# SECTION 05500 (05 50 00)

## METAL FABRICATIONS

1. GENERAL
   1. SECTION INCLUDES
      1. Steel sections, tubing, sheets, bolts, nuts, washers, welding materials, & primer.
   2. RELATED SECTIONS
      1. Section 01572-Construction Waste Management
      2. Section 03300-Cast In Place Concrete.
      3. Section 03415-Precast, Prestressed Sections.
      4. Section 04200Concrete Unit Masonry.
      5. Section 05120-Structural Steel.
      6. Section 05210-Steel Joists.
      7. Section 05511-Metal Stairs.
      8. Section 05520-Metal Handrails and Railings.
      9. Section 09900-Paints and Coatings: Field applied paint finish.
      10. Section 05551-Stair Nosing.
   3. REFERENCES
      1. Aluminum Association:
         1. AA DAF-45-Designation System for Aluminum Finishes.
      2. American Architectural Manufacturers Association:
         1. AAMA 611-Voluntary Specification for Anodized Architectural Aluminum.
      3. ASTM International (ASTM):
         1. ASTM A36/A36M-Standard Specification for Carbon Structural Steel.
         2. ASTM A53/A53M-Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
         3. ASTM A123/A123M-Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
         4. ASTM A153/A153M-Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
         5. ASTM A167-Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
         6. ASTM A307-Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
         7. ASTM A312/A312M-Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
         8. ASTM A325-Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
         9. ASTM A354-Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
         10. ASTM A479/A479M-Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels.
         11. ASTM A500-Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
         12. ASTM A501-Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
         13. ASTM A554-Standard Specification for Welded Stainless Steel Mechanical Tubing.
         14. ASTM A563-Standard Specification for Carbon and Alloy Steel Nuts.
         15. ASTM A572/A572M-Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
         16. ASTM B26/B26M-Standard Specification for Aluminum-Alloy Sand Castings.
         17. ASTM B85-Standard Specification for Aluminum-Alloy Die Castings.
         18. ASTM B209/B209M-Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
         19. ASTM B210/B210M-Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
         20. ASTM B211/B211M-Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
         21. ASTM B221/B221M-Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
         22. ASTM B695-Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
         23. ASTM F1554-Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
      4. American Welding Society:
         1. AWS A2.4-Standard Symbols for Welding, Brazing, and Nondestructive Examination.
         2. AWS D1.1-Structural Welding Code - Steel.
         3. AWS D1.2-Structural Welding Code – Aluminum.
         4. AWS D1.6-Structural Welding Code - Stainless Steel.

International Organization for Standardization (ISO) 14021–1999; Environmental Labels and Declarations

* + 1. National Ornamental & Miscellaneous Metals Association:
       1. NOMMA Guideline 1-Joint Finishes.
    2. OSHA (Occupational Safety and Health Standards):
       1. Safety and Health Regulations for Construction, Part [1926 Subpart X](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10946), [1926.1053 - Ladders.](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10839)
    3. SSPC: The Society for Protective Coatings:
       1. SSPC-Steel Structures Painting Manual.
       2. SSPC Paint 15-Steel Joist Shop Paint.
       3. SSPC Paint 20-Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
  1. SUBMITTALS
     1. Product Data:
        1. Recycled Content:
           1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
           2. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
           3. If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
           4. If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.
     2. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.4welding symbols. Indicate net weld lengths.
     3. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.
  2. QUALITY ASSURANCE
     1. Finish joints in accordance with NOMMA Guideline 1.
  3. QUALIFICATIONS
     1. Design fabrications under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Florida.
  4. DELIVERY, STORAGE, AND HANDLING
     1. Section 01600-Product Requirements: Product storage and handling requirements.
     2. Accept metal fabrications on site in labeled shipments. Inspect for damage.
     3. Protect metal fabrications from damage by exposure to weather.
  5. FIELD MEASUREMENTS
     1. Verify field measurements are as indicated.

