1. GENERAL

This section details the mortar requirements for the stone joint mortar and stone patching mortar. Identification of the areas of repair are to be established by the Contractor but under the direction of the Contract Administrator with respect to the criteria for repair. The primary purpose of the repointing is to restore the structural integrity and enhance the water-tightness of the building. The use of bonding agents is prohibited unless authorized in writing by the Contract Administrator. All sealant on or in existing stone joint is to be completely removed and joints to be pointed with mortar.

1.1 Related Sections

.1 Section 04 05 00: Masonry Procedures

.2 Section 04 40 10: Masonry Repairs

.3 Section 04 50 50: Removal of Stone Masonry

1.2 References

.1 ASTM C5-79-1988 Specification for Quicklime for Structural purposes.

.2 ASTM C207-79-1988 Specification for Hydrated Lime for Masonry.

.3 CAN/CSA-A5-M88 Portland Cement.

.4 CAN/CSA-A8-M88 Masonry Cement.

.5 CSA A82.56-1950, R1971 Aggregate for Masonry Mortar and ASTM C144.

.6 CSA A179-M1994 Mortar and Grout for Unit Masonry.

1.3 Compressive Strength and Tolerances

.1 Stone Mortar

.1 Mortar compression strength when tested using 50 mm mortar cubes in accordance with CSA standard A179M shall be a minimum 3.5 MPa, cured for 28 days. The designated mortar shall be Type N. The air content shall be between 7% and 14%.

.2 If the mortar fails to meet the 7 day compressive strength requirements, but meets the 28 day compressive strength requirement it is to be accepted. If the mortar fails to meet the 7 day compressive strength requirement, but its strength at 7 days exceeds two thirds of the value required for the 7 day strength, the contractor may elect to continue work at their own risk while awaiting the results of the 28 day tests, or to take down the work affected.

1.4 Samples

.1 Prepare a mock-up of the mortar joint pointing and patching work in areas agreed upon on site with the Contract Administrator. Mock-up acceptability will be based on visual compatibility with existing mortar and stone and conformance to specified

strength requirements. The Contractor will not be permitted to proceed until approval of the mock-up has been received.

.3 Samples of the mortar and patching material used for the mock-up area will be submitted for the compressive strength testing. The Contractor will be required to subcontract a CSA certified testing agency to obtain samples and complete a compressive strength testing in accordance with CSA requirements. Costs for mortar testing to be submitted under the Testing Cash Allowance.

.4 The approved mock-up, mortar mix, and the methods and procedures used to achieve the mock-up will establish a minimum acceptable standard for remaining work based on the Contract Administrator's site review and receipt of the compressive strength test results. Work will not proceed on other areas before the mock-up is approved.

.5 See also Section 04 40 10 for further mock-up requirements.

1.5 Test Reports

.1 Submit two (2) sets of test results to show that properties are appropriate to each particular mortar mix.

1.6 Existing Conditions

.1 Investigate possible structural problems and report before beginning masonry work. Contract Administrator will provide ongoing direction with respect to necessity of the type of repair.

.2 In general, mortar joints will require repointing when:

I) **Open Joints:** the mortar is deeply eroded (more than one half inch from the face of the masonry), or the mortar has fallen out, or,

II) **Cracked Joints:** cracks, hairline width or larger, have formed in the mortar, or,

III) **Separated Joints:** the mortar and masonry no longer adhere, resulting in a gap or crack between the two, or the mortar is sitting loosely in the joint, or,

IV) **Unsound Joints:** joint is found to contain voids or weak areas as revealed by hammer-sounding or other approved method.

V) **Caulked Joints:** Sealant has been applied on or in the mortar joint. All caulking must be completely removed and joint cleaned for mortar application.

.3 Study the existing pointing styles and methods of reproducing them. Style of joint will be reviewed in the mock-up.

.4 Examine horizontal and vertical joints to determine which were struck first and whether they are same style, as well as other respects of workmanship which establish authenticity of original work.

1.7 Environmental Requirements

.1 Execute work when ambient temperature is above 4º C. When ambient temperature is below 4º C, cease work unless provisions are in place to protect mortar from freezing.

.2 Prepare and maintain temperature of mortar between 5º C and 30º C until used.

1.8 Scheduling of Work

.1 Submit work schedule indicating anticipated progress stages within time of final completion shown in bid document.

.2 Take measures necessary to complete work within approved schedule time. Schedule may not be changed without approval.

1.9 Alternatives

.1 Obtain the Contract Administrator's approval before changing manufacturer's brands or sources of supply of mortar materials during entire contract or other methods of mixing mortar specified elsewhere in this specification.

2. PRODUCTS

2.1 Stone Joint Mortar

.1 Materials

.1 Sand: to CSA A82.56. Passing 1.18 mm for stone mortar.
.2 Water shall be potable, clean and free of deleterious amounts of acids, alkalies, or organic materials.
.3 Lime:
  .1 Processed Lime (Quicklime): to ASTM C5 and CSA A82.43M.
  .2 Hydrated Lime: ASTM C207 and A82.43M.
.4 Portland Cement: CAN/CSA-A5.
.5 Masonry Cement: CAN/CSA-A8.
.6 White Cement (If Required): use white silica sand and white Portland Cement and lime.
.7 Colour: ground coloured natural aggregates to match the existing. If a pigment is required, ensure that only chemically pure synthetic oxide pigments are utilized and are alkali proof and sun fast. Do not use organic dyes.
.8 Calcium chloride shall not be used for any purpose or in any instance.
.9 Air entrainment: factory processed lime (Type 2A) with agents for air entrainment shall be used on exterior mortar mixes at dosages recommended by the manufacturer.

