

- Part 1 General**
- 1.1 RELATED WORK
- .1 Division 3 – Concrete
 - .2 Section 07 21 00 – Thermal Insulation
 - .3 Section 07 25 00 – Air/Vapour Barrier Membrane
 - .4 Division 31 – Earthwork
- 1.2 REFERENCES
- .1 ASTM International
 - .1 E28 - Standard Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.
 - .2 E96 - Test Method for Water Vapour Transmission of Materials.
 - .2 Canadian Government Standards Board
 - .1 CAN/CGSB 37-GP-56M- 9th Draft, 1997 - Standard for Modified Bituminous Sheet Membranes.
 - .2 CAN/CGSB 37-GP-5M - Standard for Asphalt Plastic Cement
- 1.3 QUALIFICATIONS
- .1 Waterproofing shall be installed by a manufacturer-approved applicator, with minimum three (3) years related experience in the installation of torch-applied waterproofing membranes and with projects of similar size and scope.
- 1.4 DELIVERY AND STORAGE
- .1 Deliver and store Materials undamaged in original containers with manufacturer's labels and seals intact.
 - .2 Store roll Materials horizontally in original packaging in a weather protected environment, clear of ground and moisture. Do not double stack. Store rolls, adhesives and primers, and mastics at temperatures of +10°C and above to facilitate handling. Protect rolls from direct sunlight until ready for use. Only the rolls which will be used that day should be removed just prior to installation.
- 1.5 SAFETY REQUIREMENTS
- .1 Do not install primers or modified mastics in an enclosed environment without adequate ventilation.
 - .2 Provide adequate fire extinguishers as required by applicable codes or other authorities having jurisdiction do to the presence of flammable primers and mastics.
 - .3 No smoking or open flames are allowed in the vicinity of the product application due to volatile vapours from the flammable Products noted in 1.9.2.
- Part 2 Products**
- 2.1 WATERPROOFING SYSTEM COMPATIBILITY
- .1 All components of the waterproofing system, including membrane, sealants, primer, mastics and adhesives shall be compatible with one another, and shall be supplied by one manufacturer.

2.2 WATERPROOFING MEMBRANE SYSTEM

- .1 The waterproofing system shall consist of a SBS modified bitumen glass reinforced thermofusible membrane with non-woven fiberglass having the following physical properties:
 - .1 Colour: Black
 - .2 Thickness: 2.5mm (100 mils) minimum
 - .3 Water Vapour Permeance (ASTM E96, Method A): 0.2 ng/Pa.m².s., (0.003 perms)
 - .4 Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
Air leakage (ASTM E2178): <0.000 L/s/m² @ 75Pa
 - .5 Water Tightness (CAN/CGSB-37.58-M86): Pass
Nail Sealability (ASTM D1970): Pass
 - .6 Low temperature flexibility (CGSB 37-GP-56M): -15°C (5 deg F)
 - .7 Elongation (ASTM D412-modified): MD 40% / XD 40%
 - .8 Acceptable products: Blueskin TG as manufactured by Henry-Bakor or equal in accordance with B7 Substitutions.
- .2 Primer: a synthetic rubber based quick setting primer having the following physical properties:
 - .1 Compatible with sheet waterproofing membrane, and substrate,
 - .2 Colour: green,
 - .3 Solids by weight: 30%,
 - .4 0.9 kg/l (approx.),
 - .5 Drying time (initial set): 60 minutes
 - .6 Acceptable products: Bakor 930-18 Primer as manufactured by Henry-Bakor or equal in accordance with B7 Substitutions.
- .3 Termination Sealant: polymer modified sealing compound having the following characteristics:
 - .1 Compatible with sheet waterproofing membrane, substrate and insulation Materials
 - .2 Colour: black,
 - .3 Solids by volume: 70%
 - .3 Water vapour permeance: 2.9 ng/Pa.s.m², to ASTM E96
 - .4 Complies with CGSB 37.29, "Rubber-Asphalt Sealing Compound"
 - .5 Remains flexible with aging
 - .6 Adheres to wet surfaces
 - .7 Chemical resistance: Alkalis, calcium chloride, mild acid and salt solutions
 - .8 Acceptable products: Polybitume 570-05 Polymer Modified Sealing Compound as manufactured by Henry-Bakor or equal in accordance with B7 Substitutions..

Part 3

Execution

3.1 EXAMINATION

- .1 Verify that surfaces and conditions are ready to accept the Work of this Section. Commencement of Work or any parts thereof shall mean acceptance of the prepared substrate.

3.2 SURFACE PREPARATION

- .1 All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar, frost of other contaminants. Fill spalled areas in substrate to provide an even plane.
- .2 All concrete shall have cured for a minimum of seven (7) days, and must be dry before waterproofing membranes are applied. Lightweight structural concrete must be cured a minimum of fourteen (14) days.
- .3 Voids, ridges, honeycombing and other damaged surfaces, shall be repaired by the trades involved, using Materials compatible with the membrane system to leave a level surface.
- .4 All joints or transitions between planes, shall be sharply formed and free of broken edges, loose aggregate, preformed joint fillers, sealants, or back-up Material.

3.3 INSTALLATION – WATERPROOF MEMBRANE

- .1 Apply materials in strict accordance with manufacturer's recommendations.
- .2 Use appropriate waterproofing membrane as recommended by manufacturer based on air and surface temperature at time of application. Membrane is not to be applied in unsuitable weather conditions, as directed by manufacturer.
- .3 Apply primer using roller or spray at rate recommended by manufacturer and allowed to dry as recommended by manufacturer. Primed surfaces not covered by waterproofing membrane during the same Working Day must be re-primed.
- .4 Apply crack treatment sheet membrane to primed and prepared substrate following manufacturers printed instructions. Seal cracks and joints between 1.5 mm (1/16") and 6 mm (1/4") in width with a strip of 150 mm (6") wide flashing membrane, centred on crack or joint. Provide 150 mm (6") end laps.
- .5 Torch-apply membrane along horizontal and vertical construction joints and cracks as detailed.
- .6 Reinforce joints in precast concrete decks along length of units with a strip of 150 mm (6") wide flashing membrane, centered over joint. Joint width not to exceed 12 mm (1/2").
- .7 For vertical & horizontal applications, apply waterproofing membrane to prepared substrate in lengths of 2400mm (8ft) or less. Position for alignment, beginning at the base of the wall. Using a propane torch, soften backside of the membrane by burning off the polypropylene film. Bitumen should be in a semi-molten state to ensure adequate adhesion. Exercise caution to avoid overheating the membrane or its reinforcement during the application of the waterproofing membrane. Apply sufficient hand pressure and use a roller to ensure adhesion to the primed substrate. Terminate membrane using mastic. All laps within 300mm (1ft) of a 90° change in plane to be sealed.
- .8 Install successive courses of membrane ensuring to provide 150mm (6") laps at ends, and 76mm (3") laps at sides. All end and side laps shall be thermofused using a propane torch and trowel.
- .9 Continue membrane installation onto the horizontal and vertical planes to tie into all door frames and window sills.
- .10 Where three (3) or more planes come into contact, reinforce with cut section of

- .11 Reinforce all deck to vertical junctions using a strip of 150 mm (6") wide flashing membrane. Extend flashing membrane 75 mm (3") on vertical and horizontal surface. Lap ends of flashing membrane a minimum of 75 mm (3"). Ensure membrane is fully bonded to the substrate and that all terminations are well sealed. Membrane should be free of voids, wrinkles or fishmouths prior to the application of the hot rubberized asphalt.
All outside corners to be pre-treated with minimum 225mm (9") strip of membrane reinforcing at the joint.
- .12 Seal top edge of the membrane to the substrate with modified mastic at the end of each Working Day.
- .13 Prior to the installation of the insulation, inspect membrane for punctures or tears. Any location where the membrane's integrity has been breached, repairs are mandatory. The repair patch must extend at least 150mm (6") beyond the damaged area on all sides. Seal the perimeter edges of the repair patch with a bead of modified mastic.
- .14 Do not allow membrane to come in contact with coal tar products such as creosote, EPDM membrane or polysulphide based sealants.
- .15 Do not install the insulation or otherwise cover the waterproofing membrane until approval is given by the Contract Administrator, and Air/Vapour Barrier Inspections agency

3.4 PROTECTION OF FINISHED WORK

- .1 Follow manufacturer's recommendations for the application of protection boards.
- .2 The waterproofing membrane is not designed for permanent exposure. Protect membrane from job Site abuse as soon as possible following membrane application.

