SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

SCOPE

The scope of work includes, but is not necessarily limited to, the furnishing of necessary materials, labor, tools, equipment, accessories and testing to complete the following:

Steel Bollards.

Loose bearing and leveling plates.

REFERENCE

Applicable provisions of Division 1 shall govern all work under this section.
Related section 10 80 00 – Plastic Bollard Covers

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SUBMITTALS

Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

Samples representative of materials and finished products as may be requested by Architect/Engineer.

QUALITY ASSURANCE

Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the Work.

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."

Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

PROJECT CONDITIONS

Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 – PRODUCTS

FERROUS METALS

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 blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

Steel Plates, Shapes, and Bars: ASTM A 36/ A 36M.

Rolled Steel Floor Plates: ASTM A 786/A 786M.

Steel Tubing: Product type (manufacturing method) and as follows:

Cold-Formed Steel Tubing: ASTM A 500.

Hot-Formed Steel Tubing: ASTM A 501.

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 E 488, conducted by a qualified independent testing agency.

Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/ A 47M malleable iron or ASTM A 27/ A 27M cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153/A 153M.

Welding Rods and Bare Electrodes: Select according to AWS specifications for the metal alloy to be welded.

FASTENERS

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.

Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568, Property Class 4.6), with hex nuts, ASTM A 563/ A 563M, and, where indicated, flat washers.

Machine Screws: ANSI B18.6.3 (ANSI B18.6.7M).

Lag Bolts: ANSI B18.2.1 (ANSI B18.2.3.8M).

Wood Screws: Flat head, carbon steel, ANSI B18.6.1.

Plain Washers: Round, carbon steel, ANSI B18.22.1 (ANSI B18.22M).

Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.

Anchor Bolts: ASTM F1554-99, Grade 36

Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

Expansion Anchors: Anchor bolt and sleeve assembly of material 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 E 488 conducted by a qualified independent testing agency.

Material: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as required.

Adhesive Anchors: Hilti HVA adhesive anchor with anchor meeting ASTM A193-01b, Grade B7.

Threads on anchors shall conform to Unified Standard Series of ASME B18.2.6 with Class 2A tolerances.

GROUT

Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, non-corrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

Non-shrink, Nonmetallic Grouts:

B-6 Construction Grout; Bonsal American, Inc.

Diamond-Crete Grout; Concrete Service Materials Co.

Sure-Grip High Performance Grout; Dayton Superior Specialty Chemical Corp.

Euco N-S Grout; Euclid Chemical Co.

Five Star Grout; Five Star Products, Inc.

Vibropruf #11; Lambert Corp.

Crystex; L & M Construction Chemicals, Inc.

Masterflow 928 and 713; ChemRex-Degussa Building Systems.

Sealtight 588 Grout; W. R. Meadows, Inc.

Sonogrout 14; Sonneborn Building Products, ChemRex-Degussa Building Systems

Kemset; ChemMasters.

STEEL BOLLARDS

Fabricate pipe bollards from Schedule 40 steel pipe.

Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch- (6.4-mm-) thick steel plate welded to bottom of sleeve.

CONCRETE FILL

Concrete Materials and Properties: Comply with requirements of Division 3 Section 03 30 00 "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.

FABRICATION, GENERAL

Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

Remove sharp or rough areas on exposed traffic surfaces.

Weld corners and seams continuously to comply with the following:

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

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.

Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

ROUGH HARDWARE

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 or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.

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.

LOOSE BEARING AND LEVELING PLATES

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.

LOOSE STEEL LINTELS

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.

Weld adjoining members together to form a single unit where indicated.

MISCELLANEOUS FRAMING AND SUPPORTS

General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.

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.

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.

Except as otherwise indicated, space anchors 24 inches on-center and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

Fabricate support for suspended toilet partitions as follows:

Beams: Continuous steel shapes of size required to limit deflection to L/360 between hangers.

Hangers: Steel rods spaced not more than 36 inches on-center. Thread rods to receive anchor and stop nuts. Fit hangers with wedge-shaped washers for full bearing on sloping flanges of support beam.

Braces and Angles: Steel angles of size required for rigid support of beam and for secure anchorage.

FINISHES

General:

Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designing finishes.

Finish metal fabrications after shop assembly.

Shop Finish

Surface Preparation:

SSPC-SP1: The Society for Protective Coatings “Surface Preparation Specification No. 1 – Solvent Cleaning”, September 1, 2000 Edition and SSPC-SP2: “Surface Preparation Specification No. 6 – Commercial Blast Cleaning”, September 1, 2000 Edition.

Primer:

Fast curing, universal modified alkyd, rust inhibiting shop coat with 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. Primer shall comply with all federal standards for VOC, lead, and chromate levels. Color shall be gray.

Shop prime immediately after surface preparation, applying according to manufacturer’s instructions to provide a dry film thickness of not less than 2.0 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surface.

Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements:
ASTM A 153/A 153M for galvanizing hardware.
ASTM A 123/A 123M for galvanizing both fabricated and un-fabricated products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch (0.76 mm) thick or thicker.
Touch-Up Painting
Immediately after erection, clean field welds, bolted connections, and abraded areas of the shop paint and paint all exposed areas with the same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
Galvanizing Repair Paint: High-zinc-dust-content paint for galvanizing welds and repair-painting galvanized steel, with dry film containing not less than 90 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.
Finish Painting
Finish Painting shall be performed under Division 9 Section – Paints and Coatings.

PART 3 – EXECUTION

PREPARATION

Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

Center nosings on tread widths with noses flush with riser faces and tread surfaces.

Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

INSTALLATION, GENERAL

Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

Field Welding: Comply with the following requirements:

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

SETTING LOOSE PLATES

Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

Set loose leveling and bearing plates on wedges or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

Use non-shrink, metallic grout in concealed locations where not exposed to moisture; use non-shrink, nonmetallic grout in exposed locations, unless otherwise indicated.

ADJUSTING AND CLEANING

Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

Apply by brush or spray to provide a 2.0-mil (0.05-mm) minimum dry film thickness.

Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION