

**COMMON WORK RESULTS FOR MASONRY**

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**1. GENERAL**

**1.1 References**

- .1 Canadian Standards Association (CSA)
  - .1 CAN/CSA A165 Series, Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).
  - .2 CAN/CSA A179, Mortar and Grout for Unit Masonry.
  - .3 CAN/CSA 3-A371, Masonry Construction for Buildings.

**1.2 Action and Informational Submittals**

- .1 Provide submittals in accordance with Section E3 – Submittals and Shop Drawings.
- .2 Product Data:
  - .1 Provide Manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, limitations and colours.
- .3 Samples:
  - .1 Provide samples as follows:
    - .1 Two (2) of each type of masonry unit specified, including special shapes, supplemented with specific requirements in Sections.
    - .2 Two (2) cured samples of mortar and grout, illustrating mortar colour and colour range, supplemented with specific requirements in Section 04 05 12 - Masonry Mortar and Grout.
    - .3 Two (2) of each type of masonry anchorage, reinforcement and connector proposed for use, supplemented by specific requirements in Section 04 05 19 - Masonry Anchorage and Reinforcing.
    - .4 Samples: used for testing and when accepted become standard for material used.
- .4 Shop Drawings:
  - .1 Provide Drawings stamped and signed by Professional Engineer registered or licensed in Province of Manitoba.
  - .2 Provide Shop Drawings detailing temporary bracing required, designed to resist wind pressure and lateral forces during installation.
- .5 Certificates: provide Manufacturer's product certificates certifying materials comply with specified requirements.
- .6 Test and Evaluation Reports:

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- .1 Provide test reports to certify compliance of masonry units and mortar ingredients with specified performance characteristics and physical properties.
- .2 Provide data for masonry units, in addition to requirements set out in referenced CSA and ASTM Standards, indicating initial rates of absorption.
- .7 Installer Instructions: provide Manufacturer's installation instructions, including storage, handling, safety and cleaning.

### 1.3 Site Conditions

- .1 Ambient Conditions: assemble and erect components when temperatures are above 4°C.
- .2 Weather Requirements: to CAN/CSA-A371.
- .3 Cold weather requirements:
  - .1 To CAN/CSA-A371 with following requirements:
    - .1 Maintain temperature of mortar between 5°C and 50°C until batch is used or becomes stable.
    - .2 Maintain ambient temperature of masonry work and its constituent materials between 5°C and 50°C and protect site from windchill.
    - .3 Maintain temperature of masonry above 0°C for minimum of twenty-eight (28) days, after mortar is installed.
    - .4 Preheat unheated wall sections in enclosure for minimum seventy-two (72) hours above 10°C, before applying mortar.
  - .4 Hot weather requirements:
    - .1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
    - .2 Keep masonry dry 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.
  - .5 Spray mortar surface at intervals and keep moist for maximum of three (3) days after installation.

## 2. PRODUCTS

### 2.1 Materials

- .1 Masonry materials are specified in other Sections of Division 4.

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**3. EXECUTION**

**3.1 Installation**

- .1 Do masonry work in accordance with CAN/CSA-A371 except where specified otherwise.
- .2 Build masonry plumb, level, and true to line, with vertical joints in alignment, respecting construction tolerances permitted by CAN/CSA-A371.
- .3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

**3.2 Construction**

- .1 Exposed masonry:
  - .1 Remove chipped, cracked, and otherwise damaged units, in accordance with CAN/CSA A 165, in exposed masonry and replace with undamaged units.
  - .2 Jointing:
    - .1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints where concave joints are indicated.
    - .2 Strike flush joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.
  - .3 Cutting:
    - .1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.
    - .2 Make cuts straight, clean, and free from uneven edges.
  - .4 Building-In:
    - .1 Build in items required to be built into masonry.
    - .2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
    - .3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.
  - .5 Support of loads:
    - .1 Use Mix Type 7 concrete to E25 Structural Concrete, where concrete fill is used in lieu of solid units.
    - .2 Use grout to CAN/CSA A179 where grout is used in lieu of solid units.

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- .3 Install building paper below voids to be filled with concrete or grout; keep paper 25 mm back from faces of units.
  
- .6 Provision for movement:
  - .1 Leave 3 mm space below shelf angles.
  - .2 Leave 40 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
  - .3 Built masonry to tie in with stabilizers, with provision for vertical movement.
  
- .7 Loose steel lintels:
  - .1 Install loose steel lintels. Centre over opening width.
  
