

**ITEM 560.1011--07 - CLEAN AND REPOINT RUBBLE STONE MASONRY**  
**ITEM 560.1012--07 - CLEAN AND REPOINT ASHLAR STONE MASONRY**

**DESCRIPTION:**

The work shall consist of removing existing mortar from joints and exposed surfaces of stones, and repointing joints in rubble masonry, where indicated on the contract plans or where ordered by the Engineer.

Replacement of missing or damaged stones and grouting of voids is also included under the Clean and Repoint Rubble Stone Masonry item.

Grouting of voids is included under the Clean and Repoint Ashlar Stone Masonry item.

**MATERIALS:**

Portland cement shall be Type 6 (white) cement meeting the material requirements of Subsection 701-01 of the Standard Specifications, except that the maximum permissible alkali content shall be 0.60 percent. All portland cement used for this item shall be supplied by the same manufacturer.

Hydrated lime shall meet the requirements of ASTM C 207, Type SA. All hydrated lime used for this item shall be supplied by the same manufacturer.

Masonry sand shall be obtained from a natural local source, and graded per ASTM C 144. The sand shall be free of impurities such as salts, organic impurities, and other deleterious materials in accordance with ASTM C 144. The Contractor shall provide a sample of the masonry sand to the Engineer for approval prior to commencing work.

Water used for mixing and curing mortar shall meet the requirements of Subsection 712-01 of the Standard Specifications.

New stones shall match or replicate the existing masonry and native stone as closely as possible in kind, sizes, quality, color, texture, and finish. All stones shall be clean and free from structural defects. Samples of the new stone shall be submitted to the Engineer for approval.

Abrasive for blast cleaning, shall conform to Subsection 572-2 of the Standard Specifications. Medium or fine grit material shall be used.

**CONSTRUCTION DETAILS:**

Cleaning and repointing work shall be performed by skilled masons. Work shall be supervised by a lead mason with a minimum of five years masonry restoration experience. The Contractor shall provide the Engineer with specific documentation of lead mason's experience.

The Contractor shall prepare a masonry cleaning and repointing sample, at a representative location selected by the Engineer. The sample area shall measure 1.0 square meter for the Clean and Repoint Rubble Stone Masonry item, and 2.0 square meters for the Clean and Repoint Ashlar Stone Masonry item. The sample cleaning and repointing shall be completed in accordance with the plans and this

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specification. The completed sample shall be subject to approval by the Engineer, in writing, prior to commencing cleaning and repointing work throughout the structure. The approved sample will be the standard by which completed stone patching work will be accepted. The approved sample repair shall remain as part of the finished work. In the event that the cleaning and repointing sample is not approved, a new sample shall be prepared at a new location selected by the Engineer. The rejected sample areas shall be cleaned and repointed as directed by the Engineer.

For the Clean and Repoint Rubble Stone Masonry item, all existing pointing mortar shall be removed to a minimum uniform depth of 50 mm or 2.5 times the joint width, whichever is greater. For the Clean and Repoint Ashlar Stone Masonry item, all existing pointing mortar shall be removed to a minimum uniform depth of 20 mm or 2.5 times the joint width, whichever is greater. Any loose or disintegrated mortar beyond this minimum depth shall also be removed as ordered by the Engineer. Removal of mortar from joints shall be accomplished using hand tools and small pneumatically-powered chisels, such as Chicago Pneumatic Model CP 0456 or equal, and small electric grinders. If electric grinders are utilized for cleaning vertical joints, special care shall be used at ends of the joints to prevent damage to adjacent stones. For the Clean and Repoint Rubble Stone Masonry item, small electric grinders will be permitted for removal of mortar from narrow portions of horizontal joints only. All tools shall be subject to approval by the Engineer prior to commencing work. If, in the opinion of the Engineer, the Contractor's methods of mortar removal are found to be damaging to the masonry, work shall be stopped until acceptable corrective action is taken.

The face of the stones shall be cleaned to remove existing mortar smears and plastered over areas, exposing the natural stone faces. The mortar removal shall be accomplished using hand tools and small pneumatically-powered chisels. Once the bulk of the mortar has been removed to the satisfaction of the Engineer, a light abrasive blast cleaning shall be utilized to remove chisel marks and any remaining cement film.

After cleaning and removal work is complete, the joints shall be rinsed with water and brushed out to remove any loose particles and dust. The rinsing action should not scour additional bedding mortar material out of the joint.

For the Clean and Repoint Rubble Stone Masonry item, missing or damaged stones shall be replaced with new stones as directed by the Engineer. New stones shall be placed such that the natural stratification is parallel to the bedding plane. Loose stones shall be carefully removed, cleaned, and reset in their original position. Bedding mortar for setting stones shall be proportioned and mixed as specified for pointing mortar. Stones shall be set in accordance with Subsection 560-3.05 of the Standard Specifications.

For the Clean and Repoint Rubble Stone Masonry item, if a loose stones are encountered, or if stones become loose during the work, wedges shall be carefully installed in the transverse joints, as approved by the Engineer. Installed wedges shall be slightly recessed from the surface of the joint.

After mortar removal and cleaning work is complete, but prior to pointing, grout injection ports shall be installed in joints at void locations identified by the Engineer. Where a void is evident or suspected, but there is not an adequate opening for grout injection, the Contractor shall drill

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through the bedding mortar as directed by the Engineer to create a sufficient opening for grout injection. Grout injection ports shall be of a size and type approved by the Engineer. The joints around the injection ports shall be sealed using pointing mortar or as approved by the Engineer. After pointing is complete and the mortar has cured for a minimum of 72 hours, grout shall be placed through the previously installed injection ports. Immediately prior to and during grout injection, the surface of the wall shall be kept wet to deter adhesion of spilled grout. A water hose and brush shall be kept on hand during injection for cleaning any grout spills from the masonry surface. Where injection ports are located in groups, injection shall begin at the lowest injection port and work upwards. Grout shall be injected at a consistent and uninterrupted pressure to uniformly force grout into voids. The maximum injection pressure shall be 30 kPa, unless otherwise approved by the Engineer. Grout placement shall continue until the flow of grout completely stops at the maximum injection pressure, or until grout exits from an adjacent port. If grout exits from an adjacent port, the adjacent port shall be temporarily plugged and injection continued to achieve maximum penetration. Injection ports shall be sealed immediately after feed line is removed to prevent leakage of grout. If grout exits from an adjacent port, the injection operations shall resume at that port prior to setting of the grout. Grout placement equipment and procedures shall be approved by the Engineer prior to commencing grouting work. Once the grout has cured, the injection ports shall be carefully removed and the holes filled with pointing mortar.

Pointing mortar shall consist of 1 part portland cement, 2 parts lime, and 8 parts sand. Dry ingredients shall be measured by volume and thoroughly mixed prior to the addition of any water. Add sufficient water to the dry ingredients to produce a mortar that retains its form when hand-squeezed and released. Mix for approximately 5 minutes. Allow this mortar to stand covered for not less than 1 hour nor more than 1 ½ hours for prehydration. Add additional water in small portions until a stiff, but workable consistency is reached. The use of pigments or other mortar additives will not be permitted. Mortar shall be used within 30 minutes of final mixing. Retempering of mortar will not be permitted.

Pointing shall not be done when the ambient temperature is 5° C or below, nor when the stone contains frost. At the time of pointing, the joints shall be damp, but with no standing water present. All pointing mortar shall be placed by hand. Where the existing mortar has been removed to a depth greater than 50 mm, these deeper areas shall be filled first, compacting mortar to fill all voids. Once a uniform joint depth is attained, the joint shall be filled by applying several layers of mortar, packing it well into the back corners. The thickness of the individual layers shall not exceed 13mm and each successive layer of mortar shall be permitted to reach thumb-print hardness before application of the next layer. The final layer of mortar shall be recessed slightly behind the face of the stones, and finished with an approved flat pointing tool. Feathered edges should be avoided. After the mortar has dried, but before it is initially set (1 to 2 hours), excess mortar shall be removed from the edge of the joint by brushing with a natural bristle or nylon brush.

Repointed surfaces shall be kept moist by water-misting at least three times a day, or as directed by the Engineer, and protected from extreme heat, freezing, high winds, and direct sunlight for a seventy-two hour period after finishing. Repointed areas shall be protected from rain for at least 12 hours after finishing.

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At the completion of the project, masonry surfaces shall be cleaned using plain water and natural bristle or nylon brushes as directed by the Engineer. Use of chemical detergents will not be permitted for cleaning masonry.

**METHOD OF MEASUREMENT:**

This work will be measured by the number of square meters (including joints within the stone masonry) measured along the plane of the exposed surfaces of the stone masonry. Exposed horizontal surfaces at the top of walls will not be considered in computing the payment area for this item.

No measurement will be made for areas of rejected cleaning and repointing samples.

**BASIS OF PAYMENT:**

The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to complete the work. No separate payment will be made for placement of grout material into voids.

Grout material for filling voids will be paid for under a separate item.