

# 3

## Level of Service Results: Freeways & Arterials

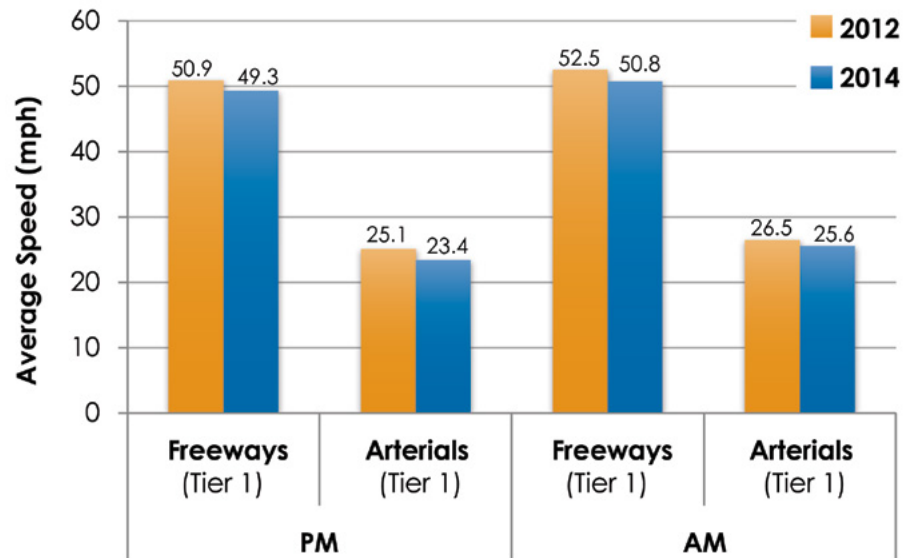
2014 monitoring results reported a reduction in the average speed by 0.9 mph to 1.7 mph from 2012 on the Tier 1 network.

This section presents a summary of LOS results for the freeways, ramps and arterials (Tier 1 and Tier 2 CMP network). In general, the number of congested segments across the CMP network increased from 2012 to 2014. Additionally, the majority of major corridors showed a slight decline in speed in 2014. Significant improvements were observed on the freeway network in the Caldecott Tunnel and on the arterial network around the Hayward Loop. **Appendix A** and **B** provide detailed segment results.

### 3.1 | Average Speeds

2014 monitoring results reported a reduction in the average speed by 0.9 mph to 1.7 mph from 2012 on the Tier 1 network. This is likely caused by the improving economy combined with impact due to construction activities occurring across the county.

**Figure 3-1** presents the countywide average of the freeway and arterial speeds by peak period between 2012 and 2014. The 2014 results demonstrate a continuation in the trend observed during the 2012 monitoring period.



**Figure 3-1: Average Speeds on CMP Network – 2012 vs 2014**

The difference in performance of arterials (Tier 2) between 2012 and 2014 is not reported above, as the 2014 results are considered to be a baseline only. In 2014, Alameda CTC surveyed arterials on the Tier 2 network using commercial speed data. The 2013 validation study that compared the floating car and commercial speed data did not validate the commercial speed data well on arterials. Alameda CTC moved to use commercial speed data on these arterials since they are monitored for informational purposes only, and adopting this methodology significantly reduced cost.

Also, since monitoring this Tier 2 network began only from 2012, there is no historic data similar to Tier 1 network exist for tracking trend. Instead these 2014 results will serve as a baseline in future comparisons with other commercial speed data surveys.

### 3.2 | Overview of Congested (LOS F) Segments

Under the CMP legislation, any CMP segment performing at LOS F during the monitoring is potentially subject to CMP conformity requirements. For the Alameda CTC LOS Monitoring program, only LOS monitoring in the afternoon peak on the Tier 1 CMP network is subject to CMP conformity, or potential development of a deficiency plan. Alameda CTC labels LOS F segments as congested.

In 2014, the number of congested segments increased from 42 to 45 in the afternoon peak period. Similarly in the morning peak period, the number of congested segments increased from 28 to 32 (Figure 3-2). When compared to the afternoon peak, the morning peak had fewer congested segments in 2012 and 2014. Since the CMP segment lengths vary significantly, to better understand the extent of the network experiencing congestion, congested segments were also analyzed using their lengths. Of the total CMP network, 7.5% of the length was congested in the afternoon peak and 7.3% in the morning peak. Therefore, Alameda CTC observed similar lengths of congestion in both peaks. Figure 3-3 shows the proportion of the network length containing uncongested and congested segments.

Further, these figures show that the freeway network experiences a significant proportion of the congested segments even though the combined arterial network (Tier 1 and Tier 2) is longer. This further demonstrates the nature of the transportation network in terms of freeways supporting regional and local traffic and arterials supporting more local traffic.

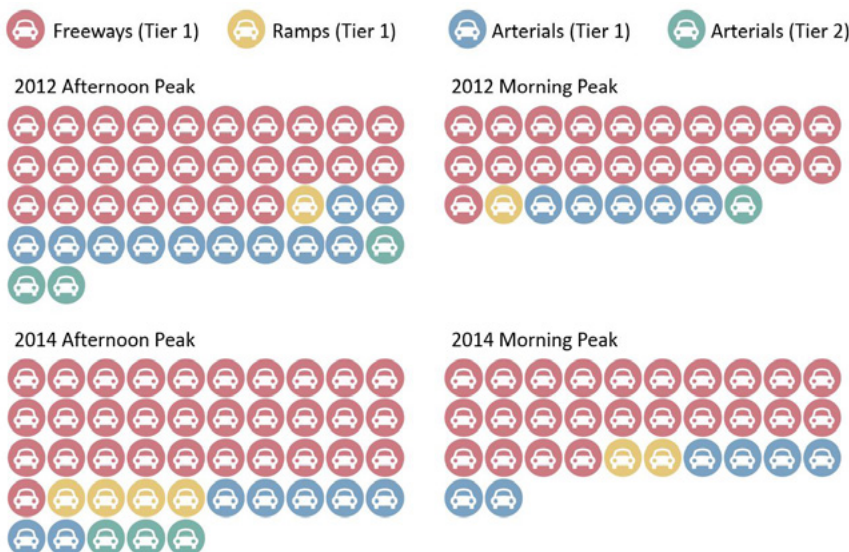


Figure 3-2: Number of Congested Segments in 2012 and 2014

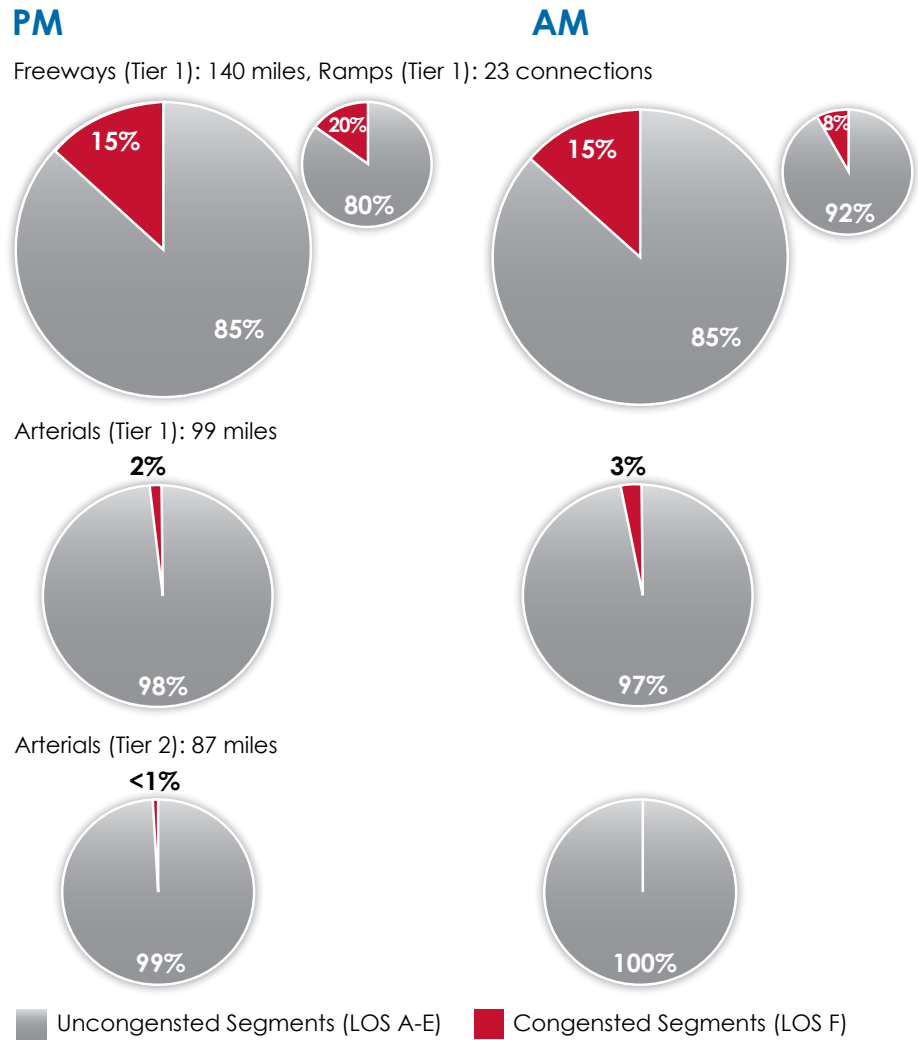


Figure 3-3: Length of Congested Segments for 2014 (in miles)

### 3.3 | Countywide Network Performance

Figures 3-4 and 3-5 compare the location of congested segments between 2012 and 2014 on the Tier 1 and Tier 2 networks. They highlight the congested segments (LOS F) in:

- Both monitoring cycles;
- 2012 only, but performance improved in 2014; and
- 2014 only, indicating performance declined in 2014.

There were notable improvements from 2012 congested conditions on CA-24 across the Caldecott Tunnel (in the morning peak) and around the new Hayward Loop where construction was completed after 2012. New congested segments were observed on some of the key interregional commute corridors in the western part of the county connecting to counties across the San Francisco Bay such as I-580, I-680, and I-880.

