

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- .2 Related Sections:
 - .1 01 00 10 – General Instructions
 - .2 04 03 41 – Historic – Repair of Stone
 - .3 07 92 10 – Joint Sealing
 - .4 26 05 00 – Common Work Results for Electrical

1.2 REFERENCES

- .1 Definitions:
 - .1 Bronze: a general term for an alloy of in which the major element is copper which can include tin, zinc, lead, silicon and other elements in order to achieve different characteristics.
 - .2 Bronze conservator: A person with training and experience in restoring architectural and artistic bronzes.
 - .3 Patineur: A person with training and experience in patinating and repatinating architectural and artistic bronzes.
 - .4 Heritage lighting restorer: Person or company experienced in restoring heritage light including rewiring and certifying to electrical code.
 - .5 Relamping: Replacing the electrical components and associated accessories of a lamp/light fixture including but not limited to: wiring, ballasts, sockets, mounts, fasteners, lamps/bulbs, reflectors, isolation material.
 - .6 Replace: To remove identified items and install new versions to same size, material, finish and quality, unless otherwise indicated.
 - .7 Bielstein Test: A simple chemical test used as a qualitative test to measure chlorides.
- .2 References:
 - .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C1464-06 (2011) Standard Specification for Bent Glass.
 - .2 ASTM/BMHA A156.18, Materials and Finishes Standard 623-624.

1.3 SUBMITTALS

- .1 Provide submittals for review in accordance with Section 01 00 10 – General Instructions and Division 26.
- .2 Submittals to include the following:
 - .1 **Bronze statue/object removal, transportation, storage and reinstallation procedures.** Submit a written description of the proposed procedures for bronze statue/object removal, transportation, storage and protection, describing detailed direction for lifting, crating, transportation, storage conditions, resetting/re-anchoring. Include methods and materials for protection of the bronze

statue/object. The Departmental Representative will review and provide comments and written acceptance of the procedures. The procedures must not be implemented until written acceptance is provided by the Departmental Representative.

- .2 Protection Program: Submit a written description of the proposed protection plan, describing methods and materials for protection of the monument stonework, surrounding site, and vegetation that may be damaged by the conservation operations. Provide a detailed description of the proposed protection materials and installation methods. Include proposed methods for controlling and disposing of all cleaning and treatment waste materials consistent with governing requirements.
- .3 Hazard Assessment and General Safety Program: Submit a written plan detailing the potential hazards to personnel and the public that could occur during the course of work. Submit a safety plan detailing the specific actions, including training, procedures, protection, and signage, that will be performed to address and mitigate the hazards.
- .4 Cleaning Methodology: Prior to preparing cleaning sample mock-up panels, submit a detailed written description of methods, sequencing, working pressures, materials and equipment proposed for use in cleaning. Contractor may propose products for testing in addition to those specified. Only submitted and approved products and methods will be tested.
- .5 Submit manufacturer's literature, product data, use and installation instructions and MSDS for each of the products and materials proposed for use in performance of the work of this section, including all proposed cleaning, patination, and coating materials, protection materials, and equipment. Materials used for the conservation work must be identical to those submitted and approved.
- .6 Submit samples of new bronze alloys for review of colour. Contractor to submit up to 3 sets of 6 different alloy samples (unpatinated), minimum 50mm x 50mm x 6mm for approval by the Departmental Representative, identified as to which bronze piece they are proposed to be used on.
- .7 Submit 3 x full-scale models of parts to be recast per indications.
- .8 Submit written procedures for restoration and relamping of Lamp No. 4.
- .9 4 x Frosted opaque glass lenses for replacement of cracked lenses in perimeter lamps.
- .10 1 x Cylindrical plexiglass shades for replacing cracked shades on torchères.
- .11 3 x 300 mm lengths of closed cell neoprene / SBR.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide documents in accordance with Section 01 00 10 General Instructions.
 - .1 Project Record
 - .1 Provide a written and illustrated Conservation Treatment report documenting the condition of the bronze prior to the start of work, all materials and methods used for the restoration, photographs of the work in progress, and the completed work. Minimally the bronze must be photographed prior to the start of cleaning, during and after initial cleaning, during fabrication, during and after repair, during and after patination, during and after coating, and during and after installation.
 - .2 The report to include written description and photographic illustrations of patination solutions formulas, concentrations, sequencing, application and heating means, and process descriptions detailing the method used

to achieve the artistic repatination of the sculpture based on those followed for the approved mock-ups.

