

2012 LOS Monitoring Study

Executive Summary

CONGESTION MANAGEMENT PROGRAM LEGISLATION AND LOS MONITORING

The Congestion Management Program (Program) statute, passed by the California State Legislature in 1990, requires that all elements of the Program¹ be monitored at least biennially by the designated Congestion Management Agency (CMA)². The Alameda County Transportation Commission, as the designated CMA for Alameda County, is responsible for the development of the Alameda County Congestion Management Program (CMP) which requires that Level of Service (LOS) standards be established and monitored biennially during even-numbered years on the Alameda County CMP designated roadway system (“CMP network”). The CMP network (Figure 1) includes all of the major freeways, selected ramps and special segments, arterials, and major collector roadways in Alameda County.

This report provides the background for the Alameda County LOS Monitoring Program, followed by highlights of the results from the 2012 monitoring study and how they

¹ The five elements of the Congestion Management Program include: Level of Service Standards, Performance Element, Travel Demand Element, Land Use Analysis Program and Capital Improvement Program.

² The most recent Alameda County Congestion Management Program (CMP) was adopted by the Alameda County Transportation Commission on December 1, 2011. The original CMP was adopted on October 24, 1991.

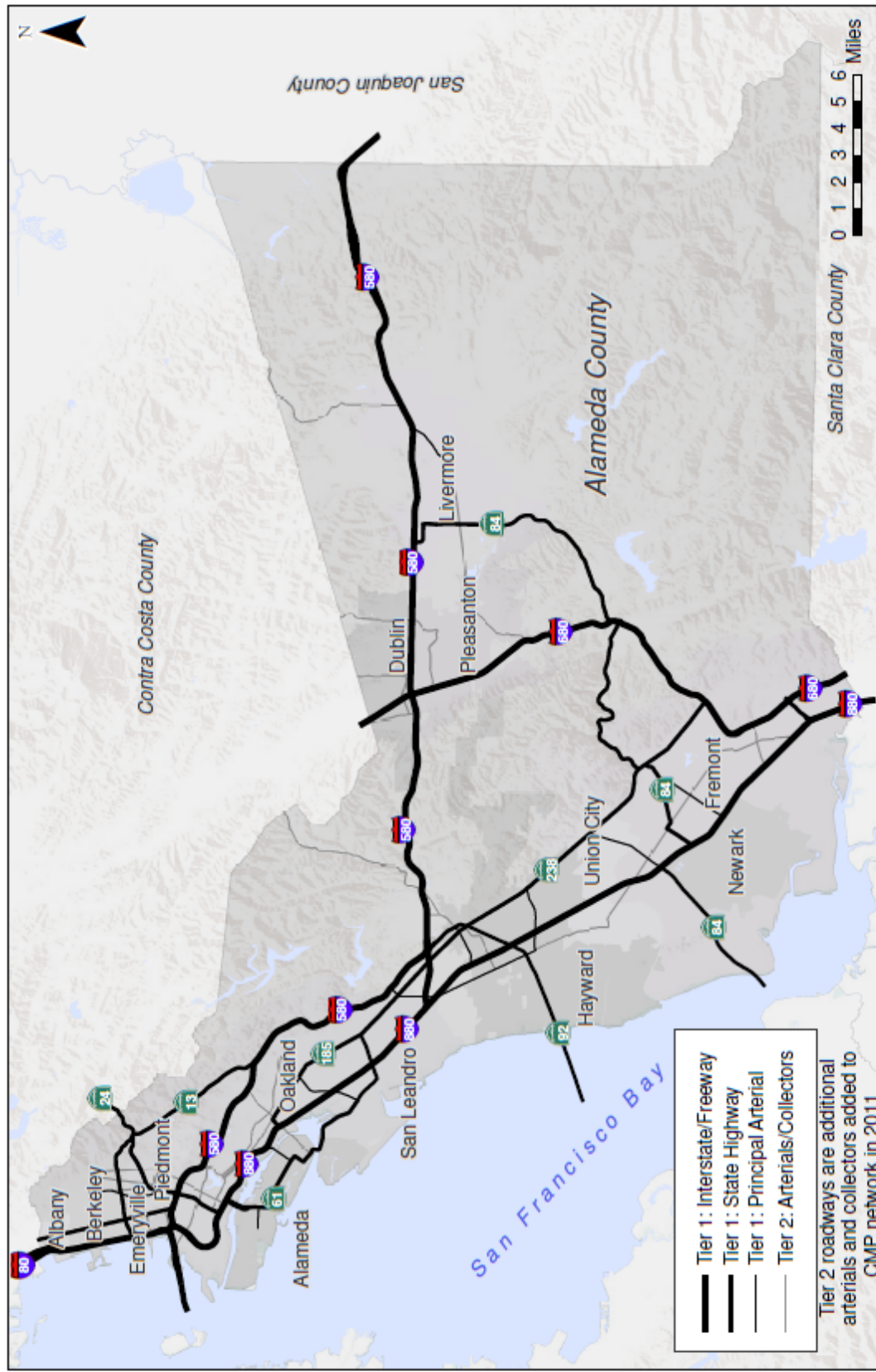
compare with the 2010 monitoring results, and finally long-term trend analysis using data collected over the years.

The objectives of this LOS monitoring effort are:

- to determine the average travel speeds and existing LOS throughout Alameda County;
- to identify those roadway segments in the County that are operating at LOS F; and
- to identify long-term trends in traffic congestion on the CMP network.

ALAMEDA COUNTY LOS MONITORING PROGRAM

Level of service on the Alameda County CMP network has been monitored since 1991. While the network was monitored every year initially, monitoring has been conducted biennially since 1998. Monitoring is done by collecting travel time data on the CMP network. This travel time data combined with the length of the roadways are used to estimate speeds on the respective roadways. The estimated speed is used to assess how well the roadways are performing.



Alameda County CMP System
Figure 1

Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Foot



The CMP Network

The CMP network consists of the Tier 1 and Tier 2 roadways as shown in Figure 1. The distinction is that only Tier 1 is used for CMP Conformity purposes as explained in the section below.

The Tier 1 network, adopted in 1991 (with an exception of a 2.5 mile segment of Hegenberger Road in Oakland), has years of data collected for this effort and includes the following:

- Approximately 232 miles of roadways and 22 freeway-to-freeway ramps and special segments (see Table 1, Appendix A).
 - Freeways – 134 miles
 - State highways – 71 miles
 - Principal arterials – 27 miles
 - Freeway-to-freeway ramps and special segments – 22

The Tier 2 network, in contrast, was added more recently to the 2011 update of the CMP network. It includes:

- Approximately 90³ miles of additional principal arterials and major collectors (see Table 2, Appendix A)

All CMP roadways are split into several segments each with uniform characteristics for the purposes of travel time data collection and speed estimation.

LOS Standards

The CMP statute requires that a level of service standard be established for the CMP network. The Alameda County LOS Monitoring Study follows the LOS speed standards based on the 1985 Highway Capacity Manual⁴. Based on these standards, the level of service is assigned ranging from A (the best or free-flow traffic)

³ In the 2011 CMP Update, the total length of the Tier 2 roadways was estimated to be 92 miles. However, as measured on the ground in 2012, the correct total length of the Tier 2 network is 89.8 miles.

⁴ As part of the 2013 CMP Update, the 2010 Highway Capacity Manual standards will be considered to be used for LOS Monitoring purposes.

to F (the poorest or stop-and-go traffic) for the roadways, using the estimated speeds from the travel time data collected as shown below:

- LOS A: Free traffic flow
- LOS B: Stable traffic flow
- LOS C: Stable traffic flow with restricted speed
- LOS D: Approaching unstable flow
- LOS E: Unstable traffic flow
- LOS F: Stop-and-go traffic

The required minimum level of service (i.e., the level of service standard) for the CMP roadways is LOS E. An exception to this LOS E standard is made for roadways that operated at LOS F during the original surveys when the 1991 “baseline” conditions were established. These roadways are “grandfathered” in at LOS F.

Except for grandfathered segments, when a CMP roadway is congested and fails to meet this standard, a deficiency plan is required to be prepared by the member agency that identifies:

- the cause of the deficiency;
- measures to improve the performance of the roadway; and
- a funding plan for the proposed improvements.

The conformance with the level of service standard is assessed biennially during the LOS monitoring years and conformance on the progress of the adopted deficiency plans is assessed annually. A member agency’s State gas tax subventions may be withheld if said agency does not maintain the LOS standard or have an approved deficiency plan for roadways that fall below the LOS standard.

