

SECTION 04901 - CLAY MASONRY RESTORATION AND CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes restoration and cleaning of **brick** as follows:
 - 1. Repairing clay masonry, including replacing damaged units.
 - 2. Reanchoring veneers.
 - 3. Repointing mortar joints.
 - 4. Removing plant growth.
- B. Related Sections include the following:
 - 1. Division 4 Section "Unit Masonry Assemblies" for new clay masonry construction.
 - 2. Division 7 Section "Sheet Metal Flashing and Trim" for metal flashing installed in or on restored clay masonry.
 - 3. Division 7 Section "Joint Sealants" for sealing joints in restored clay masonry.

1.3 DEFINITIONS

- A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.
- B. Medium-Pressure Spray: 400 to 800 psi; 4 to 6 gpm.
- C. High-Pressure Spray: 800 to 1200 psi; 4 to 6 gpm.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
- B. Samples for Verification: Before erecting mockup, submit samples of the following:
 - 1. Each type of exposed masonry unit to be used for replacing existing units.
 - a. For each brick type, provide straps or panels containing at least four bricks.
- C. Qualification Data: For **restoration specialists**.

- D. Restoration Program: For each phase of restoration process, provide detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of restoration work including protection of surrounding materials on building and Project site.
- E. Cleaning Program: Describe cleaning process in detail, including materials, methods, and equipment to be used and protection of surrounding materials on building and Project site, and control of runoff during operations.
 - 1. If materials and methods other than those indicated are proposed for cleaning work, provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.5 QUALITY ASSURANCE

- A. Restoration Specialist Qualifications: Engage an experienced masonry restoration and cleaning firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.
 - 1. At Contractor's option, work may be divided between two specialist firms: one for cleaning work and one for repair work.
 - 2. Restoration Worker Qualifications: Persons who are experienced in restoration work of types they will be performing.
- B. Chemical Manufacturer Qualifications: A firm regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory-trained representatives who are available for consultation and Project-site inspection and assistance at no additional cost.
- C. Source Limitations: Obtain each type of material for masonry restoration (face brick, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry units to Project site strapped together in suitable packs or pallets or in heavy-duty cartons.
- B. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- E. Store lime putty covered with water in sealed containers.

- F. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.7 PROJECT CONDITIONS

- A. Repoint mortar joints and repair masonry only when air temperature is between and 40 and 90 deg F and is predicted to remain so for at least 7 days after completion of work.
- B. Cold-Weather Requirements: Comply with the following procedures for masonry repair and mortar-joint pointing:
 - 1. When air temperature is below 40 deg F, heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F.
 - 2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 7 days after repair and pointing.
- C. Hot-Weather Requirements: Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 90 deg F and above.
- D. Patch masonry only when air and surface temperatures are between and 55 and 100 deg F and are predicted to remain above 55 deg F for at least 7 days after completion of work. On days when air temperature is predicted to go above 90 deg F, schedule patching work to coincide with time that surface being patched will be in shade or during cooler morning hours.
- E. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least 7 days after completion of cleaning.

1.8 SEQUENCING AND SCHEDULING

- A. Order replacement materials at earliest possible date, to avoid delaying completion of the Work.
- B. Perform masonry restoration work in the following sequence:
 - 1. Remove plant growth.
 - 2. Repair existing masonry, including replacing existing masonry with new masonry materials.
 - 3. Rake out joints that are to be repointed.
 - 4. Point mortar joints.
 - 5. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
 - 6. Remove paint.
 - 7. Clean masonry surfaces.
 - 8. Rake out joints that are to be repointed.
 - 9. Point mortar joints.

- C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units to comply with Part 3 "Masonry Unit Patching" Article. Patch holes in mortar joints to comply with Part 3 "Repointing Masonry" Article.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
 - 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 MASONRY MATERIALS

- A. Face Brick and Accessories: Provide face brick and accessories, including specially molded, ground, cut, or sawed shapes where required to complete masonry restoration work.
 - 1. Provide units with colors, surface texture, size, and shape to match existing brickwork and with physical properties not less than those determined from preconstruction testing of selected existing units.
 - a. For existing brickwork that exhibits a range of colors, provide brick that matches that range rather than brick that matches an individual color within that range.
 - 2. Provide units with colors, surface texture, and physical properties to match Architect's sample. Match existing units in size and shape.
 - a. For sample that exhibits a range of colors, provide brick that matches that range rather than brick that matches an individual color within that range.
- B. Building Brick: Provide building brick complying with ASTM C 62, of same vertical dimension as face brick, for masonry work concealed from view.
 - 1. Grade SW where in contact with earth.
 - 2. Grade SW, MW, or NW for concealed backup.

2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II.
 - 1. Provide white cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

- B. Hydrated Lime: ASTM C 207, Type S.
- C. Quicklime: ASTM C 5, pulverized lime.
- D. Factory-Prepared Lime Putty: Screened, fully-slaked lime putty, prepared from pulverized lime complying with ASTM C 5.
- E. Mortar Sand: ASTM C 144, unless otherwise indicated.
 - 1. Color: Provide natural sand; of color necessary to produce required mortar color.
 - 2. For pointing mortar, provide sand with rounded edges.
 - 3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands, if necessary, to achieve suitable match.
- F. Water: Potable.

2.4 PAINT REMOVERS

- A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste formulation for removing paint coatings from masonry.
 - 1. Products:
 - a. American Building Restoration Products, Inc.; 800 Brush Grade.
 - b. Diedrich Technologies Inc.; 606/606X Extra Thick Multi-Layer Paint Remover.
 - c. Hydrochemical Techniques, Inc.; Hydroclean Heavy Duty Paint Remover (HT-716).
 - d. Price Research, Ltd.; Price Heavy Duty Paint Stripper.
 - e. ProSoCo; Sure Klean Heavy-Duty Paint Stripper.
- B. Covered or Skin-Forming Alkaline Paint Remover: Manufacturer's standard covered or skin-forming alkaline formulation for removing paint coatings from masonry.
 - 1. Products:
 - a. American Building Restoration Products, Inc.; Grip 'N Strip 800 F.A.
 - b. Diedrich Technologies Inc.; 404 Rip-Strip.
 - c. Dumond Chemicals, Inc.; Peel Away 1 System.
 - d. ProSoCo; Enviro Strip #2.
- C. Solvent-Type Paint Remover: Manufacturer's standard water-rinsable, solvent-type gel formulation for removing paint coatings from masonry.
 - 1. Products:
 - a. American Building Restoration Products, Inc.; No. 3 Grip 'N Strip.
 - b. Diedrich Technologies Inc.; 505 Special Coatings Stripper.
 - c. Dominion Restoration, Inc.; Dominion Multi-Layer Paint & Graffiti Remover.
 - d. Dumond Chemicals, Inc.; Peel Away 2.
 - e. Hydrochemical Techniques, Inc.; Hydroclean Solvent Paint Remover (HT-300).
 - f. Price Research, Ltd.; Price Strip-All.

- g. ProSoCo; Sure Klean Fast Acting Paint Stripper.

2.5 CLEANING MATERIALS

- A. Water for Cleaning: Potable.
- B. Hot Water: Heat water to a temperature of 140 to 160 deg F.
- C. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium polyphosphate (TTSP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. (20 L) of solution required.
- D. Nonacidic Gel Cleaner: Manufacturer's standard gel formulation, with pH between 6 and 9, that contains detergents and chelating agents and is specifically formulated for cleaning masonry surfaces.
 - 1. Products:
 - a. Price Research, Ltd.; Price Marble Cleaner-Gel.
 - b. ProSoCo; Sure Klean 942 Masonry Cleaner.
- E. Nonacidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.
 - 1. Products:
 - a. Dominion Restoration, Inc.; Bio-Cleanse.
 - b. Dumond Chemicals, Inc.; Safe n' Easy Architectural Cleaner/Restorer.
 - c. Price Research, Ltd.; Price Non-Acid Masonry Cleaner.
 - d. ProSoCo; Enviro Klean Restoration Cleaner.
- F. Mild Acidic Cleaner: Manufacturer's standard mildly acidic cleaner containing no hydrochloric, hydrofluoric, or sulfuric acid; or chlorine bleaches.
 - 1. Products:
 - a. Diedrich Technologies Inc.; Envirostore 100.
 - b. Dominion Restoration, Inc.; DR-60 Stone and Masonry Cleaner.
 - c. Dumond Chemicals, Inc.; Safe n' Easy Heavy Duty Restoration Cleaner.
 - d. ProSoCo; Sure Klean Light-Duty Restoration Cleaner.

2.6 MISCELLANEOUS MATERIALS

- A. Masonry Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching masonry, is vapor- and water permeable, exhibits low shrinkage, and develops high bond strength to all types of masonry.
 - 1. Formulate patching compound used for patching brick in colors and textures to match brick being patched.

- B. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.
1. Products:
 - a. American Building Restoration Products, Inc.; LM 130 Acid Shield.
 - b. Diedrich Technologies Inc.; Diedrich Acid Guard.
 - c. Price Research, Ltd.; Price Mask.
 - d. ProSoCo; Sure Klean Strippable Masking.
- C. Masonry Repair Anchors, Expansion Type: Mechanical fasteners designed for masonry veneer stabilization consisting of 1/4-inch diameter, Type 304 stainless-steel rod with brass expanding shells at each end and water-shedding washer in the middle. Expanding shells shall be designed to provide positive mechanical anchorage to veneer on one end and backup masonry on the other.
1. Products:
 - a. Dur-O-Wal, a Dayton Superior Company; Mechanical Repair Anchors.
 - b. Hohmann & Barnard, Inc.; #521RA Repair/Restoration Anchor.
- D. Masonry Repair Anchors, Spiral Type: Type 304 stainless-steel spiral rods designed to anchor to backing and veneer. Anchors are flexible in plane of veneer but rigid perpendicular to it.
1. Provide adhesive-installed anchors complete with manufacturer's standard epoxy adhesive and injection tubes, screens, sleeves, or other devices required for installation.
 2. Provide driven-in anchors designed to be installed in drilled holes and relying on screw effect rather than adhesive to secure them to backup and veneer.
 3. Products:
 - a. Dur-O-Wal, a Dayton Superior Company; Dur-O-Flex.
 - b. Heckmann Building Products, Inc.; #391 Spiro Remedial Tie.
 - c. Helifix Ltd.; **Helifix HRT60**.

2.7 MORTAR MIXES

- A. Preparing Lime Putty: Slake quicklime and prepare lime putty according to appendix to ASTM C 5 and manufacturer's written instructions.
- B. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

- C. Do not use admixtures of any kind in mortar, unless otherwise indicated.
- D. Mortar Proportions: Mix mortar materials in the following proportions:
 - 1. Pointing Mortar for Brick: **1 part portland cement, 2 parts lime, and 6 parts sand**
 - 2. Rebuilding (Setting) Mortar: Comply with ASTM C 270, Proportion Specification, Type N, unless otherwise indicated; with cementitious material content limited to portland cement and lime.

2.8 CHEMICAL CLEANING SOLUTIONS

- A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical cleaner manufacturer.
- B. Acidic Cleaner Solution for Brick: Dilute with water to produce hydrofluoric acid content of 3 percent or less, but not greater than that recommended by chemical cleaner manufacturer.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.
 - 1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.
- B. Comply with chemical cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
 - 1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. 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.
 - 2. Keep wall wet below area being cleaned to prevent streaking from runoff.
 - 3. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
 - 4. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
 - 5. Dispose of runoff from cleaning 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.
- C. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and projections to protect from mortar droppings.
 2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
 3. Immediately remove mortar in contact with exposed masonry and other surfaces.
 4. Clean mortar splatters from scaffolding at end of each day.
- D. Remove downspouts adjacent to masonry and store during masonry restoration and cleaning. Reinstall when masonry restoration and cleaning is complete.

