SECTION 05 5000

METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Work of this Section consists of metal fabricated items, and includes but is not limited to miscellaneous

1. Steel framing and supports.
2. Elevator sill supports.
3. Metal ladders and safety cages:
4. Loose bearing and leveling plates.
5. Steel weld plates and angles.
6. Metal bar gratings.
7. Miscellaneous steel trim.
8. All other miscellaneous metal, framing and supports not specified in other Sections as indicated on the Drawings and as needed to complete the Work.

B. Related Documents and Sections: Examine Contract Documents for requirements that directly affect or are affected by Work of this Section. Other Documents and Sections that directly relate to work of this Section include, but are not limited to:

1. General provisions of the Contract, including General and Supplementary Conditions, and Division 01 General Requirements Specification Sections.
2. Section 05 5100 - METAL STAIRS AND RAILINGS.
3. Section 05 7500 - DECORATIVE FORMED METAL.
4. Section 08 4000 - ALUMINUM-FRAMED FACADE SYSTEMS.
5. Section 08 4113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
6. Section 09 9100 - PAINTING.

1.2 PERFORMANCE REQUIREMENTS:

A. Contractor's Design: Design of items subject to structural loads, including comprehensive engineering analysis by a qualified professional engineer, capable of withstanding the effects of gravity loads and design loads indicated on Drawings and required by building codes in effect for project.

B. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.7.

C. Structural Performance of Alternating Tread Devices: Alternating tread devices shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Uniform Load: 100 lbf/sq. ft.
2. Concentrated Load: 300 lbs. applied on an area of 4 sq. in.
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Alternating Tread Device Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's printed descriptions of materials and systems, performance criteria, use limitations, recommendations and installation information, for the following:

1. Paint products.
2. Grout.

B. Shop Drawings: Submit fabrication and assembly drawings indicating materials, piece quantities and dimensions, each piece surface finish, assembly configuration, erection sequence, piece numbering, specific attachments and attachment requirements.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
2. Provide templates for anchors and bolts specified for installation under other Sections.
3. Drawings for installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATION SUBMITTALS

A. Delegated Design analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Provide professionally prepared calculations and certification of the performance of this Work. Show how design load requirements and other performance criteria have been satisfied.

B. Certificates: Submit with manufacturer’s signature certifying that each product and/or system meets the requirements of the performance characteristics, physical criteria, and applicable standards specified.

1. Mill Certificate: Stainless steel.

C. Welding certificates.

D. Qualification Statements: Submit a letter, on printed letterhead and signed by an officer of the firm, for each listed quality assurance qualification listed, attesting to meeting each requirement called out.

1.5 QUALITY ASSURANCE

A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of Calfornia and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of panels that are similar to those indicated for this Project in material, design, and extent.

B. Welding: Qualify procedures and personnel.

1. Perform welding in conformance with AWS D1.1 and AWS D1.3. as applicable.

C. Shop fabricate work to greatest extent possible. Label each piece in shop to facilitate field assembly.

D. Mockups: Before beginning with fabrication of canopy and Main Lobby stair elements, build mockups to demonstrate aesthetic affects and qualities of materials and workmanship; include

specified finishes. Where not otherwise indicated, determine extent of mockup in consultation with Architect.

E. Field Measurements: Where fabrications are indicated to fit against walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

F. Preinstallation Conference: The General Contractor shall schedule and conduct conference at the project site. As a minimum, the meeting shall include the General Contractor, Fabricator, Erector, the finish painting subcontractor, and the Architect. Coordinate requirements for shipping, special handling, attachment of temporary erection bracing, touch up painting and other requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage and moisture.

1. Manufacturers, fabricators, suppliers and shippers shall provide least amount of packaging that adequately and properly protects, supports and contains the items shipped, and is reusable, returnable or recyclable.
2. Mark products with Shop Drawing location reference, unless already properly marked.
3. Sequence deliveries to avoid delays, but minimize on-site storage.

1.7 PROJECT CONDITIONS

A. Do not permit use of stairs, ladders, handrails, or other work until work is completely and fully installed and ready to assume intended design loads. Do not permit overloading of metal fabrication systems.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.1 MATERIALS

A. General: Provide products and materials of new stock, free from defects, and of best commercial quality for each intended purpose.

B. Ferrous Metals:

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
3. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
4. Steel Tubing: ASTM A 500, cold-formed steel tubing.
5. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless otherwise indicated.
6. Steel Bars for Bar Gratings: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or

ASTM A 1018/A 1018M.

7. Wire Rod for Bar Grating Crossbars: ASTM A 510.

C. Nonferrous Metals:

1. Aluminum Plate and Sheet: ASTM B 209, Alloy 3003-H14 or 5005-H32 as suitable to fabrication and finishing requirements. Alloy 6061-T6 where necessary for strength requirements.
2. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500.

D. Inserts: Threaded or wedge type, galvanized ferrous castings; either ASTM A47 malleable iron, or ASTM A27 cast steel. Provide threaded inserts and wedge inserts manufactured by one of the following:

1. Hohmann and Barnard.
2. Gateway Erections, Inc.
3. Richmond Screw Anchor Co.

E. Provide anchors, bolts, sockets, sleeves, and other parts required for securing each item of work to other construction.

1. Anchor bolts, bolts smaller than 5/8 in., and fasteners shall be steel castings conforming to ASTM A307. Bolts larger than 5/8 in. shall conform to ASTM A325.

F. Provide exposed fastenings of same material and finish as metal to which applied, unless otherwise noted. Comply with Structural Drawings unless indicated otherwise.

G. Welding Rods: Conform to AWS Standards and recommendations of welding rod manufacturer.

H. Grout for Interior Applications: Pre-mixed, non-staining, non-corrosive, non-shrink, non-metallic complying with CE CRD-C-621, Type D.

2.2 SPECIAL METAL FABRICATIONS

A. General: Items listed herein are exposed to view and shall be subject to aesthetic criteria.

1. Fabricate with special care using materials carefully selected for best appearance, and consistent with accepted mockups. Store materials off ground and keep clean. Cut, fit and assemble work with surfaces smooth, square and with complete contact at joints.

B. Material: 3/26 or 3/8 inch carbon steel plate as shown on Drawings.

1. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

2.3 FABRICATION - GENERAL

A. Fabricate work of this Section to be straight, plumb, level and square, and to sizes, shapes and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill and tap metal work as required for proper assembly.

1. Fabricate miscellaneous supports, brackets, braces and the like required to fully complete the work.
2. Obtain loading requirements from suppliers of work to be supported. Design and support systems with a safety factor of at least 6 unless otherwise indicated.
3. Allow for thermal movements.

4. Shear and punch metals accurately. Remove burrs.
5. Ease exposed edges to a radius of approximately 1/32 in., unless indicated otherwise. Form bent corners to smallest radius possible without causing grain separation or impairing work.
6. Remove sharp or rough areas on exposed traffic surfaces.
7. Weld seams continuously. Spot welding is permitted for temporary welding only.

B. Work Exposed to View: For work exposed to view, select materials with special care. Fabricate work with uniform hairline joints at locations accepted by Architect. Form welded joints and seams continuously.

C. Miscellaneous Bearing and Leveling Plate Fabrication: Provide miscellaneous loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Fabricate units flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts as required.

D. Miscellaneous Framing and Supports: Fabricate miscellaneous framing and supports to adequately support live and dead loads with a safety factor of 5. Provide necessary anchors, inserts, and fasteners. Fabricate support system to carry entire load of work being supported to structure above. Do not transfer any loads to ceiling systems.

1. Cut, drill, and tap units to receive hardware, hangers and similar items.
2. Coordinate loading and attachment requirements for miscellaneous framing and supports with manufacturers of items being supported.

E. Counter Supports: Fabricate counter support brackets to support weight of counter, plus an additional 200 lb. concentrated load located to create greatest stress. Fabricate brackets in locations shown on Drawings. Drill or punch brackets for anchor bolts and fasteners.

F. Metal Ladders:

1. General:
   a. Comply with ANSI A14.3, except for elevator pit ladders.
   b. For elevator pit ladders, comply with ASME A17.1/CSA B44.
2. Steel Ladders:
   a. Space siderails 18 inches apart unless otherwise indicated.
   b. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
   c. Rungs: 1-inch- diameter steel bars.
   d. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
   e. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
   f. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.
   g. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 3/4 inch in least dimension.
   h. Prime ladders, including brackets and fasteners, with zinc-rich primer.

G. Ladder Safety Cages:

1. General:
   a. Fabricate ladder safety cages to comply with ANSI A14.3.
   b. Provide primary hoops at tops and bottoms of cages and spaced not more than 20 feet o.c. Provide secondary intermediate hoops spaced not more than 48 inches o.c. between primary hoops.

c. Fasten assembled safety cage to ladder rails and adjacent construction by welding or with stainless-steel fasteners unless otherwise indicated.

2. Steel Ladder Safety Cages:
   a. Primary Hoops: 1/4-by-4-inch flat bar hoops.
   b. Secondary Intermediate Hoops: 1/4-by-2-inch flat bar hoops.
   c. Vertical Bars: 3/16-by-1-1/2-inch flat bars secured to each hoop.
   d. Prime ladder safety cages, including brackets and fasteners, with zinc-rich primer

H. Metal Bollards

1. Fabricate metal bollards from Schedule 40 steel pipe.
   a. Cap bollards with 1/4-inch- thick steel plate, after filling with concrete.
2. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch- thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.
3. Finishes: Galvanized after fabrication, for polyurethane coating system.

I. Loose Bearing and Leveling Plates

1. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction.
   a. Drill plates to receive anchor bolts and for grouting.
2. Galvanize plates after fabrication.
3. Prime plates with zinc-rich primer.

