SECTION 050374 - HISTORIC DECORATIVE METAL REPLICATION

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

1. GENERAL
	* + 1. SUMMARY
				1. Section Includes:

Replication and installation of historic decorative metal items and whole assemblies.

* + - * 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 013591 "Historic Treatment Procedures" for general historic treatment requirements.

Section 050372 "Historic Decorative Metal Repair" for repairing historic decorative metalwork, including replicating components that are part of repair work.

Section 057000 "Decorative Metal" for new decorative metal construction.

* + - 1. ALLOWANCES

Retain this article if products and Work included in this Section are covered by lump-sum, unit-cost, quantity, or testing and inspection allowances.

Quantity allowances require a Schedule of Quantity Allowances coordinated with a Unit-Price Schedule. See "Planning the Work" Article in the Evaluations for a discussion of the bidding method.

* + - * 1. See Section 012100 "Allowances" for description of allowances for replication and installation of historic decorative metal items and whole assemblies.

If using quantity allowances, retain three subparagraphs below or include similar language in Section 012100 "Allowances" to clarify how work covered by quantity allowances is to be authorized.

Perform replication and installation of historic decorative metal items and whole assemblies under quantity allowances and only as authorized. Authorized work includes **[work required by Drawings and the Specifications and] [only]** work as directed in writing by Director’s Representative.

Retain first subparagraph below to suit Project.

Notify Director’s Representative **[weekly] <Insert time interval>** of extent of work performed that is attributable to quantity allowances.

Perform work that exceeds quantity allowances only as authorized by Change Orders.

Paragraph below is an example only; revise to suit Project. Insert additional allowances in accordance with retained types of work and allowances established. If there are multiple drawing designations for types of work, establish separate allowances for each drawing designation.

* + - * 1. Replicating door push plates and pull handles is part of **<Insert name of allowance>**.
			1. UNIT PRICES

Retain this article if products and Work specified in this Section are measured and paid for under the provisions of unit prices.

Retain this article with "Allowances" Article above for unit-price adjustments to quantity allowances.

* + - * 1. See Section 012200 "Cost Computations" for description of unit prices affecting Work of this Section.

Unit prices apply to authorized work covered by **[quantity allowances] [estimated quantities]**.

Unit prices apply to authorized additions to and deletions from the Work as authorized by Change Orders.

* + - 1. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" Paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - * 1. Preinstallation Conference: Conduct conference at **[Project site] <Insert location>**.

Retain one or both subparagraphs below if additional requirements are necessary; include information about conference.

Review minutes of Preliminary Historic Treatment Conference that pertain to replication and installation of historic decorative metal items and whole assemblies.

Review methods and procedures related to replication and installation of historic decorative metal items and whole assemblies including, but not limited to, the following:

Historic treatment specialist's personnel, equipment, and facilities needed to make progress and avoid delays.

Materials, material application, sequencing, tolerances, and required clearances.

Fire-protection plan.

Decorative metal historic treatment program.

Coordination with building occupants.

* + - 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 each type of product.
				5. Shop Drawings:

Include plans, elevations, and sections showing locations and extent of replication work, with enlarged details of replacement parts indicating materials, profiles, methods of attachment, accessory items, and finishes.

Include field-verified dimensions and the following:

Full-size patterns with complete dimensions for new decorative metal items and their jointing, showing relationship of existing items to new items.

Templates and directions for installing anchor bolts and other anchorages.

Identification of each new metal item and component and its location on the structure in annotated plans and elevations.

Provisions for expansion, weep holes, and conduits as required for each location and exposure.

Provisions for sealant joints if required.

**<Insert requirements>**.

Retain "Samples for Initial Selection" or "Samples for Verification" Paragraph below, or both.

* + - * 1. Samples for Initial Selection: For the following:

Each type of decorative metal item and component with applied finishes.

Sealant materials.

Accessories to verify color selection.

* + - * 1. Samples for Verification: Actual sample of finished products for the following products in manufacturer's standard sizes unless otherwise indicated:

Retain and revise subparagraphs below and insert others to suit Project.

Each type of new material to be used for replacing existing or missing decorative metal; 6 inches long in least dimension or whole item.

Retain "Patterns for Casting" Subparagraph and option in "Casting Samples" Subparagraph below for tight control of appearance and size (accommodating shrinkage) of cast components. If retaining "Patterns for Casting" Subparagraph and option in "Casting Samples," consider limiting these requirements to specific, highly visible items. These requirements add to Project time and cost.

Patterns for Casting: Before casting items, submit the actual patterns from which molds will be made for casting. Package and ship to prevent loss or damage, or make patterns available for inspection by Director’s Representative at fabrication plant.

Casting Samples: For castings, provide one of each shape, color, and texture of component, suitable and ready for installation.**[ Make this submittal after acceptance of patterns for casting.]**

Fittings and brackets.

Medallions.

Each type of exposed connection between components. Show method of finishing components at connections.

Each type of exposed finish prepared on metal of the same alloy to be used for the Work of this Section; 6 inches long in least dimension.

Wood Rail: 12 inches long.

Sealant materials.

Accessories: Each type of anchor, accessory, and miscellaneous support in required finishes.

Consider "Qualification Statements" and "Decorative Metal Historic Treatment Program" paragraphs below as they relate to Project goals and importance.