END OF SECTION

Part 1

General

1.1

RELATED SECTIONS

- .1 Section 07 25 00 – Air/Vapour Barrier Membrane
- .2 Section 07 53 33 – EPDM Membrane Roofing
- .3 Section 07 62 00 – Sheet Metal Flashing and Trim

1.2

REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM E96-96, Test Methods for Water Vapour Transmission of Materials or latest.
 - .2 ASTM C208-95, Standard Specification for Cellulosic Fiber Insulating Board or latest.
 - .3 ASTM C591-94, Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation or latest.
 - .4 ASTM C726-93, Standard Specification for Mineral Fiber Roof Insulation Board or latest.
 - .5 ASTM C728-97, Standard Specification for Perlite Thermal Insulation Board or latest.
 - .6 ASTM C1126-98, Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation or latest.
 - .7 ASTM C1289-98, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board or latest.
 - .8 ASTM C 665-98, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing, or latest.
 - .9 ASTM C 1320-99, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction, or latest.
- .4 Canadian Gas Association (CGA)
 - .1 CAN/CGA-B149.1-M95, Natural Gas Installation Code or latest.
 - .2 CAN/CGA-B149.2-95, Propane Installation Code or latest.
- .5 Canadian General Standards Board (CGSB)
 - .1 CGSB 71-GP-24M-77, Adhesive, Flexible, for Bonding Cellular polystyrene Insulation or latest.
- .6 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701-97, Thermal Insulation, Polystyrene, Boards and Pipe Coverings or latest.
 - .2 CAN/ULC-S702-97, Thermal Insulation, Mineral Fibre, for Buildings or latest.
 - .3 CAN/ULC-S705.1 – Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Material Specification
 - .4 CAN/ULC-S705.2 – Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Installer's Responsibilities – Specification.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from Site and dispose of packaging Materials at appropriate recycling facilities.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging Material for recycling.

1.4 ENVIRONMENTAL REQUIREMENTS

- .1 Apply foamed-in-place insulation only when surfaces and ambient temperatures are within manufacturer's recommended limits.

Part 2 Products

2.1 BLANKET INSULATION

- .1 Batt and blanket mineral fibre: to ASTM C 665, Type 1, CFC and formaldehyde free to R-Value/thickness and locations indicated on Drawings:
- .2 Mineral fibre thermal/acoustic:
 - .1 Unfaced, friction fit, rolls, to CAN/ULC-S702: Johns Manville, Roxul and Ottawa Fibre Inc. or approved alternative with 3rd party testing data to support and confirm.
- .3 Mineral fibre fire-resistant:
 - .1 "RXL Safe n' Sound" non-combustible mineral wool fibre insulation made from basalt rock and slag, by Roxul Inc.
 - .2 "Paroc Safing Insulation" by Partek Insulation, as distributed by Steels Industrial Products, basaltic rock fibres bonded into semi-rigid board.

2.2 RIGID INSULATION

- .1 Rigid board:
 - .1 Exterior walls above grade: Extruded polystyrene to CAN/ULC-S701, Type 3, RSI = 0.87/25mm (R5/in.), butt edges. Standard of acceptance: Styrospan, or Styrofoam CavityMate by Dow Chemical Inc., or CelFort 200 by Owen's Corning Celfortec Inc.

2.3 CONCRETE FACED INSULATED WALL PANELS

- .7 Wall panel attachment:
 - .1 Galvanized Steel: ASTM A123/A123M-08 - Zinc-Coated (Galvanized), Z275 to G90 coating designation, preformed as supplied by manufacturer, complete with corrosion proof masonry fasteners.
- .8 Insulation:
 - .1 STYROFOAM Tech-Crete Blanks by DOW Chemical, extruded polystyrene, conforming to code requirements, in accordance with CAN/ULC S701 type 4.
 - .2 Thermal resistance: RSI 0.87/25mm to ASTM C518.

- .3 Foam Compressive Strength: 240 kPa (35 PSI) in accordance with ASTM D1621.
- .4 Water Absorption: ASTM D2842: <0.7 % by volume
- .5 Water Vapour Permeance: 0.8 perms in accordance with ASTM E96
- .6 Insulation Thickness: 102mm
- .9 Concrete panels:
 - .1 Concrete: Latex modified concrete mix, 8 mm (5/16") thick, with control joint score at mid-length.
 - .2 Edge Treatment: Tongue and groove along longitudinal foam edges, butt joints on lateral edges.
 - .3 Surface Finish: Textured Broom finish; Grey colour, may be coated.
- .10 Accessories:
 - .1 Gaskets to Adjacent Substrates: Standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant; colour to match adjacent colour.
 - .2 Sealants to Adjacent Substrates: Standard type suitable for use with installation of system; non-staining, non-skinning, non-shrinking and non-sagging; ultraviolet and ozone resistant; colour as selected.
 - .3 Clips and Fasteners: Manufacturer's standard type to suit application; as supplied.
 - .4 Field Repair and Touch-up: As recommended by panel manufacturer.
 - .5 Wall panel coloured coating (if required): Exterior grade, latex based, concrete or masonry paint or stain.
- .11 Components:
 - .1 Exterior concrete faced insulated wall panel sizes:
 - .1 Width: 610 mm (24 inches).
 - .2 Length: 1220 mm (48 inches).
 - .3 Thickness: 110mm (4.3 inches)
- .12 Manufacturer: Tech-Crete Processors Ltd.
- 2.3 FOAMED-IN-PLACE INSULATION
 - .1 Spray-foam insulation: spray polyethylene to CAN/ULC-S705.1
 - .2 Primer (if required): in accordance with manufacturer's recommendations for surface conditions.
- 2.4 ADHESIVE
 - .1 Adhesive (for polystyrene): to CGSB 71-GP-24 or latest, Type Bulldog Wetstick/Bulldog Grip PL 200.

2.6 FASTENERS

- .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.
- .2 Performance requirements for installed insulation fasteners:
 - .1 Pullout Resistance: minimum 200N, perpendicular to applicable substrates and within temperature range of -30C to +40C.
 - .2 Corrosion Resistance: carbon steel components shall show not more than 15% of the surface rusted, and coatings shall not blister, peel or crack, when tested to Corrosion Test Procedure of Factory Mutual Research Approval Standard, Class I Roof Covers (4470)

Part 3 Execution

3.1 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 or as required by code, whichever is more stringent.
- .5 Cut and trim insulation neatly to fit all 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 cover insulation until it has been inspected and approved by Contract Administrator.

3.2 EXAMINATION

- .1 Examine substrates and immediately inform Contract Administrator of defects in writing.
- .2 Prior to commencement of Work ensure that substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

3.3 BLANKET INSULATION INSTALLATION

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .3 Do not compress insulation excessively to fit into spaces.
- .4 Use mineral fibre fire-resistant insulation where required to maintain fire separations.

- .5 In all sound rated walls, ensure that acoustic batt insulation is installed snugly to all penetrations and that acoustic separation is not compromised.
- .6 Do not enclose insulation until it has been inspected and approved by Contract Administrator.

3.4 RIGID INSULATION INSTALLATION

- .1 Where required, imbed insulation boards into vapour barrier type adhesive, using type and method as recommended by insulation manufacturer.
- .2 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150mm wide 0.15mm polyethylene strip over expansion and control joints using compatible adhesive before application of insulation.

3.5 CONCRETE FACED INSULATED WALL PANELS INSTALLATION

- .1 Install concrete faced insulation panels vertically, and extend boards full height of foundation. Install on exterior face of perimeter foundation wall using manufacturer's recommended concealed clip and mechanical fastening system.
- .2 Shape foam side of panels as required to ensure the panels sit flat against the substrate surface.
- .3 Seal all joints between concrete facing with manufacturer's recommended sealant, above and below grade.

