PART 1- GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 072400 – Exterior Insulation and Finish Systems.

.2 Section 072700.01 – Air / Vapour Barriers.

.3 Section 079200 – Joint Sealants

.4 Section 085100 – Metal Windows.

.5 Section 099199 – Painting for Minor Works.

1.2 REFERENCES

.1 ASTM International
- .1 ASTM A 496/A 496M-07, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.

.2 CSA International
- .1 CAN/CSA-A165 SERIES-04(R2009)], CSA Standards on Concrete Masonry Units covers: A165.1, A165.2, A165.3.
- .2 CAN/CSA-A179-04(R2009), Mortar and Grout for Unit Masonry.
- .3 CAN/CSA-A370-04(R2009), Connectors for Masonry.
- .4 CAN/CSA A371-04(R2009), Masonry Construction for Buildings.
- .5 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
- .6 CSA S304.1-04(R2009), Design of Masonry Structures.

.3 Green Seal Environmental Standards (GS)
- .1 GS-11-2008, 2nd Edition, Paints and Coatings.

.4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1113-A2007, Architectural Coatings.

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 masonry products and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 – Environmental Procedures.
- .3 Indicate VOC's in g/L for epoxy coatings and galvanized protective coatings and touch-up products to be applied within building envelope.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
- .2 Shop drawings consist of bar bending details, lists and placing drawings.
- .3 Placing drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples will be returned for inclusion into work.
- .3 Submit duplicate, full size samples of each type of masonry unit.

1.4 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, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect masonry products from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MASONRY UNITS

.1 Standard concrete block units: to CAN/CSA-A165 Series (CAN/CSA-A165.1).
- .1 Classification: H/15/A/M.
- .2 Size: modular.
- .3 Special shapes: provide bull-nosed units for exposed corners framing the interior window sill. Provide purpose-made shapes for lintels and bond beams. Provide additional special shapes as indicated.

2.2 REINFORCEMENT AND CONNECTORS

.1 Bar reinforcement: to CAN/CSA-A371 and CSA G30.18, Grade 400.

.2 Wire reinforcement: to CAN/CSA-A371 and ASTM A 496/A 496M, truss type.

.3 Connectors shall be corrosion resistant: to CAN/CSA-A370 and CSA S304.1.

2.3 MORTAR AND GROUT

.1 Mortar: to CAN/CSA-A179.
- .1 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.
- .2 Colour: ground coloured natural aggregates or metallic oxide pigments.

.2 Mortar Type: S based on property specifications,

.3 Mortar for foundation walls, manholes, sewers, pavements, walks, patios and other exterior masonry at or below grade: type M based on property specifications.

.4 Following applies regardless of mortar types and uses specified above:
- .1 Mortar for stonework: type N based on property specifications.
- .2 Mortar for grouted reinforced masonry: type S based on property specifications.

.5 Grout: to CAN/CSA-A179, Table 3.

.6 Parging mortar: type S to [CAN/CSA-A179].

2.4 ACCESSORIES

.1 Weep hole vents: purpose-made galvanized steel.

.2 Nailing Inserts: 0.5 mm minimum thickness, galvanized.

.3 Bolts: 12 mm diameter x 150 mm long with ends bent 50 mm at 90 degrees.

.4 Flashings: copper sheet, 600 g/mý, asphalt laminated to two layers of creped kraft paper, reinforced with 12.7 x 12.7 mm fibreglass scrim.

.5 Primers, Paints, Coatings: VOC limit 50 g/L maximum to SCAQMD Rule 1113.

.6 Coatings: VOC limit 100 g/L maximum to SCAQMD Rule 1113.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Consultant.
  .2 Inform Consultant 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 Consultant.

3.2 INSTALLATION

.1 Do masonry work in accordance with CAN/CSA-A371 except where specified otherwise.
  .1 Bond: running stretcher bond with vertical joints in perpendicular alignment and centred on adjacent stretchers above and below.
  .2 Coursing height: 200 mm for one block.
  .3 Jointing: tool where exposed or where paint or other finish coating is specified to provide smooth compressed, concave surface.

.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.

3.3 CONSTRUCTION

.1 Exposed masonry:
- .1 Remove chipped, cracked, and otherwise damaged units, in exposed masonry and replace with undamaged units.
- .2 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects. Make cuts straight, clean, and free from uneven edges.

.2 Building-in:
- .1 Install masonry connectors and reinforcement where indicated on drawings.
- .2 Build in items required to be built into masonry.
- .3 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
- .4 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.
- .5 Install loose steel lintels over openings where indicated.

.3 Concrete block lintels:
- .1 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.
- .2 End bearing: not less than 200 mm as indicated on drawings.

.4 Support of loads:
- .1 Use concrete to Section 03 30 00 - Cast-in-Place 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.
- .3 Install building paper below voids to be filled with concrete; keep paper 25 mm back from faces of units.

.5 Provision for movement:
- .1 Leave 3 mm space below shelf angles.
- .2 Leave] 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.

.6 Interface with other work:
- .1 Cut openings in existing work as indicated.
- .2 Openings in walls: approved by Consultant.
- .3 Make good existing work. Use materials to match existing.

.7 Build in flashings in masonry in accordance with CAN/CSA-A371.
- .1 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings. Install flashings under weep hole courses and as indicated.

.2 In cavity walls and veneered walls, carry flashings from front edge of masonry, under outer wythe, then up backing not less than 150 mm, and as follows:
  .1 For masonry backing embed flashing 25 mm in joint.
  .2 For concrete backing, insert flashing into reglets.
  .3 For wood frame backing, staple flashing to walls behind sheathing paper.
  .4 For gypsum board backing, bond to wall using manufacturer's recommended adhesive.
.3 Lap joints 150 mm and seal with adhesive.

.8 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at maximum horizontal spacing of 600 mm on centre.

3.4 REINFORCING AND CONNECTING

.1 Install masonry connectors and reinforcement in accordance with CAN/CSA-A370, CAN/CSA-A371 and CSA S304.1 unless indicated otherwise.

.2 Prior to placing concrete, mortar, and grout, obtain Consultant's approval of placement of reinforcement and connectors.

3.5 BONDING AND TYING

.1 Bond walls of two or more wythes using metal connectors in accordance with CAN/CSA-A371, CSA S304.1 and as indicated.

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

3.6 REINFORCED LINTELS AND BOND BEAMS

.1 Reinforce masonry lintels and bond beams as indicated.

.2 Place and grout reinforcement in accordance with CAN/CSA-A179, CAN/CSA-A371 and CSA S304.1.

3.7 GROUTING

.1 Grout masonry in accordance with CAN/CSA-A179, CAN/CSA-A371 and CSA S304.1 and as indicated.

3.8 ANCHORS

.1 Supply and install metal anchors as indicated.

3.9 LATERAL SUPPORT AND ANCHORAGE

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

3.10 SITE TOLERANCES

.1 Tolerances of CAN/CSA-A371 apply.

3.11 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse, and 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.

3.12 PROTECTION

.1 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

.2 Repair damage to adjacent materials caused by masonry products installation.

END OF SECTION

PART 1- GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 072400 – Exterior Insulation and Finish Systems.

.2 Section 072700.01 – Air / Vapour Barriers.

.3 Section 076200 – Metal Flashing.

1.2 REFERENCES

.1 CSA International
- .1 CSA B111-[1974(R2003)], Wire Nails, Spikes and Staples.
- .2 CSA O121-[08], Douglas Fir Plywood.
- .3 CSA O141-[05(R2009)], Softwood Lumber.
- .4 CSA O151-[09], Canadian Softwood Plywood.
- .5 CAN/CSA-O325.0-[07], Construction Sheathing.
- .6 CAN/CSA-Z809-[08], Sustainable Forest Management.

.2 Forest Stewardship Council (FSC)
- .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

.3 Green Seal Environmental Standards (GS)
- .1 GS-11-[11], Paints and Coatings.

.4 National Lumber Grades Authority (NLGA)
- .1 Standard Grading Rules for Canadian Lumber [2010].

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1113-[A2011], Architectural Coatings.

.6 Sustainable Forestry Initiative (SFI)
- .1 SFI-[2010-2014] Standard.

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 rough carpentry work, and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Wood Certification: submit vendor's / manufacturer's Chain-of-Custody Certificate number for CAN/CSA-Z809 or FSC or SFI certified wood.
- .3 Low-Emitting Materials:
  - .1 Submit listing of paints and coatings used in building, comply with VOC and chemical component limits or restriction requirements.
  - .2 Submit listing of composite wood products used in building, stating that they contain no added urea-formaldehyde resins, and laminate adhesives used in building, stating that they contain no urea-formaldehyde.

1.4 MAINTENANCE MATERIALS SUBMITTALS

.1 Extra Stock Materials

.2 Provide electrical equipment backboards for mounting electrical equipment as indicated. Use 19 mm thick plywood on 19 x 38 mm furring around spacing, perimeter and at maximum 300 mm intermediate

1.5 QUALITY ASSURANCE

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

.3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.

.4 Sustainable Standards Certification:
- .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: 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, indoors, and in a dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect wood from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
- .1 CAN/CSA-O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.
- .3 CAN/CSA-Z809 or FSC or SFI certified.

.2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
- .1 S2S is acceptable for all.
- .2 Board sizes: "Standard" or better grade.
- .3 Dimension sizes: "Standard" light framing or better grade.
- .4 Post and timbers sizes: "Standard" or better grade.

.3 Panel Materials:
- .1 Douglas fir plywood (DFP): to CSA O121, standard construction.
- .2 Canadian softwood plywood (CSP): to CSA O151, standard construction.
- .3 Plywood, OSB and wood based composite panels: to CAN/CSA-O325.

.4 Wood Preservative:
- .1 Surface-applied wood preservative: clear, copper naphthenate or 5% pentachlorophenol solution, water repellent preservative.
- .2 Pentachlorophenol use is restricted to building components that are in ground contact and subject to decay or insect attack only. Where used, pentachlorophenol-treated wood must be covered with two coats of an appropriate sealer.
- .3 Structures built with wood treated with pentachlorophenol and inorganic arsenicals must not be used for storing food nor should the wood come in contact with drinking water.

.5 Primers, Paints, and Coatings: in accordance with manufacturer's recommendations for surface conditions:
- .1 Primer: VOC limit 100 g/L maximum to GS-11 SCAQMD Rule 1113.
- .2 Paint: VOC limit 50 g/L maximum toGS-11 SCAQMD Rule 1113.
- .3 Coating: VOC limit 100 g/L maximum to GS-11 SCAQMD Rule 1113.

2.2 ACCESSORIES

.1 Fasteners: to CAN/CSA-G164, for exterior work, interior highly humid areas, pressure- preservative, or fire-retardant treated lumber.

.2 Nails, spikes and staples: to CSA B111.

.3 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for rough carpentry installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Consultant.
- .2 Inform Consultant 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 Consultant.

3.2 PREPARATION

.1 Treat surfaces of material with wood preservative, before installation.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and 1 minute soak on plywood.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

.4 Treat material as follows:
- .1 Wood cants, fascia backing, curbs, nailers, sleepers on roof deck.
- .2 Wood furring on outside surface of exterior masonry and concrete walls.
- .3 Wood sleepers supporting wood subflooring over concrete slabs in contact with ground or fill.

3.3 INSTALLATION

.1 Comply with requirements of NBC, supplemented by the following paragraphs.

.2 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding and other work as required.

.3 Align and plumb faces of furring and blocking to tolerance of 1:600.

.4 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.5 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized, steel fasteners.

.6 Install wood backing, dressed, tapered, and recessed slightly below top surface of roof insulation for roof hopper.

.7 Install sleepers as indicated.

.8 Use caution when working with particle board. Use dust collectors and high quality respirator masks.

.9 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.10 Countersink bolts where necessary to provide clearance for other work.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse, and 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.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 072400 – Exterior Insulation and Finishing Systems.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C 208-[95(2001)], Specification for Cellulosic Fiber Insulating Board.
- .2 ASTM C 591-[01], Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
- .3 ASTM C 612-[04], Standard Specification for Mineral Fibre Block and Board Thermal Insulation.
- .4 ASTM C 726-[05], Standard Specification for Mineral Fiber Roof Insulation Board.
- .5 ASTM C 728-[05], Standard Specification for Perlite Thermal Insulation Board.
- .6 ASTM C 1126-[04], Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation.
- .7 ASTM C 1289-[05a], Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- .8 ASTM E 96/E 96M-[05], Standard Test Methods for Water Vapour Transmission of Materials.

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 71-GP-24M-[77(R1983)], Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.

.3 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC-S604-[M91], Standard for Type A Chimneys.
- .2 CAN/ULC-S701-[05], Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
- .3 CAN/ULC-S702-[97], Standard for Thermal Insulation, Mineral Fibre, for Buildings.
- .4 CAN/ULC-S704-[03], Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.2 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

.3 Submit 2 copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's insulation products and adhesives.

.2 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports 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.

.3 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM), and Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordinate with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material for recycling in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 INSULATION

.1 Extruded polystyrene (XPS), Expanded polystyrene (EPS): to CAN/ULC-S701.
- .1 Type: 2 or 4 (match existing insulation).
- .2 Compressive strength: match existing insulation.
- .3 Thickness: match existing insulation.
- .4 Size: match existing insulation.
- .5 Edges: match existing exterior details.

.2 Mineral fibre board: to CAN/ULC-S702, ASTM C 726, ASTM C 612.
- .1 Type: 1, 2, or 3 (match existing insulation).
- .2 Density: match existing insulation.
- .3 Surfaces: match existing insulation.
- .4 Thickness: match existing insulation.
- .5 Size: match existing insulation.
- .6 Breather membrane for type 2: minimum permeance 300 ng/(Pa.s.mý).
- .7 Vapour barrier for type 3: maximum permeance 60 ng/(Pa.s.mý).

2.2 ADHESIVE

.1 Adhesive (for polystyrene): to CGSB 71-GP-24.

2.3 ACCESSORIES

.1 Insulation clips: impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 WORKMANSHIP

.1 Install insulation after building substrate materials are dry.

.2 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.

.4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN4-S604 type A chimneys, and CAN/CGA-B149.1 and CAN/CGA-B149.2 type B and L vents.

.5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.

.6 Offset both vertical and horizontal joints in multiple layer applications.

.7 Do not enclose insulation until it has been inspected and approved by Consultant.

3.3 EXAMINATION

.1 Examine substrates and immediately inform Consultant in writing of defects.

.2 Prior to commencement of work ensure:

.1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

3.4 RIGID INSULATION INSTALLATION

.1 Apply adhesive to polystyrene, or mineral fibre insulation board substrate by notched trowel in accordance with manufacturer's recommendations.

.2 Imbed insulation boards into vapour barrier type adhesive, applied as specified, prior to skinning of adhesive.

.3 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm wide 0.15 mm modified bituminous membrane over expansion and control joints using compatible adhesive and primer before application of insulation.

3.5 CLEANING

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

.2 Waste Management: separate waste materials for reuse, and 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.

END OF SECTION

PART 1- GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 072113 – Board Insulation.

.2 Section 072700.01 – Air / Vapour Barriers.

.3 Section 076200 – Metal Flashing.

.4 Section 079200 – Joint Sealants.

.5 Section 099199 – Painting for Minor Works.

1.2 REFERENCES

.1 Definitions:
- .1 Aesthetic joint: joint for appearance of installation ease. Also known as aesthetic reveals, grooves and reglets used to provide starting and stopping points during application of finish coat.
- .2 Back wrapping: at edges (termination) of EIFS where the reinforcing mesh and base coat extend from the back side of the insulation around the termination edge and onto the front of the insulation.
- .3 Base coat: layer consists of polymer modified, typically mixed with Portland cement and applied to face of insulation board and reinforced with one or more layers of mesh to function as a weather barrier.
- .4 Lamina: base coat, reinforcing mesh and finish.

.2 Reference Standards:
- .1 ASTM International
  - .1 ASTM B 117-09, Standard Practice for Operating Salt Spray (Fog) Apparatus.
  - .2 ASTM C 144-11, Standard Specification for Aggregate for Masonry Mortar.
  - .3 ASTM C 297/C 297M-04(2010), Standard Test Method for Flatwise Tensile Strength of Sandwich Construction.
  - .4 ASTM C 1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
  - .5 ASTM D 968-05(2010), Standard Test Methods for Abrasion Resistance of Organic Coatings by the Falling Abrasive.
  - .6 ASTM D 2247-11, Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

.7 ASTM E 72-10, Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
.8 ASTM E 96/E 96M-10, Standard Test Methods for Water Vapor Transmission of Materials.
.9 ASTM E 2098-00(2006), Standard Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish Systems (EIFS), after Exposure to a Sodium Hydroxide Solution.
.10 ASTM E 2134-01(2006), Standard Test Method for Evaluating the Tensile-Adhesion Performance of an Exterior Insulation and Finish System (EIFS).
.11 ASTM E 2321-03, Standard Practice for Use of Test Methods E 96 for Determining the Water Vapor Transmission (WVT) of Exterior Insulation and Finish Systems (EIFS).
.12 ASTM E 2430-05, Standard Specification For Expanded Polystyrene (EPS) Thermal Insulation Boards For Use In Exterior Insulation and Finish Systems (EIFS).
.13 ASTM G 154-06, Standard Practice for Operating Fluorescent Light Apparatus UV Exposure of Nonmetallic Materials.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.162-2004, Emulsion Coating for Stucco and Masonry.
.2 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.

.3 CSA International
.1 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.4 EIFS Council of Canada (ECC)
.1 ECC EQI-2010, Quality Assurance Program.

.5 EIFS Industry Members Association (EIMA)
.1 EIMA 101.86-95, Standard Test for Impact Resistance

.6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1113-A2011, Architectural Coatings.
.2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

.7 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S134-92(1998), Standard Method of Fire Test of Exterior Wall Assemblies.
.2 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.3 CAN/ULC-S702-09, Standard for Mineral Fibre Thermal Insulation for Buildings.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings:
- .1 Convene pre-installation meeting 1 week prior to beginning work of this Section, and on-site installation, with contractor's representative and Consultant in accordance with Section 01 31 19 - Project Meetings to:
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other building construction subtrades.
  - .4 Review manufacturer's written installation instructions and warranty requirements.

1.4 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 EIFS system materials, and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements, and 01 35 43 - Environmental Procedures.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
- .2 Indicate on drawings:
  - .1 Wall layout, details, connections, expansion joints, finish system, installation sequence, including interface with doors, windows, air barriers, vapour retarders and other components.

.4 Samples:
- .1 Submit samples of framing components and fasteners.
- .2 Submit one 300 x 300 mm sample of each colour of finished wall system prior to fabrication of final product and system.

1.5 QUALITY ASSURANCE

.1 Qualifications:
- .1 Installation of exterior insulation and finish wall system by applicators certified or licensed by manufacturers of system used to ECC EQI.

.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 EPS insulation is a fragile material and needs protection during shipping, handling and storage. It is not UV-stable and needs protection from the sun. If it is left unprotected and exposed, the exposed surfaces will discolour and become brittle. If installed in this condition the exposed surface must be sanded to expose virgin material before base coat application.

.4 Storage and Handling Requirements:
- .1 Store materials off ground, indoors, and in a dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect EIFS systems from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

1.7 SITE CONDITIONS

.1 Ambient Conditions:
- .1 Temperature, relative humidity, moisture content.
  - .1 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
  - .2 Apply EIFS components at temperatures, relative humidity, and substrate moisture content and substrate temperature in accordance with manufacturer's written instructions.
  - .3 Maintain ambient temperature above [4] degrees C during adhesive application and until cured minimum 24 hours.
  - .4 Maintain ambient temperature above [4] degrees C during base coat application and until cured minimum 24 hours.
  - .5 Maintain ambient temperature above [4] degrees C during finish coat application and until cured minimum 24 hours.
- .2 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of insulation, adhesive and caulking materials.

.3 Ventilation:
.1 Departmental Representative will arrange for ventilation system to be operated during installation of insulation. Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.
.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
.3 Provide continuous ventilation during and after insulation application. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of insulation installation.

1.8 WARRANTY

.1 For work of this Section 07 24 00 - Exterior Insulation and Finish System, 12 months warranty period is extended to 60 months.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

.1 Exterior insulation and finish system to be site applied cladding system consisting of adhesive, insulation board, base coat with reinforcing mesh and finish.
.1 Adhesive applied, Mechanically fastened, or Combination - adhesive and mechanically fastened.

2.2 DESIGN REQUIREMENTS

.1 Design panels in accordance with design hourly wind pressure from NBCC.

.2 Design to ECC QPI recommendations.

2.3 PERFORMANCE REQUIREMENTS

.1 Ensure installed modified polymer coat wall system has performance properties as follows:
.1 Comply with CAN/ULC-S134.
.2 Finish-abrasion resistance: falling sand method to ASTM D 968, no deleterious effects after 500 litres.
.3 Finish-salt spray resistance: to ASTM B 117, after 300 hours exposure to 5% salt spray solution - no effects.

.4 Finish-moisture resistance: to ASTM D 2247, after 14 days exposure - no deleterious effects.

.5 Accelerated weathering: to CAN/CGSB-1.162, and ASTM G 154, 2000 hours - no effect.

.6 Impact resistance: to ASTM E 72, only slight dents observed up to 108.465J EIMA 101.86 Level 4, >17 joules.

.7 Bond strength: to CAN/CGSB-1.162, and ASTM E 2098, ASTM C 297, dry, wet-2 hour dry, wet-7 day dry, minimum 1 MPa.

.8 Permeability: to CAN/CGSB-1.162, and ASTM E 96, 5.93 perms ASTM E 2321.

2.4 SURFACE PREPARATION MATERIALS

.1 Conditioner: water base, clear conditioner/sealer compatible with system materials, recommended by system manufacturer.

.2 Leveller: polymer-modified, cement-based, reinforced levelling compound.

2.5 ADHESIVES

.1 Acrylic, non-cementitious adhesive.

.2 Polymer-modified cement-based, reinforced adhesive.

.3 Acrylic based, reinforced adhesive.

2.6 MECHANICAL FASTENERS

.1 Expansion anchors, electroplated steel nail, 100 mm long, minimum 25 mm penetration into substrate, 38 mm washers, nylon sheath.

.2 Screws: to ASTM C 1002, Type S, 9.5 mm penetration into steel, 38 mm diameter polyethylene washers.

.3 Insulation clips: impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, 2.5 mm annealed steel spindle, length to suit insulation, 25 mm diameter self locking washers.

2.7 INSULATION (MATCH EXISTING INSULATION)

.1 Moulded (expanded) polystyrene (EPS): to CAN/ULC-S701, Type 1, 2, or 3, and ASTM E 2430, RSI as indicated.

.2 Extruded polystyrene (XPS): to CAN/ULC-S701, Type 3 or 4, RSI indicated.

.3 Mineral fibre insulation: to CAN/ULC-S702.
- .1 Type 1 - preformed insulation boards or sheets without a membrane.
- .2 Type 2 - preformed insulation boards or sheets with a permeable membrane.
- .3 Type 3 - preformed insulation boards or sheets with a vapour barrier.

2.8 BASE COAT

.1 Test Adhesive Base Coat to: ASTM C 297 / ASTM E 2134.

.2 Modified polymer: non-cementitious, fibre reinforced, premixed base coat system, match existing colour.

.3 Modified, cementitious, one component base coat system: Portland cement, silica sand aggregate, acrylic liquid admixture, 13.2% acrylic to cement ratio, match existing colour.

.4 Acrylic: non-cementitious, fibre reinforced base coat system, texture, match existing colour.

2.9 REINFORCING MESH

.1 Reinforcing Mesh to: ASTM E 2098.

.2 Balanced, non-woven glass fibre fabric made from twisted multi-end strands, treated, alkali resistant, compatible with chemical bonding system base coat and finish coat, weight (standard – 163 g/mý).

.3 Speciality mesh:
- .1 Detail mesh: flexible, symmetrical, woven glass fibre fabric made from twisted multi-end strands, treated, alkali resistant, compatible with chemical bonding system base coat and finish coat, weight 153 g/mý.
- .2 Corner mesh: precreased, non-woven glass fibre fabric made from twisted multi-end strands, treated, alkali resistant, compatible with chemical bonding system base coat and finish coat, weight 212 g/mý.

2.10 FINISH COAT

.1 Modified polymer finish coat system: acrylic resins in dispersion, silica aggregate, integral mineral pigmentation and additives, match existing colour.

.2 Modified finish coat system: synthetic stucco, acrylic type, Portland cement, silica sand aggregate, integral mineral pigmentation and additives, match existing colour exposed aggregate, and texture finish.

2.11 PRIMER

.1 Acrylic based, Silicone enhanced primer.