1. PRODUCTS
   1. MATERIALS – METAL FABRICATIONS

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***NOTE TO SPECIFIER: Where alternate materials are shown below, select materials to be used and edit Section accordingly.***

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* + 1. All metal fabrication products are to contain recycled content.
    2. Steel Sections: [ASTM A36/A36M.] and/or [ASTM A572/A572M; Grade 50.]
    3. Steel Plate: [ASTM A36/A36M.] and/or [ASTM A572/A572M; Grade 50.]
    4. Hollow Structural Sections: [ASTM A500, Grade B.] and/or [ASTM A501.]
    5. Steel Pipe: ASTM A53/A53M, Grade B Schedule 40.
    6. Sheet Steel: ASTM A653/A653M, Grade 33 Structural Quality with galvanized coating.
    7. Bolts: ASTM A307; Grade A or B and/or ASTM A325; Type 1
       1. Finish: Unfinished or Hot dipped galvanized.
    8. Nuts: ASTM A563 heavy hex type.
       1. Finish: Unfinished and/or Hot dipped galvanized as noted
    9. Washers: ASTM F436; Type 1.
       1. Finish: Unfinished, and/or Hot dipped galvanized as noted
    10. Welding Materials: AWS D1.1; type required for materials being welded, Class E60 or E70 for manual welds.
    11. Shop and Touch-Up Primer: SSPC Paint 15, Type 1, red oxide.
    12. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.
  1. MATERIALS - STAINLESS STEEL
     1. Bars and Shapes: ASTM A479/A479M, Type 304
     2. Tubing: ASTM A269 or ASTM A554; Type 304
     3. Pipe: ASTM A312/A312M, seamless, Type 304.
     4. Plate, Sheet and Strip: ASTM A167; Type 304.
     5. Bolts, Nuts, and Washers: ASTM A354.
     6. Welding Materials: AWS D1.6; type required for materials being welded.
  2. MATERIALS - ALUMINUM
     1. Extruded Aluminum: ASTM B221/B221M, Alloy 6063], Temper T5 or T6.
     2. Sheet Aluminum: ASTM B209/B209M, Alloy 5050-H-32, or temper best suited to application.
     3. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, Alloy 6063, Temper T6.
     4. Aluminum-Alloy Bars: ASTM B211/B211M, Alloy 6063, Temper T6.
     5. Aluminum-Alloy Sand Castings: ASTM B26/B26M.
     6. Aluminum-Alloy Die Castings: ASTM B85.
     7. Bolts, Nuts, and Washers: Stainless steel.
     8. Welding Materials: AWS D1.2; type required for materials being welded.
  3. LINTELS
     1. Lintels: Steel sections, size and configuration as indicated on Drawings, length to allow 8 inches minimum bearing on both sides of opening.
        1. Exterior Locations: Galvanized.
        2. Interior Locations: Prime paint, one coat.
  4. LEDGE AND SHELF ANGLES
     1. Ledge and Shelf Angles, Not Attached to Structural Framing: For support of metal decking or joists; prime paint, one coat.
  5. ELEVATOR SILL ANGLES AND HOIST AND DIVIDER BEAMS
     1. Sill Angles: Steel sections as indicated on Drawings for support of elevator sills; galvanized.
     2. Hoist and Divider Beams: Steel wide flange sections, shape and size required to support applied loads with maximum deflection of 1/240 of the span; prime paint, one coat.
  6. DOOR FRAMES
     1. Door Frames: Steel Channel sections, size indicated on Drawings, with jamb anchors suitable for building into masonry or attachment to concrete or steel framing, minimum 4 anchors per jamb; prime paint, one coat.
  7. BOLLARDS
     1. Bollards: Steel pipe, concrete filled, crowned cap, 6 inches diameter, length as indicated on Drawings; prime paint, one coat.
     2. Concrete Fill: 3,000 psi as specified in Section 03300.
     3. Anchors: Concealed type as indicated on Drawings.
  8. LADDERS
     1. Ladder: ANSI A14.3, Steel welded construction:
        1. Side Rails: 3/8 x 2 inches, side rails spaced at 20 inches
        2. Rungs: One inch diameter (or width) rod spaced 12 inches on center. The rungs and steps of fixed metal ladders shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize slipping.
        3. Mounting: Space rungs 7 inches from wall surface; with steel mounting brackets and attachments.
        4. Finish: Prime paint, one coat.

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***NOTE TO SPECIFIER: Safety cages are required when ladder height exceeds 20 feet. Rest platforms are required when ladders exceed 30 feet Delete if ladders are lesser in height***

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* + 1. Ladder Safety Cage: Steel bar sections, minimum 1/4 inches x 2 inches.
       1. Bottom hoop 18 inches radius maximum 74 inches above finished floor.
       2. Other hoops 14 inches radius spaced maximum 48 inches on center.
       3. Vertical bars spaced 10 inches on center.
       4. Finish: Match ladder finish.
    2. Ladder Security Enclosure: Sheet steel minimum 16 gage/0.058 inches thick, formed to enclose ladder side rails and rungs when closed and to swing free of ladder rungs and side rails with minimum 1-1/2 inches clear to side rails in open position.
       1. Provide continuous steel hinge full height of enclosure.
       2. Provide steel hasp for padlocking in closed and open position.
       3. Finish: Match ladder finish.
    3. Refer to OSHA (Safety and Health Regulations for Construction, Ladders) for other requirements for ladders and recommendations on clearances and maximum distances for top and bottom of cages and enclosures.
  1. WALL PROTECTION PLATES AND CORNER GUARDS
     1. Wall Protection Plates: Stainless steel plate, 1/8 inch thick, counter sunk fasteners, beveled exposed edges, size as indicated on Drawings.
     2. Corner Guards: Stainless steel angle, 3 x 3 x 1/8 inch, counter sunk fasteners, beveled exposed edges, size as indicated on Drawings.]
  2. ANCHOR BOLTS
     1. Anchor Rods: [ASTM F1554; Grade 55, weldable. or ASTM A307; Grade A.
        1. Shape: Hooked.
        2. Furnish with nut and washer; unfinished.
     2. Drilled In Expansion Anchors.
        1. HILTI Corporation, Tulsa, OK
        2. Powers Fasteners, Brewster, NY.
        3. ITW Redhead, Woodsdale IL
  3. FABRICATION
     1. Fit and shop assemble items in largest practical sections, for delivery to site.
     2. Fabricate items with joints tightly fitted and secured.
     3. Continuously seal joined members by continuous welds.
     4. 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.
     5. Exposed Welded Joints: NOMMA Guideline 1 Joint Finish 2.
     6. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
     7. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
  4. FACTORY APPLIED FINISHES - STEEL
     1. Prepare surfaces to be primed in accordance with SSPC SP 2.
     2. Do not prime surfaces in direct contact with concrete or where field welding is required.
     3. Prime paint items with one coat except where galvanizing is specified.
     4. Galvanizing: ASTM A123/A123M; [minimum 1.2oz/sq ft coating thickness; galvanize after fabrication.
     5. Galvanizing for Fasteners, Connectors, and Anchors:
        1. Hot-Dipped Galvanizing: ASTM A153/A153M.
        2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.
  5. FACTORY APPLIED FINISHES - STAINLESS STEEL

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***NOTE TO SPECIFIER: Select one of the following, and/or designate locations.***

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* + 1. Satin Polished Finish: Number 4, satin directional polish parallel with long dimension of finished face.
    2. Mirror Polished Finish: Number 8, mirror polish with preliminary directional polish lines removed.
  1. FACTORY APPLIED FINISHES - ALUMINUM
     1. Finish coatings to conform to AAMA 611. Comply with AA DAF-45.
     2. Interior/Exterior Aluminum Surfaces: AAMA A41 anodized, Class I, clear color.
     3. Interior/Exterior Aluminum Surfaces: AAMA A43 anodized, Class I, to selected color.
  2. FABRICATION TOLERANCES
     1. Squareness: 1/8 inch maximum difference in diagonal measurements.
     2. Maximum Offset Between Faces: 1/16 inch.
     3. Maximum Misalignment of Adjacent Members: 1/16 inch.

Maximum Bow: 1/8 inch in 48 inches.

* + 1. Maximum Deviation From Plane: 1/16 inch in 48 inches .

1. EXECUTION
   1. EXAMINATION
      1. Section 01300-Administrative Requirements: Coordination and project conditions.
      2. Verify field conditions are acceptable and are ready to receive Work.
   2. PREPARATION
      1. Clean and strip primed steel items to bare metal where site welding is required.
      2. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.
   3. INSTALLATION
      1. Install items plumb and level, accurately fitted, free from distortion or defects.
      2. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.
      3. Field weld components indicated on Drawings.
      4. Perform field welding in accordance with the applicable AWS structural welded code (for the materials being welded).
      5. Obtain approval of Architect/Engineer prior to site cutting or making adjustments not scheduled.
      6. After erection, touch up welds, abrasions, and damaged finishes with prime paint or galvanizing repair paint to match shop finishes.
   4. ERECTION TOLERANCE
      1. Section 01400-Quality Requirements: Tolerances.
      2. Maximum Variation From Plumb: 1/4 inch per story or for every 12 ft in height whichever is greater, non-cumulative.
      3. Maximum Offset From Alignment: 1/4 inch.
      4. Maximum Out-of-Position: 1/4 inch.

END OF SECTION