SECTION 04903: INJECTION GROUTING

PART 1-GENERAL

1.1 SUMMARY OF WORK

A. Extent of masonry restoration work is as shown on the Drawings and as specified herein.

1. The drawings endeavor to show the extent of masonry restoration work required. The contractor shall review the Drawings, Photographs and make a Pre-bid field visit to verify all work whether shown or not shown on the Drawings.

B. The work includes, but is not limited to: (Examples)

1. Repairing cracks and voids in masonry construction.
2. Repointing mortar joints.

1.2 QUALITY ASSURANCE

A. Restoration Specialist: Work must be performed by a firm having not less than 5 years successful experience in comparable masonry restoration projects and employing personnel skilled in the restoration process and operations indicated.

1. Only skilled journeymen masons who are familiar and experienced with the materials and methods specified and are familiar with the design requirements shall be used for masonry restoration.

2. One skilled journeyman mason, trained and Certified by the specified masonry repair system manufacturer, shall be present at all times during masonry restoration and shall personally direct the work.

B. Field -Construction Mock-ups: Prior to start of general masonry restoration, prepare the following sample panels and sample areas on building where directed by Architect. Obtain Architect's acceptance of visual qualities before proceeding with the work. Retain acceptable panels in undisturbed condition, suitably marked, during restoration as a standard for judging completed work.

1. Cleaning: Demonstrate materials and methods to be used for cleaning for each type of masonry surface and condition with sample panel 4 sq. ft. in area. The cleaning method or methods shall be tested on an inconspicuous area of the building.

2. Crack Repair: Prepare a sample area for each type of crack repair required for masonry. Repair shall demonstrate methods and quality of workmanship expected for crack repair.

3. Repointing: Prepare 2 separate sample areas of approximately 5' high by 5' wide for each type of repointing required, one for demonstrating methods and quality of workmanship expected in removal of mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints. Sample areas shall be located in an inconspicuous yet readily accessible place.

C. Repointing and Grouting work: The samples of each type of repair work shall be done in an area that will be exposed to the same weathering conditions as the building. Allow samples to cure at least seven days before obtaining acceptance of color, texture and detailing match. Samples shall be viewed from an approved distance.

D. Source of Materials: Obtain materials for patching, coating, sealing, crack repair and repointing from a single manufacturer source to ensure match quality, color, texture and detailing.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each product specified. Include test data and certifications substantiating that products comply with requirements.

B. Submit the following items in time to prevent delay of the work and to allow adequate time for review and resubmittals, if needed. Do not order materials or start work before receiving the written approval:

1. Written certificates from the materials manufacturer should be submitted stating that all installers of the material have successfully completed a training workshop for installation of the material, or have met alternative workmanship qualifications acceptable to the manufacturer, or provide written certification from the manufacturer that on-site training services have been contracted for.

2. Safety Data Sheets (SDS) as appropriate.

3. Certificates, except where the material is labeled with such certification, by the producers, of the materials, that all materials supplied comply with all the requirements of these specifications and the appropriate standards.

4. Color-match grout samples fabricated on pieces of appropriate masonry from or on the building using the specified grout as required. A minimum of three color shades shall be provided, representing the range of colors present in the existing masonry. (Color-matching is only required if grout is to be exposed.)

5. Written verification that all specified items will be used. Provided purchase orders, shipping tickets, receipts, etc. to prove that the specified materials were ordered and received.

C. Restoration Program: Submit written program for each phase of restoration process including protection of surrounding material on building and site during operations. Describe in detail material methods and equipment to be used for each phase of restoration work.

D. SUBSTITUTIONS

1. If alternative methods and materials to those indicated are proposed for any phase of restoration work, provide written description, including evidence of at least 10 years' successful use on other, comparable projects, and program of testing to demonstrate effectiveness for use on this project. Provide documentation showing compliance with the requirements for substitutions and the following information:

a. Coordination information, including a list of changes needed to other work that will be necessary to accommodate the substitution.

b. A comparison of the substitution with the specified products and methods, including performance, durability, and visual effect.

c. Product data, including specifications for products and installation procedures.

d. Samples, where applicable, or as requested.

e. A statement indicating the effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the substitution on contract completion time.

f. Cost information, including a proposal of the net change, if any, in the contract sum.

g. Certification that the substitution conforms to the contract documents and is appropriate for the applications indicated. Material substitution requests must be accompanied by independent laboratory test reports from a lab designated by the architect to establish equivalent performance levels and specification compliance. Testing shall be paid for by the submitting party.

h. The Contractor's waiver of rights to additional payment or time that may become necessary because of the failure of the substitution to perform adequately.

