

SECTION 055100 - METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Preassembled steel stairs with [**concrete-filled**] [**precast concrete**] [**epoxy-resin-filled**] [**and**] [**abrasive-coating-finished formed-metal**] treads. All tread finishes by Contractor.
2. Industrial-type stairs with steel [**floor plate**] [**grating**] [**concrete**] treads.
3. Steel tube railings attached to metal stairs.
4. Steel tube handrails attached to walls adjacent to metal stairs.
5. Railing gates at the level of exit discharge.

B. Related Sections:

1. Section 033000 "Cast in Place Concrete" for treads and landings.
2. Section 055000 "Metal Fabrications" for [**metal treads and nosings installed at locations other than in metal stairs**] [**and**] [**alternating tread devices**].
3. Section 055213 "Pipe and Tube Railings" for pipe and tube railings[**not attached to metal stairs or to walls adjacent to metal stairs**].
4. [**Section 061000 "Rough Carpentry"**] [**Section 061053 "Miscellaneous Rough Carpentry"**] for wood blocking for anchoring railings.
5. Section 092216 "Non-Structural Metal Framing" for metal backing for anchoring railings.

C. Reference Standards:

1. American Disability Act (ADA)
 - a. ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1
2. American Institute of Steel Construction
 - a. Manual of Steel Construction
 - b. Code of Standard Practice
3. American Iron and Steel Institute (AISI):

- a. AISI 121: Standard Definitions for Use in the Design of Steel Structures.
4. American National Standards Institute (ANSI):
 - a. ANSI A117.1: Accessible and Usable Buildings and Facilities Standards.
5. ASTM International formerly American Standards for Testing and Materials (ASTM):
 - a. ASTM 1008: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened.
 - b. ASTM A1011/A 1011M: Standard Specification for Steel, Carbon, Hot-Rolled Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - c. ASTM A 123: Standard Specification for Zinc (Hot-Dip Galvanized) coatings on Iron and Steel Products.
 - d. ASTM A 153/A 153M: Standard Specification for Zinc Coating (Hot-Dip Galvanized on Iron and Steel Hardware.
 - e. ASTM A 283/A 283M: Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
 - f. ASTM A 36/A 36M: Standard Specification for Carbon Structural Steel.
 - g. ASTM A 47/A 47M: Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process.
 - h. ASTM A 513: Standard Specification for Electric-Resistance-Welded Carbon and Alloy Mechanical Tubing.
 - i. ASTM A 526/A 536M: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
 - j. ASTM A 53: Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated, Welded and Seamless.
 - k. ASTM A 6/A 6M: Standard specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - l. ASTM A 780/A 780M: Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - m. ASTM A 786: Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
 - n. ASTM E 894: Standard Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
 - o. ASTM E935: Standard Test Method for Performance of Permanent Metal Railing Systems and Rails for Buildings.
6. American Welding Society (AWS):

- a. AWS D1.1/D1.1M: Structural Welding Code - Steel.
 - b. AWS D1.3: Structural Welding Code - Sheet Steel.
7. International Code Council
- a. ICC International Building Code: Check local code enforcement for which edition has been adopted.
8. Master Painters Institute(MPI):
- a. MPI #20: Epoxy Zinc-Rich Primer
9. National Association of Architectural Metal Manufacturers (NAAMM):
- a. AMP 500-06: Metal Finishes Manual
 - b. AMP 510-92: Metal Stair Manual
 - c. MBG 531-09: Metal Bar Grating Manual
10. New York City Building Code Reference Standard:
- a. RS 6-1: Photoluminescent Exit Path Markings.
 - b. RS 6-1A: Additional Standards as Required by Reference Standard RS 601 for Photoluminescent Exit Path Markings
11. Society for Protective Coatings (SSPC):
- a. SSPC-PC3: Power Tool Cleaning
 - b. SSPC Paint 20: Zinc-Rich Coating
 - c. SSPC Paint 25: Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel Type 1 and Type 2
 - d. SSPC-SP 2: Hand Tool Cleaning
 - e. SSPC-SP 3: Power Tool Cleaning
 - f. SSPC-SP 6/Nace No. 3: Commercial Blast Cleaning
12. Miscellaneous:
- a. Local construction codes and guidelines enforced by the local code officials having jurisdiction over code enforcement.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Stairs: Metal stairs 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. (4.79 kN/sq. m).
 2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
 3. Uniform and concentrated loads need not be assumed to act concurrently.

