3 | Level of Service Results: Freeways and Arterials

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 2014 to 2016. Additionally, the majority of major corridors showed a slight decline in speed in 2016. This is likely caused by the improving economy combined with impact due to construction activities occurring across the county. The 2016 results demonstrate a continuation in the speed decline trend observed during the 2012 and 2014 monitoring periods. Appendices A and B provide detailed segment results.

3.1 | Average Speeds

Figure 3-1 compares the countywide average of the freeway and arterial speeds by peak period between 2014 and 2016. For Tier 1 Freeways, there was a moderate decline (- 1.1 mph) in the morning peak period, and sharp reductions in speeds in the afternoon (- 3.4 mph) and weekend (- 2.2 mph) peaks. Note that the 2016 average speeds do not include I-580 data in East County (between San Ramon Road/Foothill Road and North Flynn Road) as the segment is in an express lane ramp up period, whereas the 2014 average speeds includes that segment. The Tier 1 Arterials saw a moderate drop (- 0.5 mph) in the morning peak, and held nearly steady in the afternoon peak with a slight increase (+ 0.1 mph). For Tier 2 Arterials, there were stronger speed decreases in the morning (-1.3 mph) and afternoon (-2.2 mph) peaks.

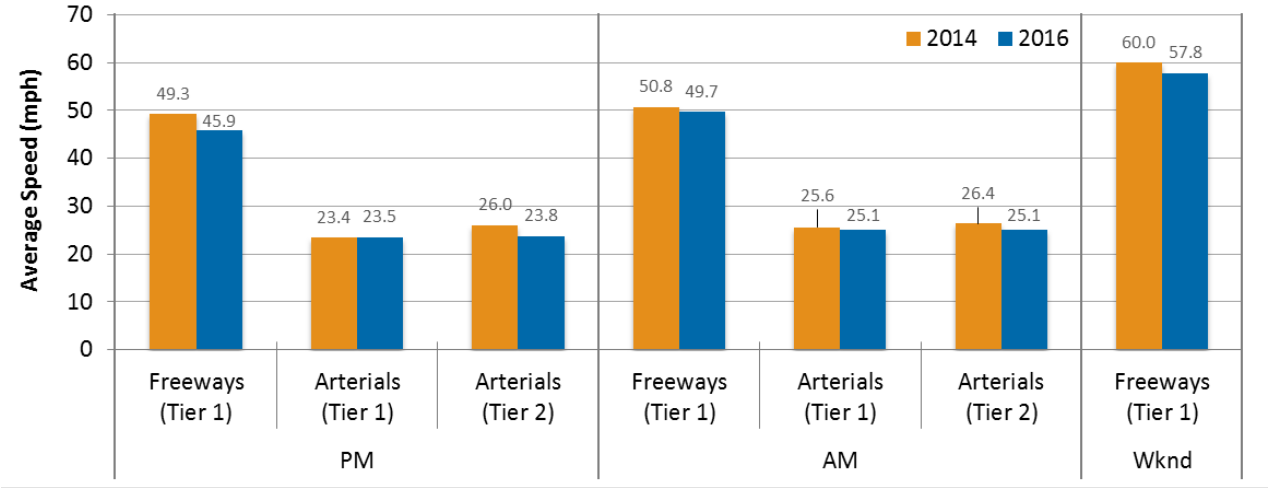

Figure 3-1: Average Speeds (mph) on CMP Network – 2014 vs 2016

In 2016, a larger reduction in speed was observed on the Tier 2 Arterial network, particularly in the afternoon peak period. Traffic congestion and slowing of traffic speeds generally can be seen as an indicator of increased traffic demand, driven by economic activity of a healthy regional economy. These trends and other possible reasons for this speed reduction are discussed in Section 8 |.

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. Alameda CTC monitors only Tier 1 CMP network performance in the afternoon peak for CMP conformity, or potential development of a deficiency plan.

Alameda CTC considers segments performing at LOS F as congested. In 2016, the number of congested segments increased from 42 to 61 in the afternoon peak period for Tier 1 segments. Freeway and Tier 1 Arterial segments saw the greatest increase in number of congested segments. Similarly in the morning peak period, the number of congested segments increased from 32 to 37 (see Figure 3-2), with the increase consisting almost entirely of freeway segments. When compared to the afternoon peak, the morning peak had fewer congested segments in 2014 and 2016.

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 length, 11.1% was congested in the afternoon peak and 7.4% was congested in the morning peak. Weekend congestion is also rising with two additional congested freeway segments from 2014 to 2016, bringing the 2016 total to ten congested segments. The length of the freeway network that is congested on weekends has also risen from 2.9% in 2014 to 3.5% in 2016.

