

## **SECTION 05 50 00 METAL FABRICATIONS**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

- A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.
- B. Items specified.
  - 1. Railings
  - 2. Bird wire deterrent system

#### **1.2 RELATED WORK**

- A. Steel frame for railing attachment: Section 05 12 00, STRUCTURAL STEEL FRAMING.
- B. Colors, finishes, and textures: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Prime and finish painting: Section 09 91 00, PAINTING.

#### **1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Steel framing.
  - 2. Railings.
  - 3. Bird wire deterrent system
- C. Shop Drawings:
  - 1. Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
  - 2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
  - 3. Provide templates and rough-in measurements as required.

- D. Manufacturer's Certificates:
  - 1. Stainless steel wire mesh.
  - 2. Bird wire deterrent.
- E. Furnish setting drawings and instructions for installation of anchors to be preset into concrete and masonry work, and for the positioning of items having anchors to be built into concrete or masonry construction.

#### **1.4 QUALITY ASSURANCE**

- A. Each manufactured product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.
- B. Each product type shall be the same and be made by the same manufacturer.
- C. Assembled product to the greatest extent possible before delivery to the site.
- D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

#### **1.5 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society of Mechanical Engineers (ASME):
  - B18.6.1-97 ..... Wood Screws
  - B18.2.2-87(R2005) ... Square and Hex Nuts
- C. American Society for Testing and Materials (ASTM):
  - A36/A36M-08 ..... Structural Steel
  - A47-99(R2009) ..... Malleable Iron Castings
  - A48-03(R2008) ..... Gray Iron Castings
  - A53-10 ..... Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
  - A123-09 ..... Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - A167-99(R2009) ..... Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A269-10 ..... Seamless and Welded Austenitic Stainless Steel Tubing  
for General Service

A307-10 ..... Carbon Steel Bolts and Studs, 60,000 PSI Tensile  
Strength

A312/A312M-09 ..... Seamless, Welded, and Heavily Cold Worked Austenitic  
Stainless Steel Pipes

A391/A391M-07 ..... Grade 80 Alloy Steel Chain

A653/A653M-10 ..... Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy  
Coated (Galvannealed) by the Hot-Dip Process

A786/A786M-09 ..... Rolled Steel Floor Plate

B221-08 ..... Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire,  
Shapes, and Tubes

B456-03(R2009) ..... Electrodeposited Coatings of Copper Plus Nickel Plus  
Chromium and Nickel Plus Chromium

B632-08 ..... Aluminum-Alloy Rolled Tread Plate

C1107-08 ..... Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

D3656-07 ..... Insect Screening and Louver Cloth Woven from Vinyl-  
Coated Glass Yarns

F436-10 ..... Hardened Steel Washers

F468-10 ..... Nonferrous Bolts, Hex Cap Screws, and Studs for General  
Use

F593-02(R2008) ..... Stainless Steel Bolts, Hex Cap Screws, and Studs

F1667-11 ..... Driven Fasteners: Nails, Spikes and Staples

D. American Welding Society (AWS):

D1.1-10 ..... Structural Welding Code Steel

D1.2-08 ..... Structural Welding Code Aluminum

D1.3-08 ..... Structural Welding Code Sheet Steel

E. National Association of Architectural Metal Manufacturers (NAAMM)

AMP 521-01 ..... Pipe Railing Manual

AMP 500-06 ..... Metal Finishes Manual

MBG 531-09 ..... Metal Bar Grating Manual

MBG 532-09 ..... Heavy Duty Metal Bar Grating Manual

F. Structural Steel Painting Council (SSPC)/Society of Protective Coatings:

SP 1-04..... No. 1, Solvent Cleaning

SP 2-04..... No. 2, Hand Tool Cleaning

SP 3-04..... No. 3, Power Tool Cleaning

G. Federal Specifications (Fed. Spec):

RR-T-650E ..... Treads, Metallic and Nonmetallic, Nonskid

## **PART 2 - PRODUCTS**

### **2.1 DESIGN CRITERIA**

- A. In addition to the dead loads, design fabrications to support the 90 MPH wind loads unless otherwise specified.

