

MEMORANDUM

To: CHAIR AND COMMISSIONERS
CALIFORNIA TRANSPORTATION COMMISSION

CTC Meeting: June 24-25, 2020

From: STEVEN KECK, Chief Financial Officer

Reference Number: 4.7, Information Item

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Subject: **TRANSPORTATION ASSET MANAGEMENT PLAN – 2020 ANNUAL
BENCHMARK PERFORMANCE REPORT**

SUMMARY:

The California Department of Transportation (Department) will present to the California Transportation Commission (Commission) its 2020 Performance Benchmark Report (Report) on the condition of highway assets.

BACKGROUND:

The California Transportation Asset Management Plan (TAMP) and Senate Bill 1 established performance targets for the SHOPP primary asset classes (pavement, bridges, culverts and traffic management system elements). To measure progress toward meeting the defined performance targets, the Commission adopted an addendum to SHOPP Guidelines in October of 2017. The addendum called on the Department to develop annual benchmarks (future condition projections) to measure progress made for each of the four primary asset classes.

The benchmark projections were established using the following general steps:

1. Begin with the most recent inventory and condition information available
2. Reduce the condition by the expected annual deterioration
3. Improve the condition with annual project level accomplishments
4. Incorporate inventory growth

These four steps are repeated for each of the 10 years in the analysis horizon 2017-18 through 2026-27. If the annual project accomplishments exceed the annual deterioration, then the condition of the asset improves by the net difference.

*“Provide a safe, sustainable, integrated and efficient transportation system
to enhance California’s economy and livability”*

The benchmark projection analysis includes uncertainty factors associated with assumptions made relative to the size of the inventory, condition, deterioration rates and expected project accomplishments. These factors were incorporated into the analysis using a Monte Carlo simulation that develops a range of potential outcomes given these uncertainties. These potential outcomes are represented graphically using a shaded range on each side of projection line shown in the lower trend line set of three charts for each asset. The Department will update the benchmark projections every two years to reflect the annual project accomplishments and future uncertainties and will adjust the work plan where necessary to meet the SB 1 performance outcomes.

Senate Bill 1 included two additional performance metrics related to pavement and bridges; Level of Service (LOS) for pavement and a number of bridges fixed. These two are calculated using a different methodology given the nature of the measure. Both of these measures are also included in the Annual Benchmark Report.

Attachment



2019/20 Performance Benchmark Report

JUNE 2020

California Department of Transportation



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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 2018 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. To measure progress toward meeting the defined performance targets, the California Transportation Commission (Commission) adopted an addendum to SHOPP Guidelines in October of 2017. The addendum called on Caltrans to develop annual benchmarks (future condition projections) to measure progress made for each of the four primary asset classes towards achieving the 10-year targets.

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 April 2020, updated condition information where available, Ten-Year SHOPP Project Book accomplishments and updated Highway Maintenance projections.






SB1 included two additional performance objectives related to pavement and bridges – Level of Service (LOS) for pavement cracking and spalling, and number of bridges fixed. These two metrics will be achieved through the same project accomplishments and maintenance strategies included 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.

Beginning this year, the annual benchmarks report now includes a summary of condition assessments for seven supplementary assets (drainage pump plants, highway lighting, office buildings, overhead sign structures, roadside rest facilities, transportation related facilities, and weigh in motion scales).

2019/20 Performance Summary

The projections presented in this report show that the condition of the four primary asset classes will generally improve over the next ten years. Caltrans is on track to meet or exceed SB1 condition-based targets by 2027 for pavement, bridges, and culverts, as presented in Table 1. Condition of transportation management systems (TMS) are expected to close in on SB1 targets, well within the uncertainties and limitations of the analysis. The Pavement Level of Service (LOS) target has been met. Caltrans will continue to monitor progress towards achieving LOS as well as TMS targets.







Table 1 – Progress Towards 2027 SB1 Targets




| Asset Class | 2027 SB1 Target | Status of Progress | |
|-----------------|---|---|----------|
| Pavement | 98% Good or Fair Condition; |  | On Track |
| | 90% level of service (LOS) achieved for maintenance of potholes, spalls, and cracks |  | On Track |
| Bridges | Fix an additional 500 bridges |  | On Track |
| Culverts | 90% Good or Fair Condition |  | On Track |
| TMS | 90% Good Condition |  | Monitor |

| Definitions | | |
|---|-----------------|--|
|  | 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 set forth in the TAMP. Caltrans is on track to meet or exceed TAMP targets by 2027 for pavement and culverts. While the proportion of good condition bridges is projected to rise, corrective actions need to be initiated to assure that the fair and poor targets are achieved. Caltrans will continue to monitor progress towards achieving TMS targets.

Table 2 – Progress Towards 2027 TAMP Targets

| Asset Class | | Good | Fair | Poor | Status of Progress | |
|---------------------|---------|-------|------|------|--|-----------------|
| Pavement | Class 1 | 60% | 39% | 1% |  | On Track |
| | Class 2 | 55% | 43% | 2% |  | On Track |
| | Class 3 | 45% | 53% | 2% |  | On Track |
| Bridges and Tunnels | | 83.5% | 15% | 1.5% |  | Action Required |
| Drainage (Culverts) | | 80% | 10% | 10% |  | On Track |
| TMS | | 90% | N/A | 10% |  | Monitor |

| Definitions | | |
|---|-----------------|--|
|  | 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 26,895 assessed lane miles of pavement on Class I roadways, representing over half of the 49,672 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 3 summarizes the condition of the Pavement Class I asset inventory for the most recent condition assessment (2019 APCS) as well as the prior condition assessment (2018 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

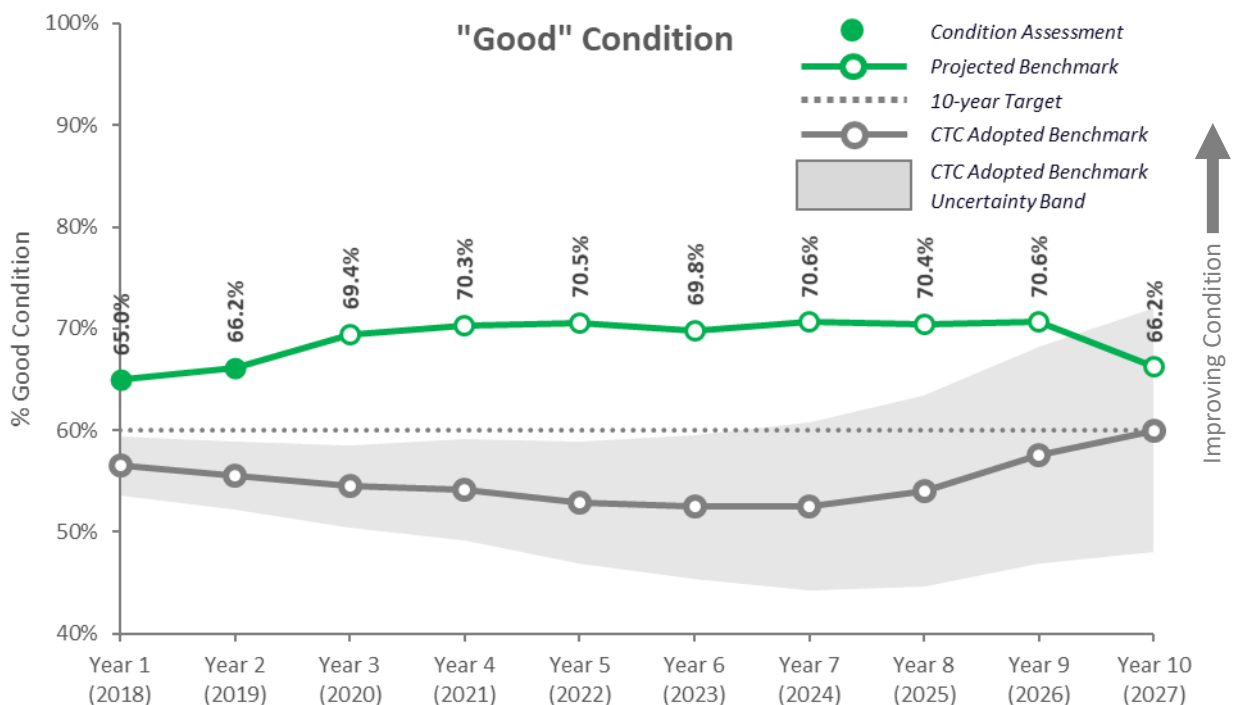
Reported annual pavement conditions and total lane miles are based on a phased data collection effort through the Automated Pavement Condition Survey (APCS) over an 11-month period, between January and November of the reporting year. Projects under construction will not be reflected in the condition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

Table 3 – Pavement Class I Condition Summary

| | Condition | 2027 Target | 2018 Year End | 2019 Year End | Change in Condition |
|--|-----------|-------------|---------------|---------------|---------------------|
| | Good | 60.0% | 65.0% | 66.2% | +1.2% ↑ |
| | Fair | 39.0% | 33.8% | 32.6% | -1.2% ↓ |
| | Poor | 1.0% | 1.3% | 1.2% | -0.1% ↓ |

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 condition through 2019 is presented in the charts with a solid fill symbol.

**Figure 1 - Pavement Class I, Good**

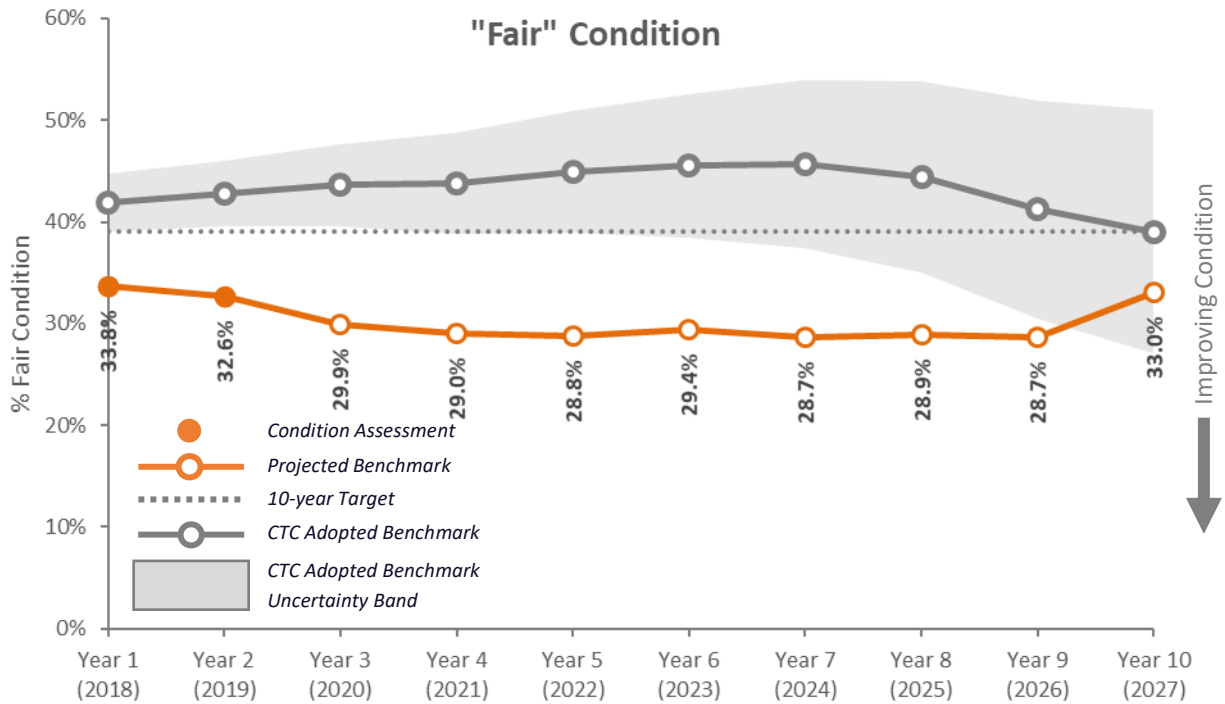


Figure 2 - Pavement Class I, Fair

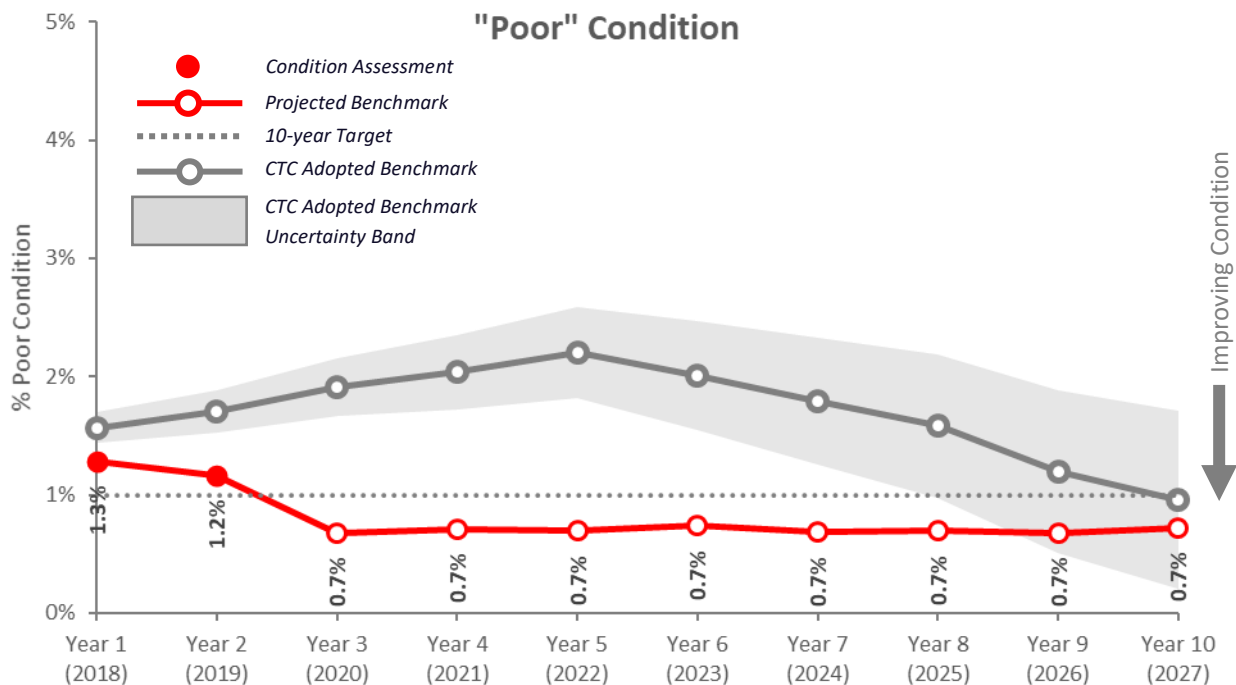


Figure 3 - Pavement Class I, Poor

Benchmark Observations

Pavement Class I conditions have improved with decreases in both fair and poor lane miles, as reflected in the 2019 APCS over the prior year. Projected pavement conditions through 2027 indicate further improvement in the near term, followed by relatively level conditions thereafter. Recent delivery of pavement projects supported by SB-1 funding has been a contributing factor to the observed condition improvements.

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 16,056 assessed lanes miles of pavement on Class II roadways, representing approximately one-third of the 49,672 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 condition assessment (2019 APCS) as well as the prior condition assessment (2018 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, between January and November of the reporting year. Projects under construction will not be reflected in the condition assessment.

Table 4 - Pavement Class II Condition Summary

| | Condition | 2027 Target | 2018 Year End | 2019 Year End | Change in Condition |
|--|-----------|-------------|---------------|---------------|---------------------|
| | Good | 55.0% | 45.9% | 46.8% | +0.9% ↑ |
| | Fair | 43.0% | 53.3% | 52.4% | -0.9% ↓ |
| | Poor | 2.0% | 0.9% | 0.9% | 0.0% ↔ |

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 condition through 2019 is presented in the charts with a solid fill symbol.

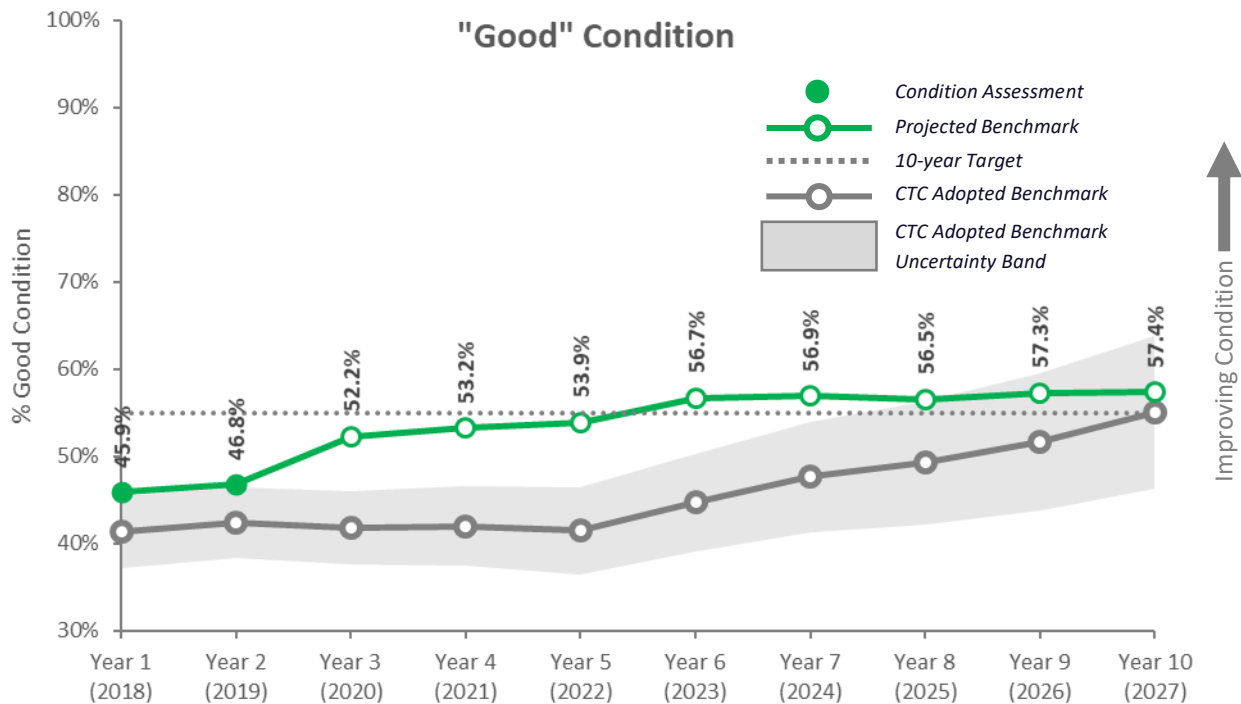


Figure 4 - Pavement Class II, Good

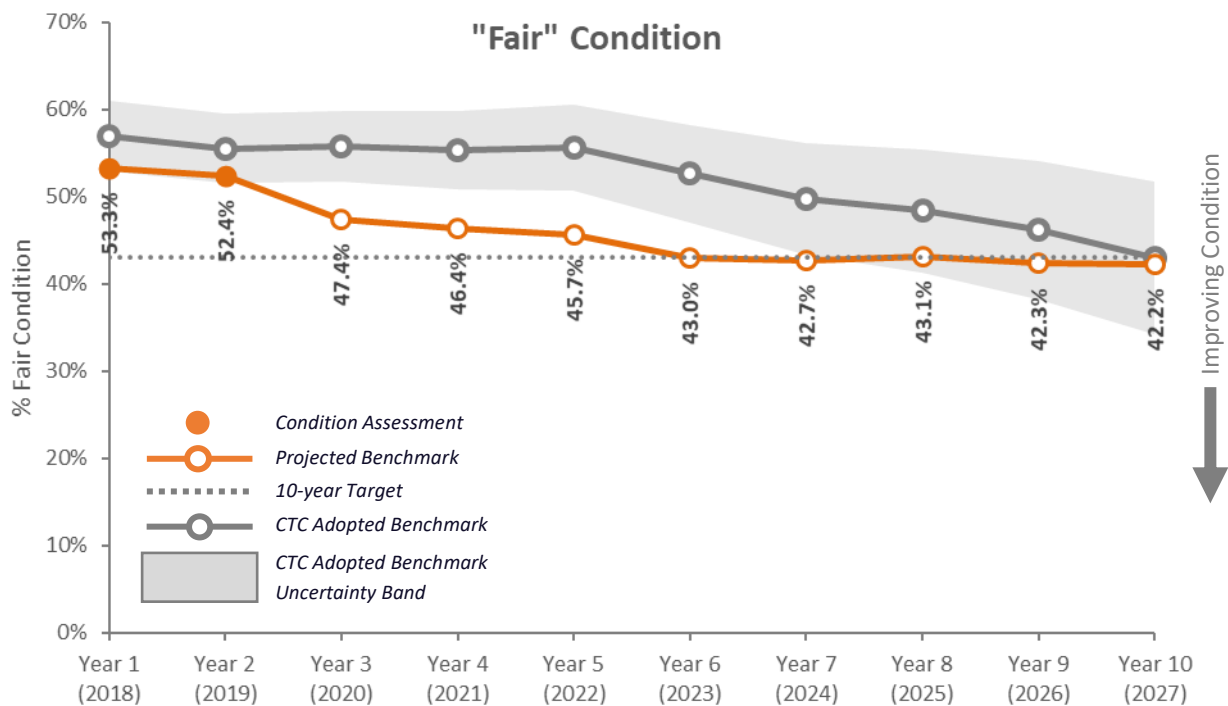


Figure 5 - Pavement Class II, Fair

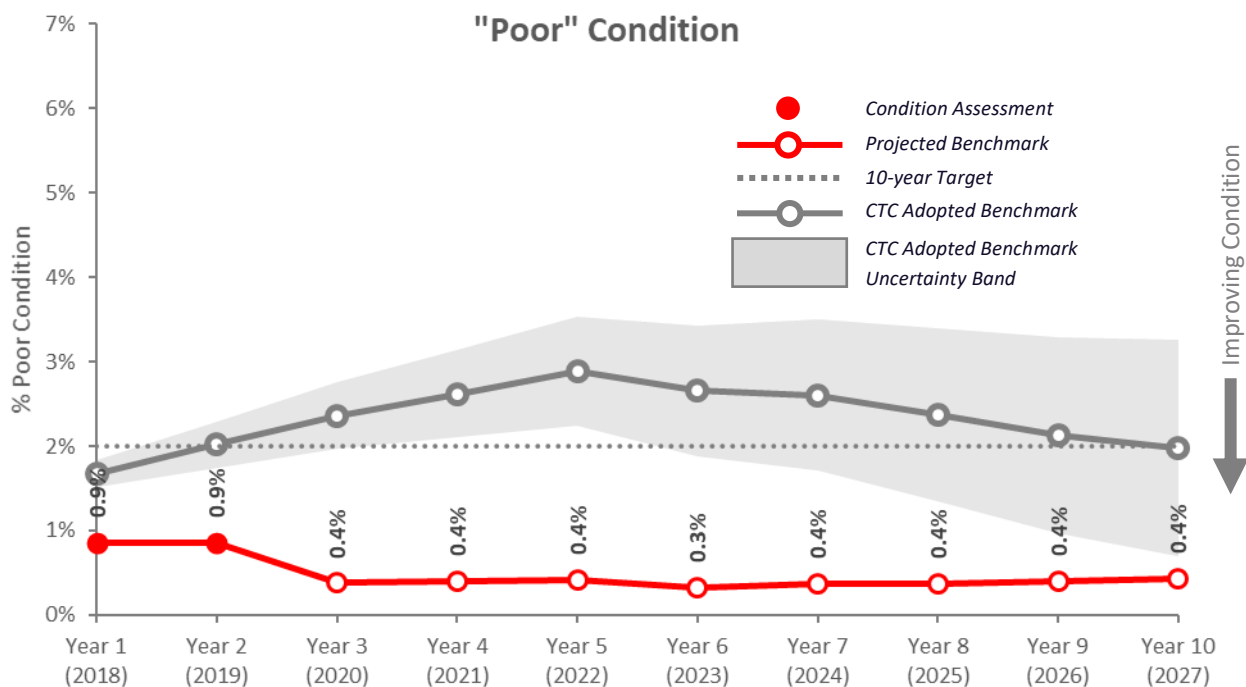


Figure 6 - Pavement Class II, Poor

Benchmark Observations

Pavement Class II conditions have improved with a decrease in fair lane miles, as reflected in the 2019 APCS over the prior year. The poor condition target is currently being met. Projected pavement conditions through 2027 indicate further improvement in the near term, followed by relatively level conditions thereafter. Recent delivery of pavement projects supported by SB-1 funding has been a contributing factor to the observed condition improvements.

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 6,720 assessed lanes miles of pavement on Class III roadways, representing approximately 13% of the 49,672 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 condition assessment (2019 APCS) as well as the prior condition assessment (2018 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, 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

| | Condition | 2027 Target | 2018 Year End | 2019 Year End | Change in Condition |
|--|-----------|-------------|---------------|---------------|---------------------|
| | Good | 45.0% | 42.5% | 44.7% | +2.2% ↑ |
| | Fair | 53.0% | 56.5% | 54.4% | -2.1% ↓ |
| | Poor | 2.0% | 1.0% | 1.0% | 0.0% ↔ |

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 condition through 2019 is presented in the charts with a solid fill symbol.

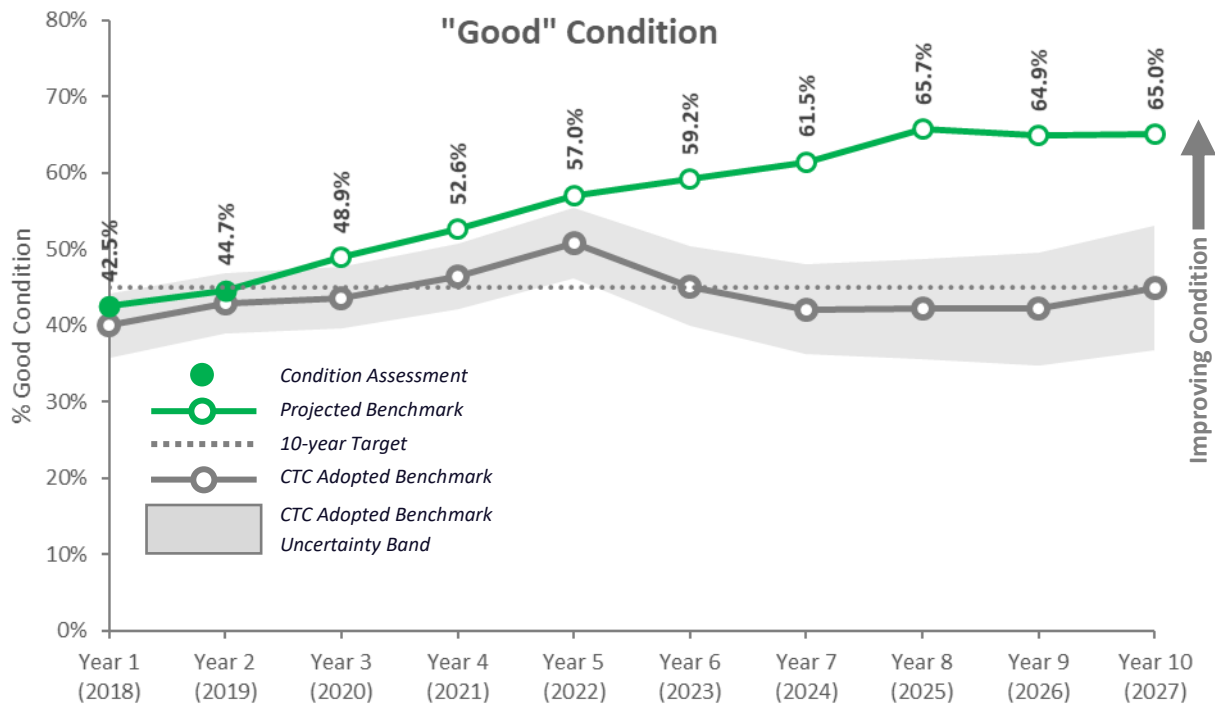


Figure 7 - Pavement Class III, Good

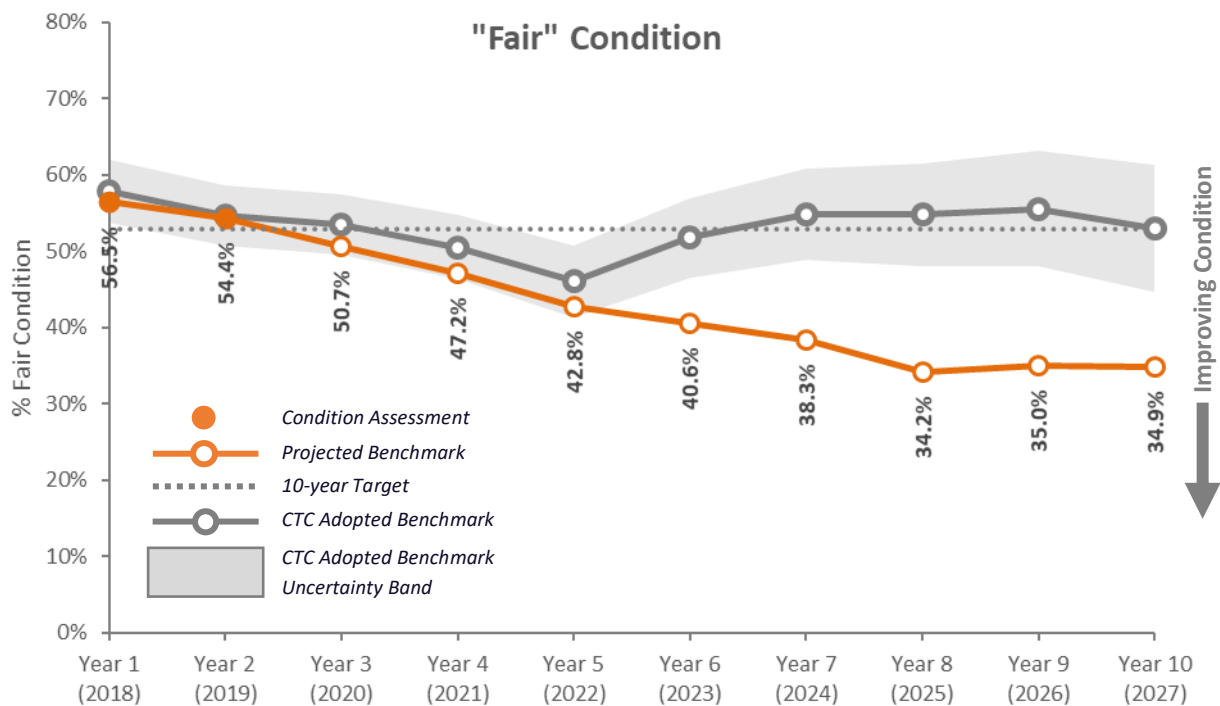


Figure 8 - Pavement Class III, Fair

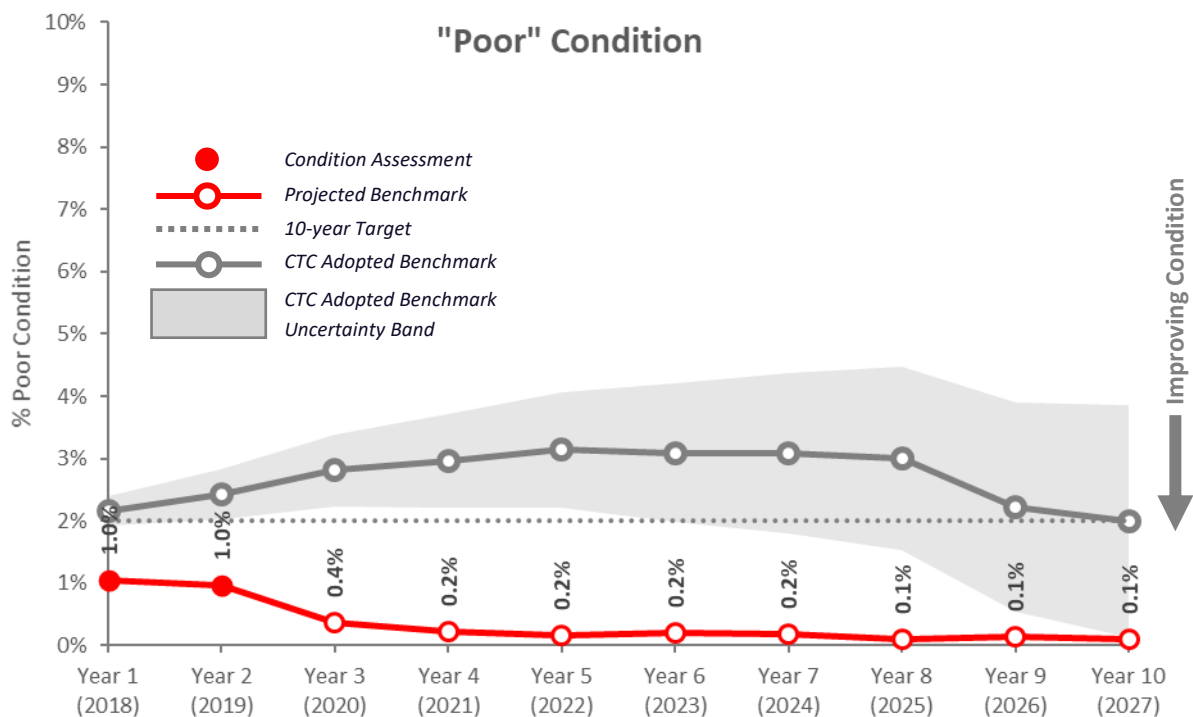


Figure 9 - Pavement Class III, Poor

Benchmark Observations

Pavement Class III conditions have improved with a decrease in fair lane miles, as reflected in the 2019 APCS over the prior year. The poor condition target is currently being met. Projected pavement conditions through 2027 indicate further improvement in the near term, followed by relatively level conditions thereafter. Recent delivery of pavement projects supported by SB-1 funding has been a contributing factor to the observed condition improvements.

Bridge and Tunnel Health

Overview

Caltrans is responsible for the maintenance of 13,189 State Highway System (SHS) bridges totaling over 246 million square feet of bridge deck area. These bridges are an average of 48 years old and at the point that typically results in increased maintenance needs. Caltrans also maintains 57 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.



Timing of the Condition Assessment

The reported annual bridge and tunnel health conditions are based on data collected over a multi-year inspection cycle. Most bridges are inspected every 2-years, with some bridges inspected every 4-years.

Table 6 summarizes the condition of the bridge and tunnel asset inventory for the most recent condition assessment. 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 the data set submitted for the National Bridge Inventory (NBI) in March of 2020. Definitions of these condition states can be found in Appendix A.

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.

Table 6 – Bridge and Tunnel Health Condition Summary

| | Condition | 2027 Target | 2018 Year End | 2019 Year End | Change in Condition |
|--|-----------|----------------|------------------|------------------|------------------------|
| | Good | 83.5% | 60.3% | 54.1% | -6.2% ↓ |
| | Fair | 15.0% | 35.7% | 42.5% | +6.8% ↑ |
| | Poor | 1.5% | 4.0% | 3.5% | -0.5% ↓ |

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 deck and liner area from 2018 through 2027. The assessed condition through 2019 is presented in the charts with a solid fill symbol.

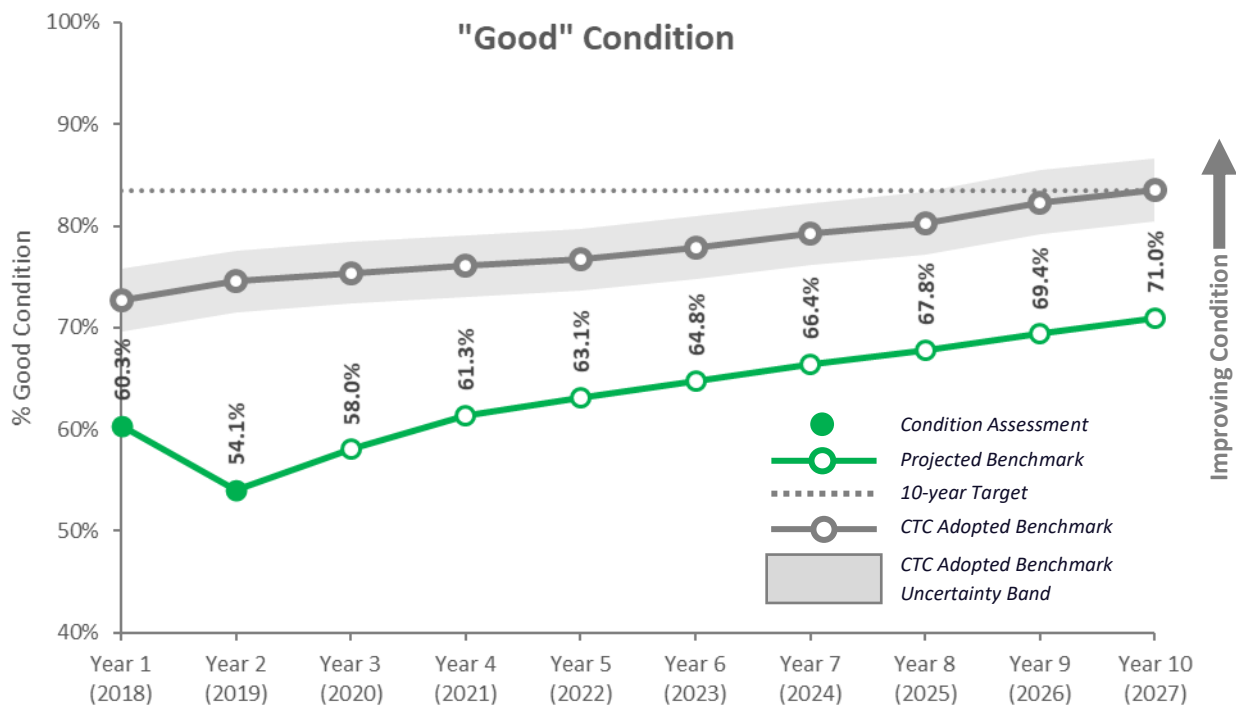


Figure 10 – Bridge and Tunnel Health, Good

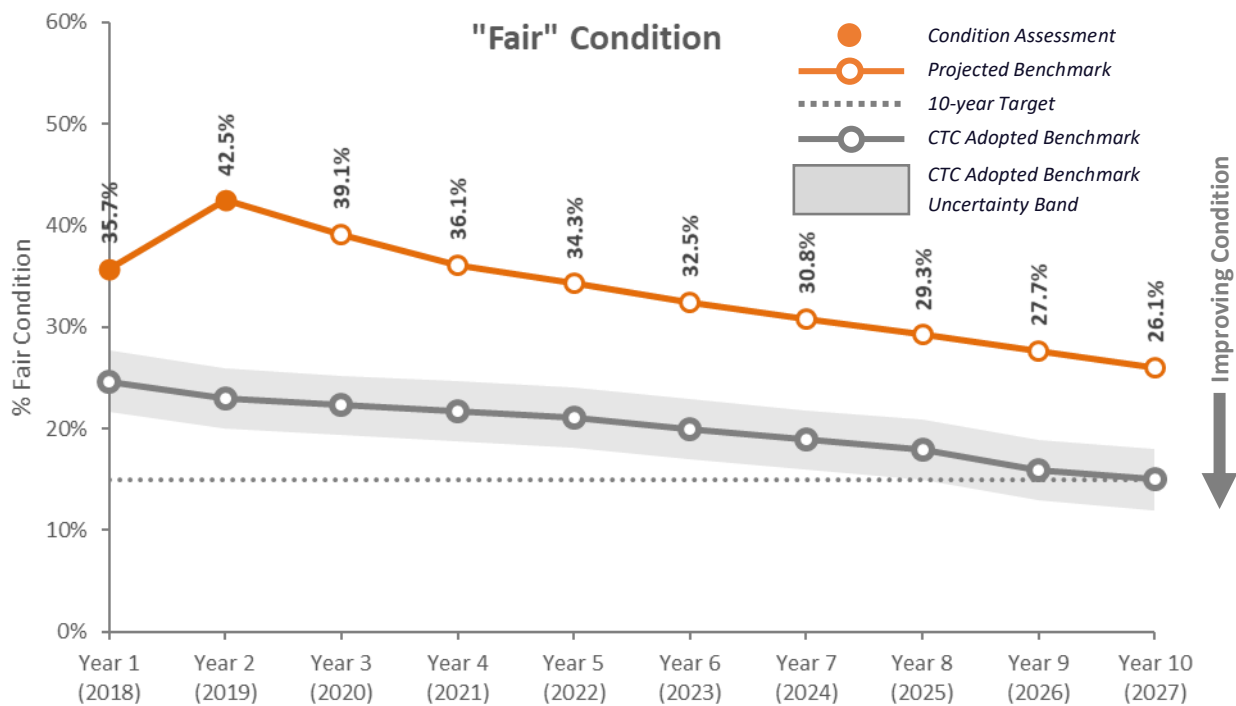


Figure 11 - Bridge and Tunnel Health, Fair

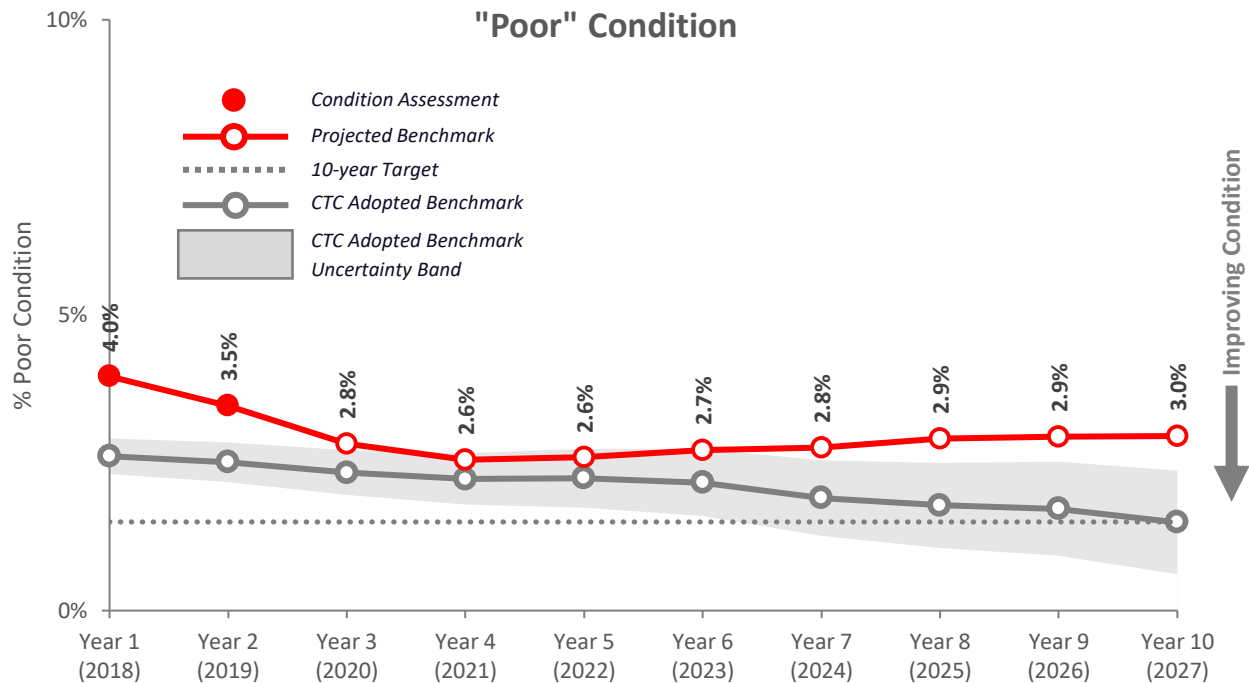


Figure 12 – Bridge and Tunnel Health, Poor

Benchmark Observations

Between 2018 and 2019, the condition of bridges and tunnels have improved overall, as reflected by a decrease in the percentage of poor by 0.5%. The percentages of good and fair have worsened, however, on the order of 6% to 7%. While the percentages of good, fair, and poor bridges are projected to steadily improve over the next ten years, future target conditions are not likely to be met without corrective action. The increased funding from SB1 will have a significant impact on future bridge and tunnel conditions. However, due to time frames for bridge project delivery, an average of 9 plus years from initiation to construction completion, the condition improvements will likely be realized after 2027.

