PROPOSAL FOR ADOPTION

TRI-VALLEY TRANSPORTATION PLAN AND ACTION PLAN UPDATE

Prepared for
Tri-Valley Transportation Council

Prepared by
DKS Associates
TRANSPORTATION SOLUTIONS

Approved for Circulation by TVTC on July 30, 2008

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DRAFT

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1 INTRODUCTION

1.1 Overview of the Tri-Valley Transportation Plan and Action Plan Update

The 2008 Update to the Tri-Valley Transportation Plan/Action Plan assesses transportation issues within the Tri-Valley area and outlines a recommended package of vision statements, goals, policies, objectives and actions for addressing those issues. The study area includes Danville, San Ramon, Dublin, Pleasanton, Livermore, and unincorporated portions of Contra Costa County and Alameda County. In addition to serving as a guide for transportation planning through 2030, the Plan also represents the Action Plan for Routes of Regional Significance for Contra Costa County jurisdictions, as mandated by Measures C and J, and provides information that can be incorporated into the Congestion Management Programs for Contra Costa and Alameda Counties.

As the Action Plan for the Tri-Valley, many of the Plan's recommendations and goals will be incorporated into the 2008 Update to the Countywide Comprehensive Transportation Plan prepared by the Contra Costa Transportation Authority. In addition, the Tri-Valley Transportation Council (TVTC) joint powers agreement states that member jurisdictions are to consider the Tri-Valley Transportation Plan when adopting or amending general plans, specific plans, zoning ordinances, or capital improvement programs. The Tri-Valley Transportation Plan is intended to be congruent with, and does not override, existing policies, agreements, and regulations that exist in each jurisdiction or between jurisdictions.

This report documents the 2008 update of the Tri-Valley Transportation Plan and Action Plan. In 1995, the TVTC developed and adopted the first Transportation Plan and Action Plan. This planning document served as a guide for Tri-Valley transportation planning through 2010 and, for Contra Costa County jurisdictions, as the Measure C mandated Action Plan. The Action Plan underwent a focused update in 2000. Since then, new demographic, land use, and travel forecast data has become available. Measure J was passed in Contra Costa, and statewide Proposition 1B was approved, and MTC updated its Regional Transportation Plan. All of these events combined have triggered the need to revisit the Tri-Valley Transportation and Action Plan to reflect changes in traffic, finance and policy.

1.2 Elements of an Action Plan

In 1988, Contra Costa County voters approved Measure C, a one-half percent sales tax that generated $1 billion in funding over 20 years. Measure C also included an innovative Growth Management Program (GMP) that encouraged local jurisdictions to participate in a cooperative, multi-jurisdictional planning process, and, among other things, establish flexible traffic service standards for Regional Routes. In November 2004, Meas-

ure J was passed by the voters of Contra Costa, extending the sales tax program and the GMP for another 25 years. The Contra Costa Transportation Authority, created to manage this program, allocates 18 percent of the sales tax revenue it receives to local jurisdictions that comply with Measure C and J Growth Management Program requirements. To receive these funds, each Contra Costa jurisdiction must, among other requirements, participate in an ongoing cooperative, multi-jurisdictional planning process. As a part of this process, "Action Plans for Routes of Regional Significance" are to be developed by the Regional Transportation Planning Committees (RTPC) with input from local jurisdictions. The TVTC, composed of elected officials from the seven member jurisdictions, serves as the RTPC for the Tri-Valley sub-regional area.

Each Action Plan must:

1) Identify Routes of Regional Significance,

2) Set Multimodal Transportation Service Objectives (MTSOs), and

3) Establish Actions for meeting those MTSOs and local responsibilities for carrying them out

In addition, local jurisdictions and the RTPCs are to establish thresholds that trigger the evaluation of the impacts of major developments and General Plan amendments for their effects on the local and regional transportation system and the ability to achieve the MTSOs established in the Action Plan.

1.3 The 2008 Action Plan Update

The 2008 Tri-Valley Transportation Plan and Action Plan Update focuses on updating the growth management components to the plan that are required for the Contra Costa jurisdictions to comply with the Measure C and J GMP. In addition, changes have been reflected for the Alameda jurisdictions with regard to new project priorities and funding opportunities. During the course of the 2008 Update, the TVTC reviewed and updated several major elements of the Action Plan including the Statements of Vision, Goals and Policies; Multimodal Transportation Service Objectives; Actions; the Subregional Transportation Impact Fee; and Development Review Procedures. The TVTC carried forward the designated network of Routes of Regional Significance from the 2000 Plan without revision.

Statements of Vision, Goals and Policies of an Action Plan help guide its overall direction. Decisions regarding investments, program development, and development approvals are based on these policies.

Routes of Regional Significance are roadways are considered to be important from a regional perspective, providing regional mobility and connecting multiple jurisdictions

While the designation of Routes of Regional Significance is the responsibility of the RTPC, they are generally routes that carry significant through traffic, connect two or more jurisdictions, serve major transportation hubs, or cross county lines. For these roadways the RTPCs use the Action Plan to establish quantifiable performance measures called MTSOs

Multimodal Transportation Service Objectives (MTSOs) represent quantifiable performance measures that are to be maintained or met within a specific timeframe. This may include, for example, average peak-hour speeds, peak-period congestion duration, roadway level of service, transit loading, or transit service frequency. MTSOs can also represent targets for system performance such as transit ridership, mode shares, or average vehicle occupancy.

Actions are the specific actions, measures, or programs that the jurisdictions in Tri-Valley agree to in order to achieve the MTSOs. The responsibility of carrying out the actions may be at the local jurisdiction level or at the RTPC level. Actions may involve implementing specific projects at the local level, or they may call for the RTPC to support region-wide projects that have a local impact. (Note: Contra Costa jurisdictions are required to carry out these actions in order to be found in compliance with the Measure C/J GMP).

Subregional Transportation Mitigation Program (STMP) is the regional transportation fee program adopted by TVTC to generate revenues to fund transportation improvements within the Tri-valley that are necessary to mitigate the impact of new growth.

Development Review Procedures are agreements about how General Plan amendments or major development projects proposed by local jurisdictions will be reviewed by the jurisdictions and TVTC to determine whether the development proposal adversely affects the ability to meet the adopted MTSO.

1.4 Outline of the Document

Chapter 2 of this document describes the review of statements of vision, goals and policies that was undertaken and presents a revised set of statements to guide the 2008 Transportation Plan and Action Plan. **Chapter 3** provides a description of the existing transportation conditions in the Tri-Valley. This chapter identifies the Routes of Regional Significance and the updated MTSOs. An assessment of the MTSOs from 2006 and 2007 monitoring is used to indicate the current status of the Tri-Valley with respect to the Action Plan.

A forecast of future population, employment and transportation conditions is presented in **Chapter 4** for the year 2030. In this chapter an assessment of the MTSOs for the Routes of Regional Significance is provided for the 2030 forecast for a baseline condition that assumes that only currently funded transportation improvements are in place.

Chapter 5 of the report defines the key elements of the 2008 Transportation Plan and Action Plan. This includes an updated description of the Transportation Plan elements and the actions defined by the Action Plan Update to maintain the MTSOs for the Routes of Regional Significance. The actions include "regional significant actions' designed to improve conditions throughout the Tri-Valley and actions specifically designed to address needs on individual Routes of Regional Significance. For each action, the agency or agencies responsible for implementing the action is identified.

The financial plan for meeting the needs of the Transportation Plan and Action Plan is presented in **Chapter 6**. This includes a brief description of the existing funding sources that support the transportation plan elements and the Subregional Traffic Impact Fee Program designed to implement "regional significant projects" in the Action Plan. **Chapter 6** also provides a description of an agreement for cost sharing for transportation improvements that are necessary to mitigate the impact of development in more than one jurisdiction.

Chapter 7 provides guidance on implementation of the Transportation Plan and Action Plan. The chapter includes a description of the process for Plan adoption and amendment. It defines a process and schedule for monitoring and reporting the MTSOs. The chapter defines the agreed-upon procedures for review of developments and General Plan Amendments. The chapter provides a method for conflict resolution and identifies the future role of the TVTC in monitoring, implementing and updating the Transportation Plan and Action Plan.

2 REVIEW OF VISION, GOALS, AND POLICIES

2.1 Review of Consistency with General Plans of Tri-Valley Communities

The 2008 Transportation Plan and Action Plan Update began with a review of the statements of vision, goals and policies that had been developed in prior Transportation Plans/Action Plans. The statements of vision, goals and objectives of the 1995 Action Plan had been retained in the 2000 Action Plan Update but two new statements were added.

1995 ACTION PLAN VISIONS, GOALS, AND POLICIES

- Manage congestion and enhance mobility
- Encourage alternatives to single occupant vehicles
- Integrate planning with air quality, community character, and other environmental factors

ADDITIONAL VISIONS, GOALS, AND POLICIES IN THE 2000 ACTION PLAN UPDATE

- Increase vehicle occupancy, transit, and TDM programs
- Support corridor management and incident management programs

The review of statements of vision, goals and policies began with a review of their consistency with the General Plans of the Tri-Valley communities. Within the General Plans, four main transportation themes form a common thread:

Minimize arterial congestion and delays. All of the cities call for minimizing arterial congestion and delays in one form or another to provide "an efficient transportation system" and "acceptable levels of service". One or more of the cities mention transportation demand management, increasing vehicle occupancy, increasing transit use, and undertaking physical and operational improvements in order to achieve this goal.

Encourage alternative modes of transportation. To achieve an efficient transportation system with minimal congestion, encouraging alternative modes of transportation was recognized as a policy for all of the cities. Pedestrian, bicycle, and transit improvements are supported in order to meet this goal, as are mixed-use developments.

Increase livability. Tri-Valley communities expressed concern for livability issues such as residential neighborhood traffic and pedestrian environments in their General Plans. Traffic calming, improved arterial operations and improved safety were top priorities to increase livability.

Support integrated regional planning. Most of the Tri-Valley communities specifically cite regional planning or the Action Plan as a priority to be involved with and support.

2.2 Proposed Statements of Vision, Goals, and Policies

Based on the review of consistency with the General Plans of the Tri-Valley communities and a preliminary assessment of forecasted growth in the Tri-Valley, a revised set of statements of vision, goals and policies was developed. They are as follows:

1. Integrate transportation planning with planning for air quality, community character and other environmental factors.

2. Support corridor management programs to make the most efficient, effective and safe use of existing facilities and services.

3. Support incident management programs to maintain mobility when accidents or breakdowns occur on major transportation facilities.

4. Consider both the need for vehicular mobility and congestion reduction, and such livability concepts as walkability, bicycle access and community character.

5. Maintain and actively pursue expanded transit, ridesharing and non-motorized mode options and trip reduction programs to increase accessibility, to increase the transit share of travel in the Tri-Valley and to increase average vehicle occupancy.

6. Manage school-related traffic to enhance safety and reduce peak period traffic impacts.

7. Classify the Routes of Regional Significance as either interregional or intraregional in order to recognize the different trip types served on each Route. Interregional Routes provide linkages between the Tri-Valley and other sub-areas and include I-680, I-580, SR-84, Vasco Road, and Crow Canyon Road. Intraregional Routes connect communities within the Tri-Valley and include all other Routes of Regional Significance.

8. Maintain established MTSOs on routes of regional significance.

9. Maintain established capacity constraints to limit interregional traffic at Tri-Valley gateways on I-580, I-680, Crow Canyon Road, and Vasco Road.

10. Encourage through-trips and interregional travel to stay on interregional routes and discourage diversion of these trips to intraregional routes as a mechanism for ensuring intraregional mobility.

11. Support arterial traffic management strategies that address hotspots at critical intersections and approaches.

12. Respect past regional commitments in the prioritization of funding of projects.

13. Work cooperatively with regional transportation partners to maximize funding opportunities.

2.3 Multimodal Transportation Service Objectives

Multimodal Transportation Service Objectives provide a mechanism for the jurisdictions within the Tri-Valley to define the quality of service that is desired on their Routes of Regional Significance. A combination of measures were defined in the 1995 Transportation Plan/Action Plan and retained in the 2000 update. With the exception of link volume /capacity (V/C) ratio[1], the following performance measures are carried forward in the 2008 Update:

Peak Hour Travel Speed. This measure, applied only to I-580 and I-680, sets a minimum average peak hour speed for the AM and PM peak hours. The target minimum speed is 30 miles per hour.

Delay Index. The Delay Index compares the time required to travel between two points during the peak hour to the time required during non-congested, off-peak hours. This measure is defined as the observed travel time divided by the free-flow travel time:

Delay Index (DI) = (Observed Travel Time) ÷ (Free-Flow Travel Time)

The target minimum value for the Delay Index for I-580 and I-680 is 2.0, A DI of 2.0 indicates that a trip though the segment takes twice as long during peak

[1] A link volume/capacity (V/C)ratio is defined as the volume, whether observed or forecast, of traffic on a roadway link divided by its capacity. This measure was applied to SR 84 in the 1995 and 2000 TVTC Plan; it was replaced by a delay index MTSO in the 2008 Update.

hours as during the off-peak, due to congestion and slow speed. The proposed target value for SR 84 is 3.0.

Duration of Congestion. This MTSO is expressed in terms of hours of congestion per day. Hours of congestion can be measured with traffic counts or speed runs and should apply to mixed-flow lanes only. A target value has been set only for I-680 south of SR 84. A target value of no more than five (5.0) hours of congestion per day has been set.

Intersection Levels of Service. Level of service is a measure of the amount of delay that results from volume on a particular facility. For intersections, the delay is a function of the volume of all of the through movements and turning movements at the intersection as well as the number of lanes serving each movement and the time of the traffic signal. For the purpose of this MTSO the level of service is defined by an assessment of the overall ratio of volume to capacity for the intersection and is calculated using the CCTALOS method for AM and PM peak hours based on turning-movement counts. The target for this MTSO is to maintain a level of service "D" or better for each of the intersections on the Routes of Regional Significance, but the V/C ratio that is used to determine whether the MTSO is met varies somewhat based on local jurisdictions' definitions. For most intersections it is V/C < 0.90. For intersection on the following roadway segments it is < or = 0.91: Crow Canyon Road (within San Ramon), San Ramon Valley Boulevard (South of Sycamore Valley Road), Dougherty Road (North of Old Ranch Road), Bollinger Canyon Road, Alcosta Boulevard, and Tassajara Road. For the intersection of Crow Canyon Road and Camino Tassajara it is < or = 0.90.

The previous action plans have used a link level of service measure as the MTSO for SR 84 but this has been changed to a combination of the Delay Index used for the freeways and the intersection level of service used for the other arterials.

The previous versions of the Transportation Plan and Action Plan have also identified goals for reducing reliance on the automobile. These goals provide input for the planning process but are not used in the evaluation of performance on the Routes of Regional Significance.

Mode Split. Mode split is the percentage of peak period travelers that use transit as the mode of travel. While previous version of Transportation Plan/Action Plan has stated increasing transit mode split as a goal, no specific target value has ever been set. Mode split is generally measured through extensive home interview and work place surveys. These data are available every decade from the U.S. Census and periodically from MTC. In between times, transit ridership may be monitored as a surrogate for mode split; however, field measurement of mode

split through observation of traffic levels is not feasible. Transit operators routinely collect and report annual ridership.

Average Vehicle Ridership. This MTSO is the ratio of total person commute trips to vehicles used for commuting. The Tri-Valley Transportation Plan/Action Plan includes a regional action to increase AVR by 10% from 1.1 to 1.2. Several Tri-Valley jurisdictions maintain voluntary employer trip reduction programs to increase AVR.

3 EXISTING TRANSPORTATION CONDITIONS

3.1 Routes of Regional Significance

Three state highways provide access to and from the Tri-Valley. These highways include Interstate 680, Interstate 580, and SR 84. In addition, a number of arterial roadways facilitate travel within the Tri-Valley, connecting individual cities as well as carrying local traffic. The three state highways, along with numerous arterials together make up what are known as Routes of Regional Significance, as shown in Tables 1 and 2 and in Figure 3. These routes have been further classified as either interregional or intraregional in order to recognize the different trip types served on each route. Interregional routes provide linkages between the Tri-Valley and other sub-areas and include I-580, I-680, SR 84, Vasco Road and Crow Canyon Road. Intraregional routes connect communities within the Tri-Valley and include all other Routes of Regional Significance.

