SECTION 055000 - METAL FABRICATIONS

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. SUMMARY
				1. Section Includes:

Several items in list below are not described in detail in Part 2. These items are covered by material requirements and articles such as "Miscellaneous Framing and Supports," but they must be indicated in detail on Drawings.

Steel framing and supports for ceiling-hung toilet compartments.

Steel framing and supports for operable partitions.

Steel framing and supports for overhead **[doors] [and] [grilles]**.

Retain first subparagraph below if steel angles or other shapes are used to support countertops between cheek walls.

Steel framing and supports for countertops.

Steel framing and supports for **[healthcare] [laboratory]** equipment.

Steel tube reinforcement for low partitions.

Steel framing and supports for mechanical and electrical equipment.

Steel framing and supports for applications where framing and supports are not specified in other Sections.

Elevator machine beams**[, hoist beams,] [and] [divider beams]**.

Steel shapes for supporting elevator door sills.

Steel girders for supporting wood frame construction.

Steel pipe columns for supporting wood frame construction.

Slotted channel framing.

Retain first subparagraph below if prefabricated columns are not specified in Section 051200 "Structural Steel Framing."

Prefabricated building columns.

Shelf angles.

Retain first subparagraph below for elevator pit ladders and other metal ladders.

Metal ladders.

Ladder safety cages.

Alternating tread devices.

Metal **[ships' ladders] [and] [pipe crossovers]**.

Metal floor plate**[ and supports]**.

Elevator pit sump covers.

Structural-steel door frames.

Miscellaneous steel trim including **[steel angle corner guards] [steel edgings] [and] [loading-dock edge angles]**.

Vehicular barrier cable systems.

**[Pipe] [Downspout]** guards.

Delete first subparagraph below if nosings and treads are specified with stairs and if cast-metal thresholds are specified with hardware.

Abrasive metal **[nosings] [treads] [and] [thresholds]**.

Cast-iron wheel guards.

Metal downspout boots.

Retain subparagraph below if bearing and leveling plates are not specified with items that they support.

Loose bearing and leveling plates for applications where they are not specified in other Sections.

* + - * 1. Products furnished, but not installed, under this Section include the following:

Loose steel lintels.

Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

Retain subparagraph below if weld plates and angles are not specified in same Section as work that is welded to them.

Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

* + - * 1. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.

Section 051200 "Structural Steel Framing" for steel framing, supports, elevator machine beams, hoist beams, divider beams, door frames, and other steel items attached to the structural-steel framing.

Section 077200 "Roof Accessories" for manufactured metal roof walkways and metal roof stairs.

Section 329300 "Plants" for tree grates.

* + - 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 metal fabrications that are anchored to or that receive other work. 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.
			2. 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 the following:

Nonslip aggregates and nonslip-aggregate surface finishes.

Fasteners.

Shop primers.

Shrinkage-resisting grout.

Prefabricated building columns.

Slotted channel framing.

Manufactured metal ladders.

Ladder safety cages.

Alternating tread devices.

Metal **[ships' ladders] [and] [pipe crossovers]**.

Metal bollards.

Vehicular barrier cable systems.

**[Pipe] [Downspout]** guards.

Abrasive metal **[nosings] [treads] [and] [thresholds]**.

Cast-iron wheel guards.

Metal downspout boots.

USE PARAGRAPH BELOW WITH EPD REQUIREMENT WHEN PROJECT ESTIMATE IS $1M OR MORE.

* + - * 1. Submit an Environmental Product Declaration (EPD) from the manufacturer for structural steel and slotted channel framing within this specification section, if available. A statement of the contractor’s good faith effort to obtain the EPD shall be provided if not available.

Manufacturer-provided EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 *Environmental labels and declarations*, ISO 14044 *Environmental management – Life cycle assessment*, and ISO 21930 *Core rules for environmental product declarations of construction products and services.*

* + - * 1. Shop Drawings: Show fabrication and installation details.**[ Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.]** Provide Shop Drawings for the following:

Steel framing and supports for ceiling-hung toilet compartments.

Steel framing and supports for operable partitions.

Steel framing and supports for overhead **[doors] [and] [grilles]**.

Steel framing and supports for countertops.

Steel tube reinforcement for low partitions.

Steel framing and supports for mechanical and electrical equipment.

Steel framing and supports for applications where framing and supports are not specified in other Sections.

Elevator machine beams**[, hoist beams,] [and] [divider beams]**.

Steel shapes for supporting elevator door sills.

Steel girders for supporting wood frame construction.

Steel pipe columns for supporting wood frame construction.

Prefabricated building columns.

Shelf angles.

Metal ladders.

Ladder safety cages.

Alternating tread devices.

Metal **[ships' ladders] [and] [pipe crossovers]**.

Metal floor plate**[ and supports]**.

Elevator pit sump covers.

Structural-steel door frames.

