

SECTION 05120**MISCELLANEOUS AND STRUCTURAL STEEL****PART 1 - GENERAL****1.01 SCOPE OF WORK:**

- A. Furnish all labor, materials, equipment, incidentals, transportation, erection and supervision necessary to complete all miscellaneous steel and related work called for by the plans and/or specifications or reasonably inferable from either or both.
- B. Furnish, fabricate and erect structural steel and related items required to complete the work, including all steel required for connections.
- C. Provide all accessories as required.
- D. Paint.

1.02 RELATED WORK:

- A. Painting

1.03 STANDARDS

- A. Except where otherwise indicated, conform all materials, workmanship and practices to the requirements of the following references and codes, except as otherwise specified herein or in the Contract Drawings.
 - 1) South Florida Building Code
 - 2) AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
 - 3) AISC Code of Standard Practice
 - 4) American Welding Society (AWS), Structural Welding Code, AWS D1.1.
 - 5) American Society for Testing Materials (ASTM).
 - 6) Steel Structures Painting Council (SSPC), Surface Preparations Specifications.
 - 7) Specifications for Structural Joints Using ASTM A325 or A490 Bolts as approved by the Research Council on Riveted and bolted Structural Joints of the Engineering Foundation.
- B. Where standards are referenced herein, the latest edition of each reference shall apply.

1.04 QUALIFICATIONS

- A. Welding procedures, welders, welding operators and tackers shall be qualified in accordance with the "Code for Welding in Building Construction" and hold current Dade County Certificates as qualified to weld downhand and overhead.

1.05 SUBMITTALS

- A. Shop drawings: Submit to the Engineer of Record shop drawings indicating all shop and erection details, including cuts, connections, holes, threaded fasteners and welds (indicate welds by AWS symbols), templates and directions for installing anchor bolts, submit description of erection procedures, including sequence of erection, temporary bracing and welding procedures.
 - 1) Structural steel, including certified copies of mill test reports covering chemical and physical properties.
 - 2) High-strength bolts, including nuts and washers.
 - 3) Primer paint
 - 4) Shrinkage-resistant grout

1.06 PRODUCT HANDLING:

- A. Use markings corresponding to markings shown on approved shop drawings.
- B. Storage of materials: structural materials, either plain or fabricated, shall be stored above the ground upon platforms, skids or other supports. Material shall be kept free from dirt, grease and other foreign matter and shall be protected from corrosion.

PART 2 - MATERIALS (AS APPLICABLE)

2.01 GENERAL:

- A. Unless otherwise specified on the Drawings, all structural steel, steel bolts, nuts, washers and all other miscellaneous ferrous metal items (except cast iron and stainless steel) shall be hot dip galvanized in accordance with ASTM A123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products" or A153 "Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware".
- B. Fabricated products shall be hot-dip galvanized after all welding and fabrication is complete, except as may be otherwise specified herein or shown on the Plans for finishes other than galvanized. Internal threads shall be tapped or retapped after galvanizing.

2.02 MATERIALS:

- A. Rolled steel shapes, bars and plates: Domestic manufacture conforming to ASTM A36/A36M.
- B. Steel Pipe, Welded and Seamless ASTM A53-90b, Type E or S, Grade B ($F_y=35$ ksi).