Caltrans continues to monitor the mix of good and fair condition categories for bridges relative to the established targets. We believe that the initial targets established in 2018 for the fair condition category was too aggressive and we are in the process of evaluating potential recommended changes to good and fair bridge target conditions at a future Commission meeting.

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 212,181 culverts totaling over 20 million linear feet, that drain rainwater, drainage channels, streams, and rivers away from highways in a controlled manner. About 75% of the inventory has been assessed to-date, with the remaining 25% underway with an anticipated completion date of 2023. Over 16,000 inspections have been completed since the last benchmarks report.

Changes in Asset Condition

The health 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 (as of April 2020) as well as the prior condition assessment (December 2018 as reported in 2019 SHSMP). 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.



Timing of the Condition Assessment

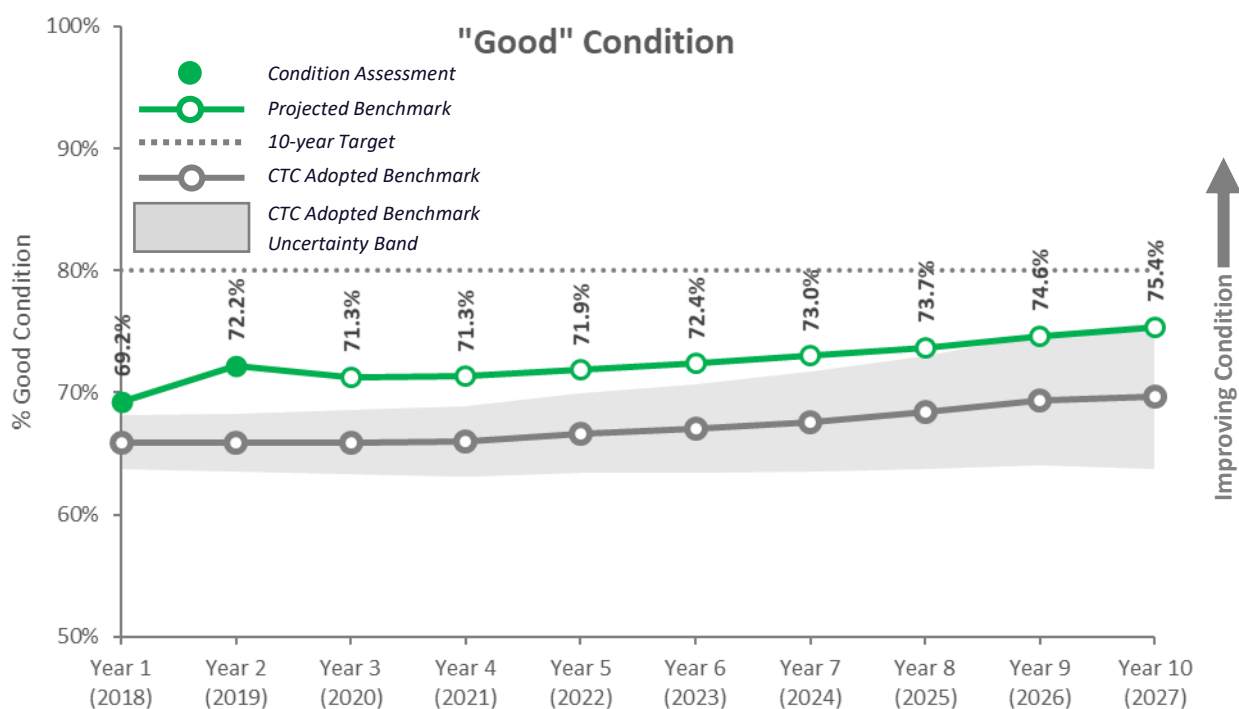
The reported annual drainage asset conditions are determined based on the initial inspection and the expected improvements to the condition state upon completion of the restoration work. This assessment is updated monthly based on the available data.

Table 7 - Drainage Condition Summary

| | Condition | 2027 Target | 2018 Year End | 2019 Year End | Change in Condition |
|--|-----------|-------------|---------------|---------------|---------------------|
| | Good | 80.0% | 69.2% | 72.2% | +3.0% ↑ |
| | Fair | 10.0% | 21.0% | 18.0% | -3.0% ↓ |
| | Poor | 10.0% | 9.8% | 9.8% | 0.0% ↓ |

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 condition through 2019 is presented in the charts with a solid fill symbol.

**Figure 13 – Drainage, Good**

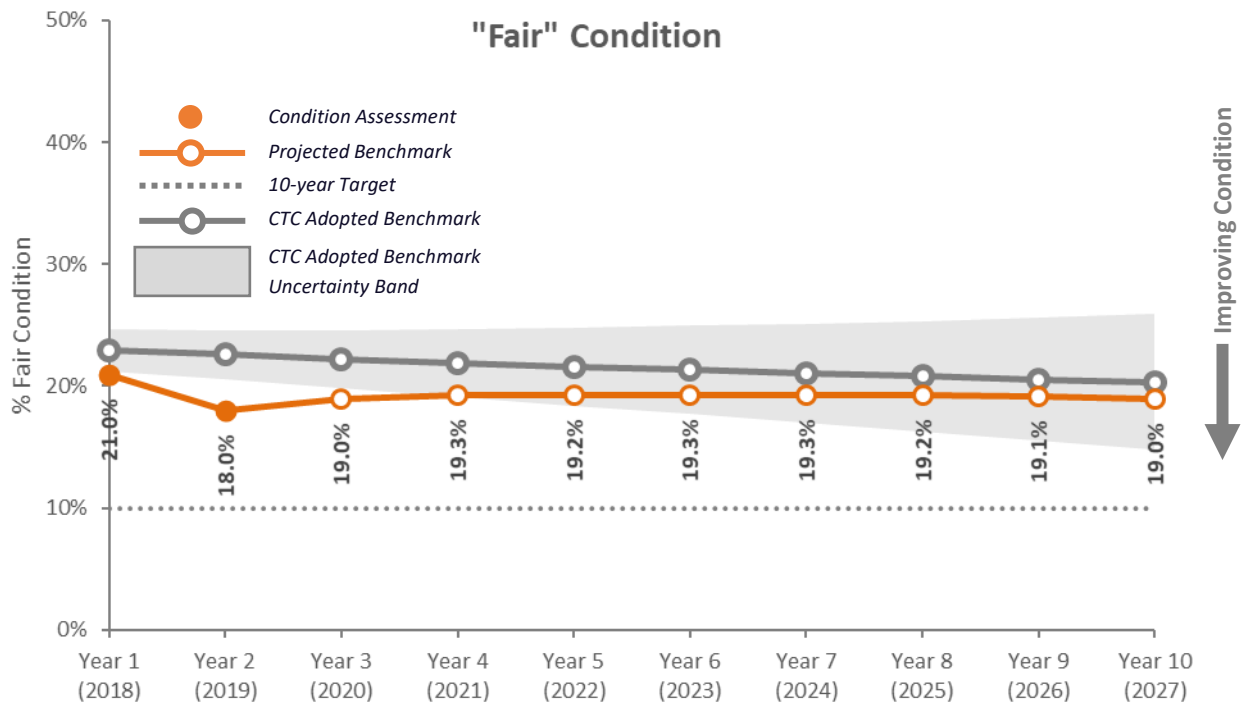


Figure 14 - Drainage, Fair

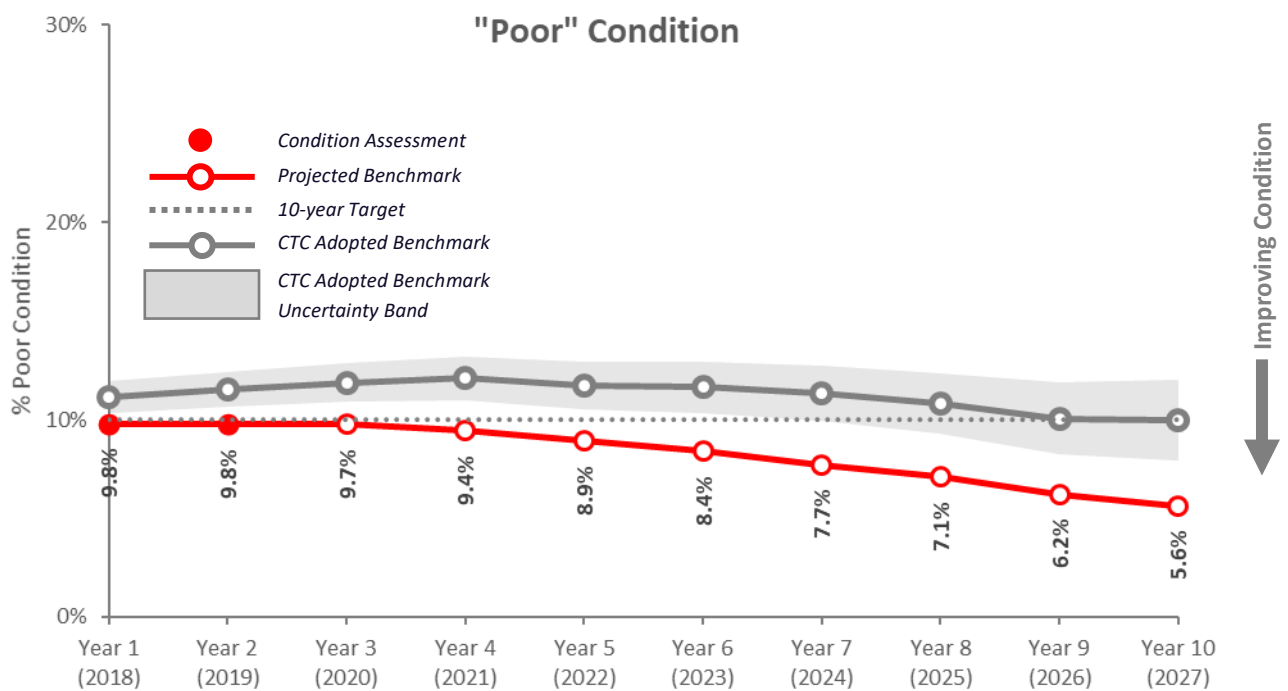


Figure 15 - Drainage, Poor

Benchmark Observations

The year-over-year assessed conditions for drainage have improved, with a 3% increase in good and a commensurate decrease in fair. Poor condition drainage has remained constant at 9.8%, achieving the 2027 target, and is projected to decline further by 2027. Projections for fair condition drainage are not expected to change significantly over the 10-year period. This is mainly because Caltrans has been focusing initial efforts on fixing poor culverts to achieve the SB1 goal. It is expected that Caltrans will continue to use additional maintenance forces to clean out clogged culverts and make repairs as a strategy to improve culverts in both fair and poor condition. SHOPP and Maintenance Program efforts will continue to address identified needs.

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 condition assessment as well as the prior condition assessment. Condition is presented in percentages of good and poor, by TMS units, for the most recent condition assessment (April 2020) as well as the prior condition assessment (as reported in 2019 SHSMP). Definitions of these condition states can be found in Appendix A.



Timing of the Condition Assessment

The reported annual TMS asset conditions are determined based on the age of the TMS asset and an assessment of how the TMS asset is functioning. This assessment is currently being updated quarterly.

Table 8 - Transportation Management Systems Condition Summary

| | Condition | 2027 Target | 2018 Year End | 2019 Year End | Change in Condition |
|--|-----------|-------------|---------------|---------------|---------------------|
| | Good | 90.0% | 67.4% | 74.6% | +7.2% ↑ |
| | Poor | 10.0% | 32.6% | 25.4% | -7.2% ↓ |

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 condition through 2019 is presented in the charts with a solid fill symbol.

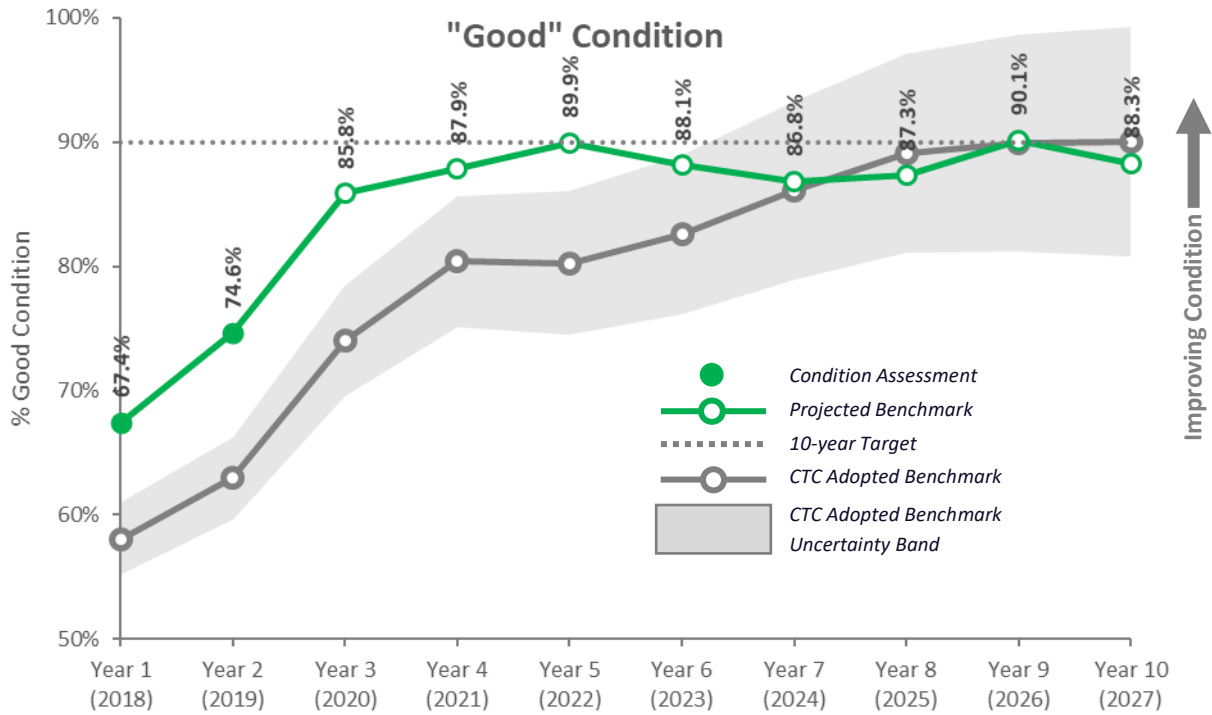


Figure 16 – Transportation Management Systems, Good

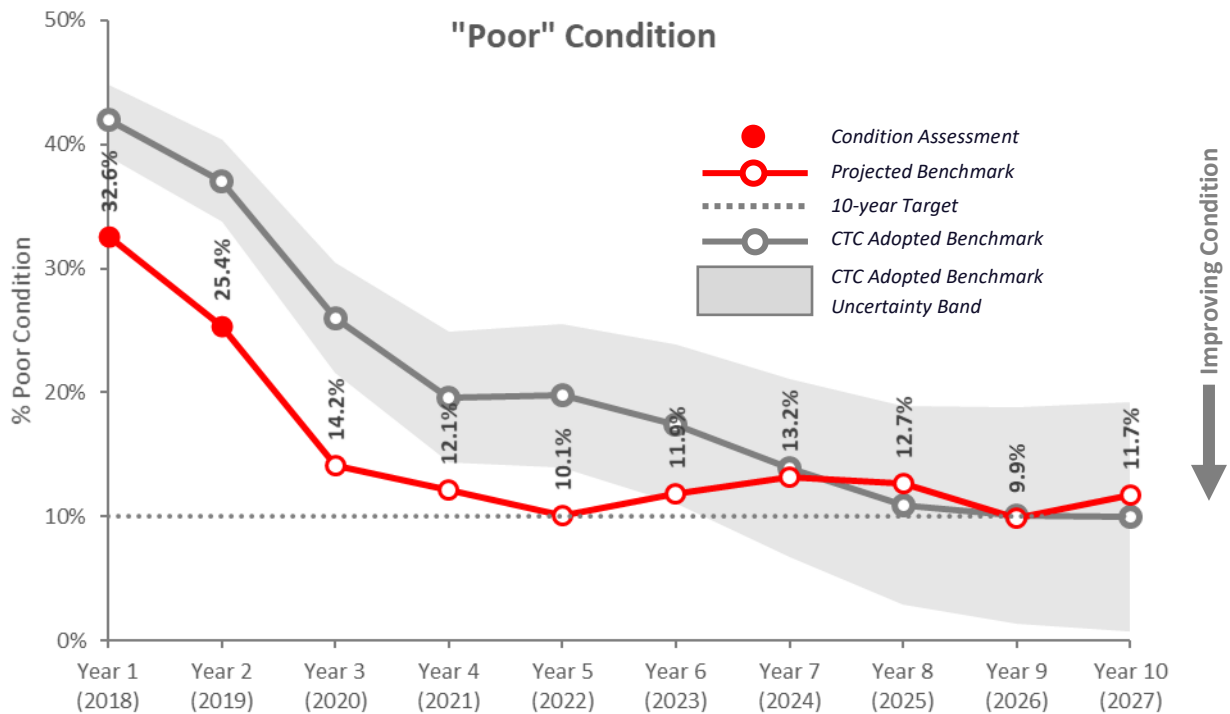


Figure 17 - Transportation Management Systems, Poor

Benchmark Observations

Current TMS condition reflects significant improvement over the prior year with a reduction of 7.2% poor. As reported in the prior benchmarks progress report, a review process has been underway to verify TMS inventory and condition data and to validate the condition changes resulting from anticipated work on projects in the latter years of the 10-year period. The projections indicate that current planned and programmed projects are likely to deliver the needed performance to close in on 2027 targets, well within the uncertainties and limitations of the analysis.

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 baseline of 114 bridges. To satisfy the provisions of SB1, Caltrans need to fix at least 1640 bridges between 2018 and 2027.

Current and Projected Number of Bridges Fixed

The number of bridges fixed in the current and last fiscal years is determined from an analysis of bridge project records and an estimate of when the work was effectively complete, referred to as the Expected Construction Work Complete (ECWC) date.

Table 9 presents the number of bridges fixed in FY 2018/19 and 2019/20. Table 10 presents the breakdown of the counts of bridges in each fiscal year by the primary type of fix.

Expected Construction Work Complete (ECWC)

The point in time when performance credit is taken is defined by the Expected Construction Work Complete (ECWC) date. This is the date when construction work is effectively complete, the project limits are open to traffic, and benefits are realized by the travelling public. The ECWC is estimated to be 2/3rds the time between the contract award date and the Construction Contract Acceptance (CCA) date.

Table 9 – Fix an Additional 500 Bridges

| Fix Bridges | FY 2018/19 | FY 2019/20 |
|--------------|------------|------------|
| Baseline | 114 | 114 |
| Additional | 151 | 42 |
| Total | 265 | 156 |

Table 10 – Count of Bridges by Type of Fix

| Fix Bridges | FY 2018/19 | FY 2019/20 |
|----------------|------------|------------|
| Health | 242 | 138 |
| Scour | 11 | 5 |
| Seismic | 12 | 11 |
| Goods Movement | - | 2 |
| Total | 265 | 156 |

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 over the 10-year period through FY 2026/27. Bridges fixed through the SHOPP are based on projects defined in the SHOPP Ten Year Project Book. For bridges fixed through the Highway Maintenance (HM) Program, the first two years are based on projects in a currently approved HM workplan. For HM projects in the remaining 8 years, the minimum of the first two years is used to estimate the number of bridges fixed in subsequent years, assuming consistent future HM funding. Bridges fixed through the HM Program are counted as fixed in the year the contract is awarded due to short delivery periods.