* + - * 1. Qualification Statements: For historic treatment specialist.
				2. Decorative Metal Historic Treatment Program: For replicating historic decorative metal items and whole assemblies.
			1. MAINTENANCE MATERIAL SUBMITTALS
				1. Extra Stock Material: Furnish extra materials to Director’s Representative that match products installed and that are packaged with protective covering for storage and identified with labels describing contents, including material, finish, source, and location on or in building.

Subparagraphs below are examples only; revise to suit Project. If preferred, replace specific number with a percentage of required number of pieces of each element. Elaborate on descriptions if some component types require extra materials but others do not.

Cast-Metal Replications: **[Five] <Insert number>** additional **[castings of each type] [cast grilles of each type] <Insert requirement>**.

Hardware: Furnish **[five] <Insert number>** additional hardware push-plate and pull-handle sets of set number **<Insert set number>**.

Retain "Molds for Castings" Paragraph below if future need for molds can be reasonably expected and Director’s Representative has space and takes responsibility for their storage and protection. Often, cast-metal manufacturer stores molds for long or indefinite periods. Patterns from which molds were made might be useful for display purposes, but they are less useful for fabrication than are molds. If a pattern or patterns are required, revise this article accordingly.

* + - * 1. Molds for Castings: On completion of manufacturing of cast components, deliver one unused mold of each shape and size of component to Project site. Deliver to a location and at a time determined by Director’s Representative, to become property of the State.

Deliver molds carefully packed, protected from dirt, moisture, and breakage so as to arrive in usable, undamaged condition and enable long-term storage and possible future use.

* + - 1. QUALITY ASSURANCE

In "Historic Treatment Specialist Qualifications" Paragraph below, insert additional, specific requirements for demonstrating unique skills of firm and personnel to suit Project. See Section 013591 "Historic Treatment Procedures" for general qualifications of historic treatment specialist.

Retain both options in "Historic Treatment Specialist Qualifications" Paragraph only if historic replications include method of manufacture.

* + - * 1. Historic Treatment Specialist Qualifications: A qualified historic decorative metal fabrication and installation specialist.**[ Repair specialist to be experienced in forge welding.]** Experience**[ in torch or arc welding and]** installing and finishing new decorative metalwork is insufficient experience for historic decorative metal replication work.
				2. Decorative Metal Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for historic treatment work, including each process or phase of replicating decorative metal, related work, and the protection of surrounding materials and Project site.

If materials and methods other than those indicated are proposed for any phase of historic treatment work, add a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project.

* + - 1. MOCKUPS

Retain required mockups in this article; insert others to suit Project. Generally, retain option in first paragraph below because separate mockups may not adequately show blending of new work with existing construction.

* + - * 1. Prepare mockups of historic decorative metal replication and installation processes**[ on existing surfaces]** to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation. Prepare mockups so they are inconspicuous.

Mockups in "Replicated Cut-Out Metal Item," "Replicated Wrought Iron Railing with Wood Handrail," and "Cast-Metal Items" subparagraphs below are examples only.

Replicated Cut-Out Metal Item: **[Two] <Insert number>** cut-out bronze-plate **[wall registers] <Insert item description>**.

Replicated Wrought Iron Railing with Wood Handrail: **[Approximately 4 ft. in length] [Length as indicated on Drawings] <Insert dimension>**.

Retain "Cast-Metal Items" Subparagraph below for custom castings or duplicate replacements. See the Evaluations for discussion on casting duplicates.

Cast-Metal Items: Submit patterns, models, or plaster castings made from existing decorative metal for each replacement casting required.

Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Director’s Representative specifically approves such deviations by Change Order.

* + - 1. DELIVERY, STORAGE, AND HANDLING
				1. Pack, deliver, and store decorative metal items in suitable packs, heavy-duty cartons, or wooden crates; surround with sufficient packing material to ensure that products are not deformed, cracked, or otherwise damaged.
				2. Store decorative metal inside a well-ventilated area, away from uncured concrete and masonry and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.
				3. Protect strippable protective covering on decorative metal from exposure to sunlight and high humidity, except to extent necessary for period of decorative metal installation.
			2. FIELD CONDITIONS

Usually, retain this article; revise to suit Project.

* + - * 1. Weather Limitations: Proceed with replication and installation of historic decorative metal items and whole assemblies only when existing and forecasted weather conditions are within environmental limits set by each manufacturer's written instructions and specified requirements.
1. PRODUCTS
	* + 1. METAL MATERIALS
				1. General: Provide decorative metal materials made of alloys, forms, and types that match existing metals and have the ability to receive finishes matching existing finishes unless otherwise indicated. Exposed-to-view surfaces exhibiting imperfections inconsistent with existing materials are unacceptable.
				2. Source Limitation for Replacement Cast Materials: Obtain castings for replication of decorative metal items and whole assemblies from single source from single manufacturer with resources to provide materials of consistent quality in appearance and physical properties.

Retain required materials in remaining paragraphs below; revise material requirements or insert other materials to suit Project. See the Evaluations for discussion on historic treatment using modern materials. Revise alloy and temper designation to suit structural performance and finish requirements.

* + - * 1. Aluminum: Alloy and temper recommended in writing by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required:

Extruded Bars and Shapes: ASTM B221, Alloy 6063-T6.

Generally, retain "Extruded Structural Pipe and Tubes" or "Drawn General-Purpose Seamless Tubes" Subparagraph below if pipe or tube is required.

Extruded Structural Pipe and Tubes: Alloy 6063-T6.

Drawn General-Purpose Seamless Tubes: ASTM B483, Alloy 6063-T832.

Plate and Sheet: ASTM B209, Alloy 6061-T6.

Die and Hand Forgings: ASTM B247, Alloy 6061-T6.

Castings: ASTM B26, Alloy A356-T6.

Retain "Copper Alloys, Bronze" Paragraph below for bronze look. None of the alloys below are true tin-bronzes. Verify availability and color matching with manufacturers. See the Evaluations.

* + - * 1. Copper Alloys, Bronze: Copper alloy designated below for each form required:

Extruded Shapes: ASTM B455, Alloy UNS No. C38500 (extruded architectural bronze, 57 percent copper and 40 percent zinc).

Plate, Sheet, Strip, and Bars: ASTM B36, Alloy UNS No. C28000 (muntz metal, 60 percent copper and 40 percent zinc).

Seamless Pipe: ASTM B43, Alloy UNS No. C23000 (red brass, 85 percent copper and 15 percent zinc).

Seamless Tubes: ASTM B135, Alloy UNS No. C23000 (red brass, 85 percent copper and 15 percent zinc).

Generally, retain "Composition Bronze Castings" or "Sand Castings" Subparagraph below if required. Verify availability and color matching of other copper-alloy forms with manufacturers. See the Evaluations.

Composition Bronze Castings: ASTM B62, Alloy UNS No. C83600 ("85-5-5-5" is the common trade name; 85 percent copper and 5 percent each of tin, lead, and zinc).

Sand Castings: ASTM B584, Alloy UNS No. C86500 (No. 1 manganese bronze; 58 percent copper, 39 percent zinc, 1 percent manganese, and small amounts of other metals).

Retain "Copper Alloys, Brass" Paragraph below for brassy-yellow color. Verify availability and color matching with manufacturers. See the Evaluations.

* + - * 1. Copper Alloys, Brass: Copper alloy designated below for each form required:

Extruded Shapes: ASTM B249, Alloy UNS No. C36000 (free-cutting brass, 60 percent copper, 36 percent zinc, and small amounts of other metals).

Plate, Sheet, Strip, and Bars: ASTM B36, Alloy UNS No. C26000 (cartridge brass, 70 percent copper and 30 percent zinc).

Seamless Tubes: ASTM B135, Alloy UNS No. C26000 (cartridge brass, 70 percent copper and 30 percent zinc).

Sand Castings: ASTM B584, Alloy UNS No. C85200 (high-copper yellow brass, 72 percent copper, 24 percent zinc, and small amounts of other metals).

* + - * 1. Monel: Nickel-copper alloy designated below for each form required:

Alloy UNS No. N04400 in "Plate, Sheet, and Strip"; "Rod, Bar, and Wire"; "Seamless Tubes"; "Forgings"; and "Sand Castings" subparagraphs below is the Monel metal alloy most used for architectural applications. Monel cannot be extruded; no ASTM standard exists for sand-cast Monel.

Plate, Sheet, and Strip: ASTM B127, Alloy UNS No. N04400.

Rod, Bar, and Wire: ASTM B164, Alloy UNS No. N04400.

Seamless Tubes: ASTM B165, Alloy UNS No. N04400.

Forgings: ASTM B564, Alloy UNS No. N04400.

Sand Castings: Monel alloy matching Alloy UNS No. N04400.

* + - * 1. Nickel Silver: Copper-nickel-zinc alloy designated below for each form required:

Alloy UNS No. C74500 (also termed "65-10") and Alloy UNS No. C75200 (also termed "65-18") in "Extruded Shapes" and "Plate, Sheet, Strip, and Bar" subparagraphs below are commonly available nickel silvers. Verify availability and color matching with manufacturers.

Extruded Shapes: ASTM B151, Alloy **[UNS No. C74500] [UNS No. C75200]**.

Plate, Sheet, Strip, and Bar: ASTM B122, Alloy **[UNS No. C74500] [UNS No. C75200]**.

* + - * 1. Stainless Steel: Grade designated below for each form required:

Indication of size and wall thickness differs for tubing and pipe. For stainless steel tubing, indicate by OD and wall thickness; for pipe, indicate by nominal size and schedule number. Type 304 is generally standard; Type 316 has better corrosion resistance in coastal environments but is less available.

Tubing: ASTM A554, **[Grade MT-304] [Grade MT-316]**.

Pipe: ASTM A312, **[Grade TP304] [Grade TP316]**.

Grades in first option in "Castings" Subparagraph below are used as cast equivalent of Type 304 and Type 302, respectively; grade in second option is used as cast equivalent of Type 316.

Castings: ASTM A743, **[Grade CF8 or CF20] [Grade CF8M]**.

Plate, Sheet, and Strip: ASTM A240 or ASTM A666, **[Type 304] [Type 316]**.

Flat Bar: ASTM A666, **[Type 304] [Type 316]**.

Bars and Shapes: ASTM A276, **[Type 304] [Type 316]**.

* + - * 1. Steel: Standard and grade designated below for each form required:

Tubing: Cold formed, ASTM A500.

Steel Plate, Shapes, and Bars: ASTM A36.

Mild steel product in "Steel Bars" Subparagraph below is a possible substitute for genuine wrought iron; it is frequently used for railings that are similar to historic wrought iron but have lower corrosion resistance.

Steel Bars: Mild steel; ASTM A29, Grade 1010.

Steel Sheet: ASTM A1008, cold-rolled commercial steel sheet; matte finish; suitable for exposed applications.

* + - * 1. Cast Iron: Standard designated below for each type of casting:

Gray-Iron Castings: ASTM A48, Class 30.