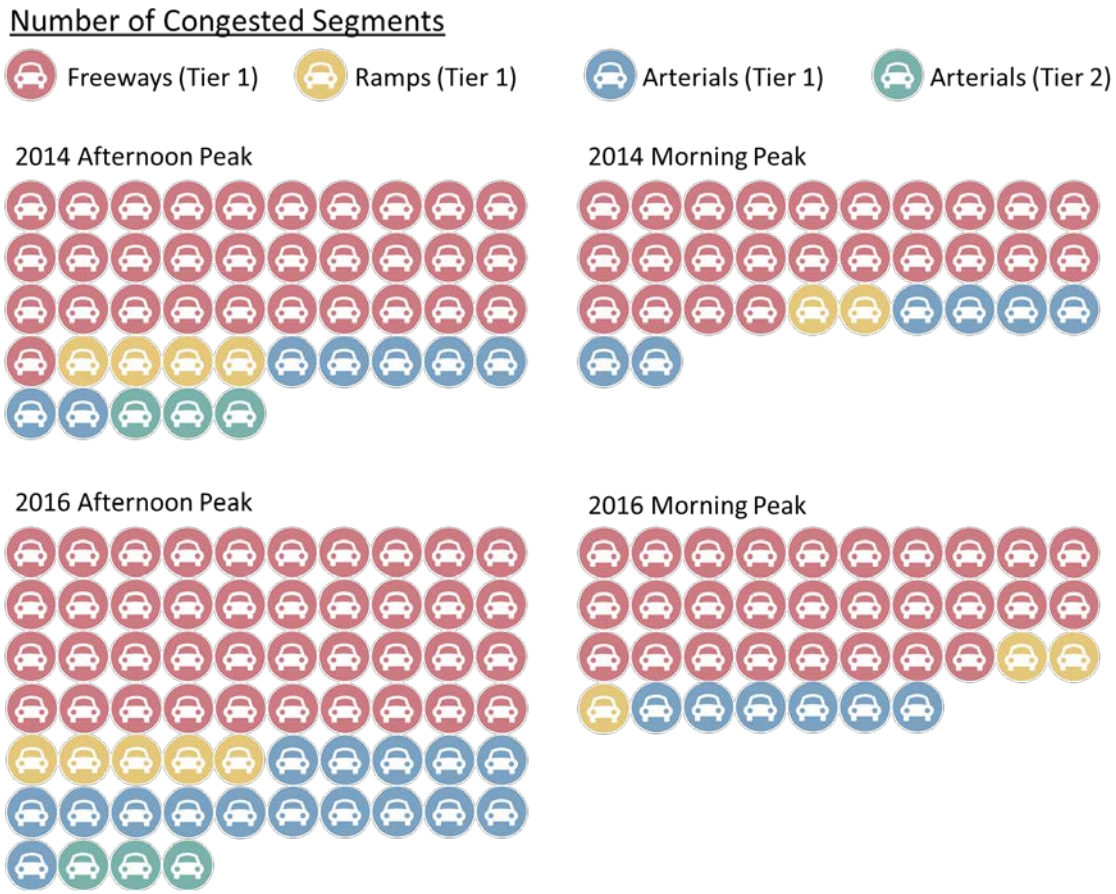

Figure 3-2: Number of Congested Segments in 2014 and 2016

3.3 | Countywide Network Performance

Figures 3-3 and 3-4 compare the location of congested segments between 2014 and 2016 on the Tier 1 and Tier 2 networks. They highlight the congested segments (LOS F) in:

- Both monitoring cycles;
- 2014 only, but performance improved in 2016; and
- 2016 only, indicating performance declined in 2016.

In the afternoon peak, new congested segments were observed on I-880 (northbound) which is one of the key intraregional commute corridors connecting with employment centers in Santa Clara County. Largely, these new congested segments appeared adjacent to existing congested segments indicating that the length of queuing is increasing. New congested segments for 2016 were also found on the Tier 1 Arterial network especially on several eastbound segments of State Route 84 in Niles Canyon and approaching Pigeon Pass. These segments have experienced performance drop between 2014 and 2016, possibly due to increased demand as they serve as an alternative route to the already-congested eastbound I-680.

In the morning peak, there were notable improvements from 2014 congested conditions on I-880 southbound in Newark and on westbound State Route 262 (Mission Boulevard). New congested segments emerged on I-80 (westbound) in Berkeley, on I-580 (westbound) between Foothill Boulevard/MacArthur Boulevard and the split to State Route 13 (northbound), and on I-880 (northbound) between Marina Boulevard and Hegenberger Road. Similarly, the new congested segments were generally adjacent to existing congested conditions.

The following sub-sections discuss the 2016 observations 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 the 1991 or 1992 base monitoring years (i.e. grandfathered). The subsections also provide details on network improvements completed between 2014 and 2016 that could potentially explain changes in segment performance.

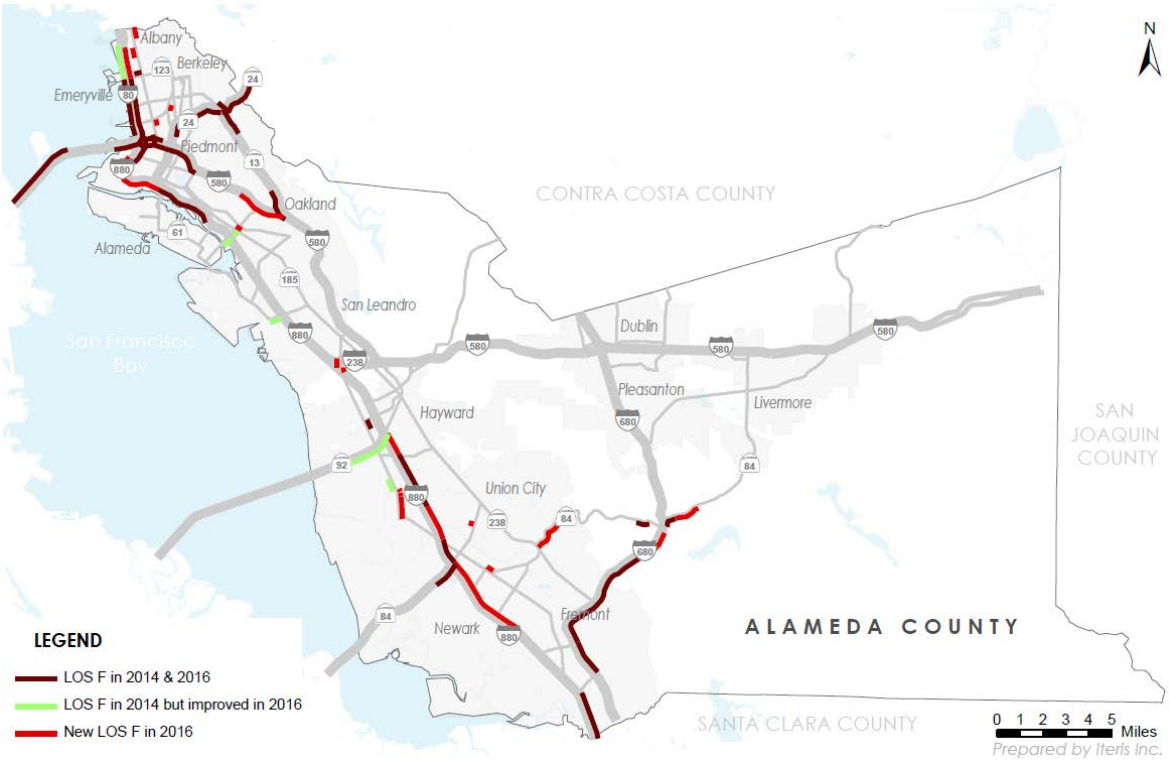

Figure 3-3: Change in Congested Segments (LOS F) from 2014 to 2016 – PM Peak Period

