

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 04 03 07 – Historic: Masonry Repointing
- .2 Section 04 03 08 – Historic: Mortaring

1.2 REFERENCES

- .1 Definitions:
 - .1 Low-pressure water rinsing: less than 500 psi, measured at nozzle tip.
 - .2 Medium-pressure water rinsing: a maximum of 900 psi, measured at nozzle tip.
- .2 Canadian Environmental Assessment Act (CEAA) 1995

1.3 SUBMITTALS

- .1 Submit WHMIS documentation in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Comply with the requirements of Workplace Hazardous Materials Information Sheet (WHMIS) and submit documentation to Departmental Representative.

1.4 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Demonstrate machinery, tools and nozzles for approval by Departmental Representative.
- .3 Submit samples of all cleaning materials for approval of Departmental Representative.

1.5 TEST AND EVALUATION REPORTS:

- .1 Submit test results in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit electronic copies of test results describing cleaning method, compressor equipment, water pressure at compressor, tools, nozzle size and distance from masonry surface used for cleaning of each test patch.
- .3 Proceed with cleaning upon written approval by Departmental Representative, concerning tested cleaning methods.

1.6 QUALITY ASSURANCE

- .1 Comply with requirements of Workplace Hazardous Materials Information Sheet (WHMIS).
- .2 Mock-ups:
 - .1 Do mock-ups tests in accordance with Section 01 00 10 - General Instructions.
 - .2 Notify Departmental Representative 48 hours before commencing cleaning of each test patch. Obtain approval from Departmental Representative before commencing test.

- .3 Provide one test patch for each cleaning method specified. Locate test patches in inconspicuous places directed by Departmental Representative.
- .4 Test patches to be 400 mm square, and located at a minimum of 3 different locations per element to be cleaned.
- .5 Locate test patches in inconspicuous places directed by Departmental Representative.
- .6 Start with lowest impact tests and stop testing at desired level of cleaning is achieved, stop testing immediately when damage is caused.
- .7 Stop work when cleaning has detrimental effect on surrounding material and plants.
- .8 Conduct tests to determine best methods of protecting surrounding historic material, openings and plants during test cleaning procedure, and monitor for detrimental effects.
- .9 Do not proceed with work without approval of mock-up.
- .10 Allow 24 hours for inspection of mock-up by Departmental Representative.
- .11 Accepted mock-up will demonstrate minimum standard for work. Mock-up may remain as part of finished work.
- .12 Protect masonry openings from water/chemical infiltration during cleaning. Collect, neutralize and dispose of water and chemicals in accordance with contract requirements, applicable regulations and Canadian Environmental Assessment Act (CEAA).

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 00 10- General Instructions.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Divert unused cleaning agents from landfill to official hazardous material collections site approved by Departmental Representative.
- .4 Do not dispose of unused cleaning agents into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard

1.8 ALTERNATIVES

- .1 Obtain, in writing from Departmental Representative authorization for changes of cleaning method, cleaning medium, tools, pressure, and flow rates.

1.9 SITE CONDITIONS

- .1 Existing Conditions
 - .1 Report to Departmental Representative, conditions that may affect efficiency and/or safety of the cleaning process prior to starting.
 - .2 Record existing conditions using high resolution digital colour photos, 4MB minimum, before and after cleaning.
 - .3 Advise Departmental Representative of potential cleaning problems.
 - .4 Do not clean areas of deteriorated masonry without prior written approval of Departmental Representative.
- .2 Ambient Conditions
 - .1 Do not use wet cleaning methods when there is threat of frost.
 - .2 Do not use chemical cleaners when temperature is below 10 degrees C.

- .3 Follow manufacturer's written instructions on use of chemical cleaners in accordance with product's temperature range application.
- .4 Do not perform cleaning procedures if the winds are strong enough to spread cleaning material to adjacent unprotected areas or publicly accessible areas.
- .5 Provide shading to masonry to avoid cleaning in full, hot sunlight.

1.10 SCHEDULING

- .1 Submit Work schedule indicating progress of stages within time of final completion shown in Tender documents, and in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Complete Work within approved schedule time.
 - .1 Do not change Schedule without written approval of Departmental Representative.
- .3 Co-ordinate cleaning work schedule with other work on site.

PART 2 Products

2.1 MATERIALS

- .1 Use clean potable water free from contaminants.
- .2 Treat water which has high metal content before use in cleaning.
- .3 Poulticing clay.
 - .1 Acceptable material: Fuller's Earth; attapulgite clay or pre-approved equivalent.
- .4 Use masking material to approval of Departmental Representative.

2.2 TOOLS AND EQUIPMENT

- .1 Use only brushes with stiff fibred nylon
- .2 Use only scrapers of wood or plastic.
- .3 Use water pumps fitted with accurate pressure regulators and gauges capable of being preset and locked at maximum specified levels.
 - .1 Water pumps to have rating of 350 kPa.
- .4 Use pressure rinsing equipment equipped with pressure gauge at nozzle end.
- .5 Use air compressors equipped with on-line oil filters to avoid spraying oil onto masonry
- .6 Use plastic or non-ferrous metal piping and fittings.
- .7 Micro-abrasive low pressure wet cleaning system, capable of delivering 60 -100 mesh crushed glass abrasive through a 6-8 mm vortex nozzle at adjustable low pressures of 20 – 30 psi. Acceptable equipment: JOS/Rotek micro-abrasive equipment or pre-approved alternate.
- .8 Use fan tipped nozzles, such that delivery of pressure water is sprayed in broad impact line at stone surface.

PART 3 Execution

3.1 SITE VERIFICATION OF CONDITIONS

- .1 Record existing conditions, by means of photographs, before and after cleaning. Advise Departmental Representative of potential complications.
- .2 Report to Departmental Representative conditions of deteriorated masonry or pointing not noted on Contract Drawings found before and during cleaning.

3.2 PREPARATION

- .1 Place safety devices and signs near work areas as indicated and directed.
- .2 Cover surfaces not to be cleaned.
- .3 Ensure good ventilation in work area.
- .4 Dry brush or scrape accumulations from masonry.

3.3 PROTECTION

- .1 Mask or seal vents, windows, and other openings, to prevent water entry.
- .2 Cover and protect surfaces and non-masonry finishes not to be cleaned.
 - .1 Obtain approval of protection method from Departmental Representative before commencing cleaning procedure.
- .3 Protect wood, glass, and metal adjacent to masonry.
- .4 Protect plants, gardens, shrubs from excessive watering and chemicals.
- .5 Hang sheeting material from scaffolding to enclose water spray.
- .6 Ensure workers wear eye, head, and face protection, and protective gloves, coveralls, boots and filter mask to MSHA/NIOSH standard.
- .7 Protect cleaned surfaces from contact with rain and snow during cleaning period.
- .8 Protect rainwater leaders from being blocked by residue.
- .9 Protect finished Work from damage until take-over.
- .10 Protect adjacent Work from spread of dust and dirt beyond work areas.
- .11 Protect operatives and other site personnel from hazards.

3.4 EXECUTION OF GENERAL CLEANING PRIOR TO WORK START AND COMPLETION

- .1 Moderate Pressure Water Cleaning: This general cleaning procedure will be used prior to work and following completion of all work on the masonry.
 - .1 Pre-wet masonry surface from bottom of masonry upwards, followed by washing from top to bottom.
 - .2 Remove lightly adhered construction dirt with moderate low pressure 500 psi wash-down at flow rate of 0.25 L/s.

- .3 Avoid prolonged wetting and excessive water penetration.
- .4 Do not exceed maximum pressure at nozzle or have nozzle closer to masonry than approved by Departmental Representative at tests. Pressure gauge must be installed at the nozzle tip.
- .2 Use brushing only to supplement water washing.

3.6 FERRIC STAIN REMOVAL

- .1 Prepare poultices using either EDTA, Orthophosphoric acid or Oxalic acid mixed in Fuller Earth or equivalent silicate clay.
 - .1 Chemical concentrations will be directed and supervised by Departmental Representative.
- .2 Dwell times and the effectiveness of the various poultices will be determined through mock-ups which are directed and supervised by the Departmental Representative.
- .3 Provide low pressure micro-abrasive cleaning to provide final touch up to the cleaned areas where it is felt to be necessary by the Departmental Representative.
 - .1 Applies to all masonry areas of ferric oxide cleaning.

3.7 PAINT SPLAT REMOVAL FROM SURFACE OF STONE

- .1 The following will be utilized where paint splats and isolated patches are encountered on the masonry.
- .2 Scrape surfaces with non-ferric scrapers to remove loose paint and caulking.
- .3 Carry out chemical removal using methylene dichloride based Paint Stripper in gel form.
 - .1 Work surface must be between 20 and 25 degrees Celsius.
 - .2 Apply paint stripper liberally to surface of paint.
 - .3 Cover with plastic sheeting to avoid evaporation.
 - .4 Leave in contact for up to 30 minutes, making sure that surface is agitated frequently with a stiff brush, and the paint stripper is generously spread over the surface throughout the dwell time.
 - .5 Dwell time will be determined by calculating the maximum effect of the chemical within a given time. This will be determined by the Departmental Representative.
 - .6 Scrape all loosened paint and discard immediately following all Government Regulations for handling and disposal.
 - .7 Repeat procedure until natural surface of the stone is exposed and free of paint and chemical smears.
 - .8 Rinse and scrub by hand with hot water and stiff bristle brush.