- .8 Control joints:
  - .1 Construct continuous control joints as indicated.
  
- .9 Movement joints:
  - .1 Build-in continuous movement joints as indicated.
  
- .10 Interface with other work:
  - .1 Cut openings in existing work as indicated.
  - .2 Openings in walls: reviewed by Contract Administrator.
  - .3 Make good existing work. Use materials to match existing.

**3.3 Site Tolerances**

- .1 Tolerances in notes to CAN/CSA A371 apply.

**3.4 Field Quality Control**

- .1 Site Tests, supplemented as follows:
  - .1 Masonry materials will be sampled and tested by independent testing agency appointed and paid by Contract Administrator in accordance with CSA S304.1.
  - .2 Notify inspection agency minimum of twenty-four (24) hours in advance of requirement for tests.

**3.5 Cleaning**

- .1 Final Cleaning:
  - .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

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**3.6 Protection**

.1 Temporary Bracing:

- .1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place stamped and signed by a Professional Engineer registered or licensed in the Province of Manitoba.
- .2 Brace masonry walls as necessary to resist wind pressure and lateral forces during construction.

.2 Moisture Protection:

- .1 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until completed and protected by flashing or other permanent construction.
- .2 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.
- .3 Air Temperature Protection: protect completed masonry as recommended in 1.3 Site Conditions.

**END OF SECTION**

## MASONRY MORTAR AND GROUT

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### 1. GENERAL

#### 1.1 References

- .1 Canadian Standards Association (CSA)
  - .1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CAN/CSA A179, Mortar and Grout for Unit Masonry.
  - .3 CAN/CSA A371, Masonry Construction for Buildings.
  - .4 CAN/CSA-A3000, Cementitious Materials Compendium; CAN/CSA-A3002, Masonry and Mortar Cement.

#### 1.2 Action and Informational Submittals

- .1 Product Data:
  - .1 Provide submittals in accordance with Section E3 – Submittals and Shop Drawings.
  - .2 Provide manufacturer's printed product literature, specifications and datasheets. Include product characteristics, performance criteria, and limitations.
  - .3 Provide two copies of Workplace Hazardous Materials Information System (WHMIS) - Material Safety Data Sheets (MSDS). Indicate VOC's mortar, grout, parging, colour additives and admixtures. Expressed as grams per litre (g/L).
- .2 Samples:
  - .1 Samples: provide unit samples supplemented as follows:
    - .1 Provide confirmation of source or product data sheet, prior to mixing or preparation of mortars, to Contract Administrator of:
      - .1 Aggregate: coarse aggregate and sand.
      - .2 Cement.
      - .3 Lime.
      - .4 Colour pigment samples.
- .3 Manufacturer's Instructions:
  - .1 Provide Manufacturer's installation instructions.

## MASONRY MORTAR AND GROUT

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### 1.3 Quality Assurance

- .1 Test Reports: certified test reports including sand gradation tests in accordance with CAN/CSA A179 showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

### 1.4 Site Conditions

- .1 Ambient Conditions: maintain materials and surrounding air temperature to:
  - .1 Minimum 10°C prior to, during, and forty-eight (48) hours after completion of masonry work.
  - .2 Maximum 32°C prior to, during, and forty-eight (48) hours after completion of masonry work.

## 2. PRODUCTS

### 2.1 Materials

- .1 Use same brands of materials and source of aggregate for entire project.
- .2 Cement:
  - .1 Portland Cement: to CAN/CSA A3000, Type GU - General use hydraulic cement.
  - .2 Masonry Cement: to CAN/CSA A3002 and CAN/CSA A179, Type S.
  - .3 Mortar Cement: to CAN/CSA A3002 and CAN/CSA A179, Type S.
- .3 Aggregate: supplied by one (1) supplier.
  - .1 Fine Aggregate: to CAN/CSA A179, natural sand.
  - .2 Course Aggregate: to CAN/CSA A179 normal density.
- .4 Water: clean and potable.
- .5 Lime:
  - .1 Quick Lime: to CAN/CSA A179, Type S.
  - .2 Hydrated Lime: to CAN/CSA A179, Type S.
- .6 Dirt resistant additives: aluminum tristearate, calcium stearate, or ammonium stearate.
- .7 Bonding Agent: latex type.

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- .8 Polymer Latex: organic polymer latex admixture of butadiene-styrene type non-emulsifiable bonding admixture.

