SECTION 055113 - METAL PAN STAIRS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS
				1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			2. SUMMARY
				1. Section Includes:

Preassembled steel stairs with **[concrete-filled] [precast concrete] [precast terrazzo]** **[epoxy-resin-filled] [and] [abrasive-coating-finished, formed-metal]** treads.

**[Steel tube ]**railings and guards attached to metal stairs.

**[Steel tube ]**handrails attached to walls adjacent to metal stairs.

Railing gates at the level of exit discharge.

* + - 1. COORDINATION
				1. 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.
				2. Coordinate installation of anchorages for metal stairs**[, railings, and guards]**.

Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts,**[ blocking for attachment of wall-mounted handrails,]** and items with integral anchors, that are to be embedded in concrete or masonry.

Deliver such items to Project site in time for installation.

* + - * 1. Coordinate locations of hanger rods and struts with other work so they do not encroach on required stair width and are within fire-resistance-rated stair enclosure.

Retain paragraph below if railings and guards are specified in this Section.

* + - * 1. Schedule installation of railings and guards so wall attachments are made only to completed walls.

Do not support railings and guards temporarily by any means that do not satisfy structural performance requirements.

* + - 1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For metal pan stairs and the following:

Perforated metal.

Woven-wire mesh.

Welded-wire mesh.

Prefilled metal-pan-stair treads.

Abrasive nosings.

Shop primer products.

Nonslip-aggregate concrete finish.

Abrasive-coating finish to formed-metal stairs.

Precast concrete treads.

Precast terrazzo treads.

Epoxy-resin-filled stair treads.

Handrail wall brackets.

Grout.

* + - * 1. Sustainable Design Submittals:
				2. Shop Drawings:

Include plans, elevations, sections, details, attachments to other work, and welding procedure specifications (WPS).

Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.

Include plan at each level.

Retain first subparagraph below if railings and guards are specified in this Section.

Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.

Indicate profile and dimensions of precast terrazzo treads.

Indicate profile and dimensions of epoxy-resin-filled treads.

* + - * 1. Samples for Verification: For each type and finish of **[nosing] [precast terrazzo tread] [epoxy-resin-filled tread]**.

Retain “Delegated-Design Submittal” Paragraph below if design services have been delegated to Contractor.

* + - * 1. Delegated-Design Submittal: For stairs, **[railings and guards,] [precast terrazzo treads,] [epoxy-resin-filled treads]**, including analysis data signed and sealed by the qualified professional engineer, licensed in the State of New York, responsible for their preparation.

Retain “Qualification Data” Paragraph below if design services have been delegated to Contractor. Coordinate with qualification requirements in “”“Quality Assurance” Article.

* + - * 1. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed and registered in the State of New York.

Retain “Welding certificates” Paragraph below if retaining “Welding Qualifications” Paragraph in “Quality Assurance” Article.

* + - * 1. Welding certificates.

Consider retaining “Paint Compatibility Certificates” Paragraph below if primers are fully specified in this Section rather than in painting Sections.

* + - * 1. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

Retain "Source quality-control reports" Paragraph below if Contractor is responsible for source quality-control testing and inspecting.

* + - * 1. Source quality-control reports.

Use subparagraph below for projects over $100,000. See Article 1.4. below.

Documentation to confirm compliance.

* + - 1. QUALITY ASSURANCE
				1. Installer Qualifications: Fabricator of products.

Retain “Welding Qualifications” Paragraph below if shop or field welding is required. If retaining, also retain “Welding certificates” Paragraph in “Informational Submittals” Article.

* + - * 1. Welding Qualifications: Qualify procedures and personnel according to the following:

AWS D1.1, “Structural Welding Code – Steel.”

AWS D1.3, “Structural Welding Code – Sheet Steel.”

AWS D1.2, “Structural Welding Code – Aluminum.”

AWS D1.6, “Structural Welding Code – Stainless Steel.”

Use paragraph below for projects over $100,000. Paragraph is taken from Article 25.4 of the General Conditions.