Miscellaneous steel trim including **[steel angle corner guards] [steel edgings] [and] [loading-dock edge angles]**.

Metal bollards.

Loose steel lintels.

Vehicular barrier cable systems.

Retain "Samples for Verification" Paragraph below for two-stage Samples.

* + - * 1. Samples for Verification: For each type and finish of extruded **[nosing] [and] [tread]**.

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

* + - * 1. Delegated-Design Submittal: For **[ladders] [alternating tread devices] [cold-formed slotted channel ] [and] [vehicular barrier cable systems] <add fabrication>**, including analysis and design data signed and sealed by the qualified professional engineer in New York State responsible for their preparation.

Coordinate "Qualification Data" Paragraph below 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 New York State.

Usually, delete "Mill Certificates" Paragraph below unless Type 316L stainless steel is required. Type 316L is more expensive than Type 304 and submittal of mill certificates is one of the few ways of verifying that Type 316L is actually being furnished.

* + - * 1. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.

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

* + - * 1. Welding certificates.

Retain "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.
				2. Research Reports: For post-installed anchors.

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 with General Conditions Article 25.4 Domestic Steel.

* + - 1. QUALITY ASSURANCE

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 in accordance with the following:

AWS D1.1, "Structural Welding Code - Steel."

AWS D1.2, "Structural Welding Code - Aluminum."

AWS D1.6, "Structural Welding Code - Stainless Steel."

For metals other than the ones listed above provide relevant welding qualifications and 5 years minimum relevant experience.

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. FIELD CONDITIONS

If possible, design metal fabrications so that they do not have to fit other construction and delete this article.

* + - * 1. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.
1. PRODUCTS

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 in New York State, to design **[ladders] [alternating tread devices]** **[cold-formed slotted channel][and] [vehicular barrier cable systems] <add fabrication>**.

Generally, retain "Structural Performance of Aluminum Ladders" Paragraph below for aluminum ladders unless Project's structural engineer is required to design building components. Delete if sizes of ladder components are specified or indicated on Drawings.

* + - * 1. Structural Performance of Aluminum Ladders: Ladders**[, including landings,]** shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3 and applicable OSHA standards.
				2. Structural Performance of Alternating Tread Devices: Alternating tread devices shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

Uniform Load: 40 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.

Alternating Tread Device Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.

Comply with applicable railing loadings in Section 055213 "Pipe and Tube Railings."

Revise options in "Vehicular Barrier Cable Systems" Paragraph below to suit Project.

* + - * 1. Vehicular Barrier Cable Systems: Design vehicular barrier cable systems to resist a single 6000-lbf service load and 10,000-lbf ultimate load applied horizontally in any direction to the cable system, with anchorages or attachments capable of transferring this load to the structure. Limit deflection to 18 inches Design shall assume loads are applied at a height of 18 inches above the floor or ramp surface on an area not to exceed 1 sq. ft..

"Thermal Movements" Paragraph below is for exterior metalwork; revise to suit Project conditions and metalwork exposure.

* + - * 1. 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.

Differential values in "Temperature Change" Subparagraph below (for aluminum in particular) are suitable for most of the United States.

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

* + - 1. METALS
				1. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

Stainless Steel, General: Provide Type 316L for all exterior applications and where indicated.

* + - * 1. Structural Steel Plates, Shapes, and Bars: ASTM A36.
				2. Wide Flange Structural Steel Shapes: ASTM A992 , Grade 50.

Usually, retain Type 304 in "Stainless Steel Sheet, Strip, and Plate" and "Stainless Steel Bars and Shapes" paragraphs below; Type 316L is for corrosive environments.

* + - * 1. Stainless Steel Sheet, Strip, and Plate: ASTM A240 or ASTM A666, **[Type 304] [Type 316L]**.
				2. Stainless Steel Bars and Shapes: ASTM A276, **[Type 304] [Type 316L]**.
				3. Stainless Steel Tubing: ASTM A554, **[Type 304] [Type 316L]**

"Rolled-Steel Floor Plate" Paragraph below specifies yield strength of 30 ksi; revise if higher strength is required.

* + - * 1. Rolled-Steel Floor Plate: ASTM A786, rolled from plate complying with ASTM A36 or ASTM A283, Grade C or D.
				2. Rolled-Stainless Steel Floor Plate: ASTM A793.
				3. Abrasive-Surface Floor Plate: Steel plate [with abrasive granules rolled into surface] [or] [with abrasive material metallically bonded to steel].

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

Harsco Industrial IKG, a Division of Harsco Corporation.

W.S. Molnar Company.

Approved equivalent.

Source Limitations: Obtain floor plate from single source from single manufacturer.

