SECTION 05 51 00

METAL STAIRS

PART 1 – GENERAL

1.1 PURPOSE

A. This guideline is intended to provide useful information to the Professional Service Provider (PSP) to establish a basis of design. PSP is to apply the principles of this section such that the University of Texas at Arlington (UTA) may achieve a level of quality and consistency in the design and construction of their facilities. Deviations from these guidelines must be approved by UTA and may require justification through Life Cycle Cost (LCC) analysis and submitted to UTA for approval.

1.2 LESSONS LEARNED AND DESIGN CONSIDERATIONS

A. Paint all cuts and welds to prevent rusting.

1.3 WORK INCLUDED

A. Stairs with concrete treads.
B. Structural steel stair framing and supports.
C. Handrails and guards.

1.4 RELATED WORK

A. Section 03 30 00 – Cast-in-Place Concrete: Concrete fill in stair pans and landings.
B. Section 03 30 00 – Cast-in-Place Concrete: Placement of metal anchors in concrete.
C. Section 04 20 00 – Unit Masonry: Placement of metal fabrications in masonry.
D. Section 05 50 00 – Metal Fabrications.
E. Section 05 52 13 – Pipe and Tube Railings: Metal handrails and balusters other than specified in this section.
F. Section 09 90 00 – Painting and Coating: Paint finish.

1.5 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; current edition; (ADA Standards for Accessible Design).
B. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; current edition.
C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; current edition.
D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; current edition.
E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; current edition.
F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; current edition.
G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; current edition.
H. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; current edition.
I. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; current edition.
J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; current edition.
K. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; current edition.
L. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; current edition.

1.6 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 for submittal procedures.
B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of

fasteners, and accessories.
1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
2. Include the design engineer's stamp or seal on each sheet of shop drawings.

C. Delegated Design Data: As required by authorities having jurisdiction.
D. Welders' Certificates.
E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.7 QUALITY ASSURANCE
A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this Work and licensed in the State of Texas, or personnel under the direct supervision of such an engineer.
B. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
C. A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).

PART 2 – PRODUCTS

2.1 METAL STAIRS - GENERAL
A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.
2. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.
3. Dimensions: As indicated on drawings.
4. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
5. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
6. Separate dissimilar metals using paint or permanent tape.

B. Metal Jointing and Finish Quality Levels:
1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
a. Welded Joints: Continuously welded and ground smooth and flush.
b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
c. Exposed Edges and Corners: Eased to small uniform radius.
d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.
2. Commercial: Exposed joints as inconspicuous as possible, whether welded or mechanical; underside of stair not covered by soffit IS considered exposed to view.
a. Welded Joints: Intermittently welded on back side, filled with body putty, and sanded smooth and flush.
b. Welds Exposed to View: Ground smooth and flush.
c. Mechanical Joints: Butted tight, flush, and hairline.
d. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts.
e. Exposed Edges and Corners: Eased to small uniform radius.
f. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for satin or matte finish.

C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.2 METAL STAIRS WITH CONCRETE TREADS
A. Jointing and Finish Quality Level: Architectural, as defined above.
B. Risers: Closed.
C. Treads: Metal pan with field-installed concrete fill.
1. Concrete Depth: 1-1/2 inches, minimum.
2. Tread Pan Material: Steel sheet.
3. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch minimum.

4. Pan Anchorage to Stringers: Welded to carrier angles welded to stringers.
5. Concrete Reinforcement: None.
6. Concrete Finish: Steel troweled.

D. Risers: Same material and thickness as tread pans.
1. Riser/Nosing Profile: Sloped riser with rounded nosing of minimum radius.
2. Nosing Depth: Not more than 1-1/2 inch overhang.
3. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide.

E. Stringers: Rolled steel channels.
1. Stringer Depth: As indicated on drawings.
2. End Closure: Sheet steel of same thickness as risers welded across ends.

F. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.

G. Railings: Steel pipe railings.

H. Finish: Galvanized after fabrication, except sheet components to be galvanized before fabrication.

I. Finish:
1. Interior: Shop or factory prime painted.
2. Exterior: Re-coatable epoxy primer.

J. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.3 HANDRAILS AND GUARDS

A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
1. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.

B. Guards:
1. Top Rails: Round pipe or tube rails unless otherwise indicated.
a. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
2. Infill at Picket Railings: Vertical pickets.
a. Horizontal Spacing: Maximum 4 inches on center.
b. Material: Solid steel bar.
c. Shape: Round.
d. Size: 1/4 inch diameter.
e. Top Mounting: Welded to underside of top rail.
f. Bottom Mounting: Welded to top surface of stringer.
3. Infill at Pipe Railings: Pipe or tube rails sloped parallel to stair.
a. Outside Diameter: 1 inch.
b. Material: Steel pipe or tube, round.
c. Vertical Spacing: Maximum 4 inches on center.
d. Jointing: Welded and ground smooth and flush.
4. End and Intermediate Posts: Same material and size as top rails.
a. Horizontal Spacing: As indicated on drawings.
b. Mounting: Welded to top surface of stringer.

2.4 MATERIALS

A. Steel Sections: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A500 or ASTM A501 structural tubing, round and shapes as indicated.

C. Steel Plates: ASTM A6/A6M or ASTM A283/A283M.

D. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.

E. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
2. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).

F. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230 with G40/Z120 coating.

G. Concrete Fill: Type specified in Section 03 30 00.

2.5 SHOP FINISHING

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime Painting: Use specified shop- and touch-up primer.
1. Preparation of Interior Steel:
a. SSPC-SP 2, Hand Tool Cleaning.

b. Number of Coats: One.
2. Preparation of Exterior Steel Stair:
a. SSPC-SP6/NACE 3, 2 mil (50 micron) profile, Commercial Blast Cleaning.
b. Number of coats: One, 4.0-6.0 dft.

D. Galvanizing: Hot-dip galvanize to minimum requirements of ASTM A123/A123M.
1. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.

PART 3 – EXECUTION

3.1 PREPARATION

A. When field welding is required, clean and strip primed steel items to bare metal.
B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.2 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.
B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
D. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1.
E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
F. Obtain approval prior to site cutting or creating adjustments not scheduled.
G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.3 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION