SECTION 05500
MISCELLANEOUS METAL FABRICATIONS

PART I - GENERAL

1.01 DESCRIPTION:

A. Scope: Work under this Section shall include all material and installation necessary to provide Miscellaneous Metal Fabrications, as shown and detailed on the drawing and specified herein.

B. Related Work Specified Elsewhere:

1. Division 5 – STRUCTURAL STEEL

1.02 QUALITY ASSURANCE

A. References:

1. 2013 California Building Code (CBC)
5. Steel Structures Painting Council (SSPC): Painting Manual

B. QUALIFICATIONS:

1. General: Fabricator and installer specializing in the work of this Section with minimum three (3) years documented experience.
2. Welding: Performed by certified welders per AWS

1.03 SUBMITTALS

A. General: Refer to Section 01330 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

B. Shop Drawings: Submit manufacture and installation details, including fastenings.

C. Product Data: None required for specified products; required for alternate products.

D. VOC compliance certificate signed by manufacturers certifying compliance of their products with regulations of authorities having jurisdiction over volatile organic compounds (VOCs).

1.04 PRODUCT HANDLING

A. General: Refer to Section 01310 – COORDINATION
B. Items Requiring Anchorage in Concrete: Deliver with complete setting diagrams, measurements, ICC evaluation reports, and manufacturer's written instructions.

1.05 GUARANTEE

A. General: Refer to Section 01770 – CONTRACT CLOSEOUT.

B. Period: Provide in required form for a period of one (1) year from the date of final acceptance by the University’s Representative.

PART II - PRODUCTS

2.01 MATERIALS

A. Steel Shapes:

1. General: ASTM A36 except ASTM A992 for wide-flange shapes

2. Steel Tubing: ASTM A500, Grade B

3. Steel Pipe: ASTM A53, Grade B

B. Fastenings:

1. General: Bolts, nuts, screws, washers, and other various fastenings necessary for proper erection of work. Galvanized steel fastenings or other non-rusting types for exterior steel work.

2. Exposed in Finished Surfaces: Tamperproof countersunk Phillips flat head screws, unless otherwise shown; finish to match adjacent surfaces.

3. Plastic Screw Anchors:

a. Type HUD, manufactured by Hilti, Inc.

b. Star Anchors and Specialty Fasteners, Inc., or equal.

C. Post-installed Anchors:

1. Except where indicated on the drawings, post-installed anchors shall consist of the following anchor types as provided by Hilti, Inc. or approved equal.

a. Anchorage to concrete

i) Adhesive anchors for cracked/uncracked concrete use:

1) Hilti HIT-HY 200 Safe Set System with HILTI HIT-Z rod per ICC ESR-3187

2) Hilti HIT-HY 200 Safe Set System with HILTI Hollow Drill Bit System with threaded rod per ICC ESR-3187.

3) Hilti HIT-RE 500-SD Epoxy Adhesive Anchoring System with threaded rod per ICC ESR-2322 for slow cure applications

4) ITW Red Head EPCON G5 per ICC-ESR 1137

5) Powers PE 1000 per ICC-ESR 2583
ii) Medium duty mechanical anchors for cracked/uncracked concrete

1) Hilti KWIK HUS EZ and KWIK HUS EZ-I screw anchors per ICC ESR-3027
2) Hilti KWIK BOLT-TZ expansion anchors per ICC ESR-1917
3) ITW Red Head PER ICC-ESR 2427
4) Powers Power-Stud SD2 per ICC-ESR 2502

iii) Heavy duty mechanical anchors for cracked concrete use

1) Hilti HDA undercut anchors per ICC ESR 1546
2) Hilti HSL-3 expansion anchors per ICC ESR 1545
3) USP DUC undercut anchors per ICC ESR 1970

b) Rebar doweling into concrete

i) Adhesive anchors for cracked concrete use

1) Hilti HIT-HY 200 Safe Set System with Hilti Hollow Drill Bit System with continuously deformed rebar per ICC ESR-3187.
2) Hilti HIT-RE 500-SD Epoxy Adhesive Anchoring System with continuously deformed rebar per ICC ESR-2322.
3) ITW Red Head EPCON G5 per ICC-ESR 1137
4) Powers PE 1000 per ICC-ESR 2583

c) Anchorage to solid grouted masonry

i) Adhesive anchors use

1) Hilti HIT-HY 70 Masonry Adhesive Anchoring System per ICC-ESR 3342
2) Steel anchor element shall be Hilti HAS-E continuously threaded rod or continuously deformed steel rebar
3) Simpson Acrylic Tie Adhesive Anchor System per ICC-ESR 1958
4) Powers T 38+ Epoxy per ICC-ESR 3149

ii) Mechanical anchors use

1) Hilti KWIK BOLT-3 Expansion Anchors per ICC ESR 1385
2) Hilti KWIK-HUS EZ Screw Anchors per ICC-ESR 3056
3) Simpson Titen Screw Anchors per ICC-ESR 1056
4) Powers Wedge Bolt per ICC-ESR 1678

d) Anchorage to hollow/multi-wythe masonry

i) Adhesive anchors use

1) Hilti HIT-HY 70 Masonry Adhesive Anchoring System per ICC ESR-3342.
2) Steel anchor element shall be Hilti HAS-E continuously threaded rod or continuously deformed steel rebar.
3) The appropriate size screen tube shall be used per adhesive manufacturer's recommendation.
4) Simpson Acrylic Tie Adhesive Anchor per ICC-ESR 1958
2) Anchor capacity used in design shall be based on the technical data published by the manufacturer or such other method as approved by the Structural Engineer of Record. Substitution requests for alternate products must be approved in writing by the Structural Engineer of Record prior to use. Contractor shall provide calculations demonstrating that the substituted product is capable of achieving the performance values of the specified product. Substitutions will be evaluated by their having an ICC ESR showing compliance with the relevant building code for seismic uses, load resistance, installation category, and availability of comprehensive installation instructions. Adhesive anchor evaluation will also consider creep, in-service temperature and installation temperature.