* + - * 1. If the value of the contract exceeds $100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.
			1. DELIVERY, STORAGE, AND HANDLING
				1. Store materials to permit easy access for inspection and identification.

Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.

Protect steel members and packaged materials from corrosion and deterioration.

Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

Repair or replace damaged materials or structures as directed.

* + - * 1. Store and handle galvanized steel members per the recommendations of the American Galvanized Association.
1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. PERFORMANCE REQUIREMENTS

Retain “Delegated Design” Paragraph below if Contractor is required to assume responsibility for design.

* + - * 1. Delegated Design: Engage a qualified professional engineer, licensed and registered to practice in the State of New York, to design stairs, **[railings and guards,] [precast terrazzo treads,] [epoxy-resin-filled treads]**, including attachment to building construction.
				2. 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:

Uniform Load: 100 lbf/sq. ft..

Concentrated Load: 300 lbf applied on an area of 4 sq. in..

Uniform and concentrated loads need not be assumed to act concurrently.

Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.

Retain option in subparagraph below or insert another requirement. The NYSBC limits deflection of floor members to L/360. If brittle materials such as marble, granite, or ceramic tiles are used on treads and platforms, deflection limit should be reduced to L/720.

Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

Retain “Structural Performance of Railings and Guards” Paragraph below if railings and guards are specified in this Section. See the Evaluations in Section 055213 “Pipe and Tube Railings” for information about performance requirements for railings.

* + - * 1. Structural Performance of Railings and Guards: Railings and guards, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

"Handrails and Top Rails of Guards" and "Infill of Guards" subparagraphs below are examples only and are based on the NYSBC; revise to suit Project and to comply with requirements of authorities having jurisdiction. For some occupancy categories under certain circumstances, less-stringent provisions may apply.

Handrails and Top Rails of Guards:

Uniform load of 50 lbf/ft. applied in any direction.

Concentrated load of 200 lbf applied in any direction.

Uniform and concentrated loads need not be assumed to act concurrently.

Infill of Guards:

Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..

Infill load and other loads need not be assumed to act concurrently.

Delete “Thermal Movements” Subparagraph below if only interior railings and guards are required.

Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

Differential values in “Temperature Change” Subparagraph below (for aluminum in particular) are suitable for most of the U.S.

Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

Retain “Seismic Performance of Stairs” Paragraph below for projects requiring seismic design. Model building codes and ASCE/SEI 7 establish criteria for buildings subject to earthquake motions. Verify requirements of authorities having jurisdiction.

* + - * 1. Seismic Performance of Stairs: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

Component Importance Factor: Per design parameters indicated.

* + - 1. METALS
				1. Metal Surfaces: 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.

Retain material types, qualities, and grades in remaining paragraphs below that are indicated in the Specifications or on Drawings. Insert or delete items to suit Project.

* + - * 1. Steel Plates, Shapes, and Bars: ASTM A36.

Retain “Steel Tubing for Railings and Guards” or “Steel Pipe for Railings and Guards” Paragraph below if steel railings and guards are specified in this Section. Typically, allow fabricator to use either type of tubing in first paragraph below unless structural engineer of record has designed railings and guards based on one tube type. If higher strength is required, consider specifying ASTM A513 Type 5 tubing or ASTM A513 tubing of a high-strength alloy, after verifying availability.

* + - * 1. Steel Tubing for Railings and Guards: [**ASTM A500 (cold formed)**] [**or**] [**ASTM A513**].

Delete subparagraph below if railings are galvanized after fabrication or if not using galvanized railings.

Provide galvanized finish for exterior installations and where indicated.

Primary difference between round steel tubing and steel pipe is in outside dimensions. Pipe sizes are normally indicated by use of NPS designator and weight class or schedule number; for tubing, OD and wall thickness are used. See Section 055213 “Pipe and Tube Railings.”

Type, grade, and weight in “Steel Pipe for Railings and Guards” Paragraph below are typical default requirements; revise to suit Project.

* + - * 1. 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.

