

**SPECIFICATIONS - DETAILED PROVISIONS**  
**Section 05100 - Structural Metals**

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**SECTION 05100  
STRUCTURAL METALS**

**PART 1 - GENERAL**

1.01 DESCRIPTION

Requirements specified in the Conditions of the Contractors Division 1 form a part of this Section. Provide structural metal work as indicated, specified, and required.

A. Work Included in This Section. Principal items are:

1. Structural steel members.
2. Plates and connections.

B. Related Work Not included in This Section.

1. Steel reinforcement.
2. Steel decking.
3. Miscellaneous metal work.

1.02 QUALITY ASSURANCE

Unless otherwise specified all work specified herein and shown on the drawings shall conform to the applicable requirements of the following specifications and codes:

- A. Fabrication and Erection of Structural Steel shall be in accordance with the latest edition of the AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings," and "Code of Standard Practice for Steel Buildings and Bridges."
- B. Structural Metals Other than Steel shall conform to applicable "state of the art" codes.

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1.03 SUBMITTALS

- A. Shop Drawings. Submit shop drawings for approval before fabrication of any of the work. Show complete fabrication details with material and specification lists. Show all welds, fabrication and finish details, and shop painting. In approving shop drawings, the District does not assume responsibility for accuracy of the work relative to other components as constructed. Also refer to applicable requirements hereafter specified in paragraph "Substitutions."
- B. Test Reports. Furnish notarized certified physical and chemical mill test reports for material used for major structural members such as beams, joists, columns, and their connectors. Perform all tests in accordance with applicable ASTM standards.
- C. Shop Painting Data. In coordinated manner with requirements for Painting and Protective Coatings specified in applicable Section 09870 and 09871, Contractors shall submit product list with product data sheets of intended shop coats which for compatibility shall be the same products and manufacturer as those of deferred field-applied systems intended to be used in work of Division 9.

**PART 2 - PRODUCTS**

2.01 GENERAL

Materials shall be new, sound, and of best commercial quality available.

2.02 STRUCTURAL STEEL

Fabricated from steel conforming to the latest edition of ASTM Designation for A-36.

2.03 STEEL PIPE

Where used for columns or other structural purposes, pipe shall conform to ASTM Designation A-53, Grade B, seamless.

2.04 CAST IRON

Conform to ASTM A-48 Class 40B.

2.05 BLACK STEEL

Conform to ASTM A-569.

2.06 STAINLESS STEEL

Type 316 or, where specifically authorized, Type 304, non-magnetic.

## 2.07 BOLTS

- A. Common. Conform to ASTM Designation A-307.
- B. High Tensile. Conform to ASTM Designation A-325.
- C. Stainless Steel. Type 316 stainless steel with nuts and washers of similar material.

## 2.08 WELDING ELECTRODES

Conform to the requirements of the American Welding Society, "Specifications for Iron and Steel Arc Welding Electrodes," latest edition.

## 2.09 SHOP PRIME PAINT

To assure compatibility with deferred field-applied paint or coating system on ferrous metals, use shop prime paint product and manufacture as specified for systems intended for field application in applicable Section 09870 or 09871. Portions of work immediately adjacent to intended field welds and portions intended for embedment shall not be shop primed.

## 2.10 GALVANIZING

All metal work shown or specified to be galvanized shall be zinc coated after fabrication at the rate of 1.25 oz./s.f. in conformity with "Specifications for Zinc Coatings on structural steel shapes, plates, and bars and their products," ASTM Designation A-123. Galvanized coatings marred or damaged during erection or fabrication shall be repaired by use of DRYGALV as manufactured by the American Solder and Flux Company, Galvalloy, Galvion, or equal, applied in accordance with the manufacturer's instructions.

# **PART 3 - EXECUTION**

## 3.01 FABRICATION

Workmanship shall conform to AISC specifications, latest edition. Work shall conform to drawings and approved shop drawings. Work shall be performed in the shop of any approved fabricator, except field welding, when approved, shall be as specified hereinafter.

- A. Connections
  - 1. Standard AISC, latest edition, specifications shall be used in determining the connections (unless otherwise shown on the drawings), including the number of bolts and spacing required. In addition to the AISC specifications, the best shop practices shall be followed for shearing, punching, diameter of bolt holes, spacing, welding, etc.

