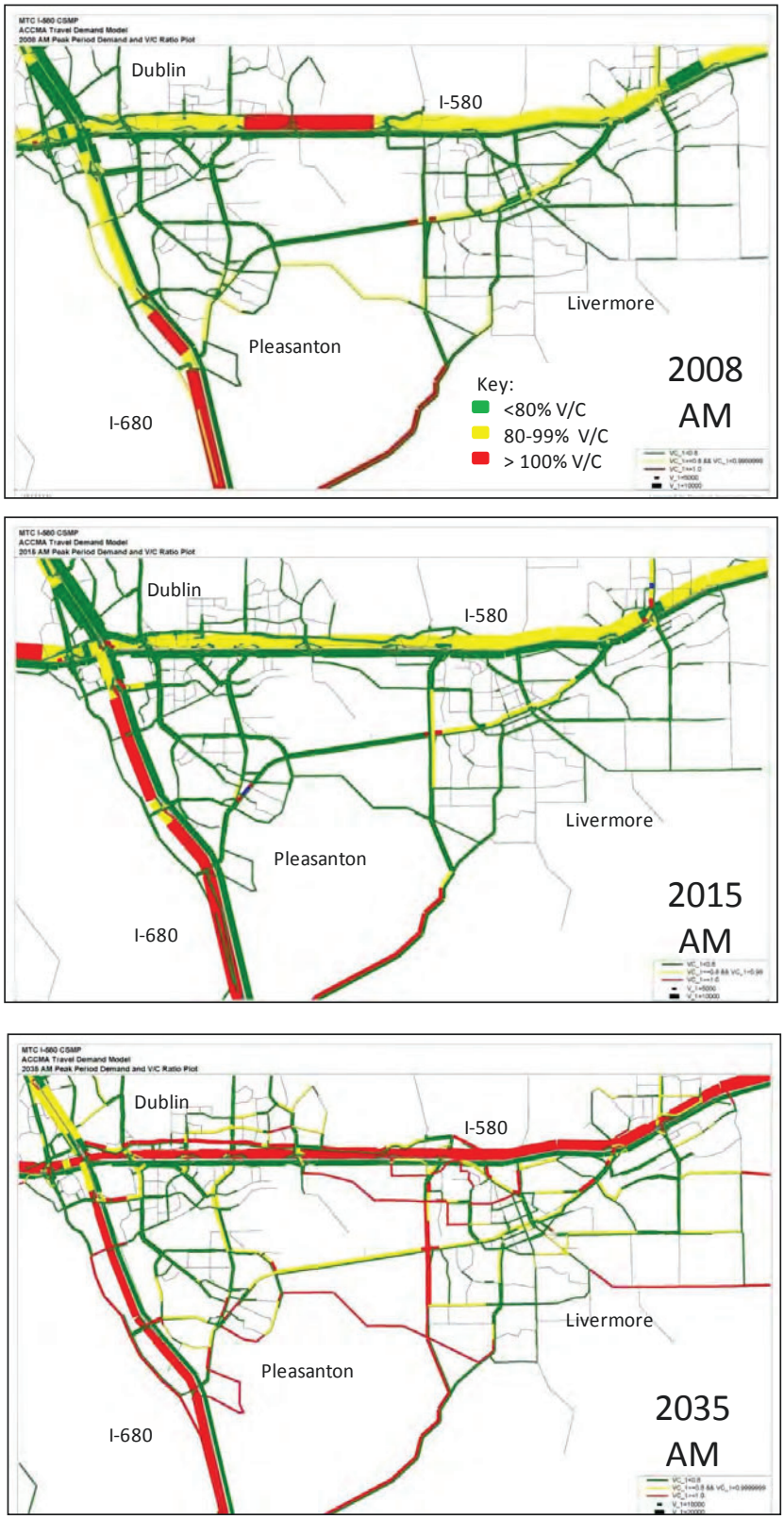
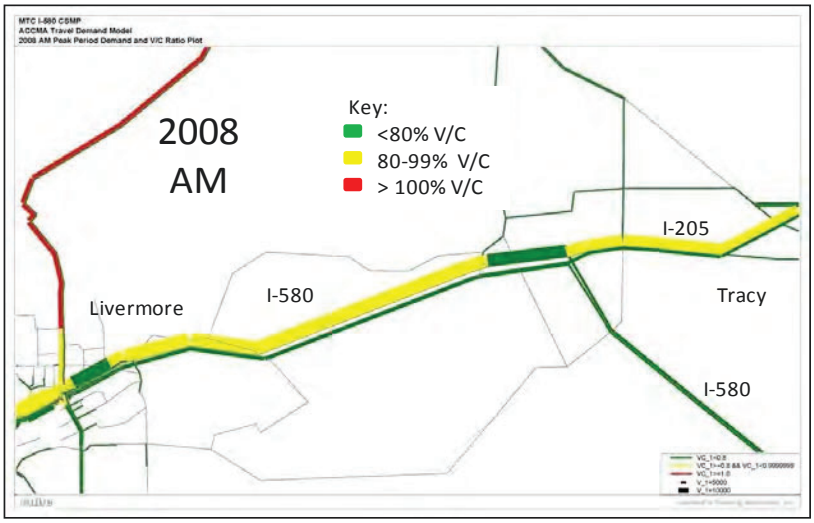
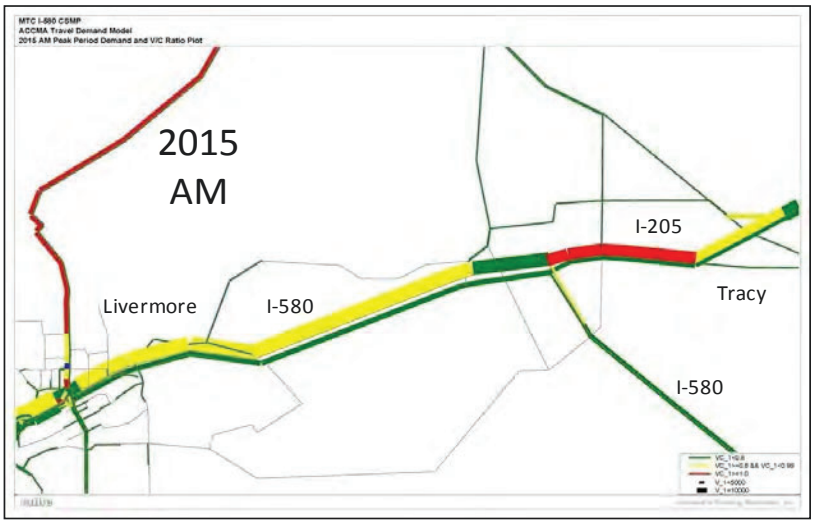


Figure 17: AM Peak Congestion Trends (East)





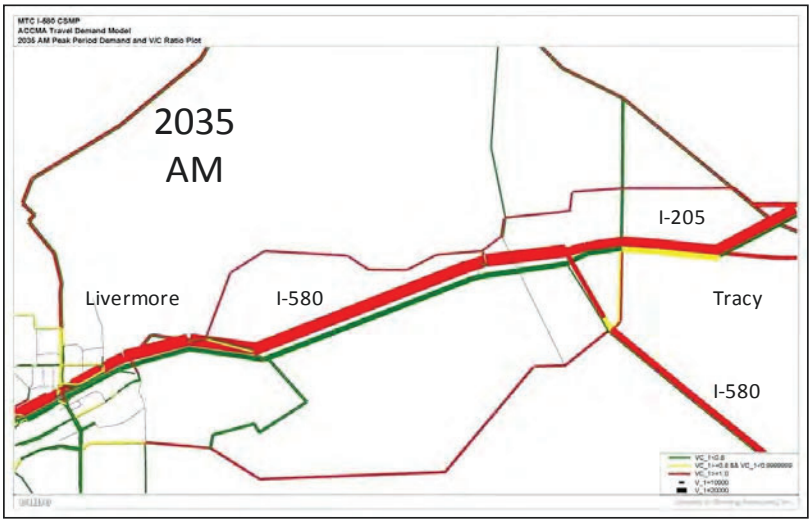
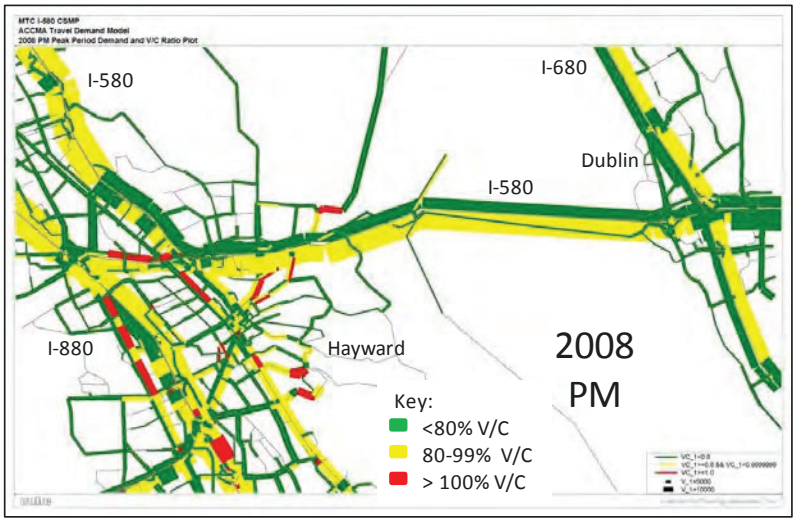
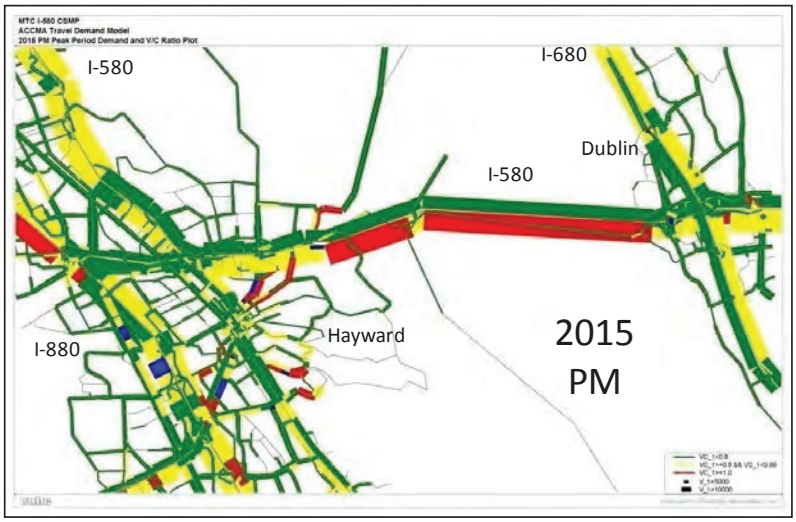


Figure 18: PM Peak Congestion Trends (West)





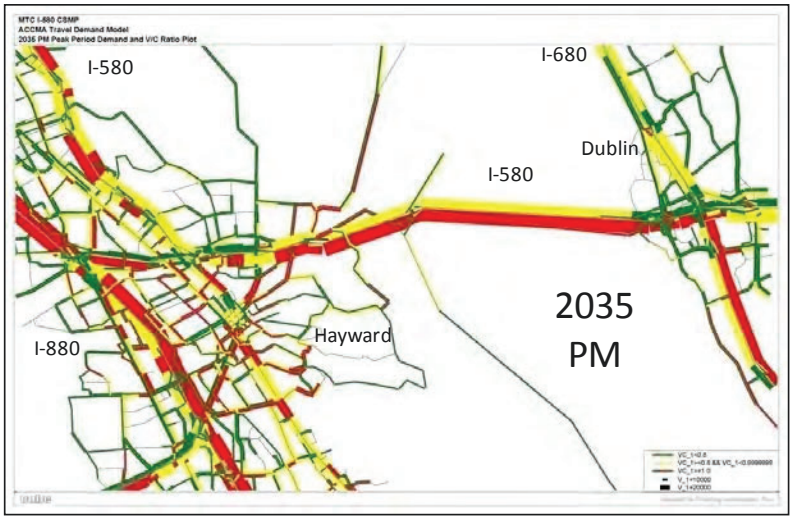
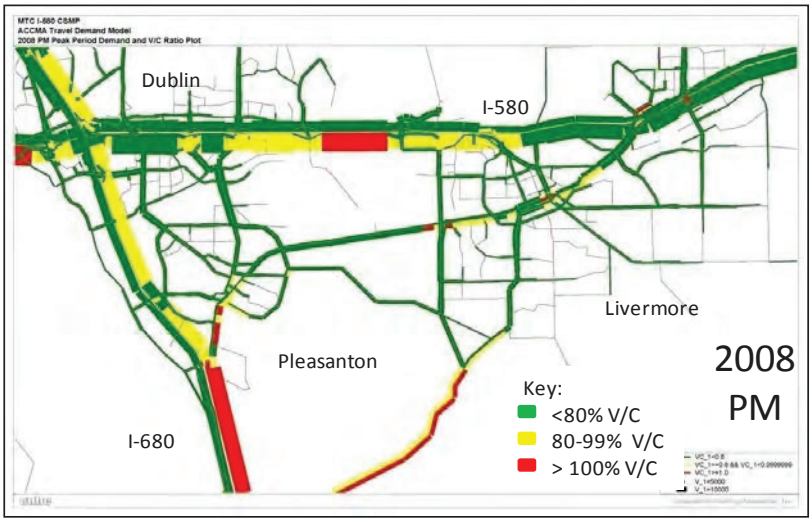
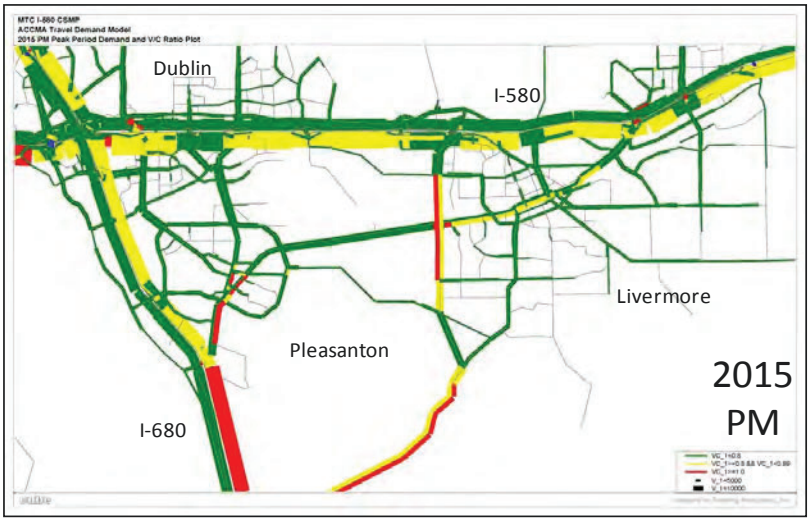


Figure 19: PM Peak Congestion Trends (Central)





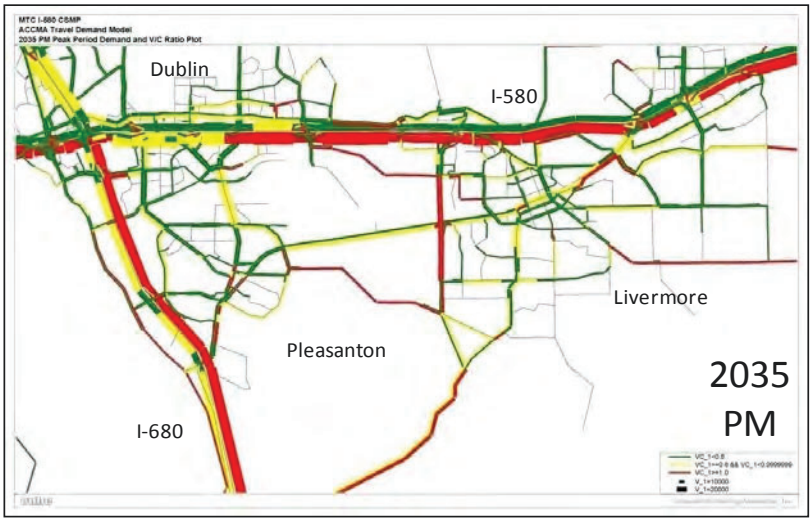
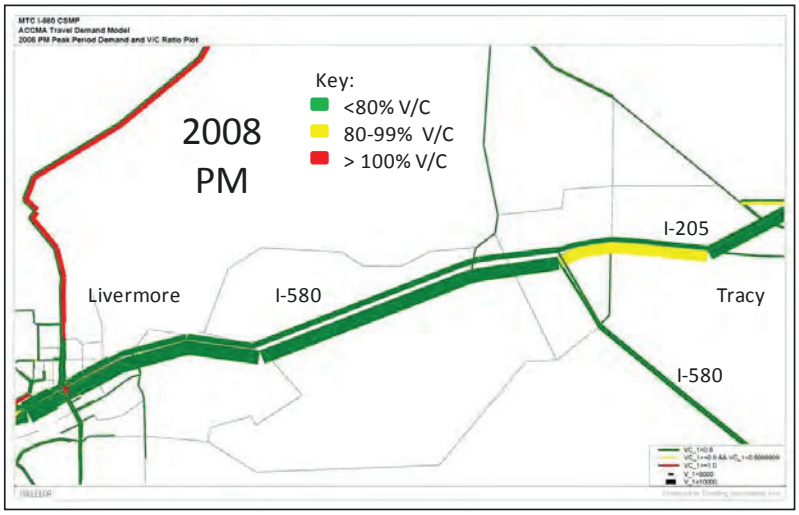
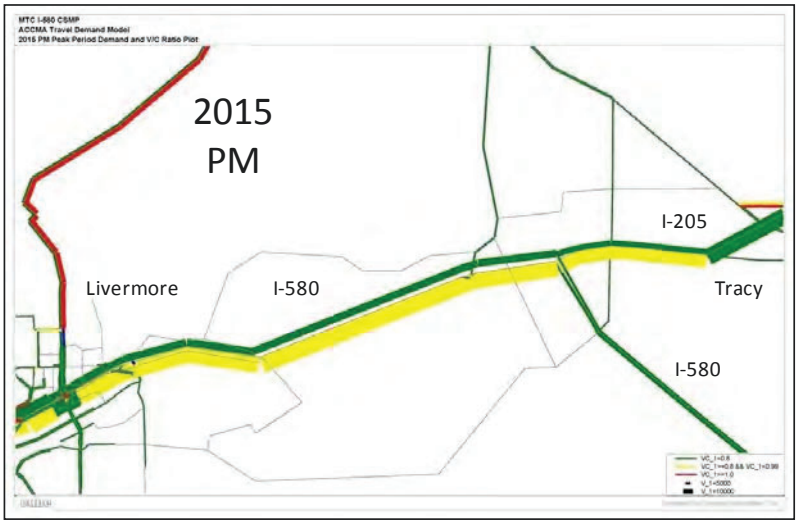
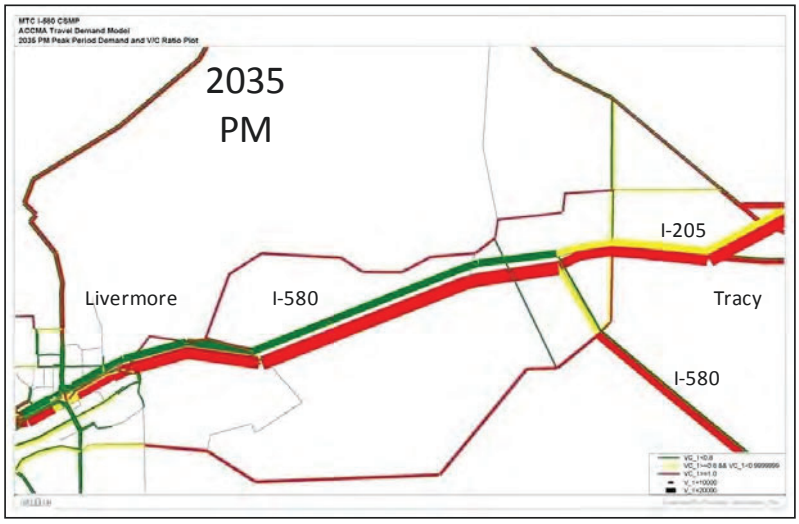


Figure 20: PM Peak Congestion Trends (East)







Mobility Trends on Surface Streets

The forecasted trends in congestion on surface streets feeding the I-580/I-238 freeway and on adjacent parallel arterials are shown in Table 43 for streets east of (and including) Eden Canyon Road and Table 44 for streets west of Eden Canyon Road. The daily vehicle-hours of delay on the surface streets is forecasted to increase marginally or even decrease in 2015 due to roadway network improvements. However, by 2035 severe congestion would occur given no additional improvements..

Table 43: Mobility Trends on Surface Streets East of Eden Canyon

	2008	2015	2035
AM 4-Hour Peak Period			
Vehicle Miles of Travel (VMT)	45,213	60,136	130,389
Vehicle Hours of Travel (VHT)	1,419	1,807	20,955
Vehicle Hours of Delay (VHD)	175	191	17,477
Mean Vehicle Speed (mph)	31.9	33.3	6.2
Mean Delay/Vehicle (mins)	7.6	6.5	279.7
Congested Lane-Miles	1.0	0.6	16.1
Person Miles of Travel (PMT)	56,450	75,609	168,718
Person Hours of Travel (PHT)	1,764	2,265	26,657
Person Hours of Delay (PHD)	213	236	22,172
Mean Person Speed (mph)	32.0	33.4	6.3
Mean Delay/Person (mins)	7.4	6.4	274.2
PM 5-Hour Peak Period			
Vehicle Miles of Travel (VMT)	71,718	89,282	163,629
Vehicle Hours of Travel (VHT)	2,500	3,072	14,713
Vehicle Hours of Delay (VHD)	514	672	10,309
Mean Vehicle Speed (mph)	28.7	29.1	11.1
Mean Delay/Vehicle (mins)	13.7	15.1	132.5
Congested Lane-Miles	1.0	1.9	11.6
Person Miles of Travel (PMT)	88,028	109,647	204,177
Person Hours of Travel (PHT)	3,048	3,755	18,385
Person Hours of Delay (PHD)	610	808	12,892
Mean Person Speed (mph)	28.9	29.2	11.1
Mean Delay/Person (mins)	13.3	14.8	132.7

Source: ACCMA Model (2008)

Table 44: Mobility Trends on Surface Streets West of Eden Canyon

	2008	2015	2035
AM 4-Hour Peak Period			
Vehicle Miles of Travel (VMT)	52,575	55,238	82,574
Vehicle Hours of Travel (VHT)	2,484	2,216	13,400
Vehicle Hours of Delay (VHD)	813	447	10,747
Mean Vehicle Speed (mph)	21.2	24.9	6.2
Mean Delay/Vehicle (mins)	18.9	9.9	159.3
Congested Lane-Miles	2.9	0.9	8.6
Person Miles of Travel (PMT)	63,471	66,762	99,980
Person Hours of Travel (PHT)	3,071	2,720	16,443
Person Hours of Delay (PHD)	1,052	580	13,230
Mean Person Speed (mph)	20.7	24.5	6.1
Mean Delay/Person (mins)	20.3	10.6	162.0
PM 5-Hour Peak Period			
Vehicle Miles of Travel (VMT)	81,884	88,816	124,714
Vehicle Hours of Travel (VHT)	3,322	3,414	19,257
Vehicle Hours of Delay (VHD)	713	565	15,238
Mean Vehicle Speed (mph)	24.7	26.0	6.5
Mean Delay/Vehicle (mins)	10.7	7.8	149.5
Congested Lane-Miles	3.8	5.3	16.7
Person Miles of Travel (PMT)	99,684	106,679	146,757
Person Hours of Travel (PHT)	4,043	4,099	22,321
Person Hours of Delay (PHD)	865	675	17,591
Mean Person Speed (mph)	24.7	26.0	6.6
Mean Delay/Person (mins)	10.6	7.7	146.7

Source: ACCMA Model (2008)

Trends in Reliability

This section reports on the baseline trends of reliability in terms of "variation of travel time or the Buffer Index". The buffer index is computed according to the following equation:

Buffer Index = (95% Travel Time – Mean Travel Time) / (Mean Travel Time)

Table 45 shows the trends in travel time variability (standard deviation of travel time) and the buffer index.

Table 45: Trends in Reliability on I-238 and I-580

Reliability Trends (minutes) **2008**

Segment	Stretch	Miles	Pk	Mean TT	Std. Dev.	95%	Buffer Ind
I-238	I-580 to I-880	2	AM	3.1	0.4	4.3	37%
I-238	I-880 to I-580	2	PM	2.6	4.8	17.1	556%
I-580	I-238 to I-680	10	AM	16.2	1.4	20.4	26%
I-580	I-238 to I-680	10	PM	16.9	2.6	24.8	46%
I-580	I-680 to I-205	21	AM	29.2	3.4	39.3	35%
I-580	I-680 to I-205	21	PM	25.3	2.4	32.5	28%

Reliability Trends (minutes) **2015**

Segment	Stretch	Miles	Pk	Mean TT	Std. Dev.	95%	Buffer Ind
I-238	I-580 to I-880	2	AM	3.1	0.7	5.1	66%
I-238	I-880 to I-580	2	PM	2.5	0.4	3.7	45%
I-580	I-238 to I-680	10	AM	20.7	7.6	42.8	107%
I-580	I-238 to I-680	10	PM	18.8	5.9	36.0	92%
I-580	I-680 to I-205	21	AM	27.2	4.4	39.8	47%
I-580	I-680 to I-205	21	PM	25.0	3.3	34.7	39%

Reliability Trends (minutes) **2035**

Segment	Stretch	Miles	Pk	Mean TT	Std. Dev.	95%	Buffer Ind
I-238	I-580 to I-880	2	AM	4.9	2.3	11.7	137%
I-238	I-880 to I-580	2	PM	4.6	2.0	10.5	126%
I-580	I-238 to I-680	10	AM	61.9	90.8	326.1	427%
I-580	I-238 to I-680	10	PM	37.5	30.7	126.7	238%
I-580	I-680 to I-205	21	AM	144.8	240.2	843.5	482%
I-580	I-680 to I-205	21	PM	89.4	85.1	336.9	277%

Mean TT = mean travel time over stretch of freeway
Std. Dev. = Standard deviation of travel time.
95% = 95 percentile highest travel time.

Source: ACCMA Model 2008 (for mean travel times). Reliability for 2015 and 2035 were predicted using regression equations fitted to 511.org data for I-580. Developed by Dowling Associates.

The standard deviation and the 95 percentile highest travel times were forecasted for 2015 and 2035 using the following equations fitted to observed 2008 reliability data.

95% Time = Mean Time * {0.78 * (Mean Time/mile) + 0.46} R^2 = 61%
Std. Dev. = Mean Time * {0.27 * (Mean Time/mile) + 0.18} R^2 = 61%

All times in minutes.

Reliability is forecasted to improve on I-238 between now and 2015, thanks to the widening project currently under construction. Reliability on I-580 between I-238 and I-680 is expected to deteriorate by 2015 significantly. Reliability will deteriorate only modestly on I-580 east of I-680, thanks to the recently opened ramp metering and the currently programmed HOV lane improvements.

Reliability will deteriorate massively on all stretches of I-238 and I-580 by 2035 if no further capacity improvements are made after 2015.

Trends in Safety

This section reports on the baseline trends of safety in terms of collisions and collision rates. The collision rates on I-580 and I-238 have historically (over the past 3 years fluctuated, sometimes increasing, sometimes decreasing. The trends are not stable from year to year and differ from section to section of the freeway.

Assuming that the collision rates hold steady at current levels as they have for the last few years than the forecasted 65% growth in peak period VMT between 2008 and 2035 should result in a similar 65% increase in annual collisions on both the I-238 and I-580 freeways (see Table 46).

Table 46: Collision Trends on I-238 and I-580

Direction	Year	Daily VMT	Annual MVM	Rate/MVM	Annual Collisions
I-238	2008	306,600	94	1.69	159
I-880 to I-580	2015	364,100	112	1.69	189
(2.0 miles)	2035	487,100	150	1.69	253
I-580	2008	1,636,600	502	0.74	372
I-238 to I-680	2015	1,796,500	552	0.74	408
(10.0 miles)	2035	2,258,400	693	0.74	513
I-580	2008	3,399,400	1,044	0.69	717
I-680 to I-205	2015	3,965,700	1,217	0.69	837
(21.0 miles)	2035	6,106,400	1,875	0.69	1288
Growth					65%

VMT = vehicle-miles traveled
MVM = million vehicle-miles
Sources: Caltrans TASAS reports (2005-2007), ACCMA model (2008)

Trends in Productivity

This section reports on trends in lane-miles lost to congestion. The lost lane-miles of productivity is computed according to the following equation. The results and trends are shown in Table 47.

Lost Lane Miles = { 1 – (Observed Lane Throughput)/2000 vphpl} * Lanes * Congested Miles

Lost Lane-Miles = (Proportion lost throughput) * (Congested Lane-Miles)

The stretch of I-238 between I-880 and I-580 is projected to experience a 75% increase in lost peak period productivity between 2008 and 2035. The stretch of I-580 between I-238 to I-680 will see a 41% increase in lost productivity. The stretch of I-580 between I-680 to I-205 will see a 338% increase in lost productivity.

The surface streets in the immediate vicinity of each freeway interchange will experience a 278% increase in lost productivity west of Eden Canyon Road, and an increase of 1,285% east of Eden Canyon Road (The Tri-Valley portion of the corridor).

Table 47: Trends in Productivity

Facility	Stretch	Year	Congested Lane-Miles	Lost Lane-Miles
I-238	I-880 to I-580	2008 AM	2.80	1.54
		2008 PM	3.20	1.76
		2015 AM	2.70	1.49
		2015 PM	0.10	0.06
		2035 AM	5.60	3.08
		2035 PM	4.90	2.70
I-580	I-238 to I-680	2008 AM	29.30	16.12
		2008 PM	32.40	17.82
		2015 AM	32.00	17.60
		2015 PM	35.70	19.64
		2035 AM	42.80	23.54
		2035 PM	44.50	24.48
I-580	I-680 to I-205	2008 AM	28.80	15.84
		2008 PM	18.70	10.29
		2015 AM	29.20	16.06
		2015 PM	6.00	3.30
		2035 AM	104.00	57.20
		2035 PM	103.90	57.15
Streets (adjacent to freeway Interchanges)	West of Eden	2008 AM	2.90	2.18
		2008 PM	3.80	2.85
		2015 AM	0.90	0.68
		2015 PM	5.30	3.98
		2035 AM	8.60	6.45
		2035 PM	16.70	12.53
Streets (adjacent to freeway Interchanges)	East of Eden	2008 AM	1.00	0.75
		2008 PM	1.00	0.75
		2015 AM	0.60	0.45
		2015 PM	1.90	1.43
		2035 AM	16.10	12.08
		2035 PM	11.60	8.70

Source: ACCMA model (2008), peak period results, lost throughput estimated at 75% for surface streets, 55% for freeways.

5. CORRIDOR BOTTLENECK TRENDS

This section identifies the mobility bottlenecks on the freeway and nearby surface streets. It describes their causes, and the extent of congestion attributable to each bottleneck.

5.1. Existing

Freeway System

Preliminary assessment of existing conditions utilized the aerial photography to identify major freeway bottleneck locations, and queues on the mainline associated with each. Table 50 provides a summary of the existing freeway bottleneck locations.

Figure 21 illustrates the key bottleneck locations and congested sections along the I-580 corridor.

Surface Street System

This section identifies the key bottleneck intersections feeding the I-580 and I-238 freeways and parallel arterials. Table 48 shows the surface streets with signalized intersections operating at peak hour volume capacity ratios greater than 1.00 or delays greater than LOS "E". These conditions are indicative of surface street bottleneck problems. The bottleneck intersections are also shown in Figure 21.

Table 48: Existing Surface Street Bottlenecks (Near Freeway)

Intersection	Agency	Problem
Hopyard Road at Owen Drive	Pleasanton	PM peak hour demands going north to access or cross freeway regularly exceed capacity
Hacienda Drive at Owen Drive	Pleasanton	PM peak hour demands going north to access or cross freeway regularly exceed capacity
Santa Rita Road at I-580 EB	Pleasanton	PM peak hour demands going north to access or cross freeway regularly exceed capacity
Castro Valley Blvd. at Crow Canyon Rd	Alameda County	AM/PM Peak Hours demands exceed intersection capacity. Intersection is near maxed out on exclusive right turn lanes and double left turn lanes.
Grove Way and Foothill Blvd.	Hayward	AM/PM Peak Hours – side street approaches are inadequate width to accommodate left and right turns from cross street. Side streets, being one lane each direction, can only accept single left turn lane traffic from Foothill Boulevard.

Source: Dowling Associates

Unsignalized intersections operating at poor level of service are not considered bottlenecks because they can often be mitigated through signalization. There are some all-way stop controlled intersections operating at LOS F in the corridor as shown in Table 49. For minor street stop control, only the delay for the most severely delayed movement is shown. The solution to capacity problems at unsignalized intersections is often signalization.

Table 49: 2008 Surface Street Operations

N-S Street	E-W Street	Control Type	AM Peak			PM Peak		
			V/C	DELAY	LOS	V/C	DELAY	LOS
Alameda County								
Stanton Ave	Castro Valley Blvd	Signalized	0.92	45.6	D	0.95	47.6	D
Strobridge Ave	I-580 WB Off Ramp	Stop Control	N/A	26.9	D	N/A	55.8	F
Strobridge Ave	I-580 EB Ramps	Signalized	0.55	14.2	B	0.72	23.5	C
Redwood Rd	Norbridge Ave	Signalized	0.48	20.7	C	0.52	21.9	C
Redwood Rd	I-580 WB On Ramp	Signalized	0.45	7.1	A	0.36	3.5	A
Redwood Rd	I-580 EB Off Ramp	Signalized	0.47	6.4	A	0.54	10.0	A
Redwood Rd	Vegas Ave	Signalized	0.51	24.4	C	0.53	22.0	C
I-580 WB On Rmp	Castro Valley Blvd	Signalized	0.77	19.9	B	0.78	16.8	B
Center St	Castro Valley Blvd	Signalized	0.89	55.4	E	0.86	44.8	D
Center St	I-580 EB Off Ramp	Signalized	0.55	13.9	B	0.56	16.8	B
Center St	Grove Wy	Signalized	0.91	68.2	E	0.77	47.0	D
Crow Canyon Rd	E Castro Valley Blvd	Signalized	0.90	57.5	E	0.95	63.5	E
I-580 WB Ramps	E Castro Valley Blvd	Signalized	0.75	26.0	C	0.98	39.0	D
Eden Canyon Rd	I-580 WB Ramps	Stop Control	N/A	3.0	A	N/A	6.1	A
Eden Canyon Rd	I-580 EB Ramps	Stop Control	N/A	6.2	A	N/A	5.8	A
Paloverde Rd	E Castro Valley Blvd	Stop Control	N/A	48.4	E	N/A	51.4	F
Fallon Rd	I-580 EB Ramps	Stop Control	N/A	5.4	A	N/A	7.1	A
Greenville Rd	Northfront Rd	Stop Control	N/A	99.9	F	N/A	66.1	F
Greenville Rd	Southfront Rd	Signalized	0.23	10.8	B	0.25	11.9	B
I-580 WB Ramps	N Flynn Rd	Stop Control	N/A	5.3	A	N/A	1.2	A
I-580 EB Ramps	N Flynn Rd	Stop Control	N/A	4.8	A	N/A	5.5	A
Grant Line Rd	Altamont Pass Rd	Stop Control	N/A	4.4	A	N/A	13.7	B
Grant Line Rd	I-580 WB Ramps	Stop Control	N/A	8.1	A	N/A	9.0	A
Grant Line Rd	I-580 EB Ramps	Stop Control	N/A	7.8	A	N/A	9.2	A
Dublin								
San Ramon Rd	Dublin Blvd	Signalized	0.48	28.6	C	0.48	31.1	C
San Ramon Rd	I-580 WB Off-Ramp	Signalized	0.65	9.6	A	0.67	9.9	A
Amador Plaza Rd	St Patrick Way	Signalized	0.29	14.6	B	0.33	15.5	B
Dougherty Rd	Dublin Blvd	Signalized	0.74	38.1	D	0.72	39.4	D
Dougherty Rd	I-580 WB Off Ramp	Signalized	0.53	8.9	A	0.37	9.7	A
Hacienda Dr	Hacienda Crossings	Signalized	0.26	9.9	A	0.54	18.1	B
Hacienda Dr	I-580 WB Off Ramp	Signalized	0.35	8.8	A	0.56	5.4	A
Tassajara Rd	Dublin Blvd	Signalized	0.82	11.0	B	0.59	12.8	B
Tassajara Rd	I-580 WB Off Ramp	Signalized	0.41	14.3	B	0.54	9.3	A
Fallon Rd	I-580 WB Ramps	Stop Control	N/A	4.7	A	N/A	2.2	A
Hayward								
Foothill Blvd	Grove Wy	Signalized	0.86	41.4	D	1.00	69.0	E
Livermore								
Airway Blvd	N Canyon Pkwy	Signalized	0.58	39.7	D	0.54	37.3	D
Airway Blvd	I-580 WB Ramps	Signalized	0.74	6.1	A	0.36	7.9	A
Airway Blvd	I-580 EB Off Ramp	Signalized	0.79	41.0	D	0.68	30.9	C
I-580 Ramps	Portola Ave	Stop Control	N/A	1.8	A	N/A	13.4	B
N Murieta Blvd	Portola Ave	Signalized	0.76	20.3	C	0.72	24.8	C
N Livermore Ave	I-580 WB Ramps	Signalized	0.52	11.0	B	0.42	10.1	B
N Livermore Ave	I-580 EB Ramps	Signalized	0.39	6.6	A	0.73	13.0	B
Springtown Blvd	Bluebell Dr	Signalized	0.50	13.5	B	0.63	13.1	B
Springtown Blvd	I-580 WB Ramps	Signalized	0.56	10.5	B	0.78	6.6	A
1st St	I-580 EB Ramps	Signalized	0.65	14.4	B	0.81	25.5	C
1st St	Southfront Rd	Signalized	0.65	39.4	D	0.57	25.4	C
N Vasco Rd	Northfront Rd	Signalized	0.63	22.0	C	0.60	28.7	C
S Vasco Rd	Preston Wy	Stop Control	N/A	1.7	A	N/A	6.1	A
I-580 WB Ramps	Northfront Rd	Stop Control	N/A	78.9	F	N/A	5.7	A
I-580 EB Ramps	Southfront Rd	Stop Control	N/A	2.2	A	N/A	1.4	A
Pleasanton								
Foothill Rd	Dublin Canyon Rd	Signalized	0.46	22.2	C	0.48	24.4	C
Hopyard Rd	I-580 EB Off Ramp	Signalized	0.81	11.9	B	0.78	13.0	B
Hopyard Rd	Owens Dr	Signalized	0.77	34.1	C	0.92	50.0	D

N-S Street	E-W Street	Control Type	AM Peak			PM Peak		
			V/C	DELAY	LOS	V/C	DELAY	LOS
Hacienda Dr	I-580 EB Off Ramp	Signalized	0.58	10.5	B	0.81	16.0	B
Hacienda Dr	Owens Dr	Signalized	0.39	22.3	C	0.80	40.7	D
Santa Rita Rd	I-580 EB Off Ramp	Signalized	0.72	24.9	C	0.74	28.3	C
Santa Rita Rd	Rosewood Dr	Signalized	0.39	12.1	B	0.57	11.7	B
San Leandro								
Washington Ave	Springlake Dr	Signalized	0.51	14.9	B	0.58	16.3	B
Washington Ave	I-238/I-880 Ramps	Signalized	0.85	30.4	C	0.75	24.5	C
I-238/I-880 Ramps	Beatrice St	Stop Control	N/A	25.8	D	N/A	52.8	F
Washington Ave	Beatrice St	Signalized	0.57	15.4	B	0.64	18.8	B
I-880 SB Off Ramp	E Lewelling Blvd	Signalized	0.65	9.4	A	0.75	12.3	B
I-238 SB Off Ramp	Springlake Dr	Signalized	0.16	8.0	A	0.25	7.7	A
Hesperian Blvd	Springlake Dr	Signalized	0.40	12.3	B	0.47	13.1	B
Hesperian Blvd	I-238 WB On Ramp	Signalized	0.45	15.4	B	0.53	9.8	A
Hesperian Blvd	Sycamore St	Signalized	0.33	5.7	A	0.49	7.9	A
Hesperian Blvd	E Lewelling Blvd	Signalized	0.77	43.1	D	0.84	55.6	E
Hesperian Blvd	I-880 NB Off Ramp	Signalized	0.40	7.2	A	0.54	10.2	B
E 14th St	Elgin St	Signalized	0.58	17.5	B	0.58	20.1	C
E 14th St	1-238 SB Ramps	Signalized	0.41	10.5	B	0.47	15.8	B
I-238 NB Ramps	E Lewelling Blvd	Signalized	0.51	10.3	B	0.77	19.6	B
Mission Blvd	E Lewelling Blvd	Signalized	0.37	14.1	B	0.46	11.1	B

Delay is in units of seconds per vehicle. LOS is level of service. V/C is not calculated for unsignalized intersections.
Source: Synchro Analyses by Dowling Associates

2008

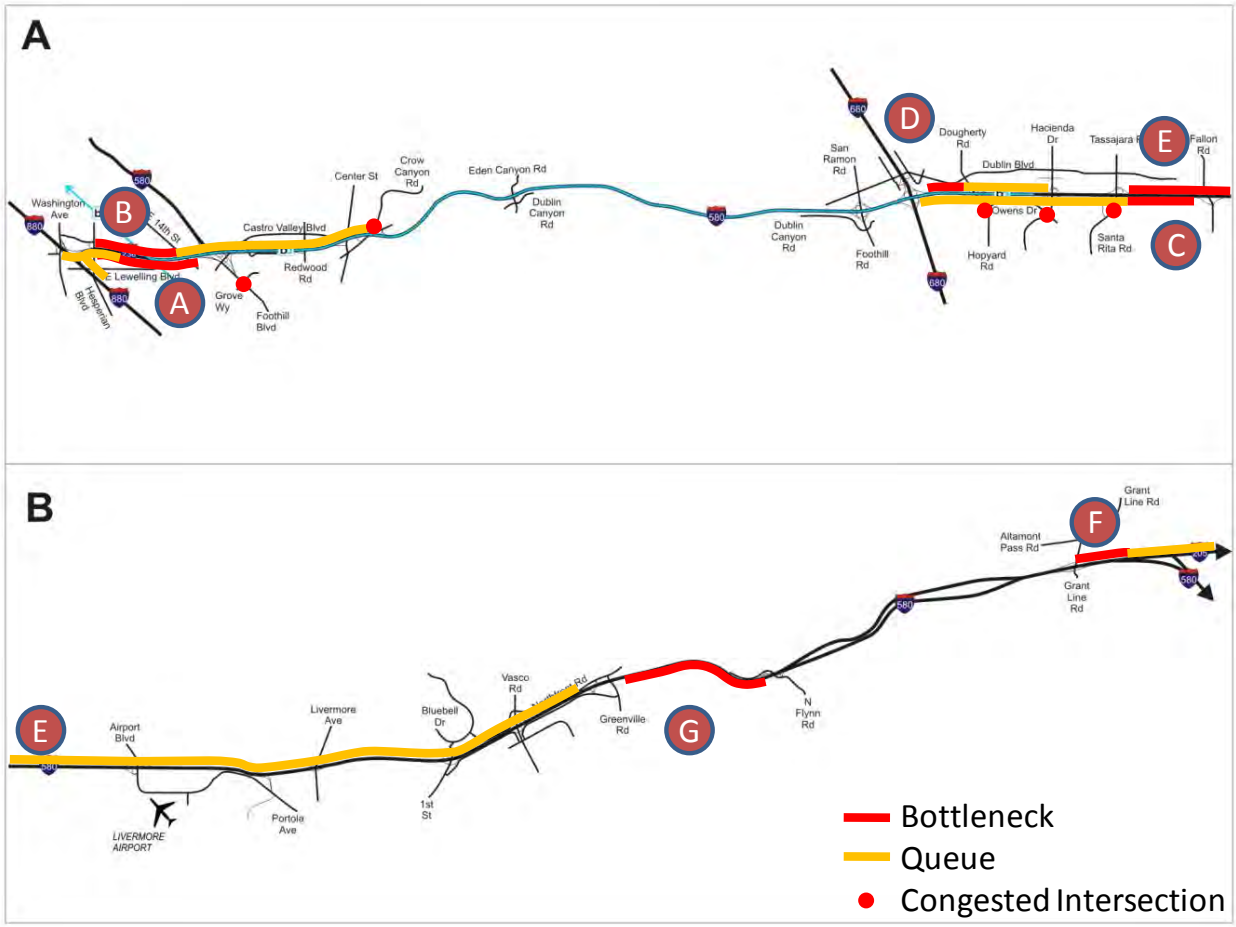


Table 50: Existing Bottleneck Locations

Dir	No.	Bottleneck	Pk	Maximum Queue	Main Cause	Additional Factors/Comments	Duration
I-238 SB		None	AM*				
	A	I-880 NB On to Lewelling Off	PM	Beyond the I-880 NB to I-238 SB/EB (>1 mile)	Insufficient Capacity Lane Drop	Operational problems: high on-ramp volume merging from I-880 NB connector, lane drop at Lewelling off-ramp, high truck usage (about 12%)	3:40 to 6:33 PM
I-238 NB	**B**	I-580 EB On to I-880 SB Off	AM	Crow Canyon Road, approximately 3.6 miles)	Insufficient Capacity	Operational problems: high diverging off-ramp volume to I-880 SB connector, high truck usage (about 12%)	5:23 to 9:50 AM
			PM	Strobridge Ave (approx. 1.85 mile)	Insufficient Capacity	Operational problems: high diverging off-ramp volume to I-880 SB connector, high truck usage (about 12%)	3:40 to 7:02 PM
I-580 EB		None	AM				
	C	Santa Rita Road to Fallon Off-ramp	PM	I-680 off-ramp (approximately 4 miles)	Recurring, Over-capacity	Operational problems: lane drop at Santa Rita Road off-ramp and at El Charro Road off-ramp, high truck usage (about 10%)	3:10 to 7:02 PM
	G	East of Greenville	PM	None observed	Upgrade to pass	The steep upgrade to pass can cause transitory queuing, but none observed on two days of data collection May 2008. Perhaps because upstream bottleneck at Santa Rita ("C") metered the traffic.	
I-580 WB	**D**	Dougherty Rd on-ramp to I-680 off-ramp	AM	Hacienda Drive off-ramp (approximately 1.8 miles)	Recurring, Weaving	Operational problems: short weaving distance between Dougherty Drive on-ramp and I-680 off-ramp, and high weaving traffic volumes. In addition, capacity constraint on the loop ramp to I-680 SB also contributed to the bottleneck. High truck usage (about 10%)	8:24 to 9:21 AM
	E	Airway Blvd on-ramps to Tassajara Rd off-ramp	AM	Beyond Greenville Road off-ramp (approximately 12 miles)	Recurring, Over-capacity	There could be additional hidden/secondary bottlenecks upstream of the Airway Blvd bottleneck	5:23 to 8:53 AM
	F	I-205 merge to Grant Line Road	AM	On I-205, upstream of I-580 merge (approx. 1.3 miles)	Recurring, major merge	Major merge of two freeway mainline	5:53 to 6:22 AM
		None	PM				

* MTC staff noted that on this section of freeway, 2003 Caltrans speed plots have shown bottleneck occurrence during the AM peak hour as well.

5.2. Bottleneck Trends

This section discusses the new bottlenecks that are expected to come into play in 2015 and 2035. The discussion is summarized in Table 51, and Figure 22 and Figure 23 below.

Table 51: Bottleneck Trends

No.	Direction	Bottleneck	2008	2015	2035
A	I-238 SB	Mission On	Active PM		Active AM/PM
B	I-238 NB	Mission On	Active AM/PM		Active AM/PM
C	I-580 EB	Santa Rita On	Active PM		Active PM
D	I-580 WB	I-680 off Ramp	Active AM	Active AM	Active AM
E	I-580 WB	Airway On	Active AM		Active AM
F	I-580 WB	I-205 Merge	Active AM	Active AM	Active AM
G	I-580 EB	Altamont Pass	Active PM		Active PM
H	I-580 EB	Dublin Grade			Active PM
I	I-580 WB	Dublin Grade		Active AM	Active AM
J	I-580 WB	Isabel to Airway		Active AM	
K	I-580 WB	N. Livermore to Airway		Active AM	
L	I-580 EB	Isabel to N. Livermore		Active PM	
M	I-580 EB	Airway to Isabel		Active PM	
N	I-580 WB	Hacienda HOV Weave		Active AM	Active AM
O	I-580 WB	Fallon to Tassajara		Active AM	
P	I-238 NB	Mission Off Lane Drop		Active AM	Active AM
Q	I-580 WB	Ramp Meter at I-205 merge		Active AM	Active AM

(I-238 northbound is equivalent to the westbound direction of travel. Southbound I-238 is equivalent to eastbound travel in the corridor.)

Bottleneck Trends 2015

Freeway System

Freeway performance is forecasted to deteriorate modestly between 2008 and 2015 due to the many projects coming on line between now and then.

Many of the bottlenecks currently active in 2008 will dissipate in 2015 due to the widening of I-238, the addition of HOV lanes in the Dublin/Pleasanton stretch of I-580, ramp metering on I-580, and the construction of the truck climbing lane on EB I-580 east of Greenville Road leading up to the Altamont Pass. Some new bottlenecks will result from increased demands expected between 2008 and 2015 and because some of the programmed improvements will release existing bottlenecks causing increased demand to arrive at downstream bottlenecks. The bottlenecks are summarized in Table 75 and discussed in more detail below.

The following bottlenecks in 2008 would remain in 2015:

- The I-580 WB to I-680 off ramp bottleneck (Bottleneck “D” in Figure 22) will remain in 2015, because none of the currently programmed improvements address this problem.

- The I-580 WB AM bottleneck at the I-205 merge (Bottleneck "F" in Figure 22) will remain in 2015 because no improvements are programmed to address this problem and the widening of I-205 in the Tracy area will worsen this problem by delivering more traffic to this bottleneck.

The following new bottlenecks will arise in 2015:

- A new bottleneck will arise in the westbound direction during the AM peak period at the lane drop west of terminus of the HOV lane within San Ramon/Foothill Road interchange (Bottleneck "I" in Figure 22). The bottleneck will back up traffic into the I-680 interchange and will affect southbound I-680 operations during the AM peak period.

- Westbound AM peak period bottlenecks will arise between the North Livermore, Isabel, and Airway Boulevard interchanges (Bottlenecks "J" and "K" in Figure 22). The congestion will cause on ramp traffic to back up and affect surface street operations on North Livermore Avenue during the AM peak period.

- Eastbound PM peak period bottlenecks will arise at the lane drops between auxiliary lanes within the Airway Boulevard and Isabel Avenue interchanges (Bottleneck "M" in Figure 22). The eastbound lane drop between the Isabel and North Livermore interchanges will also result in a bottleneck during the PM peak period (Bottleneck "L" in Figure 22).

- A new point of turbulence will be introduced in the westbound direction at the point where the HOV lane splits off from the mixed flow lanes just east of the Hacienda Blvd. overcrossing (Bottleneck "N" in Figure 22). HOV's and toll vehicles desiring to exit at Hopyard or I-680 must slow to exit the HOT lane at this point.

- A westbound bottleneck will arise during the AM peak period where the auxiliary lane terminates at Fallon Road interchange (bottleneck "O" in Figure 22). The demand west of this point will exceed the capacity of the 4 mixed flow lanes plus HOT lane.

- A westbound AM peak period bottleneck will arise west of the lane drop at East 14th Street/Mission Boulevard (bottleneck "P" in Figure 22). The forecasted off-ramp demand at this point is significantly lower than the capacity of a freeway lane, so the termination of a mainline lane at this off-ramp results in a bottleneck west of this point.

Surface Street System

Several intersections in the west side of the corridor will become bottlenecks (volume/capacity > 1.00) in 2015, while the number of bottleneck intersections in the east side of the corridor will decline (see Table 52). The bottleneck intersections in 2015 are:

- Hesperian Blvd and E Lewelling Blvd
- I-238/I-580 Off Ramp and Castro Valley Blvd
- Foothill Blvd and Grove Wy
- Stanton Ave and Castro Valley Blvd
- Redwood Rd and I-580 WB On Ramp
- Crow Canyon Rd and E Castro Valley Blvd
- Hopyard Rd and Owens Dr
- Airway Blvd and N Canyon Pkwy
- N Livermore Ave and I-580 EB Ramps
- Grove Way and Castro Valley Blvd

Figure 22: Bottlenecks in 2015 Baseline

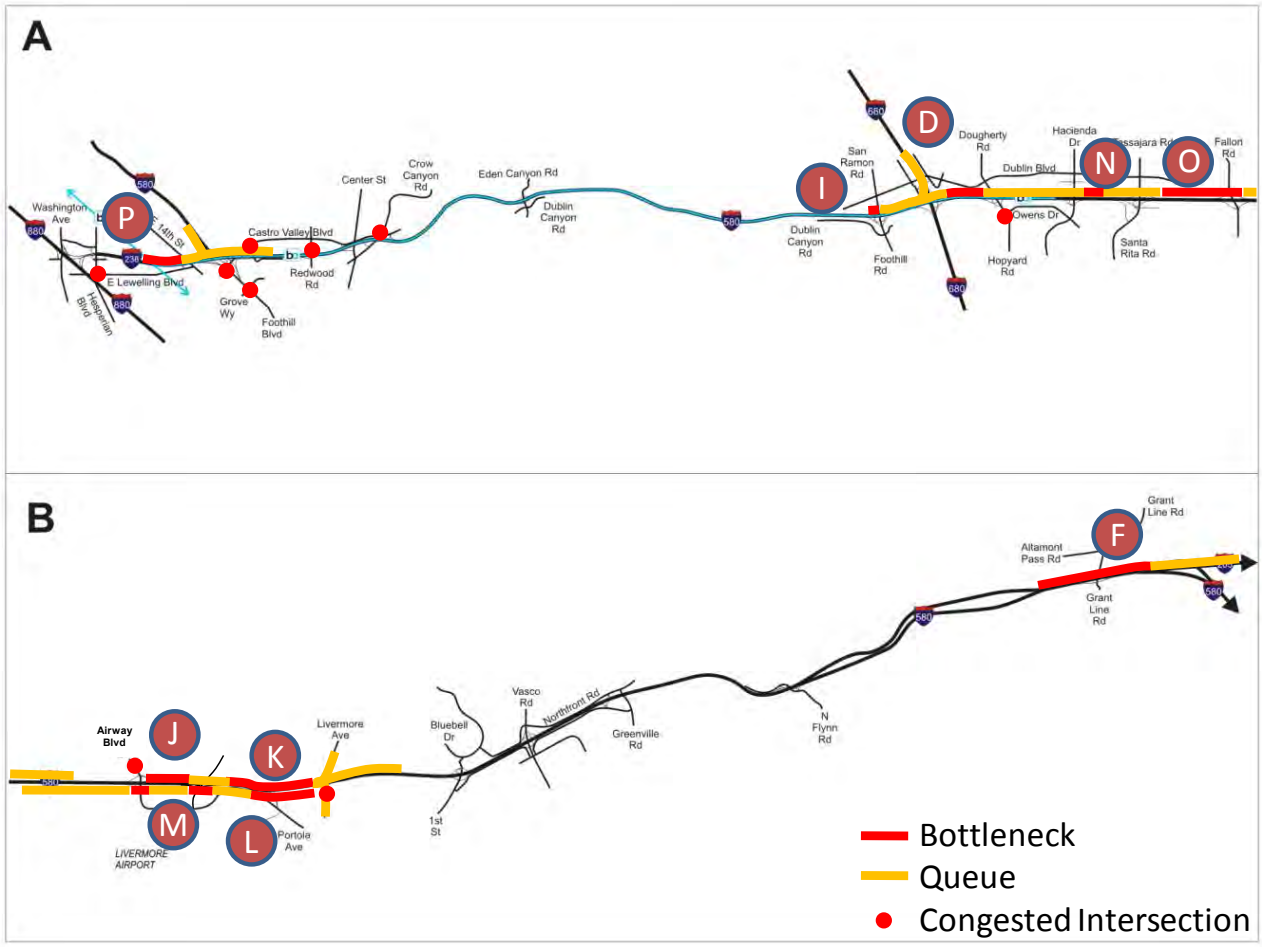


Table 52: Surface Street Congestion 2015

Int ID	N-S Street	E-W Street	Control	Agency	AM Peak Hour			PM Peak Hour		
					V/C	DELAY	LOS	V/C	DELAY	LOS
1	Washington Ave	Springlake Dr	Signal	San Leandro	0.74	24.6	C	0.63	20.6	C
2	Washington Ave	I-238/I-880 Ramps	Signal	San Leandro	0.82	24.2	C	0.89	24.7	C
3	I-238/I-880 Ramps	Beatrice St	All Stop	San Leandro	N/A	138.1	F	N/A	201.1	F
4	Washington Ave	Beatrice St	Signal	San Leandro	0.49	11.9	B	0.66	18.7	B
5	I-880 SB Off Ramp	E Lewelling Blvd	Signal	San Leandro	0.75	11.7	B	0.80	13.4	B
6	I-238 SB Off Ramp	Springlake Dr	Signal	San Leandro	0.38	18.9	B	0.26	13.9	B
7	Hesperian Blvd	Springlake Dr	Signal	San Leandro	0.48	19.6	B	0.64	14.0	B
8	Hesperian Blvd	I-238 WB On Ramp	Signal	San Leandro	0.49	10.7	B	0.69	15.8	B
9	Hesperian Blvd	Sycamore St	Signal	San Leandro	0.52	5.9	A	0.66	11.1	B
10	Hesperian Blvd	E Lewelling Blvd	Signal	San Leandro	0.96	80.0	F	1.06	105.0	F
11	Hesperian Blvd	I-880 NB Off Ramp	Signal	San Leandro	0.63	8.3	A	0.54	11.0	B
12	E 14th St	Elgin St	Signal	San Leandro	0.87	23.9	C	0.70	21.0	C
13	E 14th St	1-238 SB Ramps	Signal	San Leandro	0.65	13.8	B	0.78	23.6	C
14	I-238 NB Ramps	E Lewelling Blvd	Signal	San Leandro	0.52	9.4	A	0.85	19.5	B
15	Mission Blvd	E Lewelling Blvd	Signal	San Leandro	0.45	10.6	B	0.73	13.9	B
16	I-238/I-580 Off Ramp	Castro Valley Blvd	Signal	Alameda Co.	0.80	51.2	D	1.34	155.4	F
17	Foothill Blvd	Grove Wy	Signal	Hayward	0.89	44.6	D	1.10	111.0	F
18	I-238 NB On Ramp	Castro Valley Blvd	None	Alameda Co.	Not Eval			Not Eval		
19	Stanton Ave	Castro Valley Blvd	Signal	Alameda Co.	0.84	44.5	D	1.00	53.9	D
20	Strobridge Ave	I-580 WB Off Ramp	2-Stop	Alameda Co.	N/A	3.4	A	N/A	22.3	C
21	Strobridge Ave	I-580 EB Ramps	Signal	Alameda Co.	0.52	14.4	B	0.77	22.2	C
22	Redwood Rd	Norbridge Ave	Signal	Alameda Co.	0.62	29.0	C	0.88	74.8	E
23	Redwood Rd	I-580 WB On Ramp	Signal	Alameda Co.	1.16	69.3	E	0.80	20.1	C
24	Redwood Rd	I-580 EB Off Ramp	Signal	Alameda Co.	0.85	16.1	B	0.87	18.0	B
25	Redwood Rd	Vegas Ave	Signal	Alameda Co.	0.81	42.3	D	0.80	29.9	C
26	I-580 WB On Ramp	Castro Valley Blvd	Signal	Alameda Co.	Removed in 2015			Removed in 2015		
27	Center St	Castro Valley Blvd	Signal	Alameda Co.	1.02	73.1	E	0.89	50.4	D
28	Center St	I-580 EB Off Ramp	Signal	Alameda Co.	Removed in 2015			Removed in 2015		
29	Center St	Grove Wy	Signal	Alameda Co.	0.84	49.3	D	0.93	62.4	E
30	Crow Canyon Rd	E Castro Valley Blvd	Signal	Alameda Co.	0.92	59.8	E	1.07	76.5	E
31	I-580 WB Ramps	E Castro Valley Blvd	Signal	Alameda Co.	0.70	21.7	C	0.91	29.2	C
32	Eden Canyon Rd	I-580 WB Ramps	2-Stop	Alameda Co.	N/A	3.1	A	N/A	8.5	A
33	Eden Canyon Rd	I-580 EB Ramps	2-Stop	Alameda Co.	N/A	6.4	A	N/A	6.2	A
34	Paloverde Rd	E Castro Valley Blvd	All Stop	Alameda Co.	N/A	128.1	F	N/A	126.6	F
35	San Ramon Rd	Dublin Blvd	Signal	Dublin	0.62	31.6	C	0.63	34.4	C
36	San Ramon Rd	I-580 WB Off-Ramp	Signal	Dublin	0.93	25.3	C	0.76	14.0	B
37	Foothill Rd	Dublin Canyon Rd	Signal	Pleasanton	0.58	23.6	C	0.60	24.8	C
38	Amador Plaza Rd	St Patrick Way	Signal	Dublin	0.47	19.3	B	0.46	18.2	B
39	Village Pkwy	I-680 NB On Ramp	None	Dublin	Not Eval			Not Eval		
40	Dougherty Rd	Dublin Blvd	Signal	Dublin	0.86	48.3	D	0.88	49.6	D
41	Dougherty Rd	I-580 WB Off Ramp	Signal	Dublin	0.79	10.9	B	0.70	10.9	B
42	Hopyard Rd	I-580 EB Off Ramp	Signal	Pleasanton	0.79	13.1	B	0.80	10.5	B
43	Hopyard Rd	Owens Dr	Signal	Pleasanton	1.09	117.3	F	1.02	78.7	E
44	Hacienda Dr	Hacienda Crossings	Signal	Dublin	0.46	14.7	B	0.71	24.2	C
45	Hacienda Dr	I-580 WB Off Ramp	Signal	Dublin	0.50	7.5	A	0.78	9.1	A
46	Hacienda Dr	I-580 EB Off Ramp	Signal	Pleasanton	0.95	27.4	C	0.87	12.2	B
47	Hacienda Dr	Owens Dr	Signal	Pleasanton	0.68	18.8	B	0.89	55.0	D
48	Tassajara Rd	Dublin Blvd	Signal	Dublin	0.85	38.2	D	0.59	28.9	C
49	Tassajara Rd	I-580 WB Off Ramp	Signal	Dublin	0.49	13.5	B	0.71	12.5	B
50	Santa Rita Rd	I-580 EB Off Ramp	Signal	Pleasanton	0.79	25.6	C	0.96	40.7	D
51	Santa Rita Rd	Rosewood Dr	Signal	Pleasanton	0.40	5.1	A	0.59	15.5	B
52	El Charro Rd	I-580 WB Ramps	Stop/Signal	Dublin	0.55	8.0	A	0.24	5.4	A
53	El Charro Rd	I-580 EB Ramps	Stop/Signal	Alameda Co.	0.41	6.0	A	0.17	4.5	A
54	Airway Blvd	N Canyon Pkwy	Signal	Livermore	1.21	100.2	F	0.45	34.0	C
55	Airway Blvd	I-580 WB Ramps	Signal	Livermore	0.41	6.5	A	0.25	8.3	A
56	Airway Blvd	I-580 EB Off Ramp	Signal	Livermore	0.47	33.0	C	0.46	34.0	C
57	I-580 Ramps	Portola Ave	2-Stop	Livermore	Not Included in 2015			Not Included in 2015		
58	N Murieta Blvd	Portola Ave	Signal	Livermore	Not Included in 2015			Not Included in 2015		
59	N Livermore Ave	I-580 WB Ramps	Signal	Livermore	0.64	14.3	B	0.64	11.3	B
60	N Livermore Ave	I-580 EB Ramps	Signal	Livermore	0.74	13.2	B	1.05	56.7	E
61	Springtown Blvd	Bluebell Dr	Signal	Livermore	0.55	14.1	B	0.64	13.6	B

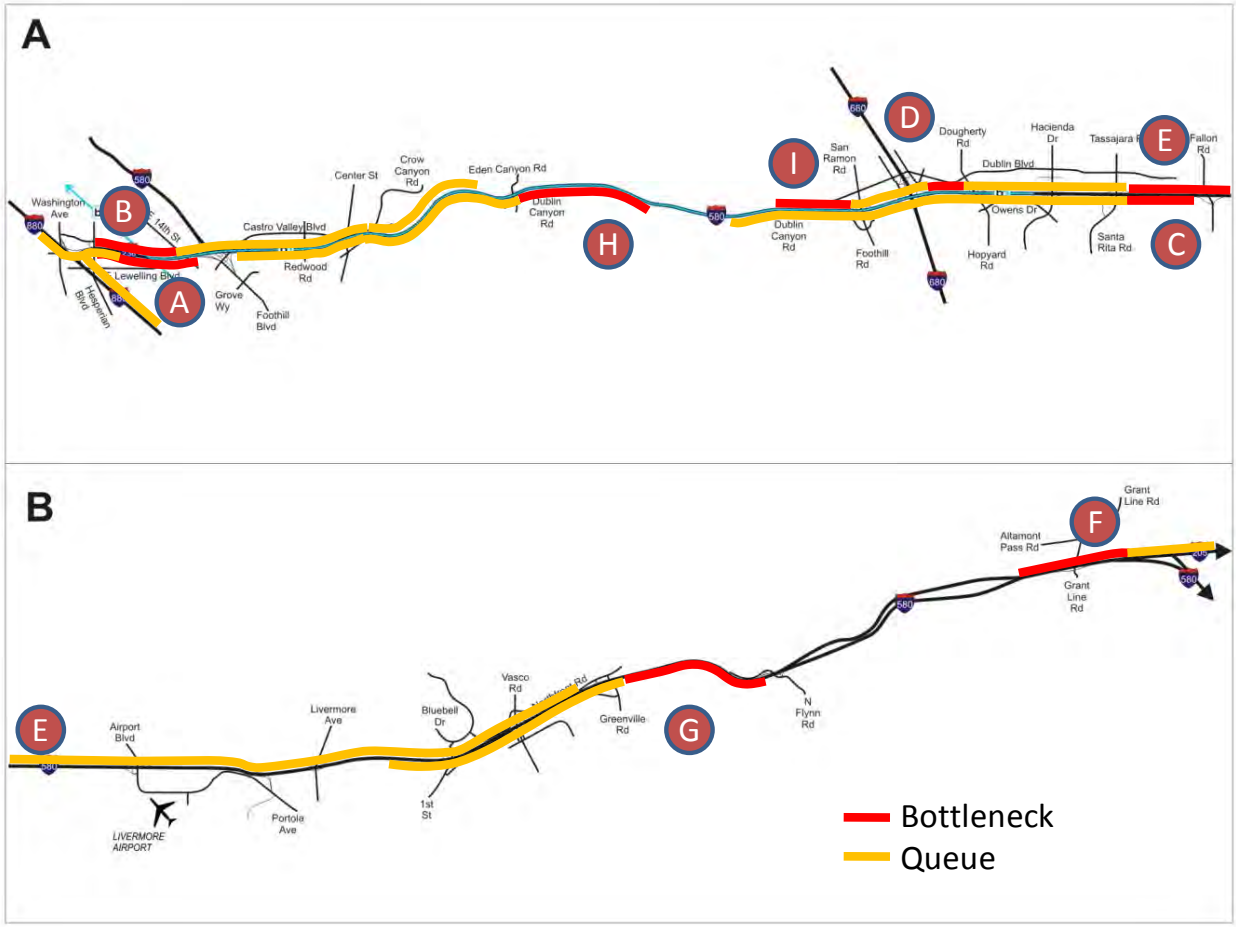
Int ID	N-S Street	E-W Street	Control	Agency	AM Peak Hour			PM Peak Hour		
62	Springtown Blvd	I-580 WB Ramps	Signal	Livermore	0.62	10.8	B	0.78	7.5	A
63	1st St	I-580 EB Ramps	Signal	Livermore	0.67	10.8	B	0.83	22.2	C
64	1st St	Southfront Rd	Signal	Livermore	0.80	57.9	E	0.81	53.9	D
65	N Vasco Rd	Northfront Rd	Signal	Livermore	0.73	23.3	C	0.72	30.9	C
66	S Vasco Rd	Preston Wy	2-Stop	Livermore	N/A	1.7	A	N/A	6.0	A
67	I-580 WB Ramps	Northfront Rd	2-Stop	Livermore	N/A	188.0	F	N/A	6.3	A
68	I-580 EB Ramps	Southfront Rd	All Stop	Livermore	N/A	Not Eval	F	N/A	Not Eval	F
69	Greenville Rd	Northfront Rd	All Stop	Alameda Co.	N/A	278.7	F	N/A	190.2	F
70	Greenville Rd	Southfront Rd	Signal	Alameda Co.	0.30	11.3	B	0.27	12.4	B
71	I-580 WB Ramps	N Flynn Rd	2-Stop	Alameda Co.	N/A	4.7	A	N/A	1.2	A
72	I-580 EB Ramps	N Flynn Rd	2-Stop	Alameda Co.	N/A	5.5	A	N/A	5.6	A
73	Grant Line Rd	Altamont Pass Rd	2-Stop	Alameda Co.	N/A	3.3	A	N/A	14.7	B
74	Grant Line Rd	I-580 WB Ramps	2-Stop	Alameda Co.	N/A	8.5	A	N/A	9.3	A
75	Grant Line Rd	I-580 EB Ramps	2-Stop	Alameda Co.	N/A	7.9	A	N/A	9.9	A
76	Grove Way	Castro Valley Blvd	Signal	Alameda Co.	0.87	15.7	B	1.02	37.5	D
77	I-580 WB Ramps	Isabel Ave	Signal	Livermore	0.43	6.9	A	0.57	9.0	A
78	I-580 EB Ramps	Isabel Ave	Signal	Livermore	0.49	4.4	A	0.79	3.5	A

Source: Dowling Associates – Synchro Analysis.

Bottleneck Trends 2035

Failure to construct any additional capacity or traffic management improvements in the I-238/I-580 corridor past 2015 will result in re-activating all of the existing bottlenecks relieved by the 2015 improvements, as well as worsening the new bottlenecks that show up in 2015. The result is so extreme that traffic congestion occurs everywhere, on both freeway and surface streets, with few locations escaping the problem.

2035


A
B
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14th St
Lewelling Blvd
Hesperian Blvd
Grove Wy
Foothill Blvd
Castro Valley Blvd
Redwood Rd
Center St
Crow Canyon Rd
Eden Canyon Rd
Dublin Canyon Rd
H
I
San Ramon Rd
Dougherty Rd
D
Dublin Blvd
Hacienda Dr
Tassajara Rd
E
Fallon Rd
Owens Dr
Hopyard Rd
Foothill Rd
Santa Rita Rd
C
B
Grant Line Rd
Altamont Pass Rd
F
Grant Line Rd
E
Airport Blvd
LIVERMORE AIRPORT
Portola Ave
Livermore Ave
Bluebell Dr
1st St
Vasco Rd
Greenville Rd
G
N Flynn Rd
Bottleneck
Queue

6. TRANSIT SERVICES

The transit network along the I-580 East CSMP Corridor includes express commuter services connecting the Central Valley to the Bay Area and local transit services that provide connections within the Tri-Valley region, specifically Dublin, Pleasanton and Livermore. Figure 24 illustrates the Transit Network along the I-580 East CSMP Corridor. Table 53 summarizes local/connector and commuter express services along the I-580 East CSMP Corridor.

6.1. Altamont Commuter Express Rail

The Altamont Commuter Express (ACE) service operates four westbound trains in the morning, leaving Stockton between 4:30 AM and 9:30 AM and four eastbound trains in the afternoon, leaving San Jose between Noon and 5:30 PM. ACE Stations along the I-580 EAST CSMP Corridor include two at Livermore, and a single station in Pleasanton. San Joaquin Regional Rail Commission (SJRRC) operates the 86-mile ACE rail service, on shared rail lines with Union Pacific, from Stockton to downtown San Jose.

The trip times are slightly over 2 hours between Stockton and San Jose. Average weekday ridership is about 3,750 (total for both directions). The service also has a shuttle to Dublin/Pleasanton BART, which averages about 200 riders per weekday. The total seated capacity on the system is about 2,600 per direction, or 5,200 both ways. Park and ride lots are located at Stockton, Lathrop/Manteca, Tracy, Vasco Rd, Pleasanton, Fremont, Great America, and San Jose Diridon stations.

ACE eventually plans to add longer platforms in Alameda County that can handle 8 car trains as opposed to the current maximum of 6 cars. There are also plans to add an additional train during commute hours.

6.2. San Francisco Bay Area Rapid Transit District

The San Francisco Bay Area Rapid Transit District (BART) operates this system of grade-separated, electric heavy rail trains connecting Dublin/Pleasanton and the East Bay to San Francisco employment and recreation. BART trains run in the median of the I-580 EAST CSMP Corridor from Castro Valley to Pleasanton. BART stations are located at Dublin/Pleasanton and Castro Valley and Hayward (see Table 54). Table 30 shows average weekday patronage for the three BART stations serving the corridor. Over 15,000 one-way trips originate at these three stations.

Figure 24: Existing Regional Transit Services in Study Corridor

Source: Caltrans District 4, Office of System & Regional Planning, GIS & Technical Support Branch. October 2008.

Table 53: Current Transit Routes & Services along the I-580 East CSMP Corridor

LOCAL AND CONNECTOR SERVICES			COMMUTER EXPRESS SERVICES		
WHEELS Local Service Routes			**WHEELS Shuttles and Express Routes**		
Route	**To/From**	**To/From**	**Route**	**To/From**	**To/FromTo**
12/12V WB	Livermore Transit Center (Murrieta Blvd/ Las Positas College/ East Dublin)	Dublin/Pleasanton BART Station	20XAM Weekday	Dublin/Pleasanton BART Station (Greenville Rd/Vasco Rd/LLNL*)	Dublin/ Pleasanton BART Station
12/12V EB	Dublin/Pleasanton BART Station (East Dublin/ Las Positas College/Murrieta Blvd)	Livermore Transit Center	20XPM Weekday	Dublin/Pleasanton BART Station (LLNL*/ Vasco Rd/ Greenville Rd)	Dublin/ Pleasanton BART Station
12A WB/EB (Sat)	Livermore Transit Center (Murrieta Blvd/ Las Positas College/ East Dublin	Dublin/Pleasanton BART Station	**MAX Commuter Express**		
			Route	**To/From**	**To/From**
			Express	Modesto Area	Dublin/ Pleasanton BART Station
12A WB/EB (Sun)	Livermore Transit Center (East Dublin/ N. Canyons Pkwy/ Murrieta Blvd)	Dublin/Pleasanton BART Station	**Tri-Delta Transit**		
			Route	**To/From**	**To/From**
54	Dublin/Pleasanton BART Station	Pleasanton ACE Station	Delta Express (DX)	Contra Costa County Area	Dublin/ Pleasanton BART Station/ Hacienda Business Park/LLNL*
County Connection			**SJRDT**		
Route	**To/From**	**To/From**	**Route**	**To/From**	**To/From**
970 B/C	Dublin/Pleasanton BART Station	Various Contra Costa locations	151/152/153/154	San Joaquin County Area	LLNL*/Sandia Lab
AC Transit			157/160	San Joaquin County Area	Dublin/ Pleasanton BART Station
Route	**To/From**	**To/From**			
880	Castro Valley BART Station	Bay Fair BART Station			

* Lawrence Livermore National Laboratory

Table 54: BART Stations Serving I-580 Corridor

Station	Location	Parking Capacity	Catchment Area
Dublin /Pleasanton	I-580 east of I-680 I/C	3,047	I-680 corridor, I-580 corridor east to Tracy
Castro Valley	I-580 at Redwood Rd.	1,118	Castro Valley, Hayward, Dublin
Hayward	Meekland Ave. between A and B Sts.	1,467	Hayward, Castro Valley

Note: Catchment areas derived from BART Station Profile Study, August 1999. Parking lot capacity data from BART 2006 inventory.

Table 55: Average Weekday BART Origins at Stations Serving I-580 Corridor

Destination Station / Market Area	Origin station			
	Dublin/Pleasanton	Castro Valley	Hayward	Total
Dublin / Pleasanton Station	--	155	115	270
Castro Valley Station	179	--	17	196
Hayward Station	109	21	--	129
S Alameda Co	678	172	1,126 1	,976
N Alameda / W Contra Costa Co	1,691	567	1,791	4,050
Central / East Contra Costa Co	67	30	188	284
San Francisco	4,685	1,484	1,520	7,689
San Mateo Co	409	88	108	605
Total	7,842	2,525	4,874	15,241

6.3. Livermore Amador Valley Transit Authority

The Livermore Amador Valley Transit Authority (LAVTA) operates the WHEELS bus service for the Tri-Valley communities of Dublin, Pleasanton, and Livermore; including BART connectors. Services include express bus, and local shuttle for ACE and BART Stations and various local employers. LAVTA provides 11 fixed routes local service, Direct Access Responsive Transit (DART), Dial-A-Ride, Prime Time, and shuttle service and demand-responsive Para Transit service (see Table 56). DART provides service in conjunction with WHEELS, allowing more flexible routing and fewer stops for passengers with specific drop-off areas not served by WHEELS. All WHEELS vehicles have front loading bike racks.

6.4. Contra Costa County Connection

County Connection regional bus service provides connection between San Ramon/Contra Costa County to Dublin, Pleasanton and the East Dublin/Pleasanton BART Station. The County Connection Amtrak Thruway Motor coach connects San Jose to Stockton via the East Dublin/Pleasanton BART Station.

Table 56: Wheels/LAVTA Routes Serving I-580 Corridor

Route	Location	Average Weekday Patronage
1	East Dublin	285
3	West Dublin	206
8	Hopyard/Vintage Hills	242
10	Intermunicipal	3,531
11	Springtown via 1st	107
12	East Dublin/North Lv.	739
14	North-Central Lv.	215
15	Springtown via Wal-Mart	620
16	Livermore Tripper	57
18	Granada	146
20	East Livermore	106
50	HBP/Koll Shuttle	168
51	Jail Shuttle	N/A
53	ACE Shuttle - Stoneridge	64
54	ACE Shuttle - Hacienda	130
70	Walnut Creek	251
810	East Bay Owl	26
Total		6,893

6.5. Modesto Commuter Express

The Modesto Area (MAX) Commuter Express provides commuter bus service from the Modesto Downtown Transportation Center directly to the Dublin/Pleasanton BART station twice each morning. The express bus also provides two return trips each evening to both locations.

6.6. San Joaquin Regional Transit District

The San Joaquin Regional Transit District (SJRTD) operates public transit services in the Stockton area, including intercity, interregional, and rural transit (see Table 57). This includes connections to Sacramento, Dublin/Pleasanton BART, and the Bay Area. This interregional service is designed to meet the needs of commuters who travel distances greater than 50 miles one-way. Eight SJRDT interregional routes connect to the Lawrence Livermore and Sandia Laboratories. Three SJRDT interregional routes connect to Dublin/Pleasanton BART. SJRTD provides bus service between San Joaquin County cities (Manteca, Tracy, and Stockton) and major employment and transit centers in Dublin, Pleasanton and Livermore.

Table 57: San Joaquin RTD Buses Serving I-580 Corridor

Route	From	To	Buses/ Day	Daily Boardings
151	Stockton	Livermore (LANL, Sandia)	1	54
152	Stockton	Livermore (LANL, Sandia)	1	55
153	Manteca / Tracy	Livermore (LANL, Sandia)	1	44
154	Manteca	Livermore (LANL, Sandia)	1	51
157	Stockton / Manteca / Tracy	Dublin BART, Bishop Ranch, Hacienda	1	31
160	Stockton	Dublin / Pleasanton BART	1	90
162	Tracy	Sunnyvale (Lockheed)	1	56
164	Manteca	Sunnyvale (Lockheed)	1	106
166	Stockton / Manteca / Tracy	Sunnyvale (Lockheed)	1	99
167	Ripon / Manteca	Livermore (LANL, Sandia)	1	56
170	Stockton / Manteca / Tracy	San Jose	2	90
171	Stockton / Lathrop / Tracy	Dublin / Pleasanton BART	1	81
172	Stockton / Lathrop	Sunnyvale (Lockheed)	1	67
173	Stockton / Manteca / Tracy	Sunnyvale (Northrop Grumman)	1	83
174	Stockton / Manteca / Tracy	Mountain View/Palo Alto	1	65
175	Stockton / Manteca / Tracy	Milpitas / Santa Clara	2	48

6.7. Tri-Delta Transit

Tri-Delta Transit, a service of the East Contra Costa Transit Authority, provides bus routes primarily within East Contra Costa County, and provides commuter routes to major employment and transit centers in Dublin, Livermore, and Pleasanton (see Table 58).

The Delta Express Route from Antioch to Dublin goes from the Antioch Hillcrest park and ride lot to Oakley, Brentwood, Discovery Bay, Mountain House, Dublin BART Station and the Hacienda Business Park in Pleasanton. Two runs a day are made starting at 4:47 AM and 5:17 AM and arriving at their termini at 6:32 and 7:02 AM. Two return runs are provided at 4:19 and 5:34 PM, arriving back in Antioch at 6:02 and 7:17 PM. These buses use the I-580 freeway between West Grant Line Road and Hacienda Drive.

The Delta Express Route from Antioch to Livermore runs the same route between Antioch and Mountain House, but uses only the piece of I-580 between West Grant Line and Greenville Road before turning off to access the Lawrence Livermore Laboratory.

Table 58: Tri Delta Transit Routes Serving I-580 Corridor

From	To	Round Trips/Day	Avg Wkdy Patronage
Antioch	Dublin	2	72
Antioch	Livermore	2	82
Total		4	154

6.8. Alameda-Contra Costa Transit District (AC Transit)

AC Transit provides bus service to residents and visitors of Alameda and Contra Costa Counties with an extensive network of local and transbay transit lines. AC Transit provides service as far in the east as Castro Valley and Hayward area along the I-580 East CSMP Corridor. Data on these routes is provided in Table 59.