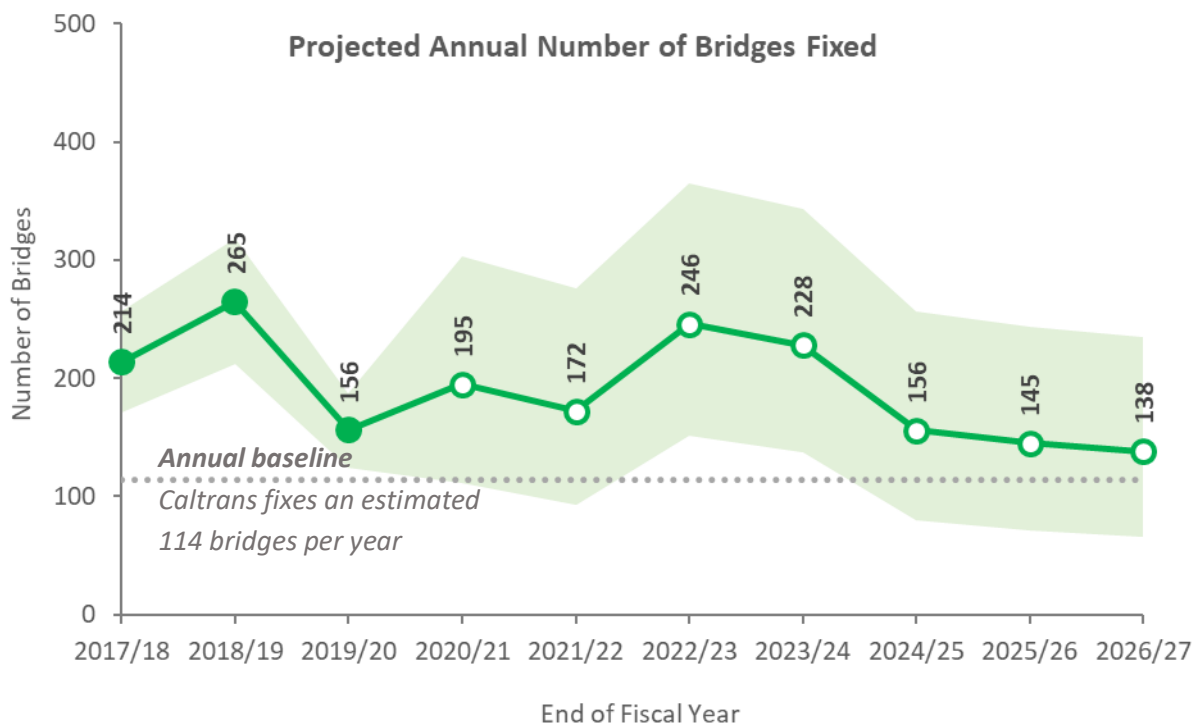


Figure 18 – Projected Number of Bridges Fixed Each Year

The assessed conditions for fiscal years through 2019/20 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 common but 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 is expected to fix an additional 500 bridges beyond the established baseline of 1140 bridges over the 10-year period (114 bridges/year on average), for a total of 1640 bridges. Figure 19 presents the cumulative total number of bridges fixed, including the uncertainty band to account for project delays and HM programming. Based on the projection and modeling assumptions, it is possible that the SB1 target could be achieved earlier than 2027.

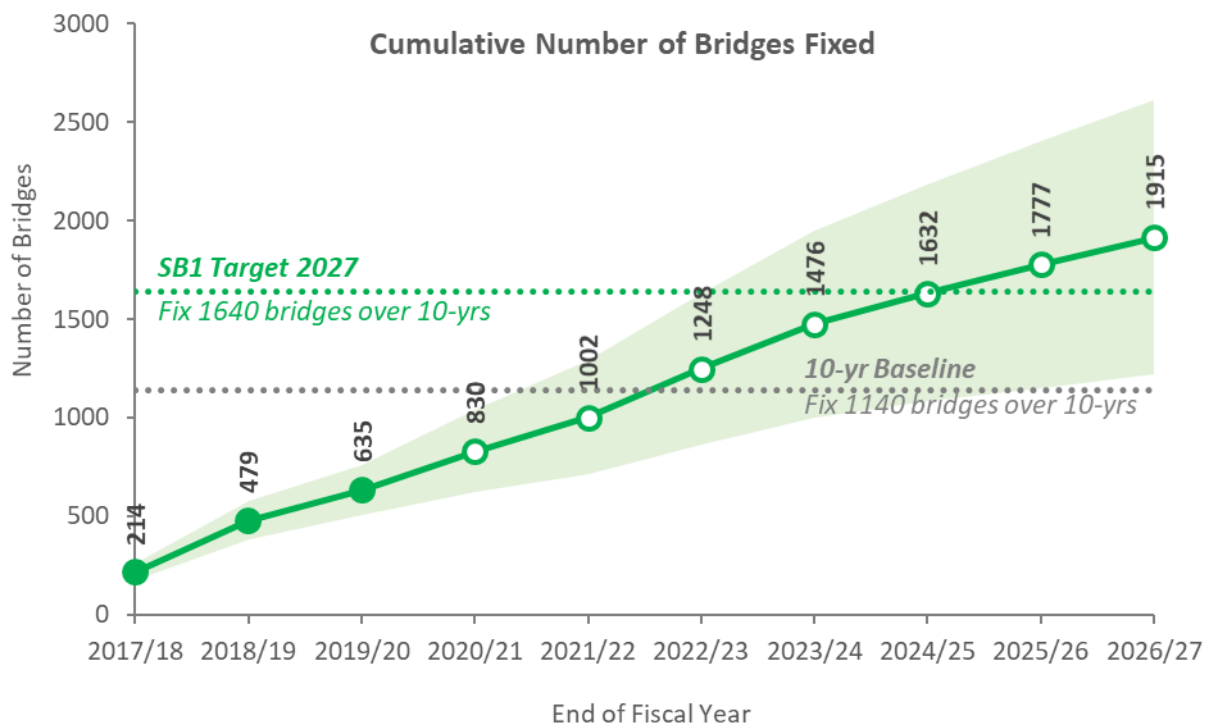


Figure 19 – Projected Cumulative Total Number of Bridges Fixed Above the Baseline

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. 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 LOS are based on practical thresholds that take into consideration the pavement condition, effectiveness of treatments, traffic impact and employees/contractor safety. Additional information on the criteria can be found in Appendix B.

Table 11 summarizes assessments of LOS from the 2018 and 2019 APCS.

Table 11 – LOS Summary

| SB-1 Target | 2018 Year End | 2019 Year End |
|------------------------|--------------------------|--------------------------|
| 90 | 95 | 94 |

Supplementary Asset Classes

Overview

The California Transportation Commission put forth Transportation Asset Management Plan Guidelines in June 2017, identifying the four primary asset classes (pavement, bridge, culverts, and TMS) and the following supplementary asset classes:

- Drainage Pump Plants
- Highway Lighting
- Office Buildings
- Overhead Sign Structures
- Roadside Rest Facilities
- Sidewalks, Park & Ride, and ADA Infrastructure (deficiency model)
- Transportation Related Facilities
- Weigh in Motion Scales

While funding to fully close performance gaps for supplemental assets has not been available to date, Caltrans continues to make progress towards maintaining and improving conditions. Note, the condition for Sidewalks, Park & Ride, and ADA Infrastructure is not presented here, as only assets with identified deficiencies are tracked.

Figure 20 through Figure 26 presents the trends in supplemental asset conditions, as assessed near the end of each calendar year. Conditions are shown for the 2016 end of calendar year (from the 2017 SHSMP) and 2018 (from the 2019 SHSMP). Condition assessments were not available for 2017. Preliminary condition data was available for most of the supplemental assets and are symbolized in the charts as empty circle, as final condition assessments are pending further review. Fair and poor target conditions are shown in the charts as grey dashed lines.