Round steel tubing and pipe are sized differently. Pipe is designated by the terms "nominal pipe size (NPS)" in inches or "diameter nominal (DN)" in millimeters, and by "weight" or "schedule number." The NPS is approximately equal to the ID for Schedule 40 (Standard Weight) pipe; the DN is a rounded conversion of the NPS. For other weights, the size is neither OD nor ID because the OD is kept the same for all weights (to allow use of the same pipe fittings) and the ID is varied to provide the required wall thickness. Round tube is designated by OD and wall thickness. Although the size designations are different, only the round tube sizes that match pipe sizes are generally available.

* + - * 1. Structural Steel Tubing: ASTM A500, cold-formed steel tubing.
				2. Structural Steel Pipe: ASTM A53, Standard Weight (Schedule 40) unless otherwise indicated.
				3. Zinc-Coated Steel Wire Rope: ASTM A741.

Wire Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

* + - * 1. Stainless Steel Wire Rope: Wire rope manufactured from stainless steel wire complying with ASTM A492, Type 316.

Wire Rope Fittings: Stainless steel connectors, Type 316, with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

* + - * 1. Steel Prestressing Strand: ASTM A416, Grade 270, low-relaxation, seven-wire, with 0.9-lb/sq. ft. zinc coating.

Steel Prestressing Strand Fittings: Hot-dip galvanized-steel anchors and connectors with capability to sustain, without failure, a load equal to minimum breaking strength of steel prestressing strand with which they are used.

"Slotted Channel Framing" Paragraph below describes typical component of metal channel framing systems such as that manufactured by Unistrut.

* + - * 1. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

Size of Channels: **[1-5/8 by 1-5/8 inches] [As indicated] <Insert size>**.

Metal thicknesses in "Material" subparagraphs below are 12, 14, and 16 gauge, respectively.

Material: Galvanized steel, ASTM A653, **[commercial steel, Type B] [structural steel, Grade 33]**, with G90 coating; **[0.108-inch] [0.079-inch] [0.064-inch]** nominal thickness.

Material: Cold-rolled steel, ASTM A1008, **[commercial steel, Type B] [structural steel, Grade 33]; [0.0966-inch] [0.0677-inch] [0.0528-inch]** minimum thickness; **[unfinished] [coated with rust-inhibitive, baked-on, acrylic enamel] [hot-dip galvanized after fabrication]**.

* + - * 1. Cast Iron: Either gray iron, ASTM A48, or malleable iron, ASTM A47, unless otherwise indicated.
				2. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.
				3. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
				4. Aluminum-Alloy Rolled Tread Plate: ASTM B632, Alloy 6061-T6.
				5. Aluminum Castings: ASTM B26, Alloy 443.0-F.
				6. Bronze Extrusions: ASTM B455, Alloy UNS No. C38500 (extruded architectural bronze).
				7. Bronze Castings: ASTM B584, Alloy UNS No. C83600 (leaded red brass) or UNS No. C84400 (leaded semired brass).
				8. Nickel Silver Extrusions: ASTM B151, Alloy UNS No. C74500.
				9. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).
			1. FASTENERS

Usually, retain "Type 304" option in "General" Paragraph below; retain "Type 316" option if required for corrosive environments.

* + - * 1. General: Unless otherwise indicated, provide **[Type 304] [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, at exterior walls. Select fasteners for type, grade, and class required.

Provide stainless steel fasteners for fastening **[aluminum] [stainless steel] [or] [nickel silver]**.

Provide bronze fasteners for fastening bronze.

Retain the paragraph below for DOCCS projects

Provide security nylon lock nuts and/or thread-locker fluid on nuts accessible to inmates.

* + - * 1. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

"High-Strength Bolts, Nuts, and Washers" Paragraph below specifies weathering steel bolts and nuts.

* + - * 1. High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A325 or A440 as noted, Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.

Retain first option in "Stainless Steel Bolts and Nuts" Paragraph below for use with Type 304; second option for use with Type 316L.

* + - * 1. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy **[Group 1] [Group 2]**.
				2. Anchor Bolts: ASTM F1554, Grade 36 or as noted, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

If retaining "Anchors, General" Paragraph below, indicate loads on Drawings and verify safety factors with Project's structural engineer.

* + - * 1. Anchors, General: 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 in accordance with ASTM E488, conducted by a qualified independent testing agency.
				2. Cast-in-Place Anchors in Concrete: Either threaded, deformed, or headed type unless otherwise indicated; galvanized ferrous castings, either ASTM A47 malleable iron or ASTM A27 cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329.
				3. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

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.

First option in "Material for Exterior Locations and Where Stainless Steel Is Indicated" Subparagraph below refers to Type 304 and similar alloys; second option 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.

Retain "Slotted-Channel Inserts" Paragraph below if required for supporting elevator guide rails or other items on masonry or concrete walls.

* + - * 1. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, depth indicated by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.
			1. MISCELLANEOUS MATERIALS

Retain one or more of "Shop Primers," "Universal Shop Primer," and "Water-Based Primer" paragraphs below. Second paragraph specifies a typical primer for painted finishes that provides minimum protection to steel. Third paragraph specifies a typical primer for high-performance coating. If retaining both second and third paragraph, indicate on Drawings or in a schedule where each is required.