Table 1: Current Interregional Routes of Regional Significance

Interregional Route
I-580
I-680
State Route 84
Vasco Road
Crow Canyon Road

Table 2: Current Intraregional Routes of Regional Significance

Intraregional Routes	
Sycamore Valley Road	Stanley Boulevard
Danville Boulevard	Stoneridge Drive
Camino Tassajara	Sunol Boulevard
Crow Canyon Road	First Street (Livermore)
San Ramon Valley Boulevard	Vasco Road
Bollinger Canyon Road	Fallon Road
Alcosta Boulevard	North Canyons Parkway
Dougherty Road	Isabel Extension
Tassajara Road	North Livermore Avenue

Intraregional Routes

Dublin Boulevard	West Las Positas Boulevard
San Ramon Road	Bernal Avenue
Hopyard Road	Jack London Boulevard
Santa Rita Road	Hacienda Drive

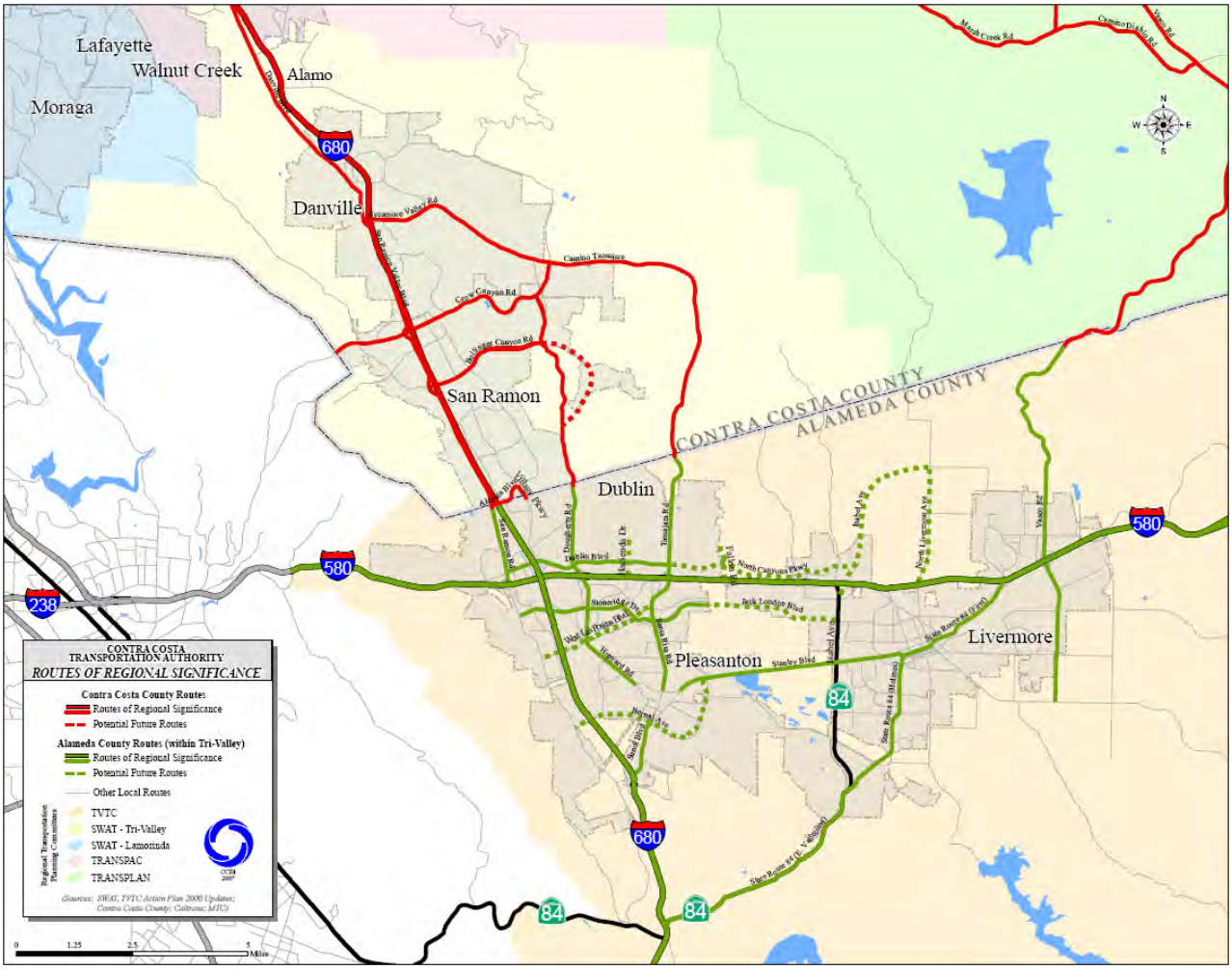
All freeways and many major arterials are designated as Routes of Regional Significance, but it is up to the individual RTPC to establish these routes for incorporation into the Authority's Countywide Plan. The CCTA's Implementation Guide provides the following criteria for identifying Routes of Regional Significance[2]:

1. Connect two or more subareas;
2. Cross county boundaries;
3. Carry a significant amount of through traffic; or
4. Provide access to a regional highway or transit facility (e.g. A BART station or freeway interchange).

Roadways that meet one or more of these criteria may be designated as Regional Routes. Last updated in 2000, many arterials were designated as "potential future routes", shown as dotted lines in Figure 3. Changing the classification of these roadways from "potential" to "designated" Routes of Regional Significance requires unanimous agreement by TVTC.

[2] Contra Costa Transportation Authority, Implementation Guide, December 1990, p. IG-10.

Figure 1: Tri-Valley Routes of Regional Significance



3.2 Traffic Volumes and Conditions

An evaluation of the values of the MTSOs for the Routes of Regional Significance provides an overview of the existing traffic conditions in the Tri-Valley. Most of the MTSOs from the previous Action Plan were met during the most recent monitoring efforts in 2006 and 2007. Table 3 summarizes the results of the monitoring.

Table 3: Status of Existing[1] MTSOs

MTSO	*Standard*	*Facilities*	*2006 and 2007 Monitoring*
Peak Hour Travel Speeds	Minimum average speed of 30 miles per hour	I-680	Met overall in AM and PM but not met for one segment NB in PM
		I-580	Met overall but not met for one segment WB in AM and one EB in PM
Delay Index	Delay index of 2.0 or less	I-680	Met overall in AM and PM but not met for one segment NB in AM and NB in PM
		I-580	Met overall but not met for two segments WB in AM and one EB in PM
Congestion Duration	No more than 5 hours of congestion per day south of SR-84	I-680	Met
Link Volume-to-Capacity Ratio	Link V/C ratio less than 0.99	SR-84	Met in all but one segment
Intersection Level of Service	LOS [2]"D"at signalized intersections[2]	26 Arterials	Met for all intersections except for two in AM and three in PM

Source: 2007 CCTA MTSO Monitoring Report, 2006 ACCMA LOS Monitoring Report

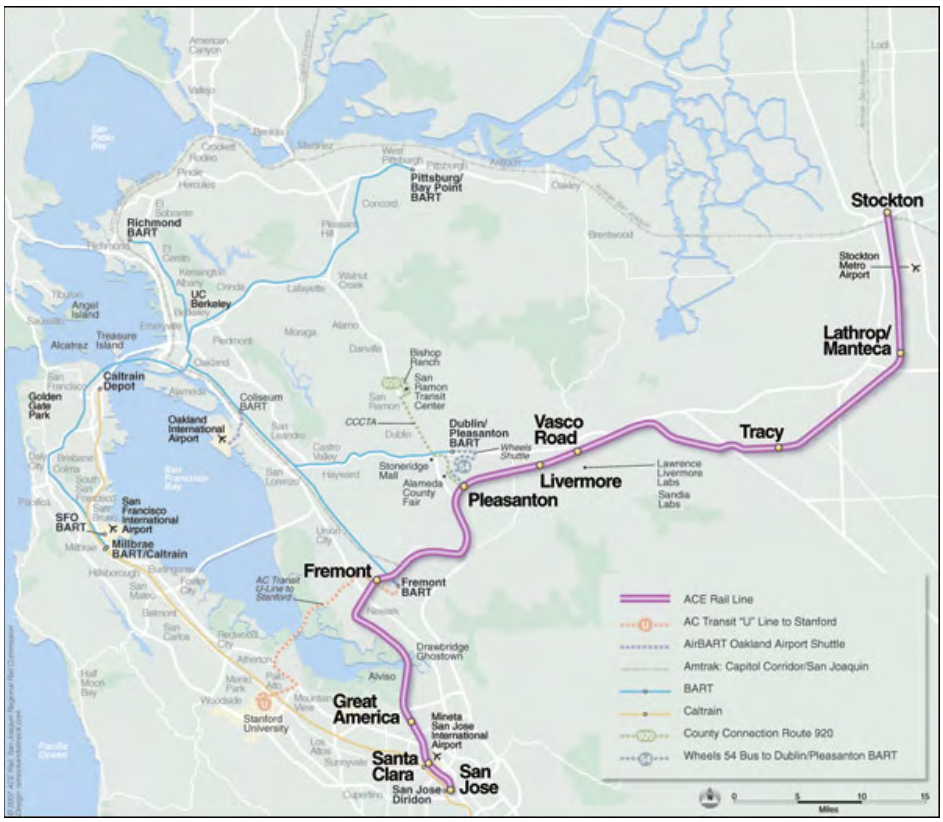
1. Only MTSOs from the 2000 Transportation Plan and Action Plan Update were monitored. New MTSOs adopted in this update will be monitored in the future.
2. The definition of level of service "D" varies by jurisdiction. For most intersections it is V/C < 0.90. For the following roadway segments it is < or = 0.91: Crow Canyon Road (within San Ramon), San Ramon Valley Boulevard (South of Sycamore Valley Road), Dougherty Road (North of Old Ranch Road), Bollinger Canyon Road, Alcosta Boulevard, and Tassajara Road. For the intersection of Crow Canyon Road and Camino Tassajara it is < or = 0.90.

3.3 Transit Service

Transit service in the Tri-Valley is provided by the Altamont Commuter Express (ACE Rail), the San Francisco Bay Area Rapid Transit District (BART), County Connection, and the Livermore Amador Valley Transit Authority (LAVTA). In general, transit ridership has been slowly recovering after a decline during the years following the economic downturn of 2000-2001. In particular, Altamont Commuter Express (ACE) Rail, BART, and LAVTA are showing an increase in ridership while County Connection ridership is holding steady.

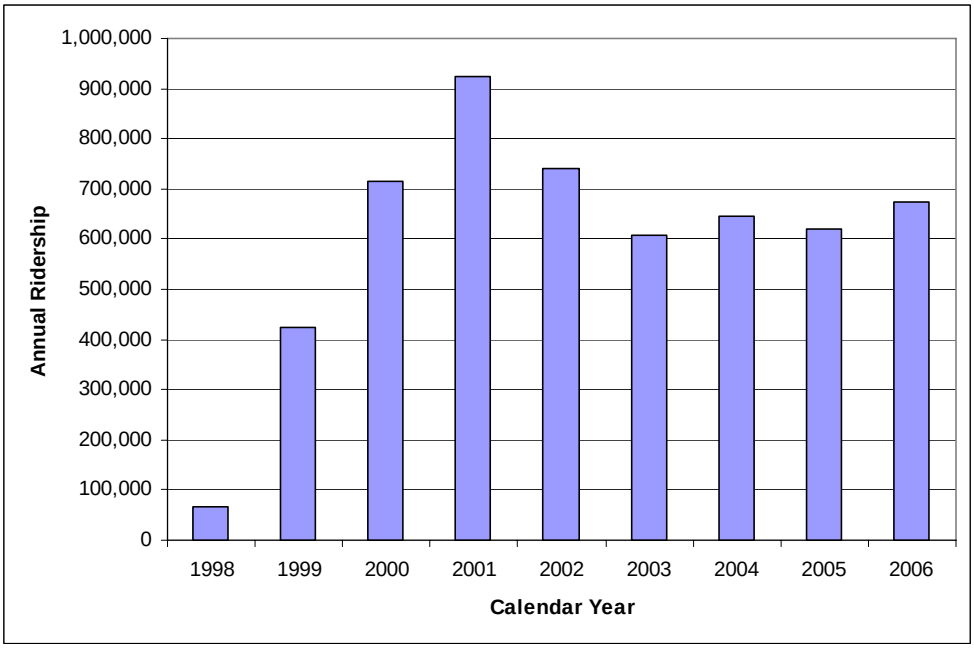
Providing commuter rail service from Stockton to San Jose, ACE Rail serves the Tri-Valley with two stops in Livermore and another in Pleasanton. Service began in 1998 and has since expanded to 4 round-trip trains. The complete route and stations served is shown in Figure 4. Similar to LAVTA, ACE Rail ridership has begun to recover after last peaking in 2001. Figure 5 shows the ridership trends since 1998.

Figure 2: ACE Rail System Map



Source: http://www.acerail.com, June 2008

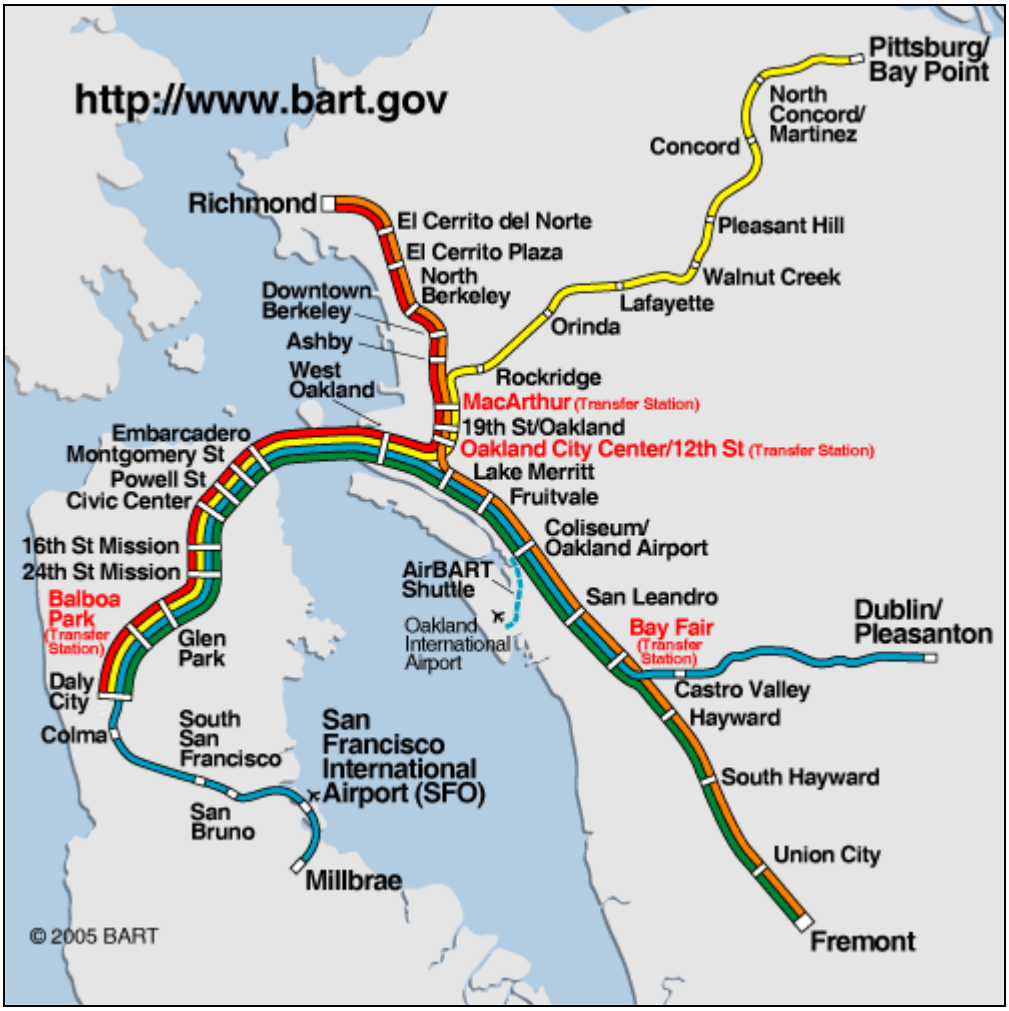
Figure 3: Annual Ridership for ACE Rail



Source: 2006 MTC Statistical Summary of Bay Area Transit Operators.

BART service to the Tri-Valley is provided at the Dublin/Pleasanton BART station. The station can be accessed through an on-site park-and-ride lot and through numerous County Connection and LAVTA bus routes. A map showing the BART system is presented in Figure 6. Ridership in the form of average annual weekday exits at the Dublin/Pleasanton station, along with the nearby Walnut Creek and Castro Valley stations is shown in Figure 7. The most apparent trend is a significant increase in ridership, especially at the Dublin/Pleasanton station, since FY 2003.

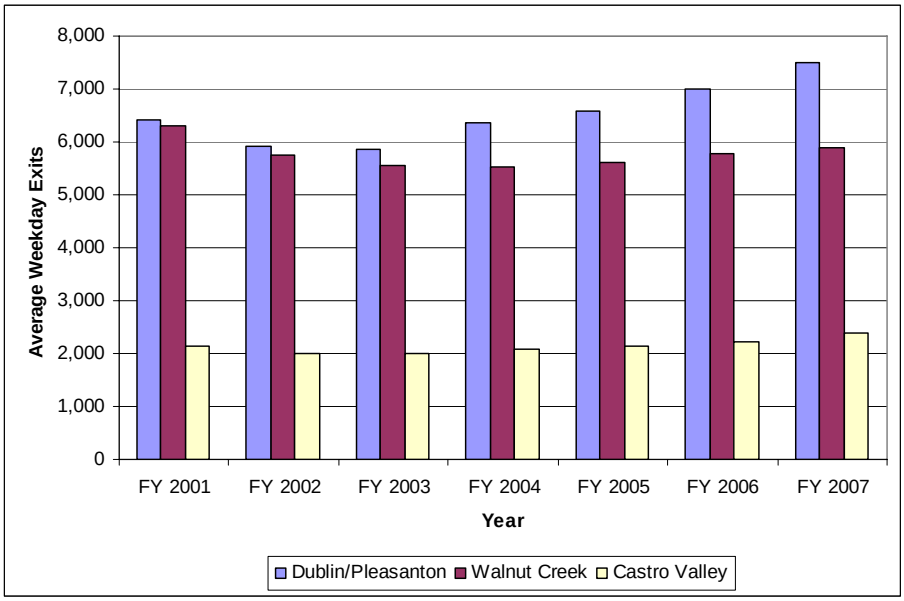
Figure 4: BART System Map



Source: http://www.bart.gov, September 2007

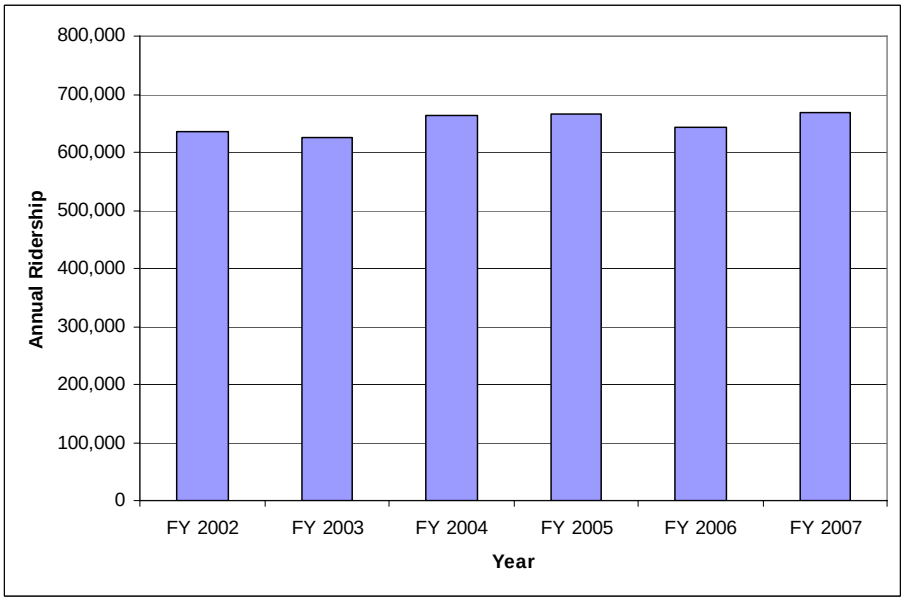
County Connection serves the Contra Costa County portion of Tri-Valley as well as the Dublin/Pleasanton BART station and the Alameda County Fairgrounds ACE train station. The bus routes currently serving this area are 121, 135, 221, 920, 960, and 970. Ridership on the Tri-Valley area routes has increased over FY 2006 and is approaching 2004 and 2005 levels as shown in Figure 8. Figure 9 identifies the locations of these routes. Route 259 was recently discontinued in January 2005 while Route 135 started in December 2006.

