SECTION 05505

METAL FABRICATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the requirements for furnishing and installing metal fabrications made from steel shapes, plates, bars, strips, tubes, pipes and castings not a part of structural steel or specified in other Sections, including but not limited to the following items:

1. Miscellaneous steel framing for partition supports.
2. Countertop support brackets.
3. Pulling irons, inserts, and other miscellaneous steel shapes.
4. Steel pipe bollards.
5. Tube framing and mesh infill panels.
6. Steel awnings / sunscreens.
7. Ornamental iron fencing and gates.
8. Metal security fence and gates.
9. Miscellaneous exterior gates.
10. Extruded aluminum blind pockets.
11. Exterior canopy framing.
12. Miscellaneous angles, plates, bars, rods and other items not specified in other Sections but shown or required to complete the work.

B. Related Sections:

1. Alternates are specified in Section 01230.
2. Field applied paint finish is specified in Section 09900.
3. Stainless steel corner guards and aluminum chair rail is specified in Section 10260
4. Stainless steel casework is specified in Section 12312.

1.02 SUBMITTALS

A. Product Data: Include information on paint products and grout.

B. Shop Drawings: Include plans, elevations and details of metal fabrications and their connections. Show anchorage and accessory items. Include details for attaching metal fabrications to building structure. Furnish templates for anchors and bolts installed under other Sections.

C. Weld Samples: Two 4-inch long pieces of steel tubing joined together at a 90-deg. angle with welds ground smooth, flush and imperceptible. Approved welding sample shall be used as a standard for judging the acceptability of welds in steel tube or pipe gates.

D. Submit documentation indicating percentages by weight of postconsumer and preconsumer recycled content (note: industry averages often do not accurately represent the recycled content within a certain product. Many products have higher than average recycled contents). Include statement indicating costs for each product having recycled content.

1.03 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in successfully producing metal fabrications similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the work.

B. Welding Qualifications: Qualify welding processes and welding operators in accordance with AWS D1.1, D1.2, and D1.3 as applicable. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved.

1.04 ENVIRONMENTAL QUALITY ASSURANCE

A. Field-applied metal primers, other than for touch-up purposes, used inside the building shall have a maximum VOC shall not exceed 250 g/L.

B. Galvanizing repair paint shall have a maximum VOC content of 420 g/L.

1.05 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 recorded measurements on shop drawings. Coordinate fabrication schedule to avoid delay of work.

1.06 SEQUENCING AND SCHEDULING

A. Painting: Items specified in this Section as having a shop applied prime coat will be job painted as specified in Section 09900, unless otherwise noted.

PART 2 - PRODUCTS

2.01 FERROUS METALS

A. General: For fabrication of metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

B. Steel Plates, Shapes and Bars: ASTM A36.

C. Steel Tubing: Cold formed, ASTM A500; or hot-rolled, ASTM A501.

D. Structural Steel Sheet: Hot-rolled, ASTM A570; or cold-rolled ASTM A611, Class 1.

E. Galvanized Structural Steel Sheet: ASTM A446, galvanized in accordance with ASTM A525, G90 coating designation.

F. Steel Pipe: ASTM A53; type and grade selected by fabricator; black finish unless galvanizing is indicated or specified; standard weight, schedule 40, unless otherwise indicated.

G. Gray Iron Castings: ASTM A48, Class 30.

H. Malleable Iron Castings: ASTM A47, grade selected by fabricator.

2.02 FASTENERS

A. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A, with hex nuts, ASTM A563, and flat washers.

B. Machine Screws: ANSI B18.6.3.

C. Lag Bolts: ANSI B18.2.1.

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

E. Plain Washers: Round, carbon steel, ANSI B18.22.1.

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

G. Expansion Anchors: Anchor bolt and sleeve assembly 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, determined in accordance with ASTM E448.

2.03 GROUT

A. Non-Shrink Non-Metallic Grout: Euclid Chemical Co. "Euco N-S Grout", L&M Construction Chemicals, Inc. "Crystex", Master Builders Technologies, Inc. "Masterflow 928 and 713" or approved equal.

