

**Partie 1      General**

**1.1            RELATED REQUIREMENTS**

- .1      Section 03 30 00 – Cast-in Place Concrete.
- .2      Section 04 03 41 – Historic – Repairing Stone.
- .3      Section 04 05 12 – Masonry Mortar and Grout.
- .4      Section 04 05 19 – Masonry Anchorage and Reinforcing.
- .5      Section 04 05 23 – Masonry Accessories.
- .6      Section 04 22 00 – Concrete Unit Masonry.
- .7      Section 04 43 16 – Granite Veneer Cladding.
- .8      Section 07 26 00 – Vapour Retarders.
- .9      Section 07 42 43 – Composite Wall Panels.
- .10     Section 07 62 00 – Sheet Metal Flashing and Trim.
- .11     Section 07 92 00 – Joint Sealants.
- .12     Section 08 11 00 – Metal Doors and Frames.
- .13     Section 08 11 16 – Aluminum Doors and Frames.
- .14     Section 08 44 13 – Glazed Aluminum Curtain Walls.
- .15     Section 08 50 00 – Windows.
- .16     Section 08 90 00 – Louvres and Vents.

**1.2            REFERENCES**

- .1      American Concrete Institute (ACI)
  - .1      ACI 530/530.1-11, Building Code Requirements and Specifications for Masonry Structures and Related Commentaries.
- .2      ASTM International
  - .1      ASTM A153/A153M-09, Standard Specification for Zinc Coated (Hot Dip) on Iron and Steel Hardware.
  - .2      ASTM A508/A508M-05b(2010), Standard Specification for Quenched and Tempered Vacuum-Treated Carbon and Alloy Steel Forgings for Pressure Vessels.
  - .3      ASTM A580/A580M-13a, Standard Specification for Stainless Steel Wire.
  - .4      ASTM C97/C97M-09, Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.
  - .5      ASTM C99/C99M-09, Standard Test Method for Modulus of Rupture of Dimension Stone.
  - .6      ASTM C119-11, Standard Terminology Relating to Dimension Stone.

- .7 ASTM C144-11, Standard Specification for Aggregate for Masonry Mortar.
- .8 ASTM C150/C150M-12, Standard Specification for Portland Cement.
- .9 ASTM C170/C170M-09, Standard Test Method for Compressive Strength of Dimension Stone.
- .10 ASTM C207-06(2011), Standard Specification for Hydrated Lime for Masonry Purposes.
- .11 ASTM C241/C241M-13, Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.
- .12 ASTM C270-12a, Standard Specification for Mortar for Unit Masonry.
- .13 ASTM C568/C568M-10, Standard Specification for Limestone Dimension Stone.
- .14 ASTM C780/C780M-12a, Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
- .15 ASTM C880/C880M-09, Standard Test Method for Flexural Strength of Dimension Stone.
- .16 ASTM C1242-12ae1, Standard Guide for Design, Selection, and Installation of Stone Anchors and Anchoring Systems.
- .3 CSA Group
  - .1 CAN/CSA-A179-F04(C2009), Mortar and Grout for Unit Masonry.
  - .2 CAN/CSA-A370-F04(C2009), Connectors for Masonry.
  - .3 CAN/CSA-A371-F04(C2009), Masonry Construction for Buildings.
  - .4 CAN/CSA-A3000-F08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .4 International Masonry Industry All-Weather Council (IMIAC)
  - .1 Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
- .5 South Coast Air Quality Management District (SCAQMD)
  - .1 SCAQMD Rule 1168-05, Adhesive and Sealant Applications.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for precut stone cladding and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the province of Quebec, Canada.
  - .2 Indicate sizes and sections of granite, arrangements of joints and bonding, anchoring, dowelling, and cramping.

- .3 Each section of granite indicated on shop drawings must bear corresponding number marked on its back or bed.
- .4 Samples:
  - .1 Submit sample for each finish product specified, 2 complete sets of colour chips representing manufacturer's full range of available colours, textures, and patterns.

#### **1.4 QUALITY ASSURANCE**

- .1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Mock-ups:
  - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
    - .1 Construct mock-up panel of granite veneer construction 1200 x 1800 mm, showing colors and textures, use of reinforcement , ties, through wall flashing, weep holes, jointing, coursing, mortar and quality of work.
    - .2 Mock-up used:
      - .1 To judge quality of work, substrate preparation, operation of equipment and material application.
    - .3 Perform test cleaning on mock-up to ensure desired result as per article CLEANING.

#### **1.5 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: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect dimension stone veneer cladding from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **1.6 SITE CONDITIONS**

- .1 Ambient Conditions:
  - .1 Do not install at temperatures below 12 degrees C or above 38 degrees C.
  - .2 Maintain temperatures at or above 12 degrees C until cementitious materials have fully cured.
  - .3 When work is carried out in cold weather, refer to IMIAC's Recommended Practices and Specifications for Cold Weather Masonry Construction.
  - .4 Do not apply epoxy mortar and grouts at temperatures below 15 degrees C or above 25 degrees C.
- .2 Field Measurements:
  - .1 Make field measurements necessary to ensure proper fit of members.

