



## 12-8 STEEL PEDESTRIAN BRIDGES

### General

This memo addresses the Division of Engineering Services (DES) design and construction policies for steel pedestrian bridges to be built within the State right of way. All other Caltrans guidance material and memos still apply (such as the Highway Design Manual (HDM), Design Information Bulletins (DIB) 82-03, etc.). Caltrans standards for bicycle facilities exceed the AASHTO standards, so direct reference to the AASHTO guides for pedestrian bridges may not be sufficient.

Pedestrian bridges are structures which cross highways, roads, railroads, waterways, and other features, and are primarily designed for pedestrian, bicyclists, equestrian and light maintenance vehicle traffic but not designed for typical highway traffic.

### Steel Pedestrian Bridge Classifications

Steel pedestrian bridges shall be classified as either “standard bridges” or “minor bridges.” These classifications are to be used by the DES in determining the design and construction conformance criteria for steel pedestrian bridges.

A steel pedestrian bridge is defined as a standard bridge if it satisfies one or more of the following:

- The bridge crosses the state highway, local roadway or railroad.
- The bridge provides a major link for the public to important service facilities such as schools, transportation hubs, public sports and convention facilities, libraries and hospitals.
- The bridge is officially designated as critical by a local emergency plan.
- The bridge is maintained by Caltrans.

All pedestrian bridges are considered to be standard bridges unless they have been designated by the State Bridge Engineer to be minor bridges. Minor bridges may potentially conform to less stringent design and review protocol and to less stringent fabrication requirements.

### Obtaining A Minor Bridge Classification

Steel pedestrian bridges to be classified as minor bridges shall be approved by the State Bridge Engineer through the Structure Type Selection process.



For in house projects, when a project engineer determines that a minor bridge designation is appropriate, as a part of the Type Selection process the project engineer shall obtain written concurrence from the District to use the minor bridge design and construction criteria.

For special funded projects or encroachment permit projects, prior to the Type Selection process, the local agency shall submit a formal written request to the District to classify the bridge as minor. This written request shall include a discussion of the following:

- Why the proposed bridge cannot be located outside of the State right-of-way.
- Why the right-of-way cannot be relinquished to the local agency.
- Impacts and interferences with current and future operations and maintenance of the highway facilities.
- Draft verbiage that will be included in the maintenance agreement with the local agency stating that the local agency will:
  1. Operate and maintain the structure,
  2. Indemnify the State from any liability for the bridge, and
  3. Remove the bridge upon request of the State if it is not properly maintained.

Once the District provides the DES with written concurrence to the local agency's request, the proposed structure and the minor classification can be further considered through the Type Selection process.

Final bridge design should not begin prior to the Type Selection approval.

It shall be noted that though a bridge may be classified as minor, all geometric pedestrian standards still apply (it is generally the District's role to ensure compliance).

## Design Specifications

All pedestrian bridges shall be designed in accordance with the current *AASHTO LRFD Bridge Design Specifications* with California Amendments, in conjunction with the current version of the *AASHTO Guide Specifications for the Design of Pedestrian Bridges*. It will be determined through the Type Selection process whether deviations within these codes are warranted. From a design perspective, the only difference between a standard bridge and minor bridge is how steel members are specified on the plans as discussed below.



### *Steel Member Identification*

All steel members in a standard bridge shall be identified on the plans as either “Fracture Critical Members (FCMs)”, “Main Members”, “Secondary Members” or “Primary Components of Main Members” in accordance with Caltrans Memo To Designers (MTD) 12-2.

All steel members in a minor bridge should be identified on the plans as “Main Members”, “Secondary Members” or “Primary Components of Main Members” in accordance with MTD 12-2. For minor bridges, it is unnecessary to identify FCMs.

### *Design Consideration*

It is strongly recommended that a redundant system be designed and the use of FCMs be avoided. The use of FCMs increases cost of fabrication, inspection, and testing dramatically.

Articles of “Box-Tube Connections; Choices of Joint Details and Their Influence on Costs” by J. W. Post (AISC, National Steel Construction Conference Proceedings, 1990, Kansas City, MO) provides valuable information for detailing and fabrication of tubular structures.

## **Pre-approval of Design-Manufacturers And Fabricators of Steel Pedestrian Bridges**

Design-Manufacturers and Fabricators (DMFs) of steel pedestrian bridges shall be pre-approved. To be eligible for pre-approval of Standard Bridges, DMFs shall be AISC certified or certified by Caltrans. Requests for pre-approval shall be submitted by DMFs to the Caltrans DES Material Engineering and Testing Services (METS), Office of Structures Materials, Quality Assessment and Management Branch, and the Caltrans DES Structural Steel Committee. Pre-approval may take up to six months for processing and involves the following:

- A facility visit by METS at the expense of the applicant for verification.
- Submission of a list that includes at least three steel truss bridges in service in or close to the State, with their location and description of usage.
- A set of design calculations and working drawings for sample bridges that could be built within the State right-of-way (for design-manufacturers only).

Pre-approval of a DMF will be based on a review of the submitted materials for conformance to the Caltrans’ requirements.

Requests for pre-approval may be submitted at any time. DMFs that are pre-approved will be included either on a pre-approved list for standard bridges or on a pre-approved list for minor bridges. DMFs without the AISC certification for fabrication of major steel bridges may be



qualified on the pre-approved list for minor bridges if a facility audit by METS warrants it. DMFs on the pre-approval list for standard bridges are automatically on the pre-approval list for minor bridges. The pre-approval status will remain valid for three years for standard bridges, and five years for minor bridges.