2.04 PAINT

A. Metal Primer: SSPC 20, Type 2.

1. Exterior Exposure: Tnemec 90-97 Tnemec Zinc or approved equal.

2. Interior Exposure: VOC compliant rust-inhibitive primer.

3. Exposed to view items to be field painted shall be primed with a primer compatible with final finish coats specified in Section 09900.

B. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel; Rust-Oleum Corp. "Zinc-Rich Cold Galvanizing Compound", Tnemec 90-93, ZRC Worldwide "Galvalite" or approved equal.

2.05 FABRICATION, GENERAL

A. Workmanship:

1. Use materials of size and thickness indicated or required to produce strength and durability in finished product for use intended.

2. Work to dimensions indicated,

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

4. Ease exposed edges to a radius of approximately 1/32-inch, unless otherwise indicated.

5. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

6. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces. Welds shall be imperceptible in the finished work.

7. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use Phillips flat- head countersunk screws or bolts for exposed fasteners, unless tamperproof security screws are indicated.

8. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

B. Galvanizing: Provide zinc coating for items indicated or specified to be galvanized, as follows:

1. ASTM A153 for galvanizing iron and steel hardware.

2. ASTM A123 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 and heavier.

C. Fabricate joints exposed to the weather to exclude water or provide weep holes.

D. Shop Painting:

1. Shop paint miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces.

2. Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-2, SP-3, or SP-7.

3. Remove oil, grease and similar contaminants in accordance with SP-1.

4. Brush or spray on primer in accordance with manufacturer's instructions, at a rate of 2.0-mils thickness for each coat.

5. Apply one shop coat to fabricated metal items, except apply 2-coats to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish from the first.

6. Primer on exposed to view items to be field painted shall be smooth and suitable for application of final finish coats specified in Section 09900.

7. Apply a heavy coat of bituminous paint, compounded for application in 30-mil coat, to metal surfaces in contact with concrete, masonry and dissimilar metals. Do not apply on exposed surfaces.

2.06 MISCELLANEOUS METAL FABRICATIONS

A. Loose Bearing and Leveling Plates: Provide for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill to receive anchor bolts and for grouting as required. Galvanize after fabrication.

B. Miscellaneous Framing and Supports:

1. Provide miscellaneous framing and supports not a part of structural steel framework, as required to complete work.

2. Fabricate to sizes, shapes and profiles shown or required.

3. Fabricate from structural steel shapes and plates and steel bars of welded construction using mitered joints for field connection.

4. Cut, drill and tap units to receive hardware and similar items.

5. Furnish integrally welded anchors for casting into concrete or building into masonry.

6. Finish: Galvanize exterior frames and supports, shop prime interior frames and supports.

C. Bollards:

1. Fixed Bollards: Fabricate bollards from galvanized steel pipe of diameter and height indicated. Embed in concrete footings, fill with concrete and close top end by welding a 1/4-inch steel plate in place or provide a smooth concrete domed cap.

2. Removable Bollards: Fabricate bollards from galvanized steel pipe of diameter and height indicated, with ¼-inch steel plate welded to top end. Install in galvanized steel pipe sleeve embedded in concrete. Provide padlock hasp for securing bollards in sleeve.

D. Framing and Mesh Infill Panels:

1. Framing: Fabricate from hot-dip galvanized steel tubing to of sizes indicated. Tubing gauge as recommended by fabricator for panel sizes indicated. Welds shall be continuous and ground smooth, flush and imperceptible in the completed work.

2. Mesh: 4-inch x 4-inch opening size, welded to framing as indicated.

3. Security Gates: Fabricate from hot-dip galvanized steel tubing and mesh infill to match adjacent panels. Provide hardware as specified in Section 08710.

4. Finish: Field painted as specified in Section 09900.

E. Ornamental Iron Fencing and Gates: Fabricated from hot-dip galvanized steel tubing and miscellaneous shapes to sizes and configurations indicated. Provide matching swinging gates. Gate hardware is specified in Section 08710. Finish with field applied paint as specified in Section 09900.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate and furnish anchors, setting drawings, diagrams, templates, instructions, and directions for installation of anchors, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors.

