SECTION  – manufactured stone masonry

1. GENERAL
   1. SUMMARY
      1. Provide stone face veneer for all exposed [interior] and [exterior] surfaces as indicated on the drawings.
      2. Stone veneer forms a part of the exterior rain screen and protective veneer facing. Design to allow for ventilation, drainage, and pressure equalization of the voids between the stone veneer and the insulation with the exterior atmospheric pressures.
      3. Different air pressures occur at various locations on the exterior surfaces due to wind forces. The Consultant has detailed the cavity space into separate compartments as a means of controlling these pressure differences within the building envelope.
      4. Structural steel support angles and brackets shall be supplied and installed onto the building structure by Section 05 50 00 – Metal Fabrications. Loose lintel support angles shall be as specified in Section 05 50 00 – Metal Fabrications but be supplied and installed by this Section.
      5. This Section includes supply and installation of unit masonry assemblies consisting of the following:
         1. Stone face veneer.
         2. Mortar and grout.
         3. Reinforcing steel.
         4. Embedded flashing.
         5. Miscellaneous masonry accessories.
      6. Related Requirements:
         1. Section 05 12 00 – Structural Steel.
         2. Section 05 40 00 – Cold Formed Metal Framing.
         3. Section 05 50 00 – Metal Fabrications.
         4. Section 07 21 00 – Thermal Insulation.
         5. Section 07 27 13 – Modified Bituminous Sheet Air Barrier.
         6. Section 07 27 39 – Vapour Permeable Air Barrier Membrane.
         7. Section 07 62 00 – Sheet Metal Flashing and Trim.
         8. Section 07 92 00 – Joint Sealants.
         9. Section 08 11 13 – Steel Doors and Frames.
         10. Section 08 11 16 – Aluminum Doors, Frames and Sidelites.
         11. Section 08 41 13 – Aluminum Framed Entrances and Storefronts.
         12. Section 08 44 13 – Glazed Aluminum Curtain Walls.
         13. Section 09 29 00 – Gypsum Board.
   2. reference standards
      1. Canadian Standards Association (CSA):
         1. CSA A82.3 M1978 (Reaffirmed 1992): Calcium Silicate (Sand Lime) Brick.
         2. CSA A179 14, Mortar and Grout for Unit Masonry.
         3. CSA A370 14, Connectors for Masonry.
         4. CSA A371 14, Masonry Construction for Buildings.
         5. CAN/CSA A5 93: Portland Cement.
         6. CAN3 S304 14, Design of Masonry Structures.
      2. American Society for Testing of Materials (ASTM):
         1. ASTM A153/A153M 09, Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
         2. ASTM A580/A580M 14: Standard Specification for Stainless Steel Wire.
         3. ASTM C67 14, Standard test method for sampling and testing brick and structural clay tile.
         4. ASTM C144 11, Standard Specification for Aggregate for Masonry Mortar.
         5. ASTM C207 06(2011), Standard Specification for Hydrated Lime for Masonry Purposes.
         6. ASTM C270 14a, Standard Specification for Mortar for Unit Masonry.
      3. Underwriters Laboratories of Canada:
         1. CAN/ULC-S102 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
   3. administrative requirements
      1. Pre-Construction Conference: Arrange a site meeting attended by the contractor's superintendent, the Subcontractor's representative and foreman for this Project, the Consultant, materials supplier(s), and other relevant personal before commencement of Work for this Section; agenda for meeting will include but not be limited to, the following:
         1. Mortar and grout testing, batch control and grouting procedures.
         2. Air barriers and insulation.
         3. Cavity compartmentalization and drainage.
         4. Appearance of exposed block lintels.
         5. Reinforcement corners, wall intersections.
         6. Interior and exterior crack control measures.
         7. Trowelled or tooled joints to concealed masonry faces.
         8. Methods for keeping mortar out of cavity space.
         9. Sample wall.
         10. Review of submitted stone unit samples.
      2. Coordination: Coordinate components of the Work of this Section with work performed by other Sections including but not limited to, the following:
         1. Rain Screen Wall Construction:

Manufactured masonry veneer forms a part of the exterior rain screen and protective facing.

Construct assembly to allow for ventilation, drainage, and pressure equalization of the voids between the veneer and the insulation with the outside pressures.

Construct cavity space divided into separate compartments as a means of controlling these pressure differences within the building envelope.

* + - 1. Sheet Metal Flashings and Trim:

Coordinate installation of prefinished sheet metal through flashings with Section 07 62 00 – Sheet metal Flashing and Trim.

* 1. submittals
     1. Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
     2. Submit duplicate samples indicative of colour and texture of each stone veneer unit and of each special stone shape specified.
     3. Submit sample from run to be supplied prior to delivery of material on site.
  2. mock-up wall
     1. Provide required Mock Ups in accordance with Section 01 45 00 – Quality Control.
     2. Construct a mock up of stone veneer in conjunction with brick veneer exterior wall at the site for review prior to commencing masonry work. Mock up wall of stone veneer to comprise of an area suitable to indicate all stone types, shapes and coursings required for the Work.
     3. Indicate colour and variation of stonework in the mock up wall. Assembly to include cavity compartmentalization, and procedures for keeping cavity free from mortar droppings. Also include tooling of stonework joints, jamb return, cavity wall reinforcement and ties, flexible flashing, insulation, cavity vents and weep holes in the mock up wall.
     4. When reviewed and accepted by the Consultant, the mock up wall shall be a quality standard for stonework and shall remain intact and protected for duration of Work. Consultant will use mock up wall as reference to confirm mortar colour and joint tooling of the stonework for the Project.
     5. Mock up wall, when accepted by Consultant, may form a part of the construction for the final building wall construction.
  3. DELIVERY, STORAGE, HANDLING AND PROTECTION
     1. Deliver mortar materials in original unbroken and undamaged packages in approved protective film with the maker's name and brand distinctly marked thereon, and upon delivery store in a shed until used on the work.
     2. Lift skids with proper and sufficiently long slings or forks with protection to prevent damage to units. Protect edges and corners.
     3. Stack skids carrying units on timbers or platforms at least 75 mm (3") above grade.
     4. Store or pile sand on a plank platform and protect from dirt and rubbish.
     5. Store mortar materials and sand in such a manner as to prevent deterioration or contamination by foreign materials in a manner designed to prevent damage and staining of units.
     6. Materials stacked on floors of building must not exceed structural design loads.
     7. Do not use salt or calcium chloride to remove ice from masonry surfaces.
  4. protection
     1. Store materials on dry platforms protected from soiling and weather.
     2. Cover stored building stone units with protective enclosure if exposed to weather. Place polyethylene or other plastic film between wood and other finished surfaces of units when stored for extended periods of time.
     3. When air temperature has dropped below 0 deg C (e.g. overnight), ensure that materials are above freezing, and free from ice, when installed.
     4. Build stonework in enclosures heated by approved smokeless means when temperature remains below 0 deg C. All materials shall be above 4 deg C when installed.
     5. Prevent Work from freezing for at least 48 hours by enclosure, artificial heat, or other acceptable method.
     6. Cover top of Work with waterproof sheet when Work is not in progress.
     7. Protect adjacent surfaces and Work from damage during cleaning of masonry.
     8. Provide adequate bracing for stonework during construction and until permanent lateral supports are in place.
     9. Protect stonework from frost heave and other forces to which it would normally not be subject after completion of the Work.
  5. ENVIRONMENTAL REQUIREMENTS
     1. In cold weather conform to Clause 5.15.2 of CSA A371 and maintain temperature of mortar between 5 deg C and 50 deg C until used.
     2. In hot weather protect freshly laid masonry from drying too rapidly, by means of waterproof, non staining coverings.

1. Products
   1. manufacturers
      1. Basis-of-Design products are named in this Section; additional manufacturers offering similar aluminum framed entrance and storefront systems may be incorporated into the work provided they meet the performance requirements established by the named products.
      2. Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis-of-Design Materials, manufacturers offering products that may be incorporated into the Work include but are not limited to, the following:
         1. Boral Stone Products LLC; Cultured Stone.
   2. manufactured units
      1. Texture: [Brick][Stone][Manufacturer's standard product line].
      2. Compressive Strength: 12.4 Mpa (1800 psi), to ASTM C192 and ASTM C39.
      3. Bond Between Stone Unit, Type S Mortar, and Backing: ASTM C482, 345 kPa (50 psi).
      4. Freeze/Thaw: ASTM C67, no disintegration and less than 3 percent weight loss.
      5. Combustibility: ULC/CAN4 S114-M80, passes.
      6. Fire Hazard Test: CAN/ULC-S102.
      7. Maximum Veneer Unit Weight: 73 kg/m2 (15 psf).
   3. DRAINAGE MAT
      1. Drainage Mat: Randomly oriented geometric patterned drainage and ventilation mat designed to eliminate moisture vapour in wall applications with following characteristics:
         1. Thickness: 10 mm (0.40").
         2. Weight: 641 g/m2 (18.9 oz/yd2).
         3. Width: 1220 mm (48").
         4. Class A flame spread per CAN/ULC-S102.
         5. Hydrophobic compound.
         6. Resistant to chemical damage.
         7. Does not support mould growth.
   4. accessory materials
      1. Metal Lath:
         1. Standard: 1.4 kg/m2 (2.5 lb) galvanized expanded metal lath or 1.3 mm (18 gauge) woven wire mesh.
         2. Metal Buildings and open stud construction: 1.8 kg/m2 (3.4 lb) galvanized expanded rib lath.
      2. Fasteners:
         1. [Into Wood Studs: Minimum 3 mm (0.120 inch) shank diameter galvanized nails or staples of sufficient length to penetrate 35 mm (1-3/8 inches) minimum into the stud.]
         2. [Into Metal Studs: Minimum 11.1 mm (7/16 inch) head diameter, corrosion-resistant, self-drilling, self-tapping, pancake head screws of sufficient length to penetrate 10 mm (3/8 inch) minimum into the stud.]
      3. Sealants: Refer to Section 07 92 00 – Joint Sealants.
      4. Perimeter Insulation: Refer to Section 07 21 00 – Thermal Insulation.
      5. Air Barrier: Refer to Section 07 27 13 – Modified Bituminous Sheet Air Barrier.
      6. Weep/Vent Inserts: [Refer to Section 04 20 00.] [PVC 'T' shaped brick vents by Goodco Limited, or cadium plated airplane type 'Weep Holes-343' by Blok-Lok Limited, set 32" O.C. for architectural block in the following locations:
         1. Bottom course of manufactured stone masonry units throughout.
         2. Top courses of manufactured stone masonry units throughout.
         3. Manufactured stone masonry units resting on lintels and intermediate angles.]
      7. Cavity Drainage Material: [Refer to Section 04 20 00 – Unit Masonry.]
      8. Lateral Wall Support Bracing: Refer to Section 05 50 00 – Metal Fabrications.
   5. EMBEDDED FLASHING MATERIAL
      1. Flexible Flashing Membrane:
         1. Self adhering rubberized asphalt flashing; non-extruding composite flashing membrane compatible with air and vapour membrane; consisting of pliable, adhesive rubberized asphalt compound, bonded to a high density, cross laminated polyethylene film to produce an overall thickness of a minimum of 1/32" and specifically manufactured for use as a through wall flashing and damp course membrane, and as follows:

Acceptable Materials:

Bakor, Blueskin TWF.

Grace Construction Products, Perm-A-Barrier 4000 Wall Flashing.

Soprema, Sopraseal Stick 1100HT.

* + - 1. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.
    1. Metal Flashing: Provide metal flashing materials in accordance with Section 07 62 00 – Metal Flashing and Trim, and as follows:
       1. Fabricate through wall flashing with snap lock receiver on exterior face to receive counter flashing.
       2. Fabricate through wall flashing with drip edge by extending flashing 13 mm (1/2") out from wall, with outer edge bent down 30 deg and hemmed.
       3. Fabricate through wall flashing with sealant stop by bending metal back on itself 19 mm (3/4") at exterior face of wall and down into joint 10 mm (3/8") to form a stop for retaining sealant backer rod.
       4. Fabricate metal drip edges and sealant stops for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending a minimum of 75 mm (3") into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam; form hem on upper surface of metal so that completed seam will shed water.
       5. Fabricate metal drip edges for flexible flashings from stainless steel; extend a minimum of 75 mm (3") into wall and 13 mm (1/2") out from wall, with outer edge bent down 30 deg and hemmed.
  1. MORTAR MATERIALS
     1. Mortar: Premixed Type N or mortar mixed using components and proportions following manufactured masonry manufacturer's installation instructions. Comply with CAN/CSA A179.
     2. Mortar Colour: Iron oxide pigments; Colour: As selected by the Consultant from the manufacturer's standard product line.
     3. Water: potable, clean and free of deleterious amounts of acids, alkalies or organic materials.
  2. METAL FINISHES
     1. Hot Dip Galvanizing: to ASTM A153, Class B2.
     2. Stainless Steel: to ASTM A508, Type 302.

1. Execution
   1. EXAMINATION
      1. Verify that site conditions are ready to receive work.
      2. Beginning of installation means acceptance of site conditions.
   2. preparation
      1. Protection: Prevent work from occurring on the opposite of walls to which manufactured masonry is applied during and for 48 hours following installation of the manufactured masonry.
      2. Verify items provided by other sections of work are properly sized and located.
      3. Surface Preparation: Follow manufacturer's instructions for the appropriate type of manufactured masonry and substrate.
   3. INSTALLATION OF DRAINAGE MAT
      1. Install in accordance with manufacturer's instructions.
      2. Place drainage mat horizontally against exterior wall fabric side out, entangled core to building interior. Starting at bottom of the wall, position first piece of drainage mat where the bottom edge of the veneer will meet ledger board.
      3. Mechanically fasten using staples, large head nail, or washer and screw using one fastener for each 0.1 m2 (1 ft2). When installing over concrete or block back-up walls that do not accept mechanical fasteners, hold in place with small dabs of glue every 610 mm (24"). Do not fasten through flashing.
      4. Seam adjacent pieces with selvage edge overlapping lower drainage mat piece.
      5. Trim drainage mat around all penetrations, windows, and doors so that the material is flush to the flashing.
   4. INSTALLATION OF MANUFACTURED MASONRY
      1. The Consultant recognizes that the building stone product is subject to variations in colours, tones, and textures.
      2. Select stone from several pallets, mix units from several pallets or cubes as they are placed, thereby distributing exposed stone veneer of varying colours, tones, and textures evenly over wall surface to produce a uniform, slightly variegated blend of tones, colours and textures. Avoid placing units that are contrasting in appearance in close proximity to one another.
      3. Large variations in colour or texture between adjacent blocks of material will cause the Consultant to reject the installation, and the installer to rebuild the assembly at no additional cost to Contract.
      4. Use special shaped stone units, shapes and profiles as indicated on drawings. Site cut corner stone sawn face is not acceptable unless accepted in advance by the Consultant.
      5. Use chipped or blemished units only where the defect will be concealed; reject all defective and broken units or units with chipped edges or corners.
      6. Cut stone units with motor driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full size units without cutting. Pre soak units using clean water prior to cutting.
      7. Clean cut units using a stiff fibre brush and clean water. Allow units to surface dry prior to placement.
      8. Install cut units with cut surfaces and, where possible, cut edges concealed. Where complex cutting is required, place mortar along the cut edge and trowel smooth to provide a consistent 13 mm (1/2") wide gap.
      9. Wetting of stone: Wet stone before laying. Allow units to absorb water so they are damp but not wet at the time of laying.
      10. Lay Work true to line and level. Accurately space courses. Keep bond plumb throughout. Corners and reveals shall be plumb and true. Check Work regularly.
      11. Lay stonework so that joints are even and so that average distance between joint centrelines is equal to the nominal modular dimension of the stone. Lay stonework in running bond, stack bond or soldier coursing as indicated on drawings. Where not indicated, notify Consultant prior to starting work. Set stone into full mortar bed.
      12. Set stone in accordance with manufacturer's recommended installation practices and materials. Review manufacturer's written recommendations with the Consultant before proceeding.
      13. Leave openings for equipment to be installed before completing stonework. After installing equipment, complete stonework to match the construction immediately adjacent to the opening.
      14. Keep the space between backing wall and facing clear of mortar droppings when the stonework forms a veneer as noted.
      15. Where fresh stone veneer abuts or is built upon partially or fully set stone or masonry, clean the exposed surface, and dampen to obtain bond.
      16. Use no toothing of new Work into Work that has set unless accepted by Consultant; rake back one-half unit lengths where a stop off is necessary.
      17. Build cavity and composite walls and other masonry construction to the full thickness shown.
      18. Use concave tooled and compressed joints for all stonework, except where stack bond is indicated use rake joints square, 6 mm (1/4") deep +1 mm (1/24") and then compact the mortar in the joint.
      19. Leave 10 mm (3/8") minimum clear space below shelf angles, or more as indicated.
      20. Do not shift or tap units after mortar has taken initial set. If adjustment is required, remove mortar, and reset in fresh mortar.
   5. CONSTRUCTION TOLERANCES
      1. Conspicuous vertical lines, external corners, door jambs, reveals, and expansion and control joints, shall not vary from plumb by more than 6 mm (1/4") in 6100 mm (20') maximum.
      2. Vertical alignment of exposed head joints shall not vary from plumb by more than 6 mm (1/4") in 3050 mm (10') maximum.
      3. Conspicuous horizontal lines, exposed lintels, sills, parapets, and reveals, shall not vary from level by more than 6 mm (1/4") in 6100 mm (20') maximum.
      4. Exposed bed joints shall not vary from thickness indicated by more than ± 2 mm (1/12"), with a maximum thickness limited to 10 mm (3/8"). Do not vary from bed joint thickness of adjacent courses by more than 2 mm (1/12").
      5. Exposed head joints shall not vary from thickness indicated by ± 2 mm (1/12"). Do not vary from adjacent bed joint and head joint thicknesses by more than 2 mm (1/12").
   6. CONTROL AND EXPANSION JOINTS
      1. General: Install control and expansion joints in stonework where indicated. Build in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in plane restraint of wall or partition movement, and as follows:
         1. Form control and expansion joints in stonework by installing temporary foam plastic filler in head joints and remove filler when stone masonry is complete forming an open joint not less than 10 mm (3/8") wide. Then insert sealant and backer rod specified Section 07 92 00 – Joint Sealants. Keep joint free and clear of mortar., then insert sealant and backer rod specified Section 07 92 00 – Joint Sealants.
         2. Build in horizontal, pressure relieving joints where indicated; construct joints by either leaving a space of width required for installing sealant and backer rod specified Section 07 92 00 – Joint Sealants, and as follows:

Locate horizontal, pressure relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind stone veneer.