3.2 UNUSED ANCHOR REMOVAL

- A. Remove masonry anchors, brackets, wood nailers, and other extraneous items no longer in use unless identified as historically significant or indicated to remain.
1. Remove items carefully to avoid spalling or cracking masonry.
 2. If item cannot be removed without damaging surrounding masonry, cut off item flush with surface and core drill surrounding masonry and item as close around item as practical.
 3. Patch holes where items were removed unless directed to remove and replace units.

3.3 BRICK REMOVAL AND REPLACEMENT

- A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
1. When removing single bricks, remove material from center of brick and work toward outside edges.
- B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
- C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose masonry units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
- D. Remove in an undamaged condition as many whole bricks as possible.
1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 2. Store brick for reuse, as indicated.
 3. Deliver cleaned brick not required for reuse to Owner, unless otherwise directed.
- E. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.
- F. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

- G. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than **30 g/30 sq. in. per min.** Use wetting methods that ensure that units are nearly saturated but surface is dry when laid. Maintain joint width for replacement units to match existing joints.
1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
 2. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing of surrounding area.

3.4 REANCHORING VENEERS

- A. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Install at not more than **16 inches** o.c. vertically and **32 inches** o.c. horizontally, unless otherwise indicated. Install at locations to avoid penetrating flashing.
- B. Recess anchors at least **5/8 inch** from surface of mortar joint and fill recess with pointing mortar.

3.5 CLEANING MASONRY, GENERAL

- A. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other.
- B. Use only those cleaning methods indicated for each masonry material and location.
1. Do not use wire brushes or brushes that are not resistant to chemical cleaner being used. Do not use plastic-bristle brushes if natural-fiber brushes will resist chemical cleaner being used.
 2. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry.
 3. For chemical cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray tip.
 4. For water spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
 5. For high-pressure water spray application, use fan-shaped spray tip that disperses water at an angle of at least 40 degrees.
 6. For heated water spray application, use equipment capable of maintaining temperature between **140 and 160 deg F** at flow rates indicated.
 7. For steam application, use steam generator capable of delivering live steam at nozzle.
- C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.

- D. Removing Plant Growth: Completely remove plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible before removal. Remove loose soil and debris from open masonry joints to whatever depth they occur.
- E. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, calking, asphalt, and tar.
 - 1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.
 - 2. Remove paint and calking with alkaline paint remover.
 - a. Comply with requirements for paint removal.
 - b. Repeat application up to two times if needed.
 - 3. Remove asphalt and tar with solvent-type paint remover.
 - a. Apply only to asphalt and tar by brush without prewetting.
 - b. Allow paint remover to remain on surface for 10 to 30 minutes.
 - c. Rinse off with **cold** water using low-pressure spray.
 - d. Repeat application if needed.
- F. Water Spray Applications: Unless otherwise indicated, hold spray nozzle at least **6 inches** from surface of masonry and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.
- G. Steam Wash: Apply steam to masonry surfaces at pressures not exceeding **80 psi**. Hold nozzle at least **6 inches** from surface of masonry and apply steam in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.
- H. Chemical Cleaner Application Methods: Apply chemical cleaners to masonry surfaces to comply with chemical cleaner manufacturer's written instructions; use brush or spray application methods, at Contractor's option. Do not spray apply at pressures exceeding **50 psi**. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
- I. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.
 - 1. Apply neutralizing agent and repeat rinse, if necessary, to produce tested pH of between 6.7 and 7.5.
- J. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.6 PAINT REMOVAL

- A. Paint Removal with Alkaline Paste Paint Remover:

1. Apply paint remover to dry, painted masonry with brushes.
2. Allow paint remover to remain on surface for period recommended by manufacturer.
3. Rinse with **cold** water applied by **low**-pressure spray to remove chemicals and paint residue.
4. Repeat process, if necessary, to remove all paint.
5. Apply acidic cleaner to masonry, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner remain on surface for period recommended by chemical cleaner manufacturer.
6. Rinse with cold water applied by low-pressure spray to remove chemicals and soil.

