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460 STRUCTURAL STEEL AND MISCELLANEOUS METALS. (REV 10-29-14) (FA 2-9-15) (7-15)

ARTICLE 460-1 is deleted and the following substituted:

460-1 Description.

460-1.1 General: Prepare, fabricate, assemble, erect, and perform all nondestructive testing for structural steel or miscellaneous metal structures, or portions thereof in accordance with the Contract Documents.

Obtain Structural Steel and Miscellaneous Metals from a fabricator that is currently on the Department's Production Facility Listing. Fabricators seeking inclusion on the list shall meet the requirements of Section 105.

As used in this specification, the following terms shall apply:

Main or primary load-carrying member or component: This designation refers to the following;

1. Longitudinal or transverse rolled beams or fabricated girders (I or box, curved or straight)
2. All truss members not designated as cross frames
3. Cross frames, diaphragms and connection plates of horizontally curved beams or girders
4. Rib members of steel arches
5. Bracing members subjected to and specifically designed for traffic live load and/or other loads
6. Cross frames or diaphragms at pier and abutment supports of tub or box girders (trapezoidal members) and their connection plates
7. Attachments and components of the above such as splice, cover, cross frame and diaphragm connection and gusset plates, but not transverse and bearing stiffeners (unless acting as a cross frame or diaphragm)
8. Cables, moment release pins and links, and hangers
9. All steel substructure members except those designated as secondary in the Contract Documents
10. Other members as may be identified in the Contract Documents

Miscellaneous components - This designation refers to, but is not limited to, the following:

1. Ladders
2. Platforms
3. Bearings
4. Railings
5. End Wall Grates
6. Roadway Gratings
7. Metal Drainage Components
8. Steel Expansion Joint and Components

460-1.2 Fabrication Categories: As a prerequisite for being on the Department's Production Facility Listing, fabricators must currently be accredited in accordance with one of

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the programs in Table 460-1, by fabrication category/categories of the products that they are producing.

Fabricators are required to submit their proposed fabrication Quality Control (QC) Plan for review by the Department.

Table 460-1 Fabrication Categories	
Structure Type	Accepted Accreditation Program
Advanced Bridge: Tub or trapezoidal box girders, closed boxed girders, large or non-preassembled truss bridges, arches, cable supported bridges, moveable bridges, and bridges with curved radii tighter than defined for intermediate bridge.	AISC Advanced Bridge
Intermediate Bridge: A rolled beam bridge with field or shop slices, either straight or with a radius over 500 feet: a built-up I-shaped plate girder bridge with constant web depth (except for dapped ends), with or without splices, either straight or with a radius over 500 feet: a build-up I-shaped plate girder with variable web depth (e.g. haunched) either straight or with a radius over 1000 feet; a truss bridge with a length of 200 feet or less that is entirely or substantially preassembled at the certified facility and shipped in no more than three subassemblies.	AISC Intermediate Bridge
Simple Bridge: Unspliced rolled sections and pedestrian bridges	AISC Simple Bridge
Highway Metal Components, including Aluminum: Fence materials, guardrails, handrails, reinforcing steel (rebar), casing pipes, metal drainage items, stay-in-place forms, light poles, high mast poles, metal buildings, steel strain poles, bridge rail, stairs, walkways, grid decks, scuppers, expansion joints, bearings, ballast plates, complex expansion joints, high load multi-rotational bearings, bracing not designed for primary loads (diaphragms, cross frames, and lateral bracing), moveable bridge machinery and sign or signal structures erected partially or completely over the traveled roadway or mounted on bridges.	AISC Highway Metal Components ISO 9001 AWS CWF
NOTES: An AISC fracture critical (FC) endorsement is required for all FC work. Other accreditations programs may be submitted to the FDOT State Materials Office for review and consideration in addition to the programs listed in the table above.	

ARTICLE 460-2 is deleted and the following substituted:

460-2 Materials.

Provide the materials specified in the Contract Documents in accordance with Sections 6, 105, ASTM A6, and AASHTO/AWS D1.5, Bridge Welding Code. Fabricate all unpainted steel elements using steels with weathering characteristics as defined in ASTM A709 for grades with a "W" suffix.