3.02 INSTALLATION

A. General:

1. Fastening to In-Place Construction: Provide threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.

2. Cutting, Fitting and Placement:

a. Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications.

b. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels.

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

3. Fit exposed connections together forming tight hairline joints.

a. Weld connections not shop welded.

b. Grind exposed joints smooth and imperceptible, and touch-up shop paint coat.

c. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and intended for bolted or screwed field connections.

4. Field Welding: Comply with AWS for procedures of manual shielded metal-arc welding, appearance and quality of welds, and methods used in correcting welding work.

B. Setting Loose Plates:

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

2. Set loose leveling and bearing plates on wedges, or other adjustable devices.

3. Tighten anchor bolts after the bearing members have been positioned and plumbed.

4. Cut-off protruding ends of wedges flush with the edge of the bearing plate before packing with grout.

5. Use metallic non-shrink grout in concealed locations where not exposed to moisture; use non-metallic non-shrink grout in exposed locations.

6. Pack grout solidly between bearing surfaces and plates to ensure no voids remain.

C. Bollards: Anchor bollards in concrete with preset pipe sleeves. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solid with non-shrink, nonmetallic grout. Provide removable bollards where indicated.

3.03 ADJUST AND CLEAN

A. Touch-Up Painting: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0-mils.

B. Galvanized Surfaces: Clean field welds, bolted connections and abraded areas and spot prime with specified primer applied to a minimum dry film thickness of 2.5-mils.

END OF SECTION

SECTION 05580

FORMED METAL FABRICATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the requirements for furnishing and installing ornamental formed sheet metal fabrications, including but not limited to the following:

1. Interior stainless steel sheet metal.

B. Related Sections:

1. Metal fabrications are specified in Section 05505.
2. Joint sealants are specified in Section 07920.
3. Stainless steel casework is specified in Section 12312.

1.02 REFERENCE STANDARDS

A. Leadership in Energy and Environmental Design (LEED), www.usgbc.org/LEED, United States Green Building Council (USGBC).

1. LEED – NC v2.2 Reference Guide, first edition, dated December 2006.

1.03 SUBMITTALS

A. Refer to Section 01352 – LEED Requirements for LEED related submittal requirements.

B. Shop Drawings: Submit large scale shop drawings showing materials, dimensions, joints, fasteners, provisions for thermal movement, metal thickness, finishes, and methods of attachment to supporting construction. Show proposed location of all joints exposed to view in the completed work. Show provisions for draining condensation in exterior fabrications.

C. Samples: 8-inch square sample of each metal and finish required. Prepare on same material and gauge to be used for the work. Resubmit samples until approved by the Architect.

D. Fabricator's Qualifications: Furnish evidence that the proposed fabricator of this work has a minimum of 5-years successful experience fabricating, finishing and installing similar work.

E. LEED Submittals – Refer to Section 01352:

1. Product Data for Credit MRc4.1: For products having recycled content, documentation indicating percentages by weight of post-consumer and pre-consumer recycled content. Include statement indicating costs for each product having recycled content.
2. Product Data for Credit EQc4.1: For sealants and adhesives used at the Project site, including printed statement of VOC content.

1.04 QUALITY ASSURANCE

A. Fabricator shall have a minimum of 5-years experience in the fabrication of formed metal fabrications similar to those required for this Project.

B. Panel Flatness: Fabricate sheet metal fabrications to be free of oil-canning and other imperfections.

1.05 ENVIRONMENTAL QUALITY ASSURANCE

A. Applicable LEED Credits – Refer to Section 01352:

1. Credit MRc4.1 – Recycled Content.

2. Credit EQc4.1 – Low-Emitting Materials.

1.06 PRODUCT HANDLING

A. Wrap sheet metal fabrications in heavy cardboard or other suitable protective coverings before shipment to protect against damage during transit and handling.

