

SECTION 040322
BRICK MASONRY REPAIR AND REPLACEMENT

PART 1 - GENERAL

1.1 STIPULATIONS

- A. The specifications sections "General Conditions to the Construction Contract", "Special Conditions" and Division 01 – General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 SUMMARY

- A. Section includes work consisting of repairing clay brick masonry as follows:
 - 1. Repairing unit masonry.
 - 2. Removing abandoned anchors.
 - 3. Infilling brick.
- B. Related Requirements:
 - 1. Section 024119 "Selective Demolition" for removal and dismantling work.
 - 2. Section 040120.64 "Brick Masonry Repointing" for repointing joints in brick unit masonry.
 - 3. Section 099000 "Paints and Coatings" for painting interior brick masonry.

1.3 DEFINITIONS

- A. Low-Pressure Spray:
 - 1. Pressure: 100 to 400 psi.
 - 2. Flow Rate: 4 to 6 gpm.
- B. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.
- C. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of bricks to freezing and thawing.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site directly following a biweekly site meeting.
- B. If needed, insert list of conference participants not mentioned in Section 010400 " Coordination and Control."

1. Review minutes of Preliminary Conference that pertain to masonry repair.
2. Review methods and procedures related to repairing brick masonry, including, but not limited to, the following:
 - a. Mason's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, sequencing, tolerances, and required clearances.
 - c. Quality-control program.
 - d. Brick masonry repair program.
 - e. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

- A. Order sand and gray portland cement for colored mortar immediately after approval of mockups. Take delivery of and store in a sufficient quantity to complete Project.
- B. Work Sequence: Perform masonry repair work in the following sequence, which includes work specified in this and other Sections:
 1. Remove plant growth.
 2. Clean masonry.
 3. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
 4. Repair masonry, including replacing existing masonry with new masonry materials.
 5. Rake out mortar from joints to be repointed.
 6. Point mortar and sealant joints.
 7. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
- C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in bricks according to "Brick Masonry Patching" Article. Patch holes in mortar joints according to Section 040120.64 "Brick Masonry Repointing."

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 2. Include recommendations for product application and use.
 3. Include test data substantiating that products comply with requirements.
- B. Samples for Initial Selection: For the following:
 1. Colored Mortar: Submit sets of mortar that will be left exposed in the form of sample mortar strips, 6 inches long by 1/2 inch wide, set in aluminum or plastic channels.
 - a. Have each set contain a close color range of at least six Samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
 - b. Submit with precise measurements on ingredients, proportions, gradations, and sources of colored sands from which each Sample was made.

2. Sand Types Used for Mortar: Minimum 8 oz. of each in plastic screw-top jars.
 - a. For blended sands, provide Samples of each component and blend. Identify blend ratio.
 - b. Identify sources, both supplier and quarry, of each type of sand.
 3. Include similar Samples of accessories involving color selection.
- C. Samples for Verification: For the following:
1. Each type of brick to be used for replacing existing units. Include sets of Samples to show the full range of shape, color, and texture to be expected.
 - a. For each brick type, provide straps or panels containing at least four bricks. Include multiple straps for brick with a wide range.
 2. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For brick masons including field supervisors and workers and testing service.
- B. Quality-control program.
- C. Brick masonry repair program.

1.8 QUALITY ASSURANCE

- A. Mason's Qualifications: A qualified mason with seven (7) years experience. Experience in pointing or repointing only new masonry is insufficient experience for masonry repointing and pointing work on this project.
- B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising worker performance and preventing damage.
- C. Brick Masonry Repair Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of masonry repair work, including protection of surrounding materials and Project site.
- D. Mockups: Prepare mockups of brick masonry repair to demonstrate tooling and to set quality standards for materials and execution and for fabrication and installation.
 1. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches in least dimension. Construct sample areas in locations in existing walls where directed by Architect unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
 - a. Replacement: Four brick units replaced.

- b. Reanchoring Veneers: Install three masonry repair anchors in mockup wall assembly of each anchor type required.
- 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Sample: Contractor is to send samples of existing original mortar to pre-blended mortar manufacturer for matching color and texture for each building. See schedule in section 040120.64 "Brick Masonry Repointing" for mortar types at specific buildings.
 - 1. Temporary Patch: As directed by Architect, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver bricks to Project site strapped together in suitable packs or pallets or in heavy-duty cartons and protected against impact and chipping.
- B. Deliver packaged 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.
- G. Handle bricks to prevent overstressing, chipping, defacement, and other damage.

1.11 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit repair work to be performed according to product manufacturers' written instructions and specified requirements.
- B. Temperature Limits: Repair brick masonry only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.
- C. Cold-Weather Requirements: Comply with the following procedures for masonry repair unless otherwise indicated:

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 seven days after repair.
- D. Hot-Weather Requirements: Protect masonry repairs 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 to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.
- E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Source Limitations: Obtain each type of material for repairing masonry (face brick, cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MASONRY MATERIALS

- A. Face Brick: Units, required to complete masonry repair work. See schedule at the end of this section.
1. Brick Matching Existing: Units with colors, color variation within units, surface texture, size, and shape that match existing brickwork and with physical properties as listed below:
 - a. Physical Properties: According to ASTM C216 and as follows:
 - 1) Compressive Strength: 3000 PSI.
 - 2) 24-Hour Cold-Water Submersion Absorption: N/A.
 - 3) Five-Hour Boil Absorption: 17%.
 - 4) Saturation Coefficient: .078.
 - 5) Initial Rate of Absorption: N/A.
 2. Products: Basis of Design subject to compliance with requirements, provide the following: Glen-Gery 900 Red Matte standard or comparable product by one of the following or equal as approved by the professional:
 - a. McAvoy Fine Red Mattex Standard
 - b. Watertown brick Exton Matt Standard
 3. Tolerances as Fabricated: According to tolerance requirements in ASTM C216, Type FBX.
 4. Date Identification: Emboss in the clay body on a concealed, interior surface of each unit in easily read 1/2-inch-high characters, "MADE 2021" or "MADE 2022." Manufacturer's name may also be embossed.

- B. Building Brick: ASTM C62, of same vertical dimension as face brick, for masonry work concealed from view.
 - 1. Grade SW where in contact with earth.
 - 2. Grade SW for concealed backup.

2.3 MORTAR MATERIALS

- A. Pointing Mortar: Preblended, factory-mixed cementitious product that is custom manufactured for repointing masonry is preferred for this project:
 - 1. Products: Basis of Design subject to compliance with requirements, provide the following: Spec Mix: preblended Portland, Lime and Sand. As manufactured by Spec Mix, LLC 1230 Eagan Industrial Road, Suite 160. 888-Spec-Mix or comparable product by one of the following or equal as approved by the professional:
 - a. Glen-Gery Color Mortar Blend: a prepackaged mortar shall be custom-colored matched. As manufactured by Glen-Gery Corporation 1166 Spring St. Wyomissing, PA 19610. (610) 374-4011.
 - b. Rosendale Natural Cement-based mortar: a prepackaged mortar shall be custom-colored matched: 12M Preblended Natural Cement as Manufactured by Edison Coatings Inc. Plainville, CT (860) 747-2220.
 - c. Amerimix AMX 400 Series Portland Cement, Lime and Sand Mortar: a prepackaged mortar shall be custom-colored matched. As manufactured by Amerimix 900 Ashwood Pkwy, Suite 600. Atlanta, GA 30338. (888) 313-0755.
 - 2. Formulate pointing mortar used for repointing brick masonry in colors and textures to match each unit being repointed.
- B. Portland Cement: ASTM C150/C150M, Type I or Type II; white or gray or both where required for color matching of mortar.
 - 1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Water: ASTM C 270, potable.
- E. Mortar Sand: ASTM C144 unless otherwise indicated.
 - 1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
 - 2. Colored Mortar: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
 - 3. For exposed mortar, provide sand with rounded edges.
- F. Mortar Pigments: ASTM C979/C979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.
 - 1. Davis Colors or (approved equal)

2.4 ACCESSORY MATERIALS

- A. Masonry Wall Tie, Corrugated Type 304 stainless-steel wall tie for tying face brick to masonry backup.
 - 1. Basis of Design Product: Subject to compliance with requirements, provide: Hohmann and Barnard; CWT – Corrugated Wall Tie or comparable product by one of the following or equal as approved by the professional:
 - a. Blok-Lok Ltd; BL-364 Corrugated Flexible Gripstay Anchor
 - b. Heckmann Building Products, Inc; 260 Corrugated Wall Tie
- B. Setting Buttons and Shims: Resilient plastic, nonstaining to masonry, sized to suit joint thicknesses and bed depths of bricks, less the required depth of pointing materials unless removed before pointing.
- C. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.
- D. Paint: See section 099000 "Painting" for painting of exposed steel.
 - 1. Surface Preparation: Use coating requiring no better than SSPC-SP 2, "Hand Tool Cleaning," surface preparation according to manufacturer's literature or certified statement.
- E. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:
 - 1. Previous effectiveness in performing the work involved.
 - 2. Minimal possibility of damaging exposed surfaces.
 - 3. Consistency of each application.
 - 4. Uniformity of the resulting overall appearance.
 - 5. Do not use products or tools that could do the following:
 - a. Remove, alter, or harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in Contract.
 - b. Leave residue on surfaces.

2.5 MORTAR MIXES

- A. 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.
- B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
 - 1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.
- C. Do not use admixtures in mortar unless otherwise indicated.

- D. Mixes: Mix mortar materials in the following proportions:
1. Rebuilding (Setting) Mortar by Type: ASTM C270, Proportion Specification, Type N or Type O unless otherwise indicated; with cementitious material limited to Portland cement and lime.
 2. Colored Mortar: Add mortar pigments to produce exposed, setting (rebuilding) mortar of colors required.

PART 3 - EXECUTION

3.1 MASONRY REPAIR SPECIALIST

- A. Qualified Masonry Firms: Subject to compliance with requirements, provide brick repair by firms experienced in the repair and replacement of brick masonry in older buildings.

3.2 PROTECTION

- A. Prevent mortar from staining face of surrounding masonry and other surfaces.
1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
 2. Keep wall area wet below rebuilding and repair work to discourage mortar from adhering.
 3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.
- B. Remove gutters and downspouts and associated hardware adjacent to immediate work area, and store during masonry repair work. Reinstall when repairs are complete.
1. Provide temporary rain drainage during work to direct water away from building.

3.3 MASONRY REPAIR, GENERAL

- A. Have repair work performed only by qualified mason.
- B. Repair Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from 20 feet away by Architect.

3.4 ABANDONED ANCHOR REMOVAL

- A. Remove abandoned anchors, brackets, wood nailers, and other extraneous items no longer in use unless indicated to remain.
1. Remove items carefully to avoid spalling or cracking masonry.
 2. Notify Architect before proceeding if an item cannot be removed without damaging surrounding masonry. Do the following where directed:
 - a. Cut or grind off item approximately **3/4** inch beneath surface, and core drill a recess of same depth in surrounding masonry as close around item as practicable.

- b. Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.
- 3. Patch the hole where each item was removed unless directed to remove and replace brick.

3.5 BRICK REMOVAL AND REPLACEMENT

- A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be demolished. Carefully 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.
- C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition. Coordinate with new flashing, reinforcement, and lintels.
- D. Notify Architect and DGS Bureau of Construction of unforeseen detrimental conditions, including voids, cracks, bulges, loose masonry units in existing backup, rotted wood, rusted metal, and other deteriorated items.
- E. 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. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
 - 3. Store brick for reuse. Store off ground, on skids, and protected from weather.
 - 4. Deliver cleaned brick not required for reuse to Client Agency unless otherwise indicated.
- F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.
- G. Replace removed damaged brick with other removed brick and salvaged brick in good condition, where possible, **or** with new brick matching existing brick. Do not use broken units unless they can be cut to usable size.
- H. 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.
 - 1. Maintain joint width for replacement units to match existing joints.
 - 2. Use setting buttons or shims to set units accurately spaced with uniform joints.
- I. Lay replacement brick with rebuilding (setting) mortar and 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 C67 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.
 - 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 according to Section 040120.64 "Brick Masonry Repointing." Point at same time as repointing of surrounding area.
3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.

J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.

1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.6 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, applied by low-pressure spray.
1. Do not use metal scrapers or brushes.
 2. Do not use acidic or alkaline cleaners.
- B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.
- C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
- D. Remove masking materials, leaving no residues that could trap dirt.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Client Agency will engage qualified testing agencies to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.
- B. 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 lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.
- C. Notify testing agency, Architect's Project representatives, and DGS in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors and Architect's Project representatives have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.8 MASONRY-WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property.
- B. Masonry Waste: Remove masonry waste and legally dispose of off Client Agency's property.

3.9 BRICK MASONRY REPLACEMENT SCHEDULE

Brick Masonry Replacement Schedule			
Location:	Face Brick (Color):	Manufacturer:	Finish:
Exterior Face	900 Red Matte	Glen-Gery	N/A
Interior Face	900 Red Matte	Glen-Gery	Painted to match existing

END OF SECTION 040322