Figure 5: Average Annual Weekday Exits at Select BART stations



Source: BART 2007 Ridership Report

Figure 6: Annual Ridership for County Connection Tri-Valley Bus Routes



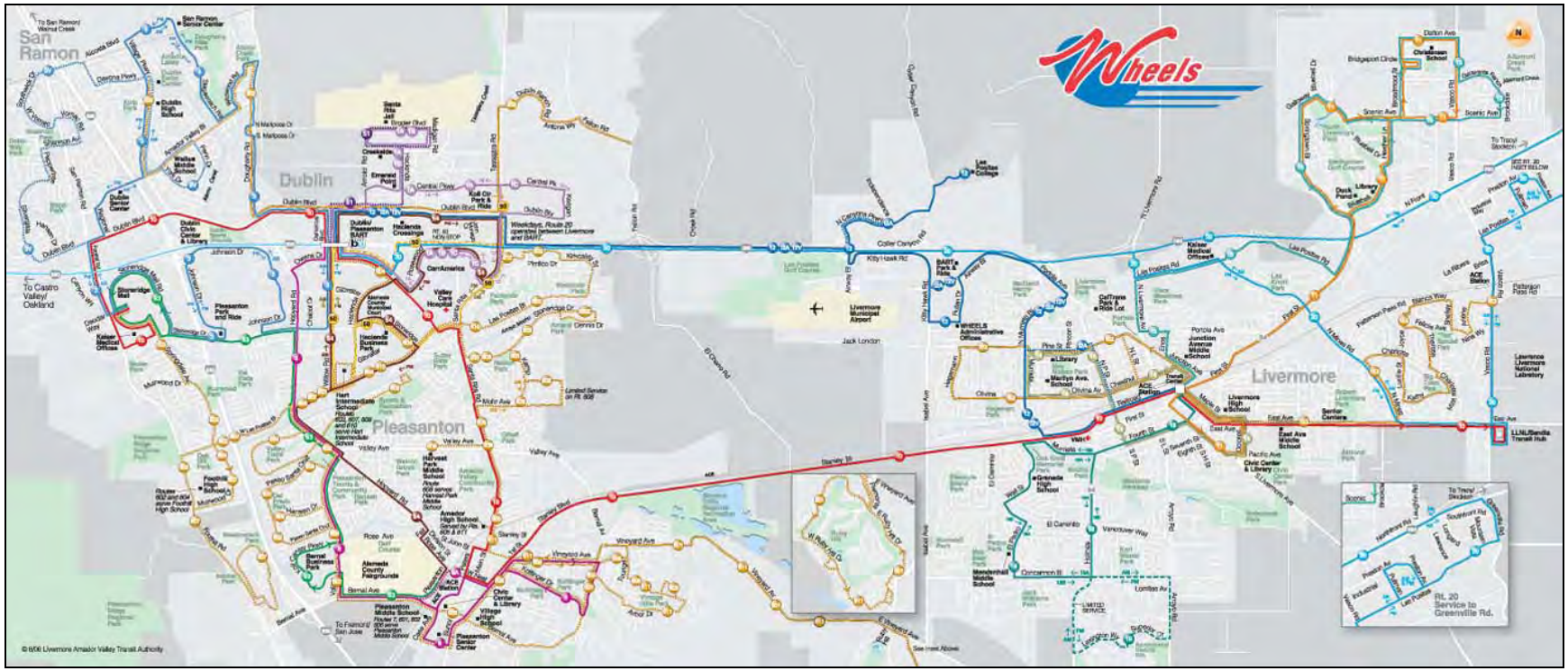
Source: County Connection, August 2007

In the Alameda County portion of Tri-Valley, LAVTA is the primary transit provider serving Dublin, Pleasanton, and Livermore with local and express bus services, as illustrated in Figure 10. LAVTA provides 11 fixed local services, one express service, four shuttle services (servicing BART, ACE and the Santa Rita Jail) and demand-responsive paratransit service. Between 2005 and 2006, ridership for LAVTA, presented in Figure 11, shows a sharp increase in ridership that had previously peaked in FY 2001.

Figure 7: County Connection System Map (Tri-Valley area)

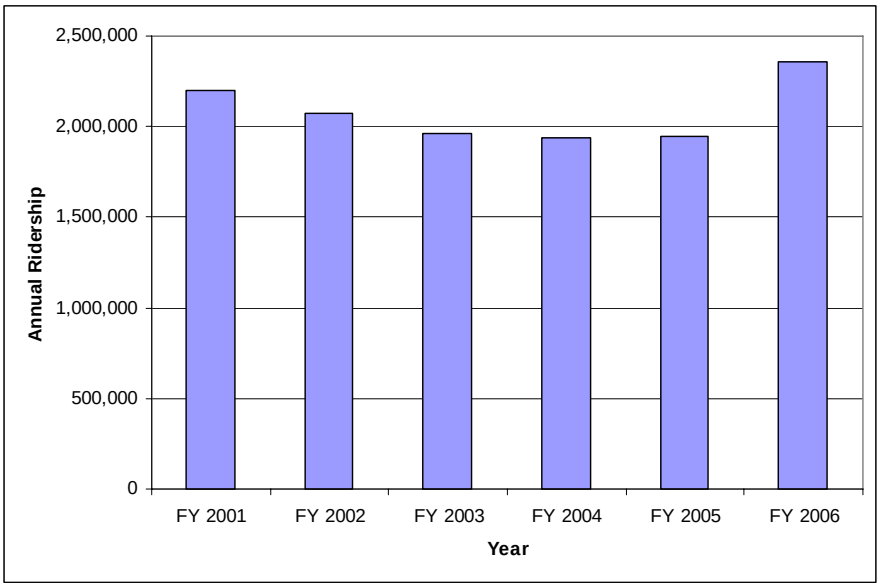
Source: http://www.cccta.org, September 2007

Figure 8: LAVTA System Map



Source: http://www.lavta.org, September 2007

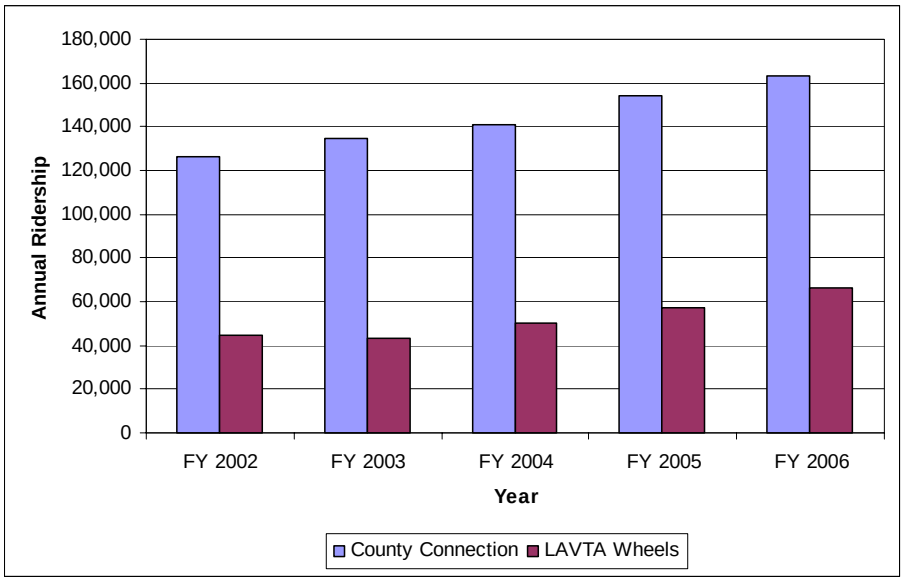
Figure 9: Annual Ridership for LAVTA Bus Routes



Source: 2006 MTC Statistical Summary of Bay Area Transit Operators.

Paratransit services within the Tri-Valley are provided by both County Connection and LAVTA. Ridership on Para transit, shown in Figure 12, has been steadily rising, mirroring a trend found throughout the Bay Area. With population forecasts showing a large increase in the senior (age 62 and over) demographic, the rising demand for Para transit is a trend that is expected to continue.

Figure 10: Annual System Wide Paratransit Ridership



Source: 2006 MTC Statistical Summary of Bay Area Transit Operators

3.4 Conclusions about Existing Transportation Conditions

Looking back at the original Action Plan adopted by TVTC in 1995, it is striking to note that the Plan indicated that there was very little congestion on the Tri-Valley's arterial and freeway network. Today, we see not only significant congestion, but also continued rapid growth that is expected to cause still greater levels of traffic congestion in the future. To continue to meet the MTSOs, new actions and measures may be required. It is important to note, however, that inability to achieve the MTSOs does not of itself constitute non-compliance with the Contra Costa GMP. Exceedance of an MTSO does, however, suggest that the Action Plan may need to be re-evaluated to determine whether the MTSOs needs to be adjusted, or whether new actions can be introduced to address the exceedance.

Transit is playing an important role in the region, but transit ridership is not growing at as fast a rate as population, employment or traffic volumes. In fact, forecasts indicate a continued reliance on the single-occupant auto as the dominant mode of transit in the Tri-Valley. If the Tri-Valley is to continue to seek to meet its transportation objectives by increasing transit use and increasing vehicle occupancy, more resources will be required to increase transit service to the point where it is sufficiently attractive to achieve a higher transit mode share and higher vehicle occupancies. More resources will also be needed to enhance other alternatives to the single-occupant vehicle such as carpooling, vanpooling, bicycling and walking.

4 OVERALL GROWTH RATES AND FUTURE TRAVEL PATTERNS

4.1 Population and Employment Forecasts

Forecasts for future population and employment levels in the Tri-Valley were derived from the Contra Costa Transportation Authority's (CCTA) Countywide travel demand forecasting model. By resolution, this model was adopted by the TVTC in 2006 as the replacement for the previous Tri-Valley Model. The traffic forecasts generated by the model are based on the Association of Bay Area Governments (ABAG) Projections 2005, and the subsequent 2006 CCTA Land Use Information System (LUIS '06), which was extensively reviewed and refined by the Tri-Valley local jurisdictions. The model is capable of generating forecasts for the year 2000, 2010, 2020, and 2030. Current year 2007 estimates are derived through straight-line interpolation between 2000 and 2010.

Population and employment forecasts are summarized in Tables 4 and 5. By 2030, the total Tri-Valley population is forecasted to grow 57 percent from today. Seniors (age 62 and over) are to make up most of that growth, more than tripling in number.

The total number of employees, or jobs, in the Tri-Valley is expected to grow at a similar rate as the number of employed residents. Since there are currently more employees than employed residents, the net in-commuting travel pattern that exists today will likely continue.

Table 4: Population and Employment Forecast

	2007	*2030*	*Net Growth*	*Percent Growth*
Total Population	330,973	520,649	189,676	57%
Total Household Population	327,189	456,064	128,875	39%
Total Households	118,749	165,853	47,104	40%
Total Employed Residents	172,675	270,075	97,400	56%
Total Employees	202,110	314,261	112,151	55%
Average Household Size	2.76	2.75		
Employed Residents/HH	1.45	1.63		

Source: CCTA Travel Demand Model, Projections 2005

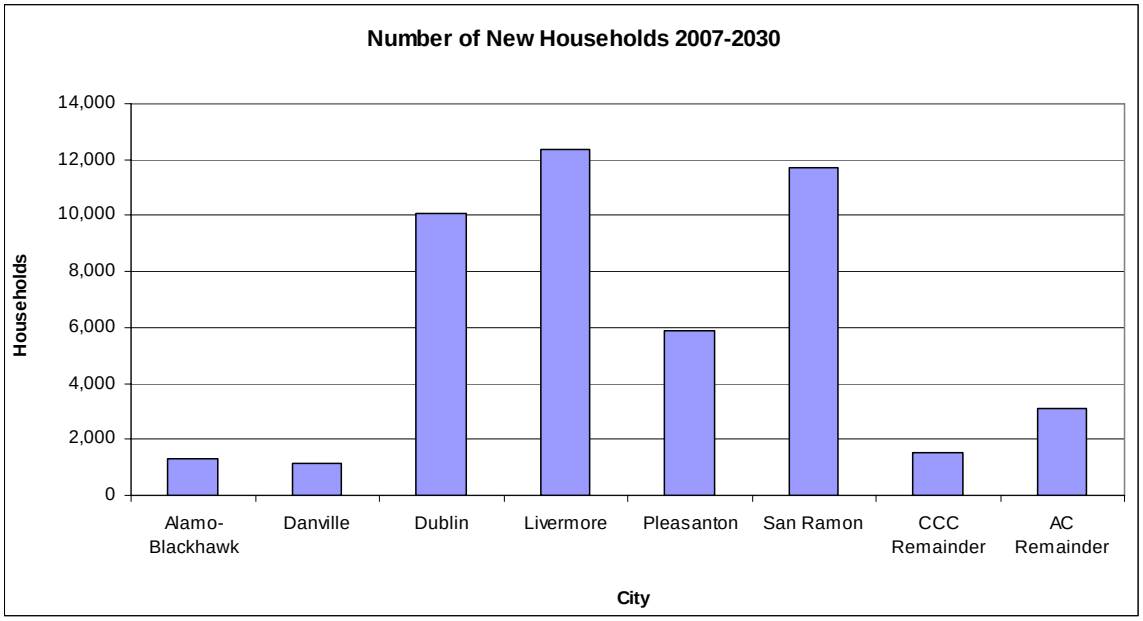
Table 5: Population Forecast by Age Group

	2007	*2030*	*Net Growth*	*Percent Growth*
Senior (Age 62+)	38,938	119,839	80,902	208%
Adult (Non-Senior)	227,328	318,195	90,867	40%
Non-working Young	64,708	82,615	17,907	28%
Total Population	330,973	520,649	189,676	57%

Source: CCTA Travel Demand Model, Projections 2005

Of the total household growth in the Tri-Valley, approximately 60 percent of it is expected to occur in Dublin, Pleasanton, and Livermore as shown in Figure 11. The communities of Alamo, Blackhawk, Danville, and San Ramon are forecasted to absorb 15 percent of the total growth while the other 25 percent is to occur in the remaining areas of Contra Costa and Alameda counties.

Figure 11: Household Growth by Area, 2007 to 2030



Source: CCTA Travel Demand Model, Projections 2005

Total employment is forecasted to grow 55 percent in the Tri-Valley by 2030 as shown in Table 6. Most of this growth is to occur in the service sector which will account for over 40 percent of the total employment growth.

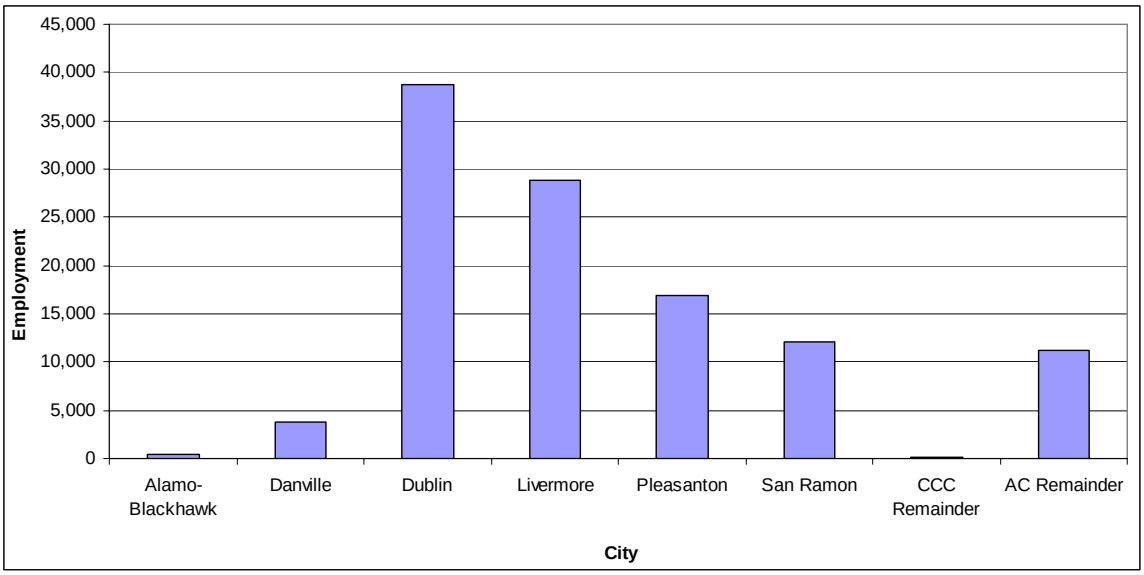
Table 6: Employment Forecast

	2007	*2030*	*Net Growth*	*Percent Growth*
Retail	36,757	58,922	22,164	60%
Service	86,590	132,280	45,691	53%
Manufacturing	20,046	32,465	12,419	62%
Agricultural	1,669	2,452	784	47%
Wholesale	9,721	14,862	5,141	53%
Other	47,327	73,279	25,952	55%
Total Employment	202,110	314,261	112,151	55%

Source: CCTA Travel Demand Model, Projections 2005

Distribution of employment growth is not expected to be even, with Dublin and Livermore accounting for over 60 percent of the additional Tri-Valley jobs as presented in Figure 12.

Figure 12: Employment Growth by Area, 2007 to 2030



Source: CCTA Travel Demand Model, Projections 2005

4.2 Traffic Forecasts

As shown in Table 7, traffic demand is expected to grow at a brisk pace along Tri-Valley area freeways and arterials. Most of the percentage growth is found along arterial roadways that, in 2000, were mostly serving undeveloped land but will be serving residential development in the future (or even already today).

Table 7: Traffic Forecasts for Select Routes of Regional Significance

Road Name	*2000* *PM Peak Volume / Peak Direction*	*2000 - 2030* *PM Peak Volume % Growth*
I-680 (North of Diablo Road)	8440	9%
I-680 (South of SR-84)	7600	34%
I-580 (West of I-680)	7100	45%
I-580 (East of Tassajara Road)	8750	16%
I-580 (East of Vasco Road)	7050	37%
Vasco Road (At County Line)	840	65%
Vallecitos Road – SR 84 (East of I-680)	1050	96%
Stanley Blvd (West of Isabel Avenue)	1980	6%
Bollinger Canyon Road (At Dougherty Road)	760	233%
Crow Canyon Road (at Dougherty Road)	670	109%
Camino Tassajara (at Crow Canyon Road)	1410	41%

Source: CCTA Travel Demand Model, Projections 2005

4.3 Evaluation of MTSO Values for 2030 Traffic Conditions

As indicated in Table 8, the growth in traffic that is expected in the Tri-Valley will result in a significant deterioration in MTSO performance despite a significant investment in transportation projects and service (see Chapter 5 for assumed projects that are already programmed.) The forecast also reflects a doubling of transit ridership in the Tri-Valley and an increase in the peak period transit mode share from about 8% to about 12%. We note, however, that historically, the model has tended towards over-predicting transit ridership for the Bay Area. By way of example, MTC's regional model, upon which the Countywide Model is based, consistently over-predicted transit ridership in the 2001 Regional Transportation Plan. Although MTC's model predicted a more-than 15 percent increase in transit ridership between 2000 and 2005, actual ridership in the Bay Area de-

clined. These results suggest that additional actions beyond the already programmed projects will be needed to meet the goals and objectives of the plan.

Table 8: Status of Existing and Proposed MTSOs for 2030 Baseline Forecast

MTSO	*Standard*	*Facilities*	*2030 Forecasts*
Peak Hour Travel Speeds	Minimum average speed of 30 miles per hour	I-680	Not met for AM NB or SB and not met for PM NB or SB
		I-580	Not met for AM EB or WB and not met for PM EB
Delay Index	Delay index of 2.0 or less for I-580 and I-680	I-680	Not met for AM NB or SB and not met for PM NB or SB
		I-580	Not met for AM EB or WB and not met for PM EB
	3.0 for SR 84[1]	SR 84	Met
Congestion Duration	No more than 5 hours of congestion per day south of SR-84	I-680	Met
Link Volume-to-Capacity Ratio	*Link V/C ratio less than 0.99*[2]	SR-84	Met in all but one segment
Intersection Level of Service[3]	LOS "D" at signalized intersections[4]	26 Arterials	Not met for 19 intersection in the AM and 27 intersection in the PM

1. The 2008 Action Plan Update proposes the addition of this MTSO.
2. The 2008 Action Plan Update proposes the deletion of this MTSO.
3. Intersection levels of service are difficult to predict due to the number of factors that influence the results such as intersection geometry and specific turning movement volumes. However, the 2030 forecasts, which show a large number of intersections not meeting the level of service standard, do indicate that future travel patterns may adversely affect intersection operations.
4. The definition of level of service "D" varies by jurisdiction. For most intersections it is V/C < 0.90. For the following roadway segments it is < or = 0.91: Crow Canyon Road (within San Ramon), San Ramon Valley Boulevard (South of Sycamore Valley Road), Dougherty Road (North of Old Ranch Road), Bollinger Canyon Road, Alcosta Boulevard, and Tassajara Road. For the intersection of Crow Canyon Road and Camino Tassajara it is < or = 0.90.

5 PROPOSED TRANSPORTATION PLAN AND ACTION PLAN

5.1 Focus of the Transportation Plan

As with the previously adopted Tri-Valley Transportation Plan and Action Plan, this Update focuses on transportation improvements within the Tri-Valley, and avoids expansion of the so-called "gateways" that enter and leave the Tri-Valley. Three contributing factors have led to re-affirmation of this approach.

1. **Financial Constraints** - Financial resources for all projects are limited. The Measure C, Measure J and Measure B sales tax programs provide substantial funding for specific projects in Tri-Valley. Other projects must compete for the relatively small pot of public funds. Developer fees, which have an upper limit, could help supplement public funds. Future sales tax or gasoline tax initiatives may or may not be successful.

2. **Physical Limitations within Corridors** - Expansion of major corridors within Tri-Valley is limited due to existing development and terrain. These limitations hinder the development of transportation corridors other than the existing I-680 and I-580 corridors.

3. **Development Patterns** - Development patterns within Tri-Valley have been geared toward relatively low housing and commercial densities. These patterns are expected to continue in the future. This development pattern is impossible to serve thoroughly with transit, given realistic funding expectations.

The Tri-Valley Transportation Plan and Action Plan uses the above policy focus to create a set of actions comprising an integrated plan. The transportation plan comprises enhancement to roadway capacity coupled with increased transit service, control of demand (growth management and TDM), and acceptance of congestion in locations where it cannot be avoided. The following sections provide an overview of the plan.

5.2 Roadways

The plan includes many improvement projects for freeways, interchanges, arterials, and intersections. These are all based on the reality of *gateway constraints*.

Gateway Constraints In the development of the first Tri-Valley Transportation Plan/Action Plan in 1995, analysis of alternatives through the planning process showed that the TVTC's mobility and accessibility would not be improved by widening any of the gateways for single-occupant vehicles leading into the area. The gateways include I-680 north and south, I-580 east and west, Crow Canyon Road to Castro Valley, and Vas-

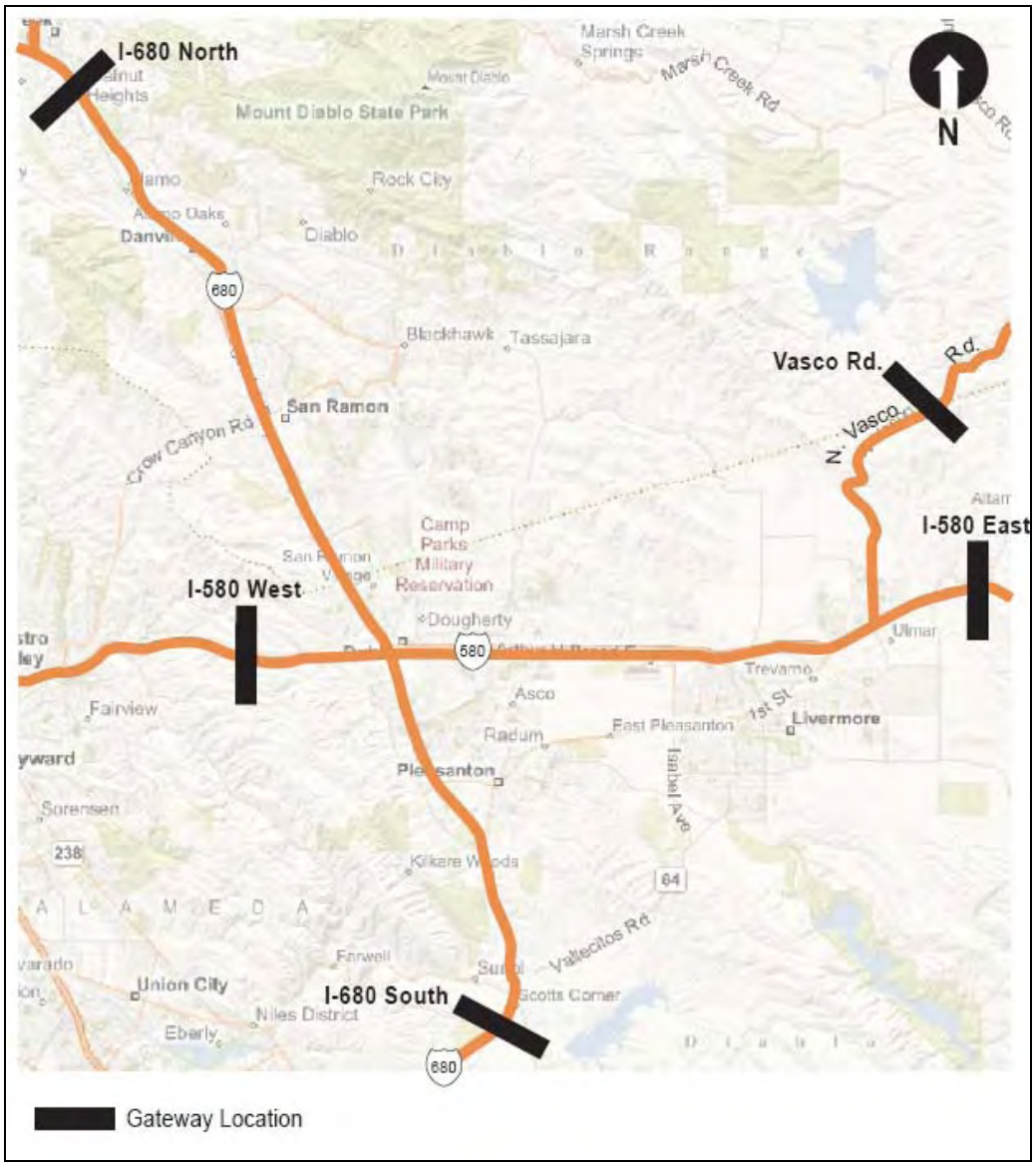
co Road in Alameda County. Their locations are illustrated in Figure 13. Widening of these gateways would leave the freeways congested, lead to more through traffic, and increase traffic volumes on other Tri-Valley roads. This is true because of the Tri-Valley's strategic location between San Joaquin County and the Bay Area and also between Central and Eastern Contra Costa County and Santa Clara County.

The implication of gateway constraints for roadway planning is that the interior freeways and arterials should be sized to handle only what traffic can get through the gateways. Thus, the plan recognizes that congestion will occur for several hours each weekday at the gateways, but this will have the positive effect of metering single-occupant vehicle travel to and from the area. Within the Tri-Valley area, the road system is designed to function with these gateways constrained to minimize congestion. The roadway plan, when combined with a balance between jobs and housing and given expected financial constraints and forecast travel demands, produces the best conditions that can reasonably be expected.

The reasons behind the gateway constraint concept are different for different gateways, as discussed below.

- **I-680 North** The section north of Diablo Road cannot be widened beyond the HOV lanes without overcoming several significant constraints: the widening would require additional right-of-way, construction of new retaining structures, and the costly reconstruction of existing overpasses and undercrossings, as well as increase impacts on adjoining land uses. The gateway constraint assumption recognizes these constraints. This concept should not be construed as an effort to preclude all potential solutions to mitigate increasing congestion on I-680 between Interstate 580 and SR 24. TVTC should work cooperatively with TRANSPAC and CCTA to identify and pursue strategies that are mutually beneficial.
- **I-680 South** The section south of SR 84 has room to be widened, and limited widening would help accommodate and balance increased flows into this section from both I-680 and the new SR 84 project. Accordingly, the plan recommends the addition of HOV lanes. Gateway constraints would still apply for single-occupant vehicles.
- **I-580 West** The topographic constraints along the Dublin Grade and the limits imposed at the I-680/I-580 interchange make widening beyond the current four lanes prohibitively expensive. The 1997 opening of the Dublin – Pleasanton BART line provide a new alternative to vehicular use of I-580. The Plan relies on the BART to provide needed additional capacity through the gateway.

Figure 13: Locations Where Gateway Capacity Constraint Policy Applies



Source: DKS Associates, 2008

- **I-580 East (Altamont Pass)** Alameda County policy, in recognition of the need to encourage shorter commuter trips and not overload Tri-Valley roads with regional traffic, opposes increases to capacity for single-occupant vehicles across this gateway. The gateway constraint policy also applies to Patterson Pass Road, Tesla Road and Old Altamont Road. The plan, however, includes HOV lanes, as a second-priority project, in recognition of the importance of I-580 as a regional facility. The Plan also relies on and supports the continuation of the recent ACE service across this gateway.
- **Crow Canyon Road (to Castro Valley)** Safety improvements are planned for this section of Crow Canyon Road, although, the TVTC supports maintaining the two-lane cross-section.
- **Vasco Road** While the TVTC supports Vasco Road remaining a two-lane road, the Plan includes safety improvements to this roadway. Any future upgrade should be done in such a manner to not preclude future accommodation of public transit or other improvements as subsequently determined appropriate.

The plan is based upon the following set of assumptions regarding gateway capacity on the freeways and major arterials that access the Tri-Valley:

- **I-680 North** Six lanes plus HOV lanes
- **I-680 South** Six lanes plus HOV lanes
- **I-580 West** Eight lanes
- **I-580 East (Altamont Pass)** Eight lanes plus HOV lanes
- **Crow Canyon Road (to Castro Valley)** Two lanes with safety improvements
- **Vasco Road** Two lanes with safety improvements

Any departure from these assumptions would require amending the Plan.

In response to the issues raised by the gateway approach, the Contra Costa Transportation Authority has established a gateway constraint methodology as part of its Technical Procedures.

Current gateways are established by two factors: geographic constraints and financial constraints. To some degree, the geographic constraints can be overcome through significant capital investments in new highway projects. However, the Tri-Valley Transportation Plan is based upon the assumption that significant capacity enhancements to the gateways serving Tri-Valley are not financially feasible. The policy of the TVTC is to work closely with neighboring jurisdictions, Congestion Management Agencies, Caltrans, and MTC to resolve capacity problems at the gateways and as needed through the partnership activities and to subsequently adjust Tri-Valley Transportation Plan should funding of mutually acceptable facilities become possible.

Corridor Management Congestion Strategies A number of alternative strategies to adding new lanes or building new roads are available for addressing congestion. These

strategies focus on improving the efficiency of traffic flow on roads, and thereby increasing the number of vehicles or people that can move through that corridor. The range of potential strategies is broad. They can include the addition of auxiliary lanes to freeways, incident management programs such as the Freeway Service Patrol, changeable message signs that provide information to travelers on travel alternatives, ramp metering, and support for travel alternatives such as park-and-ride lots and HOV bypass lanes at freeway ramps. In a sense, the gateway constraint concept is a strategy for managing the main travel corridors within the Tri-Valley.

Caltrans, with support from MTC, is in the process of implementing Traffic Operations Systems (TOS) along freeway corridors within the Bay Area. These systems will provide information to travelers on accidents and other delays on freeways, alternative routes to avoid these delays, and other information to encourage traveler decisions that would improve efficient roadway operations.

Ramp metering controls the volume of traffic entering a freeway at selected ramps to avoid break-down in the flow on the freeway. By avoiding break-down, the freeway is able to maintain the highest level of throughput and the system is kept as efficient as possible. Although a single freeway lane can carry as many as 2000 to 2200 vehicles per hour under optimal conditions (maximum throughput generally occurs at a level of service E), as demand exceeds those optimal conditions, the volumes carried actually drop. Under the most congested conditions (level of service F), travel lanes have been observed to carry only around 1,600-1,700 vehicles per hour. One source of this congestion is the "turbulence" caused by the merging of vehicles at freeway ramps. By smoothing out this merging, ramp metering can help make the flow of traffic on the freeway lanes more efficient and thus increase the vehicle throughput and speeds.

An additional benefit from ramp metering is a decrease in the accident rate. Reductions from 20 to 50 percent have been achieved through improved merging operations. The reduction of accidents not only improves the safety of the freeway, but also reduces non-recurring delay and increases freeway throughput. Ramp meters can also encourage the peak spreading that needs to occur to keep the gateways flowing. This happens because motorists are willing to accept only up to about a 10-minute wait at the meters. Beyond that, they will adjust their trip making (i.e., choose to travel at a different time or choose a different mode). This peak spreading helps to get the most out of the system when gateway constraints are a reality. When combined with HOV bypasses, ramp metering can also provide an additional incentive for carpooling and can help buses increase average speeds. When combined with HOV lanes on the freeways, the ramp metering-with-bypass system allows carpools and buses to achieve real travel time advantages compared to single-occupant vehicles.

Ramp metering has two potential drawbacks: backups on the local street system and rewarding long-distance commuters. The potential for backups on local streets can be minimized through ramp widening and strategic placement of the meters. Where these

mitigation measures are not possible, ramp metering can significantly reduce levels of service adjoining intersections and along adjacent streets. Backup onto local streets can also be avoided by installing detectors at the end of ramps and adjusting metering rates to avoid backups beyond the end of the ramp. Some of the recent ramp-metering implementations in the Bay Area have proceeded with formal agreements between Caltrans and the local jurisdictions that spill-back detectors and metering rates will be used to prevent the backups onto local streets.

Ramp metering can result in a disproportional benefit to long-distant commutes when there is a high percentage of through travelers and the metering rates in the corridor are set low to maintain the highest possible speeds on the freeway through lanes. The risk of rewarding long-distance commutes can be minimized by implementing the following three policies: 1) deploy the system of ramp metering for the entire length of a freeway corridor rather than in isolated locations, 2) meter to achieve maximum throughput rather than maximum freeway speed, and 3) set upper limits on the delay imposed at individual ramps.