Malleable-Iron Castings: ASTM A47, grade as recommended in writing by fabricator for type of use indicated.

Retain first option in "Wrought Iron" Paragraph below for genuine wrought iron; retain second option for pure iron; and retain last option for mild steel worked to provide the appearance of wrought iron. Genuine wrought iron may be unavailable; it is rarely produced in the United States. The Wagner Companies offers pure iron imported from Europe.

* + - * 1. Wrought Iron: **[Pure iron with not more than 0.035 percent carbon and containing fibrous slag (iron silicate)] [pure iron with not more than 0.035 percent carbon and no slag (iron silicate)] [or] [mild steel; ASTM A29, Grade 1010]**; hand worked or machine forged to the form indicated.
			1. PROTECTIVE COATING MATERIALS

Retain "Wax Coating" or "Lacquer Coating" Paragraph below, or both, to suit Project. If retaining more than one coating, indicate location of each on Drawings or by inserts. First paragraph specifies a wax coating commonly used for application to exterior bronze statuary after cleaning and patinizing; it generally requires reapplying annually or biennially. Waxes can also be applied to other metals but are generally not applied over painted coatings. Generally, retain last option in first paragraph if using hot-wax method of application. Verify, with Director’s Representative, that wax coating is appropriate for State’s continuing maintenance capability.

BWC Company products are carnauba-based waxes with solvents. Its "Boston Polish Wax" is amber, its "Bowling Alley Wax" is clear, and its "New England Brown Wax" is dark brown.

Fisher Scientific products are yellow carnauba wax flakes or powder without solvent.

Real Milk Paint Co. products are carnauba wax with or without solvents. Its "Carnauba Wax Flakes" vary from yellow to light brown and are without solvent, and its "Carnauba Wax Paste" is with solvent.

Talas products are waxes without solvents. Its "Be Sq #175 Microcrystalline Wax" is amber microcrystalline wax, its "Carnauba Wax" is pure carnauba wax flakes (No. 1, yellow), and its "Cosmolloid 80 H" and "Victory White Microcrystalline Wax" are clear microcrystalline waxes.

* + - * 1. Wax Coating: Inert, high-melting-point wax or wax blend, consisting primarily of **[carnauba] [or] [microcrystalline petroleum]** wax**[ and no solvents]**.

Color: **[Clear] [Amber] [Dark brown]**.

"Lacquer Coating" Paragraph below specifies a resin coating commonly used for application to exterior bronze statuary after cleaning and patinizing; it generally requires removing and reapplying every five years or less. It can be applied to other metals but is generally not applied over painted coatings. Verify, with Director’s Representative, that this coating is appropriate for State's continuing maintenance capability.

* + - * 1. Lacquer Coating: Clear, organic, waterborne, air-drying, acrylic lacquer called "Incralac"; specially developed for coating copper-alloy products; consisting of a solution of acrylic resin, methyl methacrylate copolymer, leveling agent, and corrosion-inhibitor benzotriazole.
			1. MISCELLANEOUS MATERIALS
				1. Wood Rails:

Retain one of two subparagraphs below if wood rails are part of a replicated railing assembly or are supported by or attached to decorative metal brackets; revise to suit Project. Retain first subparagraph if wood rails are specified in this Section; retain second subparagraph if wood rails are specified in another Section. Indicate details on Drawings.

Hardwood rails of species and profile indicated, with **[transparent finish] <Insert finish>**, and prepared for securing to metal subrail or brackets as indicated on Drawings.

Species and Finish: **[Match design reference sample] [Match existing] [As indicated on Drawings] [Ash, natural finish] [Cherry, natural finish] [Walnut, natural finish] [White oak, light-stained finish] <Insert species and finish>**.

If rails are required to serve as handrails rather than only as top rails of guards, verify that profile complies with regulations for accessibility.

Profile: **[Match design reference sample]** **[Match existing] [As indicated on Drawings] [Square shape, 1-3/4 by 1-3/4 inches , with edges eased to 1/4-inch radius] [Rectangular shape, 1-3/4 by 5 inches , with edges eased to 1/4-inch radius] [Round shape, 2-inch diameter]**.

Hardwood rails of species and profile **[matching design reference sample] [matching existing] [as indicated on Drawings] <Insert description>**, complying with **[Section 062023 "Interior Finish Carpentry."] [Section 064023 "Interior Architectural Woodwork."] <Insert Section number and title.>**

Retain "Welding Electrodes and Filler Metal" Paragraph below if aluminum, steel, or wrought-iron components will be welded or filled using modern methods. Consider deleting the phrase "color match" if all components will be painted or plated. Forge welding, which is typically used to weld wrought iron, uses heat and hammering and generally does not involve filler metal.

* + - * 1. Welding Electrodes and Filler Metal: Select in accordance with AWS specifications for metal alloy welded; use metal type and alloy as recommended in writing by producer of metal to be welded or filled and as required for color match, strength, and compatibility in fabricated items.

Retain "Brazing Rods for Copper-Alloy Components" Paragraph below if copper-alloy components will be brazed.

* + - * 1. Brazing Rods for Copper-Alloy Components: Type and alloy as recommended in writing by producer of metal to be brazed and as required for color match, strength, and compatibility in fabricated items.

Retain "Brazing Rods for Cast-Iron Components" Paragraph below if cast-iron components will be brazed.

* + - * 1. Brazing Rods for Cast-Iron Components: Type and alloy as recommended in writing by brazing-rod manufacturer and as required for strength and compatibility in fabricated items.
				2. Fasteners of same basic metal as fastened metal unless otherwise indicated. Use metals that are noncorrosive and compatible with each metal joined.