Monitoring for Conformance and Information

Until 2010, travel time data was collected during the P.M. (4:00 to 6:00) and A.M. (7:00 to 9:00) peak periods on the Tier 1 network. Beginning in 2012, data had also

been collected on the freeways during weekend peak period (1:00 to 3:00 P.M.) and on the Tier 2 network during both P.M. and A.M. peak periods. Only data collected on the Tier 1 network during the P.M. peak period are used for CMP Conformity purposes. All other data collected on the Tier 1 (A.M. and weekend peak periods) and on Tier 2 (P.M. and A.M.) networks are used for informational purposes only. Table 1 below shows the CMP roadways by data collection time period and the corresponding monitoring purpose.

Table 1: CMP Roadways Monitoring Periods and Purpose of Monitoring
Monitoring Purpose

		Conformity	Informational
Tier 1	Freeways P.M.	X	
	Arterials P.M.	X	
	Ramps and Special Segments P.M.	X	
	Freeways-Weekend 1-3 P.M.		X
	Freeways A.M.		X
	Arterials A.M.		X
	Ramps and Special Segments A.M.		X
Tier 2	Arterials P.M.		X
	Freeways A.M.		X

Other Travel Time Surveys

To evaluate the comparative performance of various transportation modes between selected Origin-Destination (O-D) pairs, travel time surveys are conducted for auto, transit, bicycle and HOV lane trips. These O-D pairs have been selected as either major employment centers or residential areas to simulate typical commute trips on County's major corridors. Ten O-D pairs are studied to simulate typical commute trips on the County's major travel corridors. The O-D pairs surveys began in 1996 with five pairs; over the years more locations were added. Since 2000, ten O-D pairs have been surveyed on an on-going basis.

Travel times on the three Bay bridge crossings (i.e., Bay Bridge, San Mateo Bridge and Dumbarton Bridge) that connect Alameda County to San Francisco and San Mateo Counties have been reported since 2002.

SUMMARY OF 2012 LOS MONITORING COMPARED TO 2010

Based on the 2012 monitoring results, overall speeds on county roadways have declined slightly since 2010 while speeds improved in a few areas.

The decline in overall speeds is likely due to the recovering economy combined with construction activities across the county (see below).

- Data from the Bureau of Labor Statistics (September 2012) show statewide employment improved, adding 500,000 jobs between January 2010 and July 2012.
- Notable construction activities on major roadways that likely created congestion:
 - Bay Bridge (east span construction)
 - I-880/5th Avenue (retrofit)
 - I-880/High Street (retrofit)
 - SR 238 / Foothill Boulevard (operational improvements)
 - Caldecott Tunnel (4th bore construction)
 - Hegenberger Road (Oakland Airport Connector)

Improvements observed appear to be the result of the completion of transportation projects since Spring 2010 when the CMP network was last monitored.

- Projects completed since Spring 2010:
 - I-880/SR 92 improvements
 - Eastbound I-580 HOV Lane construction in east county
 - Southbound I-680 Express Lane opening

Overall Average Speed

The overall system-wide speed for the county freeways and arterials are shown in

Table 2 below. Data were collected for the first time in 2012 for the Tier 2 arterials and freeways during the weekend peak period.

Table 2: Average Vehicle Speeds during Peak Periods on Alameda County CMP Roadways (in mph)

		2010 Results	2012 Results
Tier 1	Freeways P.M.	51.8	50.9
	Arterials P.M.	26.1	25.1
	Freeways A.M.	53.4	52.5
	Arterials A.M.	28.0	26.5
	Freeways-Weekend 1-3 P.M.	-	62.2
Tier 2	Arterials P.M.	-	25.1
	Freeways A.M.	-	24.9

Based on an average of the speeds on all CMP roads in the county, the overall average speeds decreased systemwide on freeways and arterials. This occurred during both P.M. and A.M. peak periods with decreases ranging between 0.9 to 1.5 mph. The highest decline of 1.5 mph occurred on arterials during the A.M. peak period.

