SECTION 050373 - HISTORIC DECORATIVE METAL REFINISHING

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

* + - 1. SUMMARY
				1. Section includes historic treatment of decorative metal in the form of refinishing bare metal surfaces as follows:

Refinishing metal in place.

Removing and dismantling metal for shop refinishing; reinstalling refinished metal.

Integral metal finishes.

Metallic-plated finishes.

Clear protective coatings.

* + - * 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 050371 "Historic Decorative Metal Cleaning" for cleaning and removing paint from historic metalwork.

Section 090391 "Historic Treatment of Plain Painting" for plain painting of historic metalwork.

Section 090398 "Historic Treatment of Gilding" for gilding on historic metalwork.

* + - 1. ALLOWANCES

Retain products and Work included in this Section that are covered by cash or quantity allowance. Do not include amounts. Insert descriptions of items in Part 2 or 3 to provide information affecting the cost of the Work that is not included under the allowance. Delete this article if all work is done by lump-sum price.

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

* + - * 1. Allowances for historic treatment of decorative metals are specified in Section 012100 "Allowances."

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 historic treatment of decorative metals under quantity allowances and only as authorized. Authorized work includes [work required by Drawings and Specifications and] 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 according to 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. Refinishing **<Insert item description> is part of <Insert name of allowance>**.
			1. UNIT PRICES

Retain this article if Work specified in this Section is measured and paid for under the provisions of unit prices. Do not include amounts. Insert descriptions of items in Part 2 or 3 to provide information affecting the cost of the Work that is not included under the unit price.

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

* + - * 1. Work of this Section is affected by unit prices specified in Section 012200 "Cost Computations."

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. DEFINITIONS

Retain terms that remain after this Section has been edited for a project.

Pressure spray values are not standardized but are typical for preparatory cleaning without abrasives; revise to suit Project. If abrasives are used, revise values because these pressures are too high.

* + - * 1. Low-Pressure Spray:

Pressure: **[100 to 400 ] <Insert value>** psi.

Flow Rate: **[4 to 6 ] <Insert value>** gpm.

* + - * 1. Medium-Pressure Spray:

Pressure: **[400 to 800 ] <Insert value>** psi.

Flow Rate: **[4 to 6 ] <Insert value>** gpm.

* + - * 1. High-Pressure Spray:

Pressure: **[800 to 1200 ] <Insert value>** psi.

Flow Rate: **[4 to 6 ] <Insert value>** gpm.

* + - 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>.

If needed, insert list of conference participants not mentioned in Section 013591 "Historic Treatment Procedures."

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 historic treatment of decorative metal.

Review methods and procedures related to historic treatment of decorative metal 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.

Include recommendations for product application and use.

Include test data substantiating that products comply with requirements.

Retain "Shop Drawings" Paragraph below if this information is not indicated on Drawings.

* + - * 1. Shop Drawings:

Include plans, elevations, and sections showing locations and extent of refinishing work.

Include field-verified dimensions.

Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs below for two-stage Samples.

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

A range of each type of exposed finish prepared on metal of the same alloy matching existing metal.

* + - * 1. Samples for Verification: For the following products in manufacturer's standard sizes unless otherwise indicated, finished as required for use in the Work:

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

Each type of exposed finish prepared on metal of the same alloy matching existing metal; 6 inches long in least dimension.

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

* + - * 1. Qualification Data: For historic treatment specialist.
				2. Decorative Metal Historic Treatment Program: For refinishing historic decorative metalwork.
			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.

* + - * 1. Historic Treatment Specialist Qualifications: A qualified historic decorative metal refinishing specialist.

Retain "Single Specialist" Subparagraph below if required; revise to suit Project. If also retaining "Historic Treatment Specialist Firms" Paragraph in "Historic Treatment Specialist" Article, coordinate the listed specialists in cited Sections.