3.8 GENERAL CLEANING USING MICRO ABRASIVE CLEANING EQUIPMENT SYSTEM

- .1 General cleaning refers to the lightening or removal of dark deposited surfaces by atmospheric pollutants. It also refers to a general all-wall surface area method to lighten scuffs and tool marks left on the faces of most stone after dressing back of friable and thin exfoliating surface skins. It also refers to miscellaneous severe deposits of paint, bitumen, and black sulphate deposits that exist adjacent to and behind the downpipes around the building.

- .2 General cleaning with micro-abrasive cleaning will be carried out only once small spot cleaning, such as paint splat or salt efflorescence, as well as general dressing back of exfoliating surfaces using tools is completed first. Acceptable equipment: JOS or ROTEC type equipment .
- .3 The level of clean required will be determined by mock-ups in the presence and under the direction of the Departmental Representative. The parameters of the operation to be determined by the mock-ups will include abrasive aggregate size and type, psi of abrasive delivery from the nozzle and working distance from the masonry. Two speeds of nozzle passing the surface is required.
 - 1. The first is for the vast majority of the masonry surfaces whereby only very light atmospheric dirt is present, but where the surface of the majority of stones have been gently tooled to remove thin plate exfoliations throughout. This will assume a quick pass of the nozzle over the surface.
 - 2. The second is for only those areas which retain black surfaces from a previous poor cleaning regime (sandblasted). This will assume a slower, more standard speed for removing adhered carbon deposits from blackened sandstone.
 - 3. Note that stone requiring refinishing do not require cleaning. Make certain that the polished base stones at the flagpoles are fully protected against any contact the micro abrasive could make with them.
- .4 Back pointing must be completed prior to start of micro abrasive cleaning.
 - .1 Allow for 2 weeks cure to have passed on the back-pointing mortar before starting with this cleaning procedure.
 - .2 Provide means of trapping and collecting spent abrasive slurry and removing from site.
 - .3 Provide tarping as necessary to prevent micro abrasive waste from contacting masonry outside the area being worked on, in order to protect adjacent masonry, artwork, property and pedestrians. Such protection will be strictly enforced.
 - .4 Do not allow spent abrasive slurry to run over surface of newly completed granite work of the plinth level.

3.9 CAULKING REMOVAL

- .1 All caulking and sealants are to be removed, at all locations where sealant has been used to stop up joints.
 - .1 Full skin and breathing protection is required.
 - .2 Methods and procedures
- .1 Begin by cutting away as much of the caulking as is possible using small sharp knives, combined with pulling away by hand.
- .2 Liberally apply thickened paint stripper to the surface of the stone where the caulking adheres to the grains of the surface and cover immediately with light plastic to prevent drying.
 - .1 Do not apply in direct sunlight. Keep working surface well shaded.

- .2 Do not let the stripper dry on the surface. Keep covered to prevent drying, adding liberal amounts of the chemical to maintain a wet, active contact with the surface.
- .3 Allow the stripper to dwell on the surface for approx. 20 minutes.
- .4 Agitate the surface with a small stiff bristle brush.
- .5 As it begins to peel and lift, swab the caulking up, being certain that the cotton rag used for swabbing is wetted with additional stripper.
- .6 Repeat procedure as necessary. A final pass over the surface using a sharp chisel pneumatically driven at low speed may be used if approval is given by the Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 04 03 06 - Historic-Cleaning Historic Masonry
- .2 Section 04 03 08 - Historic Mortaring.
- .3 Section 04 05 00 - Common Work Results for Masonry.
- .4 Section 07 92 00- Joint Sealants.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM A276-13A, Standard Specification for Stainless Steel Bars and shapes
- .2 Canadian Standards Association (CSA)
 - .1 CSA A23.1- 09/A23.2-09, Construction Materials and Methods of Concrete Construction.
 - .2 CSA-A371- 04 (2014), Masonry Construction for Buildings.

1.3 DEFINITIONS

- .1 Raking: the removal of loose/deteriorated mortar until sound mortar is reached, but not less than a depth of 30 mm.
- .2 Repointing: filling and finishing of masonry joints from which mortar has been raked out or otherwise found voided.
- .3 Backpointing: filling recesses of cut out or otherwise voided joints with mortar to a limit that is possible with standard pointing tools in preparation for front or finish pointing.
- .4 Front or finish pointing: last stage of filling a mortar joint, 30mm, to face of masonry following backpointing.
- .5 Tooling: finishing of masonry joints using tool to provide final profile and texture.
- .6 Grouting: placement of semi-liquid cement/lime binder by low pressure for purposes of filling deep voids of masonry unit joints that cannot otherwise be filled by standard pointing tools.

1.4 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit labeled samples of materials to be used on project for approval before work commences.

1.5 QUALIFICATIONS

- .1 One worker shall be in charge of all mortar mixing for the duration of the project.

1.6 MOCK-UPS

- .1 Construct mock-ups in accordance with Section 04 05 00- Common Work Results for Masonry.
- .2 Construct mock-ups to demonstrate raking out and repointing procedure for the following:
 - .1 raking out of joints
 - .2 resetting stones
 - .3 backpointing of joints
 - .4 finish pointing and tooling of joints
 - .5 protection and curing of mortar joint work.
 - .6 Sanded sealant joint.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Store cementitious materials and aggregates in dry location on the work site.
 - .1 Provide waterproof barrels with fitted lids to store dry ingredients.
 - .2 Provide a storage shed on site to protect all materials from precipitation and temperatures below 5 degrees C.
- .2 Ensure that manufacturer's labels and seals are intact upon delivery.
- .3 Remove rejected or contaminated material from site.
- .4 It is expected that an insulated shed dedicated to the storage and mixing of all mortaring materials and activities will be provided on site. The interior must be maintained between temperatures of 12 degrees C and 25 degrees C.

1.8 PROTECTION

- .1 At end of each working day, cover unprotected work with moist burlap and waterproof membranes. Membranes should extend to 0.5 m over surface area of work and be tightly installed to prevent finished work from drying out too rapidly.
- .2 Protect adjacent finished work against damage which may be caused by on-going work.
- .3 All methods of enclosure and protection shall be to the approval of the Departmental Representative.
- .4 Newly laid mortar shall be protected from exposure to rain, wind, and full sunlight during initial set and :
 - .1 7 day period for curing backpointing.
 - .2 28 day period for front pointing.
- .5 Provide and maintain protection for masonry at all times when work is suspended to prevent water from entering partially repointed masonry.
- .6 Protection shall consist of plus 6mil polyethylene sheets draped at the outside face of the burlap. Burlap to be kept humid during entire period, around the clock, during the mortar curing period.
 - .1 Stretch dense, tight woven burlap in within 4 inches of masonry. Maintain 100% humidity of the burlap. Maintain membrane of 6ml polyethylene plastic against the outside face of the burlap so as to assist with damp condition of the burlap. Lifting the

plastic and misting with a misting nozzle on a hose is permitted for back-pointing. However, maintenance to keep the burlap damp during front pointing must not allow water to be sprayed or misted in any way that directly contacts the fresh mortar joints in the process. Burlap sheeting and plastic must be folded upon adjacent sheets and secured so as to insure openings in the damp curing system does not occur. Maintain damp curing for back pointing for 3 days. Maintain damp curing for front pointing for 7 days.

1.9 EXISTING CONDITIONS

- .1 Report in writing, to Departmental Representative areas of deteriorated masonry revealed during work. Obtain Departmental Representative's approval and instructions of repair and replacement of masonry units before proceeding with repair work.

1.10 ENVIRONMENTAL REQUIREMENTS

- .1 When daily average temperature is 12°C or less:
 - .1 Store cements, limes and sands for immediate use within heated, solidly constructed and insulated enclosure with a dry floor. Maintain temperature of dry mortaring materials to minimum temperature of 12°C.
- .2 If necessary, heat or cool water used for mixing mortars to maintain temperatures as follows:
 - .1 At time of use temperature of mixed mortar to be minimum of 12°C and maximum of 30°C.
 - .2 Do not mix cement with water or with aggregate or with water-aggregate mixtures having higher temperature than 22°C.
- .2 Protection requirements are specified in Section 04 05 00 - Common Work Results for Masonry.
- .3 Obtain approval from Departmental Representative for methods of enclosure and protection.

Part 2 Products

2.1 MATERIALS

- .1 Mortar materials: to Section 04 03 08 – Historic Mortaring.
- .2 Grout material to Section 04 03 08 – Historic Mortaring
- .3 Dowels/anchors//cramps: Stainless Steel, 8 – 25 mm diameter for dowels, 3-6mm thick by 25-32mm thick bar stock for anchors//cramps , to ASTM A276, Grade 304.
- .4 Burlap: washed, non-staining and tight woven.
- .5 6 mil polyethylene, clean and free of holes and tears
- .6 Hardwood wedges, free of tannins.
- .7 Light timber as necessary to assist framing and or stretching burlap/polyethylene curing protection system.

2.2 PROPORTIONS

- .1 Proportions: to Section 04 03 08 – Historic-Mortaring.

2.3 MORTAR

- .1 Mortar: to Section 04 03 08- Historic -Mortaring.

