

## **DIVISION 5 - METALS**

### **SECTION 05500**

#### **METAL FABRICATIONS**

##### **PART 1 GENERAL**

##### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.

##### **1.02 SECTION INCLUDES**

- A. Shop fabricated ferrous metal items, galvanized and prime painted.
- B. Catchbasin Cast Iron Grates and Frames. (If called for)
- C. Rough Hardware.
- D. Loose Bearing and Leveling Plates.
- E. Loose Steel Lintels, including but not limited to door, window and all other brick lintels.
- F. Shelf and relieving angles.
- G. Miscellaneous framing and supports such as outdoor railing vertical and horizontal railing supports and stanchions.
- H. Any other metal fabrication not otherwise specified.

##### **1.03 SYSTEM DESCRIPTION**

- A. Railing and attachments to resist lateral force of 75 lbs at any point without damage or permanent set.

##### **1.04 SUBMITTALS**

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- B. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.
- C. Prepare Shop Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Louisiana.
- D. Product data for steel floor plates, paint products and grout.
- E. Samples representative of materials and finished products as may be requested by Architect.

##### **1.05 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Firm experienced in Producing metal fabrications similar to those indicated for this Project with record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the work.
- B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code-Steel", "AWS D1.2 "Structural Welding Code-Aluminum," and AWS D1.3 "Structural Welding Code - Sheet Steel", and the standard AWS designation for Structural Welding Code-Stainless Steel".
  - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved if pertinent, has undergone re-certification.

#### 1.06 PROJECT CONDITIONS

- A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show record measurements of final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions. Allow for trimming and fittings.

### PART 2 PRODUCTS

#### 2.01 FERROUS METALS

- A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
  - 1. Steel Plates, Shapes and Bars: ASTM A36/A 36M.
  - 2. Rolled Steel Floor Plates: ASTM A786/ A 786M.
  - 3. Cold-Formed Steel Tubing: ASTM A500.
  - 4. Hot-Formed Steel Tubing: ASTM A501.
    - a. For exterior installations and where indicated provide tubing with hot-dip galvanized coating per ASTM A 53.
  - 5. Steel Pipe: ASTM A53, Grade B Schedule 40.
    - a. Galvanized finish for exterior installation and where indicated.
    - b. Black finish, unless otherwise indicated.
  - 6. Sheet Steel: ASTM A446, Grade B Structural Quality with galvanized coating.
  - 7. Gray-Iron Castings: ASTM A 48, Class 30.
  - 8. Malleable-Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).
  - 9. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM # 488, conducted by a qualified independent testing agency.
    - a. Threaded or wedge type: galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A27/A 27M cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.
  - 10. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy to be welded.

#### 2.02 2.03 PAINT

- A. Shop Primer for Ferrous Metal: Fast-curing, lead-and chromate-free, universal modified-alkyd primer complying with performance requirements of FS TT-P-664, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P21035 or SSPC-Paint 20.
- C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers.

## 2.03 FASTENERS

- A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.
- B. Bolts and Nuts: For all installations, locations and conditions where bolts will be exposed on the surface of steel, use High Strength ASTM A 325 Rivet Head Bolts. The Rivet head bolt is to be used to emulate the historic look of the existing riveted connections of the steel in the historic building. In other conditions where visual appearance is not a consideration regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568, Property Class 4.6), with hex nuts, ASTM A 563 (ASTM A 563M), and where indicated, flat washers can be used.
- C. Machine Screws: ANSI B18.6.3
- D. Lag Bolts: ANSI B18.2.1 (ANSI B18.2.3.8M)
- E. Wood Screws: Flat head, carbon steel, ANSI B18.6.1.
- F. Plain Washers: Round, carbon steel, ANSI B18.22.1 (ANSI B18.22M).
- G. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of materials indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E488 conducted by a qualified independent testing agency.
  - 1. Material: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn
- I. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as required.

## 2.04 GROUT

- A. Nonshrink, Metallic Grout: Factory packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

## 2.05 CONCRETE FILL

- A. Concrete Materials and Properties: Comply with requirements of Section "Cast-In-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28 day compressive strength of 3000 psi (20 MPa), unless higher strengths are indicated.

## 2.06 FABRICATION, GENERAL

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Continuously seal joined members by intermittent welds and plastic filler.

- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts, consistent with design of component.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication.
- F. Accurately form components required for anchorage of stairs and landings and railings to each other and to building structure.
- G. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metal due to both solar heat gain and nighttime sky heat loss.  
1. Temperature Change (Range): 100 deg F (55.5 deg. C).
- H. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- I. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

#### 2.07 ROUGH HARDWARE

- A. Furnish bent, or otherwise custom-fabricated, bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete, brick masonry or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.
- B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts that bear on wood structural connections, and furnish steel washers elsewhere.