### **2.2 MATERIALS**

- A. Structural Steel: ASTM A36.
- B. Stainless Steel: ASTM A167, Type 302 or 304.
- C. Aluminum, Extruded: ASTM B221, Alloy 6063-T5 unless otherwise specified. For structural shapes use alloy 6061-T6 and alloy 6061-T4511.
- D. Floor Plate:
1. Steel ASTM A786.
  2. Aluminum: ASTM B632.
- E. Steel Pipe: ASTM A53.
1. Galvanized for exterior locations.
  2. Type S, Grade A unless specified otherwise.
  3. NPS (inside diameter) as shown.
- F. Primer Paint: As specified in Section 09 91 00, PAINTING.
- G. Stainless Steel Tubing: ASTM A269, type 302 or 304.
- H. Grout: ASTM C1107, pourable type.

## **2.3 HARDWARE**

### **A. Rough Hardware:**

1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.
2. Use G90 galvanized coating on ferrous metal for exterior work unless non-ferrous metal or stainless is used.

### **B. Fasteners:**

1. Bolts with Nuts:
  - a) ASME B18.2.2.
  - b) ASTM A307 for 415 MPa (60,000 psi) tensile strength bolts.
  - c) ASTM F468 for nonferrous bolts.
  - d) ASTM F593 for stainless steel.
2. Screws: ASME B18.6.1.
3. Washers: ASTM F436, type to suit material and anchorage.
4. Nails: ASTM F1667, Type I, style 6 or 14 for finish work.

## **2.4 FABRICATION GENERAL**

### **A. Material**

1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named or its standard of quality not specified.
2. Use material free of defects which could affect the appearance or service ability of the finished product.

### **B. Size:**

1. Size and thickness of members as shown.
2. When size and thickness is not specified or shown for an individual part, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.

### **C. Connections:**

1. Except as otherwise specified, connections may be made by welding, riveting or bolting.
2. Field riveting will not be approved.
3. Design size, number and placement of fasteners, to develop a joint strength of not less than the design value.
4. Holes, for rivets and bolts: Accurately punched or drilled and burrs removed.
5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
7. Use stainless steel connectors for removable members machine screws or bolts.

D. Fasteners and Anchors

1. Use methods for fastening or anchoring metal fabrications to existing wall construction as shown or specified.
2. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.
3. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
4. Fasteners for securing metal fabrication to existing construction may be threaded rods set in epoxy, welding, self drilling and tapping screws or bolts.

E. Workmanship

1. General:
  - a) Fabricate items to design shown.
  - b) Furnish members in longest lengths commercially available within the limits shown and specified.
  - c) Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.

- d) Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items.
- e) Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.
- f) Prepare members for the installation and fitting of hardware.
- g) Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.

2. Welding:

- a) Weld in accordance with AWS.
- b) Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
- c) Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
- d) Finish welded joints to match finish of adjacent surface.

3. Joining:

- a) Miter or butt members at corners.
- b) Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.

4. Anchors:

- a) Base plates shall be secured to (e) concrete construction with threaded rods in epoxy with a minimum of 5" embedment.

5. Cutting and Fitting:

- a) Accurately cut, machine and fit joints, corners, copes, and miters.
- b) Fit removable members to be easily removed.
- c) Design and construct field connections in the most practical place for appearance and ease of installation.
- d) Fit pieces together as required.
- e) Fabricate connections for ease of assembly and disassembly without use of special tools.
- f) Joints firm when assembled.

- g) Conceal joining, fitting and welding on exposed work as far as practical.
- h) Do not show rivets and screws prominently on the exposed face.
- i) The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.