3) Install anchors per the manufacturer instructions, as included in the anchor packaging.

4) Overhead adhesive anchors must follow manufacturer’s printed installation procedures.

5) The contractor shall arrange an anchor manufacturer’s representative to provide onsite installation training for all of their anchoring products specified. The Structural Engineer of Record must receive documented confirmation that all of the contractor’s personnel who install anchors are trained prior to the commencement of installing anchors.

6) Anchor capacity is dependent upon spacing between adjacent anchors and proximity of anchors to edge of concrete. Install anchors in accordance with spacing and edge clearances indicated on the drawings.

7) Existing reinforcing bars in the concrete structure may conflict with specific anchor locations. Unless noted on the drawings that the bars can be cut, the contractor shall review the existing structural drawings and shall undertake to locate the position of the reinforcing bars at the locations of the concrete anchors, by Hilti Ferroscan, GPR, X-Ray, chipping or other means.

D. Non-Shrink Grout:

1. "Embco" manufactured by BASF Corporation

2. W.R. Meadows, Inc, or equal.

E. Primer: Per Section 09900 – PAINTING

2.02 FABRICATION

A. Workmanship:

1. General: Shop assemble work in largest practical sections; minimize field connections. Grind smooth parts exposed to view; remove weld marks and leave free of fabrication marks. Miter corners and edges unless otherwise shown. Make members true to length so assembling may be done without fillers. Bends, twists, open joints in finished members, or projecting edges or corners at connections will not be permitted. Miter, cope, and block carefully to produce tight hairline joints. Provide lugs, clips, connections, bolts, and fastenings necessary to complete fabrication.
2. Galvanizing: Treat all areas burned off or damaged during fabrication with specified repair compound.

3. Reinforcement: Provide proper reinforcement for hardware, and other fabricated metal work, as required.

4. Welding: Use sequence welding to minimize distortion and heat stresses. Weld by shielded electric arc process per AWS. Use continuous welding along entire area of contact, except where spot welding is permitted. Grind all welds smooth on exposed surfaces. Spot welding not permitted on exposed surfaces.

5. Shop Painting: Per SSPC standards.

B. Fabrications:

(**CONSULTANT TO AMEND AS APPLICABLE**) 

1. Bollards:
   a. Steel pipe sections with open ends capped, welded and ground smooth.
   b. Removable Bollards: Provide galvanized sleeves for setting removable posts. Drill ¼” hole in top cap of removable barriers.

2. Ladder:
   a. General: Ladder shall meet CAL-OSHA requirements. Fabricate from steel sections per NAAMM Standards; punch side railings to receive steel rungs; space rungs at 12” on center; extend through stringers, weld around each end and grind smooth.
   b. Rung shall be coated with non-skid surface.

3. Safety Post:
   a. LadderUp Safety post, Model No. 1, manufactured by the Bilco Co.
   b. Or equal.

4. Fasteners: As shown.

PART III - EXECUTION

3.01 PREPARATION

A. General: Refer to Section 01310 – COORDINATION

B. Conditions of Work in Place: Carefully examine before beginning work; report defects.

C. Job Measurements: Take field measurements; report discrepancies between plan and field dimensions.
3.02 INSTALLATION

A. Performance:

1. General: Install with workmen skilled in the particular type of work required and in accordance with the written instructions of the manufacturers.

2. Coordination: Deliver miscellaneous metal items to be installed in concrete or masonry, complete with all clips, anchors or bolts necessary to secure them in place.

3. Workmanship: Set work plumb and true; properly assemble and erect in a rigid and workmanlike manner. Do cutting, punching, drilling and tapping for attachment of other work coming into contact with fabricated metal work where indicated or as directed. Do necessary cutting, drilling, and fitting for installation of fabricated metal work. Execute drilling, cutting, and fitting carefully; when required, fit work at job before finishing. No burning in field permitted. Replace, or repair parts damaged or injured during erection in an acceptable manner. Drill holes for fasteners to exact diameter as recommended by fastener manufacturer. Oversized holes or holes not properly located that produce misalignment of fastener will be rejected.

4. Field Touch-up: Touch-up damaged surfaces and field welds of steel, scheduled to be painted, per SSPC standards.

5. Protection: After erection, provide proper protection for fabricated metal items from other construction operations.

B. Installation:

1. Bollards:
   
a. General: Set in concrete and fill, as shown.

b. Removable Bollards: Set sleeves with removable cap in concrete as shown; provide smooth insertion and removal of bollard.

2. Ladder:
   
a. General: Fasten at top, bottom, and intermediate points not over 6'-0" apart with brackets for fastening; use expansion bolts, unless otherwise shown.

b. Safety Post: Install at center line of top two rungs on all fixed ladders located below roof hatches. Verify smooth and proper extension to full 42" height.

C. Non-shrink grout:

1. Convene pre-application meeting two (2) weeks before start of application of non-shrink grout.

2. Require attendance of parties directly affecting work of this section, including contractor, architect, engineer, applicator, and manufacturer’s representative.
3. Review materials, surface preparation, forming, mixing, placing, curing, protection, and coordination with other work.

END OF SECTION 05500