B. Paint Removal with Covered or Skin-Forming Alkaline Paint Remover:

1. Apply paint remover to dry, painted masonry with trowel, spatula, or as recommended by manufacturer.
2. Apply cover, if required by manufacturer, per manufacturer's written instructions.
3. Allow paint remover to remain on surface for period recommended by manufacturer or as determined in test panels.
4. Scrape off paint and remover and collect for disposal.
5. Rinse with **cold** water applied by **low**-pressure spray to remove chemicals and paint residue.
6. Use alkaline paste paint remover according to "Paint Removal with Alkaline Paste Paint Remover" Paragraph, if necessary, to remove remaining paint.
7. Apply acidic cleaner to masonry, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner remain on surface for period recommended by chemical cleaner manufacturer.
8. Rinse with cold water applied by **low**-pressure spray to remove chemicals and soil.

C. Paint Removal with Solvent-Type Paint Remover:

1. Apply thick coating of paint remover to painted masonry with natural-fiber cleaning brush, deep-nap roller, or large paint brush.
2. Allow paint remover to remain on surface for period recommended by manufacturer. Agitate periodically with stiff-fiber brush.
3. Rinse with cold water applied by **low**-pressure spray to remove chemicals and paint residue.

3.7 CLEANING BRICKWORK

A. Cold-Water Wash: Use cold water applied by **low**-pressure spray.

B. Cold Water Soak:

1. Apply cold water by intermittent soaking.
2. Use perforated hoses or other means that will apply a fine water mist to entire surface being cleaned.
3. Apply water in cycles with at least 30 minutes between cycles.
4. Continue water application until surface encrustation has softened sufficiently to permit its removal by water wash, as indicated by cleaning tests.
5. Remove soil and softened surface encrustation from masonry with cold water applied by low-pressure spray.

- C. Hot-Water Wash: Use hot water applied by **low**-pressure spray.
- D. Steam Cleaning: Apply steam at pressures not exceeding **80 psi**.
- E. Detergent Cleaning:
1. Wet masonry with **cold** water applied by low-pressure spray.
 2. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that masonry surface remains wet.
 3. Rinse with **cold** water applied by **low**-pressure spray to remove detergent solution and soil.
 4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.
- F. Nonacidic Gel Chemical Cleaning:
1. Wet masonry with [**cold**] [**hot**] water applied by low-pressure spray.
 2. Apply nonacidic gel cleaner in **1/8-inch (3-mm)** thickness by brush, working into joints and crevices. Apply quickly and do not brush out excessively so area will be uniformly covered with fresh cleaner and dwell time will be uniform throughout area being cleaned.
 3. Let cleaner remain on surface for period indicated below:
 - a. As recommended by chemical cleaner manufacturer.
 - b. As established by mockup.
 4. Remove bulk of nonacidic gel cleaner by squeegeeing into containers for disposal.
 5. Rinse with [**cold**] [**hot**] water applied by [**low**] [**medium**] [**high**]-pressure spray to remove chemicals and soil.
 6. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam wash.
- G. Nonacidic Liquid Chemical Cleaning:
1. Wet masonry with **cold** water applied by low-pressure spray.
 2. Apply cleaner to masonry by brush **or low-pressure spray**. Let cleaner remain on surface for period indicated below:
 - a. As recommended by chemical cleaner manufacturer.
 - b. As established by mockup.
 - c. Two to three minutes.
 3. Rinse with **cold** water applied by **low**-pressure spray to remove chemicals and soil.
 4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam wash.
- H. **Mild Acidic** Chemical Cleaning:

1. Wet masonry with cold water applied by low-pressure spray.
2. Apply cleaner to masonry **in two applications** by brush or **low-pressure spray**. Let cleaner remain on surface for period indicated below:
 - a. As recommended by chemical cleaner manufacturer.
 - b. As established by mockup.
 - c. Two to three minutes.
3. Rinse with cold water applied by **low**-pressure spray to remove chemicals and soil.
4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam wash.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam wash.