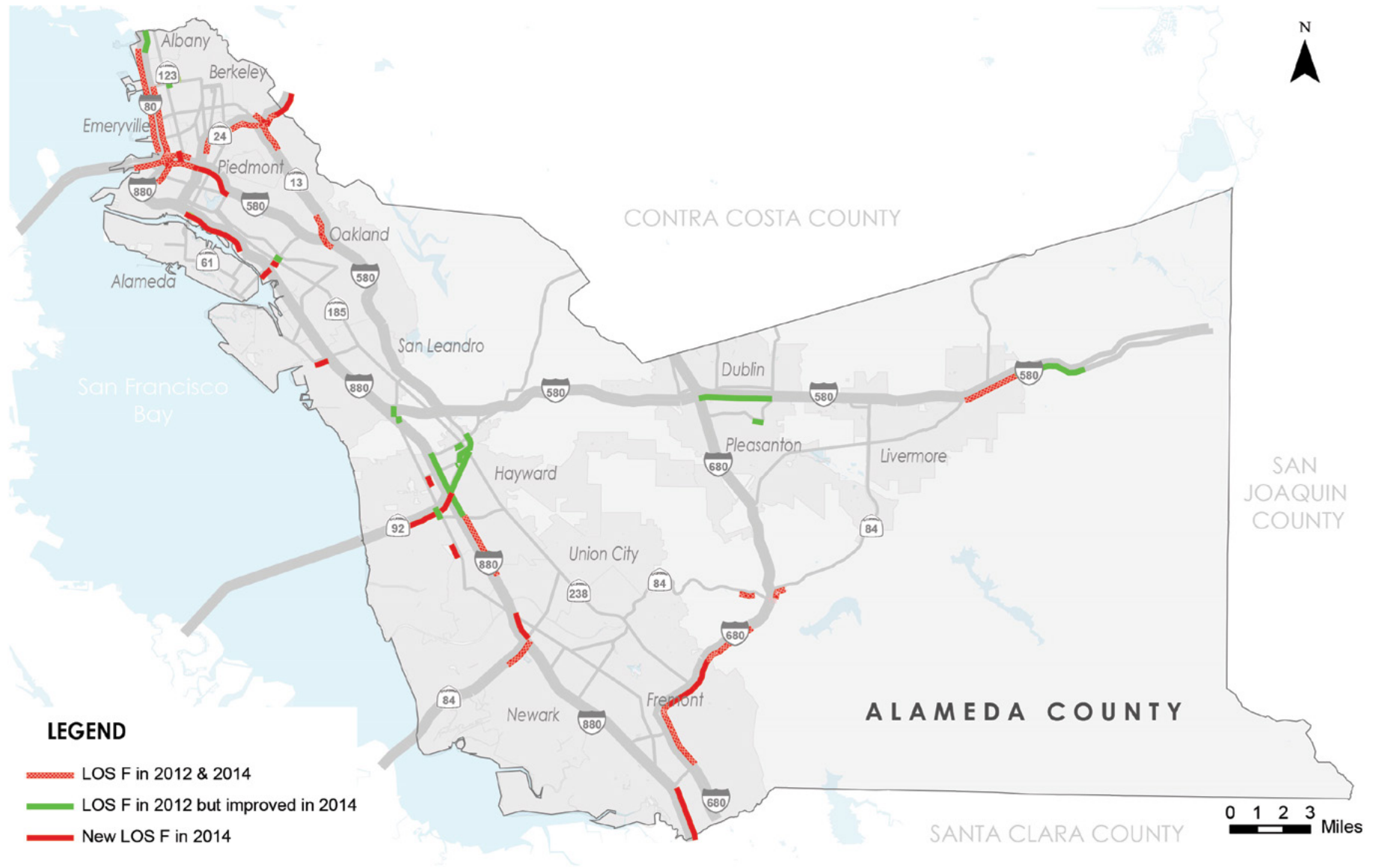


Figure 3-4: Change in Congested Segments (LOS F) from 2012 to 2014 – Afternoon Peak Period

# Level of Service Results: Freeways & Arterials



Figure 3-5: Change in Congested Segments (LOS F) from 2012 to 2014 – Morning Peak Period

The following sub-sections discuss the 2014 observations particularly related to congested segments for each category of the CMP network. Each sub-section includes a table containing details of the congested segments. The tables also note the CMP segments impacted by construction and those that were congested (LOS F) in 1991 or 1992 base monitoring year (i.e. grandfathered).

### 3.3.1 | Freeways (Tier 1)

As shown in **Figure 3-2**, the majority of congested (LOS F) segments were located on the freeway network. There were 30 congested segments in the afternoon and 24 in the morning peak periods (**Tables 3-1** and **3-2**). Out of the 30 afternoon congested segments, 12 were grandfathered. Two segments were impacted by construction.

In the afternoon peak, the majority of these congested segments were located in the north county leading to or from the Bay Bridge. Many of the remaining congested segments were on corridors carrying traffic from San Mateo and Santa Clara counties; this is presumably traffic returning from job centers on the Peninsula and in Silicon Valley.