Part 3 Execution

3.1 GENERAL

- .1 Perform work in accordance with CSA-A371. Extent of raking out and repointing is as noted on the Drawings.
- .2 Use manual raking tool to remove deteriorated mortar and ensure that no masonry units are chipped/alterd/damaged by work to remove mortar, unless otherwise specified. Tools for cutting out must be narrower than the joint.
 - .1 Rotary grinders are not allowed for cutting out mortar from joints unless approved by the Departmental Representative following demonstration of skill in cutting out.
 - .2 Cutting into or in any way damaging the original joint dimension by widening will not be tolerated.
- .3 Tool and compact mortar using jointing tool to force mortar into joint.
- .4 Finish joints as approved after mock-ups; except where specified otherwise.
 - .1 Joints cut flat and with slight 1 mm recess from arris of stone units is acceptable.
 - .2 Joints raised from surface of stone or concave in profile are not acceptable.
- .5 Use suitable approved jointing tool to form compacted flat tooled joints.
- .6 Use approved stiff bristle brush such as traditional churning brush to provide final ramming of mortar of frontpointing work and to expose texture of mortar aggregate.
- .7 Insure that masonry surface is 100% cleaned of all soil and adhered substances prior to beginning cutting out of joints work.

3.2 REPOINTING

- .1 Visual inspection by Departmental Representative prior to start of repointing work.
- .2 Raking and preparation of joints:
 - .1 Cut and rake out all joints as indicated.
 - .2 Cut and rake out unsound joints, voided joints and cavities free of deteriorated and loose mortar, dirt and other undesirable material.
 - .1 Remove any ferrous fasteners or wood wedges, or spacers embedded in joints. Do not remove original spacers of slate.
 - .3 All cutting out of joints is to be done with hammer and chisel, unless otherwise specified. Great care must be taken so as not to damage masonry units adjacent to joints.
 - .1 Use of masonry power saws or rotary grinders are not permitted except where indicated in special circumstances by the Departmental Representative. An exception may be given to the use of the Arbortech

oscillating power tool if shown through mock-ups to not cause harm or damage to the joints of the stone units.

4. Fine joints (less than 4mm) need not be raked out more than 10mm, in order to reduce the danger of chipping the masonry edges. Cut these joints with grinder, but only as indicated by the Departmental Representative. On occasions when saw cutting is permitted, make certain to stop sawcutting 50 to 75mm from end of joint. Do not saw cut stone.
 - .5 Clean joints to full depth of deteriorated mortar but in no case to less than 30mm. Clean out voids and cavities encountered.
 - .1 Clean all existing or old mortar overpointing and/or smears from surface of stones adjacent to joints. Provide mock-up to demonstrate method and results prior to executing generally on the masonry
 - .6 Clean all dust and loose debris from joint using compressed air followed by low pressure/low volume water.
 - .1 Flush open joints and voids; clean open joints and voids with low pressure water and if not free draining blow clean with compressed air.
 - .7 Flush open joints and voids; clean open joints and voids with low pressure water and if not free draining blow clean with compressed air.
 - .8 Leave no standing water.
 - .9 Any stone damaged as a result of careless raking, or saw cutting, shall be replaced at no cost to the Departmental Representative.
 - .10 In no area of the masonry can the mortar joints be raked out before all structural concerns regarding replacement stones and temporary support systems are in place, unless otherwise approved by the Departmental Representative.
 - .11 If masonry unseats or bond is broken, remove unit and reset.
- .3 Backpointing:
- .1 Where cut out joints are deeper than minimum raking out depths specified, backpoint joints to bring mortar face to specified depth for raked out joints, in preparation for finishpointing. Where voids exist that conventional backpointing procedures cannot fill using thin bar ramming, notify Departmental Representative for direction and prepare to complete deep backpointing using pressure pot grouting procedures..
 - .2 Prior to pointing work, thoroughly wet joints in order to control absorption. The masonry areas being repointed should have obvious humidity within the entire masonry surface.
 - .3 Allow water to soak into masonry and existing mortar, leaving no standing water, but remaining humid nonetheless.
 - .4 For backpointing, fill all joints full with mortar, compacting firmly into joints to ensure positive adhesion to all inner surfaces. Place mortar in layers, max 30 100 mm thick and ram with flat bar tools to back of joint before placing more backpointing mortar into the joint. Bring face of mortar in backpointed joint to specified minimum depth for raked out joints, measured from the arris of the masonry unit, leave ready for final pointing.
 - .5 Leave mortar square to stone face, and leave exposed stone each side of joint clean of mortar prior to mortar setting.
 - .6 For deep joints, provide stainless steel packing tools manufactured to permit the mason to compact mortar deep in the joints. Where joint cannot possibly be rammed with mortar either because the reach is too far or the joint too narrow (less than 3), proceed with low pressure grouting of joint to ensure complete filling of the deep joint voids. Refer to 3.4 below.
 - .7 Prevent mortar from being placed or smeared onto face of stone. Avoid mortar staining of masonry faces during backpointing.

- .8 Using the blunt end of a pointing slicker tool, inprint slight dimples into surface of backpointing so as to provide a "key" for the front pointing.
- .4 Finish pointing:
 - .1 When all required repair and replacement work is complete, carry out repointing.
 - .2 Thoroughly dampen joints as described for backpointing, item 3.4, above, and completely fill with mortar. If surface of masonry units/ stone has worn rounded edges, keep pointing back from surface to keep same width of joint. Avoid feather edges. Pack mortar solidly into voids and joints.
 - .3 Ensure that all dust, mortar particles, and other debris are removed from joints and masonry surfaces before repointing. Before applying mortar, thoroughly mist masonry to be repointed and allow to dry to damp-dry condition as describe for backpointing, item 3.4 above.
 - .4 Keep masonry damp while pointing is being performed.
 - .5 Do no pointing in freezing temperatures. See Section 04 05 10, Common Work Results for Masonry for protection required for work in this Section.
 - .6 Pack and compress mortar into voids. Maintain joint width.
 - .7 Allow mortar to set to the point of being of firm resistance when pushed on with thumb or finger then tool to match approved mock-up joints. Tool head joints, then horizontal joints. Do not overwork the face of the joints. Joints shall be uniform in appearance. Do not brush-tamp joints until they have set to the extent that brushing will not mark the joint surface by dimpling.
 - .8 For finishpointing, use flat slickers which are narrower than the joint and which remain semi-rigid when applying the mortar to the joint and tamping into place.
 - .9 When mortar has lost its plasticity at the exposed surface, tool joints behind stone arris by 1 mm maximum, and tamp with long semi-stiff bristle brush.
 - .10 Retempering of Mortar:
 - .1 Portland cement-hydrated lime mortars may only be retempered once, and-must be used within 1.5 hours of adding water to the mix during the mortar mixing process when the air temperature is less than 25 degrees C (1/2 hour only for higher temperatures, up to a maximum of 28 degrees C).
 - .2 Do not retemper coloured mortars as it will affect the colour of the mortar.
 - .3 Retempering may only be completed by re-whipping the mix. Under no circumstances must water be added.
 - .11 Remove excess mortar from masonry face before it sets. Finish jointing neatly as specified.
 - .12 Frontpointing must only be executed on large masonry areas at a time for reasons of consistency, especially with regards finish texture and colour. Small areas only will be allowed when deficiencies need correcting or when stone inserts require individual pointing around the jointed perimeter.
- .5 Sanded Sealant Joints. Install sanded sealant joints as indicated.
 - .1 Fill joints in masonry to 25mm from face of masonry.
 - .2 Install backer rod.
 - .3 Install sealant.
 - .4 While sealant is still tacky, evenly apply sand used for mortar to surface of sealant.
 - .5 Refer to Section 07 92 00 Joint Sealants.
- .6 Curing:
 - .1 See section 1.9.6 above.

- .7 Protection:
 - .1 Protect newly laid mortar from frost, rainfall or rapid drying conditions for 7 days backpointing and 21 days front pointing.
- .7 Schedule
 - .1 Backpointing, 350 mm deep:
 - .2 Finish pointing, 25 mm deep:

3.3 RESETTING OF LOOSE STONES

- .1 Repoint all void joints in backup masonry. Shave backup masonry as necessary to reset stone.
- .2 Install mortar on face of backup masonry just prior to resetting stone.
- .3 Fix dislodged masonry units in correct location with water soaked hardwood wedges.
- .4 Insert and compress firm mortar to within 30 mm of pointing surface. Allow mortar to set 24 hours.
 - .1 Grout in place where joint is too narrow to ram mortar in place or where depth is too significant to allow proper backing with flat narrow ramming bars.
- .5 Pull out wood wedges when dried and shrunken.

3.4 LOCALIZED GROUTING

- .1 Where it is determined that there are deep voids in and around a stone unit or in the centre core of the masonry, and normal deep pointing procedures are judged impossible, install specified grout with adjusted low viscosity to control flow as directed by the Departmental Representative.
 - .1 Tolerances for grout viscosity with relation to water volumes must be pre-agreed upon by the grout manufacturer
- .2 Clean out void thoroughly using tools and compressed air. Flush with water until water runs clear. Ensure ambient and masonry temperature remains above 12 degrees C or to manufacturer's instructions for at least 24 hours after voids are cleaned out.
- .3 Insert a grouting tube of approximately 8 mm diameter to a depth that reaches the voided zone of the joint (up to 200 mm) and proceed to fill and seal front of joint to be grouted to within depth required for front pointing preparation.
- .4 Leave grout tube ports spaced at 300mm to 400mm on centre horizontally and vertically in joints.
- .5 Pre-wet masonry to prevent staining by grout seepage.
- .6 Inject grout through tube under low pressure until void is considered full. Record approximate volumes of grout take through each grouting. A low pressure pot system must be used for all grouting work. Gravity grouting is not permitted. Use grout pressure at the gauge on the pot between 4 and 8 psi.

