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**DIVISION 4**

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## **MASONRY PROCEDURES**

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### **1. GENERAL**

#### **1.1 Work Included**

- .1 Masonry Work is described in other Sections of Division 4.

#### **1.2 References**

- .1 CSA A179 Mortar and Grout for Unit Masonry
- .2 CSA 3-A371 Masonry Construction for Buildings

#### **1.3 Source Quality Control**

- .1 Submit laboratory test reports in accordance with Section 01300 - Submittals.
- .2 Laboratory test reports to certifying compliance of masonry units and mortar ingredients with Specification requirements.

#### **1.4 Samples**

- .1 If requested by the Contract Administrator, submit the following Samples in accordance with Section 01300 - Submittals.
  - .1 Two (2) of each type of masonry unit specified
  - .2 One (1) of each type of masonry accessory specified
  - .3 One (1) of each type of masonry reinforcement and tie proposed for use
  - .4 As required for testing purposes

#### **1.5 Product Delivery, Storage, and Handling**

- .1 Deliver materials to jobsite in dry condition.
- .2 Keep materials dry until use, except where wetting of veneer is specified.
- .3 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

#### **1.6 Cold Weather Requirements**

- .1 Supplement Clause 5.15 of CSA A371 with the following requirements:
  - .1 Maintain temperature of mortar between 5°C and 50°C until batch is used.

#### **1.7 Hot Weather Requirements**

- .1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

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### **1.8 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 masonry Work is completed and protected by flashings or other permanent construction.
- .2 Protect masonry and other Work from marking and other damage. Protect completed Work from mortar droppings. Use non-staining coverings.
- .3 Provide temporary bracing of masonry Work during and after erection until permanent lateral support is in place.

### **2. PRODUCTS**

#### **2.1 Materials**

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

### **3. EXECUTION**

#### **3.1 Workmanship**

- .1 Masonry Work in accordance with CSA A371 except where specified otherwise.
- .2 Build masonry plumb, level, and true to line, with vertical joints in alignment.
- .3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

#### **3.2 Tolerances**

- .1 Tolerances in notes to Clause 5.3 of CSA A371 apply.

#### **3.3 Exposed Masonry**

- .1 Remove chipped, cracked, and otherwise damaged units in exposed masonry and replace with undamaged units.

#### **3.4 Jointing**

- .1 Allow joints to set just enough to remove excess water, and then tool with round joints to provide smooth, compressed, uniformly concave joints.
- .2 Strike flush all joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

#### **3.5 Cutting**

- .1 Cut out neatly for electrical switches, outlet boxes, and other recessed or built-in objects.

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- .2 Make cuts straight, clean, and free from uneven edges.

**3.6 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.

**3.7 Support of Loads**

- .1 Use concrete to Section 03300 - Cast-in-Place Concrete, where concrete fill is indicated, such as vertical cores, bond beams, and lintels.
- .2 Install building paper below voids to be filled with concrete or grout; keep paper 25 mm back from faces of units.

**3.8 Provision for Movement**

- .1 Leave a minimum of 40 mm space or as indicated on the Drawings, between top of non-load bearing walls and partitions and structural elements. Do not use wedges.

**3.9 Control Joints**

- .1 Construct continuous control joints as indicated on the Drawings.

**3.10 Expansion Joints**

- .1 Build-in continuous expansion joints as indicated.

**3.11 Field Quality Control**

- .1 Inspection and testing will be carried out by a testing laboratory designated by the Contract Administrator.
- .2 The City will pay costs for testing.
- .3 Costs for additional testing required as a result of defective materials will be the responsibility of the Contractor.

**END OF SECTION**

## **MORTAR FOR MASONRY**

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### **1. GENERAL**

#### **1.1 Work Included**

- .1 Provide all materials and labour to perform the mortar and grout Work for all masonry walls indicated on the Drawings.

#### **1.2 References**

- .1 CSA A179 Mortar and Grout for Unit Masonry

#### **1.3 Samples**

- .1 Submit Samples in accordance with Section 01300 - Submittals.

### **2. PRODUCTS**

#### **2.1 Materials**

- .1 Mortar and grout: conforming to CSA A179
- .2 Aggregate: conforming to CSA A82.56
- .3 Water: clean, potable, free of injurious amounts of acids, alkalis, and organic material
- .4 Masonry cement: conforming to CAN/CSA-A8, Type H
- .5 Portland cement: conforming to CAN/CSA-A5, normal Type 10
- .6 Hydrated lime: conforming to CSA A82.43
- .7 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated
- .8 Dirt resistant additives: aluminum tristearate, calcium stearate, or ammonium stearate

#### **2.2 Material Source**

- .1 Use same brands of materials and source of aggregate for all Work specified in this Section.

#### **2.3 Mortar Types**

- .1 Mortar for all masonry: Type S based for load bearing and non-load bearing construction.

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**MORTAR FOR MASONRY**

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**3. EXECUTION**

**3.1 Mixing**

- .1 Do masonry mortar and grout Work in accordance with CSA A179 except where specified otherwise.
- .2 Incorporate admixtures into mixes in accordance with manufacturer's instructions.
- .3 Comply with cold weather requirements specified in CSA A371 Masonry Construction for Buildings.

**3.2 Testing**

- .1 Testing of mortar materials will be carried out by an inspection and testing firm designated by the Contract Administrator.
- .2 The City 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. Sample costs will be the responsibility of the Contractor.

**END OF SECTION**

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**MASONRY REINFORCEMENT, AND ACCESSORIES**

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**1. GENERAL**

**1.1 Work Included**

- .1 Supply all material and labour for the incorporation of the masonry reinforcement into the Work of this Contract.

**1.2 References**

- .1 CAN/CSA A23.1, Concrete Materials and Methods of Concrete Construction
- .2 CSA A371, Masonry Construction for Buildings
- .3 CSA G30.3, Cold-Drawn Steel Wire for Concrete Reinforcement
- .4 CAN/CSA G30.18, Billet-Steel Bars for Concrete Reinforcement
- .5 CSA S304.1, Masonry Design for Buildings (Limit States Design)
- .6 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction

**1.3 Source Quality Control**

- .1 If requested by the Contract Administrator, submit certified copy of mill test report of reinforcement steel, showing physical and chemical analysis, minimum five weeks prior to commencing reinforcement Work.
- .2 Inform the Contract Administrator of proposed source of material to be supplied.

**1.4 Shop Drawings**

- .1 Submit Shop Drawings in accordance with Section 01300 - Submittals.
- .2 Shop Drawings shall consist of bar bending details, lists, and placing drawings.
- .3 On placing Shop Drawings, indicate sizes, spacing, location, and quantities of reinforcement.

**2. PRODUCTS**

**2.1 Materials**

- .1 Bar reinforcement: to CSA A371 and CAN/CSA-G30.18, Grade 400
- .2 Wire reinforcement: to CSA A371 and CSA-G30.3, truss type, A.S.W.G. No. 9, galvanized
- .3 Corrosion protection: to CSA S304.1, galvanized
- .4 Masonry anchors: acceptable products by Hilti and Tapcon

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- .5 Control joint filler: preformed rubber, neoprene, or polyvinyl chloride materials of size and shape indicated.

**2.2 Fabrication**

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

**3. EXECUTION**

**3.1 General**

- .1 Install masonry reinforcement in accordance with CSA A371, CAN/CSA-A23.1 and CSA S304.1 unless indicated otherwise.
- .2 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .3 Provide truss type horizontal joint reinforcement every second course.
- .4 Prior to placing concrete and mortar, obtain Contract Administrator's acceptance of placement of reinforcement.
- .5 Do additional reinforcement of masonry as indicated.

**3.2 Reinforced Lintels and Bond Beams**

- .1 Reinforce masonry lintels and bond beams as indicated.
- .2 Place and cast reinforcement in accordance with CSA S304.1.

**3.3 Grouting**

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

**3.4 Masonry Anchors**

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

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**3.5 Lateral Support and Anchorage**

- .1 Lateral support and anchorage in accordance with CSA S304.1 and as indicated.

**3.6 Control Joints**

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

**3.7 Field Bending**

- .1 Do not field bend reinforcement except where indicated or authorized by Contract Administrator.
- .2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
- .3 Replace bars which develop cracks or splits.