Delete subparagraph below if railings and guards are galvanized after fabrication or if not using galvanized railings and guards.

Provide galvanized finish for exterior installations and where indicated.

Retain one of or both “Uncoated, Cold-Rolled Steel Sheet” and “Uncoated, Hot-Rolled Steel Sheet” paragraphs below unless all steel sheet is galvanized. Cold-rolled sheet has smoother surface finish than hot-rolled sheet. Most manufacturers use hot-rolled sheet. Delete option in either paragraph to specify only structural steel if required. Revise grade, if necessary, to suit structural requirements; grades indicated are lowest in referenced standards.

* + - * 1. Uncoated, Cold-Rolled Steel Sheet: ASTM A1008,**[ either commercial steel, Type B, or]** structural steel, Grade 33 (230) Types 1 and 2, unless another grade is required by design loads; exposed.
				2. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011,[**either commercial steel, Type B, or**] structural steel, Grade 36 (250) Types 1 and 2, unless another grade is required by design loads.

Retain “Galvanized-Steel Sheet” Paragraph below if galvanized sheet is used; delete option to specify only structural steel. Revise grade, if necessary, to suit structural requirements; grade indicated is lowest in referenced standard.

* + - * 1. Galvanized-Steel Sheet: ASTM A653, G90 coating,[**either commercial steel, Type B, or**] structural steel, Grade 33, unless another grade is required by design loads.
				2. Expanded-Metal, Carbon Steel: ASTM F1267, [**Type I (expanded)**] [**Type II (expanded and flattened)**], Class 1 (uncoated).

Designations in “Style Designation” Subparagraph below indicate size. First option has openings approximately 3/4 by 1-1/2 inches and is 0.09 to 0.10 inch thick; second option has openings approximately 1 by 2-1/2 inches and is 0.13 to 0.142 inch thick.

Style Designation: **[3/4 number 13] [1-1/2 number 10]**.

Neither product in first two “Perforated Metal” paragraphs below provide corrosive resistance at perforations. Currently, steel sheet is not galvanized after fabrication, such as after perforating.

* + - * 1. Perforated Metal: Cold-rolled steel sheet, ASTM A1008, or hot-rolled steel sheet, ASTM A1011, commercial steel Type B, [0.060 inch] thick, **[with 1/4-inch holes 3/8 inch o.c. in staggered rows] [with 1/8-by-1-inch round end slotted holes in staggered rows]**.
				2. Perforated Metal: Galvanized-steel sheet, ASTM A653, G90 coating, commercial steel Type B, **[0.064 inch]** thick, **[with 1/4-inch holes 3/8 inch o.c. in staggered rows]**.
				3. Perforated Metal: Aluminum sheet, ASTM B209, **[0.125 inch] [0.063 inch]** thick, **[with 1/4-inch holes 3/8 inch o.c. in staggered rows]**.

Retain one of or both “Woven-Wire Mesh” paragraphs below. First paragraph is for steel material; second paragraph is for aluminum material. Revise pattern and wire size in both paragraphs if required.

* + - * 1. 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.
				2. Woven-Wire Mesh: Intermediate-crimp, **[diamond] [square]** pattern, 2-inch woven-wire mesh, made from 0.162-inch- diameter, aluminum wire complying with ASTM B211, Alloy 6061-T94.
				3. Welded-Wire Mesh: **[Diamond] [Square]** pattern, 2-inch welded-wire mesh, made from 0.236-inch nominal-diameter steel wire complying with ASTM A510.

Use the Article below for DOCCS projects where there is inmate contact.

* + - * 1. Welded-Wire Mesh: Intermediate-crimp or lock-crimp as indicated, Square pattern, 2-inch welded-wire mesh, made from 0.375-inch nominal-diameter steel wire complying with ASTM A510.

Use the Article below for DOCCS projects where non-climbing mesh is required and there is inmate contact.

* + - * 1. Welded-Wire Mesh: Intermediate-crimp or lock-crimp as indicated, 0.50-inch by 3-inch by 0.128 (10 ga) welded-wire mesh, complying with ASTM A510.
				2. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
				3. Aluminum Castings: ASTM B26, Alloy 443.0-F.
				4. Bronze Extrusions: ASTM B455, Alloy UNS No. C38500 (extruded architectural bronze).
				5. Bronze Castings: ASTM B584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).
				6. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).
				7. Cast Iron: Either gray iron, ASTM A48, or malleable iron, ASTM A47, unless otherwise indicated.
			1. ABRASIVE NOSINGS
				1. 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.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

American Safety Tread Co., Inc.

Balco; a CSW Industrials Company.

Safe-T-Metal Company, Inc.

Approved equivalent.

“Configuration” Subparagraph below is typical description; delete if configurations are indicated on Drawings.

Configuration: Cross-hatched units, **[3 inches] [4 inches]** wide without lip.

* + - * 1. 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.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

American Safety Tread Co., Inc.

Balco; a CSW Industrials Company.

Nystrom.

Approved equivalent.

Retain one of first two subparagraphs below.

Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.

Provide solid-abrasive units without ribs.

Two “Nosings” subparagraphs below are typical descriptions; delete both if configurations are indicated on Drawings.

Nosings: Square-back units, **[1-7/8 inches] [3 inches] [4 inches]** wide, without lip.

Nosings: Two-piece units, 3 inches wide, with subchannel for casting into concrete.

* + - * 1. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
				2. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.
				3. Apply clear lacquer to concealed surfaces of extruded units set into concrete.
			1. FASTENERS
				1. 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] [Type 316 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5]** where built into exterior walls.

Select fasteners for type, grade, and class required.

Retain “Fasteners for Anchoring Railings and Guards to Other Construction” Paragraph below if railings and guards are specified in this Section.

* + - * 1. 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**[ and capable of withstanding design loads]**.
				2. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

Structural Steel Connections: ASTM F3125, Grade A325 Type 1.

* + - * 1. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for **[exterior stairs] [stairs indicated to be galvanized] [stairs indicated to be shop primed with zinc-rich primer]**.

If retaining “Post-Installed Anchors” Paragraph below, indicate loads on Drawings and verify safety factors with Project’s structural engineer.

* + - * 1. 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 E488, conducted by a qualified independent testing agency.

Material in “Material for Interior Locations” Subparagraph below protects against corrosion in an indoor atmosphere.

Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.

Alloy Group 1 (A1) refers to Type 304 and similar alloys, and Alloy Group 2 (A4) refers to Type 316 and similar alloys.

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

Material for Exterior Locations: Alloy Group 2 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

* + - 1. MISCELLANEOUS MATERIALS
				1. Handrail Wall Brackets: **[Cast nickel-silver,] [Cast aluminum,] [Cast bronze,] [Cast stainless steel,] center of rail [2-1/2 inches] [3-1/8 inches]** from face of wall.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Blum, Julius & Co., Inc.

The Wagner Companies.

Approved equivalent.

* + - * 1. Welding Electrodes: Comply with AWS requirements and welding procedure specification.

Retain one or more of "Shop Primers," "Universal Shop Primer," "Zinc-Rich Primer," and "Shop Primer for Galvanized Steel" paragraphs below, or insert other requirements. "Universal Shop Primer" Paragraph specifies a typical primer for painted finishes that provides minimum protection to steel. "Zinc-Rich Primer" and "Shop Primer for Galvanized Steel" paragraphs specify primers suitable for high-performance coating.

* + - * 1. Shop Primers: Provide primers that comply with **[Section 099123 "Interior Painting."] [Section 099600 "High-Performance Coatings."]**
				2. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

In "Zinc-Rich Primer" Paragraph below, Type II, Level 2 is common.

* + - * 1. Zinc-Rich Primer: Comply with SSPC-Paint 20, **[Type I-A] [Type I-B] [Type I-C] [Type II]**, Level **[1] [2] [3]**, and compatible with topcoat.
				2. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish system indicated.
				3. 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.
				4. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.
				5. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for [interior] [exterior] use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

Retain "Prefilled Concrete Treads" Paragraph below if required. Verify availability with manufacturers.

* + - * 1. Prefilled Concrete Treads:

Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with minimum 28-day compressive strength of 3000 psi and maximum aggregate size of 1/2 inch unless otherwise indicated.

Delete or revise "Nonslip-Aggregate Concrete Finish" Subparagraph below if another finish is required or if concrete fill is to be covered with resilient stair treads.

Nonslip-Aggregate Concrete Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.

Plain Steel Welded-Wire Reinforcement: ASTM A1064, **[steel,] [galvanized steel,]** 6 by 6 inches, W1.4 by W1.4, unless otherwise indicated on Drawings.

Reinforcement Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening welded-wire reinforcement in place.

Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete.

* + - * 1. For galvanized reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.
			1. PRECAST CONCRETE TREADS
				1. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 5000 psi and a total air content of not less than 4 percent or more than 6 percent.
				2. Reinforcement: Galvanized, welded-wire reinforcement, 2 by 2 inches by 0.062-inch- diameter steel wire; comply with ASTM A1064, except for minimum wire size.
			2. PRECAST TERRAZZO TREADS
				1. Precast Terrazzo Stair Treads: Epoxy terrazzo units cast in maximum lengths possible. Comply with manufacturer's written instructions for fabricating precast terrazzo units in sizes and profiles indicated.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Wausau Tile Inc.

Approved equivalent

Epoxy Resin Matrix: Manufacturer's standard recommended for use indicated.

Aggregates: Comply with NTMA gradation standards for mix indicated and containing no deleterious or foreign matter.

Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C131.

24-Hour Absorption Rate: Less than 0.75 percent.

Dust Content: Less than 1.0 percent by weight.

Reinforcement: ASTM A615, Grade 60 bars, as required by unit size, profile, and thickness.

Abrasive Inserts: 1/2-inch- wide, silicon carbon/epoxy mixture.

Provide three inserts, 1/2 inch apart, with first insert located 1 inch from nosing at adjacent stair riser locations.

Color: As selected by Director’s Representative from manufacturer's standard color selections.

Finish: Honed.

Surface Sealer: Slip- and stain-resistant, penetrating sealer that is chemically neutral with pH factor between 7 and 8; does not affect color or physical properties of terrazzo type indicated; is recommend by sealer manufacturer for use with specified terrazzo; and complies with NTMA guide specification for terrazzo type applicable for this Project.

* + - 1. EPOXY-RESIN-FILLED TREADS
				1. Epoxy-Resin-Filled Treads: 3/8-inch- thick, epoxy resin with 8000-psi compressive strength; set on steel subtread.

Color: As selected by Director’s Representative from manufacturer's standard color selections.

* + - 1. FABRICATION, GENERAL
				1. Provide complete stair assemblies, including metal framing, hangers, struts,**[ railings and guards,]** clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

Join components by welding or bolting unless otherwise indicated.

Use connections that maintain structural value of joined pieces.

* + - * 1. Assemble stairs**[, railings, and guards]** in shop to greatest extent possible.

Disassemble units only as necessary for shipping and handling limitations.

Clearly mark units for reassembly and coordinated installation.

* + - * 1. Cut, drill, and punch metals cleanly and accurately.

Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.

Remove sharp or rough areas on exposed surfaces.

* + - * 1. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
				2. Form exposed work with accurate angles and surfaces and straight edges.
				3. Weld connections to comply with the following:

Comply with AWS requirements and approved welding procedure specifications.

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

Delete first subparagraph below if appearance is not important or if economy is more important.

Weld exposed corners and seams continuously unless otherwise indicated.

At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for **[Finish #1 - No evidence of welded joint] [Finish #2 - Completely sanded joint with some undercutting and pinholes okay] [Finish # 3 - Partially dressed weld with spatter removed] [Finish # 4 - Good quality, uniform undressed weld with minimal splatter]**.

* + - * 1. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

On DOCCS projects delete the first option below and retain the second option.

Where exposed fasteners are required, use **[Phillips flat-head (countersunk)][Security Torx style fastener head ]** screws or bolts unless otherwise indicated.

Locate joints where least conspicuous.

Fabricate joints that will be exposed to weather in a manner to exclude water.

Provide weep holes where water may accumulate internally.

* + - 1. FABRICATION OF STEEL-FRAMED STAIRS

NAAMM standard in "NAAMM Stair Standard" Paragraph below includes only minimal requirements. First option is typically a more elaborate enclosed or open stair; second option is typical enclosed stair (welds are required to be smooth); third option is for an economical enclosed stair. This Section does not include the fourth category of stair classified by NAAMM AMP 500 as "Industrial Class," which is a further step below "Service Class" in appearance. This class of stairs is specified in Section 055116 "Metal Floor Plate Stairs" and Section 055119 "Metal Grating Stairs."

* + - * 1. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for **[Architectural] [Commercial] [Service]** Class, unless more stringent requirements are indicated.
				2. Stair Framing:

Steel plate stringers are less expensive than channels or rectangular tubes, except for longer spans, and allow railing posts to be welded to face of stringer. Allowing plates, channels, or rectangular tubes gives fabricator maximum flexibility.

Fabricate stringers **[of steel plates] [or] [steel channels] [or] [steel rectangular tubes] [as indicated on Drawings]**.

Stringer Size: **[As required to comply with "Performance Requirements" Article] [As indicated on Drawings]**.

Provide closures for exposed ends of channel and rectangular tube stringers.

Finish: **[Shop primed] [Painted] [Galvanized]**.

Construct platforms of steel **[plate] [or] [channel] [or] [rectangular tube]** headers and miscellaneous framing members as **[required to comply with "Performance Requirements" Article] [indicated on Drawings]**.

Provide closures for exposed ends of channel and rectangular tube framing.

Finish: **[Shop primed] [Painted] [Galvanized]**.

Weld**[ or bolt]** stringers to headers; weld**[ or bolt]** framing members to stringers and headers.**[ If using bolts, fabricate and join so bolts are not exposed on finished surfaces.]**

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 do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.

Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

Retain "Metal Pan Stairs" Paragraph below if concrete-filled, epoxy-resin-filled, or precast concrete tread metal pan stairs are required. Subtreads are sheet metal pans that are filled to form the treads; subplatforms are sheet metal decking that supports the concrete fill for landings.

* + - * 1. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.

Retain first subparagraph below for exterior stairs. Revise to included interior stairs when applicable.

Fabricate treads and landing subplatforms of exterior stairs so finished walking surfaces slope to drain.

Retain first option in first "Steel Sheet" Subparagraph below for best appearance. Retain second option if appearance is less important than cost.

Steel Sheet: Uncoated, **[cold] [hot]**-rolled steel sheet**[ unless otherwise indicated]**.

If both uncoated and galvanized pans are required, retain option in "Steel Sheet" Subparagraph below and indicate locations on Drawings.

Steel Sheet: Galvanized-steel sheet**[, where indicated]**.

Retain first subparagraph below for best appearance.

Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.

Retain first subparagraph below and delete last subparagraph above if appearance is less important than cost. Below also allows risers and subtreads to be replaced if damaged during shipment or erection.

Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.

Delete first subparagraph below if using cast or extruded nosings or precast or epoxy-resin-filled treads.

Shape metal pans to include nosing integral with riser.

Delete first subparagraph below if no abrasive nosings or if nosings are installed at Project site.

Attach abrasive nosings to risers.

Delete first subparagraph below if not permitted or revise if required.

At Contractor's option, provide stair assemblies with metal pan subtreads filled with reinforced concrete during fabrication.

Treads in subparagraphs below are alternatives to concrete-filled treads.

Provide epoxy-resin-filled treads, reinforced with glass fibers, with non-slip-concrete aggregate finish to tread surface.

Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

Subplatforms are usually made from corrugated metal unless smooth soffit construction is specified. Platform framing will still project below subplatform with smooth soffit construction. If a finished soffit is required, delete "Smooth Soffit Construction" Subparagraph below and include a gypsum board or plaster soffit. Revise if only applicable to selected metal stairs and if locations are indicated on Drawings.

Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

Stairs in "Abrasive-Coating-Finished, Formed-Metal Stairs" Paragraph below are noisy because the coating is thin and the steel sheet treads act similar to drum heads.

* + - * 1. Abrasive-Coating-Finished, Formed-Metal Stairs: Form risers, treads, and platforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.097 inch (12 ga).

Steel Sheet: Uncoated, hot-rolled steel sheet unless otherwise indicated.

Directly weld risers and treads to stringers; locate welds on underside of stairs.

Provide platforms of configuration indicated or, if not indicated, the same as treads. Weld platforms to platform framing.

Finish tread and platform surfaces with manufacturer's standard epoxy-bonded abrasive finish.

* + - 1. FABRICATION OF STAIR RAILINGS AND GUARDS

Retain first paragraph below and delete remainder of this article if Section 055213 specifies railings and guards for metal pan stairs.

* + - * 1. Comply with applicable requirements in **[Section 055213 "Pipe and Tube Railings."]**
				2. 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.

Rails and Posts: Minimum 1/4-inch wall thickness **[1-5/8-inch- diameter] [1-1/2-inch- square]** top and bottom rails and 1-1/2-inch- square posts.

Retain one infill configuration from first five subparagraphs below or revise depending on style of railing and guards used and code requirements. See NYSBC for exceptions to passage of 4-inch diameter sphere requirement. Delete all if configuration is indicated on Drawings.

Picket Infill: **[1/2-inch-] [3/4-inch-] [round] [square]** pickets spaced to prohibit the passage of a 4-inch diameter sphere.

Expanded-Metal Infill: Expanded-metal panels edged with U-shaped channels made from steel sheet and not less than 0.043 inch thick. Orient expanded metal with long dimension of diamonds **[parallel to top rail] [perpendicular to top rail] [vertical]**.

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 thick. Orient perforated metal with pattern **[parallel to top rail] [perpendicular to top rail] [horizontal] [vertical] [as indicated on Drawings]**.

Coordinate selection in "Mesh Infill" Subparagraph below with retained wire mesh pattern.

Mesh Infill: **[Woven] [Welded]**-wire mesh crimped 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]**.

The NYSBC allows configurations in "Intermediate Rails Infill" Subparagraph below only for certain occupancies and applications. Verify required rail spacing before retaining.

Intermediate Rails Infill: **[1-5/8-inch- diameter] [1-1/2-inch- square] intermediate rails spaced less than [12 inches] [21 inches]** clear.

Coordinate paragraph below with applicable DOCCS standards on DOCCS projects in areas of inmate contact.

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.

* + - * 1. Welded Connections: Fabricate railings and guards with welded connections.

Fabricate connections that are exposed to weather in a manner that excludes water.

Provide weep holes where water may accumulate internally.

Cope components at connections to provide close fit, or use fittings designed for this purpose.

Weld all around at connections, including at fittings.

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove flux immediately.

Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for **[Finish #1 - No evidence of a welded joint] [Finish #2 - Completely sanded joint, some undercutting and pinholes are okay] [Finish #3 - Partially dressed weld with spatter removed] [Finish #4 - Good quality, uniform undressed weld with minimal splatter]** as shown in NAAMM AMP 521.

* + - * 1. Form changes in direction of railings and guards as follows:

Retain one of five subparagraphs below.

As detailed.

Retain one of first three subparagraphs below if bending is used. First subparagraph allows fabricator to choose radius of bends. Second is for flush (zero-radius) bends. Third is for radii that are indicated on Drawings.

By bending**[ or by inserting prefabricated elbow fittings]**.

By flush bends**[ or by inserting prefabricated flush-elbow fittings]**.

By radius bends of radius indicated**[ or by inserting prefabricated elbow fittings of radius indicated]**.

Retain subparagraph and one of three options below if bending is not used. First option allows fabricator to choose radius of fittings. Second is for flush (zero-radius) fittings. Third is for radii that are indicated on Drawings.

By inserting prefabricated **[elbow fittings] [flush-elbow fittings] [elbow fittings of radius indicated]**.

Retain first paragraph below unless all bends are made with standard elbow fittings.

* + - * 1. For changes in direction made by bending, use 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.
				2. Close exposed ends of railing and guard members with prefabricated end fittings.
				3. 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 or less.

* + - * 1. Connect posts to stair framing by direct welding unless otherwise indicated.
				2. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.

Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

Delete inapplicable requirements in subparagraphs below or revise to suit Project.

For galvanized railings and guards, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.

For nongalvanized railings and guards, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

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.

Retain "Fillers" Paragraph below if railings are supported from plaster or gypsum board walls.

* + - * 1. 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.

Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

* + - 1. FINISHES
				1. Finish metal stairs after assembly.
				2. 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.

Retain first subparagraph below if galvanized items are painted.

Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.

Generally, retain subparagraph below for railings and guards hot-dip galvanized after fabrication.

Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

* + - * 1. Preparation for Shop Priming: Prepare uncoated, ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
				2. 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. EXECUTION
	* + 1. EXAMINATION
				1. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.

For wall-mounted railings, verify locations of concealed reinforcement within gypsum board and plaster assemblies.

* + - * 1. Proceed with installation only after unsatisfactory conditions have been corrected.
			1. INSTALLATION OF METAL PAN STAIRS
				1. 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.

* + - * 1. 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.

Delete first paragraph below if other fastening methods are acceptable.

* + - * 1. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

Retain subparagraph below where stair vertical supports are supported on concrete or masonry.

Grouted Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates.

Clean bottom surface of plates.

Revise requirements in subparagraphs below to suit Project.

Set plates for structural members on wedges, shims, or setting nuts.

Tighten anchor bolts after supported members have been positioned and plumbed.

Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.

Promptly pack grout solidly between bearing surfaces and plates so no voids remain.

Neatly finish exposed surfaces; protect grout and allow to cure.

Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

* + - * 1. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
				2. 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.

Comply with requirements for welding in "Fabrication, General" Article.

* + - * 1. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."

Install abrasive nosings with anchors fully embedded in concrete.

Center nosings on tread width.

* + - * 1. Install precast concrete treads with adhesive supplied by manufacturer.
				2. Install precast terrazzo treads according to manufacturer's written instructions.
			1. INSTALLATION OF RAILINGS AND GUARDS

Retain this article for steel railings and guards when specified in this Section.

* + - * 1. Adjust railing and guard systems before anchoring to ensure matching alignment at abutting joints with tight, hairline joints.

Space posts at spacing indicated or, if not indicated, as required by design loads.

Plumb posts in each direction, within a tolerance of 1/16 inch in 3 feet.

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.

Secure posts, rail ends, and guard ends to building construction as follows:

Anchor posts to steel by **[welding] [or] [bolting]** to steel supporting members.

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.

* + - * 1. Install railing gates level, plumb, and secure for full opening without interference.

Attach hardware using tamper-resistant or concealed means.

Adjust hardware for smooth operation.

* + - * 1. Attach handrails to wall with wall brackets.

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.][ follows:]**

For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

For hollow masonry anchorage, use toggle bolts.

For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.

Retain one of two subparagraphs below if using steel studs.

For steel-framed partitions, use hanger or lag bolts set into **[fire-retardant-treated ]**wood backing between studs. Coordinate with stud installation to locate backing members.

For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

* + - 1. REPAIR

Retain first "Touchup Painting" Paragraph below if touchup painting is included in this Section.

* + - * 1. 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.

Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

Retain "Touchup Painting" Paragraph below if touchup painting is specified in Section 099123 "Interior Painting."

* + - * 1. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in **[Section 099123 "Interior Painting."] [Section 099600 "High-Performance Coatings."]**
				2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

END OF SECTION 055113