## **1.7 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

## **Partie 2 Products**

### **2.1 DESIGN CRITERIA**

- .1 General: design, fabricate and install stonework to withstand normal loads from wind, gravity, movement of building structure, seismic forces and thermally induced movement, as well as to resist deterioration under conditions of normal use including exposure to weather, without failure.
- .2 Retain services of cladding engineer, as described below, to design the cladding support and retention system. Cladding engineer will prepare engineering calculations for justification of principal stonework, units, fasteners, and anchorage components for compliance with performance criteria.
- .3 Engineering Calculations: base calculations on design loads, material properties, and applicable safety factors, in compliance with applicable codes and Building Standards. Include following information as part of calculations.
  - .1 Stone loads and allowable loads.
  - .2 Stone thicknesses.
  - .3 Support and anchorage loads, stresses, safety factors, design loads, and allowable loads.
  - .4 Support and anchorage sizes.
- .4 Design connections and attachments for limestone to CAN/CSA-A370.
- .5 Design, detail and fabricate connections to provide allowance for fabrication tolerances, erection tolerances and structural deflections. Refer to CAN/CSA-A370, CAN/CSA-A371 and ASTM C1242.

- .6 Control of Corrosion: prevent galvanic and other forms of corrosion by insulating metals and other materials from direct contact with non-compatible materials, or by suitable coating.

## 2.2 MORTAR MATERIALS

- .1 Refer to Section 04 05 12 – Masonry Mortar and Grout.
- .2 Water: potable, clean and free of deleterious amounts of acids, alkalies or organic materials.

## 2.3 STONE MATERIALS

- .1 Type C-x (identified on drawings): dressed St-Marc limestone:
  - .1 Select new stone as follows:
    - .1 Free of seams, cracks or other imperfections impairing structural soundness or performance (e.g.: clay laminations more than 3 mm thick).
    - .2 Free of excessive mottling or piebald markings, clay spots, coal streaks, iron banding, or foreign substances impairing appearance.
    - .3 To maintain continuity of colour and texture of existing units to be replaced or to match adjacent units, as applicable.
  - .2 St-Marc limestone description:
    - .1 Density. (kg/m<sup>3</sup>): 2,560
    - .2 Absorption by weight (%): 3.0
    - .3 Compressive strength (MPa): 28
    - .4 Modulus of rupture (MPa) to ASTM C-99: 6.9
    - .5 Abrasion resistance, min. hardness (to ATSM C-241):10
  - .3 Face finish: waterjet, corresponding to samples approved by Departmental Representative.

## 2.4 PREFABRICATED COMPONENTS

- .1 Stone veneer (vertical cladding and entablatures): limestone veneer as follows.
  - .1 Course height: as indicated on drawings.
  - .2 Dimensions: modular, as indicated on drawings.
  - .3 Face finish: waterjet, corresponding to samples approved by Departmental Representative.
- .2 Dimension stone (for lintels and window supports, corners in west wing): limestone masonry components, as follows.
  - .1 Course height: as indicated on drawings.
  - .2 Dimensions: modular, as indicated on drawings.
  - .3 Face finish: waterjet, corresponding to samples approved by Departmental Representative.

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## **2.5 REINFORCEMENT AND ANCHORAGES**

- .1 Anchors, Cramps, Dowels: 316 stainless steel.
- .2 Wall ties: to CAN/CSA-A370, 316 stainless steel triangular wire.
- .3 Fasteners: stainless steel.
- .4 Refer to Section 04 05 19 – Masonry Anchorage and Reinforcement.

## **2.6 FLASHING**

- .1 Flexible Flashing: air/vapour barrier sheet membrane, as specified under Section 07 26 00- Vapour Retarders.
- .2 Flashing membrane: self-adhering SBS rubberized asphalt sheeting, laminated to yellow cross-laminated polyethylene 1 mm thick film.
- .3 Sheet metal: stainless steel.

## **2.7 ACCESSORIES**

- .1 Spacers: non-staining resilient plastic, sized to joint thicknesses and lengths, not extending into portion of joint reserved for sealing compound to prevent spacers from adhering to compound.
- .2 Weep Hole Vents: moulded polyvinyl chloride grilles, insect proof.
- .3 Sealing compound and back-up materials: to Section 07 92 00 – Joint Sealants.

## **2.8 PREPARATION**

- .1 Cut granite to shape and dimensions and full to square with bed faces and joints as indicated.
  - .1 Properly dress cladding faces.
  - .2 Cut granite for coping, cornices, entablatures, supports and lintels to fit beds.
- .2 Cut-in reglets for flashings where indicated.
- .3 Execute moulded work from full size details.
  - .1 Make exposed arrises in true alignment and ease slightly to prevent snipping.
- .4 Back-check granite coming in contact with structural members as indicated.
  - .1 Allow minimum of 10 mm locally and 25 mm clearance between back of stone and steel and concrete structural members.
  - .2 Shape beds of stone resting on structural work to fit supports.
- .5 Cut granite for anchors, cramps and dowels.
  - .1 Provide Lewis pin holes in pieces which can not be manually handled.
  - .2 Do not cut holes in exposed surfaces.
- .6 Finish stone facing and joints as indicated and in accordance with product and Works samples and mock-ups.

