PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian General Standards Board (CAN/CGSB)
  .1 Elastomeric Liquid Applied Membrane complies with CAN/CGSB 37.58.

1.2 SUBMITTALS

.1 Submit proof of manufacturer's CCMC Listing and listing number to Departmental Representative.

.2 Submit proof of manufacturer's current ISO certification and registration and compliance to Departmental Representative.

.3 Submit proof of manufacturer's participation certificate for Environmental Choice Program to Departmental Representative.

.4 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.5 Indicate all required flashing, penetrations and field fabricated seams details.

1.3 PRODUCT DATA

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

.2 Submit Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Submit product data sheets for rubberized asphalt and rigid insulation. Include:
  .1 Product characteristics.
  .2 Performance criteria.
  .3 Limitations.

1.4 QUALITY ASSURANCE

.1 Contractor to provide written confirmation he has successfully completed waterproofing projects to the size of the project specified within the last 5 years.

.2 Contractor to hold preconstruction meeting with department representative present, and the manufacturer’s technical Representative to review the existing substrate condition, and review the process of installation.

.3 Manufacturer’s technical representative to provide a final review inspection.

.4 Submit all reports to the department representative.

.5 Perform Work in accordance with the printed requirements of the membrane manufacturer and this specification. Advise designer of any discrepancies prior to commencement of the Work.

.6 Maintain one copy of manufacturer's literature on site throughout the execution of the Work.

.7 Submit documentation certifying that the primary membrane complies with CGSB 37.58.

.8 Materials used in this Section, including, primers, mastics and membranes, and rigid insulation shall be fully compatible and shall be produced by one manufacturer.

.9 Submit copies of the membrane manufacturer's current certification to ISO 9002 model which include the manufacturing of the membrane, primer, mastics, adhesives and rigid insulation.

.10 Prior to installation of the rigid insulation, provide infrared thermal testing is required meeting the following conditions:

.1 Upon completion of the Primary Waterproofing Membrane, and all associated terminations, the Contractor shall:

.1 Provide water testing for all field construction, flashing seams, etc. for all retaining walls, and all internal pits as noted on the document.

1.5 MOCK-UPS

.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.

.2 Construct mock-up 10 m^2 minimum size showing typical lap joint, one inside corner and one outside corner. Accepted mock-up may form part of complete work.

.3 Allow 24 hours for inspection of mock-up by Engineer before proceeding with waterproofing work.

1.6 DELIVERY, STORAGE AND HANDLING

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

.2 Provide and maintain dry, off-ground weatherproof storage.

.3 Stand roll materials on end.

.4 Remove only in quantities required for same day use.

.5 Store insulation protected from sunlight and weather and deleterious materials.

.6 Store materials in accordance with manufacturer's written instructions.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal, and with Waste Reduction Workplan.

.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.

.4 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

1.8 PROJECT/SITE ENVIRONMENTAL REQUIREMENTS

.1 Temperature, relative humidity, moisture content.

.1 Apply waterproofing only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

.2 Do not install when air and substrate temperature remains below 5°C, or when wind chill gives equivalent cooling effect.

.3 Install on dry substrate, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into system.

.2 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of rubberized asphalt, sealing compounds, primers and caulking materials.

.3 Ventilation:

.1 Departmental Representative will arrange for ventilation system to be operated during installation of waterproofing. Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.

1.9 EXTENDED WARRANTY

.1 The Warranty is to be provided in the form of a Manufacturers extended warranty, to include coverage for complete system for failure to meet specified requirements and leakage. Contractor hereby warrants that Waterproofing will stay in place and remain leak proof in accordance with GC24, but for 60 months beyond substantial performance.

PART 2 - PRODUCTS

2.1 GENERAL

.1 Elastomeric Liquid Membrane:
- .1 Provide a one component elastomeric rubberized asphaltic waterproofing membrane.
  - .1 Colour: Black
  - .2 Thickness 2.25mm
- .2 Complies to CAN/CGSB-37.58.
- .3 Acceptable Manufacturers:
  - .1 Henry
  - .2 WR Meadows

2.2 WATERPROOFING ACCESSORIES:

.1 Primer:
- .1 As recommended by waterproofing membrane system manufacturer;

.2 Joint backing:
- .1 Closed-cell, polyethylene rod as recommended by membrane manufacturer;

.3 Reinforcing fabric:
- .1 Woven fiberglass scrim cloth, as per manufacturer's recommendations.

.4 Elastomeric sheet flashing:
- .1 1.5 mm thick by 25mm wide uncured neoprene sheeting;

.5 Joint Treatment:
- .1 Sealants as recommended by manufacturer.

.6 Protection board:
- .1 Prefabricated board, mineral filled, high melt asphalt core, between non-woven fiber mats smooth surfaces.
- .2 Thickness: 6.5mm
- .3 Water absorption to CAN/CSA A247M

.7 Sheet Waterproofing Membrane Flashing:
- .1 Self-adhering composite membrane consisting of SBS rubberized asphalt compound integrally laminated to high density cross-laminated polyethylene film, designed to be self-adhesive.
- .2 Acceptable Materials:
  - .1 Manufacturer: BAKOR, Model: SA
  - .2 Manufacturer: Henry, Model: Blueskin WP

.8 Termination Bar:
- .1 As recommended by the manufacturer.

.9 Sealers:

.1 Plastic cement: to CAN/CGSB-37.5, cutback asphalt type as per manufacturer's recommendations.

.2 Sealant: refer to Section 07 92 10.

2.3 INSULATION

.1 Refer to Section 07 21 13 Board Insulation.

2.4 SOURCE QUALITY CONTROL

.1 Submit laboratory test reports in accordance with Section 01 45 00 - Quality Control.

.2 Submit laboratory test reports certifying compliance of rubberized asphalt and with specification requirements.

PART 3 - EXECUTION

3.1 PROTECTION

.1 Cover walls and adjacent work where materials hoisted or used.

.2 Clean off drips and smears of bituminous material immediately.

.3 Protect from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.

.4 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.

3.2 SUBSTRATE PREPARATION FOR CONCRETE

.1 Before application of waterproofing, the substrate shall be clean and dry, free from surface water, ice, snow or frost, dust, dirt, oil, grease, curing compounds of any other foreign matter detrimental to the adhesion waterproofing.

.2 Prior to installation the cementitious and waterproofing system manufacturers representative to review the concrete substrates with regards to moisture content, smoothness of surface, etc.

.3 Rout, clean, prepare and detail surface cracks in accord with manufacturer's instructions; install backer rod where required. Contractor to ensure all crack, voids are epoxy filled prior to proceeding with the application of waterproofing.

3.3 WATERPROOFING APPLICATION

.1 General:

.1 Install waterproofing system in accord with manufacturer's recommendations and instructions as applies to the Work except where more stringent requirements are indicated.

.1 Ensure environmental conditions for installation and surface conditions meet the manufacturer’s standards.

.2 Waterproofing membrane shall have a minimum thickness of 2.25mm dry-film thickness.

.2 Verify proper dry condition of substrate using method recommended by membrane system manufacturer; perform adhesion checks prior to general application of membrane system using field adhesion test method recommended by manufacturer.

.3 Mask off adjoining surfaces not to receive membrane system.

.4 Wipe clean all detail coats with white rags wetted with Xylene solvent; do not saturate detail coat.

.5 Apply membrane uniformly and allow cure in accord with manufacturer's instructions.

.6 Provide installation in a single application of mil thickness as noted. Material cures through solvent evaporation to provide a heavy duty “seamless” rubber like impervious membrane.

.7 Feather terminating edge when entire area cannot be completed in one day; clean area 150 mm wide along terminating edge of membrane with Xylene solvent on clean white rags prior to startup on next working day; use interlaminary primer per manufacturer's instructions as needed; overlap existing work by 150 mm with new work.

.8 Install protection board over cured membrane in accord with manufacturer's instructions.

3.4 PROTECTION AND CLEAN-UP

.1 Promptly remove primer or membrane system material from adjacent surfaces with MEK, Toluene or Xylene; leave work area in broom clean condition.

.2 Prohibit traffic over completed work and protect against work overhead until protection course is installed; protect from damage until protected beneath overlaying work.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International, (ASTM):
- .1 ASTM E96/E96M-16, Test Method for Water Transmission of Materials.
- .2 ASTM D1622/D1622M-14, Test Method for Apparent Density of Rigid Cellular Plastics
- .3 ASTM E84-16, Test Method for Surface Burning Characteristics of Building Materials

.2 Canadian Standards Association (CSA):
- .1 CAN/CSA-B149.1-15, Natural Gas and Propane Installation Code.

.3 Underwriters Laboratories of Canada (ULC):
- .1 CAN/ULC S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.2 SUBMITTALS

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

.2 Manufacturer's Instructions:
- .1 Submit manufacturer's installation instructions.

1.3 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 Manufacturer's Representative must review the final installed product to ensure boards are secure and no thermal drifts are visible.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 BOARD INSULATION FOR PERIMETER FOUNDATION

.1 For areas below grade, provide the following:
- .1 Expanded Polystyrene Insulation:
  - .1 Expanded to CAN/ULC-S701
  - .2 Type 3
  - .3 Required RSI value 1.76.
  - .4 Insulation value thickness per inch based on value listed in the latest edition of NRC - Evaluation listing.
  - .5 Acceptable Manufacturer:
    - .1 Truefoam
    - .2 Francelle
- .2 Extruded Polystyrene Insulation:
  - .1 Extruded to CAN/ULC-S701
  - .2 Type 3
  - .3 Required RSI value 1.76.
  - .4 Insulation value thickness per inch based on value listed in the latest edition of NRC - Evaluation listing.

