

## SECTION 055116 – METAL FLOOR PLATE STAIRS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Industrial Class stairs with patterned steel floor plate treads.
2. Steel railings and guards attached to metal stairs.
3. Steel handrails attached to walls adjacent to metal stairs.

##### B. Related Sections:

1. Section 055213 – Pipe and Tube Railings
2. Section 099113 – Exterior Painting

##### C. Reference and Industry Standards

1. The following reference standards shall be applicable to this Section:
  - a. The current Enterprise Green Communities (EGC) Criteria, and the current New York City Overlay.
2. Industry Standards
  - ASTM (American Society for Testing and Materials)
  - AWS (American Welding Society)
  - NAAMM (National Association of Architectural Metal Manufacturers)
  - NOMMA (National Ornamental and Miscellaneous Metals Association)
  - SSPC (Society for Protective Coatings)

##### D. The current NYC Overlay of the current Enterprise Green Communities Criteria:

1. Mandatory Requirements: See the NYC Overlay of the EGC reference standard for full specifications.
  - a. All projects must achieve compliance with the mandatory criteria measures that are applicable:
    - Criterion 6.4: Healthier Material Selection
    - Criterion 6.10: Construction Waste Management
2. Optional Project Requirements for Certification Points
  - a. Additionally, rehab projects are required to achieve **55** optional points. Criteria with optional points related to this Specification Section include, but may not be limited to:

- Criterion 6.1: Ingredient Transparency for Material Health
- Criterion 6.2: Recycled Content and Ingredient Transparency
- Criterion 6.5: Environmentally Responsible Material Selection
- Criterion 6.7: Regional Materials
- Criterion 6.10: Construction Waste Management

## 1.2 COORDINATION

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

## 1.3 ACTION SUBMITTALS

- A. Product Data: For metal floor plate stairs and the following:
1. Metal floor plate treads.
  2. Woven-wire mesh.
  3. Welded-wire mesh.
  4. Shop primer products.
  5. Grout.
- B. Shop Drawings:
1. Include plans, elevations, sections, details, and attachments to other work.
  2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
  3. Include plan at each level.
  4. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.
- C. Delegated-Design Submittal: For stairs [, **railings, and guards**], including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the State of New York.
- B. Welding certificates.
- C. Documentation for compliance with Enterprise Green Communities Criteria.

## 1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1 Structural Welding Code - Steel.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design stairs [, **railings, and guards**], including attachment to building construction.

### 2.2 METALS

- A. Steel Plates, Shapes, and Bars: ASTM A36.
- B. Rolled-Steel Floor Plate: ASTM A786, rolled from plate complying with ASTM A36 or ASTM A283, Grade C or D.
- C. Steel Tubing for Railings and Guards: [**ASTM A500 (cold formed)**] [**or**] [**ASTM A513**].
  - 1. Provide galvanized finish for exterior installations and where indicated.
- D. Steel Pipe for Railings and Guards: ASTM A53, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
  - 1. Provide galvanized finish for exterior installations and where indicated.
- E. Woven-Wire Mesh: Intermediate-crimp, [**diamond**] [**square**] pattern, 2-inch woven-wire mesh, made from 0.135-inch nominal-diameter steel wire complying with ASTM A510.
- F. Welded-Wire Mesh: [**Diamond**] [**Square**] pattern, 2-inch welded-wire mesh, made from 0.236-inch nominal-diameter steel wire complying with ASTM A510.
- G. Cast Iron: Either gray iron, ASTM A48, or malleable iron, ASTM A47, unless otherwise indicated.

### 2.3 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls.
  - 1. Select fasteners for type, grade, and class required.
- B. Fasteners for Anchoring Railings and Guards to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings and guards to other types of construction indicated.
- C. Post-Installed Anchors: Torque-controlled expansion 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 E488, conducted by a qualified independent testing agency.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.

2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy [**Group 1**] [**Group 2**] stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

#### 2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with *Section 099113 – Exterior Painting* and *Section 099123 – Interior Painting*.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer compatible with topcoat.
  1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Zinc-Rich Primer: Comply with SSPC-Paint 20, and compatible with topcoat.
- D. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with [**SSPC-Paint 20**] [**ASTM A780**] and compatible with paints specified to be used over it.
- F. Non-metallic, Shrinkage-Resistant Grout: ASTM C1107 factory-packaged, non-metallic aggregate grout; recommended by manufacturer for [**interior**] [**exterior**] use; non-corrosive and non-staining; mixed with water to consistency suitable for application and a 30-minute working time.

#### 2.5 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, railings, guards, 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.
- B. Assemble stairs [, **railings, and guards**] in shop to greatest extent possible.
  1. Disassemble units only as necessary for shipping and handling limitations.
  2. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately.
  1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
  2. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.

- F. 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 Finish #4 - Good quality, uniform undressed weld with minimal splatter.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
  2. Locate joints where least conspicuous.
  3. Fabricate joints that will be exposed to weather in a manner to exclude water.
  4. Provide weep holes where water may accumulate internally.