### 2.2 Mortar Mixes

- .1 Mortar for all masonry: Type S.

### 2.3 Mortar Mixing

- .1 Mix mortar ingredients in accordance with CAN/CSA A179 in quantities needed for immediate use.
- .2 Maintain sand uniformly damp immediately before mixing process.
- .3 Do not use anti-freeze compounds including calcium chloride or chloride based compounds.
- .4 Do not add air entraining admixture to mortar mix.
- .5 Use a batch type mixer in accordance with CAN/CSA A179.
- .6 Pointing mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than one (1) hour no more than two (2) hours then remix with sufficient water to produce mortar of proper consistency for pointing.
- .7 Re-temper mortar only within two (2) hours of mixing, when water is lost by evaporation.
- .8 Use mortar within two (2) hours after mixing at temperatures of 32°C, or two and a half (2-1/2) hours at temperatures under 10°C.

### 2.4 Grout Mixes

- .1 Bond Beams: concrete to E25 Structural Concrete, Mix Type 6.
- .2 Lintels: concrete to E25 Structural Concrete, Mix Type 6.
- .3 Grout: Minimum compressive strength of 20 MPa at twenty-eight (28) days. Maximum aggregate size and grout slump: CAN/CSA A179.

### 2.5 Grout Mixing

- .1 Mix grout ingredients in quantities needed for immediate use in accordance with CAN/CSA A179.
- .2 Add admixtures in accordance with Manufacturer's instructions; mix uniformly.
- .3 Do not use calcium chloride or chloride based admixtures.

### 2.6 Mix Tests of Grout

- .1 Testing of materials will be carried out by an inspection and testing firm designated by the Contractor.

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- .2 The Contractor will pay costs for tests.
- .3 Costs for additional testing required as a result of defective materials will be the responsibility of the Contractor.
- .4 Submit samples of all materials proposed for testing.

### **3. EXECUTION**

#### **3.1 Preparation**

- .1 Apply bonding agent to existing concrete surfaces.
- .2 Plug clean-out holes with masonry units. Brace masonry for wet grout pressure.

#### **3.2 Construction**

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

#### **3.3 Mixing**

- .1 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, Mixing by hand must be pre-approved by the Contract Administrator.
- .2 Clean all mixing boards and mechanical mixing machine between batches.
- .3 Mortar must be weaker than the units it is binding.
- .4 Contractor to appoint one individual to mix mortar, for duration of project. In the event that this individual must be changed, mortar mixing must cease until the new individual is trained, and mortar mix is tested.

#### **3.4 Mortar Placement**

- .1 Install mortar to requirements of CAN/CSA A179.
- .2 Remove excess mortar from grout spaces.

#### **3.5 Grout Placement**

- .1 Install grout in accordance with CAN/CSA A179.
- .2 Work grout into masonry cores and cavities to eliminate voids.
- .3 Do not install grout in lifts greater than 400 mm, without consolidating grout by rodding.
- .4 Do not displace reinforcement while placing grout.

**MASONRY MORTAR AND GROUT**

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**3.6 Field Quality Control**

- .1 Site Tests, Inspection:
  - .1 Masonry mortar and grout will be sampled and tested by independent testing agency appointed and paid by Contract Administrator in accordance with CSA S304.1.
  - .2 Notify inspection agency minimum of twenty-four (24) hours in advance of requirement for tests.

**3.7 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.

**3.8 Protection**

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

**END OF SECTION**

## MASONRY ANCHORAGE AND REINFORCING

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### 1. GENERAL

#### 1.1 References

- .1 ASTM International (ASTM)
  - .1 ASTM A36/A36M, Standard Specification for Carbon Structural Steel.
  - .2 ASTM A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
  - .3 ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - .4 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  - .5 ASTM A580/A 580M, Standard Specification for Stainless Steel Wire.
  - .6 ASTM A641/A 641M, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
  - .7 ASTM A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
  - .8 ASTM A1064/A 1064M, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- .2 Canadian Standards Association (CSA)
  - .1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CAN/CSA A179, Mortar and Grout for Unit Masonry.
  - .3 CAN/CSA A370, Connectors for Masonry.
  - .4 CAN/CSA A371, Masonry Construction for Buildings.
  - .5 CAN/CSA G30.18, Billet-Steel Bars for Concrete Reinforcement.
  - .6 CSA-S304.1, Design of Masonry Structures.
  - .7 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

#### 1.2 Action and Informational Submittals

- .1 Provide submittals in accordance with Section E3 – Submittals and Shop Drawings.
- .2 Product Data:

## MASONRY ANCHORAGE AND REINFORCING

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- .1 Provide Manufacturer's printed product literature, specifications and datasheets illustrating products to be incorporated into project for specified products.
- .3 Shop Drawings:
  - .1 Provide Shop Drawings in accordance with E3 – Submittals and Shop Drawings.
    - .1 Provide Drawings stamped and signed by Professional Engineer registered or licensed in Province of Manitoba.
    - .2 Provide Shop Drawings detailing bar bending details, anchorage details, lists and placing Drawings.
    - .3 On placing Drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.
  - .4 Manufacturer's Instructions:
    - .1 Provide Manufacturer's installation instructions.

### 1.3 Quality Assurance

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
  - .1 Certificates: product certificates signed by Manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

## 2. PRODUCTS

### 2.1 Materials

- .1 Bar reinforcement: to CAN/CSA A371 and CAN/CSA-G30.18, Grade 400.
- .2 Wire reinforcement: to CAN/CSA A371 and ASTM A1064/A1064M, ladder type.
- .3 Connectors: to CAN/CSA A370 and CAN/CSA S304.1.
  - .1 Slotted block tie complete with insulation clip to masonry support wall.
  - .2 Slotted extension strip for dimensional stone veneer.
- .4 Corrosion protection: to CAN/CSA S304.1, galvanized to CAN/CSA-S304.1 and CAN/CSA A370.
- .5 Ties: hot dip galvanized to CAN/CSA A370 Table 5.2 steel finish.
  - .1 Corrugated to CAN/CSA A370.
  - .2 Unit ties, to CAN/CSA A370: Z style, fabricated from galvanized cold-drawn steel, size to suit application.

## MASONRY ANCHORAGE AND REINFORCING

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- .3 Adjustable Unit Ties: to CAN/CSA A370: proprietary type ties, type, style and size to suit application in accordance with Manufacturer's recommendations.
  - .1 Minimum spacing:
    - .1 Vertical: 600 mm
    - .2 Horizontal: 800 mm
  - .4 Joint Reinforcement Ties: to CAN/CSA A370:
    - .1 Single Wythe Joint Reinforcement: ladder type:
      - .1 Steel wire, hot dip galvanized: to ASTM A 641M, Class 1 after fabrication.
      - .2 Cold drawn steel wire conforming to ASTM A 82/82M.
  - .6 Control joint filler: preformed rubber, neoprene, or polyvinyl chloride materials of size and shape indicated.

### 2.2 Fabrication

- .1 Fabricate reinforcing in accordance with CAN/CSA A23.1.
- .2 Fabricate connectors in accordance with CAN/CSA A370.
- .3 Obtain the Contract Administrator's acceptance for locations of reinforcement splices other than shown on placing Drawings.
- .4 Subject to review by the Contract Administrator, weld reinforcement in accordance with CSA W186.
- .5 Ship reinforcement and connectors, clearly identified in accordance with the Drawings.

### 3. EXECUTION

#### 3.1 Installation

- .1 Supply and install masonry connectors and reinforcement in accordance with CAN/CSA A370, CAN/CSA A371, CAN/CSA A23.1 and CSA S304.1 unless indicated otherwise.
- .2 Prior to placing concrete and mortar, obtain the Contract Administrator's acceptance of placement of reinforcement and connectors.
- .3 Supply and install additional reinforcement of masonry as indicated.

#### 3.2 Bonding and Tying

- .1 Tie masonry veneer to backing in accordance with NBC, CSA S304.1, CAN/CSA A371, and as indicated.

## MASONRY ANCHORAGE AND REINFORCING

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### **3.3 Reinforced Lintels and Bond Beams**

- .1 Reinforce masonry lintels and bond beams as indicated.
- .2 Place and grout reinforcement in accordance with CSA S304.1, CAN/CSA A371, and CAN/CSA A179.
- .3 Support and position reinforcing bars in accordance with CAN/CSA A371.

### **3.4 Grouting**

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

### **3.5 Masonry Anchors**

- .1 Supply and install metal anchors where indicated.
- .2 If masonry anchors are not specified on the Drawings, review proposed anchor and application with the Contract Administrator prior to use.

### **3.6 Lateral Support and Anchorage**

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

### **3.7 Movement Joints**

- .1 Terminate reinforcement 25 mm short of each side of control joints unless otherwise indicated.
- .2 Install continuous control joint fillers in joints.