J. Steel Weld Plates and Angles

1. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work.
   a. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

K. Metal Bar Grating

1. Fabricate welded steel bar gratings to comply with NAAMM A202.1, with mark/size of W-15-4 (welded with bearing bars 15/16 inch o.c., and cross bars 4 inch o.c.), bearing bar sizes as indicated, and as follows:
2. Traffic Surface: Smooth.
3. Removable Grating Sections: Fabricate removable grating sections where indicated with banding bars welded to entire perimeter of removable section. Provide anchors and fasteners for attachment to supports. Provide minimum of four saddle clips for each removable section. Fabricate each clip to fit over two bearing bars. Furnish threaded bolt with nuts and washers for each clip required.

L. Miscellaneous Steel Trim

1. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges.
   a. Miter corners and use concealed field splices where possible.
2. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
   a. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
3. Galvanize miscellaneous steel trim, where indicated.
4. Prime miscellaneous steel trim, where indicated with zinc-rich primer.

2.4 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize all exterior miscellaneous metalwork, all items located in exterior wall and roof assemblies, and all items indicated to be galvanized in strict compliance with ASTM A123, A143, A153, A384, A385, and A386. Any item that is cut, welded, or is otherwise damaged must be repainted with an acceptable zinc-rich coating product.

1. Nickel Zinc: Comply with ASTM B6.
2. Coverage: Provide at least 2.0 oz./sq.ft. nickel zinc coverage, but not less than the coverage required by referenced standards.
3. Fabrication: To the greatest extent possible, galvanize after fabrication is completed.
4. Touch Up: Touch-up damaged or abraded galvanized surfaces with cold galvanizing compound complying with ASTM A780.
5. Galvanized items scheduled to be painted shall NOT receive chromate passivation or similar pretreatment which might interfere with paint adhesion.

B. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.
5. Galvanized surfaces.

C. Surface preparation, as specified division 09 9100 Painting. Prime immediately after surface preparation to prevent formation of oxides on the prepared surface.

D. Shop Coat Primer Paint: As indicated on Architectural Drawings. Shop-applied primer specified in paint system for each location, Section 09 9100 - PAINTING with all weld or connections to be touched up with field applied primer.

E. Immediately after surface preparation, apply primer according to manufacturer's written instructions and Section 09 9100 - PAINTING. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

F. Steel High Performance Finish: Refer to Section 09 9100 - PAINTING.

G. Where non-complying primers are used by the steel fabricator, the fabricator shall completely remove same from all surfaces and prepare and prime surfaces in accordance with the requirements of Section 09 9100 - PAINTING for painted steel work at no additional cost.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorage devices, setting drawings, diagrams, templates, instructions, and directions for installation of concrete inserts, sleeves, anchor bolts, and miscellaneous items to be embedded or attached to concrete work, masonry work, or structural steel work.

3.2 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners necessary for securing work of this Section to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of work of this Section.

C. Erect work square, plumb and true, accurately fitted, and with tight joints and intersections. All anchors, inserts and other members to be set in concrete or masonry shall be furnished loose by this trade to be built-into concrete and masonry by those trades. Avoid field cutting or drilling to greatest extent possible.

D. Brace work rigid and secure to surrounding construction. Provide temporary bracing or anchors where required.

E. Fit exposed connections accurately together to form hairline joints. Shop weld connections, except when work cannot be shop welded due to shipping size or galvanizing limitations.

F. Field Welding: Comply with AWS D1.1 for procedures of manual metal-arc welding, appearance and quality of welds, and correction methods for defective welds.

G. Where members other than expansion bolts or inserts are fastened into concrete, set such members in proprietary-type expanding grout manufactured specifically for such purpose. Use grouts strictly in accordance with manufacturer's directions. Form to receive members with galvanized metal sleeves, or other approved method to provide at least 1/2 in. clearance around entire perimeter. At exposed applications, hold expanding grout back 1/2 in. from finish surface and fill voids with Portland cement grout to match color and texture of surrounding concrete surface.

H. Electrolytic Isolation: Where dissimilar metals are to come into contact with one another, isolate by application of a heavy coating of bituminous paint on contact surfaces in addition to shop coat specified above. Do not permit the bituminous paint in any way to remain on surfaces to be exposed or to receive sealant.

3.3 INSTALLATION

A. Miscellaneous Bearing and Leveling Plates: Clean concrete and masonry surfaces of bond reducing materials. Roughen surfaces if required to improve bond to surface. Clean bottom surface of leveling plates immediately prior to installation.

1. Set loose leveling and bearing plates on wedges or other adjustable devices. Tighten anchor bolts after plates have been positioned plumb and level. Pack voids between plates and bearing surfaces solidly with specified grout.

B. Miscellaneous Items: Carefully review Drawings for miscellaneous metal items required by various trades but not specifically listed above, such as miscellaneous clip angles, miscellaneous steel bracketing, and other miscellaneous metal items as indicated on Drawings, reasonably implied there from, or reasonably necessary for thorough completion of work.

3.4 REPAIRING, CLEANING, AND PROTECTION

A. Prepare primed areas to receive touch-up according to SSPC-SP3, “Power Tool Cleaning”. Touch-up damaged primed surfaces with specified primer.

END OF SECTION

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