* 1. cavities
     1. Keep cavities clean of mortar droppings and other materials during construction. Procedures outlined in the subparagraphs below help eliminate clogging of weep holes during construction. Use one of the following methods, or propose additional methods prior to construction at Site Meeting noted in paragraph 1.7:
        1. Provide wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity. Wood strips usually rest on ties and have wires attached for lifting.
        2. Provide temporary opening by omitting 1 stone unit every 1220 mm (48") at bottom of cavity and in first course above flashing. After wall has been built to top of cavity and mortar has set, clean out cavity and then close temporary opening.
        3. Provide mortar net placed at bottom of cavity.
        4. Proposed methods, other than those indicated above, shall have proven results at maintaining open cavity, reducing water collection at base of cavity, and allowing pressure equalization within wall cavity. Methods that allow the cavity to fill with mortar droppings using wicks or gravel as a part of a drainage system interfere with pressure equalizing properties required for the wall system and will not be acceptable.
     2. Cavity Insulation:
        1. Coordinate tie spacing with insulation joint locations and substrate framing.
        2. Install cavity insulation in accordance with manufacturer's instructions with materials specified in Section 07 21 00 – Thermal Insulation.
        3. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways.
        4. Press units firmly against inside substrate. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.
     3. Cavity Venting And Weeping:
        1. Install cavity vents and weep holes in vertical joints of veneer facing of each continuous cavity at 610 mm (24") o/c.
        2. Locate vent and weep holes in line vertically.

Install weep holes at bottom of cavity directly above support angles and above horizontal blocking, support angles and lintels occurring within the wall construction.

Install vent holes in top course of stonework, at underside of support angles and at parapets.

* + - 1. Locate cavity breaks not exceeding 12 m (40') o/c.

Close cavities off vertically within 610 mm (24") each side of corners and at all vertical stone veneer control joints.

Form cavity break using insulation cut to match full depth of cavity plus thickness of wall insulation x minimum 50 mm (2") wide.

Butter back face of insulation strip with adhesive and apply directly to face of air and vapour retarder.

Install adjacent panels tight to sides of vertical insulation strip using 89 mm (3-1/2") galvanized nails at 406 mm (16") o/c pressed into insulation diagonally so that the vertical strip is attached to the insulation panels on each side. Take care not to damage or penetrate the air and vapour retarder membrane with nails.

* + 1. Install through wall flexible and metal flashings as detailed.
  1. MORTAR MIXING
     1. Thoroughly mix mortar ingredients in proper quantities needed for immediate use to requirements of CSA A179.
     2. Add mortar colour and admixtures to requirements of manufacturer's instructions.
     3. Provide uniformity of mix and colouration.
     4. Take representative samples for testing consistency of strength and colour according to CSA A179.
     5. Use mortar within 2 hours after mixing at temperatures of 26 deg C or 2 1/2 hours at temperatures under 10 deg C.
  2. PLACING
     1. Lay building stone in full bed of mortar, properly jointed with other work. Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.
     2. Fully bond intersections, and external corners.
  3. FLASHING
     1. Extend flashing through veneer, turn up and bed into mortar joint of masonry or seal into sheathing over steel stud framed back up.
     2. Lap end joints and seal watertight.
  4. LINTELS
     1. Install loose steel lintels as scheduled.
  5. 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.
  6. CLEANING
     1. Clean building stone as work progresses. Allow mortar droppings on masonry to partially dry then remove by means of brushing with a stiff fibre brush.
     2. Clean the stonework using methods approved by the manufacturer. Do not use cleaning compounds, additives, soaps or detergents unless approved in writing by the masonry manufacturer and accepted by the Consultant.
     3. Use of acids is not allowed. Test proprietary materials in small location to ensure that no damage or permanent staining resulting from the use of proprietary cleaning agents occurs.
     4. Do not use wire brushes or metal tools for cleaning use fibre brushes or wood paddles.
     5. Do not wipe off mortar or grout runs while wet. Wait until dry and then remove.
  7. PROTECTION
     1. Protect building stone from damage resulting from subsequent construction operations.
     2. Use protection materials and methods that will not stain or damage building stone.
     3. Remove protection materials upon Substantial Performance of the Work, or when risk of damage is no longer present.

end of section