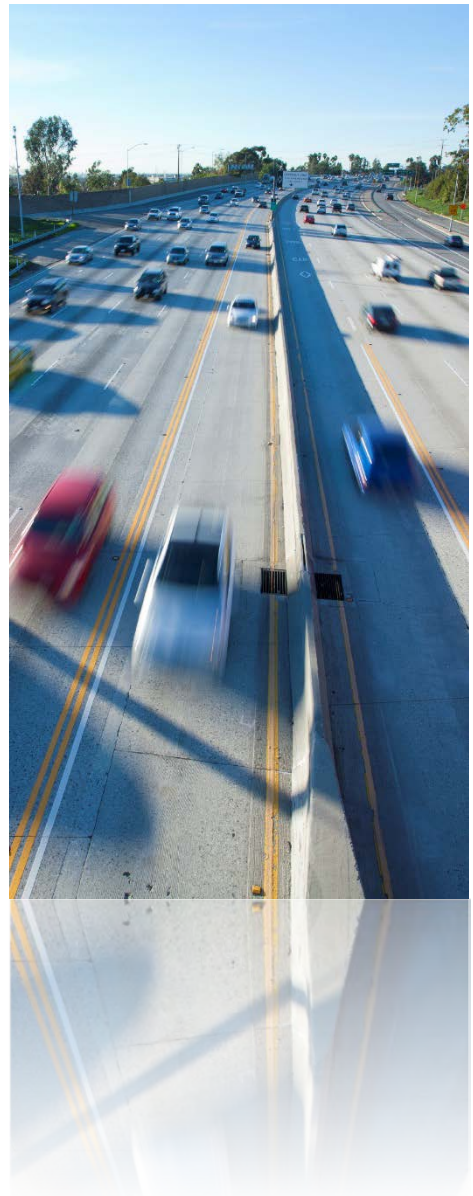
ES | Executive Summary



Traffic congestion is common on roadways in major metropolitan areas. Congestion can be seen as a situation in which at a certain time, on a certain roadway, the demand exceeds the capacity. Roadway capacity can be improved through operational improvements such as signal timing or increased by adding lanes; while population, land use and economic changes such as employment or commercial activity can influence the demand on the transportation network. Carpooling, bicycling, and using public transit can further reduce demand and allow satisfactory operation without adding road capacity. Even with reduction in transportation demand, it may still exceed the supply, resulting in traffic congestion.

California law mandates that urban areas develop a Congestion Management Program (CMP) that describes the strategies to assess, monitor, and improve the performance of each county's multimodal transportation system, and strengthen the integration of transportation and land use. The Alameda County Transportation Commission (Alameda CTC) has been designated as the Congestion Management Agency (CMA) for Alameda County and is responsible for managing and updating the CMP. As part of the CMP which has been in place since 1991, Alameda CTC has been monitoring traffic congestion every two years on the county's designated CMP roadways.

The LOS monitoring's focus is to measure average travel speeds on the county roadways, identify congested segments, and assess long term congestion trends on the CMP network. The Highway Capacity Manual (HCM) is used to describe the level of service (LOS) at which each roadway segment operates, based on travel speeds measured during the LOS monitoring effort. As required by state law, if a CMP segment is found to operate at LOS F conditions during any LOS monitoring cycle, after applicable exemptions, a deficiency plan is required to be prepared to improve the performance of that CMP segment. The LOS monitoring results provide a better understanding of the performance of Alameda County's roadways, but also informs the agency's other planning processes.

Alameda County CMP Network and Other Monitoring Elements

The CMP legislation requires that Alameda CTC designates a CMP roadway network for performance monitoring. Alameda County's CMP network consists of approximately 328 miles of roadways and is divided into two tiers (see Figure ES-1). The CMP network's Tier 1 roadways were initially adopted in 1991 and updated in 1992, and included all freeways, state highways, selected principal arterials and freeway ramp connectors. The Tier 2 roadways were added to the CMP network in 2011 and included principal and major arterials. Monitoring of Tier 1 roadways in the afternoon peak period (4:00 to 6:00 p.m.) is subject to CMP conformity. Monitoring of Tier 1 roadways in the morning peak period (7:00 to 9:00 a.m.) and Tier 2 roadways for both peak periods are for information purposes only.

In addition to monitoring the Tier 1 and Tier 2 roadways, the LOS Monitoring Report also includes other monitoring elements for informational purpose only, including monitoring the three bridges connecting Alameda County to San Francisco and San Mateo counties. The LOS Monitoring Report also conducts travel time surveys between 10 origin and destination (OD) pairs using multiple transportation modes. Starting in the 2014 LOS monitoring cycle, Alameda CTC also began monitoring mainline freeway HOV and express lanes.

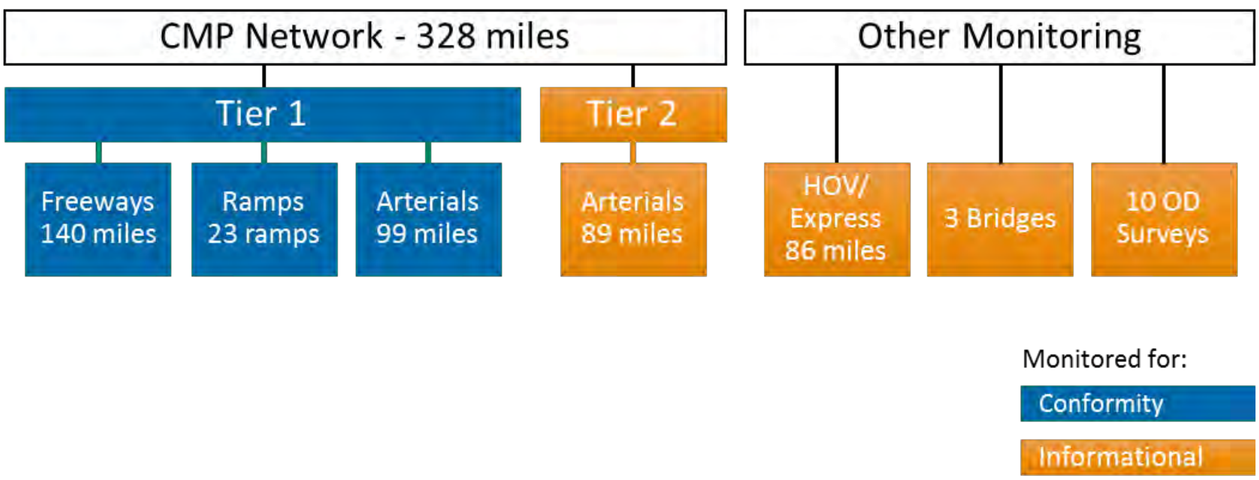


Figure ES-1: Alameda County CMP Network Details and Other Monitoring Elements

Measuring Congestion Levels: LOS Standards

Roadway segments are monitored by measuring the average traffic speed over a specific length of roadway. Prior to 2014, speeds were calculated from travel time data that is typically obtained from floating car surveys. However, starting in the 2014 monitoring cycle, the study has also used commercially available speed information for monitoring a large portion of the CMP network. This commercial speed data is obtained through a third-party data collection vendor, INRIX, for the 2016 monitoring cycle.

Based on the average speed, an LOS grade is assigned to each roadway segment using adopted standards based on the HCM. The LOS category gives information about the quality of service to drivers, and ranges from LOS A (best) to LOS F (worst). LOS A represents the best travel conditions from the driver's perspective where roadways operate at free flow speeds and LOS F represents congested or stop-and-go conditions.

CMP Conformity

Alameda CTC evaluates Tier 1 roadway segments in the afternoon peak period for CMP performance conformity. A Tier 1 roadway segment that performs at LOS F in the afternoon peak may trigger CMP conformance requirements, where the respective local jurisdiction would be required to prepare a deficiency plan to improve segment performance. The deficiency plan will typically include details on the cause of the deficiency, measures to improve the roadway performance, and a funding plan for the proposed improvements. There are statutory exemptions that would exempt some of the congested roadways from deficiency planning, including if the roadway segment was already deficient or "grandfathered" in the base monitoring year (when the CMP network was formed in 1991 or 1992), or construction work was active during the monitoring period.