4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 5. Limit deflection of treads, platforms, and framing members to **[L/240] [L/360] [L/720]** **<Insert deflection ratio>** or 1/4 inch (6.4 mm), whichever is less.
- B. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 2. Infill of Guards:
 - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Seismic Performance: Metal stairs shall withstand the effects of earthquake motions determined according to **[ASCE/SEI 7] <Insert requirement>**.
1. Component Importance Factor is 1.5.

1.4 ACTION SUBMITTALS

- A. Product Data: For metal stairs and the following:
1. Prefilled metal-pan stair treads.
 2. Precast concrete treads.
 3. Epoxy-resin-filled stair treads. (By Contractor)
 4. Nonslip aggregates and nonslip-aggregate finishes. (By Contractor)
 5. Abrasive nosings. (By Contractor)
 6. Metal floor plate treads.
 7. Paint products.
 8. Erection drawings (Hard/Electronic copies).
- B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 2. Laboratory Test Reports for Credit IEQ 4: For primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- D. Samples for Initial Selection: For products involving selection of color, texture, or design.
- E. Samples for Verification: For the following products, in manufacturer's standard sizes:
1. Epoxy-resin-filled stair treads. (By Contractor)
 2. Stair treads with nonslip-aggregate surface finish. (By Contractor)
 3. Metal floor plate treads.
 4. Grating treads.
 5. Abrasive nosings. (By Contractor)
- F. Engineering calculations and stamped construction documents provided by a third party. **[NOTE: Possible delays and additional cost may be associated with this option.]**

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified **[professional engineer]** **[testing agency]**.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for **[stairs]** **[and]** **[railings]**.
 1. Test railings according ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall have produced the types of stair, platforms and railing systems specified in this section for not less than five (5) years.
- B. Installer Qualifications: Fabricator of products.
- C. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Preassembled Stairs: [**Commercial**] [**Service**] class.
 2. Industrial-Type Stairs: Industrial class.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- E. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.7 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. Contractor to coordinate, provide and install all anchors for metal stair erection. 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.
- C. Contractor to coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than [25] <Insert number> percent.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 513.
- D. 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.

- E. Steel Bars for Grating Treads: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.
- F. Wire Rod for Grating Crossbars: ASTM A 510 (ASTM A 510M).
- G. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, [**either commercial steel, Type B, or**] structural steel, Grade 30 (Grade 205), unless another grade is required by design loads.
- H. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, [**either commercial steel, Type B, or**] structural steel, Grade 33 (Grade 230), unless another grade is required by design loads.
- I. Expanded-Metal, Carbon Steel: ASTM F 1267, [**Type I (expanded)**] [**Type II (expanded and flattened)**], Class 1 (uncoated).
 - 1. Style Designation: [**3/4 number 13**] [**1-1/2 number 10**] <Insert designation>.
- J. Woven-Wire Mesh: Intermediate-crimp, square pattern, 2-inch (50-mm) woven-wire mesh, made from 0.135-inch (3.5-mm) nominal diameter wire complying with ASTM A 510 (ASTM A 510M).

2.3 ABRASIVE NOSINGS

Note: All Abrasive Nosings are provided and installed by the Contractor.

- A. Cast-Metal Units: Cast [**iron**] [**aluminum**] [**bronze**] [**nickel silver**], with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - 1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
 - a. American Safety Tread Co., Inc.
 - b. Balco Inc.
 - c. Barry Pattern & Foundry Co., Inc.
 - d. Granite State Casting Co.
 - e. Safe-T-Metal Company, Inc.
 - f. Wooster Products Inc.
 - 2. Configuration: Cross-hatched units, [**3 inches (75 mm)**] [**4 inches (100 mm)**] wide without lip.
 - 3. Configuration: Cross-hatched angle-shaped units, same depth as bar-grating treads and 1 to 1-1/2 inches (25 to 38 mm) wide.
- B. Extruded Units: [**Aluminum**] [**Bronze**] units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.