.2 Primer: to SCAQMD Rule 1113.

2.12 ACCESSORIES

.1 Accessories: galvanized corner beads, casing beads, stop beads, starter strips and accessories, as recommended by exterior insulated wall system manufacturer to suit system components.

2.13 EXPANSION JOINTS

.1 Expansion joints: match existing conditions.

.2 Ensure expansion joints are back wrapped.

.3 Joint Cleaner: non-corrosive and non-staining type, compatible with joint forming materials and in accordance with sealant manufacturer's written recommendations.

.4 Sealant primer: as recommended by sealant manufacturer.

.5 Joint filler: extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 - 200 kPa, outsized 30 to 50%.

.6 Sealant: in accordance with Section 07 92 00 - Joint Sealants, compatible with systems materials, recommended by system manufacturer.

- .1 Weather seals: multi-component, chemical curing to CAN/CGSB-19.24, Type 2, Class B.
- .2 Panel joints: multi-component, chemical curing to CAN/CGSB-19.24, Type 2, Class B.
- .3 Sealant: to SCAQMD Rule 1168.

2.14 MATERIALS: SITE MIX

.1 Cement: to CAN/CSA-A3001, Type GU.

.2 Sand: dry bag.
- .1 For white cement: silica sand, 30-50 mesh.
- .2 For grey cement: mortar sand to ASTM C 144.

.3 Water: potable.

2.15 MIXES

.1 General:
- .1 Mixer: high speed, clean and rust free.
- .2 Mixing pail: clean and rust free.
- .3 Mixes: additive free.

.2 Conditioner: mix in accordance with manufacturer's written instructions.

.3 Leveller: mixed to uniform consistency in accordance with manufacturer's written instructions.

.4 Adhesive: mixed in accordance with manufacturer's written instructions.

.5 Base coat: mixed to uniform consistency in accordance with manufacturer's written instructions.

.6 Finish coat: mixed to uniform consistency in accordance with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 INSTALLERS

.1 Acceptable Installers: use only installers or applicators who are certified or licensed by manufacturers of system used by ECC EQI.

3.2 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for EIFS installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant.
.2 Examine surfaces to receive traffic topping to ensure they are smooth, dry, and free from conditions that will adversely affect execution, permanence, or quality of work of this Section.
.3 Inform Consultant of unacceptable conditions immediately upon discovery.
.4 Proceed with installation only after unacceptable conditions have been remedied, and after receipt of written approval to proceed from Consultant.

3.3 PREPARATION

.1 Prepatory protection:
  .1 Protect adjacent surfaces from damage resulting from Work of this Section.
  .2 Protect finished Work from water penetration at end of each day or on c ompletion of each section of Work.
  .3 Protect installation from moisture for 48 hours minimum after completion of each portion of Work.
  .4 Protect top of parapet walls, and openings until flashings and trim, are installed.

.2 Surface preparation:
  .1 Ensure environmental and site conditions are suitable for installation of system.
  .2 Prepare new and existing surfaces in accordance with manufacturer's written instructions.

3.4 INSTALLATION

.1 Install system to CAN/ULC-S134, and ECC EQI.

.2 Surface preparation:
  .1 Conditioner: water base, clear conditioner/sealer compatible with system materials, substrate and as recommended by system manufacturer.
    .1 Add water and mix.
    .2 Apply to clean, dry substrate surfaces ensuring complete even coverage in accordance with manufacturer's written instructions.
  .2 Leveller: polymer-modified, cement based, reinforced leveling compound.
    .1 Add water and mix.
    .2 Allow set time.
    .3 Apply to existing substrate, 6 mm thick maximum.
    .4 Allow time to fully cure as outlined in manufacturers' written instructions.

.3 Insulation anchors: install insulation anchors to spacing and pattern recommended by EIFS manufacturer. Maintain continuity of air barrier system.

.4 Adhesives application and installation of insulation board:
- .1 Apply uniform ribbons of adhesive to back of and parallel to long dimension of insulation board, using recommended notched trowel.
- .2 Offset insulation joints.
- .3 Immediately place insulation boards in running bond pattern on walls with long dimension horizontal, starting from level base line. Apply firm pressure over entire surface of board to ensure full contact. Determine location and pattern of sheathing joints. Bridge sheathing joints by minimum of 200 mm.
- .4 Butt vertical and horizontal joints tightly together. Ensure joints between boards are free of adhesive.
- .5 Cut insulation board in L-shaped pattern to fit around openings. Do not align joints with corners of openings.
- .6 Remove individual boards periodically when adhesive is still wet to check for satisfactory contact with substrate and back of insulation board.

.5 Back wrapping:
- .1 Ensure edge of insulation board is wrapped with base coat prior to installation to substrate.
- .2 Apply strip of detail mesh with adhesive to substrate at level base line and at terminations.
- .3 Ensure width of detail mesh is adequate to adhere 100 mm of mesh onto substrate and to wrap around insulation board edge with minimum 64 mm coverage on outside of insulation board.
- .4 After adhering detail mesh to substrate ensure, mesh ends hang free for completion of back wrapping procedure after insulation application.

.6 Accessories:
- .1 Install required accessories as detailed and as required by EIFS manufacturer and to CAN/ULC-S134 and ECC EQI.

.7 Preparation of Insulation Board surface:
- .1 Fill open joints in insulation board with slivers of insulation or spray foam as recommended by manufacturer's written instructions.
- .2 Rasp surface to achieve smooth, level, even surface after insulation boards have firmly adhered to substrate.
  - .1 Remove ultraviolet ray damage. Rasp smooth any irregularities in insulation board greater than 1.6 mm.
  - .2 Ensure insulation board [tolerance not greater than 6 mm in 2,500 mm in accordance with manufacturer's written instructions.
- .3 Remove ultraviolet ray damage.
- .4 Rasp smooth any irregularities in insulation board greater than 1.6 mm.
  - .1 Ensure insulation board tolerance not greater than 6 mm in 2,500 mm in accordance with manufacturer's written instructions.

.8 Joints:
- .1 Reveals and aesthetic grooves:
  - .1 Cut reveals and aesthetic grooves with appropriate tool in locations indicated.
  - .2 Offset reveals minimum 75 mm from insulation joints.
  - .3 Maintain minimum 19 mm insulation board thickness at bottom of groove after cutting.
  - .4 Install deep V control joints to divide wall area into maximum 14 mý panels with maximum 5.5 linear meters in any direction at floor lines, dissimilar substrates, and masonry wall joints.
  - .5 Install shallow V surface mount control joints at colour separations, window corners, door corners, drip grooves, to sub-divide panels into 1200 x 1200 mm areas.
- .2 Expansion joints:
  - .1 Install expansion joints in locations indicated and to manufacturers written instructions.
  - .2 Install expansion joints at isolation joints in substrate, where new construction abuts existing construction, and at locations where movement is expected.

.9 Back wrapping completion:
- .1 Complete back wrapping procedure by applying base coat to exposed edges of insulation board and 100 mm onto face of insulation board.
- .2 Pull mesh tight around board and embed it in base coat with trowel.
- .3 Use corner trowel for clean, straight lines.
- .4 Smooth wrinkles or gaps in mesh.

.10 Mesh and base coat application:
- .1 Apply 225 x 300 mm diagonal strips of detail mesh at corners of windows, doors and penetrations through insulation. Embed strips in wet base coat and trowel from centre to mesh edge to avoid wrinkles.
- .2 Apply detail mesh at reveals. Embed mesh in wet base coat and trowel from base of reveal to mesh edges.
- .3 Apply corner mesh at inside and outside corners. Embed mesh in wet base coat and trowel from corner of mesh edges.
- .4 High impact mesh application: apply base coat over insulation board to uniform thickness of approximately 3 mm. Work horizontally or vertically in 1000 mm strips, and immediately embed mesh into wet base coat by trowelling from centre to edge of mesh. Butt mesh at seams. Allow base coat to dry.
- .5 Standard mesh application:
  - .1 Apply base coat over insulation board, including areas with high impact mesh to uniform thickness of approximately 3 mm.
  - .2 Work horizontally or vertically in 1000 mm strips, and immediately embed mesh into wet base coat by trowelling from centre to mesh edge.

.3 Overlap mesh 64 mm minimum at mesh seams and overlaps of detail mesh.
.4 Feather seams and edges.
.5 Double wrap inside and outside corners with minimum 64 mm overlap in each direction. Embed corner mat in wet base coat, allow to dry, then overlap up to corner with standard reinforcing mesh embedded in base coat.
.6 Avoid wrinkles in mesh.
.7 Fully embed mesh so that no mesh colour shows through base coat when dry.
.8 Ensure minimum base coat thickness 1.6 mm when dry. Re-skim base coat if 1.6 mm thickness not achieved during initial application. Allow base coat to thoroughly dry before applying primer or finish coat.

.11 Finish coat application:
.1 Apply finish coat in accordance with manufacturer's writing installation instructions.
.2 Prime dry base coat and allow to dry thoroughly before applying finish coat.
.3 Apply finish coat directly over base coat, or primed base coat, only after base coat or primer has thoroughly dried.
.4 Apply finish by spray or trowel as recommended by manufacturer.
.5 Apply finish in continuous application, and work towards wet edge.
.6 Do not install separate batches of finish coat side by side.
.7 Do not apply finish into or over sealant joints. Apply finish to outside of wall only.
.8 Do not apply finish over irregular or unprepared surfaces.
.9 Apply textured or aggregate finishes to wall areas as indicated and in accordance with manufacturer's written instructions.

3.5 BELOW GRADE INSTALLATION

.1 Back wrapping:
.1 Ensure edge of insulation board is wrapped with base coat prior to installation to substrate.
.2 Apply strip of detail mesh with adhesive to substrate at level base line and at all terminations.
.3 Ensure width of detail mesh is adequate to adhere 100 mm of mesh onto substrate and to wrap around insulation board edge with minimum 64 mm coverage on outside of insulation board.
.4 After adhering detail mesh to substrate ensure mesh ends hang free for completion of back wrapping procedure after insulation application.

.2 Adhesive and insulation board installation:
.1 Apply 3 mm thick, uniform coat of waterproof adhesive on wall surface.

.2 Stipple adhesive by pressing trowel into wet adhesive then removing trowel from surface.
.3 Immediately install insulation board by pressing firmly into wet adhesive.
.4 Do not apply more adhesive than can be covered with insulation before material sets or develops a 'skin'.
.5 Install insulation to minimum 300 mm above grade and to foundation footing.

.3 Joints:
.1 Reveals and aesthetic grooves:
.1 Cut reveals and aesthetic grooves with appropriate tool in locations indicated.
.2 Offset reveals minimum 75 mm from insulation joints.
.3 Maintain minimum 19 mm insulation board thickness at bottom of groove after cutting.
.4 Install deep V control joints [to divide wall area into maximum 14 mý panels with maximum 5.5 linear metres in any direction, at floor lines, at dissimilar substrates, and at masonry wall joints.
.5 Install shallow V surface mount control joints at colour separations, window corners, door corners, drip grooves, to sub-divide panels into 1200 x 1200 mm areas.
.2 Expansion joints
.1 Install expansion joints in locations indicated and to manufacturer's written instructions.
.2 Install expansion joints at isolation joints in substrate, where new construction abuts existing construction, and at locations where movement is expected.

.4 Back wrapping completion:
.1 Complete back wrapping procedure by applying base coat to exposed edges of insulation board and 100 mm onto insulation board face.
.2 Pull mesh tight around board and embed it in base coat with trowel.
.3 Use corner trowel for clean, straight lines.
.4 Smooth wrinkles or gaps in mesh.

.5 Base coat application:
.1 Standard mesh application:
.1 Apply base coat over insulation board, including areas with high impact mesh to uniform thickness of approximately 3 mm.
.2 Work horizontally of vertically in strips of 1000 mm, and immediately embed mesh into wet base coat by trowelling from centre to edge of mesh.
.3 Overlap mesh not less then 64 mm at mesh seams and at overlaps of detail mesh.
.4 Feather seams and edges.
.5 Double wrap inside and outside corners with minimum 64 mm overlap

in each direction. Embed corner mat in wet base coat, allow to dry, then overlap up to corner with standard reinforcing mesh embedded in base coat.

.6 Avoid wrinkles in mesh.

.7 Fully embed mesh so that no mesh colour shows through base coat when dry.

.8 Ensure minimum base coat thickness of 1.6 mm when dry. Re-skim base coat if 1.6 mm thickness not achieved during initial application. Allow base coat to thoroughly dry before applying primer or finish coat.