### **3.8 Field Bending**

- .1 Do not field bend reinforcement and connectors except where indicated or authorized by the Contract Administrator.
- .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.

### **3.9 Field Quality Control**

- .1 Obtain Contract Administrator approval of placement of reinforcement and connectors, prior to placing concrete, mortar or grout.

### **3.10 Field Touch-up**

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

**MASONRY ANCHORAGE AND REINFORCING**

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**END OF SECTION**

## CONCRETE UNIT MASONRY

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### 1. GENERAL

#### 1.1 References

- .1 Canadian Standards Association (CSA)
  - .1 CAN/CSA A165 Series, Standards on Concrete Masonry Units Consists of A165.1, A165.2, A165.3.
  - .2 CAN/CSA A371, Masonry Construction for Buildings.
  - .3 CSA S304.1, Design of Masonry Structures.
  - .4 MPI #205, for unpainted concrete.

#### 1.2 Action and Informational Submittals

- .1 Provide submittals in accordance with Section E3 – Submittals and Shop Drawings.
- .2 Samples:
  - .1 Provide unit samples.
- .3 Provide Manufacturer's Written Instructions.
- .4 Anti-graffiti coating system:
  - .1 Instructions: Provide instructions bearing manufacturer's name, coating type, and recommended installation procedures. Provide methods and material instruction for graffiti removal. Include adhesive-backed graffiti removal instruction label suitable for application to interior surface.
  - .2 Manufacturer's Warranty: Submit one copy of manufacturer's warranty for specified materials.
  - .3 Field Sample: Apply graffiti resistant coating to field mock-up sample representing exterior wall surface to be coated. Apply coating system over a minimum 1 m x 1 m test area and test removal of applied spray paint in presence of Contract Administrator and the City for approval using removal methods recommended by the manufacturer.

#### 1.3 Quality Assurance

- .1 Certificates:
  - .1 Provide certified Test and Evaluation Reports.

### 2. PRODUCTS

#### 2.1 Materials

- .1 Standard concrete block units Type H/15/A/M: to CSA A165.1.

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- .1 Classification: H/15/A/M.
  - .2 Dimensions:
    - .1 Nominal: 200 mm wide x 200 mm high x 400 mm long.
  - .3 Special shapes: provide bull-nosed units for exposed corners. Provide purpose made shapes for lintels (U-blocks) and bond beams (Knockout). Provide additional special shapes as indicated or required.
- .2 CMU Veneer concrete block units Type H/15/A/M: to CAN/CSA-A165 Series (CAN/CSA-A165.1).
- .1 Classification: H/15/A/M.
  - .2 Dimensions - Nominal: 100 mm wide x 200 mm high x 400 mm long.
  - .3 Special shapes: provide L-Corner units for exposed corners. Provide additional special shapes as indicated.
  - .4 Profile/Texture for Architectural Concrete Unit Masonry:
    - .1 Smooth faced units.
  - .5 Colour:
    - .1 Integrally coloured pre-finished architectural concrete block with one or more faces ground to expose variegated colours of natural aggregates.
    - .2 Colour 591 "Manitoba Stone".
  - .3 Notwithstanding visual inspection requirements of CSA Standards, masonry units shall be free of surface indentations, surface cracks due to manufacture or chipping. Units so delivered shall not be used where exposed to view, but may be used where concealed.

### 2.2 Reinforcement

- .1 Reinforcement in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

### 2.3 Connectors

- .1 Connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

### 2.4 Flashing

- .1 Flashing: in accordance with Section 07 26 00.

### 2.5 Mortar Mixes

- .1 Mortar and mortar mixes in accordance with Section 04 05 12 - Masonry Mortar and Grout.

## CONCRETE UNIT MASONRY

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### 2.6 Grout Mixes

- .1 Grout and grout mixes in accordance with Section 04 05 12 - Masonry Mortar and Grout.

### 2.7 Cleaning Compounds

- .1 Use low VOC products.
- .2 Compatible with substrate and acceptable to masonry manufacturer for use on products.
- .3 Cleaning compounds compatible with concrete unit masonry and in accordance with Manufacturer's written recommendations and instructions.

### 2.8 Tolerances

- .1 Tolerances for standard concrete unit masonry tolerances in accordance with CAN/CSA A165.1, supplemented as follows:
  - .1 Maximum variation between units within specific job lot not to exceed 2 mm.
  - .2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.
  - .3 Out of square tolerance not to exceed 2 mm.

### 2.9 Graffiti Resistant Coating

- .1 Apply Graffiti Resistant Coating to CMU Veneer as described in Section 09 96 23

## 3. EXECUTION

### 3.1 Preparation

- .1 Protect adjacent finished materials from damage due to masonry work.

### 3.2 Installation

- .1 Concrete block units:
  - .1 Bond: running.
  - .2 Coursing height: 200 mm for one (1) block and one (1) joint.
  - .3 Jointing: concave where exposed or where paint or other finish coating is specified.
- .2 Special Shapes:
  - .1 Install special units to form corners, returns, offsets, reveals and indents without cut ends being exposed and without losing bond or module.
  - .2 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.

## CONCRETE UNIT MASONRY

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- .3 End bearing: not less than 200 mm or as indicated on Drawings.
- .4 Install special site cut shaped units.

### 3.3 Reinforcement

- .1 Install reinforcing in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

### 3.4 Connectors

- .1 Install connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

### 3.5 Flashing

- .1 Install flashings: in accordance with Section 07 26 00.

### 3.6 Mortar Placement

- .1 Place mortar in accordance with Section 04 05 12 - Masonry Mortar and Grout.

### 3.7 Grout Placement

- .1 Place grout in accordance with Section 04 05 12 - Masonry Mortar and Grout.

### 3.8 Construction

- .1 Cull out masonry units, in accordance with CAN/CSA A165 and approved range of colour samples, with chips, cracks, broken corners, excessive colour and texture variation.
- .2 Build in miscellaneous items such as bearing plates, steel angles, bolts, anchors, inserts, sleeves and conduits.
- .3 Construct masonry walls using running bond unless otherwise noted.
- .4 Build around frames previously set and braced. Fill behind hollow frames within masonry walls with mortar or grout and embed anchors.
- .5 Fit masonry closely against electrical and plumbing outlets so collars, plates and covers overlap and conceal cuts.
- .6 Install movement joints and keep free of mortar where indicated.
- .7 Hollow Units: spread mortar setting bed from outside edge of face shells. Gauge amount of mortar on top and end of unit to create full joints, equivalent to shell thickness. Avoid excess mortar.
- .8 Solid Units: apply mortar over entire vertical and horizontal surfaces. Avoid bridging of airspace between brick veneer and backup wall with mortar.
- .9 Ensure compacted head joints. Use full or face-shell joint as indicated.

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- .10 Tamp units firmly into place.
- .11 Do not adjust masonry units after mortar has set. Where resetting of masonry is required, remove, clean and reset units in new mortar.
- .12 Tool exposed joints concave; strike concealed joints flush.
- .13 After mortar has achieved initial set up, tool joints.
- .14 Do not interrupt bond below or above openings.

### **3.9 Repair/Restoration**

- .1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.

### **3.10 Field Quality Control**

- .1 Concrete masonry units will be sampled and tested by independent testing agency appointed and paid by the Contractor in accordance with CSA S304.1.
- .2 Notify inspection agency minimum of 24 hours in advance of requirement for tests.

### **3.11 Cleaning**

- .1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.

### **3.1 Graffiti Resistant Coating**

- .1 Apply Graffiti Resistant Coating to CMU Veneer as described in Section 09 96 23.

**END OF SECTION**

## DIMENSION STONE VENEER

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### 1. GENERAL

#### 1.1 References

.1 Reference Standards:

.1 American Concrete Institute (ACI)

.1 ACI 530, Building Code Requirements and Specifications for Masonry Structures and related Commentaries.

.2 ASTM International (ASTM)

.1 ASTM A153/A153M, Standard Specification for Zinc Coated (Hot Dip) on Iron and Steel Hardware.

.2 ASTM A508/A508M, Standard Specification for Quenched and Tempered Vacuum-Treated Carbon and Alloy Steel Forgings for Pressure Vessels.

.3 ASTM A580/A580M, Standard Specification for Stainless Steel Wire.

.4 ASTM C97/C97M, Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.

.5 ASTM C99/C99M, Standard Test Method for Modulus of Rupture of Dimension Stone.

.6 ASTM C119, Standard Terminology Relating to Dimension Stone.

.7 ASTM C144, Standard Specification for Aggregate for Masonry Mortar.

.8 ASTM C150/C150M, Standard Specification for Portland Cement.

.9 ASTM C170/C170M, Standard Test Method for Compressive Strength of Dimension Stone.

.10 ASTM C207, Standard Specification for Hydrated Lime for Masonry Purposes.

.11 ASTM C241/C241M, Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.

.12 ASTM C270, Standard Specification for Mortar for Unit Masonry.

.13 ASTM C568/C568M, Standard Specification for Limestone Dimension Stone.

.14 ASTM C780, Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

.15 ASTM C880/C880M, Standard Test Method for Flexural Strength of Dimension Stone.

## **DIMENSION STONE VENEER**

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- .16 ASTM C1242, Standard Guide for Selection, Design, and Installation of Dimension Stone Attachment Systems.
- .3 Canadian Standards Association (CSA)
  - .1 CAN/CSA A179, Mortar and Grout for Unit Masonry.
  - .2 CAN/CSA A370, Connectors for Masonry.
  - .3 CAN/CSA A371, Masonry Construction for Buildings.
  - .4 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .4 International Masonry Industry All-Weather Council
  - .1 Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

### **1.2 Administrative Requirements**

- .1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, Manufacturer's installation instructions and Manufacturer's warranty requirements.

### **1.3 Action and Informational Submittals**

- .1 Provide submittals in accordance with E3 – Submittals and Shop Drawings.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature, specifications and data sheet. Indicate VOC's for joint fillers and sealants.
- .3 Manufacturer's Instructions:
  - .1 Provide manufacturer's installation instructions.
- .4 Shop Drawings:
  - .1 Provide Shop Drawings in accordance with E3 – Submittals and Shop Drawings.
  - .2 Indicate sizes and sections of stone, arrangements of joints and bonding, anchoring, dowelling and cramping.
  - .3 Each stone indicated on Shop Drawings must bear corresponding number marked on its back or bed.
- .5 Samples:
  - .1 Provide unit samples:
    - .1 Variety of colours available from quarry with sufficient availability.

## **DIMENSION STONE VENEER**

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.6 Provide certificates:

.1 Certified Test and Evaluation Reports:

.1 Conduct tests on dimension stone for compressive strength and modulus of rupture.

### **1.4 Closeout Submittals**

.1 Operation and Maintenance Data:

.1 Provide maintenance data for incorporation into manual specified in Section E51 – Closeout Submittals.

### **1.5 Quality Assurance**

.1 Quality Control

.1 Obtain stone from single quarry source with resources to provide materials of specified consistent quality.

.2 Obtain mortar ingredients of uniform quality and from a single manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

.3 Obtain each type of stone accessory, sealants and other materials from a single manufacturer for each product.

.2 Mock-ups:

.1 Construct mock-ups as follows:

.1 Construct mock-up panel on-site of exterior dimension stone veneer construction 1200 x 1800 mm.

.2 Perform test cleaning on mock-up to ensure desired result as per article 3.5 Cleaning.

### **1.6 Site Conditions**

.1 Ambient Conditions:

.1 Maintain materials and surrounding air temperature to minimum 10°C prior to and forty-eight (48) hours after completion of stonework.

.2 Cold Weather Requirements: IMIAC - Recommended Practices and Specifications for Cold Weather Masonry Construction.

.2 Field Measurements:

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

## DIMENSION STONE VENEER

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### 2. PRODUCTS

#### 2.1 Manufacturers

- .1 From local quarry.

#### 2.2 Design Criteria

- .1 General: design, fabricate and install stonework to withstand normal loads from wind, gravity, movement of building structure, 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 Anchorage to Section 04 05 19.
- .5 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.

#### 2.3 Mortar Materials

- .1 Refer to Section 04 05 12.

#### 2.4 Stone Materials

- .1 Dolomite Limestone: to ASTM C568/C568M, Category III - High Density; special shapes as indicated; having the following average properties when tested to the identified standard:
  - .1 Compressive Strength: 206.1 MPa, to ASTM C170/C170M.
  - .2 Absorption: 0.75%, to ASTM C97/C97M.
  - .3 Density: 2,670 kg/m<sup>3</sup>, to ASTM C97/C97M.
  - .4 Modulus of Rupture: 15.4 MPa, to ASTM C99/C99M.

## **DIMENSION STONE VENEER**

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- .5 Flexural Strength: 11.0 MPa to ASTM C880/C880M.
- .6 Abrasion Resistance: 19.9 to ASTM C241/C241M.

