SECTION 05500

MISCELLANEOUS METALWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall furnish, fabricate, and install miscellaneous metalwork and appurtenances, complete, in accordance with the requirements of the Contract Documents. The Contract Documents shall take precedence over these Specifications.

1.02 RELATED SECTIONS

A. Section 01300 – Shop Drawings and Submittals

1.03 REFERENCE SPECIFICATIONS, CODE AND STANDARDS

A. Federal Specifications:

MIL-G-18015 A (3)	(Ships) Aluminum Planks. (6063-T6)
MIL-A-907E	Antiseize Thread Compound, High Temperature

B. Government Standards:

Cal OSHA Occupational Safety and Health Administration

C. Trade Standards:

Aluminum Association (AA) publications, as referenced herein.

D. Commercial Standards:

AA-M32C22A41	Aluminum Assn.
AASHTO	HS-20 Truck Loading
AISC	Specifications and Commentary
AISI	Design of Light Gauge, Cold-Formed Steel Structural Members
ASTM A 36	Specification for Structural Steel
ASTM A 48	Specification for Gray Iron Castings
ASTM A 53	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A 123	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 125	Specification for Steel Springs, Helical, Heat Treated
ASTM A 153	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile

ASTM A 500	Specification for Cold-Formed Welded and Seamless Carbon Steel Tubing in Rounds and Shapes
ASTM A 563	Specification for Carbon and Alloy Steel Nuts
ASTM A 575	Specifications for Steel Bars, Carbon, Merchant Quality, M-Grades
ASTM A 786	Specification for Rolled Steel Floor Plates
ASTM B 98	Specification for Copper-Silicon Alloy Rod, Bar, and Shapes
ASTM B 438	Specification for Sintered Bronze Bearings (Oil-Impregnated)
ANSI/AWS D1.1	Structural Welding Code - Steel
ANSI/AWS D1.2	Structural Welding Code - Aluminum
ANSI/AWS QC1	Specification for Qualification and Certification of Welding Inspectors
NFPA 101	Life Safety Code
NAAMM	Metal Stairs Manual

E. I.C.B.O. Evaluation Reports:

ER-5279	Simpson SET Adhesive Anchor Systems

1.04 SUBMITTALS

A. Shop Drawings: Shop drawings of all miscellaneous metalwork shall be submitted to the Engineer for review in accordance with Section 01300 – Shop Drawings and Submittals.

B. Layout drawings for grating shall be submitted showing the direction of span, type, material and depth of grating, size and shape of grating panels, seat angle details, and details of grating hold down fasteners. Load and deflection tables shall be submitted for each style and depth of grating used.

C. An ICBO report listing the ultimate load capacity in tension and shear for each size and type of concrete anchor used shall be submitted to the Engineer for review. Contractor shall submit manufacturer's recommended installation instructions and procedures for all adhesive anchors for Engineer's review. Upon review, by Engineer, these instructions shall be followed specifically.

D. No substitution for the indicated adhesive anchors will be considered unless accompanied with ICBO report verifying strength and material equivalency, including temperature at which load capacity is reduced to 90 percent of that determined at 75 degrees F.

E. Calculations: Engineering calculations shall be submitted for review. Engineering calculations shall include (but not be limited to) ladders, guardrail posts, railings, handrail brackets, brackets, support flanges, and fasteners or anchors.

1.05 QUALITY ASSURANCE

A. All weld procedures and welder qualification shall be available in the Contractor's field office for Engineer's review.

B. All welding shall be inspected by a Contractor-provided inspector qualified in accordance with AWS requirements and approved by the Engineer.

C. Inspection: All Work hereunder shall be subject to continuous inspection by a Special Inspector selected by the District and approved by the local Building Official having jurisdiction. Special Inspection shall be performed in accordance with the current edition of the Uniform Building Code.