LOS F Segments in 2012

The CMP roadway segments that performed at LOS F in 2012 are shown in Figure 2 (see Tables 3 and 4, Appendix A, for detail). An increased number of LOS F segments were observed between 2012 and 2010:

- Number of LOS F segments in the P.M. peak period – 39 in 2012 (35 in 2010)
- Number of LOS F segments in the A.M. peak period – 27 in 2012 (19 in 2010)

Improved LOS F Segments from the Prior Monitoring Cycle

The total number of improved segments from the previous monitoring cycle decreased from nineteen in 2010 to fifteen in 2012.

- Improved P.M. peak period segments – 11 in 2012 (10 in 2010)
- Improved A.M. peak period segments – 4 in 2012 (9 in 2010)

Table 5 in Appendix A lists the segments that performed at LOS F in 2010 and improved in 2012. These changes are discussed in more detail below.

CMP System and Corridor Performance Highlights

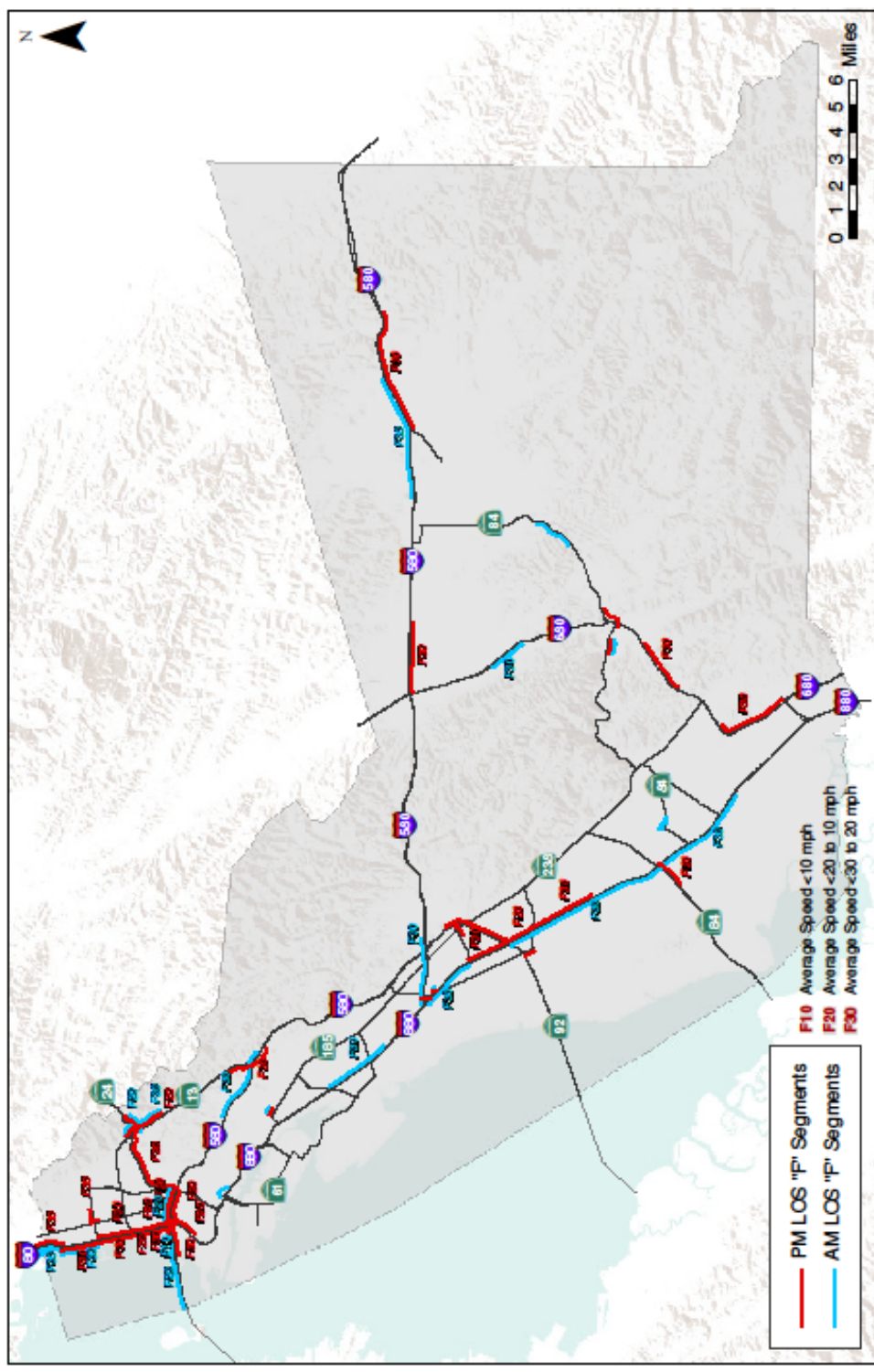
This section highlights observations about system performance and specific corridors in 2012 compared to 2010 for freeways, arterials, ramps and special segments, origin and destination pairs and the Bay bridge crossings. Figures 3 to 11 in Appendix B illustrate the level of service of the CMP network by Planning Areas for P.M., A.M. and weekend peak periods.

Freeways (Tier 1)

*Weekday P.M. and A.M. periods
(Figures 3 to 10 in Appendix B)*

Projects that have been completed since the 2010 monitoring cycle appeared to have improved the performance of a few roadways. Completion of the I-880/ State Route (SR) 92 interchange improvements appeared to have improved eastbound SR 92 in the P.M. towards I-880 and a section of northbound I-880 in the South County between Decoto Road and Alvarado-Niles Road. Similarly, the opening of the eastbound I-580 HOV lanes in East County appeared to have lessened the intensity of congestion near the I-580/I-680 interchange.

Few new bottlenecks were reported on the freeways. These congested segments were located on northbound I-880 in the P.M. between Alvarado Niles and A Street and eastbound I-580 in the P.M. between 1st Street and N. Flynn Road.



2012 AM and PM Peak Period Level of Service "F" Results
Countywide

Figure 2



On southbound I-680, a new congested segment was observed in 2012 in the A.M. between Bernal and Sunol Boulevards.

Reasons for these new bottlenecks are either being studied or will be investigated as described in Table 3 at the end of this summary. The potential causes of the congestion on southbound I-680 are being studied in the I-680 Express Lane Evaluation Study that is currently underway; it is expected to be completed in Spring 2012.

*Weekend Peak Period
(Figure 11 in Appendix B)*

Data collection on the freeways during the weekend began in 2012, and trends will be compared with the next monitoring cycle onwards. An analysis of the speed data collected in 2012 is currently reported.

- A majority of the freeways were performing at higher speeds with mostly LOS A conditions.
- Congested segments with LOS F conditions were observed on I-80 in both directions and I-580 segments connecting to I-80, likely due to Bay Bridge construction.

Arterials (Tiers 1 and 2)

*Tier 1 Arterials
(Figures 3 to 10 in Appendix B)*

Many of the congested spots observed on Tier 1 Arterials in 2012 appeared to be related to construction activities occurring in Central and North County with the exception of two segments in East County.

- LOS F conditions were observed during the P.M. peak period on eastbound A Street, southbound Hesperian Boulevard, eastbound SR 92 from I-880 to Mission, and SR 238 (Foothill Boulevard). Congestion on these segments appears to be related to the SR 238 (Foothill) Improvements project.
- The LOS F condition on SR 185 (International Boulevard) near High Street appears to be related to the High

Street and 42nd Street Improvements project.

- A significant drop in speed was experienced in the A.M. peak period on westbound SR 84 for 1.6 miles from Ruby Hill Boulevard towards Vallecitos Nuclear Center. The reduction in speed was nearly 30 mph from 47.4 mph in 2010 to 18.1 mph in 2012.
- Eastbound SR 84 between Sunol Road to Pleasanton-Sunol Road experienced a decrease in speed of about 10 mph in the A.M. peak period, from 19.2 mph in 2010 to 9.3 mph in 2012. This segment has been functioning at LOS F in the P.M. peak period since 2010.

Tier 2 Arterials

Travel time data was collected for the first time in 2012 on the Tier 2 network; therefore, trends will be compared with the next monitoring cycle onwards. Only speeds were reported in 2012, instead of the typical LOS designations, because free-flow speed studies have not been done. Free-flow speed studies, which are required to determine the classification of the roads to assign a level of service designation, will be done in 2014. Upon completion of these studies, LOS designations will be assigned.

- North County had a higher number of Tier 2 arterial segments operating at the lower speed range of 10 to 20 mph compared to other areas of the county—reflective of its dense urban development.
- Westbound Broadway between 14th and 5th Streets during the P.M. peak period experienced a speed of 8.3 mph. This is the lowest speed of all of the Tier 2 Arterial segments in both time periods. This is consistent with traffic conditions in typical downtown areas that have multimodal characteristics.
- Roadways in East County that traverse the County line generally recorded higher speeds of over 40 mph. The highest speed of 56.4 mph was observed on southbound Vasco Road crossing the County line in the P.M. peak period.

Ramps and Special Segments (Tier 1)

Twenty-two Freeway-to-Freeway ramps and special segments are monitored in 2012. These include ramps on all major freeway interchanges in the county (I-80/I-580, I-880/SR 238, SR 13/SR 24 and I-580/I-680) and the Posey and Webster tubes connections with I-880.

Based on the data collected in 2012, speeds generally declined on the ramps and special segments as compared to 2010. The one exception was in Central County on the I-880/I-238 interchange.

- Speeds increased on westbound I-238 to northbound I-880 in the P.M. by 19 mph from 2010 to 2012. Reasons for this improvement are not clear.

Origin and Destination Travel Times

For the Origin and Destination pairs and Bay bridge crossings, only travel time data instead of speed is reported as travel time is more easily compared between various modes of travel. Data are collected by more than one mode for the O-D pairs and from an external source for the bridges.

Origin and Destination Pairs

Data are reported for six O-D pairs in 2012. All pairs show a general increase in transit travel times and slight decrease in auto travel times except for travel times between Fremont and San Jose.

- Travel time between Fremont and San Jose by general purpose and HOV lanes either increased or stayed the same in 2012 as compared to 2010.

Bay Bridge Crossings

A comparison was made between the 2009⁵ and 2012 data for the three bridges using data from MTC's 511.org database. Travel time across the bridges in general has increased in both directions and during

⁵ 2009 data was used consistent with data included in the 2010 LOS Monitoring Report.

both peak periods with the exception of San Mateo Bridge.

- The San Mateo Bridge shows improvement in both directions during the P.M. peak period. The eastbound trip shows the highest travel time reduction of 19% (16.5 minutes in 2009 to 13.4 minutes in 2012), likely due to the completion of the I-880/SR 92 improvements.

OBSERVED GENERAL TRENDS

Based on the data collected since 1991 for the LOS Monitoring studies, trends in Alameda County roadway performance have been observed using two measures: vehicle hours of delay and average speeds on the CMP network. Vehicle hours of delay have been reported since 2008 while average speeds on the CMP network have been reported since 1991.

Vehicle Hours of Delay

Since 2008, vehicle hours of delay (VHD) for the LOS F freeway segments were reported to highlight the estimated delay due to the congestion on county freeways. This estimation captures the core delay occurring on the CMP freeways during the 2-hour peak period when the CMP network is monitored.

VHD During the P.M. Peak Period

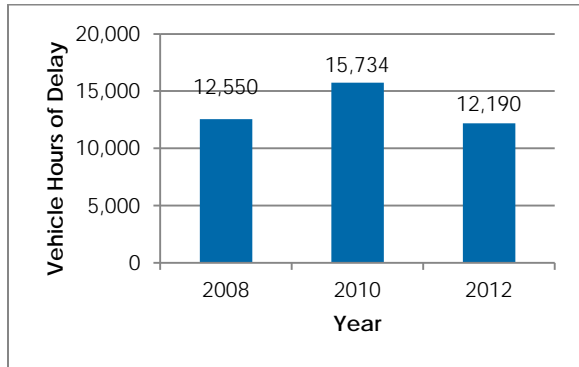
Chart 1 shows the total VHD occurring during the P.M. peak period on the LOS F freeway segments since 2008.

The VHD for the P.M. peak period shows a reduction of 3,544 from 2010, with a delay of 12,190 in 2012 compared to 15,734 in 2010. Two projects likely contributed to this decrease: I-880/SR 92 improvements and eastbound I-580 HOV lanes. These projects were under construction in 2010 but were completed when 2012 monitoring was performed:

- Eastbound SR 92 near I-880 showed an estimated VHD of 1,980 in 2010, which was eliminated in 2012.

- Eastbound I-580 in the East County showed an estimated VHD of 969 in 2012 compared to 4,328 in 2010, a reduction of 3,359 VHD.

Chart 1: Vehicle Hours of Delay in LOS F Segments During the P.M. Peak Period



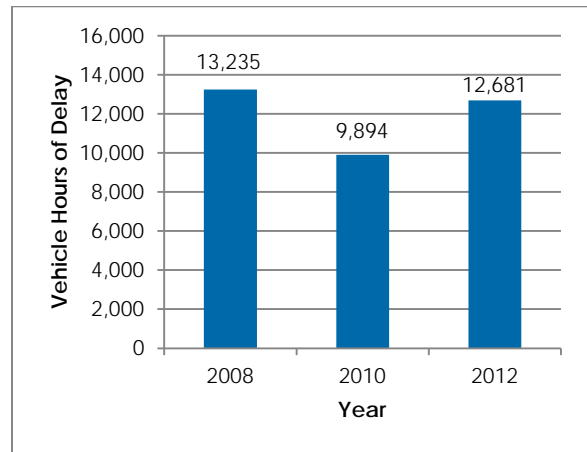
The combined VHD reduction from 2010 to 2012 between these two corridors is 5,339, which is considerably higher than the systemwide decrease in VHD of 3,544 experienced on the countywide CMP freeways in 2012 compared to 2010. Also, the reduced VHD during the P.M. peak period could be attributed to a greater number of improved segments reported during the P.M. peak commute direction, likely due to completed projects.

VHD During the A.M. Peak Period

Chart 2 illustrates the estimated total VHD on the LOS F freeway segments during the A.M. peak period since 2008.

Unlike the VHD reduction seen during the P.M. peak period LOS F segments, the estimated total VHD on the LOS F freeway segments during the A.M. peak period increased from 9,894 hours in 2010 to 12,681 hours in 2012. This trend is consistent with the general decreased speed experienced on the roadway system in 2012 compared with 2010. So while overall systemwide congestion has increased between 2012 and 2010, most of those congestion increases seem to be attributable to the A.M. peak period.

Chart 2: Vehicle Hours of Delay in LOS F Segments During the A.M. Peak Period



Average Speeds on the CMP Network and Relationship to Jobs and Vehicle Miles Traveled

Average speeds during the P.M. peak period for the Tier 1 freeways and arterials have been reported since 1991. Comparative analyses were performed using the average speeds over time and other external factors such as unemployment (indicator for jobs) that would impact the volume of traffic on the roadways and vehicle miles traveled (VMT) (vehicle throughput). The intent of the analysis was to see how the roadways are performing during the fluctuations of the economy as well as to measure the effectiveness of the congestion management activities (projects and programs) implemented on the county roadways.

Chart 3 illustrates that a general correlation exists between the average speeds on the county freeways and the jobs in the Bay Area. When unemployment goes up (i.e., fewer jobs in the region), less traffic is expected to be on the road, thus average speed goes up. However, no correlation appears to exist between the average speeds on arterials and employment as shown in Chart 4. This also indicates the need to study the county arterials to better understand their performance.

Chart 3: Average Freeway Speeds and Unemployment

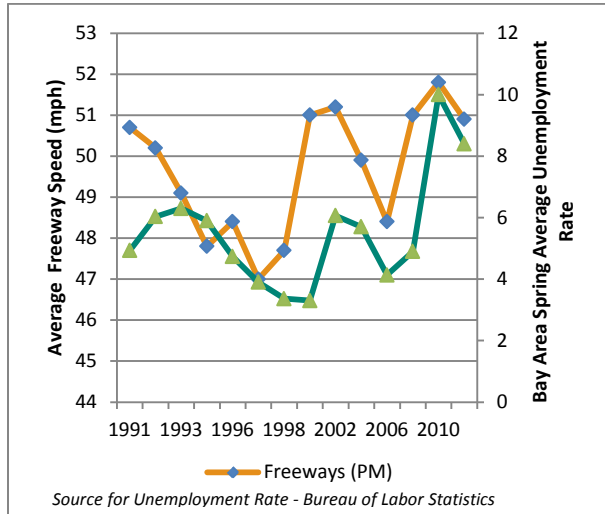
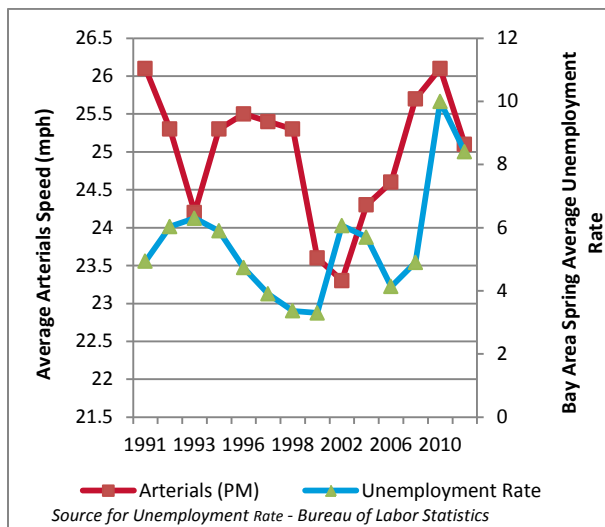


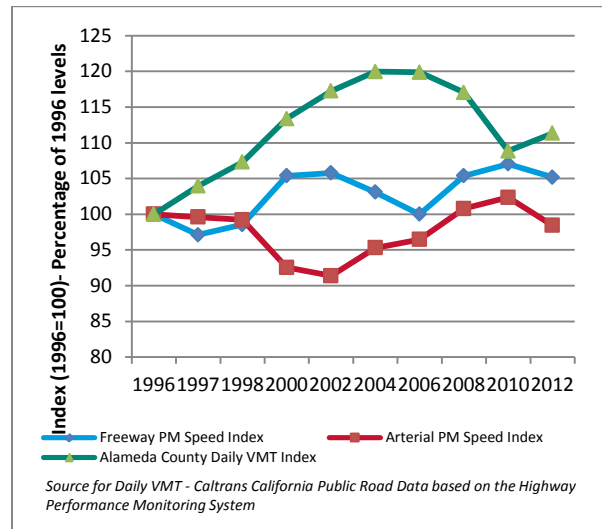
Chart 4: Average Arterial Speeds and Unemployment



Based on Caltrans' California Road Data, VMT on the Alameda County roadways increased from 32.8 million in 1996 to 36.5 million in 2011 (2011 data is the most recent estimation and is plotted for 2012 in the chart). The highest throughput of 39.4 million VMT was experienced in 2004. Chart 5 illustrates that the speeds on the

CMP roadways have been somewhat stable since 1996 fluctuating only within 10 percentage points despite the 20% increase experienced in VMT between 1996 and 2012. This could be the result of various congestion management activities undertaken in the county through planning and implementation of various programs and projects.

Chart 5: Average Speeds on the CMP Roadways in the P.M. and Increased Road Usage



PLANNED IMPROVEMENTS RELATED TO THE CONGESTED ROADWAYS AND NEXT STEPS

Table 3 lists the projects and improvements underway, planned, or being studied on identified congested roadways. For projects under construction, the level of improvement will be maintained in the next LOS monitoring cycle. Also identified are the segments that are currently operating at LOS F where additional study is needed to determine the cause.

Table 3: Impacted Segments with LOS F in 2012 and Options for Potential Improvements

<i>Construction Underway or Completed Recently</i>	
I-80 segments	Bay Bridge construction and recently started I-80 ICM project
SR 24 segments	Caldecott Tunnel 4 th Bore project
I-880 segments in the North and Central County	I-880/5 th Avenue Retrofit I-880/High Street Improvements SR 238 (Foothill) Improvements
<i>In Project Development Phase/Programmed/Planned/Being Studied</i>	
I-880 Segments	I-880 Integrated Corridor Management
Northbound I-680	HOV/HOT lane implementation
Eastbound and Westbound I-580 in East County	HOV to HOT lane conversion Eastbound truck climbers lane
-Southbound I-680 north of SR 84 -Eastbound SR 84 near Sunol	I-680 Express Lane Evaluation (After) Study
Eastbound SR 84 near Vallecitos Nuclear Center	Safety Improvements by Caltrans (SHOPP) Truck Climbing Lanes on Pigeon Pass Improvements identified in the Triangle Study Route 84 Express Way
<i>To be Investigated</i>	
Northbound I-880 congestion near SR 92 interchange	Central and South County LATIP projects
Eastbound I-580 congestion near Greenville Road	Eastbound truck climbing lane