Single Specialist: Have the work of **[Section 050371 "Historic Decorative Metal Cleaning"] [Section 050372 "Historic Decorative Metal Repair"] [Section 050374 "Historic Decorative Metal Replication"] [and] [Section 050383 "Historic Cast Iron Repair"]** performed by the same historic treatment specialist firm, complying with specialist qualifications of those Sections.

* + - * 1. 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 refinishing 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.

Retain required mockups in "Mockups" Paragraph below; insert others to suit Project. Test areas that were prepared or are required as part of a separate contract to evaluate and establish historic treatment materials and processes are not mockups. Generally, retain option because separate mockups may not adequately show blending of new work with existing construction.

* + - * 1. Mockups: Prepare mockups of historic treatment refinishing processes[ on existing surfaces] to demonstrate aesthetic effects and to set quality standards for materials and execution. Prepare mockups so they are inconspicuous or reversible.

Mockups in "Waxing Bronze," "Refinishing Decorative Metal," and "Repairing Decorative Metal Finish" subparagraphs below are examples only.

Waxing Bronze: Wax a cleaned area **[approximately 2 sq. ft. ] [as indicated on Drawings] <Insert dimension>** of **[each type of ]**bronze **[sculpture] [paneling] [and] [hardware] <Insert item description>**.

Refinishing Decorative Metal: Refinish **[one] <Insert number>** decorative **<Insert item description>** for each type of metal indicated to be refinished.

Repairing Decorative Metal Finish: Repair finish of **[one] <Insert number>** decorative **<Insert item description>** for each type of metal finish indicated to be repaired.

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

These mockups are typically installed as part of existing building rather than erected separately.

Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

* + - 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 the period of decorative metal installation.
			2. FIELD CONDITIONS

Usually retain this article; revise to suit Project.

* + - * 1. Weather Limitations: Proceed with historic treatment of decorative metal only when existing and forecasted weather conditions are within environmental limits set by each manufacturer's written instructions and specified requirements.
1. PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements.

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with manufacturers.

* + - 1. PREPARATORY CLEANING MATERIALS

For a decorative metal item having a mix of materials, such as painted and plated metals, consider using cleaning materials and a single cleaning method selected for gentleness to all the materials and finishes on the item. See Section 050371 "Historic Decorative Metal Cleaning" for additional cleaning materials and methods. Acidic cleaners are generally not used on exposed metals unless they will be painted.

If local water is known to be unsuitable, consider informing Contractor of this in "Water" Paragraph below. Hard or softened water may be unsuitable even though potable.

* + - * 1. Water: Potable.

Retain "Hot Water" Paragraph below if heated water is required.

* + - * 1. Hot Water: Water heated to a temperature of 140 to 160 deg F .

Retain remaining paragraphs below to suit Project.

Revise "Detergent Solution, Job Mixed" Paragraph below for specific laundry detergent requirements if known. Detergent products vary in composition.

* + - * 1. Detergent Solution, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.

Revise "Nonacidic Liquid Chemical Cleaner" Paragraph below to suit Project. Always test cleaners on substrates to be cleaned; strongly alkaline solutions can damage bare aluminum.

* + - * 1. Nonacidic Liquid Chemical Cleaner: Manufacturer's standard mildly alkaline liquid cleaner, formulated for removing organic soiling from ordinary building materials including polished stone, brick, copper, brass, bronze, aluminum, stainless steel, plastics, wood, and glass.

Abrasives can be used for paint removal as well as for cleaning surfaces, depending on the abrasive type and how it is used.

* + - * 1. Abrasive Materials:

Abrasive Pads for Copper-Alloy Cleaning: Extra-fine bronze wool or plastic abrasive pads.

Blasting Abrasive: **[Pulverized walnut shells] [Powdered aluminum silicate] <Insert material>**.

Revise "Abrasives for Ferrous Metal Cleaning" Subparagraph below if mechanically cleaning stainless steel surfaces; allow only stainless steel tools. Carbon-steel residues can rust and stain stainless steel surfaces.