.2 For areas above grade, provide the following:
- .1 Extruded Polystyrene Insulation:
  - .1 Extruded to CAN/ULC-S701.
  - .2 Type 3
  - .3 Required RSI Value 1.76.
  - .4 Insulation value thickness per inch based on value listed in the latest edition of NRC – Evaluation listing.
  - .5 Complete with a factory installed 25 mm thick concrete facing.
  - .6 Product based on 'T-clear' product.
  - .7 Acceptable Manufacturer:
    - .1 Styrofoam
    - .2 Celfort

2.2 INSULATION THERMAL – EXTERIOR

.1 Semi-Rigid Fibrous Insulation:
- .1 Mineral Wool cavity wall ASTM C612, Type 2, Class 4. Mineral wool to be manufactured from Basalt rock/steel slag and contain recycled content. Fibers to be bonded and preformed into semi-rigid boards.
- .2 Acceptable Manufacturer:
  - .1 Roxul
- .3 Required R-value 4.44 per 25.4mm. Refer to drawings for value required in wall cavity.
- .4 Locations:
  - .1 Exterior walls of addition
  - .2 Parapet construction
  - .3 Roof curb construction.

2.3 SEMI-RIGID FIBROUS INSULATION (CAVITY WALLS, CURTAIN WALL AND PARAPETS AS DETAILED)

.1 Semi-Rigid Fibrous Insulation:
- .1 Mineral wool cavity wall ASTM C612, Type 2, Class 4. Mineral wool to be manufactured from Basalt rock/steel slag and contain recycled content. Fibers to be bonded and preformed into semi-rigid boards.
- .2 Acceptable Manufacturer:
  - .1 Roxul
- .3 Required R-value 4.44 per 25.4 mm. Refer to drawings for value required in wall cavity.

2.4 POLYISOCYANURATE RIGID INSULATION IN METAL CLADDING SYSTEM

.1 Polyisocyanurate rigid insulation:
- .1 RSI 1.05 for 25mm
- .2 ASTM C1289 Type 1, Class 1
- .3 CAN/ULC 5704, Type 1, Class 1
- .4 ICC-ES Evaluation Report
- .5 ESR - 3398
- .6 Energy Star
- .7 JM (John Manville)
- .8 IKO

2.5 EXPANDING FOAM INSULATION FOR WINDOW INSTALLATION

.1 Expanding Foam Insulation.
- .1 Foamed-in-Place Sealant - Low Pressure Type: semi-flexible soft, single-component polyurethane sealant, to CAN/ULC-S701; and having the following properties:
  - .1 Core Density (ASTM D1622): 27.24 kg/m3.
  - .2 Fire Resistance (ASTM E84): Flame spread = 10, Smoke Developed = 20.
  - .3 Colour: Yellow.
  - .4 Cure Time: approximately 12 hours
  - .5 Tack-free Time: 6-9 minutes
  - .6 Applicator: Straw applied

2.6 INSULATION CLIPS

.1 Insulation clips, impale type perforated 50m x 50mm cold rolled curb on steel 0.8mm thick, (mechanically attached to concrete 2.5mm spindle, length to suit insulation, c/w 25mm diameter self-locking washer.

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 COORDINATION

.1 Coordinate with Section 07 27 13 Air/Vapour Barriers.

.2 Coordinate with Section 07 46 13 Preformed Metal Siding Panels, regarding spacing / installation of girts, etc.

3.3 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 50 mm from sidewalls of CAN/CGA-B149.2 type B & 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 Departmental Representative.

.8 Ensure a complete thermally sound installation.

3.4 SEMI – RIGID BOARD INSULATION INSTALLATION

.1 Building substrate to be dry before installing insulation.

.2 Install spindle anchor clips for semi-rigid insulation board by mechanically fastening to laterally load bearing stud framing or concrete/CMU wall as indicated.

.3 The spindle application through the self-sealing air/vapour membrane is to be totally sealed. Apply additional membrane over the application if required to seal. Inspect the area prior to applying the insulation boards.

3.5 BELOW SIDEWALK INSULATION

.1 Prior to installation of insulation, Contractor to verify that compaction of the subgrade has been approved by the Geotechnical Engineer or Departmental Representative's Testing Agency.

.2 For location and extent of the under sidewalk/slab insulation, refer to drawings.

.3 Provide insulation pads at entrance doors, 1220 mm out from face of building by length of the opening.

.4 Provide insulation full width and length under concrete sidewalks.

3.6 INSTALLATION BELOW SLAB

.1 Place insulation under slabs after base for slab has been compacted and prepared as per drawings and specs.

.2 Cut and fit insulation tight to protrusions or interruptions to the insulation plane.

.3 Prevent insulation from being displaced or damaged.

.4 Coordinate insulation installation with vapour barrier installation as detailed on drawings.

3.7 CLEANING

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

END

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials
- .1 ASTM D1709-16a, Test Methods for Impact Resistance of Plastic Film by the Free Falling Dart Method
- .2 ASTM E96/E96M-16, Test Method for Water Transmission of Materials
- .3 ASTM E154/E154M-08a(2013)e1, Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
- .4 ASTM E1745-11, Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 VAPOUR BARRIERS – SLAB ON GRADE

.1 Manufactured with polyethylene resins which meets all criteria for Class 'A', per ASTM E1745.
- .1 Description:
  - .1 High performance 0.38mm (15 mil) under slab membrane vapour retarder made from polyethylene resins that provide superior physical and performance properties; see chart below:

Properties	**Test Method**	**Metric**
Appearance		Blue
Thickness, Normal		0.38 mm
Weight		240 g/m²
Classification	ASTM E1745	CLASS A, B & C
Tensile Strength Average MD & TD (New Material)	ASTM E154 Section 9, (D882)	 91 N/cm
(After Exposure)		93 N/cm
Puncture Resistance	ASTM D1709 Method B	2600 g
Maximum use Temperature		82° C
Minimum use Temperature		-57° C
Permeance (New Material)	ASTM E154 Section 7 ASTM E96 Procedure B	 0.0096 *Perms
(After Conditioning)	ASTM E154 Section 8, E96 Section 11, E96	 0.0101 0.0099

	Section 12, E96 Section 13, E96	0.0105 0.0119
WVTR	ASTM E96 Procedure B	0.0059 gm/hr-m² **
**g/(24hr m² mm Hg)		

.2 Acceptable Materials:
- .1 Raven Industries, Model: VaporBlock® Plus™ 15 mil
- .2 Viper, Model: VAPORCHECK® II 15-mil
- .3 W R Meadows, Model: PERMINATOR 15 mil

2.2 ACCESSORIES

.1 Joint sealing tape: air resistant pressure sensitive adhesive tape, type recommended by vapour barrier manufacturer, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Slab on Grade:
- .1 Install reinforced sheet vapour barrier on as specified on underside of concrete floor slab. Ensure that sheet membranes are sealed to the perimeter vertical surfaces.
- .2 Use sheets of largest practical size to minimize joints.
- .3 Inspect sheets for continuity. Repair punctures and tears with sealing tape before work is concealed.

3.2 PERIMETER SEALS

.1 Seal perimeter of sheet vapour barriers as follows:
- .1 Apply continuous bead of sealant to substrate at perimeter of sheets.
- .2 Lap sheet over sealant and press into sealant bead.
- .3 Bond lapped sheets at sealant bead into wood substrate.
- .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.3 LAP JOINT SEALS

.1 Seal lap joints of sheet vapour barrier as follows:
- .1 Attach first sheet to substrate.
- .2 Apply continuous bead of sealant over solid backing at joint.
- .3 Lap adjoining sheet minimum 150 mm and press into sealant bead.
- .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM):
- .1 ASTM C920-14a, Standard Specification for Elastomeric Joint Sealants.
- .2 ASTM E96/E96M-16, Test Method for Water Vapour Transmission of Materials.
- .3 ASTM E2178-13, Test Method for Air Permeance of Building Materials
- .4 ASTM E2357-11, Test Method for Determining Air Leakage of Air Barrier Assemblies.

1.2 SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, including installation instructions, MSDS sheets, specifications and data sheets in accordance with Section 01 33 00 Submittal Procedures.

1.3 ENVIRONMENTAL REQUIREMENTS

.1 Maintain temperature and humidity conditions as recommended by the Manufacturer.

.2 Do not install sealant or adhesive, or air/vapour barrier in enclosed spaces without ventilation.

1.4 MOCK-UP

.1 Refer to Section 01 45 00 Quality Control for requirements of mock-up.

.2 Construct typical air/vapour barrier and flashing around exterior windows and frames, junction with roof system; and interface with dissimilar substrates, refer to installation methods noted and manufacturer’s recommendations.

.3 Locate where directed by Departmental Representative.

.4 Allow forty-eight (48) hours for inspection of mock-up by Departmental Representative before proceeding with air/vapour barrier Work.

.5 Contractor only to proceed once the testing is complete and written approval has been received by the Departmental Representative.

.6 When accepted, mock-up will demonstrate minimum standard for this work. Approved mock-up may remain as part of the Work.

1.5 WASTE MANAGEMENT

.1 Separate and recycle waste materials in accordance with Section 01 74 21 Construction Waste Management and Disposal and project Construction Waste Management Plan.

1.6 PERFORMANCE CRITERIA

.1 Provide air/vapour barrier sheet material to ASTM E2178 and ASTM E2357 Standards.

1.7 DELIVERY, STORAGE AND PROTECTION OF PRODUCT

.1 Deliver and store materials in compliance with Section 01 61 00 Common Product Requirements.

.2 Comply with manufacturer's recommendations for handling, storage and protection during installation.

.3 Protect and store materials off the ground, away from physical damage and from becoming wet, soiled or covered with ice or snow before, during and after installation.

.4 Label packages to include material name, production date and/or product code.

.5 Use proper hoisting of equipment and/or rigging and follow applicable safety guidelines when handling or hoisting materials.

.6 Store from the weather in an enclosed area not subject to heat over 49ºC.

1.8 QUALITY ASSURANCE/QUALITY CONTROL

.1 Contractor to be approved by the manufacturer of the air /vapour barrier Manufacturer.

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

.3 Manufacturer's Representative to provide two unscheduled site reviews during the installation of this product and one at completion to verify that all products and procedures are being installed as per manufacturer's recommendations. Provide written reports for site reviews to the Project Manager.