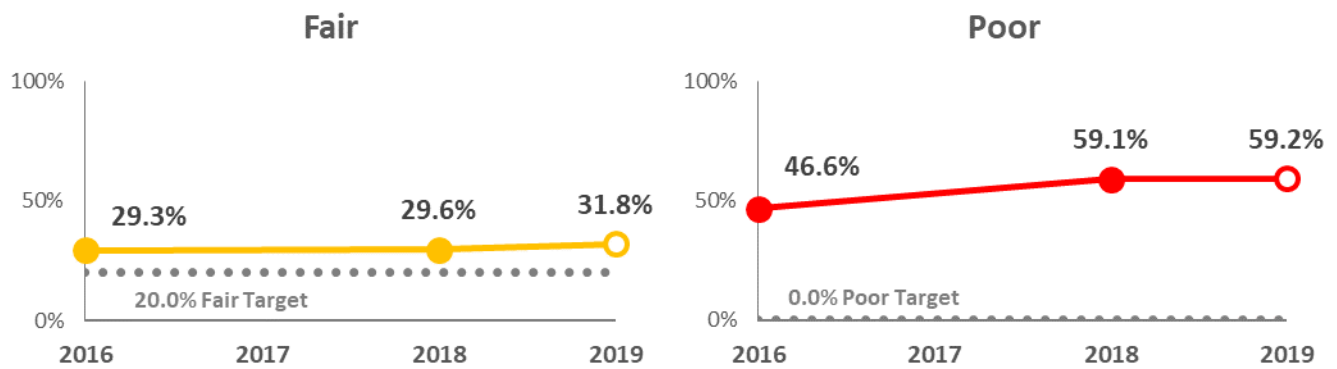


Figure 20 – Condition of Drainage Pump Plants

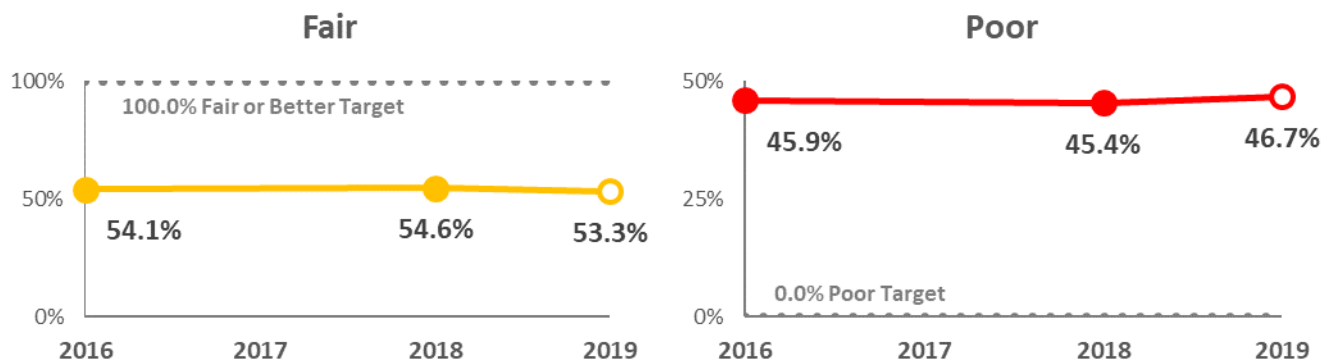


Figure 21 – Condition of Highway Lighting

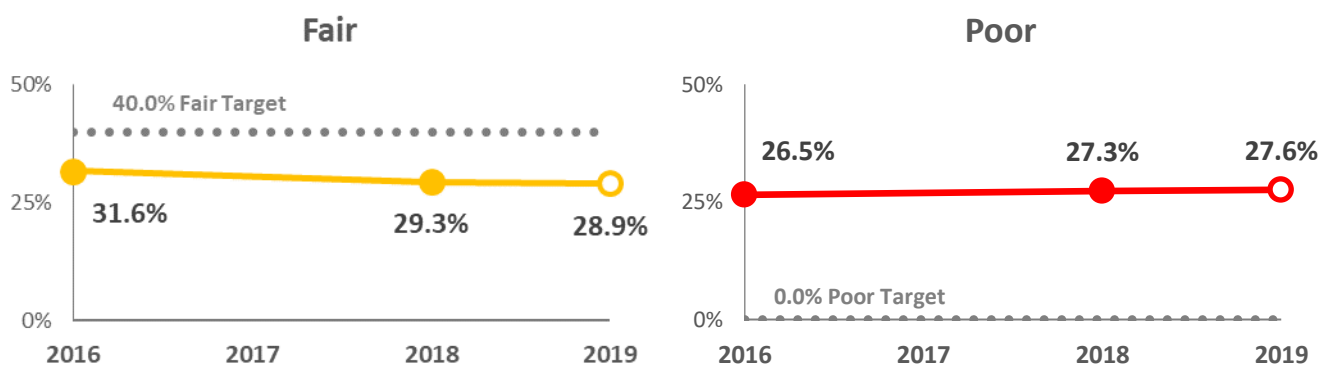


Figure 22 – Condition of Office Buildings

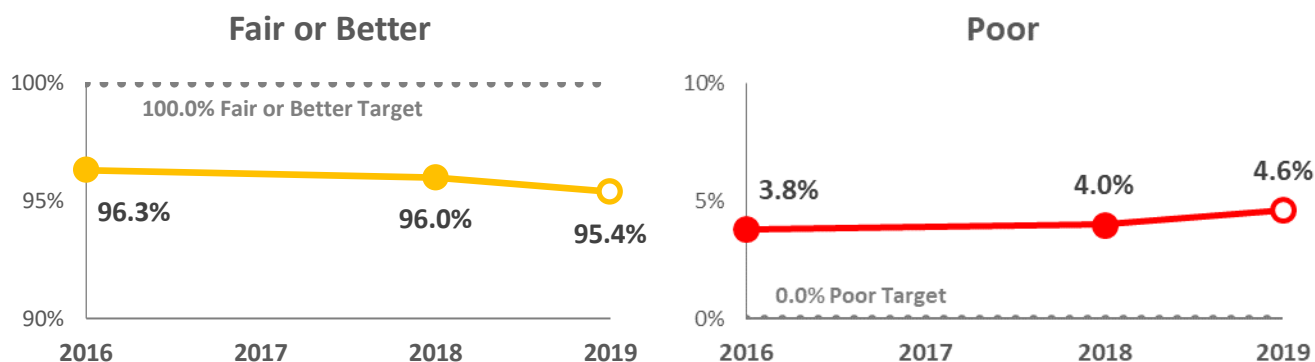


Figure 23 – Condition of Overhead Sign Structures

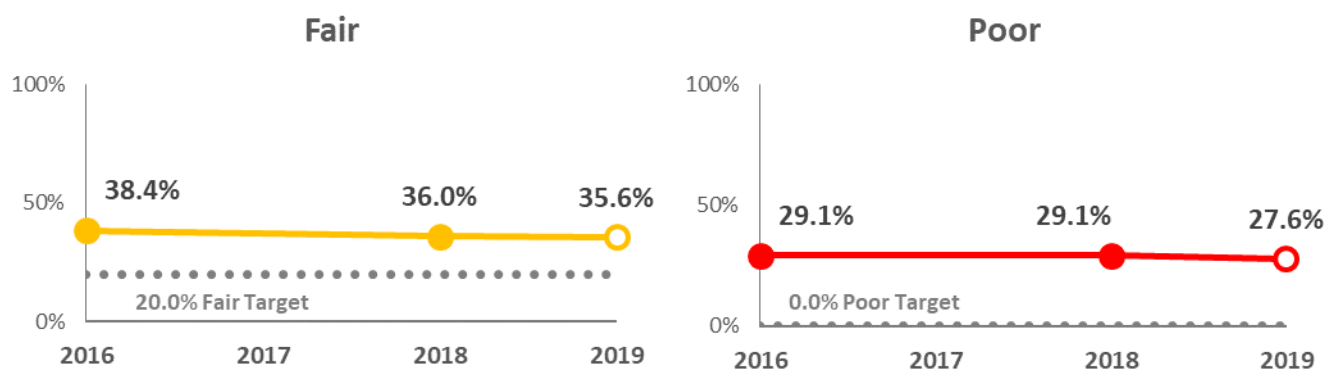


Figure 24 – Condition of Roadside Rest Facilities

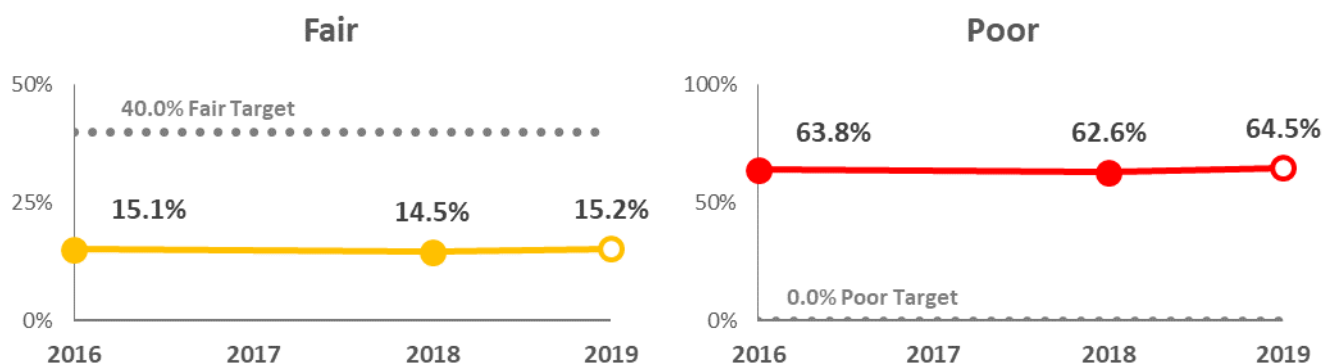
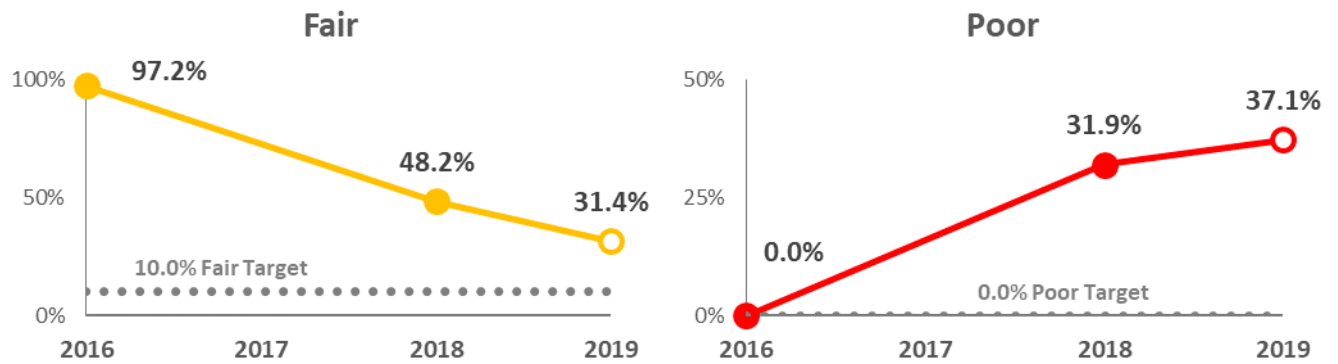


Figure 25 – Condition of Transportation Related Facilities

Table 12 – Weigh in Motion Scales**Figure 26 – Condition of Weigh in Motion Scales**

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 2019 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 13 – Pavement Performance Metrics

| Metrics | | Good | Fair | Poor |
|-------------------|----------------------------------|-------|-----------|-------|
| IRI (inches/mile) | | <95 | 95-170 | >170 |
| Cracking (%) | Asphalt | <5 | 5-20 | >20 |
| | Jointed Concrete | <5 | 5-15 | >15 |
| | Continuously Reinforced Concrete | <5 | 5-10 | >10 |
| Rutting (inches) | | <0.20 | 0.20-0.40 | >0.40 |
| Faulting (inches) | | <0.10 | 0.10-0.15 | >0.15 |

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 14 – Bridge Health Performance Metrics

| Condition | Criteria |
|-------------|---|
| Good | Deck, superstructure, and substructure ratings are all Good, or the culvert rating is Good |
| Fair | The lowest of the three ratings for deck, superstructure, and substructure is Fair, or the culvert rating is Fair |
| Poor | The lowest of the three ratings for deck, superstructure, and substructure is Poor, or the culvert rating is Poor |

Table 15 – Tunnel Health Performance Metrics

| Condition | Criteria |
|-------------|---|
| Good | Less than 20% of the elements are classified as deteriorated |
| Fair | More than 20% of the elements are classified with minor deterioration |
| Poor | More than 20% of the elements are classified with significant deterioration |

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 16 – Drainage Performance Metrics

| Condition | Criteria |
|-------------|--|
| Good | Overall health score between 80 to 100 |
| Fair | Overall health score between 50 to 79 |
| Poor | Overall health score between 0 to 49 |

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 17 – TMS Performance Metrics

| Condition | Criteria |
|-------------|---|
| Good | Within expected lifecycle and consistent functional availability |
| Fair | N/A |
| Poor | Beyond expected life cycle or is not meeting functional availability because of chronic down time |

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 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:

$$SB\ 1\ Pavement\ LOS = (FPS * W_F + RPS * W_R) / Total\ number\ of\ segments$$

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

$$FPS = [Percent\ Passing\ Cracking + Percent\ Passing\ Potholes] / 2$$

the Rigid Pavement Score (RPS) is defined as:

$$RPS = [Percent\ Passing\ Cracking + Percent\ Passing\ Spalling] / 2$$

and the Weighting (W) is defined as:

$$W = Total\ number\ of\ flexible\ or\ rigid\ pavement\ segments$$

The technical criteria for determining if a segment passes or fails is shown in Table 18:

Table 18 – Pavement LOS Criteria

| Attribute | Failure Criteria | Description |
|------------------|----------------------------------|--|
| Cracking | cracking $\geq \frac{1}{2}$ inch | Any single crack at its widest point |
| Potholes | > 1 each pothole | Any potholes greater than 36 square inches in area |
| Spalling | ≥ 1 sq. ft. | Cumulative area of spalling |



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