

DIVISION 5 - METALS

SECTION 05120 – STRUCTURAL STEEL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

The General Provisions, Special Provisions and General Requirements of the Specifications, apply to the work specified in this Section.

1.02 DESCRIPTION OF WORK

- A. This section includes, but not limited to, all the design, shop drawings, materials, labor, construction, placement and finishing of all structural steel necessary to complete the project.
- B. Related Sections:
 - 1. Section 09911 – EXTERIOR PAINTING

1.03 SUMMARY

- A. This Section includes the following:
 - 1. Structural steel.

1.04 DEFINITIONS

- A. Structural Steel: Elements of structural steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.05 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
 - 1. Show fabrication of structural-steel components.
 - 2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 3. Include embedment drawings.

4. Include erection plans.
 5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts.
 7. Identify pretensioned and slip-critical high-strength bolted connections.
- D. Welding certificates.
- E. Qualification Data: For Installer
- F. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
1. Structural steel including chemical and physical properties.
 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 3. Shop primers.
- G. Source quality control test reports.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator who has a minimum of 10 years in business and certified under the AISC Certification Program for Structural Steel Fabricators.
- B. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."
- D. Comply with applicable provisions of the following specifications and documents:
1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 2. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
 3. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and LRFD Design."
 4. AISC's "Specification for the Design of Steel Hollow Structural Sections."
 5. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
 6. AISC Certification Program for Structural Steel Fabricators

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
 - 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.08 COORDINATION

- A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.01 STRUCTURAL STEEL MATERIALS

- A. Channels and Angles: ASTM A36/A36M.
- B. Plate and Bar: ASTM A36/A36M.
- C. Hollow Structural Sections: ASTM A500, Grade C, structural tubing.
- D. Welding Electrodes: Comply with AWS requirements.

2.02 BOLTS, CONNECTORS, AND ANCHORS

- A. Bolts, Nuts, and Washers: ASTM A307, Type 1, heavy hex steel structural bolts; ASTM A563 heavy hex carbon-steel nuts; and ASTM F436 hardened carbon-steel washers.

2.03 PRIMER

- A. Primer: SSPC-Paint 20, Type I, Inorganic zinc-rich shop primer. Provide primers that are VOC compliant for building location.
- B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

- C. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.04 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and LRFD Design
- B. Identify high-strength structural steel according to ASTM A6/A6M and maintain markings until structural steel has been erected.
 - 1. Mark and match-mark materials for field assembly.
 - 2. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- D. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- F. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.

2.05 SHOP CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

2.06 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be high-strength bolted with slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials
 - 5. Galvanized surfaces.
- B. Painting: Apply a 1-coat, primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.07 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A123/A123M.
 - 1. Fill vent holes and grind smooth after galvanizing.
 - 2. Galvanize all exposed structural steel.

2.08 SOURCE QUALITY CONTROL

- A. The State will engage an independent testing and inspecting agency to perform inspections and prepare test reports. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E165.
 - 2. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - 3. Ultrasonic Inspection: ASTM E164.
 - 4. Radiographic Inspection: ASTM E94.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.03 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and LRFD Design".
- B. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- C. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure.
- D. Do not use thermal cutting during erection.
- E. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.04 FIELD CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and LRFD Design" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: The State will engage a qualified independent testing and inspecting agency to inspect field welds.
- B. Welded Connections: Field welds will be visually inspected according to AWS D1.1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and follow inspection procedures per paragraph 2.09. D.
- C. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.06 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.
- B. Touchup Painting: Cleaning and touchup painting are specified in Section 09911 – EXTERIOR PAINTING.

PART 4 - MEASUREMENT AND PAYMENT

4.01 BASIS OF MEASUREMENT AND PAYMENT

Work under this Section will not be measured for payment but will be paid for at the Contract Lump Sum Price.

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
05120	Structural Steel	Lump Sum

END OF SECTION