

# Memorandum

To: CHAIR AND COMMISSIONERS

CTC Meeting: October 13-14, 2021

From: MITCH WEISS, Executive Director

Reference Number: 4.6, Action

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Subject: Evaluation of Caltrans' Effectiveness in Reducing Deferred Maintenance and Improving Conditions on the State Highway System

## **Recommendation:**

Staff recommends the California Transportation Commission (Commission) approve the evaluation set forth in Attachment A and find that the California Department of Transportation (Caltrans) is making progress towards reducing deferred maintenance and improving road conditions on the state highway system. Staff further recommends that the findings of this evaluation be included in the Commission's Annual Report to the Legislature pursuant to Section 14535 of the Government Code.

## **Issue:**

Senate Bill (SB) 1 (Beall, Chapter 5, Statutes of 2017) requires Caltrans to report to the Commission its progress toward meeting the targets and performance measures established for the asset management plan and requires the Commission to evaluate Caltrans' effectiveness in reducing deferred maintenance and improving road conditions on the state highway system, as demonstrated by the progress made toward meeting the goals set forth in SB 1.

At the June 2021 Commission meeting, Caltrans reported to the Commission on its progress toward meeting the targets and performance measures established by SB 1.

While Caltrans achieved a slight improvement from the prior year for bridge health, it was recognized future target conditions are not likely met without corrective action. To help address this concern, Caltrans has identified a program of projects to focus on bridge deck conditions which will help meet the adopted bridge health targets.

## **Background:**

SB 486 (DeSaulnier, Chapter 917, Statutes of 2014) created requirements for Caltrans to develop an asset management plan to guide the selection of State Highway Operation and

Protection Program projects and to provide for a transparent means to track and evaluate performance of the program relative to established targets and benchmarks approved by the Commission.

SB 1 enacted ten-year performance targets for the state highway investments and requires Caltrans to incorporate the performance targets into the asset management plan, along with benchmarks to measure the degree to which progress is made towards achieving the overall 2027 targets.

Attachments:

- Attachment A: Evaluation of Caltrans' Effectiveness in Reducing Deferred Maintenance and Improving Conditions on the State Highway System
- Attachment B: 2020-21 Performance Benchmark Report

## California Transportation Commission

### Effectiveness in Reducing Deferred Maintenance and Improving Conditions on the State Highway System 2021 Evaluation of Caltrans' 2020 Performance Reporting

#### Statutory requirements

Senate Bill (SB) 486 (DeSaulnier, Chapter 917, Statutes of 2014) created requirements for the California Department of Transportation (Caltrans) to develop an asset management plan to guide the selection of State Highway Operation and Protection Program (SHOPP) projects and to provide for a transparent means to track and evaluate performance of the program relative to established targets and benchmarks adopted by the Commission.

Referred to variously as goals, outcomes, and targets, Senate Bill 1 (Beall, Chapter 5, Statutes of 2017) states that it is the intent of the Legislature that Caltrans meet the following preliminary performance outcomes for additional state highway investments by the end of 2027:

- (1) Not less than 98% of pavement on the state highway system in good or fair condition.
- (2) Not less than 90% level of service achieved for maintenance of potholes, spalls, and cracks.
- (3) Not less than 90% of culverts in good or fair condition.
- (4) Not less than 90% of transportation management system units in good condition.
- (5) Fix not less than an additional 500 bridges.

Government Code section 14526.7 requires Caltrans to incorporate performance targets into the asset management plan, along with benchmarks to measure the degree to which progress is made toward achieving the overall 2027 targets. In March 2018, the Commission adopted annual benchmarks for the four SHOPP primary asset classes (pavement, bridges, culverts, and traffic management system elements) to measure progress toward meeting the SB 1 performance targets. In March 2021, the Commission adopted revisions to the Good and Fair performance targets for Bridges and Culverts. These revisions do not change the SB 1 and Commission adopted 2027 performance targets or annual benchmarks.

#### Evaluation of Caltrans' progress

Government Code section 14526.7(b) and Streets and Highways Code section 2032.5 require that Caltrans report to the Commission on its progress toward meeting the targets and performance measures established for state highways.

Streets and Highways Code section 2032.5(c) states that annually, the Commission shall evaluate the effectiveness of Caltrans in reducing deferred maintenance and improving road conditions on the state highway system, as demonstrated by the progress made toward achieving the goals set forth in SB 1.

**Basis for evaluation**

In June 2021, Caltrans reported on its progress toward meeting the targets established for the state highway system based on 2020 data (Attachment B). At the time, the pavement condition assessment for 2020 was not available. Therefore, pavement and Level of Service conditions in the report were projections based on 2019 data and estimated deterioration rates and project-level condition improvements. Once the 2020 pavement condition data is available, the 2020-21 Performance Benchmark Report will be revised.

Pursuant to statute, Commission Staff utilized Caltrans' assessment of its progress toward achieving the annual benchmarks to evaluate the effectiveness of Caltrans, through the end of 2020, in reducing deferred maintenance and improving road conditions on the state highway system. If necessary, the Commission will update its evaluation once Caltrans has revised the 2020-21 Performance Benchmark Report.

**Progress towards 2027 SB 1 Targets**

The table below summarizes the key information presented to the Commission by Caltrans on its progress toward achieving the SB 1 targets through the end of 2020.

Asset Class	2027 SB 1 Target	Caltrans Reported 2020 Year End Condition
Pavement	98% Good or Fair Condition	99%*
Pavement	90% level of service achieved for maintenance of potholes, spalls, and cracks	94%*
Bridges	Fix an additional 500 bridges	542 additional bridges fixed**
Culverts	90% Good or Fair Condition	90.0%
Transportation Management Systems	90% Good Condition	79.0%

\* Projected condition. This is due to a delay in receiving the Automated Pavement Condition Survey (APCS) data.

\*\* The Independent Office of Audits and Investigations is conducting an audit to validate the number of additional bridges fixed. Commission staff will evaluate the audit findings when it is released.

## Progress towards 2027 TAMP Targets

The table below summarizes the key information presented to the Commission by Caltrans on its progress toward achieving the Commission-adopted targets and benchmarks through the end of 2020.

Asset Class	Commission Adopted 2027 Performance Targets	Commission Adopted 2020 Year End Benchmark	Caltrans Reported 2020 Year End Actual
Pavement* in good or fair condition			
Class 1	99%	98.1%	99.3%**
Class 2	98%	97.6%	99.6%**
Class 3	98%	97.2%	99.6%**
Bridges in good or fair condition	98.5%	97.7%	96.6%
Culverts in good or fair condition	90%	88.1%	90.0%
Transportation management systems in good condition	90%	74.0%	79.0%

\* Class 1 includes interstates, other principal arterials, and urban freeways and expressways, (54% of the state highway system). Class 2 includes rural freeways and expressways, and minor arterials (32% of the state highway system). Class 3 includes major and minor collector routes (14% of the state highway system).

\*\* Projected condition. This is due a delay in receiving the Automated Pavement Condition Survey (APCS) data.

## Supplementary Asset Classes

In the Commission's Transportation Asset Management Plan Guidelines that were adopted in June 2017, nine supplementary asset classes were approved: drainage pump plants, highway lighting, office buildings, overhead signs, roadside rest facilities, sidewalks (ADA accessibility), park and ride facilities (ADA accessibility), transportation related facilities, and weigh in motion scales. Targets were adopted by the Commission in March 2018 that reflected system condition levels based on unconstrained system needs.

Caltrans reported in June 2021 on its progress towards meeting those targets. The table below summarizes the key information presented to the Commission by Caltrans on its progress toward achieving the Commission-adopted targets through the end of 2020.

Asset Class	Commission Adopted 2027 Performance Targets	Caltrans Reported 2018 Year End Actual
Drainage Pump Plants	80% Good Condition	15.3%
Highway Lighting	100% Good or Fair Condition	53.3%
Office Buildings	60% Good Condition	43.6%
Overhead Sign Structures	100% Good or Fair Condition	92.9%
Roadside Rest Facilities	80% Good Condition	36.0%
Transportation Related Facilities	60% Good Condition	22.8%
Sidewalks and Park and Ride Facilities (ADA accessibility)	Reduce current deficiency by 25%	Caltrans didn't report
Weigh in Motion Scales	90% Good Condition	44.3%

## Evaluation

As reported by Caltrans, the Commission adopted 2020 yearend benchmarks are being exceeded for culverts and transportation management systems, and appears to be exceeding the benchmarks for all classes of pavement. In addition, Caltrans is exceeding the Pavement Level of Service benchmark and met the “fix 500 additional bridges” target. Meeting these benchmarks is evidence of progress toward reducing deferred maintenance and improving road conditions on the state highway system.

While Caltrans achieved a slight improvement from the prior year for bridge health, Caltrans did not meet the year end benchmark. Future target conditions are not likely to be met without corrective action. To help address this concern, Caltrans has identified a program of projects to focus on bridge deck conditions and will request that the Commission program additional projects into the State Highway Operations and Protection Program.

Commission staff has concerns with Caltrans’ progress towards meeting the Commission adopted 2027 performance targets for some of the Supplementary Asset classes. Caltrans said these targets were more aspirational goals and could not be reached without additional funding. Commission staff is working with Caltrans to identify achievable targets based on current levels of funding. The Commission expects Caltrans to request the adoption of revised performance targets for Supplementary Assets classes at an upcoming Commission meeting.

# 2020/21 Performance Benchmark Report

June 2021



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 March 2021, updated condition information where available, Ten-Year SHOPP Project Book accomplishments and updated Highway Maintenance projections.

SB1 includes 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 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 seven supplementary assets (drainage pump plants, highway lighting, office buildings, overhead sign structures, roadside rest facilities, transportation related facilities, and weigh in motion scales).

As of the time of report preparation, the condition of pavements for 2020 was not available due to COVID-19 related and contracting delays in carrying out and processing assessments from the Automated Pavement Condition Survey (APCS). As such, the conditions of pavement and Level of Service (LOS) presented in this report are based on a projection of 2020 pavement conditions that consider the prior year's condition assessment and project-level condition improvements delivered over the past year. The Department will amend this report with the updated pavement information from 2020 when it becomes available.



## 2020/21 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. The condition of culverts is 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 in the prior two reporting periods and is projected to surpass targets through 2027.

**Table 1 – Progress Towards 2027 SB1 Targets**

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

-  **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 TMS. Current projected conditions for bridge and drainage indicate that Caltrans will be very close to achieving targets, in most instances within a fraction of a percentage point. Caltrans will continue to proactively monitor progress for these assets.

**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		48.5%	50%	1.5%		Monitor
Drainage (Culverts)		70%	20%	10%		Monitor
TMS		90%	N/A	10%		On Track

-  **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.

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# 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 lanes 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 year (based on projected 2020 conditions) as well as the prior year’s condition assessment (2019 APCS). As of the time of report preparation, the condition of pavements for 2020 was not available due to delays in carrying out and processing assessments from the Automated Pavement Condition Survey (APCS). As such, the conditions of pavement presented here are based on a projection of 2020 pavement conditions that consider the prior year’s condition assessment, ongoing deterioration and project-level condition improvements delivered over the past year.



### 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.

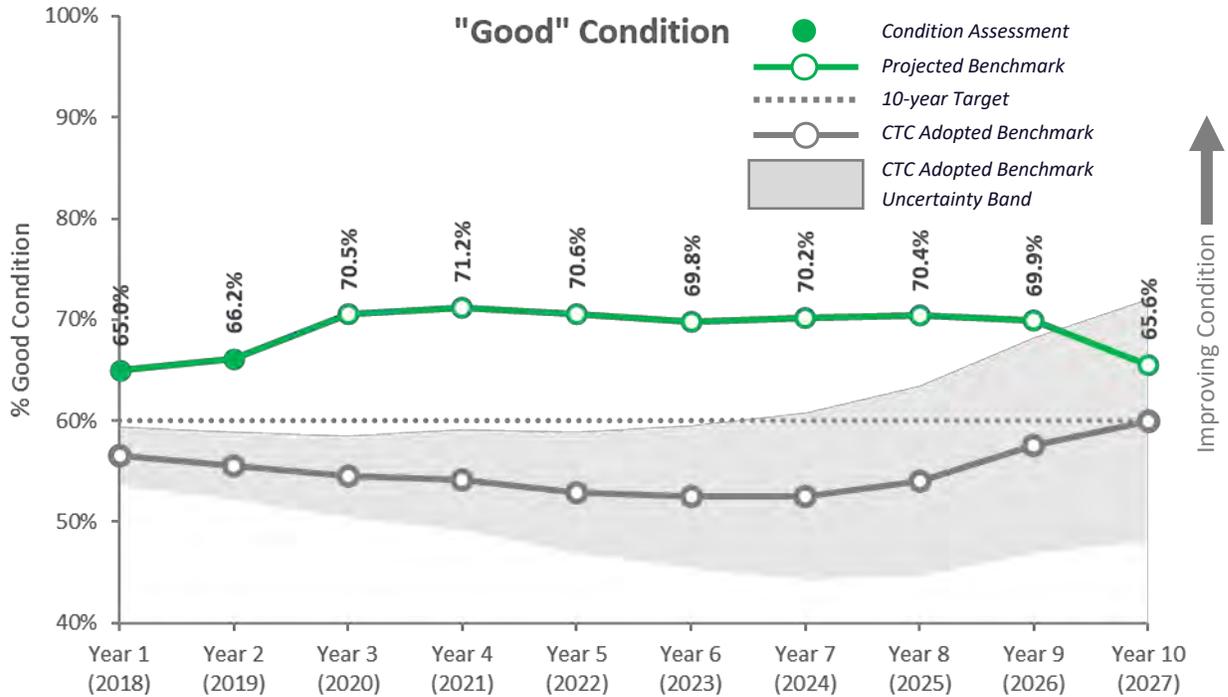
Condition is presented in percentages of good, fair, and poor, by lane miles corresponding to the condition at the end of calendar year. Definitions of these condition states can be found in Appendix A.

**Table 3 – Pavement Class I Condition Summary**

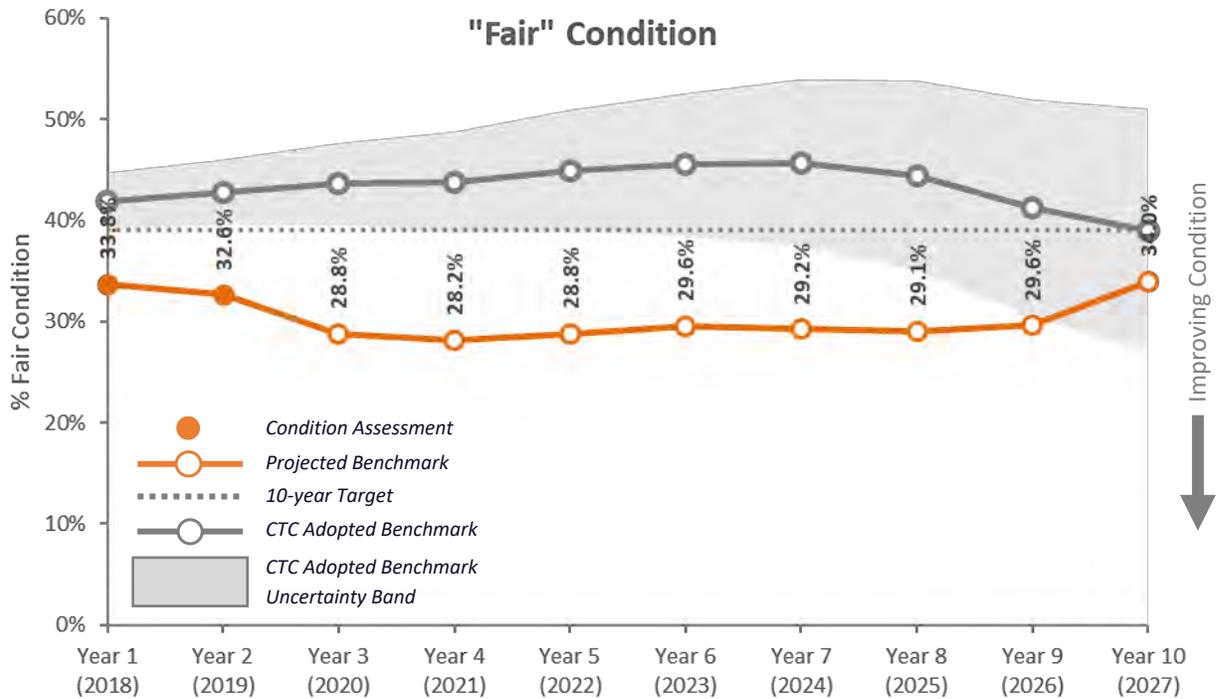
Condition	2027 Target	2019 Year End	2020 Year End (Projected)	Change in Condition
Good	60.0%	66.2%	70.5%	+4.3% ↑
Fair	39.0%	32.6%	28.8%	-3.8% ↓
Poor	1.0%	1.2%	0.7%	-0.5% ↓

## Projected and Assessed Conditions

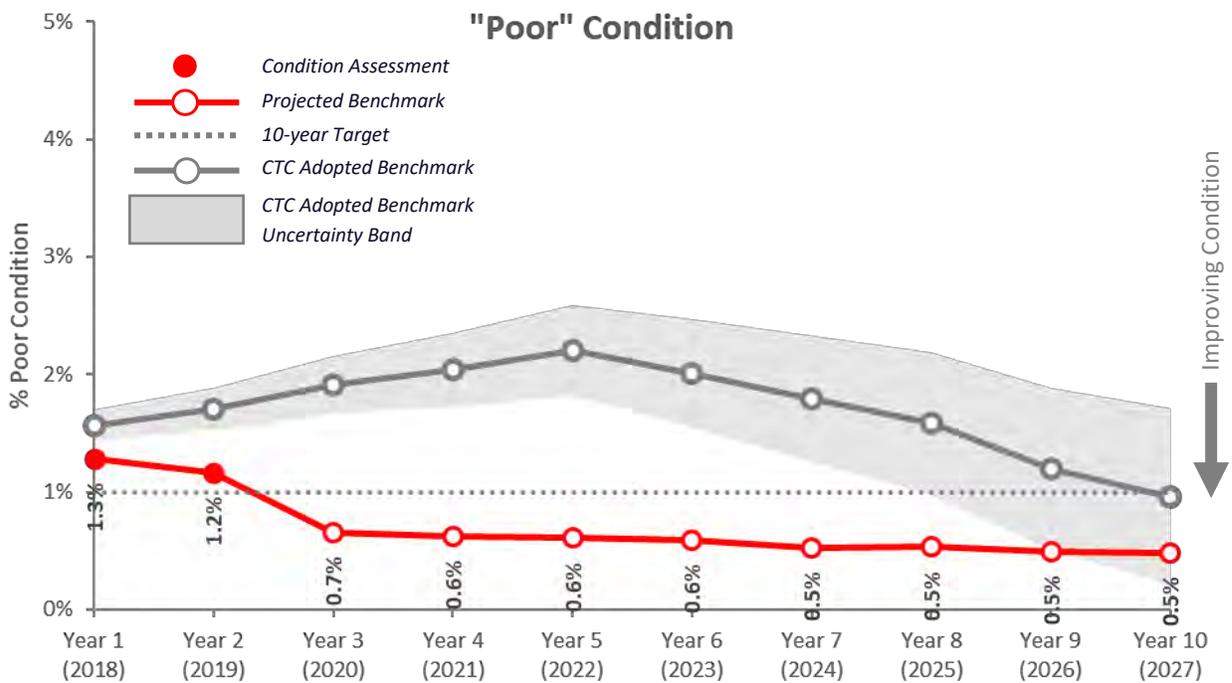
Pavement Class I benchmarks are presented in Figure 1 through Figure 3. These charts show projected year-end good, fair, and poor condition as percentages of total lane miles from 2018 through 2027. The assessed condition through 2019 is presented in the charts with a solid fill symbol.



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



**Figure 2 - Pavement Class I, Fair**



**Figure 3 - Pavement Class I, Poor**

## Benchmark Observations

Projected 2020 Pavement Class I conditions suggest that all condition targets are currently being met. Significant improvements are observed over the prior year's conditions with decreases in both fair and poor lane miles and an increase in good condition pavements. This will need verification once the 2020 APCS pavement conditions become available. Projected pavement conditions in future years indicate relatively stable conditions through 2027. Continued delivery of pavement projects supported by the initiation of 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 year (based on projected 2020 conditions) as well as the prior year's condition assessment (2019 APCS). As of the time of report preparation, the condition of pavements for 2020 was not available due to delays in carrying out and processing assessments from the Automated Pavement Condition Survey (APCS). As such, the conditions of pavement presented here are based on a projection of 2020 pavement conditions that consider the prior year's condition assessment and project-level condition improvements delivered over the past year.

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

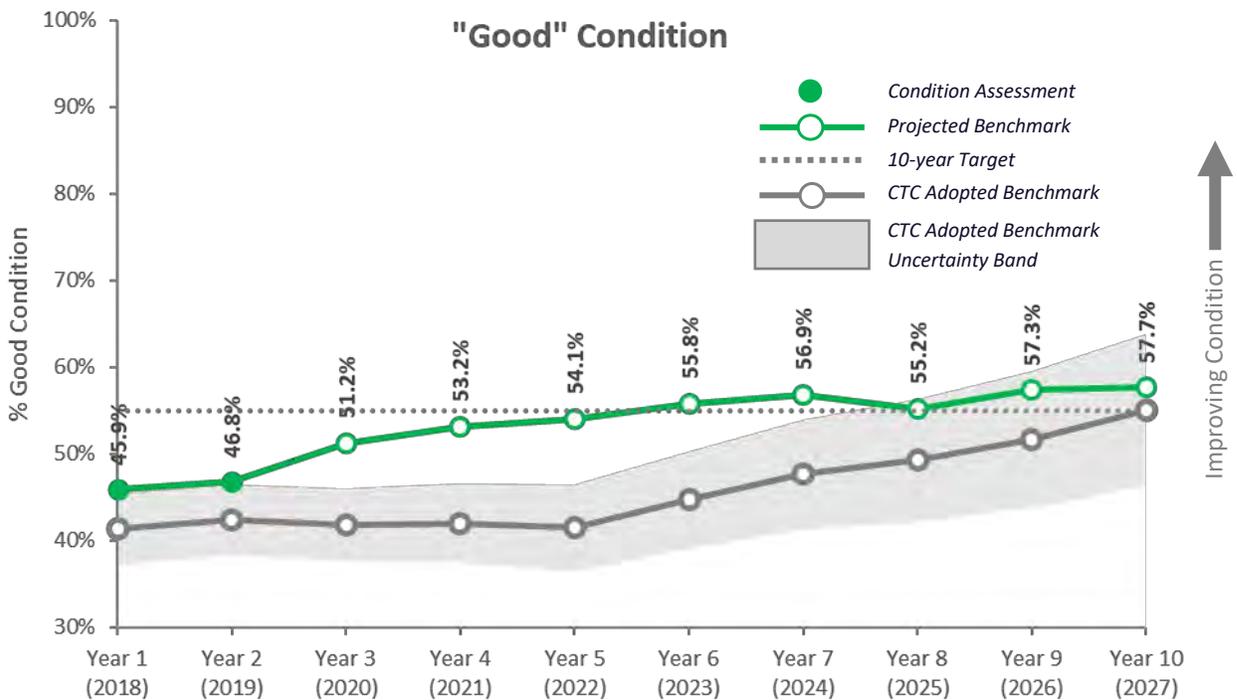
Reported annual pavement conditions and total lane miles are based on a phased data collection effort through the Automated Pavement Condition Survey (APCS) over an 11-month period, between January and November of the reporting year. Projects under construction will not be reflected in the condition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

**Table 4 - Pavement Class II Condition Summary**

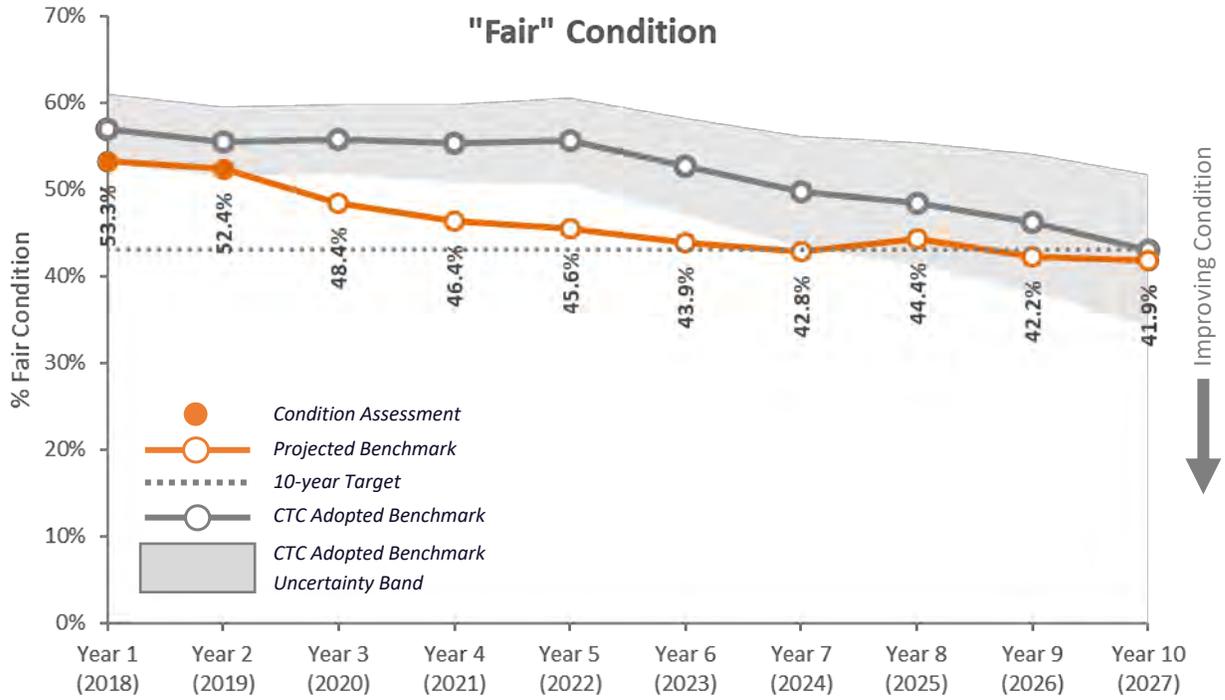
Condition	2027 Target	2019 Year End	2020 Year End (Projected)	Change in Condition
Good	55.0%	46.8%	51.2%	+4.4% ↑
Fair	43.0%	52.4%	48.4%	-4.0% ↓
Poor	2.0%	0.9%	0.4%	-0.5% ↓

## Projected and Assessed Conditions

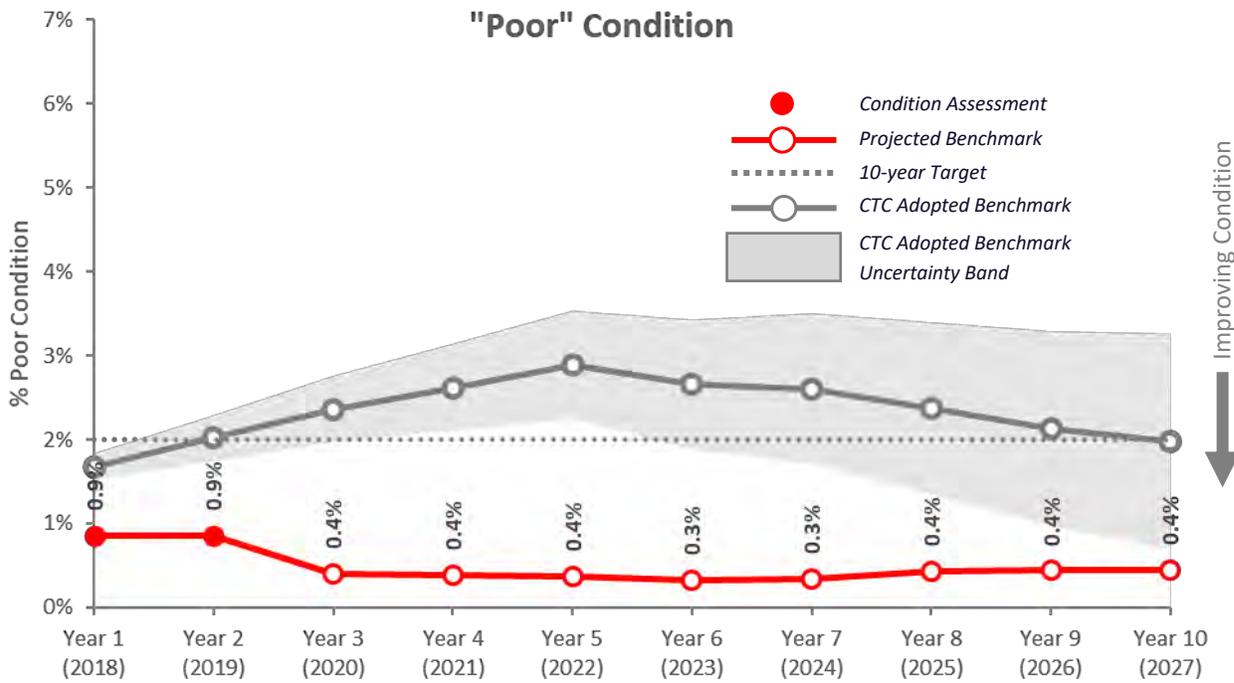
Pavement Class II benchmarks are presented in Figure 4 through Figure 6. These charts show projected year-end good, fair, and poor condition as percentages of total lane miles from 2018 through 2027. The assessed condition through 2019 is presented in the charts with a solid fill symbol.



**Figure 4 - Pavement Class II, Good**



**Figure 5 - Pavement Class II, Fair**



**Figure 6 - Pavement Class II, Poor**

## Benchmark Observations

Projected 2020 Pavement Class II conditions suggest that the poor target is currently being met. Significant improvements are observed over the prior year's conditions with decreases in both fair and poor lane miles and an increase in good condition pavements. This will need verification once the 2020 APCS pavement conditions become available. Projected pavement conditions in future years indicate relatively stable conditions through 2027. Continued delivery of pavement projects supported by the initiation of 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 year (based on projected 2020 conditions) as well as the prior year's condition assessment (2019 APCS). As of the time of report preparation, the condition of pavements for 2020 was not available due to delays in carrying out and processing assessments from the Automated Pavement Condition Survey (APCS). As such, the conditions of pavement presented here are based on a projection of 2020 pavement conditions that consider the prior year's condition assessment and project-level condition improvements delivered over the past year.