Abrasives for Ferrous Metal Cleaning: Aluminum oxide paper, emery paper, fine steel wool, steel scrapers, and steel-wire brushes of various sizes.

* + - 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, levelling agent, and corrosion inhibitor benzotriazole.

Product in "Copper-Alloy Corrosion Inhibitor" Paragraph below is commonly used to stabilize residual cuprous chloride and prevent further corrosion. Revise water to ethanol if required; ethanol penetrates cracks and crevices better than water.

* + - * 1. Copper-Alloy Corrosion Inhibitor: Solution of **[1] [to] [3] <Insert number>** percent benzotriazole in water.
			1. MISCELLANEOUS MATERIALS

Product in "Liquid Strippable Masking Agent" Paragraph below does not protect against strong chemicals such as those used for removing paint.

* + - * 1. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, glazed masonry, and polished stone surfaces from damaging effects of acidic and alkaline cleaners.
				2. Masking Tape: Nonstaining, nonabsorbent material; compatible with chemical solutions being used and substrate surfaces; and that will easily come off entirely, including adhesive.
				3. 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. FINISHES, GENERAL
				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 not acceptable. 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 for bare aluminum assemblies or components to suit Project. If retaining more than one, indicate location of each on Drawings or by inserts. Primers and paint finishes for aluminum are specified in other Sections.

* + - * 1. Unfinished: No applied finish; only preparatory cleaning.

Retain one of first two options in "Clear Anodic Finish" Paragraph below. This finish is shop applied. 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. This finish is shop applied. 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 Refinishing 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.
			1. COPPER-ALLOY FINISHES

Retain finishes in this article for bare copper-alloy assemblies or components to suit Project. If retaining more than one, indicate location of each on Drawings or by inserts.

* + - * 1. Finish designations for copper alloys comply with the system defined in NAAMM/NOMMA 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 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 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] <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] <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] <Insert description>**.

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

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

Retain finishes in this article for bare ferrous-metal assemblies or components to suit Project. Retain "Patina Finish" Paragraph below for patina finish on bare iron or steel. Insert other finishes to suit Project. Copy article and revise for different iron and steel finishes. Primers and paint finishes for iron are specified in other Sections. Patina finishes are available from manufacturers listed in "Manufacturers" 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 finish manufacturers and products.

* + - 1. STAINLESS STEEL FINISHES

Retain finishes in this article for bare stainless steel assemblies or components to suit Project. These finishes can be shop or field applied. If retaining more than one, 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" 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, according to **[ASTM A480] <Insert requirement>**.

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.

Directional Satin Finish: No. 4.

Dull Satin Finish: No. 6.

Reflective, Directional Polish: No. 7.

Mirrorlike Reflective, Nondirectional Polish: No. 8.

* + - 1. PLATED FINISHES

Retain "Shop Plating" or "In-Place Plating" Paragraph below, or both, to suit Project. If retaining more than one plating process, indicate location of each on Drawings or by inserts. Verify, with a plating Applicator, the available and recommended processes for Project conditions; revise process descriptions below if required. See the Evaluations.

Shop plating generally produces the most uniform results, but removing an item may not be feasible.

* + - * 1. Shop Plating: Plate item by electrodeposition using **[tank electroplating process] [tank electroplating process, brush plating process, or both] <Insert requirement>**.

In-place plating is often used for replating damaged and worn areas and for items that cannot be removed.

* + - * 1. In-Place Plating: Plate item by brush plating (electrodeposition) process.
				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 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>** copper-to-zinc composition. Yellow brass of **[70/30] <Insert copper/zinc proportion>** copper-to-zinc 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 using list of preapproved firms as quality-control procedure.

If retaining second option in "Historic Treatment Specialist Firms" Paragraph below.

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

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

* + - 1. PROTECTION
				1. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

Cover adjacent surfaces with materials that are proved to resist chemical solutions being used unless products being used will not damage adjacent surfaces. Use protective materials that are waterproof and UV resistant. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.