.9 Protect base coat to prevent damage from backfill.

.6 Finish coat application:

.1 Do not apply finish coat below grade.

3.6 SILLS AND HORIZONTAL PROJECTION

.1 Base coat application standard mesh application:

.1 Apply base coat over insulation board, including areas with high impact mesh to uniform thickness of approximately 3 mm.

.2 Work horizontally or vertically in strips of 1000 mm, and immediately embed mesh into wet base coat by trowelling from centre to mesh edge.

.3 Overlap mesh not less then 64 mm at mesh seams and at overlaps of detail mesh.

.4 Feather seams and edges.

.5 Double wrap inside and outside corners with minimum 64 mm overlap in each direction. Embed corner mat in wet base coat, allow to dry, then overlap up to corner with standard reinforcing mesh embedded in base coat.

.6 Avoid wrinkles in mesh.

.7 Fully embed mesh so that no mesh colour shows through base coat when dry.

.8 Ensure minimum base coat thickness of 1.6 mm when dry. Re-skim base coat if 1.6 mm thickness not achieved during initial application. Allow base coat to thoroughly dry before applying primer or finish coat.

.9 Apply waterproof base coat and mesh over dry standard application base coat and mesh on sloped surface and immediately above and below grade.

.2 Finish coat application:

.1 Apply finish coat in accordance with manufacturer's written installation instructions.

.2 Prime dry base coat and allow to dry thoroughly before applying finish coat.

.3 Apply finish directly over base coat, or primed base coat, only after base coat or primer has thoroughly dried.

.4 Apply finish by spray or trowel as recommended by manufacturer.

.5 Apply finish in continuous application, and work towards wet edge.

.6 Do not apply separate batches of finish coat side by side.
.7 Do not apply finish into or over sealant joints. Apply finish to outside of wall only.
.8 Do not apply finish over irregular or unprepared surfaces.
.9 Apply textured or aggregate finishes to wall areas as indicated and in accordance with manufacturer's written instructions.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Clean adjacent surfaces.

.4 Waste Management: separate waste materials for reuse, and 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.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 040499 – Masonry for Minor Works.

.2 Section 060899 – Rough Carpentry for Minor Works.

.3 Section 072400 – Exterior Insulation and Finish Systems.

.4 Section 076200 – Metal Flashing.

.5 Section 079200 – Joint Sealants.

.6 Section 085100 – Metal Windows.

.7 Section 086270 – Tubular Unit Skylights.

.8 Section 088050 – Glazing.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.
- .2 CAN/CGSB-19.24M-M90, Multi-Component, Chemical Curing Sealing Compound.
- .3 CGSB 19-GP-14M-84, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.2 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.

.3 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
.1 Provide drawings of special joint conditions.

.4 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
.1 Existing Substrate Condition: report deviations, as described in PART 3 - EXAMINATION in writing to Departmental Representative.
.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning.

1.4 QUALITY ASSURANCE

.1 Qualifications:
.1 Applicator: company:
.1 Currently licensed by National Air Barrier Association, Canadian Urethane Foam Contractor's Association, or certifying organization.
.2 Must maintain their license throughout the duration of the project.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Avoid spillage: immediately notify Departmental Representative or Consultant if spillage occurs and start clean up procedures.

.4 Clean spills and leave area as it was prior to spill.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse, and recycling, in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.7 AMBIENT CONDITIONS

.1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

1.8 SEQUENCING

.1 Sequence work in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM), Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Charts.

.2 Sequence work to permit installation of materials in conjunction with related materials and seals.

PART 2 - PRODUCTS

2.1 SHEET MATERIALS

.1 Match existing sheet material physical characteristics. Tie into existing system.

2.2 SEALANTS

.1 Sealants in accordance with Section 07 92 00 - Joint Sealants.

.2 Match physical characteristics of existing sealants.

2.3 ADHESIVES

.1 Mastic Adhesive: compatible with sheet seal and substrate, thick mastic of uniform knife grade consistency.

2.4 ACCESSORIES

.1 Thinner and cleaner for Butyl, or Neoprene Sheet: as recommended by sheet material manufacturer.

.2 Attachments: galvanized steel bars and anchors.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials, and installation.

.2 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program, and requirements for materials and installation.

.3 Perform Work in accordance with Canadian Urethane Foam Contractor's Association - Professional Contractor Quality Assurance Program, and requirements for materials and installation.

3.3 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept work of this section.

.2 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.

.3 Report unsatisfactory conditions to Departmental Representative and Consultant in writing.

.4 Do not start work until deficiencies have been corrected.
.1 Beginning of Work implies acceptance of conditions.

3.4 PREPARATION

.1 Remove loose or foreign matter, which might impair adhesion of materials.

.2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.

.3 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.

.4 Ensure metal closures are free of sharp edges and burrs.

.5 Prime substrate surfaces to receive adhesive and sealants in accordance with manufacturer's instructions.

3.5 INSTALLATION

.1 Install materials in accordance with manufacturer's instructions.

.2 Secure sheet seal to masonry materials with self-adhesive, continuous metal bar with anchors (refer to existing conditions).
- .1 Caulk with sealant to ensure complete seal.
- .2 Position lap seal over firm bearing.

.3 Lap sheet seal onto existing roof vapour retarder and seal with applicable sealant (refer to existing conditions).
- .1 Caulk to ensure complete air seal.
- .2 Position lap seal over firm bearing.

.4 Install sheet seal between window frames and adjacent wall, seal materials with applicable sealant (refer to existing conditions).
- .1 Caulk to ensure complete seal.
- .2 Position lap seal over firm bearing.

.5 Apply sealant within recommended application temperature ranges.
- .1 Consult manufacturer when sealant cannot be applied within these temperature ranges.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Waste Management: separate waste materials for reuse, and 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 WORK

.1 Protect finished work in accordance with Section 01 61 00 - Common Product Requirements.

.2 Do not permit adjacent work to damage work of this section.

.3 Ensure finished work is protected from climatic conditions.

3.8 SCHEDULES

.1 Wall Air/Vapour Barrier Over Outer Surface of Masonry:
.1 Trowel seal over masonry unit surface to thickness of 6 mm
.2 Seal masonry anchor penetrations air tight.

.2 Window Frame Perimeter:
.1 Lap sheet seal from wall air seal surface with 75 mm of full contact over firm bearing to window frame with 25 mm of full contact.
.2 Edge seal with sealant.

.3 Roof System Air/Vapour Barrier (Non-Permeable Roofing Membrane – match and tie into existing roofing system) Over Skylight Curb:
.1 Apply membrane air seal over curb surfaces with adhesive.
.2 Edge seal membrane with sealant.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 060899 – Rough Carpentry for Minor Works.

.2 Section 072400 – Exterior Insulation and Finish Systems.

.3 Section 072700.01 – Air / Vapour Barriers.

.4 Section 079200 – Joint Sealants.

.5 Section 085100 – Metal Windows.

.6 Section 086270 – Tubular Unit Skylights.

.7 Section 088050 – Glazing.

1.2 REFERENCES

.1 The Aluminum Association Inc. (AAI)
- .1 AAI-Aluminum Sheet Metal Work in Building Construction-2002.
- .2 AAI DAF45-03, Designation System for Aluminum Finishes.

.2 American Society for Testing and Materials International (ASTM)
- .1 ASTM A 167-99(2004), Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM A 240/A 240M-07e1, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .3 ASTM A 606-04, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
- .4 ASTM A 653/A 653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .5 ASTM A 792/A 792M-06a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .6 ASTM B 32-04, Standard Specification for Solder Metal.
- .7 ASTM B 370-03, Standard Specification for Copper Sheet and Strip for Building Construction.
- .8 ASTM D 523-89(1999), Standard Test Method for Specular Gloss.

.9 ASTM D 822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.3 Canadian Roofing Contractors Association (CRCA)
.1 Roofing Specifications Manual 1997.

.4 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
.2 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.

.5 Canadian Standards Association (CSA International)
.1 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt.
.2 AAMA/WDMA/CSA 101/I.S.2/A440-2008, Standard/Specification for Windows, Doors, and Unit Skylights.
.3 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.6 Green Seal Environmental Standards
.1 Standard GS-03-93, Anti-Corrosive Paints.
.2 Standard GS-11-97, Architectural Paints.
.3 Standard GS-36-00, Commercial Adhesives.

.7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.8 South Coast Air Quality Management District (SCAQMD), California State
.1 SCAQMD Rule #1113-04, Architectural Coatings.
.2 SCAQMD Rule #1168-05, Adhesives and Sealants.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements, and 01 35 43 - Environmental Procedures.

.3 Shop Drawings:
.1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.

.4 Samples:
.1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours.

1.4 QUALITY ASSURANCE

.1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning of work of this Section, and on-site installation, with contractor's representative and Departmental Representative and Consultant in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM), and Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Waste Management and Disposal:
.1 Separate waste materials for reuse, and recycling, in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

.1 Zinc coated steel sheet: 0.6 mm thickness, commercial quality to ASTM A 653/A 653M, with Z275 designation zinc coating.

2.2 PREFINISHED STEEL SHEET

.1 Prefinished steel with factory applied silicone modified polyester.
.1 Class F1S.
.2 Colour selected by Consultant from manufacturer's standard range.
.3 Specular gloss: 30 units +/- 5 in accordance with ASTM D 523.
.4 Coating thickness: not less than 25 micrometres.

.5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D 822 as follows:
.1 Outdoor exposure period 1000 hours.
.2 Humidity resistance exposure period 1000 hours.

2.3 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB 37.5.

.3 Underlay for metal flashing: asphalt laminated 3.6 to 4.5 kg kraft paper.

.4 Sealants in accordance with Section 07 92 00 - Joint Sealants.

.5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness: same as sheet metal being secured.

.6 Fasteners: of same material as sheet metal, to CSA B111, [ring thread] flat head roofing nails of length and thickness suitable for [metal flashing] application.

.7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.8 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details.

.2 Fabricate aluminum flashings and other sheet aluminum work in accordance with AAI-Aluminum Sheet Metal Work in Building Construction.

.3 Form pieces in 2400 mm maximum lengths.
.1 Make allowance for expansion at joints.

.4 Hem exposed edges on underside 12 mm.
.1 Mitre and seal corners with sealant.

.5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated of 0.6 mm thick prefinished steel.

2.6 REGLETS AND CAP FLASHINGS

.1 Form recessed reglets and metal cap flashing of 0.6 mm thick sheet metal to be built-in masonry work for base flashings as detailed and in accordance with CRCA FL series details.
  .1 Provide slotted fixing holes and steel/plastic washer fasteners.
  .2 Cover face and ends with plastic tape.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install sheet metal work in accordance with CRCA FL series details, AAI-Aluminum Sheet Metal Work in Building Construction, and as detailed.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal.
  .1 Secure in place and lap joints 100 mm.

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
  .1 Flash joints using S-lock forming tight fit over hook strips, and as detailed.

.5 Lock end joints and caulk with sealant.

.6 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.

.7 Caulk flashing at reglet and cap flashing with sealant.

3.3 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Leave work areas clean, free from grease, finger marks and stains.

.4 Waste Management: separate waste materials for reuse, and 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.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 040499 – Masonry for Minor Works.

.2 Section 072400 – Exterior Insulation and Finish Systems.

.3 Section 072700.01 – Air / Vapour Barriers.

.4 Section 076200 – Sheet Metal Flashing and Trim.

.5 Section 085100 – Metal Windows.

.6 Section 086270 – Tubular Unit Skylights.

.7 Section 088050 – Glazing.

1.2 REFERENCES

.1 ASTM International
- .1 ASTM C 919-08, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
- .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
- .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
- .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
- .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 General Services Administration (GSA) - Federal Specifications (FS)
- .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1168-A2005, Adhesives and Sealants 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 joint sealants, and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Manufacturer's product to describe:
.1 Caulking compound.
.2 Primers.
.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
.3 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements, and 01 35 43 - Environmental Procedures.

.3 Samples:
.1 Submit 2 samples of each type of material and colour.
.2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.4 Manufacturer's Instructions:
.1 Submit instructions to include installation instructions for each product used.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

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, indoors, and in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect joint sealants from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

.1 Ambient Conditions:
.1 Proceed with installation of joint sealants only when:
.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
.2 Joint substrates are dry.
.3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.2 Joint-Width Conditions:
.1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

.2 Departmental Representative will arrange for ventilation system to be operated on maximum outdoor air and exhaust during installation of caulking and sealants. Ventilate area of work as directed by Departmental Representative and Consultant by use of approved portable supply and exhaust fans.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.

.3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Multi-component, chemically curing, epoxidized polyurethane sealant:
- .1 To CAN/CGSB-19.24-M90, colour as selected by Consultant from manufacturer's standard range.

.2 Preformed compressible and non-compressible back-up materials:
- .1 Polyethylene, urethane, neoprene or vinyl foam:
  - .1 Extruded closed cell foam backer rod.
  - .2 Size: oversize 30 to 50 %.
- .2 Neoprene or butyl rubber:
  - .1 Round solid rod, Shore A hardness 70.
- .3 High density foam:
  - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/mü density, or neoprene foam backer, size as recommended by manufacturer.
- .4 Bond breaker tape:
  - .1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

.1 Perimeters of exterior openings where frames meet exterior facade of building (i.e. brick, block, precast masonry): sealant type: Epoxidized Polyurethane Sealant.

.2 Expansion and control joints in exterior surfaces of poured-in-place concrete walls: sealant type: Epoxidized Polyurethane Sealant.

.3 Expansion and control joints in exterior surfaces of precast, architectural wall panels: sealant type: Epoxidized Polyurethane Sealant.

.4 Control and expansion joints in exterior surfaces of unit masonry walls: sealant type: Epoxidized Polyurethane Sealant.

.5 Coping joints and coping-to facade joints: sealant type: Epoxidized Polyurethane Sealant.

.6 Cornice and wash (or horizontal surface joints): sealant type: Epoxidized Polyurethane Sealant.

.7 Exterior joints in horizontal wearing surfaces (as itemized): sealant type: Epoxidized Polyurethane Sealant.

.8 Seal interior perimeters of exterior openings as detailed on drawings: sealant type: Epoxidized Polyurethane Sealant.

.9 Control and expansion joints on the interior of exterior poured-in place concrete walls: sealant type: Epoxidized Polyurethane Sealant.

.10 Expansion and control joints on the interior of exterior precast, architectural wall panels: sealant type: Epoxidized Polyurethane Sealant.

.11 Joints of underside of precast beams or planks: sealant type: Epoxidized Polyurethane Sealant.

.12 Control and expansion joints on the interior of exterior surfaces of unit masonry walls: sealant type: Epoxidized Polyurethane Sealant.

.13 Interior control and expansion joints in floor surfaces: sealant type: Epoxidized Polyurethane Sealant.

.14 Perimeters of interior frames, as detailed and itemized: sealant type: Epoxidized Polyurethane Sealant.

.15 Interior masonry vertical control joints (block-to-block, block-to-concrete, and intersecting masonry walls): sealant type: Epoxidized Polyurethane Sealant.

.16 Joints at tops of non-load bearing masonry walls at the underside of poured concrete: sealant type: Epoxidized Polyurethane Sealant.

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.

.2 Primer: in accordance with sealant manufacturer's written recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Consultant.
- .2 Inform Consultant 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 Consultant.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

.1 Sealant:
- .1 Apply sealant in accordance with manufacturer's written instructions.
- .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
- .3 Apply sealant in continuous beads.
- .4 Apply sealant using gun with proper size nozzle.
- .5 Use sufficient pressure to fill voids and joints solid.
- .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:
- .1 Cure sealants in accordance with sealant manufacturer's instructions.
- .2 Do not cover up sealants until proper curing has taken place.

3.7 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 adjacent surfaces immediately.
- .3 Remove excess and droppings, using recommended cleaners as work progresses.
- .4 Remove masking tape after initial set of sealant.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse, and 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.

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 040499 – Masonry for Minor Works.

.2 Section 072400 – Exterior Insulation and Finish Systems.

.3 Section 072700.01 – Air / Vapour Barriers.

.4 Section 076200 – Sheet Metal Flashing and Trim.

.5 Section 079200 – Joint Sealants.

.6 Section 088050 – Glazing.

1.2 REFERENCES

.1 Aluminum Association (AA)
- .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International
- .1 ASTM A 123/A 123M-12, Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.
- .2 ASTM E 1748-95(2009), Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.

.3 CSA Group
- .1 AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .2 CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .3 CAN/CSA-A440.4-07(R2012), Window, Door, and Skylight Installation
- .4 CAN/CSA-A440.2/A440.3-09, Fenestration energy performance/User guide to CSA A440.2, Fenestration energy performance.
- .5 CAN/CSA-Z91-02(R2013), Health and Safety Code for Suspended Equipment Operations.
- .6 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.

.4 Forest Stewardship Council (FSC)
- .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

.5 Green Seal (GS)
.1 GS-11-11 Paints and Coatings.

.6 Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual - current edition.
.1 MPI #79, Primer, Alkyd, Anti-Corrosive for Metal.

.7 South Coast Air Quality Management District (SCAQMD)
.1 SCAQMD Rule 1113-11, Architectural Coatings.
.2 SCAQMD Rule 1168-05, Adhesives and Sealants.

.8 Sustainable Forestry Initiative (SFI)
.1 SFI-2010-2014 Standard.

.9 Screen Manufacturers Association (SMA)
.1 SMA 1201R-2002 Specification for Insect Screens for Windows, Sliding Doors and Swinging Doors.

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 windows 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 Ontario, Canada.
.2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim, junction between combination units, elevations of unit, anchorage details, location of isolation coating, description of related components, and exposed finishes, fasteners, and caulking. Indicate location of manufacturer's nameplates.

.4 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.
.3 Submit one representative model of each type window.
.4 Include frame, sash, sill, glazing and weatherproofing method, insect screens, surface finish and hardware. Show location of manufacturer's nameplates.

.5 Test and Evaluation Reports:
- .1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications.
- .2 All test reports that reference the NAFS must include, on the first page, a summary of the results including, at minimum:
  - .1 The product manufacturer.
  - .2 The type of product.
  - .3 The model number/series number.
  - .4 The primary product designation.
  - .5 The secondary product designation.
    - .1 Positive design pressure.
    - .2 Negative design pressure.
    - .3 Water penetration resistance test pressure.
    - .4 Canadian air infiltration and exfiltration levels.
  - .6 The test completion date.
- .3 The report will also contain the following information:
  - .1 Test dates.
  - .2 Report preparation dates.
  - .3 Test information retention period.
  - .4 Location of testing facilities.
  - .5 Full description of test samples, including:
    - .1 Anodized finish, weathering characteristics.
    - .2 Condensation resistance.
    - .3 Forced entry resistance.
    - .4 Mullion deflection - combination and composite windows.
  - .6 Complete description of amendments, as applicable.
  - .7 Conclusion.
  - .8 Drawings signed by the testing laboratory, if provided.
- .4 Low-Emitting Materials:
  - .1 Submit listing of sealants and paints, primers and coatings used in building, comply with VOC and chemical component limits.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for windows for incorporation into manual.

1.5 QUALITY ASSURANCE

.1 Certifications: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: 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, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect windows from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Materials: to CSA-A440 supplemented as follows:

.2 All windows by same manufacturer.

.3 Sash: aluminum or steel; thermally broken. Match existing windows.

.4 Main frame: aluminum or steel; thermally broken. Match existing windows.

.5 Glass: in accordance with Section 08 80 50 - Glazing.

.6 Interior and Exterior metal sills and aluminum facings: extruded aluminum or brake formed aluminum sheet metal of type and size as detailed (match existing windows); minimum 3 mm thick, complete with joint covers, jamb drip deflectors, chairs, anchors and anchoring devices.

.7 Isolation coating: alkali resistant bituminous paint.

2.2 WINDOW TYPE AND CLASSIFICATION

.1 Product type:
- .1 FW- Fixed window.

.2 Classification rating: to CSA-A440.

2.3 FABRICATION

.1 Fabricate in accordance with CSA-A440 supplemented as follows:

.2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.

.3 Face dimensions detailed are maximum permissible sizes.

.4 Brace frames to maintain squareness and rigidity during shipment and installation.

.5 Finish steel clips and reinforcement with shop coat primer to MPI #79, 380 g/mý zinc coating to ASTM A 123/A 123M.

2.4 ALUMINUM FINISHES

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
- .1 Clear anodic finish: designation AA.
- .2 Integral colour anodic finish: designation, colour to match existing windows.
- .3 Impregnated colour anodic finish: designation AA, colour to match existing windows.
- .4 Electrolytically deposited colour anodic finish: designation AA, colour to match existing windows.

2.5 ENAMEL COATING

.1 Enamel coating: in accordance with CSA-A440, including appendices, supplemented as follows:
- .1 Standard colour to match existing windows (aluminum or steel).

2.6 ISOLATION COATING

.1 Primers, Paints, Coatings: in accordance with manufacturer's recommendations for surface conditions.
- .1 Primer: VOC limit 100 g/L maximum to GS-11, SCAQMD Rule 1113.
- .2 Coating: VOC limit 100 g/L maximum to GS-11, SCAQMD Rule 1113.
- .3 Paint: VOC limit 50 g/L maximum to GS-11, SCAQMD Rule 1113.

.2 Isolate aluminum from following components, by means of isolation coating:
- .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
- .2 Concrete, mortar and masonry.
- .3 Wood.

2.7 GLAZING

.1 Glaze windows in accordance with CSA-A440.

2.8 AIR BARRIER AND VAPOUR RETARDER

.1 Equip window frames with site installed air / vapour barrier material for sealing to building air / vapour barrier as follows:
- .1 Material: identical to, or compatible with, building air / vapour barrier material to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
- .2 Material width: adequate to provide required air tightness and vapour diffusion control to building air / vapour barrier from interior.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Consultant.
- .2 Inform Consultant 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 Consultant.

3.2 INSTALLATION

.1 Window installation:
- .1 Install in accordance with CSA-A440.
- .2 Arrange components to prevent abrupt variation in colour.

.2 Sill installation:
- .1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece at each location.
- .2 Cut sills to fit window opening.
- .3 Secure sills in place with anchoring devices located at ends and joints of continuous sills, and evenly spaced 600 mm on centre in between.
- .4 Fasten expansion joint cover plates, and drip deflectors with self tapping stainless steel screws.
- .5 Maintain 6 to 9 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3 to 6 mm space at each end.

.3 Caulking:

.1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.

.2 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within window units except where exposed use is permitted by Consultant.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse, and 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.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by window installation.

END OF SECTION

PART 1- GENERAL

1.1 SECTION INCLUDES

.1 Tubular unit skylight daylighting systems with formed curb counterflashing for mounting on prefabricated roof curbs, for flat and low-slope roofing applications.

1.2 RELATED REQUIREMENTS

.1 Section 060899 – Rough Carpentry for Minor Works.

.2 Division 07 – Roofing Section for Tubular Unit Skylight Penetration in Roof

.3 Section 072700.01 – Air / Vapour Barriers.

.4 Section 076200 – Sheet Metal Flashing and Trim.

.5 Section 079200 – Joint Sealants.

.6 Section 088050 – Glazing.

.7 Section 095199 – Acoustical Ceilings for Minor Works

1.3 REFERENCES

.1 American Architectural Manufacturers Association (www.aama.net), Window & Door Manufacturers Association (www.wdma.com), Canadian Standards Association (www.csagroup.org/us/en/services)

- .1 AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/ Specification for Windows, Doors, and Skylights (NAFS)
- .2 CSA A440S1-09 – Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440
- .3 AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems
- .4 AAMA 2603 – Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum and Panels

.2 ASTM International: www.astm.org:

- .1 ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.2 ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
.3 ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-supporting plastics in a Horizontal Position
.4 ASTM D 2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics
.5 ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free
.6 ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials
.7 ASTM E 108 - Standard Test Methods for Fire Tests of Roof Coverings
.8 ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
.9 ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
.10 ASTM E 408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques
.11 ASTM E 1651-94(2004) - Standard Test Method for Total Luminous Reflectance Factor by Use of 30/t Integrating-Sphere Geometry
.12 ASTM E 1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
.13 ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes

.3 Code of Federal Regulations:
.1 29 CFR 1910.23 (e) (8) - Occupational Safety and Health Standards for Walking-Working Surfaces to Guard Floor and Wall Openings and Holes

.4 Illuminating Engineering Society of North America (IESNA): www.ies.org:
.1 IESNA – The Lighting Handbook.

.5 National Fenestration Rating Council: www.nfrccommunity.org:
.1 NFRC 100 - Procedure for Determining Fenestration Product U-factors
.2 NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.

.6 National Fire Protection Association: www.nfpa.org:
.1 NFPA 70 - National Electrical Code.