* + - * 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.

* + - * 1. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
				2. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
				3. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
				4. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
				5. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.
				6. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

Retain "Concrete" Paragraph below if required for concrete-filled bollards, footings for bollards, or wheel guards.

* + - * 1. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi.
			1. FABRICATION, GENERAL
				1. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
				2. 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.
				3. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
				4. Form exposed work with accurate angles and surfaces and straight edges.
				5. Weld corners and seams continuously to comply with the following:

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.

At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing**[ and contour of welded surface matches that of adjacent surface]**.

* + - * 1. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
				2. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
				3. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
				4. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
				5. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

First 18 articles below specify fabrication requirements for typical metal fabrications; revise those retained to suit Project and insert others as required. Not all metal fabrications require separate fabrication articles but instead rely on the general requirements above and details indicated on Drawings.

* + - 1. MISCELLANEOUS FRAMING AND SUPPORTS
				1. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
				2. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

Fabricate units from slotted channel framing where indicated.

Furnish inserts for units installed after concrete is placed.

Requirements in first paragraph below are examples only; revise to suit Project. Base support and bracing sizes on written instructions of manufacturer of item being supported. Add similar provisions for other supports, such as for ceiling-hung toilet compartments, overhead doors, etc.

* + - * 1. Fabricate supports for operable partitions from continuous steel beams of sizes **[indicated] [recommended by partition manufacturer]** with attached bearing plates, anchors, and braces as **[indicated] [recommended by partition manufacturer]**. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

Revise first paragraph below if girders are spliced. Add ASTM F3125, Grade A325 or A490 bolts to "Fasteners" Article if required for splicing or for connecting to pipe columns.

* + - * 1. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.

Provide bearing plates welded to beams where indicated.

Drill or punch girders and plates for field-bolted connections where indicated.

Delete subparagraph below if nailers are not used or are fastened with powder-actuated fasteners.

Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches o.c.

Revise first paragraph below if tubing is used. Revise default weld size requirement, or delete and detail welds on Drawings to suit Project.

* + - * 1. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

Unless otherwise indicated, fabricate from Schedule 40 steel pipe.

Unless otherwise indicated, provide 1/2-inch baseplates with four 5/8-inch anchor bolts and 1/4-inch top plates.

Retain one of two paragraphs below if required. If retaining either, indicate applicable items on Drawings.

* + - * 1. Galvanize miscellaneous framing and supports where indicated.
				2. Prime miscellaneous framing and supports with **[zinc-rich primer] [primer specified in Section 099600 "High-Performance Coatings"]** where indicated.
			1. PREFABRICATED BUILDING COLUMNS

Delete this article if prefabricated building columns are specified in Section 051200 "Structural Steel Framing."

* + - * 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Black Rock Column, Inc.

Dean Lally L.P.

Approved equivalent.

* + - * 1. Source Limitations: Obtain prefabricated building column from single source from single manufacturer.
				2. General: Provide prefabricated building columns consisting of load-bearing structural-steel members protected by concrete fireproofing encased in an outer non-load-bearing steel shell. Fabricate connections to comply with details shown or as needed to suit type of structure indicated.
				3. Fire-Resistance Ratings: Provide prefabricated building columns listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for ratings indicated, based on testing in accordance with ASTM E119.

Insert UL design number here or indicate on Drawings if required.

Fire-Resistance Rating: **[4 hours] [3 hours] [2 hours] [As indicated]**.

* + - 1. SHELF ANGLES

Retain this article for angles supported from concrete frame. Angles connected to structural-steel framing are specified in Section 051200 "Structural Steel Framing."

* + - * 1. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

Provide mitered and welded units at corners.

Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

* + - * 1. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
				2. Galvanize**[ and prime]** shelf angles located in exterior walls.
				3. Prime shelf angles located in exterior walls with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**

Retain paragraph below if inserts are not specified in Section 033000 "Cast-in-Place Concrete."

* + - * 1. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.
			1. METAL LADDERS
				1. General:

ANSI A14.3 specifies minimum design requirements for ladders and safety cages.

Comply with ANSI A14.3**[, except for elevator pit ladders]**.

For elevator pit ladders, comply with ASME A17.1/CSA B44.

* + - * 1. Steel Ladders:

Delete first subparagraph below if spacing is indicated on Drawings or if minimum spacing in referenced standards is acceptable. ANSI A14.3 and ASME A17.1/CSA B44 minimum spacing is 16 inches.

Space siderails **[16 inches] [18 inches]** apart unless otherwise indicated.

First option in "Siderails" Subparagraph below is ANSI A14.3 minimum dimension for normal atmospheric exposures; second is minimum for unusual atmospheric exposures.

Siderails: Continuous, **[3/8-by-2-1/2-inch] [1/2-by-2-1/2-inch]** steel flat bars, with eased edges.

First option in "Rungs" Subparagraph below is ANSI A14.3 minimum dimension for normal atmospheric exposures; second is minimum for unusually corrosive atmospheric exposures.

Rungs: **[3/4-inch- diameter] [3/4-inch- square] [1-inch- diameter] [1-inch- square]**, steel bars.

Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.

Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.

Manufacturers of products below claim they wear better than granules set in epoxy-resin adhesive.

Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.

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

Harsco Industrial IKG, a division of Harsco Corporation.

W.S. Molnar Company.

Approved equivalent.

Source Limitations: Obtain nonslip surfaces from single source from single manufacturer.

Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than **[1/2 inch] [3/4 inch]** in least dimension.

Option in first subparagraph below can be deleted if supports are indicated on Drawings. ANSI A14.3 minimum support spacing is 10 feet.

Support each ladder**[ at top and bottom and not more than** 60 inches **o.c.]** with welded or bolted steel brackets.

Galvanize**[ and prime] [exterior ]**ladders, including brackets.

Prime [exterior ]ladders, including brackets and fasteners, with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**

* + - * 1. Aluminum Ladders:

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

Fixfast USA.

O'Keeffe's Inc.

Precision Ladders, LLC.

Approved equivalent.

Source Limitations: Obtain aluminum ladders from single source from single manufacturer.

Delete first subparagraph below if spacing is indicated on Drawings or if minimum spacing in referenced standards is acceptable. ANSI A14.3 and ASME A17.1/CSA B44 minimum spacing is 16 inches.

Space siderails **[16 inches] [18 inches]** apart unless otherwise indicated.

Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches deep, 3/4 inch wide, and 1/8 inch thick.

Rungs: Extruded-aluminum tubes, not less than 3/4 inch deep and not less than 1/8 inch thick, with ribbed tread surfaces.

Fit rungs in centerline of siderails; fasten by welding or with stainless steel fasteners or brackets and aluminum rivets.

Provide platforms as indicated fabricated from **[pressure-locked aluminum bar grating] [or] [extruded-aluminum plank grating]**, supported by extruded-aluminum framing. Limit openings in gratings to no more than **[1/2 inch] [3/4 inch]** in least dimension.

Option in first subparagraph below can be deleted if supports are indicated on Drawings. ANSI A14.3 minimum support spacing is 10 feet.

Support each ladder**[ at top and bottom and not more than 60 inches o.c.]** with welded or bolted aluminum brackets.

Provide minimum 72-inch- high, hinged security door with padlock hasp at foot of ladder to prevent unauthorized ladder use.

* + - 1. LADDER SAFETY CAGES

ANSI A14.3 requires safety cages for ladders longer than 24 feet unless a ladder safety system is provided. OSHA regulations require cages for ladders longer than 20 feet.

* + - * 1. General:

Fabricate ladder safety cages to comply with ANSI A14.3. Assemble by welding or with stainless steel fasteners.

Provide primary hoops at tops and bottoms of cages and spaced not more than 20 feet o.c. Provide secondary intermediate hoops spaced not more than 48 inches o.c. between primary hoops.

Fasten assembled safety cage to ladder rails and adjacent construction by welding or with stainless steel fasteners unless otherwise indicated.

* + - * 1. Steel Ladder Safety Cages:

Primary Hoops: 1/4-by-4-inch flat bar hoops.

Secondary Intermediate Hoops: 1/4-by-2-inch flat bar hoops.

Vertical Bars: 3/16-by-1-1/2-inch flat bars secured to each hoop.

Galvanize**[ and prime]** ladder safety cages, including brackets and fasteners.

Prime ladder safety cages, including brackets and fasteners, with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**

* + - * 1. Aluminum Ladder Safety Cages:

Primary Hoops: 1/4-by-4-inch flat bar hoops.

Secondary Intermediate Hoops: 1/4-by-2-inch flat bar hoops.

Vertical Bars: 1/4-by-2-inch flat bars secured to each hoop.

* + - 1. ALTERNATING TREAD DEVICES
				1. Alternating Tread Devices: Fabricate alternating tread devices of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.

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

Lapeyre Stair Inc.

Precision Ladders, LLC.

Approved equivalent.

First subparagraph below is based on requirements in the NYSBC for alternating tread devices used for access to an unoccupied roof.

Tread depth shall be not less than 5 inches exclusive of nosing or less than 8-1/2 inches including the nosing, tread width shall be not less than 7 inches, and riser height shall be not more than 9-1/2 inches.

First subparagraph below is based on requirements in the NYSBC for alternating tread devices used as an element of a means of egress.

Tread depth shall be not less than 8-1/2 inches exclusive of nosing or less than 10-1/2 inches including the nosing, tread width shall be not less than 7 inches, and riser height shall be not more than 8 inches.

Fabricate from **[steel] [stainless steel] [aluminum]** and assemble by welding or with stainless steel fasteners.

Comply with applicable railing requirements in Section 055213 "Pipe and Tube Railings."

* + - * 1. Galvanize**[ and prime] [exterior ]**steel alternating tread devices, including treads, railings, brackets, and fasteners.
				2. Prime **[exterior ]**steel alternating tread devices, including treads, railings, brackets, and fasteners, with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**
			1. METAL **[SHIPS' LADDERS] [AND] [PIPE CROSSOVERS]**

Verify that use of ships' ladders is acceptable to authorities having jurisdiction before retaining this article. ANSI A14.3 and OSHA regulations discourage use of ships' ladders 60 degrees or steeper. See the Evaluations.

* + - * 1. Provide metal **[ships' ladders] [and] [pipe crossovers]** where indicated. Fabricate of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.

Treads shall be not less than 5 inches exclusive of nosing or less than 8-1/2 inches including the nosing, and riser height shall be not more than 9-1/2 inches.

Fabricate **[ships' ladders] [and] [pipe crossovers]**, including railings from **[steel] [stainless steel] [aluminum]**.

Fabricate treads**[ and platforms]** from **[welded or pressure-locked steel bar] [pressure-locked stainless steel bar] [pressure-locked aluminum bar] [extruded-aluminum plank]** grating. Limit openings in gratings to no more than **[1/2 inch] [3/4 inch]** in least dimension.

Fabricate treads**[ and platforms]** from **[rolled-steel floor] [rolled-stainless steel floor]** **[rolled-aluminum-alloy tread] [abrasive-surface floor]** plate.

Comply with applicable railing requirements in Section 055213 "Pipe and Tube Railings."

* + - * 1. Galvanize**[ and prime] [exterior ]**steel **[ships' ladders] [and] [pipe crossovers]**, including treads, railings, brackets, and fasteners.
				2. Prime **[exterior ]steel [ships' ladders] [and] [pipe crossovers]**, including treads, railings, brackets, and fasteners, with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**
			1. METAL FLOOR PLATE
				1. Fabricate from **[rolled-steel floor] [rolled-stainless steel floor] [rolled-aluminum-alloy tread] [abrasive-surface floor]** plate of thickness indicated below:

Thickness: **[1/8 inch] [3/16 inch] [1/4 inch] [5/16 inch] [3/8 inch] [As indicated]**.

* + - * 1. Provide grating sections where indicated, fabricated from **[welded or pressure-locked steel bar] [pressure-locked stainless steel bar] [pressure-locked aluminum bar] [extruded-aluminum plank]** grating. Limit openings in gratings to no more than **[1/2 inch] [3/4 inch] [1 inch]** in least dimension.
				2. Provide **[steel] [stainless steel] [aluminum]** angle supports as indicated.
				3. Include **[steel] [stainless steel] [aluminum]** angle stiffeners, and fixed and removable sections as indicated.
				4. Provide flush **[steel] [stainless steel] [aluminum]** bar drop handles for lifting removable sections, one at each end of each section.
			1. ELEVATOR PIT SUMP COVERS

Retain one of first two paragraphs below.

* + - * 1. Fabricate from **[1/8-inch] [3/16-inch] [rolled-steel] [abrasive-surface]** floor plate with four 1-inch- diameter holes for water drainage and for lifting.
				2. Fabricate from welded or pressure-locked steel bar grating. Limit openings in gratings to no more than **[1/2 inch] [3/4 inch] [1 inch]** in least dimension.
				3. Provide steel angle supports unless otherwise indicated.
			1. STRUCTURAL-STEEL DOOR FRAMES

Retain this article for structural-steel door frames built into masonry or concrete walls and not attached to structural-steel building frame. Door frames connected to structural-steel framing are specified in Section 051200 "Structural Steel Framing."

* + - * 1. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than 10 inches o.c. Reinforce frames and drill and tap as necessary to accept finish hardware.

Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.

* + - * 1. Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.
				2. Galvanize**[ and prime] [exterior ]**steel frames.
				3. Prime [exterior ]steel frames with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**
			1. MISCELLANEOUS STEEL TRIM
				1. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
				2. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

* + - * 1. Galvanize**[ and prime] [exterior ]**miscellaneous steel trim.
				2. Prime **[exterior ]**miscellaneous steel trim with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**
			1. VEHICULAR BARRIER CABLE SYSTEMS
				1. Vehicular Barrier Cable Systems: Of diameter required by performance requirements, but not less than 1/2-inch- diameter, **[zinc-coated steel wire rope] [stainless steel wire rope] [zinc-coated steel prestressing strand]** with turnbuckles, toggles, machine swage terminals, and other fittings and accessories for securing to structural columns and walls and for tightening barrier cable.
			2. **[PIPE] [DOWNSPOUT]** GUARDS

First paragraph below is an example of pipe or downspout protection for building exteriors, parking garages, and other locations where subject to damage by vehicles.

* + - * 1. Fabricate **[pipe] [downspout]** guards from 3/8-inch- thick by 12-inch- wide, **[steel] [stainless steel, ASTM A480, No. 4 finish]** plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch clearance between pipe and pipe guard. Drill each end for two 3/4-inch anchor bolts.
				2. Galvanize**[ and prime]** steel **[pipe] [downspout]** guards.
				3. Prime steel **[pipe] [downspout]** guards with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**
			1. ABRASIVE METAL **[NOSINGS] [TREADS] [AND] [THRESHOLDS]**
				1. Cast-Metal Units: Cast **[iron] [aluminum] [bronze (leaded red or semired brass)] [nickel silver (leaded nickel bronze)]**, 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.

Source Limitations: Obtain units from single source from single manufacturer.

Six subparagraphs below are examples only; other types and sizes are available. Retain types required and revise to suit Project. Delete all six if configurations are indicated on Drawings.

Nosings: Cross-hatched units, 4 inches wide with **[1/4-inch] [1-inch]** lip, for casting into concrete.

Nosings: Cross-hatched units, 1-1/2 by 1-1/2 inches, for casting into concrete.

Treads: Cross-hatched units, full depth of tread with 3/4-by-3/4-inch nosing, for application over bent plate treads or existing stairs.

Thresholds: Fluted-saddle-type units, 5 inches wide by 1/2 inch high, with tapered edges.

Thresholds: Fluted-interlocking- (hook-strip-) type units, 5 inches wide by 5/8 inch high, with tapered edge.

Thresholds: Plain-stepped- (stop-) type units, 5 inches wide by 1/2 inch high, with 1/2-inch step.

* + - * 1. Extruded Units: **[Aluminum] [Bronze]**, 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.

Source Limitations: Obtain units from single source from single manufacturer.

Retain one of first two subparagraphs below.

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

Provide solid-abrasive-type units without ribs.

Nosings:

First three subparagraphs below are examples only; other types and sizes are available. Retain types required and revise to suit Project. Delete all three if configurations are indicated on Drawings.

Square-back units, **[1-7/8 inches] [3 inches] [4 inches]** wide, for casting into concrete steps.

Beveled-back units, **[3 inches] [4 inches]** wide with 1-3/8-inch lip, for surface mounting on existing stairs.

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

"Treads" Subparagraph below is example only; other types and sizes are available. Retain type required and revise to suit Project. Delete all if configurations are indicated on Drawings.

Treads: **[Square] [Beveled]**-back units, full depth of tread with 1-3/8-inch lip, for application over existing stairs.

Retain one of first two paragraphs below.

* + - * 1. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
				2. Drill for mechanical anchors and countersink. Locate holes not more than 4 inches from ends and not more than 12 inches o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.

Provide two rows of holes for units more than 5 inches wide, with two holes aligned at ends and intermediate holes staggered.

* + - * 1. Apply bituminous paint to concealed surfaces of cast-metal units.
				2. Apply clear lacquer to concealed surfaces of extruded units.
			1. CAST-IRON WHEEL GUARDS
				1. Provide wheel guards made from cast-iron, 3/4-inch- thick, hollow-core construction, of size and shape indicated. Provide holes for countersunk anchor bolts and grouting.
				2. Prime cast-iron wheel guards with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**
			2. METAL DOWNSPOUT BOOTS
				1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

J.R. Hoe & Sons Inc.

Neenah Foundry Company.

Approved equivalent.

* + - * 1. Source Limitations: Obtain downspout boots from single source from single manufacturer.
				2. Provide downspout boots made from cast **[iron] [aluminum]** in heights indicated with inlets of size and shape to suit downspouts. Provide units with flanges and holes for countersunk anchor bolts.

Outlet: **[Vertical, to discharge into pipe] [Horizontal, to discharge into pipe] [At 35 degrees from horizontal, to discharge onto splash block or pavement]**.

* + - * 1. Prime cast-iron downspout boots with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**
			1. LOOSE BEARING AND LEVELING PLATES
				1. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
				2. Galvanize exterior bearing and leveling plates.
				3. Prime interior plates with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**
			2. LOOSE STEEL LINTELS
				1. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

Retain first paragraph below if bearing lengths are not indicated on Drawings or in schedules.

* + - * 1. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches unless otherwise indicated.
				2. Galvanize**[ and prime]** loose steel lintels located in exterior walls.
				3. Prime loose steel lintels located in interior walls with **[zinc-rich primer.] [primer specified in Section 099600 "High-Performance Coatings."]**
			1. STEEL WELD PLATES AND ANGLES
				1. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel anchors for embedding in concrete.
			2. GENERAL FINISH REQUIREMENTS
				1. Finish metal fabrications after assembly.
				2. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.
			3. STEEL AND IRON FINISHES
				1. 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 subparagraph below if galvanized items are painted.