Do not apply chemical solutions during winds of enough force to spread them to unprotected surfaces.

Neutralize alkaline and acid wastes before disposal.

Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

* + - 1. HISTORIC DECORATIVE METAL REFINISHING, GENERAL

Revise this article to suit Project. See Section 013591 "Historic Treatment Procedures" for general historic treatment procedures.

Retain first paragraph below if not retaining "Historic Treatment Specialist" Article.

* + - * 1. Have decorative metal refinishing performed by a qualified decorative metal refinishing specialist.

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

* + - * 1. Refinishing Appearance Standard: Refinished surfaces are to have a uniform appearance as viewed from **[20 ] [50 ] <Insert distance>** feet away by Director’s Representative.
				2. Execution of the Work: In refinishing historic items, disturb remaining existing work as minimally as possible and as follows:

Remove dirt and corrosion.

Sequence work to minimize time before protective coatings are reapplied.

Refinish items in place unless otherwise indicated and retain as much original finish as possible and according to required appearance.

Make historic treatment of materials reversible whenever possible.

Retain option in "Refinishing Decorative Metal Item" and "Repairing Finish of Decorative Metal Item" paragraphs below if required; revise to suit Project.

* + - * 1. Refinishing Decorative Metal Item: Remove existing metal finishes on item unless otherwise indicated**[, including integral polished and patinated finishes and plated finishes,]** and **[reapply them] [apply new, specified finishes]**.
				2. Repairing Finish of Decorative Metal Item: Restore areas of deteriorated or missing finish on item and blend restored finish with existing, adjacent finish**[, including integral polished and patinated finishes and plated finishes]**.
			1. PREPARATORY CLEANING

Retain cleaning methods in this article for cleaning metal before refinishing; revise to suit Project; consult a preservation specialist before retaining or inserting other methods. See the Evaluations in Section 050371 "Historic Decorative Metal Cleaning." High-pressure spray may be too harsh if applied to metal attached to masonry with soft joints.

* + - * 1. Perform preparatory cleaning before performing refinishing work. Use only those methods indicated for each type of decorative metal and its location.

Brushes: If using wire brushes, use brushes of same base metal composition as metal being treated. Use brushes that are resistant to chemicals being used.

Spray Equipment: Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that spray methods do not damage surfaces.

Equip units with pressure gauges.

Retain first subparagraph below unless spray application of chemical cleaners is unacceptable. Wind drift of chemical cleaners is often a problem with spray application.

For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with nozzle having a cone-shaped spray.

Fan-spray angle in first subparagraph below is considered efficient for low and medium pressure and less harmful than sprays with narrower angles. Never use a fan spray with an angle of less than 15 degrees.

For water-spray application, use fan-shaped spray that disperses water at an angle of 25 to 50 degrees.

Retain first subparagraph below if high-pressure spray is permitted.

For high-pressure water-spray application, use fan-shaped spray that disperses water at an angle of at least 40 degrees.

Retain first subparagraph below if heated water is required. Revise temperature range to suit Project.

For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.

Uniformity: Perform each cleaning method in a manner that results in uniform coverage of all surfaces, including corners, contours, and interstices, and that produces an even effect without streaks or damaging surfaces.

Protection: After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

* + - * 1. Water Cleaning: Clean with **[cold] [hot]** water applied by **[low] [medium] [high]**-pressure spray. Supplement with **[natural-fiber] [or] [plastic]** bristle brush. Use small brushes to remove soil from joints and crevices.
				2. Detergent Cleaning:

Wet surface with **[cold] [hot]** water applied by low-pressure spray.

Generally, retain last option in first subparagraph below for decorative metals with desirable patina. Scrubbing can remove patina if used aggressively.

Scrub surface with detergent solution and **[natural-fiber] [or] [plastic]** bristle brush until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that surface remains wet.**[ Leave uniform patina intact.]**

Retain one of first two options and one of last four options in subparagraph below.

Rinse with **[cold] [hot]** water applied with **[sponges or wash cloths] [low-pressure spray] [medium-pressure spray] [high-pressure spray]** to remove detergent solution and soil.

* + - * 1. Nonacidic Liquid Chemical Cleaning: Apply chemical cleaner to surfaces according to chemical-cleaner manufacturer's written instructions.

Alkaline cleaners work better with hot water.

Wet surface with **[cold] [hot]** water applied by low-pressure spray.

Apply cleaner to surface**[ in two applications]** by brush**[ or low-pressure spray]**.

Retain one option in first subparagraph below; revise to suit Project. Third option is an example only.

Let cleaner remain on surface for period **[recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>**.

Retain one of first two options and one of last three options in "Non-Ferrous Metals" Subparagraph below.

Non-Ferrous Metals: Rinse with **[cold] [hot]** water applied by **[low] [medium] [high]**-pressure spray to remove chemicals and soil.

Ferrous Metals: Do not rinse ferrous metals with water; neutralize chemical cleaner on ferrous metals as recommended in writing by manufacturer. Dry immediately with clean soft cloths. Follow direction of grain in metal.

Generally, retain first option in "Cleaning with Abrasive Pads" Paragraph below for decorative metals with desirable patina. This method can remove patina if used aggressively.

* + - * 1. Cleaning with Abrasive Pads: Clean surfaces to remove dirt**[, leaving uniform patina intact,]** by light rubbing with abrasive pads and water. **[Rinse with cold water to remove residue. Apply rinse by low-pressure spray] [Do not rinse ferrous metals with water; wipe with damp cloths to remove residue] <Insert requirement>**.

Generally, retain first option in "Cleaning by Abrasive Blasting" Paragraph below for decorative metals with desirable patina. Abrasive blasting can remove patina if used aggressively or with hard abrasives.

* + - * 1. Cleaning by Abrasive Blasting: Clean surfaces to remove dirt**[, leaving uniform patina intact,]** by dry blasting with specified blasting abrasive at pressure and distance from surface indicated below. **[Rinse with cold water, low-pressure spray to remove residue.] [Do not rinse ferrous metals with water; wipe with damp cloths to remove residue] <Insert requirement>**.

Pressure and Distance from Surface:

Retain one of two subparagraphs below.

Maximum pressure of **[60 ] [100 ] [200 ] <Insert value>** psi with specified blasting abrasive propelled from a distance of **[6 to 12 ] [12 to 18 ] <Insert dimension>** inches from the surface.

As established by mockup.

* + - 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. Pretreatment option is commonly used to stabilize residual cuprous chloride.

* + - * 1. Protective Hot-Wax Coating:**[ Pretreat cleaned copper-alloy surfaces with copper-alloy corrosion inhibitor, wipe off excess with ethanol-saturated rag, and allow surface to dry. If fresh corrosion appears, repeat process.]** 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 ; hot 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:**[ Pretreat cleaned copper-alloy surfaces with copper-alloy corrosion inhibitor, wipe off excess with ethanol-saturated rag, and allow surface to dry. If fresh corrosion appears, repeat process.]** 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 according to 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 or replated on Drawings or in the Historic Decorative Metal Refinishing Schedule; revise requirements for plating to suit Project.

Retain "Shop Plating" or "In-Place Plating" Paragraph, or both, to suit Project; if retaining both, indicate location of each process on Drawings or by inserts. Shop plating generally produces the most uniform results, but removing an item may not be feasible. In-place plating is often used for replating damaged and worn areas and for items that cannot be removed. Verify, with a plating Applicator, the available and recommended processes for Project conditions; revise process descriptions below if required. See the Evaluations.

* + - * 1. Shop Plating: Dismantle from substrate each item indicated for shop plating or replating; 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; reassemble and reinstall it.

* + - * 1. In-Place Plating: Protect from damage the materials surrounding and below each item indicated for in-place plating or replating.

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.

Retain option in subparagraph below for selective replating. See the Evaluations.

Plate item to match approved mockup**[ and blend with existing, adjacent plating. Finish surface by buffing to blend new plating with existing, adjacent plating]**.

* + - 1. FIELD QUALITY CONTROL
				1. Testing Agency: Director’s Representative will engage a qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.
				2. Notify testing agency in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors have had reasonable opportunity to inspect work areas at locations of lift devices or scaffolding.
			2. DISMANTLING, REPAIR, AND REINSTALLATION

Indicate on Drawings or in the Historic Decorative Metal Refinishing Schedule which decorative metal items are to be dismantled for refinishing or repair and refinishing and reinstalled.

* + - * 1. Perform dismantling, repair, and reinstallation work as required in Section 050372 "Historic Decorative Metal Repair."
			1. HISTORIC DECORATIVE METAL REFINISHING 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 used; and where direction by a historic treatment specialist is considered insufficient. The design professional decides what to include in a schedule and what to annotate on Drawings. This schedule is an example only; revise to suit Project and coordinate with historic decorative metal schedules in Section 050371 "Historic Decorative Metal Cleaning" and Section 050372 "Historic Decorative Metal Repair," if retained.

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

* + - * 1. Treatment of Decorative Handrail **[DMR-#] <Insert drawing designation>**: Tarnished bronze railing with bronze handrail.

Perform work **[in the shop] [or] [in the field]**.

Cleaning: **[Water cleaning] [Detergent cleaning] [Chemical cleaning] [Abrasive blasting] <Insert description>**.

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

* + - * 1. Treatment of Decorative Cast-Iron Facade and Storefront **[DMFS-#] <Insert drawing designation>**: Repair facade and storefront and replace missing components.

Perform work **[in the shop] [or] [in the field]**.

Retain "Dismantle and Salvage Items" Subparagraph below if applicable for specific components of facade and storefront that require salvage; revise to suit Project.

Dismantle and Salvage Items: Dismantle the following**[, return to shop to perform indicated treatment of item,]** and deliver to Director’s Representative for storage for future installation.

Cast-iron medallions.

**<Insert item to be salvaged>**.

Cleaning: **[Water cleaning] [Detergent cleaning] [Chemical cleaning] [Abrasive blasting] <Insert description>**.

Paint Removal: **[Alkaline-paste paint remover] [Covered or skin-forming alkaline paint remover] [Solvent-type paint remover] [Low-odor, solvent-type paint remover] <Insert method>** as specified in Section 050371 "Historic Decorative Metal Cleaning."

Rust Removal: **[Chemical] [Mechanical] <Insert method>** as specified in Section 050372 "Historic Decorative Metal Repair."

Repair: As specified in Section 050372 "Historic Decorative Metal Repair."

Finish Treatment:

Retain one or more of "Protective Coating," "Metal Plating," and "Painted Finish" subparagraphs below to suit Project; if retaining more than one, indicate location of each on Drawings or by inserts. Insert other finishes to suit Project.

Protective Coating: **[Hot-wax] [Lacquer]** coating.

Metal Plating: Plate cast-iron components with **[brass] [and] [nickel] <Insert plating metal>** where indicated on Drawings.

Painted Finish: As specified in **[Section 090391 "Historic Treatment of Plain Painting."] <Insert Section number and title.>**

* + - * 1. Treatment of Bronze Statue Finish **[DMS-#] <Insert drawing designation>**: Clean, repair **[patina] [plated]** finish, and coat statue.

Perform work **[in the shop] [or] [in the field]**.

Cleaning: **[Water cleaning] [Detergent cleaning] [Chemical cleaning] [Abrasive blasting] <Insert description>**.

Finish Repair: Selectively **[patinate] [plate]** the **[nose] [trident] [damaged plating] [and] [previous metal repairs] <Insert description>** to match the rest of the statue.

Protective Coating: Protective **[hot-wax] [lacquer]** coating.

END OF SECTION 050373