

**SECTION 05120**  
**STRUCTURAL STEEL**

**PART 1 - GENERAL**

**1.1 SUMMARY:**

**A. Section Includes:**

1. Structural steel framing and support members, pipe columns, and braces complete with required braces, connection plates, welds, washers, bolts, nuts, shims, anchor bolts, and templates.
2. Base plates, cap plates, and shear stud connectors. Erecting, connecting, field welding, and adjusting for plumb and level.
3. All other work normally related to the above or specified under this section.

**B. Related Sections**

1. Section 01400 - Quality Control: Testing.
2. Section 03450 - Architectural Precast Concrete
3. Section 03600 - Grout: Grouting under base and bearing plates.
4. Section 05500 - Metal Fabrications: Loose steel angle lintels not attached to structural steel stairways.
5. Divisions 15 and 16 - Steel supports for mechanical or electrical equipment.

**C. Work Furnished But Not Installed**

1. Anchor bolts, anchor bolt templates, loose bearing plates and embedded items: Installed under Section 03300 Cast-in-Place Concrete or Section 04200 Unit Masonry.

**1.2 SUBMITTALS:**

**A. Certificates:**

1. Submit welder certificates to University for review and for records.
2. For all high-strength bolts, nuts and hardened washers, submit certification of domestic (U.S.) manufacture and compliance with all provisions of these specifications.
3. Alternately, for high-strength bolts, nuts and/or hardened washers of foreign manufacture, submit certified mill test reports and other pertinent data demonstrating compliance with all provisions of these specifications.

**B. Shop Drawings:**

1. Submit shop drawings as specified under Section 01300.

C. Design Calculations:

1. Submit design calculations, bearing the seal and signature of a Professional Engineer, employed by the Contractor and registered in the State of Colorado for the following:
  - a. Connections not as indicated on the structural drawings.
  - b. Request for substitution of member sizes or material grades.
  - c. Modification of the strength or configuration of structural framing requested for the Contractor's convenience, erection sequence or construction equipment and materials.

- D. Provide a statement from the manufacturer stating that materials provided were manufactured within a 500 mile radius of the project. Include location.  
(Applies to LEED MRc5: Regional Materials)

**LEED MRc4: Recycled Content**

**Provide a statement from the manufacturer including the recycled content percentage, by weight, and whether the recycled content is post-consumer or post-industrial.**

1.3 QUALITY ASSURANCE:

A. Fabricator Qualifications:

1. A firm with not less than 5 years continuous experience in the fabrication of structural steel similar in scope as required for this project.

A. Sole Source Responsibility:

1. Subcontract with installation of the work of this section to the same firm that performed the fabrication.

SOLE SOURCE RESPONSIBILITY NOT  
REQUIRED FOR SMALL PROJECTS.

B. Testing Agency:

1. Testing and inspection will be made by an approved testing laboratory selected and paid by the Owner. Contractor shall furnish testing agency access to work, facilities, and incidental labor required for testing and inspection. Retention by the Owner of an independent testing agency shall in no way relieve the Contractor of responsibility for performing all work in accordance with the Contract requirements.
2. Furnish the testing agency and Architect / Engineer with the following:
  - a. A complete set of shop and erection drawings.
  - b. Mill test reports.

- c. Information as to time and place of all rollings and shipment of material to shops.
- d. Full and ample means and assistance for testing all material.
- e. Proper facilities, including scaffolding, temporary work platforms, etc., for inspection of the work in the mills, shop and field.

C. Welder Qualifications: Welding shall be done only by welding operators currently qualified according to AWS D1.1.

D. Codes and Standards:

1. Comply with the provisions of the following, except as otherwise indicated:

- a. AISC "Code of Standard Practice for Steel Buildings and Bridges" except delete sentence of paragraph 4.2.1 which states: "This approval constitutes the Owner's acceptance of all responsibility for the design adequacy of any detail configuration of connections developed by the fabricator as a part of his preparation of these shop drawings" and delete the first sentence of Section 3.3 "Discrepancies".
- b. AISC Section 3.4 Legibility of Plans: In the first sentence, delete the phrase "and made to scale not less than 0.125" to the foot."
- c. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings", including the "Commentary" and Supplements thereto as issued.

- a. AISC "Specifications for Structural Joints using ASTM A325 or A490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.

ADD AISC "SPECIFICATIONS FOR ARCHITECTURALLY EXPOSED STRUCTURAL STEEL" WHERE APPROPRIATE. BE SURE TO CLEARLY INDICATE THESE MEMBERS ON THE DRAWINGS.

- b. AWS D1.1 "Structural Welding Code - Steel".
- c. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS:

- A. Where exact sizes and weights called for are not readily available, secure the Structural Engineer's acceptance of suitable sizes in time to prevent delay due to such substitutions.

### 2.2 STANDARD MEMBERS:

- A. Factory stamp standard members with AISC member designation or provide certification that members meet specified requirements.

## 2.3 BOLTS:

- A. Anchor Bolts: ASTM A307, non-headed type.
- B. Unfinished Bolts and Nuts: ASTM A307, Grade A, hexagonal heads and nuts.
- C. High-Strength Bolts and Nuts: ASTM A325 or A490, heavy hexagonal heads and nuts and hardened washers.
  - 1. Direct tension indicator washers are preferred.

## PART 3 - EXECUTION

### 3.1 FIELD QUALITY CONTROL:

- A. General:
  - 1. Owner will engage and pay for an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.
  - 2. Testing agency will perform tests for shop and field connections, interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom. Provide a matrix report summarizing all connections and which connections were inadequate. Update matrix following any reinspections.
  - 3. Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements.
  - 4. Perform additional tests, at Contractor's expense, as may be necessary to show compliance of corrected work. Clearly identify reinspection costs belonging to the Contractor.
  - 5. Inspect in accordance with AISC specifications.
  - 6. Inspect and test during fabrication of structural steel assemblies, as follows:
    - a. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
  - 7. Perform visual inspection of all welds.
  - 8. Perform specific tests of welds by one of the following methods:
    - a. Liquid Penetrant Inspection: ASTM E165.
    - b. Magnetic Particle Inspection: ASTM E109; performed on root pass and on

finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.

c. Radiographic Inspection: ASTM E94 and E142; minimum quality level "2-2T".

d. Ultrasonic Inspection: ASTM E164.

**END OF SECTION 05120**