- .3 Provide clear, in focus, colour digital photographs in TIFF or JPEG format, use SLR type digital camera, with minimum 7 megapixel resolution. Provide prints of each photo, minimum 101 x 152 mm in archival mountings in hard cover binders. Include copy of photographs on compact disc (CD).

.2 Moulds

- .1 At the completion of the new bronze fabrication, transfer the reusable models and/or moulds employed in the fabrication of new elements to the Departmental Representative. Rubber moulds shall be provided set within their mother moulds and filled with plaster to preserve their shape during storage.

1.5 REGULATORY REQUIREMENTS/SAFETY REQUIREMENTS

- .1 Comply with the requirements of Section 01 00 10 for the disposal of waste materials.
- .2 Comply with the requirements of Section 01 35 30 – Health and Safety Requirements.
- .3 Provide mechanical ventilation, protective clothing, protective enclosures and other equipment required to ensure the health and safety of the workers and the public.

1.6 SAMPLES/MOCK-UPS

- .1 Cleaning, Spot Patination, Coating Testing/Sample Panels, glass lens, plexiglas shades:
 - .1 Coordinate all repair panels and mock-ups with the phasing and/or performance schedule defined in the RFP Statement of Work.
 - .2 Within seven (7) days of the contract award, the contractor shall submit all required documentation and begin preparation for all sample panels and mock-ups. Do not proceed with implementation of mock-ups prior to acceptance of submittals. Submit proposed locations for mock-ups for approval prior to implementation.
 - .3 After submittal and approval of product literature and prior to the start of treatments prepare the following sample mock-up panels at locations approved by the Departmental Representative.
 - .1 Clean a sample panel of each specified procedure, using the methods, materials and working pressures specified and according to the approved submittals.
 - .2 Mock-ups MUST be performed in the presence of the Departmental Representative. Adjust the chemical concentrations and methodologies during mock-ups as directed by the Departmental Representative.
 - .3 Results of the mock-ups will determine the materials, chemical concentrations, dwell time, water and micro-abrasive pressures, and laser procedures and other factor to be used for all of the specified work.
- .2 Protection: Prepare a mock-up using methods and materials proposed for protection of surrounding materials and vegetation. Protection must be capable of protecting adjacent stone from damage during all work on the bronzes. Test for effectiveness during the test cleaning in the presence of the Departmental Representative. Use actual cleaning materials and working pressures to test protective coverings.
- .3 Cleaning: Prepare an approximately 150mm x 300mm mock-up sample demonstrating the results of each sequential step of cleaning using the specified/proposed materials and methodology. Prepare samples on relatively concealed portions of the sculpture, selected

in coordination with the Departmental Representative. Adjust the materials and methodologies during sample preparation to determine those which most effectively achieve the desired level of cleaning without harm to the bronze. Approved results of the sample preparation and review will dictate the final materials and methodology to be used for the work. Prepare samples in the presence of the Departmental Representative. Obtain written approval of cleaning methods, working pressures, materials, equipment used and sample panels before proceeding with the work.

- .4 Repairs: Submit proposed locations for each type of repair including new weep holes, crack repair, seam repair, pitting repair, and hole repair using the materials and methods specified and those proposed by the Conservator. Prepare mock-ups of individual repairs as directed by the Departmental Representative on sample material for approval prior to commencing work on the monument.
- .5 Patination: Prepare 2 (two) approximately 150mm x 150mm sample areas for each patination technique required to achieve the required colouring. Locate samples in concealed locations on the sculpture/element selected in coordination with the Departmental Representative.
- .6 Hot Wax Coating: Prepare an approximately 150mm x 150mm sample area of the hot wax coating over 1 (one) of the patination sample areas.
- .7 New Bronze Elements: Using the full scale models of the replacement elements, prepare mock-ups of the completed installation for visual approval and approval of the proposed installation/anchorage methods and anchorage locations.
- .8 The Conservator and Patineur shall obtain written acceptance of cleaning methods, protection methods, patination, waxing and repair materials and methods, equipment and sample panels before proceeding with the conservation work.
- .9 Accepted panels and cleaning materials and procedures will become the standard for review of the work of this section.
- .10 Bronze Lamp Door Reinstallation: Provide mock-up of reinstalled door for lamp no. 4 to include: glass lens, stops, interior plexiglass lens, pivots, catches, weatherstripping, for review and approval by the Departmental Representative. This may remain in place on approval of the Departmental Representative.
- .11 Additional samples shall be prepared at no additional cost until the work is accepted.