3.6 FOAMED-IN-PLACE INSULATION INSTALLATION

- .1 Install spray-foam insulation to clean surfaces in accordance with CAN/ULC-S705.2, and manufacturer's written recommendations. Use primer where recommended by manufacturer.
- .2 Foam insulate all gaps between insulation and envelope, and at penetrations through the building envelope.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

- .1 Conform to the requirements of Division 1 in addition to the requirements of this section.

1.2 RELATED WORK

- .1 The sub trade is responsible for the supply and installation of the following items, including all related labour and Materials necessary to successfully complete the installation of same whether or not noted on the Contract Documents.
 - 1. Composite building panels
 - 2. Fastening system
 - 3. Closures and related trim
 - 4. Caulking and sealants

1.3 QUALITY ASSURANCE

- .1 Manufacturer's Qualification: 20 year minimum experience in Manufacturing Glass Fibre Reinforced Concrete Panels.
- .2 Provide a written guarantee covering the replacement of defective Work for a period of one year from the expiry of the standard one year Contractor's warranty.
- .3 The following will be deemed as defective Work; leakage, failure to stay in place, undue cracking, chipping or adjacent deformations, panel deformation, buckling, spalling, deterioration of surface. Failure of 15% of surface area of panels shall be deemed a total failure of the installation requiring complete re-application of the panels.
- .4 In addition, provide a written guarantee from the manufacturer regarding defective panel replacement, for a period of 3 years.

1.4 SHOP DRAWINGS

- .1 Building panel Shop Drawings shall be submitted to the Contract Administrator for review. No Work shall be fabricated before review of Shop Drawings by the Contract Administrator. Submit Shop Drawings in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Indicate on the Drawings all information required to fabricate and install components of the Section. This shall include product and Material standards, dimensions, connection and jointing details, gauges, finishes, etc. ensure that plan and section details of interior and exterior corners, horizontal and vertical joints, fascias and soffits, cut-outs, misc. trim, fastening methods etc., are shown at a minimum 1:5 scale.

Part 2 Products

2.1 PANEL SYSTEM

- .1 The following specified products and Materials form the complete building panel system required for this Project. Ensure that only compatible products and Materials are used. Alternates may only be used if approved, in writing, by the Contract Administrator.
- .2 Face Fastened: Wall panels shall be exposed aggregate faced panels, prefabricated on 50mm (2") rigid insulation and are to be face fastened. They shall consist of inorganic fibre with natural stone and cement.
- .3 Back fastened: Panels shall be SYNSTONE simulated slate panels, and are to be back fastened. They shall consist of inorganic fibre with natural stone and cement.

- .3 Panels shall be fabricated in the factory to ensure that they are the same size, consistent in colour and free from warps, cracks and other imperfections. The panels shall be Synstone Thermo-shield, Series #1, #2 or #3 depending on location with a nominal overall thickness of 57mm(2-1/4"), 60mm (2-3/8") or 63mm (2-1/2").
- .4 These panels shall meet a maximum flame spread rating of 5 and a maximum developed smoke rating of 25 when tested in accordance to CAN4-S102M. FR designed panels are non-combustible when tested to ASTM E-136-81 (Also CAN4-S114M80). The panel sizes of 122 mm (48") by 3048mm (120") are to be used in order to minimize joints when being installed on the job Site.
- .5 Panels shall be glass fibre reinforced concrete Synstone panels as manufactured by Concrete Cladding Systems Ltd., 905.607.8304, supplied and installed as per the manufacturer's latest published data, and as noted on the Drawings and Specifications.
- .6 The concrete panel has been designed for a wind load of 25 psf. Based on the recommendation of the Pre-stressed Concrete Institute (PSI), a factor of Safety of 4 to 6 should be used for GFRC Materials. A safety factor of 4 has been used in this design calculation

2.2 FASTENERS

.1 Consealed Fasteners

- .1 All panels are supplied with 8mm (5/16") dia. blind weld nuts cast in the panels during manufacturing. 12 gauge galvanized steel hook clips are bolted to the panels with 8mm (5/16") dia. bolts and the assembly is hung on 16 gauge galvanized steel "J" girts that are mechanically fastened to the substrate.

.2 Exposed Fasteners

- .1 Concrete and brick masonry walls, use 5mm (3/16") Tapcons or Drillcrete self tapping concrete anchors. Colour matched fasteners to be flat head and epoxy coated. Minimum 38mm (1 1/2") effective embedment.
- .2 All screws should have sufficient corrosion resistance or be coated with climaseal, or equivalent corrosion resistant products.
- .3 The distance between fasteners both vertically and horizontally should not be more than 610mm (24") o.c. and also not less than 13mm (1/2") from the panel's edge. Care should be taken that the head of the screw does not penetrate the panel surface. Note that the head of the screw must be colour matched to the panel.
- .4 A joint gap of not less that 6mm (1/4") must be maintained between all panels. All joints should be filled with backing rod and caulking using a high quality sealant.

2.3 SEALANTS

- .1 Dow Corning 795 or CWS, one-part silicone, neutral-cure, architectural or Bondaflex Sil 295 NB or Sil 199PG, one-part silicone neutral cure, architectural sealant. Colour as selected by the Contract Administrator from the manufacturer's chart.

Part 3 Execution

3.1 INSTALLATION

- .1 All panels are to be installed level, true and plumb and in line as indicated on the Drawings. Tolerances shall be within 2mm in 3 meters vertically and horizontally, and 3mm in 3 meters for the diagonal surface alignment.

- .2 Panels required to be stored shall be protected from dirt and damage. Keep panels covered at all times to protect from dirty rain water until on the project. Panels which are damaged in any way shall not be accepted or installed.
 - .3 Synstone Thermo-shield exterior panels are to be pre-drilled with a 5mm (3/16") concrete drill bit.
 - .4 Screws are to be located so that panels can be individually removed without removing adjacent Materials such as flashing.
 - .5 To maintain 6mm (1/4") gaps between panels use "Synstone Black Shims" before panels are fastened. Remove before caulking.
 - .6 Site cut one panel to the correct width in a long run of panels to ensure 6mm (1/4") gap is maintained between all panels.
 - .7 During installation immediately remove any dust from the surface of the panels caused from saw cutting or drilling. If not removed could stain panel.
 - .8 It is recommended that only installers approved by Synstone International Ltd. be allowed to install this system.
- 3.2 CLEAN UP
- .1 Clean all panels periodically during the process of reaching substantial completion with approved methods in accordance with manufactures recommendations. Dust from cutting and drilling holes in panels must be removed immediately. Do not use wire brushes, metallic tools or abrasives.
 - .2 Upon completion of panel installation, remove any excess sealant with solvent approved or recommended by the panel manufacturer. Power wash the complete installation to remove construction dirt. No routine maintenance is required with Synstone panels. If required, the panels may be cleaned with mild detergent and water or plain water.

END OF SECTION

Part 1

General

1.1

RELATED SECTIONS

- .1 Section 05 30 00 – Structural Steel Deck
- .2 Section 06 10 00 – Rough Carpentry
- .3 Section 07 13 00 – Sheet Waterproofing
- .4 Section 07 21 13 – Board Insulation
- .5 Section 07 25 00 – Air/Vapour Barrier Membrane
- .6 Section 07 62 00 – Sheet Metal and Flashing
- .7 Section 07 92 00 – Joint Sealings
- .8 Division 22 – Plumbing Penetrations.
- .9 Division 23 – HVAC Penetrations
- .10 Division 26 – Electrical Penetrations

1.2

REFERENCES

- .1 ASTM C 1177/C 1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2006.
- .2 ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2013.
- .3 ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- .4 ASTM D 4637 - Standard Specification for EPDM Sheet used in Single-Ply Roof Membrane; 2004.
- .5 ASTM D 4811 - Standard Specification for Nonvulcanized (Uncured) Rubber Sheet Used as Roof Flashing; 2004.
- .6 ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.
- .7 ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
- .8 FM 1-28 - Design Wind Loads; Factory Mutual System; 2007.
- .9 FM 1-29 - Roof Deck Securement and Above Deck Roof Components; Factory Mutual System; 2006.
- .10 FM 4470 - Approval Standard - Class I Roof Covers; current version.
- .11 PS 1 - Construction and Industrial Plywood; 2009.
- .12 PS 20 - American Softwood Lumber Standard; 2010.
- .13 SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; 2007. (ANSI/SPRI ES-1).

1.3 QUALIFICATIONS

- .1 Applicator Qualifications: Roofing installer shall have the following:
 - .1 Current Firestone Red Shield Licensed Contractor status.
 - .2 At least five years experience in installing specified system.
- .2 Pre-Installation Conference: Before start of roofing work, Contractor shall hold a meeting to discuss the proper installation of materials and requirements to achieve the warranty.
 - .1 Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.
 - .2 Notify Contract Administrator well in advance of meeting.

1.4 QUALITY ASSURANCE

- .1 Review details related to installation of roofing system and notify Contract Administrator in writing of conditions unacceptable for installation of specified Materials. Absence of such notice will be construed as an acceptance of area to be roofed.
- .2 Upon completion, have the installation inspected by an authorized representative of the manufacturer in the presence of the City's representative.

1.5 SUBMITTALS

- .1 Submit in duplicate latest edition of manufacturer's product data, details and installation recommendations.
- .2 Shop Drawings: Provide:
 - .1 The roof membrane manufacturer's standard details customized for this project for all relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.
- .3 Pre-Installation Notice: Copy to show that manufacturer's required Pre Installation Notice (PIN) has been accepted and approved by the manufacturer

1.6 PRODUCT HANDLING

- .1 All Materials: handle and store in a manner which will prevent their damage. Store in original containers and clearly mark with supplier's name and product name.
- .2 Store uncured flashing products in a cool (under 21°C) and dry area to avoid premature curing.
- .3 Store all other Materials in a protected dry area where temperature maintained between 10°C to 27°C

1.7 JOB CONDITIONS

- .1 Weather: do not proceed with Work under conditions of inclement weather such as precipitation or high winds, or when such conditions appear imminent. Work at temperatures below 5°C may require the use of a heat gun for Work involving uncured EPDM flashing.
- .2 All surface: dry and free from dust and debris.
- .3 Solvent Materials and cleaners: do not use near sparks or open flames. Properly ventilate areas where solvent-base Materials are in use to avoid concentration of vapours.

1.8 WARRANTY

- .1 Warranty: 20 year labour and Material standard warranty shall be issued by manufacturer to the City through the Applicator warranting the EPDM membrane and all roof systems in accordance with manufacturer published warranty.
- .2 The applicator (Roofing Subcontractor) shall pay fees for this warranty to the manufacturer of EPDM membrane, before proceeding with Work. The receipt confirming payment shall be presented to the City and the Contract Administrator through the Contractor's office.

1.9 PROTECTION

- .1 Fire: protect all Materials against contact with extreme heat, sparks, and open flames during storage and installation.
- .2 Incompatible Materials: protect all Materials against contact with incompatible Materials including, but not limited to, petroleum distillates, organic solvents, and solvent-based roof cement.

Part 2 Products

2.1 GENERAL

- .1 All elements of the EPDM Roofing System shall be products of the system manufactured with the system trademark. Materials used in conjunction with the system which are not products of this manufacturer shall be approved in writing by the system manufacturer.

2.2 ROOFING SYSTEM DESCRIPTION

- .1 Roofing System:
 - .1 Membrane: Ethylene propylene diene monomer (EPDM).
 - .2 Thickness: As specified elsewhere.
 - .3 Membrane Attachment: Fully adhered.
 - .4 Slope: Deck is flat. Provide required slope by means of tapered insulation.
 - .5 Comply with applicable local building code requirements.
- .2 Deck Cover: Gypsum sheathing board.
- .3 Vapor Barrier over deck cover:
 - .1 Membrane: High density polyethylene sheet with SBS modified bitumen adhesive.
 - .2 Attachment: Self adhering.
- .4 Insulation:
 - .1 Total System R Value: R-35
 - .2 Maximum Board Thickness: 2 inches (50 mm); use as many layers as necessary; stagger joints in adjacent layers.
 - .3 Base Layer: Polyisocyanurate foam board, non-composite.
 - .4 Attachment: Fasten as required for 20 year warranty.
- .2 Top Layer: Polyisocyanurate foam board, non-composite.
 - .1 Attachment: Fasten as required for 20 year warranty.

2.3 EPDM ROOFING SYSTEM MATERIALS

- .1 Gypsum Sheathing Board: fiberglass mat faced, treated gypsum core panel, Georgia Pacific DensDeck, Type 'X', moisture-resistant, thickness as noted, maximum practical lengths.

- .2 Vapor Barrier Membrane: Comprised of SBS modified bitumen adhesive, factory-laminated to a tri-laminate woven, high-density polyethylene top surface. Release liner protecting adhesive.
 - .1 Intended for use as a direct to deck air/vapor barrier in roofing systems and may be used as a temporary roof membrane for up to ninety (90) days.
 - .2 Thickness: 0.0325" (0.826 mm) minimum, when tested in accordance with ASTM D 5147.
 - .3 Max Load at Break at 73 °F (23 °C): 64 lbf/in, MD (11 kN/m) 88 lbf/in, XMD (15 kN/m) when tested in accordance with ASTM D 5147.
 - .4 Low Temperature Flexibility: -30 °F (-34 °C) when tested in accordance with ASTM D 5147.
 - .5 Moisture Vapor Permeance, 0.02 Perms (0.92 Ng/Pa•s•m²) maximum, when tested in accordance with ASTM E 96.
 - .6 Air Permeability: 0.00114 ft³/min•ft² (0.007 L/sec•m²) maximum, when tested in accordance with ASTM E 2178.
 - .7 Acceptable Product: V-Force Vapor Barrier Membrane by Firestone.
- .3 Base Layer Roofing Insulation: Closed cell polyisocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM C 1289 Type II Class 1, with the following additional characteristics:
 - .1 Thickness: as noted
 - .2 Size: 48 inches (1220 mm) by 96 inches (2440 mm), nominal. Exception: Insulation to be attached using adhesive or asphalt may be no larger than 48 inches (1220 mm) by 48 inches (1220 mm), nominal.
 - .3 R-Value (LTTR): 1.0 inch (25 mm) Thickness: 6.25", minimum.
 - .4 Compressive Strength: 20 psi (138 kPa) when tested in accordance with ASTM C 1289.
 - .5 Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
 - .6 Acceptable Product: ISO 95+ polyiso board insulation as manufactured by Firestone.
- .4 Sloped Roofing Insulation: Closed cell polyisocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM C 1289 Type II Class 1, with the following additional characteristics:
 - .1 Thickness: as noted
 - .2 Size: 48 inches (1220 mm) by 96 inches (2440 mm), nominal. Exception: Insulation to be attached using adhesive or asphalt may be no larger than 48 inches (1220 mm) by 48 inches (1220 mm), nominal.
 - .3 R-Value (LTTR): 1.0 inch (25 mm) Thickness: 6.25", minimum.
 - .4 Compressive Strength: 20 psi (138 kPa) when tested in accordance with ASTM C 1289.
 - .5 Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
 - .6 Acceptable Product: ISO 95+ polyiso board insulation as manufactured by Firestone.
- .5 Roofing and Flashing Membrane: Cured synthetic single-ply membrane composed of ethylene propylene diene terpolymer (EPDM) with the following properties:
 - .1 Colour: Black
 - .2 Thickness: 1.5mm (0.060")
 - .3 Membrane attachment: Fully adhered

- .4 Reinforcement: Polyester weft inserted scrim; membrane complying with ASTM D 4637 Type II.
- .5 Nominal Thickness Tolerance: Plus/minus 10 percent.
- .6 Sheet Width: Provide the widest available sheets to minimize field seaming.
- .7 Acceptable Product: RubberGard Reinforced EPDM Membrane as manufactured by Firestone.