- C. Shaped Structural Tubing shall conform with ASTM A500, Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes", Grade B ($F_y=42$ ksi) welded or seamless.
- D. Stainless Steel
1. Stainless steel used in this Project, except for threaded fasteners or other specific applications which are covered elsewhere herein, shall be AISI Type 316L, where welding is required and Type 316 where no welding is involved. Welded shapes shall be shop fabricated and welded if not available in specified sizes.
 2. Stainless steel plates, sheet and strip shall conform with the chemical and mechanical requirements of ASTM A240/A240M, "Heat-Resisting Chromium and Chromium Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels". Sheet shall have No. 1 finish (both sides) as defined in ASTM A 480/A480, "General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip", Section 8.1.1 and 10.1.2, respectively; except that both in addition to these specifications shall be thoroughly cleaned and passivated after fabrication.
 3. Stainless steel bars and structural shapes shall conform with the dimensions and tolerances of ASTM A6/A6M, "General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use". Mechanical and chemical properties shall conform with ASTM A276 "Stainless and Heat-Resisting Steel Bars and Shapes". Hot rolled bars and shapes shall have a blast clean finish.
 4. The Contractor shall furnish the Engineer of Record with manufacturer's test certificates showing that the steel has met the above requirements, in addition to which the Department may take representative samples from the material on the job and have them tested by an independent testing laboratory.
- E. Bolts:
- 1) Anchor Bolts: ASTM A307, non-headed type with heavy hexagonal nuts unless otherwise specified.
 - 2) Structural Steel: ASTM A325, hexagonal, with high strength hexagonal nuts, and hardened washers.
 - 3) Unfinished threaded fasteners:
 - (a) Conform with ASTM A307, Grade A, regular low carbon steel bolts and nuts.
 - (b) Furnish either hexagonal or square heads and nuts; except use only hexagonal heads for exposed bolts.
 - 4) Bolts for aluminum shall be stainless steel.
- F. Welding electrodes: E-70XX series, conforming to AWS for method employed.

- G. Shop-paint: Rust inhibitive primer Rustoleum 769, Southern Coating R.I.P. 476, Pittsburgh Iron Hide or approved equal.
 - 1) To insure satisfactory and successful final painting of materials and equipment, it is essential that the shop applied paints be mutually compatible with the field paints.

2.03 LADDER

- A. Ladders in dry/wet well pump stations shall be galvanized steel ladders, fabricated with structural shapes. The ladder shall have watertight welded joints, ground smooth. The ladder shall comply with OSHA Standards.
- B. Prior to fabrication, verify all dimensions by actual measurement, so that the finished ladders will fit accurately and provide a neat appearance, with no part out of line and grade by more than 1/8 inch.
- C. Side rails shall be 16 inches apart and shall be 2-1/2 inches by 3/8 inch rectangular bar stock, minimum.
- D. Bolts securing ladders to concrete substrate shall be 3/8-inch stainless steel wedge anchors.
- E. Rungs shall be approximately 12 inches apart, with the bottom rung 12 inches from the deck or floor, and shall be one inch diameter solid bar stock, minimum. Rungs shall fit into drilled holes in the side rails, and shall then be welded on both sides of each rail.
- F. Ladders may be vertical, or inclined, but negative inclination will not be permitted. Ladders shall be no closer than 8 inches from the wall to provide toe space. The rails shall be supported as required, but supports shall not be spaced greater than 10 feet apart.
- G. The ladder from the access hatch to the intermediate deck shall have extension rails which can be pulled up when the hatch is open. The extensions shall be of a design to insure a positive locking arrangement when in the extended position.

2.04 CONCRETE ANCHORS

- A. Where concrete anchors are called for on the Drawings, one of the types listed below shall be used; except, where one of the types listed below is specifically called for on the Drawings, only that type shall be used. The determination of anchors equivalent to those listed below shall be on the basis of ultimate tensile and shear capacities from test data published by the manufacturer.
 - 1. Shell-Type Anchors: Shell-type anchors shall be self-drilling or non-drilling Red Head anchors as manufactured by the Phillips Drill Company, or approved equal.
 - 2. Wedge Anchors: Wedge anchors shall be Red Head wedge-type anchors as manufactured by the Phillips Drill Company, Parabolts anchors as manufactured by the Molly Division of Emhart Corporation, or approved equal.