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2. Shop connections shall be welded, or bolted unless otherwise indicated.
3. Insofar as possible, fit all work and assemble in shop ready for erection.

B. Members

1. All members shall be free from twists, kinks, buckles, or open joints.
2. All members, holes, and their spacing shall be so accurately made that when assembled the parts shall come together and bolt without distortion.
3. Parts assembled with bolts shall be in close contact, except where separators are required. Where unlike metals are in contact, insulate as necessary to prevent corrosion.
4. Provide bolt holes to secure special items to structural members.
5. Bearing surfaces shall be planed to true beds. Abutting surfaces shall be closely fitted. Steel requiring accurate alignment shall be provided with slotted holes and/or washers for aligning the steel.
6. All materials shall be delivered in the order in which they will be required so as to avoid all delay in completion of the project.

C. Welding

1. Welding in shop and field shall be done by operators who have previously qualified by tests, as prescribed in the American Welding Society, "Standard Qualification Procedure." Welding of steel shall be in accordance with latest edition of the AWS "Code for Fusion Welding and Gas Cutting in Building Construction." All welds shall exhibit characteristics required by AWS D1.1 and its current revisions.
2. Make all welds with E70-XX classification mild or low-alloy steel covered arc-welding electrodes conforming to AWA A5.1 and A5.5 specifications for filler metal, except as otherwise designated on structural drawings and except as otherwise recommended by AWS and AISC for welding high strength steel alloys other than ASTM A-36 and A-53 steels. All steel before being fabricated shall be thoroughly wire brushed, clean of all scale and rust, and thoroughly straightened by approved methods that will not injure the materials being worked on. Welding shall be continuous along the entire line of contact except where tack or intermittent welding is permitted. Where exposed, welds shall be cleaned of flux and slag and ground smooth.

3.02 ERECTION

- A. Erection shall include the installation and erection of all structural steel as called for in this section. The Contractor shall verify correctness before starting erection. Erection shall be performed in conformance with the latest edition of AISC Code of Standard Practice.
- B. As erection progresses, the work shall be securely bolted up to take care of all dead-load, wind, and erection stresses.
- C. No final bolting or welding shall be done until each portion of the structure has been properly aligned and plumbed.
- D. Bolts shall be drawn up tight and threads set so that nuts cannot become loose.
- E. Damaged Members. During erection, members which are bent, twisted, or damaged shall be straightened or replaced as directed. If heating is required in straightening, a heating method shall be used which will insure uniform temperature throughout the entire member. Members, which in the opinion of the District are damaged to an extent impairing their appearance, strength, or serviceability, shall be removed and replaced with new members.
- F. Anchor Bolts and Anchors. Anchor bolts and anchors shall be properly located and built into connection work. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately. Embedded anchor bolts that are submerged in process water or sludge, or are in enclosed tanks or spaces exposed to process gas or moisture, shall be Type 316 stainless steel with nuts of same material. To such stainless steel bolts apply a non-oxidizing lubricant grease before bolting using a molybdenum disulfide grease compound or a NO-OX-10 type compound.
- G. Bearing Plates. Provide bearing plates under beams and columns resting on walls or footings. Bearing plates may be attached or loose and aligned on steel wedges or shims. After the supported members have been plumbed and properly positioned and the anchor nuts tightened, the entire bearing area under the plate shall be dry-packed solidly with bedding mortar. Wedges and shims shall be cut off flush with edge of bearing plate, and shall be left in place.

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- H. Substitutions. Unless otherwise directed, the exact sections, shapes, thicknesses, sizes, weights, and the details of construction shown for the structural steelwork shall be furnished, provided however that the Contractor, because of his stock or shop practices, may suggest changes if the net area of section is not thereby reduced, if the section properties are at least equivalent and if the overall dimensions are not exceeded. All substitutions or other deviations from drawings and/or specifications shall be specifically noted or "clouded" on the shop drawing submittals.
  
- I. Flame Cutting. Flame cutting by the use of a gas cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing. The use of as flame-cutting torch will be permitted only on minor members, when the member is not under stress, and then only after the approval of the District has been obtained.
  
- J. Storage of Materials. Structural material, either plain or fabricated, shall be stored above ground upon platforms, skids, or other supports. Materials shall be kept free from dirt, grease, and other foreign matter and shall be protected from corrosion.

**END OF SECTION 05100**