I. Mild Acidic Chemical Cleaning:

1. Wet terra cotta with cold water applied by low-pressure spray.
2. Apply cleaner to terra cotta[**in two applications**]. Let cleaner remain on surface for period indicated below:
 - a. As recommended by chemical cleaner manufacturer.
 - b. As established by mockup.
 - c. Two to three minutes.
3. Rinse with cold water applied by [**low**] [**medium**] [**high**]-pressure spray to remove chemicals and soil.
4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam wash.

J. Two-Part Chemical Cleaning:

1. Wet terra cotta with [**cold**] [**hot**] water applied by low-pressure spray.
2. Apply alkaline prewash cleaner to terra cotta by brush or roller. Let cleaner remain on surface for period recommended by chemical cleaner manufacturer.
3. Rinse with [**cold**] [**hot**] water applied by medium-pressure spray to remove chemicals and soil.
4. Apply acidic afterwash cleaner to terra cotta[**in two applications**], while surface is still wet, using low-pressure spray equipment, deep-nap roller, or soft-fiber brush. Let cleaner remain on surface for period recommended by chemical cleaner manufacturer.
5. Rinse with cold water applied by medium-pressure spray to remove chemicals and soil.
6. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam wash.

3.8 REPOINTING MASONRY

- A. Rake out and repoint mortar joints to the following extent:

1. All joints in areas indicated.
 2. Joints where mortar is missing or where they contain holes.
 3. Cracked joints where cracks can be penetrated at least **1/4 inch** by a knife blade **0.027 inch** thick.
 4. Cracked joints where cracks are **1/8 inch** or more in width and of any depth.
 5. Joints where they sound hollow when tapped by metal object.
 6. Joints where they are worn back **1/4 inch** or more from surface.
 7. Joints where they are deteriorated to point that mortar can be easily removed by hand.
 8. Joints, other than those indicated as sealant-filled joints, where they have been filled with substances other than mortar.
- B. Do not rake out and repoint joints where not required.
- C. Rake out joints as follows:
1. Remove mortar from joints to depth of **2-1/2 times joint width**, but not less than **1/2 inch** or not less than that required to expose sound, unweathered mortar.
 2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
 3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
 - a. Cut out mortar by hand with chisel and mallet. Do not use power-operated grinders without Architect's written approval based on submission by Contractor of a satisfactory quality-control program and demonstrated ability of operators to use tools without damaging masonry. Quality-control program shall include provisions for supervising performance and preventing damage due to worker fatigue.
 - b. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and mallet. Strictly adhere to written quality-control program. Quality-control program shall include provisions for demonstrating ability of operators to use tools without damaging masonry, supervising performance, and preventing damage due to worker fatigue.
- D. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.
- E. Point joints as follows:
1. Rinse masonry-joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen masonry-joint surfaces before pointing.
 2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than **3/8 inch** until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
 3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than **3/8 inch**. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing bricks have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid

widened joint faces. Take care not to spread mortar over edges onto exposed masonry surfaces or to featheredge mortar.

4. When mortar is thumbprint hard, tool joints to match original appearance of joints. Remove excess mortar from edge of joint by brushing.
- F. Cure mortar by maintaining in thoroughly damp condition for at least 72 hours including weekends and holidays.
1. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
 2. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.
- G. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.9 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.
1. Do not use metal scrapers or brushes.
 2. Do not use acidic or alkaline cleaners.
- B. Wash adjacent woodwork and other nonmasonry surfaces. Use detergent and soft brushes or cloths.
- C. Clean masonry debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
- D. Sweep and rake adjacent pavement and grounds to remove masonry debris. Where necessary, pressure wash surfaces to remove mortar, dust, dirt, and stains.

3.10 FIELD QUALITY CONTROL

- A. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of scaffolding, as needed, to observe progress and quality of portion of the Work completed.

END OF SECTION 04901