Data Collection Technology: Commercial Speed Data and Floating Car Surveys

Starting in the 2014 monitoring cycle, Alameda CTC began using commercial speed data in addition to the traditional floating car surveys for LOS monitoring purposes. Use of commercial speed data was approved by the Commission in 2013 based on a validation exercise carried out by Alameda CTC. The validation exercise determined that commercial speed data could be used for all freeways (Tier 1), most ramps (Tier 1), and a portion of the Tier 2 arterials with available commercial speed data. These segments make up two-thirds of the CMP network, and were monitored using commercial speed data in 2014 and 2016. The remaining one-third of CMP roadway segments, including all Tier 1 arterials and a portion of Tier 2 arterials were monitored using floating car surveys in 2014 and 2016. Further, HOV lanes, where commercial speed data is not reported on these lanes separately from general purpose lanes, three ramps (Tier 1), and 18 miles of arterials (Tier 2) that had inadequate coverage of commercial speed data were also monitored using floating car surveys.

Countywide Results

The 2016 monitoring results indicate that average speeds on the CMP network declined from 2014 as shown in Figure ES-2, continuing the trend observed since 2010 as in the previous 2012 and 2014 monitoring cycles. Overall, the results show that:

- **Freeways**: The average speed change on freeways (Tier 1) declined during all periods in 2016 compared to 2014. The decline ranged from a moderate decrease (-1.1 mph) during the morning peak to a sharper decrease (-3.3 mph) during the afternoon peak;
- **Tier 1 Arterials:** The average speed change on Tier 1 arterials were modest in 2016 compared to 2014. Tier 1 Arterials experienced a slight decrease (- 0.5 mph) during the morning peak and a marginal improvement (+ 0.1 mph) during the afternoon peak; and
- **Tier 2 Arterials**: The average speed change on Tier 2 arterials declined during all periods in 2016 compared to 2014 with moderate declines during the morning (- 1.3 mph) and afternoon (- 2.2 mph) peaks.

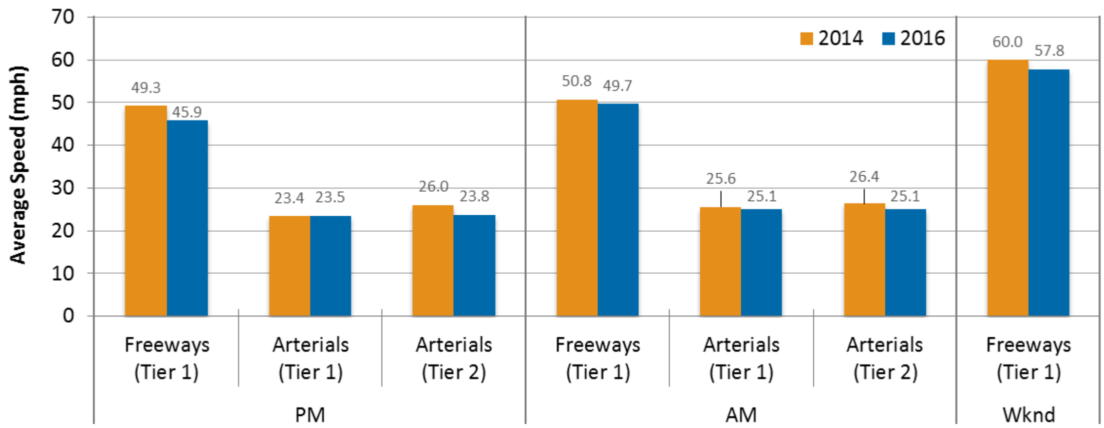


Figure ES-2: Average Speeds on CMP Network – 2014 vs 2016

2016 monitoring generally reported increased congestion on the CMP network from the 2014 monitoring cycle, with declined network average speeds and increased number of congested segments.

The general trend of decreasing roadway speeds is likely due to the improving economy combined with other trends such as gas price reduction which bring more traffic onto the roads. There was also a notable location showing increasing speed due to completion of an improvement project, namely SR-92 approaching I-880, where ramp meters were activated between the 2014 and 2016 monitoring cycles.

In 2016, the number of congested segments operating at LOS F increased from 45 to 64 in the afternoon peak. Similar trends were noticed in the morning peak, where the LOS F segments increased from 32 to 37. Figure ES-3 shows the locations of the LOS F segments in the afternoon and morning peak periods, and active construction during the 2016 LOS monitoring period.

