

Division 5

Section 5A

Structural Steel and Miscellaneous Iron

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DIVISION 5

SECTION 5A

STRUCTURAL STEEL AND MISCELLANEOUS IRON

1.0 SCOPE

The work covered by this specification shall include the furnishing of all plant, labor, equipment, tools, and material for the complete execution of all structural steel and miscellaneous iron fabrication and erection work shown on the drawings and hereinafter specified.

Pipe sleeves, and iron and steel castings not attached to the structural steel or miscellaneous iron shall neither be furnished nor erected by the contractor, unless otherwise indicated by the general contractor.

2.0 GENERAL

2.1 Codes and Standards

The following standard specifications and all specifications, codes and standards as amended to date referred to therein are made a part of this specification and shall apply to the work, except as otherwise stated.

.1 Specification for the Design, Fabrication and Erection of Structural Steel for Buildings of the American Institute of Steel Construction and any Supplementary provisions thereto.

.2 Code of Standard Practice for Steel Buildings and Bridges of the American Institute of Steel Construction.

.3 Standard Code for Arc and Gas Welding in Building Construction of the American Welding Society.

.4 Specification for Structural Joints using ASTM A325 Bolts approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.

.5 Steel Structures Painting Manual Vol. 1-Good Painting Practice; Vol. 2-Systems & Specifications: of the Steel Structures Painting Council.

.6 Other specifications, codes and standards, pertinent to and mentioned in the body of this specification, refer to the latest revision and are made a part of this specification.

.7 Where any of the above specifications deviate from or conflict with this specification, then this specification shall govern.

3.0 DETAILED REQUIREMENTS

3.1 Materials

All structural steel and miscellaneous iron shall conform to the ASTM requirements as shown on the drawings, or hereinafter specified.

Wherever this specification requires conformity to ASTM, Federal or any other standard specification, a certified statement that the material conforms to the applicable specification, or a certified copy of mill test report, shall be submitted by the contractor to the owner. This requirement may be waived at the discretion of the Owner.

.1 Structural Steel

All structural steel shapes, plates and angles unless otherwise specified, shall conform to ASTM Standard Specification A36.

.2 Rivet Steel

Rivet steel shall conform to ASTM Standard Specification A502, Grade 1.

.3 High Strength Bolts

High strength bolts and nuts shall conform to ASTM Standard Specification A325.

.4 Paint

Paint shall conform to Federal Specification TT-P-86c.

3.2 Shop Drawings

.1 The contractor shall prepare shop drawings consisting of erection diagrams and shop details. Where the design of

connections and other required details are not shown on the design drawings, the contractor shall design and arrange the required details in accordance with recognized practice, and in such a manner as to develop the full strength of the member or as may otherwise be determined by the Owner.

.2 The contractor shall submit the completed and checked shop drawings for approval to the Owner. The Owner reserves the right to modify these details if, in his opinion, such modification is deemed to be necessary, and the fabrication shall be in accordance with such revised or modified details. Drawings "not approved" or "approved as noted" shall be re-submitted to the Owner for approval.

.3 The approval of shop drawings shall cover, generally, the size and arrangement of principal and auxiliary members and strength of connections. This approval shall in no way relieve the contractor of his responsibility for the correctness of the shop drawings.

.4 The shop drawings shall be approved by the Owner prior to the beginning of any fabrication, except that the contractor may proceed with fabrication on the basis of "Approved as Noted" drawings, provided that the noted corrections are made.

.5 Where field bolting or riveting is required, an erector's summary and placement list shall be furnished. Where field welding is required, details shall be furnished, showing type, size and amount of welding.

.6 The contractor shall supply the Owner with a schedule showing the dates on which all shop drawings will be submitted for approval.

3.3 Anchor Bolts

The contractor shall furnish all anchor bolts, anchorage sections, sleeves, washers and nuts, etc., shown on the drawings. Such items shall be delivered in ample time for their proper setting before the concrete is poured. After bolts have been tightened, threads on bolts used to fasten structural steel and miscellaneous iron to the concrete shall be deformed or tack welded to the nut to prevent loosening.

3.4 Checker Plate

Checker plate for platform floors shall be U. S. Steel Multigrip Floor Plate or approved equal. The thickness as

shown on the plans shall be measured through the body, not including raised pattern.

3.5 Grating

- .1 All grating and fasteners shall be of the size and type shown on the drawings.
- .2 Where openings or cut-outs occur in the grating, the edges of all such cut-outs shall be banded with steel strips of the same size and thickness as the main carrier bars, welded in place.

3.6 Safety Chain

- .1 Safety chains shall be 3/16" straight link, proof coil, chain conforming to ASTM-A-413 with a snap fastener on one end.
- .2 Suitable eye-bolts or loops shall be provided on the members to which the chain is fastened, to receive the anchor link and hook.

