
Exhibit 11-B: Bridges and Structures

Definitions

Bridge – Defined in 23 Code of Federal Regulations (CFR) 650.305, a bridge is: a structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.

Bridge Length – The greater dimension of a structure measured along the center of the roadway between backs of abutment backwalls or between ends of bridge floors.

Bridge Roadway Width – The clear width of a structure measured at right angles to the center of the roadway between the bottom of curbs or, if curbs are not used, between the inner faces of parapet or railing.

Other Structures – Any structure, other than a “bridge,” as defined above, that is related to a Local Public Agency (LPA) highway or transportation project, including but not limited to:

- Structures designed as a bridge, but not meeting the bridge definition noted above
- Culverts not meeting the bridge definition noted above
- Earth retaining structures
- Underground structures
- Pedestrian and/or bicycle structures
- Transit structures

Statewide Design Standards for Bridges and Structures

LPA funded highway transportation projects with bridges and structures on the State Highway System (SHS) must be designed in accordance with current SHS standards in the Caltrans bridge design and geotechnical manuals.

All local bridge and structure projects off the SHS, and either on or off the National Highway System (NHS), must be designed in accordance with the current Caltrans adopted edition of the AASHTO Local and Resistance Factor Design (LRFD) Bridge Design Specifications with California Amendments. Caltrans bridge design manuals, policies, standards, and guidance are available on the Caltrans Engineering Manuals website: <https://dot.ca.gov/programs/engineering-services/manuals>. The [Caltrans Geotechnical Manual](#) is also available from the Caltrans Engineering Manuals website.

The following bridge design policies, criteria, and standards address bridge design:

- The current Caltrans adopted edition of the AASHTO LRFD Bridge Design Specifications with California Amendments
- The current version of the Caltrans Seismic Design Criteria (SDC)
- The current releases to the Caltrans Bridge Memo to Designers (MTD)

The MTD serves as a supplement to the Caltrans adopted edition of the AASHTO LRFD Bridge Design Specifications with California Amendments and the Caltrans' Seismic Design Criteria. Caltrans MTDs are technical policies and procedures particular to California and assist the Structure Designer in the interpretation and application of structural and seismic design standards.

The [Bridge Design Detailing Manual Guidelines](#) includes standard guidelines, examples, and checklists to assist engineers and detailers to produce Preliminary Design Studies, Contract Plans and other detailing related standards.

Bridge Design Alternatives

Structural Capacity - Alternatives to the criteria contained herein for the structural capacity of bridges, bridge railings, and other structures are not allowed. Alternatives to bridge design detailing are permitted as long as they do not impact structural capacity.

Geometric Standards - Alternatives to accepted geometric standards are allowed. For alternatives to geometric criteria, see Design Decisions described in Section 11.5. Design decisions that would result in the construction of a federally funded new bridge with a Sufficiency Rating of less than 80 are not allowed.

Railroad Bridges

LPAs should consider developing project-specific design criteria for local bridge projects carrying rail traffic.

Bridge Railing

LPA funded highway transportation projects on the SHS must use a current Caltrans approved bridge railing. Current Caltrans approved bridge railings and associated details can be found within the current [Caltrans Standard Plans](#) and current [Caltrans Bridge Standard Details](#) (commonly referred to as XS sheets).

For local bridge projects off the NHS, bridge railing designs must either meet the crash testing requirements of [AASHTO Manual for Assessing Safety Hardware \(MASH\)](#), or can be geometrically and structurally evaluated as equal to a crash-tested system. For more information on bridge railing types tested under AASHTO MASH, or for bridge railing that has been evaluated as equal to a crash-tested system, refer to both the AASHTO Task Force 13 Report: [A Guide to Standardized Highway Barrier Hardware](#) and the [FHWA Bridge Railings](#) website.

For local bridge projects on the NHS, bridge railing designs must meet the crash testing requirements of AASHTO MASH. Any new proposed bridge railing design must meet AASHTO MASH testing requirements.

Foundation Investigation for Design

A foundation investigation and report must be completed for all LPA bridge projects with major rehabilitation or replacement unless the engineer in responsible charge of design documents that site conditions clearly indicate the report is unnecessary. Federal funds will not participate in any construction change orders or claims relating to inadequate foundation investigations when such a waiver has been exercised. In addition, federal participation in future repair costs resulting from the inadequate foundation investigation will be made on a project-by-project basis.

The following reports are part of the foundation investigation:

- Structures Preliminary Geotechnical Report (SPGR)
- Preliminary Foundation Report (PFR) – Type Selection Process
- Foundation Report (FR) – Final PS&E Process

For further guidance refer to [Foundation Reports for Bridges](#) and [Foundation Reports for Buildings and Miscellaneous Structures](#).

Bridge and Culvert Hydraulic Design

LPA funded highway transportation projects with bridges and structures on the SHS must be designed in accordance with current SHS standards in the Caltrans bridge design manuals, [Caltrans Geotechnical Manual](#) and [Caltrans Highway Design Manual](#).

All local bridge and structure projects off the SHS and either on or off the NHS must be designed in accordance with the current Caltrans adopted edition of the AASHTO LRFD Bridge Design Specifications with California Amendments.

The goal of hydraulic design for bridges and structures is to convey surface and stream waters originating upstream of the drainage facility to the downstream side without significant upstream and downstream impacts in a manner that meets regulatory requirements.

The LPA must use sound engineering judgment in selecting and applying their project-specific hydraulic criteria in order to design the most cost-effective project considering the importance of the facility, safety, federal and state regulations, environmental requirements, legal obligations, and ease of maintenance.

The following resources are available to assist LPAs in hydraulics and hydrologic design:

- [Caltrans Highway Design Manual](#)
- [FHWA Hydraulic Engineering Circular \(HEC\) Publications](#)
- [LAPM Chapter 11, Section 11.6 - Highway Cross Drainage, Hydraulic, and Hydrologic Design](#)
- [FHWA Hydraulic Engineering Website](#)
- [Central Valley Flood Protection Board Website](#)
- [NOAA Fisheries Website](#)
- [California Department of Fish and Wildlife Website](#)

The LPA must document their selected project-specific hydraulic and hydrologic design criteria within the following two bridge hydraulic reports:

- Preliminary Hydraulic Report (during the project planning phase)
- Final Hydraulic Report (during the project design phase)

The Scour Data Table must be shown on the plans for new projects and on the As-Built Plans for projects going to construction after November 16, 2015.

References

AASHTO

LRFD Bridge Design Specifications

<https://store.transportation.org/item/collectiondetail/202>

LRFD Guide Specification for the Design of Pedestrian Bridges

<https://store.transportation.org/Item/PublicationDetail?ID=2333>

Standard Specifications for Highway Bridges

<https://store.transportation.org/item/collectiondetail/15>

Task Force 13 Report: A Guide to Standardized Highway Barrier Hardware

<https://tf13.org/OldGuide/plots/Gshbh.pdf>

Caltrans

Bridge Design Details

<https://dot.ca.gov/programs/engineering-services/bridge-design-details>

Bridge Memo to Designers

<https://dot.ca.gov/programs/engineering-services/manuals/memo-to-designers>

Bridge Rails and Barriers, A Reference Guide for Transportation Projects in the Coastal Zone

<https://dot.ca.gov/-/media/dot-media/programs/design/documents/caltrans-bridge-rails-and-barriers-a11y.pdf>

Bridge Standard Details (XS Sheets)

<https://dot.ca.gov/programs/engineering-services/manuals/bridge-standard-details>

California Amendments (to the AASHTO LRFD Bridge Design Specification) – current edition

<https://dot.ca.gov/programs/engineering-services/manuals>

California Bank and Shore Rock Slope Protection Design

https://www.fs.fed.us/biology/nsaec/fishxing/fplibrary/Racin_2000_California_bank_and_shore_rock_slope_protection.pdf

Caltrans Engineering Manuals

<https://dot.ca.gov/programs/engineering-services/manuals>

Caltrans Geotechnical Manual

<https://dot.ca.gov/programs/engineering-services/manuals/geotechnical-manual>

Foundation Reports for Buildings and Miscellaneous Structures

<https://dot.ca.gov/-/media/dot-media/programs/engineering/documents/geotechnical-services/202001-gm-frforbuildings-a11y.pdf>

Foundation Reports for Bridges

<https://dot.ca.gov/-/media/dot-media/programs/engineering/documents/geotechnical-services/202101-gm-frforbridges-a11y.pdf>

Standard Plans

<https://dot.ca.gov/programs/design>

Soil and Rock Logging Manual

<https://dot.ca.gov/programs/engineering-services/manuals/soil-and-rock-logging-manual>

FHWA

23 CFR Part 650 Bridges, Structures and Hydraulics

<https://www.ecfr.gov/current/title-23/part-650>

FHWA Bridge Railing

https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/listing.cfm?code=long

Hydraulic Engineering

<http://www.fhwa.dot.gov/engineering/hydraulics/>

Other

California Department of Fish and Wildlife

<http://www.wildlife.ca.gov/>

Central Valley Flood Protection Board

<http://www.cvfpb.ca.gov/>

NOAA Fisheries

<http://www.nmfs.noaa.gov/>