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## **2.9 GROUT**

- .1 In accordance with Section 04 05 12 – Masonry Mortar and Grout.

## **2.10 JOINT SEALANTS AND BACKER RODS**

- .1 Non-staining type, as specified in Section 07 92 00 - Joint Sealants.

## **2.11 FABRICATION TOLERANCES**

- .1 Fabricate to the following tolerances.
  - .1 Length: plus or minus 3 mm.
  - .2 Height: plus or minus 3 mm.
  - .3 Deviation From Square: plus or minus 3 mm, with measurement taken using the longest edge as the base.

## **Partie 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for granite veneer cladding installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### **3.2 PREPARATION**

- .1 Cut and install stone to shape and dimensions indicated, to lay on its natural quarry bed (horizontal sedimentation bed).
- .2 Rough dress lateral surfaces in contact with joint mortar to increase adherence of mortar.
- .3 Clean sawn backs and beds of rust stains and iron particles.
- .4 Execute moulded work from full size details. Make exposed arrises in true alignment and ease slightly to prevent snipping.
- .5 Cut limestone for anchors, cramps, dowels. Provide Lewis pin holes in pieces which can not be manually handled. Do not cut holes in exposed surfaces.
- .6 Back-check limestone coming in contact with structural members as indicated. Shape beds of stone resting on structural work to fit supports.
- .7 Cut-in reglets for flashings where indicated.
- .8 Clean surfaces with water and stiff brush.

### 3.3 SITE TOLERANCES

- .1 Variation from Plumb: plus or minus 6 mm per 3 metres maximum.
- .2 Variation from Level: plus or minus 13 mm per 6 metres maximum.
- .3 Variation in Cross-Sectional Dimensions: plus 13 mm or minus 6 mm.

### 3.4 SETTING STONE - GENERAL

- .1 Construction in accordance with CAN/CSA-A371.
- .2 Reinforcement and anchorage in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .3 Set stones plumb, true, and level, to requirements as indicated and approved shop drawings.
- .4 Align stone edges and faces according to established relationships and indicated tolerances.
- .5 Provide movement joints of widths and at locations indicated. Ensure movement joints are kept free of mortar.

### 3.5 SETTING STONE WITH MORTAR

- .1 Set stones in full bed of mortar with vertical joints buttered and placed full, except where otherwise specified.
  - .1 Completely fill anchor, dowel and lifting holes.
- .2 Lay stone veneer in coursed ashlar bond.
  - .1 Connect stone veneer to structural back-up with approved wall ties, spaced not more than 1,200 mm horizontally and 600 mm vertically.
- .3 Lay stone panel cladding to patterns indicated on drawings.
  - .1 Install anchors, dowels and cramps.
  - .2 Shim and adjust supports to set stones accurately in locations indicated with uniform joints of widths indicated.
- .4 Make joints 10 mm thick.
- .5 Place setting buttons under stones to maintain joint thickness.
  - .1 Set heavy stones and projecting courses after mortar in courses below has hardened sufficiently to support weight.
- .6 Brace and anchor projecting stones until wall above is set.
- .7 Install through-wall flashing membranes at continuous shelf angles, steel lintels, ledges and similar obstructions to the downward flow of water.
- .8 Install weep hole vents at 1,200 mm on centre horizontally above through-wall flashing, above shelf angles and at bottom of walls.
- .9 Pointing: remove dirt and loose mortar from joints by using pressurized airstream.
  - .1 Wet joints for mortar pointing.

- .2 Dry joints for sealant pointing (expansion joints).
- .3 Point joints with pointing mortar in 2 stages. Rub smooth with appropriate tool to slightly concave joint.
- .4 Point expansion, coping and sill joints with sealant. Do work in accordance with Section 07 92 00 - Joint Sealant.

### **3.6 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Clean stone as work progresses.
  - .1 Allow mortar droppings on stone to partially dry then remove by means of brushing with a stiff fibre brush.
- .3 Clean mock-up before integration with Work for approval by Departmental Representative.
- .4 Clean all Work as follows:
  - .1 Protect windows, sills, doors, trim and other work from damage.
  - .2 Remove large particles with stiff fibre brushes without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
  - .3 Scrub with household detergent dissolved in clean water using stiff fibre brushes, then clean off immediately with clean water using hose.
  - .4 Repeat cleaning process as often as necessary to remove mortar and other stains.
- .5 Use alternative cleaning solutions and methods for difficult to clean stone only after consultation with masonry unit manufacturer.
- .6 Waste Management: separate waste materials for reuse/recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### **3.7 PROTECTION OF FINISHED SURFACES**

- .1 Protect stone from damage resulting from subsequent construction operations.
- .2 Use protection materials and methods which will not stain or damage stone.
- .3 Remove protection materials upon Substantial Performance of Work, or when risk of damage is no longer present.

### **3.8 SCHEDULE**

- .1 Refer to drawings for identification of stones.

**END OF SECTION**