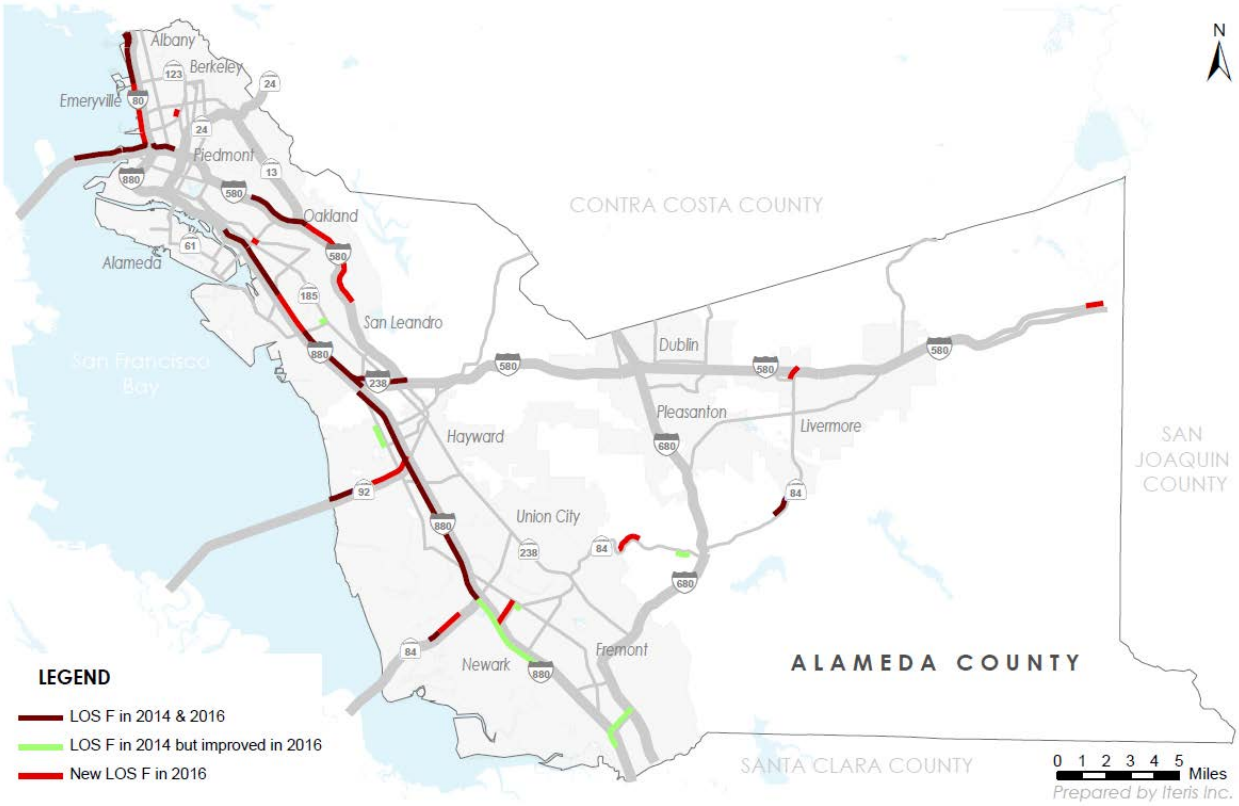

Figure 3-4: Change in Congested Segments (LOS F) from 2014 to 2016 – AM Peak Period

3.3.1 | Freeways (Tier 1)

As shown in Figure 3-3 and Figure 3-4, the majority of congested (LOS F) segments were located on the freeway network. There were 40 congested segments in the afternoon and 28 in the morning peak periods (See Tables 3-1 and 3-2). Out of the 40 afternoon congested segments, 15 were grandfathered and five 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 likely to be 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 north county had fewer congested segments in the morning peak compared to the afternoon peak.

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

CMP Route	Segment Limits	Jurisdiction
I-80 – EB**	Toll Plaza to I-580 SB Merge	Oakland
I-80 – EB**	I-80/I-580 (Merge) to Powell St.	Emeryville
I-80 – EB**	Powell St. to Ashby Ave.	Emeryville – Berkeley
I-80 – EB**	Ashby Ave. to University Ave.	Berkeley
I-80 – EB**	University Ave. to Jct. I-580 (off)	Berkeley – Albany
I-80 – WB**	University Ave. to Ashby Ave.	Berkeley
I-80 – WB**	Ashby Ave. to Powell St.	Emeryville
I-80 – WB**	Powell St. to I-80/I-580 (Split)	Emeryville
I-580 – EB	San Ramon Rd./ Foothill Rd. to I-680	Pleasanton
I-580 – EB	I-680 to Hopyard Rd.	Pleasanton
I-580 – EB	Hopyard Rd. to Santa Rita Rd.	Pleasanton
I-580 – EB	1st St. to Greenville Rd.	Livermore
I-580 – EB	Greenville Rd. to N.Flynn Rd.	Unincorporated
I-580 – EB**	I-80 to I-980	Oakland
I-580 – EB	I-980 to Harrison St.	Oakland
I-580 – EB	Harrison St. to Lakeshore Ave.	Oakland
I-580 – EB	Coolidge Ave. to SR 13 Off	Oakland
I-580 – WB **	SR 24 On-ramp to I-80/580 Split	Oakland
I-680 – NB	Rt. 262/Mission Blvd. to Durham Rd.	Fremont
I-680 – NB	Durham Rd. to Washington Blvd.	Fremont
I-680 – NB	Washington Blvd. to Rt. 238/Mission Blvd.	Fremont
I-680 – NB	SR 238/Mission Blvd. to Vargas Rd.	Fremont
I-680 –NB	Vargas Rd. to Andrade Rd.	Unincorporated
I-680 – NB	Andrade Rd. to Calaveras Rd.	Unincorporated
I-880 – NB **	Dixon Landing Rd. to SR 262/Mission Blvd.	Fremont
I-880 – NB*	Stevenson Blvd. to Decoto Rd.	Fremont
I-880 – NB*	Decoto Rd. to Alvarado Blvd.	Fremont
I-880 – NB*	Alvarado Blvd. to Alvarado-Niles Blvd.	Fremont - Union City
I-880 – NB*	Alv-Niles Blvd. to Tennyson Rd.	Union City – Hayward
I-880 – NB*, **	Tennyson Rd. to SR 92	Hayward
I-880 – NB	I-880/I-80 (split) to I-880/I-80 (merge)	Oakland
I-880 – SB	I-880/I-80 merge to Jct. 980	Oakland
I-880 – SB	I-980 to 23rd	Oakland
SR 13 – NB	Moraga Ave. to Hiller Dr. (Sig)	Oakland
SR 13 – SB	Redwood Rd. to Jct. I-580 (EB Merge)	Oakland
SR 24 – EB **	Jct. I-580 (on) to Broadway/SR 13	Oakland
SR 24 – EB **	Broadway/SR 13 to Caldecott Tun. (enter)	Oakland
SR 24 – EB **	Caldecott Tun. (enter) to Fish Ranch Rd.	Oakland
SR 84 – EB	Newark Blvd./ Ardenwood Blvd. to I-880 NB (off)	Newark
I-80 – WB ***	SF County Line to Fremont St. off-ramp	SF

* Construction

** Grandfathered

*** This segment is outside of Alameda County and reported for informational purposes

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 Ave.	Berkeley – Albany
I-80 – WB	University Ave. to Ashby Ave.	Berkeley
I-80 – WB	Ashby Ave. to Powell St.	Emeryville
I-80 – WB	Powell St. to I-80/I-580 (Split)	Emeryville
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	I-205 (SJ Co) to Grant Line Rd.	Unincorporated
I-580 – WB	Foothill Blvd. /MacArthur Blvd. to SR 13 Off	Oakland
I-580 – WB	SR 13 Off to Fruitvale Ave.	Oakland
I-580 – WB	SR 24 On-ramp to I-80/580 Split	Oakland
I-580 – EB	Central Ave. (County Line) to I-80 Jct.	Albany
I-880 – NB*	I-880/I238 (split) to Marina Blvd.	San Leandro
I-80 – WB	Central (County Line) to Jct. I-580	Albany
I-880 – NB*	Marina Blvd. to SR 112/Davis	San Leandro
I-880 – NB*	SR 112/Davis to Hegenberger Rd.	Oakland – San Leandro
I-880 – NB*	Hegenberger Rd. to High St./42nd Ave.	Oakland
I-880 – NB	High/42nd Ave. to 23rd Ave (first on)	Oakland
I-880 – SB*	I-238 (Marina Blvd. before 06) to A St.	Unincorporated
I-880 – SB*	A St. to SR 92	Hayward
I-880 – SB*	SR 92 to Tennyson Rd.	Hayward
I-880 – SB*	Tennyson Rd. to Alv-Niles Blvd.	Hayward - Union City
I-880 – SB*	Alvarado-Niles to Alvarado Blvd.	Union City – Fremont
I-880 – SB*	Alvarado Rd. to Decoto Rd.	Fremont
SR 84 – WB	Ardenwood Blvd. /Newark Blvd. to Paseo Padre Pkwy.	Newark
SR 84 – WB	Paseo Padre Pkwy. to Toll Gate	Fremont
SR 92 – WB*	I-880 to Clawiter Rd.	Hayward
SR 92 – WB*	Clawiter Rd. to Toll Plaza	Hayward

* Construction

The I-80 Integrated Corridor Management (ICM) Project in Alameda and Contra Costa Counties, implements dynamic signing and adaptive ramp meter control and is expected to begin operation by September 2016. This is expected to result in operational improvements on I-80 that will be captured in the next monitoring cycle. CMP segments that were congested (LOS F) in 2014 afternoon peak, but have improved in 2016 are:

- I-80 - Westbound: Junction with I-580 to University (Berkeley – Albany) (LOS F to E)
- State Rte 92 – Eastbound: Clawiter Rd to I-880 (Hayward) (LOS F to E)

CMP segments that were congested (LOS F) in the 2014 morning peak, but have improved in 2016 are:

- I-880 - Southbound: Decoto Road to Stevenson Boulevard (Fremont) (LOS F to E)

The afternoon peak performance improvement on the SR 92 segment mentioned may have attributed to ramp metering implementation on interchanges in that segment. Table 3-3 shows other freeway improvements completed between 2014 and 2016 and their corresponding influence on the performance of the impacted CMP network segments.

The I-80 Integrated Corridor Management (ICM) Project in Alameda and Contra Costa Counties, implements dynamic signing and adaptive ramp meter control and is expected to begin operation by September 2016. This is expected to result in operational improvements on I-80 that will be captured in the next monitoring cycle.

CMP segments that were congested (LOS F) in 2014 afternoon peak, but have improved in 2016 are:

- I-80 - Westbound: Junction with I-580 to University (Berkeley – Albany) (LOS F to E)
- State Route 92 – Eastbound: Clawiter Road to I-880 (Hayward) (LOS F to E)

CMP segments that were congested (LOS F) in the 2014 morning peak, but have improved in 2016 are:

- I-880 - Southbound: Decoto Road to Stevenson Boulevard (Fremont) (LOS F to E)

The afternoon peak performance improvement on the SR 92 segment mentioned may have attributed to ramp metering implementation on interchanges in that segment. Table 3-3 shows other freeway improvements completed between 2014 and 2016 and their corresponding influence on the performance of the impacted CMP network segments.