Table 59: AC Transit Routes Serving the I-580 Corridor

Line	From	To	Peak Headway	Off-peak Headway	Notes
M	Castro Valley BART	San Mateo	30 min.	120 min.	
80	San Leandro BART	Hayward BART	30	30	
84	San Leandro BART	Kaiser Hayward	30	30	Also serves Castro Valley and Hayward BART
87	Castro Valley BART	Castro Valley	60	60	Circular route
91	Castro Valley BART	South Hayward BART	30	30	Also serves Hayward BART
880	Castro Valley BART	Bayfair BART	--	60	

6.9. Multi-Modal Facilities

Multimodal facilities consist of park and ride lots, and transit hubs.

There are three state owned and four privately owned Park and Ride facilities along the I-580 East CSMP Corridor. The Livermore Transit Station has the largest capacity providing 526 parking spaces at no charge. Park and Ride Lot location, size, and usage are summarized in Table 60.

Table 60: Park and Ride Lots along the I-580 East CSMP Corridor

PM	Name	Parking Spaces	Usage	Comment
9.68	Livermore	526		Livermore Transit Center
13.20	Livermore	97	6.4%	Portola near Alviso Place, ½ mile from I-580 (Caltrans)
14.20	Livermore	121		East Airway and Rutan
17.90	Dublin	199		Koll Center and Tassajara Rd.
20.70	Pleasanton	80		Johnson Dr. and Stoneridge
29.20	Center Street	138	34.8%	E. of Center St. at I-580 – Castro Valley (Caltrans)
30.70	John Drive	10	70%	N. side of Foothill Blvd. at John Dr. near I-580 (Caltrans)

Source: 511.org and Caltrans Park and Ride Lot Inspection (May 2008)

There are three transit hubs in the corridor.

Pleasanton ACE Station

The Pleasanton ACE Station is located at the Alameda County Fairgrounds in Pleasanton.

Livermore Transit Center

The Livermore Transit Center is located on Railroad Avenue near First Street, serves as a major transfer point for various transit operators and shuttles in Dublin, Pleasanton and Livermore. The Livermore Transit Center provides transfer or connections for WHEELS, ACE, Amtrak CA, and Greyhound.

Dublin/Pleasanton BART Transit Center

The Dublin/Pleasanton BART Transit Center is served by nine LAVTA fixed routes. WHEELS bus service centers around the BART Station and the Livermore Transit Center, and provide connecting shuttles coordinated with ACE train schedules.

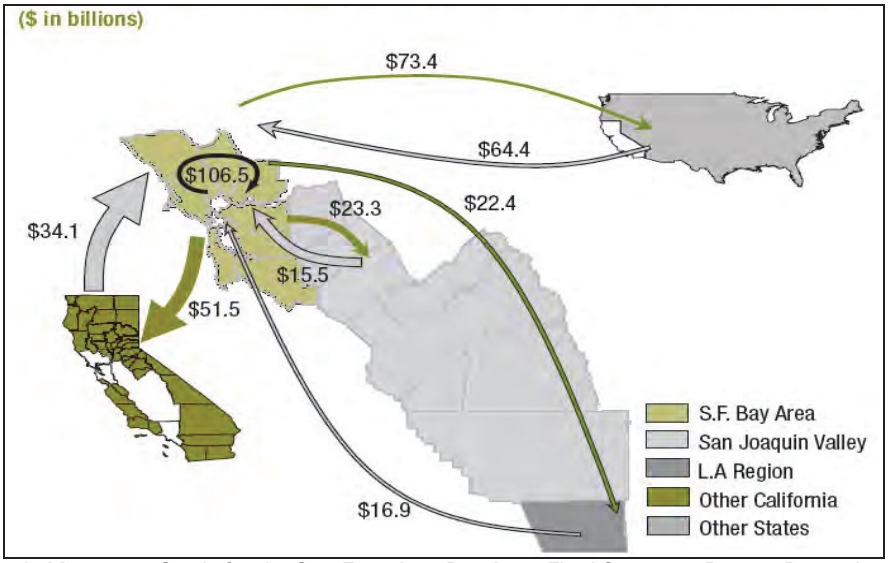
7. FREIGHT MOVEMENT TRENDS

This section describes the existing freight movement conditions for the I-238/I-580 corridor.

7.1. Bay Area Trade Patterns

As shown in Figure 25 and Table 61 below, the largest share of the Bay Area's domestic trade stays within the California, with approximately 39 percent of goods moved within the Bay Area (having both an origin and a destination within the region). A significant portion (28.9%), however, moves between the Bay Area and the San Joaquin Valley & LA) potentially along the I-580 corridor in Alameda County.

Figure 25: Bay Area Trading Partners



Source: *Regional Goods Movement Study for the San Francisco Bay Area,* Final Summary Report. December 2004. MTC

Table 61: Annual Bay Area Trade Flow

Trade Flow Annual Dollar Value (in billions)		
	$	%
Within Bay Area	$106.50	39.42%
Bay Area to San Joaquin Valley	$23.30	8.62%
San Joaquin Valley to Bay Area	$15.50	5.74%
Bay Area to Los Angeles Region	$22.40	8.29%
Los Angeles Region to Bay Area	$16.90	6.25%
Subtotal — Bay Area Domestic Trade Potentially along I-580 (Between BA, San Joaquin Valley/LA)	**$78.10**	**28.90%**
Bay Area to "Other California"*	$51.50	19.06%
"Other California" to Bay Area	$34.10	12.62%
Subtotal — Bay Area Domestic Trade Between "Other California"	$85.60	31.68%
Subtotal — Bay Area Domestic Trade Within California	**$270.20**	

Source: *Regional Goods Movement Study for the San Francisco Bay Area,* Final Summary Report. December 2004. MTC

7.2. Highways and Freight

In terms of volume, weight and dollar value, about 80 percent of the goods movement in the Bay Area involves trucking.[7]

While the I-880 corridor carries the highest volume of truck traffic in the region and among the highest of any highway in the state, the I-580 corridor is the primary connection between the Bay Area and the national interstate truck network. A substantial share of Bay Area domestic trade is with Southern California, the San Joaquin Valley and other West Coast destinations, and most of this trade uses I-580 as a connector. This corridor experiences the second-highest volume of truck traffic in the region (about 12,000 trucks a day); most of it is long-haul in nature involving the heaviest trucks. Increasingly, regional distribution centers have located in the San Joaquin Valley and trucks providing goods to the Bay Area use this corridor for access.

7.3. Daily and Peak Hour Truck Volumes

As shown in the tables below, throughout the corridor trucks consist of approximately 8 percent of the total vehicle volume. The Caltrans daily truck share is 8.7% (Table 62). This is slightly higher than the peak period share (7.9%) (Table 18). This could potentially be due to higher truck usage during off peak hours.

Table 62: Daily Truck Volumes on I-580

Caltrans 2007 Truck Data Summary

RTE	DIST	CNTY	POST MILE	LEG	DESCRIPTION	VEHICLE AADT TOTAL	TRUCK AADT TOTAL	TRUCK % TOT VEH
580	4	ALA	R8.265	B	LIVERMORE, GREENVILLE	144000	14976	10.4
580	4	ALA	R8.265	A	LIVERMORE, GREENVILLE	153000	12745	8.33
580	4	ALA	10.689	B	JCT. RTE. 84	182000	20384	11.2
580	4	ALA	10.689	A	JCT. RTE. 84	173000	21106	12.2
580	4	ALA	20.726	B	PLEASANTON, JCT. RTE. 680	212000	14352	6.77
580	4	ALA	20.726	A	PLEASANTON, JCT. RTE. 680	182000	16726	9.19
580	4	ALA	R30.807	B	JCT. RTE. 238	181000	10408	5.75
580	4	ALA	R30.807	A	JCT. RTE. 238	152000	9378	6.17
					Corridor-Wide Total	**1379000**	**120075**	**8.7%**

Source: Caltrans Truck Data 2007.

[7] Adapted from the *Regional Goods Movement Study for the San Francisco Bay Area* Final Summary Report. December 2004. MTC http://eastbayeda.org/research_facts_figures/Studies/GoodsMovement/RegionalGoodsMovementStudyFinalSummary.pdf

7.4. Future Freight Growth Along I-580

As represented in the graph on the right, growth in containerized cargo is expected to generate substantial truck traffic at the Port of Oakland, bringing containers to and from the port directly and to the off-dock intermodal terminals. Because many of the support facilities are now located in the Central Valley, trucks serving these shippers need to be on the road earlier in the day, contributing not only to an increase in truck travel along the I-580 corridor in generally, but specifically increasing congestion during the AM commuter peak.

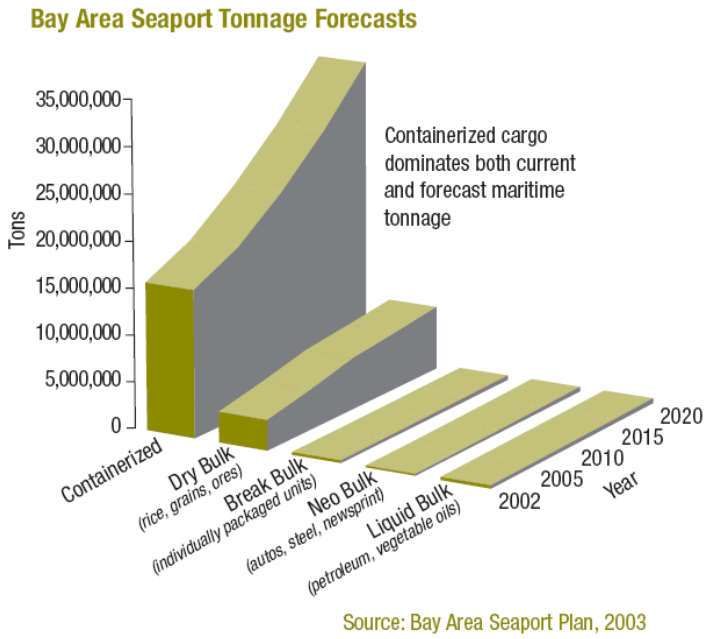


Figure 26: Seaport Freight Forecasts

Also, because there is a shortage of adequate truck stopping and parking facilities, drivers that are not domiciled locally prefer to leave the Bay Area at the end of their work assignment in large part because there are no satisfactory facilities in the immediate area. Drivers know that when they get "stuck" within the Bay Area, the choices of where to park are few and not satisfactory. Based on data from the American Trucking Associations' report, "U.S. Freight Forecast to…2017," 40% more trucks are expected on the nation's roads with a corresponding 48% increase in miles traveled as compared to 2006." Source: ACCMA Truck Parking Facility Feasibility and Location Study - Final Report (Dec 2008)

7.5. Issues Constraining Rail Freight Growth

A problem facing the rail system is the growing competition between freight rail needs and passenger rail needs in the Altamont Pass Corridor (I-580). More capacity to address these conflicting needs may be needed in the future. Finally, there is growing interest in using the rail network as an alternative connection to the San Joaquin Valley. However, current facilities and services may not be capable of filling this role.

8. PRIOR AND ON-GOING STUDIES

A natural source of improvements for the I-580 corridor is the various on-going and recently completed studies of the I-580 corridor. The I-580 corridor is fortunate to have been the focus of numerous studies of management, operations, and capacity improvements that might be made to the freeway, the surface street system within the corridor, and transit. Table 63 provides a list of the prior studies of which the consultant team is currently aware. These studies have employed a wide range of tools to reach their conclusions including subregional travel demand models, macroscopic highway operations analysis (Highway Capacity Manual and Synchro), and microscopic simulation analysis (CORSIM, Paramics).

The salient characteristics of these studies are summarized below. Note that several of these studies recommended improvements that were already included in the 2015 baseline projects list. Other studies have recommended improvements that are already included in one or more long range plans for the corridor. Finally, some of the recommendations of these studies have yet to be implemented or included in short or long range plans for the corridor.

8.1. Tri-Valley Triangle Study

This study was conducted for ACCMA by Parsons Transportation Group with travel forecasting support by Dowling Associates. It was completed in September 2007. The report can be obtained from ACCMA's website.[8]

The purpose of the Triangle Study was to develop, by consensus, a long range transportation plan for improvements to the I-580, I-680, and Route 84 highways that benefits the Tri-Valley region. The cities of Dublin, Pleasanton, and Livermore, and the County of Alameda participated in the study.

The Triangle Study recommended the following improvements:

1. BART right of way protection on I-580
2. I-580 westbound HOV/HOT lane and ramp metering between Greenville and Foothill.
3. I-580 WB Auxiliary lane between First and Isabel
4. I-680 ramp metering
5. I-580 eastbound climbing lane at Altamont Pass
6. I-580/I-680 Phase 1 interchange improvements (westbound to southbound improvements)
7. I-580 eastbound Phase 1 – Auxiliary lanes from Isabel to First
8. I-680 southbound HOV/HOT lane from Alcosta to SR 84
9. I-580/I-680 Phase 2 westbound to southbound direct connector
10. I-680 northbound HOV/HOT lane from Alameda Creek to Alcosta
11. I-580 eastbound – Phase 2 – Mixed flow lanes from Santa Rita to Vasco
12. I-580 Eastbound HOV/HOT lane from Foothill to Hacienda.

[8] http://www.accma.ca.gov/pdf/TriangleStudy/TriangleTrafficStudyDraftReport.pdf

Table 63: List of Recent and On-Going I-580 and Related Mobility Studies

Name	Lead Agency	Status/Description
Triangle Study	ACCMA	Complete
El Charro EIR	Livermore	Completed.
Tri-Valley Impact Fee	TVTC	Completed. Identified 23 projects for funding.
Tri-Valley Action Plan 2008	TVTC	Draft report as of July 2008.
Hayward Rte 238	Hayward	Completed. Widen Foothill Blvd and create one-way couplets.
Central Freeways PSR	ACCMA	Ongoing.
I-580 WB HOV	ACCMA	Completed. Recommended various interchange and mainline freeway improvements.
Staples Ranch	Pleasanton	Development traffic impact analysis. Involves extension of Stoneridge Dr to El Charro either as full street or pedestrian/bike/bus only street.
BART to Livermore EIR	BART	BART extension within I-580 median to Greenville Road Station,
SB 880 HOV	ACCMA	Ongoing
I-580 WB Aux Lane	ACCMA	Study was to analyze completion of wb aux lane between El Charro to Tassajara
Castro Valley Circulation Study	Alameda County	On-going, Expected Complete March 2009.
I-680 Express Lanes	ACCMA	Before/After Study
I-580 Express lanes	ACCMA	Before/After Study
I-580 EB Aux lanes (Isabel to First Street)	ACCMA	Auxiliary lanes between Isabel, North Livermore and First Street.
I-580 WB Aux lane (Vasco to First St)	Livermore	Completed December 2008.
I-580 EB HOV Lane EA/IS	ACCMA	Completed Sept 2006. Eastbound HOV lane between east of Greenville Road interchange and Hacienda Drive Interchange. Also auxiliary lanes between El Charro Road and Airway Boulevard and between First Street and Vasco Road
I-580/I-680 HOV Direct Connector PSR	ACCMA	Completed 2007.[9]
I-580 Corridor TMP	ACCMA	Study of ITS improvements for I-580. Study completed August 2006. Implementation on-going.[10]
I-580 ITS System Integration	ACCMA	Expected completion May 2009
Dublin-Livermore BRT	ACCMA	Study of Bus Rapid Transit Service between Lawrence Livermore Labs and Pleasanton BART. Study is On-Going. [11]

[9] http://www.accma.ca.gov/pages/Projects.aspx
[10] http://www.i580.info/projects/project.php?id=1
[11] www.fta.dot.gov/documents/CA_Livermore_Amador_BRT_(sean.libberton_v1).doc

8.2. Traffic Study for El Charro Specific Plan

This study was conducted by Dowling Associates for the City of Livermore and was completed in January 2007. The report can be obtained from the City of Livermore or via the City's website.[12] The contact person for this study is Damian Stefanakis at Dowling Associates.

The purpose of the study was to identify and mitigate any transportation-related impacts associated with the proposed El Charro Specific Plan project under near-term (2008) and future (2030) conditions. The Project is a 1.45 million square foot retail center located on a 152 acres site at the southeast quadrant of I-580 and El Charro Road. The project impacts were assessed for a Phase 1 only scenario with 0.55 million square feet of retail space and a Project Build-out scenario. Three separate roadway alternatives were analyzed. The "southern" roadway alignment option assumes a two-lane extension of Jack London Boulevard from its existing terminus west o El Charro Road; while the "northern" roadway alignment option assumes a two-lane extension of Airway Boulevard from Terminal Circle to El Charro Road. The third option assumes the "southern" alignment with a discontinuous Stoneridge Drive. The City Council approved the El Charro Specific Plan with the southern roadway alignment option.

The study called for a number of improvement measures to lessen the potential project impacts. Such measures include an addition of a third eastbound left-turn lane at the intersection of Santa Rita Road at Pimlico Road and I-580 eastbound ramps as well as an addition of a second eastbound right-turn lane at the intersection of El Charro Road and I-580 eastbound ramps.

8.3. Tri-Valley Transportation Council Nexus Study – Fee Update

This study was conducted by Cambridge Systematic with support from Dowling Associates for the Tri-Valley Transportation Council (TVTC). The report can be obtained from the TVTC. The contact person for this study is Damian Stefanakis at Dowling Associates and Chris Womum at Cambridge Sytematics.

The purpose of the study was to update the TVTC's transportation impact fee program in order to generate funding for transportation improvements needed to accommodate increased travel demands resulting from new developments from which the fee was collected. The TVTC has elected 23 projects to receive funding from the Tri-Valley Transportation Development Fee. The first 11 projects, as shown in Table 64, are projects that were included in the original program adopted in 1995 and the remaining new projects are shown in Table 65.[13]

[12] http://www.ci.livermore.ca.us/CDD/Planning/el_charro.html

[13] Cambridge Systematics, Inc. *Tri-Valley Transportation Council Nexus Study Fee Update Final Report*, January 2008.

Table 64: Existing TVTC FEE Projects

	Project	Total Cost	Unfunded Cost	Comments
A-1	I-580/I-680 Interchange (southbound to eastbound)	–	–	Project completed.
A-2a	Route 84 Expressway I-580 to I-680	$336.57	$221.77	Project study report complete.
A-2b	Isabel Route 84/I-580 Interchange	$180.00	$15.00	Environmental complete.
A-3	I-680 Auxiliary Lanes	$47.00	$38.33	Segments 1 and 3 complete.
A-4	West Dublin/Pleasanton BART Station	–	–	Under construction.
A-5a	I-580 HOV Lane Eastbound	$161.87	$8.00	Project split into phases. Project study report complete.
A-5b	I-580 HOV Lane Westbound	$165.40	$20.00	
A-6	I-680 HOV Lanes, SR 84 to Top of Sunol Grade	–	–	Southbound complete. Northbound not considered for funding.
A-7	I-580/Foothill/San Ramon Road Interchange	$0.81	$0.81	North half complete.
A-8	I-680/Alcosta Interchange	–	–	Project complete.
A-9a	Crow Canyon Road Improvements Phase 1	$15.50	$10.95	Project split into phases.
A-9b	Crow Canyon Road Improvements Phase 2	$32.34	$32.34	
A-10a	Vasco Road Safety Improvements Phase 1	$23.25	$4.15	Project split into phases.
A-10b	Vasco Road Safety Improvements Phase 2	$25.83	$25.83	
A-11	Express Bus/Bus Rapid Transit	$20.36	$12.16	BRT added to scope.
	Total	**$1,008.93**	**$389.34**	

Costs are in Millions of 2007 Dollars

Table 65: Additional TVTC Fee Projects

	Project	Total Cost	Unfunded Cost
B-1	I-580/I-680 interchange (westbound to southbound)	$705.00	$700.00
B-2	5th eastbound lane on I-580 from Santa Rita to Vasco Road	$131.30	$131.30
B-3	I-580/First Street interchange modification	$30.30	$4.20
B-4	I-580/Vasco Road interchange modification	$50.50	$14.60
B-5	I-580/Greenville Road interchange modification	$35.35	$7.77
B-6	Jack London Boulevard extension	$27.78	$3.54
B-7	El Charro Road Extension	$18.50	$5.00
B-8	Camino Tassajara widening: East Blackhawk Drive to County line	$49.43	$44.92
B-9	Danville Boulevard/Stone Valley Road I-680 Interchange Improvements	$2.70	$2.60
B-10	I-680 SB HOV lane Gap Closure, Livorna to North Main	$55.00	$36.50
B-11a	I-680 Express Bus/HOV on- and Off-Ramps	$80.00	$47.30
B-11b	I-680 Transit Corridor Improvements	$100.00	$100.00
Total		**$1,285.86**	**$1,097.73**

Costs are in Millions of 2007 Dollars

8.4. 2008 Tri-Valley Transportation Plan Action Plan Update

This study is being conducted by DKS Associates for the Tri-Valley Transportation Council (TVTC). The draft study was completed in July 2008. Final adoption is anticipated in Spring 2009. The draft report is available from the website of Contra Costa Transportation Authority (CCTA)[14].

The purpose of the Plan is to assess transportation related issues within the Tri-Valley area and outlines a recommended package of policies and actions for addressing those issues. A list of projects recommended in the 2008 Plan Update is shown in Table 66.

[14] http://www.ccta.net/assets/documents/Action~Plan/Tri-ValleyActionPlan.pdf

Table 66: Draft Tri-Valley Action Plan Project Recommendations

Project / Action Name	Project / Action Limits	Primary Sponsor
I-580		
I-580 Eastbound / Westbound HOV Lane	Foothill Road to E. of Vasco Rd.	
5th EB I-580 through lane	Santa Rita Road to Vasco Road	
Westbound I-580 Aux Lane	Airport Blvd to Tassajara Rd	
SOV capacity should NOT be increased on I-580 at Altamont Pass nor at Dublin Grade		
I-680		
I-680: Construct Auxiliary Lanes,	Sycamore to Crow Canyon	CCTA
HOV over Sunol Grade (northbound)	NB HOV lane from Fremont to Rt. 84	
I-680/Norris Canyon Rd HOV Ramps	Interchange of I-680 and Norris Canyon	CCTA
Southbound I-680 HOV Lane Extension	North Main to Livorna	TRANSPAC
I-680 HOV Lane Extension	Between Alcosta and south to SR 237	Caltrans
I-680/Sunol I/C improvements		
I-680 SB High Occupancy Toll (HOT) Lane		
I-680 Transportation Operations System	I-580 to Santa Clara County Line	
SR-84		
Isabel Parkway/SR 84 Interchange	At Rt. 84	Caltrans
Construct Isabel Parkway/SR 84: phase one	I-580 to Vallecitos Road altrans	
Isabel Avenue widening to four lanes and extension (to I-580)	From Vallecitos Rd. to Vineyard	Caltrans
Isabel Avenue widening to six lanes	From Airway Blvd. To Vineyard Ave.	Livermore
Isabel Avenue/I-580 interchange Phase II	At Rt. 84	Caltrans
Isabel Avenue/SR 84/I-580: Build Second Overcrossing	At Interstate 580	Caltrans
Vasco Road		
I-580/Vasco Road interchange	I-580 at Vasco Road	Caltrans
Safety improvements on Vasco Road	Livermore city limit to Alameda/Contra Costa line	Alameda County
Crow Canyon Road		
Widening to 6 lanes	Alcosta to Tassajara Ranch Drive	San Ramon
Safety improvements on Crow Canyon Road	Castro Valley Blvd to Alameda County/San Ramon limit line	Alameda County
1st Street		
1st Street Widening	Portola Ave. to I-580	Livermore
1st Street interchange	I-580 at 1st Street	Caltrans
Bollinger Canyon Road		
East Branch Rd., Bollinger extension to Camino Tassajara	Bollinger Canyon Ext. to Windermere Parkway	Contra Costa County
Camino Tassajara		
Camino Tassajara Widening	East Blackhawk Drive to County Line	Contra Costa County
Dougherty Road		
Widen to 8 lanes	I-580 to Dublin Boulevard	Dublin
Widen to 6 lanes north of Dublin Boulevard	Contra Costa county line to I-580	Dublin
Dublin Boulevard		
Dublin Blvd. Widening	Donlon Way to Tassajara Rd.	Dublin
Dublin Boulevard Extension	Tassajara to Doolan Rd.	Dublin
San Ramon Road		
I-580/Foothill/San Ramon I/C	At Foothill interchange	Pleasanton
San Ramon Valley Boulevard		
Widen to 4 lanes through Danville	Sycamore Valley Rd. to Crow Canyon	San Ramon
Santa Rita Road		
Santa Rita Road interchange	Santa Rita Road/ Tassajara road at I-580	Dublin

Project / Action Name	Project / Action Limits	Primary Sponsor
Stanley Boulevard		
Widen	Murrieta Blvd. to west city limit	
Stanley Blvd./Isabel grade separation	Isabel at Stanley	Livermore
Stoneridge Drive		
Extend Stoneridge Drive from current eastern terminus to El Charro Road	Santa Rita Road to El Charro	
Tassajara Road		
Widen to 8 lanes	I-580 to Dublin Blvd.	Dublin
Widen to 6 lanes north of Dublin Boulevard	From Dublin Blvd. to County line	Dublin
Transit		
Increase ACE Train to 4 round trips/day		
More Park & Ride Lots		
Increase County Connection to 8 lines service.		
Increase WHEELS to 21 lines, 30 minute headways.		
New express bus routes on I-580, I-680, and Vasco Road.		

Adapted from Tables 9 and 10 and text of Draft Tri-Valley Action Plan, July 2008, DKS Associates

8.5. Route 238 Corridor Improvement Project

This study was conducted by Mark Thomas Company and Dowling Associates for the City of Hayward. The traffic report was completed in March 2007. The report can be obtained from the City of Hayward.

The goal of the project was to improve traffic conditions along Foothill Boulevard and Mission Boulevard between I-580 and Industrial Parkway and in downtown Hayward. The primary proposed improvements include widening of Foothill Boulevard to four lanes in each directions and creating a mini-loop by converting Foothill Boulevard to a six-lane, one-way northbound street between A Street and Mission Boulevard, A Street to a five-lane, one-way westbound street between Foothill Boulevard and Mission Boulevard, and converting Mission Boulevard to a five-lane, one-way southbound street between A Street and D Street and six lanes between D Street and Jackson Street.

8.6. Central Alameda County Freeway Study

This study was conducted by Kimley-Horn and Associates for ACCMA. The study was completed in October 2007.

The purpose of the study was to identify short-term improvements for the freeway system in central Alameda County that would yield similar benefits as the defunct Route 238 extension project. The study area extends on I-880 from Davis Street to Whipple Avenue and on Route 238/I-580 to Redwood Boulevard. The study recommends a list of candidate improvement projects to be prioritized for implementation. Two of the candidate projects pertinent to I-580 are:

- I-580/Strobridge Off-Ramp Modification: Construction of a new westbound off-ramp from I-580 to Castro Valley Boulevard and reconfiguration of Norbridge Avenue, which would intersect Strobridge Avenue at the location of the exiting off-ramp junction
- I-580/Redwood Road Interchange: Expansion of the I-580 Redwood Road interchange to provide a new I-580 westbound off-ramp and a new I-580 eastbound off-ramp at Redwood Road; it would also

provide a new off-ramp from I-580 eastbound to Grove Way. This is a part of the I-580 Castro Valley Interchange Project.

8.7. I-580 WB HOV Lane Widening Project

The traffic assessment for this study was completed in July 2008 and the study is currently being finalized. When complete, the report can be obtained from Mr. Ray Akkawi of ACCMA.

The project entails the construction of a 13.1-mile long HOV lane in the westbound direction of I-580 corridor from the Greenville Road interchange in Livermore to the San Ramon Road interchange in Dublin and Pleasanton. It also includes the construction of westbound auxiliary lanes between Vasco Road and First Street interchanges and between First Street and North Livermore interchanges; as well as construction of westbound merge lane west of North Livermore Avenue on-ramp and west of Airway Boulevard on-ramp. Other improvements included:

- Widen North Livermore Avenue undercrossing and Dougherty Drive undercrossing
- Widen existing crossings of the Arroya Las Positas and the Tassajara Creek
- Widen Dougherty Road undercrossing
- Construct westbound bus ramp from the HOV lane to East Dublin BART station
- Construct HOV bypass lanes at: Greenville Road, Vasco Road, First Street, North Livermore Avenue and Airway Boulevard

The study found that the proposed project would achieve an average travel time savings of 13 minutes for vehicles traveling in the mixed flow lanes and 31 minutes for vehicles utilizing the HOV lane in the AM peak hour. It further found that the project would reduce approximately 1,250 vehicle hours of delay during the same period by alleviating freeway congestions and reducing bottleneck locations.

8.8. I-580 Westbound Auxiliary Lane – Vasco Road to First Street

This study was conducted by Dowling Associates for the City of Livermore. The assessment was completed in December 2008. The report can be obtained from Mahendra Patel of the City of Livermore.

The study found that the proposed auxiliary lane on westbound I-580 between the interchanges of Vasco Road and First Street would increase the travel speed on the merging area by approximately 20 mph and the freeway segment immediate upstream of the merging area by approximately 9 mph.

8.9. I-580 Westbound Auxiliary Lane Extension – Fallon Road to Tassajara Road

This study was conducted by Dowling Associates for Caltrans. The assessment was completed in August 2008. The report can be obtained from Peter Lau of Caltrans District 4.

The study demonstrated that the proposed 2,460 foot auxiliary lane extension from Fallon Road on-ramp to Tassajara Road off-ramp would improve mainline operations from LOS E to LOS D during the morning peak commute period with a reduction of average speed by 2 mph. The auxiliary lane would increase mainline capacity, thereby would provide marginal improvement to the upstream section east of Fallon Road on-ramp.

8.10. I-580 Eastbound HOV Lane Environmental Assessment/Initial Study

This study was conducted by Parsons Transportation Group for the California Department of Transportation and the Federal Highway Administration and was completed in September 2006. The Environmental Assessment/Initial Study report can be obtained from Caltrans' website[15].

The project, one of several transportation improvement projects envisioned in the Tri-Valley Implementation Plan, entails the construction of an eastbound high-occupancy vehicle (HOV) lane in the median of Interstate Highway 580 (I-580) between just east of the Greenville Road interchange and the Hacienda Drive interchange in the Livermore Valley. The project would also construct eastbound auxiliary lanes between El Charro Road and Airway Boulevard and between First Street and Vasco Road. Other improvements include:

- Realign the Airway Boulevard off-ramp, the First Street on-ramp, and the Greenville Road on-ramp and off-ramp
- Widen existing shoulders to current ten-foot standard widths
- Widen the outside on the south or eastbound side of I-580 between the El Charro Road off-ramp and west of Airway Boulevard and between Portola Avenue and Greenville Road
- Provide enforcement areas in median for the California Highway Patrol
- Provide median paving in order to enable mechanized maintenance
- Replace existing centerline metal tri-beam median barrier with double tri-beam and concrete barrier

The purpose of the project is to reduce eastbound peak period congestion and delay, encourage use of HOVs and transit, support regional air quality attainment goals and improve safety for motorists and Caltrans maintenance workers. The project is estimated to cost $75 million and would be funding by a variety of sources including the Traffic Congestion Relief Program, State Transportation Improvement Plan, Regional Measure 2 and the County of Alameda's Measure B.

8.11. I-580 EB Auxiliary Lanes – Isabel to N. Livermore to First Street

This study was conducted by Dowling Associates for ACCMA. The assessment was completed in September 2008. The report can be obtained from ACCMA.

The study evaluated the effects of the proposed auxiliary lanes on eastbound I-580 between the future Isabel Avenue northbound on-ramp and North Livermore Avenue off-ramp, and between the North Livermore Avenue on-ramp and First Street off-ramp. Four different project alternatives were analyzed.

- Option A, which assumed full auxiliary lanes on the proposed segments, would result in improved conditions west of North Livermore Avenue off-ramp but would degrade the level of service east of North Livermore Avenue on-ramp due to downstream queues.
- Option B, which included a full auxiliary lane on the Isabel Avenue/North Livermore Avenue segment but only allows a 1,500 feet acceleration lane on the North Livermore Avenue on-ramp and 1,500 feet deceleration lane on the First Street off-ramp, would have similar results as Option A.
- Option C provides a full auxiliary lane between North Livermore Avenue and First Street and did not demonstrate any significant improvements as compared to No Project scenario.
- Option D, which assumed a full auxiliary lane between Isabel Avenue and North Livermore Avenue, yielded similar results as Option A and B but the mainline queues would be slightly longer as this option provides a relatively lower increase in capacity.

Option A would also achieve the highest travel time savings of 4.2 minutes and Option C the lowest at 0.5 minutes as compared to No Project scenario.

[15] www.dot.ca.gov/dist4/envdoc.htm#580eb

8.12. Isabel Avenue/I-580 Interchange

This study was conducted by Dowling Associates for the City of Livermore. The contact person for this study is Mike Irby at the City of Livermore.

The Isabel/580 interchange will provide permanent connection between I-580 and Isabel Avenue/State Route 84 to relieve congestion at the existing Airway/580 interchange and enhance traffic circulation within the business and commercial area north of 580. The Isabel/580 interchange will improve access to the residential developments, commercial businesses, Las Positas College, and future development north of I-580 by creating two additional crossings over I-580. As part of this project, the partial-access Portola interchange will be removed and replaced with a flyover extension of Portola Avenue that will connect to Isabel Avenue and North Canyons Parkway north of the freeway. Construction may begin in April 2009.

8.13. State Route 84 Expressway Widening Project

This study was conducted by Fehr and Peers for Caltrans, ACTIA and the City of Livermore and was completed in October 2006. The Initial Study/Environmental Assessment for the project can be obtained from Caltrans' website.[16]

The project involves the widening of SR 84 from two to four lanes between Ruby Hill Drive and Stanley Boulevard and from two to six lanes between Stanley Boulevard and Jack London Boulevard in eastern Alameda County. The purpose of the project is to improve traffic circulation along SR 84 as a regional connection between I-680 and I-580 and improve bicycle and pedestrian access. It was found that the project would generally improve operations at I-580 ramp intersections with the exception of the Livermore Avenue/I-580 westbound ramp intersection which would degrade from LOS D with No Project Alternative to LOS E with the proposed project during the PM peak hour because the project is anticipated to attract traffic to the Livermore Avenue interchange.

8.14. Stoneridge Drive Specific Plan Amendment - Staples Ranch

This study was conducted by Dowling Associates for the City Pleasanton in 2007 and 2008. The report can be obtained from Mike Tassano of the City of Pleasanton.

The purpose of the study was to identify and mitigate any transportation-related impacts associates with the proposed Stoneridge Drive Specific Plan Amendment – Staples Ranch project under near-term and future conditions. The Project consists of 37 acres of auto malls containing 331,000 square feet of buildings, 45 acres of senior and assisted care housing containing 800 senior care units, 17 acres of community parks and 175,000 square feet of retail space.

The project calls for the extension of Stoneridge Drive eastwards as a two-lane divided arterial street across the Arroyo Mocho and preserve the right-of-way for future widening and extension of Stoneridge Drive to a six-lane road that connects to El Charro Road as shown in the 1996 Pleasanton General Plan at build-out. Some of the mitigation measures identified in the study include:

- Lane modification at the Hopyard and I-580 eastbound ramp intersection
- Signalization and lane modification of the El Charro Road and I-580 eastbound ramp intersection
- Widening of southbound Santa Rita Road to provide a second left-turn lane at the I-580 eastbound ramp intersection

[16] http://www.dot.ca.gov/dist4/documents/sr84fed/sr84fed_1of5_fm_chs%201-7.pdf

8.15. BART Extension to Livermore EIR

This study is being conducted by Wilbur Smith Associates for the Bay Area Rapid Transit District (BART). The target completion date for the Final EIR is Fall 2009 and a preferred alternative is anticipated to be identified by the end of 2009. Once complete, the report can be obtained from Marianne Payne of BART. The contact person for this study is Mike Aronson at Dowling Associates and William Hurrell of Wilbur Smith Associates. The purpose of the study is to determine the feasibility of the planned BART extension to the Livermore Valley, identify and evaluate alignment alternatives and develop conceptual engineering and cost estimates for the alternatives. An administrative draft EIR is being prepared that contains assessment of a number of project alternatives including No Build (which assumes I-580 HOV and enhanced bus services), BART to Greenville Road via I-580, and BART to Isabel/Stanley via Chain of Lakes and via Isabel (SR 84).

8.16. I-580/Castro Valley Interchange Improvement

This study was conducted by TY Lin for the Caltrans and was completed in June 2004.

The project involves improving the access to and from I-580 in Castro Valley. The improvements include creating a full interchange at Redwood Road by adding a new eastbound on-ramp and westbound off-ramp, constructing a new eastbound off-ramp from I-580 to Grove Way, and removing two existing ramps: the eastbound off-ramp to Center Street and the westbound on-ramp from Castro Valley Boulevard. Construction began in September 2008 and is on-going with completion targeted in late 2010. The cost estimate for the project is approximately $34 million to be funding by a mix of federal, state and local sources.[17]

8.17. Castro Valley Redevelopment Strategic Plan

This study was conducted by DKS Associates for Alameda County Redevelopment Agency and was completed in May 2005. The traffic analysis can be obtained from the County's website[18].

The purpose of the traffic analysis is to determine the feasibility of reconfiguring Castro Valley Boulevard in order to calm traffic and encourage trips not destined for downtown to use alternative roadways to connect to I-580. Castro Valley Boulevard is a heavily traveled roadway that parallels I-580 so changes may affect operations on I-580.

The study assessed the feasibility of a lane diet along Castro Valley Boulevard from two travel lanes to one travel lane each direction. It also evaluated the suitability of constructing improvements to encourage and improve access to Norbridge Avenue to develop a bypass of Castro Valley Boulevard. The study concluded that Castro Valley Boulevard should retain the two-lane configuration in each direction but improvement, such as signalization, to the intersection of Strobridge Avenue and Norbridge Avenue could encourage trip diversion off Castro Valley Boulevard between Lake Chabot Road and Redwood Road.

[17] http://www.actia2022.com/rss/pdfs/090112_ACTIA%2012_%20I-580%20Castro%20Valley%20Interchanges%20Improvements.pdf

[18] http://www.co.alameda.ca.us/cda/redevelop/projects/cv/documents/plan/07%20Appendices%20CVRSP%20Screen%20Res.pdf

8.18. Castro Valley Circulation Study

This study is being conducted by Dowling Associates for Alameda County and expected to be completed in March 2009. The report (when it becomes available) can be obtained from Mr. John Bates at Alameda County.

The purpose of the study is to develop an efficient circulation plan for the Castro Valley area by examining existing and future (2015 and 2035) traffic operations. The primary area of focus is the vicinity of the westerly end of Norbridge Avenue, which includes Strobridge Avenue, Castro Valley Boulevard, and I-580 WB Strobridge Avenue off-ramp. Some alternatives have been conceived in past years, and the objective of the study is to utilize these and any new ideas to develop a comprehensive circulation plan for the area. Encouraging traffic to stay on arterials and not intrude into neighborhoods is a key goal. They have already installed a concrete (mountable) island to stop southbound traffic on Strobridge Avenue south of Gary Drive (which had been a cut through route into the neighborhood and then over to Foothill Blvd.).

The main goals are to try to alleviate traffic congestion at the intersections of Norbridge Av & Castro Valley Boulevard and Strobridge Av & Castro Valley Boulevard as well to provide two-way traffic on Norbridge Av east of Strobridge Av (to provide an alternate east-west roadway to Castro Valley Boulevard. The three alternatives to be tested include:

- Moving the WB off ramp at Strobridge to instead touch down directly to Castro Valley Boulevard west of the intersection of Castro Valley Boulevard and Strobridge Avenue/John Drive. Also, provide a two-way connection to Norbridge Av from Strobridge Av.
- Keeping the WB off ramp at Strobridge where it currently is (touching down at Strobridge), but converting this intersection to a roundabout and providing a one-way eastbound connection to Norbridge Av (to total a 2-way connection, since there is already a one-way westbound connection further north). Also evaluating a roundabout for the EB off ramp intersection, too. (but would also have roundabout at WB ramp)
- Keeping the WB off ramp at Strobridge where it currently is (touching down at Strobridge), but signalizing the intersection and providing a new west leg of the intersection (two-way) that connects to Castro Valley Boulevard west of the Strobridge/John intersection (connects at same point as in Alt. I, but allows this to happen without the expensive bridge work from the freeway). This alternative also includes a two-way connection to Norbridge Av east of Strobridge Ave.

The study will assume whatever the freeway improvements are part of the ACCMA models for 2015 and 2035. There will be a full diamond interchange at I-580 & Redwood Road (by adding the new WB off ramp and EB on ramp). The WB on ramp west of Center Street is gone (recently closed). The EB off ramp to Center Street is "moved" east to diverge from the freeway near Center Street and touch down onto Grove Way (instead of touching down at Center Street, as it currently does).

8.19. ACCMA I-580 Corridor Express Carpool (HOT) Lanes Study

See description of I-680 Express Carpool Lanes Study below.

8.20. ACCMA I-680 Corridor Express Carpool (HOT) Lanes Study

These studies are being conducted by Dowling Associates for ACCMA. The Before Study was completed in December 2008; the After Study will take place after the implementation of the Project.

The study corridors are Interstate 580 from west of the I-580/I-680 interchange to east of Greenville Road in Alameda County and Interstate 680 from Route 84 interchange in Alameda County to Route 237 interchange

in Santa Clara County. The Express Carpool Lane Projects would implement a high-occupancy vehicle and toll (HOT) lane in the existing freeway corridors. The purpose of the Express Carpool Lane Evaluation studies is to prepare an overall Evaluation Plan and the Existing Conditions, or "Before" Report. The Existing Conditions Report will establish a benchmark for the existing freeway operations prior to the implementation of the Express Lanes.