**3.8 Cleaning**

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

**END OF SECTION**

## CONCRETE UNIT MASONRY

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### 1. GENERAL

#### 1.1 Work Included

- .1 Concrete Block Masonry
- .2 Installation of Masonry Accessories

#### 1.2 Standards

- .1 CAN 3-A165 Series, CSA Standards on Concrete Masonry Units
- .2 Perform masonry Work to CSA S304.1, CSA A370 and CAN 3-A371 except where specified otherwise.
- .3 Conform to the National Building Code of Canada

#### 1.3 Cold Weather Requirements

- .1 Conform to weather protection requirements of Clause 5.15 in CSA A371 Masonry Construction for Buildings.

#### 1.4 Protection

- .1 Cover tops of completed and partially completed walls with waterproof coverings at end of each working day. Drape covers over walls and extend 600 mm down both sides. Anchor securely in position.
- .2 Protect adjacent finished surfaces from marking or damage due to masonry Work.
- .3 Provide temporary bracing of masonry Work during erection to prevent damage due to winds or other lateral loads until permanent structure provides adequate bracing.

#### 1.5 Storage and Handling

- .1 Store materials on-site in a manner to prevent damage. Store masonry units off the ground.
- .2 Protect all materials from damage due to weather conditions.
- .3 Handle materials carefully to prevent chipping and breaking.

### 2. PRODUCTS

#### 2.1 Materials

- .1 Standard Concrete Masonry Units: to CSA A165.1, normal weight, type H/15/A/M, modular size of 390 mm x 190 mm x 190 mm, and 390 mm x 240 mm x 190 mm, refer to Drawings for locations of different sizes; units to be manufactured by CCI Tallcrete.

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- .2 Specialty Sound Absorbing Concrete Masonry Units for the exterior walls of the Exhaust Fan Building and exterior and interior walls of the Blower Room in the Blower Building: to CSA A165.1, normal weight, type H/15/A/M, Sound blox Type RF modular size of 390 mm x 240 mm x 190 mm, refer to Drawings for locations of different sizes; units to be manufactured by Western Noise Control Ltd. and distributed by CCI Tallcrete.
- .3 Special Shapes: provide Type H/15/A/M Bull-Nosed units for exposed corners.
- .4 Provide purpose made knock out blocks for bond beams and lites unless noted. At door and windows openings provide purpose made bond beam shapes for lintels.

### 2.2 Exposed Faces

- .1 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.

## 3. EXECUTION

### 3.1 Workmanship

- .1 Build masonry Work true-to-line, plumb, square, and level, with vertical joints in proper alignment.
- .2 Tolerances for exposed masonry Work shall be:
  - .1 Variation from mean plane: 3 mm under 2.5 m straight edge
  - .2 Variation in masonry openings: 6 mm maximum
  - .3 Variation from plumb: 9 mm in 6 m
- .3 Assume complete responsibility for dimensions, plumbs, and levels of this Work and constantly check same with graduated rod.
- .4 Masonry courses to be of uniform height and both vertical and horizontal joints to be of equal and uniform thickness.
- .5 Construct walls upward in a uniform manner, no one portion being raised more than 4 feet above another at any time. Build no more than 1500 mm of wall measured vertically in any one day.
- .6 Buttering corners of units, throwing mortar into joints and deep or excessive furrowing of bed joints will not be permitted. Do not shift or tap units after mortar has taken initial set. Where adjustments must be made after mortar has started to set, remove mortar and replace with fresh supply.

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### 3.2 Blockwork

- .1 Lay standard concrete block in running bond, with thicker end of face shell upward. Coursing to be modular: 200 mm for one block and one joint for concrete masonry units, 100 mm for one block and one joint for split-face and smooth face scored half high units.
- .2 Lay specialty sound absorbing concrete block in running bond. Provide full bed of mortar for full width and length of the block. Place next block with open ends facing downward in full bed of mortar. Once concrete block has been layed in place, remove mortar from funnel shape slot for appearance purposes. Funnel shaped slot to face the interior of room where the sound aborsbing is required.
- .3 Use bull-nosed units for exposed external corners, door and window jambs, etc. Exposed open cells not permitted.
- .4 Concrete masonry units shall have face shells and their end joints fully filled with mortar, and joints squeezed tight. Also fill webs at cores, to be reinforced and grouted, and strike flush at core taking care to prevent mortar from falling into core.
- .5 Install acoustic inserts in specialty sound absorbing concrete masonry units in accordance with manufacture's written instructions.
- .6 Tie intersecting non-bearing walls together with masonry reinforcing every second course.
- .7 Do not tie intersecting bearing walls together in masonry bond, except at corners.