## Manufacturer-Designed Bridges

### *Concept Approval*

When a manufacturer-designed bridge (prefabricated bridge) is proposed for a pedestrian bridge crossing, the following information shall be prepared:

- Why a manufacturer-designed bridge is being proposed.
- How manufacturer-designed bridge will be specified on the plans.
- How the manufacturer-designed bridge will be covered in the special provisions.
- Restrictions and requirements for using the manufacturer-designed bridge in a public works contract.
- An assurance, certified by an engineer registered in the State of California, that the bridge will be designed and constructed to meet applicable Caltrans standards.
- Preliminary plan details that include general bridge configuration, connections between the superstructure and the substructures, connections to railing and connections to the top of deck.

A manufacturer-designed bridge to be classified as minor bridges shall be approved by the State Bridge Engineer through the Structure Type Selection process.

For in house projects, the project engineer shall prepare above information as a part of the Type Selection process.

For special funded and encroachment permit projects, the local agency shall prepare and submit the above information to the District prior to the Type Selection process. The Type Selection process can proceed once the District provides the DES with written concurrence to the local agency's justification.

Final design and PS&E approval of the substructure components, including foundations, must follow the normal Caltrans procedures.



### *Manufacturer-designed Bridges Designated as Standard Bridges*

When a manufacturer-designed bridge that is designated as standard is approved for use, the manufacturer of the bridge shall submit working drawings, design calculations and independent check calculations.

The working drawings must be sealed by an engineer (civil or structural) registered in the State of California. The working drawings shall contain General Design Notes that list the appropriate Caltrans design standards used.

Both the design and check calculations shall be certified by different engineers (civil or structural) registered in the State of California.

Working drawings and calculations may be submitted during the project development phase or the construction phase. The timing of these submittals and the review and approval processes should be coordinated amongst all pertinent project development and construction team members including the manufacturing company.

If these items are submitted and approved in the construction phase, the project contract specifications must contain a provision that covers the submittal and review process including the duration of the reviews.

In all cases, the project contract specifications shall include a statement that a manufacturer must be on the pre-approved list prior to the bid opening date for that project.

### *Manufacturer-designed Bridges Designated as Minor Bridges*

When a manufacturer-designed bridge that is designated as minor is approved for use, the manufacturer of the bridge shall conform to the same requirements as above for standard bridges except for the following:

- Independent check calculations do not need to be prepared by an engineer (civil or structural) registered in the State of California.
- Design and check calculations ordinarily will not need to be submitted for review, but shall be made available by the manufacturer upon request from Caltrans for a period up to three years from project completion.

## Construction Specifications

Pedestrian bridges shall be constructed in accordance with the Caltrans Standard Specifications, and project special provisions that shall be based on Caltrans Standard Special Provisions (SSPs). Through the use and proper editing of the SSPs, the appropriate welding requirements will be incorporated into the contract document. A summary of the requirements is shown in Figure 1.

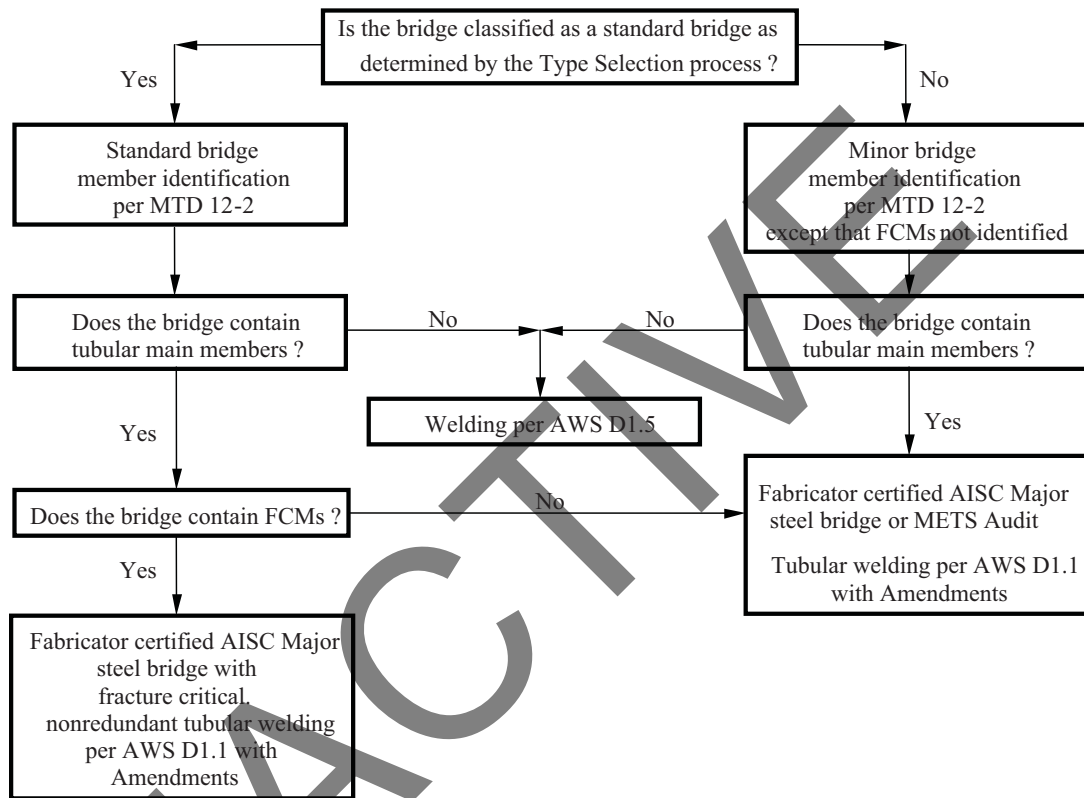


Figure 1. Welding Specifications Flowchart

*( original signed by Kevin J. Thompson )*

Kevin J. Thompson  
 State Bridge Engineer  
 Deputy Chief, Division of Engineering Services  
 Structure Design