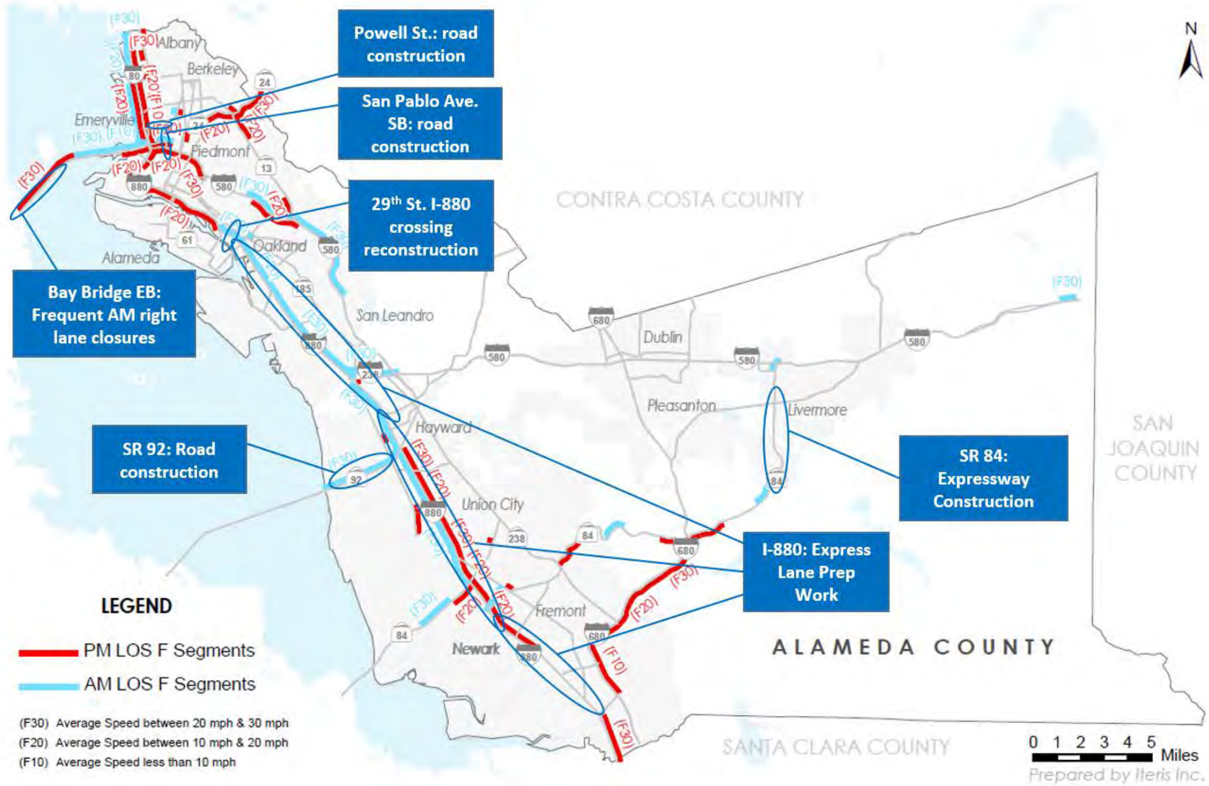


Figure ES-3: 2016 LOS Monitoring: Congested Segments in the Morning and Afternoon Peak Periods and Active Construction

After applying applicable statutory exemptions (including interregional trips on the segments that performed at LOS F during the 2016 LOS monitoring in the afternoon peak period), no new deficient segments were identified.

Two performance metrics developed from big data were computed for the first time in this monitoring cycle. The first new metric was reliability, which measures the variation in travel time from day to day. The results showed that travel in the morning peak period was typically more reliable than the afternoon peak period. Further, while the congested segments generally exhibited less reliability, an interesting finding was that some freeway segments, such as State Route 92 in the eastbound direction in the afternoon peak, had heavy congestion, but reliably long travel times. The second new metric examined was the duration of congestion. This metric measured the period of time across the day that the segment was considered to be congested. It is a measure of how much the congestion spreads beyond the typical commute peak periods. Many of the segments with the longest durations of congestion were on the I-80 or I-580 segments connecting to the Bay Bridge. The results from this new analysis can be used as a baseline in future monitoring studies.