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

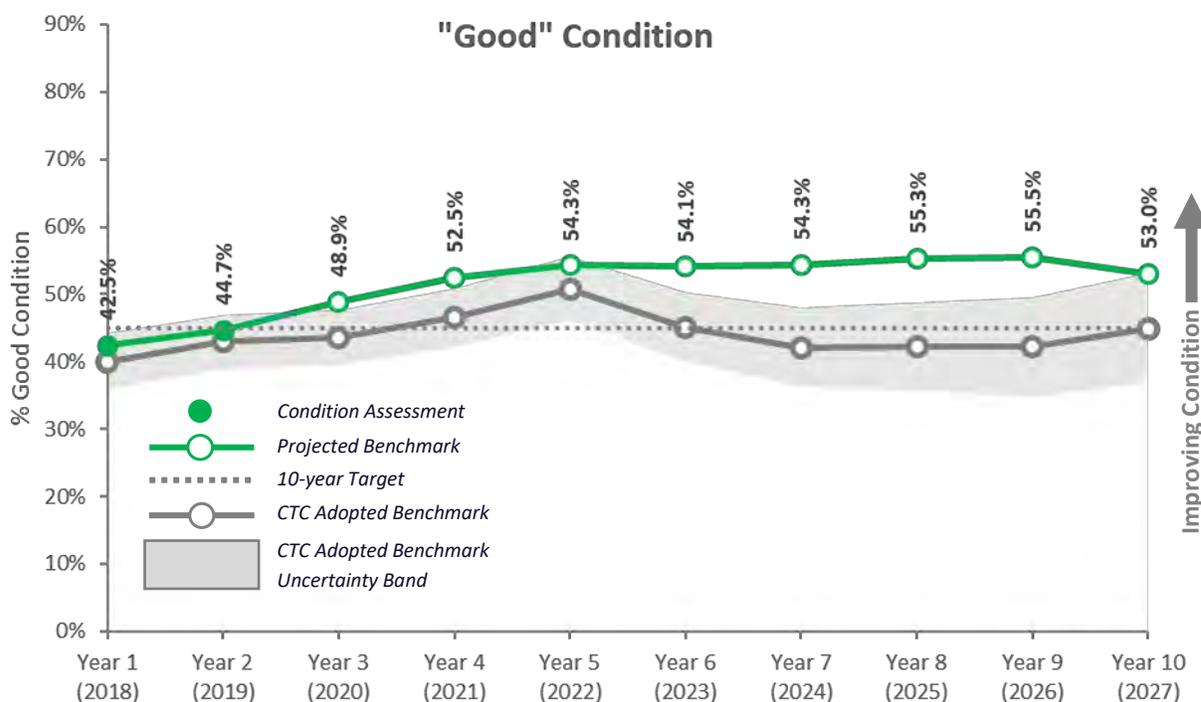
Reported annual pavement conditions and total lane miles are based on a phased data collection effort through the Automated Pavement Condition Survey (APCS) over an 11-month period, between January and November of the reporting year. Projects under construction will not be reflected in the condition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

**Table 5 - Pavement Class III Condition Summary**

	2018	2019	2020	2021
<b>Good</b>	42.5%	44.7%	48.9%	48.9%
<b>Fair</b>	53.0%	54.4%	50.7%	50.7%
<b>Poor</b>	2.0%	1.0%	0.4%	0.4%

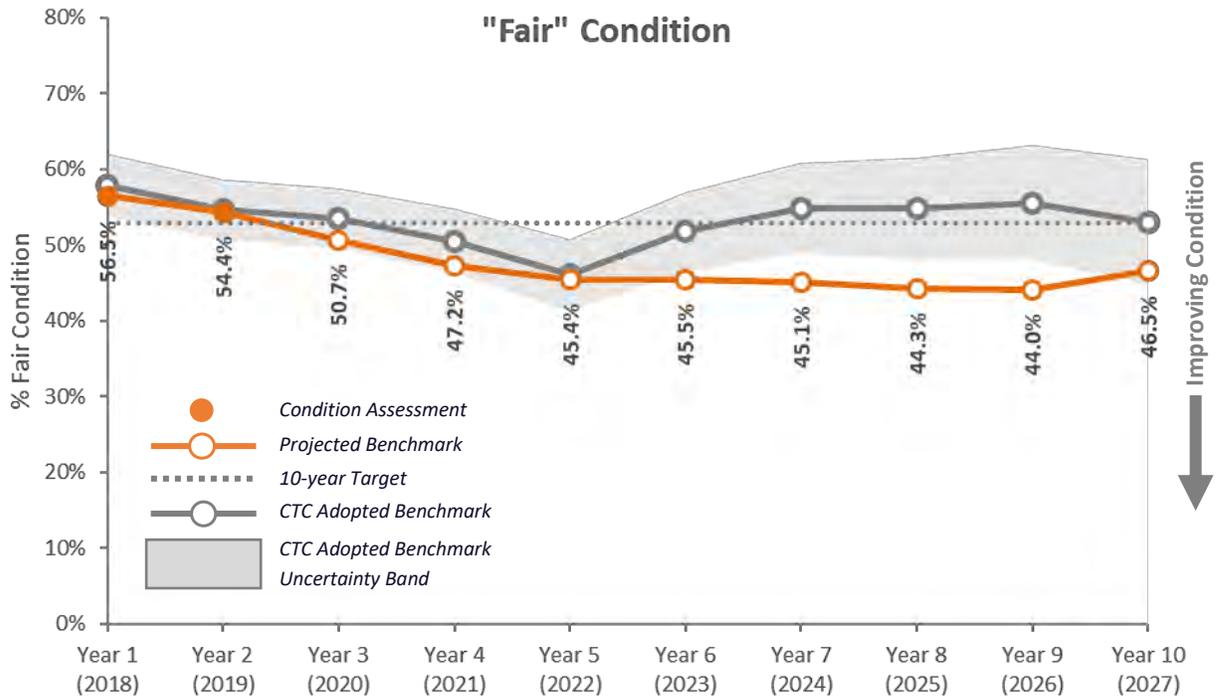
## Projected and Assessed Conditions

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.

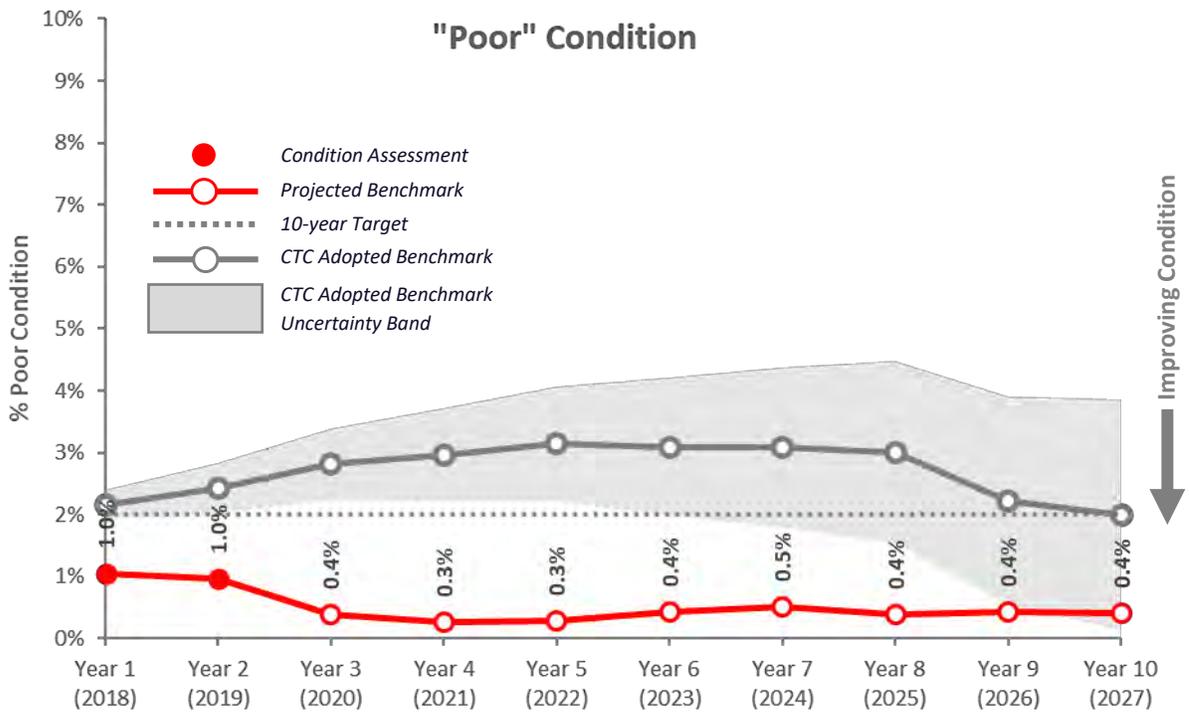


**Figure 7 - Pavement Class III, Good**

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**Figure 8 - Pavement Class III, Fair**



**Figure 9 - Pavement Class III, Poor**

## **Benchmark Observations**

Projected 2020 Pavement Class III conditions suggest that all condition targets are currently being met. Significant improvements are observed over the prior year's conditions with decreases in both fair and poor lane miles and an increase in good condition pavements. This will need verification once the 2020 APCS pavement conditions become available. Projected pavement conditions in future years indicate relatively stable conditions through 2027. Continued delivery of pavement projects supported by the initiation of SB-1 funding has been a contributing factor to the observed condition improvements.

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# Bridge and Tunnel Health

## Overview

Caltrans is responsible for the maintenance of 13,209 State Highway System (SHS) bridges 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 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 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 2021. 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**

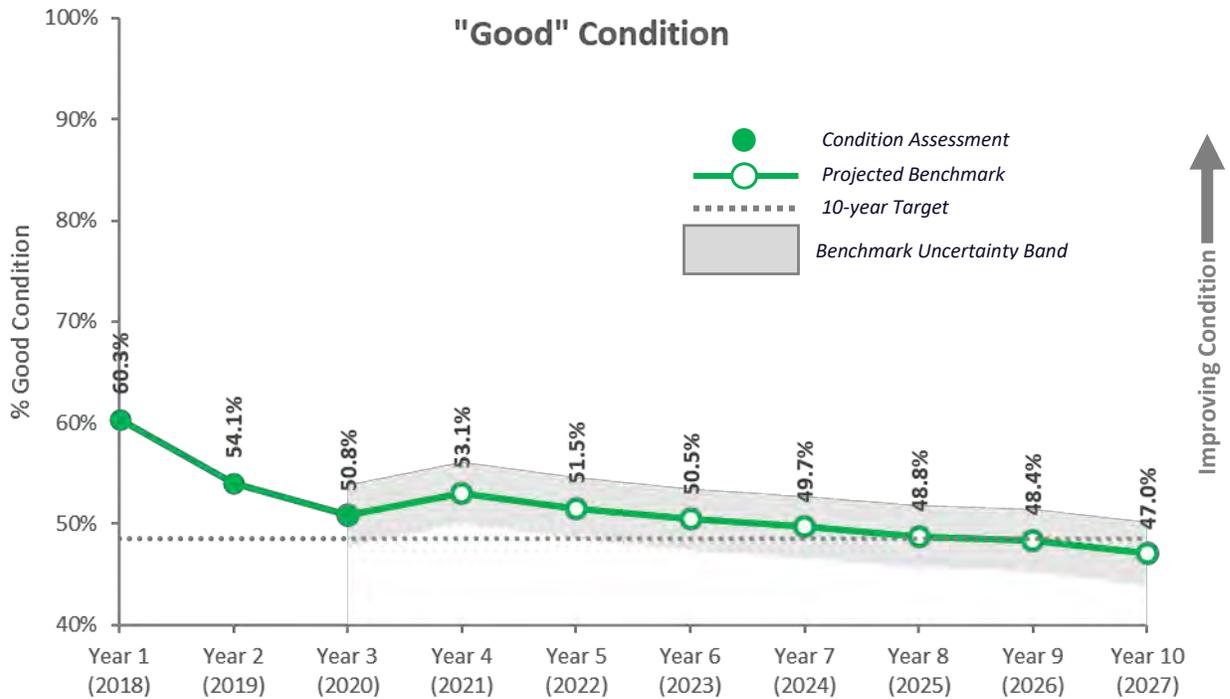
Condition	2027 Target	2019 Year End	2020 Year End	Change in Condition
Good	48.5%	54.1%	50.8%	-3.2% ↓
Fair	50.0%	42.5%	45.8%	+3.3% ↑
Poor	1.5%	3.5%	3.4%	-0.1% ↓

Note, the fair target for bridges and tunnels has been revised from prior reporting. The revision was presented and adopted in the March 2021 meeting of the California Transportation Commission. The increase in the fair target for bridges and tunnels from 15% to 50% was initiated by recent findings that a higher percentage of bridges and tunnels move to and remain in fair condition than initially observed. Furthermore, nearly half the existing fair bridges have no work recommendations, leading to an overstatement of fair needs in the plan. Note that not all fair bridges require any maintenance action. This change brings Caltrans more in line with fair bridge targets established in other state Departments of Transportation.