.2 Proportions

.1 Exact ratio of lime and sand specified in 2.2.1 varies according to properties of material sources, and to properties of historic lime mortars. Use of a mixture which has lower ultimate compression strength than masonry unit is required.
.2 Starting point for development of mortar by volume:

.1 Exterior stone mortar shall be Type N, as defined by CSA A179 (latest). Suggesting mortar constituent starting point shall be:

Portland Cement:	1 part
Lime:	1 parts
Sand:	4.5 to 6 parts

.3 Air content of exterior mortar mixes shall not exceed 14% by volume but at no time be less than 7%.

.3 Mortar

.1 Masonry mortar mixed in proportion with enough water to make as stiff as can be worked.
.2 Repointing: new mortar to be used in repointing is to match the existing mortar as specified in paragraph 2.2.
.3 Time limit: discard mix not used and placed within 2 hours.
.4 Allow mortar to set before subjecting to load.
.5 Colouring material agent: colour pigments comprising of metallic oxide composition shall not exceed 10% of weight of binder materials. Carbon black not to exceed 3.0% of weight of binder materials.
.6 Do not use admixtures or anti-freeze components in mortar unless authorized in writing by the Contract Administrator.

.4 Coloured Lime Mortar

.1 Use sand as colouring agent.
.2 Maintain one mortar mixer exclusively for coloured mortar for each type of stone.

2.2 Stone Patching Mortar

.1 Stone Patching: Premixed cementitious patching material formulated to match the colour texture of the existing masonry. Mortar shall not contain any acrylic, latex or other synthetic polymer additives. The mortar need only be mixed with potable water on site. Mortar must be vapour permeable, frost and salt resistant, shrink resistant, and be physically compatible with the substrate, including, but not limited to porosity, tensile and compressive strength.

Tyndall Stone: Jahn Restoration Mortar M70 distributed by:
Cathedral Stone Products Inc.
8332 Bristol Ct.
#107 Jessup, MD, 20794
Tel: (301) 317-4658
Fax: (301) 317-4670
www.jahnmortars.com

.2 Repair mortar colour match of masonry to be established by submitting masonry sample to distributor, prior to mobilization onto site.

3. EXECUTION

3.1 Stone Joint Mortar

.1 Preparation

.1 Soak processed lime in water for not less than 24 hours or soak hydrated lime in water for not less than 12 hours.
.2 Place safety devices and signs near the work.

.2 Mixing

.1 Mix all dry ingredients before adding any water to obtain even colour and remove lumps.
.2 Add one half cup water and mix for about 5 minutes. The remaining water should then be added in small portions until the desired consistency is reached. In general, the desired mortar consistency uses the minimum amount of water to allow the mortar to stick to a trowel held upside down.
.3 Retempering or addition more water after the initial mix is prepared is not permitted. Allow mortar to age approximately ½ hour prior to application to reduce shrinkage.
.4 Mix mortar ingredients in quantities for use in 2 hours.
.5 Use manual mixing as long as quantities of materials and water are accurately controlled and the method of mixing is approved by the Contract Administrator.
.6 Add water slowly while mixing until all lumps are eliminated.

.3 Field Quality

.1 Follow proper batching procedure.
.2 Use batching box.
.3 Monitor mixing time.
.4 The Contractor shall retain a CSA certified testing agency to complete the pre-qualification strength testing on mortar samples prepared by the contractor for approval. In addition, the Contractor shall retain the CSA certified testing agency to obtain mortar samples from the Contractor's working mix in accordance with CSA standards.
.5 Costs for testing shall be carried by the Owner with test reports provided to the Contractor and Contract Administrator.

.4 Cleaning

.1 Remove droppings and splashes using clean sponge and water.
.2 Clean masonry with clean water and soft natural bristle brush.

.5 Protection of Completed Work

.1 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of day work day. Anchor securely in position.
.2 Provide if necessary, temporary bracing, and scaffolding as required.

3.2 Stone Repair Mortar

.1 Preparation

.1 Surfaces to receive Jahn mortar must be sound and free of all dust, dirt, grease, laitance and/or any other coating or foreign substance which may prevent proper adhesion.
.2 Remove all loose and deteriorated masonry from the patch area plus an additional 6 mm of what appears to be sound material (minimum depth 12 mm) using manual or pneumatic cutting techniques. The void created should have edges which are square cut, maintaining 90° angles.
.3 Complete the preparation by washing the surface with clean water and a bristle brush.

.2 Mixing

.1 The mixing ratio is approximately 5 to 5½ parts powder to 1 part water by volume, depending on temperature and humidity.
.2 Place clean water in a clean, rust free mixing container and add the powder as specified. The mixing may be done by hand, stirring two to three minutes or until the mortar is thoroughly mixed.
.3 The mortar should be the consistency of damp sand.
.4 M70 may also be mixed using a slow speed drill (400 - 600 RPM) equipped with a Jiffler type mixing paddle. For best results add the powder to the water slowly.
.5 The working time will vary, depending upon wind, temperature, and humidity.

.3 Field Quality

.1 Never apply Jahn Mortar to a frosted or exceedingly hot substrate. The applied mortar must be protected from extreme heat, freezing, excessive wind, direct sunlight, and rain. Ambient temperature range should be 4°C to 32°C with low to average humidity.
.2 Never add bonding agents to Jahn Mortar or use them as surface preparation materials.
.3 Minimum thickness of mortar application is 12 mm.

.4 Cleaning

.1 Uncured mortar should be removed immediately with clean water and a rubber sponge.
.2 Cured mortar may only be removed chemically or mechanically.

END OF SECTION