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Structural components designated as “fracture critical” shall conform to the provisions of the AASHTO/AWS D1.5, Bridge Welding Code, Clause 12-AASHTO/AWS Fracture Critical Control Plan for Non-Redundant Members, in addition to the requirements of the Contract Documents.

Meet the additional following requirements:

Steel and Miscellaneous Metal Items	Section 962
Material Testing and Certifications	Section 962
Galvanizing	Section 962
Structural Coatings.....	Section 560
Structural Coating Materials	Section 975

ARTICLE 460-3 is deleted and the following substituted:

460-3 Pre-Assembly Requirements.

460-3.1 Shop Drawings: When shop drawings are required, submit such drawings in accordance with Section 5. For drawing presentation format, refer to the AASHTO/NSBA Steel Bridge Collaboration “Guidelines for Shop Detail Drawing Presentation”.

460-3.2 Welding Procedures: Submit all shop and field welding procedures to the Engineer. Such procedures shall contain a notation that they have been reviewed by a Certified Welding Inspector, and shall be signed, dated and stamped accordingly.

460-3.3 Pre-Assembly Meeting: Prior to commencing work, a meeting shall be held between the Contractor and the Engineer. Representatives of the Fabricator, Suppliers or subcontractors may attend the meeting if requested by the Engineer or Contractor. During this meeting, the Engineer may review various aspects of the job, including but not limited to, any of the following:

1. Plant and Personnel Certification.
2. Organizational Structure of Contractor personnel.
3. Traceability of Materials to Pre-Qualified Fabricator.
4. Shop Drawing requirements, submittal, review and approval process.
5. Fabrication Procedures, especially shop assembly, welding and painting.
6. Sampling and Testing Procedures.
7. Project specific areas of concern for fabrication, inspection and testing.
8. Handling of Material Test Reports.
9. Work Schedule.
10. Lines of Communication.
11. Availability of Quality Control and Verification Inspectors during specific fabrication/erection operations.
12. Loading and Transporting.
13. Handling of non-conformance and repair issues.
14. Special Requirements.
15. Consistency between fabrication shop drawings and the Erection Plan, specifically between the fabrication shop blocking diagrams and available site locations for temporary support during erection.

460-3.4 Access to Fabrication Facilities: Provide the Engineer full access of facilities or sites where the product is being stored, fabricated, assembled, coated or erected.

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D Provide and maintain office facilities at the fabrication facility for the Department's inspectors that ensure a reasonable amount of privacy, are clean, properly illuminated, heated or air-conditioned as necessary and are relatively free of noise, dust and odors. Locate the office reasonably close to the work and provide access any time fabrication, assembly or erection operations are in progress. Provide a desk, chair, and a four-drawer locking file cabinet for the use by each inspector and the Engineer. Provide a telephone within the office with an outside line suitable for modem communication. Provide ready access to adequate parking, fax and copy machines, and clean, contractor-maintained restrooms within a reasonable distance to the office.

R The Engineer may observe any or all activities and perform nondestructive testing of materials, components and the fabricated product to the extent considered necessary to confirm the conformance with Contract Documents.

460-3.5 Notification Prior to Commencement of Assembly: Notify the Engineer at least one week prior to beginning assembly, when conducted in-state, and at least two weeks prior to beginning assembly, when conducted out-of-state.

SUBARTICLE 460-4.3.2.1 is deleted and the following substituted:

A **460-4.3.2.1 Cold Bending:** Fracture critical and non fracture critical plates and bars shall be cold bent, unless otherwise permitted according to the provisions of Section 460-4.3.2.2.

The minimum bend radii measured to the concave face of the plate, shall be taken as $5.0(t)$ for all grades and thicknesses of steel conforming to structural steel for bridges, AASHTO M270M/M 270 (ASTM A709/A709M), where 't' is the thickness of the plate in inches. For cross-frame or diaphragm connection plates up to 0.75 inches, the minimum bending radii may be taken as $1.5(t)$. For all other grades of steel the minimum bend radii recommendations from the plate fabricator shall be followed, but the radii shall not be less than the minimums specified herein.

F Wherever possible, bend lines shall be oriented perpendicular to the direction of final rolling of the plate. If the bend lines are parallel to the direction of final rolling, the minimum bend radii shall be increased to $7.5(t)$.

SUBARTICLE 460-4.3.4.5.1 is deleted and the following substituted:

T **460-4.3.4.5.1 General:** Procedures for cambering of built-up plate girders shall be submitted as a part of the Producer Quality Control (QC) Plan. In the procedures, address any proposed preloading and heat application and control. Minor heat adjustments in camber at the finishing stage of the girder do not require approval if the patterns and temperatures are followed in accordance with the approved procedures.

Do not utilize heat-cambering as the primary source of vertical camber in horizontally curved main load-carrying members; cut the web plate to the required position. Only use heat-cambering on horizontally curved main members to adjust cut cambering with the approval of the Engineer.

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SUBARTICLE 460-4.3.4.9.2 is deleted and the following substituted:

460-4.3.4.9.2 Removal of Lubricants: Remove lubricants from the exposed surfaces of installed fastener assemblies and other surfaces in accordance with the approved Producer QC Plan or the paint manufacturer's recommendations prior to painting. Demonstrate the procedures to the Engineer prior to preparations for painting. Bring to the Engineer's attention any manufacturer's processes or procedures that conflict with those specified in the Contract Documents.

SUBARTICLE 460-4.6 is deleted and the following substituted:

460-4.6 Evaluation of Work: The Engineer will evaluate and accept materials and work conforming to the Contract Documents. These evaluations may take place prior to or following delivery of the materials to the site of the structure. Materials or work that fails to meet Contract requirements will be rejected.

The Engineer may, at his sole discretion, permit further inspections and testing of materials or work that fail to meet Contract requirements for acceptance. The cost of such inspections and tests shall be borne by the Contractor.

Bring to the attention of the Engineer, all nonconforming work and or materials that cannot be brought into conformance with the Contract Documents using pre-established procedures as outlined in the Department approved Producer QC Plan. Submit the following information to the Engineer:

A cover letter prepared on the Contractor's letterhead and addressed to the Engineer briefly describing the nonconforming work and the proposed credit to the Contract proportionate to the nonconformance. For each fabricating facility and for each project within that fabrication facility, submittals must be numbered consecutively beginning with the number 1, at the start of each project. Erectors will start with one for each individual project.

A completed Department Nonconforming Structural Steel and Miscellaneous Metal Component Data Sheet prepared by the Contractor and countersigned by the Engineer's designated representative to indicate agreement between the Contractor and the Department regarding the nonconformance, not any solution, resolution or credit. If the Contractor and the Engineer's designated representative are not in agreement regarding the nonconformance, the Engineer's designated representative will either reject the submittal indicating the reason(s) for the rejection or modify the submittal and forward to the Engineer. In the event of modification, the Contractor will initial the submittal before being forwarded to the Engineer, thereby indicating the Contractor's concurrence with the modification.

A list of supporting information such as sketches, documentation, calculations, pictures, etc., must be included in the appropriate space on the Nonconforming Component Data Sheet. Supporting information regarding Contract Document noncompliance in the form of separate documents is only necessary when space on the Department Nonconforming Structural Steel and Miscellaneous Metal Component Data Sheet is inadequate for the required data. All of the supporting information required for the form must be prepared by, or under the supervision of, the Specialty Engineer who will sign and seal one (1) complete copy of the supporting information.

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D If requested by the Engineer, submit a structural and durability evaluation of the proposed repair and/or remediation. This evaluation must be conducted under the supervision of a Specialty Engineer and the submittal is to bear the Specialty Engineer's signature and seal.