The Before and After evaluations will provide feedback on the performance of the system, particularly in relation to the overall goals of the Express Carpool Lane Project, including the following:

- Optimize the HOV lane usage to improve traffic throughput in the corridor;
- Utilize this new revenue stream to help pay for transportation improvements and transit operations in the corridor;
- Maintain LOS C or better for all Express Lane users;
- Improve highway and transit in corridor with revenues generated; and
- Employ new Intelligent Transportation System (ITS) technologies such as dynamic pricing and in-vehicle electronic enforcement.

8.21. I-580/I-680 HOV Direct Connector PSR

The PSR evaluated options to address key commute movements currently experiencing significant congestion and identified alternatives for further evaluation, including feasible options for direct connector structures for two critical commute movements: 1) westbound I-580 HOV to southbound I-680 HOV, and 2) northbound I-680 HOV to eastbound I-580 HOV. The PSR also evaluated the ultimate HOV movements and updated the master build-out plan for the I-580/I-680 interchange.[19]

8.22. I-580 Corridor Transportation Management Plan

This study conducted by TYLIN for ACCMA and was completed in August 2006. The report can be obtained from ACCMA.

This study focuses on the Intelligent Transportation System (ITS) and Traffic Operations System (TOS) improvements for I-580. The TMP includes the installation and implementation of ITS and TOS to allow transportation managers to better manage traffic congestion and traffic incidents. The TMP covers I-580 and local roads from San Ramon/Foothill Road to Greenville Road. The local arterials include First Street, Vasco Road, Greenville Road, Livermore Avenue, Stanley Boulevard, Sunol Boulevard, Santa Rita Road, Stoneridge Drive, Tassajara Road, Bernal Avenue, Altamont Pass Road, Concannon Boulevard, Patterson Pass Road, Dublin Boulevard, and Tesla Road.[20] Implementation is on-going.

8.23. I-580 Corridor ITS System Integration

This project is being conducted by DKS for ACCMA and is slated for completion by Spring 2009. DKS is charged with managing the full system integration and ensuring proper operations of the Intelligent Transportation System along the I-580 corridor.

[19] http://www.accma.ca.gov/pages/Projects.aspx
[20] http://www.i580.info/projects/project.php?id=1

8.24. Dublin-Livermore Bus Rapid Transit

This study is being conducted by Kimley-Horn for ACCMA. The report, when it is completed, can be obtained from ACCMA.

The Livermore Amador Valley Transit Authority (LAVTA) is proposing to construct and operate a 12.0-mile arterial and highway-running bus rapid transit (BRT) line serving the communities of Livermore, Pleasanton, and Dublin. The route goes from Lawrence Livermore Labs to Pleasanton BART station via East Avenue, Stanley Boulevard, Santa Rita Road, and Owens Drive. The Livermore-Amador Route 10 BRT project includes 34 new stations, signal prioritization, and the purchase of 14 electric-hybrid vehicles. The proposed service would operate with 10-minute headways during the peak-period and 15-minute headways during the weekday off-peak.[21]

[21] www.fta.dot.gov/documents/CA_Livermore_Amador_BRT_(sean.libberton_v1).doc

9. CANDIDATE STRATEGIES

The purpose of this chapter is to develop the list of improvement strategies for evaluation. An initial list was developed and qualitatively evaluated for relative cost-effectiveness based on previous studies and information in the literature. The more cost-effective measures from the list were then combined into baskets of strategies for further technical evaluation.

9.1. Summary of Corridor Management Issues

This section highlights the key corridor system management issues that the strategies will need to address. Corridor system management strategies are needed in the I-580/I-238 corridor to address the existing and forecasted mobility, lost productivity, bottleneck, and reliability problems identified in the previous chapters. Transit service and goods movement within the corridor are also adversely affected by the same problems identified earlier.

Existing 2008 Management Issues

The I-238 and I-580 freeway within the study corridor currently experience the following operational problems:

1. Insufficient through capacity on the stretch of I-238 between I-880 and I-580 in San Leandro.
2. Insufficient through capacity on the stretch of I-580 between the Tassajara Road/Santa Rita Road interchange in Dublin/Pleasanton and the Airway Boulevard Interchange in Livermore.
3. Up grade operational problems on the approaches to the Altamont Pass between Livermore and Tracy.
4. An off-ramp capacity bottleneck for westbound I-580 at the I-680 interchange.

Surface street operations problems are currently present on several of the major arterials leading to the I-580 freeway in Hayward and Pleasanton. Foothill Boulevard experiences congestion problems in Hayward at Grove Street due to inadequate cross street capacity. Hopyard Road, Hacienda Drive, and Santa Rita Road experience congestion problems leading to the I-580 freeway in Pleasanton because the demand to access the freeway temporarily exceeds the capacity of these arterials and the ability of the freeway to absorb the traffic delivered to it by these arterials.

Forecasted Management Issues – Short Term 2015

Freeway performance is forecasted to deteriorate modestly between 2008 and 2015 due to the many projects coming on line between now and then.

Many of the bottlenecks currently active in 2008 will dissipate in 2015 due to the widening of I-238, the addition of HOV lanes in the Dublin/Pleasanton stretch of I-580, ramp metering on I-580, and the construction of the truck climbing lane on EB I-580 east of Greenville Road leading up to the Altamont Pass. Some new bottlenecks will result from increased demands expected between 2008 and 2015 and because some of the programmed improvements will release existing bottlenecks causing increased demand to arrive at downstream bottlenecks. The bottlenecks are summarized in Table 75 and discussed in more detail below.

The following bottlenecks in 2008 would remain in 2015:

- The I-580 WB to I-680 off ramp bottleneck (Bottleneck “D” in Figure 22) will remain in 2015, because none of the currently programmed improvements address this problem.

- The I-580 WB AM bottleneck at the I-205 merge (Bottleneck "F" in Figure 22) will remain in 2015 because no improvements are programmed to address this problem and the widening of I-205 in the Tracy area will worsen this problem by delivering more traffic to this bottleneck.

The following new bottlenecks will arise in 2015:

- A new bottleneck will arise in the westbound direction during the AM peak period at the lane drop west of terminus of the HOV lane within San Ramon/Foothill Road interchange (Bottleneck "I" in Figure 22). The bottleneck will back up traffic into the I-680 interchange and will affect southbound I-680 operations during the AM peak period.

- Westbound AM peak period bottlenecks will arise between the North Livermore, Isabel, and Airway Boulevard interchanges (Bottlenecks "J" and "K" in Figure 22). The congestion will cause on ramp traffic to back up and affect surface street operations on North Livermore Avenue during the AM peak period.

- Eastbound PM peak period bottlenecks will arise at the lane drops between auxiliary lanes within the Airway Boulevard and Isabel Avenue interchanges (Bottleneck "M" in Figure 22). The eastbound lane drop between the Isabel and North Livermore interchanges will also result in a bottleneck during the PM peak period (Bottleneck "L" in Figure 22).

- A new point of turbulence will be introduced in the westbound direction at the point where the HOV lane splits off from the mixed flow lanes just east of the Hacienda Blvd. overcrossing (Bottleneck "N" in Figure 22). HOV's and toll vehicles desiring to exit at Hopyard or I-680 must slow to exit the HOT lane at this point.

- A westbound bottleneck will arise during the AM peak period where the auxiliary lane terminates at Fallon Road interchange (bottleneck "O" in Figure 22). The demand west of this point will exceed the capacity of the 4 mixed flow lanes plus HOT lane.

- A westbound AM peak period bottleneck will arise west of the lane drop at East 14th Street/Mission Boulevard (bottleneck "P" in Figure 22). The forecasted off-ramp demand at this point is significantly lower than the capacity of a freeway lane, so the termination of a mainline lane at this off-ramp results in a bottleneck west of this point.

Forecasted Management Issues – Long Term 2035

Performance deteriorates dramatically after 2015, assuming that no additional projects are built.

Failure to construct any additional capacity or traffic management improvements in the I-238/I-580 corridor past 2015 will result in re-activating all of the existing bottlenecks relieved by the 2015 improvements, as well as worsening the new bottlenecks that show up in 2015. The result is so extreme that traffic congestion occurs everywhere, on both freeway and surface streets, with few locations escaping the problem.

This result was expected and is not considered realistic. The 2035 ("no further improvements scenario") was created solely for the purpose of providing a neutral benchmark for comparing long-term improvement strategies.

9.2. Initial Strategies Identification

Freeway corridor congestion occurs when localized demands exceed localized capacity for a short period of time. Overall, the I-580/I-238 has sufficient capacity to serve all demand, if demand were spread evenly

across the corridor and the hours of the day. Congestion occurs at specific bottlenecks of the I-580/I-238 during peak hours of the day because of localized demand/capacity deficiencies.

There are a wide variety of tools available to the people of the I-580/I-238 corridor for addressing these localized problems (see Figure 27). These include land use decisions, transit improvements, demand management, freeway and surface street management, freeway and street improvements, and freeway/street operations. Each of these tools primarily affects one or both of the primary explanatory factors for congestion: demand and capacity. Management can affect both demand and capacity, and in fact, management is most effective when it deals with both demand and capacity.

In turn, it must be recognized that changes in capacity will affect demand, and demand can affect capacity. So the strategies, and the methods used to evaluate them must recognize this feedback effect.

Freeway Improvement Options

Interim report materials prepared by the National Cooperative Highway Research Program (NCHRP) 3-83 project provide a typology of freeway bottlenecks and links them to possible low-cost solutions. Figure 28 shows the NCHRP 3-83 typology and where the I-580/I-238 bottlenecks observed in 2008 and forecasted for 2015 and 2035 fall within that typology.

The NCHRP 3-83 Interim Report then provides a matrix of feasible mitigation measures for each bottleneck type with a preliminary assessment of their likelihood of being successful (see Table 67).

The I-238 bottlenecks (A, B, and P) fall primarily in the lane drop category of Interchanges and Mainline Geometry. The number of lanes on the mainline is less than the number of lanes on the ramps feeding I-238 at each I-880 and I-580. Table 67 suggests that auxiliary lanes, shoulder plus lanes, restriping to narrower lanes to get more total lanes, addition of all purpose lanes, reversible lanes, and the addition of HOV lanes may be good solutions. We know that some of these solutions (e.g. reversible lanes, restriping existing pavement for more lanes) are simply not feasible because I-238 currently only has two lanes in each direction and the peak period demands are relatively balanced.

The I-580 bottlenecks between Tassajara/Santa Rita roads and Airway Boulevard (C, E, J, K, L, M) fall primarily in the “demand surge” category because on-ramp volumes feeding these bottlenecks cause the peak period demand to exceed capacity. Table 67 suggests that auxiliary lanes, shoulder plus lanes, all purpose lane additions, and ramp metering are likely to be good solutions.

Figure 27: Types of Strategies to Affect I-580/I-238 Congestion

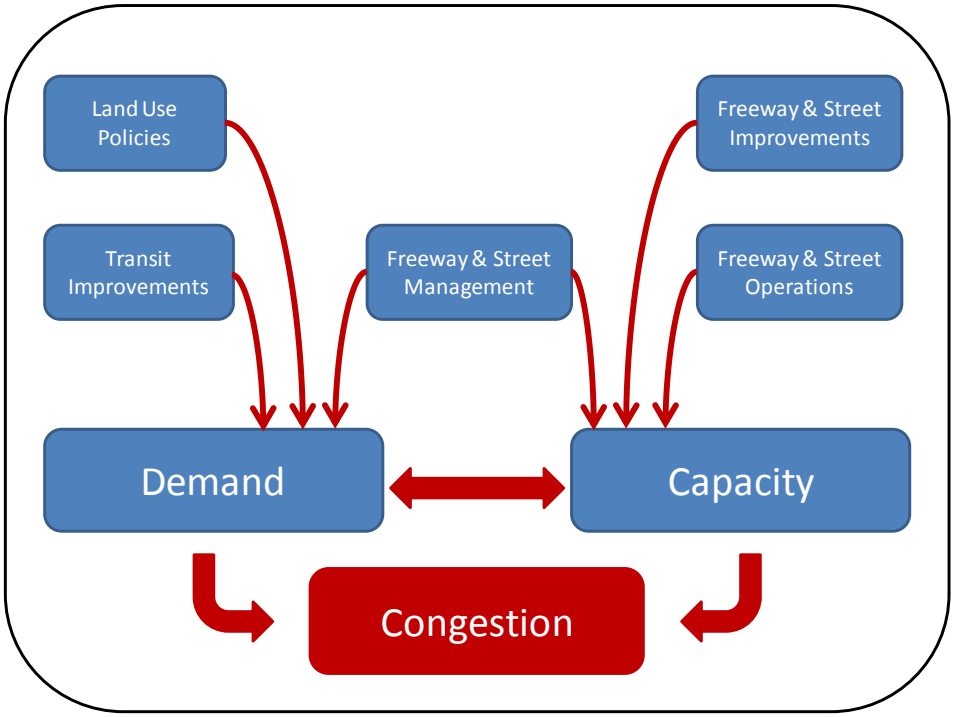
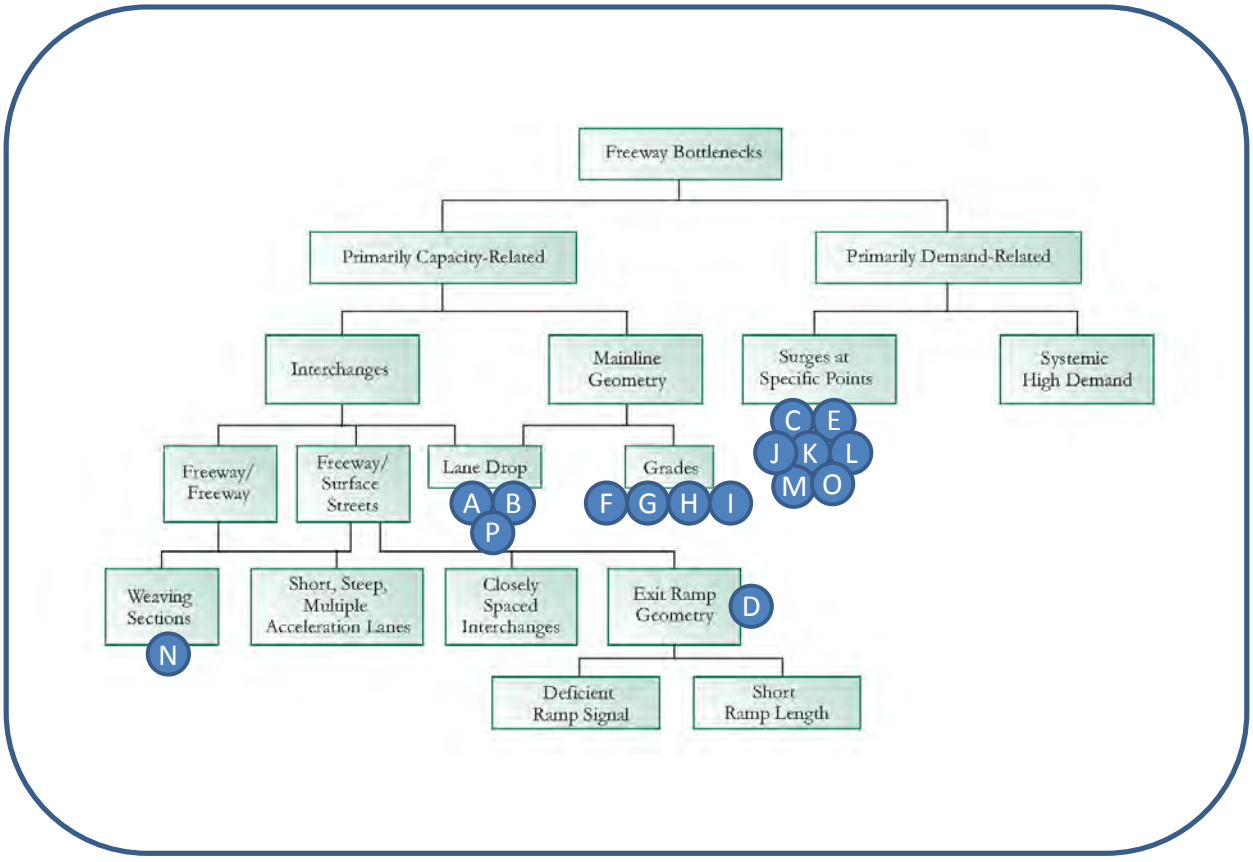


Figure 28: Freeway Bottleneck Types



Letters refer to bottlenecks identified in Figure 21 and Figure 22.

Source: Adapted from Traffic Bottlenecks: A Primer: Focus on Low-Cost Operational Improvements, FHWA, July 2007

The I-580 Westbound AM peak period bottleneck at the I-680 interchange is caused primarily by weaving within the collector distributor road system associated with the interchange. This is an interchange design issue which does not fall within the freeway bottleneck types listed in Table 67. Among the limited solutions to this bottleneck problem are flyovers, and interchange reconstruction.

Several existing and future I-580 bottlenecks relate to the upgrades to the Dublin Grade and the Altamont Pass (F,G,H,I). Solutions to this particular bottleneck type are not listed in Table 67, but they generally consist of truck climbing lanes, and truck lane restrictions. Peak period truck prohibitions are not a realistic option for this corridor because this corridor is a major inter-regional goods movement routes for the San Francisco Bay Area.

Another bottleneck will occur in the future on westbound I-580 near Hacienda, just upstream of the start of the buffer separated HOV lane that goes from this point through the Hopyard, I-680, and San Ramon/Foothill Road interchanges (Bottleneck "N"). HOV's wishing to access these interchanges will have to exit the HOV lane at Hacienda, causing some weaving friction to through traffic.

Freeway Management & Operations Options

The Freeway Management and Operations Handbook (2003 updated 2006) provides a comprehensive list of improvement and management strategies that can be considered for implementation as part of a corridor system management plan (CSMP)[22]. These strategies have been organized and summarized in Table 68 and comments have been added regarding their relative feasibility.

These management and operation options include actions to manage demand, such as pricing to reduce peaking of demand, HOV options to encourage shifting of demand to alternate modes, and options to discourage the use of the freeway for short distance "hops" between local destinations.

Surface Street Improvement Options

There is limited surface street capacity between Hayward/Castro Valley and Dublin/Pleasanton, and between Dublin/Pleasanton and Livermore. One option would be to build parallel roadway capacity for these stretches of the corridor. This option would not only reduce the strain on the freeway but would also reduce the strain on roads feeding the freeway.

Travel between Livermore and Pleasanton is currently limited to Stanley Boulevard and the I-580 freeway. Additional connecting road capacity between the two cities would off-load the bottleneck stretch of I-580 between Santa Rita Road and Airway Boulevard. The City of Livermore has approved plans to extend West Jack London Boulevard from SR 84 Kitty Hawk Road (Isabel Avenue) to El Charro Road. The City of Pleasanton has the extension of Stoneridge Drive from Santa Rita Road to El Charro Road in its General Plan, but the extension is extremely controversial for the city.

[22] L.G. Neudorff, J.E. Randall, R. Reiss, R. Gordon, Freeway Management and Operations Handbook, Federal Highway Administration, FHWA-OP-04-003, Washington DC, 2003 (updated 2006).

Table 67: Low Cost Mitigation Strategies for Freeway Bottlenecks

Bottleneck Types	Mitigation Measures											
	Auxiliary Lanes	Collector- Distributor Rd.	Paved Right Shoulder	Paved Left Shoulder	Shoulder / Plus Lane	Re-Stripping to add more, narrower lanes	All-Purpose Lane (concurrent or reversible)	HOV Lanes, (Concurrent or Reversible)	Truck Restrictions	Ramp Metering	Temporary Ramp Closures	Traffic Diversion Information
(I) Heavy on-Ramp Demand	++	-	+	-	++	+	++	-	+	++	-	+
(II) Lane Drops	++	-	++	-	++	++	++	++	+	+	+	+
(II) Tunnels and Bridges	-	-	-	-	-	++	-	+	++	-	-	+
(II) Horizontal & Vertical Curves	++	-	++	++	++	-	++	+	++	+	+	+
(II) Narrow Lanes and Lateral Obstruction	+	+	+	+	+	-	+	+	++	+	+	+
(II) Inadequate Accel. and/or Decel. lanes	++	++	++	-	++	+	+	+	++	+	++	++
(III) Weaving Sections	+	+	+	+	+	++	++	++	+	-	-	+

++ = *good solution,* + *may be helpful,* - = *not helpful*

Source: NCHRP 3-83 Interim Report, December 2006.

Table 68: Freeway Management & Operation Improvement Options

Option		Applicability to I-580/I-238
Traffic Control Devices		
	Static Signs	In-place to state standards
	Pavement Markings	In-place to state standards
	Rumble Strips	Not applicable
	Reversible Lanes (Zipper Lanes)	Not feasible because it interferes with HOV/HOT lane and BART in median options
	Truck Bans	General Bans Not feasible, critical freight corridor.
	Enforcement	In-place, presumably to state standards
Roadway Lighting		
	Additional safety lighting	In-place to state standards
Ramp Management and Control		
	Ramp Metering	In-place Foothill Rd to Greenville Rd. Option elsewhere.
	HOV Priority Entry	In-place Foothill Rd to Greenville Rd. Option elsewhere.
Managed Lanes		
	HOV	Programmed Foothill Rd to Greenville Rd. Option elsewhere.
	HOT	Programmed Foothill Rd to Greenville Rd
	Truck Lanes	Option
Traffic Incident Management		
	Collisions	Incident Management Plans in place. Option is to further refine with better detection.
	Hazardous Materials	Incident Management Plans in place. Option is to further refine with better detection.
	Closures	Incident Management Plans in place. Option is to further refine with better detection.
Planned Special Event Management		
	County Fair, Ball Games, Horse Races	Planned Special events have minimal impacts on I-580.
Evacuation Management and Operations		
	Fire, Flood, Earthquake	Out of scope for CSMP
Information Dissemination		
	CMS – Changeable message signs	Additional signs programmed
	Portable message signs	Programmed
	HAR – highway advisory radio	Programmed
	ATIS – in-vehicle devices	Long Term option
Detection and Surveillance		
	Loops, Video, Tag readers	Improvements Programmed
Regional Integration		
	State/Local interfaces	Option to improve regularity and formality of interface.

Surface Street Management and Operations Options

Increasing the ability of surface streets to carry traffic parallel to the freeway and carry traffic away from the freeway would benefit freeway operations. This option was the subject of a recent study by ACCMA (The I-580 Corridor Transportation Management Plan) and is in various stages of implementation through ACCMA's I-580 Corridor ITS System Integration Project. The Transportation Management Plan (TMP) includes the installation and implementation of ITS and TOS to allow transportation managers to better manage traffic congestion and traffic incidents. The TMP covers I-580 and local roads from San Ramon/Foothill Road to Greenville Road. The local arterials include First Street, Vasco Road, Greenville Road, Livermore Avenue, Stanley Boulevard, Sunol Boulevard, Santa Rita Road, Stoneridge Drive, Tassajara Road, Bernal Avenue, Altamont Pass Road, Concannon Boulevard, Patterson Pass Road, Dublin Boulevard, and Tesla Road.

Transit Improvement Options

There are several regional transit improvement options that can redirect single occupant vehicle (SOV) and HOV demand to transit, thus reducing freeway and surface street congestion.

Several regional transit improvements have been or are the subject of various studies and planned projects. These include the BART extension to Livermore (along various alignments) and/or the Greenville Road interchange on I-580. Regional plans call for improvements to the ACE train service and San Joaquin RTD express service across the Altamont Pass. Increased Delta transit connections to Antioch and Brentwood are among the transit options.

Bus Rapid Transit (BRT) between major employment centers and the BART stations is another option. LAVTA is currently studying BRT between the Lawrence Livermore Laboratories and the Dublin/Pleasanton BART station.

Non-Motorized Mode Improvement Options

The trip lengths served by the I-238/I-580 freeway corridor greatly exceed the maximum trip length for pedestrian travel and generally exceed typical bicycle trip lengths. Thus few options for improving non-motorized travel for the full length of the corridor appear appropriate. Local travel by non-motorized mode parallel to the corridor is certainly appropriate, and best handled on parallel surface streets that have more frequent access to adjacent land uses than the freeway. Current local general plans for improving bicycle and pedestrian circulation appear to be the best available improvement options for non-motorized travel, these plans having been subjected to extensive environmental and public scrutiny.

The freeway does act as an effective barrier to non-motorized mode travel across the freeway, and thus options to improve freeway crossing by non-motorized modes are appropriate. New crossings or improved crossings need to be tied in to surface street facilities for non-motorized travel. As such, the local general plans are the best source of information on options for improving non-motorized travel across the freeway.

Land Use Options

The option of modifying the land use decisions of stakeholder agencies in the corridor is an option that all local agencies are already well aware of and are pursuing to the extent feasible. These options include balanced jobs and housing growth, transit oriented developments, and green-house gas neutral developments. This CSMP will not investigate these options, but will recognize that they will be an important contribution by local agencies to the long term success of the CSMP.

9.3. Potential ITS Technology Improvements

This section presents the suggested refined candidate list of ITS strategies to be evaluated.[23]

Caltrans District 4 Deployment Approach

Caltrans District 4 has established the following informal guidelines for positioning ITS field elements along a freeway corridor.24

- Ramp Metering Stations: Caltrans District 4 recently completed a Ramp Meter Development Plan (RMDP) which identifies specific ramp meter deployment locations. Caltrans plans to meter all on-ramp and connectors in the ALA238/580 corridor.
- Traffic Monitoring Stations: Spaced between 0.33 and 0.50 miles apart.
- CCTV Cameras: Spaced at one mile intervals. Cameras are considered at interchanges and between interchanges. CCTV are also located to monitor ramp meters at on-ramps and connectors.
- Changeable Message Sign (CMS): Considered at decision points upstream of freeway-to-freeway interchanges. May also be considered for installations along long stretches of highway. CMS may provide information such as travel time on freeways and on transit.
- Highway Advisory Radio: Spaced at intervals that will provide full coverage of the highway. Depending on the terrain, HAR transmitters are typically located approximately 5 miles apart. EMS units are deployed at locations within the HAR transmitter's operating range.
- Placements of TMS, CMS, HAR, and EMS units are not specifically located until a related construction project is identified for programming and Caltrans District 4's Traffic Systems division has reviewed the project.
- Center to Center communication between Caltrans TMC and the TMC's for local jurisdictions.

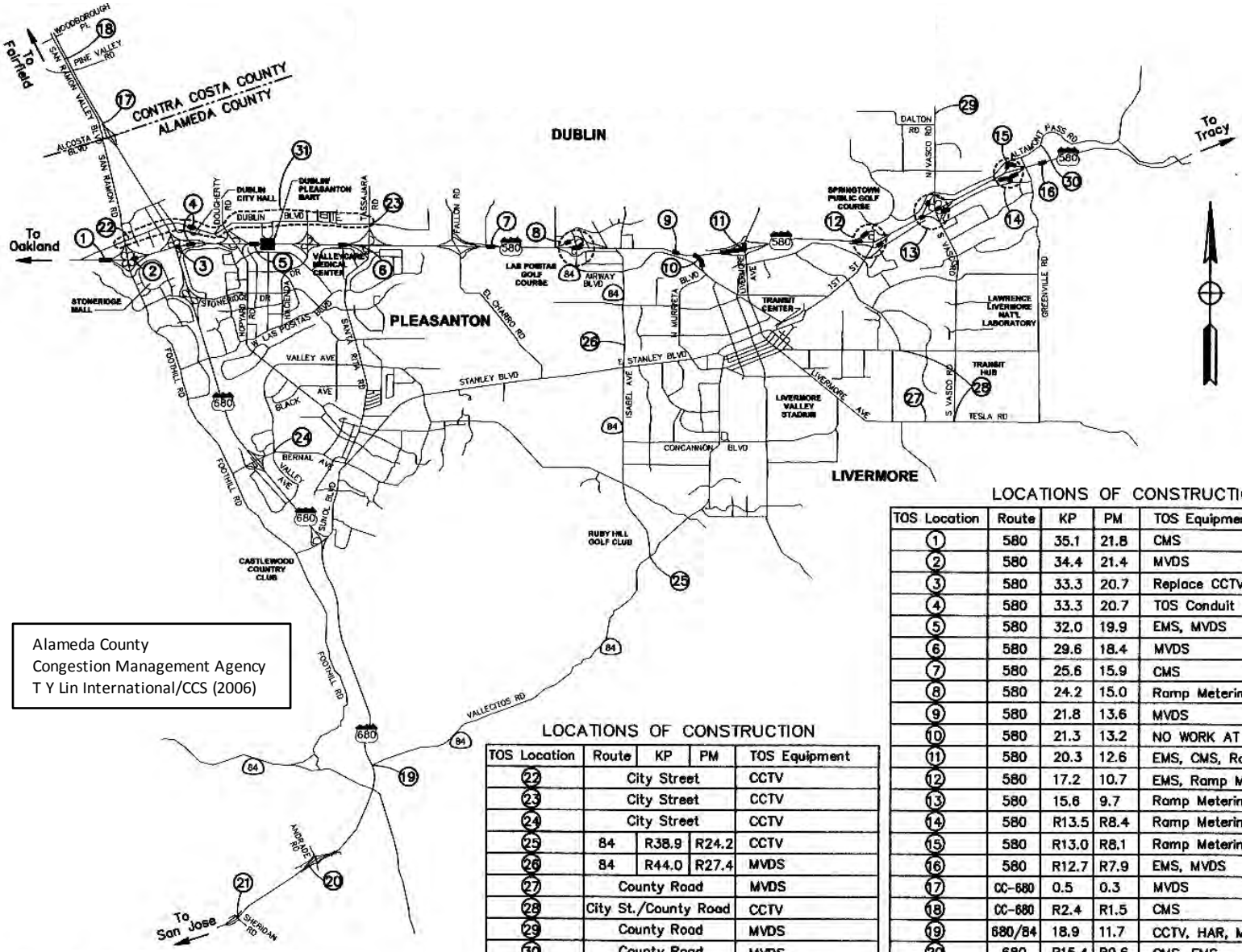
ITS Improvements from I-580 Corridor TMP

The I-580 Corridor Transportation Management Plan developed 31 ITS improvement recommendations. They are listed and mapped in Figure 29. These improvements are currently being implemented and consequently are not included among the additional ITS improvement recommendations for the I-580 CSMP.

DKS Associates is currently conducting the I-580 Corridor ITS System Integration project for ACCMA to manage the full system integration and ensure proper operations of the Intelligent Transportation System along the I-580 corridor. It is scheduled for completion in spring 2009.

[23] This chapter prepared primarily by Richard Shinn and Ron Mikalson of TransCore.
[24] E-mail from Mark S. Powers, Caltrans District 4 Senior Engineer, dated April 12, 2007, with revisions and additions per Alan S. Chow, April 6, 2009.

Figure 29: I-580 Corridor TMP Improvements



LOCATIONS OF CONSTRUCTION

TOS Location	Route	KP	PM	TOS Equipment
22	City Street			CCTV
23	City Street			CCTV
24	City Street			CCTV
25	84	R38.9	R24.2	CCTV
26	84	R44.0	R27.4	MVDS
27	County Road			MVDS
28	City St./County Road			CCTV
29	County Road			MVDS
30	County Road			MVDS
31	City Street			Interconnect

LOCATIONS OF CONSTRUCTION

TOS Location	Route	KP	PM	TOS Equipment
1	580	35.1	21.8	CMS
2	580	34.4	21.4	MVDS
3	580	33.3	20.7	Replace CCTV, CCTV
4	580	33.3	20.7	TOS Conduit for City of Dublin
5	580	32.0	19.9	EMS, MVDS
6	580	29.6	18.4	MVDS
7	580	25.6	15.9	CMS
8	580	24.2	15.0	Ramp Metering, CCTV
9	580	21.8	13.6	MVDS
10	580	21.3	13.2	NO WORK AT THIS LOCATION
11	580	20.3	12.6	EMS, CMS, Ramp Metering
12	580	17.2	10.7	EMS, Ramp Metering, HAR, CCTV
13	580	15.6	9.7	Ramp Metering
14	580	R13.5	R8.4	Ramp Metering
15	580	R13.0	R8.1	Ramp Metering, CCTV
16	580	R12.7	R7.9	EMS, MVDS
17	CC-680	0.5	0.3	MVDS
18	CC-680	R2.4	R1.5	CMS
19	680/84	18.9	11.7	CCTV, HAR, MVDS
20	680	R15.4	R9.6	CMS, EMS
21	680	13.0	8.1	NO WORK AT THIS LOCATION

ITS Improvement Recommendations

Corridor-wide Recommendations

- Continue implementation of the ITS recommendations that came out of the I-580 Corridor Transportation Management Plan and are currently being managed in the ITS System Integration project.

- Implement Caltrans District 4 ITS deployment approach. Comparing the existing and planned ITS field element inventory to the District 4 guidelines presented in the previous section, The following is recommended:

    - Ramp Metering Stations: Deploy ramp metering at the locations identified in the RMDP.

    - TMS: Additional TMS stations will be deployed as part of the HOT lane implementation. Exact locations are best determined by the HOT lane design engineers however it is recommended to require all HOT lane TMS sites to also monitor the general purpose lanes and transmit that data to Caltrans District 4. Additional TMS sites are recommended for the following locations:

        - I-580 at El Charro Road/Fallon Road

        - I-580 at North Flynn Road

        - I-580 at Grant Line Road

    - CCTV: Pan-Tilt-Zoom (PTZ) CCTV cameras deployed at strategic locations allow transportation management staff to monitor conditions and assist with incident management. In addition to the planned CCTV locations listed in the Caltrans District 4 ITS inventory, It is recommended that consideration be given to the locations listed below. It is expected that any HOT lane implementation to include a CCTV camera at each point where vehicles can enter or exit the toll lanes. It is recommended that that the deployment of CCTV components seamlessly integrate with Caltrans District 4's video system.

        - I-580 at Hesperian Avenue

        - I-580 & North Flynn Road

        - I-580 & Grant Line Road

    - CMS units are deployed at locations where drivers can tailor their routes to account for new information pertaining to roadway conditions. In the Bay Area they are also employed to disseminate real time travel times obtained from FastTrak toll tags. In addition to the CMS locations listed in the Caltrans District 4 ITS inventory, It is recommended that consideration be given to the locations listed below. It is expected that any HOT lane implementation include a CMS unit located at each toll lane entry point. The primary purpose of these units will be to post the current toll price along with the current status of the toll lane (i.e. open or closed).

        - I-580 WB at Eden Canyon Road

    - Highway Advisory Radio (HAR) can be an excellent method for disseminating traffic and incident information to the traveling public. Since virtually every vehicle is equipped with an AM radio, strategically placed HAR units and supporting Extinguishable Message Signs can theoretically reach every motorist on the corridor. While HAR can be a very effective tool in rural areas with few FM and AM radio stations, this is not true in major metropolitan areas such as the Bay Area. Simply put, the vast majority of motorists in major metropolitan areas do not tune their radios to

HAR broadcasts. Instead of investing in additional fixed HAR sites, It is recommended that Caltrans invest in portable HAR transmitters that can be deployed in support of the numerous construction projects planned for the corridor. In lieu of additional fixed HAR sites, It is recommended that MTC and Caltrans District 4 focus on further improvements to the dissemination of traffic and incident information via the television and radio outlets serving this corridor.

Recurrent Problem Spot Recommendations

I-238 EB between I-880 NB and Lewelling Avenue (PM Peak) and I-238 WB between I-580 EB and I-880 SB (AM & PM Peak)

Ramp metering is planned for EB traffic at I-580 and I-238. TMS sites are in place on I-238 at East 14th Street, SR-185, Kent Street and Hesperian Boulevard. This provides sufficient coverage of the area.

CCTV cameras are planned for the I-238/I-580 interchange and I-238/Ashland. An additional CCTV camera is recommended for I-238/Hesperian to provide more complete coverage of this congested area.

Two CMS units are located on I-238 in the vicinity of Ashland Avenue to support motorists in both directions. Deployment of a CMS unit on I-580 WB near Eden Canyon Road is recommended to advise motorists of conditions on I-238 in advance.

I-580 WB between Dougherty Road and I-680 (AM Peak)

Ramp metering is in place at Dougherty Road/Hopyard Road. TMS sites are in place at both I-680 and Dougherty Road/Hopyard Road and a CCTV camera is deployed at Hopyard Road. In addition, CMS units are in place at Hacienda Drive to support WB motorists and San Ramon Valley Road/Foothill Road to support EB motorists. In short, ITS field device coverage of this area is sufficient.

The primary issue is simply the lack of capacity. There is one lane supporting motorists traveling on I-580 WB to I-680 SB and during the morning commute this is saturated with technology workers traveling from the Central Valley to their places of employment in Silicon Valley.

I-580 WB between Airway Boulevard and Tassajara Road (AM Peak) and I-580 between Santa Rita Road and Fallon Road (PM Peak)

Ramp metering is operational at Airway Boulevard, Santa Rita Road/Tassajara Road, and El Charro Road/Fallon Road.

TMS units are located at Airway Boulevard and Santa Rita Road/Tassajara Road but not El Charro Road/Fallon Road. Given the planned development (Ice Rink, Auto Mall, and senior housing) on the Pleasanton side of El Charro Road, traffic volumes are expected to increase drastically in the next few years. As such deployment of TMS sites is recommended to support both WB and EB lanes.

CCTV cameras are in place at Santa Rita Road/Tassajara Road and Airway Boulevard. Additional CCTV cameras are not recommended for this area.

A CMS unit on I-580 EB west of San Ramon Road/Foothill Road is in place to advise EB motorists of conditions between Santa Rita Road and Fallon Road. Another CMS unit is located on I-580 WB west of Livermore Avenue to advise motorists entering the Tri-Valley of conditions between Airway Boulevard and Tasajara Road

I-580 EB east of Greenville Road to Alameda County Line and I-580 WB between I-205 and Grant Line Road

Ramp metering is in place at Greenville Road and planned for North Flynn Road, Grant Line Road, and I-205. Since the remaining portion of this area is sparsely populated with few residences or businesses, additional ramp metering is not warranted.

TMS sites are in place between Greenville Road and North Flynn Road. Deploying TMS sites is recommended along the remainder of the area from North Flynn Road to the Alameda County line.

Caltrans has a CCTV camera located at Greenville Road. Deployment of additional CCTV cameras is recommended at North Flynn Road to monitor conditions at the truck scales and Grant Line Road.

Caltrans has a CMS unit east on I-580 east of I-205 to advise motorists of congested conditions in the Tri-Valley area. For motorists traveling to Silicon Valley, San Francisco or the East Bay, there are simply no viable alternate routes however the CMS unit will serve to keep the traveling public informed of conditions and incidents. There is another CMS unit on I-580 EB east of Livermore Avenue to advise motorists traveling through the Altamont Pass to the Central Valley. Existing signage is sufficient.

Planning Level Cost Estimate for ITS Improvements

Listed below is a high level cost estimate for constructing, operating and maintaining the ITS enhancements recommended by TransCore (see Table 69). This estimate does not include the ITS field elements listed in the inventory information obtained from Caltrans District 4.

A total of $515,400 of ITS enhancements are recommended for the corridor with $369,000 in capital improvements and $146,400 in ongoing operations and maintenance.

Table 69: Planning Level Cost Estimates for I-580/I-238 ITS Improvements

ITS Enhancement Planning Level Cost Estimate									
Item	Description	Unit of Measure	Qty	Capital Equipment Unit Cost	Capital Equipment Extended Cost	Estimated Useful Life (Years)	Estimated Annual O&M Costs	Total O&M Cost	Total Cost
Ramp Meter	Furnish, install, and maintain ramp meter assembly, signal displays, controller, cabinet, detection and optimization	EA	0	$48,000	$0	5	$2,700	$0	$0
TMS	Furnish, install, and maintain RTMS unit for monitoring a 8 lane freeway facility (4 lanes in each direction)	EA	3	$13,000	$39,000	10	$580	$17,400	$56,400
	580/El Charro 580/North Flynn 580/Grant Line								
CCTV	Furnish, install, and maintain CCTV camera with PTZ control, CODEC, camera tower and mounting and utilities	EA	3	$31,000	$93,000	10	$2,300	$69,000	$162,000
	238/Hesperian 580/North Flynn 580/Grant Line								
Fixed CMS	Furnish, install, and maintain fixed CMS unit and utilities for overhead structure spanning one direction of travel (four lane facility assumed)	EA	1	$237,000	$237,000	10	$6,000	$60,000	$297,000
	580 WB/Eden Canyon								
Total					**$369,000**			**$146,400**	**$515,400**

Note: Unit cost and useful life figure obtained from FHWA's IDAS system. Unit cost figures are nationwide averages based on 2005 dollars

Caltrans TOS and Ramp Meter Installations Project

Caltrans District 4 has an approved Project Study Report PSR 04372-151130 to complete the TOS and ramp meter installations on ALA238/580 and Caltrans Project Development is now working on the Project Report.

The ITS improvements recommended above should be consistent with the elements to be installed in the Project Report.[25]

Note that Caltrans is using the following cost estimates for its Project Report:

- $300,000 for CMS
- $120,000 for CCTV
- $85,000 for HAR
- $50,000 for EMS
- $130,000 for TMS for both directions
- Ramp Meter Only - $100,000 per ramp
- Ramp Meter w/ widening - $500,000 per ramp

[25] Alan S. Chow, Caltrans District 04, April 6, 2009.