### **2.5 Manufactured Units**

- .1 Ashlar Stone: dolomite limestone masonry units, as described below:
  - .1 Bed Thickness: 90 mm thick;
  - .2 Ashlar Sizes: random lengths, in the following bond percentages:
    - .1 Face Height A: 190 mm high; 30%.
    - .2 Face Height B: 90 mm high; 30%.
    - .3 Face Height C: 40 mm high; 20%.
    - .4 Face Height D: 140 mm high; 20%.
  - .3 Finish: split finish on exposed faces and ends.
  - .4 Colour and Pattern: limestone colour, flurried pattern, to match approved sample range.
- .2 Panel Stone: dolomite limestone masonry units , as described below:
  - .1 Bed Thickness: 120 mm thick;
  - .2 Panel Size: 400 mm wide x 1300 mm high.
  - .3 Finish: smooth finish on exposed faces and ends.
  - .4 Colour and Pattern: limestone colour, flurried pattern, to match approved sample range.

### **2.6 Reinforcement and Anchorages**

- .1 Refer to 04 05 19 - Masonry Anchorage and Reinforcing.

### **2.7 Flashing**

- .1 For through wall flashing refer to Section 07 26 00.

### **2.8 Accessories**

- .1 Mortar: in accordance with Section 04 05 12 - Masonry Mortar and Grout.
- .2 Weep Hole Vents: purpose made plastic louvered vents, insect proof.
- .3 Sealant and Backer Rod: in accordance with Section 07 92 00 - Joint Sealants.

## **DIMENSION STONE VENEER**

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### **2.9 Fabrication**

- .1 Cut stone to shape and dimensions and full to square with joints as indicated.
  - .1 Dress exposed faces true.
  - .2 Cut stone for sills, to lay on its natural quarry bed.
- .2 Cut-in reglets for flashings where indicated.
- .3 Execute profiled work from full size details and templates.
  - .1 Make exposed arises in true alignment and ease slightly to prevent snipping.
- .4 Cut stones for anchors, and support systems.
  - .1 Do not cut holes in exposed surfaces.
- .5 Finish exposed faces and edges of stones to comply with requirements indicated for finish and to match approved samples and field-constructed mock-up.

### **2.10 Grout**

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

### **2.11 Joint Sealants and Backer Rods**

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

### **2.12 Graffiti Resistant Coating**

- .1 Apply Graffiti Resistant Coating as described in Section 09 96 23.

### **2.13 Fabrication Tolerances**

- .1 Fabricate limestone dimension stone to the following tolerances:
  - .1 Unit Length: plus or minus 3 mm.
  - .2 Unit 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.
  - .4 Bed Depth: plus or minus 10 mm.

## **3. EXECUTION**

### **3.1 Preparation**

- .1 Waterproof exterior slabs on back prior to setting.

## **DIMENSION STONE VENEER**

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- .2 Clean stone surfaces by washing with stiff fibre brush and water.

### **3.2 Installation Tolerances**

- .1 Variation from Plumb: plus or minus 6 mm per 3 m maximum.
- .2 Variation from Level: plus or minus 13 mm per 6 m maximum.
- .3 Variation from Linear Building Line: plus or minus 13 mm per 6 m maximum.
- .4 Variation in Cross-Sectional Dimensions: plus 13 mm or minus 6 mm.

### **3.3 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 Provide movement joints of widths and at locations indicated. Ensure movement joints are kept free of mortar.

### **3.4 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 random coursed ashlar bond.
  - .1 Connect stone veneer to structural back-up with approved wall ties, spaced not more than 800 mm horizontally and 600 mm vertically.
- .3 Make joints 10 mm thick.
- .4 Embed only ends of lugged sills and steps in mortar.
  - .1 Leave balance of joint open for final pointing.
- .5 Place setting buttons under stones to maintain joint thickness.
- .6 Use soaked softwood wedges to support stone in proper alignment until mortar has set.
  - .1 Remove wedges when dry and without breaking them off, fill voids with pointing mortar.
- .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 600 mm on centre horizontally above through-wall flashing above shelf angles, and at bottom of walls.

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- .9 Tool joints after initial set has occurred.

### **3.5 Cleaning**

- .1 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.
- .2 Post-Construction: Clean mock-up panel as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, clean masonry 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 solution of 25 mL trisodium phosphate and 25 mL household detergent dissolved in 1 litre of 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.
- .3 Use alternative cleaning solutions and methods for difficult to clean stone only after consultation with masonry unit manufacturer.

**END OF SECTION**