.7 The Coatings Society (SSPC): www.sspc.org:
.1 SSPC-SP 12/NACE NO. 5 - Surface Preparation And Cleaning Of Metal

1.4 COORDINATION

.1 Coordinate dimensions, locations, and details of skylight curbs specified in Section 060899 Rough Carpentry and specified in Section 077200 Roof Accessories with tubular unit skylight curb cap flashings. Verify requirements for roofing system terminations. Match existing roofing materials and specifications.

.2 Coordinate tubular unit skylight interior termination locations with structural layout, ceiling grid layouts, and other ceiling-mounted items.

1.5 PREINSTALLATION MEETINGS

.1 Preinstallation Conference: Conduct conference at Project site prior to delivery of tubular unit skylight and installation of roof deck.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
  .1 For tubular unit skylights. Include standard construction details, product performance characteristics, and material descriptions, dimensions of individual components and profiles, and finishes.

.3 Shop Drawings:
  .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
  .2 Indicate size and description of components, materials, attachment devices, description of frame and finish, and construction details.

.4 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.5 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.7 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for tubular unit skylights for incorporation into manual.

1.8 QUALITY ASSURANCE

.1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Approval of Manufacturers and Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
- .1 Completed and signed Substitution Request form.
- .2 Product data, including photometric data and independent test data indicating compliance with requirements.
- .3 Sample product warranty.

1.9 WARRANTY

.1 Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of tubular unit skylights that fail in materials or workmanship under normal use within specified warranty period.
- .1 Failures include, but are not limited to, the following:
  - .1 Deterioration of metals, metal finishes, dome, and other materials beyond normal weathering.
  - .2 Breakage of glazing.
- .2 Warranty Period:
  - .1 Tubular Unit Skylight Assembly: 10 years from date of purchase.
  - .2 Tunnel Reflective Coating: 20 years from date of purchase.

1.10 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, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect skylights and frames from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

.1 Basis-of-Design Product: VELUX America Inc.
.2 Substitutions: As permitted under Instructions to Bidders and Section 012500 Substitution Procedures.
.3 Source Limitations: Obtain tubular unit skylights through single source from single manufacturer.

2.2 TUBULAR DAYLIGHTING DEVICES

.1 System Description: Tubular unit skylight daylighting devices with exterior glazed dome, glazing retainers and gaskets, exterior curb counterflashing assembly with integral adjustable pivot device, reflective tunnel, interior diffuser assemblies, and accessories, as required to meet installation and performance requirements indicated.
  .1 Basis of Design: VELUX America, Inc, Model TCC 022 Commercial Curb Mount Sun Tunnel Skylight.

.2 Roof Dome Assembly: Transparent, UV-resistant dome with flashing base supporting dome, and top of tunnel.
  .1 Unit Sizes: 22 inch (559 mm) diameter.
  .2 Dome Glazing: 0.125 inch (3.18 mm) minimum thickness injection molded transparent impact modified acrylic material; with UV-absorbing additive.
  .3 Dome Seal: Adhesive-backed foam weatherstrip.
  .4 Daylight Directing Device: 22 inch (559 mm) diameter, injection molded, impact modified acrylic prism array configured to direct low-angle sunlight into tunnel and re-reflect high solar heat gain sunlight to exterior.
    .1 Basis of Design: VELUX America, Inc, VELUX SunCurve Daylight Directing Device.

.3 Roof Curb Counterflashing: One-piece, formed low slope curb counterflashing suitable for installation on roof curb up to 60 deg. from horizontal.
  .1 Material: Galvanized steel sheet, 0.023 inch/24 ga. (0.58 mm) thick.
    .1 Dimensions: Curb-mounted, 21 inches (533 mm) or 31 inches (787 mm) square, as required for skylight unit sizes indicated on Drawings, with 3 inch (76.2 mm) vertical counterflashing lip.
    .2 Finish: Powder coat, gray.
  .2 Flashing Insulator: Manufacturer's standard closed-cell thermal isolation material affixed to underside of flashing.
  .3 Intermediate Ring: High-impact plastic reflective tunnel receiver attached to top of roof curb counterflashing base serving as mounting base for dome assembly and providing a thermal break between counterflashing base and

reflective tunnel, configured to channel condensed moisture out of assembly.
- .1 Intermediate Ring Seal: Santoprene O-ring providing weather tight seal with roof curb counterflashing.
- .2 Pivot Ring and Reflective Tunnel Collar: High-impact plastic pivoting socket mounts in intermediate ring and secures to factory-installed tunnel collar; adjustable to allow increased adjustability for proper alignment of tunnel sections.

.4 Flashing Accessories:
- .1 Manufacturer's standard turret risers, [12 inches (305 mm) high] [36 inch (914 mm) high] [height indicated on Drawings], matching counterflashing metal and finish.
- .2 Fire Band: Dome edge protection band, as required for installation in fire-resistance-rated roof assemblies; matching counterflashing metal and finish.

.5 Reflective Tunnel: Skylight light shaft formed from Class II anodized aluminum sheet, 0.016 inch/26 ga. (0.41 mm) thick, with silver specular interior finish surface coated with vacuum-evaporated silicone oxide and titanium oxide protective surface that protects the tunnel surface from corrosion and provides a long life of reflection characteristics.
- .1 Basis of Design: VELUX America, Inc, Model TTK or ZTR Rigid Reflective Tunnel.
- .2 Diameter: As required for indicated skylight unit sizes.
- .3 Reflectance: 99 percent reflectance when measured in accordance with ASTM E 1651 at 30 degrees from vertical. Total reflectance greater than 98 percent when measured in accordance with ASTM E 1651.
- .4 Color Rendition, ASTM E 408: As defined by CIE L*a*b* color model, L equal to 99-100, values a* and b* shall not exceed +1 or be less than -1.

.6 Reflective Tunnel Components: Provide components indicated and as required for installation based upon roof, ceiling, and structural member configuration, skylight and diffuser locations indicated on Drawings, and manufacturer's recommendations, selected from the following:
- .1 Rigid Tunnel Extensions: Reflective extension tube, lengths as required for application.
- .2 Universal Reflective Elbows: Reflective angle adaptors adjustable to 45 degrees, 0.023-inch/24-ga. (0.58 mm) thick, and mounted at the top, middle, or bottom of reflective tunnel assemblies as required for application.
- .3 Reflective Tunnel Fastening System: Manufacturer's recommended fastening devices consisting of spring tempered stainless steel pull clip mechanical fasteners allowing tunnel vertical and horizontal joints to be secured without the use of screws or tools, used in conjunction with pre-located punched holes in tunnel sections, that allow for a tight naturally-occurring tapered mating of interconnecting tunnel sections and elbows.
  - .1 Basis of Design: VELUX America, Inc, Flexi-Loc Fasteners.

.7 Reflective Tunnel Accessories: Provide accessories indicated and as required for installation based upon roof, ceiling, and structural member configuration, skylight and diffuser locations indicated on Drawings, and manufacturer's recommendations, selected from the following:

.1 Rotating Couplers: Rotating adaptors allowing coupling of two elbows to create 90 degree transition of tunnels using fastening system connections with rotating joint enabling alignment of tunnel sections.

.2 Commercial Energy Kit: Two clear diffusers mounted in airtight Santoprene gasketing system inserted in a round polymer housing that provides a thermal break and installs in line with building envelope insulation to isolate tunnel from exterior temperatures. Kit is affixed to tunnel with manufacturer's spring lock fasteners.

.1 Basis of Design: VELUX America, Inc, Commercial Energy Kit Model ZTC.

2.3 DIFFUSERS

.1 Square Diffuser Assemblies for Suspended and Hard Ceiling Applications: Round-to-square transition box with white diffuse internal coating attached directly to bottom of tunnel and fitted to standard suspended ceiling grid or hard ceiling, with hinged, white painted extruded aluminum diffuser frame with high visible light transmittance lens, seals, and white metal ceiling trim.

.1 Basis of Design: VELUX America, Inc, Square Diffuser Model TTC.

.2 Size: As required for skylight sizes indicated, and coordinated with nominal 24 by 24 inch (610 by 610 mm) ceiling grid size.

.3 Lens Type: Prismatic lens, minimum 92 percent visible light transmittance.

2.4 CURB FRAME

.1 Rough carpentry curb: Refer to drawings for curb dimensions, and as specified in Section 06 08 99 – Rough Carpenty for Minor Works.

2.5 ACCESSORIES

.1 Fasteners: Screws to manufacturers standard, galvanized steel.

.2 Sealants: VOC limit 250 g/L maximum to SCAQMD Rule 1168.

.3 Suspension Wire: 12-ga., galvanized steel wire.

2.6 PERFORMANCE REQUIREMENTS

.1 Unit Skylight Standard, 22 inch (559 mm) Unit: CSA-A440, NAFS-11 or previous:
- .1 Performance Class and Grade (Primary Designator): CW-PG100.
- .2 Design Pressure (DP): +200/-100 psf (+9.58/-4.79 kPa).
- .3 Water Test Pressure: 15 psf (0.72 kPa) with no leakage at 5 gallons per minute spray rate.
- .4 Canadian Air Infiltration/Exfiltration Rating: A2 (1.5 L/s/m^2 maximum).

.2 Daylighting: Provide daylighting photometric performance comparable to basis of design product at layout indicated, based upon daylighting profile of March 21, 9:00 am local time, at Project location by simulation in accordance with IESNA guidelines.

.3 Air Infiltration: Maximum air leakage through unit of 0.30 cfm/sq. ft. (1.5 L/s/sq. m) of fixed area as determined according to ASTM E 283 at a static-air-pressure differential of 1.57 lbf/sq. ft. (75Pa.)

.4 Water Penetration under Static Pressure: No evidence of water penetration through unit when tested according to ASTM E 331 at a static-air-pressure differential of 15 lbf/sq. ft. (720 Pa).

.5 Surface-Burning Characteristics of Plastic Glazing: Provide plastic glazing meeting NAFS and identical to specimens tested for fire-exposure behavior in accordance with test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
- .1 Self-Ignition Temperature: 650 deg F (345 deg. C) or more for plastic glazing in thickness indicated when tested per ASTM D 1929.
- .2 Smoke-Production Characteristics: Comply with either requirement below:
  - .1 Smoke-Developed Index: 450 or less when tested per ASTM E 84 on plastic glazing in manner indicated for application.
  - .2 Smoke Density: 75 or less when tested per ASTM D 2843 on plastic glazing in thickness indicated for application.
- .3 Burning Characteristics: Tested and labeled in accordance with ASTM D 635.
  - .1 Plastic Glazing for Domes: Acrylic Class CC2.

.6 Fire Ratings for Roof Assemblies with Fire Classifications: Tubular unit skylight with dome edge protection band tested in accordance with ASTM E 108 and listed as passing Burning Brand test with target classification of Class B

.7 Energy Performance with Thermal Break Kit Installed:
  .1 Thermal Transmittance: NFRC 100 maximum U-factor:
    .1 22 inch (559 mm) Units: 0.43 Btu/hr*ft2*deg F (2.44 W/m2*deg C).
  .2 Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum SHGC:
    .1 22 inch (559 mm) Units: 0.22.

.8 Fall Protection Standard Compliance: 29 CFR 1910.23: Passed.

2.7 MATERIALS

.1 Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, either commercial steel or forming steel.

.2 Aluminum Sheet: Flat sheet complying with ASTM B 209/B 209M.

.3 Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic, nominally free of sulfur and containing no asbestos fibers, formulated for 15-mil dry film thickness per coating.

.4 Joint Sealants: As specified in Section 079200 - Joint Sealants.

.5 Mastic Sealants: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

.6 Roofing Cement: ASTM D 4586, asbestos free, designed for trowel application or other adhesive compatible with roofing system.

2.8 FINISHES

.1 Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

.2 Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

.3 Galvanized Steel Sheet:
  .1 Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
    .1 Color and Gloss: Neutral gray.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for tubular unit skylights installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Consultant.
- .2 Inform Consultant 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 Consultant.

.2 Confirmation of the existing roof structural slab is required before installation can begin. The structural engineering drawing, S1, shows the existing roof slab being composed of siporex lightweight concrete panels, and the proposed structural supporting members are designed in accordance with this roof slab specification.