Ramp metering has recently been implemented in the Tri-Valley on the eastbound ramps of I-580. An evaluation of the benefits and impacts of the ramp metering is underway and will continue as ramp metering is implemented on the westbound ramps later in the year. The results of the evaluation should provide useful information on whether it is a useful freeway management tool for the Tri-Valley. The Contra Costa jurisdictions have not reached consensus on the implementation of ramp metering on I-680. Ramp metering should not be implemented on I-680 until a general consensus is reached among affected jurisdictions on a workable and equitable implementation plan for the I-680 corridor. Consideration should be given to how ramp metering would affect the local roadway network as well as the effect it would have on the freeway.

Freeway HOV Lanes HOV lanes provide the advantage of reducing travel times for ridesharers and transit patrons. They also enhance mobility during off-peak hours by being available for all vehicles. This is especially important when considering truck traffic, which increasingly relies on off-peak hours to reach destinations without undue delays.

The TVTC recognizes the benefits of HOV lanes, but realizes that take-a-lane programs do not work. Such an ill-fated attempt at providing HOV lanes on I-580 resulted in federal legislation prohibiting their use on freeways in unincorporated areas, which has been only recently changed. Thus, HOV lanes must be added to the freeways.

Extension of the HOV lane system in the Tri Valley is also included in the plan. On I-680, a northbound HOV lane is programmed for the Sunol grade between the Santa Clara County line and SR 84. A southbound lane is already in place. An extension of HOV lanes is also programmed on I-680 south from Alcosta Boulevard to connect with the existing southbound lane south of SR 84 and the programmed northbound lane. On I-580 HOV lanes are programmed eastbound and westbound from Foothill Road to just

east of Vasco Rd. Recommended HOV lane extensions beyond what is already programmed include extension of the I-680 lanes north from Livorna Road to North Main though the SR 24 interchange and on I-580 east to the San Joaquin County line. Operation of the programmed HOV lanes southbound on I-680 over the Sunol grade and westbound on I-580 between Foothill Road and Vasco Road is also planned.

Arterial Issues The planned arterial system has been designed to provide smooth circulation in and between the Tri-Valley cities and to provide access to the freeway system. Intersections and freeway interchanges are the focal points of the arterial system. All of the widenings and extensions are necessary to serve new development, so the plan calls for direct developer construction or at least funding. The primary issue is how to share costs between jurisdictions having joint responsibility for a particular road. This is discussed further in the Financing Plan chapter.

There are two major arterials in the Tri-Valley that do not provide direct access to planned development but rather serve interregional traffic between Alameda County and Contra Costa County. These two arterials are Crow Canyon Road and Vasco Road.

Crow Canyon Road The portion of Crow Canyon Road west of Bollinger Canyon Road is a two-lane rural road that lies within the jurisdiction of Alameda County and Contra Costa County. While once used by its adjacent residents to bring goods to the market, today Crow Canyon Road is being used by commuters as an alternate to the I-580/I-680 freeways. Development in the vicinity of Crow Canyon Road, especially in the fast-growing San Ramon Valley area, has generated a significant increase in traffic on this roadway. The expected forecast for this roadway is LOS F.

The roadway, which is a narrow and winding road, was not designed to handle commuter traffic and does not have adequate width or alignment. Alameda County, in collaboration with Contra Costa County and the City of San Ramon, prepared and developed a project study report, pursuant to California Senate Bill 1149. The report recommended the construction of eight-foot shoulders, climbing lanes, and road realignment eliminating short-radii curves.

Contra Costa County has in its Measure C program the improvement of Crow Canyon Road within Contra Costa County. Alameda County, however, is seeking for funds to improve the two-lane section of the roadway. Unfortunately, improvement of this portion of Crow Canyon Road cannot be directed to a particular developer construction. But since the traffic forecast clearly indicates that traffic increase on this roadway is development-related, it is recommended that sub regional transportation impact fees be used to improve the section of Crow Canyon Road within the Tri-Valley.

Vasco Road Vasco Road is a narrow and winding rural road that is a major commuter and truck route linking the Tri-Valley with eastern Contra Costa County. Approximately 17 miles of Vasco Road, starting at a point on Vasco Road approximately one-half mile south of the county line to the intersection of Camino Diablo in Contra Costa County, has been relocated as a result of the construction of the Los Vaqueros Reservoir. This portion of Vasco Road is designed to State and County standards. The remaining section of the roadway in Alameda County (approximately three miles in length) needs to be upgraded to these standards as well to improve traffic flow and safety. Alameda County is currently seeking funds to improve the section of the roadway from the new Vasco Road to the Livermore City limit. This proposed improvement includes realignment of the roadway, widening of shoulders, and installing passing lanes without increasing its capacity, consistent with the standards beings used in the Los Vaqueros-Vasco Road project.

Road Improvements The Tri-Valley Transportation Plan and Action Plan includes many road improvement projects. These projects, listed in Tables 9 and 10, were developed by the member jurisdictions of the TVTC. Projects range from intersection modifications to freeway improvements and new roads.

Table 9: Programmed Projects for the Tri-Valley Interregional Routes of Regional Significance

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 Rd to Vasco Rd	I-580 Eastbound: Santa Rita Road to Vasco Road	
Westbound I-580 Aux Lane	Airport Blvd to Tassajara Rd	
I-680		
I-680: Construct Auxiliary Lanes, Sycamore to Crow Canyon	Sycamore to Crow Canyon	CCTA
HOV over Sunol Grade (northbound)	Northbound HOV lane from Fremont to Rt. 84	
I-680/Norris Canyon Rd HOV Ramps	Interchange of I-680 and Norris Canyon in San Ramon	CCTA
Southbound I-680 HOV Lane Extension	North Main to Livorna	TRANSPAC

Project / Action Name	*Project / Action Limits*	*Primary Sponsor*
I-680 HOV Lane Extension	Between Alcosta and south to SR 237	Caltrans
Transportation Operations System on I-680 South of I-580	I-580 to Santa Clara County Line	
I-680/Sunol I/C improvements		
I-680 Southbound High Occupancy Toll (HOT) Lane		
SR-84		
Isabel Parkway/SR 84 Interchange	At Rt. 84	Caltrans
Construct Isabel Parkway/SR 84: phase one	I-580 to Vallecitos Road	Caltrans
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	from the Livermore city limit to the 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

Table 10: Programmed Projects for the Tri-Valley Intraregional Routes of Regional Significance

Project / Action Name	*Project / Action Limits*	*Primary Sponsor*
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 Dr to County Line)	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
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	

Project / Action Name	*Project / Action Limits*	*Primary Sponsor*
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

5.3 Transit

The key transit improvements in the Tri-Valley have been the extension of BART to Dublin-Pleasanton and the institution of ACE commuter service between the Central Valley and Santa Clara County. Local LAVTA WHEELS routes rerouted to serve the BART and ACE station and create transit centers with timed transfers between modes. WHEELS and County Connection routes have also been rerouted and augmented to serve new development areas: North Livermore, East Dublin, and Dougherty Valley. In addition, some new express bus service has been implemented, included subscription bus service between BART and Concord and service between Walnut Creek and Bishop Ranch and the ACE station. Tri Delta transit began new service between East Contra Costa and Livermore.

The development pattern in the Tri-Valley is one of overall low density, however, and the new areas proposed for development will generally reinforce the low-density pattern. The low-density pattern does not support the extensive use of transit or cost-effective transit operations. If transit is to serve a much greater role than it does today, development densities will need to increase. Some plans for higher residential or commercial densities, or both, around BART stations are planned or under development. The East Dublin plan focuses higher densities near the existing BART station. Plans are being developed for a dense commercial and residential development around the planned West Dublin station.

The Tri-Valley Transportation Plan includes several transit improvements. These have been developed by a transit subcommittee of the TVTC that has included representatives from BART, CCCTA (County Connection), LAVTA (WHEELS), and Contra Costa County. The plan includes the following major components: Additional BART station in West Dublin, enhanced ACE commuter service, additional park-and-ride lots, additional express bus service in heavily traveled corridors, additional local bus service to new development areas, reoriented local bus service to serve BART and park-and-ride lots, and decreased headways on existing routes.

The Tri-Valley Transit Plan has been developed to correspond to expected funding levels. Since the area is expected to almost double in population, the hope is that transit funding will also double, although transit funding may not keep pace with population increases. Nevertheless, the plan includes the provision for significant new services plus greater use of existing routes that have available capacity. Additional riders can be served without additional investment.

BART West Dublin Station. The plan includes construction of a new BART station at West Dublin (already under construction). The East Dublin/Pleasanton extension opened in 1998. The planned BART headways are nine minutes.

ACE Commuter Service. The ACE commuter service, which began service through the Tri-Valley in 1998, provides peak-hour commuter train service between the Central Valley and Santa Clara County. The plan would add four round trips per day.

Park-and-Ride Lots. The plan includes the addition of new park-and-ride lots. These would be served by various bus lines and could also serve as staging locations for carpools.

County Connection. The plan calls for the expansion of service from the current six lines serving Tri-Valley (30-minute headways) to eight lines. The lines would serve Danville, San Ramon, Bishop Ranch, and Dougherty Valley; and some would extend down to the East Dublin BART station.

WHEELS. Under the plan, WHEELS service would expand from the current 12 lines with 30–60-minute headways to 21 lines, all with 30-minute headways. The route system would be extensively revised to serve the two BART stations, park-and-ride lots, and the newly-developed areas of East Dublin and North Livermore. Some routes would also extend into San Ramon and Danville.

Express Bus Service. The plan calls for the provision of new express bus routes operating in the I-680, I-580 and Vasco Road corridors.

5.4 Freight Transportation

Freight transportation provides an important contribution to the economy. As such, it is both necessary and appropriate that the plan give strategic priority to the movement of freight. To highlight the strategic importance of freight transportation, this plan designates I-580 as a Critical Freight Route and I-680 as a Major Freight Route. These designations are consistent with the Alameda County Long-Range Transportation Plan. As a Critical Freight Route, I-580 should be accorded priority for federal, state and regional intermodal funding. Also, I-580 should be operated in a manner that ensures that freight can be moved with maximum efficiency. To this end, expenditure priority should be given to those operational improvements necessary to prevent the encroachment of commute traffic from congesting Critical Freight Routes during midday hours (defined as from 9:00 am to 3:00 pm). As a Major Freight Route, I-680 should be given consideration for intermodal funding.

5.5 Transportation Demand Management (TDM)

While the TVTC supports TDM measures, it does not want to base the Plan on unrealistic TDM goals that are not supported by feasible programs. The Plan is based on a goal of an average 10 percent increase in AVR for all employers increasing the AVR from 1.1 to 1.2. This increase would be realized through the adoption and enforcement of local trip reduction ordinances.

5.6 Land Use and Growth Management

Land use assumptions for this Plan Update are based on ABAG *Projections 2005*, and were subject to extensive review and input by staff from the TVTC local jurisdictions through each planning department. It should be noted, however, that the Tri-Valley Transportation Plan and Action Plan uses a 2030 forecast that is not the same as General Plan "buildout," which may be either higher *or* lower than the adopted forecast.

OVERVIEW OF CONTRA COSTA JURISDICTION'S RESPONSIBILITIES UNDER THE GMP

The Contra Costa GMP requires that local jurisdictions follow a procedure for review of impacts resulting from proposed local General Plan amendments that have the potential to influence the effectiveness of adopted Action Plans

The following requirements apply to Contra Costa jurisdictions with regard to compliance with the GMP:

- Submission to Regional Committee of proposed revision(s) to Action Plan to mitigate impacts associated with proposed General Plan amendments. General Plan amendments that would reduce the effectiveness of adopted Action Plans may lead to a determination of non-compliance if the Action Plan cannot be revised with the approval of the Regional Committee and the CCTA.

To respond to this requirement, Contra Costa jurisdictions may include the following types of land-use-policy actions:

- Modify allowable densities for newly developing areas or areas where redevelopment is anticipated.
- Change distribution of planned land uses (new or redeveloped) to reduce impacts on Regional Routes.
- Prohibit urban expansion in specified geographic areas.
- Condition development approvals on progress in attaining Multimodal Transportation Service Objectives.

General Plan Amendments in Contra Costa County

The tools and procedures for conducting General Plan updates and analyzing proposed General Plan amendments will be the same as those used in preparing the Growth Management Elements. If the specific project or policy changes are large enough to meet requirements established by the region in its adopted Action Plan, the jurisdiction considering the plan amendment must submit the amendment to the Regional Committee for evaluation of its impact on the ability to achieve Action Plan objectives. The Growth Management Program directs the RTPCs to evaluate proposed amendments only in relation to issues affecting Action Plan success and consistency. It will be the responsibility of the jurisdiction considering the amendment to either:

1. Demonstrate that the amendment will not violate Action Plan policies or the ability to meet Action Plan Traffic Service Objectives; or

2. Proposed modification to the Action Plan that will prevent the General Plan amendments from adversely affecting the regional transportation network.

If neither of these can be done, approval of the General Plan amendment may lead to a finding of non-compliance with the Growth Management Program.

General Plan Consistency with Contra Costa Action Plans

The Action Plans for Routes of Regional Significance will be based on adopted General Plan land uses, the existing road network, and planned improvements to the network. Consistency with the Action Plans must be established for any changes to the General Plan that may significantly reduce the ability of the facility to meet the MTSOs. The RTPC will be responsible for establishing the type and size of amendment that will require review by the RTPC and the process for implementing this review. Approval of a General Plan amendment found to be inconsistent with the adopted Action Plans may render the jurisdiction ineligible for Local Street and Maintenance Improvement Funds from the CCTA.

Consistency with the Action Plans can be achieved by revising the proposed amendment, adopting local actions to offset impacts to the Route of Regional Significance, or Council or Board denial of the amendment.

Jurisdictions in the Tri-Valley may implement a proactive Growth and Congestion Management Strategy once a detailed growth management study has been conducted. The study should indicate the development reductions, land use density reductions, or other types of growth management or control that would be required for each applicable Tri-Valley jurisdiction to achieve MTSOs. Any development reduction should be proportional to the traffic distribution percentages for each jurisdiction. Also, the impact of this development reduction to traffic impact fees should be analyzed. All jurisdictions will then review this information and know exactly how much reduction in development or growth management or control is needed to meet the MTSOs.

JOBS-HOUSING BALANCE

One of the most important strategies for linking land use and transportation is jobs-housing balance. In theory, the more workers can either find affordable, attractive housing close to their jobs, or a job that matches their skills and income needs near their place of residence, the more they can shorten the length and duration of their journey to work. Studies have, in fact, shown that a greater jobs-housing balance can shorten work trips, reduce the overall number of work trips and encourage more walking trips.

In addition, since commute patterns in "imbalanced" areas are now highly directional, adding new jobs could encourage commuting in the direction where capacity remains. This shift would spread traffic demand more and make more efficient use of our investment in the system.

Jobs-housing balance in one area, however, doesn't mean that no one will leave to work in another. In a multi-centered, intensively developed and continually changing urban region like the Bay Area, people usually need to travel beyond their immediate neighborhood not only for work, but also for shopping, childcare, recreation, and other needs. And the large number of dual-career households requires difficult balancing between the different commute needs of the two earners. In addition, even if one area achieves jobs-housing balance, imbalances in other areas will draw workers from balanced areas to where there is a deficit of workers to fill the jobs.

For example, even though the Tri-Valley has a pretty good balance between jobs and employed residents, around 45 percent of those employed residents commute to jobs outside that sub-area. As long as the Silicon Valley continues adding new jobs but few new houses, those businesses will need to bring in workers from adjoining areas like the Tri-Valley and even further afield. Employers in the Tri- Valley will likewise need to find their workers in places like Central and East Contra Costa and the Central Valley.

Urban location theory suggests that greater jobs-housing balance should occur as part of market interactions. While this balancing appears to have taken place, at least to some extent and in some areas, it has not occurred in the Bay Area. If local and regional policies can make a greater proximity between jobs and housing attractive and affordable to the workers in those jobs, the jobs-housing balance can help support greater efficiency on the transportation system.

5.7 Additional Action Plan Actions

The Tri-Valley Transportation Plan includes programmed projects to address future transportation needs throughout the Tri-Valley and specific projects along each Route of Regional Significance. These projects were identified in previous sections of this chapter. The roadway projects specific to the Routes of Regional Significance were identified in Tables 8 and 9. The analysis of the future travel demand with the programmed improvements indicates that the Tri-Valley will not be able to meet all of the goals of the Plan as reflected in the MTSOs. Additional programs to reduce the amount of vehicular travel or projects to provide additional roadway capacity will be required. To address these potential deficiencies, additional actions have been identified. These include *regional actions* designed to improve travel conditions throughout the Tri-Valley as well as *additional actions for Routes of Regional Significance*.

REGIONAL ACTIONS

Listed below are regional actions that are intended to reduce congestion and improve efficiency on the regional transportation system. These actions are broader in nature than the route-specific actions identified in the following subsection. Implementation of regional actions requires a coordination effort among local jurisdictions and regional agencies. The TVTC jurisdictions, while not able to implement all of these actions directly, agree to use every opportunity to work cooperatively with responsible agencies, including Caltrans, BART and MTC, toward their successful implementation.

1. Increase AVR for peak hour trips from 1.1 to 1.2 through increased number or frequency of express buses, new HOV lanes, other transit improvements and local TDM programs.

2. Improve the operational efficiency of freeways and arterial streets through effective corridor management strategies. These strategies could include traffic operations systems and ramp metering, provided studies show that metering would effectively reduce overall delay within the corridor and not adversely affect operations of adjacent intersections. Provide HOV bypass lanes wherever space permits.

3. Support growth that achieves an overall jobs-housing balance within the Tri-Valley.

4. Support new funding sources to support commute alternatives and alternative-fueled vehicles for transit operators to fund needed transportation projects. The extension of county sales tax measures is one potential source of such funding. The State legislature has also passed enabling legislation that would allow MTC to propose a regional gasoline tax to the people of the Bay Area that would focus on providing increased funding for commute alternatives and other transportation projects.

5. Support active promotion of regional ridesharing services and commute incentives.

6. Support development of a seamless HOV network in the Tri-Valley to encourage the use of carpools and bus transit, and explore the possibility of connecting the HOV network to adjoining areas.

7. Encourage increases in transit service to meet the needs of the Tri-Valley, particularly the needs of the transit dependent

8. Investigate the use of high-capacity transit wherever it might be appropriate

9. Work to find sources of stable funding to support ongoing transit operations and to support new or enhanced express bus service.

10. Increase coordination of bus services between transit operators (both inter- and intra-county).

11. Support the preparation by Caltrans of an incident management plan for the State highways in the Tri-Valley. The TVTC recognizes that incidents can have a profound effect on traffic conditions both on the freeways and on the arterials.

12. The TVTC will work to proactively define a vision for viable, sustainable transit service for the Tri-Valley. This effort will include formulating a vision for the San Ramon Valley portion of the Tri-Valley.

13. The TVTC will develop subarea corridor management plans for selected regional routes to ensure adequate roadway capacity for local and subregional travel.

Specific recommendations for expansion of transit services include the following:

1. Regional Express Bus Program
2. Expand BART Bus Feeder Service
3. Study BART Extension to Livermore
4. Explore Application of Bus Rapid Transit Project
5. Systemwide Bus Stop Improvements
6. Expansion of Paratransit Services
7. Support Transit Service in Vasco Road Corridor

ADDITIONAL ACTIONS FOR ROUTES OF REGIONAL SIGNIFICANCE

This section describes additional actions for specific Routes of Regional Significance within the Tri-Valley designed to address potential deficiencies in MTSO values for 2030. These actions are above and beyond the actions identified in Tables 8 and 9 that are already programmed. Once the Plan is adopted, each jurisdiction will be responsible for making a good faith effort to implement the agreed-upon actions. In Contra Costa County, a jurisdiction's compliance with the 1988 Measure C Growth Management Program will be judged based partly upon its efforts to implement these agreed-upon actions.

The actions, programs and measures identified in the Action Plan are intended to mitigate congestion and achieve the MTSOs assuming that future traffic will be constrained by the limited capacities of highway facilities serving the Tri-Valley Gateways (see Section 5.2, "Gateway Constraints"). An individual jurisdiction may also elect to implement more stringent actions, measures or programs, in addition to those identified in this plan, on facilities within its jurisdictions.

Interregional Routes

I-580

- I-580: Construct High Occupancy Vehicle (HOV) Lanes
- I-580: Construct HOV Lanes, Vasco to San Joaquin
- I-580 Eastbound / Westbound HOV Lane
- I-580 WB High Occupancy Toll (HOT) Lane

I-680

- I-680/Sycamore Valley Rd HOV Ramps

- Northbound I-680 HOV Lane Extension: Through the SR 24 junction, this element includes a new HOV flyover structure.
- Evaluate ramp-metering on I-680 as a method for maintaining an acceptable level for the delay index on both the freeway as well as the local roadway network
- I-680 Express Bus System Expansion
- Improve geometrics of intersection of Crow Canyon Road/I-680 southbound off-ramp

SR-84

- Isabel Avenue extension
- SR 84 Expressway
- SR 84 Expressway Widening
- Isabel Ave Widening
- Study extension of Isabel Avenue North of I-580

Vasco Road

- I-580/Vasco I/C Improve to ultimate configuration

Intra-Regional Routes

None

6 FINANCIAL PLAN

6.1 Overview of the Financial Plan

The projects and programs of the Tri-Valley Transportation Plan and Action Plan receive funding from a variety of sources. Many of the projects and programs designed to address needs within an individual community are funded by the general revenues of the jurisdiction (city or county) in which the project is being implemented or through development impact fees specific to the jurisdiction. Larger projects of a more regional nature generally receive funding from a variety of funding sources designed to address subarea or regional issues. These include revenue from the county sales tax measures for Alameda County (Measure B) and Contra Costa County (Measures C and J).

Measure B was passed in 2000 and extended the half-cent sales tax for transportation in Alameda County through the year 2022. Measure B provides roughly $3 billion over the 20-year period. Some of the key Tri-Valley projects funded by Measure B are the following:

- I-580 Auxiliary Lanes
- I-580 BART to Livermore Studies
- I-680 SMART Lanes (HOV/HOT)
- SR 84 Expressway
- Vasco Road Safety Improvements
- Altamont Commuter Express Rail Capital Improvements
- Bicycle and Pedestrian Trail Improvements

Measure C in Contra Costa County was passed in 1988 and provides a half-cent sales tax for transportation through the year 2008. Measure J was passed in 2004 and extends the half-cent sales tax through 2034. Measure C is currently providing roughly $70 million to $80 million per year and Measure J will provide roughly $ 2 billion over the 25-year period. Some of the key Tri-Valley projects that will be funded by Measures C and J are the following:

- I-680 HOV Lane Gap Closure and Transit Corridor Improvements
- BART Parking, Access and Other Improvements
- Local Street Maintenance and Improvements
- Major Street:
- Traffic Flow, Safety and Capacity Improvements
- Transportation for Livable Communities Grants
- Pedestrian, Bicycle and Trail Facilities
- Bus Services
- Transportation for Seniors and People with Disabilities
- Commute Alternatives
- Congestion Management, Transportation Planning Facilities and Services
- Safe Transportation for Children

Additional regional funds are provided by the following federal, state and regional sources:

- Federal Surface Transportation Funds – SAFETEA-LU
- State Transportation Development Act (TDA)/State Transit Assistance (STA) Revenues
- State Transportation Improvement Program (STIP) Funds
- State Corridor Management Improvement Account (Prop 1B)
- State Environmental Enhancement and Mitigation
- STDA, Article 3 – Bicycle and Pedestrian Funds
- Bridge Toll Revenues
- Regional Measure 2 Bridge Toll Revenues for Specific Projects and Programs
- AB 1107 half-cent sales tax revenues for transit (BART and AC Transit)
- Transportation Fund for Clean Air - Vehicle Registration Fees for Clean Air Programs

Because of the dramatic growth that is expected in the Tri-Valley and the surrounding areas, the funding from the sources identified above will not be sufficient to address all of the travel needs in a way that allows the area to meet all of its MTSOs in 2030. Since the first plan was adopted in 1995, the TVTC has looked to an additional Tri-Valley funding from new development that can be linked directly to new development. Two elements of the financing plan for the Tri-Valley Transportation Plan and Action Plan are designed to address this additional need for funds: the sub regional transportation impact fee, and the cost-sharing formulae for road improvements that benefit multiple jurisdictions.

6.2 Subregional Transportation Impact Fee

In 1998, the member jurisdictions of the Tri-Valley Transportation Council entered into a Joint Exercise of Powers Agreement (JEPA) that established the Tri-Valley Transportation Development Fee, or TVTDF. The TVTDF comprises a set of uniform fees on new development within the Tri-Valley area. The use of the fee is guided by the TVTDF Strategic Expenditure Plan, which outlines the priorities for the Tri-Valley area as agreed to by the seven TVTC member agencies. The TVTDF Strategic Expenditure Plan lists project costs for each of the potential projects to be funded; estimates expected revenues from the TVTDF and other possible revenue sources for the projects; sets a prioritization plan and a timeline for project delivery; and identifies the TVTDF jurisdiction responsible for overseeing implementation of the project.

The 26 projects that the fee can fund are divided into two groups. Exhibit A projects are the original 11 projects funded through the fee program adopted in 1995. The 11 Exhibit B projects have recently been added in the latest update of the fee nexus study because they are considered important regional projects to help address the impacts of growth with the Tri Valley. Three of the original projects have already been completed.

6.3 Shared Facilities

Implementation of much of the planned arterial system will be the direct responsibility of new development. Many of the arterials, however, are shared among jurisdictions. For each of these improvements, a negotiated agreement needs to be reached about cost sharing between jurisdictions. The cost-sharing approach could be based on which jurisdiction's traffic is expected to use the facility, or it could be based simply on the boundaries within which the facility lies, or a combina-

tion. These agreements should be negotiated in advance so that when development takes place, the responsibility for road improvements is clear.

7 PLAN IMPLEMENTATION, MONITORING, AND REVIEW

This chapter describes how the Tri-Valley Transportation Plan will be implemented. Specific topics include plan adoption by member jurisdictions, the procedure for monitoring transportation service objectives, and procedures for handling development applications.

7.1 Plan Adoption and Amendment

As specified in the Joint Powers Agreement (JPA) that created the TVTC, adoption of the Tri-Valley Transportation Plan shall require the unanimous vote of all members of the TVTC. Following plan adoption, all TVTC member jurisdictions agree to consider the Plan when adopting or amending circulation elements of their general plans and specific plans, zoning ordinances, or capital improvement programs.

While compliance with the Tri-Valley Transportation Plan (TVTP) is essentially voluntary among the Alameda County jurisdictions, at least until aspects of the TVTP become part of the Alameda County Congestion Management Program, the Contra Costa jurisdictions have a mandate for compliance. Because the TVTP constitutes the Action Plan for the Contra Costa Tri-Valley jurisdictions, the Contra Costa jurisdictions in the Tri-Valley must implement the planned actions to maintain compliance with Measure C and J or risk losing their return-to-source funds. Compliance is tied to local implementation of action policies as described in Chapter 5, "Action Plan." One locality, however, cannot be judged ineligible for local street maintenance and improvement funds because of the unwillingness of another locality to participate in the process.

The first TVTP was adopted in January 1995 and the TVTC updated it in 2000 in conjunction with the preparation of the 2000 Contra Costa Countywide Comprehensive Transportation Plan. The 2008 TVTP is the second update to the original plan. In the future, the TVTC is expected to comprehensively update the TVTP every four to eight years.

More focused amendments to the TVTC can be triggered by:

1. Responses to identified exceedances of adopted MTSOs;

2. A jurisdiction's proposal to adopt a major general plan amendment that was not considered in the existing plan and that propose new or modified actions in the TVTP; and/or

3. A change in the major assumptions underlying the Plan, such as a change in the assumptions for Gateway Constraints.

This plan is based upon the assumption that major gateways into Tri-Valley will not be expanded beyond the capacities assumed for the gateways as set forth in Chapter 5. Any change in these assumptions, such as the addition of HOV lanes on I-580 over the Altamont Pass, would require that this plan be amended to incorporate revised assumptions for the Tri-Valley gateway constraints.

Increased capacity at the gateways could significantly increase projected congestion on downstream freeway sections and arterial streets. As specified in the Joint Powers Agreement governing the TVTC, amendments to the plan will require a unanimous vote of all members of the TVTC.

7.2 Monitoring Multimodal Transportation Service Objectives

The Multimodal Transportation Service Objectives (MTSOs) are the heart of the TVTP. They represent the both the TVTC's objectives for how the Regional Routes function and its yardstick for measuring progress for achieving its goals. Chapter 5, Action Plan, outlines the MTSOs and the Regional Routes to which they apply.

Currently, the MTSOs are largely being met. With forecast growth, however, many of the MTSOs are expected to be exceeded by 2030, even with planned improvements and the other actions outlined in the TVTP.

As part of the periodic comprehensive review and update of the TVTP, the TVTC will monitor the current status of the MTSOs and forecast their status in the future. This monitoring will rely on data collected from the CCTA and the Alameda CMA.

Congestion Duration. This MTSO is expressed in terms of hours of congestion per day. Hours of congestion can be measured with traffic counts or speed runs and should apply to mixed-flow lanes only. The plan uses a capacity of 2,200 vehicles per lane per hour (1,100 vehicles capacity for auxiliary lanes). Traffic counts can also be used to show duration of congestion. Freeway monitoring should be done by Caltrans or the CMA.

Delay Index. The Delay Index compares the time required to travel between two points during the peak hour to the time required during non-congested, off-peak hours. This measure is defined as the observed travel time divided by the free-flow travel time:

Delay Index (DI) = (Observed Travel Time) ÷ (Free-Flow Travel Time)

The minimum value for the Delay Index — which indicates minimum delay — is 1.0. A DI of 1.0 indicates that traffic is moving at free-flow speed, as measured by floating car runs, unconstrained by congestion. As congestion increases and average speed decreases, the DI increases as well. For example, a DI of 2.0 indicates that the trip takes twice as long during peak hours as during the off-peak, due to congestion and slow speed.

Intersection Levels of Service. Intersection levels of service should be calculated using the CCTA-LOS method for AM and PM peak hours based on turning-movement counts. Intersection monitoring should be conducted by the jurisdiction in which the intersection lies. The intent of the TVTP is to maintain the intersection MTSO at all signalized intersections. However, to avoid extensive data collection, each jurisdiction should establish a list of critical intersection for monitoring. TVTC should initiate a discussion of utilizing intersection level-of-service calculations based on the Highway Capacity Manual as a supplement or alternative to the CCTALOS method.

Mode Split. Mode split is virtually impossible to measure in the field, except through extensive home interview and work place surveys. These data are available every decade from the U.S. Census and periodically from MTC. In between times, transit ridership should be monitored as a surrogate for mode split. The mode split goal of the TVTP can only be met if transit ridership increases over the reporting period. The transit operators routinely collect and report annual ridership.

Average Vehicle Ridership. This MTSO relates directly to commute trips. The Tri-Valley Transportation Plan includes a regional action to increase AVR from 1.1 to 1.2. Several Tri-Valley jurisdictions maintain voluntary employer trip reduction programs to increase AVR.

7.3 Development Applications Review and General Plan Amendments

As noted above, the JPA that established the Tri-Valley Transportation Council requires each member jurisdiction to consider the TVTP when it adopts or amends circulation elements of their general plans and specific plans, zoning ordinances, or capital improvement programs. In addition, the JPA requires member jurisdictions to bring proposed new transportation projects of "regional or subregional significance" to the TVTC for review and comment.

The member jurisdictions, as part of the adoption of the Tri-Valley Transportation Plan, have agreed to analyze the impacts of new development and general plan amendments and to share the results of these analyses with other Tri-Valley jurisdictions. These analyses shall assume gateway constraints described in this plan as described in the Contra Costa Transportation Authority's *Technical Procedures.*

The TVTP recognizes that the Alameda and Contra Costa members of the TVTC must respond to different countywide requirements for analyzing the effects of land use or land use plan changes: the Alameda jurisdictions must fulfill the requirements of the Alameda Congestion Management Program while the Contra Costa jurisdictions must fulfill the requirements of both the Measure C Growth Management Program (which will be superseded by the Measure J GMP in 2009) and the Contra Costa CMP.

Development Review. Member jurisdictions must analyze the impacts of any development project that generates more than 100 peak hour vehicle trips and must circulate that analysis to all the jurisdictions that make up the TVTC. This analysis may be circulated separately or as part of CEQA documents prepared by the lead agency. Lead agencies may elect to use the MTSOs as thresholds of significance in their CEQA documents. Consistent with the JPA, the member jurisdiction should forward any regional and subregional transportation projects proposed as mitigation measures for the project for TVTC review and comment.

Contra Costa jurisdictions must conduct this analysis consistent with the Contra Costa Transportation Authority's *Implementation Guide* and *Technical Procedures.* Alameda jurisdictions must assess the effects of the development on the Metropolitan Transportation System consistent with the Alameda CMP.

General Plan Amendments. Member jurisdictions must analyze the impacts of any amendment to their General Plans that generates more than 500 peak hour vehicle trips and must circulate that analysis to all the jurisdictions that make up the TVTC. This analysis may be circulated separately or as part of CEQA documents prepared by the lead agency. A jurisdiction considering a general plan amendment should evaluate its impact on the TVTP and demonstrate that the proposed amendment would not significantly reduce the ability to achieve the MTSOs. If further transportation improvements are necessary beyond what are in the TVTP, the jurisdiction should specify how they would be funded.

For the Contra Costa jurisdictions, approval of a General Plan Amendment found to be inconsistent with the adopted Action Plans may result in a finding that the jurisdiction is out of compliance with the Measure C or J GMP and thus ineligible for Local Street Maintenance and Improvements and CC-TLC funds from the CCTA.

Consistency with the Action Plans can be achieved by revising the proposed amendment, adopting local actions to offset impacts to the Route of Regional Significance, or Council or Board denial of the amendment.

If there are MTSO exceedances, or projected MTSO exceedances, in a Tri-Valley jurisdiction, then that jurisdiction can either (a) implement transportation improvements (e.g., road widening) to correct the MTSO deficiency on that affected network segment, or (b) implement other measures intended to result in measurable improvements to MTSOs on the Routes of Regional Significance network and contribute to significant improvements in air quality. Failing this, the jurisdiction can refer the problem to the TVTC for joint resolution.

The tools and procedures for conducting General Plan amendments and analyzing proposed General Plan amendments shall be in accordance with the Measure C/J *Technical Procedures* and *Implementation Documents*. If the specific project or policy changes generate more than 500 peak hour vehicle trips, the jurisdiction considering the Plan amendment must submit the amendment to the Regional Committee for evaluation of its impact on the ability to achieve Action Plan objectives. TVTC would then evaluate proposed amendments only in relation to issues affecting Action Plan success and consistency. It will be the responsibility of the jurisdiction considering the amendment to either:

1. Demonstrate that the amendment will not violate Action Plan policies or the ability to meet Action Plan Traffic Service Objectives; or

2. Propose modification to the Action Plan that will prevent the General Plan amendment from adversely affecting the regional transportation network.

If neither of these can be done, approval of the General Plan amendment by a Contra Costa jurisdiction may lead to a finding of non-compliance with the Growth Management Program.

