

DIVISION 05 – METALS
Section 05 50 00 – Metal Fabrications

PART 1 – GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

The provisions and intent of the Contract, including the General Conditions, Supplementary Conditions, and General Requirements, apply to this work as if specified in this section. Work related to this section is described in:

- A. Section 35 59 13 – Marine Fenders
- B. Section 03 60 00 – Grouting
- C. Section 09 96 00 – High Performance Coatings

1.02 DESCRIPTION OF WORK

All metal fabrications are indicated on the drawings and in the specifications. The work shall consist of furnishing all materials, labor, and equipment for fabricating and/or repairing, galvanizing, and erecting metal fabrications, including hardware, in accordance with the drawings and this specification.

1.03 REFERENCE STANDARDS

- A. American Galvanizers Association (AGA), Quality Assurance Manual.
- B. American Institute of Steel Construction (AISC), Specification for Structural Steel Buildings, 2016.
- C. American Institute of Steel Construction (AISC), Code of Standard Practice for Steel Buildings and Bridges, 2016.
- D. American Society for Testing Materials (ASTM), Standard Specifications and Standard Test Methods, designated by basic reference in this section (use the most current edition at the time of bid unless otherwise indicated).
- E. American Welding Society (AWS) D1.1 – 2015, Structural Welding Code – Steel.
- F. American Welding Society (AWS) A2.4 – 2007, Standard Symbols for Welding, Brazing, and Nondestructive Examination.
- G. Society for Protective Coatings (SSPC), Surface Preparation Specifications.

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- H. Washington Association of Building Officials (WABO) Standard No. 27-13, WABO Welder and Welding Operator Performance Qualification Standard for Structural Steel, Sheet Steel, and Reinforcing Steel.

1.04 QUALITY ASSURANCE

- A. Demonstrate that the fabricator has a minimum of five (5) years experience fabricating and working similar metals and configurations, including cutting, bending, forming, welding, and finishing.
- B. Welders shall be currently certified by the Washington Association of Building Officials (WABO) for structural welding.
- C. Qualify welding procedures, operations, welders, and tackers in accordance with AWS D1.1.
- D. The galvanized coating applicator shall specialize in hot-dip galvanizing after fabrication and follow the procedures in the AGA Quality Assurance Manual.
- E. Perform nondestructive testing (NDT) and inspection of all shop and field welds in accordance with AWS D1.1 at no cost to the Port. Welds failing to comply shall be repaired or replaced at the Contractor's expense.

1.05 SUBMITTALS

- A. Detailed and coordinated shop drawings indicating all shop and erection details, including cuts, copes, connections, holes, fasteners, material specifications, welds, surface preparations, and finishes.
- B. Welder qualifications and certifications.
- C. Weld Procedure Specifications (WPS's) proposed for use on the project. Submit supporting Procedure Qualification Records (PQR's) for all WPS's not prequalified by AWS.
- D. Galvanized coating applicator's Certificate of Compliance that the hot-dip galvanized coatings meet or exceed the specified requirements of ASTM A123 or F2329, as applicable.
- E. Mill certificates for each heat number of structural and miscellaneous steel and welding consumable.

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PART 2 – PRODUCTS

2.01 GENERAL

- A. All products shall be new, free from oxidation, corrosion, and defects, and shall be of the specified quality.
- B. Protect all materials and fabrications before, during, and after installation from damage. Protect the installed work of other trades from damage.
- C. Protect galvanized finishes and painted coatings from damage by use of padded slings and straps.
- D. In the event of damage, immediately make all repairs and replacements as per the manufacturer's written recommendations and as approved by the Engineer at no additional cost to the Port.

2.02 STRUCTURAL STEEL

- A. Plates and bars: ASTM A572, Grade 50, unless noted otherwise.
- B. Angles and channels: ASTM A36.
- C. Wide flange shapes: ASTM A992.
- D. HSS sections: ASTM A500, Grade B.
- E. Pipe: ASTM A53, Grade B, ASTM A106, Grade B or C.

2.03 BOLTS, NUTS, RODS AND WASHERS

- A. Anchor bolts or anchor rods: ASTM F 1554, Grade 55, unless noted otherwise.
- B. Economy bolts, hex head bolts, and other bolts not specified as high strength: ASTM A 307, Grade A.
- C. Nuts and washers for economy bolts, hex head bolts, and other bolts not specified as high-strength: ASTM A 563, suitable for grade of bolt, ASTM F 844, standard washer, unless noted otherwise.
- D. High-Strength bolts, nuts, and washers: ASTM A 325-X, Type 3, ASTM A 563-DH, hot-dip zinc coated, and ASTM F 436, hot-dip zinc coated.

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2.04 OTHER MATERIALS

- A. Chains, shackles, and links: See Section 35 59 13 – Marine Fenders
- B. All other materials not specifically described but required shall be proposed by the Contractor, new, free of corrosion, and subject to the approval of the Engineer.

PART 3 – EXECUTION

3.01 PREPARATORY REVIEW

- A. Prior to all work of this section, inspect the installed work of all other trades affecting this work and verify that all such work is complete to the point where this installation may commence.
- B. Coordinate and furnish placement drawings, templates, instructions, and directions for installation of embedded anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items.
- C. Verify that the work can be fabricated and installed in accordance with the drawings, specifications, and reference standards. Immediately report discrepancies to the Engineer and do not proceed with fabrication or installation until discrepancies are resolved and direction is provided.

3.02 FABRICATION

- A. All structural steel shall be fabricated in accordance with the approved shop drawings and reference standards.
- B. Shop-fabricate and preassemble all items complete for installation to the extent practicable to minimize field assembly. Disassemble units only as necessary for shipping and handling limitations.
- C. Unless otherwise indicated on the drawings, weld all shop connections unless otherwise directed on the drawings. All joints shall be tightly fitting, securely fastened, square, plumb, straight, and true.
- D. Drill or punch all holes required for attachments and bolted connections including those of other trades. Burned holes are not allowed.
- E. Welding of all metal fabrications shall conform to AWS D1.1.

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- F. Install and erect all miscellaneous metal and metal fabrications in accordance with the design drawings, shop drawings, and reference standards.

3.03 PROTECTIVE COATINGS

A. Galvanizing:

1. All carbon steel chains, nuts, bolts, washers, anchor rods and other hardware, except as noted in this specification, shall be hot dip galvanized in conformance with A123, A143, A2329, A384, and A385, as applicable.
2. Identify proposed drain holes or vent holes required to produce galvanized coatings to the specified standards. Clearly locate these holes on the shop drawings.
3. Galvanize items, to the extent practicable, immediately after fabrication is complete.
4. Damaged galvanizing, including damage due to welding, shall be restored in accordance with ASTM A 780, Annex A3 to 6 mils minimum plus coated with zinc-rich paint as described in 02 41 00 Demolition. Zinc-rich paints and cold spray materials alone are not acceptable. Surface preparation and application shall be according to the manufacturer's specifications.

END OF SECTION