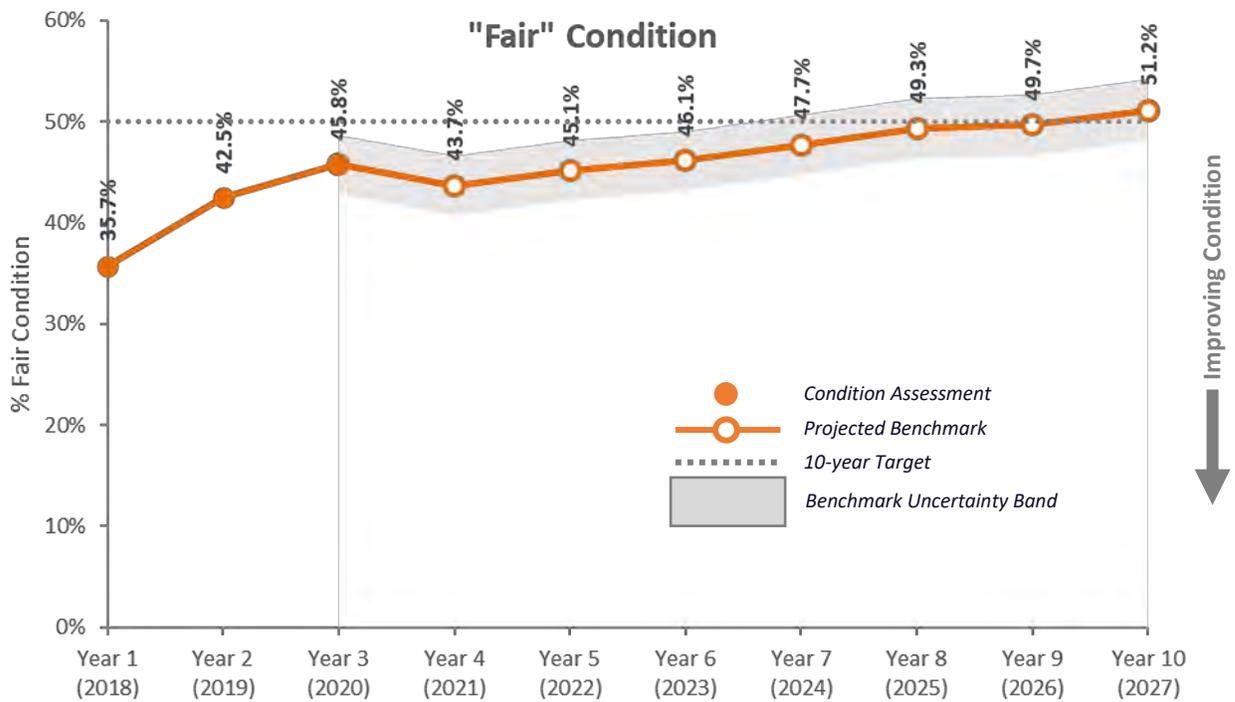
## Projected and Assessed Conditions

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 condition through 2020 is presented in the charts with a solid fill symbol.

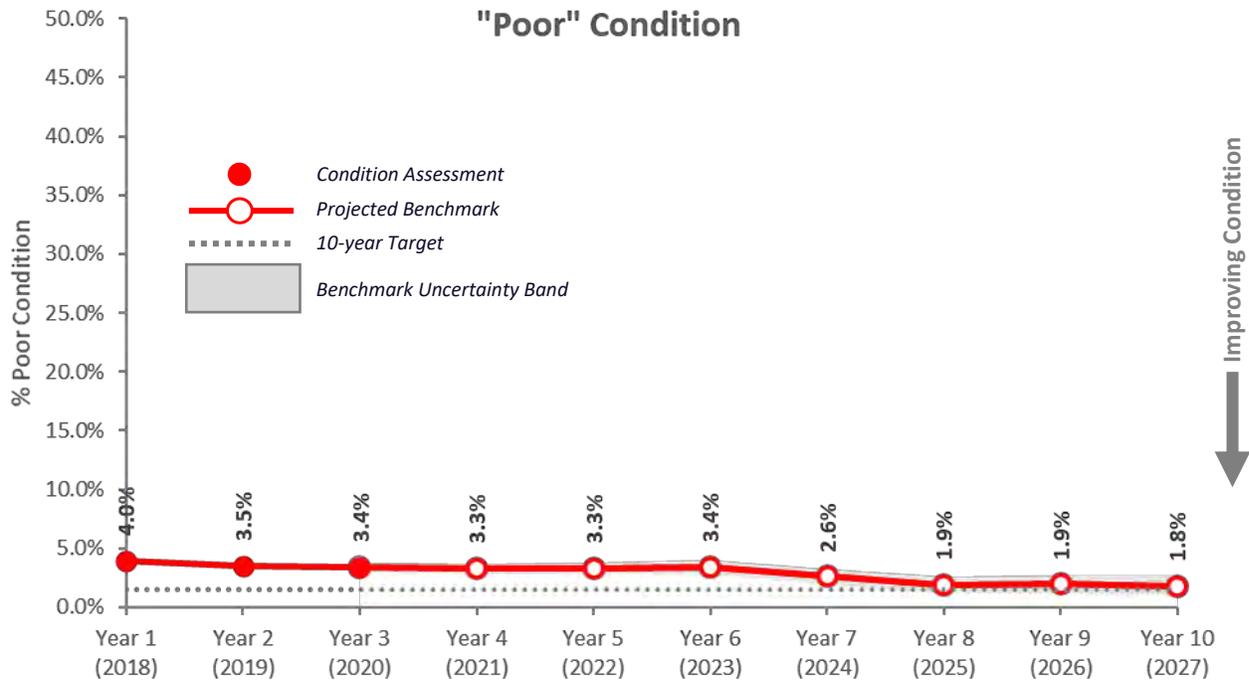
Due to the change in the fair target, the projected bridge conditions and associated uncertainty bands (represented by the grey shaded zones) have been adjusted to align with current projections and are only shown beginning with the current year through 2027.



**Figure 10 – Bridge and Tunnel Health, Good**



**Figure 11 - Bridge and Tunnel Health, Fair**



**Figure 12 – Bridge and Tunnel Health, Poor**

## Benchmark Observations

The condition of poor bridges and tunnels has declined over the prior year and current projections suggest that this decreasing poor trend will continue through 2027. The percentages of good and fair have worsened, however, on the order of 2% to 3%. This increase in fair and decrease in poor 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 recent Commission-adopted 50% fair target.

The reduction in poor bridges is dependent upon a new \$150 million, 2-year initiative under development to address millions of square feet of fair and poor bridges. This initiative is intended to address the subset of bridges where improvements to the deck will result in condition change of the entire bridge. These repairs can typically be carried out under quick turn-around projects, are cost-effective, and represent a significant portion of the remaining poor bridges in the inventory.

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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 166,477 inspected and rated culverts totaling over 16 million linear feet, that drain rainwater, drainage channels, streams, and rivers away from highways in a controlled manner. About 78% of the inventory has been assessed to-date, with the remaining 22% underway with a goal of completing initial assessments by 2023. Over 26,000 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 (June 2020 as reported in the 2021 SHSMP) 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.



### 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.

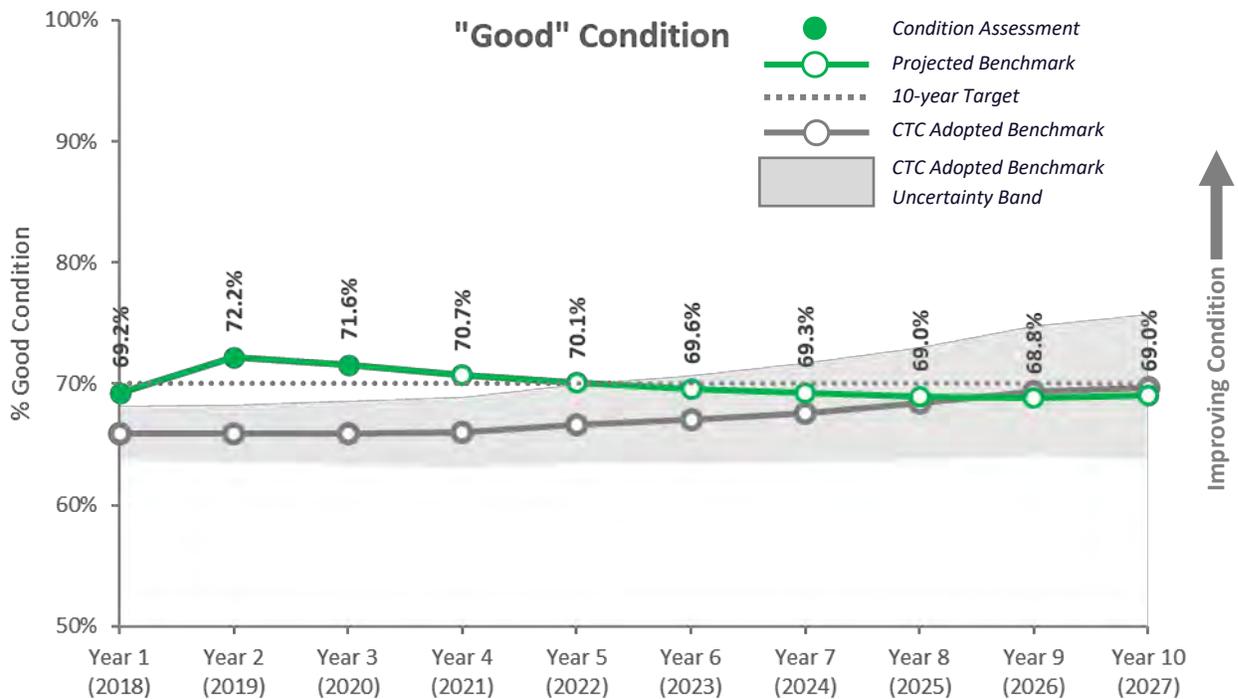
Note, the methodology for reporting conditions for drainage was recently changed to comply with a findings and recommendations from a recent Inspector General audit of drainage assessment practices. In prior reporting in the Performance Benchmarks and the State Highway System Management Plan, the condition 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**