SUBARTICLE 460-4.7 is deleted and the following substituted:

R schedule final inspection of the completed work within two weeks prior to shipment or erection to verify that all Contract Document requirements have been met. After verification that all Contract Document requirements have been met and all necessary repairs have been satisfactorily completed, the Quality Control Manager shall certify, by initials and/or signature, such materials, components or members. The record shall include certification for:

A. items being shipped or stored prior to final assembly. Affix a certification in the form of a stamp or tag in accordance with 460-4.2 and as indicated in the Producer Q C Plan, and with a copy of the certification placed in the Contractor's permanent project records,

B. work being placed into its final position. Document in the Contractor's permanent project records.

A Submit a summary certification at the least once a month or with each payment request that includes the following or similar wording. "The undersigned, being a responsible official of (insert Contractor identification) certifies that the materials, components or members listed herein have been produced under strict quality control and meet the requirements of the Contract Documents" Include a positive identification in the certification such that the applicable materials, components and/or members can be uniquely identified utilizing just the summary certification document. The Quality Control Manager shall sign this summary certification.

SUBARTICLE 460-7.1 is deleted and the following substituted:

460-7.1 Pre-erection Requirements:

460-7.1.1 Erection Plan: Develop an Erection QC Plan for review and approval of the Engineer.

460-7.1.2 Submittals: Meet the requirements of Sections 5 and 103 for any required submittals. Provide submittals to the Engineer for review by the Department in accordance with Section 5 and the Contract Documents.

460-7.1.3 Erection Plan: Submit, for the Engineer's review, an Erection Plan locating all primary members, lifting equipment and temporary supports or braces, and bolting pattern tightening procedures not considered routine. Ensure that the plan includes the Specialty Engineer's signature and stamp. Include supporting calculations indicating that the design unit stresses indicated in the Contract Documents have not been exceeded. Provide this plan or plans to the Engineer three weeks before erecting the piece or pieces.

Include the following information in the Erection Plan:

T 1. A plan of the work area showing all substructure units and foundations; surface roads and railroads; all streams, creeks and rivers; all overhead utilities; and any underground utilities that could possibly impact, or be adversely affected by, erection operations as determined by the Specialty Engineer.

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D 2. The erection sequence for all primary load-carrying members and all primary load-carrying member bracing. Note any and all permanent or temporary support and/or bracing locations, including crane-holding positions.

3. The center of gravity locations, pick weight and delivery orientation for all primary load-carrying members.

4. Identify any bolting requirements not considered routine.

5. Locate all pick crane work points.

6. Identify all temporary works and staging areas such as barges, mats and temporary excavation support.

R 7. Provide capacity charts on the drawings for each crane configuration and boom extension utilized.

8. Details of all temporary bracing, falsework, towers and shoring.

9. Provide any procedures requested by the Engineer and not contained in the Erection Plan.

SUBARTICLE 460-7.7 is deleted and the following substituted:

A **460-7.7 Bolted Connections:** For splice connections of primary members, as well as connections of diaphragms or crossframes, fill at least 50% of the holes prior to crane release. The 50% may be either erection bolts in a snug tight condition or full size erection pins, but at least half (25% of all holes) shall be bolts, and sufficient pins shall be used near outside corners of splice plates and at member ends near splice plate edges to ensure alignment. Filled holes should be uniformly distributed between the web and flange connections for primary members such that approximately 50% of the web connections are filled and approximately 50% of the flange connections are filled. For diaphragms or cross-frames, the filled holes should be uniformly distributed between all the bolt groups connecting the diaphragm or crossframe to the primary member. The 50% requirement may be waived if a reduced percentage is calculated as sufficient and shown on the approved Erection Plan. Primary member splice connections that are made up on the ground (prior to erection) shall be 100 percent complete prior to any lifting operation. Fully tighten all bolts prior to installation of deck forming for each unit.

F SUBARTICLE 460-7.9.1 is deleted and the following substituted:

T **460-7.9.1 General:** Perform Quality Control inspections of all phases of the work. The inspection frequency and depth shall be sufficient to ensure that all materials and workmanship incorporated into the work meet the requirements of the Contract Documents and that the processes are controlled to ensure that the final finished product(s) conform to the physical characteristics and dimensions required by the Contract Documents. The Quality Control Manager shall be responsible for all inspection operations. An adequate number of Quality Control Inspectors shall be available to ensure review of all materials and fabrication processes are preformed in accordance with the Producer QC Plan. Weekly meetings shall be held with the Engineer to review inspection findings. The review of this information is to identify any refinements and/or improvements in the process being utilized in the work. The frequency of the meetings may be altered by the Engineer.

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