1. **Manufacturers:** Subject to compliance with requirements, **[provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:**
 - a. ACL Industries, Inc.
 - b. American Safety Tread Co., Inc.
 - c. Amstep Products.
 - d. Armstrong Products, Inc.
 - e. Balco Inc.
 - f. Granite State Casting Co.
 - g. Wooster Products Inc.
 2. **[Provide ribbed units, with abrasive filler strips projecting 1/16 inch (1.5 mm) above aluminum extrusion.] [Provide solid-abrasive-type units without ribs.]**
 3. Nosings: Square-back units, **[1-7/8 inches (48 mm)] [3 inches (75 mm)] [4 inches (100 mm)]** wide, without lip.

Or
 4. Nosings: Two-piece units, 3 inches (75 mm) wide, with subchannel for casting into concrete.
- C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- D. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.
- E. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.4 FASTENERS

Note: All anchoring fasteners are provided and installed by the Contractor. The Manufacturer shall provide only product-related fasteners.

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Post-Installed Anchors: **[Torque-controlled expansion anchors] [or] [chemical anchors]** capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
 2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy **[Group 1 (A1)] [Group 2 (A4)]** stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Primers: Provide primers that comply with [**Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."**] [**Section 099600 "High-Performance Coatings."**]
- D. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.6 FABRICATION, GENERAL

- A. Stringers shall be cut and formed from a single piece of stock for the full, design length. Splicing shall not be permitted.
- B. Risers shall be solid and equally spaced to within 3/16" of any adjacent riser and within 3/8" of any two non-adjacent risers on the stair.
- C. All closed tubes that require hot dip galvanizing will include an appropriately sized drain hole.
- D. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
- E. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Preassembled Stairs come either treads to stringers or rail to stringer with bolt in treads.
- F. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- G. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

- H. Form exposed work with accurate angles and surfaces and straight edges.
- I. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Weld exposed corners and seams continuously unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for **[Type 1 welds: no evidence of a welded joint]** **[Type 2 welds: completely sanded joint, some undercutting and pinholes okay]** **[Type 3 welds: partially dressed weld with spatter removed]** **[Type 4 welds: good quality, uniform undressed weld with minimal splatter]**.
- J. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use carriage bolts unless otherwise indicated. Locate joints where least conspicuous.
- K. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.7 STEEL-FRAMED STAIRS

- A. Manufacturers: Provide products by the manufacturer listed below:
 - 1. Lapeyre Stair, Inc.
 - a. Contact Information: Lapeyre Stair, Inc.
5117 Toler Street
Harahan, LA 70123
Phone: (800) 535-7631 or (504) 733-6009
Fax: (504) 733-4393
Web: www.lapeyrestair.com
 - b. Substitutions shall not be considered.
- B. Stair Framing:
 - 1. Fabricate stringers of steel **[plates]** **[channels]** **[plates or channels]**.
 - a. Provide closures for exposed ends of channel stringers.
 - 2. Construct platforms of steel **[plate]** **[channel]** **[plate or channel]** headers and miscellaneous framing members as **[needed to comply with performance requirements]** **[indicated]**.
 - 3. Weld stringers to headers; weld framing members to stringers and headers