9.4. Strategies Selected For Evaluation

This section presents the refined list of strategies to be evaluated in the next stage of the CSMP technical analysis. The initial strategies identified in previous sections are here reduced to a smaller set of feasible options for investigation for inclusion in the corridor system management plan.

This proposed list of improvement strategies for further analysis is composed of the following parts:

1. Planned Improvement Projects
2. Supplemental Localized Improvement Strategies
3. Supplemental Management Strategies
4. ITS Technology Improvements

The planned improvement projects are those already proposed or sponsored for post 2015 by one or more local and/or regional agency in the area.

Supplemental localized improvement strategies are those identified by the consultant team to address specific bottleneck problems.

Supplemental management strategies are corridor-side strategies indentified by the consultant team for supporting the already planned improvements and the supplemental localized improvements.

Intelligent transportation system (ITS) technology improvements to support better management of the freeway corridor are described in a later section.

Planned Improvement Projects

Planned improvement projects that have been planned by public agencies for the I-580 and I-238 corridor, but which are currently not programmed are the top candidates for evaluation in the rest of the CSMP for I-580 and I-238. These planned projects will be considered as part of the improvement strategies to be evaluated in the CSMP.

Table 70 shows regional highway and transit projects in the corridor. These are “planned” state highway projects that ACCMA and its member agencies consider likely to be implemented by 2035 if sufficient funding can be obtained.

Table 71 shows the local street improvement projects that are in local agency General Plans. These are “planned” local road projects that ACCMA and its member agencies consider likely to be implemented by 2035 if sufficient funding can be obtained. These projects are not yet fully funded and are consequently part of the strategies to be evaluated in the next tasks of the CSMP.

Table 72 shows the planned transit improvement projects in the corridor.

Supplemental Localized Improvement Projects

Table 73 provides the refined list of potential strategies for resolving specific bottleneck problems.

Supplemental Management Strategies

Table 74 provides the refined list of potential management strategies that are most applicable to the I-238/I-580 corridor and will be evaluated in the next stage of the CSMP preparation.

Table 70: Previously Planned Regional Improvement Projects for I-580/238 Corridor

Project Name	Description	Cost (1)	Notes
I-580/Foothill Rd Interchange Improvements	Interchange improvements	2.1	(2)
I-580/Hacienda Dr Interchange Improvements	Reconstruct interchange	18.8	(2)
I-580/First Street Interchange Modification	modify with partial cloverleaf interchange, expand off ramp to 2 lanes	37.0	(2)
I-580/Isabel Ave/SR 84/Portola IC Interchange Improvements	Improve multi-modal access	28.0	(2)
I-580/Vasco Rd Interchange Modification	modify with partial cloverleaf interchange	40.0	(2)
I-580 Greenville Interchange Reconfiguration	replace with modified diamond interchange	43.0	(2)
I-580 WB Truck Climbing Lane - Altamont Summit	widen from 4 lanes to 5 (truck climbing lane)	50.0	(2)
I-580 Westbound off ramp to Dublin/ Pleasanton BART station	Construct new off-ramp to access Dublin/Pleasanton BART station	30.0	(2)
I-580 Westbound Auxliliary lane - Airway to Isabel	widen WB from 4 lanes to 5 (auxiliary lane)	39.5	(2)
I-580 Westbound Auxliliary lane - Isabel to First	widen WB from 4 lanes to 5 (auxiliary lane)	10.0	(2)
I-580 WB to I-680 SB connectors	Fly-over connectors: HOV and mixed-flow	705.0	(2)
I-580 Corridor – Regional HOT Network	WB - San Joaquin County Line to I-680 EB – Greenville Road to S.J. County Line I-680/580 Connector widen for HOT	578.6	(2)
I-680 Sunol Grade SB HOV – Sunal to SR 84	new HOV lane	107.4	(2)
I-680 SB HOT Lane – SR 84 to SR 237	New HOT lane, ramp metering, auxiliary lanes, pavement rehabilitation	230.9	(2)
Route 84 4-Lane Expwy on new alignment – I-880 to Alvarado-Niles	new 6-lane expressway	112.0	(2)
Route 84 Expressway Widening – I-680 to Pigeon Pass	widen from 2 lanes to 4	2.3	(3)
Route 84 Expressway Widening – Pigeon Pass to Jack London	widen from 2 lanes to 6 between Jack London at Stanley and from 2 lanes to 4 between Stanley and Pigeon Pass	129.6	(2)
Route 84 Expressway Widening – New SR84 Link to W. Jack London	widen from 4 lanes to 6	24.6	(2)
Route 84 Expressway Widening – Airway to new SR84 start	eliminate when new SR84 interchange goes in	39.5	(2)
Total		2,228.30	

Notes:

1. Cost estimates in millions of 2007 Dollars unless noted otherwise below.
2. Cost estimates from the MTC "Draft Transportation 2035 Plan: Change in Motion"; in cases where the cost estimate included more than one project listed here (e.g., I-580 HOV lane v. I-580 EB and WB HOV lanes) the cost was divided between the projects.
3. Cost for preparation of supplemental Project Study Report for Route 84 widening from Pigeon Pass to I-680.

Table 71: Planned Local Street Projects for I-580/238 Corridor

Street	Juris.	From	To	Description
Foothill Blvd	Hayward	I580 EB ramps		remove parking during peak periods, spot widening
Foothill Rd	Dublin	Stoneridge Dr	school	widen from 2 lanes to 4
San Ramon Rd	Dublin	I580 EB ramps	I580 WB ramps	widen from 4 lanes to 8
Greenville Rd	Livermore	Northfront Rd	Las Positas Rd	widen from 4 lanes to 6
Holmes St	Livermore	Lexington Way	Wetmore Rd	widen from 2 lanes to 4
Las Positas Rd	Livermore	Vasco Rd	Lawrence Dr	widen from 2 lanes to 4
Northfront Rd	Livermore	Vasco Rd	Herman Ave	widen from 2 lanes to 4
P St	Livermore	Railroad Ave	Chestnut St	widen from 2 lanes to 4
Redwood Rd	Livermore	terminus	Las Colinas Rd	extension of 2-lane roadway
Stanley Blvd	Livermore	Murietta Blvd	Isabel Ave (SR84)	widen from 4 lanes to 6
Vasco	Livermore	I580 EB ramps	Las Positas Rd	widen from 4 lanes to 8
Vasco	Livermore	I580 WB ramps	I580 EB ramps	widen from 2 lanes to 6
Vasco	Livermore	Scenic Ave	I580 WB ramps	widen from 4 lanes to 6
W Jack London Blvd	Livermore	Isabel Ave (SR84)	terminus	widen from 2 lanes to 4
W Jack London Blvd	Livermore	terminus	El Charro Rd	widen from 2 lanes to 4
Airway Blvd	Livermore	I580 EB ramps	I580 WB ramps	widen from 4 lanes to 6
Airway Blvd	Pleasanton	North Canyons Pkwy	I580 WB ramps	widen from 4 lanes to 6
Bernal Ave	Pleasanton	1st St	Independence St *	widen from 2 lanes to 4
Bernal Ave	Pleasanton	I680 SB ramps	I680 NB ramps	widen from 2 lanes to 4
Busch Rd	Pleasanton	Valley Ave	El Charro Rd	new 4 lane roadway
Castlewood Dr	Pleasanton	Pleasanton Sunol	I608 SB ramps	widen from 2 lanes to 4
El Charro Rd	Pleasanton	farm road	Stanley Blvd	new 4 lane roadway
North Canyons Pkwy	Pleasanton	Collier Canyon Rd	Doolan Rd	widen from 4 lanes to 6
Santa Rita Rd	Pleasanton	Valley Ave	Mohr Ave	widen from 6 lanes to 8
Stoneridge Dr	Pleasanton	Santa Rita Rd	terminus	widen from 4 lanes to 6
Stoneridge Dr	Pleasanton	terminus	El Charro Rd	new 4 lane roadway
Vineyard Ave	Pleasanton	Bernal Ave	W Old Vineyard Ave	widen from 2 lanes to 4
W Las Positas Blvd	Pleasanton	Foothill Rd	Payne Rd	widen from 2 lanes to 4
Marina Blvd	San Leandro	Alvarado St	Merced St	widen from 4 lanes to 6

Table 72: Planned Transit Projects for I-580/238 Corridor

Project Name	Description	Cost	Notes
ACE Rail Service Improvements	Acquire ROW, complete track improvements, expand station platforms	150.0	
BART Extension to Livermore – Hacienda to Vasco	Extend current BART service to Livermore along the I-580 corridor	129.0	3
LAVTA	Transit operating and capital improvement program	783.4	
High Speed Rail	Fund infrastructure for CE, BART, Caltrain, Muni, VTA	439.0	
Total		1501.4	

Notes:

1. Cost estimates in millions of 2007 Dollars unless noted otherwise below.
2. Cost estimates from the MTC "Draft Transportation 2035 Plan: Change in Motion";
3. Cost varies between $64.5 – 129.0 million, according to alignment selected.

Table 73: Bottleneck Specific Improvement Strategies for ALA-580/ALA-238 Corridor

No.	Bottleneck	Location	Strategy	Potential Benefits	Potential Challenges
A B	I-238 SB I-238 NB	I-880 to I-580 I-580 to I-880	Add Through lanes	Solves Capacity Problems	ROW costs, Impact adjacent residences
			Add HOV lanes	Reduces capacity problems, encourages HOV	ROW costs, Impact adjacent residences
			Add HOV/HOT	Solves capacity problems, encourages HOV Revenue reduces net cost.	ROW costs, Impact adjacent residences
			Elevated HOV/HOT	Solves capacity problems, encourages HOV Revenue reduces net cost.	Higher construction costs Noise impacts residences
			Peak Period Shoulder Lane Use by Transit	Helps transit get around bottlenecks.	Safety and Pavement Maintenance Issues
			Fwy-Fwy, and Entry Ramp Metering	Reduces demand surges, Increases capacity 5%.	Less effective than previous strategies Impacts on streets Storage on I-880 and I-580
C E	I-580 EB I-580 WB	Santa Rita to Fallon Airway to Tassajara	Super Aux Lanes Santa Rita to Airway EB/WB	Solves Capacity Problems	ROW costs Bridge construction cost at Fallon/El Charro
			Construct Stoneridge and Dublin Extensions	Partially off-loads freeway	Creates new street short cuts
			BART Extension	Partially off-loads freeway	Cost, Alignment Selection
D	I-580 WB	I-680 Off-Ramp	Flyover ramp(s)	Solves capacity problems	Cost
F G H I	I-580 WB I-580 WB I-580 EB I-580 WB	Altamont Pass Dublin Grade	Truck Climb Lane(s)	Solves capacity problem	Cost
J	I-580 WB	Isabel/Airway	Aux Lane	Solves capacity problem	None – Part of Isabel project
K	I-580 WB	N.Livermore/Isabel	Aux Lane	Solves capacity problem	None – Part of Isabel project
L	I-580 EB	Isabel/N.Livermore	Aux Lane	Solves capacity problem	None – Part of Isabel project
M	I-580 EB	Airway/Isabel	Aux Lane	Solves capacity problem	None – Part of Isabel project
N	I-580 WB	HOV Entrance at Hacienda	Advanced Signing	Reduces weaving intensity	Signing may not be effective
O	I-580 WB	Fallon/Tassajara	Aux Lane	Solves capacity problem	None – Part of Fallon project
P	I-580 WB	Mission Lane Drop	Add Lane	Solves capacity problem	Cost and ROW constraints
Q	I-580 WB	Ramp Meter at I-205 merge	Increase metering rates	Reduces queuing on I-580 in SJ County.	Increases congestion in Tri-Valley.

Table 74: Freeway Management & Operation Improvement Options

Option		Description
Traffic Control Devices		
	None	
Ramp Management and Control		
	Ramp Metering	In-place Foothill Rd to Greenville Rd. Option elsewhere. Extend to Castro Valley and I-238
	HOV Priority Entry	In-place Foothill Rd to Greenville Rd. Option elsewhere. Extend to Castro Valley and I-238
Managed Lanes		
	HOV	Programmed Foothill Rd to Greenville Rd. Extend to Castro Valley and I-238
	HOT	Option for planned HOV lanes to increase capacity
Information Dissemination		
	CMS – Changeable message signs	See ITS Technology Chapter
	Portable message signs	See ITS Technology Chapter
	HAR – highway advisory radio	See ITS Technology Chapter
Detection and Surveillance		
	Loops, Video, Tag readers	See ITS Technology Chapter
Regional Integration		
	State/Local interfaces	Option to improve regularity and formality of interface.

Freight Movement Strategies

Close to 30% of the Bay Area's domestic trade (in dollar value) is with the San Joaquin Valley and the Los Angeles basin. The majority of that trade moves between the Bay Area and these two areas via the I-580 corridor. Eighty percent of all goods movement involves trucking.[26]

The I-580 Corridor experiences the second-highest volume of truck traffic in the region (about 12,000 trucks a day)[27]; most of it is long-haul in nature involving the heaviest trucks. Increasingly, regional distribution centers have located in the San Joaquin Valley and trucks providing goods to the Bay Area use this corridor for access.

Growth in containerized cargo is expected to generate substantial truck traffic at the Port of Oakland, bringing containers to and from the port directly and to the off-dock intermodal terminals. Because many of the support facilities are now located in the Central Valley, trucks serving these shippers need to be on the road earlier in the day, contributing not only to an increase in truck travel along the I-580 corridor in generally, but specifically increasing congestion during the AM commuter peak.

Truck Movement Issues and Strategies

The most critical issues for truck movement in the corridor are the unpredictable levels of congestion in the westbound direction during the morning peak and in the eastbound direction during the afternoon peak. Scheduling reliability is more important than the actual travel time.

The previously described strategies to deal with recurring traffic congestion bottlenecks and non-recurring incidents will address many, but not all of the truck movement issues.

[26] Regional Goods Movement Study for the San Francisco Bay Area, Final Summary Report. Dec. 2004. MTC
[27] Caltrans Truck Data 2007

If the policy is adopted to use the Altamont Pass as a bottleneck to meter peak period traffic entering the Bay Area during the morning peak, this will adversely affect the delivery to goods to the Bay Area and the Port of Oakland in particular from distribution centers in the Central Valley.

The bulleted paragraphs below describe some strategies specifically tailored to solving the truck movement issues if the Altamont Pass is retained as a regional traffic metering point:

- A truck climbing and bypass lane might be constructed on the westbound approaches of I-205 and I-580 to the Altamont Pass so that trucks may have better assurance of a dependable delivery schedule. This bypass would have to extend back several miles from the interchange of I-205 and I-580 (possibly to Patterson Pass Road) to enable trucks to enter the bypass before becoming trapped in the forecasted queues. Given the truck volumes, a single lane may not be adequate.
    - The truck bypass lane might be extended the length of the corridor from I-880/I-238 interchange to the I-580/I-205 interchange.

- Altamont Pass Road might be designated a truck bypass route, but would not have adequate capacity to perform this function unless operated as a one-way road westbound in the morning. Part time one way operation would require extensive signing, temporary barricading, and maintenance personnel to ensure safety for traffic coming from roadside land uses.

- Piggybacking trailers on the railroad through the pass would enable trucks to avoid the congestion at the Altamont Pass, however; the use of the existing Union Pacific tracks for additional freight runs will conflict with attempts to schedule more passenger trains over the pass. The abandoned Western Pacific alignment over the Altamont Pass might be re-tracked to provide a second rail line over the pass, solving the rail capacity problem. An intermodal yard would need to be identified or constructed in Tracy to facilitate piggybacking over the pass.

- More distribution centers might be relocated from the east side of the pass (in Tracy) to the west side of the pass (in Livermore)

Rail Goods Movement Issues and Strategies

The problem facing the rail system is the growing competition between freight rail needs and passenger rail needs in the Altamont Pass Corridor (I-580). More capacity to address these conflicting needs may be needed in the future. There is growing interest in using the rail network as an alternative connection to the San Joaquin Valley. However, current facilities and services may not be capable of filling this role.

Possible strategies for addressing the rail capacity issue over the Altamont Pass and through the Tri-Valley Area include:

- Double tracking the existing single track Union Pacific line from Tracy Defense Depot to Niles (Fremont). This might be most cost effectively accomplished by re-tracking the old Western Pacific ROW between these two points. However, other agencies may have other plans for this old ROW which may preclude its reactivation as a rail line.

10. EVALUATION APPROACH

This section describes the technical approach used for evaluating candidate improvement strategies for the Corridor System Management Plan (CSMP).

The evaluation approach is designed to apply a sound and appropriate level of evaluation, based on the amount of information already available for the corridor, the complexity of the proposed mitigation measures, and the amount of detail needed to reach consensus on the viability and desirability of any of the proposed measures. The analysis, to the greatest extent possible, makes use of past and current evaluations of the corridor.

10.1. CSMP Objectives

The evaluation approach was tailored to the objectives of the CSMP effort.

The objective of a CSMP is to identify actions and projects that will improve corridor mobility and preserve the mobility gains obtained from currently programmed projects in the corridor. The CSMP should include capacity, management, and operation improvements for the freeway, surface streets, and for transit.

The recommendations of the CSMP should address short term as well as long term needs for the corridor. For this study, short term is considered to be the year 2015; long term is considered to be the year 2035.

Bicycle and pedestrian issues will be addressed in the CSMP to the extent of identifying "gaps and opportunities".

Land use policies are, at this time, being deferred to the next generation of the CSMP. This first generation of the CSMP will focus on short and long term freeway, street, and transit management, operations, capacity improvements, and bicycle/pedestrian gaps and opportunities.

10.2. Selection of Mobility as Predominant Goal

The CSMP effort involves the measurement of several dimensions of corridor performance: Mobility, Reliability, Safety, Productivity, and Pavement Condition. However, as stated above, the objective of a CSMP is to improve corridor mobility and preserve mobility gains. Consequently, it is appropriate to select mobility as the predominant measure against which to measure the performance of the various strategies being considered for inclusion in the CSMP.

10.3. Three Levels of Mobility for I-580 CSMP

The Existing Conditions and Trends analysis results suggest that it would not be feasible (and perhaps not desirable) to fully eliminate congestion in the I-580 corridor through the year 2035. Consequently, two less aggressive mobility goals have been identified to aid the stakeholders and the Corridor team in the development of a recommended improvement plan for the corridor. The three target levels of mobility for the I-580 CSMP are therefore:

- Eliminate All Freeway Congestion (The most aggressive)
- Maintain Existing Freeway Congestion Levels (hold the line)

- Allow Freeway Congestion to Deteriorate (but keep all recurrent congestion within the 4 hour AM and 5 hour PM peak periods).

The mobility goal target desired by the stakeholders and the Corridor Team determines the minimum level of improvements required in the CSMP. The improvements required to achieve the least stringent mobility goal (allow congestion to deteriorate) for the short term (2015) or the long term (2035) become the first priority improvements for that respective future year. The additional improvements required for the next level of mobility (maintain congestion at current levels) become the next priority of improvements.

Freeway congestion is chosen as the "parakeet in the coal mine" for assessing mobility in the I-580 corridor, because the surface streets, HOV's, and bus transit cannot experience uncongested conditions while the freeway is congested. Thus the freeway congestion is used as an overall indicator of the mobility health of the overall corridor.

When a group of strategies achieved a selected mobility goal for the freeway, but the analysis revealed additional mobility problems for the surface streets, HOV's, and/or bus transit, then additional strategies were added to the scenario to achieve both the freeway congestion goal and a similar goal for surface streets, HOV's and bus transit.

10.4. Sketch Planning Tool for Initial Assessment

A sketch planning tool was created to assist in the initial development of scenarios to meet each of the three mobility goals, and to assess the benefits of adding individual strategies to each scenario.

This tool is a spreadsheet with freeway and ramp peak period demands and capacities. It has a simple congestion prediction formula based on the Bureau of Public Roads speed/flow equation calibrated to the observed speeds and congestion in the I-580 corridor. The calibrated equation uses a free-flow speed of 60 mph, an alpha parameter of 3.1 and a beta parameter of 9.7.

The ACCMA model forecasted demands for 2015 and 2035 were calibrated by comparing the model forecasted demands for 2008 to the counted peak period volumes on a link by link basis. The model's forecasts for 2015 and 2035 were adjusted link-by-link (separately for each peak period) according to the difference between the model forecasted peak period demand for 2008 and the count.

The spreadsheet computes v/c ratios, vehicle-miles traveled, vehicle-hours traveled, vehicle-hours of delay, and mean speed, averaged over each of the AM and PM peak periods. The AM peak is 4 hours long. The PM peak is 5 hours long. The spreadsheet also checks for ramp metering demands in excess of the maximum metering capacity of 900 vehicles per hour per metered lane.

The spreadsheet was used to build up individual strategies to achieve each of the three levels of the mobility goal.

10.5. Development of Scenarios

The list of improvement strategies was developed in the Task 3 List of Strategies technical memorandum delivered in draft form on January 17, 2009. That same memorandum grouped the strategies into 5 major categories according to how the impacted congestion (either by modifying demand or modifying capacity (either on the freeway or on adjacent surface streets).

In this study a scenario is defined as a combination of strategies that achieves a given level of mobility. The strategies come in various flavors or types:

- **Freeway Management and Operations Improvements** – These include all managed lane additions or conversions to the freeway for high occupancy vehicles (HOV's), green vehicles, toll paying single occupant vehicles (HOT), and or trucks. Freeway management includes ramp metering, freeway service patrols, incident detection and response, and advanced traveler information systems (ATIS).
- **Surface Street Management and Operations Improvements** – These strategies include signal coordination and optimization, managed lanes, incident detection and response, and ATIS.
- **Freeway Capacity Improvements** – These are generally lane additions to the freeway such as mixed flow lanes or auxiliary lanes.
- **Surface Street Capacity Improvements** – These include interchange reconstructions; overpass widening, through lane additions, turn lane additions, roundabouts, addition of medians, and the signalization of unsignalized intersections.
- **Transit/Pedestrian/Bicycle Improvements** – These strategies include transit accessibility, frequency, reliability, speed, cost, and other pedestrian and bicycle environment improvements to increase transit/bicycle/pedestrian usage and reduce vehicle usage in the corridor.
- **Gateway Constraint**– These strategies include the use of chokepoints in the corridor to limit surges in demand within the peak period, such as Altamont Pass.

Prioritization Scheme

Each scenario was constructed of a basket of strategies. Strategies were selected for each basket according to the following prioritization scheme:

- First low cost improvements are considered (low cost in terms of fiscal, environmental, and economic cost). Within the low cost improvements, first freeway management improvements are added to the scenario. If these are insufficient to achieve the mobility goal, then surface street management improvements are added. Freeway capacity and then surface street improvements were then added if the low cost management improvements were insufficient to achieve the mobility goal. If these improvements are insufficient, then low cost transit/pedestrian/bicycle improvements are added. Finally, if all of the above low cost improvements were insufficient to achieve the mobility goal then low impact demand management measures are used to restrict the demand to meet the mobility goal.

- If the low cost management, capacity, alternative mode, and low impact demand measures are insufficient to achieve the mobility goal, then high cost and high impact measures are added to the scenario (in the same order as for the low cost measures) until the mobility goal is achieved.

The logic for this manner of assembling of the strategies into scenarios is as follows:

1. There are too many strategies, many with synergies that vary according to how they are combined, and there are insufficient resources to evaluate all possible combinations. Thus a structured scenario building process is required in the absence of tests of individual measures.
2. Ineffective low cost or high cost measures were previously removed from consideration during Task 3 based on previous studies or information in the literature.
3. Low cost (economic, fiscal,or environmental cost) measures are preferred to high cost measures.
4. The literature shows that management measures are generally more cost effective than capacity improvements.
5. Freeway management measures are more effective than surface street measures at improving corridor mobility, because freeway management measures work directly on the freeway. Surface street management measures have an indirect effect on freeway operations.
6. Freeway and surface street capacity measures are generally more effective than alternative mode measures in the I-580 corridor because in this corridor the auto mode carries the vast majority of person trips.
7. Freeway capacity improvements are generally more effective at improving freeway corridor mobility than street capacity improvements because freeway improvements work directly on the freeway. Surface street improvements indirectly affect freeway mobility.

8. Alternative mode improvements are preferred to choke point demand management, because choke points create (or preserve) mobility problem spots.

Treatment of Previous Studies

The I-580 corridor is fortunate to have been the focus of numerous studies of management, operations, and capacity improvements that might be made to the freeway, the surface street system within the corridor, and transit. These studies have employed a wide range of tools to reach their conclusions including subregional travel demand models, macroscopic highway operations analysis (Highway Capacity Manual and Synchro), and microscopic simulation analysis (CORSIM, Paramics).

The results of these technical studies were evaluated and used as appropriate to develop the comparative performance information necessary for evaluating the relative cost-effectiveness of the proposed improvement strategies. Professional judgment was employed to reconcile and normalize the results produced by these prior studies using different analytical tools and assumptions. Qualitative comparisons of relative performance were developed for individual strategies where the differences in the analytical tools employed prevented more rigorous numerical comparisons.

The recommended projects coming out of previous studies were generally given first priority for inclusion in each basket of strategies. This was done for a combination of technical analysis and practical reasons:

1. The recommended project has already been subject individually to an in-depth cost-effectiveness evaluation.
2. Much more information is known on the strengths, weaknesses, and costs of the recommended projects than is available for the other candidate strategies being considered within the CSMP.

The recommendations coming out of previous studies are therefore “pre-qualified”. Of course, the previous studies were first reviewed to determine the consistency of their assumptions and analysis approach to the overall CSMP analysis approach before choosing whether or not to accept the resulting recommendations for inclusion in the CSMP strategy basket evaluation.

Cost-Effectiveness Criteria

In the above prioritization scheme, the relative cost-effectiveness of the individual candidate strategies was used to determine which strategies to include within each basket. This assessment was made on a qualitative basis taking into account published literature and previous studies in the area on the cost-effectiveness of the individual strategies.

The costs of the strategies were assessed based on their first-order costs, their capital and annual maintenance/operation costs. Second order costs associated with forgone investment opportunities, value of time, safety costs, societal costs, and environmental costs, etcetera, were qualitatively identified, where appropriate, but were not reduced to specific numerical values.

The relative effectiveness of the individual strategies were determined based on their impacts on the following measures of effectiveness (MOE’s):

1. Mobility MOE’s
    a. Freeway Person-Miles Traveled (PMT), Person-Hours (PHT), Person-Hours Delay (PHD)
    b. Freeway + Surface Streets PMT, PHT, PHD (The I-580 Basin Influence Area)
    c. Surface Street Intersection Level of Service
2. Reliability MOE’s
    a. Buffer Index (the percentage of the trip time that a traveler must budget to leave early in order to be 95% confident of arriving on time)
3. Safety MOE’s

    a. Estimated Annual Collisions (all types)
4. Productivity MOE's
    a. Estimated Annual Lost Lane-Miles of Capacity

10.6. Analytical Tools for Final Assessment

The wide breadth of improvement strategies to be considered (long and short term, management, operations and capacity improvements) required a wide range of tools to provide a sound analytical basis for selecting among options. Thus a combination of travel demand modeling (the ACCMA model), macroscopic operations analysis (Synchro, Highway Capacity Manual analysis), and microscopic analysis was used to evaluate the strategies for the corridor.

The ACCMA model was used to generate forecasts of demand and estimates of mode shifts, route shifts, and destination shifts for the future at a basin-wide level during the 4 hour AM peak period and the 5-hour PM peak period. The model forecasts were furness adjusted according to the differences between the model 2008 estimates and the 2008 counts.

Highway Capacity Manual (HCM) techniques in Synchro was used to evaluate AM and PM peak hour operations at the signalized intersections at each freeway interchange plus one signal each direction away from the interchange.

Microsimulation modeling (Paramics and SimTraffic) was used in combination to model freeway operations and the operations of the ramps and ramp intersections feeding the freeway during the 4-hour AM peak period and the 5-hour PM peak period.

10.7. Analysis for the Short Term (2015)

The Existing Conditions and Trends (ECT) analysis identified a few residual mobility problems that would remain even after all of the programmed short term improvements were completed for 2015.

Sketch Planning Assessment

The evaluation looked first at the longer term strategies recommended in previous studies (see section 10.8 below) to see which ones can best address the residual short term mobility problems. Strategies recommended from previous studies were reviewed to determine which ones can best be accelerated to implementation in the short term. These were usually the more advanced management and operations strategies plus lower cost capacity improvement strategies contained in previous studies.

These "additional" short term strategies were selected for inclusion in the recommended short term improvements scenario based on the technical analyses produced in the prior studies. The prioritization criteria used for selecting strategies are discussed in Section 10.5. The additional strategies were combined with the programmed 2015 short term improvements into a single scenario for the final assessment.

Final Assessment (Microsimulation)

The analysis of the recommended short term strategies was performed using a combination of sketch planning and simulation modeling.

The 2008, 2015 programmed, and final level 3 mitigated 2015 scenario were evaluated using a combination of the ACCMA travel demand model (for the year 2015) and the corridor microsimulation models (Paramics and SimTraffic) developed and calibrated for the I-580 CSMP effort. These tools provided a single consistent

and sound set of performance measures for evaluating the effectiveness of the recommended short term improvements scenario.

The sketch planning results for the intermediate improvement scenarios (Level 1 and 2) were used to interpolate the equivalent microsimulation results for these two scenarios.

10.8. Analysis for the Long Term (2035)

The Existing Conditions and Trends (ECT) analysis identified significant capacity shortfalls and mobility problems for 2035 if no further improvements were made after 2015. Consequently, before evaluating management and operation strategies the evaluation first focused on the currently planned long term improvements for the corridor that are contained in the MTC Draft 2035 Regional Transportation Plan, the CCTA Tri-Valley Action Plan, and local general plans.

Sketch Planning Assessment

Table 70 shows the planned regional highway and transit projects in the corridor. These are "planned" state highway projects that ACCMA and its member agencies consider likely to be implemented by 2035 if sufficient funding can be obtained.

Table 71 shows the local street improvement projects that are in local agency General Plans. These are "planned" local road projects that ACCMA and its member agencies consider likely to be implemented by 2035 if sufficient funding can be obtained.

It is recognized that the City of Pleasanton is currently in the process of updating its current general plan. The Consultant team endeavored to incorporate those improvements considered to be likely to make it through the planning process.

Evaluation of Currently Planned Improvements

The currently planned improvements for the corridor were evaluated as a single batch of improvements. They were evaluated for the AM and PM peak periods for the year 2035 using a combination of the ACCMA travel demand model (to forecast corridor demands and estimate basin-wide performance) and the Paramics/SimTraffic models to estimate freeway mainline/ramp operations, and surface street operations within the immediate vicinity of the freeway interchanges.

Development of Additional Long Term Strategies

The year 2035 mobility problems remaining after the planned 2035 improvements are in place were identified. The consultant team then developed supplemental management, operations, and capacity improvements (freeway, transit, and local streets) for addressing the remaining 2035 problems. Schematic layouts, construction cost estimates, and annual maintenance/operation costs were estimated, as appropriate. The previous chapter described the range and types of strategies that were considered.

Analysis of Long Term Strategies

The supplemental long term strategies to address long term mobility needs in the corridor were grouped (packaged) into three scenarios:

- The level 1 scenario included: freeway management, freeway capacity, street management, street capacity, transit, and demand management measures needed to ensure that all forecasted peak period demands could be served within each peak period.

- The level 2 scenario included the additional improvements necessary to return the forecasted congestion levels to current 2008 levels. Congestion level was measured using the average speed for the corridor.
- The level 3 scenario included the additional improvements necessary to change the corridor to almost a congestion free condition during both peak periods.

Final Assessment

The analysis of the recommended Long term strategies was performed using primarily sketch planning modeling.

The forecasted 2035 demands so greatly exceeded capacity that the microsimulation results for the 2035 planned, and 2035 Level 1 scenarios were not considered reliable[28]. Consequently the sketch planning results were used in the final evaluation for all of the 2035 scenarios.

The sketch planning model estimates for 2008 validated relatively well against the 2008 microsimulation results. This is because the sketch planning model speed-flow equation was calibrated to match observed speeds on the freeway. Consequently the sketch planning model was considered to be sufficiently accurate for comparing the large differences in performance among the 2035 scenarios.

However, the sketch planning model was not considered sufficiently accurate for evaluating bottlenecks and backups for 2035. Consequently, bottleneck analysis was not conducted for the 2035 scenarios.

[28] This was determined by comparing microsimulation runs for the 2035 planned improvements scenario against the 2008 microsimulation results. The vehicle-miles traveled and vehicle hours traveled predicted for 2035 by the microsimulation models proved to be unreliable when compared to 2008.

11. SHORT TERM IMPROVEMENTS ANALYSIS (2015)

This chapter presents the alternatives analysis for short term (year 2015) improvements to the I-580/I-238 corridor. First the currently programmed projects expected to be completed by 2015 are described and evaluated. The impacts of these improvements on mobility were assessed using microsimulation. Various supplemental improvement scenarios are then evaluated to address lingering congestion problems revealed in the analysis of the programmed projects. The alternative scenario analysis is performed using sketch planning analysis. A final, microsimulation based, evaluation is then performed on the highest level scenario, and the results for the intermediate level scenarios were interpolated from those results.

11.1. Programmed Improvements

Table 33, Table 34, and Table 35 describe the funded or programmed highway, local street and transit improvements within the corridor study area. These improvements are diagrammed in Figure 30, Figure 31, and Figure 32.

The state highway projects are programmed, while the local road projects are either programmed or planned. These projects are called “programmed” because they are considered to be likely to be implemented by or before 2015.

The 2015 baseline projects were generally taken from the 2015 highway and transit network improvements incorporated by ACCMA in its travel demand model update for 2008. The improvements within the ACCMA model were generally reviewed by ACCMA member agencies at the time the ACCMA model was last updated.

The regional and local improvement project lists for 2015 baseline were reviewed and updated by ACCMA, MTC and Caltrans staff in late 2008.

In addition to the programmed improvements, the westbound I-580 ramp metering was implemented and operational in September 2008, which occurred after the evaluation of existing conditions and validation of existing models. The ramp metering was included when evaluating baseline 2015 conditions.

11.2. Performance of Programmed Improvements

The programmed improvements were input to the ACCMA travel demand model along with MTC/ABAG/ACCMA forecasted land use and regional network changes for the year 2015. The ACCMA model forecasted AM peak period and PM peak period demands were then input into the Paramics and Synchro/Simtraffic microsimulation models for the I-580 corridor to assess corridor performance with the programmed improvements for 2015.

The microsimulation model results were reviewed to identify lingering bottlenecks after the programmed improvements are in place. The microsimulation results were then aggregated into corridorwide mobility performance measures.

Bottleneck Analysis

The lingering bottlenecks after the programmed short term improvements are in place are shown in Figure 22. They are listed in Table 75.

Many of the bottlenecks currently active in 2008 will dissipate in 2015 due to the widening of I-238, the addition of HOV lanes in the Dublin/Pleasanton stretch of I-580, ramp metering on I-580, and the construction of the truck climbing lane on EB I-580 east of Greenville Road leading up to the Altamont Pass. Some new bottlenecks will result from increased demands expected between 2008 and 2015 and because some of the programmed improvements will release existing bottlenecks causing increased demand to arrive at downstream bottlenecks. The bottlenecks are summarized in and discussed in more detail below.

The following bottlenecks in 2008 would remain in 2015:

- The I-580 WB to I-680 off ramp bottleneck (Bottleneck "D" in Figure 22) will remain in 2015, because none of the currently programmed improvements address this problem.

- The I-580 WB AM bottleneck at the I-205 merge (Bottleneck "F" in Figure 22) will remain in 2015 because no improvements are programmed to address this problem and the widening of I-205 in the Tracy area will worsen this problem by delivering more traffic to this bottleneck.

The following new bottlenecks will arise in 2015:

- A new bottleneck will arise in the westbound direction during the AM peak period at the lane drop west of terminus of the HOV lane within San Ramon/Foothill Road interchange (Bottleneck "I" in Figure 22). The bottleneck will back up traffic into the I-680 interchange and will affect southbound I-680 operations during the AM peak period.

- Westbound AM peak period bottlenecks will arise between the North Livermore, Isabel, and Airway Boulevard interchanges (Bottlenecks "J" and "K" in Figure 22). The congestion will cause on ramp traffic to back up and affect surface street operations on North Livermore Avenue during the AM peak period.

- Eastbound PM peak period bottlenecks will arise at the lane drops between auxiliary lanes within the Airway Boulevard and Isabel Avenue interchanges (Bottleneck "M" in Figure 22). The eastbound lane drop between the Isabel and North Livermore interchanges will also result in a bottleneck during the PM peak period (Bottleneck "L" in Figure 22).

- A new point of turbulence will be introduced in the westbound direction at the point where the HOV lane splits off from the mixed flow lanes just east of the Hacienda Blvd. overcrossing (Bottleneck "N" in Figure 22). HOV's and toll vehicles desiring to exit at Hopyard or I-680 must slow to exit the HOT lane at this point.

- A westbound bottleneck will arise during the AM peak period where the auxiliary lane terminates at Fallon Road interchange (bottleneck "O" in Figure 22). The demand west of this point will exceed the capacity of the 4 mixed flow lanes plus HOT lane.

- A westbound AM peak period bottleneck will arise west of the lane drop at East 14th Street/Mission Boulevard (bottleneck "P" in Figure 22). The forecasted off-ramp demand at this point is significantly lower than the capacity of a freeway lane, so the termination of a mainline lane at this off-ramp results in a bottleneck west of this point.

Several intersections in the west side of the corridor will become bottlenecks (volume/capacity > 1.00) in 2015, while the number of bottleneck intersections in the east side of the corridor will decline (see Table 76). The bottleneck intersections in 2015 are:

- Hesperian Blvd and E Lewelling Blvd
- I-238/I-580 Off Ramp and Castro Valley Blvd
- Foothill Blvd and Grove Wy
- Stanton Ave and Castro Valley Blvd
- Redwood Rd and I-580 WB On Ramp

- Crow Canyon Rd and E Castro Valley Blvd
- Hopyard Rd and Owens Dr
- Airway Blvd and N Canyon Pkwy
- N Livermore Ave and I-580 EB Ramps
- Grove Way and Castro Valley Blvd

Corridorwide Mobility Performance

The corridorwide mobility performance in 2015 with the programmed improvements is tabulated in Table 78.

- The 2015 programmed improvements result in the following mobility changes between 2008 and 2015:
- Vehicle-Miles Traveled (VMT) Demand during the AM/PM peak periods increases 21%
- Vehicle-Hours Traveled increases 23%
- Vehicle-Hours of Delay increases 49%
- Average speed of traffic drops by 2%

11.3. Supplemental Improvement Scenarios

Three levels of supplemental improvement scenarios were identified.

- Level 1 improvements are designed to bring the total AM and PM peak period demands and capacities within a balance. The peak period volume/capacity ratios are less than or equal to 100% for all ramps and mainline sections of freeways.
- Level 2 improvements are designed to bring the total AM and PM peak period congestion levels (measured in terms of mean travel time for trips traveling the length of the corridor) back to existing 2008 levels.
- Level 3 improvements are designed to eliminate all recurring congestion within the AM and PM peak periods.

The supplemental improvements for each scenario are described in Table 77. Each higher level scenario incorporates the lower level improvements. The improvements are diagrammed in Figure 34, Figure 35, and Figure 36.

11.4. Performance of Supplemental Scenarios

The corridorwide mobility performance of the three scenarios is shown in Table 78. All three scenarios address an expected 21% increase in vehicle-miles traveled (VMT) in the corridor.

Level 1 Improvement Scenario

With a few exceptions, the programmed improvements for 2015 provide sufficient capacity to serve the total AM and PM peak period demands.

- The 4-hour AM peak period demand for the westbound I-580 off ramp to I-680 will exceed its 4-hour capacity by 3%. The level 1 supplemental improvement widens this to a 3-lane ramp.
- The 5-hour PM peak period demand for the eastbound I-580 off-ramp to I-680 will exceed its 5-hour capacity by 18%. The level 1 supplemental improvement widens this to a 2-lane ramp.
- The 5-hour PM peak period demand for the northbound I-680 to I-580 Eastbound on-ramp will exceed its 5-hour capacity by 40%. The level 1 supplemental improvement widens this to a 2-lane ramp.

The level 1 improvements have the following impacts on mobility:

- Peak period vehicle-hours traveled (VHT) decreases below the forecasted level with just the 2015 programmed improvements, but still remains 21% above current 2008 levels.
- Peak period vehicle-hours delay (VHD) decreases below the forecasted level with just the 2015 programmed improvements, but still remains 37% above current 2008 levels.
- Peak period mean speed improves over the 2015 programmed improvements scenario and is approximately equal to current 2008 levels.

Level 2 Improvement Scenario

The programmed improvements for 2015 plus the additional Level 1 Scenario improvements are sufficient of themselves to provide mobility performance in the corridor superior to existing 2008 conditions. The mean speed for the corridor during both peak periods will improve from slightly under 47 mph to slightly better than 47 mph. Thus no additional improvements were necessary to meet the objectives of the Level 2 improvement scenario.

Level 3 Improvement Scenario

The goal of the level 3 improvements was to eliminate congestion within both the AM and PM peak periods. Several additional improvements were identified to achieve this goal at the sketch planning level. Improvements were added to this scenario until the peak period volume/capacity ratio for every segment and ramp in the corridor was less than or equal to 80% of capacity. The Level 3 improvements were then entered into the Paramics simulation model to obtain the mobility performance results.

- Vehicle-hours travelled increased by 9% over existing 2008 levels.
- Vehicle-hours delay was reduced by 26% compared to 2008 levels (delay was not totally eliminated).
- The average freeway travel speed in the corridor increased from 52.7 mph in 2008 to 58.5 mph.

Figure 37 shows the bottlenecks and congestion that would remain after the Level 3 improvements.

- A westbound AM bottleneck would occur on I-238 northbound at the East 14th Street lane drop (Bottleneck “P” in the exhibit). The congestion would be prolonged during the AM peak period, extending back into and through the I-580/I-238 interchange.
- A westbound AM bottleneck would occur at the I-680 interchange (Bottleneck “D”) resulting in intermittent congestion during the AM peak period. The bottleneck is caused by the weaving of traffic on westbound I-580 to access the off ramps to northbound and southbound I-680.
- There would be turbulence during the AM peak period in the westbound direction where HOT lane vehicles must exit the HOT lane at Hacienda if they want to access the San Ramon Road, I-680, or Hopyard Road off-ramps. This is bottleneck “N” in the exhibit. The congestion would be intermittent during the peak period.
- There would be intermittent congestion in the westbound direction during the AM peak period on the approach to the Altamont Pass (Bottleneck “F”). The congestion would occur primarily early in the AM peak period, dissipating later in the period. This bottleneck is caused by the upgrade to the pass.
- The programmed ramp meters on I-580 westbound just before the merge with I-205 (Bottleneck “Q”) would cause prolonged queuing during the AM peak period that would not clear out before the end of the peak. Doubling the ramp meter capacity (by allowing two vehicles per green) would solve this backup problem, but would contribute to the queue approaching the Altamont Pass, west of Grant Line Road, making that queue more prolonged.

The improvements contained in this scenario did not completely achieve the objective of totally eliminating recurrent peak period congestion in the corridor; however, further improvements were not deemed to be cost-effective.

Figure 30: Schematic Diagram of 2015 Programmed Projects (A)

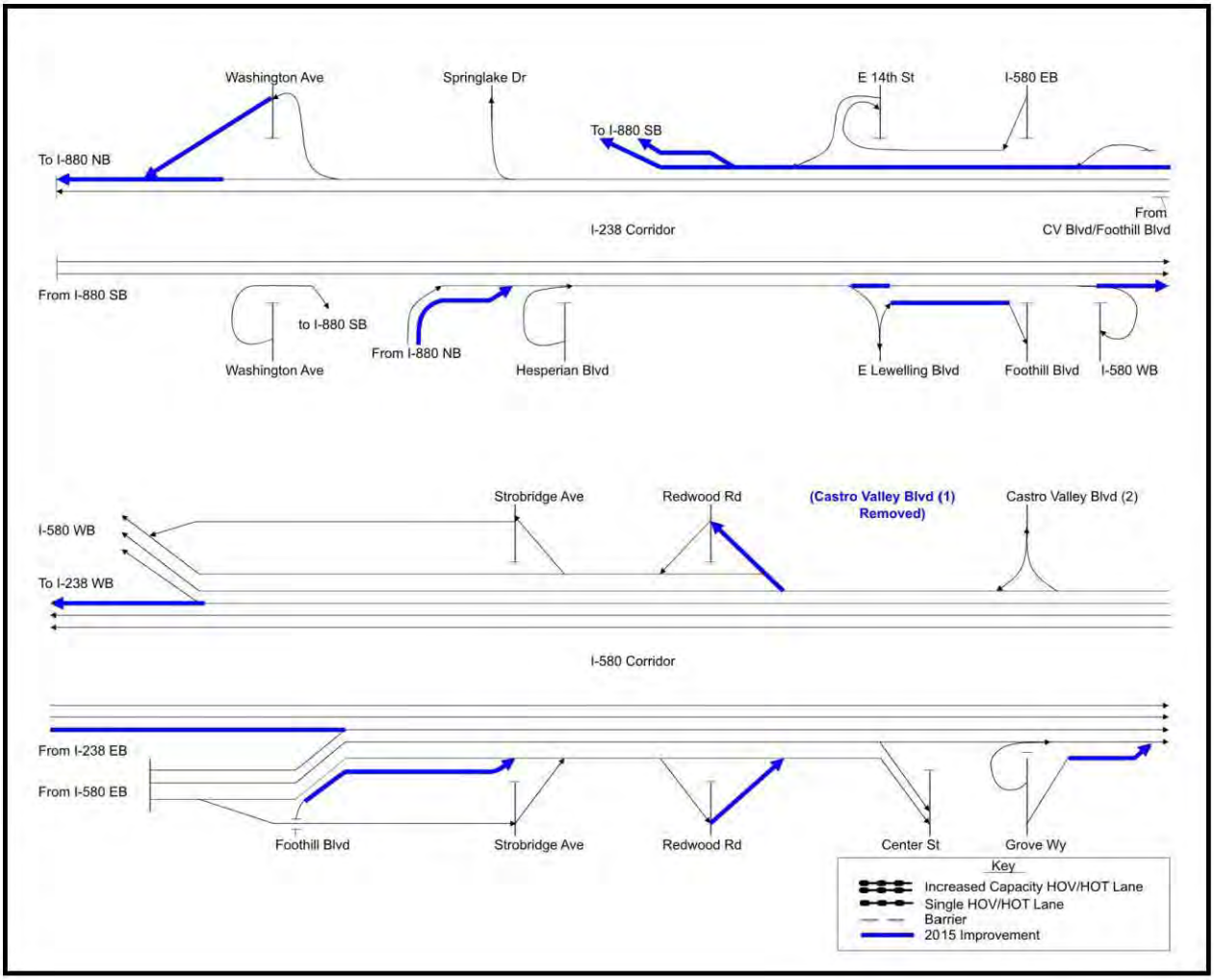


Figure 31: Schematic Diagram of 2015 Programmed Projects (B)

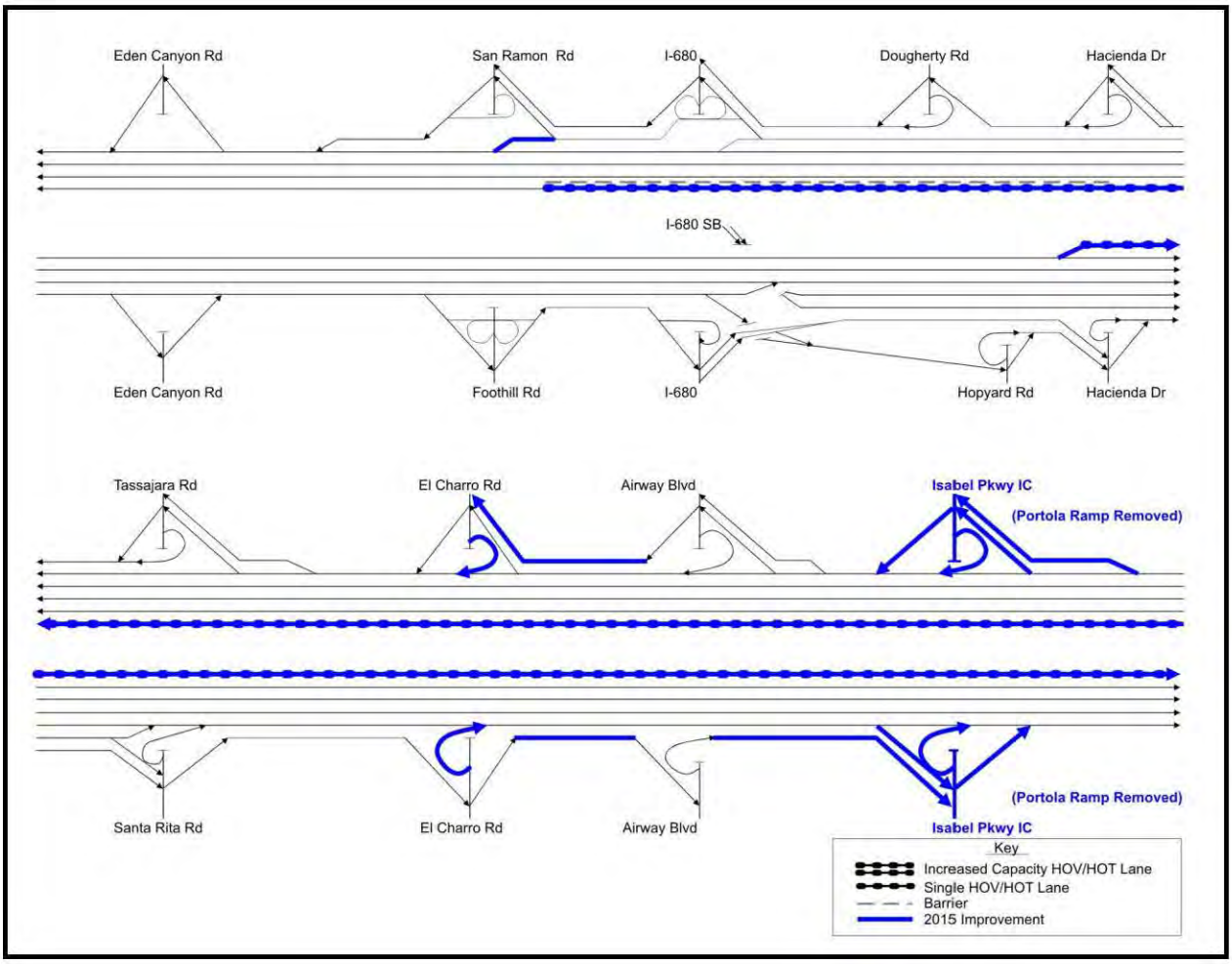


Figure 32: Schematic Diagram of 2015 Programmed Projects (C)

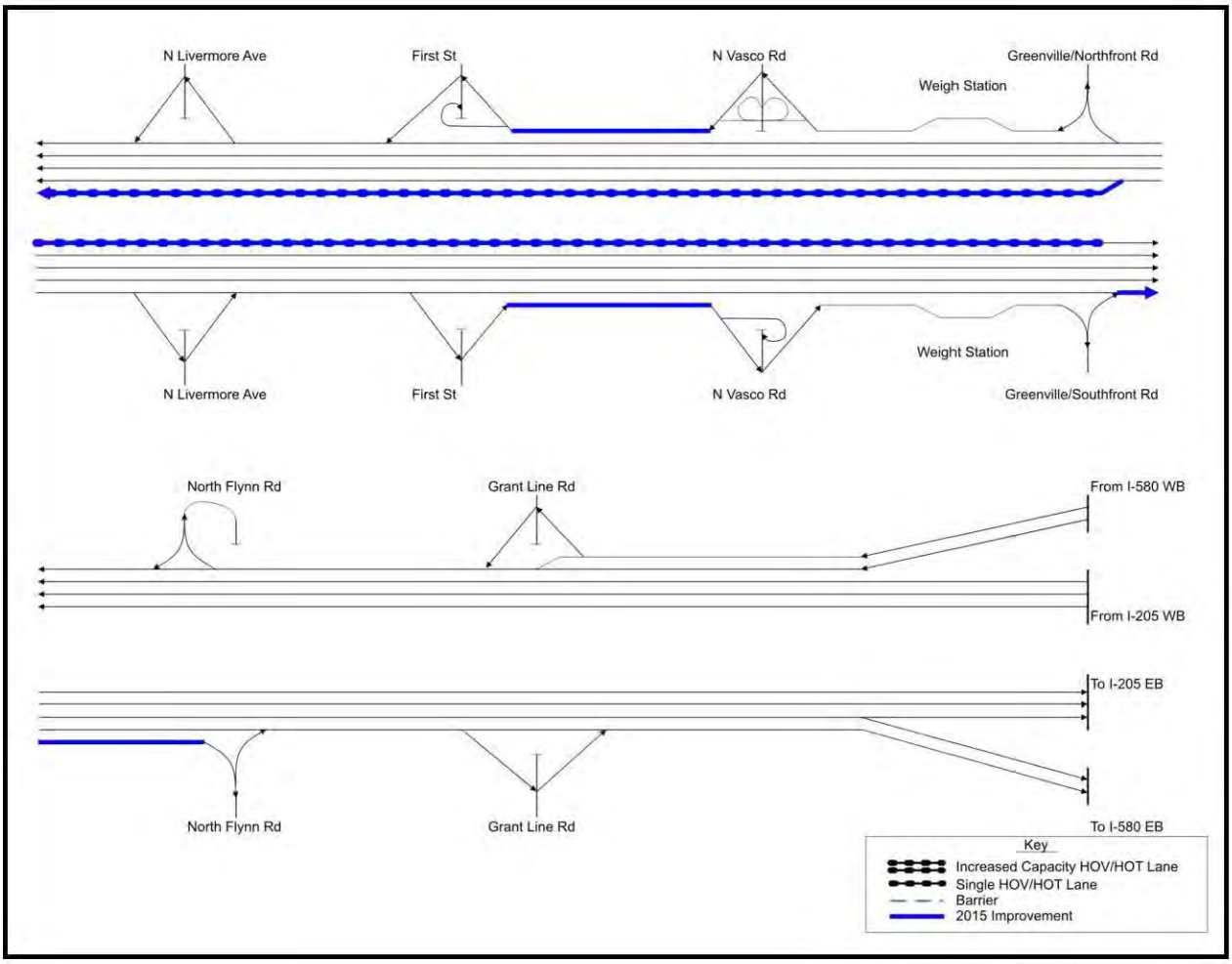


Figure 33: Bottlenecks in 2015 with Programmed Improvements

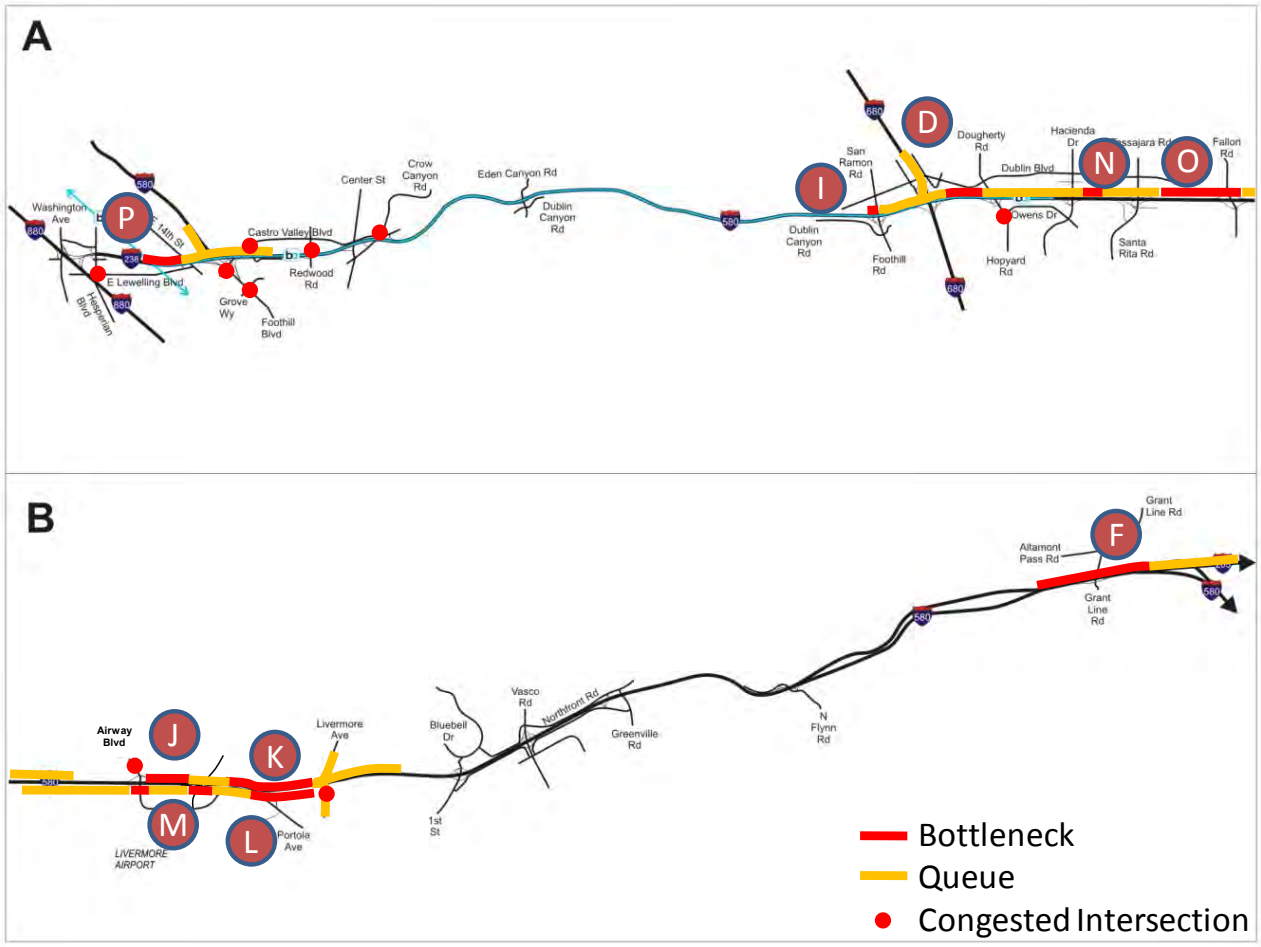


Table 75: Short Term Freeway Bottlenecks – Programmed Improvements

Bottle-neck	Direction	Location	Active	Cause/Notes
A	I-238 SB	I-880 to I-580		Resolved by programmed improvements
B	I-238 NB	I-580 to I-880		Partially Resolved by programmed widening, however, the widening draws significant increase in demand. (See bottleneck "P")
C	I-580 EB	Santa Rita to Fallon		Resolved by HOV lane and ramp metering improvements
D	I-580 WB	I-680 Off-Ramp	AM	Insufficient off-ramp capacity due to collector-distributor weave.
E	I-580 WB	Airway to Tassajara		Insufficient mainline capacity partially resolved by HOV/HOT lane and ramp metering improvements (See Bottleneck "O")
F	I-580 WB	I-205 to Altamont Pass	AM	Exacerbated by I-205 widening
G	I-580 WB	Greenville to Altamont Pass		Resolved by truck climbing lane
H	I-580 EB	Dublin Grade (West of Eden)		Not a problem in 2008 or 2015
I	I-580 WB	San Ramon Road Interchange	AM	Lane drop at end of HOV lane
J	I-580 WB	Isabel to Airway	AM	Lack of auxiliary lane
K	I-580 WB	N. Livermore to Isabel	AM	Lack of auxiliary lane
L	I-580 EB	Isabel to N. Livermore	PM	Lane drop east of Isabel Interchange
M	I-580 EB	Isabel Interchange Airway Interchange	PM PM	Lane drop within interchange Lane drop within interchange
N	I-580 WB	Hacienda Interchange	AM	HOV lane diverge from mixed flow lanes requiring HOV's to exit to access I-680.
O	I-580 WB	Fallon Rd. to Tassajara Rd.	AM	Inadequate mainline capacity
P	I-238 NB	E.14th St to I-880 SB off	AM	Lane drop at E.14th Off ramp, plus increased demand drawn by widening of I-238.

Table 76: Surface Street Congestion 2015 – Programmed Improvements

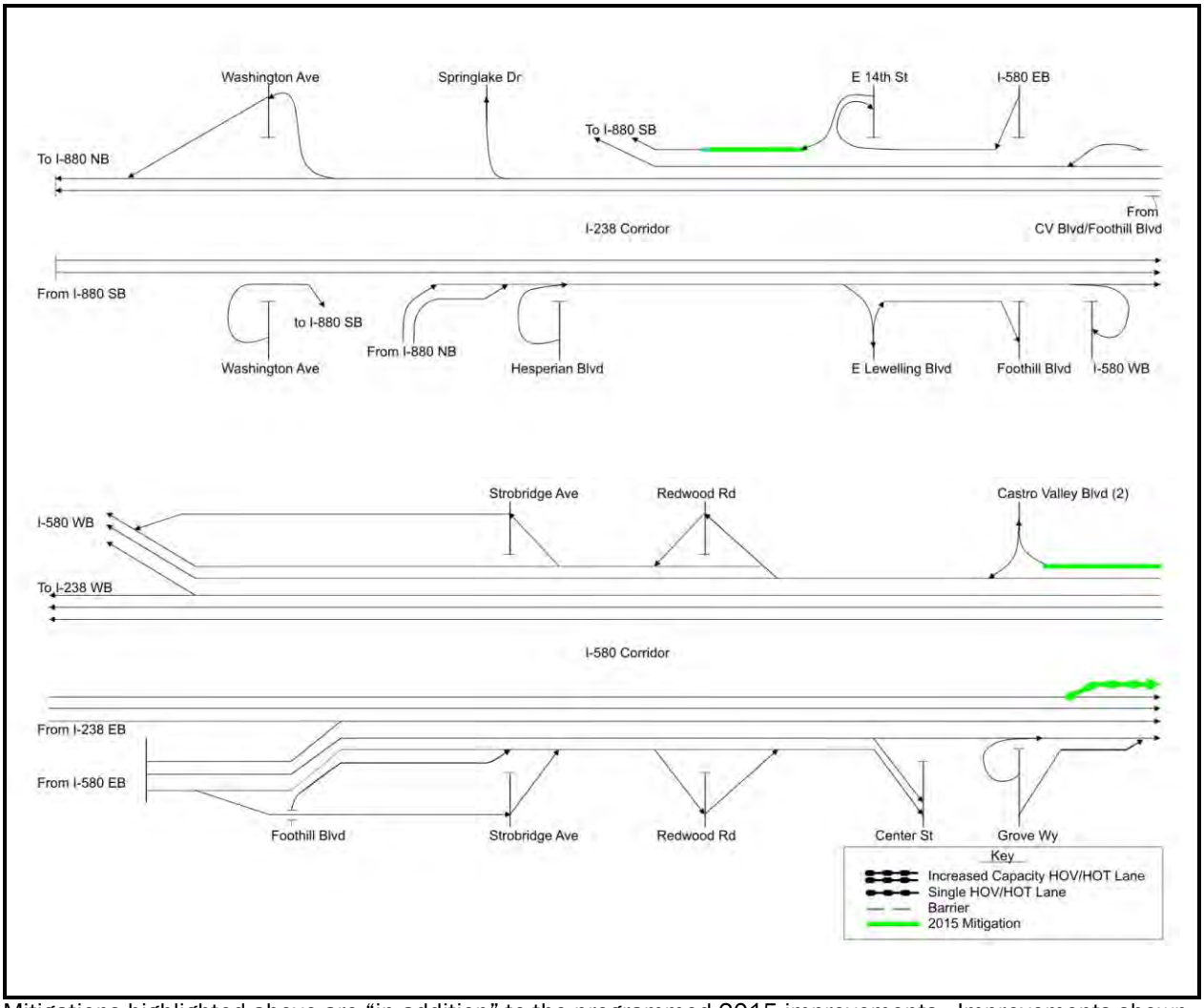
Int ID	N-S Street	E-W Street	Control	Agency	AM Peak Hour			PM Peak Hour		
					V/C	DELAY	LOS	V/C	DELAY	LOS
10	Hesperian Blvd	E Lewelling Blvd	Signal	San Leandro	0.96	80.0	F	1.06	105.0	F
16	I-238/I-580 Off Ramp	Castro Valley Blvd	Signal	Alameda Co.	0.80	51.2	D	1.34	155.4	F
17	Foothill Blvd	Grove Wy	Signal	Hayward	0.89	44.6	D	1.10	111.0	F
19	Stanton Ave	Castro Valley Blvd	Signal	Alameda Co.	0.84	44.5	D	1.00	53.9	D
23	Redwood Rd	I-580 WB On Ramp	Signal	Alameda Co.	1.16	69.3	E	0.80	20.1	C
27	Center St	Castro Valley Blvd	Signal	Alameda Co.	1.02	73.1	E	0.89	50.4	D
30	Crow Canyon Rd	E Castro Valley Blvd	Signal	Alameda Co.	0.92	59.8	E	1.07	76.5	E
43	Hopyard Rd	Owens Dr	Signal	Pleasanton	1.09	117.3	F	1.02	78.7	E
54	Airway Blvd	N Canyon Pkwy	Signal	Livermore	1.21	100.2	F	0.45	34.0	C
60	N Livermore Ave	I-580 EB Ramps	Signal	Livermore	0.74	13.2	B	1.05	56.7	E
76	Grove Way	Castro Valley Blvd	Signal	Alameda Co.	0.87	15.7	B	1.02	37.5	D

A total of 78 intersections were evaluated. Only intersections with peak hour volume/capacity ratios greater than or equal to 1.00 are shown in this table. Note that level of service for signalized intersections is determined by average delay, not volume/capacity ratio.
Source: Dowling Associates – Synchro Analysis.

Table 77: Supplemental Scenarios – Short Term

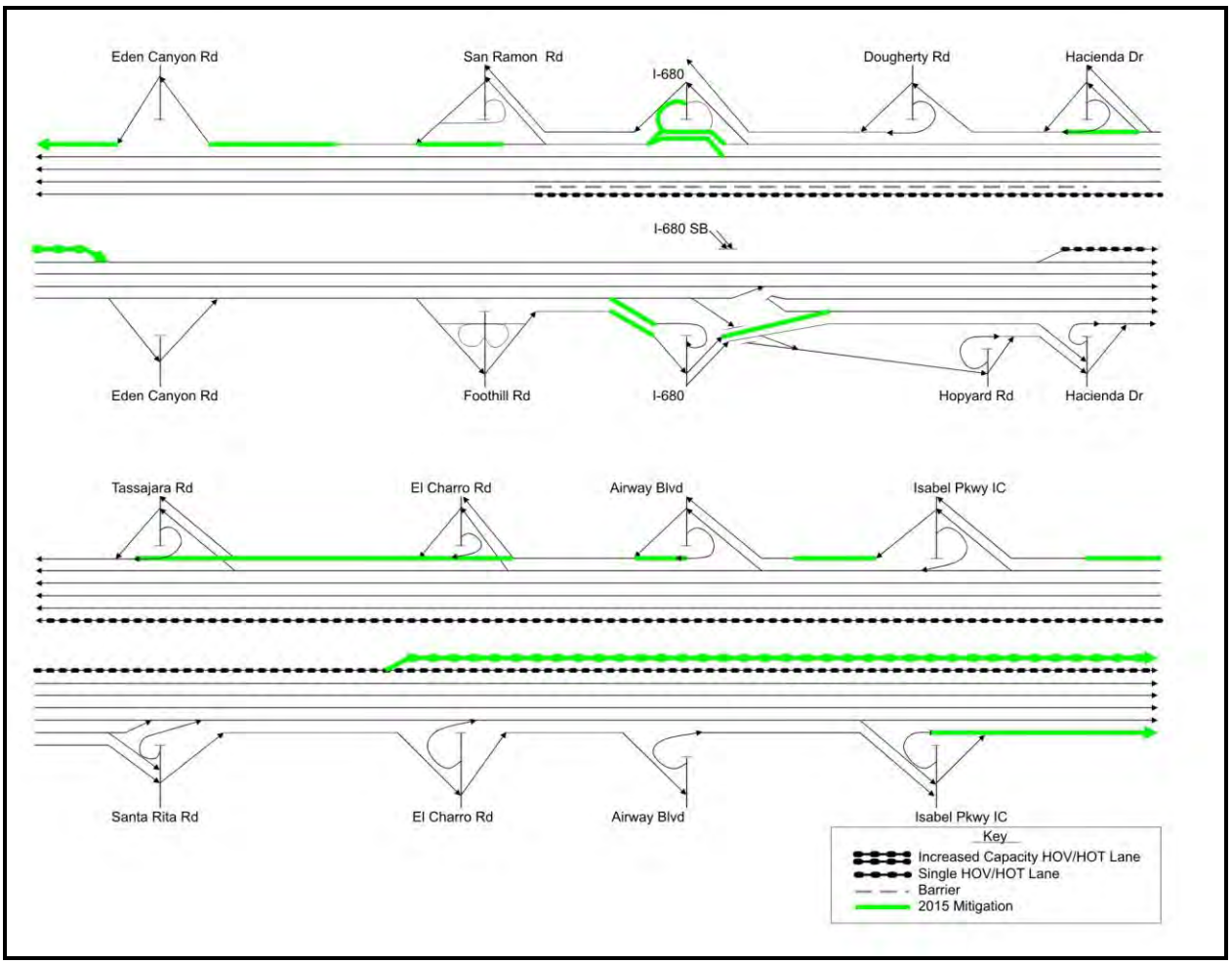
Level 1 Scenario – Ensure capacity for entire peak demand
1. Increase Capacity of I-580 WB to I-680 off ramp
2. Change San Ramon/Foothill Rd to WB580 on-ramp meter to two vehicles per green.
Level 2 Scenario – Ensure congestion is maintained at 2008 levels
3. No additional mitigations required.
Level 3 Scenario – Eliminate Congestion
4. Install ramp meters remaining unmetered on-ramps in corridor
5. Complete installation of Caltrans ITS infrastructure plan for I-580/I-238 corridor
6. Add WB aux (5th lane), N. Livermore to Isabel
7. Add WB aux (5th lane), N. Livermore to Isabel
8. Add WB aux (5th lane), Isabel Direct On to Airway Off
9. Add 5th lane WB, Airway Loop On to Airway Direct On (extend aux lane back to loop on)
10. Add 5th lane WB, Fallon/El Charro Off to Tassajara/Santa Rita Loop On
11. Add 5th lane WB, Hacienda Off to Hacienda Direct On.
12. Add 5th lane WB, from lane drop west of San Ramon/Foothill on to Eden Canyon Off
13. Add 5th lane WB aux lane, from Eden Canyon On to Grove Way off.
14. Add 4th lane WB from Mission/East 14th off to I-880 SB off.
15. Make I-880 NB to I-238 SB a full two-lane ramp.
16. Add HOV/HOT lane EB between Grove direct on and Eden Canyon off
17. Make I-680 EB off 2 lanes between freeway and where ramp diverges to loop for NB 680.
18. Make I-680 NB on full 2-lane on ramp where merges with EB 580. (Currently it necks down to one lane within a few hundred feet of merging with I-580 EB.
19. Add 5th lane (aux lane) eastbound between Isabel direct on and N. Livermore off.
20. Increase capacity of HOT lane (above that of a typical single HOT lane) EB between El Charro Off and First Street direct On.
21. Add HOV/HOT lane EB between N.Flynn Off and I-205 off, continue HOV lane to Tracy on I-205.

Figure 34: Schematic of Supplemental Scenarios – Short Term (A)



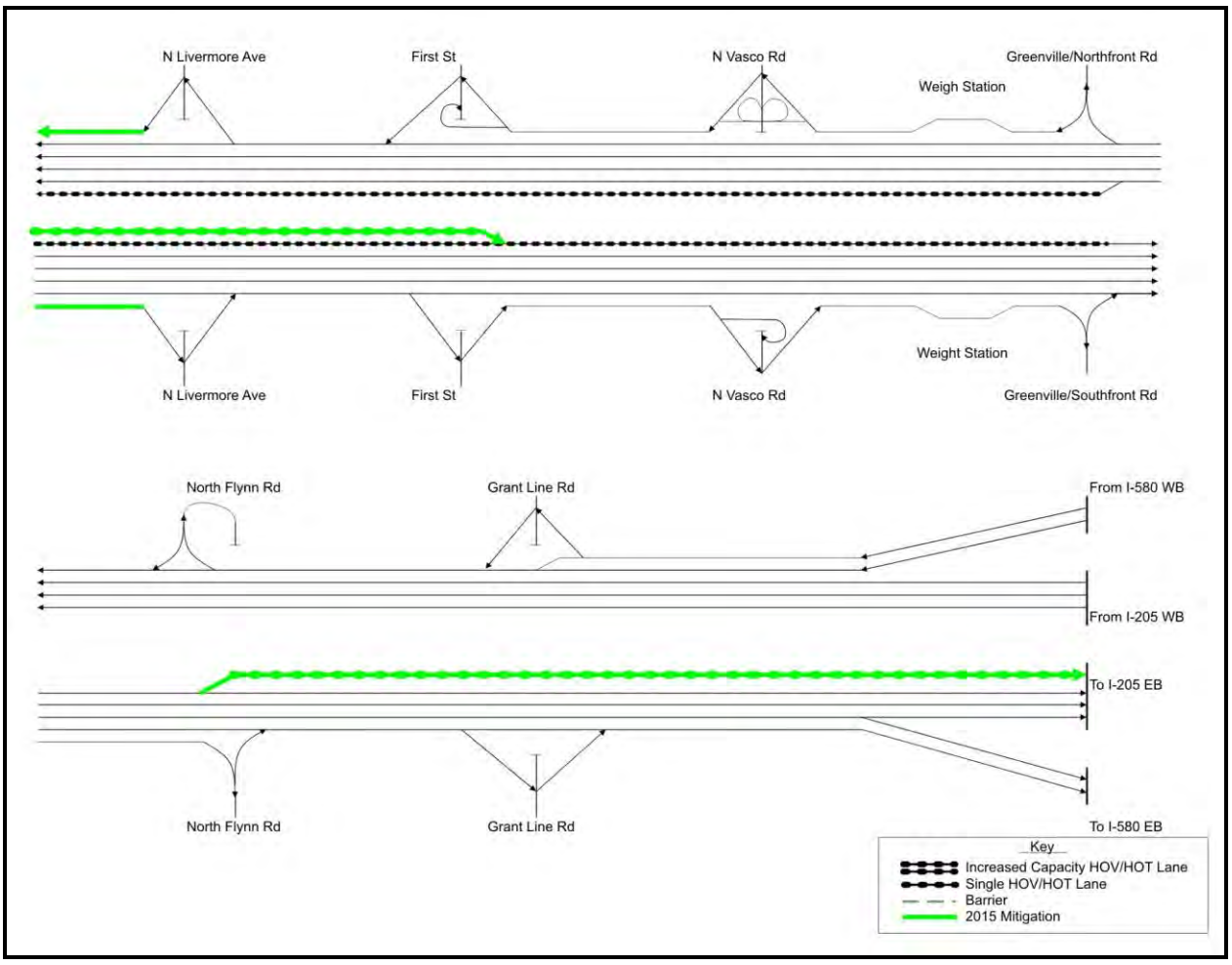
Mitigations highlighted above are "in-addition" to the programmed 2015 improvements. Improvements shown are for Level 3 (which also includes all of the Level 2 and 1 improvements).

Figure 35: Schematic of Supplemental Scenarios – Short Term (B)



Mitigations highlighted above are "in-addition" to the programmed 2015 improvements. Improvements shown are for Level 3 (which also includes all of the Level 2 and 1 improvements).

Figure 36: Schematic of Supplemental Scenarios – Short Term (C)



Mitigations highlighted above are "in-addition" to the programmed 2015 improvements. Improvements shown are for Level 3 (which also includes all of the Level 2 and 1 improvements).

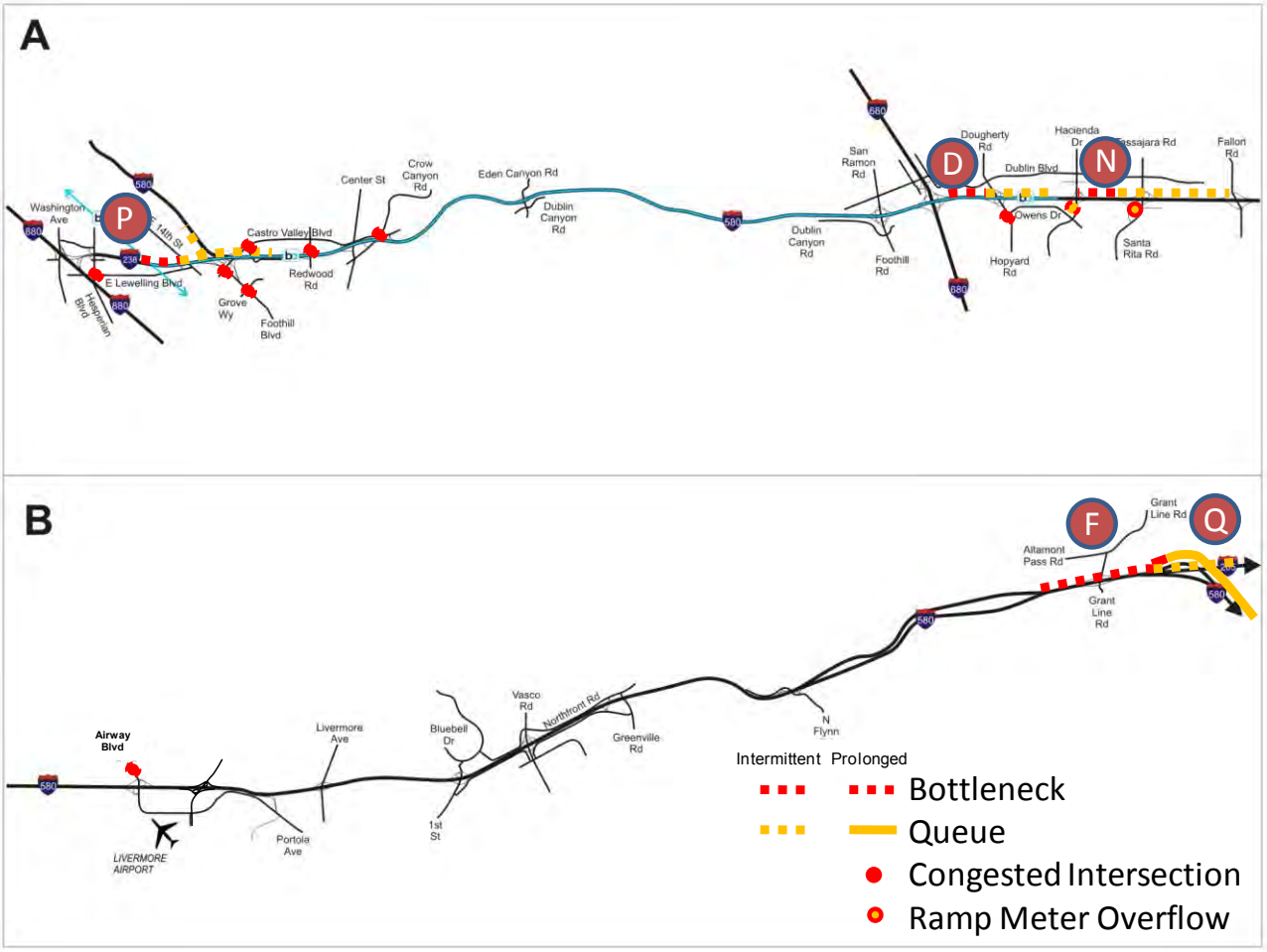
Table 78: Performance of Short Term Scenarios

	2008 Existing	2015 Program	2015 Level 1	2015 Level 2	2015 Level 3
VMT (AM)	1,263,752	1,456,186	1,456,200	1,456,200	1,456,186
VMT (PM)	1,662,204	2,078,294	2,078,300	2,078,300	2,078,294
Total VMT	2,925,956	3,534,480	3,534,500	3,534,500	3,534,480
Change	0%	21%	21%	21%	21%
VHT (AM)	24,763	27,305	26,900	26,900	25,549
VHT (PM)	30,810	41,253	40,500	40,500	34,836
Total VHT	55,573	68,559	67,400	67,400	60,385
Change	0%	23%	21%	21%	9%
VHD (AM)	6,815	6,355	6,100	6,100	4,332
VHD (PM)	5,572	12,141	10,810	10,810	4,814
Total VHD	12,387	18,496	16,910	16,910	9,145
Change	0%	49%	37%	37%	-26%
MPH (AM)	51.0	53.3	54.1	54.1	57.0
MPH (PM)	54.0	50.4	51.3	51.3	59.7
Total MPH	52.7	51.6	52.4	52.4	58.5
Change	0%	-2%	0%	0%	11%

Freeway Mainline Performance: VMT = Vehicle-Miles Traveled, VHT = Vehicle-Hours Traveled, VHD = Vehicle-Hours Delay, MPH = Mean speed miles per hour. AM is for 5–9 AM, PM is for 2:30-7:30 PM.

Results for 2008 Existing, 2015 Program, and 2015 Level 3 are based on Paramics microsimulation model. Results for Level 1 and Level 2 improvements are interpolated from microsimulation results.

Figure 37: Bottlenecks in 2015 with Level 3 Scenario Improvements



12. LONG TERM IMPROVEMENTS ANALYSIS (2035)

This chapter presents the alternatives analysis for long term (year 2035) improvements to the I-580/I-238 corridor. First the currently planned projects expected to be completed by 2035 are described and evaluated. The impacts of these improvements on mobility were assessed using microsimulation. Various supplemental improvement scenarios were then evaluated to address lingering congestion problems revealed in the analysis of the planned long term projects. The alternative scenario analysis was performed using sketch planning analysis.

A final, microsimulation based, evaluation was not performed on the highest level scenario, because the improvements required to achieve the level 3 mobility targets were so extensive as to be unrealistic. There was little new information to be gained from microsimulation of a level of improvements that was inherently unrealistic.

12.1. Planned Improvement Projects

Planned improvement projects that have been planned by public agencies for the I-580 and I-238 corridor, but which are currently not programmed were tested using the ACCMA travel demand model and the Paramics microsimulation model.

Table 70 shows regional highway and transit projects in the corridor. Table 72 shows the planned transit improvement projects in the corridor. Table 71 shows the local street improvement projects that are in local agency General Plans These are "planned" projects that ACCMA and its member agencies consider likely to be implemented by 2035 if sufficient funding can be obtained. These improvements are diagrammed in Figure 38, Figure 39, and Figure 40

12.2. Performance of Planned Improvements

The planned improvements were input to the ACCMA travel demand model along with MTC/ABAG/ACCMA forecasted land use and regional network changes for the year 2035. The ACCMA model forecasted AM peak period and PM peak period demands were then input into the Paramics and Synchro/Simtraffic microsimulation models for the I-580 corridor to assess corridor performance with the planned improvements for 2035.

The microsimulation model results were reviewed to identify lingering bottlenecks after the programmed improvements are in place. The microsimulation results were then aggregated into corridorwide mobility performance measures.

Corridorwide Mobility Performance

The corridorwide mobility performance in 2035 with the planned improvements is tabulated Table 83.

- The AM/PM peak period demand as measured in terms of vehicle-miles traveled (VMT) is forecasted to increase by 53% over current, 2008 levels
- Peak period vehicle-hours traveled (VHT) is forecasted to increase by over a thousand percent over existing 2008 conditions.
- Peak period vehicle-hours of delay (VHD) is forecasted to increase by over a thousand percent over existing 2008 conditions.
- The mean speed would drop from slightly under 53 mph under current conditions to under 5 mph.

Bottleneck Analysis

The AM and PM peak period congestion that would be present in 2035 with only planned improvements in place was so pervasive that a bottleneck analysis was not considered productive or informative.

12.3. Supplemental Improvement Scenarios

Three levels of supplemental improvement scenarios were identified.

- Level 1 improvements are designed to bring the total AM and PM peak period demands and capacities within balance, when averaged over the entire peak period. The peak period volume/capacity ratios are less than or equal to 100% for all ramps and mainline sections of freeways.
- Level 2 improvements are designed to bring the total AM and PM peak period congestion levels (measured in terms of mean travel time for trips traveling the length of the corridor) back to existing 2008 levels.
- Level 3 improvements are designed to eliminate all recurring congestion within the AM and PM peak periods.

The supplemental improvements for each scenario are described in Table 82. They are diagrammed in Figure 41, Figure 42, and Figure 43.

12.4. Performance of Supplemental Scenarios

The corridorwide mobility performance of the three scenarios is shown in Table 83. All three scenarios address an expected 53% increase in vehicle-miles traveled (VMT) in the corridor.

Level 1 Improvement Scenario

This level of improvement involves 52.9 lane-miles of added capacity over and above the programmed improvements for 2015.

The HOT lanes between I-680 and Greenville Road would be extended as follows:

- Westbound: from I-205 in Tracy, through the I-580 merge to North Flynn Road.
- Eastbound from Greenville Road to Tracy on I-205.

HOT lane capacity would be increased (above that of a typical single HOT lane) westbound between Isabel and Dougherty Road, and eastbound between Airway and First Street.

These improvements would cause the following mobility impacts:

- Peak period VHT would be significantly reduced, but would still exceed current levels by 142%.
- Peak period VHD would be significantly reduced over the 2035 plan level, but would still exceed current levels by 470%.
- Average speed of peak period travel would be 33 mph compared to the current mean speed of slightly under 53 mph.

Level 2 Improvement Scenario

This level of improvement involves 91.1 lane-miles of added capacity over and above the programmed improvements for 2015. HOT lane capacity westbound would be increased (above that of a typical single HOT lane) from Dougherty Road to I-680. A similar capacity increase (above that of a typical single HOT lane) for the eastbound HOT lane would start from Tassajara to Airway, and from First Street to Vasco. A single HOT lane eastbound would run over the Dublin Grade from Grove Way (in Castro Valley) to Foothill (In Dublin/Pleasanton).

These improvements would cause the following mobility impacts:

- Peak period VHT would be significantly reduced, but would still exceed current levels by 55%.
- Peak period VHD would be significantly reduced over the 2035 plan level, but would still exceed current levels by 81%.
- Average speed of peak period travel would be 52 mph, close to the current mean speed of slightly under 53 mph.

Level 3 Improvement Scenario

This level of improvement involves 126.1 lane-miles of added capacity over and above the programmed improvements for 2015.

Continuous HOT lanes would run both directions between Redwood Road and Tracy on I-205 (There could be a short break eastbound in the HOT lane through the I-680 interchange).

A high capacity westbound HOT facility, with capacity above that of a typical single HOT lane, would run between I-680 and I-205 in Tracy. High capacity eastbound HOT facility, with capacity above that of a typical single HOT lane, would run from Santa Rita to I-205 in Tracy.

The I-580 WB to I-680 SB direct ramp would have to be widened to 3 mixed flow lanes plus a high capacity HOT facility (with capacity greater than that of a typical single HOT lane).

These improvements would cause the following mobility impacts:

- Peak period VHT would be significantly reduced, but would still exceed current levels by 34%.
- Peak period VHD would be significantly reduced to 16% below current levels.
- Average speed of peak period travel would be 60 mph, better than the current mean speed of slightly under 53 mph.

The amount of capacity improvements necessary to mitigate all of the forecasted 2035 demand was so extensive as to be unrealistic. Consequently a bottleneck neck analysis of the congestion remaining after these improvements were in place was not conducted.

Table 79: Planned Long Term Regional Improvement Projects for I-580/238 Corridor

Project Name	Description	Cost	Notes
I-580/Foothill Rd Interchange Improvements	Interchange improvements	2.1	
I-580/Hacienda Dr Interchange Improvements	Reconstruct interchange	18.8	
I-580/First Street Interchange Modification	modify with partial cloverleaf interchange, expand off ramp to 2 lanes	37.0	
I-580/Isabel Ave/SR 84/Portola IC Interchange Improvements	Improve multi-modal access	28.0	
I-580/Vasco Rd Interchange Modification	modify with partial cloverleaf interchange	40.0	
I-580 Greenville Interchange Reconfiguration	replace with modified diamond interchange	43.0	
I-580 WB Truck Climbing Lane - Altamont Summit	widen from 4 lanes to 5 (truck climbing lane)	50.0	
I-580 Westbound off ramp to Dublin/ Pleasanton BART station	Construct new off-ramp to access Dublin/Pleasanton BART station	30.0	
I-580 Westbound Auxliliary lane - Airway to Isabel	widen WB from 4 lanes to 5 (auxiliary lane)	39.5	
I-580 Westbound Auxliliary lane - Isabel to First	widen WB from 4 lanes to 5 (auxiliary lane)	10.0	
I-580 WB to I-680 SB connectors	Fly-over connectors: HOV and mixed-flow	705.0	
I-580 Corridor – Regional HOT Network	WB - San Joaquin County Line to I-680 EB – Greenville Road to S.J. County Line I-680/580 Connector widen for HOT	578.6	
I-680 Sunol Grade SB HOV – Sunal to SR 84	new HOV lane	107.4	
I-680 SB HOT Lane – SR 84 to SR 237	New HOT lane, ramp metering, auxiliary lanes, pavement rehabilitation	230.9	
Route 84 4-Lane Expwy on new alignment – I-880 to Alvarado-Niles	new 6-lane expressway	112.0	
Route 84 Expressway Widening – I-680 to Pigeon Pass	widen from 2 lanes to 4	2.3	3
Route 84 Expressway Widening – Pigeon Pass to Jack London	widen from 2 lanes to 6 between Jack London at Stanley and from 2 lanes to 4 between Stanley and Pigeon Pass	129.6	
Route 84 Expressway Widening – New SR84 Link to W. Jack London	widen from 4 lanes to 6	24.6	
Route 84 Expressway Widening – Airway to new SR84 start	eliminate when new SR84 interchange goes in	39.5	
Total		2,228.30	

Notes:

1. Cost estimates in millions of 2007 Dollars unless noted otherwise below.
2. Cost estimates from the MTC "Draft Transportation 2035 Plan: Change in Motion"; in cases where the cost estimate included more than one project listed here (e.g., I-580 HOV lane v. I-580 EB and WB HOV lanes) the cost was divided between the projects.
3. Cost for preparation of supplemental Project Study Report for Route 84 widening from Pigeon Pass to I-680.

Note that the Caltrans Ramp Meter Deployment Plan calls for metering of the freeway to freeway connectors at the I-580 and I-680 interchange. This option was not evaluated in this CSMP traffic analysis, but it is an available option for further managing freeway corridor congestion.

Table 80: Planned Transit Projects for I-580/238 Corridor

Project Name	Description	Cost	Notes
ACE Rail Service Improvements	Acquire ROW, complete track improvements, expand station platforms	150.0	
BART Extension to Livermore – Hacienda to Vasco	Extend current BART service to Livermore along the I-580 corridor	129.0	3
LAVTA	Transit operating and capital improvement program	783.4	
High Speed Rail	Fund infrastructure for CE, BART, Caltrain, Muni, VTA	439.0	
Total		1501.4	

Notes:

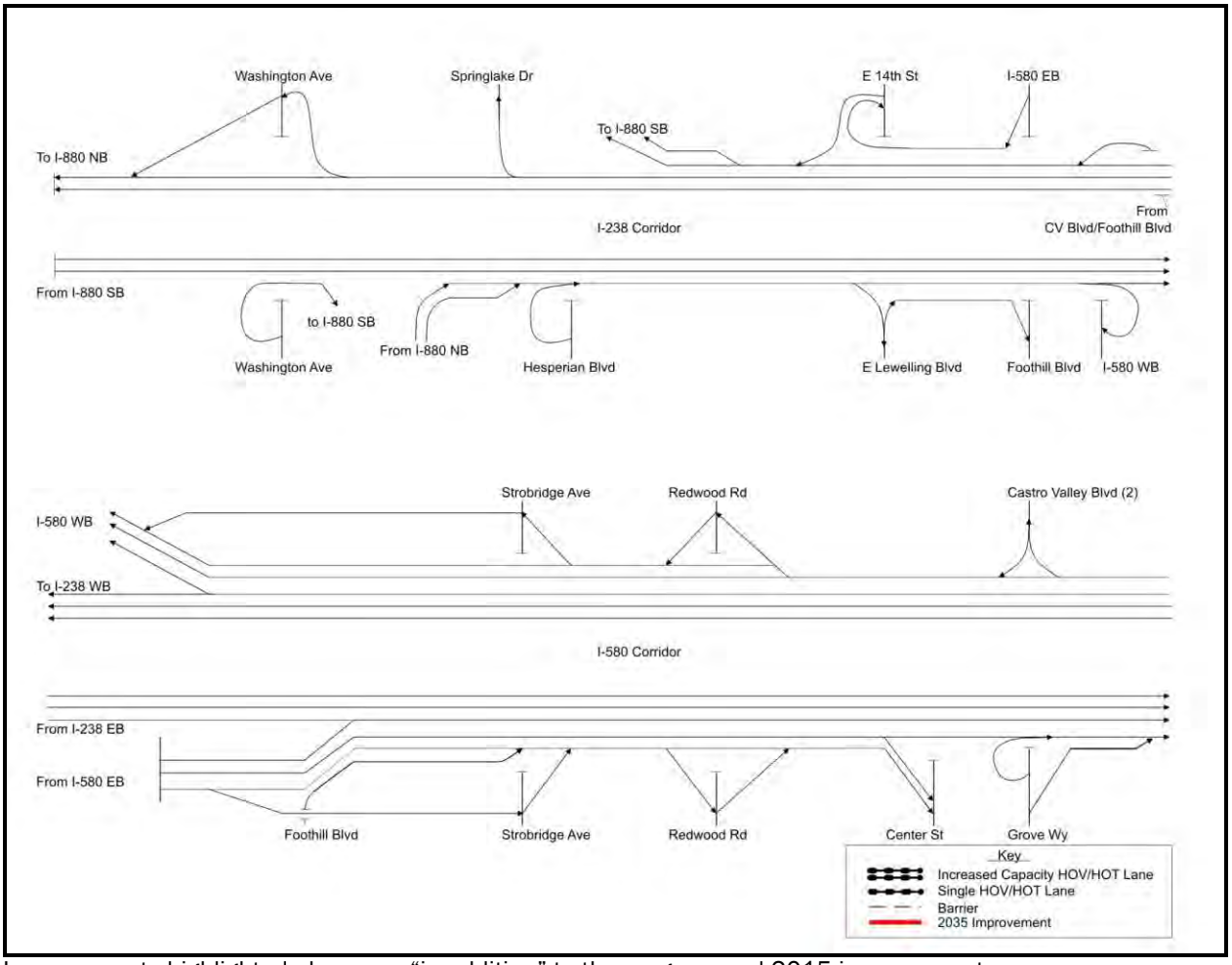
1. Cost estimates in millions of 2007 Dollars unless noted otherwise below.
2. Cost estimates from the MTC "Draft Transportation 2035 Plan: Change in Motion";
3. Cost varies between $64.5 – 129.0 million, according to alignment selected.

Table 81: Planned long Term Local Street Projects for I-580/238 Corridor

Street	Agency	From	To	Description
Foothill Blvd	Hayward	I580 EB ramps		remove parking during peak periods, spot widening
Foothill Rd	Dublin	Stoneridge Dr	school	widen from 2 lanes to 4
San Ramon Rd	Dublin	I580 EB ramps	I580 WB ramps	widen from 4 lanes to 8
Greenville Rd	Livermore	Northfront Rd	Las Positas Rd	widen from 4 lanes to 6
Holmes St	Livermore	Lexington Way	Wetmore Rd	widen from 2 lanes to 4
Las Positas Rd	Livermore	Vasco Rd	Lawrence Dr	widen from 2 lanes to 4
Northfront Rd	Livermore	Vasco Rd	Herman Ave	widen from 2 lanes to 4
P St	Livermore	Railroad Ave	Chestnut St	widen from 2 lanes to 4
Redwood Rd	Livermore	terminus	Las Colinas Rd	extension of 2-lane roadway
Stanley Blvd	Livermore	Murietta Blvd	Isabel Ave (SR84)	widen from 4 lanes to 6
Vasco	Livermore	I580 EB ramps	Las Positas Rd	widen from 4 lanes to 8
Vasco	Livermore	I580 WB ramps	I580 EB ramps	widen from 2 lanes to 6
Vasco	Livermore	Scenic Ave	I580 WB ramps	widen from 4 lanes to 6
W Jack London Blvd	Livermore	Isabel Ave (SR84)	terminus	widen from 2 lanes to 4
W Jack London Blvd	Livermore	terminus	El Charro Rd	widen from 2 lanes to 4
Airway Blvd	Livermore	I580 EB ramps	I580 WB ramps	widen from 4 lanes to 6
Airway Blvd	Pleasanton	North Canyons Pkwy	I580 WB ramps	widen from 4 lanes to 6
Bernal Ave	Pleasanton	1st St	Independence St *	widen from 2 lanes to 4
Bernal Ave	Pleasanton	I680 SB ramps	I680 NB ramps	widen from 2 lanes to 4
Busch Rd	Pleasanton	Valley Ave	El Charro Rd	new 4 lane roadway
Castlewood Dr	Pleasanton	Pleasanton Sunol	I608 SB ramps	widen from 2 lanes to 4
El Charro Rd	Pleasanton	farm road	Stanley Blvd	new 4 lane roadway
North Canyons Pkwy	Pleasanton	Collier Canyon Rd	Doolan Rd	widen from 4 lanes to 6
Santa Rita Rd	Pleasanton	Valley Ave	Mohr Ave	widen from 6 lanes to 8
Stoneridge Dr	Pleasanton	Santa Rita Rd	terminus	widen from 4 lanes to 6
Stoneridge Dr	Pleasanton	terminus	El Charro Rd	new 4 lane roadway
Vineyard Ave	Pleasanton	Bernal Ave	W Old Vineyard Ave	widen from 2 lanes to 4
W Las Positas Blvd	Pleasanton	Foothill Rd	Payne Rd	widen from 2 lanes to 4
Marina Blvd	San Leandro	Alvarado St	Merced St	widen from 4 lanes to 6

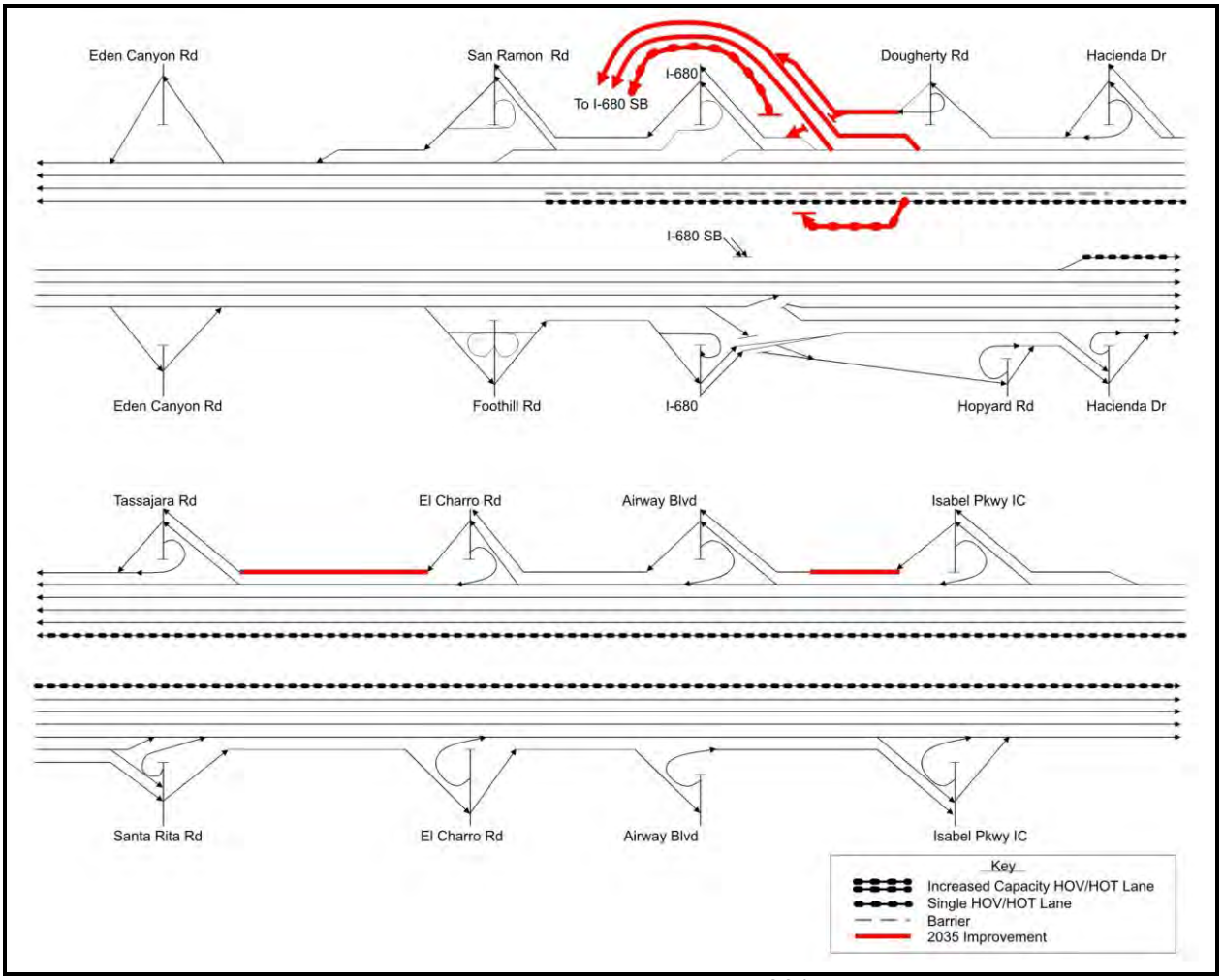
Source: ACCMA Model 2035 Highway and Transit Networks (2008).

Figure 38: Schematic of Planned Improvements Long Term (A)



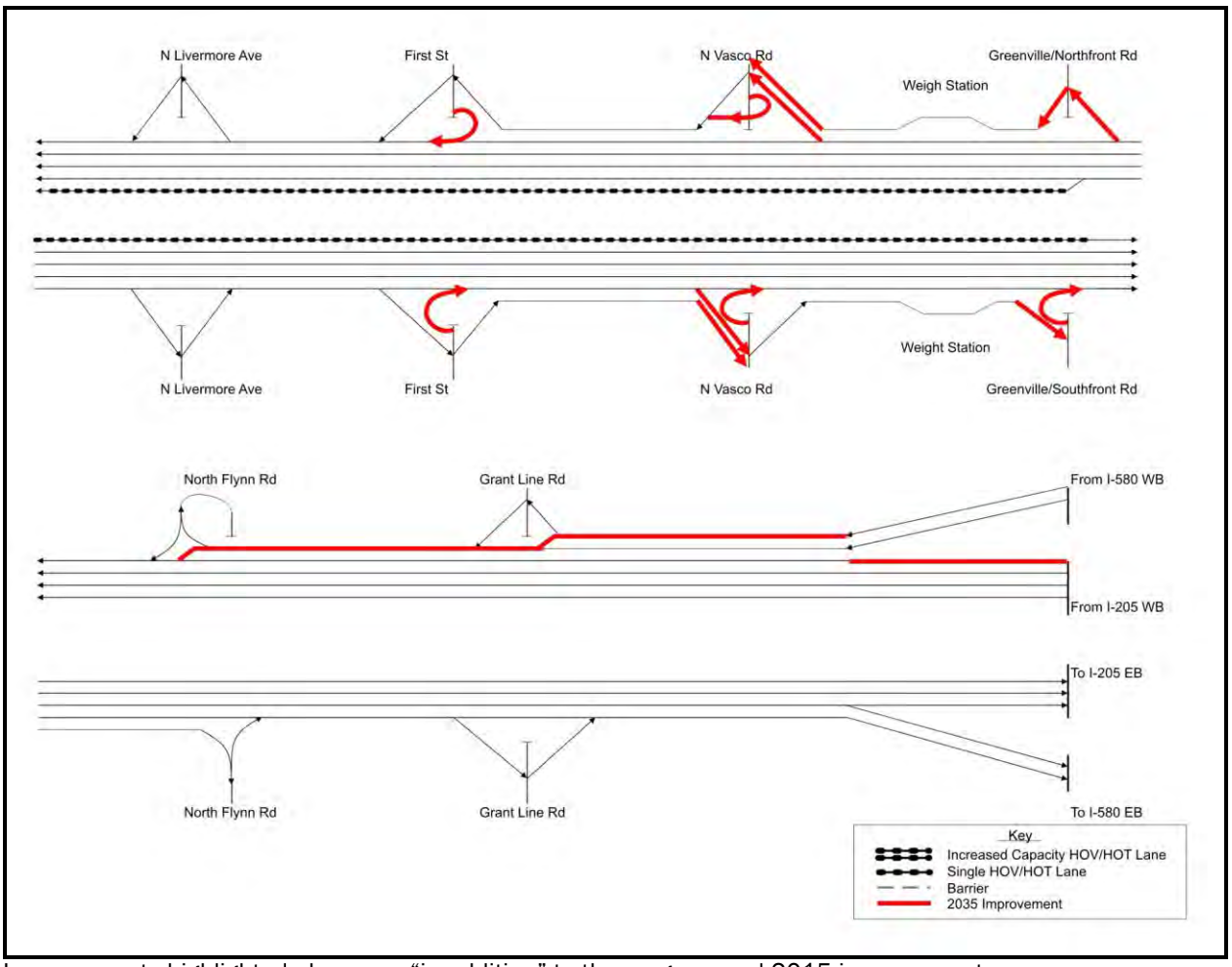
Improvements highlighted above are "in-addition" to the programmed 2015 improvements

Figure 39: Schematic of Planned Improvements Long Term (B)



Improvements highlighted above are “in-addition” to the programmed 2015 improvements

Figure 40: Schematic of Planned Improvements Long Term (C)



Improvements highlighted above are “in-addition” to the programmed 2015 improvements

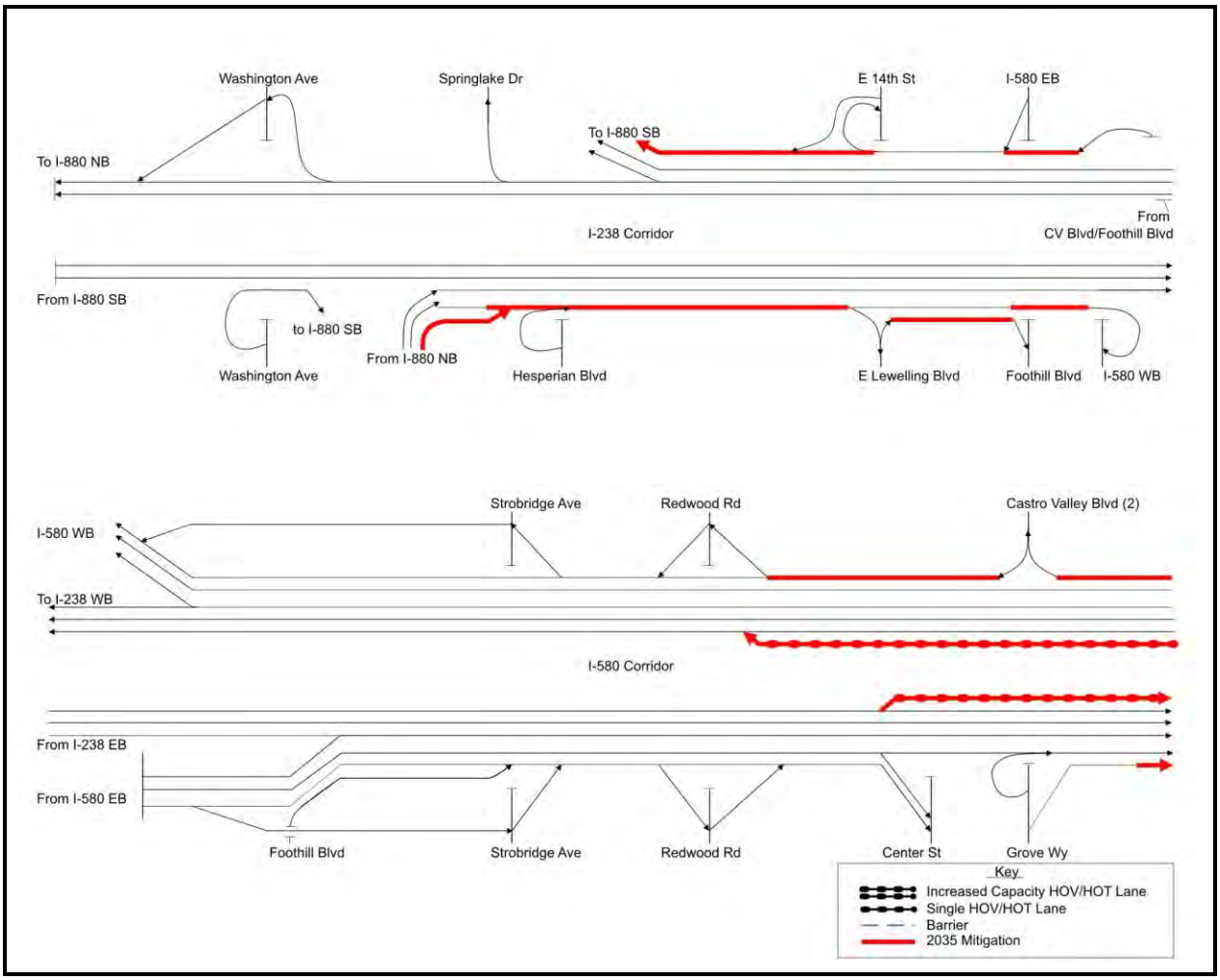
Table 82: Supplemental Long Term Improvements

Supplemental Long-Term Projects
Level 1 – Ensure capacity for entire peak demand
Westbound
1. Add WB HOT lane to I-205 WB from Tracy to N.Flynn On
2. Widen I-580 WB on from 2 to 3 lanes (east of the I-205 merge in Tracy area)
3. Add WB lane (makes 6) between I-205 merge and Grant Line Road Off ramp.
4. Add WB lane N.Flynn to Greenville Rd Off (makes 5 mixed flow lanes total).
5. Add 2nd lane to Greenville WB off ramp.
6. Add fifth WB lane N. Livermore Off to Isabel Off.
7. Increase the capacity of the WB HOT lane between Isabel Off to Dougherty Road Loop On to handle demand that is forecasted to exceed that of a typical single HOT lane..
8. Add 5th WB aux lane between Isabel direct on and Airway Off.
9. Expand WB to SB 680 off-ramp mixed flow flyover to 3 lanes. (Keep the direct HOV ramp to the flyover and the HOV lane on the flyover)
10. Extend WB HOV lane past San Ramon Off to lane add just before Redwood Off. (Four lanes plus HOV become 5 mixed flow lanes before Redwood Off)
11. Add 4th WB lane East 14th On to I-880 SB.
12. Change San Ramon/Foothill Rd to WB580 on-ramp meter to two vehicles per green. (Max metering rate becomes 1800 vphpl)
13. Change Airway direct on ramp to WB580 on-ramp meter to two vehicles per green. (Max metering rate becomes 1800 vphpl)
Eastbound
14. Add 3rd lane to I-880 NB on ramp to SB 238.
15. Add 2nd lane to I-680 off ramp
16. Add 2nd lane to Dougherty Off Ramp
17. Add 2nd lane to I-680 NB On Ramp
18. Increase the capacity of the EB HOT lane Airway Off to First Street On above that of a typical single HOT lane.
19. Add 5th EB Lane:
a. Isabel On to Livermore Off (AUX)
b. Livermore On to First Street Off (AUX)
c. Vasco Loop On to Vasco Direct On
d. Weigh station Off to Weigh Station On
e. Greenville Off to Greenville On
f. N. Flynn off to Grant Line On
20. Add 6th EB lane between Grant Line On and I-205 off.
21. Add HOT lane EB Greenville Off to I-205 off ramp.
22. Add HOT lane to EB I-205 off ramp through Tracy.
23. Add HOT lane to EB I-580 off ramp through Tracy.
Level 2 – Ensure congestion is maintained at 2008 levels
Westbound
24. Add 4th WB lane to I-205 WB in Tracy leading up to I-580 merge.
25. Add 4th WB lane to I-580 WB in Tracy leading up to the I-205 merge.
26. Add 7th WB lane between I-205 merge and Grant Line Road off.
27. Add 2nd lane to WB off ramp at Grant Line Road.
28. Add another WB lane between Grant Line off and Greenville Off.
29. Add 5th WB lane between Greenville Off and On, and between Weigh Station off and On.
30. Add 5th WB lane between First Street Off and First Street direct on.
31. Increase capacity of WB HOT lane (above that of typical single HOT lane) at First Street direct on and run through to Isabel Off.
32. Add 5th WB mixed flow lane Isabel off through Isabel Loop on to Isabel direct on.
33. Add 5th WB mixed flow lane between El Charro Off, El Charro Loop On, and El Charro Direct On.
34. Add 5th WB mixed flow lane between Tassajara Off and Tassajara Loop On.

Supplemental Long-Term Projects
35. Add 5th WB mixed flow lane between Hacienda Off, Hacienda Loop On, and Hacienda Direct On.
36. Add 5th WB mixed flow lane between Dougherty Off, and Dougherty Loop On.
37. Increase capacity of WB HOT lane (above that of typical single HOT lane) from Dougherty Loop On to I-680 Off.
38. Add 5th WB mixed flow lane between lane drop west of San Ramon Rd to Grove Way Off.
39. Add 4th WB mixed flow lane between East 14th off and East 14th On.
Eastbound
40. Add 4th Lane EB: I-880 NB through to I-580 WB off
41. Add EB HOV lane Eden Canyon Off to Foothill Off.
42. Increase capacity of EB HOT lane Tassajara Loop On to Airway Off above that of typical single HOT lane.
43. Add 5th EB lane
g. Isabel On to Livermore off
h. Livermore On to First Off
44. Add 6th EB lane
i. Isabel Loop On to Isabel Direct On
j. Livermore Off to Livermore On
k. First Street Off to First Street Loop On, to First Street Direct On
l. Greenville On to Grant Line On
45. Increase capacity of EB HOT lane First Street Direct On to Vasco Loop On above that of typical single HOT lane.
46. Add 4th EB lane to I-205 EB off ramp through Tracy.
Level 3 – Eliminate Congestion
Westbound
47. Add 7th WB lane between Grant Line off and Greenville Off.
48. Add 5th lane WB Vasco Off to Vasco On.
49. Add 6th lane WB
m. N. Livermore On to Isabel Off (AUX)
n. Isabel Loop On to Isabel Direct On to Airway Off
o. Airway On to El Charro Off (AUX)
p. Fallon On to Tassajara Off (AUX)
q. Hacienda On to Hopyard Off (AUX)
r. Hopyard Direct On to I-680 Off
50. Increase capacity of WB HOT off ramp lane to I-680 above that of typical single HOT lane.
51. Increase capacity of EB HOT lane I-680 off to I-680 SB On above that of typical single HOT lane.
52. Widen I-680 NB on ramp to 2 lanes
53. Widen I-680 SB on-ramp to 2 lanes
54. Add 5th WB lane between Grove Way On and Redwood Off
55. Add 4th NB lane to I-238 between Foothill On and I-580 EB On
56. Change Dougherty/Hopyard Direct WB580 on-ramp meter to two vehicles per green. (Max metering rate becomes 1800 vphpl)
Eastbound
57. Add 4th Lane to I-880 SB to I-238 SB on-ramp
58. Add 5th EB lane Lewelling On to Foothill Off.
59. Extend EB HOT lane Center Off to Grove Direct On.
60. Add 5th EB lane (auxiliary lane) Grove Way direct On to Eden Canyon Off
61. Add 5th EB lane (auxiliary lane) Eden Canyon On to Foothill Off
62. Extend EB HOT lane Foothill Off to Foothill On
63. Add 3rd lane to I-680 SB on-ramp
64. Add 3rd lane to I-680 NB on-ramp
65. Increase capacity of EB HOT lane Santa Rita Off to Santa Rita Loop On above that of typical single HOT lane.
66. Add 5th EB lane
a. Airway Off to Airway On
b. Isabel Off to Isabel Loop On
c. Vasco Off to Vasco Loop On
d. Vasco Loop On to Greenville On

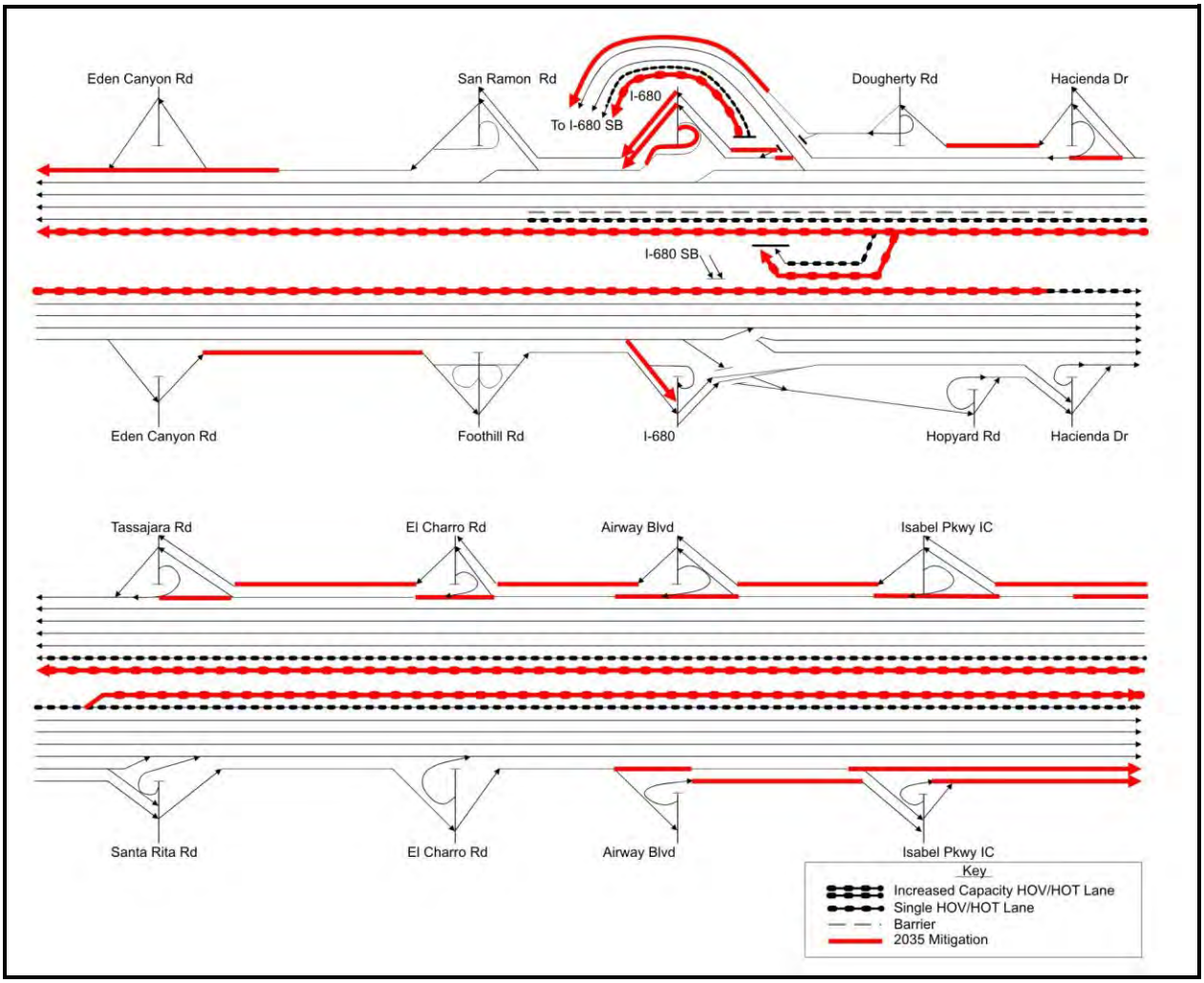
Supplemental Long-Term Projects
67. Add 6th EB lane
e. Airway On to Isabel Off (AUX)
f. Isabel Direct On to N. Livermore Off (AUX)
g. N. Livermore On to First Street Off (AUX)
h. First Street Loop On to First Street Direct On to Vasco Off
i. Greenville On to I-205 Off
68. Add 3rd EB lane to I-580 Off ramp through Tracy.

Figure 41: Schematic of Supplemental Long Term Improvements (A)



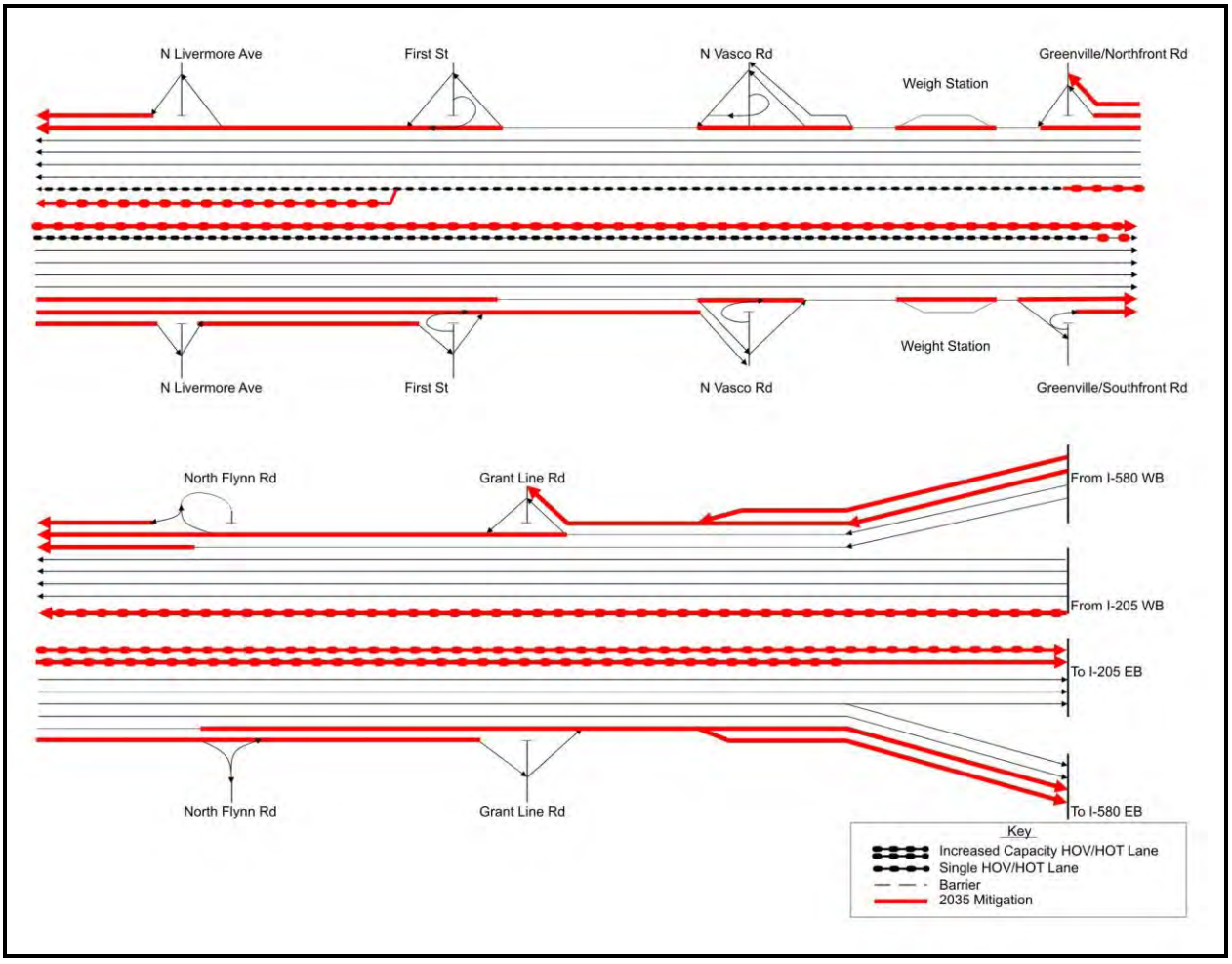
Mitigations highlighted above are "in-addition" to the planned 2035 improvements. Improvements shown are for Level 3 (which also includes all of the Level 2 and 1 improvements)

Figure 42: Schematic of Supplemental Long Term Improvements (B)



Mitigations highlighted above are "in-addition" to the planned 2035 improvements. Improvements shown are for Level 3 (which also includes all of the Level 2 and 1 improvements)

Figure 43: Schematic of Supplemental Long Term Improvements (C)



Mitigations highlighted above are "in-addition" to the planned 2035 improvements. Improvements shown are for Level 3 (which also includes all of the Level 2 and 1 improvements).

Table 83: Performance of Long Term Scenarios

	2008 Existing	2035 Plan	2035 Level 1	2035 Level 2	2035 Level 3
VMT (AM)	1,263,752	1,943,100	1,943,100	1,943,100	1,943,100
VMT (PM)	1,662,204	2,530,400	2,530,400	2,530,400	2,530,400
Total VMT	2,925,956	4,473,500	4,473,500	4,473,500	4,473,500
Change	0%	53%	53%	53%	53%
VHT (AM)	24,763	226,100	55,400	39,500	35,700
VHT (PM)	30,810	737,300	79,100	46,800	38,600
Total VHT	55,573	963,400	134,500	86,300	74,300
Change	0%	1634%	142%	55%	34%
VHD (AM)	6,815	198,341	27,641	11,741	7,941
VHD (PM)	5,572	701,151	42,951	10,651	2,451
Total VHD	12,387	899,493	70,593	22,393	10,393
Change	0%	7162%	470%	81%	-16%
MPH (AM)	51.0	8.6	35.1	49.2	54.4
MPH (PM)	54.0	3.4	32.0	54.1	65.6
Total MPH	52.7	4.6	33.3	51.8	60.2
Change	0%	-91%	-37%	-2%	14%

Freeway Mainline Performance
VMT = Vehicle-Miles Traveled, VHT = Vehicle-Hours Traveled, VHD = Vehicle-Hours Delay, MPH = Mean Speed (mph)

Results for 2008 Existing are based on Paramics microsimulation model. Results for 2035 Planned, Level 1, Level 2, and Level 3 improvements are from sketch planning analysis. The forecasted 2035 demands so greatly exceed capacity that the usual output data collection processes in the microsimulation model were unable to accurately accumulate the unserved demand.

13. RECOMMENDED STRATEGIES

This chapter presents the draft recommended short term and long term improvements for the corridor

13.1. Recommended Short Term Improvements

The recommended short term Management, Capacity, Transit, and Demand Management Improvements are presented in Table 84. The freeway improvements are diagrammed in Figure 44, Figure 45, and Figure 46.

Freeway Management Improvements

The recommended short-term freeway management improvements consist of completing the installation of ramp meters with HOV lanes on the remaining unmetered on-ramps in the corridor, adjustments to the ramp metering rates at locations forecasted to have unacceptable queues in 2015, increasing the capacity of the HOT lanes above that of a typical single HOT lane in the most intensely used section of the freeway corridor, and the augmentation of existing freeway service patrol trucks in the corridor.

The peak period demands at the San Ramon/Foothill Boulevard east and westbound on-ramps, and at the I-580 westbound on-ramp at the I-205 interchange are forecasted to exceed the maximum feasible ramp metering rates (900 vph/lane) in 2015. Consequently, to avoid excessive queuing onto surface streets and onto I-580 in San Joaquin County, it is recommended that the queues at these three ramps be monitored by Caltrans and the metering policy at these three on-ramps be changed to allow two vehicles per green when the observed queues become excessive. This recommended improvement is expected to have a high cost-effectiveness ratio because the costs of changing the policy at these locations consists solely of installing signs indicating the policy change.

Caltrans has observed that many drivers do not take advantage of the 2 vehicles per green policy (at locations where such a policy has been put in place), so the capacity increases associated with such a policy change are typically only 10% to 20%. To obtain greater capacity increases at these metered on-ramps it may be necessary to add a second metered lane for SOV's. The cost estimate for this improvement assumes that the ramps would need to be widened.

Operations analysis of the Hacienda Loop On-Ramp to Eastbound I-580, and of the Tassajara Loop On-Ramp to Eastbound I-580 suggest that queues on these two ramps will back up onto surface streets by 2015 unless additional storage is provided on these ramps for when the ramp meters are operational. It is recommended that a second storage lane be added to each loop on-ramp to improve the ability of Caltrans to flexibly meter these two ramps without adversely impacting surface street operations. This improvement is expected to have a highly favorable cost-effectiveness ratio because it will reduce the frequency and probability of intermittent backups onto the surface streets that in turn could cause significant delays to other surface street traffic.

Experience with the current ramp metering system on I-580 has shown them to be highly cost-effective at reducing freeway congestion and delays. Consequently it is recommended that the installation of ramp meters be completed for the remainder of the I-238 and I-580 corridor. Freeway-to-freeway ramps would be excluded. HOV lanes would be provided all of the remaining on-ramps where the available right-of-way and geometric constraints permit them, except Eden Canyon, where the rural nature of development suggests that HOV volumes would not be significant.

Additional ITS improvements (in addition to ramp metering) are listed in Table 85. These improvements will provide better information to Caltrans on traffic conditions and enable Caltrans to better communicate guidance information to drivers.

Demand forecasts for 2015 suggest that the peak period HOV demands would exceed the desired 1600 vehicle per hour per lane capacity of the planned single HOV lane between First Street in Livermore and Santa Rita/Tassajara Road in Pleasanton/Dublin. Consequently it is recommended that additional capacity be provided in each direction of the HOT lanes on this heavily utilized section of the I-580 freeway.

The HOV demand for the HOT lanes can be reduced by increasing the minimum persons per vehicle for HOV's to 3 persons. This will open up more slots in the HOT lanes for toll paying drivers and will enable the operators to preserve good operating conditions in the HOT lanes. This option however will also result in increased vehicles in the mixed flow lanes.

A second option for increasing HOT lane capacity is to add more lanes. This higher cost option was used to estimate the costs for this improvement. This option however may have right-of-way cost implications when taking into account a future longer term BART extension in the freeway median. The cost of purchasing additional right-of-way to preserve the option of BART in the median was not considered in the cost estimates for the dual-HOT lanes option.

The average customer reported wait times for freeway service patrol (FSP) response is close to 10 minutes for the freeway service patrol beat that extends east from Hacienda Drive to the Altamont Pass (FSP Beat 22). Consequently, it is recommended that a fourth truck be provided to augment the FSP service on this stretch of I-580. It is also recommended that the hours of coverage be extended to match those of the adjacent FSP beat (#27). Studies by MTC of the cost-effectiveness of freeway service patrols have found them to be very cost-effective.

Surface Street Management Improvements

Studies of the cost effectiveness of signal timing optimization have always shown the surface street management to be highly cost-effective. Consequently, it is recommended that the local agencies (San Leandro, Hayward, Alameda County, Dublin, Pleasanton, and Livermore continue to pursue improvement of their current signal coordination systems. Better integration surface street signal operation with information on freeway conditions is also desirable, as expressed in the I-580 Transportation Management Plan (TMP).

Freeway Capacity Improvements

Freeway capacity improvements are almost always less cost-effective than management measures, due to the greater costs of capacity improvements. However, there will remain several significant congestion bottlenecks in 2015 even after the programmed improvements are in place and the above recommended management measures are implemented. Consequently several already planned freeway capacity improvements are recommended for acceleration to 2015 along with a couple additional improvements identified from the microsimulation and traffic operations analysis.

The planned westbound auxiliary lanes on I-580 that are part of the Isabel Avenue and the Fallon/El Charro interchange projects should be accelerated to enable their completion by 2015 or as soon thereafter as feasible to resolve bottleneck problems that are forecasted to occur between North Livermore and Isabel Avenue, between Isabel Avenue and Airway Blvd., and between Fallon/El Charro and Tassajara/Santa Rita Road.

Similarly the planned eastbound auxiliary lane between Isabel Avenue and North Livermore that is part of the Isabel Avenue interchange project should be accelerated as much as feasible to address the capacity bottleneck problems that will arise soon after this interchange opens.

A new northbound bottleneck will arise on I-238 between the lane drop at the Mission/East 14th Street off-ramp and the southbound I-880 off-ramp around 2015. The queues are forecasted to significantly affect westbound I-580 and the eastbound I-580 off-ramp to northbound I-238. Consequently it is recommended that the 4th lane on northbound I-138 be continued to the I-880 southbound off-ramp.

The I-580 westbound to I-680 southbound loop off-ramp will continue to be a significant bottleneck in 2015. The proposed westbound to southbound flyover ramp will eventually solve this problem but the cost is such that this cannot be a short term improvement. Consequently, a minor improvement is recommended that might reduce the effects of this bottleneck on westbound 580. Providing a separate short off-ramp for westbound traffic going to southbound 680 will separate the queue of traffic going to southbound 680 from the traffic going to northbound 680. The benefits are marginal.

Surface Street Capacity Improvements

Eight signalized intersections in the vicinity of the I-580 and I-238 freeways are forecasted to operate at peak hour volume/capacity ratios in excess of 1.00. These bottlenecks generally restrict the ability of surface street traffic to access the freeway but also can affect freeway off-ramp operations and the ability of surface street traffic to use the surface streets as an alternative to the freeway for short trips. Consequently it is recommended that spot intersection capacity improvements be made at the intersections forecasted to be bottlenecks. While the direct benefits to freeway mobility are expected to be small, the benefits to surface street traffic of reducing the v/c ratio below 1.00 are significant. Consequently, these improvements are recommended to supplement the previously identified freeway management, surface street management, and freeway capacity improvements.

Transit Improvements

There have been significant transit improvements in the I-580 corridor over the last few years: The BART Dublin/Pleasanton Line, and increased trains on the San Joaquin ACE train. The objective here is to preserve these improvements in the face of significant reduction in transit operations funding at the state level.

Gateway Constraint and Other Measures

No further demand management or other measures are required preserve mobility and reliability in the I-238/580 corridor for the short term beyond those already described above under freeway management and surface street management.

13.2. Recommended Long Term Improvements

The recommended long term Management, Capacity, Transit, and Demand Management Improvements are presented in **Error! Reference source not found.**. The freeway improvements are diagrammed in Figure 44, Figure 45, and Figure 46. The off-freeway subregional transit and surface street improvements are mapped in Figure 47.

The recommended long-term improvements do not seek to preserve the mobility gains that would be achieved by 2015 with the recommended short-term improvements, or even attempt to return mobility and reliability to 2008 levels. This is because the forecasted 56% to 110% growth in weekday peak period demand for the corridor between San Joaquin County and the Bay Area so greatly exceeds any feasible capacity improvements that the goal is no longer to improve single-occupant vehicle mobility but to reduce its deterioration as much as possible.

The overall long term strategy is to NOT increase single-occupant vehicle capacity over the Altamont Pass, and instead focus on capacity increases for alternative modes of travel. The Altamont Pass becomes a designated inter-regional choke point for single-occupant vehicle travel during the weekday peak periods, with options available to bypass this choke point for multi-occupant vehicles and rail transit.

Freeway Management Improvements

The freeway management strategy is to extend the HOV/HOT lanes to a much fuller length of the corridor (from Redwood Road in Castro Valley to the I-205 interchange near Tracy). The recommended HOT lanes (single lane each direction) would extend into Tracy on I-205.

The stretch of I-580 where HOV demands exceed the capacity of a single HOT lane in each direction would be extended as well. The impacted sections would run between First Street in Livermore to Santa Rita Road in Pleasanton in both directions. In the westbound direction the impacted sections would extend beyond Santa Rita Road continuing on to the San Ramon/Foothill Road interchange. In the eastbound direction the impacted HOT lane sections would continue past First Street and terminate at Vasco Road.

The MTC 2035 RTP project to construct direct flyover ramp from westbound I-580 to southbound I-680 is recommended in the long term to address continuing congestion problems at this interchange. The flyover is recommended at 2 mixed flow lanes plus 1 HOT lane. This configuration would not be sufficient to serve all of the demand forecasted for this movement in 2035, if that demand could all reach this interchange within the peak period. This configuration will work only if steps are taken to constrain single-occupant vehicle demand over the Altamont Pass and if additional capacity is provided elsewhere (see surface street capacity improvements and transit improvement described below) to relieve the demand at this interchange.

This flyover is primarily a capacity improvement, but since it includes a HOT lane and will only work acceptably if implemented in combination with the other demand management measures described below, it has been classified as a freeway management improvement.

Surface Street Management Improvements

Long-term surface street management improvements consist of continuing to improve signal coordination, incident detection, and incident management on surface streets. In addition, HOT lanes are recommended to be added to SR 84 (Isabel Parkway and Pigeon Pass) between the I-580 and I-680 freeways to help off-load the I-580/I-680 interchange.

Freeway Capacity Improvements

The recommended long-term freeway capacity improvements consist of the already planned interchange reconstruction projects at the San Ramon/Foothill, Hacienda Drive, First Street, Vasco Road, and Greenville Road interchanges. The expected benefits to freeway mainline operation consist primarily of the benefits expected from the auxiliary lanes associated with these interchange projects.

This follows the overall philosophy of the long term improvements which is to avoid single-occupant vehicle capacity improvements.

Surface Street Capacity Improvements

The recommended long-term surface street capacity improvements are designed to off-load the I-580 freeway and the I-580/I-680 interchange as much as possible through capacity improvements to alternate facilities. These include widening SR84 its full length between I-580 and I-680, extending El Charro south to connect to Stanley Boulevard, and widening the Byron Highway as an alternate access route between the San Joaquin Valley and the Bay Area.

Transit Improvements

The recommended long-term transit improvements are designed to augment alternatives to single-occupant vehicle travel in the I-580 corridor. These improvements address rail capacity shortfalls over the Altamont

Pass (Double tracking the Union Pacific line, capacity and safety improvements), extension of BART to connect to the ACE train, and facilities to ease transfers between those two transit services.

Gateway Constraint and Other Measures

The recommended additional demand management and other measures for the long term consist of restricting further single-occupant capacity improvements through the Altamont pass to 8 mixed-flow lanes total, and enhancing the safety of the other rural roads in the area that commuters are likely to use to get around the bottleneck at Altamont Pass. These alternate rural roads include Vasco Road, Altamont Pass Road, and Patterson Pass Road.

13.3. Cost Estimates for Recommended Program

The short-term improvements are estimated to cost $62.34 million for construction. The long-term improvements are estimated to cost an additional $2.394 billion for construction plus significant additional annual operating costs for the improved transit services. The bases for these cost estimates are provided in Appendix A, Schematics and Cost Estimates Memo.

Table 84: Recommended Short Term Improvements

Freeway Management Improvements	Construction Cost (millions$)
1. Increase ramp meter capacity above 900 vph at the following metered on ramps a. San Ramon/Foothill Road On b. I-580 Westbound on-ramp at I-205	1.0 (1)
2. Increase storage capacity for following metered on-ramps a. Hacienda Loop On to EB 580 (increase storage to 2 lanes) b. Tassajara Loop On to EB 580 (increase storage to 2 lanes)	2.6
3. Install ramp meters with HOV lanes (where Right of Way allows) at the following on-ramps a. Hesperian Blvd. to I-238 SB b. East 14th Street to I-238 WB c. East Lewelling Blvd. to I-238 SB d. Foothill Blvd. to I-238 NB e. Foothill Blvd. to I-580 EB f. Strobridge Avenue to I-580 EB g. Redwood Road to I-580 EB h. Redwood Road to I-580 WB i. Grove Way Loop On to I-580 EB j. Grove Way Direct On to I-580 EB k. East Castro Valley Blvd. to I-580 WB l. Eden Canyon Road to I-580 EB m. Eden Canyon Road to I-580 WB	35.0
4. Install ITS improvements in corridor (see section on Recommended ITS Improvements below)	0.5
5. Improve eastbound HOT lane operations between Santa Rita/Tassajara On and First Street Off to address forecasted capacity shortfall.	3.8 (2)
6. Improve westbound HOT lane operations between First Street On and Santa Rita/Tassajara Off to address forecasted capacity shortfall	3.8 (2)
7. Add 4th truck to Freeway Service Patrol Beat #22 (I-580: Hacienda to Grant Line) to keep average customer wait time below 10 minutes. Increase operating hours to 5:30 AM to 9:30 AM and 3:30 PM – 7 PM to be consistent with adjacent beat #27.	(3)
Surface Street Management Improvements	
8. Continue Improvement of Signal System Coordination and Optimization with integration as appropriate with freeway operations.	5.0
Freeway Capacity Improvements	
9. Construct separate off-ramp WB 580 to access SB 680 SB loop ramp.	0.3
10. Accelerate Construction of WB auxiliary lane between N. Livermore and Isabel.	(4)
11. Accelerate Construction of WB auxiliary lane between Isabel direct on and Airway Off	(4)
12. Accelerate Construction of WB auxiliary lane between Fallon/El Charro Off and Tassajara/Santa Rita Loop On	(4)
13. Add 4th lane WB from Mission/East 14th off to I-880 SB off.	5.6
14. Accelerate Construction of EB auxiliary lane between Isabel direct on and N. Livermore off.	(4)

Surface Street Capacity Improvements	
15. Spot Intersection capacity improvements: a. East Lewelling Blvd. and Hesperian Blvd. b. Castro Valley Blvd. and Foothill Blvd. c. Foothill Blvd. and Grove Way d. Castro Valley Blvd. and Stanton Avenue e. Redwood Road and I-580 WB Off-ramp f. Castro Valley Blvd. and Grove Way/Crow Canyon Road g. Hopyard Road and Owens Drive h. Airway Blvd. and North Canyon Parkway	4.7
Transit Improvements	
16. Preserve frequency and number of routes of San Joaquin RTD (SMART), and Modesto (MAX BART) inter-regional express bus service to Dublin/Pleasanton BART Station	(5)
17. Preserve frequency and number of routes of County Connection and Tri-Delta express bus service to Dublin/Pleasanton BART Station	(5)
Additional Demand Management and Other Measures	
18. None - Management and capacity improvements are able to reduce congestion below current levels in the corridor.	None
Total	**62.3**

Notes:

(1) Cost estimate is for adding lane to ramp.
(2) Cost estimate is for adding second HOT lane, but excludes right-of-way costs that might be needed to preserve right-of-way for BART in median. Other options available for increasing capacity.
(3) No capital costs if vehicle is leased.
(4) Possible reduction in construction costs if work is moved up to earlier year.
(5) No capital costs involved in preservation of existing routes and services.

Table 85: Recommended I-580/I-238 ITS Improvements

Item	Description
Caltrans Ramp Meter Deployment Plan (RMDP)	Continue implementation of Caltrans RMDP for corridor. This involves metering all remaining on-ramps in corridor; and the metering of selected freeway to freeway connectors at I-680/I-580, and I-580/I-205 interchanges.
I-580 TMP	Continue implementation and integration of I-580 Corridor Transportation Management Plan ITS improvements (see Figure 29 for details).
TMS (Traffic Monitoring stations)	Furnish, install and maintain RTMS units for monitoring 8-lane freeway facility at following locations: • I580/El Charro • I-580/North Flynn • I-580/Grant Line
CCTV (Closed Circuit Television)	Furnish, install and maintain CCTV cameras with PTX control, CODEC, camera tower and mounting and utilities at the following locations: • I-238/Hesperian • I-580/North Flynn • I-580/Grant Line
Fixed CMS (Changeable message signs)	Furnish, install and maintain fixed CMS units and utilities for overhead structure spanning one direction of travel at the following locations: • I-580 westbound at Eden Canyon Road

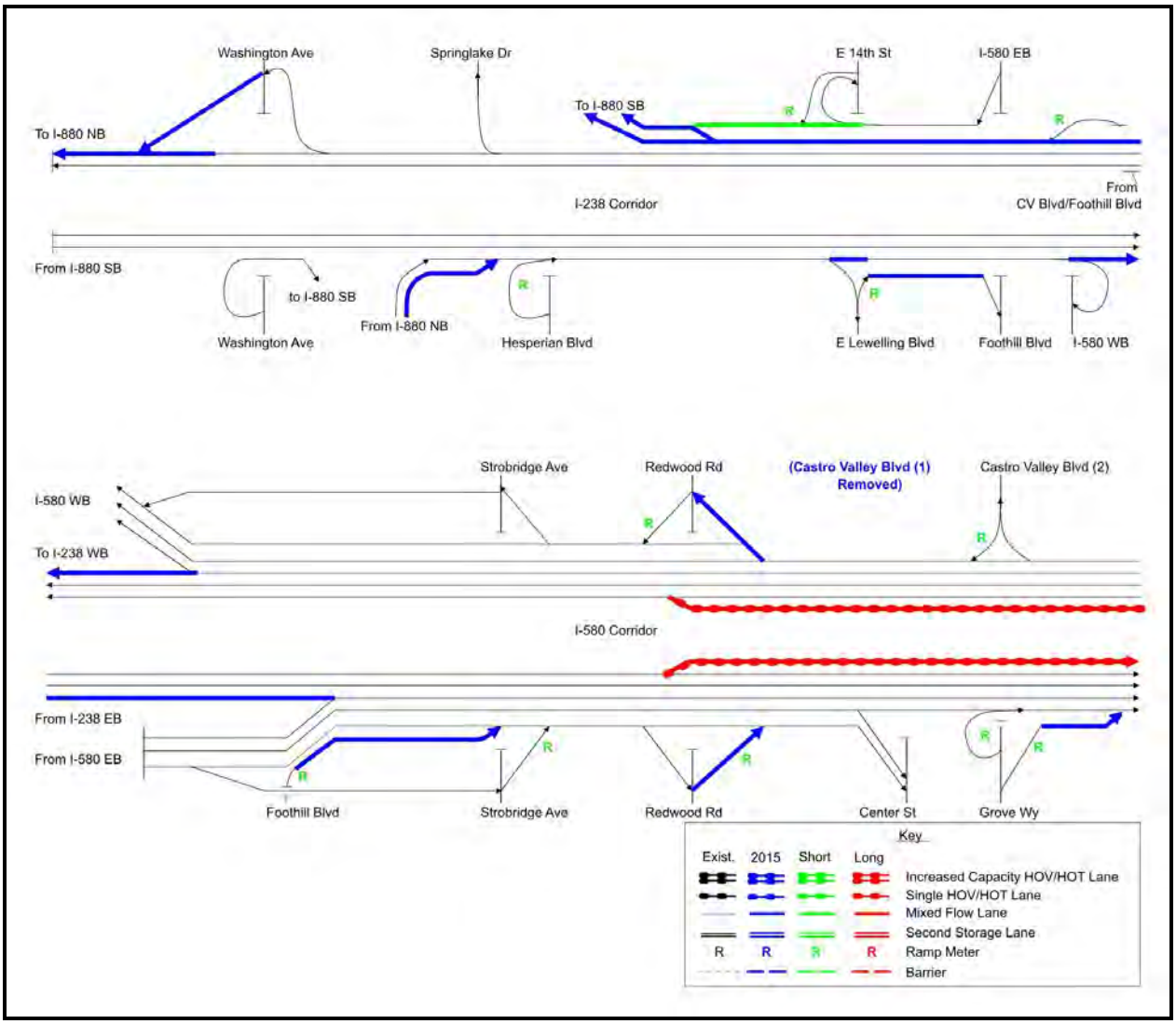
Table 86: Recommended Long Term Improvements

Freeway Management Improvements	Construction Cost (millions$)
19. Extend Single HOT lanes: g. Westbound between I-680 and Redwood Road. h. Eastbound between Redwood Road and Hacienda. i. Westbound between I-205/Mountain House Parkway and Greenville Road j. Eastbound between Greenville Road and I-205/Mountain House Parkway	365.3
20. Improve operations of HOT lanes to address forecasted capacity shortfalls for following sections: k. Westbound between Santa Rita and I-680 l. Eastbound between First Street and Vasco Road.	7.4
21. Construct Direct Ramp I-580 WB to I-680 SB – 2 mixed flow lanes plus 1 HOT lane.	750.0
Surface Street Management Improvements	
22. Signal coordination, incident detection, incident management.	5.0
23. Add HOT lanes both directions to SR 84 between I-580 and I-680.	110.0
Freeway Capacity Improvements	
24. Reconstruct San Ramon/Foothill Road Interchange	2.1
25. Reconstruct Hacienda Drive Interchange	20.0
26. Reconstruct First Street Interchange	37.0
27. Reconstruct Vasco Road Interchange	45.0
28. Reconstruct Greenville Road Interchange	43.0
29. (This project number Not Used)	
Surface Street Capacity Improvements	
30. Widen SR 84 to 4 lanes divided expressway I-680 to Isabel Avenue to Stanley (off loads I-680/I-580 interchange)	129.6
31. Widen SR 84 (Isabel Parkway) to 6-lalne expressway Stanley to Jack London	(1)
32. Widen Byron Highway (SR 239) to 4 lane divided expressway from SR 4 Bypass to I-205 (off loads I-580 over Altamont Pass and Vasco Road)	15.5
33. El Charro Road extension to Stanley Blvd. (off loads Santa Rita interchange)	18.5
Transit Improvements	
34. Double Track Union Pacific (ACE) rail line Tracy to Livermore	34.5
35. Increase ACE train service to 7 trains.	12.4
36. Altamont Rail Corridor Speed and Safety Improvements (90 mph)	30.0
37. Extend BART to ACE/Livermore Station and I-580/Greenville Road Station	700.0
38. Cross-Platform transfer BART/ACE at Livermore Station	20.0
39. Cross-Platform transfer ACE/High Speed Rail at San Jose Station	20.0
40. Integrate BART/ACE Monthly Passes	(2)
41. Bus Rapid Transit between major Livermore employers and BART/ACE train Livermore Station	23.0
Additional Demand Management and Other Measures	
42. Restrict I-580 over Altamont Pass to 8 mixed-flow lanes (4 each direction).	(3)
43. Safety Improvements (including signing, striping, signalization, realignments, passing lanes, median barriers, increased speed enforcement) to Altamont Pass Road and Patterson Pass Road to accommodate expected diverted SOV demand.	6.0
Total	2,394.4

Notes:

(1) Cost is included in cost estimate for Project #30, Widen SR 84 to 4 lanes divided expressway.
(2) Capital costs would depend on fare reading equipment requirements.
(3) No capital cost for this measure.

Figure 44: Recommended Improvements (A)



Exist. = Existing lanes (black)
2015 = Programmed improvements by 2015 (blue)
Short = Recommended supplemental short term improvements (green).
Long = Recommended supplemental long-term improvements (red).

Figure 45: Recommended Improvements (B)

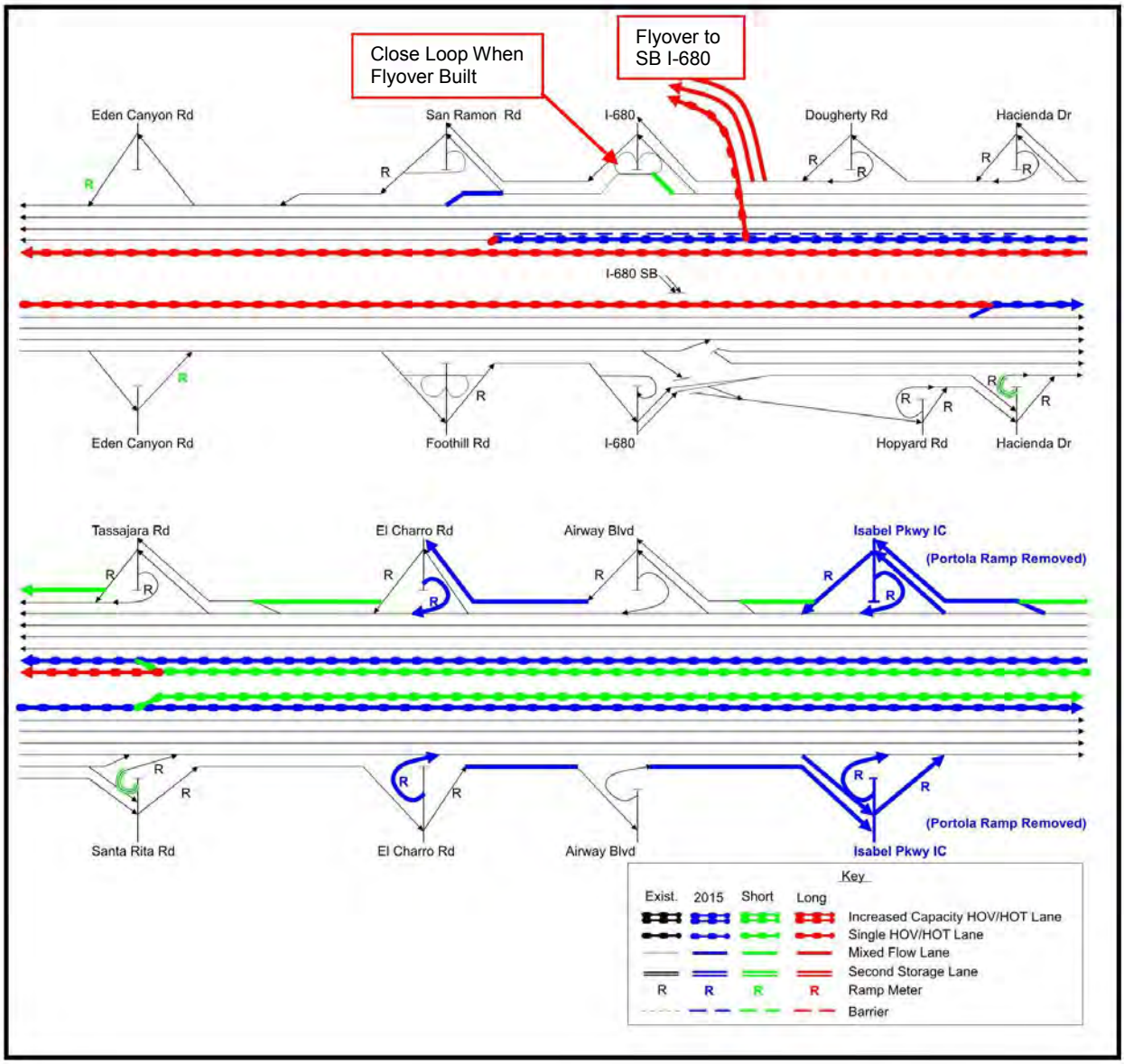


Figure 46: Recommended Improvements (C)

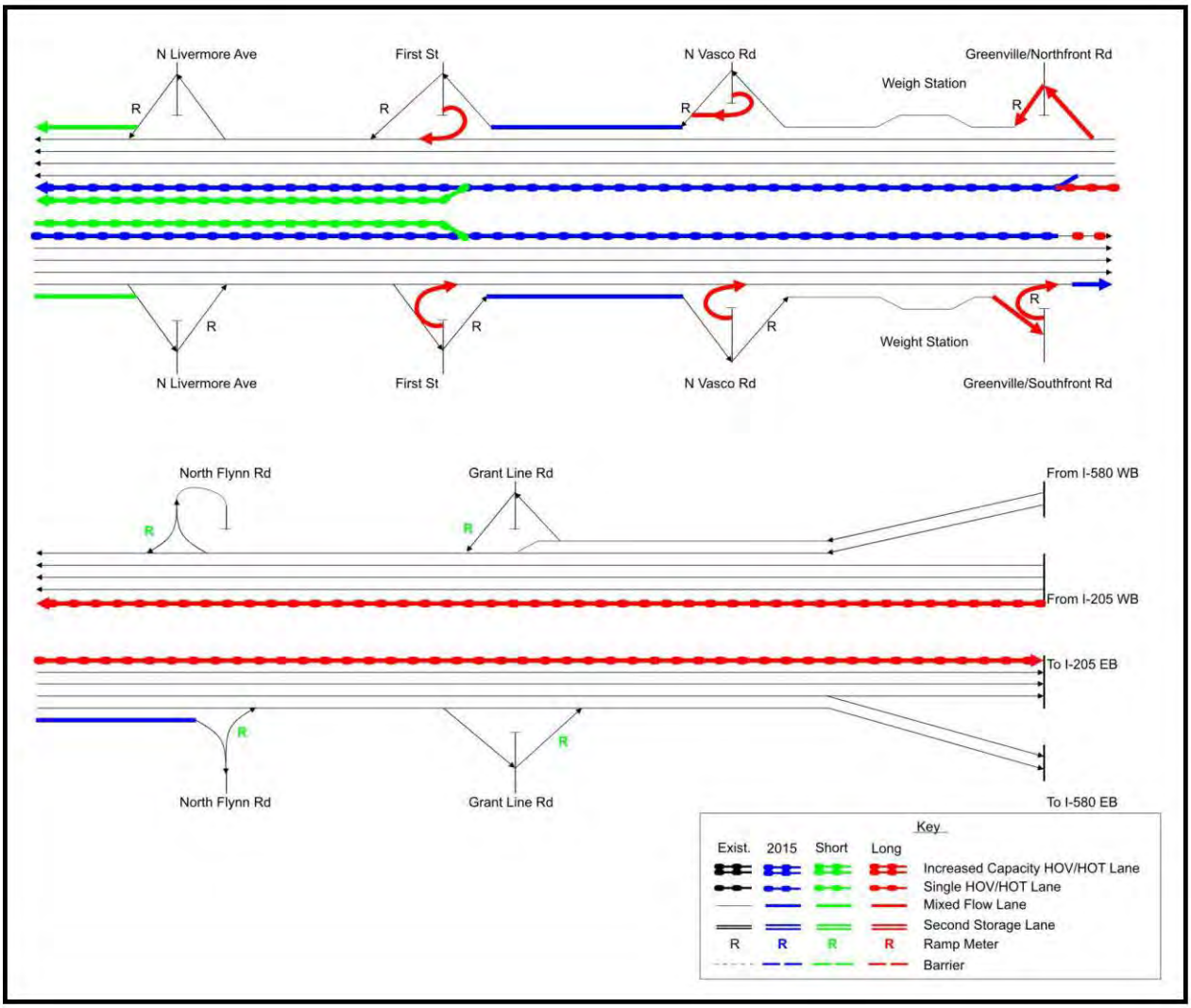
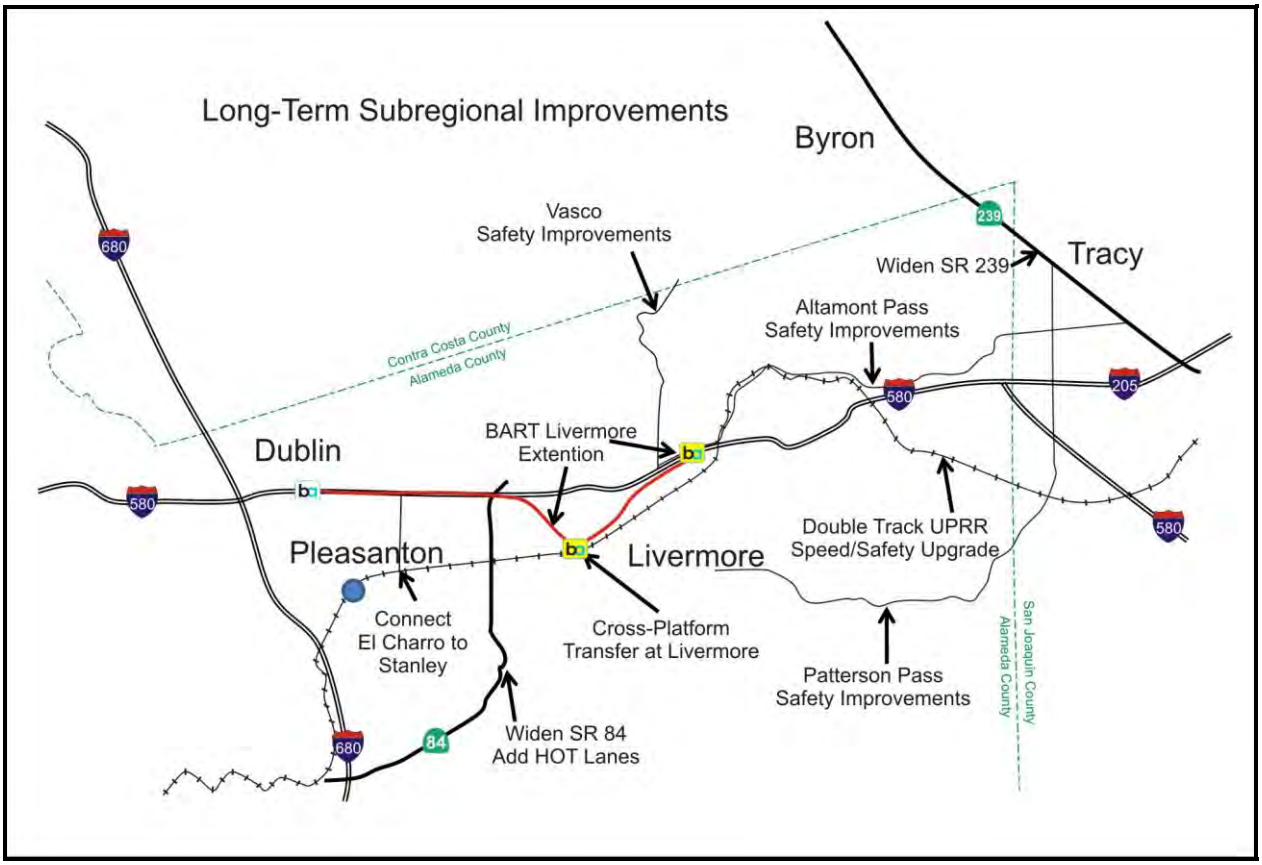


Figure 47: Recommended Long Term Subregional Improvements



13.4. Performance of Recommended Program

The recommended strategies and improvements were evaluated using the Paramics microsimulation model for the I-238/I-580 freeways. The corridor-wide results for the freeway are shown in Table 87. The bottleneck results for short term are shown in Figure 48.

The recommended short term improvements generally preserve current freeway congestion levels through 2015 with some improvement in average delay per person (The freeway serves more people in 2015 at about the same congestion levels as today, therefore the mean delay per person goes down).

The recommended long-term improvements provide as much amelioration of congestion problems as feasible, but are insufficient to serve the anticipated growth in travel between the San Joaquin Valley and the San Francisco Bay Area.

Mode Choice Impacts of Recommended Program

The recommended short term improvements are unlikely to significantly affect mode choice, so the ACCMA model mode choice forecasts for 2015 with currently programmed improvements was used to evaluate both the programmed improvements and the recommended improvements.

The recommended long-term improvements are very likely to significantly increase the use of alternative modes of travel across the Altamont Pass. However, the increased usage in alternative modes would not be sufficient to significantly affect the forecasted congestion in the Altamont Pass area. Consequently, the ACCMA mode choice model was not re-run to estimate the new mode share. The ACCMA model 2035 mode choice forecasts assuming all planned projects were used to evaluate the recommended long-term improvement projects. This approach conservatively over estimated the likely numerical values for congestion in the corridor, but did not over-estimate the fact that serious congestion would still be present in 2035, even with the recommended improvements.

The analysis was performed using microsimulation on the original ACCMA travel demand model OD tables (after calibration to match the observed ramp counts). The ACCMA model was not re-run to estimate the mode choice impacts of the recommended improvements.

Microsimulation of Recommended Improvements

The calibrated Paramics microsimulation model for the I-238/I-580 corridor was used to evaluate 2008, 2015 programmed, 2015 recommended, 2035 planned, and 2035 recommended improvement scenarios. The 2035 microsimulation results however tended to be unrealistic and misleading (showing unrealistically high average vehicle speeds) due to the high demand levels forecasted for 2035 for all scenarios evaluated. The high demand levels forced the microsimulation model to store a great number of vehicles off-the-network. These vehicles did not contribute to the mean speed of traffic actually moving on the network. Consequently, the 2035 microsimulation results are not reported in this final report.

The 2035 microsimulation model files and outputs are included in the technical deliverables that go with this report. The model files for 2035 are provided for the use of the technical experts on the Corridor Team.

Instead of reporting the 2035 microsimulation results, we have reported instead, estimates derived from the ACCMA model. For similar reasons bottleneck analysis was not performed for the long-term. The results of the long term bottleneck analysis would have been uninformative.

Table 87: Freeway Performance with Recommended Improvements

Performance Measure	2008 Existing	2015 Programmed	2015 Recommended	2035 Programmed	2035 Planned	2035 Recommended
Mobility						
Person Miles of Travel (PMT)	3,849,400	4,369,300	4,369,300	6,358,700	6,177,000	6,177,000
Person Hours of Travel (PHT)	91,900	108,700	104,312	560,300	467,200	462,574
Person Hours of Delay (PHD)	30,400	38,500	34,112	457,500	368,600	363,974
Mean Person Speed (mph)	42	40	42	11	13	13
Mean Delay/Person (mins)	20	24	17	284	247	245

Figure 48: Short-Term Freeway Bottlenecks with Recommended Improvements