B. Store sheet metal in a dry, well-ventilated place to prevent condensation.

C. Do not allow sheets or other components to come in contact with mud, uncured concrete, cement, lime, and other strong chemicals which, in the presence of moisture, might cause staining.

D. Deliver and store panel components suitable wrapped or otherwise protected to prevent damage to finish. Do not store panels or accessories with strippable film in direct sunlight.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Metal sheets shall be selected for straightness and flatness, and shall be free of fabrication marks, dents, scratches, oil canning or other imperfections. Where thickness of sheet metal is not indicated or specified, provide thickness required to prevent oil canning or other imperfections.

1. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25-percent.

B. Stainless Steel Sheet: ASTM A167 and AISI Type 302/304, with No. 4 finish.

C. Concealed Fasteners: Material shall same basic metal as the metal fastened. Do not use metals that are corrosive or incompatible with materials joined.

D. Accessories: Provide components required for a complete installation, including clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.

1. Sealing Tape: Pressure-sensitive, 100-percent solids, polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining type.

2. Joint Sealant: One-part elastomeric polyurethane, polysulfide, or silicone rubber sealant as recommended by panel fabricator. Comply with requirements specified in Section 07920.

a. VOC content of interior sealants shall not be more than 250 g/L when calculated according to 40 CFR 49, Subpart D (EPA Method 24).

E. Adhesives: As recommended by panel fabricator for laminating sheet metal to backing materials.

1. VOC content of contact adhesive shall not be more than 250 g/L when calculated according to 40 CFR 49, Subpart D (EPA Method 24).

2. VOC content of metal-to-metal adhesives shall not be more than 30 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3. VOC content of multi-purpose construction adhesive shall not be more than 40 CFR 59, Subpart D (EPA Method 24).

2.03 FABRICATION

A. Maintain the visual design concepts shown, including member sizes, profiles and alignment. Verify supporting dimensions affecting this work prior to beginning fabrication.

B. Design and fabricate sheet metal fabrications to permit installation on fully concealed mounting devices.

C. Use materials that are smooth and free of blemishes such as pitting, seam marks, roller marks, trade names and roughness for work exposed to view. Metal surfaces shall be flat and square, free of oil canning, dents, scratches, or other defects.

D. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise damaging the work.

E. Form sheet metal items in lengths to minimize joints or to result in joints only where indicated. Fold back exposed ends of unsupported sheet metal to form a 1/2-inch wide hem on the concealed size, or ease exposed edges with backing to a radius of approximately 1/32-inch.

F. Provide straps, plates and brackets as required for support and anchorage of fabricated items.

G. Reinforce sheet metal items as required for attachment and support of other work.

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect adjacent construction and make sure that all conditions detrimental to the proper and timely execution of this work have been corrected before proceeding.

3.02 INSTALLATION

A. Provide anchorage devices and fasteners required to attach sheet metal fabrications to supporting construction.

B. Perform cutting, drilling and fitting required for installation. Install sheet metal fabrications accurately in proper location, alignment and elevation, plumb, level, free of rack as measured from established lines and levels.

C. Fit exposed joints tightly and accurately to form hairline joints. Fasteners shall be concealed.

D. Erection Tolerances:

1. Provide adjustment within the work to accommodate job variations.

2. Installed components shall conform to the following tolerances:

a. Deviation from established vertical, horizontal, or designed position shall not exceed 1/8-inch per 12-foot of length of any member, or 1/4-inch in any total run in any line.

b. Maximum offset from true alignment between two consecutive members placed end-to-end shall not exceed 1/16-inch.

E. Anchorage:

1. Anchor components securely with concealed bolts, screws or other permanent mechanical attachment systems that permit required movement. Install slip-joint linings where required to permit movement for thermal expansion and contraction.

2. Provide tape separators between contact surfaces of dissimilar materials where there is a possibility of corrosive or electrolytic action.

3.03 PROTECTION AND REPLACEMENT

A. Protect installed components from damage such as scratched surfaces, dents, nicked edges, and other defects until their acceptance. Replace components damaged beyond satisfactory field repair before their acceptance, with new ones at no additional cost to the Owner.

END OF SECTION