Table 3-3: Freeway improvements completed between 2014 and 2016

Project	CMP Segments impacted	Changes
I-880 / 5th Avenue Seismic Retrofit in Oakland	I-880 between 23rd St. and I-980	Northbound • AM – remained at LOS D • PM – remained at LOS B Southbound • AM – remained at LOS B • PM – improved from F30 to F20
I-880 SB HOV Lanes from Hegenberger Rd. to Marina Blvd.	I-880 SB from Hegenberger Rd. to SR 112 (Davis St.) and from SR 112 (Davis St.) to Marina Blvd.	Hegenberger Rd. to Davis St.: • AM – remained at LOS A • PM – LOS D to C Davis St. to Marina Blvd.: • AM – LOS C to A • PM – LOS D to C
I-80 ICM Project: Implementation of adaptive ramp meter control and dynamic signing. It is expected to be operating by September of 2016.	Between the Contra Costa County Line and the Bay Bridge Toll Plaza	The changes due to this construction improvement will be analyzed in the next monitoring cycle.
I-580 HOV/Express Lanes: Major construction were completed along both directions of I-580 in the Tri Valley area. This added express lanes in both east and westbound directions to improve person throughput and performance of the corridor in general. The express lanes opened to traffic in February 2016, just prior to the 2016 CMP monitoring period.	I-580 EB from Hacienda Dr. to Greenville Rd. I-580 WB from Greenville Rd. to I-680	Performance is not considered in this CMP study because the facility recently opened and is still in the express lanes ramp up period.
SR 92 Ramp Metering. Implementation of ramp metering on the interchanges between the Toll Plaza and I-880.	SR 92 between the Toll Plaza and Clawiter Rd. SR 92 between Clawiter Rd. and I-880	Eastbound: Toll Plaza to Clawiter Rd. • AM – LOS A to A • PM – remained at LOS E Clawiter Rd. to I-880 • AM – LOS B to B • PM – LOS F30 to E Westbound: I-880 to Clawiter Rd. • AM – LOS E to F30 • PM – remained at LOS A Clawiter Rd. to Toll Plaza • AM – remained at LOS F30 • PM – remained at LOS B

3.3.2 | Ramps and Special Segments (Tier 1)

Five ramp segments were congested in 2016 in the afternoon peak period and three in the morning peak period (See Tables 3-4 and 3-5). 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 2014. The connectors from I-880 to the Webster/Posey Tubes in the afternoon were observed to be congested again in 2016, as they were in 2014. In the morning peak period, Posey Tube (northbound) connector to I-880 was congested in both 2014 and 2016.

Table 3-4: Congested Segments on Ramps & Special Segments (Tier 1) – PM

CMP Route	Segment Limits	Jurisdiction
I-80/I-580 Interchange**	I-580 WB to I-80 NB	Oakland
I-580/SR 24 Interchange	I-580 WB to SR 24 EB	Oakland
I-580/SR 24 Interchange	SR 24 WB to I-580 EB	Oakland
SR13/SR 24 Interchange**	SR 13 NB to SR 24 EB	Oakland
I-880/SR 260 Connection	SR 260 EB to I-880 NB	Oakland

** Grandfathered

Table 3-5: 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-580/I-680 Interchange	I-580 WB to I-680 SB	Pleasanton
I-880/SR 260 Connection	SR 260 EB to I-880 NB	Oakland

In the afternoon peak, one ramp CMP segment was at LOS F in 2014 and improved in 2016, as follows:

- I-880/State Route 260 Connection from I-880 (southbound) to State Route 260 (westbound) (LOS F to E)

In the morning, there has been no improvement to congested segments on Ramps and Special Segments for 2016.

3.3.3 | Arterials (Tier 1)

In this monitoring cycle, the overall number of congested segments increased on the Tier 1 arterial network from 2014. In the afternoon, there were 16 congested segments, of which one experienced construction as well as being grandfathered, and four more segments which were grandfathered. In the morning there were six congested segments, of which one experienced construction. 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.

Table 3-6: Congested Segments on Arterials (Tier 1) – PM

CMP Route	Segment Limits	Jurisdiction
Hesperian Blvd. – NB **	La Playa to W.Winton Ave.	Hayward
Hesperian Blvd. – NB	Grant to Llewelling	Unincorporated
Hesperian Blvd. – SB **	Springlake to Llewelling	Unincorporated
Adeline St. – NB	MLK Jr - South to MLK Jr - North	Berkeley
University Ave. – WB	San Pablo Ave. to 6th	Berkeley
Decoto Rd. – WB **	Union Square to Alv-Niles Rd.	Union City
SR 84/Fremont Blvd. (Fre) – WB **	Peralta Blvd. to Thornton Ave.	Fremont
SR 84 – EB	SR 238/Mission Blvd. to Union City Limit	Fremont
SR 84 - EB	Sunol Rd. to Plea-Sunol Rd.	Fremont
SR 84 - EB	SR 84 (Off)/I-680 to Vallecitos Ln.	Unincorporated
SR 84 - EB	Vallecitos Ln. to Vallecitos Nuclear Center	Unincorporated
SR 123 San Pablo Ave. - SB	Marin Ave. to Gilman Ave.	Albany – Berkeley
SR 123 San Pablo Ave. – SB * **	Park Ave. to 35th St.	Emeryville - Oakland
SR 123 San Pablo Ave. – NB	53nd Ave. to Stanford Ave.	Oakland
SR 123 San Pablo Ave. – NB	Washington Ave. to Carlson Blvd.	Albany
SR 185 (International Blvd.) – NB	46th Ave. to 42nd Ave.	Oakland

Table 3-7: Congested Segments on Arterials (Tier 1) - AM

CMP Route	Segment Limits	Jurisdiction
Adeline St. – SB	MLK Jr - North to MLK Jr - South	Berkeley
SR 84/Thornton Ave. (Fre)-WB	Fremont to I-880 SB	Fremont
SR 84 - WB *	Ruby Hill /Kaithoff to Culvert (Lat/Long: 37.613854,-121.817224)	Unincorporated
SR 84 - WB	Niles Canyon Quarry to Eastern Fremont City Limit	Fremont
SR 185 (International Blvd.) – NB	46th St. to 42nd	Oakland
SR 84 (Liv) - SB – realign	I-580 WB (off) to Airway)	Livermore

These are the major observations from Tables 3-6 (afternoon) and 3-7 (morning):

- Following the trend identified in the 2014 report, additional segments on State Route 84 in Niles Canyon and around the Pigeon Pass area received LOS F in 2016. This performance trend follows a speed decrease trend observed over past CMP analysis cycles.
- State Route 84 in Fremont also received some new LOS F segments in 2016 in the morning, continuing a speed decrease trend over past analysis cycles.
- State Route 123 (San Pablo Avenue) in North County received three new LOS segments in the afternoon peak, again continuing the downward speed trend. One of the segments, southbound from Park Avenue to 35th Street was under construction.