#### 2.08 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat free from warps or twists, and of the required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

#### 2.09 LOOSE STEEL LINTELS

- A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Weld adjoining members together to form single unit where indicated.
- C. Size loose lintels for equal bearing of 1 inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.
- D. Galvanize loose steel lintels located in exterior walls and above all window, door and other types of openings where lintel is exposed to weather.

2.10 SHELF AND RELIEVING ANGLES

- A. Fabricate shelf and relieving angles from steel angles of size indicated and for attachment to concrete framing. Provide slotted holes to receive 3/4" bolts, spaced not more than 6 inches from ends and not more than 24 inches o.c., unless otherwise indicated.
- B. For cavity walls, provide vertical channel brackets to support shelf/relieving angles from back-up masonry and concrete. Align expansion joints in angles with indicated control and expansion joints in cavity wall exterior wythe.
- C. Galvanize shelf angles to be installed on exterior concrete framing or above windows, doors and other openings in exterior brick veneer walls.

2.11 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.
- B. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
  - 1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
    - a. Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1 1/4 " wide by 1/4" thick by 8" long.

2.12 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from structural steel shapes, plates and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices wherever possible.
- B. Provide cutouts, fittings and anchorage as required to co-ordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches o.c., unless otherwise indicated.
- C. Galvanize miscellaneous steel trim in exterior and interior located where indicated including steel lintels above doors, windows and other openings where steel lintels are exposed to the exterior.

2.13 FLOOR PLATE

- A. Fabricate steel floor plates from rolled-steel floor plate of 1/4-inch thick steel.

2.14 CAST IRON CATCH BASIN GRATES AND FRAMES (If Called For)

- A. Castings shall be uniform in quality, free from blow-holes, porosity, hard spots, shrinkage, defects, swells, cracks or other injurious defects.
- B. Surfaces shall be smooth and true to pattern.
- C. Material used in manufacturing of iron castings shall conform to ASTM specification A48-83 Class 35B iron for gray iron castings.
- D. All cast iron castings used in the ground shall be furnished with one coat of bituminous paint.

- E. Cast iron casting that will have an "on the job" final paint finish shall be furnished with one coat of rust inhibited primer paint.
- F. Tolerances: One half the maximum shrinkage possessed by the metal or +/- 5 %.
- G. Approximate size of Cast Iron Grate and Frame: Refer to architectural drawing for size of catch basin and grating size. Verify on job site.
- H. Grating to have sufficient size opening holes to handle the most severe drainage conditions at any one time and as recommended for manufacturer but no less than 2" x 2" openings.
- I. Available Manufactures: But not limited to the following:
  - 1. Barry Pattern & Foundry Co., Inc.
  - 2. Campbell Foundry Co.
  - 3. McKinley Iron Works, Inc.
  - 4. Neenah Foundry Co.
  - 5. Vulcan Foundry
  - 6. Manufacturer to match existing cast iron grating.

#### 2.15 FINISHES, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designing finishes.
- B. Finish metal fabrications after assembly.

#### 2.16 STEEL AND IRON FINISHES

- A. Galvanizing: For those items indicated for galvanizing apply zinc coating by the hot-dip process complying with the following requirements:
  - 1. ASTM A 153 for galvanizing iron and steel hardware.
  - 2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars and strip 0.0299 inch thick or thicker.
- B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrication:
  - 1. Exteriors (SSPC zone 1B): SSPC-SP 6 "Commercial Blast Cleaning."
  - 2. Interiors (SSPC Zone 1A): SSPC-SP 3 "Power Tool Cleaning".
- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.

#### 2.17 ALUMINUM FINISHES (If called for)

- A. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

#### 2.18 STAINLESS STEEL FINISHES (If called for)

- A. As per accepted industry standards for polished finishes for stainless steel.

### PART 3 EXECUTION

#### 3.01 EXAMINATION AND PREPARATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Make provisions for erection loads with temporary bracing. Keep work in alignment.
- C. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

#### 3.02 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads and provide temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated. Perform field welding in accordance with AWS D1.1.
- D. Obtain Architect/Engineer approval prior to site cutting.
- E. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

#### 3.03 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.
- B. For Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

#### 3.04 PROTECTION

- A. Protect finishes of stairs, handrails, and railing systems from damage during construction period with temporary protective coverings. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alteration and refinish entire unit, or provide new units.

END OF SECTION - 05500