- .7 The contractor must take great care not to allow the grout to seep inside the masonry and damage the interior finishes. As soon as it is detected that an unreasonable amount of grout has flowed into a specific grout tube, approximately 9 litres, stop grouting and advise Departmental Representative.
 - .1 Amount to be determined by mock-ups.

3.5 FIELD QUALITY CONTROL

- .1 The Departmental Representative will inspect the quality of the work on a regular basis.
- .2 Notify Departmental Representative prior to raking out of joints, to ensure that any stones slated for removal and repair have been identified.
- .3 Notify Departmental Representative prior to sawcutting joints, so that he/she can photograph the stone masonry.
- .3 Approval of raked out condition of joints, and approval of backpointing mortar, must be received in writing to the Contractor before the next procedure can proceed.
- .4 Provide the Departmental Representative with a minimum of 48 hours notice for required inspections.
- .5 Where work proceeds to the next phase without the approval of the Departmental Representative, the Contractor will remove all unapproved mortar at his own cost.

3.6 CLEANING

- .1 Clean surfaces of mortar droppings, stains and other blemishes resulting from work of this contract as work progresses, and at the end of each working day.
- .2 Do further cleaning after mortar has set and cured.
- .3 Clean masonry with stiff natural bristle brushes and plain water only. Diluted acid cleaners are not to be used unless instructed in writing by Departmental Representative.
- .4 Remove all embedded anchors and repoint masonry joints at anchor locations as scaffolding is removed.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 04 03 07 - Historic - Masonry Repointing and Repair.
- .2 Section 04 05 00 - Common Work Results for Masonry.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C109/C109M-13 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
 - .2 ASTM C144-11, Specification for Aggregate for Masonry Mortar.
 - .3 ASTM C185-08, Standard Test Method for Air Content of Hydraulic Cement Mortar.
 - .4 ASTM C207-06(2011) Specification for Hydrated Lime for Masonry Purposes.
 - .5 ASTM C348-08, Test Method for Flexural Strength of Hydraulic-Cement Mortars.
 - .6 ASTM C780-14, Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Masonry.
 - .7 ASTM C940-10A, Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced Aggregate-Concrete in the Laboratory.
 - .8 ASTM C979/C979M-10, Specification for Pigments for Integrally Coloured Concrete.
- .2 Canadian Standards Association (CSA International).
 - .1 CAN/CSA A3000-13, Cementitious Materials Compendium.
 - .2 CAN/CSA A179-04 (R2014), Mortar and Grout for Unit Masonry.

1.3 ALLOWABLE TOLERANCES

- .1 The Departmental Representative reserves the right to reject mortar which fails compressive strength range for specified mortar mix.

1.4 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.

1.5 SUBMITTALS

- .1 Product Data.
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit five copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for mortar, grout, parging, colour additives and admixtures.
- .2 Samples.
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

- .3 Prior to the mixing or preparation of mortars submit for approval to the Departmental Representative confirmation of source or product data sheet of:
 - .1 Sand Aggregate.
 - .2 Cements.
 - .3 Lime.
- .4 Manufacturer's Instructions.
 - .1 Submit manufacturer's installation instructions.

1.6 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties. Include the following:
 - .1 Sand gradation testing in accordance with CAN/CSA A179.
 - .2 Aggregate to be 100% dry and stored in dry condition throughout the project.
 - .3 Air content: mortar mix in plastic state.
 - .4 Vicat cone penetration: mortar mix.
 - .5 Mortar compressive strength: at 7 and 28 days or otherwise required.
- .2 Testing Standards
 - .1 Vicat cone test: to ASTM C780.
 - .2 Cube strength: to CAN/CSA A179, Annex B.
- .3 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.
- .5 Mock-ups: Construct mock-ups in accordance with Section 04 05 00. – Common Work Results for Masonry.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with local collection services.

1.8 ALTERNATIVES

- .1 Obtain Departmental Representative'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. This rule applies during the entire contract.

1.9 SITE CONDITIONS

- .1 Existing Conditions
 - .1 Investigate possible structural problems and report before beginning masonry work.
- .2 Ambient Conditions

- .1 Execute work to CAN/CSA A179.
- .2 Installation of Relative Humidity (RH) and Temperature equipment: Measure temperature and RH. Report to Departmental Representative.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Use same brands of materials and source of aggregate for entire project.
- .2 Mortar and grout: to CAN/CSA A179.
- .3 Aggregate: to CAN/CSA A179; gradation to ASTM C144. Use well graded aggregate passing 4.75mm down to 150 micron sieve where joints are greater than 6mm. Use aggregate passing 1.18mm down to 300 micron sieve where 6mm thick joints or less are indicated. In the event that the sand does not meet the noted gradation requirements, the contractor will be required to carry out additional sieving to meet the requirements or provide alternate sand.
- .4 Colour: to ASTM C979. Ground coloured natural aggregates or metallic oxide pigments.
 - .1 Provide a sample of the mortar to the Departmental Representative prior to commencement of the work. Provide sample colours of the final front pointing mix to the satisfaction of the Departmental Representative. Upwards of 6 mixes may be required. Samples are to be placed in existing joints in order to determine correct colour upon dry /curing. Allow 3 weeks to pass to allow sample to be cured and dry sufficiently to judge actual colour.
- .5 Water: potable or from approved non-potable supply.
- .6 Lime:
 - .1 Hydrated lime: ASTM C 207, type SA.
- .7 Portland Cement: CAN/CSA A3000, white, non staining, type GU.
- .8 Calcium chloride is not to be used for any mortar.
- .9 Grout for stonework: Hydraulic lime based injection and reinforcement grout, conforming to CAN/CSA A179, ASTM C348 and ASTM C940, control water content to conform to CAN/CSA A179, Clause 4.2.1.2 or Clause 4.3.1.5.
- .10 Restoration mortar for patching of stone to be a proprietary mix, pre-mixed/pre-bagged. Properties to be compatible with existing stone.
- .11 Polymer Latex admixture.

2.2 PROPERTIES

- .1 Bedding and pointing mortar for stonework mortar mix:
 - .1 1:2:6 white Portland cement: type SA lime: aggregate.
- .2 Restoration mortar; premix to manufacturer's instructions.

- .3 Vicat Cone Penetration for Stonework: to ASTM C780.
 - .1 Pointing Mortar: 15-20mm.
 - .2 Bedding Mortar: 20-30mm.

- .4 Allowable air content for all Lime Mortars; 8% to 14%.

2.3 MIXES

- .1 Do not add air entraining admixture to mortar mix.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 CONSTRUCTION

- .1 Do masonry mortar and grout work in accordance with CAN/CSA A179 except where specified otherwise.

3.3 MIXING

- .1 Prepare measuring boxes to ensure accurate proportioning of mortar ingredients. Each box to contain exact volume proportion for each specific mix ingredient.
- .2 Introduce approximately 75% of the total volume of water into the mixer, followed by 50% of the sand and all of the dry hydrated lime. Mix for approximately 3 minutes or until the materials are thoroughly blended and no particles of white lime are apparent in the mix.
- .3 Allow to stand for 5 minutes.
- .4 Add the full volume of Portland cement, the remainder of the sand and water. Mix for further 3-5 minutes until thoroughly blended and mortar has reached consistency determined by Vicat Cone penetration testing.
- .5 Add just sufficient water to obtain workable consistency for setting units. Avoid too wet a mix which stains the face of the work. Vicat Cone penetration may be slightly greater for bedding mixes, but should not exceed maximum value specified by more than 20%. Record water quantities and use for subsequent mixes to help ensure uniformity of all subsequent mixes.
- .6 Ensure that water quantity is measured and maintained at same measurement for each mortar batching.
- .7 All pointing mortar can be mixed using a regular paddle mixer. Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes.

- .8 Mixing by hand must be pre-approved by the Departmental Representative, as follows:
 - .1 Hand mixing must be carried out using high speed, 2500 Rpm drill, with paddle mixer attachment. Mixing to be completed in sufficiently small container so as to allow full contact of the paddle with the mortar during the mixing process, thus ensuring thorough incorporation of ingredients and air entrainment.
 - .2 Submit masonry tools and container for approval prior to starting pointing work.
- .9 Clean all mixing boards and mechanical mixing machine between batches.
- .10 Mortar must be weaker than the masonry units it is binding.
- .11 Mortar must not contain elements detrimental to the original masonry or surrounding materials.
- .12 Appoint one individual to mix mortar, for duration of project. In the event that this individual must be replaced, mortar mixing must cease until the new individual is trained, and mortar mix is tested.

3.4 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.
- .2 Remove droppings and splashings using clean sponge and water.
- .3 Clean masonry with low pressure clean water and soft natural bristle brush. For limestone, pressure should be between 276 and 410 kPa. See Section 04 03 07.02 - Historic: Masonry Repointing and Repair.

3.5 SCHEDULE

- .1 Use mortar matching existing mortar in colour for finish pointing to minimum depth of 30mm.
- .2 Use non-staining mortar for all repointing work.

3.6 PROTECTION OF COMPLETED WORK

- .1 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.

3.7 FIELD QUALITY CONTROL

- .1 Inspection and testing of mortar will be carried out by a Testing Laboratory designated by the Departmental Representative, to CAN/CSA A179. The mortar testing company will provide Vicat Cone penetrometer and standard air meter for measuring air content at the mortar.
- .2 Departmental Representative will pay for cost of test as specified.
- .3 Frequency of mortar testing will be specified by Departmental Representative.

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- .4 Air content to ASTM C185, for all lime mortars, and penetration using Vicat Cone to ASTM C780 for mortars used in stonework, must be tested at the same frequency as strength tests to ASTM C109, or more frequently as required by the Departmental Representative.
 - .5 The Departmental Representative reserves the right to reject sand that is not 100% dry.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 04 03 07 - Historic – Masonry Repointing.
- .2 Section 04 03 08 - Historic - Mortaring.

1.2 ALTERNATIVES

- .1 Change of manufacturer's brands, sources of supply of materials during entire contract must be approved by Departmental Representative.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM A276 – 13A, Specification for Stainless Steel Bars and Shapes

1.4 DEFINITIONS

- .1 Repair of Stone: any repair done to conserve/restore original appearance and function of partly deteriorated stones.
- .2 Filling: material used to rebuild broken or deteriorated part of stone.
- .3 Mechanical Repair: material used as adhesive to fasten broken/fractured stone elements by direct application at fracture interface and/or by application to added reinforcing elements such as dowels.
- .4 Mortar: material used to repoint the adjacent mortar joints to stone element being repaired.

1.5 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit granite epoxy repair mortar samples.

1.6 QUALITY ASSURANCE

- .1 Work of this section in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Make mason's workshop accessible to Departmental Representative for inspection of current work-in-progress.
- .3 Ensure the stone masons and site superintendent, can pass a hands-on test of skills administered by Departmental Representative where requested. Departmental Representative has right to reject any mason who does not demonstrate appropriate abilities or experience.
- .4 All masons employed on this project throughout course of project must meet above requirements. Where, during course of project, masons leave work force, any replacement masons must also meet requirements.

1.7 MOCK-UPS

- .1 Construct mock-up in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 For each individual monument type, where relevant, construct mock-up of the following:
 - .1 Two crack repairs.
 - .2 Two dutchmen.
 - .3 Two repairs using the Edison Coatings system for granite repair. Prepare two repairs each for the flamed, honed and polished finish as required.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Store materials in a dry area and supported free of ground.

1.9 ENVIRONMENTAL REQUIREMENTS

- .1 Maintain temperature at 12 degrees Celsius or above during and 72 hours after repair, throughout thickness of stone.
- .2 Choose epoxy resin compatible with humidity condition of stone as specified by manufacturer.
- .3 Provide for temporary enclosures and heating equipment to maintain specified temperatures. Take precautions to avoid overheating masonry.

1.10 EXISTING CONDITION

- .1 Record and report to Departmental Representative site conditions non-conforming to those specified before beginning work.

Part 2 Products

2.1 MATERIALS

- .1 Materials for mortar and grout, see Section 04 03 08 Historic-Mortaring.
- .2 Water: clean and free of deleterious materials such as acid, alkali and organic material in accordance to CSA A179.
- .3 Dowels and threaded rods, 4 to 26mm diameter to ASTM A276, Stainless Steel Grade 304.
- .4 Stone slabs: to have similar mechanical and aesthetic properties to existing.
- .5 Epoxy Resin Gel. Acceptable product: Sikadur 31.
- .6 Epoxy Resin, low viscosity, UV stable, capable of setting and curing in wet conditions.
- .7 Acrylic Resin: Paraloid B72 and AC33.
- .8 Acetone solvent. Industrial grade.
- .9 Methyl ethyl ketone (MEK) solvent.
- .11 Plasticine.
- .12 Plumbers adhesive tape.

- .13 Burlap, untreated and non-staining.
- .14 100% cotton rags.
- .15 Hardwood wedges: free of tannins, various lengths and thickness.
- .16 Backer-rod: Polyethylene rope to accommodate all joint width snugly.
- .17 Syringes: 60 ml volumes, with twisted attachment for standard needles. Supplier: Hospital Supply.
- .18 Catheters: 60 ml volume capacity.
- .19 Needles for syringes: sizes numbers 12 and 16.
- .20 Plumbers 6 mm and 12 mm clear tubing.

2.2 EQUIPMENT

- .1 Supply the following smaller specialized tools and equipment:
 - .1 Good quality medium size drill with hammer option suitable for doing sensitive repair work to stone..
 - .2 Small four inch grinders.
 - .3 Tungsten Carbide tipped drill bits of 4 – 35 mm for drilling holes.
 - .4 Light-weight, quick-release clamps of various sizes.
 - .5 Strap clamps.
 - .6 Plunge-type core drill, capable of coring hole of 6 mm inch.
 - .7 Metal artist spatulas of various sizes.
 - .8 Carbide-tipped scribe for marking cut lines on stone.
 - .9 Neoprene carvers mallet, small size (130 mm diameter).
 - .10 Small carbide-tipped chisels of sizes 6 mm to 12 mm.
 - .11 Carborundum rubbing of fine, medium, and coarse grain,..
 - .12 Epoxy injection pump.
 - .13 ASTM Standard sieve stack of following screens: no. 4, no 8, no 16, no 30, no.50, no 100, no 200
 - .14 400 gram digital scale of high quality (Ohaus "scout" series) sensitive to 0.01grams.

2.3 REPAIR MORTAR MIXES

- .2 Use the Edison Coatings system for coloured granite repair:
 - .1 Custom 45 type GR, with liquid RL2 component.
 - .2 Thinfill 55.
 - .3 Aquathane UA210.
 - .4 Aquaspex 220.
- .3 Using the above repair system follow the recipes and procedures provided to the contractor in writing by the manufacturer.
- .4 Multicomponent repair system requires strictly following the manufacturer instructions for all steps, procedures and material component applications to satisfactorily complete each repair.

2.4 SOURCE QUALITY CONTROL

- .5 Retain purchase orders, invoices, suppliers test certificates and documents to prove that materials used in contract meet requirements of specification.

- .6 Produce above upon request by Departmental Representative and allow free access to sources where materials were procured.

Part 3 Execution

3.1 PREPARATION

- .1 Remove decayed section of stones until sound surface is reached. Obtain Departmental Representative's approval for methodology and tools to be employed before commencing this work.

3.2 PROTECTION

- .1 Prevent damage to building, landscaping, pavement, which are to remain. Make good any damage.
- .2 Take utmost care not to damage historic fabric. Make good any damage.

3.3 RUBBING AND DRESSING BACK OF FRIABLE SURFACES

- .1 Where surface of stone is scaling or disaggregating, gently rub using hand-held carborundum blocks, and pluck with small hand-held tools, including pneumatically driven chesils.
- .2 Should the surface display significant thin-plate exfoliation or similar condition, larger hand held tools will be applied to the surface to remove them. Strict caution must be used to avoid aggressive removal of material from the surface.
- .3 Bevel the edge of any edges of retained and firm surface plates to ensure water shedding.

3.4 MECHANICAL CONSOLIDATION OF FRACTURED CRACKS IN STONE

- .1 Departmental Representative will mark location for stitches.
- .2 Drill small holes as marked by Departmental Representative to a minimum depth of 75 mm beyond line of crack being stitched.
 - .1 Hole diameters and depths will be determined by the Departmental Representative.
- .3 Clean hole thoroughly, first blowing out with forced air from compressor, followed by flushing with acetone. Allow solvent to evaporate.
 - .1 When blowing drill hole to remove dust, make certain the nozzle extension is attached such that the forced air reaches the bottom reaches of the drilled hole.
- .4 Install stainless steel dowels as noted on drawings, and as directed by Departmental Representative.
- .5 Inject with epoxy resin , adjusting viscosity to prevent unnecessary flow into unwanted voids.
- .6 Once epoxy is set, drill out cured epoxy from top 25 mm of hole and fill with suitable Edison Coatings system for coloured granite repair component.
- .7 Complete repair of crack following Repairs of Cracks in Granite procedure described in

the present Specification section.

- .3 Where the crack is wider than 4 mm or where voids are considered too large along the edge of the crack, then Edison Coatings system for coloured granite repair described above will be used.

3.5 REPAIR OF FISSURE CRACKS IN GRANITE BY PRESSURE EPOXY INJECTION

- .1 Drill stitch holes as marked and directed by Departmental Representative. For fragile detached portions such as corners, it is preferable to core the 1/4 hole required for the stitch. Thoroughly clean all dust from drilled hole. Cut and insert stainless steel rod such that it sits countersunk to surface by 20 mm. Plug hole with granite cored plug of same diameter as the drilled hole. Insert with epoxy paste such that the hole is fully sealed. With masonry tools, gently work the surface of the core plug down to surface contour of granite such that the core plug is as invisible as possible.
- .2 Loose material must be cleaned from crack and also from the adjacent surface of the granite.
- .3 Seal the immediate edges of the crack with the acrylic resin Paraloid B72. This will provide a releasing agent and removable buffer to the quick-set cement.
- .4 Apply masking tape to surface outside the acrylic resin so as to insure further protection of the stone surface from spills and or staining.
- .5 Roll plasticine into long rolls and push into top surface of cracks. Fully seal entire length of cracks so as to prevent any epoxy resin from escaping onto face of the granite.
- .6 Insert port guides and injection ports along the crack, using a quick-setting cement to seal the ports to their positions.
- .7 Inject the epoxy resin under pressures of between 50-80 psi.
- .8 Purge the injection gun and equipment away from building.
- .9 After the epoxy is cured, the cement seal and plasticine removed, use MEK solvent to remove the Paraloid B72 from the surface.
- .10 Final fills to the top surface of the cracks will be completed by using the Edison Coatings system for coloured granite repair component.