- Hesperian Boulevard added 3 new Tier 1 Arterial LOS F segments for 2016 in the evening. This roadway is parallel to I-880 and is likely serving some of the regional commuter traffic.

CMP segments that were congested (LOS F) in the 2014 afternoon peak, but have improved in 2016 are:

- State Route 112 (Davis Street) – eastbound from Doolittle Drive to I-880 (San Leandro) (LOS F to E)
- State Route 185 (International Boulevard) – southbound from 42nd Avenue to 46th Avenue (Oakland) (LOS F to C)

For the morning peak, the following CMP segments have improved since 2014:

- Hesperian Boulevard – southbound from A Street to W. Winton Avenue (Hayward) (LOS F to D)
- State Route 84/Fremont Boulevard – eastbound from Thornton Avenue to Peralta Boulevard (Fremont) (LOS F to D)
- State Route 84 – eastbound from Sunol Road to Pleasanton-Sunol Road (Fremont) (LOS F to C)
- State Route 112 (Davis Street) – westbound from East 14th to San Leandro Boulevard (San Leandro) (LOS F to D)
- State Route 262 (Mission Boulevard) – westbound from I-680 to I-880 (Fremont) (LOS F to C)

Table 3-8 shows construction completed on Tier 1 Arterials between the 2014 and 2016 monitoring periods, and their corresponding influence on the performance of the CMP network.

Table 3-8: Tier 1 Arterial Improvements completed between 2014 and 2016

Project	CMP Segments impacted	Changes
SR 112 Davis St. I-880 overcrossing replacement.	SR 112 (Davis St.) between Doolittle Dr. and I-880 SR 112 (Davis St.) between I-880 and San Leandro Blvd.	Eastbound: Doolittle Dr. to I-880 • AM – LOS D to E • PM – LOS F to E I-880 to San Leandro Blvd. • AM – LOS D to C • PM – LOS D to E Westbound: San Leandro Blvd. to I-880 • AM – remained at LOS C • PM – LOS B to C I-880 to Doolittle Dr. • AM - LOS D to C • PM – LOS D to C
SR 84 Expressway North Segment (north of Concannon Boulevard to Jack London Boulevard) widened from 4 to 6 lanes and enhanced bike and pedestrian safety and access. Completed and opened to traffic in June 2014.	SR 84 between Concannon Blvd. and Stanley Blvd. SR 84 between Stanley Blvd. and W. Jack London Blvd.	Northbound: Concannon Blvd. to Stanley Blvd. • AM – LOS B to A • PM – LOS B to A Stanley Blvd. to W. Jack London Blvd. • AM – remained at LOS A • PM – remained at LOS A Southbound: W. Jack London Blvd. to Stanley Blvd. • AM – LOS B to A • PM – LOS C to A Stanley Blvd. to Concannon Blvd. • AM – LOS A to B • PM – LOS A to B

3.3.4 | Arterials (Tier 2)

There were only three congested segments reported on the arterial (Tier 2) network in the afternoon (See Table 3-9) 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 are on Hesperian Boulevard and have experienced declining speeds in recent years.

Table 3-9: Congested Segments on Arterials (Tier 2) – PM

CMP Route	Segment Limits	Jurisdiction
Broadway (Connection to I-880)-NB	I-880 off-ramp to 5th St./Broadway	Oakland
Hesperian Blvd.-Union City Blvd.-NB	Union City/Alvarado Blvd to Whipple Rd.	Union City
Hesperian Blvd.-Union City Blvd.-NB	Whipple Rd. to Hesperian Blvd./Union City Blvd./overcrossing	Union City

All of the congested segments in 2014 during the afternoon peak period have improved in 2016. These are listed below:

- Broadway (Connection to I-880)-southbound from 5th Street/Broadway to the I-880 on-ramp (Oakland) (LOS F to E)
- High Street-eastbound from Fernside Boulevard to northbound I-880 off-ramp (Alameda, Oakland) (LOS F to E)
- Hesperian Boulevard-Union City Boulevard – southbound from Industrial Boulevard to Hesperian/Union City Boulevard/overcrossing (Hayward) (LOS F to D)

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 (See Table 3-10); this concentration is similar to 2014 monitoring results. No segments which were LOS F in 2014 improved in 2016. One segment was at LOS F for the first time in 2016: I-80 – westbound from the Toll Plaza to the SF County Line. All LOS F segments are connections to the Bay Bridge. Appendix B provides detailed weekend results.

Table 3-10: Congested Segments on Tier 1 Freeways - Weekend

CMP Route	Segment Limits	Jurisdiction
I-80 - EB	I-80/I-580 (Merge) to Powell St.	Emeryville
I-80 - EB	Powell St. to Ashby Ave.	Emeryville – Berkeley
I-80 - WB	Central (County Line) to Jct. I-580	Albany
I-80 - WB	Jct. I-580 to University Ave.	Berkeley – Albany
I-80 - WB	University Ave. to Ashby Ave.	Berkeley
I-80 - WB	Ashby Ave. to Powell St.	Emeryville
I-80 - WB	Powell St. to I-80/I-580 (Split)	Emeryville
I-80 - WB	I-580 Split to Toll Plaza	Oakland
I-80 - WB	Toll Plaza to SF County	Oakland
I-580 - WB	SR 24 On-ramp to I-80/580 Split	Oakland

3.4 | Corridor Performance Analysis

The majority of the Alameda County CMP corridors showed continued decreases in average speed in 2016.