Match existing fasteners in material and in type of fastener unless otherwise indicated.

Retain one of first two subparagraphs below. First subparagraph is more restrictive than second.

Use concealed fasteners for interconnecting decorative metal components and for attaching them to other work.

Use concealed fasteners for interconnecting decorative metal components and for attaching them to other work unless exposed fasteners are **[unavoidable] [or] [the existing fastening method]**.

Revise first subparagraph below if another screw type is required.

For exposed fasteners, use Phillips-type machine screws of head profile flush with metal surface unless otherwise indicated.

Finish exposed fasteners to match finish of metal fastened unless otherwise indicated.

Retain acceptable type of fasteners in "Anchors" Paragraph below. Do not use expansion anchors where expansion can cause damage to substrate material.

* + - * 1. Anchors: **[Adhesive type] [expansion type] [or] [types indicated on Drawings]** with bolt heads of same basic metal as fastened metal unless otherwise indicated. Use metals that are noncorrosive and compatible with each metal anchored.

If retaining "Strength" Subparagraph below, verify safety factors with Project's structural engineer; revise to suit Project.

Strength: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to 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.

Retain "Nonshrink, Nonmetallic Grout" or "Anchoring Cement" Paragraph below, or both, to suit Project.

* + - * 1. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended in writing by manufacturer for interior and exterior applications.
				2. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

Retain "Water-Resistant Product" Subparagraph below if railings are used at exterior or wet locations.

Water-Resistant Product: **[At exterior locations] [and] [where indicated]**, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer for exterior use.

Retain "Sealant Materials" Paragraph below if sealant joints are required unless all sealant work, including sealant within decorative metal joints, is specified in Section 079200 "Joint Sealants."

* + - * 1. Sealant Materials:

Coordinate type(s) of joint sealant required in first subparagraph below with applicable subparagraphs used in Section 079200 "Joint Sealants" in which various sealant types are specified. Revise sealant type or insert others if required. If more than one type of sealant is required, revise subparagraph and indicate location of each on Drawings or by inserts.

Provide manufacturer's standard, elastomeric **[single-component, nonsag urethane] <Insert type>** sealant complying with applicable requirements in Section 079200 "Joint Sealants."

Colors: Provide colors of exposed sealants to match colors of metals in which sealant is placed unless otherwise indicated.

* + - * 1. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

Previous effectiveness in performing the work involved.

Little possibility of damaging exposed surfaces.

Consistency of each application.

Uniformity of the resulting overall appearance.

Do not use products or tools that could do the following:

Remove, alter, or in any way harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in the Contract.

Leave an unintended residue on surfaces.

* + - 1. METAL FABRICATION

Some listed manufacturers specialize in metal types such as bronze and aluminum or in fabricating components rather than entire assemblies. Verify capabilities of manufacturers and revise list to suit Project.

Revise remaining paragraphs below to suit Project.

* + - * 1. Fabricate decorative metal items and components in sizes and profiles to match existing historic decorative metal, with accurate curves, lines, and angles. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
				2. Provide uniform, neat seams with minimum exposure of welds, brazing, solder, and sealant.
				3. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for fasteners. Use concealed fasteners where possible; use exposed fasteners to match existing work.
				4. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.

Use materials and methods that match color of base metal, minimize distortion, and develop maximum strength and corrosion resistance.

Remove flux immediately.

At exposed connections, match contours of adjoining surfaces, and finish exposed surfaces smooth and blended so no roughness shows after finishing.

* + - * 1. Fabricate castings free of warp, cracks, blowholes, or other defects that impair strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks.

Finish castings to match existing decorative metalwork.

"Replacement Casting for Handrail Bracket" Subparagraph below is an example only; if retaining, revise to include location or identification of pattern for replacement castings. Insert subparagraphs for other castings if required.

Replacement Casting for Handrail Bracket: Duplicate existing handrail bracket on the cast-iron railing of first-floor stairs in the lobby. Make molds from this bracket to create new cast-iron brackets.

Retain "Date Identification" Paragraph below for historic treatment projects where differentiation of new materials from original materials is required.

* + - * 1. Date Identification: Emboss on a concealed, interior surface of the metal body of each new component, in easily read characters, "MADE <Insert year>." Manufacturer's name may also be embossed.**[ For cast iron or other brittle metals, add the identification to the mold pattern before casting.][ For malleable metals, stamp identification with an imprinting tool.]**
			1. GENERAL FINISH REQUIREMENTS
				1. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
				2. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
			2. ALUMINUM FINISHES

Retain finishes in this article to suit Project. These aluminum finishes are shop applied. If retaining more than one finish, indicate location of each on Drawings or by inserts. Insert other finishes to suit Project.

* + - * 1. Mill finish.

Retain one of first two options in "Clear Anodic Finish" Paragraph below. Class II finish is standard with many manufacturers; Class I finish is heavy anodized. Verify availability with manufacturer. Revise last three options if custom mechanical finish is required and availability is verified.

* + - * 1. Clear Anodic Finish: AAMA 611, **[Class I, 0.018 mm] [Class II, 0.010 mm] or thicker over a [satin (directionally textured)] [polished (buffed)] [nonspecular as fabricated] <Insert requirement>** mechanical finish.

