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Introduction

This report presents Caltrans’ efforts to date in reducing deferred maintenance through an assessment of current and projected performance accomplishments through 2027. In compliance with Federal and State requirements, Caltrans has prepared an assessment of progress against annual benchmarks associated with the four primary asset classes (pavement, bridge, transportation management systems, and drainage) for the 10-year period spanning 2018-2027.

The California Transportation Asset Management Plan (TAMP) and Senate Bill 1 (SB1) each established 10-year performance targets for the State Highway Operation and Protection Program (SHOPP) primary asset classes. The California Transportation Commission (Commission) SHOPP Guidelines require annual reporting to measure progress and develop projections toward meeting the defined performance targets for each of the four primary asset classes.

Benchmarks were initially adopted by the Commission in March 2018. This report presents updated projections relative to the Commission adopted benchmarks. The
updated progress reflects Commission actions through March 2022, updated condition information where available, Ten-Year SHOPP Project Book accomplishments and updated Highway Maintenance projections.

SB1 includes two additional performance objectives: (1) for pavement the Level of Service (LOS) based on cracking and spalling, and (2) for bridges the number of additional bridges fixed. These two metrics will be achieved through the same project accomplishments and maintenance strategies considered in the benchmark analysis for the core assets. The department is committed to reporting progress made toward these specific performance measures so that the Commission can evaluate progress.

The annual benchmarks report includes a summary of condition assessments for eight supplementary assets (drainage pump plants, highway lighting, office buildings, overhead sign structures, pedestrian and bicycle infrastructure, roadside rest facilities, transportation related facilities, and weigh in motion scales).
2021/22 Performance Summary

The projections presented in this report indicate that the condition of the four primary asset classes continues to show improvement overall. Caltrans is currently meeting and is projected to exceed SB1 condition-based targets by 2027 for pavement and bridges as summarized in Table 1. The SB1 requirement to fix an additional 500 bridges has been met and the trend to fix additional bridges beyond the SB1 requirement is expected to continue. The condition of transportation management systems (TMS) is projected to meet targets by 2027. The condition of culverts is currently meeting SB1 targets and is expected to continue through year 2027. The Pavement Level of Service (LOS) target has been met in the prior reporting periods and is projected to surpass targets through 2027.
Table 1 – Progress Towards 2027 SB1 Targets

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>2027 SB1 Target</th>
<th>Status of Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement</td>
<td>98% Good or Fair Condition; 90% level of service (LOS) achieved for maintenance of potholes, spalls, and cracks</td>
<td>On Track</td>
</tr>
<tr>
<td>Bridges</td>
<td>Fix an additional 500 bridges</td>
<td>On Track/Target Achieved</td>
</tr>
<tr>
<td>Culverts</td>
<td>90% Good or Fair Condition</td>
<td>On Track</td>
</tr>
<tr>
<td>TMS</td>
<td>90% Good Condition</td>
<td>On Track</td>
</tr>
</tbody>
</table>

- **On Track** – Caltrans is on track to meet performance targets by 2027.
- **Monitor** – Projected performance falls within uncertainty bounds, or performance metric under revision.
- **Action Required** – Changes to plans are needed to assure that performance targets are achieved by 2027.

Table 2 presents the status of progress towards achieving 2027 targets established by the Commission and set forth in the TAMP. Caltrans is on track to meet or exceed TAMP targets by 2027 for pavement, drainage and TMS. Current projected conditions for bridge indicate that Caltrans will be achieving fair targets but will be short in achieving bridge poor targets by 2027. Caltrans will continue to proactively monitor progress for these assets.
Table 2 – Progress Towards TAMP Targets

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
<th>Status of Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class 1</td>
<td>60%</td>
<td>39%</td>
<td>1%</td>
<td>On Track</td>
</tr>
<tr>
<td>Class 2</td>
<td>55%</td>
<td>43%</td>
<td>2%</td>
<td>On Track</td>
</tr>
<tr>
<td>Class 3</td>
<td>45%</td>
<td>53%</td>
<td>2%</td>
<td>On Track</td>
</tr>
<tr>
<td>Bridges and Tunnels</td>
<td></td>
<td></td>
<td></td>
<td>Monitor</td>
</tr>
<tr>
<td>Drainage (Culverts)</td>
<td>70%</td>
<td>20%</td>
<td>10%</td>
<td>On Track</td>
</tr>
<tr>
<td>TMS</td>
<td>90%</td>
<td>N/A</td>
<td>10%</td>
<td>On Track</td>
</tr>
</tbody>
</table>

- **On Track** – Caltrans is on track to meet performance targets by 2027.
- **Monitor** – Projected performance falls within uncertainty bounds, or performance metric under revision.
- **Action Required** – Changes to plans are needed to assure that performance targets are achieved by 2027.
Pavement Class I

Overview

Pavement Class I is comprised of route segments classified as interstate, other principal arterials, and urban freeways and expressways. It includes Freight Network Tier I and II, and the Strategic Highway Network (STRAHNET) routes. Examples of Class I routes include Sacramento 80, Ventura 101, San Diego 8, Los Angeles 210, and Alameda 580. There are 27,150 assessed lanes miles of pavement on Class I roadways, representing over half of the 50,019 assessed lane miles of pavement on the State Highway System (SHS). The 2020 and 2021 Automated Pavement Condition Survey (APCS) are both being reported in this year’s report for the first time. These pavement data results are from a different service provider from prior years reports. The change in vendors has introduced some observed variances due to the use of different equipment.
Changes in Asset Condition

Pavement condition changes over time because of construction activities, traffic loading, and environmental factors, such as aging and changes in temperature and moisture. Table 3 summarizes the condition of the Pavement Class I asset inventory for the most recent year (2021 APCS) as well as the prior year’s condition assessment (2020 APCS).