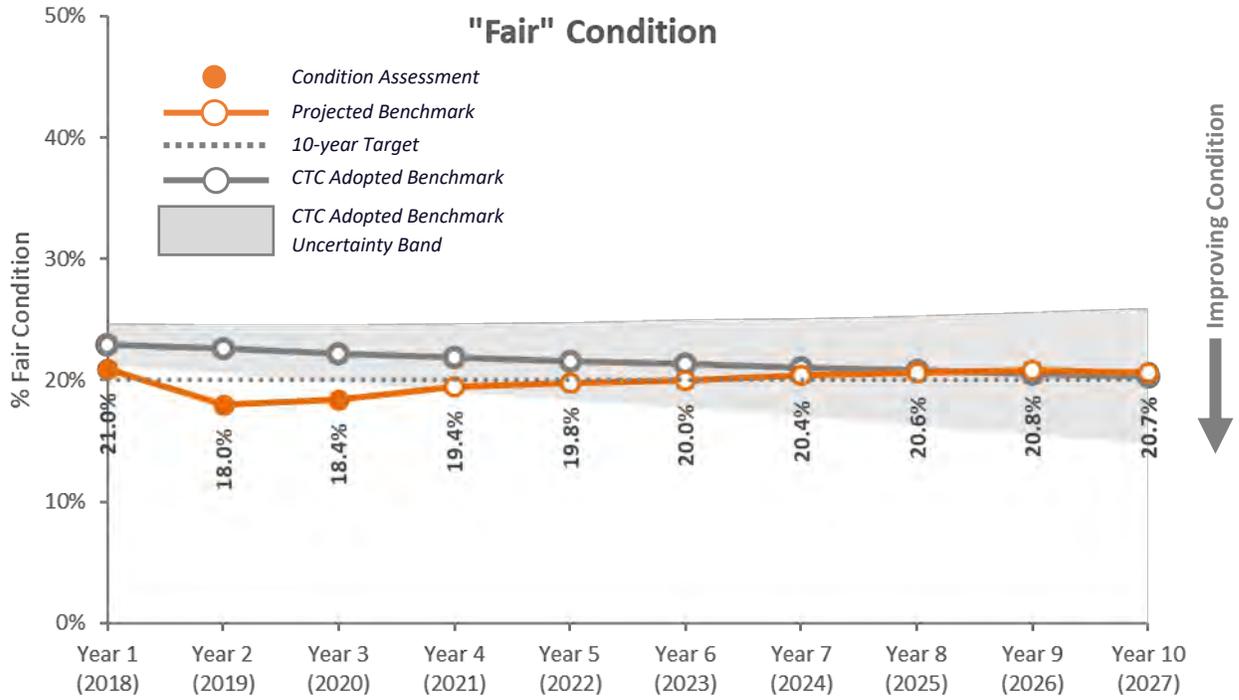
Condition	2018	2020	2027	Change
Good	70.0%	72.2%	71.6%	-0.6% ↓
Fair	20.0%	18.0%	18.4%	+0.4% ↑
Poor	10.0%	9.8%	10.0%	+0.2% ↑

## Projected and Assessed Conditions

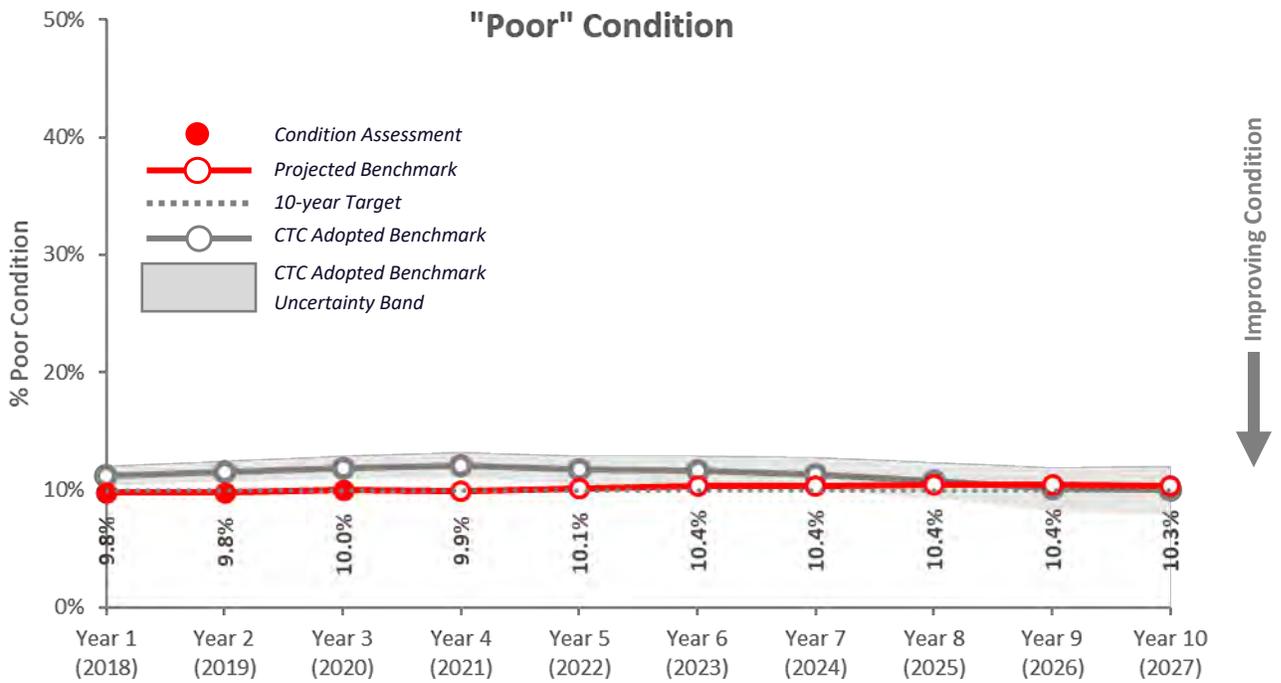
Drainage benchmarks are presented in Figure 13 through Figure 15. These charts show projected year-end good, fair, and poor condition as percentages of total linear feet from 2018 through 2027. The assessed condition through 2020 is presented in the charts with a solid fill symbol.



**Figure 13 – Drainage, Good**



**Figure 14 - Drainage, Fair**



**Figure 15 - Drainage, Poor**

## Benchmark Observations

The year-over-year assessed conditions for drainage are consistent with prior network conditions. Projections for fair and poor condition drainage suggest relatively consistent conditions over the next several years and coming within a fraction of a percentage point of the targets by 2027. This is well within uncertainty bands for the benchmark analysis. Caltrans will continue to closely monitor drainage conditions and project accomplishments.

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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 2021) as well as the prior condition assessments. Definitions of these condition states can be found in Appendix A.



### Timing of the Condition Assessment

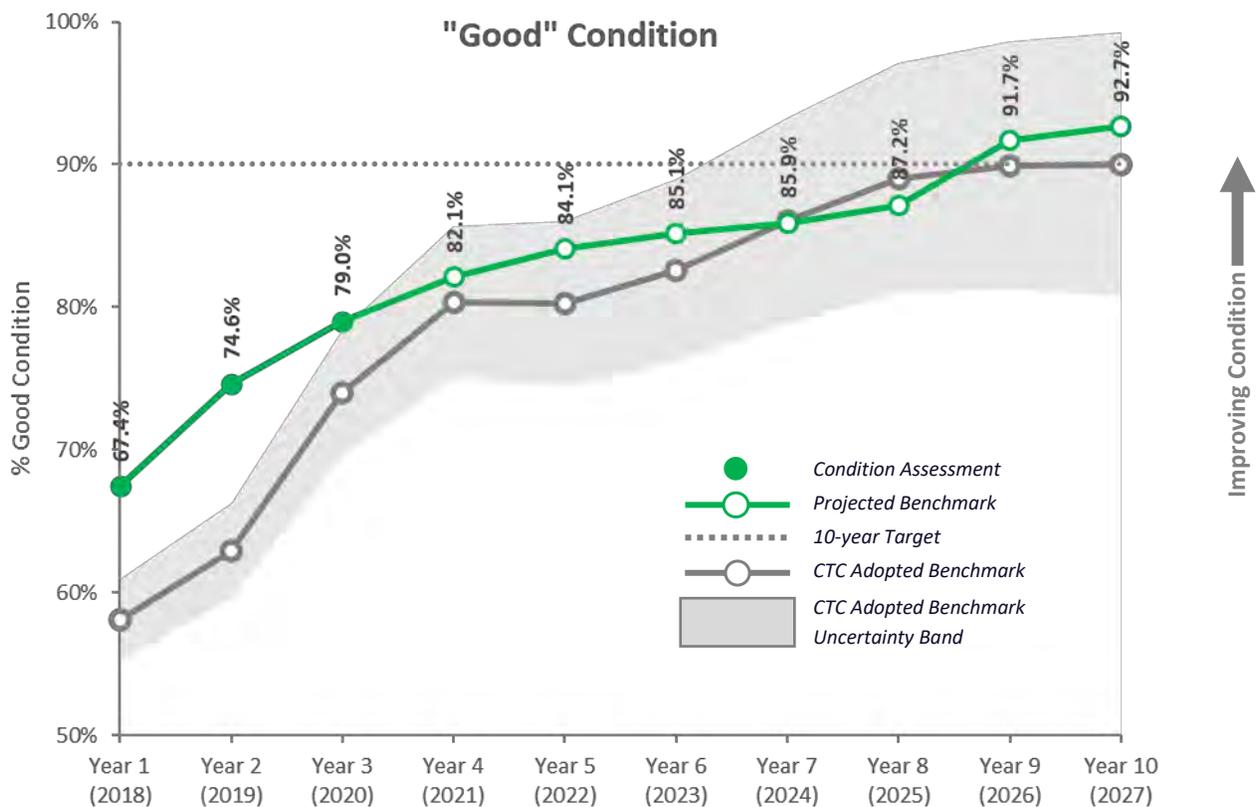
The reported annual TMS asset conditions are determined based on the age of the TMS asset and an assessment of how the TMS asset is functioning. This assessment is currently being updated quarterly.

