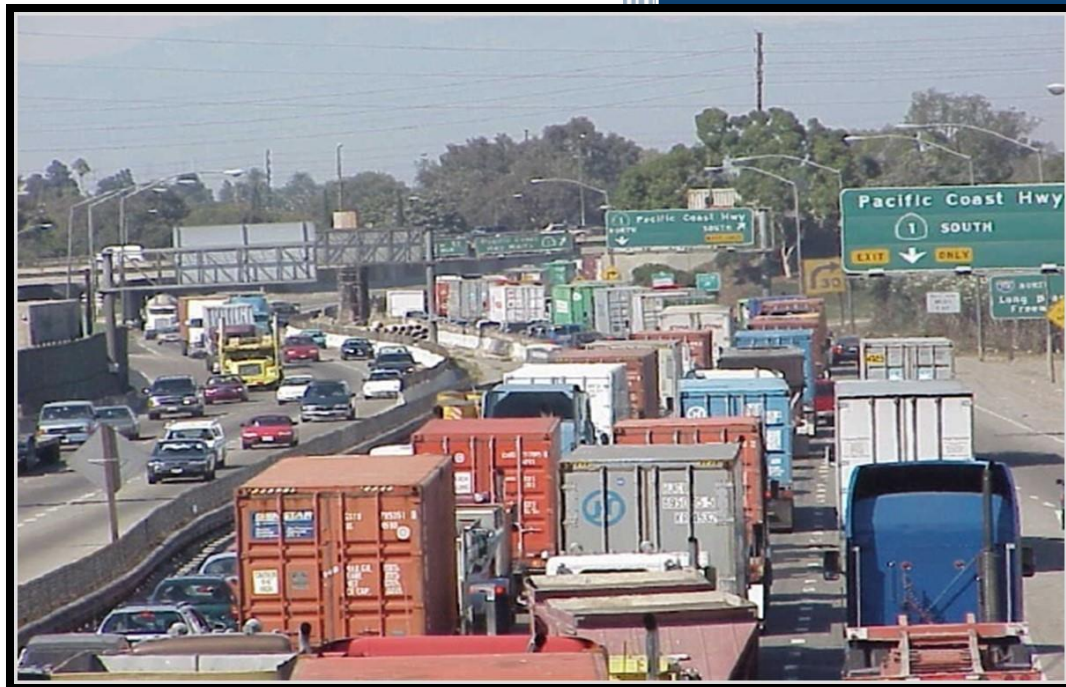


# Federally Mandated Bridge Load Ratings



Report to the Legislature  
2020 & 2021

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## Executive Summary

Bridge load rating is essential to maintaining a safe, sustainable, efficient, and economically sound transportation system. Load rating is the determination of the vehicular loads, in terms of vehicular weights, that a bridge structure can safely carry without structural damage or failure. Load rating of bridges on a continuous basis is needed to ensure the safety of the traveling public, meet federal regulations, and restrict loads so that bridge safety, serviceability, and durability will not be compromised.

The report provides an update on the following for Fiscal Years 2018-19, 2019-20, and 2020-21:

1. A summary of the recent history in completing bridge load ratings.
2. An accounting of task resource expenditures.
3. The number of bridge load ratings completed.
4. A workload estimate to complete ratings of bridges built prior to 1978.
5. An estimate of the workload required to complete ratings of bridges built since 1978.

Between Fiscal Years 2010-11 and 2015-16, the California Department of Transportation (Caltrans) encountered many challenges in its effort to meet the requirements of the agreement with the Federal Highway Administration due to limited historical data on old bridge modifications, load rating specification changes, and ongoing software upgrades. The Federal Highway Administration's 2016 review of Caltrans' progress determined these challenges limited Caltrans' ability to complete the necessary workload. As a result, the Federal Highway Administration terminated the 2011 Plan of Corrective Action and requested a new agreement.

Caltrans executed a new Plan of Corrective Action with the Federal Highway Administration on November 23, 2016, providing a 4-year timeline for completion of the necessary workload of bridge load ratings by November 2020. This new plan identified 14,371 state and local bridges still requiring new load rating calculations or updated engineering documentation.

In anticipation of the Federal Highway Administration's action, Caltrans requested, and later received, permanent resources in the State Budget in Fiscal Year 2016-17 to replace limited-term positions previously authorized to complete the bridge load ratings and to continuously perform load ratings into the future.