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 include I-680 northbound, State Route 24 eastbound and State Route 13 both directions where declining speeds were observed over the years. The lowest speed was experienced on State Route 24 in the eastbound direction, which reduced further (- 1.8 mph) in 2016. Large reductions in speed from 2014 to 2016 were observed on the I-880 in the northbound direction (- 10.5 mph) and State Route 13 in the southbound direction (- 10.0 mph). Note that the I-580 Corridor in the Tri Valley area was not included in the corridor analysis for the 2016 monitoring because it is still in the express lane ramp up period.

When comparing the 2016 results to 2014, half of the corridors had average speeds within ± 5 mph of the 2014 results. Most of these showed moderate decreases in speeds. Of the remaining corridors with larger changes in speed, with the exception of State Route 24 (westbound, in north county) (+5.1 mph), all of these corridors had reductions in speed. Speed decreases of at least - 5 mph resulted on the following directional freeways (See Figure 3-5):

- I-580 eastbound in North and Central County (-5.7 mph);
- I-680 northbound in South and central County (-6.5 mph);
- I-880 northbound in South, Central and North County (-10.5 mph);
- I-880 southbound in South, Central and North County (-5.5 mph); and
- State Route 13 southbound in north county (- 10.0 mph).

As mentioned, State Route 24 in the westbound direction increased in speed by +5.1 mph in 2016. It is thought that the performance improved due to the interaction of increasing congestion levels upstream on the I-680 in the northbound direction, which has the effect of constraining flows on State Route 24 (westbound).

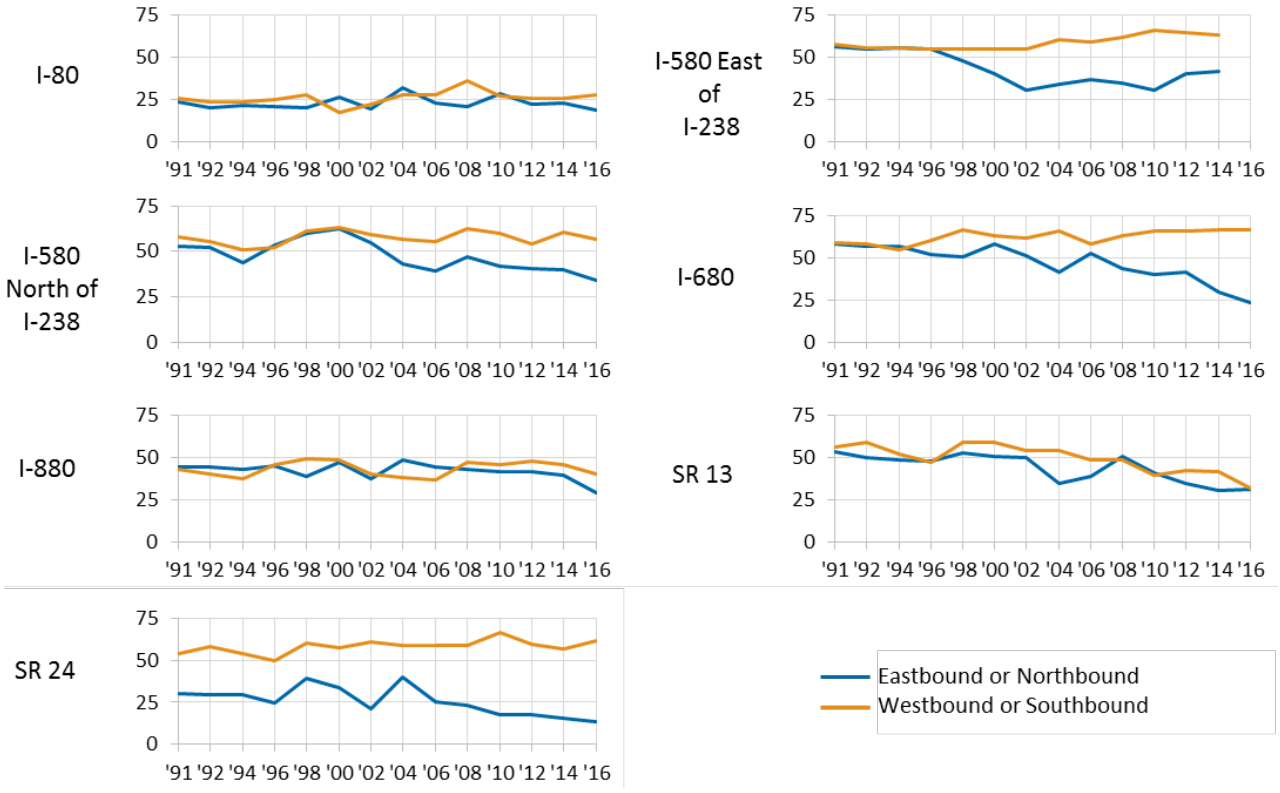

Figure 3-5: Change in Freeway Corridor Average Afternoon Speed from 1991 to 2016 (mph)

Three of the corridors which underwent changes of at least five miles per hour between 2014 and 2016 are examined in detail below.

There was a significant increase in speed on State Route 24 (westbound) from Fish Ranch Road to I-580 between 2014 and 2016. At the time of monitoring in 2014, the Caldecott Tunnel 4th bore was already opened (since November 2013), allowing a capacity increase from two to four lanes in the off-peak (westbound) direction. Because this capacity increase was already in effect during 2014 monitoring, it is not the direct cause of the improved performance between 2014 and 2016 (LOS D to B).

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 has degraded. This continues the trend for this corridor which was already underway from 2012 to 2014. Overall, from 2014 to 2016 the corridor has experienced an average decline in speed of - 6.5 mph resulting in an additional travel time of approximately 12 minutes. The resulting LOS remained at LOS F as it had been in 2012 and 2014. One additional congested segment was also identified in 2016, bringing the count up to three congested segments on I-680 (northbound) in this corridor.