3. Adhesive Anchors: Adhesive anchors shall be capsule-type Redi-Chem anchors as manufactured by- the Phillips Drill Company, Parabond Capsule Anchors manufactured by the Molly Division of Emhart Corporation, or equal. Anchors which use a pour-in or injection system for the epoxy resin placement may be used, provided that test data are submitted substantiating the equivalence of tensile and shear capacities to the capsule-type anchors specified herein.
- B. Unless otherwise noted, all concrete anchors which are submerged, or which are subject to vibration from equipment such as pumps and generators , shall be adhesive anchors.
- C. See Section 03300, "Cast-in-Place Concrete" for additional use restrictions of concrete anchors.

PART 3 - EXECUTION

3.01 FABRICATION

- A. Conform to above referenced quality standards for fabrication. Fabrication shall be in accordance with AISC specifications and by members of AISC only.
- B. Fabricate for delivery in a sequence which will expedite erection and minimize field handling.
- C. Use only certified welders.
- D. Apply one shop coat paint to surfaces not to be encased in concrete as specified under painting section after fabrication.
 - 1) Cleaning by hand or power tool of all rust, scale, weld slag, dirt and other foreign matter. Oil and grease removed with solvents.
 - (a) Do not paint surfaces which are to be welded or high-strength bolted with friction type connectors.
 - (b) Apply two coats of paint to surfaces which will be inaccessible after assembly or erection.
 - 2) Primer: 1 coat to produce a dry film thickness of 2.5 Mils.
 - 3) Repaint all areas affected by welding and abrasions after erecting.
- E. All members shall be one piece unless shown otherwise on plans or approved shop drawings.
- F. Provide all items required to be cast in, or built in, to proper trades in sufficient time to avoid delay.
- G. Galvanize all structural steel members. Hot dipped galvanized after fabrication in accordance with ASTM A123.
- H. Tolerances: meet such closer tolerances as may be required by special details or methods of erection in addition to tolerance requirements by standards specified above.

- I. Shearing, punching and cutting shall leave clean, true lines and surfaces. (Hole 1/16" larger than nominal diameter of fastener unless otherwise detailed.)
- J. Members embedded in concrete. Cleaned as per "D" above and paint exposed surfaces and initial 2-inches of embedded areas.
- K. Shop connections welded unless otherwise indicated. Comply with AWS Code for procedures, appearance, and quality of welds, and methods used in correcting work. Connection to develop full moment and shear capacity of member.
- L. Do not flame cut holes or enlarge holes by burning.
- M. Drill holes in bearing plates.

3.02 ERECTION (as applicable)

- A. Conform to above referenced standards for erection.
- B. All field welding to be by certified welders.
- C. Erect all items plumb, properly spaced true to line and dimension. Work not conforming to these requirements shall be removed and replaced correctly.
- D. Provide adequate braces and stays to hold steel in place until permanently anchored.
- E. Field paint all welds immediately after inspection.
- F. Touch up shop coats of paint which are damaged as soon as steel is erected.
- G. Field repairs to galvanizing shall be made using "Galvinox", "Galvo-Weld" or approved equal.
- H. Dissimilar materials: where aluminum surfaces come in contact with other metal, keep aluminum surfaces from direct contact with such parts by:
 - 1) Painting dissimilar metals with prime coats of aluminum metal and masonry paint excluding those containing lead pigmentation.
 - 2) Paint any dissimilar metal with coating of heavy bodied bituminous painting.
- I. Permanent connections to be welded or bolted as detailed on drawings. Welded joints shall be full strength butt or fillet welds. Connections to develop full capacity of members.
- J. Anchor bolts, inserts and other miscellaneous items of structural steel required to be cast or built-in shall be furnished to the proper trades in sufficient time to avoid delay of their work. Furnish necessary supervision, templates, spacers, etc., as required to assure proper installation.

3.03 TESTING:

- A. The Department or its representative reserves the right to test and/or inspect high strength bolted connections and field welded connections and perform additional tests and inspections as required.
- B. Correct all deficiencies in structural steel work which inspection and test reports indicate not to be in compliance with specified requirements.

END OF SECTION