As of November 30, 2020, Caltrans has completed the load rating requirements for the 14,371 bridges, as specified in the Plan of Corrective Action. In total, approximately \$37.4 million has been expended since Fiscal Year 2010-11 in the effort to complete these federally mandated bridge load ratings. As this completion occurred during the

current fiscal year, this report includes an update on the previous two fiscal years and the current fiscal year.

With the completion of this load rating effort, Caltrans has developed a first- in-the-nation procedure to continuously maintain the load ratings to reflect changing field conditions, analysis specification changes, software versions, and new truck load cases over time. The Federal Highway Administration has approved this procedure, stating:

In this nation, California is the first to develop and implement a Load Rating Maintenance Plan (LRMP) procedural document to ensure load ratings of highway structures will be maintained in perpetuity. The Caltrans engineers working to determine conditions and capacities of nearly 25,000 structures to carry highway traffic should be proud of their efforts during the past 12 years. In November 2020, as we close the chapter on this Load Rating effort, Caltrans will continue to improve and maintain highway structure load ratings under these LRMP procedures.

Continuously maintaining load ratings of bridges will provide for the safety of the traveling public, maintain vital economic connections, and allow the State of California to meet federal regulations.

## **Background**

### **Statutory Reference and Purpose**

The Budget Act of 2019 (Assembly Bill (AB) 74, Ting, Chapter 23, Statutes of 2019, Section 2, Item 2660-001-0890, Provision 5) and the Budget Act of 2020 (Senate Bill (SB) 74, Mitchell, Chapter 6, Statutes of 2020, Section 2, Item 2660-001-0890, Provision 5) require Caltrans to report to the relevant legislative committees by March 1 on Caltrans' efforts to complete federally mandated bridge load ratings.

Pursuant to the above referenced budget acts, this comprehensive report provides a brief history of the load rating efforts, expenditures for this task, the number of bridge load ratings completed, and next steps following completion of the bridge load ratings requirements of the Federal Highway Administration.

### **Program Background**

The National Bridge Inspection Standards (Code of Federal Regulations, Title 23, Part 650), adopted in 1971, established new federal inspection requirements, including condition assessments and load ratings for bridges. Bridge load ratings are performed to determine the loads (vehicle weights) that structures can safely carry. The National Bridge Inspection Standards outline the requirements regarding the frequency with which states should conduct inspections; the qualifications of inspection personnel; and the data to be collected and reported. The data, which include bridge load ratings, are required to be reported annually to the Federal Highway Administration. The Federal Highway Administration's primary method of overseeing and ensuring compliance with the National Bridge Inspection Standards is an annual review of each state's bridge inspection program, which includes a field review of bridges, interviews with state bridge staff, and a review of state bridge inspection data. If the Federal Highway Administration determines that a state is not in compliance, and the state does not adequately address the issues, redirection of federal funds from projects can be imposed as a penalty to the non-compliant state.

The 2008 Annual Program Review by the Federal Highway Administration concluded that California's standard load ratings were not in compliance with the National Bridge Inspection Standards. Specifically, the ratings did not comply with load rating requirements defined in the American Association of State Highway and Transportation Officials' *Manual for Bridge Evaluation*.

As required by the Federal Highway Administration compliance program, in January 2011, Caltrans executed an agreement, identified as a Plan of Corrective Action that was later superseded by a new Plan of Corrective Action in 2016.

## Previous Report

This report is an update to Caltrans' 2019 report provided to the Senate Transportation Committee, Senate Budget and Fiscal Review Committee, Assembly Transportation Committee, and Assembly Budget Committee. Since that report, Caltrans has completed the required bridge load rating work.

## Program Status

The prescribed methodology for bridge load ratings is detailed in the American Association of State Highway and Transportation Officials' *Manual for Bridge Evaluation* and was chosen as the national standard effective December 15, 2011. In general, this methodology includes a review of a bridge's records to assess the condition of the bridge and the adequacy of load rating information. These assessments consider loads authorized by law (legal loads) and permit loads. Federal Highway Administration memoranda dated November 15, 2013, and November 3, 2016, to all states require load ratings to take into account several new groups of vehicles (legal vehicles) authorized to use highways at the state and federal level between 2013 and 2016, including newer and heavier specialized hauling vehicles and emergency vehicles as described and defined in the Fixing America's Surface Transportation Act (FAST Act, Pub. L. 114-94, 129 Stat. 1312, December 4, 2015). Additionally, ratings describe the span reviewed and/or calculated, controlling span, controlling member and force, the rating method, and any assumptions used. A load rating is important to avoid structural damage or failure and is considered complete when a summary sheet is stamped by the load rating engineer.