In the morning peak, many of the congested segments were located on I-880 and on other corridors/bridges connecting to San Francisco, San Mateo and Santa Clara counties. It is noted that the north county still contained congested segments in the morning peak, but these are fewer compared to the afternoon congested segments in the north county.



**Table 3-1: Congested Segments on Freeways (Tier 1) – PM**

CMP Route	Segment Limits	Jurisdiction	CMP Route	Segment Limits	Jurisdiction
I-80 - EB	Toll Plaza to I-580 SB Merge	Oakland	I-680 - NB	SR 238/Mission to Vargas Rd.	Fremont
I-80 – EB**	I-80/I-580 (Merge) to Powell	Emeryville	I-680 NB	Vargas Rd to Andrade Rd.	Unincorporated
I-80 – EB**	Powell to Ashby	Emeryville, Berkeley	I-880 - NB	Dix Landing to SR 262/Mission	Fremont
I-80 – EB**	Ashby to University	Berkeley	I-880 - NB	Decoto to Alvarado Blvd.	Fremont
I-80 – WB**	Jct I-580 to University	Berkeley, Albany	I-880 - NB	Alv-Niles to Tennyson	Union City, Hayward
I-80 – WB**	University to Ashby	Berkeley	I-880 - NB	I-880/I238 (split) to I-880/I-80 (merge)	Oakland
I-80 – WB**	Ashby to Powell	Emeryville	I-880 - SB	I-980 to 23rd	Oakland
I-80 – WB**	Powell to I-80/I-580 (Split)	Emeryville	SR 13 - NB	Moraga Ave. to Hiller (Sig)	Oakland
I-580 – EB*	1st St to Greenville	Livermore	SR 13 - SB	Redwood to Jct. I-580 (EB Merge)	Oakland
I-580 – EB **	I-80 to I-980	Oakland	SR 24 – EB**	Jct. I-580 (on) to Broadway/SR 13	Oakland
I-580 – EB	I-980 to Harrison	Oakland	SR 24 – EB**	Broadway/SR 13 to Caldecott (enter)	Oakland
I-580 - EB	Harrison to Lakeshore	Oakland	SR 24 – EB**	Caldecott (enter) to Fish Ranch Rd.	Oakland
I-580 - WB	SH-24 On-ramp to I-80/580 Split	Oakland	SR 84 - EB	Newark Blvd./ Ardenwood Blvd. to I-880 NB (off)	Newark
I-680 - NB	Rt 262/Mission to Durham Rd.	Fremont	SR 92 – EB **	Clawiter to I-880	Hayward
I-680 - NB	Durham Rd to Washington Blvd.	Fremont			
I-680 - NB	Washington Blvd. to Rte. 238/Mission	Fremont			

\* Construction \*\* Grandfathered

**Improvements:** Within the freeway network, the Caldecott Tunnel 4<sup>th</sup> bore opening represents a notable improvement in performance in the morning peak. As background information, the two-bore Caldecott Tunnel opened in 1937 in its final location. In 1964, a third bore was built, which made it possible to reverse travel in the middle bore according to the peak direction of travel. However, as the demand in the off peak direction continued to build, delays were inevitable. Weekends were especially difficult to manage. The construction of the fourth bore was completed in November 2013 and was announced to produce travel time savings in the off peak direction<sup>3</sup>.

2014 monitoring showed notable improvements in the eastbound direction during the morning peak period which now has four lanes from the previous two. In 2012, the eastbound approach to the tunnel had LOS F with an average speed 18.3 mph. In 2014, the same section of road obtained a LOS C with an average speed 54.5 mph.

<sup>3</sup> Caldecott – Fourth Bore Project, URL ([www.caldecott-tunnel.org/](http://www.caldecott-tunnel.org/), accessed in Aug 2014).

**Table 3-2: Congested Segments on Freeways (Tier 1) – AM**

CMP Route	Segment Limits	Jurisdiction
I-80 - WB	Central (County line) to Jct. I-580	Albany
I-80 - WB	Jct. I-580 to University	Berkeley, Albany
I-80 - WB	I-580 Split to Toll Plaza	Oakland
I-80 - WB	Toll Plaza to SF County	Oakland
I-238 - WB	I-580 to I-880	Unincorporated, San Leandro
I-580 - WB	Greenville Rd. to 1 <sup>st</sup> St.	Livermore
I-580 – WB *	1 <sup>st</sup> St. to Portola Ave.	Livermore
I-580 – WB *	Portola to SR 84/ Airway Blvd.	Livermore
I-580 – WB	SH 13 Off to Fruitvale	Oakland
I-580 – WB	SH-24 ON Ramp to I-80/580 Split	Oakland
I-580 – EB	Central (County line) to Jct. I-80	Albany
I-880 – NB	I-880/I238 (split) to Marina Blvd.	San Leandro

\* Construction

CMP Route	Segment Limits	Jurisdiction
I-880 – NB	Marina Blvd. to SR 112/ Davis	San Leandro
I-880 – NB	Hegenberger to High/42 <sup>nd</sup>	Oakland
I-880 – NB	High/42 <sup>nd</sup> to 23 <sup>rd</sup> (1 <sup>st</sup> on)	Oakland
I-880 – SB	I-238 (Marina before 06) to A St.	Unincorporated
I-880 – SB	A St. to Rte. 92	Hayward
I-880 – SB	Rt. 92 to Tennyson	Hayward
I-880 – SB	Tennyson to Alvarado-Niles	Hayward, Union City
I-880 – SB	Alvarado-Niles to Alvarado	Union City, Fremont
I-880 – SB	Alvarado to Decoto	Fremont
I-880 – SB	Decoto to Stevenson	Fremont
SR 84 - WB	Paseo Padre Pkwy. to Toll Gate	Fremont
SR 92 – WB	Clawiter to Toll Plaza	Hayward

Other CMP segments that were congested (LOS F) in 2012 afternoon peak, but have improved in 2014 are:

- **I-80 Eastbound:** Jct I-580 (off) to Central (county line) (Albany)
- **I-580 Eastbound:** I-680 to Hopyard (Pleasanton), Hopyard to Santa Rita (Pleasanton), and Greenville to N. Flynn (Unincorporated)
- **I-880 Northbound:** Tennyson to State Route 92 (Hayward), and State Route 92 to A St (Hayward)





### 3.3.2 | Ramps and Special Segments (Tier 1)

Four ramp segments were congested in 2014 in the afternoon peak period (**Tables 3-3** and **3-4**). Two of them were grandfathered in their base monitoring year, and the ramp connector between State Routes 13/24 was also congested (LOS F) in 2012. Although the connectors from I-880 to the Webster Street/Posey Tubes had shown improvement in 2012 in the afternoon, they were observed to be congested again in the 2014. In the morning peak period, Posey Tube (northbound) as congested in both 2012 and 2014.

**Table 3-3: Congested Segments on Ramps & Special Segments (Tier 1) - PM**

CMP Route	Segment Limits	Jurisdiction
I-580/SR 24 Interchange**	I-580 WB to SR-24 EB	Oakland
SR13/SR 24 Interchange**	SR-13 NB to SR-24 EB	Oakland
I-880/SR 260 Connection	I-880 SB to SR-260 WB	Oakland
I-880/SR 260 Connection	SR-260 EB to I-880 NB	Oakland

\*\* Grandfathered

**Table 3-4: Congested Segments on Ramps & Special Segments (Tier 1) - AM**

CMP Route	Segment Limits	Jurisdiction
I-880/I-238 Interchange	I-238 WB to I-880 NB	San Leandro
I-880/SR 260 Connection	SR-260 EB to I-880 NB	Oakland

**Improvements:** There is no improvement to congested segments on Ramps and Special Segments.

### 3.3.3 | Arterials (Tier 1)

In this monitoring cycle, the overall number of congested segments decreased on the arterial (Tier 1) network from 2012. In the afternoon, there were seven congested segments, of which one experienced construction and two more were grandfathered. In terms of geographical location within the county, the maps in **Appendix A** show that there is no strong clustering of congested segments on arterials (Tier 1) in either the morning or afternoon peaks. However, many congested segments appear on the same roads in the morning and afternoon peak periods indicating likely presence of consistent bottlenecks.

The major observations have been noted in **Tables 3-5** (PM) and **3-6** (AM) on the next page.

**Table 3-5: Congested Segments on Arterials (Tier 1) - PM**

CMP Route	Segment Limits	Jurisdiction
Hesperian - NB**	La Playa to W.Winton Ave.	Hayward
University - WB	San Pablo to 6 <sup>th</sup>	Berkeley
SR 84 - EB	Sunol Rd. to Plea - Sunol Rd.	Fremont
SR 84 - EB	SR 84 (Off)/I-680 to Vallecitos Ln.	Unincorporated
SR 112 (Davis) - EB*	Doolittle to I-880	San Leandro
SR 123 San Pablo - SB**	Park to 35 <sup>th</sup>	Emeryville, Oakland
SR 185 (International Blvd) - SB	42 <sup>nd</sup> to 46 <sup>th</sup> St.	Oakland

\* Construction \*\* Grandfathered

**Table 3-6: Congested Segments on Arterials (Tier 1) - AM**

CMP Route	Segment Limits	Jurisdiction
Hesperian - SB	A St. to W.Winton Ave.	Hayward
SR 84/Fremont (Fre) - EB	Thornton to Peralta	Fremont
SR 84 - EB	Sunol Rd. to Plea - Sunol Rd.	Fremont
SR 84 - WB	Ruby Hill/Kaithoff to Culvert	Unincorporated
SR 112 (Davis) - WB*	E 14 <sup>th</sup> to San Leandro	San Leandro
SR 262 (Mission) - WB	I-680 NB to I-880 SB	Fremont

\* Construction

**Improvements:** The Hayward Loop, largely completed by June 2013, reported the most notable improvement on the arterial network. The project converted three previously two-way streets to one-way streets in downtown Hayward (A Street, State Route 238 – Foothill Boulevard, and State Route 185 – Mission Boulevard). **Appendix C** provides details on changes to the CMP segments through this upgrade.