PART 2 - PRODUCTS

2.1 AIR/VAPOUR BARRIER MEMBRANE (WALLS AND THROUGH WALL PENETRATIONS)

.1 SBS, modified membrane, impermeable to air, moisture, vapour and water, with split back poly release film.

.2 Weight/thickness: 1.0 mm (40 mils)

.3 Water Vapour Transmission (ASTM E96): 49ng/Pa.sm^2, 0.86 perms.

.4 Air Permeance: ASTM E2178, 0.0001 CFM/ft^2

.5 Primer and BES Sealant as recommended by manufacturer and meets ASTM E2357 air barrier performance standard.

.6 Roll length 22.8 m; Roll width as required.

.7 Acceptable Manufacturers:
- .1 Henry Company
- .2 Grace Construction Products
- .3 Soprema
- .4 IKO
- .5 3M

2.2 PRIMERS

.1 In accordance with manufacturer's recommendations.

2.3 SEALANTS

.1 One component, low odor, moisture cure product, silyl-terminated polyether, polymer (STPe).

.2 To ASTM C920 Type S Grade NS, Class 25.

.3 Sealants, as required, to be compatible with membrane system.

2.4 ACCESSORIES

.1 Attachments: Galvanized steel bars and anchors, as recommended by the manufacturer.

.2 Thinner and cleaner for sheet material: as recommended by sheet material manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Manufacturer's Representative to verify that surfaces and conditions are ready to accept the Work of this section.

.2 Surfaces to be clean, dry, sound, smooth and continuous, and comply with air barrier manufacturer's requirements.

.3 Report unsatisfactory conditions to the Departmental Representative in writing.

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

3.2 PREPARATION OF SUBSTRATE

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

.2 Substrates to be 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 Substrates to be free of surface moisture prior to application of self-adhesive membrane and primer as required per manufacturer's recommendations.

.4 Metal closures to be free of sharp edges and burrs.

.5 Prior to application of covering material, i.e. insulation, etc., the manufacturer's representative is to review the entire field and overlap areas to verify joints are completely sealed, also refer to Section 07 92 00 Joint Sealants.

3.3 INTERFACE WITH OTHER SYSTEMS

.1 Provide air vapour barrier material to components integral within the systems, door frames, aluminum windows, and curtain wall framing and roof systems, refer to specific sections of components. Adhere to and marry the complete air barrier system with minimum 200 mm overlap over both elements, ensuring a proper watertight seal.

.2 Membrane is not designed for permanent exposure, protect installed membrane as soon as possible. Maximum exposure not to exceed 90 days.

3.4 INSTALLATION OF FIELD APPLIED MEMBRANE

.1 Apply membrane complete and continuous to prepared and primed substrate over the entire field area , less openings in a horizontal "Overlapping Shingle Fashion", starting from the bottom of the wall. Stagger vertical joints.

.2 Align and position sheet membrane, remove protective file and press firmly into place; Minimum 50mm overlap at end and side laps. Promptly roll laps and membrane with a countertop roller to effect the seal.

.3 Verify there are no fish mouths, wrinkles etc. when applied. Cut out area and redo in accordance with manufacturer's instructions.

.4 When using membrane with masonry, position membrane, press in place and cut any penetration. Seal around openings with sealant as recommended by the manufacturer.

.5 At the end of each day's work, seal the top edge of the membrane where it meets the substrate. Trowel apply a feathered edge to seal termination and shed water.

.6 At components, i.e. window frames, pressed steel frames, aluminum door frames, roof membrane areas, where membrane has been provided, make sure a tight bond to overlap material with a minimum lap of 200 mm has been maintained.

.7 Projections, to be properly sealed with an application of sealant as recommended by the manufacturer.

.8 Membrane applied to the underside of substrate surfaces to receive special attention on application for maximum surface area adhesion to be obtained.

.9 The use of mechanical fasteners along interior corners may be required by some insulation manufacturers. Consult insulation manufacturer prior to the installation of the insulation.

.10 Areas that are primed are to receive the self-adhesive sheet Air barrier on the same day, in accordance with manufacturer’s recommendations.

3.5 PROTECTION DURING 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 Finished Work to be protected from climatic conditions.

.4 Primed surfaces to be covered the same day.

.5 Store rolls on end on original pallets or elevated platform. Protect from weather in area not hotter than 49ºC.

END

PART 1 - GENERAL

1.1 SUMMARY OF THIS SECTION

.1 As summarized and described herein, but not restricted to the following:
.1 To provide air barrier water resistant barrier..

1.2 REFERENCES

.1 ASTM E96/E96M-14, Test Method for Water Vapour Transmission of Materials.

.2 CAN/CGSB 51.32-M77, Sheathing, Membrane, Breather Type

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

.1 Contractor to be approved by the Air Barrier Manufacturer. The Applicator/Company specializing in performing work of the Section must have a minimum 5 years documented experience for projects of similar size and scope as specified.

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

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Basic Product Requirements, and as per manufacturer’s requirement.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.7 ENVIRONMENTAL CONDITIONS

.1 Maintain temperature and humidity conditions as recommended by the Manufacturer.

.2 Do not install sealant or vapour release adhesive in enclosed spaces without ventilation.

PART 2 - PRODUCTS

2.1 FIELD MATERIAL (AIR BARRIER)

.1 Self adhesive air barrier, microporous film laminate
- .1 Engineered film with a permeable adhesive technology with split-back poly-release film.
- .2 Roll width – 30”
- .3 To requirements of CGSB 51.32.
- .4 Approved Manufacturers (Product based on Henry BlueskinVP-160):
  - .1 Grace Construction Products Perm-A Barrier VPS
  - .2 Vaproshield Wrapshield SA
  - .3 Sopraseal Stick VP

2.2 PRIMERS

.1 In accordance with Manufacturer's recommendations.

2.3 SEALANTS

.1 Refer to Section 07 92 00 - Joint Sealants.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Manufacturer Representative to verify that surfaces and conditions are ready to accept the Work of this section.

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

.3 Report any unsatisfactory conditions to the Consultant in writing.

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

3.2 PREPARATION

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

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

protrusions.

.3 Ensure all 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.

3.3 PRIMER

.1 Ensure all areas that are primed receive the self-adhesive sheet Air barrier in the same day, in accordance with manufacturer's recommendations.

3.4 INSTALLATION OF AIR BARRIER (SUBSTRATE)

.1 Apply membrane complete and continuous to prepared and primed substrate in a horizontal "Overlapping Shingle Fashion". Stagger all vertical joints.

.2 Align and position sheet membrane, remove protective file and press firmly into place. Ensure minimum 50mm overlap at all end and side laps. Promptly roll all laps and membrane with a countertop roller to effect the seal.

.3 Ensure when applied there are no fish mouths, wrinkles etc. Cut out any area and redo in accordance with manufacturer's instructions.

3.5 PROTECTION OF WORK

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

.2 Ensure finished Work is protected from climatic conditions.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI)
- .1 ANSI B18.6.4-1998 (R2005), Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws - Inch.

.2 American Society for Testing and Materials (ASTM)
- .1 ASTM D2369-10(2015)e1, Test Method for Volatile Content of Coatings
- .2 ASTM D2832-92 (2016), Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings

.3 Canadian Standards Association (CSA)
- .1 CAN/CSA S136.1-12, Commentary on North American Specification for the Design of Cold-Formed Steel Structural

1.2 SAMPLES

.1 Provide samples of the specified metal siding/colour profile. Importance of this submission is to ensure the existing profile, size and colour is matched.

.2 Sample, once reviewed, will be forwarded to the contractor, no ordering of the material prior to the sample being reviewed by the Departmental Representative.

1.3 DESIGN

.1 Design metal panels in accordance with CSA S136 and CSA S136.1 standards.

.2 Manufacturer to be ISO-9002 certified.

1.4 SHOP DRAWINGS

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

.2 Indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, soffits, fascia, etc. Ensure all structurally related items by Division 5 are coordinated and noted on the shop drawings.

.3 Drawings to indicate spacing of supports and size of infill panels, perimeter trim, and partition molding. Drawing also to indicate any solid backing and/or girts required for fasteners.

.4 Drawings to indicate large scale details interfacing with other elements as aluminum window framing, louvers etc. Ensure that all air/vapour overlaps are shown from the preformed metal siding system to the adjoining materials and/or components.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Divert used metal cut-offs from landfill by disposal into the on-site metals recycling bin.

.2 Divert reusable materials for reuse at nearest used building materials facility.

.3 Divert unused caulking, sealants, and adhesive materials from landfill through disposal at hazardous material depot.

.4 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

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

PART 2 - PRODUCTS

2.1 METAL CLADDING AND COMPONENTS

.1 To requirements of CSA S136.
- .1 Finish: Coating Class F1
- .2 Thickness: .91mm base metal thickness maximum.
- .3 Profile: Profile and color to match the existing preformed metal siding in the existing building. Refer to paragraph 1.3.2 in this section.
- .4 Vertical application
- .5 Sub girts as noted in paragraph 2.6 of this Section.
- .6 Contractor to review on site conditions and ensure the material selected matches the existing, refer to 1.2 Samples this section.
- .7 Acceptable Manufacturer:
  - .1 Agway Metals
  - .2 Vicwest
  - .3 Flynn Canada

2.2 METAL FASCIA AND SOFFIT

.1 Finish: Coating Class F1

.2 Colour: As selected by Departmental Representative from manufacturer’s standard colour range, selected to match existing.

.3 Thickness: .91mm base metal thickness maximum.

.4 Metal Fascia Profile: 300mm wide strip x maximum length, interlocking joint fastener holes pre-punched.

.5 Soffit Profile: 300mm wide strip x maximum length, perforated interlocking joints, fastened holes pre-punched.

.6 Subgirts as noted in paragraph 2.6 of this Section.

.7 Acceptable Manufacturer:
- .1 Agway Metals
- .2 Vicwest
- .3 Flynn Canada

2.3 METAL FLASHING

.1 As per Section 07 62 00.

2.4 AIR/VAPOUR BARRIER

.1 Refer to Section 07 26 00 Vapour Barrier and 07 27 13 Air/Vapour Barriers.

2.5 POLY ISO INSULATION

.1 Refer to Section 07 21 13 Board Insulation.

2.6 SUB-GIRTS

.1 Notched 2-bar sub-girts, size, gauge and spacing as per manufacturer's recommendations, to fastening to cast-in-place concrete condition or to structural components of the concrete masonry laterally load bearing metal stud as indicated.

.2 Ensure the depth of the sub girts are an exact match to the existing to ensure alignment

2.7 ACCESSORIES

.1 Exposed trim: inside corners, outside corners, cap strip, drip cap, under sill trim, starter strip and window/door trim of same material, colour and gloss as cladding, with fastener holes pre-punched.

.2 Existing to new siding transition trim, to match the existing; ensure transition section matches exiting/new.

2.8 FASTENERS

.1 Screws to ANSI B18.6.4. Purpose made aluminum alloy, color head match to panel colour.

2.9 SEALANT

.1 Sealants: as per Section 07 92 00. Test for acceptable VOC emissions in accordance with ASTM D2369 and ASTM D2832.

PART 3 - EXECUTION

3.1 INSTALLATION OF METAL SIDING

.1 Install all girts and metal cladding in accordance with manufacturer's written instructions

.2 Install continuous starter strips, inside and outside corners, edgings, soffit, drip, cap, sill and window/door opening flashings as indicated.

.3 Install outside corners, fillers and closure strips with carefully formed and profiled work.

.4 Install soffit and fascia cladding as indicated.

.5 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.

.6 Attach components in manner not restricting thermal movement.

.7 Caulk junctions with adjoining work with sealant. Do work in accordance with Section 07 92 00 - Joint Sealants.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI) Factory Mutual (FM):
- .1 ANSI/FM Approval 4474, Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures (Class range from 1-60 to 1-990).

.2 American Society for Testing and Materials International (ASTM):
- .1 ASTM C208-12, Specification for Cellulosic Fiber Insulating Board.
- .2 ASTM C578-16, Specification for Rigid, Cellular Polystyrene Thermal Insulation.
- .3 ASTM C1177/C1177M-13, Glass Mat Gypsum Substrate for Use as Sheathing
- .4 ASTM D6164/D6164M-16, Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

.3 Canadian Roofing Contractors' Association (CRCA) – Roofing Specifications Manual.

.4 Newfoundland and Labrador Health and Safety Act

.5 Underwriters Laboratories of Canada (ULC):
- .1 ULC 701, Standard for Thermal Insulation, Polystyrene, Boardsand Pipe Covering.
- .2 ULC 704, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced
- .3 ULC 706, Standard for Wood Fibre Insulating Boards for Buildings

.6 National Building Code of Canada (NBC 2010).

.7 NRC – CRC CAN.A623.21.04. Standard test method for dynamic wind up lift resistance of mechanically attached membrane roofing systems.

1.2 SUBMITTALS

.1 Provide shop drawings including manufacturer's technical data sheets and installation methods for each component. Include a summary of the roofing system from top to bottom.

.2 Ensure manufacturer products specified are as prescribed by 1-90 wind uplift recommendations.

.3 Provide layout for tapered areas of rigid insulation. Ensure tapered insulation indicate a positive slope to drain.

.4 Provide fastening layouts meeting 1-90 wind uplift requirements, for field, edge and corner locations.

1.3 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of materials.

.2 Refer to the Manufacturer's recommendations regarding installation of roofing system at ambient temperatures. Roofing system should be applied when temperatures are above 0ºC.

.3 Refer to the Manufacturer's recommendations of temperatures required for conditioning the materials prior to application and install and curing after.

.4 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

.5 Only 'Dry' materials are to be installed. Materials that are installed wet, or materials that become wet during inclement weather to be removed and replaced.

1.4 SAFETY REQUIREMENTS

.1 Contractor to abide by the Newfoundland and Labrador Occupational Health and Safety Act.

.2 Ensure all roof installers have taken the Fall Protection course and abide by the Newfoundland and Labrador Fall Protection Course Guidelines.

1.5 WASTE MANAGEMENT

.1 Contractor to remove any debris resulting from installation of this roofing system immediately from site to a designated landfill approved by Provincial Regulations to accept existing roofing materials debris.

1.6 PERFORMANCE CRITERIA

.1 Compatibility between components of roofing system is essential. Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.

.2 Do roofing work in accordance with applicable, standard in Canadian Roofing Contractors Association (CRCA) Roofing Specifications Manual and to prescribed 1-120 wind uplift requirements mechanically fastened.

1.7 DELIVERY, STORAGE AND PROTECTION OF PRODUCT

.1 Comply with manufacturer's recommendations for handling, storage and protection during installation.

.2 Protect and store materials off the ground, away from physical damage and from becoming wet, soiled or covered with ice or snow before, during and after installation.

.3 Removal and replacement of roof drains and removal and reinstatement of existing mechanical units to be completed by a subcontractor qualified to complete the identified work.

.4 Label packages to include material name, production date and/or product code.

.5 Store rolls of felt and membrane in upright position. Store membrane rolls with salvage edge up.

.6 Remove only in quantities required for same day use.

.7 Place plywood runways over work to enable movement of material and other traffic.

.8 Store roofing material at +5C minimum.

1.8 QUALITY CONTROL

.1 Convene pre-installation meeting one week prior to beginning work of this Section.
- .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.
- .5 Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within one week of meeting.

.2 Manufacturer's Representative to visit site three (3) times unannounced during construction and once at completion and provide inspection reports to the Departmental Representative and Consultant.

1.9 QUALITY ASSURANCE

.1 Roofing applicator must be a good standing member of the CRCA and of the local Provincial Roofing Association and approved by the Roof Manufacturing Company selected on this Project, and have completed projects of this magnitude in the last five (5) years.

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

1.10 MOCK-UP

.1 Locate where directed by Departmental Representative.

.2 Allow 48 hours for field review of mock-up by Departmental Representative.

.3 Contractor only to proceed once the testing is complete and written approval has been received by the Departmental Representative.

.4 When accepted, mock-up will demonstrate minimum standard for this work. Approved mock-up may remain as part of the Work.

1.11 FIRE WATCH

.1 Fire Extinguishers: maintain one cartridge operated type with hose and shut-off nozzle, ULC labelled for A, B and C class protection, within 3 meters of torch applicator.

.2 A continuous fire watch shall be maintained during the hot work, to NBCC requirements, and a one (1) hour continuous fire watch maintained immediately after completion of torching.

.3 A fire watch shall also be maintained for a period of not less than four (4) hours after its completion.

.4 A final inspection of the hot work areas shall be conducted 4 hours after completion of the work.

.5 Designate a person, equipped with a fire extinguisher and a cell phone, responsible in the event of a fire, to do a mandatory walk-about to check for hot spots. Ensure the designated person has the contact numbers for the facility mangers and emergency response personnel.

.6 Make sure all workers know the escape route.

1.12 TEST REPORTS

.1 The Departmental Representative may provide a third party roof inspection company to check and verify all systems from Shop Drawing review, to actual Roof construction. If required, these include:
- .1 Site reviews during application of the system
- .2 Provide interim written reports during the application to the Departmental Representative.
- .3 Infrared testing of the entire roof will be required and will include all field applications. Testing of flashing: at cap flashing, roof to wall flashing, etc., and at all roof drains. Provide infrared testing of all seam testing.
- .4 Qualifications of the required test will be as follows:
  - .1 Upon completion of the Primary Waterproofing Membrane, Protection Course, and all associated terminations, if leaks are discovered, contractor to repair.
  - .2 Contractor to retest the system, report all deficiencies to the Departmental Representative.
- .5 Submit copies of all test reports to the Departmental Representative.
- .6 All costs of the third party testing, if required, will be borne by the Departmental Representative.

.7 Dynamic wind up lift tent to CAN – A123.21.04.

1.13 WARRANTIES

.1 Roofing Contractor to supply the Departmental Representative with a CRCA warranty certifying work completed as installed to be free of roof defect for a period of two (2) years from date of substantial performance.

.2 Contractor to provide assurance that all materials, adhesives and fasteners are fully compatible for the complete roof system.

.3 Provide manufacturer's full system warranty (non-pro-rated) in the name of the Departmental Representative, stating roofing system will remain watertight for a period of a full ten (10) years from the date of substantial completion. This warranty is to include both labour and materials necessary to affect water tightness.

PART 2 - PRODUCTS

2.1 UNDERLAYMENT BOARD

.1 Mold and Moisture Resistant, non-combustible, solid core underlayment board to provide smooth surface for Air/Vapour Barrier application.

.2 Manufactured as per ASTM C1177/C1177M.

.3 Size Boards: 1220 mm wide x 2440 mm long x 13 mm thick minimum.

.4 Acceptable Materials:
- .1 CGC Securock Glass mat Roof Board
- .2 Georgia Pacific DensDeck Prime Roof Board.
- .3 or approved alternate

2.2 VAPOUR BARRIER

.1 Modified Bitumen base sheet membrane, for use in the 'field area', over underlayment board:
- .1 Non-woven glass fiber matt, coated and permeated with SBS Modified bitumen.
- .2 Bottom side coated with thermofusible film for torch application.
- .3 Top side sanded for application of cold adhered insulation.
- .4 Minimum Thickness: 2.0 mm
- .5 Manufactured to ASTM D6164.

.2 Modified Bitumen base flashing membrane, for use at parapets and upstands against plywood backing:
- .1 Non-woven reinforcing matt, polyester coated and permeated with SBS bitumen, self-adhering one side.

.2 Thickness: 2.5mm (98mils)
.3 The back surface is self-adhered, silicone treated film.

.4 Manufactured to ASTM D6164.
.5 Primer as per manufacturer's recommendations

.3 Acceptable Manufacturer's Materials:
.1 IKO
.2 Soprema
.3 or approved alternate.

2.3 RIGID INSULATION

.1 Expanded Polystyrene Insulation:
.1 Polystyrene: to CAN/ULC-S701-05, Type 2
.2 Size 1200mm x 1200mm, butt edge
.3 Provide two layers with all staggered joints
.4 RSI-5.3 (R-30) insulation values based on NRC ratings.
.5 Acceptable Manufacturers:
.1 Truefoam
.2 Fransyl
.3 Colgrip EPS
.6 Tapered insulation as required. Refer to roof plan.

.2 Extruded Polystyrene Insulation:
.1 Polystyrene: to CAN/ULC-S701-05, Type 2.
.2 Size 600mm x 1200mm, butt edge.
.3 Provide two layers with all staggered joints
.4 RSI-5.3 (R-30) insulation values based on NRC ratings.
.5 Acceptable Manufacturers:
.1 Celotex
.2 Dow
.6 Tapered insulation as required. Refer to roof plan.

.3 Isocyanurate (Urethane) Insulation:
.1 To CAN/ULC-S701-05, black glass reinforced felt facers, flame spread classification: less than 500 unrated, butt edge.
.2 RSI-5.3 (R-30) insulation values based on NRC ratings.
.3 Provide two (2) layers with all staggered joints
.4 Acceptable Manufacturers:
.1 ISOX IFB
.2 IKOTherm
.3 Celotex
.5 Tapered insulation as required. Refer to roof plan.

2.4 COVER BOARD

.1 Fibreboard:

.1 Uniform density board coexisting of material interlocking fibres for additional strength and moisture resistance.

.2 To CAN/CSA-A-247-M86 requirements.

.3 Tests:

THICKNESS	**HIGH DENSITY**
Compressive Strength	276 kPa
Tensile Strength Perpendicular Parallel	 47.9 Kpa 1.38 MPa
Transverse Load	53 N
Water Absorption	3% Volume Max.
Linear Expansion	0.2% Max.

.4 Thickness 12.5 mm thick

.5 Acceptable Manufacturers:

.1 Georgia Pacific, Model: Commercial Roof Fibreboard

.2 Celotex, Model: Structodek

.3 or approved alternate.

2.5 COVER BOARD C/W BASE LAMINATED FR 180 POLYESTER

.1 Protection Board 12.7mm thick fire resistant fibreboard with 180g film surfaced SBS modified membrane factory laminated to top surface of the board complete with a self adhering edge.

.2 Top Surface: Poly film (thermal fusible)

.3 Acceptable Manufacturers:

.1 IKO

.2 Soprema

.3 Approved alternate

2.6 ROOF MEMBRANES

.1 Base Sheet Strip Flashing 180 g/m

.1 Non-woven reinforcing matt, polyester coated and permeated with SBS bitumen, self-adhering one side, thermo fusible plastic film over.

.2 Thickness: 2.5mm

.3 Poly Film (thermo fusible) covers the top surface; the back surface is self-adhered, silicone treated film.

.4 Manufactured to ASTM D6164.

.5 Primer as per manufacturer’s recommendations.

.6 Acceptable Manufacturers:

.1 IKO

.2 Bakor

.3 Soprema

.2 Cap Sheet and Cap Flashing 250g/m:

.1 Non-woven reinforcing mat, strengthened with selected glass fibre strands, coated and permeated with SBS modified bitumen. The underside to be protected by thermofusible plastic film. Membrane to be applied by torching only.
.2 Thickness: 4.0mm
.3 Coloured ceramic mineral granules embedded into top surface to provide protection against ultraviolet radiation with polyfilm bonded to underside for heat welding.
.4 Finish Colour Cap Sheet: as selected from full colour range.
.5 Manufactured to ASTM D6164 for Type II, Grade G materials.
.6 Acceptable Materials:
.1 IKO Torchflex TP 250 CAP
.2 Henry
.3 Soprema

2.7 ROOFING ADHESIVE

.1 Must be compatible with roofing system components and be a 'non-solvent' base.

.2 Acceptable Materials:
.1 Henry, Model: Thermostik 840-10 low solvent
.2 IKO, Model: Cold Gold adhesive
.3 Polyglass, Model: PG 350 Modified Bitumen Adhesive

2.8 FASTENERS

.1 DekFast #15 HO screw with Hex Plates (metal) or Olympic Heavy Duty screw with Standard Metal Plate, applied at 0.18 sq.m. maximum contributory area per fastener.

.2 Flashings to wood curbs and parapets: to CSA B111, round top cap nails, galvanized, long enough to penetrate wood members by at least 19 mm on flashings and parapet walls.

2.9 CONCRETE PAVERS

.1 Concrete Pavers (for use directly on roof membrane):
.1 Paving slabs to CSA A231.1
.2 2' x 2' x 2' (600mm x 600mm x 50mm) thick
.3 Factory Precast.
.4 Colour and pattern from manufacturer's standard range, to be chosen by Consultant
.5 Refer to drawings for location

.2 Adjustable Paver Pedestal
.1 Standard of Acceptance: Versajust adjustable deck support system to be used with concrete pavers by Bison.
.2 Components:
.1 Integral base levelling to correct for sloping services

.2 Each pedestal tested to support at ultimate failure compression load of 1250 lbs per pedestal.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Manufacturer's Technical Representative to examine roof decks and immediately inform the Departmental Representative, in writing, that the substrate is acceptable for the new roofing system.

3.2 PREPARATION OF SUBSTRATE

.1 Prior to installation of roof system verify:
- .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust, debris and ready for primer.

.2 Curb upstands have been installed for mechanical services requiring curbs, supports etc.

.3 Roof drains have been installed at proper elevations relative to finished roof surface.

3.3 INSTALLATION

.1 Underlayment Board Installation:
- .1 Mechanically fasten the Densdeck to the steel deck.

.2 Air Vapour Barrier Installation:
- .1 Apply the self-adhering air vapour barrier membrane to the underlayment board in accordance with manufacturer's recommendations.
- .2 Prime the underlayment board (if unprimed board) and install self-adhered vapour barrier to the underlayment board.
- .3 Temperature is to be above 5ºC when applying the membrane.
- .4 Apply the air/vapour barrier in direction of slope or perpendicular to slope. When applied perpendicular to slope, apply beginning at low point of and proceed in "shingle fashion". Position sheet to achieve correct overlap and alignment.
- .5 Verify there are no air bubbles or fish mouths in the application.
- .6 Tie-ins to other wall areas of the building envelope are to be properly tied in to form a complete and continuous air/vapour enclosure, roof and wall conditions.

.3 Insulation Panel Installation:
- .1 Loose lay the insulation panels in this layer over lapping end and side joints.
- .2 Discard broken insulation boards.
- .3 Voids are to be completely filled with insulation.
- .4 Install insulation to fit tightly next to curbs, parapets and roof protrusions.

.5 Provide tapered insulation in areas as noted on the plans.

.4 First Layer Cover Board Installation:

.1 Mechanically fasten the protection board c/w base sheet in accordance to the fastening patterns to achieve. FM – 1 – 120 wind up lift requirements.

.2 Fasteners to be a minimum of 150 mm from the board edge.

.3 Fasteners and fastening pattern and to be confirmed by the roofing manufacturer to agree with the approved shop drawings for this project.

.4 Use the shortest screw that is at least 19 mm longer than the assembly being secured. Contractor to review the location of conduit mounted to the underside of the steel deck, and verify that fasteners bypass the conduit. Contractor to repair damage or disruption to the cable/conduit under this contract.

.5 Second Layer Cover Board c/w Base Laminated FR 180 Polyester

.1 Apply a cold process adhesive to bottom of second layer of fibreboard c/w base laminated FR polyester. Stagger joints between layer by minimum 150 mm.

.2 Leave out 610 mm square area of second layer of fibreboard c/w base laminated FR polyester around all roof drain locations.

.3 Install boards tight together, and ensure all self adhered side and end laps are totally sealed, with all fastening plates hidden from view under the laps.

.6 Flashing Base Sheet Stripping:

.1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.

.2 Self adhere flashing base sheet onto substrate in 915 mm wide strips.

.3 Self adhere flashing base sheet to membrane base sheet minimum 150 mm

.7 Cap Sheet Membrane Application:

.1 Starting at low point of roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.

.2 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.

.3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.

.4 Application to be free from blisters, wrinkles and fishmouths.

.5 Do membrane application in accordance with manufacturer's recommendations.

.6 While bleed-out of membrane cap sheet is still hot, spread loose granules in bleed-out, set firmly with recommended tool, providing uniform colour and appearance.

.8 Cap Sheet Flashing:

.1 Torch cap sheet onto base sheet in 915 mm wide strips.

.2 Lap flashing cap sheet to membrane cap sheet 100 mm minimum and torch weld.

.3 Provide 75 mm minimum side lap and seal.

.4 Properly secure flashings to their support, without sages, blisters, fishmouths or wrinkles.

.5 Do work in accordance with manufacturer's recommendations.

.6 Treat bleed-out as specified for bleed-out in field.

3.4 ROOF METAL FLASHING

.1 Refer to Section 07 62 00.

3.5 ROOF PARAPETS & EQUIPMENT CURBS

.1 Refer to Section 06 10 00.

3.6 PROTECTION DURING WORK

.1 Cover walls and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.

.5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.

.6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.

.7 Place plywood runways over work to enable movement of materials and other traffic.

.8 Contractor to ensure only as much of the roofing material removed from the roof as can be made watertight and secure by days end.

.9 Contractor is solely responsible for water damage, to the interior of the building caused by lack of protection of the system during the deconstruction or construction of this roofing system.

3.7 PROTECTION AFTER WORK COMPLETED

.1 Contractor to repair damage caused by work of this contract - to adjacent roof and wall areas, and also to site areas such as lawns or paved areas that have damage caused by this contract.

.2 Contractor responsible to protect and cover interior areas for dust cover and migration of dirt stemming from work above.

3.8 CONCRETE PAVERS

.1 Refer to Roof Plan for installation of pavers around new roof top units on the existing roof system and the new roof system.