Under the 2011 Plan of Corrective Action, 11,300 bridges were originally identified as needing new load rating calculations and 12,700 bridges required updated documentation. The 2016 Plan of Corrective Action, executed on November 23, 2016, established a new target of 14,371 total bridges, of which more than 6,000 required new calculations and more than 8,000 required updated documentation.

This report addresses the five specific areas, as required, in Item 2660-001-0890, Provision 5 of the budget acts of 2019 and 2020:

1. *An explanation of any delays in completing the required bridge load ratings.*

Caltrans has overcome several challenges since 2016 and has completed the required work by the November 2020 deadline. Challenges that were overcome include limitations in the load rating analysis software, development of a training program for new staff, acquiring legible bridge plans from local agencies in California, and documentation of past analyses that have been conducted.

2. *An accounting of how resources budgeted to this task have been spent to date.*

Table 1 (below) provides the expenditures that have been spent to date, through November 30, 2020, totaling approximately \$37.4 million. The Budget Change Proposal in Fiscal Year 2016-17 provided permanent resources for Caltrans in the amount of \$3,890,000 (\$3,653,000 in Personal Services and \$237,000 in Operating Expenses) for 26 positions to perform federally mandated bridge load rating work, as well as a one-time augmentation of \$750,000 for California's contribution to AASHTOWare BrR software. Staff wages and benefits of those hired to the positions dedicated to performing the bridge load ratings account for the majority of the Personal Service Resources. Operating Expense resources have primarily been expended under the category of general expenses. Accomplishments related to this funding are covered in the next section.

Caltrans has determined the bridge analysis component accounts for approximately 76 percent of the work needed to complete a bridge load rating with the remaining 24 percent for manual records investigation; bridge model correlations; quality assurance inspections; regular reporting and reviews; and the various software revision analysis and testing.

**Table 1 - Personal Services & Operating Expenditures Per Fiscal Year (in millions)**

Table 1										
Expenditures to Date Per Fiscal Year (in millions)										
2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
\$1.57	\$3.23	\$3.37	\$3.71	\$3.83	\$3.62	\$4.55	\$3.43	\$3.75	\$3.91	\$2.38
*Expenditures prior to FY 2015-16 reflect funds provided from Budget Change Proposals in FY 2010-11 and FY 2011-12 for 26 limited-term positions. Current through November 30, 2020.										

3. *An update on the number of bridge load ratings completed.*

Caltrans completed load ratings on 15,314 bridges in six years under the 2011 Plan of Corrective Action. Since the 2016 Plan of Corrective Action was instituted, Caltrans has completed the load rating evaluations on the required 14,371 total bridges.



The breakdown on the number of bridge load ratings and documentation updates completed to date, per fiscal year, is shown in Table 2 below.

**Table 2 - Number of Bridge Load Ratings & Updates Completed to Date**

2011 Plan of Corrective Action (PCA)							2016 PCA				
Fiscal Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
<b>Annual Completions</b>	0	846	1,570	4,928	4,442	3,528	3,442	3,626	2,945	1,403	2,955
<b>Cumulative Total Completed</b>	0	846	2,416	7,344	11,786	15,314	3,442	7,068	10,013	11,416	14,371
<i>Current through November 30, 2020.</i>											

4. *An estimate of the workload required to complete bridge load ratings of bridges built prior to 1978.*

The 2016 Plan of Corrective Action supersedes the 2011 Plan of Corrective Action and identifies a different set of bridges without reference to the year in which a bridge was built. The 2016 Plan of Corrective Action does not prioritize or track the workload based on the year in which a bridge was built, as was done under the previous plan. For this reason, Caltrans does not provide an estimate for load ratings of bridges built prior to 1978.

Under the 2011 Plan of Corrective Action, 11,300 bridges built prior to 1978 were identified for analysis. When the 2011 plan was superseded, approximately 34 percent of the 11,300 bridges had already been load rated.

5. *An estimate of the workload required to complete bridge load ratings of bridges built since 1978.*

Caltrans estimates approximately 12,700 bridges have been built since 1978. However, Caltrans is no longer tracking load rating work for bridges based on the year in which a bridge was built. As such, no workload estimate for bridges built since 1978 is provided.