2.4 RELATED PRODUCTS

- .1 Flashing Membrane: Self-curing, non-reinforced membrane composed of nonvulcanized EPDM rubber, complying with ASTM D 4811 Type II, and with the following properties:
 - .1 Thickness: 0.055 inch (1.4 mm).
 - .2 Color: Same as field membrane
 - .3 Acceptable Product: RubberGard EPDM FormFlash as manufactured by Firestone.
- .2 Membrane Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.
- .3 Self-Adhesive Flashing Membrane: Semi-cured 45 mil EPDM membrane laminated to 35 mil (0.9 mm) EPDM tape adhesive; QuickSeam Flashing as manufactured by Firestone.
- .4 Pre-Molded Pipe Flashings: EPDM, molded for quick adaptation to different sized pipes; Firestone EPDM Pipe Flashing.
- .5 Self-Adhesive Lap Splice Tape: 35 mil (0.9 mm) EPDM-based, formulated for compatibility with EPDM membrane and high-solids primer; QuickSeam Splice Tape as manufactured by Firestone.
- .6 Splice Adhesive: Synthetic polymer-based, formulated for compatibility with EPDM membrane and metal surfaces; SA-1065 Splice Adhesive as manufactured by Firestone.
- .7 Bonding Adhesive: Neoprene-based, formulated for compatibility with EPDM membrane and wide variety of substrate materials, including masonry, wood, and insulation facings; Bonding Adhesive BA-2004 as manufactured by Firestone.
- .8 Adhesive Primer: Synthetic rubber based primer formulated for compatibility with EPDM membrane and tape adhesive, with VOC content less than 2.1 lb/gal (250 g/L); QuickPrime Plus LVOC as manufactured by Firestone.
- .9 Low Rise Foam Adhesive: Two-component, low-rise polyurethane adhesive designed to attach polyisocyanurate insulation to a variety of acceptable substrates; ISO Stick as manufactured by Firestone.
- .10 Seam Edge Treatment: EPDM rubber-based sealant, formulated for sealing exposed edges of membrane at seams; Lap Sealant HS as manufactured by Firestone.
- .11 Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer as manufactured by Firestone.
- .12 Water Block Seal: Butyl rubber sealant for use between two surfaces, not exposed; Water Block Seal as manufactured by Firestone.
- .13 Metal Plates and Strips Used for Fastening Membrane and Insulation: Steel with Galvalume coating; corrosion-resistance meeting FM 4470 criteria.
 - .1 Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches (33 mm) wide by 0.10 inch (2.5 mm) thick; Firestone Termination Bar as manufactured by Firestone.

- .14 Insulation Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.
- .15 Adhesive for Insulation Attachment: Type as required by roof membrane manufacturer for roofing system and warranty to be provided; use only adhesives furnished by roof membrane manufacturer.
- .16 Wood Nailers: PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.
 - .1 Width: 3-1/2 inches (90 mm), nominal minimum, or as wide as the nailing flange of the roof accessory to be attached to.
 - .2 Thickness: Same as thickness of roof insulation.
- .17 Ballast: No. 4, washed and well rounded.

Part 3 Execution

3.1 GENERAL

- .1 Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.
- .2 Obtain all relevant instructions and maintain copies at project site for duration of installation period.
- .3 Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.
- .4 Perform work using competent and properly equipped personnel.
- .5 Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.
- .6 Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F (15 to 25 degrees C).
- .7 Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
 - .1 Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
 - .2 Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
 - .3 Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.
- .8 Until ready for use, keep materials in their original containers as labeled by the manufacturer.
- .9 Consult membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

3.2 INSPECTION OF SUBTRATE

- .1 Prior to start of installation, examine all roof areas included in this Work. Notify the Contract Administrator of any unacceptable conditions. These include, but are not limited to, uneven deck surfaces, improperly installed curbs or nailers, surfaces with fins or sharp projections, and surfaces contaminated with incompatible Materials. Do not begin Work until these conditions have been corrected. Protect membrane in high traffic areas, eg. Work by other trades, application of gravel, etc.
- .2 Inform the City's appointed Roofing Inspector of roofing application schedule before proceeding with Work.

3.3 PREPARATION

- .1 Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.
- .2 Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.
- .3 Fill all surface voids in the immediate substrate that are greater than 1/4 inch (6 mm) wide with fill material acceptable insulation to membrane manufacturer.
- .4 Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.

3.4 SHEATHING

- .1 Install gypsum board sheathing to steel deck using continuous beads of adhesive on each flute.
- .2 Lay boards with long side at right angle to flutes, stagger end joints, provide full support at ends.
- .3 Cut sheathing cleanly and accurately to roof breaks and protrusions to provide a smooth surface.
- .4 Mechanically fasten sheathing around perimeter of roof deck to distance of 200mm in from edges using 8 fasteners with washers @ 152mm (6") o.c.

3.5 APPLICATION OF VAPOUR BARRIER

- .1 All deck/deck cover substrates (except metal decks) must be primed prior to application. Use only primer supplied by membrane manufacturer.
- .2 Expanded Polystyrene, Extruded Polystyrene, Common Polyisocyanurate, Fiberglass, Wood Fiber, Perlite and existing single-ply roofs are not acceptable substrates for SBS bitumen adhesive.
- .3 Application can be made at ambient temperatures as low as 25 °F (-4 °C) as long as membrane has been stored in a heated area so that it will be between 50 °F (10 °C) and 100 °F (38 °C) at the time of application.
- .4 Install with minimum 3" (76.2 mm) side laps and 6" (152.4 mm) end laps.
- .5 Roll in with a 75lb (34kg) roller to fully mate each roll to substrate, including all lap areas.
- .6 Extend vapour retardant undercant strips and blockings and lap over air/vapour barrier of wall construction to provide continuity of building air/vapour envelope.

3.6 INSULATION

- .1 Install insulation in configuration and with attachment method(s) specified in PART 2, under Roofing System.
- .2 Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.
- .3 Lay roof insulation in courses parallel to roof edges.
- .4 Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/4 inch (6 mm). Fill gaps greater than 1/4 inch (6 mm) with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than 1/4 inch (6 mm).
- .5 Mechanical Fastening: Using specified fasteners and insulation plates engage fasteners through insulation into deck to depth and in pattern required by Factory Mutual for FM Class specified in PART 2 and membrane manufacturer, whichever is more stringent.
- .6 Adhesive Attachment: Apply in accordance with membrane manufacturer's instructions and recommendations; "walk-in" individual roof insulation boards to obtain maximum adhesive contact.

3.7 INSTALLATION OF FULLY ADHERED EPDM

- .1 Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.
- .2 Lay out the membrane pieces so that field and flashing splices are installed to shed water.
- .3 Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.
- .4 Install membrane adhered to the substrate, with edge securement as specified.
- .5 Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer's recommended bonding material, application rate, and procedures.
- .6 Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches (1:6) using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.
 - .1 Exceptions: Round pipe penetrations less than 18 inches (460 mm) in diameter and square penetrations less than 4 inches (200 mm) square.
 - .2 Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing manufacturer.

3.8 FLASHING AND ACCESSORIES INSTALLATION

- .1 Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.
- .2 Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on the Drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.
 - .1 Follow roofing manufacturer's instructions.
 - .2 Remove protective plastic surface film immediately before installation.

- .3 Install water block sealant under the membrane anchorage leg.
 - .4 Flash with manufacturer's recommended flashing sheet unless otherwise indicated.
 - .5 Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.
 - .6 If the roof edge includes a gravel stop and sealant is not applied between the laps in the metal edging, install an additional piece of self-adhesive flashing membrane over the metal lap to the top of the gravel stop; apply seam edge treatment at the intersections of the two flashing sections.
 - .7 When the roof slope is greater than 1:12, apply seam edge treatment along the back edge of the flashing.
- .3 Scuppers: Set in sealant and secure to structure; flash as recommended by manufacturer.
 - .4 Roofing Expansion Joints: Install as shown on Drawings and as recommended by roofing manufacturer.
 - .5 Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; extend flashing at least 8 inches (200 mm) high above membrane surface.
 - .1 Use the longest practical flashing pieces.
 - .2 Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
 - .3 Complete the splice between flashing and the main roof sheet with specified splice adhesive before adhering flashing to the vertical surface.
 - .4 Provide termination directly to the vertical substrate as shown on Roof Drawings.
 - .6 Roof Drains:
 - .1 Taper insulation around drain to provide smooth transition from roof surface to drain. Use specified pre-manufactured tapered insulation with facer or suitable bonding surface to achieve slope; slope not to exceed manufacturer's recommendations.
 - .2 Position membrane, then cut a hole for roof drain to allow 1/2 to 3/4 inch (12 to 19 mm) of membrane to extend inside clamping ring past drain bolts.
 - .3 Make round holes in membrane to align with clamping bolts; do not cut membrane back to bolt holes.
 - .4 Apply sealant on top of drain bowl where clamping ring seats below the membrane
 - .5 Install roof drain clamping ring and clamping bolts; tighten clamping bolts to achieve constant compression.
 - .7 Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.
 - .1 Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical; otherwise use specified self-curing elastomeric flashing.
 - .2 Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2 inches (50 mm) deep, with at least 1 inch (25 mm) clearance from penetration, sloped to shed water.
 - .3 Structural Steel Tubing: If corner radii are greater than 1/4 inch (6 mm) and longest side of tube does not exceed 12 inches (305 mm), flash as for pipes; otherwise, provide a standard curb with flashing.
 - .4 Flexible and Moving Penetrations: Provide weathertight gooseneck set in sealant and secured to deck, flashed as recommended by manufacturer.

