



LRFD Steel Bridge Fabrication Specifications

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SECTION 1:
GENERAL

1.1—SCOPE

These Specifications shall govern vehicular steel bridge fabrication. This work shall consist of furnishing and fabricating steel structures and structural steel portions of other structures in accordance with these Specifications and the contract documents.

Details of design which are permitted to be selected by the Fabricator or Contractor shall conform to the provisions of the current *AASHTO LRFD Bridge Design Specifications* (BDS). All numbered references herein to specific Articles in the BDS shall refer to the 9th Edition.

Fabrication and welding, in addition to the requirements of these Specifications, shall conform to the provisions of the current AASHTO/AWS D1.5M/D1.5 *Bridge Welding Code* (D1.5M/D1.5).

Primary members or portions thereof designated in the contract documents as fracture critical members (FCMs) or system redundant members (SRMs) shall conform to the provisions of Clause 12 of the current D1.5M/D1.5.

Coatings shall be considered outside the scope of these Specifications. Fabrication of pedestrian bridges, non-bridge structures or components such as expansion joints, bearings, or tubular members shall also be considered outside the scope of this specification.

C1.1

The primary objective of these Specifications is to achieve quality and value in the fabrication of vehicular steel bridges and to help standardize vehicular steel bridge fabrication across the nation.

Historically, state Departments of Transportation (DOTs) have written their fabrication specifications based on AASHTO standards and their own individual experiences. Though this approach has worked reasonably well, many owners and fabricators recognized that all would benefit from a common specification because:

- Variations among projects in the shop would be minimized because fabricators would not need different practices, procedures, and operations for each owner, and minimizing variation improves quality and reduces errors.
- Economy in bridge fabrication would improve because fabricators would not have to change their methods and production variables from owner to owner.
- Expertise in steel bridge fabrication could be shared among states, resulting in a well-rounded, consistent fabrication standard.
- Owners would be able to share their resources, minimizing the effort each would otherwise have to expend to maintain a bridge fabrication specification.

These Specifications are based on existing state specifications, the AASHTO/NSBA Steel Bridge Collaboration S2.1, *Steel Bridge Fabrication Guide Specification* (S2.1); the AASHTO *LRFD Bridge Construction Specifications* (BCS); the AASHTO *LRFD Bridge Design Specifications* (BDS); and the AASHTO/AWS D1.5M/D1.5 *Bridge Welding Code* (D1.5M/D1.5). These Specifications defer to D1.5, the U.S. customary units specification in AASHTO/AWS D1.5M/D1.5, for specific welding requirements and for weld qualification testing requirements. The Owner is also encouraged to refer to the FHWA *Welding Reference Manual* for additional detailed information on welding. More information about AWS is available from their website at <https://www.aws.org>.

These Specifications assume that coating provisions are addressed in the referring Owner's standard specifications. For painting, the Owner is encouraged to refer to Steel Bridge Collaboration

S8.1, *Guide Specification for Application of Coating Systems with Zinc-Rich Primers to Steel Bridges*. ASTM A123/A123M, *Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products* is a commonly specified standard for galvanizing. For thermal-sprayed coatings, the Owner is encouraged to refer to Steel Bridge Collaboration S8.2, *Specification for Application of Thermal Spray Coating Systems to Steel Bridges*.

1.2—DEFINITIONS

1.2.1—Contractor

The Contractor shall be defined as the entity or its authorized representative responsible for proper completion of all tasks required by the contract documents. Subcontractors, including fabricators, erectors, and field painters, may be used by the Contractor, but the Contractor shall retain responsibility for conformance of the final product to contract requirements. The Contractor may permit direct subcontractor interaction with the Owner to expedite the project, but subcontractors shall inform the Contractor of any proposed modifications to contract requirements accepted by the Owner. The Contractor may permit or reject the changes.

1.2.2—Fabricator

The Fabricator shall be defined as the entity performing shop activities including the procurement, detailing, and manufacture of the structural steel and related components in their scope of supply. The Fabricator shall also include any agents of the Fabricator, such as subcontract fabricators. In some cases, the Fabricator may also be the Contractor, but usually the Fabricator is subcontracted by the Contractor. In these Specifications, the term Fabricator shall be used to describe roles usually performed by the Fabricator, but these roles could also be performed by the Contractor.

1.2.3—Owner

The Owner shall be defined as the entity or its authorized representative who has authority to define or accept changes to contract requirements.

C1.2.3

The Owner may have multiple representatives for various aspects or phases of the work, either as direct employees or through professional firms contracted for the work. Typically, the party responsible for the structure's adequate design is referred to as the Designer or the Engineer of Record (EOR). The Verification Inspector, defined in Article 1.2.5, represents the Owner in the shop or field, but is often

given only limited decision-making authority. The party authorized to make engineering decisions during fabrication or construction may be the EOR or some other designated individual such as a Construction Engineer or Materials Engineer. In these Specifications, the term “Owner” is usually used to encompass any relevant roles, except that “Verification Inspector” and “Designer” are used when those specific roles are discussed. In some cases, such as on public-private partnership projects and some design-build projects, the Owner is a private entity who has been granted contract authority by the government who might otherwise own the completed structure.

1.2.4—Quality Control Inspector

The Quality Control (QC) Inspector shall be defined as the duly designated person who acts for, and on behalf of, the Fabricator on inspection, testing, and quality matters to ensure that materials and workmanship satisfy the requirements of the contract documents.

1.2.5—Verification Inspector

The Verification Inspector shall be defined as the Owner’s representative who has the responsibility to accept the fabricated product based on conformance with the contract documents.

1.2.6—Contract Documents

The contract documents shall be defined as any codes, specifications, drawings, or additional requirements that are contractually specified by the Owner.

1.2.7—Primary and Secondary Members

The terms “primary member” and “secondary member” are defined in the BDS.

C1.2.5

This function is sometimes referred to as the Owner’s Inspector or as the Quality Assurance (QA) Inspector. The use of “QA” to refer to this function is avoided because the term is also frequently used to describe higher-level quality functions within the Fabricator’s quality management system.

C1.2.6

Appendix A includes items not specified in these Specifications that Owners should address elsewhere in their contract documents.

C1.2.7

The term “primary member” is defined in the 9th Edition of the BDS as follows: “a steel member or component that transmits gravity loads through a necessary as-designed load path. These members are therefore subjected to more stringent fabrication and testing requirements; considered synonymous with the term ‘main member.’”

The term “secondary member” is defined in the 9th Edition of the BDS as follows: “a steel member or component that does not transmit gravity loads through a necessary as-designed load path.”

Primary and secondary members are more specifically defined in BDS Table 6.6.2.1-1, which is provided for reference in Appendix B. Cross-frames and diaphragms in horizontally curved bridges are

defined as primary members, but do not require shop assembly.

Because it is not the Fabricator's responsibility to understand and apply design principles, the BDS requires the Designer to note all primary members or components, or portions thereof, subject to tension under Strength Load Combination I on the contract plans.

1.2.8—Fracture-Critical Members

The term “fracture-critical member” or FCM is defined in the BDS.

1.2.9—System Redundant Members

The term “system redundant member” is defined in the BDS.

C1.2.8

The term “fracture-critical member” or FCM is defined in the 9th Edition of the BDS as follows: “a steel primary member or portion thereof subject to tension whose failure would probably cause a portion of or the entire bridge to collapse.”

The BDS requires the Designer to designate which primary members or portions thereof are fracture-critical.

C1.2.9

The term “system redundant member” is defined in the 9th Edition of the BDS as follows: “A steel primary member or portion thereof subject to tension for which the redundancy is not known by engineering judgment, but which is demonstrated to have redundancy through a refined analysis.”

In essence, SRMs are members that appear to be fracture-critical based on traditional conventions but can be shown to have alternate load paths and are therefore designated as redundant. They have the same fabrication requirements as FCMs but do not become part of the Owner's fracture-critical inventory.

The BDS requires the Designer to designate which primary members or portions thereof are SRMs.