In *Contra Costa County*, if a MTSO is not met following implementation of the Action Plan, the Plan would need to be reevaluated through the forum of TVTC and SWAT. Amendments to the Plan

could include a relaxation of MTSOs, a strengthening of actions, or a combination of these approaches. In *Alameda County*, the jurisdiction with the MTSO violation can elect to modify growth rates, improve the facility, or seek a lower MTSO standard through the amendment process set forth in this chapter.

7.4 Process for Addressing MTSO Exceedances

As noted above, from time to time, the MTSOs are monitored to determine whether they are being achieved. In addition, the MTSOs are evaluated to determine if they can be achieved in the future. For this update to the TVTC Transportation Plan/Action Plan, the MTSOs were monitored in 2007, and the traffic forecasts were prepared and evaluated for 2030. In both cases, exceedances of the adopted MTSOs were observed.

Under adopted CCTA policy, exceedance of an MTSO does not constitute a compliance issue with the Growth Management Program. Similarly, the Alameda jurisdictions are not subject to any penalties or loss of funding due to an observed or forecast MTSO exceedance.

The primary purpose of the MTSOs is to provide TVTC with a quantitative measure of transportation system performance that can be consistently applied as a metric for gauging the impacts of future growth and mitigating those impacts. The MTSOs that TVTC has adopted for this Plan are by no means the "lowest common denominator." To the contrary, they reflect a broader objective of TVTC to ensure an acceptable level of mobility for its residents and workers to sustain the economy and maintain quality of life.

It is not surprising, therefore, given the level of expected growth in the Tri-Valley, coupled with the constraints on adding new capacity to the system, that the MTSOs would be exceeded either today or in the future.

When an exceedance has been determined, either through monitoring or during the Action Plan update process, the only action required under this Plan is that TVTC document the condition, and continue to monitor and address the MTSOs in future updates to the Plan under the timeframe established in Section 7.1 above.

In the case where a proposed development project or General Plan Amendment causes an exceedance, or exacerbates a situation where an already exceeded MTSO is still further exceeded, then the procedures in Section 7.3 regarding development applications review and general plan amendments shall apply.

7.5 Conflict Resolution

Because of the importance of support for the Plan by all members of the TVTC, the Council should act on a consensus basis. Some cases may arise, however, in which consensus cannot be reached. In cases where conflict exists between jurisdiction within one county, resolution should be negotiated through the forum of the Congestion Management Agency for the respective county. In cases where conflict exists between jurisdictions in different counties, resolution should be negotiated

through the TVTC with the provisions of the Joint Powers Agreement applying. These provisions state the following:

1. Unanimous vote of all members required for plan adoption and amendment.

2. Unanimous vote of all members required for adoption of annual work program and budget.

3. Five votes required for grant applications, expenditure of funds, execution of contracts, and adoption of rules of procedure.

4. Majority vote of all members present required for action on any other matter.

7.6 Future Role of TVTC

It is anticipated that implementation of the Action Plan will rest primarily with the individual jurisdictions. However, the plan has identified some continuing functions for the TVTC, as follows:

- Updates and amendments to the Tri-Valley Transportation Development Fee (TVTDF)
- Coordinated implementation of actions requiring inter-jurisdictional cooperation, including supporting the funding and development of the projects and programs listed in the TVTDF.

APPENDIX 1 TECHNICAL MEMORANDUM- ANALYSIS OF MTSOS FOR THE DRAFT TRI VALLEY TRANSPORTATION PLAN/ACTION PLAN

DKS Associates
TRANSPORTATION SOLUTIONS

TECHNICAL MEMORANDUM

TO:	Tri Valley Transportation Council		
THROUGH:	Martin R. Engelmann, CCTA		
FROM:	Bill Loudon, DKS		
DATE:	June 11, 2008 (Revised June 17, 2008)		
SUBJECT:	Analysis of MTSOs for the Draft Tri Valley Transportation Plan/Action Plan	P/A No.	07085-004

Under contract with the Contra Costa Transportation Authority, DKS Associates is conducting an analysis of the Action Plan Multi-Modal Transportation Service Objectives (MTSOs) to determine whether the MTSOs can be met under a variety of test scenarios and horizon years.

In Tri Valley, the proposed MTSO's in the Draft 2008 Transportation Plan /Action Plan Update are:

- Peak Hour Delay Index and Speed
- Peak Hour Level of Service (LOS) at Signalized Intersections
- Congestion Duration

In addition, goals have also been identified for the following:

- Peak Period Transit Mode Share
- Peak Period Average Vehicle Ridership

DKS has evaluated each of these for the following set of scenarios:

1. Baseline 2007 (Observed)
2. 2020 with Implementation of all Action Plans
3. 2020 with Implementation of all Action Plans + Gateway Constraints
4. Baseline 2030

5. 2030 with Implementation of all Action Plans
6. 2030 with Implementation of all Action Plans + Gateway Constraints

The term "Gateway Constraints" refers to a policy that the Tri-Valley Transportation Council (TVTC) adopted in 1995 regarding number of lanes on major roadways entering the Tri-Valley subarea. The policy would limit the future general-purpose-lane volume entering the Tri Valley on I-580, I-680, Crow Canyon Road and Vasco Road to no more than the existing general-purpose-lane capacities of the roads. Additional capacity could potentially be added with HOV lanes or truck lanes.

Results of the MTSO Analysis

The attached tables show the results for each scenario. Grey shading indicates if the MTSO is not met. The overall percent of segments that achieve the Delay Index MTSO targets are provided in an aggregate form as Figures 1 and 2. The Delay Index is also a direct reflection of Peak Hour Speeds: Any segment that does not meet the MTSO for Delay Index will also not meet the MTSO for Park Hour Speeds.

Regarding Delay Index, the following results summarize what is shown in Tables 1 and 2:

- At least one segment of I-680 will exceed a Delay Index value of 2.0 in each of the scenarios;
- The 2020 Action Plan with Gateway Constraints is the only scenario for which I-580 does not have at least one exceedances of the 2.0 value;
- The Delay Index value of 3.0 that is proposed for SR 84 would be exceeded in any scenario in 2020 or 2030.

Table 3 summarizes the signalized intersection level of service results.

- For all 2030 scenarios at least 29 intersections would not exceed the level of service MTSO of "D". In 2020 at least 19 intersections exceed the "D" level of service.

The MTSO for Duration of Congestion applies only to I-680 south of SR 84. The MTSO is to have no more than five hours of congestion on an average weekday. Freeway congestion is level of Service "E" or worse. No monitoring data were available with which to assess this MTSO for the existing conditions. Use of model-based forecasts for the future years, however, suggests that the hours of congestion will be less than five hours in both directions under all 2020 and 2030 scenarios.

As summarized in Table 4, the Transit Mode Share for peak period trips from the Tri Valley would increase by 66% (from 13.2% to 22.0%) by 2020 and 74% (from 13.2% to 23.0%) by 2030. Trips to the Tri Valley would increase by 55% (from 6.5% to 10.1%) by 2020 and 100% (from 6.5% to 13.1%) by 2030. In all scenarios the goal of achieving a significant increase is achieved. The range of increase over 2007 is 41.1% in the 2030 Baseline to 83.2% in the 2030 Action Plan (with and without the Gateway Constraint).

Table 5 summarizes the assessment of the changes in peak period Average Vehicle Ridership for trips from and to the Tri Valley. As indicated in the table, Average Vehicle Ridership would increase by 10% (from 1.30 to 1.43) by 2020 and 12% (from 1.30 to 1.45) by 2030. Trips to the Tri Valley would increase by 6% (from 1.22 to 1.29) by 2020 and 10% (from 1.22 to 1.34) by 2030. The goal of achieving a 10% increase in

commute period Average Vehicle ridership would be achieved under the Action Plan and the Action Plan with Gateway Constraints in 2030 but not in 2020.

Figure 1 - Delay Index Values by Year for Action Plans

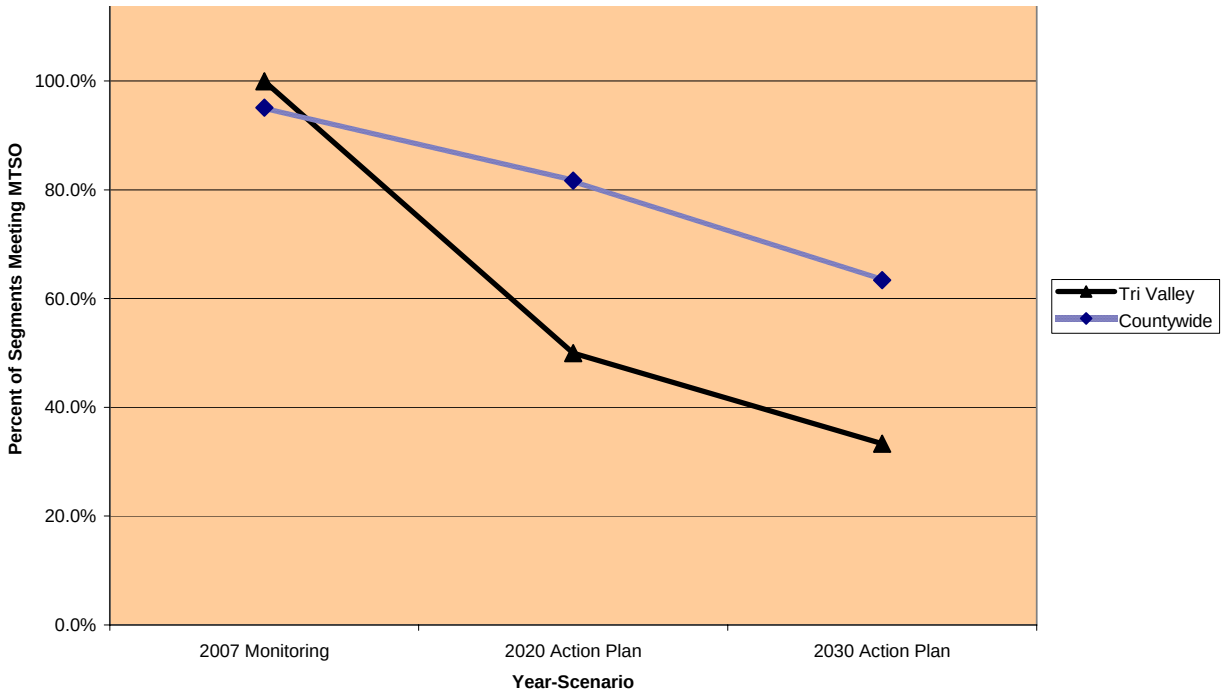


Figure 2 - Delay Index Values by Year for Action Plans with Gateway Constraints

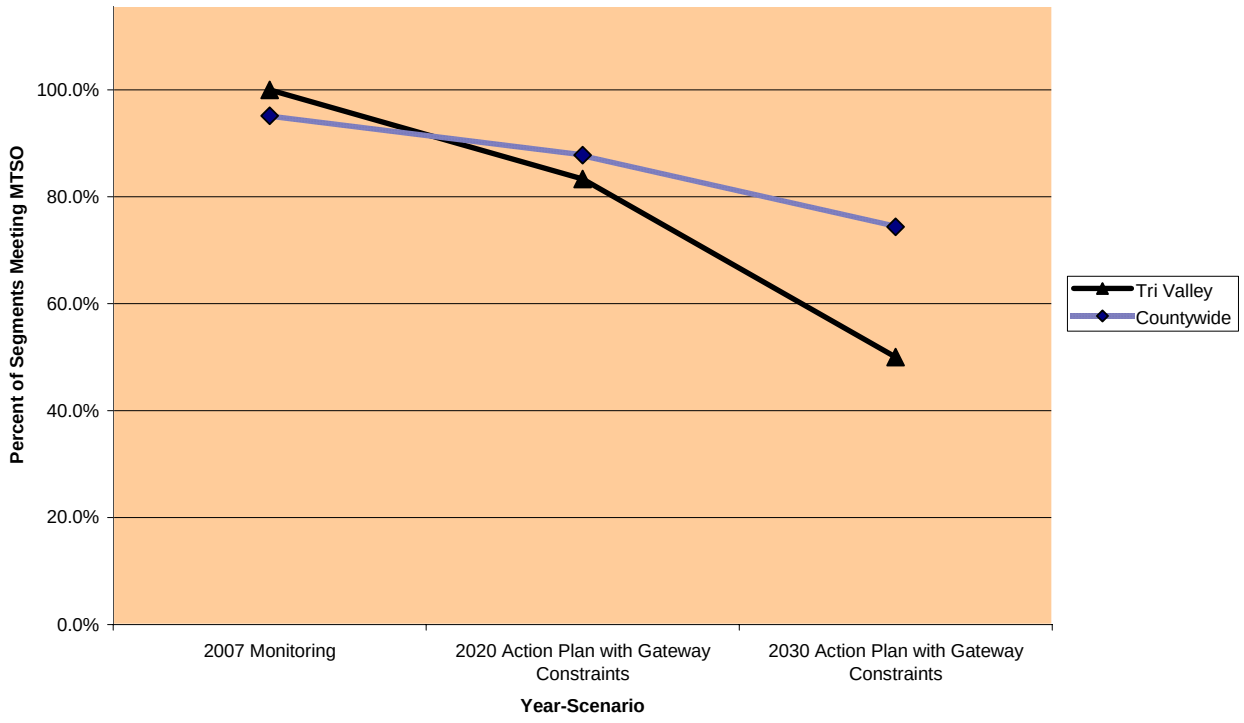

100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
Percent of Segments Meeting MTSO
2007 Monitoring
2020 Action Plan with Gateway Constraints
2030 Action Plan with Gateway Constraints
Year-Scenario
Tri Valley
Countywide

Table 1 - AM Peak Hour Delay Index Forecasts

Routes	AM Peak Hour						
	Target MTSO	2007 Base-line (Ob-served)	2020 with Action Plans	2020 with Action Plans + Gateway Constraints	2030 Base-line	2030 with Action Plans	2030 with Action Plans + Gateway Constraints
I-680							
Northbound	2.0	1.5	2.1	2.1	2.2	2.2	2.2
Southbound	2.0	1.2	2.2	1.9	3.3	3.1	1.8
I-580							
Eastbound	2.0	1.1	1.3	1.3	1.9	1.8	1.0
Westbound	2.0	1.8	2.5	1.8	5.2	5.0	3.2
SR-84							
Eastbound	3.0	1.1	1.1	1.1	1.5	1.2	1.1
Westbound	3.0	1.6	1.3	1.2	2.5	1.7	1.3

Table 2 - PM Peak Hour Delay Index Forecasts

Routes	PM Peak Hour						
	Target MTSO	2007 Base-line (Ob-served)	2020 with Action Plans	2020 with Action Plans + Gateway Constraints	2030 Base-line	2030 with Action Plans	2030 with Action Plans + Gateway Constraints

I-680							
Northbound	2.0	1.8	2.5	2.3	3.7	3.3	2.6
Southbound	2.0	1.2	1.5	1.5	2.3	1.8	1.7
I-580							
Eastbound	2.0	1.8	1.7	1.7	4.2	4.3	2.2
Westbound	2.0	1.0	1.7	1.4	1.5	1.7	1.7
SR-84							
Eastbound	3.0	1.0	1.1	0.8	1.7	1.7	0.8
Westbound	3.0	1.1	1.1	1.1	1.6	1.2	1.1

Table 3 – Signalized Intersection LOS

Location	MTSO	2007 Monitoring	2020 with Action Plans	2020 with Action Plans + Gateway Constraints	2030 Baseline	2030 with Action Plans	2030 with Action Plans + Gateway Constraints
AM Peak Hour							
Total Intersections	D	57	57	57	57	57	57
Meet MTSO	D	55	43	46	29	32	41
Exceed MTSO	**D**	**2**	**14**	**11**	**28**	**25**	**16**
PM Peak Hour							
Total Intersections	D	57	57	57	57	57	57
Meet MTSO	D	52	34	38	21	22	28
Exceed MTSO	**D**	**5**	**23**	**19**	**36**	**35**	**29**

Table 4 - Peak Period Transit Mode Share

Time Period/ Direction	Target MTSO	2007 Baseline (Modeled)	2020 with Action Plans	2020 with Action Plans + Gateway Constraints	2030 Baseline	2030 with Action Plans	2030 with Action Plans + Gateway Constraints
From Tri Valley	None	13.2%	22.0%	22.0%	16.8%	23.0%	23.0%
To Tri Valley	None	6.5%	10.1%	10.1%	11.0%	13.1	13.1
Average	None	9.85%	16.05%	16.05%	13.90%	18.05%	18.05%
Percent Change from 2007 Value			62.9%	62.9%	41.1%	83.2%	83.2%

Table - 5 Peak Period Average Vehicle Ridership

Time Period/ Direction	Target MTSO	2007 Baseline (Modeled)	2020 with Action Plans	2020 with Action Plans + Gateway Constraints	2030 Baseline	2030 with Action Plans	2030 with Action Plans + Gateway Constraints
From Tri Valley	+ 10%	1.30	1.43	1.43	1.36	1.45	1.45
To Tri Valley	+ 10%	1.22	1.29	1.29	1.29	1.34	1.34
Average	+ 10%	1.26	1.36	1.36	1.33	1.40	1.40
Percent Change from 2007 Value			7.9%	7.9%	5.2%	10.7%	10.7%

Discussion

To address the MTSO exceedances, the TVTC TAC has the following options:

1. **Modify the MTSOs.** Staff notes that the MTSOs are flexible measures that TVTC sets as part of its Action Plan. Ideally, MTSOs would envision an improvement in operations. In some cases, however, objectives may seek to avoid further degradation of performance. Or, in the worst case, where projections now indicate significant levels of deterioration, TVTC could choose to limit the rate of degradation. Furthermore, the target date for achievement, which is now set at 2030, is flexible as well. Finally, TVTC could use a different set of transportation measures for MTSOs such as safety and operability rather than delay and level of service.

2. **Modify the set of actions and programs in the Action Plan to help achieve the MTSO**; The proposed list of actions in the Plan are based primarily upon existing capital projects by the existing Tri Valley subregional fee program or one of the two county sales tax programs. New capital improvement projects, as well as new programs or measures, could be introduced to help improve future performance of the transportation system. Growth management strategies could also be re-examined to address MTSO issues.