.2 Ensure levelling pads are placed to provide a level walking surface.

.3 Installation of pavers must not interfere with.

3.8 CLEANING

.1 Contractor to provide clean-up for this roofing area. Debris and excess roofing items to be removed from the site.

3.9 NEW WORK ON EXISTING ROOF @ NEW HVAC UNITS

.1 Remove portion of existing roof surrounding new install.

.2 Provide new roof curb construction around new HVAC and condenser roof openings.

.3 Provide new two ply modified roofing system to flashing around HVAC units and then tie – in to existing roof system.

.4 Ensure a water tight seamless installation.

.5 Provide new precast paver walking surface as noted.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM D523-14, Test Method for Specular Gloss
- .2 ASTM A653/A653M-15e1, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM D822/D822M-13, Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
- .4 ASTM F1667-15, Driven Fasteners: Nails, Spikes, and Staples

.2 Canadian Roofing Contractors Association (CRCA).

1.2 SUBMITTALS

.1 Submit samples as per Section 01 33 00 Submittal Procedures.

.2 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, colour and finish.

PART 2 - PRODUCTS

2.1 PREFINISHED STEEL SHEET FLASHING

.1 Prefinished steel, with factory applied silicone modified polyester.
- .1 Class F1S.
- .2 Specular gloss: 30 units +/- 5 in accordance with ASTM D523.
- .3 Thickness: .76mm.
- .4 Colour:
  - .1 Preformed Metal Siding - colour to match siding colour
- .5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units, or less erosion rate less than 20% for ASTM D822
  - .1 Outdoor exposure 1000 hrs
  - .2 Humidity resistance 1000 hrs
- .6 Ensure 50mm vertical leg on sheet metal flashing

2.2 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to ASTM D4586 Type I.

.3 Underlay for metal flashing: dry sheathing

.4 Sealants: as per Section 07 92 00.

.5 Cleats: of same material as flashing specified, and temper as sheet metal, minimum 50mm wide. Thickness .76 mm.

.6 Fasteners: of same material as sheet metal, to ASTM F1667, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.

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

2.3 FABRICATION

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

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

.3 Hem exposed edges on underside 12.7 mm. Miter and seal corners with sealant.

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

.5 Apply isolation coating to metal surfaces to be embedded in concrete.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Use concealed fastenings except where approved before installation, fasteners installed at 600 mm o.c.

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

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

.4 Fasten at 600 mm on centre.

.5 Lock end joints and caulk with sealant.

.6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.

.7 Insert metal flashing into reglets under cap flashing to form weathertight junction.

.8 Caulk flashing at reglet cap flashing with sealant.

.9 Cut triangle on diagonal joint to minimize cut joint.

END

PART 1 – GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM):
- .1 ASTM E605/E605M-93(2015)e1, Test Methods for Thickness and Density of Sprayed Fire Resistive Material (SFRM) Applied to Structural Members.
- .2 ASTM E136-16a, Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 176;C

.2 Underwriters Laboratories of Canada (ULC):
- .1 CAN/ULC-S101-07, Methods of Fire Endurance Tests of Building Construction Materials
- .2 CAN/ULC-S102-10EN, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
- .3 CAN/ULC-S114-05, Method of Test for Determination of Non-Combustibility in Building Materials.
- .4 ULC List of equipment and materials for: Building Materials, Fire Resistance & Firestop Systems and Components.

1.2 SUBMITTALS

.1 Submit manufacturer's documentation for materials in accordance with Section 01 33 00 Submittal Procedures.

.2 Submit product data, MSDS sheets for low emitting materials which clearly identifies the VOC emissions limits.

.3 Submit manufacturer's product MSDS sheets and installation instructions in accordance with Section 01 33 00 – Submittal Procedures.

1.3 ENVIRONMENTAL REQUIREMENTS

.1 Do not apply spray fireproofing when temperature of substrate material and surrounding air is below 5 degrees C (40 degrees F).

.2 Provide ventilation in areas to receive fireproofing during and twenty-four (24) hours after application, to dry material.

.3 Provide temporary enclosure to prevent spray from contaminating air.

1.4 MOCK-UP

.1 Provide mock-up in accordance with Section 01 45 00 Testing and Quality Control. Locate where directed by Departmental Representative.

.2 Apply cementitious fireproofing to approximately $10m^2$ area of surfaces to be treated with fireproofing. Confirm with project requirements for fire ratings.

.3 Where shrinkage and cracking are evident, adjust mixture and method of application as necessary. Remove materials and re-construct mock-up.

.4 Allow forty-eight (48) hours for inspection of mock-up by Departmental Representative before proceeding with cementitious fireproofing work.

.5 Contractor only to proceed once the testing is complete and written approval has been received by the Departmental Representative.

.6 When accepted, mock-up will demonstrate minimum standard for this work. Approved mock-up may remain as part of the Work.

1.5 WASTE MANAGEMENT

.1 Separate and recycle waste materials in accordance with Section 01 74 21 Construction Waste Management and Disposal

1.6 PERFORMANCE CRITERIA

.1 Cementitious Fireproofing System: provide fire rated assembly for floor per schedule in this Section as noted on Drawings.

1.7 DELIVERY, HANDLING AND PROTECTION OF PRODUCT

.1 Materials to be delivered in original unopened packages, fully identified as to the manufacturer, brand or other identifying data and bearing. The proper Underwriters Laboratories Inc. labels for surface burning characteristics and fire resistance classification.

.2 Materials to be stored off the ground, under cover, and in a dry location until ready for use. Bags that have been exposed to water before use to be found unsuitable and discarded. Stock of material is to be rotated and used prior to its expiration date.

.3 At outdoor temperatures of less than 5˚C, an air and substrate temperature of 5˚C is to be maintained during and for twenty-four (24) hours after application. Provide natural ventilation to properly dry the fireproofing during and subsequent to its application. Interior air is to be circulated and exhausted to the outside in enclosed areas lacking openings for natural ventilation.

.4 Provide temporary enclosures to prevent spray from contaminating air beyond application area.

.5 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of fireproofing materials

1.8 QUALITY ASSURANCE/QUALITY CONTROL

.1 Fireproofing work to be performed by a firm acceptable to the cementitious fireproofing material manufacturer.

.2 Products, execution, and fireproofing thicknesses to conform to the applicable code requirements for the required fire-resistance ratings.

.3 Contractor, fireproofing manufacturer to attend a pre-installation conference to review the substrates for acceptability, method of application, applied thicknesses, inspection procedures and other issues.

.4 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

.5 Applicator Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience and approved by the manufacturer.

1.9 SEQUENCING

.1 Verify that metal substrates are prepared and ready to receive spray fire proofing.

1.10 TEST REPORTS

.1 Submit product data including certified copies of test reports verifying fireproofing applied to substrate as constructed on project will meet or exceed requirements of Specification.

.2 Submit test results in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.

.3 For assemblies not tested and rated, submit proposals based on related designs using accepted fireproofing design criteria.

.4 Provide certificate of compliance for fireproofing materials for review by Authority having Jurisdiction.

1.11 TESTING OF PRODUCT

.1 Inspection and testing of fireproofing may be carried out by Testing Laboratory designated by Departmental Representative.

.2 Contractor will pay costs for testing.

1.12 EXTENDED WARRANTY

.1 Submit a written warranty, executed by the contractor and co-signed by the installer, agreeing to repair or replace sprayed fireproofing materials that fall within the specified warranty period.

.2 Failures include, but are not limited to cracking, flaking, eroding in excess of specified requirements, peeling and delaminating of sprayed fireproofing from substrates due to defective materials or installation.

.3 Not covered in this warranty are failures due to damage by others, such as occupants and Departmental Representative maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, excessive flexing of floor systems, and work on said roof systems, and other causes not reasonable foreseeable under conditions of normal use.

.4 Extended Warranty Period: two (2) years, from date of substantial performance.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Standard of Acceptance based on Wet Mix, ULC Certified, Standard Density, Cementitious Spray Fireproofing; Isolatek - Cafco 300.
- .1 Density: ASTM E605 Standard for thickness and density of sprayed fire resistance materials applied to structural members.
- .2 Non-combustible material to: ASTM E136, CAN/ULC-S114

.2 Primer: type recommended by fireproofing manufacturer, qualified for use in ULC designs.

.3 Sealer: type recommended by fireproofing manufacturer, qualified for use in approved ULC Design.

.4 Water: clean, potable

.5 Acceptable Materials:
- .1 Grace Construction Products, Model: Monokote MK-6
- .2 A/D Fire Protection Systems, Model: Type 5GP.
- .3 Approved alternate.

PART 3 – EXECUTION

3.1 EXAMINATION

.1 Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing, are in place.

.2 Verify ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is complete.

.3 Verify that voids and cracks in substrate are filled, and projections are removed where fireproofing is exposed to view as a finish material.

3.2 PREPARATION OF SUBSTRATE

.1 Remove incompatible materials.

.2 Items required to penetrate fireproofing (eg. steel stud framing) are to be installed before installation of fireproofing.

.3 Ducts, piping, equipment, or other items that would interfere with application of fireproofing are not to be installed/positioned until fireproofing work is completed.

.4 Review and note steel members that have not been primed painted.

.5 Contractor to clean surfaces to be free of dirt, grease, loose mill scale, surface rust and other materials that may impair adhesion.

.6 Refer to manufacturer’s recommendations for specific requirements for cleaning/preparing the surface prior to the application of the fireproofing material

.7 Complete placing of concrete on the floor prior to application of the fireproofing to the underside of the steel deck and supporting beams.

3.3 INSTALLATION

.1 Apply bonding adhesive or primer to substrate as recommended by manufacturer.

.2 Apply fireproofing to correspond with tested assemblies, or acceptable calculation procedures to provide fire resistance ratings as noted.

.3 Apply fireproofing to floor assemblies including steel deck, joist and beams and steel columns supporting assemblies as indicated.