3.2 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Install skylights in accordance with CAN/CGSB-63.14 and supplement as follows:
- .1 Erect components plumb, level and in proper alignment.
- .2 Ensure continuity of existing envelope air barrier and vapour retarder systems, roof insulation, roofing membrane, and flashing as required. Ensure each element of the Work performs properly and that finished installation is weather tight.
- .3 Secure exterior grade wood curb to structure.
- .4 Adjust and seal assembly with provision for expansion and contraction of components.
- .5 Secure and seal frame to curb.

.3 Where metal surfaces of tubular unit skylights will contact incompatible metal or corrosive substrates, including preservative-treated wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation recommended in writing by tubular unit skylight manufacturer.

.4 Install tubular unit skylight curb counter flashing to produce weatherproof seal with curb and overlap with roofing system termination at top of curb.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Remove protective film from surfaces.
- .3 Clean exposed interior and exterior tubular unit skylight surfaces in accordance with manufacturers' instructions. Touch up damaged metal coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

.3 Waste Management: separate waste materials for reuse, and 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.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by tubular unit skylight installation.

.3 Replace glazing that has been damaged during construction period.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 085100 – Metal Windows.

1.2 REFERENCES

.1 ASTM International
- .1 ASTM C 542-05, Standard Specification for Lock-Strip Gaskets.
- .2 ASTM D 790-07e1, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- .3 ASTM D 1003-07e1, Standard Test Method for Haze and Luminous Transmittance of Plastics.
- .4 ASTM D 1929-96(R2001)e1, Standard Test Method for Determining Ignition Temperature of Plastics.
- .5 ASTM D 2240-05, Standard Test Method for Rubber Property - Durometer Hardness.
- .6 ASTM E 84-10, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .7 ASTM E 330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .8 ASTM F 1233-08, Standard Test Method for Security Glazing Materials and Systems.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
- .2 CAN/CGSB-12.2-M91, Flat, Clear Sheet Glass.
- .3 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
- .4 CAN/CGSB-12.4-M91, Heat Absorbing Glass.
- .5 CAN/CGSB-12.6-M91, Transparent (One-Way) Mirrors.
- .6 CAN/CGSB-12.8-97, Insulating Glass Units.
- .7 CAN/CGSB-12.8-97 (Amendment), Insulating Glass Units.
- .8 CAN/CGSB-12.9-M91, Spandrel Glass.
- .9 CAN/CGSB-12.10-M76, Glass, Light and Heat Reflecting.
- .10 CAN/CGSB-12.11-M90, Wired Safety Glass.
- .11 CAN/CGSB-12.12-M90, Plastic Safety Glazing Sheets.
- .12 CAN/CGSB-12.13-M91, Patterned Glass.

.3 Environmental Choice Program (ECP)
- .1 CCD-045-95(R2005), Sealants and Caulking Compounds.

.4 Glass Association of North American (GANA)
- .1 GANA Glazing Manual - 2008.
- .2 GANA Laminated Glazing Reference Manual - 2009.

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
- .1 Convene pre-installation meeting 1 week prior to beginning work of this Section, and on-site installation, with Contractor's Representative and Departmental Representative and Consultant in accordance with Section 01 31 19 - Project Meetings to:
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other building subtrades.
  - .4 Review manufacturer's]written installation instructions and warranty requirements.

.2 Arrange for site visit with Consultant prior to start of Work to examine existing site conditions adjacent to demolition Work.

1.4 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 glass, sealants, and glazing accessories, 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 Ontario, Canada.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples will be returned for inclusion into work.

.5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.6 QUALITY ASSURANCE

.1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Mock-ups:
- .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
- .2 Construct mock-up to include glass glazing, and perimeter air / vapour barrier seal.
- .3 Mock-up will be used:
  - .1 To judge quality of work, substrate preparation, operation of equipment and material application.
- .4 Allow 24 hours for inspection of mock-up before proceeding with work.
- .5 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.7 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, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect glazing and frames from nicks, scratches, and blemishes.
- .3 Protect prefinished aluminum surfaces with wrapping, strippable coating.
- .4 Replace defective or damaged materials with new.

1.8 AMBIENT CONDITIONS

.1 Ambient Requirements:
- .1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.
- .2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Design Criteria:
- .1 Ensure continuity of building enclosure air / vapour barrier using glass and glazing materials as follow:
  - .1 Utilize inner light of multiple light sealed units for continuity of air / vapour seal.
- .2 Size glass to withstand wind loads, dead loads and positive and negative live loads to ASTM E330.
- .3 Limit glass deflection to 1/200 flexural limit of glass with full recovery of glazing materials.

.2 Flat Glass:
- .1 Float glass: to CAN/CGSB-12.3, glazing quality as specified.
- .2 Sheet glass: to CAN/CGSB-12.2, AA-special selected.

.3 Insulating Glass Units:
- .1 Insulating glass units: to CAN/CGSB-12.8, double glazed unit, 25.4 mm overall thickness.
  - .1 Glass: to CAN/CGSB-12.3, CAN/CGSB-12.1, CAN/CGSB-12.2, CAN/CGSB-12.4, CAN/CGSB-12.10.
  - .2 Glass thickness: 6.3 mm inner light; 6.3 mm outer light.
  - .3 Inter-cavity space thickness: 12.7 mm between inner and outer lights with low conductivity spacers.
  - .4 Glass coating: surface number 3, low "E".
  - .5 Inert gas fill: argon.

.4 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

2.2 ACCESSORIES

.1 Setting blocks: Neoprene Shore A durometer hardness to ASTM D 2240, to suit glazing method, glass light weight and area.

.2 Spacer shims: Neoprene Shore A durometer hardness to ASTM D 2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.

.3 Glazing tape:
- .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D 2240; coiled on release paper; black colour.
- .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2 %, designed for compression of 25 %, to effect an air and vapour seal.

.4 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, colour as selected by Consultant.

.5 Glazing clips: manufacturer's standard type.

.6 Lock-strip gaskets: to ASTM C 542.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.
- .1 Verify that openings for glazing are correctly sized and within tolerance.
- .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
- .3 Visually inspect substrate in presence of Consultant.
- .4 Inform Consultant of unacceptable conditions immediately upon discovery.
- .5 Proceed with installation only after unacceptable conditions have been remedied, and after receipt of written approval to proceed from Consultant.

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION: EXTERIOR - DRY METHOD (PREFORMED GLAZING)

.1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
  - .1 Remove traces of primer, caulking.
  - .2 Remove glazing materials from finish surfaces.
  - .3 Remove labels.
  - .4 Clean glass and mirrors using approved non-abrasive cleaner in accordance with manufacturer's instructions.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

.3 Waste Management: separate waste materials for reuse, and 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.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.
- .1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 092216 – Non-Structural Metal Framing.

.2 Section 095199 – Acoustical Ceilings for Minor Works.

.3 Section 099199 – Painting for Minor Works.

1.2 REFERENCES

.1 Aluminum Association (AA)
- .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International
- .1 ASTM C 475-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .2 ASTM C 514-04(2009e1), Standard Specification for Nails for the Application of Gypsum Board.
- .3 ASTM C 557-03(2009)e1, Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
- .4 ASTM C 840-08, Standard Specification for Application and Finishing of Gypsum Board.
- .5 ASTM C 954-07, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
- .6 ASTM C 1002-07, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- .7 ASTM C 1047-09, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- .8 ASTM C 1280-99, Standard Specification for Application of Gypsum Sheathing.
- .9 ASTM C 1177/C 1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .10 ASTM C 1178/C 1178M-08, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.
- .11 ASTM C 1396/C 1396M-09a, Standard Specification for Gypsum Wallboard.

.3 Association of the Wall and Ceilings Industries International (AWCI)
- .1 AWCI Levels of Gypsum Board Finish-97.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .2 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.

.5 Green Seal Environmental Standards (GS)
- .1 GS-11-2008, 2nd Edition, Paints and Coatings.

.6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
- .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

.7 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-07, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

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 gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 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 gypsum board assemblies materials level off ground, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
- .3 Protect from weather, elements and damage from construction operations.
- .4 Handle gypsum boards to prevent damage to edges, ends or surfaces.

.5 Protect prefinished aluminum surfaces with wrapping, strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

.6 Replace defective or damaged materials with new.

1.5 AMBIENT CONDITIONS

.1 Maintain temperature 10 degrees C minimum, 21 degrees C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Standard board: to ASTM C 1396/C 1396M regular, 12.7 mm thick, 1200 mm wide x maximum practical length, ends square cut, edges squared.

.2 Gypsum sheathing board: to ASTM C 1396/C 1396M regular, 12.7 mm thick, 1200 mm wide x maximum practical length.

.3 Backing board and coreboard: to ASTM C 1396/C 1396M regular, 12.7 mm thick, squared edges.

.4 Metal furring runners, hangers, tie wires, inserts, anchors.

.5 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.

.6 Resilient clips and drywall furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.

.7 Nails: to ASTM C 514.

.8 Steel drill screws: to ASTM C 1002.

.9 Stud adhesive: to CAN/CGSB-71.25 and ASTM C 557.

.10 Laminating compound: as recommended by manufacturer, asbestos-free.

.11 Casing beads, corner beads, control joints and edge trim: to ASTM C 1047, 0.5 mm base thickness, perforated flanges, one piece length per location.

.12 Cornice cap: 12.7 mm deep x partition width, of 1.6 mm base thickness galvanized sheet steel, prime painted. Include splice plates for joints.

.13 Shadow mould: 35 mm high, snap-on trim, of 0.6 mm base steel thickness galvanized sheet pre-finished in satin, white colour.

.14 Vinyl and Rubber mouldings: mouldings for joint treatment of vinyl-faced gypsum board, as supplied by gypsum board manufacturer.

.15 Sealants: in accordance with Section 07 92 00 - Joint Sealants.

.16 Polyethylene: to CAN/CGSB-51.34, Type 2.

.17 Insulating strip: rubberized, moisture resistant, 3 mm thick closed cell neoprene strip, 12 mm wide, with self sticking permanent adhesive on one face, lengths as required.

.18 Joint compound: to ASTM C 475, asbestos-free.

2.2 FINISHES

.1 Texture finish: asbestos-free standard white texture coating and primer-sealer, recommended by gypsum board manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Consultant.
- .2 Inform Consultant 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 Consultant.

3.2 ERECTION

.1 Do application and finishing of gypsum board to ASTM C 840 except where specified otherwise.

.2 Do application of gypsum sheathing to ASTM C 1280.

.3 Install work level to tolerance of 1:1200.

.4 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

.5 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

.6 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

.7 Install wall furring for gypsum board wall finishes to ASTM C 840, except where specified otherwise.

.8 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.9 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

.10 Erect drywall resilient furring transversely across studs, spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 38 mm common nail or 25 mm drywall screw.

.11 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

3.3 APPLICATION

.1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.

.2 Apply single layer gypsum board to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.

- .1 Single-Layer Application:
  - .1 Apply gypsum board on ceilings prior to application of walls to ASTM C 840.
  - .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.

.3 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.4 Install gypsum board with face side out.

.5 Do not install damaged or damp boards.

.6 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 INSTALLATION

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Construct control joints of preformed units set in gypsum board facing and supported independently on both sides of joint.

.6 Provide continuous polyethylene dust barrier behind and across control joints.

.7 Install control joints straight and true.

.8 Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.

.9 Install expansion joint straight and true.

.10 Splice corners and intersections together and secure to each member with 3 screws.

.11 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.12 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:
  .1 Levels of finish:
    .1 Level 5: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.

.13 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.14 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.15 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.16 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.17 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.

.18 Mix joint compound slightly thinner than for joint taping.

.19 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.

.20 Allow skim coat to dry completely.

.21 Remove ridges by light sanding or wiping with damp cloth.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

.3 Waste Management: separate waste materials for reuse, and 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.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by gypsum board assemblies installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 092116 – Gypsum Board Assemblies.

.2 Section 095199 – Acoustical Ceilings for Minor Works.

1.2 REFERENCES

.1 ASTM International
- .1 ASTM C 645-11a, Standard Specification for Nonstructural Steel Framing Members.
- .2 ASTM C 754-11, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.2 Environmental Choice Program (ECP)
- .1 CCD-047-98(R2005), Architectural Surface Coatings.
- .2 CCD-048-95(R2006), Surface Coatings - Recycled Water-Borne.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.4 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.
  - .1 MPI #26, Primer, Galvanized Metal, Cementitious.

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants 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 metal framing and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

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, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect metal framing from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Non-load bearing channel stud framing: to ASTM C 645, 41 mm stud size, roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board.
- .1 Knock-out service holes at 460 mm centres.

.2 Metal channel stiffener: 41 x 41 mm size, 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.