3.7 Stair Treads

Treads for platform stairs shall be "Safesteps" manufactured by Irving Steel Subway Grating Company, Long Island City, New York. The treads shall have non-slip abrasive nosings. The top platform landings shall have similar nonslip abrasive nosings. The size of treads shall be as shown on the drawings. Similarly designed treads by the following manufacturers are also acceptable: Blaw-Knox Company, Pittsburgh, Pa.; Reliance Steel Products Company, McKeesport, Pa.

3.8 Pipe Handrail

Steel pipe handrails shall be 1-1/4-inch standardweight steel or wrought-iron pipe. Posts shall be 1-1/4-inch extra-strong steel or wrought-iron pipe. Pipe shall conform to ASTM Specification A 53 or A 72. Posts and rails shall be joined by continuous welding with all welds ground smooth. Railing shall be furnished with rails at 1 foot 10 inches and 3 feet 6 inches above the floor and 1/4-inch-thick toeplate extending 4 inches above the floor. Posts shall be spaced not more than 6 feet on centers. Expansion joints shall be provided in railing. Ends of handrails shall be capped. Posts on concrete shall be set in pipe sleeves cast in place or as indicated on the drawings. If sleeves larger than those

indicated are used, the space between the sleeve and the post shall be grouted with cement and fine sand.

Handrails of stairs that do not return at the wall shall have neat smooth rounded ends (half-round or parabolic). Wall rails shall be secured from the underside.

3.9 Painting

All structural steel work shall be clean, free from rust, scale or grease and shall be given a shop coat of red lead paint at point of fabrication. The paint shall conform to Federal Specification TT-P-86C, Type II. Paint shall be well worked into all joints and corners by brush. Paint shall be applied under favorable weather and temperature conditions and to dry surfaces only. Surfaces which will be inaccessible after assembly or erection shall receive two (2) coats of the shop paint specified above. Parts to be encased in concrete, and the contact surfaces of connections shall not be painted. Where field welding is permitted or required, the shop coat of paint shall be omitted for a distance of 2 inches back from the welding edge and a coat of linseed oil applied in place of the paint. Machine finished surfaces shall also be protected against corrosion by application of a coat of linseed oil.

After erection, all field connections, including welds, bolts, rivets and all abraded places on the shop paint shall be painted with above specified red lead paint.

3.10 Connections

Except where special connections are detailed on the Engineer's framing drawings, all connections shall be detailed by the contractor in accordance with the requirements of these specifications. Connections shall be made to conform with the AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, or, in the case of connections using high-strength bolts, Specifications for Structural Joints using ASTM A325 Bolts, using bearing type connections with threads excluded from shear planes. Unless otherwise called for on the drawings, shop and field connections, including connections of purlins and girts, shall be made with 3/4 inch diameter high-strength bolts or 3/4 inch diameter rivets; such bolts and rivets may be combined in any connection. Holes for 3/4 inch diameter bolts and rivets shall be 13/16-inch in diameter. Welded connections shall be used only where

bolted or riveted connections are not practicable; such welded connections will not be permitted unless shown in detail and approved on the shop drawings.

Where loads are determined and shown on the design drawings, connections shall be such as to develop those loads; where loads are not shown, connections shall develop loads as follows:

The connections at ends of tension or compression members in trusses shall develop the strength required by the stress, but not less than 50 percent of the effective strength of the members.

Where the reaction values of a beam are not shown on contract drawings, the connections shall be selected to develop 50 percent of the full shear capacity of the beam to be used as given in "The Manual of Steel Construction" Sixth Edition, AISC.

Beam connections shall be "framed beam connections" or "heavy framed beam connections" unless otherwise shown or called for on the drawings.

Surfaces of joints for riveted, welded, or highstrength bolted connections shall comply with the cleanliness requirements of all joint surfaces and contact surfaces within friction-type joints as specified in SECTION 3, BOLTED PARTS of Specification for Structural Joints Using ASTM A325 Bolts.

3.11 Fabrication

Structural material shall be fabricated and assembled in the shop to the greatest extent possible. Shearing, flame cutting, and chipping shall be done carefully and accurately. The bearing ends of columns and bearing stiffeners shall be milled; milling shall be done after assembly. Sole plates of beams and girders shall have full contact with the flanges. Stiffeners shall have full contact with the flanges or girders, and, where tight fits are required to transmit bearing, the ends of stiffeners shall be grooved and fully butt-welded to the flange.

Where riveting occurs near welded joints, the welding

shall precede the riveting, unless otherwise approved. Assembled pieces shall be taken apart, if necessary, for the removal of burrs and shavings produced by the reaming operation. Parts not completely riveted in the shop shall be secured by bolts, insofar as practicable, to prevent damage in shipment and handling.

Holes shall be cut, drilled, or punched at right angles to the surface of the metal and shall not be made or enlarged by burning. Holes in base or bearing plates shall be drilled. Holes shall be clean-cut without torn or ragged edges. Outside burrs resulting from drilling or reaming operation shall be removed with a tool making a 1/16inch bevel.

Allowance shall be made for draw in all tension bracing.

Rivet heads shall not be calked, recupped, or doublegunned. In removing defective rivets care shall be taken not to injure the adjacent metal, and, if necessary, rivets shall be drilled out. When ready for driving, rivets shall be free from slag, scale, and other adhering matter.

3.12 Miscellaneous Other Materials

- .1 All black and/or galvanized steel pipe shall conform to ASTM-A-53.
- .2 All malleable iron castings shall conform to ASTM-A-47.

3.13 Provisions for Other Work

The contractor shall provide the structural steel and miscellaneous iron members with masonry anchors, cut-outs, fittings, and holes required for the work of other trades, as shown on the drawings.

3.14 Galvanized Steel

- .1 Where galvanized steel is called for on the contract drawings, hot dipped zinc coated galvanizing used shall be in accordance with ASTM-A-123.
- .2 All galvanizing shall be done after all shearing, punching, welding and machine work has been completed, but before assembly. All fasteners used in assembly shall also be galvanized.

.3 After erection the contractor shall touch up all abrasions in the galvanized steel with one prime coat of zinc dust, zinc oxide primer conforming with Federal Specification TT-P-64ib, Type II (Alkyd).

3.15 Marking

.1 Each member shall be clearly marked in the contractor's shop with erection marks. These marks shall agree with the erection marks on the shop drawings.

.2 Erection marks shall be so placed on the members as to avoid defacement during handling, shipping and erection.

.3 All bolts, rivets, nuts, washers, etc., shall be packed in marked boxes or kegs. Loose clips and other small parts shall be grouped, wired together and tagged with proper identification markings.

4.0 INSTALLATION

4.1 Technical Requirements

The various members forming parts of a completed frame or structure shall be aligned and adjusted accurately before being fastened. Tolerances shall conform to AISC Code of Standard Practice. Fastening of splices of compression members shall be done after the abutting surfaces have been brought completely into contact. Bearing surfaces and surfaces that will be in permanent contact shall be cleaned before the members are assembled. As erection progresses, the work shall be securely fastened and braced or guyed to take care of all dead load, wind and erection stresses. Splices will be permitted only where indicated on the approved erection drawings. Poor matching of holes shall be corrected by drilling to the next larger size. Welding for redrilling will not be permitted.

4.1.1 Base Plates and Bearing Plates

Column base plates and bearing plates for beams and similar structural members to be supported on concrete or other masonry construction shall be set and anchored to the proper line and elevation. Metal wedges or shims shall be used for leveling and plumbing the structural members, including plumbing of the columns. Wedges or shims shall remain permanently in place but, where protruding, shall be

cut off flush with the edge of the base or bearing plate. The cutting off of shims and wedges shall be done as a part of the structural steel work after the grouting has been done.

4.2 Storage of Materials

Structural material, either plain or fabricated, shall be stored above-ground upon platforms, skids or other supports. Material shall be kept free from dirt, grease or other foreign matter, and shall be protected from corrosion.

4.3 Workmanship

4.3.1 Equipment and Scaffolding

Erecting equipment and scaffolding shall be suitable and safe for the workmen. Scaffolding shall be adequate to permit the proper and safe performance and inspection of the work and shall not be removed until the work has been inspected and any work found defective satisfactorily remedied and approved. All erecting equipment and scaffolding shall comply with the requirements of the applicable State codes.

4.3.2 Corrections

Errors in shop fabrication or deformation resulting from handling and transportation that prevent the proper assembly and fitting of parts shall be reported immediately to the Engineer. Replacement or approved corrections shall be made by the contractor without additional reimbursement.

4.3.3 Drift Pins

Drift pins may be used only to bring together the several parts and shall not be used in such manner as to distort or damage the metal.

4.3.4 Gas Cutting

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 a gascutting torch will be permitted only on minor members, when the member is not under stress, and then only after the approval of the Engineer has been obtained.

5.0 TESTING

No additional tests beyond those normally employed either in manufacturing, installation or construction processes or as called for by the specified codes and standards are required under this article.

6.0 INFORMATION TO BE SUBMITTED

6.1 With Bid

There will be no technical information required in bid form.

6.2 After Award

The following information and data shall be submitted.

6.2.1 Shop Drawings

Shop, detail and placing drawings for all-structural steel and miscellaneous iron shall be submitted to engineer for approval.

6.2.2 Mill Test Reports

Certified mill test reports covering the physical and chemical properties of the structural steel shall be submitted to engineer for approval.