## Conclusion and Next Steps

Continually load rating bridges is critical to providing a safe and reliable transportation network—a key aspect of Caltrans' mission. The development of a team of professionally licensed engineers in 2011 to load rate and update documentation was difficult and faced many challenges, but it resulted in innovation and is now a regular Caltrans activity.

Bridge load rating is essential to maintaining a world-class transportation network. Bridge load ratings consider the effects of new construction, new state and federal requirements, changes in structural condition, and other factors that affect bridge load capacity. Regularly considering these factors informs Caltrans engineers where action is necessary to promote bridge safety, serviceability, and durability. Decisions involving bridge maintenance, retrofitting, strengthening, widening, and replacement rely heavily on complete and accurate load rating information. Additionally, load rating information is critical to the ability to safely route trucks across the state. California averages approximately 150,000 transportation permits a year, all of which rely on bridge load rating data.

New legal vehicles have been and will continue to be incorporated into the ongoing load rating effort. Specialized hauling vehicles have been included in all calculated ratings beginning in November 2013, and with Fixing America's Surface Transportation Act (FAST Act), emergency vehicles were included in the calculations starting January 2017.

With the completion of 14,371 bridge load ratings in November 2020 under a 2016 Plan of Corrective Action, Caltrans has completed its agreements with the Federal Highway Administration to improve its bridge load rating practices. This achievement was made possible by the increased resources provided by the State Legislature beginning in Fiscal Year 2010-11. The Legislature making these resources permanent in the Budget Act of 2016 (Senate Bill 826, Leno, Chapter 23, Statutes of 2016) will allow Caltrans to continue using these resources to load rate bridges in perpetuity. These load ratings will be conducted in accordance with Caltrans' Load Rating Maintenance Plan, a first for the nation that demonstrates Caltrans' innovative spirit and how the department is achieving its strategic goal of strengthening stewardship.

## References

American Association of State Highway and Transportation Officials, AASHTOWare Bridge Rating Software, 2017. <<https://www.aashtoware.org/products/bridge/bridge-overview/>>

Manual for Bridge Evaluation, 3rd Edition, American Association of State Highway and Transportation Officials, 2018 <<https://news.transportation.org/Pages/033018pubs.aspx> >

Federal Highway Administration, "Load Rating for the FAST Act's Emergency Vehicles," Memorandum, November 3, 2016. <<https://www.fhwa.dot.gov/bridge/loadrating/161103.cfm>>

Federal Highway Administration, "Load Rating of Specialized Hauling Vehicles," Memorandum, November 15, 2013. <<https://www.fhwa.dot.gov/bridge/loadrating/131115.cfm>>

National Bridge Inspection Standards, Code of Federal Regulations, Title 23, Subpart C, Section 650.301 et seq.

## Appendix A. Statutory Reporting References

### 1. Budget Act of 2019 (AB 74, Ting, Chapter 23, Statutes of 2019, Section 2, Item 2660-001-0890, Provision 5)

**2660-001-0890**—For support of Department of Transportation, payable from the Federal Trust Fund

#### Provision:

5. The Department of Transportation shall report to the relevant legislative committees no later than March 1, 2020, on the department's efforts to complete federally mandated bridge load ratings. The report shall include
  - (a) an explanation of any delays in completing the required bridge load ratings,
  - (b) an accounting of how resources budgeted to this task have been spent to date,
  - (c) an update on the number of bridge load ratings completed,
  - (d) an estimate of the workload required to complete bridge load ratings of bridges built prior to 1978, and
  - (e) an estimate of the workload required to complete bridge load ratings of bridges built since 1978.

### 2. Budget Act of 2020 (SB 74, Mitchell, Chapter 6, Statutes of 2020, Section 2, Item 2660-001-0890, Provision 5)

**2660-001-0890**—For support of Department of Transportation, payable from the Federal Trust Fund

#### Provision:

5. The Department of Transportation shall report to the relevant legislative committees no later than March 1, 2021, on the department's efforts to complete federally mandated bridge load ratings. The report shall include
  - (a) an explanation of any delays in completing the required bridge load ratings,
  - (b) an accounting of how resources budgeted to this task have been spent to date,
  - (c) an update on the number of bridge load ratings completed,

- (d) an estimate of the workload required to complete bridge load ratings of bridges built prior to 1978, and
- (e) an estimate of the workload required to complete bridge load ratings of bridges built since 1978.