Trends

Alameda CTC has been monitoring the CMP road network's performance since 1991. In recent years, there has been a noticeable increase in network congestion influenced by the regional and national economic conditions. Figure ES-4a shows the average CMP network speeds on freeways and arterials between 2006 and 2016. Overall, average speeds on the CMP network almost returned to pre-recession speeds in 2014, after peaking in 2010 during the economic recession. Average freeways and arterials speeds show a close correlation to unemployment rates (see Figures ES-4a and ES-4b, Source: BLS[1]). Unemployment increased around 2010 and therefore fewer workers commuted during the peak periods, resulting in improved speeds across the roadway network. As unemployment decreased after 2012, CMP roadway speeds declined. Since 2014, the arterial speeds have leveled off, and the freeway speeds have continued to decline, with the most pronounced decline in the afternoon peak.

Employment and population have continued to track upwards. By 2014, unemployment in Alameda County reached pre-recession levels and since then has continued to decrease (see Figure ES-4b). Employment and population estimates from 2015 to 2016 in Alameda and surrounding counties show robust, albeit uneven growth (see Figure ES-5). Alameda County, being in the geographic center of the region, has many regional commute corridors connecting to the adjacent counties. These corridors have generally experienced more increased traffic than the roads serving internal trips within Alameda County.

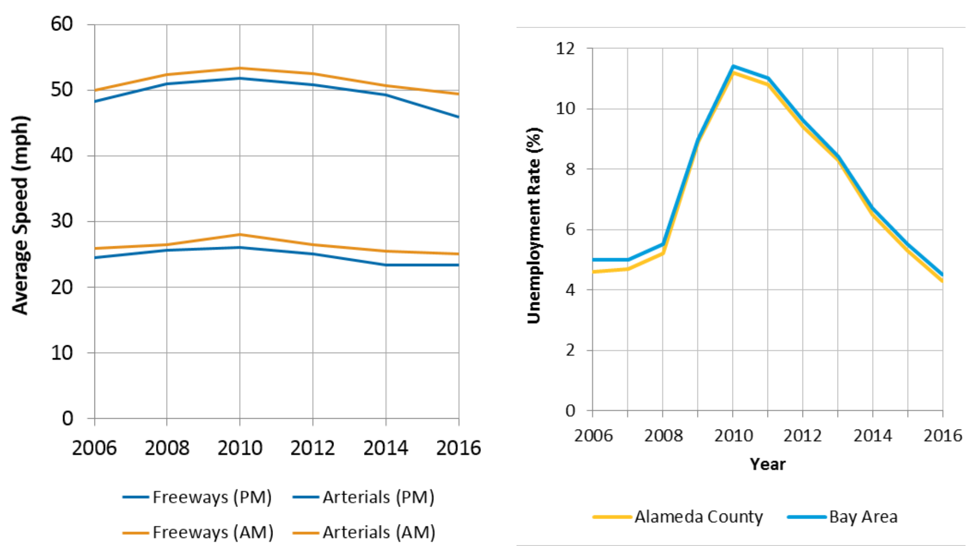


Figure ES-4: a) CMP Network Speeds (mph) and b) Unemployment Rates

[1] Local Area Unemployment Statistics. January, Not Seasonally Adjusted. Bureau of Labor Statistics. http://data.bls.gov/cgi-bin/dsrv?la

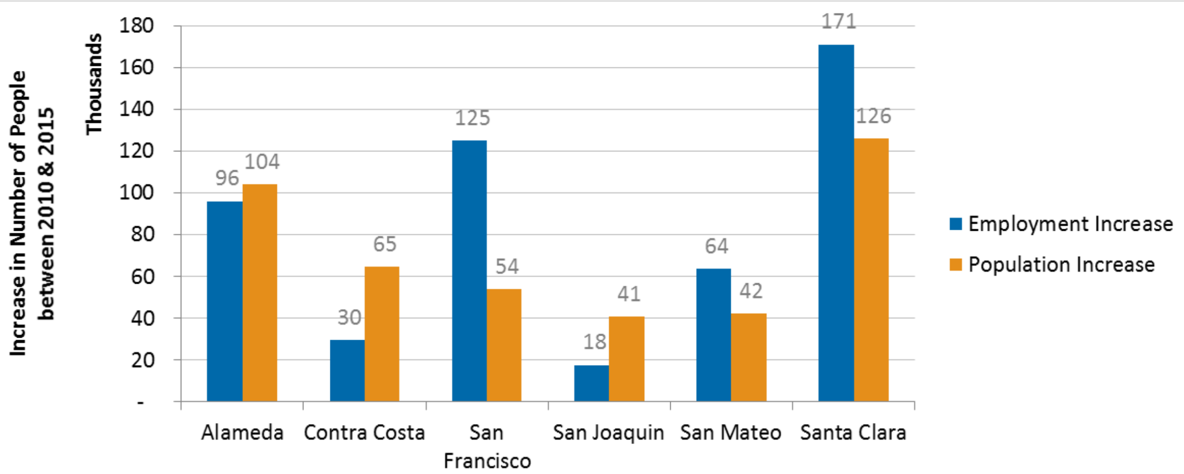


Figure ES-5: Population and Employment Growth in Alameda and Surrounding Counties (Source: DOF E-5 Report 2015-16 estimate)

Similar trends have been observed in ridership on the major regional transit system. As shown in Figure ES-6, in 2010 at the peak of unemployment, BART ridership was low and the reduced demand on freeways resulted in increased average speeds. Through the economic recovery since 2012, transit and freeway travel demand has increased again, resulting in increased ridership on BART and decline in average speeds on the CMP network.

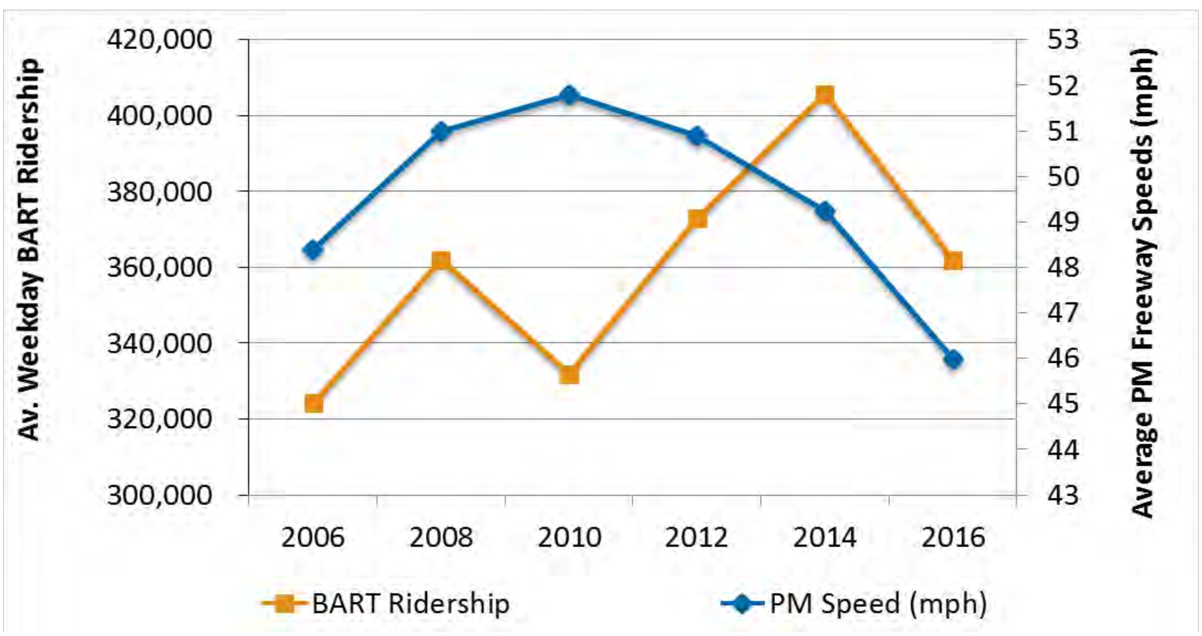


Figure ES-6: PM Peak Period Average Freeway Speed & BART Ridership (Source: BART)

> The lower gas price has been cited in a nationwide study as a factor in increased automobile miles driven.[3]

As a further factor for consideration, between 2014 and 2016, the retail price of gasoline for Alameda County motorists dropped precipitously and has since fluctuated. At the start of 2014, the price of gas in California was around $4 per gallon, but by the end of the year the price had dropped into the $2-$3 range.[2] In early 2015, the price returned to the $3-$4 range, but dropped again towards the end of the year. By 2016, it has been slightly rising, but stayed within the $2-$3 range during the monitoring period. The lower gas price has been cited in a nationwide study as a factor in increased automobile miles driven and a study of fuel consumption in California found that gasoline consumption has risen since 2014. [3] [4] The miles traveled on the Alameda County freeway network has risen 12.5% between the 2014 and 2016 monitoring cycles which further confirms this observation. [5]

Planned and Potential Transportation Improvements

In 2016, one of the impacts on road network performance were construction and maintenance activities, particularly on major corridors. However, it is noted that construction impacts were less in 2016 than 2014. This further highlights the increasing demand on the CMP network, since the network average speeds in 2016 were lower than 2014; despite the fact that 2014 had more construction.

Major construction work was present on State Route 84 in east county, and I-880 interchanges and median work in north and Central County. On the arterial network, Tassajara Road in East County and Alvarado Boulevard in South County had sections which were under repair with long term road closures. Figure ES-3 highlights the location of active construction work in 2016 that occurred in the vicinity of any CMP segments. The next LOS monitoring effort in 2018 will likely show improved performance resulting from these completed upgrades.

Beyond the above projects currently under construction, potential improvements identified to be in various stages of plan/project development were grouped as follows:

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[2] California All Grades All Formulations Retail Prices. U.S. Energy Information Administration. https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=emm_epm0_pte_sca_dpg&f=m
Cushing, OK WTI Spot Price FOB. https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RWTC&f=M

[3] U.S. Driving Tops 3.1 Trillion Miles in 2015, New Federal Data Show. Federal Highway Administration. News Release Feb 22, 2016. http://www.fhwa.dot.gov/pressroom/fhwa1607.cfm

[4] Net Taxable Gasoline Gallons. California State Board of Equalization. http://www.boe.ca.gov/sptaxprog/spftrpts.htm

[5] Alameda County Vehicle Miles Travelled Report. Caltrans Performance Measurement System (PeMS). http://pems.dot.ca.gov/

1. Projects with approval that have already been **programmed** for construction. For example, the I-880 North Safety & Operational Improvements at 23rd Avenue starting in 2017;
2. Projects in the **development or planning** phases. For example, the express lane project on I-680 northbound that is currently in the Environmental Phase; and
3. Countywide **planning study** efforts. For example, Alameda CTC's recently completed Goods Movements Plan, Transit Plan and Multimodal Arterial Plan assessed the county's multimodal needs and identified potential improvements.

Additionally, the 2014 Transportation Expenditure Plan, which is an $8 billion, 30 year plan was passed by voters as Measure BB during the November 2014 ballot and is expected to improve the countywide transportation system in all aspects. One component of the sales tax measure is investments in technology and innovation. Many current and upcoming technology trends offer potential strategies to address congestion on Alameda County's roadways. The aim of this Technology, Innovation and Development Program is to support next generation development and application of technologies that enhance the performance of a multimodal transportation system. Specifically, the program supports new and innovative approaches that improve the efficiency and safety of the movement of people and goods on all modes.

In recent years, the private sector has also applied technologies that impact transportation in Alameda County. Transportation network companies such as Uber and Lyft offer affordable first and last mile connections to a fixed route transit service (i.e. BART) that would otherwise have been a door-to-door or door-to-transit automobile trip. Delivery services such as Amazon and Instacart may eliminate the need for some shopping trips altogether, but also add more delivery vehicles to the traffic stream. Navigation driving mobile applications such as Waze have allowed drivers to make better pre-trip and en-route choices of route and departure time using historic and real time traffic information, and provide alternate route guidance around congestion and incidents. Other mobile applications have made it easier to use public transit with routing and scheduling suggestions including real time arrival information.

Moving forward, Alameda CTC will monitor these and future technology trends, when developing measures to improve the transportation system in Alameda County.

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