### 3.3 Mortar and Pointing

- .1 Make all joints uniform in thickness, straight, in line and with mortar compressed to form concave joints.

### 3.4 Building In

- .1 Build in door and window frames, steel lintels, sleeves, anchor bolts, anchors, nailing strips, and other items to be built into masonry.
- .2 Do not distort metal frames. Bed anchors of frames in mortar and fill frame voids with mortar or grout as walls are erected.

### 3.5 Bearings

- .1 Fill concrete block solid with concrete for two courses below bearing points of structural members and where indicated on Drawings.
- .2 Install building paper and wire mesh reinforcing in the bed below the second block course from top.

### 3.6 Control Joints

- .1 Provide continuous vertical control joints in concrete block partitions and walls at locations indicated, or at a maximum 7.6 m o.c.

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- .2 Form control joints as detailed. Stop masonry reinforcing each side of joints.
- .3 At control joints where specialty sound absorbing concrete block is used, provide batt insulation to infill void between backer rods. Install backer rod and sealant each side of wall.

### **3.7 Expansion Joints**

- .1 Construct expansion joints where indicated, as detailed.

### **3.8 Masonry Reinforcing**

- .1 Concrete block walls and partitions shall be continuously reinforced and tied together with wire reinforcing in every second block bed joint.
- .2 Place wire reinforcing in first and second bed joints above and below openings. Reinforcing in first bed joint shall be continuous. Second bed joint reinforcing shall extend 600 mm beyond each side of opening.
- .3 Place continuous wire reinforcing in second bed joint below the tops of walls.
- .4 Lap reinforcement minimum of 150 mm at splices and cut and bend corners.
- .5 Vertical reinforcing bars to be continuous into lintels, through intermediate bond beams, and hooked into top of wall bond beams.

### **3.9 Cutting Masonry**

- .1 Cutting of masonry units exposed in finished Work is to be done with accepted type power saw. Where electrical conduit outlets and switch boxes occur, grind and cut units before services are installed.
- .2 Obtain Contract Administrator's permission before cutting any part of area which may impair appearance or strength of the Work.
- .3 Patching of masonry is not permitted without Contract Administrator's authorization.

### **3.10 Bond Beams**

- .1 Install concrete block bond beams where indicated and where required for bearing of structural members.
- .2 Make bond beams with reinforcing bars as indicated on the Drawings placed in bottom, and fill with concrete.

### **3.11 Reinforced Block Lintels**

- .1 Install reinforced concrete block lintels at openings where steel lintels are not indicated.
- .2 Cast and cure lintels in place complete with shoring.

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**CONCRETE UNIT MASONRY**

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- .3 Place 25 mm of concrete in voids, place in deformed reinforcing bars and place concrete to level of block sides. Rod and tamp concrete well without disturbing reinforcing. Allow lintels to cure seven days before removing shores.
- .4 Minimum bearing shall be 400 mm each side of openings unless noted elsewhere.

**3.12 Nailing Inserts**

- .1 Install nailing inserts as required for wall strapping set in mortar joints at 400 mm centres each way, to manufacturer's instructions.

**3.13 Provisions for Other Trades**

- .1 Provide openings in masonry walls where required or indicated.
- .2 Accurately locate chases and openings and neatly finish to required sizes.
- .3 Where masonry encloses conduit, ducts and piping, bring to proper level indicated and as directed. Do not cover any pipe or conduit chases or enclosures until advised that Work has been reviewed and tested.
- .4 Build masonry neatly around conduit, ducts, sleeves and piping passing through.

**3.14 Cleaning**

- .1 On completion, remove any excess mortar and smears that may remain, using wood paddles or scrapers.
- .2 Point or replace defective mortar to match existing as required or directed.
- .3 Scrub surfaces to be cleaned using non-acid cleaning solution of type which will not harm constructed masonry and acoustical inserts. Check masonry unit manufacturer for acceptable solution. Clean trial test area and obtain permission to proceed with Contract Administrator.
- .4 Use large amounts of water and do cleaning in accordance with solution manufacturer's instructions.
- .5 Repeat cleaning operations as often as necessary until Work is satisfactory to the Contract Administrator.

**END OF SECTION**