3.9 BALLAST APPLICATION

- .1 Before spreading ballast, check the membrane thoroughly to verify that laps have been sealed and system is free of damage.
- .2 Ballast No. 4 Stone (well rounded). Ballast weight will be applied as follows:
 - .1 Field 10 lbs/sq.ft.
 - .2 Perimeter 12 lbs/sq.ft. – 9 ft. strip all around
 - .3 Corners 15 lbs/sq.ft. – 9 ft. x 9 ft. square

3.10 NIGHT STOP

- .1 Temporarily seal membrane to deck or abutting roof membrane with mastic recommended by membrane manufacturer.

3.11 CLEAN UP

- .1 Applicators shall remove all debris related to this Work from the project Site.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

- .1 The Work included under this section shall conform to the industry standard and be accepted by the local construction and trade associations.

1.2 RELATED WORK

- .1 Section 01 33 00 – Submittal Procedures
- .2 Division 04 – Masonry
- .3 Section 06 10 00 – Rough Carpentry
- .4 Section 07 92 00 – Joint Sealing
- .5 Division 21 – General Mechanical Requirements
- .6 Division 26 – Electrical

1.3 EXISTING CONDITIONS/PROTECTION

- .1 Exercise care when working on or about roof surfaces to avoid damage or puncturing membrane or flexible flashings.
- .2 Place plywood panels on roof surfaces to Work of this section and on access routes. Keep in place until completion of Work.

Part 2 Products

2.1 SHEET MATERIALS

- .1 Flashings and Bent Closures: 0.6 mm (24 ga.) core steel, shop pre-coated.
- .2 Flashing colour at windows and parapets: as selected by Contract Administrator from standard 8000 series colours.
- .3 Flashings at limestone: Galvalume
- .4 Fascia: shop pre-coated steel to same thickness as .1 above – colour by Contract Administrator.
- .5 Eavestroughs and light guage downspouts: pre-coated steel of 24 gauge, unless otherwise noted as per Drawings. Colour as selected by Contract Administrator from standard colours.
- .6 Pipe Sleeves: pre-coated steel of 24 gauge as per Drawings. Colour as selected by Contract Administrator from standard colours.
- .7 Vents: pre-coated steel of 24 gauge as per Drawings. Colour as selected by Contract Administrator from standard colours.

2.2 ACCESSORIES

- .1 Fastener:
 - .1 Screws: Prefinished steel with fiberglass reinforced nylon head and soft neoprene washer, at exposed locations. Finish exposed fasteners to be same colour as flashing and fascias.

- .2 Nails: Of same Material as sheet metal to CSA B111, flat head roofing nails of length and thickness suitable for metal flashing application.
- .3 Washers: of same Materials as sheet metal, 1mm (0.04") thick, with rubber packing.
- .2 Sealant: in accordance with Section 07 92 00 – Joint Sealers. Colours to be selected by Contract Administrator.
- .3 Plastic cement: to CGSB 37-GP-5Ma.
- .4 Isolation coating: alkali-resistant bituminous paint.
- .5 Underlay for metal flashing: No. 15 perforated asphalt felt to CAN/CSA-A123.3.
- .6 Cleats: of same Material and temper as sheet metal, minimum 50mm (2") wide. Thickness same as sheet metal being secured.
- .7 Solder: to ASTM B32, "Standard Specification for Solder Metal", fifty percent (50%) tin and fifty percent (50%) lead.
- .8 Flux: Rosin, cut hydrochloric acid, or commercial preparation suitable for Materials to be soldered.
- .9 Touch-up paint: as recommended by prefinished Material manufacturer.

2.3 FABRICATION

- .1 Form sections true to shape, accurate in size, square, and free from distortion or defects.
- .2 Fabricate cleats, clips, and starter strips of same Material as sheet, inter-lockable with sheet.
- .3 Form pieces in longest practical lengths, 2440mm (8ft.) maximum. Make allowance for expansion at joints.
- .4 Hem exposed edges on underside 13mm; miter and seam corners with sealant.
- .5 Form Material with flat lock seam.
- .6 Seal all joints with silicone.
- .7 Fabricate corners from one piece with minimum 450mm long legs; solder for rigidity, seal with silicone sealant.
- .8 Fabricate vertical faces with bottom edge formed outward 6mm and hemmed to form drip.
- .9 On exposed faces, return drip edge hem back to form interlock with concealed clip. Provide continuous clips at all exposed faces.
- .10 Fabricate flashings to allow toe to extend 50 mm over roofing. Return and brake edges.
- .11 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .12 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

Part 3 Execution

3.1 INSPECTION

- .1 Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
- .2 Verify membrane termination and base flashings are in place, sealed, and secure.

- .3 Beginning of installation means acceptance of existing conditions.
- 3.2 PREPARATION
- .1 Field measure Site conditions prior to fabricating Work.
 - .2 Install starter and edge strips, and cleats before starting installation.
- 3.3 INSTALLATION
- .1 Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
 - .2 Secure flashings in place using concealed continuous clip fasteners at all visible flashings. Use exposed fasteners only in locations not ordinarily visible (e.g. - inside parapet walls). All exposed fasteners must be on vertical surfaces.
 - .3 Apply plastic cement compound between metal flashings and felt flashings.
 - .4 Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
 - .5 Seal metal joints watertight.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 03 30 00 – Cast-In-Place Concrete
- .3 Section 09 29 00 – Gypsum Board
- .4 Division 21 – Mechanical General Requirements
- .5 Division 26 – Electrical

1.2 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

- .1 Provide fire and smoke stop systems consisting of a Material, or combination of Materials installed to maintain the integrity of the Fire Resistance Rating of the fire separation by maintaining an effective barrier against the spread of flame, smoke, heat and / or hot gases through penetrations, blank openings, construction joints, or at perimeter fire containment in or adjacent to the Fire Separation in accordance with the requirements of the National Building Code and Manitoba Building Code.
- .2 All fire separations to have a Fire Resistance Rating to them as indicated on Drawings. All Non-rated Fire Separations to be assigned a 45-minute Fire Resistance Rating or an F-Rating of ¾ hour minimum. Both sides of a non-rated fire separation to have a tested fire and smoke stop system applied, to match or exceed the F-rating, as indicated.
- .3 All multiple service penetration through a fire separation must have a minimum space equal to the same size of the smallest pipe or greater, minimum 50mm, between pipes to be considered an individual services penetration. Penetrations where the space between penetrating items is less than 50mm will be classified as a multi-penetrations and a square or rectangular opening shall be constructed around the penetrations with a fire and smoke stop system applied to the entire opening.

1.3 REFERENCES

- .1 Standard Method of Fire Tests Through Penetration Fire Stops, ULC-S115-M.2005/ CAN4-S115-M.2005 or ASTM E814 Test Requirements or latest.
- .2 Underwriters Laboratories (UL) ASTM E-814 under their designation of UL 1479, Fire-Tests of Through Penetration Firestops and publishes the results in FIRE RESISTANCE DIRECTORY. UL tests that meet the requirements of ULC-S115-M.2005 are given a cUL listing and are published by UL in Products Certified for Canada (cUL) Directory.
- .3 Latest edition of the ULC or cUL Listings for Firestop Systems and Components.
- .4 Standard Test Method for Surface Burning Characteristics of Building Materials, CAN/ULC-S102-M or ASTM E84 or latest.
- .5 Method for Fire tests of Building Construction and Materials CAN/ULC-S101 or ASTM E119 or latest.
- .6 International Firestop Council Guidelines (IFC) for Evaluating Firestop Systems Engineering Judgements.
- .7 International Firestop Council (IFC) Inspection Guideline and ASTM E2174-04, Standard Practice for On-Site Inspection of Installed Firestop Systems and ASTM E2393-04, or

latest Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.