Condition is presented in percentages of good, fair, and poor, by lane miles corresponding to the condition at the end of calendar year. Definitions of these condition states can be found in Appendix A.

### Table 3 – Pavement Class I Condition Summary

<table>
<thead>
<tr>
<th>Condition</th>
<th>2027 Target</th>
<th>2020 Year End</th>
<th>2021 Year End</th>
<th>Change in Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>60.0%</td>
<td>61.6%</td>
<td>61.3%</td>
<td>-0.3% ↓</td>
</tr>
<tr>
<td>Fair</td>
<td>39.0%</td>
<td>37.1%</td>
<td>37.4%</td>
<td>+0.3% ↑</td>
</tr>
<tr>
<td>Poor</td>
<td>1.0%</td>
<td>1.3%</td>
<td>1.3%</td>
<td>0.0%↔</td>
</tr>
</tbody>
</table>

Projected and Assessed Conditions

Pavement Class I benchmarks are presented in Figure 1 through Figure 3. These charts show projected year-end good, fair, and poor condition as percentages of total lane miles from 2018 through 2027. The assessed conditions through 2021 are presented in the charts with a solid fill symbol.
Figure 1 - Pavement Class I, Good

Figure 2 - Pavement Class I, Fair
Benchmark Observations

Pavement Class I poor conditions remained relatively constant for 2021, within 0.1% of conditions last reported based on 2019 assessments. However, an increase in fair and corresponding decrease in good conditions were observed. Projected pavement conditions in future years suggest improvement in subsequent years and exceeding condition targets before 2027. Continued delivery of pavement projects will be important to sustain gains to date and further improve other segments.
Pavement Class II

Overview

Pavement Class II is comprised of route segments classified as non-interstate National Highway System and Interregional Road System (IRRS). It includes Freight Network Tier III. Examples of Class II routes include Mendocino 20, Napa 29, Monterey 1, Riverside 74, and Orange 73. There are 16,276 assessed lanes miles of pavement on Class II roadways, representing approximately one-third of the 50,019 assessed lane miles of pavement on the State Highway System (SHS).

Changes in Asset Condition

Pavement condition changes over time because of construction activities, traffic loading, and environmental factors, such as aging and changes in temperature and moisture. Table 4 summarizes the condition of the Pavement Class II asset inventory for the most recent year (2021 APCS) as well as the prior year’s condition assessment (2020 APCS).

Condition is presented in percentages of good, fair, and poor, by lane miles corresponding to the condition at the end of calendar year. Definitions of these condition states can be found in Appendix A.
### Table 4 - Pavement Class II Condition Summary

<table>
<thead>
<tr>
<th>Condition</th>
<th>2027 Target</th>
<th>2020 Year End</th>
<th>2021 Year End</th>
<th>Change in Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>55.0%</td>
<td>46.3%</td>
<td>44.4%</td>
<td>-1.9% ↓</td>
</tr>
<tr>
<td>Fair</td>
<td>43.0%</td>
<td>52.6%</td>
<td>54.4%</td>
<td>+1.8% ↑</td>
</tr>
<tr>
<td>Poor</td>
<td>2.0%</td>
<td>1.1%</td>
<td>1.2%</td>
<td>+0.1% ↑</td>
</tr>
</tbody>
</table>

### Projected and Assessed Conditions

Pavement Class II benchmarks are presented in Figure 4 through Figure 6. These charts show projected year-end good, fair, and poor condition as percentages of total lane miles from 2018 through 2027. The assessed conditions through 2021 are presented in the charts with a solid fill symbol.

![Figure 4 - Pavement Class II, Good](image)
Figure 5 - Pavement Class II, Fair

Figure 6 - Pavement Class II, Poor
Benchmark Observations

Pavement Class I poor conditions remained relatively constant for 2021, within 0.1% of conditions last reported based on 2019 assessments. However, an increase in fair and corresponding decrease in good conditions were observed. Projected pavement conditions in future years suggest improvement in subsequent years and exceeding condition targets by 2027. Continued delivery of pavement projects will be important to sustain gains to date and further improve other segments.
Pavement Class III

Overview

Pavement Class III is comprised of all other routes not included in Classes I and II. Examples of Class III routes: are Trinity 3, Humboldt 36, San Luis Obispo 58, and Mono 167. There are 6,593 assessed lanes miles of pavement on Class III roadways, representing approximately 13% of the 50,019 assessed lane miles of pavement on the State Highway System (SHS).

Changes in Asset Condition

Pavement condition changes over time because of construction activities, traffic loading, and environmental factors, such as aging and changes in temperature and moisture. Table 5 summarizes the condition of the Pavement Class III asset inventory for the most recent year (2021 APCS) as well as the prior year’s condition assessment (2020 APCS).

Condition is presented in percentages of good, fair, and poor, by lane miles corresponding to the condition at the end of calendar year. Definitions of these condition states can be found in Appendix A.