**Table 8 - Transportation Management Systems Condition Summary**

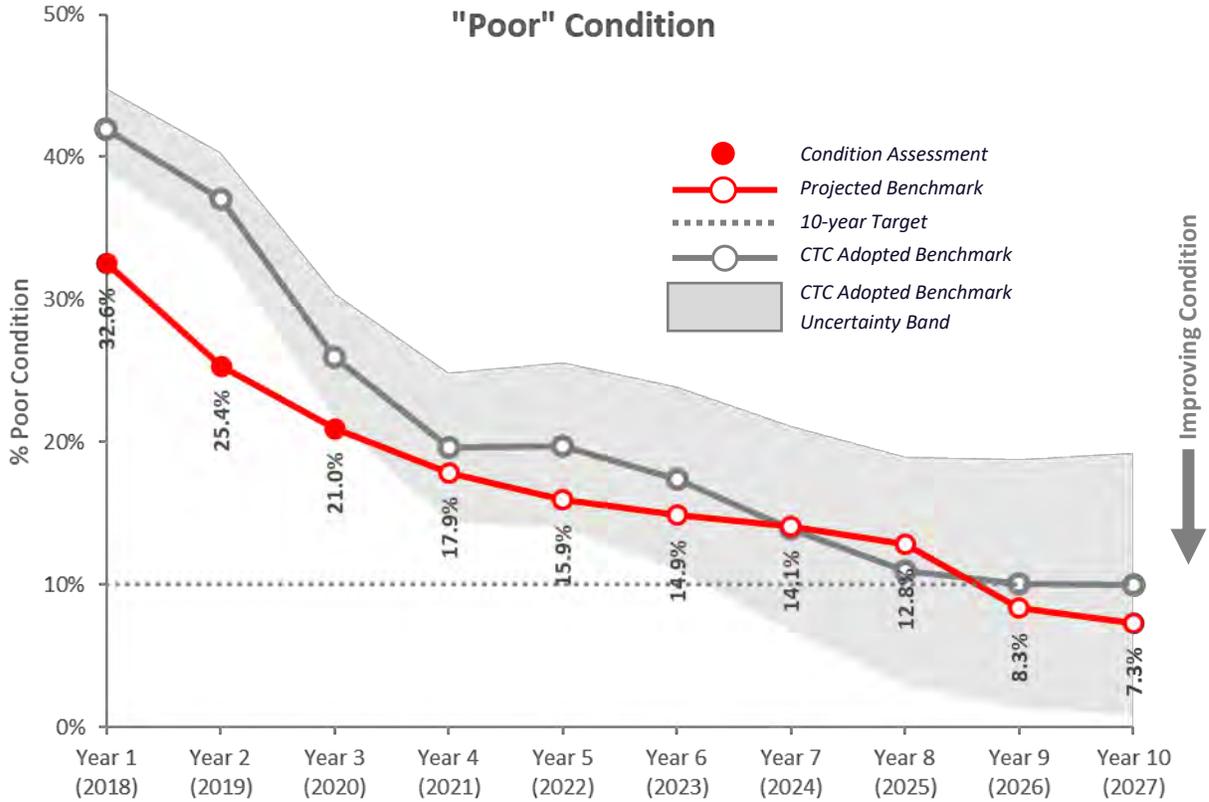
Condition	2027 Target	2019 Year End	2020 Year End	Change in Condition
Good	90.0%	74.6%	79.0%	4.4% ↑
Poor	10.0%	25.4%	21.0%	-4.4% ↓

## 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 2020 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 conditions reflect significant year-over-year improvements with an overall reduction in poor by 4.4%. This trend in TMS condition improvement is expected to continue through to 2027. Caltrans efforts to replace TMS components through work by Caltrans maintenance crews and electricians will continue to be a significant factor in achieving 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.

## 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 annually from Fiscal Year (FY) 2017/18 to 2020/21. The data shows that over the course of the past 4 fiscal years, Caltrans has fixed a total of 998 bridges. This represents an additional 542 bridges fixed relative to the baseline of 114 fixed bridges per year (or 456 bridges over four 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.

### 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 2017/18	FY 2018/19	FY 2019/20	FY 2020/21	Total
Baseline	114	114	114	114	456
Additional	100	150	41	251	542
<b>Total</b>	<b>214</b>	<b>264</b>	<b>155</b>	<b>365</b>	<b>998</b>

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

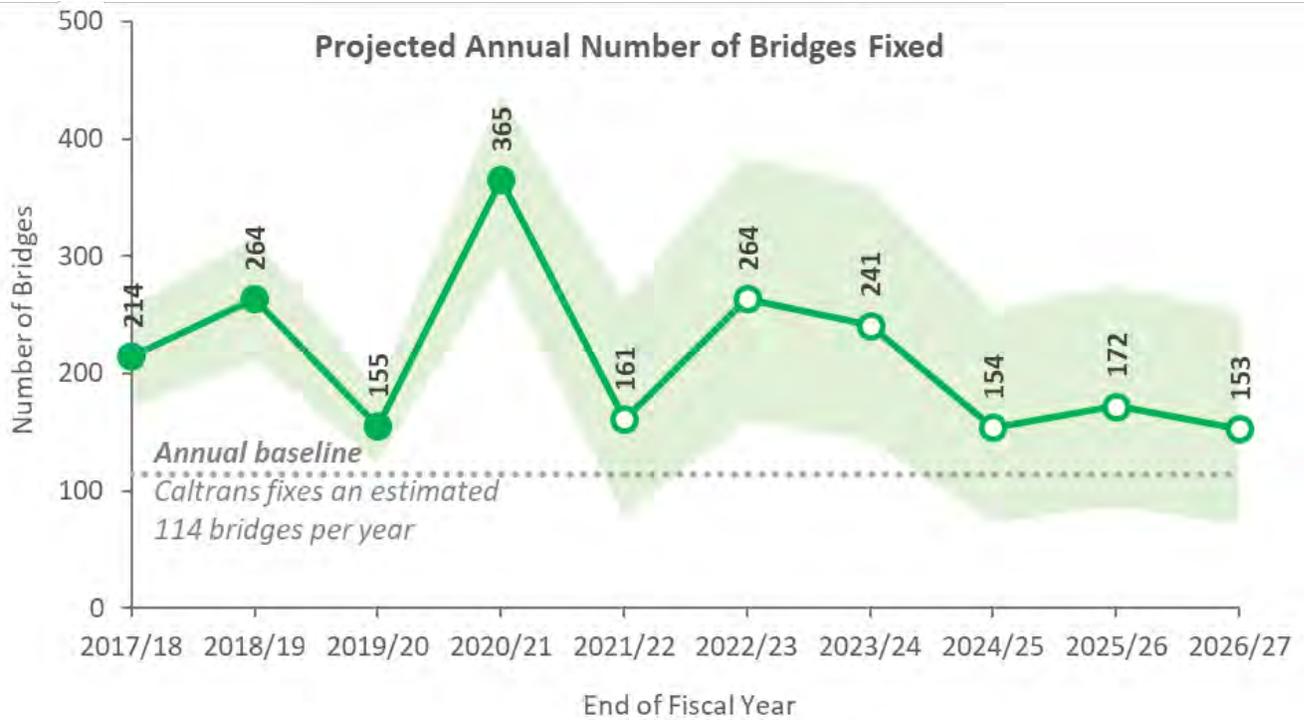
Fix Bridges	FY 2017/18	FY 2018/19	FY 2019/20	FY 2020/21	Total
Health	202	241	137	327	907
Scour	2	11	5	8	26
Seismic	9	12	11	17	49
Goods Movement	1	-	2	13	16
<b>Total</b>	<b>214</b>	<b>264</b>	<b>155</b>	<b>365</b>	<b>998</b>

**Table 9 & Table 10 Notes:**

- FY 2018/19: Number was reduced by one fixed bridge because construction was halted in midstream by court order
- FY 2019/20: Number was reduced by one fixed bridge because the bridge was already reported in the baseline.

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 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 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. 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**

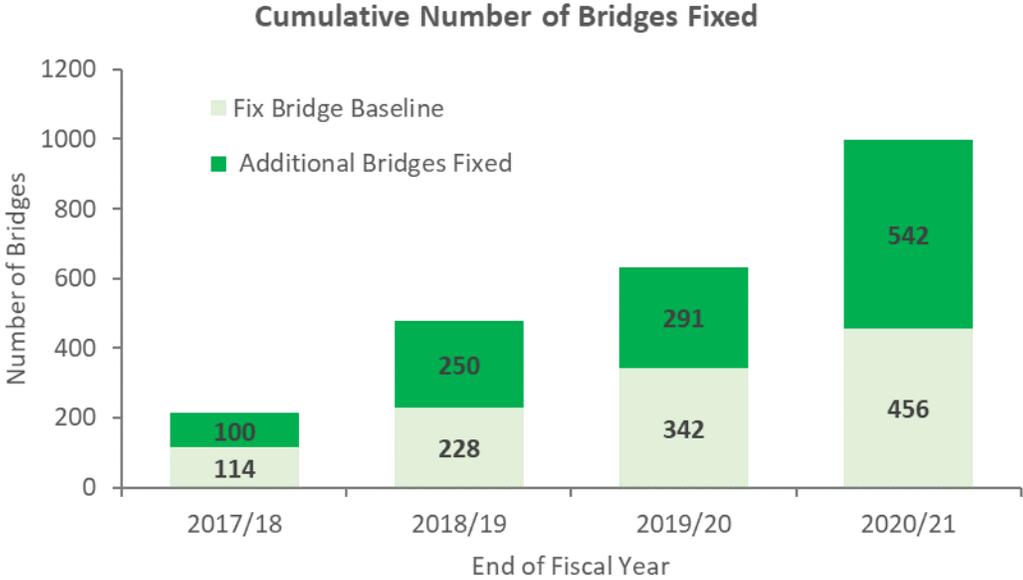
**Figure 18 Notes:**

- FY 2018/19: Number was reduced by one fixed bridge because construction was halted in midstream by court order
- FY 2019/20: Number was reduced by one fixed bridge because the bridge was already reported in the baseline.

The bridges evaluated to be fixed in fiscal years through 2020/21 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 542 bridges have been fixed over the course of the past four fiscal years, thereby meeting SB1 requirements.



**Figure 19 – Cumulative Total Number of Bridges Fixed to Date Above the Baseline**

**Figure 19 Notes:**

- FY 2018/19: Number was reduced by one fixed bridge because construction was halted in midstream by court order
- FY 2019/20: Number was reduced by one fixed bridge because the bridge was already reported in the baseline.

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# 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.

As of the time of report preparation, data from the 2020 APCS was not available due to delays in carrying out and processing assessments. As such, the LOS numbers presented for 2020 are carried over from 2019. Table 11 summarizes the assessments of LOS. The

Department will amend this report for LOS once the 2020 pavement information becomes available.

