Appendix O – Performance Based Planning

Introduction: Map-21 and Performance Based Planning

The Moving Ahead for Progress in the 21st Century Act (MAP-21) is the Federal transportation funding bill signed into law in 2012. A key feature of MAP-21 is the establishment of a performance- and outcome-based program, known as “Performance Based Planning,” with the objective to invest in projects that will make progress toward the achievement of the national goals for the transportation. The most recent Federal transportation bill, Fixing America’s Surface Transportation Act of 2016 (FAST Act), carries forward the same performance management framework. The Federal Highway Administration (FHWA) worked with state and regional agencies to identify performance measures that meet the requirements. Beginning in 2018, state Departments of Transportation (DOTs) and Metropolitan Transportation Organizations (MPOs) will be required to implement the Federal performance measures.

Under the final performance rules, state DOTs (e.g. Caltrans in the California context) are directly responsible to submit performance targets and periodic reports on progress to those targets to Federal agencies on an annual basis. MPOs, such as SJCOG, are required to establish targets for the same performance measures on all public roads in the MPO planning area within 180 days after the state establishes each target. The MPO may elect to support the statewide targets, establish numerical targets specific to their region, or use a combination of both approaches. Furthermore, MPOs must incorporate these short-range targets into their planning process – most notably, the Transportation Improvement Program (TIP) and the Regional Transportation Plan (RTP).

The Federal performance measures are thematically split into three groupings under the rubric of “Performance Management” (PM):

- PM 1: Safety
- PM2: Transportation Asset Management
- PM 3: System Reliability, Freight, Congestion, and Air Quality

PM 1 Safety targets were set by Caltrans on August 31, 2017, allowing until February 27, 2018 for MPOs to submit targets in this area. SJCOG’s approach in this area will be described in detail below and incorporated directly into this RTP. PM 2 and PM 3 targets are expected to be adopted by Caltrans in May 2018 and by MPOs in November 2018. Given the timing, SJCOG’s approach in these areas will be described below in general terms. Once the targets are established they will be incorporated into subsequent RTP and RTIP cycles.

PM 1: Safety

Caltrans Target-Setting and Methodological Considerations

FHWA issued the Safety Performance Management Final Rule (Safety PM) as an implementation of the Highway Safety Improvement Program (HSIP), effective April 15, 2016. The Safety PM identified the core Federal safety goal “to achieve a significant reduction in traffic fatalities and serious injuries on all public roads.” The Safety PM establishes five performance measures to carry out the HSIP, defined as the five-
year rolling averages for: (1) Number of Fatalities, (2) Rate of Fatalities per 100 million VMT, (3) Number of Serious Injuries, (4) Rate of Serious Injuries per 100 million VMT, and (5) Number of Non-Motorized Fatalities and Non-motorized Serious Injuries. These safety performance measures are applicable to all public roads regardless of ownership or functional classification.

The Caltrans target-setting process was guided by the Safety PM as well as the Caltrans Strategic Highway Safety Plan (SHSP) and Strategic Management Plan (SMP). In cooperation with the Office of Traffic Safety (OTS), Caltrans adopted the following five Safety Performance Management Targets:

<table>
<thead>
<tr>
<th>Performance Target</th>
<th>2018 Target (5-Yr. Rolling Average)</th>
<th>Percent Reduction From 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Fatalities</td>
<td>3,590.8</td>
<td>-7.69%</td>
</tr>
<tr>
<td>Rate of Fatalities (per 100M VMT)</td>
<td>1.0</td>
<td>-7.69%</td>
</tr>
<tr>
<td>Number of Serious Injuries</td>
<td>12,823.4</td>
<td>-1.5%</td>
</tr>
<tr>
<td>Rate of Serious Injuries (per 100M VMT)</td>
<td>3.8</td>
<td>-1.5%</td>
</tr>
<tr>
<td>Number of Non-Motorized Fatalities and Non-Motorized Serious Injuries</td>
<td>4,271.1</td>
<td>-10%</td>
</tr>
</tbody>
</table>

Caltrans set targets which considered external factors that may affect collision, fatality and serious injury rates on public roadways. This analysis referenced an active National Cooperative Highway Research Project (NCHRP) 17-67 titled, “Identification of Factors Contributing to the Decline of Fatalities in the United States,” that has preliminarily concluded that economic factors such as unemployment rates, median income, and GDP, contributed up to 85% of the variations of collisions on a yearly basis. Consistent with this claim, data from California has shown a consistent upward trend in fatalities and serious injuries concurrent with the upswing in the economy since 2010, with a 13% increase from 2015 to 2016 alone. Other external factors that impact collision rates include changing demographics (e.g. older adults, millennials), change in mode mix on roadways, and the evolution of safety technology in vehicles.

Caltrans will continue to monitor these trends over time, however there is currently no model available that can accurately predict these external factors along with their impacts on the adopted transportation safety measures. Therefore, Caltrans elected to take a simpler approach by identifying existing trends through 2016, forecasting performance for 2017, and then estimating annual targets for 2018 using annual vision-based goals. The targets for number and rate of fatalities reflect the state’s goal for zero traffic fatalities by 2030, an approach known as “Towards Zero Deaths” (TZD) and also referred to as “Vision Zero” in many California cities.

The total fatalities and fatalities per 100m VMT are shown in Figures 1 and 2 below. These figures show a forecasted 13% increase from 2016 to 2017 (following the trend from 2015 to 2016), followed by a vision-based reduction of -7.69% per year.
The total serious injuries and serious injuries per 100m VMT are shown in Figures 3 and 4 below. These figures show a forecasted 9% increase from 2016 to 2017 (following the trend from 2015 to 2016), followed by a vision-based reduction of -1.5% per year.
Finally, the target-setting process for bicycle and pedestrian fatalities and serious injuries was designed to take a more aggressive approach, allowing for zero (0.00%) increase from 2015 to 2016 and then aspiring to a 10% decrease per year thereafter. The existing trend and target is shown in Figure 5, below.

**FIGURE 4. Caltrans Serious Injury Rate Trend and Target-Setting**

![Caltrans Serious Injury Rate Trend](image)

**FIGURE 5. Caltrans Non-Motorized Fatalities and Serious Injuries Trend and Target-Setting**

![Non-Motorized Targets](image)

**SJCOG Target-Setting**

As noted above, MPOs have two options to implement the Federal Performance Management rules: supporting the statewide target or adoption region-specific numerical targets. MPOs may also elect to combine these approaches. MPOs are required to report targets to Caltrans on an annual basis, 180 days after Caltrans establishes statewide targets, and must incorporate the targets into their RTP and RTIP. The first annual deadline to report PM 1 Safety Targets to Caltrans is February 27, 2018.

Consistent with other major MPOs throughout the state, SJCOG has elected to take the approach described below:
SJCOG has elected to support the state target rather than establishing a region-specific numerical target. Based on the “PM 1 MPO Target Reporting Template” provided by Caltrans, SJCOG will be required to submit an explanation of how SJCOG will plan and program projects so that they contribute toward the accomplishment of the 2018 Caltrans Statewide Safety Performance Measure Targets.

Safety is integral to the SJCOG planning and programming process. The RTP is built around 8 policies and 27 supportive strategies, which include safety as one of the primary building blocks of the Plan:

<table>
<thead>
<tr>
<th>Policy: Increase Safety and Security</th>
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<tr>
<td>Strategy #9: Facilitate Projects that Reduce the Number of and Severity of Traffic Incidents</td>
</tr>
<tr>
<td>Strategy #10: Encourage and Support Projects that Increase Safety and Security</td>
</tr>
<tr>
<td>Strategy #11: Emergency Improvement Communication and Coordination between Agencies and Public for Preparedness</td>
</tr>
</tbody>
</table>

Specifically, SJCOG begins most transportation planning efforts with a preliminary analysis of the challenges facing the transportation system within the project area. In almost all cases, this ongoing effort continually identifies new issues and feeds them into the planning process. For example, SJCOG initiates corridor studies (or Project Study Reports-PSRs) that provide details on the types of challenges and system deficiencies found in a portion of the region. Within these reports, SJCOG sets out a goal to improve overall transportation safety along the corridor. Data analyses focus on identifying intersections, accident information, or existing design features that can benefit from the safety enhancements. This is then followed by more detailed investigation of the types of strategies that can be used to reduce the number and severity of accidents. SJCOG’s Unmet Transit Needs (UTN) Report provides the general public opportunities to raise any safety and security issues on public transit. Cumulatively, SJCOG’s planning studies suggest strategies and recommend capital projects for the long-range Regional Transportation Plan (RTP) and the Transportation Improvement Program (TIP). Safety and security improvements to major state highway corridors in the region, including but not limited to I-5, SR-99, I-205, and SR-12, were outcomes of this regional planning process.

SJCOG strives to improve communication and coordination between public agencies and the public by identifying and engaging key transportation planning stakeholders. Through these stakeholder groups, SJCOG often identifies safety issues critical to their interests. For example, SJCOG works closely with member agencies (cities and county) and the California Department of Transportation in nominating projects for the State Highway Operation and Protection Program and the Highway Safety Improvement Program.
SJCOG planning staff regularly engages with public health agencies, SJCOG Citizen Advisory Committee, Goods Movement Task Force, and with bicycle coalitions interested in transportation safety issues specific to their missions. SJCOG also work closely with public transit operators, the SJCOG Interagency Transit Committee, and the Social Services Transportation Advisory Committee to identify transit safety and security improvements and have financed those projects through the Public Transportation Modernization, Improvement and Service Enhancement Program (PTMISEA).

SJCOG also operates a transportation demand management program called **dibs**, that covers a three-county area comprised of San Joaquin, Stanislaus, and Merced. As part of the program, SJCOG receives input on safety concerns or suggestions for improvement on roadway and transit systems from the general public. Through this feedback, SJCOG is able to implement safety performance improvements that address major public safety issues, as well as the specific concerns of raised by the interest groups.

Although safety is wholistically integrated into SJCOG’s regional transportation planning and programming process, as described above, the following highlighted projects in the RTP/SCS specifically address documented safety issues:

- **SR 99/SR 120 Operational Improvements** – This project will improve the capacity and recurring traffic congestion of the eastbound to southbound and northbound to westbound connector ramps and eliminate weaving and merging between SR-99/120 and SR-99/Austin Road interchanges. The SR 99/120 freeway interchange is currently subject to significant congestion, delays, and high accident rates.
- **SR 99 at Turner Road** - Reconstruct interchange to provide operational and safety improvements.
- **Grant Line Road Corridor Improvements** - Realign roadway and widen from 2 to 4 lanes with operational and safety improvements.
- **SR 120/Brennan Avenue Intersection** – Signalization and intersection improvements. Currently stop-controlled with a high accident rate.
- **Roth Road Grade Separation** – 4-lane grade separation between Roth Road and UPRR tracks.
- **Transit Facility Safety & Security Projects** – RTD, Lodi and Manteca systems.
- **Altamont Corridor Express Speed and Safety Upgrades** - Including signal upgrade to automatic train stop increase train speed from 79 to 90 MPH and several track realignment projects.
- **Active Transportation Projects** – Most projects in this category would increase the safety of pedestrians and/or bicyclists.

**SJCOG Regional Safety Performance**

SJCOG has elected to support the statewide safety targets established by Caltrans, and is therefore not required to establish specific numerical safety targets for the region. SJCOG will track the region’s performance in the five safety performance measures using the state’s methodology. The state’s methodology will serve as regional safety indicators and will be updated on an annual basis, but at the present time, SJCOG has not set the safety targets for the region.

**Fatalities.** The State of California compared to the number of fatalities in San Joaquin County dipped during the past recession and then slowly increased, although more year-to-year variation was observed.
at the county level. In 2016, the number of fatalities (118) was equal to 2006 levels. The five year rolling average shows a similar trend, dipping from 100 in 2009 to 76 in 2012, then rising to 91 by 2016.

**FIGURE 6. San Joaquin County Fatalities Trend**

![San Joaquin County Fatalities Trend](image)

**Fatality Rate.** The fatality rate in San Joaquin County (fatalities per 100m VMT) show a similar trend to the overall number of fatalities, bottoming out during the recession and then rising again to nearly the same level as before the recession. The fatality rate in the county is consistently higher than the statewide fatality rate (for instance, in 2016 the rates were 1.81 in San Joaquin County and 1.06 statewide). One possible reason for this could be the high level of interregional pass-through traffic in San Joaquin County. SJCOG will continue to investigate this issue and potential remedies.

**FIGURE 7. San Joaquin County Fatality Rate (Fatalities per 100M VMT)**

![San Joaquin County Fatality Rate](image)

**Number and Rate of Serious Injuries.** The number and rate of serious injuries in San Joaquin County are shown in Figures 8 and 9, below. As with the fatality indicators, a downward trend during the recession and upward trend during the economic recovery are observed. However, one notable difference is that
the rate of serious injuries in San Joaquin County does not differ markedly from the statewide rate. In 2016, the rates observed were 4.41 in San Joaquin County, and 4.24 in California.

**FIGURE 8. San Joaquin County Serious Injuries**

**FIGURE 9. San Joaquin County Serious Injury Rate (Per 100M VMT)**

*Non-Motorized Fatalities and Serious Injuries.* The trend in non-motorized (e.g. bicycle and pedestrian) fatalities and serious injuries are shown in Figure 10. As with the other indicators, there are lower numbers observed during the recession. However, the indicator shows a strong spike in 2015. The indicator declines in 2016, but is still higher than any previous year except 2006.

SJCOG will conduct further research into the cause of the recent spike in non-motorized fatalities and serious injuries. One potential problem with this indicator is that it is not normalized. Thus, a rise in pedestrian and bicycle fatalities and serious injuries could be observed simply because there are more people walking and bicycling, and the opposite effect could be observed when fewer people choose to walk or bike. Lacking reliable data on the countywide rate of bicycling and walking in San Joaquin County, it is difficult to interpret the implications of the dramatic change observed from 2014 to 2015.
FIGURE 10. San Joaquin County Non-Motorized Fatalities and Serious Injuries

PM 2: Transportation Asset Management (TAM)

The second category of performance measures developed by FHWA in response to the requirements of Map-21 is known as PM 2: Transportation Asset Management. The objective of this set of performance measures is to assess the overall health of the transportation system and identify investments to maintain highways, roadways, and bridges in a state of good repair. The benefits of a properly maintained transportation system include multiple direct and indirect effects on safety, economic vitality, and quality of life:

- Increased safety, as poor roadways can lead to a higher accident rate;
- A reduction in incident-related congestion leading to greater travel time reliability;
- Reduced maintenance costs over time. Since roadways become increasingly more expensive to repair as the condition deteriorates, investing in continual maintenance is the best approach for long-term fiscal health;
- Less wear and tear on vehicles, resulting in economic benefits for roadway users;
- Indirect reductions in other environmental impacts including polluted run-off, GHG emissions (due to lower congestion and improved MPG for vehicles), and noise.

To this end, FHWA published the Bridge and Pavement Performance Management Final Federal Rule establishing performance measures for State DOTs to use in assessing the performance of the Interstate Highway System (IHS) as well as non-IHS portions of the National Highway System (NHS). The federally mandated performance measures are:

- Percent of IHS pavement in Good condition;
- Percent of IHS pavement in Poor condition;
- Percent of non-IHS NHS pavement in Good condition;
- Percent of non-IHS NHS pavement in Poor condition;
- Percent of NHS bridges by deck area in Good condition;
- Percent of NHS bridges by deck area in Poor condition.
Good condition is defined as, “Suggests no major investment is needed.” Poor condition is defined as, “Suggests major reconstruction investment is needed.” Further guidance on assessing bridge and highway condition is provided in the Final Federal Rule.

To implement the PM 2 framework established by FHWA, Caltrans developed the Draft Transportation Asset Management Plan (TAMP) in October 2017. The Draft TAMP assesses the current conditions of California’s transportation assets, establishes performance measures, and identifies statewide investment strategies to achieve the performance measures. Transportation assets in California subject to the new performance measures include 49,644 lane miles of pavement, 13,160 bridges, 205,000 culverts and drainage facilities, and 18,837 Transportation Management System (TMS) assets.

The Draft TAMP identifies the following performance targets to comply with PM2:

FIGURE 11. Statewide NHS Asset Performance Targets

<table>
<thead>
<tr>
<th>Asset (unit of measure)</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstate Pavement (lane miles)</td>
<td>60.0%</td>
<td>39.0%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Non-Interstate NHS Pavement (lane miles)</td>
<td>34.2%</td>
<td>60.9%</td>
<td>5.0%</td>
</tr>
<tr>
<td>On the SHS</td>
<td>57.6%</td>
<td>40.9%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Off the SHS</td>
<td>7.0%</td>
<td>84.0%</td>
<td>9.0%</td>
</tr>
<tr>
<td>NHS Bridge (deck area)</td>
<td>83.5%</td>
<td>15.0%</td>
<td>1.5%</td>
</tr>
<tr>
<td>On the SHS</td>
<td>83.5%</td>
<td>15.0%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Off the SHS</td>
<td>83.5%</td>
<td>15.0%</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

As of December 2017, the Draft TAMP is currently under review, and is expected to be submitted to FHWA by April 2018. Caltrans is required to establish final performance targets in this area by May 20, 2018, and MPOs must either support the statewide targets or establish their own regional targets by November 16, 2018. SJCOG is monitoring this process and will continue to work with statewide and local partners to develop targets consistent with state and federal guidelines.

PM 3: System Reliability, Freight, Congestion, and Air Quality

The final performance measure category required by Map-21, known as “Performance Management 3” (PM 3), consists of measures of the performance of the NHS pursuant to the National Highway Performance Program (NHPP); a measure of freight performance on the Interstate system; and measures to assess traffic congestion and on-road mobile source emissions for the purpose of carrying out the Congestion Mitigation and Air Quality (CMAQ) Improvement Program.

The specific performance measures are:
**Performance of the NHS**

1. Percent of the person-miles traveled on the Interstate that are reliable
2. Percent of person-miles traveled on the non-Interstate NHS that are reliable
3. Percent change in tailpipe CO2 emissions on the NHS compared to the calendar year 2017 level (GHG Measure)

**Freight Movement on the Interstate System**

4. Truck Travel Time Reliability (TTTR) Index

**CMAQ Program Traffic Congestion and Air Quality Measures**

5. Annual Hours of Peak Hour Excessive Delay (PHED) Per Capita
6. Percent of Non-Single Occupancy Vehicle (SOV) Travel
7. Total Emissions Reduction

For six of the seven performance targets identified above (all but the GHG Measure), Caltrans is required to establish final performance targets by May 20, 2018, and MPOs must either support the statewide targets or establish their own regional targets by November 16, 2018. For the GHG Measure, Caltrans must establish targets by September 28, 2018 and MPOs must either support the statewide targets or establish their own regional targets by March 27, 2019.

As of December 2017, Caltrans has not developed draft targets for this set of performance measures. Caltrans convened a Technical Advisory Group (TAG) to discuss the target-setting process, of which SJCOG is a participant. SJCOG will continue to work with statewide and local partners to develop targets consistent with state and federal guidelines.

**SJCOG Analysis of Travel Time Reliability and Congestion Performance Metrics on the NHS**

SJCOG has incorporated several of the PM3 metrics into a study of travel time reliability (TTR) and congestion on the NHS within San Joaquin County. This analysis supports both the Existing Condition and Needs Assessment for the 2018 RTP/SCS as well as SJCOG’s Regional Congestion Management Program (RCMP) which recommends the incorporation of TTR and speed-based congestion measures to support the quantification of both passenger vehicle as well as goods movement performance metrics.

Per and the National Performance Monitoring Final Rule, the preferred data is the National Performance Management Research Data Set (NPMRDS) from FHWA. The NPMRDS provides average speed data (five-minute averaging time) for federally defined roadway segments designated as part of the National Highway System (NHS). Utilizing this data set, after filtering the data to isolate average peak hour conditions, a total of 1,048,575 individual data records were processed to yield 1,195 averaged observations for 278 segments (reflecting both directions of travel) for both passenger vehicles and heavy-duty trucks respectively. Extreme outliers (e.g. 90+ mph) were removed from the data set.

Federal definitions from the National Performance Monitoring Final Rule were used to define congestion and reliability. These thresholds reflect heavy congestion (with observed average speed less than 60 percent of the free-flow speed) and unreliable road segments (with an 80th percentile travel time more than 1.5 times longer than the 50th percentile travel time (Level of Travel Time Reliability or LOTTR)). Free flow speed was empirically estimated for each individual segment using NPMRDS data between the hours of midnight and 3 AM.
The preliminary analysis is indicated in Figures 12-15, below. The resulting data set can also be used to address PM3 performance measures 1, 2, 4 and 5, once targets have been identified by Caltrans.

FIGURE 12. Passenger Vehicle Congestion and Travel Time Reliability, AM Peak Hour
FIGURE 13. Passenger Vehicle Congestion and Travel Time Reliability, PM Peak Hour

BTI: Buffer Time Index – The percent of additional travel time over the average trip needed to ensure on time arrival. Congested: Average speed is less than 60% of free flow speed.
FIGURE 14. Truck Congestion and Travel Time Reliability, AM Peak Hour

- AM Trucks
- BTI >= 50%
- BTI >= 25%
- BTI < 25%

BTI: Buffer Time Index - The percent of additional travel time over the average trip needed to ensure on time arrival
Congested: Average speed is less than 60% of free flow speed
FIGURE 15. Truck Congestion and Travel Time Reliability, PM Peak Hour

BTI: Buffer Time Index - The percent of additional travel time over the average trip needed to ensure on time arrival. Congested: Average speed is less than 50% of free flow speed.