Timing of the Condition Assessment

Reported annual pavement conditions and total lane miles are based on a phased data collection effort through the Automated Pavement Condition Survey (APCS) over an 11-month period, typically between January and November of the reporting year. Projects under construction will not be reflected in the condition assessment.
Table 5 - Pavement Class III Condition Summary

<table>
<thead>
<tr>
<th>Condition</th>
<th>2027 Target</th>
<th>2020 Year End</th>
<th>2021 Year End</th>
<th>Change in Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>45.0%</td>
<td>42.8%</td>
<td>41.3%</td>
<td>-1.5% ↓</td>
</tr>
<tr>
<td>Fair</td>
<td>53.0%</td>
<td>55.5%</td>
<td>57.1%</td>
<td>+1.6% ↑</td>
</tr>
<tr>
<td>Poor</td>
<td>2.0%</td>
<td>1.7%</td>
<td>1.6%</td>
<td>-0.1% ↓</td>
</tr>
</tbody>
</table>

Projected and Assessed Conditions

Pavement Class III benchmarks are presented in Figure 7 through Figure 9. These charts show projected year-end good, fair, and poor condition as percentages of total lane miles from 2018 through 2027. The assessed conditions through 2021 are presented in the charts with a solid fill symbol.

Figure 7 - Pavement Class III, Good
Figure 8 - Pavement Class III, Fair

Figure 9 - Pavement Class III, Poor
Benchmark Observations

Pavement Class III conditions remained relatively constant from current 2021 and the prior year’s 2020 conditions. However, poor was notably higher than the conditions reported from 2019. Projected pavement conditions in future years suggest improvement in subsequent years and exceeding condition targets before 2027. Continued delivery of pavement projects will be important to sustain gains to date and further improve other segments.
Bridge and Tunnel Health

Overview

Caltrans is responsible for the maintenance of 13,217 bridges on the State Highway System (SHS), totaling over 248 million square feet of bridge deck area. These bridges are approaching an average of 50 years old and at the point that typically results in increased maintenance needs. Caltrans also maintains 58 tunnels totaling approximately 5 million square feet of liner area.
Changes in Asset Condition

Under requirements established through the federal Moving Ahead for Progress in the 21st Century (MAP-21) Act, the performance measure for bridge health is based on the total deck area, while tunnel health is based on the total structure’s liner area. Both structure types are rated as good, fair, or poor condition.

Table 6 summarizes the condition of the bridge and tunnel asset inventory for the most recent condition assessment and the prior year’s condition assessment for a year-over-year comparison. Condition is presented in percentages of good, fair, and poor, relative to total bridge deck or tunnel liner area. The conditions presented in these benchmarks are based on a data set consistent with the subset of bridges Caltrans submitted for the National Bridge Inventory (NBI) in March of 2022. Definitions of these condition states can be found in Appendix A.

Table 6 – Bridge and Tunnel Health Condition Summary

<table>
<thead>
<tr>
<th>Condition</th>
<th>2027 Target</th>
<th>2020 Year End</th>
<th>2021 Year End</th>
<th>Change in Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>48.5%</td>
<td>50.8%</td>
<td>49.3%</td>
<td>-1.5% ↓</td>
</tr>
<tr>
<td>Fair</td>
<td>50.0%</td>
<td>45.8%</td>
<td>46.9%</td>
<td>+1.1% ↑</td>
</tr>
<tr>
<td>Poor</td>
<td>1.5%</td>
<td>3.4%</td>
<td>3.8%</td>
<td>+0.4% ↑</td>
</tr>
</tbody>
</table>

Federal bridge inspection standards are utilized to assess good, fair, and poor conditions in all states. These standards establish a range of conditions that components of bridges are evaluated against. Per federal regulations, the overall condition reported for an individual bridge is the lowest of component ratings. A poor rating for a bridge does not mean that the bridge is unsafe for use. Any bridge determined to be unsafe for use would be immediately repaired or closed to traffic regardless of condition ratings.
Further information about federal bridge inspection standards can be found in Section 2.6 of the Commission adopted TAMP.

**Projected and Assessed Conditions**

Bridge and Tunnel Health benchmarks are presented in Figure 10 through Figure 12. These charts show projected year-end good, fair, and poor condition as percentages of total bridge deck and tunnel liner area from 2018 through 2027. The assessed conditions through 2021 are presented in the charts with a solid fill symbol.

Note that due to the change in the fair target, as approved by the Commission in March 2021, the projected fair and good bridge conditions and associated uncertainty bands (represented by the grey shaded zones) have been adjusted to align with revised projections and are only shown for 2020 through 2027.

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1 Recommended Asset Management Target Changes, March 2021, California Transportation Commission, Ref. 430 Action Item, [https://catc.ca.gov/-/media/ctc-media/documents/ctc-meetings/2021/2021-03/24-4-30-a11y.pdf](https://catc.ca.gov/-/media/ctc-media/documents/ctc-meetings/2021/2021-03/24-4-30-a11y.pdf)
Figure 11 - Bridge and Tunnel Health, Fair

Figure 12 – Bridge and Tunnel Health, Poor
Benchmark Observations

The current condition of poor bridges and tunnels have increased 0.4% over the prior year, in large part due to several large bridges, including the Vincent Thomas Bridge in Los Angeles, changing from fair to poor condition in last year’s inspections. The percentages of good and fair have worsened 1.5% and 1.1% respectively. This increase in fair is expected to continue through 2027 as the bridge inventory ages. More bridges are expected to move to a final fair condition state with no identified structural or safety issues, nearing the 50% fair target.