## 2.6 FABRICATION OF STEEL-FRAMED STAIRS

- A. NAAMM Stair Standard: Comply with NAAMM AMP 510, Metal Stairs Manual, for Industrial Class, unless more stringent requirements are indicated.
- B. Stair Framing:
1. Fabricate stringers of steel [**plates**] [**or**] [**channels**].
    - a. Stringer Size: [**As indicated on Drawings**].
    - b. Provide closures for exposed ends of channel stringers.
    - c. Finish: [**Shop primed**] [**Painted**] [**Galvanized**].
  2. Construct platforms and tread supports of steel [**plate**] [**or**] [**channel**] headers and miscellaneous framing members as [**indicated on Drawings**].
    - a. Provide closures for exposed ends of channel framing.
    - b. Finish: [**Shop primed**] [**Painted**] [**Galvanized**].
  3. Weld [**or bolt**] stringers to headers; weld [**or bolt**] 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.
    - a. Locate hanger rods and struts where they do not encroach on required stair width and are 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 Floor Plate Stairs: Form treads and platforms to configurations shown from rolled-steel floor plate of thickness needed to comply with performance requirements, but not less than 1/4 inch.
  - 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 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.
  - 6. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.
- D. Risers: **[Open]** **[Solid]**.
- E. Toe Plates: Provide toe plates around openings and at edge of open-sided floors and platforms, and at open ends and open back edges of treads.
  - 1. Material and Finish: Match treads and platforms.
  - 2. Fabricate to dimensions and details indicated.

## 2.7 FABRICATION OF STAIR RAILINGS AND GUARDS

- A. Comply with applicable requirements in *Section 055213 – Pipe and Tube Railings*.
- B. Fabricate railings and guards to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of member, post spacings, wall bracket spacing, and anchorage, but not less than that needed to withstand indicated loads.
  - 1. Rails and Posts: **[1-5/8-inch-diameter]** **[1-1/2-inch-square]** top and bottom rails and 1-1/2-inch-square posts.
  - 2. Picket Infill: **[1/2-inch-]** **[3/4-inch-]** **[round]** **[square]** pickets spaced to prohibit the passage of a 4-inch diameter sphere.
  - 3. Mesh Infill: **[Woven]** **[Welded]**-wire mesh **[crimped]** **[welded]** into 1-by-1/2-by-1/8-inch steel channel frames. Orient wire mesh with **[diamonds vertical]** **[wires perpendicular and parallel to top rail]** **[wires horizontal and vertical]**.
  - 4. Intermediate Rails Infill: **[1-5/8-inch-diameter]** **[1-1/2-inch-square]** intermediate rails spaced less than **[12 inches]** **[21 inches]** clear.
- C. Welded Connections: Fabricate railings and guards with welded connections.
  - 1. Fabricate connections that are exposed to weather in a manner that excludes water.
    - a. Provide weep holes where water may accumulate internally.
  - 2. Cope components at connections to provide close fit, or use fittings designed for this purpose.

3. Weld all around at connections, including at fittings.
  4. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  5. Obtain fusion without undercut or overlap.
  6. Remove flux immediately.
  7. Finish welds to comply with NOMMA's Voluntary Joint Finish Standards for Finish #4 quality, uniform undressed weld with minimal splatter as shown in NAAMM AMP 521.
- D. Form changes in direction of railings and guards as follows:
1. As detailed.
  2. By bending [**or by inserting prefabricated elbow fittings**].
  3. By flush bends [**or by inserting prefabricated flush-elbow fittings**].
  4. By radius bends of radius indicated [**or by inserting prefabricated elbow fittings of radius indicated**].
  5. By inserting prefabricated [**elbow fittings**] [**flush-elbow fittings**] [**elbow fittings of radius indicated**].
- E. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required.
1. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- F. Close exposed ends of railing and guard members with prefabricated end fittings.
- G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
1. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- H. Connect posts to stair framing by direct welding unless otherwise indicated.
- I. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
1. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
  2. For galvanized railings and guards, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
  3. For nongalvanized railings and guards, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
  4. Provide type of bracket [**with flange tapped for concealed anchorage to threaded hanger bolt**] [**with predrilled hole for exposed bolt anchorage**] and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

- J. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports.
  - 1. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

## 2.8 FINISHES

- A. Finish metal stairs after assembly.
- B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153 for steel and iron hardware and with ASTM A123 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.
- C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- D. 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

### 3.1 INSTALLATION OF METAL STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.
  - 1. 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.
  - 1. Grouted Baseplates: Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces.
    - a. Clean bottom surface of baseplates.

- b. Set steel stair baseplates on wedges, shims, or leveling nuts.
  - c. After stairs have been positioned and aligned, tighten anchor bolts.
  - d. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
  - e. Promptly pack grout solidly between bearing surfaces and plates to ensure that no voids remain.
    - 1) Neatly finish exposed surfaces; protect grout and allow to cure.
    - 2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- 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.
- 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
  - 2. 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.
  - 3. Comply with industry standard requirements for welding.

### 3.2 INSTALLATION OF RAILINGS AND GUARDS

- A. Adjust railing and guard systems before anchoring to ensure matching alignment at abutting joints with tight, hairline joints.
- 1. Space posts at spacing indicated or, if not indicated, as required by design loads.
  - 2. Plumb posts in each direction, within a tolerance of 1/16 inch in 3 feet.
  - 3. Align rails and guards so variations from level for horizontal members and variations from parallel with rake of stairs for sloping members do not exceed 1/4 inch in 12 feet.
  - 4. Secure posts, rail ends, and guard ends to building construction as follows:
    - a. Anchor posts to steel by **[welding]** **[or]** **[bolting]** to steel supporting members.
    - b. Anchor handrail and guard ends to concrete and masonry with steel round flanges welded to rail and guard ends and anchored with post-installed anchors and bolts.
- B. Attach handrails to wall with wall brackets.
- 1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
  - 2. Secure wall brackets to building construction as required to comply with performance requirements.

### 3.3 REPAIR

- 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 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*.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

**END OF SECTION 055116**