.4 Apply fireproofing over substrate, building up to required thickness to cover substrate with monolithic blanket of uniform density and texture.

.5 Tamp smooth, surfaces visible in finished work as indicated.

.6 Apply curing compound to surface of cementitious fireproofing as required by manufacturer.

3.4 PROTECTION DURING WORK

.1 Protect surfaces not scheduled for fireproofing and equipment from damage by overspray, fall-out, and dusting.

.2 Close off and seal duct work in areas where fireproofing is being applied.

3.5 PROTECTION AFTER WORK COMPLETED

.1 Re-inspect the installed fireproofing for integrity of fire protection, after installation of subsequent work.

.2 Patch damage to fireproofing caused by testing or by other trades before fireproofing is concealed, or if exposed, before final inspection.

3.6 CLEANING

.1 Refer to Section 01 74 11 Cleaning.

.2 Remove excess material, overspray, droppings, and debris.

.3 Remove fireproofing from materials and surfaces not required to be fireproofed.

END

PART 1 - GENERAL

1.1 SUMMARY OF SECTION

.1 As summarized and described, but not restricted to:
- .1 Provide firestopping for all rated and non-rated separations including terminations and all penetrations including all architectural, structural, mechanical and electrical penetrations.
- .2 Coordinate with mechanical and electrical Divisions to ensure all penetrations are properly sealed.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM D2369-10e1, Standard Test Method for Volatile Content of Coatings.
- .2 ASTM E2174-14, Standard Practice for On-Site Inspection of Installed Fire Stops.
- .3 ASTM E2393-10a, Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.

.2 International Fire stop Council (IFC):
- .1 February 2007, Recommended IFC Guidelines for Evaluating Fire stop Systems in Engineering Judgments (EJ's) Perimeter Fire Barrier Systems.

.3 National Building Code of Canada (NBC) 2010.

.4 Underwriters' Laboratories of Canada (ULC):
- .1 CAN/ULC-S115-11, Standard Method of Fire Tests of Fire stop Systems

1.3 SUBMITTALS

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

.2 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.

.3 Shop Drawings: Submit System Design listings, indicating ULC design number and including illustrations, applicable to each firestop configuration. Provide schedule indicating material to be used, building elements to be protected, hourly rating and appropriate references.

.4 Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

.5 Submit material safety data sheets (MSDS), provided with products delivered to job site.

1.4 ENVIRONMENTAL REQUIREMENTS

.1 Comply with manufacturer's recommended requirements for temperature, relative humidity and substrate moisture content during application and curing of materials.

.2 Do not proceed with installation of firestopping materials when temperatures or weather conditions exceed manufacturer's recommendations.

.3 Ventilate solvent based and moisture-cure firestopping per manufacturer's instructions by natural means or, where inadequate, by forced air circulation.

.4 VOC Limitations: for all materials supplied by this Section, the total VOC content must be less than or equal to 250 g/L, less water, when tested to ASTM D2369 for all interior sealants applied within the weatherproofing barrier of the exterior wall.

.5 Follow Indoor Air Quality (IAQ) Plan requirements in accordance with Section 01 35 44 Indoor Environmental Protection.

.1 Work scheduling requirements must be followed for compliance.

1.5 WASTE MANAGEMENT

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Waste Management and Disposal.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

1.6 DESIGN CRITERIA

.1 Definitions:

.1 Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, water and hot gases through penetrations and joints between fire rated wall, floor and roof assemblies.

.2 System Design: An assembly of products designed to maintain the integrity of fire-rated construction when tested in accordance with CAN/ULC-S115, designed by a voting IFC member, certified by an independent ULC licensed testing agency, and ULC Listed

1.7 PERFORMANCE CRITERIA

.1 Penetrations: Provide and install firestopping systems produced to resist the spread of fire, and the passage of smoke and other gases according to requirements indicated, including but not limited to the following:

.1 Firestop penetrations passing through fire resistance rated wall and floor assemblies and other locations as indicated on the drawings.

.2 Provide and install complete penetration firestopping systems that have been tested and approved by third party testing agency.

.2 Perimeter Fire Containment Systems: Provide interior perimeter joint systems with fire-resistance ratings indicated, but not less than the fire-resistance rating of the floor construction.

.3 Fire-Resistive Joints: Provide joint systems with fire-resistance ratings indicated, but not less than the fire-resistance rating of the construction in which the joint occurs.

.4 For firestopping exposed to view, traffic, moisture, and physical damage, provide appropriate firestop systems for these conditions.

1.8 DELIVERY, HANDLING AND PROTECTION OF PRODUCT

.1 Deliver firestopping products in original, unopened containers with labels intact and legible, identifying product and manufacturer.

.2 Store and handle firestopping materials to manufacturer’s instructions.

1.9 QUALITY ASSURANCE/QUALITY CONTROL

.1 Engage an experienced Installer who is certified, licensed, or otherwise qualified by the fire stopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its fire stopping products to the Contractor or to an Installer engaged by the Contractor does not in itself infer qualification on the buyer.

.1 Installer to be member of FCIA (Firestop Contractors International Association).

.2 Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience, certified by the firestop manufacturer.

.2 A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

.3 Conduct conference at Project site. Review methods and procedures related to firestopping including, but not limited to, the following:

.1 Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

.2 Review methods and procedures related to firestopping installation.

.4 Manufacturer to certify firestop materials and methods shall conform to applicable governing codes having local jurisdiction, and certification to be forwarded to the consultant.

.5 Firestop Systems do not re-establish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Structural Engineer must be consulted prior to penetrations at load bearing assemblies.

.6 For those firestop applications that exist for which no ULC or ULc tested system is available through a manufacturer, Contractor is to provide a manufacturer's engineering judgment derived from similar ULC or ULc system designs or other tests submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.

.7 Notify Consultant when completed installations are ready for inspection prior to concealing or enclosing area containing fire stopping materials. Allow forty-eight (48) hours for site review.

.8 Firestop installation must meet requirements of ASTM E2174 and ASTM E2393 tested assemblies.

1.10 SEQUENCING AND PHASING

.1 Do not cover up firestopping installations until receipt of written notice from the Consultant.

1.11 TEST REPORTS

.1 Inspection: The Departmental Representative may retain an independent inspection agency to examine penetration and joint firestopping in accordance with ASTM E2174 and ASTM E2393.

.2 Testing will be paid by Departmental Representative, except where testing reveals non-compliant installation, for which replacement is to be paid by Installer.

1.12 EXTENDED WARRANTY

.1 Provide manufacturer’s standard warranty covering materials and applications warranty covering workmanship, both two (2) years beyond substantial performance.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Fire stopping and smoke seal to provide a full FTH system: in accordance with CAN/ULC S115.

.1 Asbestos -free materials and systems capable of maintaining an effective barrier against flame, smoke, gases and hose steam in compliance with requirements of

CAN/ULC-S115 and not to exceed opening sizes for which they are intended.

.2 Firestop system rating:
- .1 Floor Separations
- .2 Stairwells.
- .3 Electrical Rooms.
- .4 Elevator Shaft.
- .5 Boiler Room.
- .6 See drawings for other locations and fire resistance ratings.

.2 Fire-resistance rating of installed fire stopping assembly in accordance with NBC 2010.

.3 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.4 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.5 Smoke seals are required only at fire separations without a rating.

.6 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.7 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.8 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.9 Sealants for vertical joints: non-sagging, low VOC emitting to meet SCAQMD Rule #1168 - VOC content of adhesives. Colour: Red

.10 Acceptable Manufacturers:
- .1 Hilti Systems
- .2 A/D Fire Protection Systems
- .3 3M Firestop Solutions
- .4 Tremco Fire Protection Systems
- .5 STI Specified Technologies

2.2 ACCESSORIES

.1 Primer: Type recommended by firestopping manufacturer for specific substrate surfaces.

.2 Installation Accessories: Clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place, as required by System Design

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify openings are ready to receive the work of this section.

.2 Examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping.

.3 Verify that blocking, anchoring devices, back-up materials, clips, sleeves, supports and other related materials is in place where required by System Design.

.4 Do not apply firestopping to painted surfaces or surfaces treated with sealers, curing compounds, water repellent or other coatings unless compatibility of materials has been verified.

.5 Notify the General Contractor of unsatisfactory conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

.6 Commencement of Work will be considered acceptance of substrate conditions.

3.2 PREPARATION OF SUBSTRATE

.1 Prime substrates where recommended by firestopping manufacturer using manufacturer's recommended products and methods. Limit priming to area of bond.

.2 Use masking tape to prevent firestopping from contacting adjoining surfaces scheduled to remain exposed. Remove tape on completion of installation, without disturbing the firestopping seal with substrates.

.3 Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.

.4 Remove incompatible materials which may affect bond.

.5 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Substrates and surfaces are to be clean, dry and frost free. A minimum distance of 25 mm is to be maintained around the perimeter of the service line duct etc. to be fire stopped.

.6 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.7 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

.8 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

.1 General Installation:

.1 Install permanent warning labels, provided by firestopping manufacturer, adjacent to openings that may be re-penetrated or disturbed. Include following information:

.1 Warning that opening has being firestop protected.

.2 System Design number.

.3 Full FTH rating is required.

.4 Fire stop products used.

.5 Contact person and phone number in case of modification or new penetration of firestop system.

.2 Notify Consultant when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

.3 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

.2 Installation - Penetration Firestops:

.1 Verify that all building penetrations in rated and non-rated system have been firestopped.

.2 Schedule work so partitions and other construction that conceals penetrations are not erected prior to firestop ping.

.3 Install forming/damming materials and other accessories in accordance with manufacturers written instructions.

.4 Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.

.1 Provide mock-up of typical cable tray/wiring bundle and ductwork that passes through fire wall. Consultant to review and approve mock-up as typical standard of acceptance for wiring and or ductwork that passes through rated wall assemblies.

.5 Install materials to contact and adhere to substrates formed by openings and penetrating items.

.6 Finish to produce smooth, uniform surfaces for fill materials to remain exposed.

.7 Seal holes or voids made by through penetrations, poke-through termination devices, and un-penetrated openings or joints so that continuity and integrity of fire separation is maintained.

.8 Firestop caulking is not to be painted. Painting over firestop caulking may void rating / warranty.

.3 Installation - Mechanical/Electrical Components:

.1 Firestop all piping, conduit, cable trays, cables and wires, vent pipes and duct work through rated and non-rated penetrations.

.2 Coordinate fully with mechanical and electrical trades to seal all vertical/horizontal penetrations of ductwork piping, conduit, wires, etc.

.4 Installation - Firestop Joint Systems:

.1 Install joint fillers to provide support of firestop materials during application.

.2 Install in full contact with joint substrates.

.3 Completely fill recesses provided for joint configuration.

.4 Provide uniform, cross-sectional shapes and depths relative to joint width that optimize movement capability.

.5 Tool immediately after application and prior to skinning. Form smooth, uniform

beads of configuration required to produce fire-resistance rating, eliminate air pockets and verify contact and adhesion with sides of joint.

.6 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.7 Tool or trowel exposed surfaces to a neat finish.

.8 Remove excess compound promptly as work progresses and upon completion.

.9 Apply firestopping material in sufficient thickness to achieve rating.

3.4 PROTECTION DURING WORK

.1 Where deficiencies are found, repair or replace the firestopping, at no cost to Departmental Representative, to comply with requirements of the System Design.

3.5 PROTECTION AFTER WORK COMPLETED

.1 Protect firestopping during and after curing period from contact with contaminating substances. If damage caused by others, make appropriate repairs at no cost to Departmental Representative.

.2 Protect adjacent surfaces from damage by material installation.

3.6 ADJUSTMENT

.1 Arrange for inspections by Departmental Representative's independent inspection agency, if required.

.2 Where no deficiencies are found, provide repair of inspected installations, paid by Departmental Representative, as required to comply with requirements of the System Design.

.3 Where deficiencies are found, repair or replace the firestopping, at no cost to Departmental Representative, to comply with requirements of the System Design.

3.7 SCHEDULE

.1 Firestop and smoke seal at:

.1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions, ceilings and floors.

.2 Top of fire-resistance rated masonry and gypsum board partitions.

.3 Intersection of fire-resistance rated masonry and gypsum board partitions.

.4 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.

.5 Penetrations through fire-resistance rated floor slabs.

.6 Openings and sleeves installed for future use through fire separations.

.7 Mechanical and electrical penetrations.

3.8 CLEANING

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials
- .1 ASTM C834-14, Latex Sealants
- .3 ASTM C920-14a, Elastomeric Joint Sealants
- .4 ASTM C1311-14, Standard Specification for Solvent Release Sealants
- .5 ASTM E84-16, Standard Test Method for Surface Burning Characteristics of Building Materials
- .6 ASTM E90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

1.2 SAMPLES

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

.2 Submit duplicate samples of each type of material and colour.

.3 Submit Manufacturer’s Product Data for each sample submitted in accordance with Section 01 33 00 – Submittal Procedures

1.3 MOCK-UP

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Construct mock-up to show location, size, shape and depth of joint s complete with back-up material, primer, caulking and sealant. Mock-up may be part of finished work.

.3 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with sealant work.

1.4 DELIVERY, STORAGE, AND HANDLING

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

1.5 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 Departmental Representative will arrange for ventilation system to be operated on maximum outdoor air and exhaust during installation of caulking and sealants.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Waste Management and Disposal and the Waste Reduction Workplan.

.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.

.4 Dispose of surplus chemical and finishing materials in accordance with federal, provincial and municipal regulations.

.5 Separate corrugated cardboard in accordance with the Waste Management Plan and place in designated areas for recycling.

.6 Fold up metal banding, flatten, and place in designated area for recycling.

.7 Use trigger operated spray nozzles for water hoses.

.8 Return solvent and oil soaked rags for contaminant recovery and laundering or for proper disposal.

.9 Use the least toxic sealants, adhesives, sealers, and finishes necessary to comply with the requirements of this section.

.10 Close and seal tightly all partly used sealant containers and store protected in well ventilated fire-safe area at moderate temperature.

.11 Place used hazardous sealant tubes and other containers in areas designated for hazardous materials.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

.1 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.

.2 Caulking that emits strong odours, contains toxic chemicals or is not certified as mould

resistant shall not be used in air handling units.

.3 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.

2.2 EXTERIOR SEALANT MATERIAL

.1 Polyurethane Sealant:
- .1 Multi component, chemically cured polyurethane, gun grade.
- .2 Classification: Type II, Class B.
- .3 Colour: To be selected by Departmental Representative from manufacturer's standard colours.
- .4 Approved Materials:
  - .1 Tremco Dymeric 240
  - .2 Sika Sikaflex 2c NS E2 mix
  - .3 Dow

.2 Silicone Sealant (at concrete, masonry, brick or metal panel):
- .1 Low modulus, high performance, one part moisture curing sealant.
- .2 100% Silicone sealant to ASTM C920, Type S, Grade NS Class 50.
- .3 Colour: To be selected by Departmental Representative from manufacturer's standard colours.
- .4 Approved Materials:
  - .1 Dow Corning Contractors Concrete Sealant
  - .2 Tremco Sealant and Waterproofing
  - .3 Sika Canada Silicone sealant

.3 Butyl Sealant (for membranes, roofs, etc.):
- .1 Butyl sealant, single component, solvent release, non-skimming, non-sagging, black colour, to ASTM C1311.
- .2 Sealant must be compatible with substrate/materials.
- .3 Approved Materials:
  - .1 Tremco
  - .2 Sika
  - .3 Dow

2.3 INTERIOR SEALANT MATERIAL

.1 Silicone Structural Glazing Sealant:
- .1 Silicone Structural sealant with ±50% joint movement capability for structural glazing joints; to ASTM C920.
- .2 Colour: clear
- .3 Sika silicone structural sealant

.2 Acoustic Sealant:
- .1 Acoustic sealant as required at interior partitions and at gap between wall board and sub floor.
- .2 Single component, white colour, acrylic, paintable sealant to ASTM E90, ASTM

C834 and ASTM E84.

.3 Approved Manufacturers:
- .1 Hilti CP506
- .2 Tremco
- .3 Sika Canada
- .4 Dow Corning

.3 General Purpose Sealant:
- .1 Acrylic latex, single component, siliconized acrylic latex sealant; paintable colour as selected from standard colour range.
- .2 Approved Manufacturers:
  - .1 Tremco Tremflex 834
  - .2 Sika Canada
  - .3 Dow Corning

.4 Mildew Resistant Sealant:
- .1 Silicone, mildew resistant silicone sealant with ±25% movement capability to ASTM C920; colour as selected from standard colour range.
- .2 Approved Manufacturers:
  - .1 Tremco Tremsil 200
  - .2 Dow Corning 786
  - .3 Sika Canada

.5 Self Levelling Joint Filler (Concrete Control Joints - Exposed at concrete floor):
- .1 Two component, self-leveling, 100% solids polyurea control joint filler.
- .2 Approved Manufacturers:
  - .1 BASF TF100
  - .2 Tenant ECO-PJS
  - .3 or approved alternate

2.4 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 INSTALLATION

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

.2 Sealant Application:
- .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.
- .9 Install backer material sized 25% larger than the joint.
- .10 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.
- .11 Apply bond breaker tape where required to manufacturer’s instructions.
- .12 Maintain 6 mm contact to each joint surface.

.13 Avoid three sided adhesion. Use backer rod or bond breaker tape.
.14 At perpendicular surfaces provide 6 mm minimum contact. Use bond breaker tape or backer if different materials
.15 Fillet Joints: for perpendicular surfaces, use 6 mm minimum contact, Use bond breaker tape or backer if caulking to different materials
.16 Pull sealant bead to provide full sealant coverage in joints.
.17 Tool immediately after installation. Wet tool not recommended.

.3 Acoustic Sealant Application:
.1 Provide junctions of the sealant, topside and underside of each layer of gypsum board, floor and U/S deck application.
.2 Provide sealant at penetrations of the wall and vertical surface where sound wall abuts an adjacent wall.
.3 Verify that 12.7 mm gap at typical GWB and floors is filled with acoustic caulking and that the caulking is flush to the wall board for a seamless application of wall base specified.

.4 Glass with Structural Silicone Joint Installation (SSG):
.1 Bond glass to metal support members with structural silicone sealant using method as detailed on drawings.
.2 Install sealant without gaps, twisting, stretching, or puncturing backing material, with uniform depth to achieve correct profile, coverage, and performance.
.3 Use temporary glass supports to retain glass panels while sealant is applied and allowed to cure.
.4 Provide concave, smooth, uniform, sealant finish. Eliminate air pockets and verify there is complete contact on both sides of joint opening.
.5 Coordinate with Section 08 44 00 Curtain Wall and Glazed Assemblies, and Section 08 80 00 Glazing.

3.6 PROTECTION DURING WORK

.1 Mask adjacent surfaces prior to priming and caulking, to prevent staining,

3.7 PROTECTION AFTER WORK COMPLETED

.1 Protect work from contamination or staining from work of other trades.

.2 Protect sealants until cured.

3.8 SCHEDULE

.1 Perimeters of exterior openings where frames meet exterior facade of building.

.2 Expansion and control joints in exterior surfaces of poured-in-place concrete.

.3 Coping joints and coping-to facade joints.

.4 Exterior joints in horizontal wearing surfaces.

.5 Seal interior perimeters of exterior openings as detailed on drawings.

.6 Interior control joints in floor surfaces.

.7 Perimeter of fixtures (e.g. sinks, urinals, waterclosets, basins, vanities).

.8 Interior control joints in drywall.

.9 Around electrical and mechanical boxes in exterior walls.

.10 Seal corner guards to walls.

.11 Sealant specified as related work noted in other sections in the specification and as indicated on the drawings.

.12 Mildew Resistant Sealant at cove base for resilient floor.

3.9 CLEANING

.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