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**Part 1            General**

**1.1               RELATED REQUIREMENTS**

- .1       Section 04 03 07 – Historic works – masonry repointing and repair.
- .2       Section 04 03 08 – Historic works – Mortaring.
- .3       Section 04 05 00 – Common Work Results for Masonry.

**1.2               REFERENCES**

- .1       Reference Standards:
  - .1       ASTM International
    - .1       ASTM C73-[10], Standard Specification for Calcium Silicate Brick (Sand-Lime Brick).
    - .2       ASTM C216-[13], Standard Specification for Facing Brick (Solid Masonry Units Made of Clay or Shale).
  - .2       CSA International
    - .1       CAN/CSA-A82-[14], Fired Masonry Brick Made From Clay or Shale.
    - .2       CAN/CSA A-370-[14] Connectors for Masonry.
    - .3       CAN/CSA A-371-[04(R2014)], Masonry Construction for Buildings.
    - .4       CSA-S304.1-[04] C2010)], Design for Masonry Structures.

**1.3               ADMINISTRATIVE REQUIREMENTS**

- .1       Pre-installation Meeting:
  - .1       Conduct pre-installation meeting with general contractor and masonry sub-contractor to verify project requirements and procedures, manufacturer's installation instructions.

**1.4               SUBMITTALS**

- .1       Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2       Product Data:
  - .1       Submit manufacturer's printed product literature and data sheets for replacement bricks and other related products. Data sheets must indicate product characteristics, performance criteria, physical size, finish and limitations.
- .3       Shop Drawings and dismantling/demolition plans:
  - .1       Submit drawings and a sequence of dismantling and/or demolition of load-bearing and non-load-bearing brick works.
  - .2       Submit drawings stamped and signed by professional competent engineer having experience in rehabilitation of historic works registered or licensed in Province of Québec, Canada.
  - .3       Shop drawings must indicate method of brick removal.

- .4 Samples:
  - .1 Submit samples:
    - .1 Five (5) samples of replacement brick.
    - .2 One (1) of each type of masonry anchor specified. Ex: stainless steel clamps)
    - .3 One (1) of each type of masonry reinforcement and tie proposed for use.
- .5 Certificates:
  - .1 Submit certificates signed by manufacturer certifying products comply to specified performance characteristics, criteria and physical requirements.
- .6 Test Reports:
  - .1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .7 Sustainable Design Submittals:
  - .1 Construction waste management
    - .1 Submit construction waste management, and waste reduction plan established for the project, which must clarify requirements in terms of recycling and salvaging.

## 1.5 QUALITY ASSURANCE

- .1 Mock-ups:
  - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
  - .2 Construct mock-up of works showing procedures of specified brick repair/replacement, for the following cases:
    - *replacement of one isolated brick on interior wall (5 samples)*
    - *reconstruction of a portion of core wall of north wall (3mx3m)*
    - *reconstruction interior brick wall (3 rows deep - 500mmx500mm)*
    - *cleaning of existing mortar on historic recuperated brick (5 samples)*
    - *new opening in existing brick wall (sample-opening to be determined by Departmental Representative).*
    - *repairs and interventions on an historic wall by extractions (plan two samples of 1.5 meters high on a wall of 300mm thick) .*
  - .3 Construct mock-up at location designated by Departmental Representative.
  - .4 Notify Departmental Representative minimum of 10 days prior to construction of the mock-up.
  - .5 Construct mock-up under supervision of Departmental Representative to demonstrate understanding of specified procedures, techniques and formulations is achieved before work commences.
  - .6 Allow 5 days for inspection of mock-up by Departmental Representative. Accepted mock-up becomes standard for this Work.

- .7 Construct additional mock-ups until obtained results are to the satisfaction of Departmental Representative.
- .8 Mock-ups will serve the following purposes:
  - .1 To judge of quality of works, of preparation of surfaces/supports, of functioning of equipment, of preparation and application of materials, of procedures of repairs as well as curing methods.
  - .2 To demonstrate the matching of the bond patterns and colors.
  - .3 To proceed to tests to determine conformity to performance requirements.
- .9 When mock-up is accepted, proceed with pointing and repair 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 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
  - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
  - .2 Provide weather protection and construction protection in accordance with CSA-S304.1.
  - .3 Provide weather protection to newly opened sections or dismantled segments.
- .3 Recuperation of patrimonial existing bricks.
  - .1 Protect recuperated existing patrimonial bricks and store them in a manner as to facilitate their resetting.
    - .1 Store dismantled masonry units on wood pallet and protects them from exposure to water, bad weather, and any potential mechanical damage.
    - .2 Submit storage and identification system to Departmental Representative for review.
    - .3 Store detached face bricks, back-up bricks and bricks showing evidence of soluble salts on separate pallets.
  - .2 Place detached bricks on wood surfaces during handling. Prevent contact with metal.
  - .3 When bricks are lowered to ground, place directly on wooden platform that will be used for transport or storage.
  - .4 Transport and keep bricks on wooden platforms.
  - .5 Ensure that sharp edges of bricks do not come into contact with hard objects.

## **1.7 AMBIENT CONDITIONS**

- .1 Ambient conditions
  - .1 Maintain temperature of mortar materials in accordance with Section 04 03 07 - Historic Works- Masonry Repointing.

- .2 Maintain masonry temperature between 15 degrees C and 25 degrees C for duration of the Work in accordance with Section 04 05 00 - Common Work Results for Masonry.

## **1.8 ACCEPTABLE PRODUCTS AND MATERIALS**

- .1 Where a particular brand name is stipulated, see Instructions to Bidders for procedure for requesting approval of substitute materials and products

## **Part 2 Products**

### **2.1 NEW FACE AND SUBSTATE BRICK**

- .1 Burned clay brick: to CAN/CSA-A82.
  - .1 Type: FBS
  - .2 Grade: SW.
  - .3 Compressive strength: 90.38 MPa
  - .4 Size: to match existing bricks.
  - .5 Colour and texture: to match approved sample and to match existing bricks.
  - .6 Maximum 24 hour cold water absorption (CWA) at most 6.71%.
  - .7 Maximum hot water absorption after 5 hours (BWA) 4.86 %.
  - .8 Maximum Saturation Coefficient: at most 0.72.
  - .9 Frost-Thaw resistance cycles: no material lost after 50 cycles.

### **2.2 EXISTING BRICKS**

- .1 Recupérate 5% of existing bricks coming from all portions of brick walls (interior, exterior, facing, and substrate) which are to be demolished or dismantled as identified on plans. The demolition of brick substrate of central building as well as the dismantling of brick low wall at south of south wall are also part of zones of withdrawal of 5% of existing brick to recuperate. Clean carefully all mortar residues on all surfaces of recuperated bricks without damaging them .
- .2 Location and quantity of salvaged bricks to use as replacement bricks will be determined on site by Departmental Representative. All other bricks will be new as specified in paragraph 2.1. Only bricks without traces of efflorescence, and which have appearance and performance compatible with the existing, may be salvaged for reuse.
- .3 At request of Departmental Representative turn over all remaining salvaged bricks to Owner at completion of contract. These bricks must be sorted out and labeled as facing bricks or as substrate bricks. If Departmental Representative does not ask to recover recuperated patrimonial bricks at completion of the works, the contractor must dispose of them at no extra costs for the Departmental Representative.

### **2.3 MORTAR**

- .1 Mortar: in accordance with Section 04 03 08 - Historic Works- Mortaring.

## **2.4 ACCESSORIES**

- .1 Anchors: in accordance with section 04 05 19 – Masonry anchorage and reinforcing.

## **Part 3 Execution**

### **3.1 INSPECTION**

- .1 Verification of conditions: Check masonry surfaces as well as transit and storage areas, and report to Departmental Representative of any condition that would prevent the works from being executed in conformity with specifications and from being completed in the allowed delays.
  - .1 Perform a visual inspection of surfaces/supports in the presence of Departmental Representative.
  - .2 Inform in writing Departmental Representative of any deteriorated masonry zone which has not been detected.
- .2 Check the works to detect evidence of previous repairs, cracks, moisture, soluble salts contamination and other defects, and report any problem to Departmental Representative before undertaking the works.
- .3 Stop work and report problem to Departmental Representative immediately if detection of hazardous materials occurs.