While the percentage of poor condition bridges are expected to decrease by 2027, progress will need to be monitored closely. Caltrans is aggressively targeting work to address all known poor bridges as soon as the change in conditions are identified. Condition improvements are expected to begin to show in the bridge inspections in the coming years from the recent $150 million, 2-year SHOPP program to address poor condition bridge decks throughout California. In addition, Caltrans is evaluating work on bridge overcrossings where the deck wearing surfaces are maintained by local agencies through maintenance agreements and have degraded to poor condition. This work represents over 300,000 sqft (3%) of poor bridge inventory on the SHS.

The projections for bridge conditions does not consider the additional bridge-specific funding from the federal Infrastructure Investment and Jobs Act (IIJA) signed into law last year. This funding is expected to accelerate existing bridge projects while introducing more bridge work to improve conditions overall. The overall project timeline for bridge rehabilitation and replacement projects continues to be our biggest challenge to improving statewide condition metrics.
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Drainage

Overview

Caltrans provides for the replacement or in-place rehabilitation of culverts and other highway drainage system elements that have lost serviceability because of age, wear, or degradation. Currently, the SHS includes 198,861 inspected and rated culverts totaling over 19 million linear feet, that drain rainwater, drainage channels, streams, and rivers away from highways in a controlled manner. About 89% of the inventory has been assessed to-date, with the remaining 11% underway with a goal of completing initial assessments by 2023. Over 27,500 inspections have been completed since the last benchmarks report.
Changes in Asset Condition

The condition assessment of drainage assets is based on a visual inspection of five attributes: waterway adequacy, joints, materials, shape, and culvert alignment. Each attribute is scored, and culvert condition is calculated using a weighted average of attribute scores. Table 7 summarizes the condition of the drainage asset inventory for the most recent condition assessment (April 2022) as well as the prior year’s condition assessment. Condition is presented in percentages of good, fair, and poor, by linear feet of drainage systems, corresponding to the condition at the end of calendar year. Definitions of these condition states can be found in Appendix A.

Note, the methodology for reporting conditions for drainage was changed in June 2020 to comply with findings and recommendations from an audit by the Inspector General of drainage assessment practices. In prior reporting in the Performance Benchmarks and the State Highway System Management Plan, the condition of the statewide inventory of culverts included a projection of culvert conditions for assets that had not been initially inspected or required reinspection. This reporting practice has been revised so that reported conditions represent only the culverts that have been assessed. Projected inventory and conditions are only applied for future years and are distinguished from the fully assessed inventory in the 2021 State Highway System Management Plan (SHSMP).
**Table 7 - Drainage Condition Summary**

<table>
<thead>
<tr>
<th>Condition</th>
<th>2027 Target</th>
<th>2020 Year End</th>
<th>2021 Year End</th>
<th>Change in Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>70.0%</td>
<td>71.6%</td>
<td>73.3%</td>
<td>1.8% ↑</td>
</tr>
<tr>
<td>Fair</td>
<td>20.0%</td>
<td>18.4%</td>
<td>16.7%</td>
<td>-1.7% ↓</td>
</tr>
<tr>
<td>Poor</td>
<td>10.0%</td>
<td>10.0%</td>
<td>9.9%</td>
<td>-0.1% ↓</td>
</tr>
</tbody>
</table>

**Projected and Assessed Conditions**

Drainage benchmarks are presented in Figure 13 through Figure 15. These charts show projected year-end good, fair, and poor condition as percentages of total linear feet from 2018 through 2027. The assessed conditions through 2021 are presented in the charts with a solid fill symbol.

Note that due to the change in the fair target, as approved by the Commission in March 2021\(^2\), the projected fair and good drainage conditions and associated uncertainty bands (represented by the grey shaded zones) have been adjusted to align with revised projections and are only shown for 2020 through 2027.

\(^2\) Recommended Asset Management Target Changes, March 2021, California Transportation Commission, Ref. 430 Action Item, [https://catc.ca.gov/-/media/ctc-media/documents/ctc-meetings/2021/2021-03/24-4-30-a11y.pdf](https://catc.ca.gov/-/media/ctc-media/documents/ctc-meetings/2021/2021-03/24-4-30-a11y.pdf)
Figure 13 – Drainage, Good

Figure 14 - Drainage, Fair
Benchmark Observations

The year-over-year assessed conditions for drainage continue to remain relatively consistent with slight improvement of conditions. Projections for poor condition drainage suggest little to no change over the next several years and meeting the poor target by 2027. Fair condition drainage is projected to increase to 19.4% by 2027 but will be below the fair target.
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Transportation Management Systems

Overview

A Transportation Management System (TMS) is comprised of electrical/electronic TMS units that work together to reduce highway user delay, provide traveler information, and collect information on traffic behavior. There are over 20,000 TMS units on the SHS, comprised of closed-circuit televisions, changeable message signs, traffic monitoring detection stations, highway advisory radios, freeway ramp meters, roadway weather information systems, traffic signals, traffic census stations, and extinguishable message signs.
Changes in Asset Condition

TMS units are categorized as being in either good or poor condition. The condition of a TMS unit is based on the unit being within its expected life cycle and its functional availability. Table 8 summarizes the condition of the Transportation Management Systems asset inventory for the most recent year’s condition assessment as well as the prior year’s condition assessment. Condition is presented in percentages of good and poor, by TMS units, for the most recent condition assessment (April 2022) as well as the prior condition assessments. Definitions of these condition states can be found in Appendix A.

<table>
<thead>
<tr>
<th>Condition</th>
<th>2027 Target</th>
<th>2020 Year End</th>
<th>2021 Year End</th>
<th>Change in Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>90.0%</td>
<td>79.0%</td>
<td>78.7%</td>
<td>-0.3% ↓</td>
</tr>
<tr>
<td>Poor</td>
<td>10.0%</td>
<td>21.0</td>
<td>21.3%</td>
<td>0.3% ↑</td>
</tr>
</tbody>
</table>

Projected and Assessed Conditions

Transportation Management Systems benchmarks are presented in Figure 16 and Figure 17. These charts show projected year-end good and poor condition as percentages of total TMS units from 2018 through 2027. The assessed conditions through 2021 are presented in the charts with a solid fill symbol.
Figure 16 – Transportation Management Systems, Good

Figure 17 - Transportation Management Systems, Poor
Benchmark Observations

Current TMS conditions reflect a slight increase in poor condition in year 2021 by 0.3%. The projections suggest that TMS conditions are expected to improve in subsequent years through to 2027. Caltrans efforts to replace TMS components through the Highway Maintenance Program projects will be a significant factor in achieving the TMS targets.
Fix an Additional 500 Bridges

Overview

SB1 includes a performance requirement to fix not less than an additional 500 bridges over a 10-year period ending in 2027. Projects that improve the condition of the bridge from a lesser condition to a better condition, mitigate seismic or scour vulnerabilities, or address operational limitations are counted towards this goal. Prior to the passage of SB1, Caltrans was fixing an average of 114 bridges per year. For the purpose of counting towards the additional 500 bridges which should be fixed, Caltrans is reporting bridges fixed in excess of the annual baseline of 114 bridges between 2018 and 2027.

Approach for Counting Fixed Bridges

The number of bridges fixed in the current and previous fiscal years is determined from an analysis of bridge project records and an estimate of when the work is effectively complete. For Major SHOPP projects, the Expected Construction Work Complete (ECWC) date is used, defined as the date when the primary construction work is largely complete, the project limits are open to traffic, and benefits are realized by the
travelling public. The ECWC date is estimated to be 2/3rds the time between the Contract Award (CA) date and the Construction Contract Acceptance (CCA) date. For Highway Maintenance (HM) Program projects, bridges are counted as fixed in the year the contract is awarded, since the primary construction work is typically completed on average within a year of the CA date. Figure 18 presents the timeline for counting when bridges are considered fixed through the Major SHOPP and HM programs.

The use of different milestone dates between SHOPP and HM was adopted to support timely reporting of accomplishments using the most reliable project milestone data. Construction work in Major SHOPP projects typically span a period of 1 to 3 years, with the bridge portion of the work completed well before the formal closeout of the contract at CCA, especially on complex, multi-asset projects. Caltrans and the California Transportation Commission determined the ECWC date to be the most reasonable indicator of the date when the public would recognize the outcomes of the work. For HM Program projects, the duration of the construction work period is much shorter than Major SHOPP projects, due to the types of treatments that can be applied in shorter durations. The time between Contract Award (CA) and the Final Payment (FIN) for these projects on average is 325 days. Given the relatively short construction period, the CA date was used for HM projects. These HM projects will typically have a number
of bridges included that have differing dates for when the improvements are experienced by the traveling public. In some cases, the improvements are done lane by lane over a period of nights.

**Current and Projected Number of Bridges Fixed**

Table 9 presents the number of bridges fixed annually from Fiscal Year (FY) 2017/18 to 2021/22. The data shows that over the course of the past 5 fiscal years, Caltrans has fixed a total of 1,121 bridges. This represents an additional 551 bridges fixed relative to the baseline of 114 fixed bridges per year (or 570 bridges over five years), thereby meeting the SB1 requirement. Table 10 presents the breakdown of the counts of bridges in each fiscal year by the primary type of fix.

Note the number of bridges fixed in prior fiscal years have been reduced by a total of 42 bridges, 34 bridges of which were included in the baseline counts and 8 bridges where the work had been miscategorized in prior reporting as having fixed the bridge.
### Table 9 – Fix an Additional 500 Bridges

<table>
<thead>
<tr>
<th>Fix Bridges</th>
<th>FY 2017/18</th>
<th>FY 2018/19</th>
<th>FY 2019/20</th>
<th>FY 2020/21</th>
<th>FY 2021/22</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>114</td>
<td>114</td>
<td>114</td>
<td>114</td>
<td>114</td>
<td>570</td>
</tr>
<tr>
<td>Additional</td>
<td>85</td>
<td>133</td>
<td>36</td>
<td>248</td>
<td>49</td>
<td>551</td>
</tr>
<tr>
<td>Total</td>
<td><strong>199</strong></td>
<td><strong>247</strong></td>
<td><strong>150</strong></td>
<td><strong>362</strong></td>
<td><strong>163</strong></td>
<td><strong>1,121</strong></td>
</tr>
</tbody>
</table>

### Table 10 – Count of Bridges by Type of Fix

<table>
<thead>
<tr>
<th>Fix Bridges</th>
<th>FY 2017/18</th>
<th>FY 2018/19</th>
<th>FY 2019/20</th>
<th>FY 2020/21</th>
<th>FY 2021/22</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>194</td>
<td>234</td>
<td>133</td>
<td>324</td>
<td>143</td>
<td>1,028</td>
</tr>
<tr>
<td>Scour</td>
<td>2</td>
<td>9</td>
<td>5</td>
<td>8</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>Seismic</td>
<td>2</td>
<td>4</td>
<td>10</td>
<td>17</td>
<td>7</td>
<td>40</td>
</tr>
<tr>
<td>Goods Movement</td>
<td>1</td>
<td>2</td>
<td>13</td>
<td>5</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td><strong>199</strong></td>
<td><strong>247</strong></td>
<td><strong>150</strong></td>
<td><strong>362</strong></td>
<td><strong>163</strong></td>
<td><strong>1,121</strong></td>
</tr>
</tbody>
</table>
Table 9 & Table 10 Notes:

- FY 2017/18 count reduced by 15 bridges (bridges were included in the baseline)
- FY 2018/19 count reduced by 18 bridges (16 bridges were included in the baseline, 1 bridge was halted midstream by court order, 1 bridge where the work was miscategorized as fixing the bridge)
- FY 2019/20 count reduced by 6 bridges (4 bridges were included in the baseline, 2 bridges where the work was miscategorized as fixing the bridge)
- FY 2020/21 count reduced by 3 bridges (where the work was miscategorized as fixing the bridge)

A 10-year projection of bridges fixed is presented in Figure 18. The chart shows the total number of bridges anticipated to be fixed each year through FY 2026/27. Bridges fixed through the SH O P P are based on projects defined in the SH O P P Ten-Year Project Book. For bridges fixed through the HM Program, the first two years were based on projects that were in the approved HM workplan. For HM projects in the remaining years, the minimum of the first two years is used to conservatively estimate the number of bridges fixed in subsequent years, assuming consistent future HM funding.
• FY 2019/20 count reduced by 6 bridges (4 bridges were included in the baseline, 2 bridges where the work was miscategorized as fixing the bridge)
• FY 2020/21 count reduced by 3 bridges (where the work was miscategorized as fixing the bridge)

The bridges evaluated to be fixed in fiscal years through 2021/22 are presented in the chart with a solid fill symbol. The shaded area in the chart represents an upper and lower boundary, quantifying two primary uncertainties from assumptions used in the analysis. First, delays in delivery of bridge projects are difficult to predict and could account for a shift of up to 20% of the projected fixed bridges in any given year. Second, programming levels for Highway Maintenance (HM) work and fluctuations in annual HM funding can be a significant source of additional uncertainty.

Caltrans was expected to fix an additional 500 bridges beyond the established baseline of 114 bridges per year. Figure 19 presents the cumulative total number of bridges fixed to date, showing that an additional 551 bridges have been fixed since FY 2017/18, thereby meeting SB1 requirements.

![Cumulative Number of Bridges Fixed](https://example.com/cumulative_graph.png)

**Figure 20 – Cumulative Total Number of Bridges Fixed to Date Above the Baseline**

**Figure 20 Notes:**
• FY 2017/18 count reduced by 15 bridges (bridges were included in the baseline)
• FY 2018/19 count reduced by 18 bridges (16 bridges were included in the baseline, 1 bridge was halted midstream by court order, 1 bridge where the work was miscategorized as fixing the bridge)
• FY 2019/20 count reduced by 6 bridges (4 bridges were included in the baseline, 2 bridges where the work was miscategorized as fixing the bridge)
• FY 2020/21 count reduced by 3 bridges (where the work was miscategorized as fixing the bridge)

Counting Fixed Bridges by Alternative Milestones

The Independent Office of Audits and Investigations issued a report in January 2022 asserting that the inconsistencies in milestone dates between SHOPP and HM projects resulted in overstated accomplishments. The report acknowledged that “while the findings do not affect Caltrans’ ability to meet the SB 1 target by 2027,” a recommendation was put forth to “use the CCA milestone to report HM and SHOPP bridge accomplishments, or an alternate milestone that is formally implemented.”

While there are likely to be instances where counts of bridges fixed in a year are either reported earlier or later than the ECWC, these reporting anomalies would not materially impact progress towards meeting the SB1 goal. The limitations of the methodology could result in a shift in counts by advancing or delaying claimed fixes by a year, however the count and rate of bridges being fixed would remain relatively consistent. Furthermore, if CCA had been used to report accomplishments, many of the bridges fixed in the earlier reported years would represent bridge work that was not a direct result of SB1 funding. CCA is not achieved until all work and all claims have been settled. This can extend the CCA date years beyond the point that a bridge is opened to traffic and the public is experiencing the improved conditions.

To address the Inspector General’s recommendation, a cursory analysis was carried out to estimate the degree to which an alternative milestone approach would impact reporting of fixed bridges. The analysis proved challenging, as pre/post condition data

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3 “Audit of SB 1 Performance Measures and Targets & Bridges” (January 31, 2022), Final Audit Report P3010-0658, https://ig.dot.ca.gov/-/media/ig-media/documents/p3010_0658_sb_1_bridges_performance_measures_and_targets_ada.pdf
for bridges in projects with CCA in the early years were not readily available. As such, the analysis likely under-estimates the cumulative number of bridges fixed.

If ECWC was used for both SHOPP and HM in the June 2021 Performance Benchmark Report, a cumulative 413 additional fixed bridges would have been reported by FY 2020/21 and 613 by FY 2021/22. The SB1 target would have been met at a point between these two years. If CCA was used for both SHOPP and HM, 249 bridges would have been reported by FY 2020/21 and 412 bridges by FY 2021/22. The SB1 target would be met by FY 2023/24 with 678 additional bridges fixed.

Although the use of CCA provides a well-established milestone for project completion, the significant time lag between actual work completion and the administrative processes during CCA, would result in significant under-reporting that would not align with stakeholder observations. And, while it would be feasible to adopt ECWC for both SHOPP and HM projects, the difference would be on the order of a partial year. Adopting either of these changes would introduce new reporting inconsistencies, notably counting more bridges fixed in early years that were not a result of SB1 funding.
Level of Service (LOS)

Overview

SB 1 includes a performance requirement to achieve a Level of Service (LOS) for pavement cracking, spalls, and potholes of no less than 90 by 2027. LOS is a measure of how well the State Highway System is being maintained. In the March 2020 Commission meeting, the Department put forth and the Commission adopted an LOS criteria based on data captured in the Automated Pavement Condition Survey (APCS). APCS utilizes state of the art pavement condition assessment technology to capture pavement conditions on 100 percent of the State Highway System lanes. The pavement condition is typically updated annually and serves as the basis for statewide pavement condition analysis, reporting, and planning. The technical criteria for determining LOS are detailed in Appendix B.
Table 11 summarizes the assessments of LOS.

**Table 11 – LOS Summary**

<table>
<thead>
<tr>
<th>SB-1 Target</th>
<th>2020 Year End</th>
<th>2021 Year End</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>97</td>
<td>97</td>
<td>0.0%↔</td>
</tr>
</tbody>
</table>
Supplementary Asset Classes

Overview

The California Transportation Commission put forth Transportation Asset Management Plan Guidelines in June 2017 identifying the four primary asset classes and eight supplementary asset classes.

- Drainage Pump Plants
- Highway Lighting
- Office Buildings
- Overhead Sign Structures
- Bicycle and Pedestrian Infrastructure
- Roadside Rest Facilities
- Transportation Related Facilities
- Weigh in Motion Scales

Note, Bicycle and Pedestrian Infrastructure has replaced the former Sidewalks, Park & Ride, and ADA Infrastructure as a Supplementary Asset. Furthermore, condition targets
for all Supplementary Targets have been revised. These changes were approved by the Commission in the December 2021 meeting\(^4\).

While funding to fully close performance gaps for supplementary assets has not been available to date, Caltrans continues to make investments towards maintaining and improving conditions.

Figure 21 through Figure 28 presents the trends in supplementary asset conditions, as assessed at the end of each calendar year. Conditions are shown for the 2016 end of calendar year (from the 2017 SHSMP), 2018 (from the 2019 SHSMP), 2020 (from the 2021 SHSMP). Condition assessments were not available for 2017, 2019, and 2021. The conditions for 2022 will be presented in the 2023 SHSMP next year. Fair and poor target conditions are shown in the charts as grey dashed lines.

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Figure 22 – Condition of Highway Lighting

Figure 23 – Condition of Office Buildings

Figure 24 – Condition of Overhead Sign Structures
Figure 25 – Condition of Bicycle and Pedestrian Infrastructure

Figure 26 – Condition of Roadside Rest Facilities

Figure 27 – Condition of Transportation Related Facilities
Note, the significant changes to conditions shown for Weigh in Motion Scales are largely the result of changes in the metric definition in 2018 and again in 2020 in combination with maturing processes for asset condition assessments.
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Appendix A: Definition of Good, Fair, and Poor Performance Metrics

Performance metric definitions for the four primary asset classes are presented in this section. These definitions are from the 2021 State Highway System Management Plan (SHSMP).

Pavement Class I, II, and III Metrics

Pavement condition is assessed based on the final rule of the Federal MAP-21 performance measures as of January 2017. Cracking, Rutting, and International Roughness Index (IRI) metrics are used to assess the condition of asphalt pavement; while cracking, faulting and IRI metrics are used to assess the condition of jointed plain concrete pavement (JPCP). For each of these metrics, the Federal Highway Administration (FHWA) has established thresholds, as presented in Table 18.

<table>
<thead>
<tr>
<th>Metrics</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRI (inches/mile)</td>
<td>&lt;95</td>
<td>95-170</td>
<td>&gt;170</td>
</tr>
<tr>
<td>Cracking (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphalt</td>
<td>&lt;5</td>
<td>5-20</td>
<td>&gt;20</td>
</tr>
<tr>
<td>Jointed Concrete</td>
<td>&lt;5</td>
<td>5-15</td>
<td>&gt;15</td>
</tr>
<tr>
<td>Continuously Reinforced Concrete</td>
<td>&lt;5</td>
<td>5-10</td>
<td>&gt;10</td>
</tr>
<tr>
<td>Rutting (inches)</td>
<td>&lt;0.20</td>
<td>0.20-0.40</td>
<td>&gt;0.40</td>
</tr>
<tr>
<td>Faulting (inches)</td>
<td>&lt;0.10</td>
<td>0.10-0.15</td>
<td>&gt;0.15</td>
</tr>
</tbody>
</table>

For each tenth-mile long section, condition is rated good if all three metrics for this section are rated good; poor if two or more metrics are rated poor; and fair, otherwise.
Lane miles in good, fair, and poor condition are tabulated for all sections to determine the overall percentage of pavement in good, fair, and poor condition.
Bridge and Tunnel Health Metrics

Caltrans and local agencies follow FHWA National Bridge Inventory (NBI) and National Tunnel Inspection (NTI) standards for inspecting all California bridges and tunnels. Inventory condition data is based on the most recent Bridge Inspection Reports (bridge and tunnel inspections are typically scheduled every two years) that document condition states of each individual structural element per these federal guidelines. The condition state of appropriate individual elements is then mathematically converted to a condition state (good, fair or poor) of three categories for bridges (deck, superstructure and substructure) and a single condition state for either tunnels or culverts.

Good, fair, and poor NBI ratings for bridge condition span the range from 0-9. A calculated value of 7 or greater is classified as being in good condition; 5 or 6 is classified as being in fair condition; and 4 or less is classified as being in poor condition. A bridge in poor condition is considered structurally deficient (SD) by federal guidelines. Thus, if any major component is classified as being in poor condition, the bridge will be considered SD. Being classified as SD does not imply a bridge is unsafe, just that deficiencies have been identified that require maintenance, rehabilitation, or replacement.

As a bridge is assigned a condition state for the deck, superstructure, and substructure individually, the lowest of the three ratings determines the overall rating of the bridge. Caltrans maintains all data in the Structures Maintenance and Investigations (SM&I) bridge management system databases. Table 14 and Table 15 describe the performance metrics that define the criteria for determining condition for good, fair, and poor Bridge and Tunnel Health.
### Table 13 – Bridge Health Performance Metrics

<table>
<thead>
<tr>
<th>Condition</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>Deck, superstructure, and substructure ratings are all Good, or the culvert rating is Good</td>
</tr>
<tr>
<td>Fair</td>
<td>The lowest of the three ratings for deck, superstructure, and substructure is Fair, or the culvert rating is Fair</td>
</tr>
<tr>
<td>Poor</td>
<td>The lowest of the three ratings for deck, superstructure, and substructure is Poor, or the culvert rating is Poor</td>
</tr>
</tbody>
</table>

### Table 14 – Tunnel Health Performance Metrics

<table>
<thead>
<tr>
<th>Condition</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>Less than 20% of the elements are classified as deteriorated</td>
</tr>
<tr>
<td>Fair</td>
<td>More than 20% of the elements are classified with minor deterioration</td>
</tr>
<tr>
<td>Poor</td>
<td>More than 20% of the elements are classified with significant deterioration</td>
</tr>
</tbody>
</table>
Drainage Metrics

The health condition assessment of Drainage Restoration assets is based on a visual inspection of five attributes: waterway adequacy, joints, materials, shape, and culvert alignment. Each attribute is scored, and culvert condition is calculated using a weighted average of attribute scores. Table 16 describes the performance metrics for determining condition for good, fair, and poor Drainage Restoration.

Table 15 – Drainage Performance Metrics

<table>
<thead>
<tr>
<th>Condition</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>Overall health score between 80 to 100</td>
</tr>
<tr>
<td>Fair</td>
<td>Overall health score between 50 to 79</td>
</tr>
<tr>
<td>Poor</td>
<td>Overall health score between 0 to 49</td>
</tr>
</tbody>
</table>
Transportation Management System Metrics

TMS units are categorized as being in either good or poor condition. The condition of a TMS unit is based on the unit being within its expected life cycle and its functional availability. Table 17 describes the performance metrics for determining good, fair, and poor Transportation Management Systems.

Table 16 – TMS Performance Metrics

<table>
<thead>
<tr>
<th>Condition</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>Within expected lifecycle and consistent functional availability</td>
</tr>
<tr>
<td>Fair</td>
<td>N/A</td>
</tr>
<tr>
<td>Poor</td>
<td>Beyond expected life cycle or is not meeting functional availability because of chronic down time</td>
</tr>
</tbody>
</table>
Appendix B: Criteria for Pavement Level of Service (LOS)

The Department recommends the Commission adoption of the following SB1 pavement LOS criteria that segregates the State Highway System lanes into segments that are each approximately 528 feet long and approximately 12 feet wide. Each segment will be evaluated for cracking and spalls or potholes depending on the material in accordance with the technical criteria below. Each segment will be deemed as passing or failing. The calculation used to determine the pavement LOS is a weighted average of the scores for asphalt and concrete segments.

The SB1 Pavement LOS is calculated using the following formula:

\[
SB \ 1 \ Pavement \ LOS = \frac{(FPS \times W_f + RPS \times W_r)}{\text{Total number of segments}}
\]

where the Flexible Pavement Score (FPS) is defined as:

\[
FPS = \frac{[\text{Percent Passing Cracking} + \text{Percent Passing Potholes}]}{2}
\]

the Rigid Pavement Score (RPS) is defined as:

\[
RPS = \frac{[\text{Percent Passing Cracking} + \text{Percent Passing Spalling}]}{2}
\]

and the Weighting (W) is defined as:

\[
W = \text{Total number of flexible or rigid pavement segments}
\]
The technical criteria for determining if a segment passes or fails is shown in Table 17:

**Table 17 – Pavement LOS Criteria**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Failure Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cracking</td>
<td>cracking ≥ ½ inch</td>
<td>Any single crack at its widest point</td>
</tr>
<tr>
<td>Potholes</td>
<td>&gt; 1 each pothole</td>
<td>Any potholes greater than 36 square inches in area</td>
</tr>
<tr>
<td>Spalling</td>
<td>≥ 1 sq. ft.</td>
<td>Cumulative area of spalling</td>
</tr>
</tbody>
</table>
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