4. Where stairs are enclosed by gypsum board[**shaft-wall**] assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.
 5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- C. **Metal-Pan Stairs:** Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness of [**0.071 inch (14 GA.)**] [**0.120 inch (11 GA.)**].
1. Steel Sheet: Uncoated hot-rolled steel sheet.
 2. Steel Sheet: Galvanized-steel sheet.
 3. Directly weld metal pans to stringers.
 4. Shape metal pans to include nosing integral with riser.
- D. **Metal Floor Plate Stairs:** Form treads and platforms to configurations shown from [**rolled-steel**] [**abrasive-surface**] floor plate of thickness [**0.071 inch (14 GA.)**] [**0.120 inch (11 GA.)**].
1. Form treads with integral nosing and back edge stiffener. Form risers of same material as treads.
 2. Form treads with integral nosing and back edge stiffener. Form risers from steel sheet not less than 0.097 inch (2.5 mm) thick, welded to tread nosings and stiffeners and to platforms.
 3. Form treads with integral nosing and back edge stiffener, and with open risers.
 4. Weld steel supporting brackets to stringers and weld treads to brackets.
 5. Fabricate platforms with integral nosings matching treads and weld to platform framing.
- E. **Metal Bar-Grating Stairs:** Form treads and platforms to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual."
1. Fabricate treads and platforms from welded steel grating with 1-1/4-by-3/16-inch (32-by-5-mm) bearing bars at 15/16 inch (24 mm) o.c. and crossbars at 4 inches (100 mm) o.c.
 2. Fabricate treads and platforms from welded steel grating with openings in gratings no more than [**5/16 inch (8 mm)**] [**1/2 inch (12 mm)**] [**3/4 inch (19 mm)**] in least dimension.
 3. Surface: Serrated.
 4. Finish: [**Shop primed**] [**Painted**] [**Galvanized**].
 5. Fabricate grating treads with [**rolled-steel floor plate**] [**cast abrasive**] nosing and with steel angle or steel plate carrier at each end for stringer connections. Secure treads to stringers with bolts.
 6. Fabricate grating platforms with nosing matching that on grating treads. Provide toeplates at open-sided edges of grating platforms. Weld grating to platform framing.

2.8 STAIR RAILINGS

- A. Comply with applicable requirements in Section 055213 "Pipe and Tube Railings."
1. Fabricate

2. Rails may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
 3. Connect posts to stair framing by direct welding unless otherwise indicated.
- B. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
1. Rails and Posts: 1-1/2-inch- (38-mm-) square top and bottom rails and 1-1/2-inch- (38-mm-) square posts.
 2. Picket Infill: [**1/2-inch**] [**5/8-inch**] [**3/4-inch**] square pickets spaced less than 4 inches (100 mm) clear.
 3. Expanded-Metal Infill: Expanded-metal panels edged with U-shaped channels made from steel sheet not less than 0.043 inch (1.1 mm) thick. Orient expanded metal with long dimension of diamonds [**parallel to top rail**] [**perpendicular to top rail**] [**vertical**].
 4. Perforated-Metal Infill: Perforated-metal panels edged with U-shaped channels made from metal sheet, of same metal as perforated metal and not less than 0.043 inch (1.1 mm) thick. Orient perforated metal with pattern [**parallel to top rail**] [**perpendicular to top rail**] [**horizontal**] [**vertical**] [**as indicated on Drawings**].
 5. Mesh Infill: Welded wire mesh welded into 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) steel channel frames. Orient wire mesh with [**diamonds vertical**] [**wires perpendicular and parallel to top rail**] [**wires horizontal and vertical**].
 6. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with [**cam-type, self-closing**] [**spring**] hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.
- C. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for [**Type 1 welds: no evidence of a welded joint**] [**Type 2 welds: completely sanded joint, some undercutting and pinholes okay**] [**Type 3 welds: partially dressed weld with spatter removed**] [**Type 4 welds: good quality, uniform undressed weld with minimal splatter**].
- D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- E. Close exposed ends of railing members with prefabricated end fittings.
- F. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
- G. Cap handrail return if exposed.

- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges and miscellaneous fittings for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
1. Connect posts to stair framing by direct welding unless otherwise indicated.
 2. For galvanized railings, provide stainless steel fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
 3. For nongalvanized railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves.

2.9 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal stairs after assembly.
- C. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 2. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with the following.
1. Interior Stairs: SSPC-SP 3, "Power Tool Cleaning."
- E. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

Note: All planning, coordination and execution regarding the erection of the stair/stairs to be performed by Project Contractor.

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- G. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."
 - 1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.

3.2 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.
- B. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use nonmetallic, nonshrink grout unless otherwise indicated.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 INSTALLING RAILINGS

- A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:
 - 1. Anchor posts to steel by welding directly to steel supporting members.
 - 2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.
- B. Attach handrails to wall with wall brackets. Use type of bracket with predrilled hole for exposed bolt anchorage. Provide bracket with 2-1/4-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as required to comply with performance requirements.

3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in [**Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."**] [**Section 099600 "High-Performance Coatings."**]
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055100