F. Finish:

1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.
2. Steel and Iron: NAAMM AMP 504.
  - a) Zinc coated (Galvanized): ASTM A123, G90 unless noted otherwise.
  - b) Surfaces exposed in the finished work:
    - (1) Finish smooth rough surfaces and remove projections.
    - (2) Fill holes, dents and similar voids and depressions with epoxy type patching compound.
  - c) Shop Prime Painting:
    - (1) Surfaces of Ferrous metal:
      - (i) Items not specified to have other coatings.
      - (ii) Galvanized surfaces specified to have prime paint.
      - (iii) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.
      - (iv) Clean of oil, grease, soil and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
      - (v) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.
    - (2) Non ferrous metals: Comply with MAAMM-500 series.
3. Stainless Steel: NAAMM AMP-504 Finish No. 4.
4. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.



G. Protection:

1. Insulate aluminum surfaces that will come in contact with concrete, masonry, plaster, or metals other than stainless steel, zinc or white bronze by giving a coat of heavy-bodied alkali resisting bituminous paint or other approved paint in shop.
2. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

**2.5 SUPPORTS**

A. General:

1. Fabricate ASTM A36 structural steel shapes as shown.
2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
3. Field connections may be welded or bolted.

**2.6 FRAMES**

A. Frames for Guard Rail Replacement:

1. Fabricate from combination of steel plates, flat bars, tubes, and angles to size and contour shown.

**2.7 RAILINGS**

A. In addition to the dead load design railing assembly to wind load specified.

B. Fabrication General:

1. Provide continuous welded joints, dressed smooth and flush.
2. Standard flush fittings, designed to be welded, may be used.
3. Exposed threads will not be approved.
4. Form guardrail brackets to size and design shown.

C. Ornamental Guardrails:

1. Fabricate of stainless steel wire 304, (0.162") in a 1"x2" wire mesh pattern, fabricated in diameter, sheets similar to McNichols all wire mesh.
2. Provide stainless U-Edging per wire mesh Manufacturer on the perimeter of formed wire mesh to fit dimension indicated.

## **2.8 BIRD DETERRENT SYSTEM**

1. Bird wire shall be stainless wire coated with U.V. stabilized clear nylon.
  - a) Posts shall be made of stainless steel with spring hooks and solid rod suitable for installation of plastic base.
  - b) Base shall be made out of plastic with U.V. stabilizer and suitable for glued application.
  - c) Springs shall be made of stainless steel with hooks at both ends for wire installation.
2. Install bird wire deterrent system after guardrail installation is complete.
  - a) Make sure that guardrail top rail is clean to receive glue for base installation.
  - b) Glue base to top rail and post to base. Ensure that all bases are centered in place as indicated.
  - c) Install springs and wires per manufacturer's instructions to complete a fully functional bird wire deterrent systems.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION, GENERAL**

- A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.
- B. Set baseplates on to of existing concrete wall, provide temporary bracing as required.
- C. Secure base plates to all threaded rods as indicated.
- D. Field weld in accordance with AWS.
  1. Design and finish as specified for shop welding.
  2. Use continuous weld unless specified otherwise.
- E. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to wall construction as specified. Use a minimum of 5" epoxy embedment on ½" threaded rod. Special inspection is required.
- F. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.

- G. Secure escutcheon plate with set screw.

### **3.2 RAILINGS**

- A. Anchor to Walls:

- 1. Anchor rails base plate to concrete wall with ½" rods and bolts.
  - a) All threaded rods shall be placed in epoxy embedment to ensure firm attachment to wall.
  - b) Secure plates to rods with bolts, 2 minimum per plate.

- B. Rail Attachment to Guardrail Frame:

- 1. Weld brackets for metal guardrail frame as detailed.

### **3.3 BIRD WIRE DETERRENT SYSTEM INSTALLATION.**

- A. Surface should be clean and dry before installation.
- B. Glue base to top rails at 5' maximum spacing with a new spring at every 10'.
- C. Blue post to base per manufacturers recommendations.
- D. Attach springs and wire to post providing sufficient transition to limit sag of nylon coated wire to 1/8" per 10'.

### **3.4 CLEAN AND ADJUSTING**

- A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.
- B. Clean after installation exposed prefinished and plated items and items fabricated from stainless steel, aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

**END OF SECTION 05 00 00**