.8 National Building Code and the Provincial Building Code of the Province that the Authority Having Jurisdiction is responsible for.

.9 NFPA 101-Life Safety Code

.10 Canadian Electrical Code

1.4 DESIGN SYSTEM LISTINGS/SHOP DRAWINGS

.1 Submit Design System Listings, product data and Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 – Submittal Procedures. Also provide the following product data on each proposed product:

.1 Technical data on out-gassing; off-gassing and age testing.

.2 Curing time.

.3 Chemical compatibility to other construction Materials.

.2 Provide Certification by the Manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's) and are non-toxic to building occupants.

.1 According to ASTM E595.

.2 Test Method: Environmental Protection Association, EPA Method 24.

.3 Indoor Environmental Quality: Volatile Content: below 250 g/l.

.4 **DO NOT** use silicone firestops.

.3 Design System Listings shall show proposed Material, including technical data, reinforcement, anchorage, fastenings and method of installation. Construction details shall accurately reflect actual job Site conditions.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver Materials undamaged in manufacturer's clearly labelled, unopened containers, identified with brand, type, and ULC or cUL label, complete with batch number, manufacturing date and shelf life expiry date.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Do not install firestopping when ambient or substrate temperatures are outside limits permitted by Manufacturers or when substrates are wet, due to rain, frost, condensation, or other causes.

1.7 WARRANTY

.1 Manufacturers shall warrant Work of this Section against defects and deficiencies in the product Material for a period of two (2) years from date of Substantial Performance, in accordance with General Conditions of Contract. Promptly correct any defects or deficiencies, which become apparent within warranty period at no expense to the City.

.2 Fire and smoke stop system Contractor hereby warrants workmanship on Material installation for period of two (2) years from date of Substantial Performance, in accordance with General Conditions of Contract. Promptly correct any defects or deficiencies, which become apparent within warranty period at no expense to the City.

Part 2 Products

2.1 MATERIALS

- .1 Fire-stopping and smoke-seal systems: in accordance with CAN4-S115-M2005 or latest or ASTM E814 or latest.
 - .1 Asbestos-free Materials and systems capable of maintaining an effective barrier against the passage of flame, smoke, water and toxic gases in compliance with requirements of CAN4-S115-M2005 or latest or ASTM E814 or latest, and not to exceed opening sizes for which they are intended, in accordance with ULC or cUL Design Numbers or other Design System Listings acceptable to local Authority Having Jurisdiction.
 - .2 Firestopping Materials/systems shall be flexible to allow for movement of building structure (refer to architectural and structural) and penetrating item(s) without affecting the adhesion or integrity of the system.
- .2 Fire-stop Methods:
 - .1 Method 1: non-combustible, semi-rigid, felt; minimum density 65 kg per cu/m²; depth 100mm, length 1200mm; width as required. Blanket type fire-stop to be listed, and labelled in accordance with file Guide 40-U19.13. Impale - clips; galvanized wire or 25mm x 0.65mm thick galvanized steel Z-clips with dimensions to match location of fire stop Material and width of opening being sealed.
 - .2 Method 2: as per Method 1, without impale - clips.
 - .3 Method 3: Hose stream UL/cUL (Underwriters Laboratories USA) labelled.
 - .4 Method 4: Hose stream, fluid, gas and fire resistant elastomeric seal or non-shrink foam cement mortar proprietary certified assembly of a listed manufacturer.
 - .5 Methods 1 to 4: Methods used can be as per manufacturer's instructions, provided that their system employed meets or exceed the requirements of ULC/CAN4-S115-M2005 or ASTM E814 or latest.
- .3 Mechanical or Electrical service: penetration assemblies; certified in accordance with CAN4-S115-M2005 or latest or ASTM E814 or latest and listed in the ULC Guide No. 40 U19.
- .4 Service - penetration fire-stop components: Certified in accordance with CAN4-S115-M95 or latest or ASTM E814 or latest and listed in the ULC Guide No. 40 U19.
- .5 Fire-resistance rating of installed fire-stopping assembly not less than fire-resistance rating of surrounding substrate assembly (floor or wall) in accordance with the NBC.
- .6 Fire-stopping and smoke-seals at openings intended for re-entry such as cables; elastomeric seal or non-shrink foam cement mortar: do not use cementitious or rigid seal at such locations.
- .7 Firestopping and smoke-seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal; do not use a cementitious or rigid seal at such locations.
- .8 Primers: to manufacturer's recommendation for specific Material, substrate, and end-use.
- .9 Water (if applicable: portable, clean and free from injurious amounts of deleterious

substrates.)

- .10 Damming and back-up Materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .11 Sealants for vertical joints: non-sagging and having a flame-spread of not more than 25 and a maximum smoke development classification of 100 for walls and 50 for ceilings.

2.2 PRODUCT SYSTEMS

- .1 Single source responsibility: obtain firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.
 - .1 Materials of different manufacturers shall not be intermixed on the project.
- .2 Acceptable manufacturers:
 - .1 AD Fire Protection Systems Inc
 - .2 Hilti Fire Stop
 - .3 3M Fire Protection
 - .4 Tremco, Tremstop, Firestop Systems
 - .5 Rectorseal, Biofireshield

2.3 ACCEPTABLE FIRE STOP APPLICATORS

- .1 National Firestop Ltd.
- .2 Total Fire Stop Systems Limited
- .3 Western Construction Services Ltd.
- .4 Groundstar Systems (1987) Ltd.
- .5 Secure Firestop

Part 3 Execution

3.1 EXAMINATION

- .1 Verify substrate conditions, previously installed are acceptable for product installation in accordance with manufacturer's instructions and approved design system listings for each condition.
- .2 Ensure that opening / annular space does not exceed the maximum and minimum size or dimensions that is indicated on the approved Design Listing.
- .3 Verify that all joints, service penetrating elements and supporting devices/hangers have been properly installed as indicated on Approved Design Listings. All temporary lines and markings have been removed to meet the approved Design System Listings for each condition has been identified.

3.2 INSTALLATION

- .1 Protect adjacent Work Areas and finish surfaces from damage during product installation.
- .2 Install firestopping and smoke-seal Material and components in accordance with manufacturer's instructions and rated system as tested to ULC/CAN4-S115-M2005, and

ULC or cUL Design System Listings.

- .3 Coordinate with other Sub-Trades to assure that all pipes, conduit, cable, and other items, which penetrate fire separations have been permanently installed prior to installation of firestop systems.
- .4 Schedule the Work to assure that fire separations and all other construction that conceals penetrations are not erected prior to the installation of fire and smoke stop systems.
- .5 Seal holes or voids made by through-penetrations, poke-through termination devices, and un-penetrated openings or joints to ensure that both continuity and integrity of fire-separation are maintained.
- .6 Provide temporary forming as required. Remove forming Material only after firestop system has gained sufficient strength and after initial curing as per manufacturer's instructions.
- .7 Tool or trowel exposed surface to a neat finish and to accepted architectural finishes as approved by the Contract Administrator.
- .8 Remove excess compound promptly as Work progresses and upon completion.
- .9 Refer to Mechanical and Electrical Sections and Drawings for further information.

3.3 SCHEDULE OF FIRESTOP LOCATIONS

- .1 Fire stop and smoke-seal includes but not limited, to the following locations:
 - .1 Provide appropriate Firestop System when exposed to view, architectural finish as indicated in Finish Schedule, traffic, moisture, heat, movement and physical damage.
 - .2 Penetrations through fire-resistance-rated masonry, concrete, and gypsum board partitions/walls, floors and roof assemblies.
 - .3 Intersection of fire-resistance-rated masonry, concrete and gypsum board partitions.
 - .4 Joints at top and bottom of fire resistance rated concrete masonry and gypsum board partitions. Joints to allow for independent movement.
 - .5 Control and sway joints in fire-resistance-rated masonry and gypsum board partitions and walls.
 - .6 Penetrations through fire-resistance-rated floor slabs/systems, ceilings and roof.
 - .7 Openings and sleeves installed for future use through fire separations and unused openings and sleeves constructed as part of Work.
 - .8 Around mechanical and electrical assemblies/devices penetrating fire separations.
 - .9 Between edge of fire-resistant floor or roof assemblies and exterior wall assemblies.
 - .10 Between floors, walls, ceilings and roof assemblies at horizontal and vertical fire resistant ratings at floor expansion joints.
 - .11 Rigid ducts: fire stopping to consist of bead of fire stopping Material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

- .12 Mechanical and electrical recessed boxes in walls and partitions.
- .13 Where indicated on Working Drawings and Specification detail Drawings.

3.4 THIRD PARTY CONSULTANT REVIEW

- .1 Contract Administrator shall be called to perform random observation reviews during the course of construction and prior to closing off any concealed areas. These observations shall be based on ASTM E2174 Standard Practice for On-Site inspection of Installed Firestop Systems and ASTM E2393 Standard practice for On-Siite Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers. Contractor shall notify Contract Administrator minimum of 48-hours prior to requesting review.
- .2 The Contract Administrator shall perform exploratory review (destructive test) based on ASTM E2174, and E2393 where the system will be cut out by the Firestopping Subcontractor as directed by the Contract Administrator and removed to ensure the firestop system installed meets or exceeds the Design System Listing as identified.
- .3 The Firestopping Subcontractor shall do all cutting and removal of the systems for visual review from the Contract Administrator. Once the review is completed and accepted, the Firestopping Subcontractor shall replace the firestop system with new. All costs for cutting, removing and replacement shall be included in base Bid.

3.5 CLEAN-UP

- .1 Remove equipment, excess Materials and debris and clean adjacent surfaces immediately after application. Use methods and cleaning Materials approved by Manufacturer.
- .2 Protect firestopping during and after curing period from contact with contaminating substances. If damage caused by others, the Contractor shall instruct the Firestop Subcontractor to make appropriate repairs and charge to appropriate trades.
- .3 Remove temporary dams after initial set of fire stop and smoke seal Materials.

END OF SECTION

Part 1

General

1.1 RELATED WORK

- .1 Division 3 – Concrete
- .2 Section 04 05 10 – Common Masonry
- .3 Section 06 40 00 – Architectural Woodwork
- .4 Division 07 – Thermal and Moisture Protection
- .5 Section 08 11 00 – Steel Doors and Frames
- .6 Section 08 11 16 – Aluminum Doors and Frames
- .7 Section 08 14 00 – Wood Doors
- .8 Section 08 44 13 – Glazed Aluminum Curtain Walls
- .9 Division 09 – Finishes

1.2 REFERENCES

- .1 CAN/CGSB-19.1-M87, Putty, Linseed Oil Type or latest.
- .2 CAN/CGSB-19.2-M87, Glazing Compound, Nonhardening, Modified Oil Type or latest.
- .3 CGSB 19-GP-5M-76, Sealing Compound, One Component, Acrylic Base, Solvent Curing or latest.
- .4 CAN/CGSB-19.6-M87, Caulking Compound, Oil Base or latest.
- .5 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing or latest.
- .6 CGSB 19-GP-14M-76, Sealing Compound, One Component, Butyl-polyisobutylene Polymer Base, Solvent Curing or latest.
- .7 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound or latest.
- .8 CAN/CGSB-19.18-M87, Sealing Compound, One Component, Silicone Base, Solvent Curing or latest.
- .9 CAN/CGSB-19.21-M87, Sealing and Bedding Compound Acoustical or latest.
- .10 CAN/CGSB-19.22-M89, Mildew Resistant, Sealing Compound for Tubs and Tiles or latest.
- .11 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound or latest.
- .12 California South Cost Air Quality Management District Rule #1168 – Adhesive and Sealant Applications (October 2, 2003) – LEED REQUIREMENT

1.3 SAMPLES

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

1.4 SUBMITTALS

- .1 Submit to the City a binder with complete list of joint sealer assemblies with coordinated Site applied stickers.

- .2 Provide at each rated assembly a sticker adjacent to the construction detail Site.
- 1.5 DELIVERY, STORAGE, AND HANDLING
 - .1 Deliver, handle, store and protect Materials in accordance with Section 01 60 00 - Basic Product Requirements.
 - .2 Deliver and store Materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.
- 1.6 ENVIRONMENTAL AND SAFETY 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 acceptable to Labour Canada.
 - .2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
 - .3 Ventilate area of Work as directed by Contract Administrator by use of approved portable supply and exhaust fans.
 - .4 Place used hazardous sealant tubes and other containers in areas designated for Hazardous Materials.
 - .5 Apply sealants only to completely dry surfaces.

Part 2 Products

2.1 SEALANT MATERIALS

- .1 Sealants and caulking compounds must:
 - .1 meet or exceed all applicable governmental and industrial safety and performance standards; and
 - .2 be manufactured and transported in such a manner that all steps of the process, including the disposal of waste products arising therefrom, will meet the requirements of all applicable governmental acts, by laws and regulations including, for facilities located in Canada, the fisheries Act and the Canadian Environmental Protection Act (CEPA).
- .2 Sealant and caulking compounds must not be formulated or manufactured with: aromatic solvents, fibrous talc or asbestos, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium, barium or their compounds, except barium sulfate.
- .3 Sealant and caulking compounds must be accompanied by detailed instructions for proper application so as to minimize health concerns and maximize performance, and information describing proper disposal methods.
- .4 Caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant shall not be used in air handling units.
- .5 When low toxicity caulks are not possible, confine usage to areas which off-gas to the exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off-gas time.

- .6 In the selection of the products and Materials of this Section preference will be given to those with the following characteristics: non-flammable, low Volatile Organic Compound (VOC) content, manufactured without compounds which contribute to ozone depletion in the upper atmosphere, does not contain methylene chloride, does not contain chlorinated hydrocarbons.
- .7 Sealants acceptable for use on this project except CAN/CGSB-19.1 and CAN/CGSB-19.18 must be listed on CGSB Qualified Products List issued by CGSB Qualification Board for Joint Sealants. Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

	Type	Ref.	Description	Application	Accepted Material
1	Neoprene or Butyl Rubber.		Round solid rod, Shore A hardness 70		
2	High Density Foam		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/m ³ density, or neoprene foam backer, size as recommended by manufacturer.		
3	Bond Breaker Tape		Polyethylene bond breaker tape which will not bond to sealant.		
4	Polyurethane Sealant.	CAN 19.13-M87	single component, high performance, non-sagging, low modulus, non-staining	to be used at all exterior and interior control / expansion joints and on the exterior side of all window / door frame perimeters. Color as selected by the Contract Administrator.	Tremco Dymonic or Sonolastic NP1
5	Latex Sealant.	CGSB 19-GP-17M	single component, non-sagging, non-staining.	To be used on the interior side of all exterior window / door frame perimeters and at all interior window / door frame perimeters. Color as selected by the Contract Administrator	Tremco Spectrem 2
6	Silicone Sealant.	CGSB 19-GP-9M	single component, fungus resistant, non-sagging, non-staining, non-bleeding, moisture curing.	To be used in all sloped glazing, skylights, and at all joints between vanities, countertops, backsplashes and adjacent wall Materials and at the joint between bathtubs and finish flooring in washrooms. Color as selected by Contract Administrator.	Tremco Proglaze or GE Sanitary SCS 1700
7	Siliconized acrylic latex sealant		single component, pure acrylic latex, fast-setting with minimal shrinkage, white colour	To be used at exposed joints between hollowcore slabs to 1/4" maximum width.	Tremco Tremflex 834 or equal in accordance with B7

2.3 JOINT CLEANER

- .1 Non-corrosive and non-staining type, compatible with joint forming Materials and sealant recommended by sealant manufacturer.
- .2 Primer: as recommended by manufacturer.

Part 3 Execution

3.1 PROTECTION

- .1 Protect installed Work of other trades from staining or contamination.

3.2 PREPARATION OF JOINT SURFACES

- .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 Cleanup.
 - .1 Clean adjacent surfaces immediately and leave Work neat and clean.
 - .2 Remove excess and droppings, using recommended cleaners as Work progresses.
 - .3 Remove masking tape after initial set of sealant.

END OF SECTION