Retain one of first two options in "Color Anodic Finish" Paragraph below. Class II finish is standard with many manufacturers; Class I finish is heavy anodized. Verify availability with manufacturer. Revise last three options if custom mechanical finish is required and availability is verified. Indicate color on Drawings or in the Historic Decorative Metal Schedule.

* + - * 1. Color Anodic Finish: AAMA 611, **[Class I, 0.018 mm] [Class II, 0.010 mm]** or thicker over a **[satin (directionally textured)] [polished (buffed)] [nonspecular as fabricated] <Insert requirement>** mechanical finish.

"Baked-Enamel or Powder-Coat Finish" Paragraph below references AAMA standard for pigmented organic coating on extrusions and panels. Indicate color on Drawings or in the Historic Decorative Metal Schedule.

* + - * 1. Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

Consider inserting other high-performance finishes from Section 057000 "Decorative Metal."

* + - 1. STAINLESS STEEL FINISHES

Retain finishes in this article to suit Project. These finishes can be shop or field applied. If retaining more than one finish, indicate location of each on Drawings or by inserts.

* + - * 1. Surface Preparation: Remove tool and die marks and stretch lines from new replacement stainless steel, or blend into finish.

Retain "Restored Finish" Paragraph below for finish applied to match existing stainless steel or Sample.

* + - * 1. Restored Finish: Grind and polish surfaces to produce uniform, directionally textured, polished finish to match **[existing finish] [Sample]**, free of cross scratches.

Run grain to match existing metal.

When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

Generally, retain "Polished Finishes," "Stainless Steel Pipe and Tubing Finishes," or "Stainless Steel Sheet and Plate Finishes" Paragraph below for stainless steel not required to match existing stainless steel; revise to suit Project.

* + - * 1. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

Retain first subparagraph below for directional finishes.

Run grain of directional finishes with long dimension of each piece.

When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

* + - * 1. Stainless Steel Pipe and Tubing Finishes:

Retain "180-Grit Polished Finish," "320-Grit Polished Finish," or "Polished and Buffed Finish" subparagraphs below. Coordinate with other Sections that include stainless steel pipe and tubing to ensure uniform finish throughout Project, if desired, as finishes between manufacturers seldom match. Insert other finishes as required after verifying availability with manufacturers.

180-grit polished finish is the most common finish for grab bars and handrails.

180-Grit Polished Finish: Uniform, directionally textured finish.

320-grit polished finish has a finer texture than 180-grit finish above.

320-Grit Polished Finish: Oil-ground, uniform, fine, directionally textured finish.

Polished and buffed finish is similar to ASTM A480/ No. 7 finish for sheet and plate.

Polished and Buffed Finish: 320-grit finish followed by buffing **[to a high-luster finish] [to a mirrorlike finish] [to match Sample]**.

* + - * 1. Stainless Steel Sheet and Plate Finishes:

Retain "Directional Satin Finish," "High-Luster Finish," or "Mirror Finish" Subparagraph below. Insert others as required after verifying availability with manufacturers.

No. 4 finish is 120- to 320-grit polished finish.

Directional Satin Finish: ASTM A480, No. 4.

No. 7 finish has a high degree of reflectivity, produced by buffing a finely ground finish, but the grit lines are not removed.

High-Luster Finish: ASTM A480, No. 7.

No. 8 finish is highly reflective, smooth polished up to a 320-grit finish, and then buffed to a mirrorlike finish.

Mirror Finish: ASTM A480, No. 8.

* + - 1. COPPER-ALLOY FINISHES

Retain finishes in this article to suit Project. If retaining more than one, indicate location of each on Drawings or by inserts.

* + - * 1. General: Finish designations for copper alloys comply with the system defined in NAAMM/NOMMA AMP 500, "Metal Finishes Manual for Architectural and Metal Products."

"Buffed Finish"; "Buffed Finish, Lacquered"; "Satin Hand-Rubbed Finish"; and "Satin Hand-Rubbed Finish, Lacquered" paragraphs below specify natural-color finishes. Retain first paragraph for finish that weathers and changes color naturally over time unless clear coated with wax, oil, or lacquer coating. First option in first paragraph is mirrorlike; second option is less bright. Insert wax or oil coating if required. NAAMM/NOMMA AMP 500, "Metal Finishes Manual for Architectural and Metal Products," does not have a number for waxes and oils.

* + - * 1. Buffed Finish: **[M21 (buffed, smooth specular mechanical finish)] [M22 (buffed, specular mechanical finish)] <Insert description>**.
				2. Buffed Finish, Lacquered: **[M22 (buffed, specular mechanical finish; specified clear lacquer coating)] <Insert description>**.

Retain "Satin Hand-Rubbed Finish" Paragraph below for finish that weathers and changes color naturally over time unless clear coated with wax, oil, or lacquer coating. Insert wax or oil coating if required. NAAMM/NOMMA AMP 500, "Metal Finishes Manual for Architectural and Metal Products," does not have a number for waxes and oils.

* + - * 1. Satin Hand-Rubbed Finish: **[M32-M34 (directionally textured, medium satin and hand-rubbed mechanical finishes)] <Insert description>**.
				2. Satin Hand-Rubbed Finish, Lacquered: **[M32-M34-06x (directionally textured, medium satin and hand-rubbed mechanical finishes; specified clear lacquer coating)] <Insert description>**.

Remaining four paragraphs below specify patinated finishes. Chemical patinization is difficult to control to achieve a precise color; the skill of the Applicator is important. Patinated finishes are generally used in nontraffic locations where there is little or no maintenance; clear lacquer coating, hot wax, or oil can be applied to improve wear resistance. Hot wax and oil tend to saturate and darken the surface more than a clear lacquer coating. Verify, with manufacturers, the suitability of patinas for exterior exposure, if required, and requirements for clear protective coatings.

* + - * 1. Satin Finish with Statuary Conversion Coating: **[M32-C55 (directionally textured, medium satin; sulfide conversion coating)] <Insert description>**.

First and second options in "Color" Subparagraph below are preferred methods of specifying to accommodate variations in color.

Color: **[Match design reference sample] [Match existing] [Match Sample] <Insert color>**.

Coarseness of finish in "Brushed Finish with Patina Conversion Coating" Paragraph below is controlled by diameter and speed of wheel and pressure exerted.

* + - * 1. Brushed Finish with Patina Conversion Coating: M35-C12-C52 (directionally textured, rotary brushed and buff polished, nonetched cleaned; ammonium sulfate conversion coating).

First and second options in "Texture and Color" Subparagraph below are preferred methods of specifying to accommodate variations in texture and color.

Texture and Color: **[Match design reference sample] [Match existing] [Match Sample] <Insert description>**.

"Bright-Relieved Statuary Conversion Coating, Lacquered" Paragraph below is an example of a more complex finish requiring the highest skill level. It specifies finish for castings; revise for other forms of metal or if deeper color such as blackening is required.

* + - * 1. Bright-Relieved Statuary Conversion Coating, Lacquered: M12-C55-M2x-06x (matte finish as cast; sulfide conversion coating; buffed to brighten high spots; specified clear lacquer coating).

First and second options in "Color and Buffing" Subparagraph below are preferred methods of specifying to accommodate variations in color and extent of bright relief (buffing).

Color and Buffing: **[Match design reference sample] [Match existing] [Match Sample] <Insert description>**.

Retain paragraph below for proprietary patina finish not listed above. Patina finishes are available from manufacturers listed in "Historic Treatment Specialist Firms" Article in the Evaluations.

* + - * 1. **<Insert name>** Patina Finish: **<Insert description>**.
			1. FERROUS METAL FINISHES

Retain finishes in this article to suit Project. Insert other finishes to suit Project. Copy article and revise for different iron and steel finishes. If retaining more than one, indicate location of each on Drawings or by inserts. Iron and steel generally require immediate priming to prevent corrosion after fabrication and before final painting.

* + - * 1. Primer: Complying with applicable requirements in **[Section 090391 "Historic Treatment of Plain Painting"] <Insert Section number and title>** for finish painting of primed decorative metal.

Finish in "Baked-Enamel or Powder-Coat Finish" Paragraph below is shop applied to thoroughly cleaned bare metal only.

* + - * 1. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

Retain "Patina Finish" Paragraph below for patina finish on iron. Patina finishes are available from manufacturers listed in "Historic Treatment Specialist Firms" Article in the Evaluations. Verify, with manufacturers, the suitability of patinas for exterior exposure, if required, and requirements for clear protective coatings.

* + - * 1. Patina Finish: **<Insert description>**.

For exact finish, insert names of coating manufacturers and products.

* + - 1. PLATED FINISHES

Retain this article if required. Verify, with plating Applicator, the available and recommended processes for Project conditions; revise process description below if required. See the Evaluations.

* + - * 1. Shop Plating: Plate item by electrodeposition using tank electroplating process**[, brush plating process, or both]**.
				2. Plating-metal types as follows**[, with plating thickness as indicated]**:

Subparagraphs below are examples only; revise to suit Project. Retain options for plating thickness if required. Thickness can vary with metal type and anticipated location and use of finished item. Insert finishes applied to the plated surfaces if required. Copper/zinc proportions for yellow and red brass compositions are commonly used; revise to suit color and finish requirements of Project.

Brass Plating on Cast Iron: **[Minimum 0.5-mil ] [Applicator's standard] <Insert thickness> plating thickness. Red brass of [80/20] [85/15] <Insert copper/zinc proportion> composition. Yellow brass of [70/30] <Insert copper/zinc proportion>** composition.

Chromium Plating over Nickel Undercoating on Steel or Bronze: **[Minimum 0.01-mil ] [Applicator's standard] <Insert thickness>** chromium-plating thickness.

Nickel Plating on Metal: Metal is first plated lightly with copper, then plated with nickel in **[minimum 0.10-mil ] [Applicator's standard] <Insert thickness>** plating thickness.

Insert other metals and finishes to suit Project.

1. EXECUTION
	* + 1. HISTORIC TREATMENT SPECIALIST

Retain this article if list of preapproved firms is used as quality-control procedure.

If retaining second option in "Historic Treatment Specialist Firms" Paragraph below, include procedure for approving other firms in Document 002213 "Supplementary Instructions to Bidders."

* + - * 1. Historic Treatment Specialist Firms: Subject to compliance with requirements **[provide historic decorative metal replication by one of the following] [firms that may provide historic decorative metal replication include, but are not limited to, the following]**:

**<Insert, in separate subparagraphs, names of historic treatment specialist firms>**.

* + - 1. HISTORIC DECORATIVE METAL REPLICATION, GENERAL

Retain "Replication Appearance Standard" Paragraph below to control overall appearance from a distance.

* + - * 1. Replication Appearance Standard: Replicated surfaces are to have a uniform appearance as viewed from **[20 ft.] [50 ft.]** away by Director’s Representative .
				2. Execution of the Work: In replicating historic items, disturb remaining existing work as minimally as possible and as follows:

Sequence work to minimize time before protective coatings are applied.

Replace or reproduce historic items where indicated or scheduled.

Make installation of replicated items reversible whenever possible.

Removed or dismantled and salvaged items may be available for replicating. Verify condition and availability of existing materials for duplicating or to create molds or patterns.

* + - * 1. Replicate Decorative Metal Item: Where indicated, duplicate existing items with new materials matching existing materials and features.

Design heavily deteriorated or missing features of historic decorative metal with compatible materials, using surviving prototypes to create patterns or molds for duplicating.

Retain one of two subparagraphs below. Indicate on Drawings or in the Historic Decorative Metal Schedule where substitute materials may be used.

Do not use substitute materials unless otherwise indicated.

Compatible substitute materials may be used.

* + - 1. PROTECTIVE COATING

Retain "Protective Hot-Wax Coating" or "Protective Lacquer Coating" Paragraph below, or both, to suit Project. If retaining both, indicate location of each on Drawings or by inserts.

* + - * 1. Protective Hot-Wax Coating: Apply wax coating to produce uniform appearance without runs or other surface imperfections.

Clean and dry surface being waxed.

Preheat surface to about 212 deg F ; high enough to melt the wax and remove water vapor and other gases within metal surface, but not hot enough to boil the wax or ignite solvents, if any.

Apply uniform wax coating to surface, ensuring that wax coverage is complete, including recesses.**[ Apply second wax coating following the same process.]**

Inspect surface and repair holidays by reheating and applying more wax.

Buff waxed surface to a slight shine with a lint-free cloth after wax has cooled to a hazy appearance.

* + - * 1. Protective Lacquer Coating: Apply lacquer coating to produce uniform appearance without runs or other surface imperfections.

Clean and dry surface being coated.

Apply two uniform coats by air-spray method per manufacturer's written instructions, with interim drying between coats.

Apply coating to a total dry film thickness of 1 mil .

Protect coated surface from contamination until fully cured.

* + - 1. PLATING

Identify items and parts of items to be plated on Drawings or in the Historic Decorative Metal Schedule; revise requirements for plating to suit Project.

* + - * 1. Shop Plating: Disassemble item only as necessary for plating process.

Clean item to remove dirt, coatings, and corrosion.

Fill scratches, cracks, and depressions and polish or texturize metal surface to match the historic metal; prepare metal surfaces for plating.

Plate item to match approved mockup; assemble and install it.

* + - 1. INSTALLATION

Retain "Installing (Railing) (and) (Fence) Posts" Paragraph below if required; revise to suit Project.

* + - * 1. Installing **[Railing] [and] [Fence]** Posts: After posts have been inserted in sleeves, fill annular space between post and sleeve with [nonshrink, nonmetallic grout] [or] [anchoring cement], mixed and placed to comply with anchoring material manufacturer's written instructions. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8-inch buildup sloped away from post.

Retain "Anchoring Wood Rails" Paragraph below if wood rails are supported by or attached to decorative metal railings or brackets; revise to suit Project. Indicate details on Drawings.

* + - * 1. Anchoring Wood Rails: Secure wood rails to metal subrail or brackets from bottom of wood rail as indicated on Drawings. Make fastener heads flush to metal surface.

Retain "Installing Sealant" Paragraph below if joint sealants are required unless all sealant work, including sealant within decorative metal joints, is specified in Section 079200 "Joint Sealants."

* + - * 1. Installing Sealant:

After metal installation, keep joints to receive sealant dry and free of debris.

Option in first subparagraph below establishes priming as default requirement rather than relying on Contractor's judgment.

Clean and prepare joint surfaces in accordance with Section 079200 "Joint Sealants."**[ Prime joint surfaces unless sealant manufacturer recommends against priming.]** Do not allow primer to spill or migrate onto adjoining surfaces.

Fill sealant joints with specified joint sealant as recommended in writing by sealant manufacturer and in accordance with Section 079200 "Joint Sealants" and the following:

Install sealant using only proven installation methods that ensure sealant is deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding metal.

Do not allow sealant to overflow or spill onto adjoining surfaces or to migrate into the voids of adjoining surfaces, particularly rough or sculptural textures. Promptly remove excess and spillage of sealant as the work progresses. Clean adjoining surfaces by means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.

Cure sealant in accordance with Section 079200 "Joint Sealants."

* + - 1. HISTORIC DECORATIVE METAL SCHEDULE

This schedule demonstrates a method to indicate extensive historic treatment requirements for decorative metal. A schedule helps to prevent confusion where Project includes several items of varying sizes, characteristics, and complexities; where extensive drawing notations would otherwise be needed; and where direction by a historic treatment specialist is considered insufficient. The design professional must decide what to include in a schedule and what should be indicated on Drawings. This schedule is an example only; revise to suit Project and coordinate with historic decorative metal schedule in Section 050372 "Historic Decorative Metal Repair," if retained.

Insert drawing designation for each item to be treated, and indicate the methods of treatment that apply to the item. Use these designations on Drawings to identify locations.

* + - * 1. Treatment of Decorative Railing and Handrail **[DMRH-1] <Insert drawing designation>**: Missing bronze railing and handrail.

Replicate entire, bronze railing and handrail with shop-fabricated assembly matching design of handrail assembly in **<Insert location>**.

Bronze Finish: **[Satin finish with statuary conversion coating on railing; satin hand-rubbed finish, lacquered, on handrail] <Insert requirement>**.

END OF SECTION 050374