.3 Acoustical sealant: in accordance with Section 07 92 00 - Joint Sealants.

.4 Insulating strip: rubberized, moisture resistant 3 mm thick foam strip, 12 mm wide, with self sticking adhesive on one face, lengths as required.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for non-structural metal framing application in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Consultant.
  .2 Inform Consultant 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 Consultant.

3.2 ERECTION

.1 Align partition tracks at floor and 150 mm above ceiling and secure at 600 mm on centre maximum.

.2 Install damp proof course under stud shoe tracks of partitions on slabs on grade.

.3 Place studs vertically at 406 mm on centre and not more than 50 mm from abutting walls, and at each side of openings and corners.
  .1 Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.4 Erect metal studding to tolerance of 1:1000.

.5 Attach studs to bottom and ceiling track using screws, crimp method, or pop rivets.

.6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified.
  .1 Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.9 Install heavy gauge single jamb studs at openings.

.10 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs.
- .1 Secure track to studs at each end, in accordance with manufacturer's instructions.
- .2 Install intermediate studs above and below openings in same manner and spacing as wall studs.

.11 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.12 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

.13 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.14 Extend partitions to ceiling height except where noted otherwise on drawings.

.15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.
- .1 Use 50 mm leg ceiling tracks.

.16 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.17 Install two continuous beads of acoustical sealant under studs and tracks around perimeter of sound control partitions.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse, and 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.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 086270 – Tubular Unit Skylights.

.2 Section 092116 – Gypsum Board Assemblies.

.3 Section 092216 – Non-Structural Metal Framing.

1.2 REFERENCES

.1 ASTM International
- .1 ASTM C 635/C 635M-07, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
- .2 ASTM C 636/C 636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- .3 ASTM E 1477-98a(2008), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.

.3 Green Seal Environmental Standards (GS)
- .1 GS-11-2008, 2nd Edition, Paints and Coatings.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1113-A2007, Architectural Coatings.

.6 Underwriter's Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-2007, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

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 ceiling panels and ceiling suspension system, and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements, and 01 35 43 - Environmental Procedures.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
- .2 Submit reflected ceiling plans for special grid patterns as indicated.
- .3 Indicate lay-out, insert and hanger spacing, fastening details, splicing method for main and cross runners, change in level details, and acoustical unit support at ceiling fixture, including lateral bracing and accessories.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples will be returned for inclusion into work.
- .3 Submit duplicate full size samples of each type acoustical units.

1.4 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, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store materials inside, level, under cover. Protect from weather, damage from construction operations and other causes, in accordance with manufacturer's printed instructions.
- .3 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.
- .4 Store and protect acoustic ceiling materials from nicks, scratches, and blemishes.
- .5 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 COMPONENTS

.1 Acoustic units for suspended ceiling system: to CAN/CGSB-92.1.
- .1 Match existing acoustic units and suspended ceiling system in office spaces.
- .2 Flame spread rating in accordance with CAN/ULC-S102.
- .3 Smoke developed in accordance with CAN/ULC-S102.
- .4 Sound Absorption Average (SAA) of 0.9 for ceiling absorption and 0.75 for acoustic panels.
- .5 Light Reflectance (LR) range to ASTM E 1477.
- .6 Edge type: Match existing acoustic units in office spaces.
- .7 Colour: Match existing acoustic units in office spaces.
- .8 Size: 610 mm x 1220 mm (Match existing size of acoustic units).
- .9 Shape: Flat (Match existing size of acoustic units).

.2 Acoustical Suspension (Match existing suspended grid system in office spaces):
- .1 Intermediate duty system to ASTM C 635.
- .2 Basic materials for suspension system: commercial quality cold rolled steel, zinc coated.
- .3 Suspension system: non fire rated, two directional exposed tee bar grid.
- .4 Exposed tee bar grid components: shop painted satin sheen, white colour. Components die cut. Main tee with double web, rectangular bulb and 25 mm rolled cap on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.
- .5 Hanger wire: galvanized soft annealed steel wire, 3.6 mm diameter for access tile ceilings.
- .6 Hanger inserts: purpose made.
- .7 Carrying channels: refer to manufacturer’s guide for galvanized steel dimensions and carrying requirements.
- .8 Accessories: splices, clips, wire ties, retainers and wall moulding flush, to complement suspension system components, as recommended by system manufacturer.

.3 Performance/Design Criteria:
- .1 Maximum deflection: 1/360th of span to ASTM C 635 deflection test.

2.2 ACCESSORIES

.1 Touch-up paint: in accordance with manufacturer's recommendations for surface conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions prior to acoustical ceiling installation.
- .1 Visually inspect substrate in presence of Consultant.
- .2 Inform Consultant 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 Consultant.

3.2 INSTALLATION

.1 Installation: in accordance with ASTM C 636 except where specified otherwise.

.2 Suspension System:
- .1 Erect ceiling suspension system after work above ceiling has been inspected by Consultants.
- .2 Secure hangers to overhead structure using attachment methods acceptable to Departmental Representative and Consultant (Match existing).
- .3 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.
- .4 Lay out centreline of ceiling both ways, to provide balanced borders at room perimeter, with border units not less than 50% of standard unit width of system according to reflected ceiling plan.
- .5 Install wall moulding to provide correct ceiling height.
- .6 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles, and speakers.
- .7 Support at light fixtures, and diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .8 Interlock cross member to main runner to provide rigid assembly.
- .9 Ensure finished ceiling system is square with adjoining walls and level within 1:1000.

.3 Acoustic Panels:
- .1 Install acoustical panels and tiles in ceiling suspension system.
- .2 Co-ordinate ceiling work with work of other sections such as interior lighting, fire protection communication, and intrusion and detection systems.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse, and 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.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by acoustical ceiling installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 040499 – Masonry for Minor Works.

.2 Section 072400 – Exterior Insulation and Finish Systems.

.3 Section 092116 – Gypsum Board Assemblies.

1.2 REFERENCES

.1 Green Seal Environmental Standards (GS)
  .1 GS-11-2008, 2nd Edition, Paints and Coatings.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

.3 The Master Painters Institute (MPI)
  .1 Architectural Painting Specification Manual - current edition.
  .2 Maintenance Repainting Manual - current edition.

.4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  .1 SCAQMD Rule 1113-A2007, Architectural Coatings.

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 paint and coating products, and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements, and 01 35 43 - Environmental Procedures.

.3 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples will be returned for inclusion into work.
- .3 Submit duplicate 200 x 300 mm sample panels of each paint, stain, clear coating, special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Sustainable Design Submittals:
- .1 Low-Emitting Materials:
  - .1 Submit listing of paints and coatings used in building, comply with VOC and chemical component limits or restriction requirements.

1.4 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 Provide and maintain dry, temperature controlled, secure storage.
- .2 Store painting materials and supplies away from heat generating devices.
- .3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.

.4 Fire Safety Requirements:
- .1 Supply 1 - 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
- .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.5 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:
- .1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
- .2 Co-ordinate use of existing ventilation system with Departmental Representative and Consultant, and ensure its operation during and after application of paint as required.
- .3 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:
- .1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
- .2 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.

.3 Additional application requirements:
- .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
- .2 Concrete and masonry surfaces must be installed at least 28 days prior to painting work, and must be visually dry on both sides.
- .3 Apply paint in occupied facilities during silent ‘after’ hours only. Schedule operations to approval of Departmental Representative and Consultant such that painted surfaces will have dried and cured sufficiently before occupants are affected.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Supply paint materials for paint systems from single manufacturer.

.2 Conform to latest MPI requirements for painting work including preparation and priming.

.3 Materials in accordance with MPI - Architectural Painting Specification Manual, and MPI - Maintenance Repainting Manual "Approved Product" listing.
- .1 Use MPI listed materials having E2 or E3 rating where indoor air quality requirements exist.
- .2 Primer: VOC limit 100 g/L maximum to GS-11, and SCAQMD Rule 1113.
- .3 Paint: VOC limit 100 g/L maximum to GS-11, and SCAQMD Rule 1113.

.4 Colours:
- .1 Submit proposed Colour Schedule to Consultant for review.
- .2 Base colour schedule on selection of 5 base colours and 3 accent colours.

.5 Mixing and tinting:
- .1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written recommendations. Obtain written approval from Consultant for tinting of painting materials.
- .2 Use and add thinner in accordance with paint manufacturer's recommendations.
  - .1 Do not use kerosene or similar organic solvents to thin water-based paints.
- .3 Thin paint for spraying in accordance with paint manufacturer's written recommendations.
- .4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

.6 Gloss/sheen ratings:
- .1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

Gloss Level-Category	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish	Max. 5	Max. 10
Gloss Level 2 - Velvet	Max.10	10 to 35
Gloss Level 3 - Eggshell	10 to 25	10 to 35
Gloss Level 4 - Satin	20 to 35	min. 35
Gloss Level 5 - Semi-Gloss	35 to 70	
Gloss Level 6 - Gloss	70 to 85	
Gloss Level 7 - High Gloss	More than 85	

- .2 Gloss level ratings of painted surfaces as indicated.

.7 Exterior painting:
- .1 Exterior Insulation and Finishing Systems:
  (Match existing colour and specifications).
  - .1 EXT 9.1J - Latex (match existing colour and gloss level finish).
    (over alkali resistant primer).
    Premium Grade (one primer and two finish coats).

.8 Exterior re-painting:
- .1 Exterior Insulation and Finishing Systems:
  (Match existing colour and specifications).
  - .1 REX 9.1J – Latex, match existing gloss level
    (over alkali resistant primer).
    Premium Grade (one primer and two finish coats).

.9 Interior painting:
- .1 Concrete masonry units: smooth and split face block and brick:
  - .1 INT 4.2A - Latex, Gloss Level 4 finish.
    Premium Grade (one primer and two finish coats).
    (Refer to P-2 in drawing note 27).
- .2 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock" type material, etc.
  - .1 INT 9.2A - Latex, Gloss Level 4 finish. (over latex sealer).
    Premium Grade (one primer and two finish coats).
    (Refer to P-2 in drawing note 27).

.10 Interior re-painting:
- .1 Concrete masonry units: smooth and split face block and brick:
  - .1 RIN 4.2A - Latex, Gloss Level 4 finish.
    Premium Grade (one primer and two finish coats).
    (Refer to P-2 in drawing note 27).
- .2 Plaster and Gypsum Board: gypsum wallboard, drywall, "sheet rock" type material, etc.
  - .1 RIN 9.2A - Latex Gloss Level 4 finish. (over latex sealer).
    Premium Grade (one primer and two finish coats).
    (Refer to P-2 in drawing note 27).

PART 3 - EXECUTION

3.1 GENERAL

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.

.2 Perform preparation and operations for interior painting in accordance with MPI - Architectural Painting Specifications Manual, and MPI - Maintenance Repainting Manual except where specified otherwise.

3.2 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.3 PREPARATION

.1 Protection of in-place conditions:
- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Consultant.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.

.2 Surface Preparation:
- .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
- .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
- .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.

.4 Clean and prepare surfaces in accordance with MPI - Architectural Painting Specification Manual, and MPI - Maintenance Repainting Manual specific requirements and coating manufacturer's recommendations.

.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.6 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
- .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
- .2 Apply wood filler to nail holes and cracks.
- .3 Tint filler to match stains for stained woodwork.

.7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.8 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.

.9 Touch up of shop primers with primer as specified.

3.4 APPLICATION

.1 Paint only after prepared surfaces have been accepted by Consultant.

.2 Use method of application approved by Consultant.
- .1 Conform to manufacturer's application recommendations.

.3 Apply coats of paint in continuous film of uniform thickness.
- .1 Repaint thin spots or bare areas before next coat of paint is applied.

.4 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.5 Sand and dust between coats to remove visible defects.

.6 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.7 Finish closets and alcoves as specified for adjoining rooms.

.8 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

.9 Mechanical/Electrical Equipment:
- .1 Paint conduits, piping, hangers, ductwork and other mechanical and electrical equipment exposed in finished areas, to match adjacent surfaces, except as indicated.
- .2 Do not paint over nameplates.
- .3 Keep sprinkler heads free of paint.
- .4 Paint fire protection piping red.
- .5 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .6 Paint natural gas piping yellow.
- .7 Paint both sides and edges of backboards for telephone and electrical equipment before installation.
  - .1 Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse, and 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.

.4 Place paints, stains, and primers, defined as hazardous or toxic waste, including tubes and containers, in containers or areas designated for hazardous waste.

END OF SECTION