Within the loop, the Foothill Blvd (State Route 238) segment has improved from LOS F to LOS D in the afternoon peak period. On the approaches to the loop:

- The north-east bound approach on Jackson Street (State Route 92) has improved from LOS F to D in the afternoon peak period;
- The westbound approach to A Street has improved from LOS F to D in the morning peak period and eastbound approach has improved from LOS F to C in the afternoon peak period. This arterial was classified as Tier 2;
- The eastbound approach on D Street has improved from LOS F to C in the afternoon peak period. This arterial was classified as Tier 2; and
- Other segments near the loop not experiencing LOS F in 2012 have also improved.

**Table 3-7** shows other construction works completed between 2012 and 2014 and their corresponding influence on the performance of the CMP network.

**Table 3-7: Improvements completed between 2012 and 2014**

CMP Route Improvements	Segment Limits	Jurisdiction
Hesperian Blvd./Lewelling Blvd. intersection improvement to add a left turn lane; construction from Jul 2009 to Oct 2012	Hesperian Blvd. around Lewelling Blvd.	Improved performance noticed.  Northbound approach to Lewelling <ul style="list-style-type: none"> <li>• AM - LOS F to B</li> <li>• PM - LOS F to E</li> </ul> Southbound approach to Lewelling <ul style="list-style-type: none"> <li>• AM - LOS E to C</li> <li>• PM - LOS F to E</li> </ul>
Isabel Ave./Rt. 84/I-580 interchange to add a new interchange and improve access to the I-580; construction completed Mar. 2012	I-580, State Rt. 84 (new alignment – newly added CMP segments) and Airway Blvd.	The freeway segments performed worse, as other construction was occurring on the I-580 during the 2014 monitoring.
Webster St. SMART corridor to implement traffic signal re-timing, transit and emergency vehicle signal priority; construction occurred between Sep. 2012 and Oct. 2013	Webster St. and Posey Tubes	Showed mixed performance change with AM showing improvement and PM showing slight decline in speeds. Declined speeds are likely due to the improved economy.  Posey Tube Northbound <ul style="list-style-type: none"> <li>• AM - LOS C to A</li> <li>• PM - Slight speed decrease</li> </ul> Webster Tube Southbound <ul style="list-style-type: none"> <li>• AM - LOS C to A</li> <li>• PM - LOS A to B</li> </ul>

### 3.3.4 | Arterials (Tier 2)

There were only three congested segments reported on the arterial (Tier 2) network in the afternoon (**Table 3-8**) peak period and none in the morning peak period. This is expected, as by their very definition, these arterials are second tier arterials and do not typically carry high traffic volumes. Listed below are two observations:

- The segment on Broadway is categorized as LOS F under the HCM 2000, while HCM 1985 categorized the segment as LOS E. This difference can arise on higher speed arterials as HCM 2000 has an additional class of arterials which recognizes free flow speeds between 45-55 mph. Under this HCM 2000 class, average speed conditions are assigned to LOS categories differently to the equivalent in HCM 1985. Refer to **Tables 2-4** and **2-5**.
- The other two congested segments have experienced declining speeds in recent years.

**Table 3-8: Congested Segments on Arterials (Tier 2) - PM**

CMP Route	Segment Limits	Jurisdiction
Broadway (Connection to I-880) - SB	5th St./Broadway to I-880 ON Ramp	Oakland
High St.- EB	Fernside Blvd. to NB I-880 OFF Ramp	Alameda, Oakland
Hesperian Blvd. - Union City Blvd. - SB	Industrial Blvd. to Hesperian/ Union City Blvd./Overbridge	Hayward

**Improvements:** Two segments that were congested in 2012 during the afternoon peak period, improved in 2014. These are listed below:

- Winton Avenue/D Street-Eastbound: Soto Road to Foothill Boulevard/D Street (Hayward) improved from LOS F to C.
- Stoneridge Drive-Eastbound: W. Las Positas Boulevard to Santa Rita Road (Pleasanton) improved from LOS F to C.

### 3.3.5 | Weekend Monitoring on Freeways (Tier 1)

Congested segments on weekends were primarily concentrated in the north county similar to the weekday results; this concentration is similar to 2012 monitoring results. All segments were connections to the Bay Bridge (**Table 3-9**).

**Appendix B** provides detailed weekend results.

**Table 3-9: Congested Segments on Tier 1 Freeways - Weekend**

CMP Route	Segment Limits	Jurisdiction
I-80 - EB	I-80/I-580 (Merge) to Powell	Emeryville
I-80 - EB	Powell to Ashby	Emeryville - Berkley
I-80 - WB	Central (County line) to Jct. I-580	Albany
I-80 - WB	Jct. I-580 to University	Berkley - Albany
I-80 - WB	University to Ashby	Berkley
I-80 - WB	Ashby to Powell	Emeryville
I-80 - WB	I-580 Split to Toll Plaza	Oakland
I-580 - WB	SH-24 ON Ramp to I-80/580 Split	Oakland

## 3.4 | Corridor Performance Analysis

Considering that Alameda County is located at the geographic center of the region, and the employment centers are located considerably apart, either within the county or the region, trips made by drivers on the CMP network often cover several CMP segments. So, it is useful to aggregate the results for the entire corridor to understand the overall change in corridor performance. This analysis has been undertaken since 1991 for analyzing the performance in the afternoon peak period. **Appendix D** provides the full results for each corridor.

### 3.4.1 | Freeways

Out of the 14 freeway corridors reviewed in the afternoon peak (each direction considered separately), speeds stayed relatively stable over the long term. Exceptions to this are noted for I-680 northbound, SR 24 eastbound and SR 13 both directions where declining speeds were observed over the years. Not surprisingly, the lowest speed was experienced on I-80 in both directions. For comparing with 2012 and 2014 results, 12 corridors had average speeds within  $\pm 5$  mph of 2012 results. Most of these showed slight decrease in speeds. Of the remaining two corridors, one showed a decrease and one showed an increase (Figure 3-6).

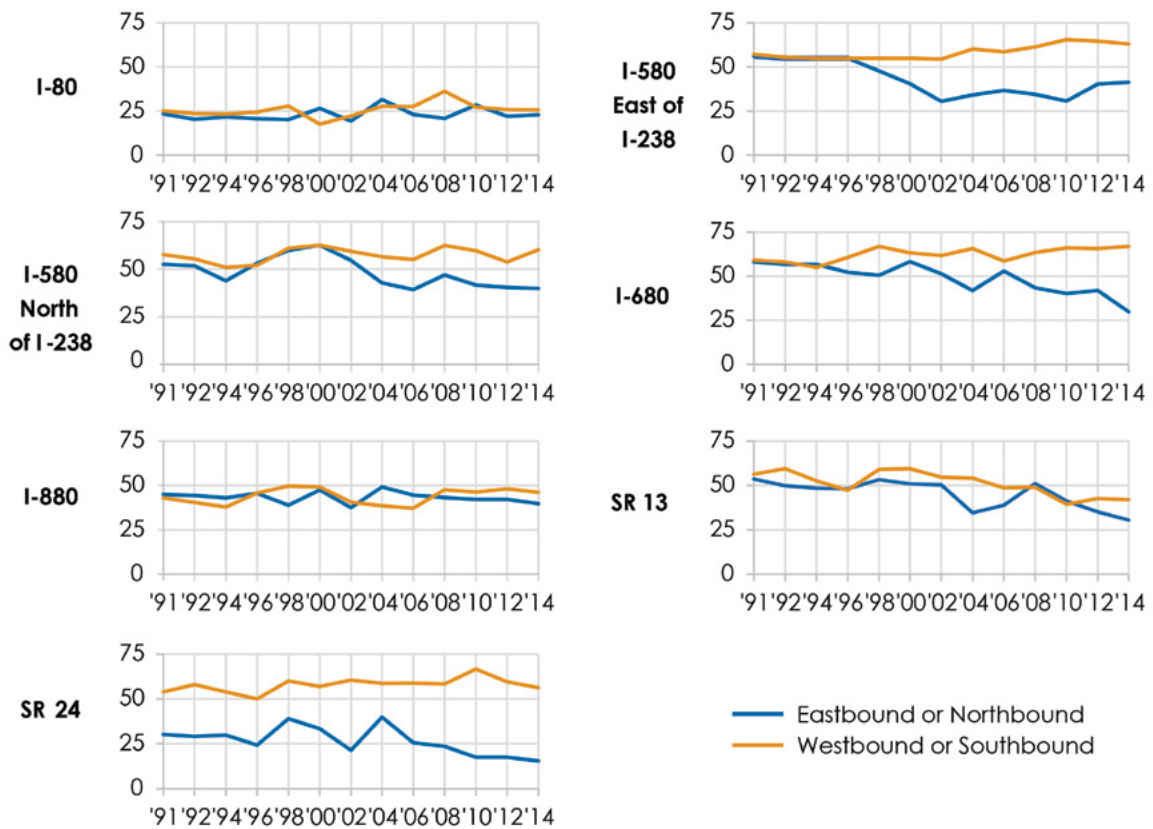


Figure 3-6: Change in Freeway Corridor Average Afternoon Speed from 1991 to 2014

There was a significant **increase** in speed on I-580 (westbound) from I-238 to I-80 between 2012 and 2014. Overall this northern portion of I-580 (constituting 14.7 miles), showed an average increase in speed of 6.4 mph, and is now performing at 2008/2010 levels. The resulting LOS improved from LOS C in 2012 to LOS A in 2014.

There was a significant **decrease** in speed on I-680 (northbound) from Scott Creek Road to Alcosta Boulevard. While the northern portion of this route continues to operate at LOS A, the average speed on the southern section between Scott Creek Road and Calaveras Road has degraded. Overall, the corridor has experienced

an average decline in speed of 12 mph resulting in an additional travel time of approximately 12 minutes. The resulting LOS degraded from LOS D in 2012 to LOS F in 2014. Two additional congested segments were also identified in 2014.

### 3.4.2 | Arterials

Historic corridor monitoring has been conducted on 24 arterial corridors (each direction considered separately). The Decoto Road/Dumbarton Bridge corridor includes both a freeway and arterial component. Of these 24 corridors, 21 had average speeds within  $\pm 2.5$  mph of 2012 results; with the majority showing slight decreases in speed.

Of the remaining three corridors, one showed a significant increase and two showed a significant decrease. Changes in average LOS were not reviewed as the arterial class of the segments varied along the arterial corridors.

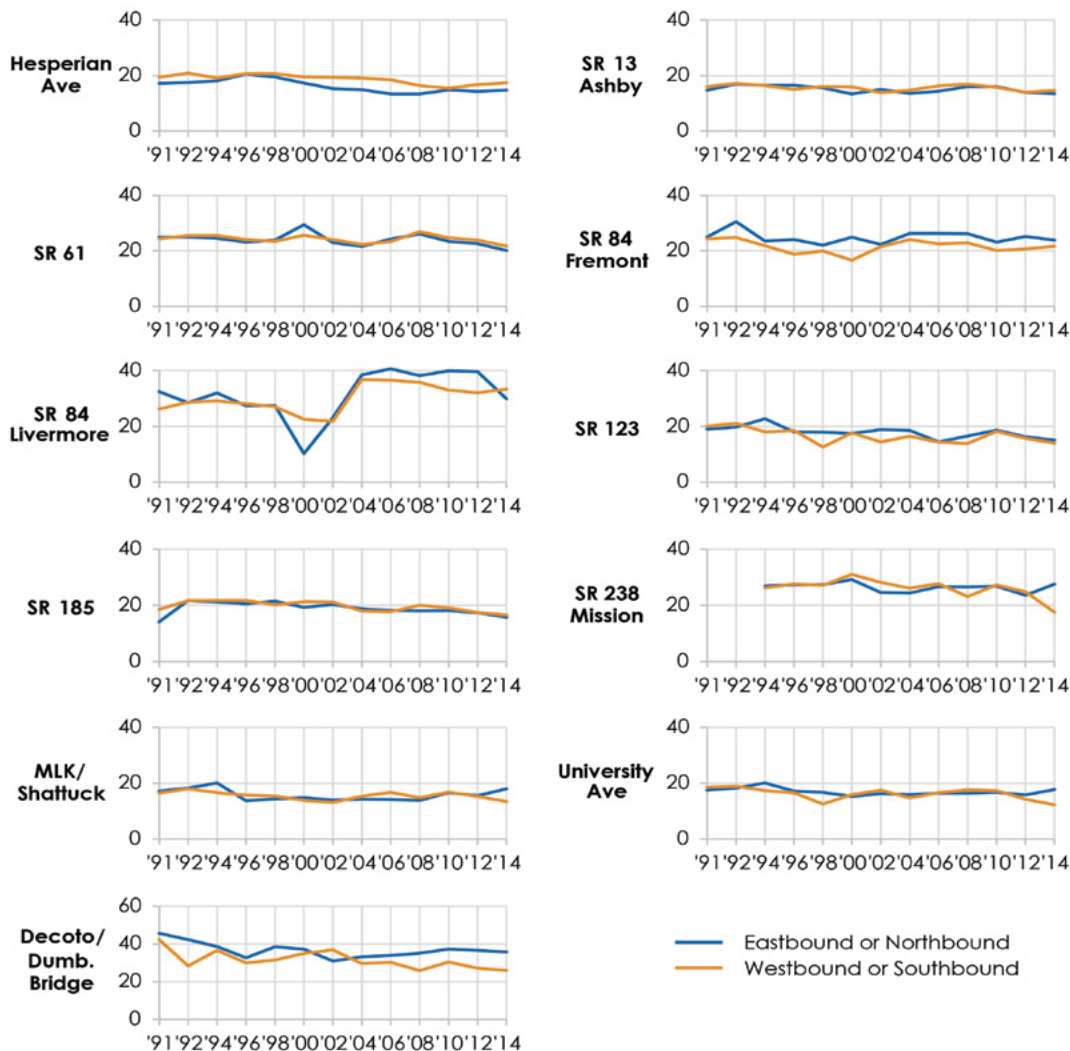


Figure 3-7: Change in Arterial Corridor Average Speed from 1991 to 2014

*The majority of the Alameda County CMP corridors showed slight decreases in average speed in 2014.*

Review of long term trends on these arterial (Tier 1) corridors show that speeds stayed relatively stable in the afternoon peak with the exception of Decoto Road/Dumbarton Bridge and SR 84 in Livermore. SR 84 in the Tri-Valley area showed a significant drop in speeds during 2000, the dot com boom period, and then a steady increase thereafter. Speed on Decoto Road/Dumbarton Bridge has been declining gradually over the years, reflecting the regional nature of traffic this road carries.

For the comparison between 2012 and 2014 performance, there was a significant **increase** in speed on State Route 238 Mission (Northbound) from I-680 in Fremont to Jackson in Hayward approaching the loop between 2012 and 2014. The average speed increased by 3.9 mph.

There was a significant **decrease** in speed on State Route 84 (westbound) from I-580 to Isabel: This corridor declined in speed by 9.8 mph. It comprises of six CMP segments and all but one segment experienced significant decrease in speed.