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**SECTION 05 51 00**

**METAL STAIRS**

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**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Provide steel stairs and landings, with stair handrails, and including plates, angles, hangers and struts for securing to building structure.
  - 1. Provide additional steel as required for support of stairs and not otherwise indicated on Architectural or Structural Drawings.
- B. Related Work:
  - 1. Section 05 73 00: Decorative metal rails with perforated panels at decks.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Design/Build: Provide special engineering for stairs and railings to ensure compliance with applicable codes and Contract Documents.

**1.3 REFERENCES**

- A. American Welding Society (AWS): D1.1, Structural Welding Code.
- B. National Association of Architectural Metal Manufacturers (NAAMM):
  - 1. Metal Stairs Manual.
  - 2. Pipe Rail Manual.

**1.4 SUBMITTALS**

- A. Product Data: Submit manufacturer's literature for products used in stair and rail fabrications, including paint, grout, and rail brackets.
- B. Shop Drawings: Submit for fabrication and erection of stairs and handrails. Indicate profiles, sizes, connection, reinforcing, and anchorage.
  - 1. Provide templates for anchorage installation by others.
- C. Design/Build Certificates: Submit certification signed by California licensed structural engineer indicating compliance with Contract Documents and code requirements.

**1.5 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Firm with not less than five years successful experience fabricating custom stairs for projects of similar size and scope.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. System Requirements: Provide steel stairs and landings, with stair handrails, and including plates, angles, hangers and struts for securing to building structure.
- B. Design Requirements: Design stairs and railings to support following minimum loads.
  - 1. Stairs: 100 lbs./sq.ft. loads, with individual stair treads designed to support a 300 pound concentrated load placed in a position which would cause maximum stress.
  - 2. Railings: Support a lateral force of 50 lbs./lin. ft. uniform load and 200 lbs. at any single point without permanent set or damage; ASTM E935.
    - a. Top Rails: Design to support minimum 300 lb. concentrated single point load applied at any point vertically or horizontally.
- C. Regulatory Requirements:
  - 1. Access: Comply with California Building Standards Code and Americans with Disabilities Act (ADA) Standards for access for persons with disabilities.
  - 2. Building Codes: Comply with requirements of applicable codes for stair and railing design, except where more restrictive codes are specified.
- D. Steel Sections, Plates, Shapes and Bars: ASTM A36.
- E. Structural Steel Sheet: Hot rolled, ASTM A1011; or cold rolled, ASTM A1008, Class 1; or grade required for design loading.
- F. Steel Pipe: ASTM A53, Type S seamless, grade as selected by fabricator and as required for design loading; minimum standard weight, STD or Schedule 40.
- G. Steel Tubing: Cold formed ASTM A500; or hot rolled, ASTM A501; minimum Grade B; seamless where exposed.
- H. Castings: Gray iron, ASTM A48, Class 30; malleable iron, ASTM A47.
- I. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron ASTM A47, or cast steel ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.
- J. Grout: Non-shrink meeting ASTM C1107, non-metallic, pre-mixed, factory-packaged, non-staining, non-corrosive; type specifically recommended by manufacturer as applicable to job condition.
- K. Fasteners and Rough Hardware: Type required for specific usage; provide zinc-coated fasteners for exterior use or where built into exterior walls.
- L. Welding Materials: AWS D1.1, type required for materials being welded.
- M. Paint: Provide primers as recommended by paint manufacturers for substrates and paints specified in Section 09 90 00 – Painting and Coating.

## 2.2 FABRICATION

- A. Stairs: Comply with requirements of NAAMM "Metal Stair Manual", including components required for proper anchorage of metal stairs.
  - 1. Types of Stairs: Refer to Drawings.
  - 2. Stair Class: NAAMM Architectural Class.
  - 3. Pan Stairs and Landings: Fabricate stairs with landings and treads of pan construction with treads, landings and risers from sheet stock.
    - a. Secure tread pans to stringers with clip angles welded in place.
    - b. Provide minimum 3000 psi concrete fill for treads and landings, with non-slip fused aluminum oxide or crushed emery finish.
  - 4. Metal Stairs: Provide with abrasive nosing, 2" wide, contrasting color to tread.
- B. Stair Railings: As indicated and as required by applicable codes and standards; comply with NAAMM "Pipe Railing Manual"; welded construction; cap exposed ends.
  - 1. Handrail: Seamless steel tube, 1-1/2" outside diameter, continuous railings conforming to applicable code and design requirements.
  - 2. Wall Rail Brackets: Castings as approved by Architect.
  - 3. Wall Returns: 90° elbow return with 1/4" maximum clearance unless otherwise indicated.
    - a. Provide wall plates only where indicated and where required by applicable codes.
- C. Fabricate stairs, landings and component connections to support live loads specified.
  - 1. Provide closed riser stairs with nosing joined flush to riser.
  - 2. Maximum Allowable Deflection: L/240.
  - 3. Stringers: As indicated on Drawings; Contractor option where not otherwise indicated.
  - 4. Reinforce underside of landings.
    - a. Concrete Fill Landings: Provide smooth soffit surfaces unless suspended finish is indicated below landing.
- D. Fabricate items with joints neatly fitted and properly secured.
- E. Grind exposed welds continuous, smooth and flush with adjacent finished surfaces, and ease exposed edges to approximate 1/32" uniform radius.

- F. Exposed Mechanical Fastenings: Flush countersunk fasteners unobtrusively located, consistent with design of structure.
- G. Fit and shop assemble in largest practical sections for site delivery.
- H. Make exposed joints flush butt type, hairline joints where mechanically fastened.
- I. Supply components required for proper anchorage of metal stairs.
- J. Fabricate anchorage and related components of same material and finish as metal stairs and rails.
- K. Thoroughly clean surfaces of rust, scale, grease and foreign matter prior to applying finish.
- L. Supply components required for proper anchorage of metal fabrications; fabricate anchorage and related components of same material and finish as metal fabrication.
- M. Finishes: Prime paint exposed metal surfaces. Thoroughly clean surfaces of rust, scale, grease and foreign matter prior to applying finish. Do not shop prime surfaces in contact with concrete or requiring field welding; shop prime in one coat.
  - 1. Prime Painting: Comply with requirements of Section 09 90 00 – Painting and Coating for preparation and priming.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible; do not delay job progress; allow for trimming and fitting where necessary.
  - 1. Verify clearances are sufficient, including code required head height clearances.

#### **3.2 INSTALLATION**

- A. Obtain Architect's review prior to site cutting or making adjustments which are not part of scheduled work.
  - 1. Perform necessary cutting and altering for installation of work of other sections.
- B. Install steel stairs and railings square and level, plumb and free from distortion or defects detrimental to appearance and performance.
- C. Make provision for erection stresses by temporary bracing; keep work in alignment.
- D. Ensure alignment with adjacent construction; coordinate with related work to ensure no interruption in installation.

- E. Field bolt and weld to match standard of shop bolting and welding; hide bolts and screws whenever possible, where not hidden, use flush countersunk fastenings.
  - 1. Perform field welding in accordance with AWS D1.1.
- F. After installation, touch-up field welds and scratched and damaged surfaces; use primer consistent with shop coat or recommended for galvanized surfaces, as applicable.
- G. Replace items damaged in course of installation and construction.

**END OF SECTION**