1.4 DELIVERY, STORAGE AND HANDLING:

A. Deliver materials to site in manufacturer's original unopened containers and packaging, bearing labels as to type and names of products and manufacturers, color numbers and batch numbers.

B. Deliver and store restoration material in manufacturer's original, unopened containers with the grade, batch and production data shown on the container or packaging.

C. Protect restoration materials during storage and construction from wetting by rain, snow or ground water, and from staining or intermixture with earth or other types of materials.

D. Protect grout, mortar and other materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

F. Comply with the manufacturer's written specifications and recommendations for mixing, application, and curing of grouts and repointing materials.

1.5 PROTECTION / SITE CONDITIONS

A. Protect persons, motor vehicles, building site and surrounding buildings from injury resulting from masonry restoration work.

B. Do not perform any masonry grouting or repointing unless air temperatures are between 50 degrees Fahrenheit (10 deg. C) and 90 degrees Fahrenheit (32 deg. C) and will remain so for at least 48 hours after completion of work.

C. Prevent masonry grouting and repointing materials from staining the face of masonry or other surfaces to be left exposed. Immediately remove all materials that come in contact with such surfaces.

D. Cover partially completed work when work is not in progress.

E. Protect sills, ledges and projections from droppings.

1.6 SEQUENCING / SCHEDULING:

A. Perform masonry restoration work in the following sequence:

1. Repair and/or replace existing roof gutters, flashing, drains and/or leaders as indicated.

2. Remove coatings, stains and foreign material from all masonry surfaces.

3. Rake-out existing mortar from joints of masonry indicated to be restored.

4. Repoint existing mortar joints of masonry indicated to be repointed and properly cure mortars.

5. Perform injection grouting procedure.

6. Repoint grout drill holes with specified repointing mortar.

7. Clean masonry.

PART 2 - PRODUCTS

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2.1 CLEANING MATERIALS:

A. Cleaning products shall be non-ionic, detergent-based masonry building wash. Material shall be non-corrosive, non-toxic, and water soluble.

1. Products: The following shall be assumed to meet the quality and performance requirements specified:

a. “E-Wash 30”, by Edison Coatings, Inc., Plainville, CT, (860)-747-2220, or approved equal.

2.2 MASONRY REPOINTING MATERIALS:

A. Repointing mortar shall be a pre-mixed, pre-colored, custom-matched cement-lime based mixture formulated to comply with the requirements of ASTM C-270 Type __ mortar.

1. Products: The following shall be assumed to meet the quality and performance requirements specified:

a. "SPEC-JOINT 46", by Edison Coatings, Inc., Plainville, CT, (860)747-2220, or approved equal.

b. If proposed equal is submitted, thorough lab testing shall be required to establish equivalent performance levels. An independent testing laboratory shall be utilized as determined by the Architect and paid for by the submitting party.

2.3 CRACK INJECTION MATERIALS

A. Cementitious crack filler shall be an ultra-fine, superplasticized, polymer- modified injection grout. Cementitious grout shall be suitable for application in wet or dry cracks, shall develop direct tensile bond strength of 200 psi minimum, shall exhibit less than 0.06% drying shrinkage, and shall have a linear coefficient of thermal expansion of 0.000004 to 0.000008 inches/inch per degree Fahrenheit.

1. Products: The following shall be assumed to meet the quality and performance requirements specified:

a. PUMP-X 53i/53, as manufactured by Edison Coatings, Inc., Plainville, CT, Phone (860) 747-2220.

PART 3 - EXECUTION

3.1 CLEANING EXISTING MASONRY AND STONE

A. General:

1. Proceed with cleaning in an orderly manner, work from top to bottom of each staging area and from one end of each elevation to the other.

2. Use only those cleaning methods indicated for each masonry material and location.

3. Perform each cleaning method indicated in a manner which results in uniform coverage of all surfaces, including corners, moldings, interstices and which produces an even effect without streaking or damage to masonry surfaces.

4. Rinse off chemical residue and soil working upwards from bottom to top of each treated area at each stage or scaffold setting.

3.2 MASONRY REPOINTING

A. Sealant Removal & Stone Repointing

1. Carefully remove existing sealants from stone joints using approved methods. Damage to edges of stone units must be avoided. Remove sealant to its full depth, and rake back existing masonry mortar beneath the sealants to provide a minimum of 3/4" depth for repointing, or until sound mortar is reached, which ever is greater.

2. Wet surfaces to insure that stone is nearly saturated but surface dry when repointed. Completely fill bed, head and collar joints. Maintain joint width to match existing.

3. When mortar is thumbprint hard, tool exposed mortar joints to match joints of original stonework

3.3 LOCATE AND MARK AREA TO BE REPAIRED / RESTORED

A. Work areas are approximately shown on drawing. Locate areas to be repaired/restored by sounding with a hammer to detect hollow and deteriorated areas.

B. Mark locations using chalk or crayon.

3.9 REPAIRING CRACKS AND VOIDS

A. Prepare cracked area in accordance to manufacturer's written instructions. Typical procedures are outlined in this section and shall be modified according to approved

materials manufacturer. Grouting procedures can vary considerably from one application to another.

1. Loose materials, such as unbonded masonry mortar, loose bricks, or delaminated concrete must be removed and replaced prior to crack injection.
2. Injection holes should be drilled to enable delivery of grout to the full length and depth of the cavity to be filled. For transverse (perpendicular to surface) crack-filling and for void injection, injection holes are typically drilled into the face of the crack at a downward angle to a depth of ½ the masonry thickness. For filling of lateral cracks (parallel to surface, e.g. delaminating layers of sandstone), holes are generally drilled near the top and bottom of the area to be filled, beginning at the upper and lower corners and then every 3-9 inches along the upper and lower edges of the cavity. The lower row may be drilled square with the surface (at 90^{O} to the wall surface).
3. For filling of voids with PUMP X-53, the diameter of the holes drilled may vary with the intended method of grout delivery. For typical delivery by grout pump through ½" pressure hose, a ¾" hole is required.
4. For crack injection with any of the PUMP X-53i-Series products, smaller holes may be drilled. ¼" diameter holes are sufficient for grout delivery through 1/8" diameter tubing.
5. Seal the face of the crack with temporary non-staining clay, sealant, or mortar.
6. All crack and void cavities must be thoroughly flushed with clean water to remove as much dirt, debris, and contaminants as possible and to pre-saturate the areas to be grouted. Continue flushing until clean water runs from the lowest port. A minimum of 20 minutes of pre-wetting should be performed prior to grouting. Repeat pre-wetting if either drying occurs prior to injection or if more than two hours elapse from the time of pre-wetting.
7. Some methods of grouting involve injecting from the lowest port, followed by plugging of the injection port once grout flows from the port above. Other methods involve injection from the upper port, plugging the lower port once grout begins to flow from the port. PUMP X53-Series products are compatible with a variety of good grouting practices and equipment.
8. Thoroughly mix the PUMP-X53-Series product selected, for 4 minutes, using a mortar mixer or slow speed drill. (250-450 rpm, "Jiffy" type mixing tool).
9. Pump X-53i-Series products are typically screened to remove unmixed material, using a common window screen, placed over the grout hopper before injection.
10. Grouting for structural repair should always be performed under the supervision of a licensed structural engineer and an experienced grouting engineer.

B. Crack repair for hairline and microscopic cracks:

1. Sufficiently pre-wet cracks with water.

2. Inject cementitious crack repair material into designated cracks, using syringes, grouting pumps, or other types of injection apparatus suitable for size of crack, distance crack injection material must travel and viscosity of material used. Seal surfaces as required, with non-staining clay or plumbers putty, to prevent crack injection material from leaking out and to facilitate pumping. Take caution not to strain the face of adjacent surfaces.

2. Immediately wipe spills off surfaces with clean, wet rag and allow injection material to cure as required.

C. Crack repair for cracks larger than 1/16" and voids larger that 1/8" mm:

1. Remove loose and spalling materials, cut into crack to a minimum depth of 3/8 inches and a width of 3/16 inch. If embedded reinforcements are rusted then cut-material deep enough to expose the rusting reinforcements and remove material around reinforcement to provide a minimum of 3/4 inch clearance for patch material.

2. Clean and coat exposed reinforcements at patch work with an approved rust-preventative agent.

3. Fill enlarged areas of crack repair with patching material, following repair procedures outlined by manufacture of patching material. Drill injection holes through patching material, once set, according to previous recommendations of this section.

4. Sufficiently pre-wet void to be grouted.

5. Inject cementitious crack repair material into designated injection holes, using syringes, grouting pumps, or other types of injection apparatus suitable for size of crack, distance crack injection material must travel and viscosity of material used. Seal surfaces as required, with non-staining clay or plumbers putty, to prevent crack injection material from leaking out and to facilitate pumping. Take caution not to strain the face of adjacent surfaces.

D. Final Cleaning: No steam cleaning or additional pressure cleaning shall be performed within 28 days of grout or repointing installation. No acid or alkali cleaning agents shall be used except as recommended and/or approved by patch manufacturer.