1.7 TESTING

- .1 The Conservator is responsible for the following testing:
 - .1 Flagpole finial: Test the bronze substrate on the underside of the truck mechanism on the east flagpole finial to determine if chloride corrosion products are present.
 - .1 Bielstein Test: Clean the surface of the underside of the truck with a bronze brush to remove surface residue and expose any potential chloride pits. Subject the surface to a propane flame. If a green flame is created, it is a positive indication of the presence of chlorides.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 00 10 – General Instructions, supplemented as follows:
 - .1 Materials to be used shall be in the manufacturer's original and unopened containers and packaging, bearing labels as to the type of material, brand name

and manufacturer's name. Materials used in the work shall be identical to the submitted, tested and accepted materials.

- .2 Store chemicals in closed containers in temperature controlled areas.
- .3 Store patination chemicals in CSA approved acid storage cabinets.
- .4 Maintain MSDS for all chemicals used on the project as required at the storage site.
- .5 Display all required signage identifying the chemicals, hazards and safety requirements at the site.
- .6 Follow the manufacturer's precautions for handling and disposal.
- .7 Limit on-site storage of solvent based products or other volatile materials to the quantities needed for one day's work.
- .8 No flammable materials are to be stored overnight on-site.
- .9 Store materials off the ground in a dry, clean location. Remove materials which are damaged or otherwise not suitable for use from the job site.
- .10 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

1.9 ENVIRONMENTAL REQUIREMENTS

- .1 Work will be performed during daylight hours only, and comply with the requirements of Section 01 00 10 for hours of work.
- .2 Apply wax coatings only when the temperature of the air and metal surfaces is no less than 10 degrees C. Maintain a constant temperature and humidity within this range for the duration of the coating of the bronze.
- .3 Collect and dispose of used cleaning materials and products immediately below and local to the area of treatment or cleaning. Prevent run off and absorption of water, chemicals into masonry below work area.
- .4 Collection and disposal system to approval of Departmental Representative at each set up location.

PART 2 PRODUCTS

2.1 BRONZE

- .1 Existing bronze: Sculptural elements, flagpoles, torchères and lamps are considered significant. Bronze shall be handled and treated with extreme care and shall be secured against damage or theft at all times.
- .2 New bronze: New bronze castings to match existing bronze. Alloy to be determined through approval of samples submitted by Conservator as per paragraph 1.7.5.

2.2 LOW-PRESSURE WATER CLEANING (LP WC)

- .1 Cleaning Medium: Water blasting.
- .2 Water: Clean potable water delivered through both a 20 micron paper filter and a 5 micron charcoal filter.
- .3 Cleaning Equipment: Low pressure water spray delivery system, pressure adjustable from 1000 to 5000 psi at 15.1 litres/min equipped with a rotating spin nozzle and 15-25 degree spray nozzles. Equipment shall have intact calibrated pressure gauges that measure water pressure at the wand.

2.3 DETERGENT/SURFACTANT

- .1 Non-Ionic, pH neutral in solution with warm potable water or approved equal.

2.4 SOLVENT

- .1 Solvent to be naphtha, Stoddard solvent or mineral spirits.

2.5 PAINT STRIPPER

- .1 Stripper to be a solvent-based pH neutral gelled paint stripper.

2.6 BRONZE PATINATION AGENTS

- .1 Aqueous solutions of one or several of the following compounds: ammonium sulfide, potassium sulfide, potassium permanganate, ferric nitrate, cupric nitrate, or copper sulfate. Determine solution concentrations and sequence of application during testing and mock-up approval.

2.7 CORROSION INHIBITOR

- .1 Vapour Phase Corrosion Inhibitor (VPCI) suitable for use on bronze and as an additive to the protective wax.
- .2 Properties: appearance – clear yellow; 70-75% non-volatile content; pH 7.0-9.0 (1% aqueous); density 0.89-0.91 kg/l.
- .3 Compatible with antioxidants and hydro-carbon-based additives.

2.8 WAX

- .1 Hot-applied wax: A custom mixed formula consisting of 70% by weight microcrystalline wax 77 C melting point (Victory Brown or equal), 14% C polymer wax 93 C melting point (Petronauba C or equal), 16% polyethylene wax 113 C melting point (Polywax 1000 or equal) with an additional 5% of Vapour Phase Corrosion Inhibitor. Add solvent (naphtha, Stoddard solvent or mineral spirits) as needed to melted wax to produce a workable paste.
- .2 Cold-applied paste wax: Johnson's Paste Wax, Tre-Wax or approved equivalent carnauba paste wax.

2.9 MISCELLANEOUS MATERIALS

- .1 Fasteners: Bronze or brass rivets, screws, bolts, or pins of the size and type to match the original fasteners found in the bronze work and as needed to secure loose or new elements.
- .2 Bronze Filler: Two-part bronze filled epoxy based putty material specifically formulated for repair of metals. Color shall match the colour of the patinated bronze.
- .3 Bronze Rods: Silicon bronze threaded rod, diameter as required to fill a particular hole.
- .4 Other: Use natural bristle brushes, mild abrasive nylon scrubbing pads, clean cotton waste, orange sticks, hand sprayers, and fine grit sandpaper or cloth as needed to aid in the conservation work. Sheet metal flashing used as a heat shield during patination shall be new and free of wax or other contaminants.
- .5 Zinc dust: 98.0% minimum metallic zinc dust
- .6 B-72 acrylic resin: methyl-methacrylate copolymer in acetone
- .7 Self-adhesive, closed cell neoprene weatherstripping, nominally 3mm thick x 3mm wide, black in colour for use in weatherstripping doors on bronze lamps.

- .8 Glazing putty. Linseed oil based, for setting curved opaque glass lens in bronze lamp.

2.10 OPAQUE GLASS LENS FOR BRONZE LAMPS

- .1 Curved opaque glass lens to sizes indicated to replace cracked lens on bronze lamps to ASTM C1464-06.
- .2 Obtain glass lens held in storage for Lamp 4 restoration from Departmental Representative

2.11 PLEXIGLAS SHADE FOR TORCHÈRES

- .1 Provide plexiglass shades to replace broken/deteriorated shades on torchères as indicated.

3 EXECUTION

3.1 SUMMARY

- .1 Furnish all labor, materials, tools, equipment and services necessary for and reasonably incidental to complete the conservation of exterior bronzes at the building and site, including but not limited to the following:
 - .1 Review background documentation of the components which will be made available by the Departmental Representative.
 - .2 On-site conservation to include cleaning, repair, patination, and application of protective coatings of the bronze statue of Louis St-Laurent; bronze bases and decorative mast tops of two flagpoles; bronze statues of Veritas (Truth) and Justitia (Justice); two bronze torchères; and seven of eight (the eighth will be removed off site for restoration and relamping) bronze light standards located on the east and the west terrace walls.
 - .1 The cleaning shall remove all loose corrosion products and staining from the bronze while retaining any remaining original patina. Cleaning to bright metal is not required.
 - .2 An even, medium- to dark statuary brown colour, (ASTM/BMHA A156.18 Materials and Finishes Standard 623-624), guided by any areas with remaining original patina and consistent with the artist's original intent, shall be achieved through chemical spot patination of the bronze without pigmentation of the finish coatings.
 - .3 Coat exposed bronze surfaces with a custom formulated hot applied wax-paste wax system and buff.
 - .3 Removal of incompatible previous repairs, damaged bronze elements, and all ferrous metal elements and anchors.
 - .4 Fabrication, finishing, patination, coating and installation of various missing/damaged and previously repaired bronze elements as shown on the Drawings. Replacement elements shall be fabricated from bronze alloys that closely match the original in composition and colour. No testing of materials for alloy analysis. New elements shall be secured using bronze screws, rivets, and pins, with no or very limited brazing, following original fabrication techniques wherever feasible.
 - .5 Providing protection of the surrounding granite base and paving and protection of plant materials adjacent to the work area during performance of any work under

this section. Contractor is responsible to restore to the Departmental Representative's satisfaction any damage that results from the work.

- .1 Providing scaffolding or access equipment as needed to perform any work under this section.
- .2 Preparation of a written and illustrated Conservation Treatment Report documenting all materials and procedures used to complete the bronze conservation.

3.2 PROTECTION

- .1 Install temporary protection at all stone and paving in the work area to prevent staining or damage during the performance of the work. Protection shall protect from impact damage, cleaning, patination, and coating materials and processes. Install and maintain shields at bases and edges of bronzes that abut stones to protect the stones from excess heat during patination.
- .2 Enclose work areas with fences and barricades as needed to protect the public and prevent un-authorized persons from entering the work area.

3.3 TORCHÈRES

- .1 Torchères may be removed to an off-site workshop for restoration of bronze on approval of the Departmental Representative. Ensure power has been safely disconnected, dismantle and detach wiring, by Division 26 under direction of bronze conservator, remove, protect and crate, and transport to workshop for restoration. Cap bases with weather tight enclosures until the torchères are restored and reinstalled. Restore torchères, protect and crate, return to site and reinstall. Connection to power by Division 26 under direction of the bronze conservator.

3.4 CORROSION REMOVAL

- .1 Use one of the following cleaning methods to remove all loose and/or esthetically inappropriate corrosion products from the surface of the bronze without removal of any remaining original patina. Cleaning to bright metal is not required or desirable; however, the bronze must be cleaned to the point that an even colour consistent with the artist's original intent for appearance can be achieved during spot-patination. The final method is to be determined by the Conservator and Patineur in consultation with the Departmental Representative, and as determined most effective during sample/mock-up preparation.
- .2 If Bielstein Test results confirm the presence of chlorides on the underside of the east flagpole finials, the following procedures are to be followed:
 - .1 It may be necessary to scrape off 'scabs' or hard residue from the underside of the truck mechanism, then water blast to flush out chlorine pits. Only proceed following consultation with the Departmental Representative.
 - .2 Test the surface again with a propane torch to ensure no further chlorides are present. Continue cleaning until flame does not turn light green.
 - .3 Fill all pits in the surfaces with zinc dust. Pack zinc dust in tightly (compressing with small wood sticks) in the manner of a dentist filling a cavity in a tooth. Lightly brush after packing to remove any zinc dust that does not adhere. Then seal each zinc-packed pit with B-72 resin.

3.5 BRONZE CLEANING

- .1 Preparation: Remove all non-bronze anchors, sealants, caulking, fillers, epoxy, prior ferrous metal repairs and ferrous metal or damaged elements prior to cleaning. Use care

during removals not to increase the area of damage by overrunning original surface during drilling, grinding or cutting work necessary to remove previous repairs. Remove surface dirt and debris from the surface of the bronze if necessary with detergent or non-ionic surfactant, clean water and soft natural bristle brushes and rinse.

- .2 Select appropriate cleaning means and methods after testing and Departmental Representative's approval of mock-ups. Apply one or more of the following methods depending on the results of the testing:
- .3 Solvent:
 - .1 Apply solvent poultices and/or pH neutral solvent-based paint strippers to areas coated with wax or lacquer and allow to dwell as needed to dissolve the remaining coating(s). Remove all residues by rinsing with steam jetting at 500 psi nozzle pressure, 40° fan tip. Maintain consistent dwell time and tip-to-surface distance and cleaning patterns throughout procedures. Repeat as needed to remove all wax and coating residues.
 - .2 Wash bronze with detergent and/or approved nonionic surfactant in clean water applied with natural bristle brushes and rinse. Run-off should be collected and disposed of in accordance with applicable hazardous waste legislation.
- .3 Water Cleaning:
 - .1 Clean all exposed bronze surfaces using low pressure water cleaning (LP WC), 1,000 to 5,000 psi water blasting. Use pressure(s) determined optimum during sample preparation.
 - .2 Cleaning shall remove all coatings and loose surface oxidation to expose the original patina. Select tips including rotating nozzles depending on surface configuration and condition revealed after cleaning. Maintain consistent angle, tip-to-surface distance, dwell time and overlap cleaning passes to ensure even cleaning. Clean bronze surfaces of all powdery or loosely adhered corrosion products and surface soiling. DO NOT clean to bare/bright metal. Do not scratch, abrade or otherwise remove the surface of the metal. Cleaned metal shall have no apparent directional finish, with even colouration.
- .4 The intent of the cleaning is to remove all dirt and corrosion products from the bronze without damage to the metal, any existing original patina or alteration of casting details. Cleaning materials and methods shall not remove any of the metal below the corrosion layer.
- .5 Use only the approved cleaning materials and equipment in accordance with the manufacturer's recommendations. Do not vary methods from those used in the approved mock-ups without approval of the Departmental Representative. Cleaning may only occur by, or under the direct on-site supervision of the Conservator.
- .6 Surfaces shall be evenly cleaned without nozzle pattern or shadowing. Cleaning shall evenly reach all corners, undercuts, all back faces, surfaces of raised decorations, etc. and leave no residue on the metal.

3.6 REPAIRS

- .1 Remove all prior ferrous metal repairs, if present, and anchors from the bronze prior to cleaning.
- .2 Anchors: Re-anchor loose elements of the bronze work with bronze or brass or stainless steel anchors of the same size, shape and function. Install new anchors after cleaning unless missing anchors could result in damage.

- .3 Cracks and Seams: Close cracks and seams by carefully peening and chasing the edges of the cracks wherever planar misalignment exists and where feasible. Peening should not deform the visible faces of the sculpture excessively. Carefully compress the edges of cracks by hammering with chasing tools, pushing the metal towards the crack to close it. Work both sides of cracks evenly if possible. Maintain existing profiles, finishes and textures. Fill open cracks and seams larger than 3mm and those that cannot be peened with pigmented epoxy fillers. Fully fill the open cracks and seams for the full thickness of the metal. Level the surface and sand after curing to conform to the contours of the metal. Fill metal after cleaning, patination and the corrosion inhibitor application.
 - .1 Holes: Fill small holes with pigmented epoxy filler. Fill larger holes with threaded bronze rod. Where rod is used, drill out the hole slightly smaller than the diameter of the threaded rod. Tap the hole with the appropriate thread size and screw the threaded rod securely in place for the full thickness of the bronze and with no perimeter gaps. Level the surface of the rods slightly proud of the surface of the bronze, peen and hand finish to conform to the contours of the surrounding bronze. Fill holes after cleaning, patination and the corrosion inhibitor application. Patinate bronze/brass rod fillers to match the adjacent metal colour.
 - .2 Weep Holes: Where the configuration of the sculpture allows rainwater to collect and pond, the intent is to drip small weep holes in the bronze to promote drainage and reduce standing water. Drill 8mm diameter weep holes at the lowest point of the location where water collects, through the full thickness of the bronze casting. Submit locations for weep holes for Departmental Representative's approval prior to commencing drilling.

3.7 PATINATION

- .1 Install and maintain protection as needed to ensure no runoff of patina chemicals, or wax onto stone.
- .2 Follow the cleaning process immediately with application of patinating agents where and as necessary to achieve an even medium to dark brown statuary colour (ASTM/BMHA A156.18 Materials and Finishes Standard 623-624), guided by any areas with remaining original patina and consistent with the artist's original intent, that matches the accepted sample. The patina shall be applied only by, or under the on-site supervision of the approved Patineur using traditional hot solution methods. Apply the patina evenly without streaking, smudging or splotchiness.
- .3 The goal will not be the re-coloring of the sculptures but the moderation of the disfiguring streaking to provide a more unified weathered appearance. The goal will be to localize the applications to only those areas needed to minimize the visual disruption of the forms by the streaking.

3.8 CORROSION INHIBITOR

- .1 Immediately follow patination with spray application of corrosion inhibitor.

3.9 WAXING

- .1 Hot-applied Wax:
 - .1 The surface of each sculpture will be heated to the flow temperature of the wax with propane torches. The wax will be brushed onto the heated surface, melted by the metal itself, and spread to an even thickness using brushes and cotton rags. Each sculpture will be fully coated and allowed to cool before commencing a second application. Two coats of the hot wax will be applied following the same methods.

- .2 Cold-applied Wax:
 - .1 A final cold applied paste wax will be brushed on the surface, allowed to dry and buffed with clean, lint-free, dampened cotton rags. All adjacent surfaces will be protected from damage and excess wax during this work.

3.10 NEW BRONZE ELEMENTS

- .1 Fabrication: Based upon on site measurement and moulding of existing elements, prepare full size models and moulds for each unique missing/damaged/inappropriate element. A list of missing/damaged/ inappropriate elements to be fabricated as scheduled in the Drawings. Models shall be oversized as needed to allow for shrinkage during casting. Cast or manufacture the new elements from bronze alloy similar to the original bronze and as is appropriate to the location and element configuration. The colour of the new metal shall match the adjacent bronze as closely as possible. Tool and chase the casting to replicate the finish level of the sculpture prior to weathering. Do not leave sanding or moulding marks on casting.
- .2 Finishing: Patinate, treat with corrosion inhibitor and coat the new elements to match the adjacent sculpture surfaces prior to installation.
- .3 Installation: Anchor new elements with bronze rivets, pins or screws. Patinate the new anchors to match the surrounding metal and coat with wax.

3.11 BRONZE LAMP NO. 4 RESTORATION

- .1 Provide access and work platforms to do work.
- .2 Assess lamp and provide report to Departmental Representative for review and approval, on the approach and procedures needed to remove, restore and relamp and reinstall. Include lamping specifications, sequencing, attachments and who will be responsible for these tasks. Detail crating, transport, and protection plans.
- .3 Provide details on the workshop where the lamp will be taken to off-site for restoration and relamping, for review and approval by the Departmental Representative.
- .4 On approval, proceed with restoration process.
- .5 Coordinate with Departmental Representative to ensure power is shut-off prior to commencing work.
- .6 Clean out interior of the lamp to remove debris and expose anchorage.
- .7 Remove lamp, protect, crate and transport to workshop.
- .8 Provide temporary weather-tight covering over stone pillar to protect it while the lamp is restored.
- .9 Dismantle, restore, relamp and reassemble lamp.
- .10 For curved opaque glass lens, after door frames are restored, re-install on continuous bed of glazing putty. Install additional glazing putty between glass and bronze glass stops.
- .11 Install closed cell neoprene weather-stripping on to seal perimeter of door openings. Trim and cut down neoprene to fit.
- .12 Relamp the light fixture, coordinating with Section 26 05 00 – Common Work Results for Electrical.
- .13 Allow for inspections and approval by Departmental Representative.
- .14 After restoration and relamping are completed, inspected and approved by the Departmental Representative, return to site and reinstall.

- .15 Remove weathertight protection, confirm power is shut off, and reinstall lamp.
- .16 Test in presence of the Departmental Representative that the lamp functions. If the lamp does not function redo work until lamp functions and is accepted by the Departmental Representative.
- .17 On acceptance by the Departmental Representative, clean up and remove access.

3.12 PROTECTION

- .1 Protect cleaned and finished metal from damage until final installation is complete. Provide temporary enclosures and coverings as may be required to protect the wax coatings from heat and abrasion.
- .2 Remove temporary protection, protective coatings, and residue left by same. Repair any damage to materials resulting from the work.
- .3 Protect completed work until final acceptance.
- .4 Vacuum and clean area to remove all metal shavings or filings after installation of new castings.
- .5 Restore any metal finishes that are damaged during transport or installation. Repair shall be invisible, or entire unit shall be refinished to the satisfaction of the Departmental Representative.

END OF SECTION