As mentioned above, there was also a significant decrease in speed on I-880 (northbound) from Dixon Landing to I-980. The average speed on the entire corridor has degraded, with three additional congested CMP segments on the southern half of the corridor in 2016. This trend was already underway from 2012 to 2014, but has become even more pronounced and could be attributed to the corridor being on the homebound commute from Santa Clara County employment centers and significant increase in regional employment in this analysis cycle, as discussed in Chapter 8.

3.4.2 | Arterials

Historic corridor monitoring has been conducted on 26 arterial corridors (each direction considered separately) as shown in Figure 3-6. This figure below includes a new graph that compares the old and new alignments of State Route 84 in Livermore in 2016, and the freeway and arterial components for the Decoto Road/Dumbarton Bridge corridor.

Of these 26 corridors, 20 had average speeds within ± 2.5 mph of 2014 results; with the majority showing slight decreases in speed. Of the remaining six corridors, one showed a significant increase and five showed a significant decreases. Changes in average LOS were not reviewed as the arterial class of the segments varied along the arterial corridors.

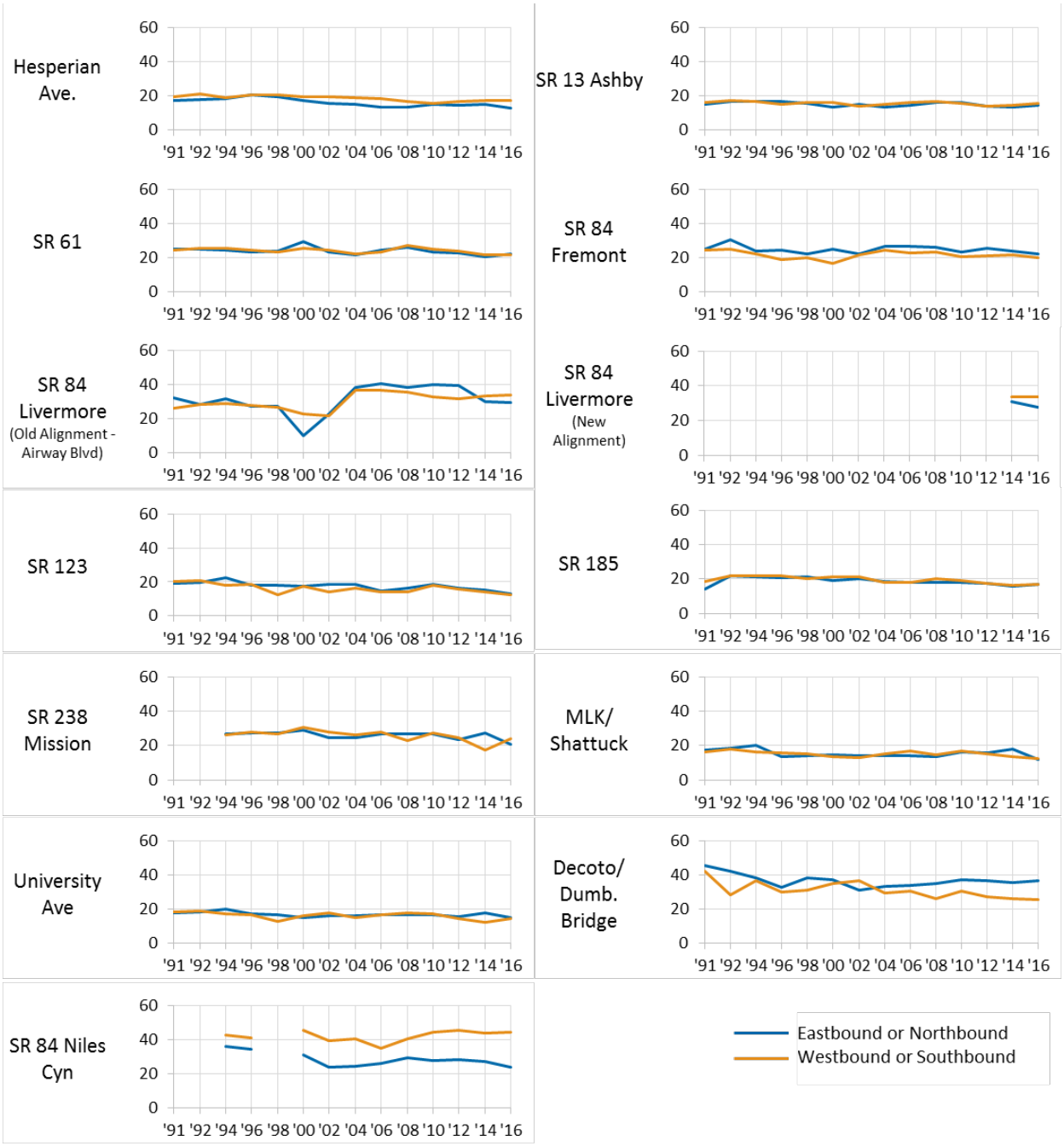

Figure 3-6: Change in Arterial Corridor Average Afternoon Speed from 1991 to 2016 (mph)

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 State Route 84 in Livermore. State Route 84 (Livermore) 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 2014 and 2016 performance, there was a significant speed increase on State Route 238 Mission Boulevard (southbound) from Jackson Street in Hayward to I-680. The average speed increased by + 6.6 mph.

There was a significant decrease in the same corridor in the northbound direction, reversing the trend from 2012 to 2014. The average speed decreased by - 6.8 mph. Another significant decrease in average speed (- 6.2 mph) from 2014 to 2016 was seen on northbound Martin Luther King Jr. Way /Shattuck Avenue in North Oakland and Berkeley. The segment of Martin Luther King Jr. Way northbound from State Route 24 to Adeline Street changed from LOS C in 2014 to LOS E in 2016. The segment of Adeline Street which shares roadway with Martin Luther King Jr. Way became a congested segment for the first time in 2016, down from LOS E in 2014. The segment of Shattuck Avenue northbound from Adeline Street to Dwight Way changed from LOS D to LOS E.

Review of long term trends on these arterial (Tier 1) corridors show that speeds stayed relatively stable in the afternoon peak with one exception.