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

* + - * 1. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
				2. Shop prime iron and steel items**[ not indicated to be galvanized]** unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

Delete subparagraph below if specifying only one shop primer.

Shop prime with **[universal shop primer] [primers specified in Section 099123 "Interior Painting"]** unless **[zinc-rich primer is] [primers specified in Section 099600 "High-Performance Coatings" are]** indicated.

* + - * 1. Preparation for Shop Priming: Prepare surfaces to comply with **[SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."] [SSPC-SP 3, "Power Tool Cleaning."] [requirements indicated below:]**

Retain or revise any of five subparagraphs below to suit Project service conditions of installed work. Insert other exposures and preparation requirements where applicable. See SSPC's painting manual.

Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."

Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."

* + - * 1. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

Stripe painting adds cost but helps ensure that hard-to-reach areas, such as crevices, inside corners, and welds, are thoroughly coated and that sharp edges (which are vulnerable to chipping and are where the film may be thinner due to surface tension) receive adequate coverage.

Stripe paint corners, crevices, bolts, welds, and sharp edges.

* + - 1. ALUMINUM FINISHES

Retain finishes in this article to suit Project. If retaining more than one, indicate location of each on Drawings or by inserts. As-fabricated finish is usually referred to as "mill finish."

* + - * 1. As-Fabricated Finish: AA-M12.

Clear anodic finish below is heavy-anodized finish; before specifying, verify availability with manufacturers.

* + - * 1. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.
1. EXECUTION
	* + 1. INSTALLATION, GENERAL
				1. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
				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.
				3. Field Welding: Comply with the following requirements:

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.

At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

* + - * 1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
				2. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
				3. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

Cast Aluminum: Heavy coat of bituminous paint.

Extruded Aluminum: Two coats of clear lacquer.

Retain remaining articles below if applicable to Project. Insert others where needed to specify requirements applicable to a specific item not covered under general installation requirements above. Not all metal fabrications require separate installation articles but instead rely on general requirements above and details indicated on Drawings.

* + - 1. INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS
				1. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
				2. Anchor supports for **[ceiling hung toilet partitions] [operable partitions] [overhead doors] [and] [overhead grilles]** securely to, and rigidly brace from, building structure.
				3. Anchor shelf angles securely to existing construction with **[post-installed anchors] [embedded anchor system] [through bolts]**.
				4. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

* + - * 1. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installation of Bearing and Leveling Plates" Article.

Grout baseplates of columns supporting steel girders after girders are installed and leveled.

* + - 1. INSTALLATION OF PREFABRICATED BUILDING COLUMNS
				1. Install prefabricated building columns to comply with ANSI/AISC 360, "Specifications for Structural Steel Buildings," and with requirements applicable to listing and labeling for fire-resistance rating indicated.
			2. INSTALLATION OF VEHICULAR BARRIER CABLE SYSTEMS

This article is an example only; revise to suit Project.

* + - * 1. Install vehicular barrier cable systems at locations indicated, mounted at heights indicated on Drawings above the parking surface. Anchor **[wire ropes] [steel prestressing strand]** to structural columns and walls and tension to withstand vehicle loading as specified in "Performance Requirements" Article with no cable tensioned less than 3000 lbf. Do not displace supporting components.
			1. INSTALLATION OF PIPE GUARDS

This article is an example only; revise to suit Project or delete and indicate on Drawings.

* + - * 1. Provide pipe guards at exposed vertical pipes in **[parking garage] [at locations indicated on Drawings]** where not protected by curbs or other barriers. Install by bolting to wall or column with expansion anchors. Provide four 3/4-inch bolts at each pipe guard or as indicated. Mount pipe guards with top edge 26 inches above driving surface.
			1. INSTALLATION OF NOSINGS, TREADS, AND THRESHOLDS
				1. Center nosings on tread widths unless otherwise indicated.
				2. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.
				3. Seal thresholds exposed to exterior with elastomeric sealant complying with Section 079200 "Joint Sealants" to provide a watertight installation.
			2. INSTALLATION OF CAST-IRON WHEEL GUARDS
				1. Anchor wheel guards to concrete or masonry construction to comply with manufacturer's written instructions. Fill cores solidly with concrete.
			3. INSTALLATION OF BEARING AND LEVELING PLATES
				1. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
				2. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.
			4. REPAIRS
				1. Touchup Painting:

Retain first subparagraph below if touchup painting is included in this Section. Retain second subparagraph if it is specified in "Exterior Painting" or Section 099123 "Interior Painting." Revise reference if Section 099600 "High-Performance Coatings" is used.

Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded 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.

Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in **[Section 099123 "Interior Painting."]**

* + - * 1. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

END OF SECTION 055000