D. The Special Inspector shall observe the work as identified on the plans for conformance with the design drawings and specifications.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Steel

1.	Standard rolled steel sections wide flanges	ASTM A992, Grade 50
2.	Shapes, Plates, Bars	ASTM A 36
3.	Pipe, Pipe Columns, Bollards Standard weight unless noted otherwise	ASTM A 53, Type E or S, Grade B
4.	Tubes	ASTM A 500 Grade B

B. Corrosion Protection: Unless otherwise indicated, miscellaneous metalwork of fabricated steel, which will be used in a corrosive environment and/or will be submerged in water/wastewater shall be coated in accordance with Section 09900 – Painting and Coating and shall not be galvanized prior to coating. All other miscellaneous steel metalwork shall be hot-dip galvanized after fabrication as specified herein.

C. Stainless Steel: Unless otherwise indicated, stainless steel metalwork and bolts shall be of Type 316 stainless steel and shall not be galvanized.

D. Aluminum: Unless otherwise indicated, aluminum metalwork shall be of Alloy 6061-T6. Aluminum in contact with concrete, porous materials, or dissimilar metals shall have contact surfaces coated in accordance with the Section 09900 – Painting and Coating.

E. Cast Iron: Unless otherwise indicated, iron castings shall conform to the requirements of ASTM A 48, Class 50B or better.

2.02 ACCESS HATCHES

A. Where access hatches are called for on the drawings to be mounted on a concrete slab (including top slabs, which are not covered with a roofing membrane) or on a concrete curb, the hatch shall be a flush type as indicated herein.

B. Hatch door leaves shall be 1/2 inch thick, Type 316 stainless steel with SlipNOT Grade 2 surface finish. Channel frames shall be a minimum of 1/2 inch thick, Type 316 stainless steel of continuous weld construction. Door leaves shall have a flush lifting handle and oversized

padlock recess with cover that is flush with the surface. Hatch doors shall be spring loaded to facilitate opening and closing.

C. All hatch hardware shall be Type 316 stainless steel including nuts, bolts, tamper-resistant hinges, lift handles, automatic hold-open arm, pins, lugs, and open compression spring assists.

D. Hatches shall be rated for direct traffic duty and AASHTO H-20-44 wheel loading with recessed, Allen head bolts for the hatch and padlock recess cover.

E. Hatch opening sizes, number and swing direction of door leaves, and locations, shall be as indicated. Sizes given shall be for the clear opening. Where the number of leaves is not given, openings larger than 42 inches in either direction shall have double-leaf doors. Unless indicated otherwise, hinges shall be located on the longer dimension side. Unless indicated otherwise, ladder hatches shall be a minimum of 30 inches wide by 36 inches long, with the ladder centered on the shorter dimension, and the door hinge opposite the ladder.

F. Installation shall be in accordance with manufacturer's instructions. Manufacturer shall guarantee against defects in material or workmanship for a period of five years.

G. Approved Manufacturer's:

1. USF Fabrication, Inc.
2. Bilco
3. Or approved equal

2.03 IRON CASTINGS

A. Iron castings shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage, distortion, or other defects. They shall be smooth and well cleaned by shotblasting.

B. Covers and grates shall fit together evenly, so that the cover fits flush with the surrounding finishes surface and the cover does not rock or rattle when loading is applied. Round covers and frames shall have machined bearing surfaces.

C. Covers and grates with matching frames shall be designed to support the following loadings:

1. Where located within a structure, the design loading shall match that required for the adjacent floor area, or, if no loading is given, a minimum of 300 pounds per square foot, unless indicated otherwise.

2. Exterior covers and grates shall be designed for AASHTO H20 loading unless indicated otherwise.

2.04 BOLTS AND ANCHORS

A. Standard Service Bolts (Not Buried or Submerged): Except where otherwise indicated, all bolts, anchor bolts, and nuts shall be ASTM A307 steel.

B. Buried or Submerged Bolts: Unless other corrosion-resistant bolts are indicated, all bolts, anchor bolts, nuts, and washers which are buried, submerged, or below the top of the wall inside any hydraulic structure shall be Type 316 stainless steel conforming to ASTM A 193 for bolts and to ASTM A 194 for nuts. All threads on stainless steel bolts shall be protected with an antiseize lubricant suitable for submerged stainless steel bolts, to meet government specification MIL-A-907E.

1. Antiseize lubricant shall be classified as acceptable for potable water use by the NSF.

2. Antiseize lubricant shall be "PURE WHITE" by Anti-Seize Technology, Franklin Park, IL, 60131, AS-470 by Dixon Ticonderoga Company, Lakehurst, NJ, 08733, or equal.

C. Bolt Requirements:

1. The bolt and nut material shall be free-cutting steel.

2. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. All bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.

3. The length of all bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case more than 1/2-inch beyond the nut.

D. Adhesive Anchors: Unless otherwise indicated, all drilled, concrete or masonry anchors shall be adhesive anchors. No substitutions will be considered unless accompanied with ICBO report verifying strength and material equivalency.

1. Epoxy adhesive anchors are required for drilled anchors where exposed to weather, in submerged, wet, splash, overhead, and corrosive conditions, and for anchoring handrails, pumps, mechanical equipment, and reinforcing bars. Epoxy anchor grout shall comply with Section 03315 - Grout. Threaded rod shall be ASTM A36 steel, unless noted otherwise, except in submerged location where stainless steel threaded rod shall be used.

2. Unless otherwise indicated, adhesive anchors shall be Simpson SET. Adhesive anchors made by other manufacturers may be used if approved by the Engineer. Such adhesive anchor shall be I.C.B.O. approved. The I.C.B.O. Evaluation Report for the proposed substitute anchors shall demonstrate that the anchors have at least much capacity as the specified anchors. Proposed substitute anchors shall meet all requirements of their I.C.B.O. Evaluation Report, including edge distance, anchor spacing, embedment, base material thickness.

E. Expansion Anchors: Material and Installation shall conform to ICBO ER-4627. Expansion anchors shall be Hilti "Kwik-Bolt II" or ICBO approved equal. Lead caulking anchors will not be permitted. Size shall be as indicated. Expansion type anchors shall be 316 stainless steel. Expansion anchors may only be used where specifically detailed. Expansion type anchors shall not be used unless approved by the Engineer.

PART 3 - EXECUTION

3.01 WELDING

A. Method: All welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.

B. Quality: In assembly and during welding, the component parts shall be adequately clamped, supported and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as indicated by the AWS Code. Upon completion of welding, all weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. All sharp corners of material to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

3.02 GALVANIZING

A. All structural steel plates shapes, bars and fabricated assemblies required to be galvanized shall, after the steel has been thoroughly cleaned of rust and scale, be galvanized in accordance with the requirements of ASTM A 123. Any galvanized part that becomes warped during the galvanizing operation shall be straightened. Field repairs to galvanizing shall be made using "Galvinox," "Galvo-Weld," or equal.

3.03 CRAFTSMANSHIP

A. All Work shall be performed by craftsmen experienced in the fabrication of architectural metal work. Exposed surfaces shall be free from defects or other surface blemishes. All dimensions and conditions shall be verified in the field in advance. All joints, junctions, miters, and butting sections shall be precision-fitted, with no gaps occurring between sections, and all surfaces shall be flush and aligned.

3.04 DRILLED ANCHORS

A. Drilled anchors and reinforcing bars shall be installed in strict accordance with the applicable I.C.B.O. Evaluation Report and manufacturer's instructions. Holes shall be roughened with a brush on a power drill, cleaned and dry. Drilled anchors shall not be installed until the concrete has reached the specified 28-day compressive strength. Adhesive anchors shall not be loaded until the adhesive has reached its indicated strength in accordance with the manufacturer's instructions.

END OF SECTION