**Table 11 – LOS Summary**

SB 1 Target	2019 Year End	2020 Year End (Projected)
90	94	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:

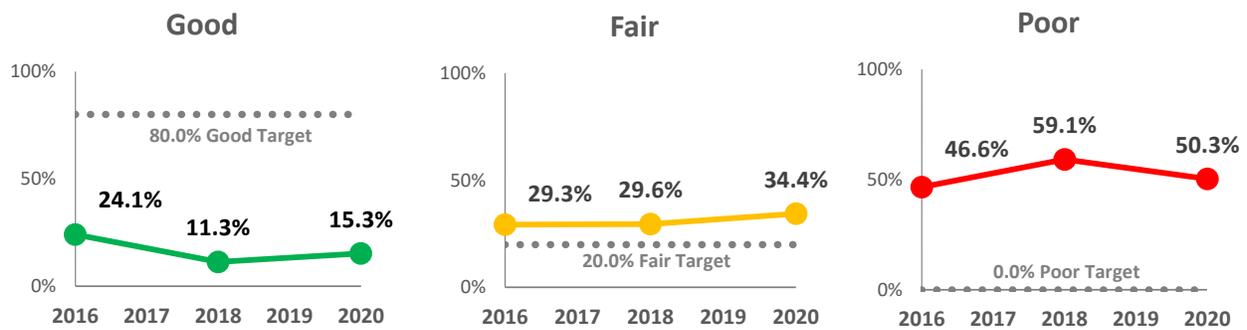
- Drainage Pump Plants
- Highway Lighting
- Office Buildings
- Overhead Sign Structures
- Roadside Rest Facilities
- Sidewalks, Park & Ride, and ADA Infrastructure (deficiency model)
- Transportation Related Facilities
- Weigh in Motion Scales

While funding to fully close performance gaps for supplemental assets has not been available to date, Caltrans continues to make investments towards maintaining and improving conditions. Note, the condition for Sidewalks, Park & Ride, and ADA

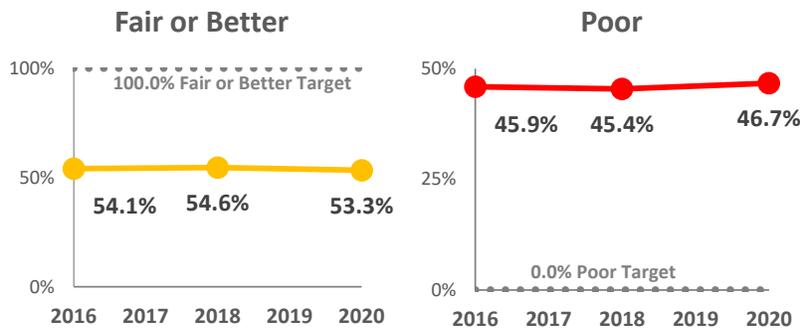
Infrastructure is not presented here, as only assets with measured conditions are tracked.

Figure 20 through Figure 26 presents the trends in supplemental 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), and 2020 (from the 2021 SHSMP). Condition assessments were not available for 2017, and 2019. Fair and poor target conditions are shown in the charts as grey dashed lines.

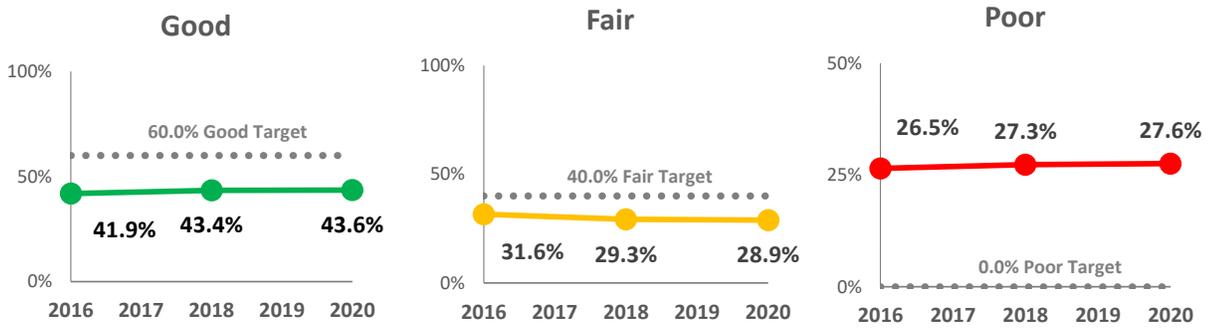
In the March 2021 meeting, the California Transportation Commission recommended that the Department review the adopted targets for the supplementary asset classes. This review will take some time to complete and potential changes were not available at the time of this report.



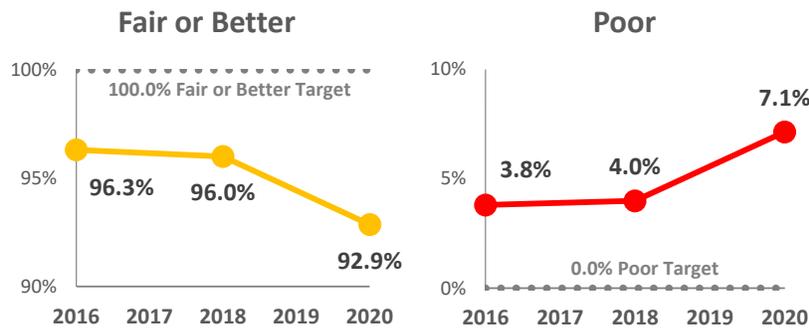
**Figure 20 – Condition of Drainage Pump Plants**



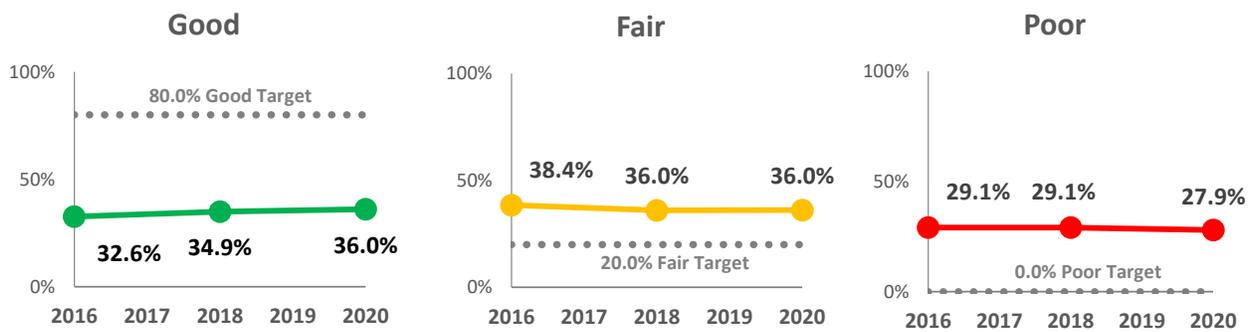
**Figure 21 – Condition of Highway Lighting**



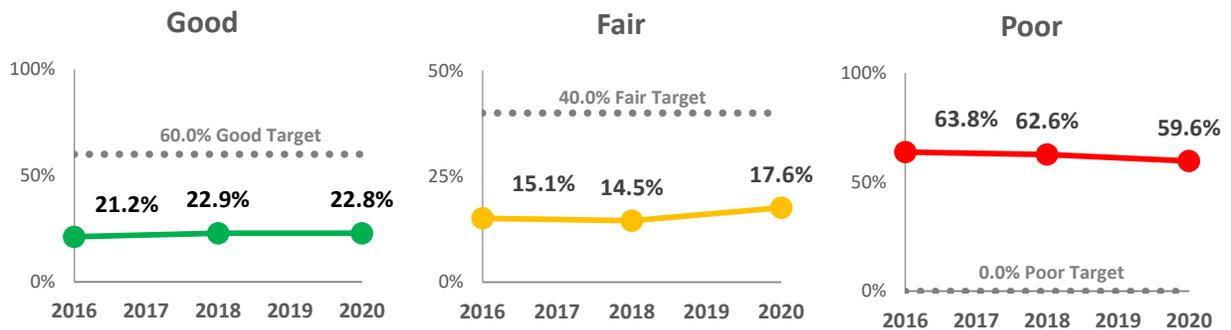
**Figure 22 – Condition of Office Buildings**



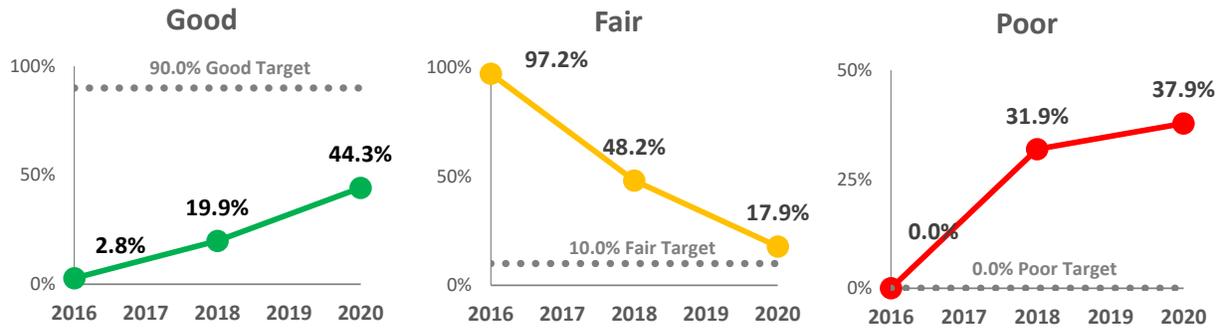
**Figure 23 – Condition of Overhead Sign Structures**



**Figure 24 – Condition of Roadside Rest Facilities**



**Figure 25 – Condition of Transportation Related Facilities**



**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 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 12 – Pavement Performance Metrics**

Metrics	Good	Fair	Poor	
<b>IRI (inches/mile)</b>	<95	95-170	>170	
<b>Cracking (%)</b>	Asphalt	<5	5-20	>20
	Jointed Concrete	<5	5-15	>15
	Continuously Reinforced Concrete	<5	5-10	>10
<b>Rutting (inches)</b>	<0.20	0.20-0.40	>0.40	
<b>Faulting (inches)</b>	<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 13 – Bridge Health Performance Metrics**

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

**Table 14 – Tunnel Health Performance Metrics**

<b>Condition</b>	<b>Criteria</b>
<b>Good</b>	Less than 20% of the elements are classified as deteriorated
<b>Fair</b>	More than 20% of the elements are classified with minor deterioration
<b>Poor</b>	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 15 – 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 16 – TMS Performance Metrics*

Condition	Criteria
<b>Good</b>	Within expected lifecycle and consistent functional availability
<b>Fair</b>	N/A
<b>Poor</b>	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 17 – Pavement LOS Criteria**

<b>Attribute</b>	<b>Failure Criteria</b>	<b>Description</b>
<b>Cracking</b>	cracking $\geq$ ½ inch	Any single crack at its widest point
<b>Potholes</b>	> 1 each pothole	Any potholes greater than 36 square inches in area
<b>Spalling</b>	$\geq$ 1 sq. ft.	Cumulative area of spalling

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