3.6 REMOVAL OF CAULKED SEALANTS

- .1 All caulking and sealants are to be removed including: along the joints between existing flashings and masonry, at all other locations where sealant has been used to stop up joints.
- .2 Full skin and breathing protection is required.
- .3 Methods and procedures
 - .1 Begin by cutting away as much of the caulking as is possible using small sharp knives, combined with pulling away by hand.
 - .2 Liberally apply thickened paint stripper to the surface of the stone where the caulking adheres to the grains of the surface and cover immediately with light plastic to prevent drying.
 - .1 Do not apply in direct sunlight. Keep working surface while shaded.
 - .2 Do not let the stripper dry on the surface. Keep covered to prevent drying, adding liberal amounts of the chemical to maintain a wet, active

contact with the surface.

- .3 Allow the stripper to dwell on the surface for approx. 20 minutes.
- .4 Agitate the surface with a small stiff bristle brush.
- .5 As it begins to peel and lift, swab the caulking up, being certain that the cotton rag used for swabbing is wetted with additional stripper.
- .6 Repeat procedure as necessary. A final pass over the surface using a sharp chisel pneumatically driven at low speed may be used if approval is given by the Departmental Representative.

3.7 DISMANTLING STONES

- .1 Photograph all elevations of the monument prior to dismantling. Develop these photo prints in well lit and well focused letter format. Provide copies to client with the number of each stone reference number clearly marked in permanent marker ink on the photograph.
- .2 Submit to Departmental Representative for approval the method of reference numbering prior to starting work.
- .3 Temporary identification of stones:
 - .1 On the face of each stone, mark with chalk (not wax) the specific reference number assigned to it.
- .4 Permanent identification of stones:
 - .1 As each stone is exposed, removed from the wall and thoroughly cleaned of adhering mortar, mark with permanent marker on the top bed surface of each stone the reference number given to it and which had already been temporarily marked with chalk on the face.
 - .2 Make certain that the permanent mark will not fade or otherwise worn away by the weather or handling during the time it is out of the wall during the project.
- .5 Provide all necessary supports, shoring, bracing necessary to insure structural stability during dismantling.
- .6 Provide complete and rigid protection in plywood around the low perimeter wall. This protection will stay in place during all of project, only to be removed when intervention to repoint and clean this wall is taking place.
- .7 Stone must be first loosened from joint surrounding the stone by hand cutting the mortar free from the front and as deep as possible without damaging stone edges. Only chisels of a narrower width than the mortar joints can be used. Rotary power tools, such as grinders and saws are not to be used in cutting out of mortar from joints.
- .8 Use hardwood wedges tapped in placed no closer than 100mm to the stone end in order to ease the stone free.
- .9 Free the stone of any attached restraint fasteners before lifting.
- .10 Mark stone on top bed with permanent marker with a specific reference number. Transfer this reference number to drawings and photographs for recording purposes and identity. Do not mark faces of the stones.
- .11 All stones must be examined for any fractures that may cause stone to break apart during lifting. Where required and where possible, these stones will be mechanically

consolidated by stitching with stainless steel threaded rod in epoxy before lifting takes place.

- .12 Lift stone using nylon straps from bottom bed only. A minimum of two straps per stone must be used while lifting. If large stones have lifting holes on top bed, and the stone is in sound condition, then these lifting holes can be used to lift the stones high enough to allow straps to be placed under and lifting can proceed using straps only.
- .13 Remove all adhering mortar from the surfaces of the stones.
- .14 Stones must be transferred immediately to wooden pallets. Minimum stacking of these stones will be tolerated. Insure that all stones stored together be protected from contact by the careful placement of non-staining rigid padding between each stone. Stone must not be placed in direct contact with the ground.
- .15 Stones must be arranged so as to allow for easy identification, access for examination and conservation intervention.
- .16 Once dismantled and stacked, the contractor must insure complete protection against all possible forms of damage or accidents that may cause loss or disfigurement to the stones.

3.8 REVIEW OF NEWLY EXPOSED MASONRY

- .1 All new exposed masonry must be reviewed by the Departmental Representative before interventions of repair or replacement can take place.

3.9 INSTALLING NEW STONES

- .1 Refer to Stone Supply Section.
- .2 Refer to Section 04 03 08 - Historic Mortaring.
- .3 Remove all loose mortar or masonry fragments of hindside joint between the new stone and core matrix.
- .4 Cut stone to exact dimension as the original it is replacing.
- .5 Set stone in exact position as original stone, being certain that the replacement stone fits the opening to the dimensions that guarantee original joint widths.
- .6 Be certain that the hind side of the replacement stone fits within an average distance from the core by 10 mm.
 - .1 Built up with compatible stone or brick if necessary.
- .7 Just prior to setting the stone, ensure that all dirt is thoroughly washed from the surface of the stone.
- .8 Thoroughly clean cavity of all dust and debris and thoroughly moisten all surfaces of the cavity.
- .9 When cavity is moist and without standing water or puddling, set replacement stone into on a mortar bed and lift into correct position.
 - .1 Ensure position temporarily using plastic spacers and removable wooden wedges that have been previously soaked.
 - .2 Remove wedges once dried out.

- .10 Set stone in correct position with respect to original building construction and wall line. Ensure plumb and level, and exact joint dimensions as originally constructed position within the wall.
- .11 Insert grouting tubes to reach to 100 mm into the joint at two locations along each of the side and top joints. Back-point around tubes and allow to set for 48 hours.
- .12 Grout the joints around the stone through the tubes.
- .13 Complete front pointing at time the surrounding wall areas is carried out.
- .14 Remove mortar droppings from face of stone before mortar is set. Sponge stone free of mortar along joints as work progresses.

3.10 DUTCHMEN INSERT PREPARATION FOR FLAGPOLE STEPS

- .1 During time that steps are dismantled, set-up and prepare existing original granite steps to accommodate cutting material to be used for dutchmen.
- .2 Maximum of two average size dutchmen to be taken from one stone at a time. Only one large size to be taken from any one existing step.
- .3 Extract by cutting from rear lower portion step, such that removal will be far from top or side joints.
- .4 Cut within 10mm of the outside dimension required for the dutchman insert.
- .5 Replace removed portion of granite with replacement granite of similar type. Use Standstead granite for refilling cut out portion.
- .6 Fit the replacement material with tight joint tolerances and preparation and follow all other procedures as for normal dutchmen procedures described in the specification.
- .7 Proceed with preparing granite piece removed from step for dutchman insert into granite step face.

3.11 DUTCHMEN INSERTS

- .1 Location and dimension of cutting required to remove deteriorated stone will be marked and agreed upon by the Departmental Representative prior to cutting.
- .2 Only stones marked on drawings or otherwise marked out by the Departmental Representative shall be cut into for purposes of inserting a Dutchman.
- .3 Adjacent masonry units should not be cut into, displaced, or in any way damaged while cutting or removing masonry units.
- .4 Departmental Representative shall approve methods and tools used for cutting out purposes.
- .5 Cutting out will follow precise incised lines (scribed) which are squared and following right angles.
- .6 Cut out deteriorated portion to a minimum of 75 mm behind wall or arris line.

- .7 Smooth the bottom and side surface of the prepared cavity to receive the new stone.
- .8 Cut new stone to dimension to fit prepared cavity snug. A tolerance of 1.0 mm will be allowed between Dutchman insert and host stone joints.
- .9 Smooth, tool or carve surface to match adjacent exterior surface of the cavity.
- .10 Provide attachment of insert stone to cavity by inserting one or two stainless steel rods into back-side of new stone set in epoxy. The drilled holes should reach 50-75 mm into connecting surface. The holes must be thoroughly cleaned before epoxy is injected.
- .11 Set insert stone flush with original surface, using a slurry of grey Portland cement pigmented to match the stone. It must be aligned with an evenly wide joint of 1 mm surrounding it.
- .12 Cut excess squeeze-out the lime binder and sponge flush and clean with the surface of Dutchman joint.

3.12 REPAIR MORTAR FILLS

- .1 Surface loss locations requiring fills to address voids and spalls, the Edison Coating repair system for granite will be used.
- .2 Consult with the manufacturer to confirm the exact methodology and procedure to address the various granite repair system products that are required to address surface losses to flamed, honed and polished granite of each relevant monument.
- .3 Surface spalls and voids being addressed are expected to require cavity preparations of the affected area. The contractor will prepare the cavity preps following mark-ups provided by the Departmental Representative. The preparation is anticipated to include the cutting back of the spalled or voided areas to a depth of 10mm or as confirmed by the manufacturer.
- .4 The manufacturer will require input on the nature and type of repair in order to formulate a best repair approach. The contractor will need to submit details of the stone type and monument location, as well as provide the manufacturer detail photos and samples of the stone being repaired with the repair mortar system.
- .5 Application to the prepared cavity will use small spatulas. Forming and pouring the void location will also be employed where such a placement procedure is felt to benefit the process of application.
- .6 Upon completion, the repairs must imitate the texture, finish and have the same reflective qualities on honed and polished surfaces.
- .7 Adjacent surfaces of the spall or void repair must be left clean and free of smears and adhesions from the repair placement process.