3. **Lay out a process for in the Action Plan specifically dealing with how TVTC will respond to an MTSO exceedance:** This option would introduce new language in the Action Plan to specify TVTC's approach to dealing with a possible MTSO exceedance. In consultation with CCTA staff, the TVTC TAC would outline a detailed procedure for dealing with MTSO exceedances.

In a meeting on June 16, 2008, the TVTC TAC expressed support for the third option and chose not to revise the MTSOs or to add actions.

APPENDIX 2: TECHNICAL MEMORANDUM - GATEWAY CONSTRAINT METHODOLOGY

DKS Associates
TRANSPORTATION SOLUTIONS

TECHNICAL MEMORANDUM

TO: TRANSPLAN-TAC

THROUGH: Martin R. Engelmann, CCTA

FROM: Joe Story, DKS

DATE: July 28, 2008; 10:30 a.m.

SUBJECT: Gateway Constraint Methodology P/A No. 07085-005

The analysis of the 2030 and 2020 Action Plans included application of the Gateway Constraint methods as detailed in the CCTA *Technical Procedures*, last updated in July 2006. Within this guidance, there is a detailed explanation of the Gateway Capacity Constraint Methodology as Chapter 9. The DKS application of this methodology is discussed here.

Determination of Constrained Locations

DKS first identified those policy locations where the potential for gateway capacity constraint exists. They include those that are "policy gateways" as set forth in the Tri-Valley and Lamorinda Action Plans: I-580 at the San Joaquin/Alameda County Line, I-580 east of Castro Valley, I-680 at the Sunol Grade, I-680 at Livorna Road (Danville), Vasco Road, and State Route 24 both east of the Caldecott Tunnel and west of I-680. These locations are listed in Table 1 and illustrated graphically in Figure 1.

In addition, the need to apply traffic management strategies that constrain traffic flow was also recognized as a constraint point to Lamorinda for Pleasant Hill Road at the Lafayette city limits. Further, State Route 4 at Willow Pass, and on I-80 at the Bay Bridge were included as constraint locations where additional capacity is not feasible. These additional gateway constraint locations that were applied are listed in Table 2 as well as also shown in Figure 1.

Application of the Gateway Constraint Methodology

Section 9.2 of the *Technical Procedures* outlines how eligible locations were determined. It should be noted that the arterial volumes used generally reflect the amount of green time anticipated on the mainline flow. The actual freeway target gateway volumes were determined by examining the PeMS data made available from Caltrans. These data sets utilized sensors on the roadways to help guide the volumes of vehicles, and

the variations of demand during an extended peak period. These were analyzed for an average Tuesday-through-Thursday condition when school would be in session. This analysis was necessary to develop the target volumes for gateway constraints, as the appropriate target volume would be lowered if the duration of congestion is longer (as there would be less of a likelihood for traffic to shift to other hours if congestion was sustained longer). The average distribution of traffic at peak hours as compared to peak periods was then assigned, as instructed in Chapter 9 of the Technical Procedures.

Traffic Shifted from Peak Hours

The resulting total number of trips in both the Action Plan and the Gateway Constraint analysis is shown in Table 3. This table demonstrates that the trips during the AM peak hour were reduced by 1.8 percent, while 1.3 percent of the trips were reduced in the PM peak hour. The largest percent reductions occurred with trips associated with San Francisco commuting (inbound in the AM peak hour and outbound in the PM peak hour) as well as counties out of the Bay Area (outbound in the AM peak hour and inbound in the PM peak hour).

Other Gateway Locations Not Constrained

DKS reviewed a number of other gateway constraint locations identified in Table 4 and generally determined that there was not a need to further reduce traffic at these locations. A comparison of other possible gateway constraint locations shows that no further constraints would result in lower traffic volumes beyond those already listed in Tables 1 and 2. Table 3 shows that the resulting 2030 gateway constraint volumes lie below a targeted capacity in all cases except one – Kirker Pass Road. Signals on the Kirker Pass Road are currently metered, so that a final gateway constraint assumption on this facility is a function of the preferred flow rates on the roadways.

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Table 1 -- Gateway Constraint Summary – Policy Direction

Facility-Direction	Gateway Location	Mixed-Flow Lanes	Gateway Method Used (In/ Out)	Action Plan 2030 Demand	Theoretical Maximum Flow Per Lane	Target Segment Capacity (CCTA Technical Procedures)	Gateway Constraint Time Period Applied -2030	Gateway Constraint Time Period Applied -2020
I580-Westbound	East of Castro Valley	4	Out	11,019	2,200	11,704	None	None
I580-Eastbound	East of Castro Valley	4	In	12,282	2,200	9,240	AM and PM	AM and PM
I580-Westbound	East of Greenville Rd (Livermore)	4	In	11,070	2,100	8,820	AM	None
I580-Eastbound	East of Greenville Rd (Livermore)	4	Out	10,451	2,100	11,172	None	None
I680-Northbound	South of SR84 (Pleasanton)	3	In	8,428	2,300	5,985	AM and PM	AM and PM
I680-Soutbound	South of SR84 (Pleasanton)	3	Out	10,472	2,300	6,669	AM and PM	PM
I680-Northbound	North of Livorna Road (Alamo)	3	Out	8,367	2,000	11,438	None	None
I680-Soutbound	North of Livorna Road (Alamo)	3	In	8,853	2,000	10,640	None	None
SR24-Eastbound	West of I-680	4	Out	11,132	2,200	10,296	PM	None

Facility-Direction	Gateway Location	Mixed-Flow Lanes	Gateway Method Used (In/ Out)	Action Plan 2030 Demand	Theoretical Maximum Flow Per Lane	Target Segment Capacity (CCTA Technical Procedures)	Gateway Constraint Time Period Applied -2030	Gateway Constraint Time Period Applied -2020
SR24-Westbound	West of I-680	4	In	10,400	2,200	13,034	None	None
SR24-Eastbound	Caldecott Tunnel	4	In	10,862	2,000	8,400	PM	PM
SR24-Westbound	Caldecott Tunnel	4	Out	11,955	2,000	10,998	AM	None
Vasco Rd-Northbound	North of Alameda/CC County Line	1	Out	1,036	850	995	PM	None
Vasco Rd-Southbound	North of Alameda/CC County Line	1	Out	1,208	850	995	AM	AM

Notes: CCTA Technical Procedures, July 19, 2006, pp. 83-93, establishes specific guidance on the calculation of gateway capacities based upon the duration of congestion. The duration is a key input variable used to determine the target for the Gateway Constraint procedure. Target procedures vary depending on whether the traffic is coming from outside or inside the study area, with locations as indicated. The assignment process creates assignment volumes that match the target segment capacity.

Figure 1 – Locations Where Gateway Constraints Applied

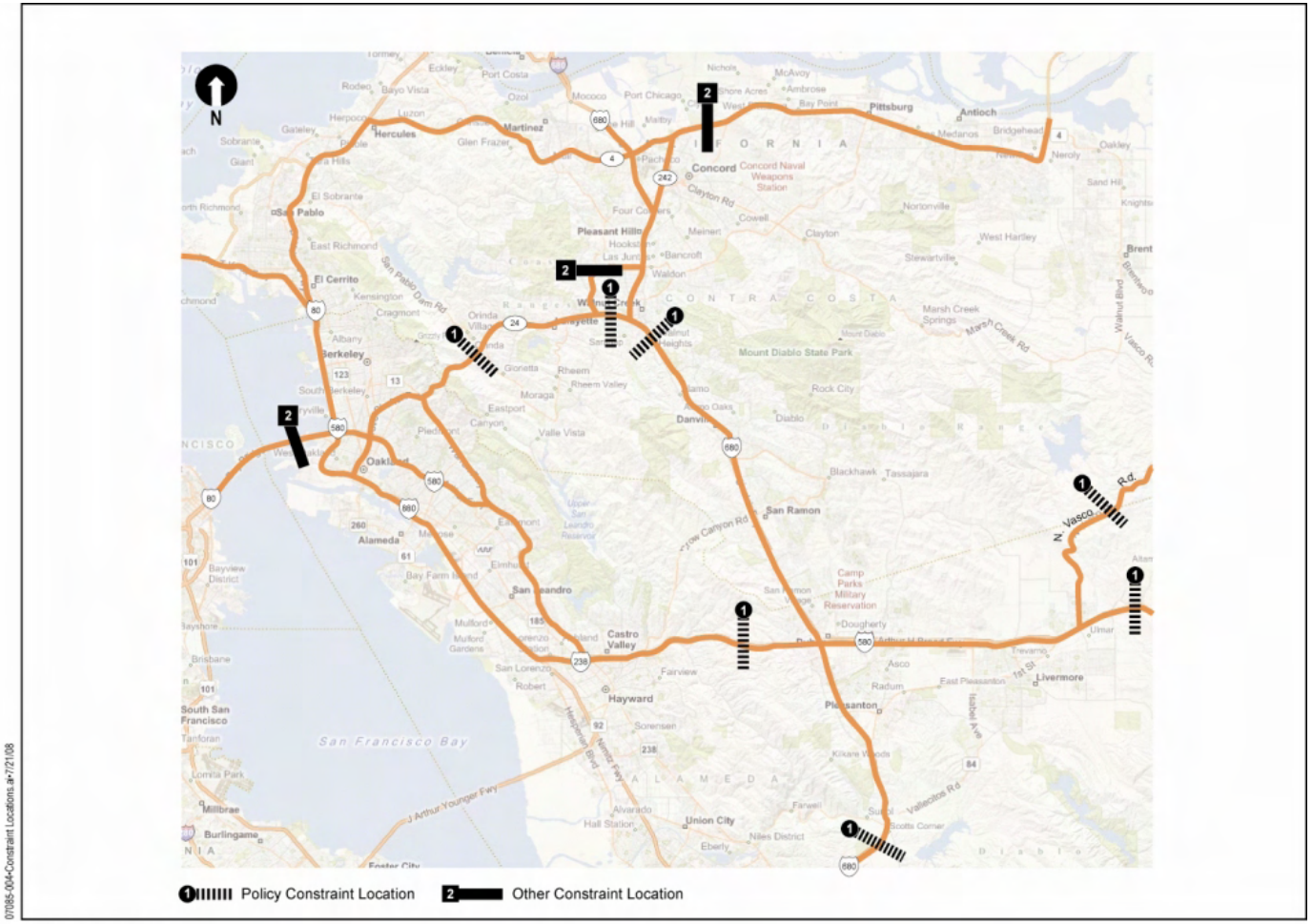

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Table 2 -- Gateway Constraint Summary – Other Constrained Locations

Facility-Direction	Gateway Location	Mixed-Flow Lanes	Gateway Method Used (In/ Out)	Action Plan 2030 Demand	Theoretical Maximum Flow Per Lane	Target Segment Capacity (CCTA Technical Procedures)	Gateway Constraint Time Period Applied - 2030	Gateway Constraint Time Period Applied - 2020
SR4-Eeastbound	West of Willow Pass	3	Out	9,211	2,000	7,560	PM	PM
SR4-Westbound	West of Willow Pass	3	Out	10,417	2,000	8,991	AM	AM
I80-Westbound	Bay Bridge Toll Plaza	5	Out	18,046	2,310	11,550	AM	AM
I80-Eastbound	Bay Bridge Toll Plaza	5	In	18,743	2,310	11,550	PM	PM
Pleasant Hill Road-Northbound	South of Reliez Valley Road	2	Out	2,437	980	2,293	PM	None
Pleasant Hill Road- Southbound	South of Reliez Valley Road	2	Out	2,466	980	2,293	AM and PM	None

Notes: CCTA Technical Procedures, July 19, 2006, pp. 83-93, establishes specific guidance on the calculation of gateway capacities based upon the duration of congestion. The duration is a key input variable used to determine the target for the Gateway Constraint procedure. Target procedures vary depending on whether the traffic is coming from outside or inside the study area, with locations as indicated. The assignment process creates assignment volumes that match the target segment capacity.

Table 3 -- Summary of Assigned Vehicle Trips – Action Plan and Action Plan + Gateway Constraint Scenarios

	Action Plan		Action Plan + Gateway Constraints		Difference		Percent Difference	
County	**Origins**	**Destinations**	**Origins**	**Destinations**	**Origins**	**Destinations**	**Origins**	**Destinations**
AM Peak Hour								
San Francisco	99,740	123,672	99,505	110,927	-235	-12,745	-0.2%	-10.3%
San Mateo	149,212	151,397	149,022	149,163	-189	-2,234	-0.1%	-1.5%
Santa Clara	363,374	378,662	364,186	377,591	811	-1,071	0.2%	-0.3%
Alameda	271,603	264,652	254,294	257,785	-17,309	-6,867	-6.4%	-2.6%
Contra Costa	200,603	172,499	197,637	172,414	-2,965	-85	-1.5%	0.0%
Solano	72,912	71,322	70,276	71,340	-2,635	18	-3.6%	0.0%
Napa	25,755	24,956	25,468	24,935	-287	-21	-1.1%	-0.1%
Sonoma	99,911	94,657	99,742	94,568	-169	-88	-0.2%	-0.1%
Marin	51,275	52,568	51,100	52,509	-175	-59	-0.3%	-0.1%
Out of Bay Area	29,776	29,776	28,093	28,093	-1,682	-1,682	-5.7%	-5.7%
Sum	**1,364,160**	**1,364,160**	**1,339,325**	**1,339,325**	**-24,835**	**-24,835**	**-1.8%**	**-1.8%**

PM Peak Hour								
San Francisco	152,849	137,866	141,420	137,764	-11,429	-102	-7.5%	-0.1%
San Mateo	211,323	211,278	208,994	211,090	-2,330	-188	-1.1%	-0.1%
Santa Clara	519,929	511,981	516,072	508,977	-3,857	-3,004	-0.7%	-0.6%
Alameda	342,931	355,567	338,348	342,121	-4,583	-13,446	-1.3%	-3.8%
Contra Costa	250,335	259,059	250,608	257,028	273	-2,032	0.1%	-0.8%
Solano	100,730	99,127	100,466	96,504	-263	-2,623	-0.3%	-2.6%
Napa	33,488	34,085	33,439	33,710	-49	-374	-0.1%	-1.1%
Sonoma	127,466	130,722	127,345	130,408	-121	-314	-0.1%	-0.2%
Marin	69,828	69,192	69,759	68,847	-69	-345	-0.1%	-0.5%
Out of Bay Area	33,633	33,633	31,570	31,570	-2,063	-2,063	-6.1%	-6.1%
Sum	**1,842,511**	**1,842,511**	**1,818,020**	**1,818,020**	**-24,490**	**-24,490**	**-1.3%**	**-1.3%**

Table 4 -- Gateway Constraint Summary – Other Locations Studied but Not Constrained

Facility	Time	Direction	Lanes	Base Capacity	2030 Demand (Action Plan)	2030 Demand (Action Plan + Gateway Constraint)	Gateway Constraint Value (@ 2 hours)[1]	Gateway Capacity	Gateway Volume/ Capacity
Richmond San Rafael Bridge	AM	EB	2	4000	2366	2824	1.05	4200	0.67
Richmond San Rafael Bridge	AM	WB	2	4000	5456	4462	1.17	4680	0.95
Carquinez Bridge	AM	EB	4	8000	7671	7296	1.17	9360	0.78
Carquinez Bridge	AM	WB	4	8000	8883	6986	1.05	8400	0.83
Benicia-Martinez Bridge	AM	NB	5	10000	6166	6358	1.17	11700	0.54
Benicia-Martinez Bridge	AM	SB	4	8000	7105	6568	1.05	8400	0.78
Antioch Bridge	AM	NB	1	2000	879	893	1.17	2340	0.38
Antioch Bridge	AM	SB	1	2000	959	856	1.17	2340	0.37
SR 4 East at San Joaquin County Line	AM	EB	1	2000	786	816	1.17	2340	0.35
SR 4 East at San Joaquin County Line	AM	WB	1	2000	1398	1310	1.05	2100	0.62
Kirker Pass Road east of Concord Avenue	AM	EB	2	1960	995	883	1.17	2293	0.39
Kirker Pass Road east of Concord Avenue	AM	WB	2	2200	3107	2833	1.17	2574	1.10

Facility	Time	Direction	Lanes	Base Capacity	2030 Demand (Action Plan)	2030 Demand (Action Plan + Gateway Constraint)	Gateway Constraint Value (@ 2 hours)[1]	Gateway Capacity	Gateway Volume/ Capacity
Richmond San Rafael Bridge	PM	EB	2	4000	3581	2958	1.05	4200	0.70
Richmond San Rafael Bridge	PM	WB	2	4000	4451	4596	1.17	4680	0.98
Carquinez Bridge	PM	EB	4	8000	8763	6723	1.17	9360	0.72
Carquinez Bridge	PM	WB	4	8000	7953	7522	1.05	8400	0.90
Benicia-Martinez Bridge	PM	NB	5	10000	6607	5625	1.17	11700	0.48
Benicia-Martinez Bridge	PM	SB	4	8000	6494	6420	1.05	8400	0.76
Antioch Bridge	PM	EB	1	2000	971	897	1.17	2340	0.38
Antioch Bridge	PM	WB	1	2000	956	953	1.17	2340	0.41
SR 4 East at San Joaquin County Line	PM	EB	1	2000	1644	1564	1.17	2340	0.67
SR 4 East at San Joaquin County Line	PM	WB	1	2000	1104	1079	1.05	2100	0.51
Kirker Pass Road east of Concord Avenue	PM	EB	2	1960	2336	2130	1.17	2293	0.93
Kirker Pass Road east of Concord Avenue	PM	WB	2	1960	1491	1473	1.17	2293	0.64

[1]*Note: Inbound capacity gateway value assumed at 1.05 for inbound traffic and 1.17 for outbound traffic, as explained in* Technical Procedures.