### **3.2 PREPARATION**

- .1 Place safety devices and signs near work area as directed in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .2 Install and remove shoring or other supports in accordance with contractor's structural engineer.
- .3 Install and remove self-supporting scaffolding in accordance with Section 01 52 00 - Construction Facilities.

### **3.3 BRICK REMOVAL**

- .1 Verify locations and dimensions of surfaces of brick dismantling Works with Departmental Representative.
- .2 In areas of work, identify deteriorated bricks and those which are salvageable with Departmental Representative.
- .3 Dismantle identified areas of salvageable brickwork as follows:
  - .1 Rake face of mortar joints, in conformance to article 3.5, RAKING JOINTS.
  - .2 In cases of unsupported load bearing brickwork, proceed to removal of bricks in accordance with approved shop drawings and with plan/sequence of dismantling and/or demolition approved by Departmental Representative.
  - .3 In cases of non-load bearing brickwork proceed to dismantling of bricks in accordance with approved shop drawings and with plan/sequence of dismantling and/or demolition approved by Departmental Representative.

- .4 During removal, protect sound areas to remain. Use manual methods of removal. Obtain Departmental Representative's approval for use of power tools before commencing work.
- .5 Remove adhered mortar from surface of adjacent bricks that remain in place.

### **3.4 BRICK SALVAGING**

- .1 Recuperate and carefully clean bricks for re-use in accordance with Article 2.2. Store and protect bricks in accordance with article 1.6, DELIVERY, STORAGE AND HANDLING.

### **3.5 RAKING JOINTS**

- .1 Use manual raking tool to obtain clean masonry surfaces.
  - .1 Remove deteriorated and adhered mortar from masonry surfaces to (3) times joint thickness except if otherwise stated in section 04 03 07 in order to create a gap with right angles and a good flat back surface.
  - .2 Clean out voids and cavities encountered.
- .2 When Departmental Representative finds it appropriate to use mechanical tools to remove the mortar do as follows.
  - .1 Proceed to raking with rotary saw blades of 86 mm maximum diameter, at center of joint only, to a maximum depth equal to half width of the joint. Mortar must stay in place at each side of saw cut. Raking must not damage the masonry elements.
  - .2 Stop saw cuts at a distance of 50 to 75 mm from end of vertical joints and of discontinuous horizontal joints. Do not notch masonry elements.
  - .3 Notify Departmental Representative if it is necessary to inspect the raking of joints before removing the remaining mortar with manual tools.
  - .4 Remove remaining mortar with manual tools.
- .3 Avoid chipping, altering or damaging masonry units during raking joints operations.
- .4 Clean surfaces of joints by compressed air without damaging texture of exposed joints or masonry units.
- .5 Flush open joints and voids; clean open joints and voids with low pressure water and if not free draining, blow clean with compressed air.
- .6 Leave no standing water.

### **3.6 BRICK REPLACEMENT**

- .1 Install masonry ties, clamps and connectors in accordance with CSA A370 and CSA A371 unless indicated otherwise. Prior to placing mortar, obtain approval of Departmental Representative of placement of these elements.
- .2 Co-ordinate bond pattern, coursing height and joint width with existing brickwork in area selected by Departmental Representative.
- .3 Mix and blend brick units within each pallet and with other pallets to ensure uniform blend of colour and texture.

- .4 Except in cold weather, pre-wet bricks having an initial rate of absorption exceeding 30 g/minute-194 cm<sup>2</sup> to uniform degree of saturation, 3 to 4 hours before laying. Do not lay until surface is dry.
- .5 Clean dust and brick fragments from each cavity where a new brick will be inserted. Before proceeding with Work, inspect cleaned surface with Departmental Representative.
- .6 Dampen the back surfaces of cavity before applying mortar and as described in section 04 03 07.
- .7 Apply mortar and lay bricks.
  - .1 Lay bricks on full beds of mortar.
  - .2 Fill vertical joints buttered and placed full in face and back-up bricks, and at vertical joint between wythes.
  - .3 Lay bricks and tool joints in one operation, tooling with a round jointer to provide smooth joints compressed uniformly concave.
- .8 Clean finished brickwork daily as work progresses in accordance to article 3.8 CLEANING.
  - .1 Remove mortar splashings on exposed brickwork.
  - .2 Leave no mortar on face of bricks.
  - .3 Remove mortar staining before it sets.
  - .4 Clean masonry with clean water and hard (non ferrous) bristle brush only.
- .9 Inspect finished brickwork with Departmental Representative.

### 3.7 REPOINTING:

- .1 Do pointing work in accordance with Section 04 03 07 - Historic Works- Masonry Repointing.
- .2 Immediately before reappointing, dampen joints and masonry units if units are porous.
- .3 Let water soak masonry and mortar. Leave no standing water. Ensure joint surfaces remain damp.
- .4 Maintain masonry damp for whole duration of repointing.
- .5 Completely fill joint with mortar.
  - .1 Masonry units with worn rounded edges: maintain joint width by pointing 1 mm back from exterior face in order to keep same width of joint.
  - .2 Avoid feather edges.
  - .3 Pack mortar solidly into voids and joints. Ensure efficient adherence to interior surfaces on full depth of joint.
- .6 Repoint joints in a continuous operation for the installation and back pointing unless otherwise indicated in section 04 03 07.
  - .1 Allow each layer to set before applying subsequent layers.
  - .2 Maintain mortar damp as the works progress.
  - .3 Maintain uniform joint width in their whole depth.

- .7 Finish joints as indicated on drawings.
  - .1 Tool, compact using flat jointing tool. Ensure that the jointing tool corresponds to the width of the joint. Use tools with variable widths to comply with this requirement.
  - .2 After initial setting of mortar, give final texture and the one with visible grain with a hard bristle brush. Brush firmly joint surface with the brush.
  - .3 Give grain final visible texture as soon as occurrence of initial setting of mortar by brushing joint surface with a hard bristle brush and a sponge lightly damp.
- .8 Remove excess mortar from masonry face before it sets.

### **3.8 CLEANING**

- .1 Cleaning during works: Carry out cleaning works in accordance with section 01 74 11 - cleaning.
  - .1 Leave site clean at the end of each working day.
- .2 Clean brick work surfaces after repairs have been completed and mortar has set.
- .3 Clean brick surfaces of mortar residue resulting from work performed without damaging bricks or joints.
- .4 Final cleaning: remove from site excess materials; rubbish, tools and equipment in accordance with section 01 74 11 - cleaning

### **3.9 PROTECTION OF FINISHED WORKS**

- .1 Cover completed and partially completed work not enclosed or sheltered at end of each work day.
  - .1 Membranes should extend to 1 m over surface area of work and be tightly installed to prevent finished work from drying out too rapidly.
- .2 Cover with waterproof tarps the new mortar joints to prevent frost, rain or rapid drying conditions from eroding recently repointed material.
  - .1 Maintain tarps in place for minimum of (4) weeks after the completion of repointing.
  - .2 Ensure that bottoms of tarps permit airflow.
- .3 Anchor coverings securely in position.
- .4 Damp cure: (see section 04 03 07 Historic works, masonry repointing).
- .5 Protect work surfaces from direct sun rays and maintain protection tarps always damp.
  - .1 As needed, plan works outside of working hours and on week-ends to maintain specified curing conditions
- .6 Protect from drying winds. Pay particular attention at corners of structure.
- .7 Once repointing works completed, maintain ambient temperature of minimum 15 degrees C for:
  - .1 Minimum (7) days in summer.



- .2 Minimum (30) days in cold weather conditions using dry heated enclosures.
- .8 Protect adjacent finished work against damage which may be caused by on-going work.

**END OF SECTION**