3.13 RESURFACING/REPOLISHING OF FLAG POLE BASES

- .1 Present honed flagpole base steps, which are later generation replacements, will be removed from site and have a professionally applied flamed finish applied. Provide mock-ups of proposed final flamed finish and texture, by submitted examples that are completed on a similar granite, such as the Standstead

granite.

- .2 The top polished base stone of each flagpole will be resurfaced and repolished to original lustre if required as part of the general repair procedure for these two stones.
- .3 Submit written outline of the procedures, tools, diamond grit that will be used in the resurfacing and repolishing process. Name the company and name of the individual who will perform the work, stating the experience he/she has had in doing this specific type of skilled work on granite.
- .4 Depending on the recommended procedures and system material components given by the Edison product manufacturers, the contractor may be required to include the repair voids of the bases as part of the resurfacing and repolishing procedure. Confirmation from the contractor after consulting the manufacturer on this aspect of repair and repolishing work must be provided before proceeding with repair installation and resurfacing/repolishing.
- .5 Contractor should assume that upwards of 5 diamond pad levels of coarseness will be required to complete the resurface/repolish work. Starting from course to fine, a range between 20 and 1200 may be required to establish the exact same finish as presently exists on the granite base stones. Mock-ups are required for each stage of this work to demonstrate the grits required for a successful finish. Submit samples on similar granite stone, such as the Stanstead granite.
- .6 Orbit or spun marks left behind by the rotary tool and polishing pad will not be accepted. It is assumed that a final powder application, spun on the surface to remove all orbiting marks will be utilized in the repolishing process.

3.14 CLEANING

- .1 Clean mock-up to demonstrate cleaning operations to Departmental Representative before starting cleaning work.
- .2 Clean stone work surfaces after repairs have been completed and mortar has set.
- .3 Clean stone surfaces of grout or mortar residue resulting from work performed without damage to stone or joints.
- .4 Clear site of debris, surplus material and equipment, leaving work area in clean and safe condition.

3.15 PROTECTION OF COMPLETED WORK

- .1 Protect finished work from impact damage for period of two weeks.
- .2 for 3 x 300 x 300 x 50mm samples on Stanstead granite for review and approval by Departmental Representative, before the existing steps/slabs are refinished.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 02 41 99 - Demolition of Minor Works.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Conduct a pre-dismantling meeting with Departmental Representative to verify project requirements, equipment, procedures and assigned storage areas.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings
 - .1 Submit drawings stamped and signed by Professional Engineer registered or licensed in Province of Ontario.
 - .2 Provide drawings for shoring and bracing where masonry will be laterally unsupported.
- .3 Site Quality Control Submittals
 - .1 Provide up-to-date copies of stone location recording system chart or card index.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide data for incorporation into manual specified in Section 01 00 10 - General Instructions. Include:
 - .1 Photographically record stonework to be dismantled.
 - .2 Drawing or chart indicating dimensions and location of each dismantled stone in removal area.

1.5 QUALITY ASSURANCE

- .1 Quality assurance in accordance with Section 01 00 10 – General Instructions.
- .2 Mock-ups
 - .1 Construct mock-up in accordance with Section 01 00 10 – General Instructions.
 - .2 Perform mock-up 1.0m x 1.0m to demonstrate dismantling procedures in location designated by Departmental Representative.
 - .3 Notify Departmental Representative minimum 72 hours prior to construction of mock-up.
 - .4 Work not to proceed prior to Departmental Representative giving approval of mock-up.
 - .5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 00 10 – General Instructions and with manufacturer's written instructions.
- .2 Protection and Storage
 - .1 Store dismantled masonry units on wood pallets, protected from exposure to water, elements and potential mechanical damage, fully covered under polyethylene.
 - .2 Submit storage and identification system to Departmental Representative for review.

- .3 Packaging Waste Management
 - .1 Remove for reuse, pallets and packaging materials, in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.7 AMBIENT CONDITIONS

- .1 Loosen wet masonry only when temperature is above 5°C.
- .2 In temperatures 5°C and below:
 - .1 Keep stones dry.
 - .2 Protect wet stones from freezing.

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Examine masonry, staging and storage areas and notify Departmental Representative in writing of conditions detrimental to acceptable and timely completion of Work.
- .2 Refer to Section 01 14 25 - Designated Substance Report for procedures on working with designated materials.
- .3 Refer to Section 02 41 99 - Demolition of Minor Works for additional direction.

3.2 SITE VERIFICATION OF CONDITIONS

- .1 Stop work in that area and report to Departmental Representative immediately, evidence of hazardous materials.

3.3 PREPARATION

- .1 Obtain Departmental Representative's approval for alternative methodology and tools to be employed before commencing the work.
- .2 Clean stone of dust and stone chips.

3.4 PROTECTION

- .1 Prevent damage to structure, landscaping, pavement, utility lines which are to remain. Make good damage incurred.
- .2 Protect surrounding components from damage during work.
- .3 Make good damage to historic fabric.
- .4 Obtain Departmental Representative's approval for repair methodology.

3.5 SPECIAL TECHNIQUES

- .1 Before dismantling stones, indicate location and dimensions of each stone in removal area on a enlarged photo, drawing or chart.

- .2 Recording of stone location and dimensions is required for historic record.

3.6 STRUCTURAL SUPPORT

- .1 Construct shoring and cradling, and other temporary framing work needed to support structure, or parts of it, during removal operations, according to approved shop drawings.

3.7 METHOD FOR LOOSENING STONES

- .1 Use approved methods to loosen stones, which will cause no damage either to stones or to other architectural elements.

- .2 Use hand tools only.

3.8 DISMANTLING AND MOVING STONES

- .1 Avoid damaging arrises of stone when removing mortar and freeing up.

- .2 Remove excess mortar with the use of hand tools.

- .3 Use wood wedges where required to remove or dislodge stone.

- .1 Use flat pry bars protected with impact absorbing protection (burlap, cardboard).

- .4 Use nylon hoisting belts, minimum 2 belts per stone.

- .5 Protect stone from damage when hoisting and lifting from position.

- .1 Use wood shims to isolate units from hoisting belts.

- .6 Where damage occurs to stone, report to Departmental Representative.

3.9 HANDLING

- .1 Place detached stones on wood surfaces during handling. Prevent contact with metal.

- .2 When stones are lowered to ground, place directly on wooden platform used for transport or storage.

- .3 Transport and keep stones on wooden platforms.

- .4 Ensure that sharp edges of stones do not come in contact with hard objects.

3.10 TEMPORARY STORAGE STAGING AREA

- .1 Place stones in designated area of site for cleaning, detailed inspection and for final marking, before storage.

- .2 Make stones accessible and retrievable when required.

3.11 CLEANING

- .1 Do cleaning operations when temperatures are above freezing conditions.

- .1 After cleaning, protect wet stones against freezing until dry.

-
- .2 Clean stones by wet scrubbing with stiff bristle brush, unless otherwise instructed by Departmental Representative.
 - .1 Use medium pressure rinsing equipment. Allow up to 900PSI to assist with cleaning surfaces of granite.
 - .3 Use chemical cleaning methods only with prior written approval of Departmental Representative.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 04 03 07 – Historic- Masonry Repointing.
- .2 Section 04 03 08 – Historic - Mortaring.
- .3 Section 04 05 19 – Masonry Anchorage and Reinforcing.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-A371-04(R2014), Masonry Construction for Buildings.

1.3 SUBMITTALS

- .1 Product Data.
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings.
 - .1 Where existing masonry becomes laterally unsupported during construction, provide shop drawings for temporary bracing, stamped by a Professional Engineer registered in the Province of Ontario.
- .3 Samples.
 - .1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Submit samples.
 - .1 One of each type of masonry anchor proposed for use.
 - .2 One of each type of Restoration mortar.
 - .3 One sample of stone to be used to replace existing stone, where stone has not been salvaged from site.
 - .4 One sample of each type of masonry accessory specified.
 - .3 Submit samples to be tested to laboratories employing technicians certified/trained in procedures for testing masonry units.
 - .4 The approved samples denote the standard material to be used.
- .4 Manufacturer's Instructions.
 - .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

- .1 Test Reports.
 - .1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.
 - .2 Submit laboratory test reports in accordance Section 01 33 00 – Submittal Procedures.
 - .3 Submit laboratory test reports certifying compliance of masonry units and mortar ingredients with specification requirements.
 - .4 For stone replacement units, submit test reports confirming compressive strength, density and porosity, to requirements set out in referenced CSA and ASTM Standards.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

- .3 Mock-ups.
 - .1 Construct mock-up reinstalled stone slabs showing colours and textures, full assembly including use of anchors, ties, dowels, cramps, dampproofing/waterproofing, drainage planes, weeping system, jointing, mortar, tooling, workmanship and cleaning procedures, and general workmanship.
 - .2 For repointing, mock-up must include samples of saw-cut joints, raked joints, backpointed joints, and finishpointed joints, for both horizontal and vertical joints.
 - .3 Mock-up will be used:
 - .1 To judge workmanship, substrate preparation, operation of equipment and material application.
 - .4 Construct mock-up where directed.
 - .5 Allow 72 hours for inspection of mock-up by Departmental Representative before proceeding with work.
 - .6 When accepted by Departmental Representative, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.
 - .7 Start work only upon receipt of written approval of the mock-up by the Departmental Representative.
- .4 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Coordinate work with that of Division 03 for concrete and Division 05 for metalwork.
- .5 The stone masons and site superintendent, engaged by the Masonry Contractor must demonstrate an ability to pass a hands-on test of skills, if so administered by the Departmental Representative. The Departmental Representative has the right to reject any mason who does not demonstrate the appropriate abilities or experience on the following tasks:
 - .1 Stone installation.
 - .2 Cutting stone.
 - .3 Carving and tooling stone.
 - .4 Dutchman repairs.
 - .5 Pinning techniques.
 - .6 Restoration mortar repairs: repairs involving proprietary stone restoration mortar shall be carried out by persons who have successfully completed the manufacturer's training course and have been certified by the manufacturer for the type of work required. Provide proof of accreditation by the manufacturer before work begins.
 - .7 Historical repointing.
- .6 All masons employed on this project must demonstrate the ability to reproduce the mock up standards.
- .7 All masons employed on this project throughout the course of the project must meet the above requirements. Where, during the course of the project, masons leave the work force, all replacement masons must also meet requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store, handle and protect materials in accordance with manufacturer's requirements.
- .2 Deliver materials to job site in dry condition.
- .3 Storage and Protection.
 - .1 Keep materials dry until use.
 - .2 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material for recycling in accordance with local collection services.
- .3 Unused metal materials are to be diverted from landfill to a metal recycling facility as approved by Departmental Representative.
- .4 Unused or damaged masonry materials must be diverted from landfill to a local facility as approved by Departmental Representative.

1.7 SITE CONDITIONS

- .1 Site Environmental Requirements.
 - .1 Cold weather requirements: Supplement Clause 6.7.2 of CAN/CSA A371 with following requirements:
 - .1 Maintain temperature of mortar between 5°C and 30°C until batch is used or becomes stable.
 - .2 Maintain ambient temperature between 5°C and 30°C and protect site from wind chill.
 - .3 Cover mortar less than 7 days old with tarpaulins when temperature is forecast to fall below 5°C, and insulated tarpaulins when temperature is forecast to fall below 0°C.
 - .4 Provide heating of masonry work when air temperature falls below -4°C.
 - .5 Maintain mean temperature of masonry above 0°C for a minimum of 7 days, after mortar is installed.
 - .6 Do not repoint if the temperature is forecast to drop below -7°C in the following 24 hours.
 - .7 Any unheated section of masonry must be preheated in it's enclosure for a minimum period of 72 hours above 10°C, before any mortar is applied.
 - .2 Hot weather requirements.
 - .1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
 - .2 Protect masonry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.
 - .1 Spray the mortar surface at intervals to keep it moist, for a minimum of three days after installation.
 - .3 Maintain minimum/maximum thermometers and relative humidity gauges on site and maintain a daily record of temperature and humidity.

1.8 PERFORMANCE

- .1 The following will be considered deficiencies in the work in addition to any failure to meet other provisions of these specifications:
 - .1 Mortar shrinkage cracks between units.
 - .2 Unfilled joints.
 - .3 Spalling of units or joints.
 - .4 Poor colour or texture blending of joints or units.
 - .5 Dusting, efflorescence of joints or units.

- .6 Surface discolouration, discolouration, variance of colour or crumbling of mortar.
- .7 Failure of anchors of built-in items.
- .8 Sloppy fitting, or otherwise poor workmanship in leveling, bedding or jointing of units.
- .9 Failure to match adjacent work or failure to match control test area.
- .10 Failure to adequately cure the mortar.

1.9 COORDINATION

- .1 Coordinate work before and during the project to ensure that alignments for concrete wall, stone work and metalwork.
- .2 Any potential or actual conflict between the accurate reinstallation of the restored metalwork and the masonry must be brought to the attention of the Departmental Representative within 30 days of the metalwork being removed from the masonry.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Masonry materials are specified in Related Sections.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 PREPARATION

- .1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.
- .2 Bracing must be approved by Departmental Representative.
- .3 Winter Heating
 - .1 Maintain ambient humidity levels.
 - .2 The use of open flame to provide heating is strictly forbidden.

3.3 INSTALLATION

- .1 Do masonry work in accordance with CAN/CSA A371 except where specified otherwise.

3.4 CONSTRUCTION

- .1 Jointing: For joint finishing, see Section 04 03 07– Historic – Masonry Repointing and as indicated.
- .2 Stone to have full mortar bed raked back as indicated for finish pointing.

3.5 SITE TOLERANCES

- .1 Tolerances: Conform to Clause 6.2 of CAN/CSA A371, unless otherwise noted.

3.6 FIELD QUALITY CONTROL

- .1 Inspection and testing will be carried out by Testing Laboratory designated by Departmental Representative.
- .2 Departmental Representative will pay costs for testing.

3.7 CLEANING

- .1 Perform cleaning after installation and when mortar has fully cured, to remove construction dust and accumulated environmental soiling.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.8 PROTECTION

- .1 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 04 05 00 - Common Work Results for Masonry.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM A1064/A1064M-13, Specification for Steel Wire, Deformed, for Concrete Reinforcement.
 - .2 ASTM A666-10, Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.
 - .3 ASTM C881/C881M-13, Specification for Epoxy Resin Base Bonding Systems for Concrete.
 - .4 ASTM C1242-14, Guide for Design, Selection, and Installation of Exterior Dimension Stone Anchors and Anchoring Systems.
- .2 Canadian Standards Association (CSA International).
 - .1 CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
 - .2 CAN/CSA A179-04 (R2014), Mortar and Grout For Unit Masonry.
 - .3 CSA A370-14, Connectors for Masonry.
 - .4 CAN/CSA A371-04 (R2014), Masonry Construction for Buildings.
 - .5 CSA S304.1-04 (R2010), Design of Masonry Structures.

1.3 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for epoxy coatings and galvanized protective coatings and touch-up products.
 - .3 Submit product data on wire reinforcement, helical wall ties and stainless steel anchors.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Shop drawings consist of anchorage details, lists and placing drawings.
 - .3 On placing drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.
 - .4 Shop drawings must show details of the stone anchorage, specify required hole size to be cored in the stone, and installation procedures. Indicate material specifications for the steel portion of the anchors.
 - .5 Shop drawings must be stamped and signed by a qualified Professional Engineer licensed to practice in the Province of Ontario.
- .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.

1.4 FIELD MEASUREMENTS

- .1 Make all field measurements necessary to ensure the proper fit of all members.

1.5 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.
- .4 Environmental Conditions: When the average daily ambient temperature is forecast to fall below 5°C, store masonry reinforcement or anchors anticipated to be in contact with fresh mortar, in an area pre-heated to 5°C minimum for 24 hours, prior to installation of anchors.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material for recycling in accordance with local collection services.
- .3 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Connectors: to CSA A370 and CSA S304.1.
- .2 Dowels: threaded stainless steel, Grade 304.
- .3 Anchors for Stone: Anchors to be Type 304 stainless steel conforming to ASTM A666.
- .4 Anchorage for Stone Veneer: Stainless steel, Grade 304, single part anchoring system for kerf cut stones; 50 mm wide split tail anchor with slotted connection hole. Place at 400 mm on centre, unless otherwise noted.
- .5 Uplift anchors for steps at St. Laurent statue: 50mm diameter disk stainless steel , 3mm thick, secured to 10mm diameter stainless steel threaded rod using two stainless steel nuts. Threaded rod to be embedded 90mm into concrete using concrete adhesive.
- .5 Epoxy Adhesive: 2-component, solvent free, cold cured, structural bonding agent conforming to ASTM C881.

2.2 FABRICATION

- .1 Fabricate reinforcing in accordance with CSA A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Fabricate connectors in accordance with CSA A370.

- .3 Ship reinforcement and connectors, clearly identified in accordance with drawings.

2.3 SOURCE QUALITY CONTROL

- .1 Provide Departmental Representative with certified copy of mill test report of masonry anchors, angles and connectors, showing physical and chemical analysis, minimum 2 weeks prior to commencing reinforcement work.
- .2 Inform Departmental Representative of proposed source of material to be supplied.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 GENERAL

- .1 Supply and install masonry connectors and reinforcement in accordance with ASTM C1242, CSA A370, CAN/CSA A371, CSA-A23.1 and CSA S304.1 unless indicated otherwise.
- .2 Prior to placing mortar, grout and Restoration Mortar, obtain Departmental Representative's approval of placement of reinforcement and connectors.
- .3 Supply and install additional reinforcement to masonry as indicated.
- .4 The use of expansion type anchors for temporary or permanent applications in stone masonry is prohibited.

3.3 Reserved.

3.4 GROUTING

- .1 Grout masonry in accordance with CSA S304.1, CAN/CSA A371 and CAN/CSA A179 and as indicated.

3.5 CRAMP ANCHORS

- .1 Supply and install stainless steel anchors per shop drawings.
- .2 Screws to be installed in holes drilled with matched tolerance carbide-tipped drill bits. Installation to be in accordance with manufacturer's instructions.

3.6 LATERAL SUPPORT AND ANCHORAGE

- .1 Supply and install lateral support and anchorage in accordance with CSA S304.1 and as indicated.

3.7 FIELD BENDING

- .1 Do not field bend reinforcement and connectors except where indicated or authorized by Departmental Representative.

- .2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
- .3 Replace bars and connectors which develop cracks or splits.

3.8 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION