PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 Comply with requirements of Division 1.

1.2 RELATED SECTIONS

.1 Section 07 14 00 – Fluid-Applied Waterproofing.

.2 Section 07 21 00 – Building Insulation.

.3 Section 31 23 10 – Excavating, Trenching and Backfilling.

1.3 REFERENCES

.1 CAN/CGSB-37.2 Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.

.2 CAN/CGSB 37.3 Application of Emulsified Asphalts for Dampproofing or Waterproofing.

.3 CAN/CGSB 37.5 Cement, Plastic, Cutback Asphalt.

.4 CGSB 37-GP-6Ma Asphalt, Cutback, Unfilled, for Dampproofing.

.5 CGSB 37-GP-9Ma Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.

.6 CGSB 37-GP-11M Application of Cutback Asphalt Plastic Cement.

.7 CGSB 37-GP-12Ma Application of Unfilled Cutback Asphalt for Dampproofing.

.8 CGSB 37-GP-15M Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.

.9 CAN/CGSB 37.16 Filled, Cutback, Asphalt, for Dampproofing and Waterproofing.

.10 CAN/CGSB 37.28 Reinforced, Mineral Colloid Type Emulsified, Asphalt for Roof Coatings and for Waterproofing.

.11 CGSB 37-GP-36M Application of Filled Cutback Asphalts for Dampproofing and Waterproofing.

.12 CGSB 37-GP-37M Application of Hot Asphalt for Dampproofing or Waterproofing.

.13 CSA A123.4 Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems.

1.3 **SUBMITTALS**

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

.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 – Submittal Procedures.

.3 Submit product data sheets for bituminous dampproofing products. Include: product characteristics, performance criteria, application methods and limitations.

1.5 **STORAGE AND HANDLING**

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

.2 Store materials on supports to prevent deformation.

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

.4 Store materials in accordance with manufacturers written instructions.

1.4 **ENVIRONMENTAL**

.1 Do not proceed with work when wind chill effect would tend to set bitumen before proper curing takes place.

.2 Maintain air temperature and structural base temperature at dampproofing installation area above 5°C for 24 hours before, during and 24 hours after installation.

.3 Do not apply dampproofing in wet weather.

.4 Provide forced air circulation during installation and curing periods for enclosed applications.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Asphalt:

.1 For application and curing at temperatures above 5°C: to CAN/CGSB-37.2; CGSB 37-GP-6Ma; CAN/CGSB-37.16; CAN/CGSB-37.28 or CSA A123.4 Type 3. Package label or bill of lading for bulk hot liquid asphalt must indicate type, flash point, equiviscous temperature range and final blowing temperature.

.2 For application and curing at temperatures above 0°C but below 5°C: to CGSB 37-GP-6Ma; CAN/CGSB-37.16; CSA A123.4 Type 3. Package label or bill of lading for bulk hot liquid asphalt must indicate type,flash point, equiviscous temperature range and final blowing temperature.

.2 Sealing compound: plastic cutback asphalt cement to CAN/CGSB-37.5.

.3 Asphalt primer: to CGSB 37-GP-9Ma or CAN/CGSB-37.2 to suit emulsion or cut back type asphalt dampproofing.

2.2 **COMPATIBILITY**

.1 Ensure that all materials used are compatible. Provide proof of compatibility.

.2 Ensure that bituminous dampproofing and fluid-applied waterproofing specified in Section 07 14 00 are compatible products by the same manufacturer. Provide proof of compatibility.

PART 3 - EXECUTION

3.1 **MANUFACTURER'S INSTRUCTIONS**

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

3.2 **EXAMINATION**

.1 Verification of conditions: verify that conditions of substrate previously installed by other Sections or Contracts are acceptable for bituminous dampproofing application in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with application only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.3 **WORKMANSHIP**

.1 Keep hot asphalt:
- .1 Below its flash point.
- .2 At or below its final blowing temperature.
- .3 Within its equiviscous temperature range at place of application.

3.4 **PREPARATION**

.1 Before applying dampproofing seal exterior joints between foundation walls and footings, joints between concrete floor slab and foundation and around penetrations through dampproofing with sealing compound.

3.5 **APPLICATION**

.1 Do dampproofing in accordance with CAN/CGSB-37.3; CGSB 37-GP-12Ma; CGSB 37-GP-36M; or CGSB 37-GP-37M except where specified otherwise.

.2 Do sealing work in accordance with CGSB 37-GP-11M except where specified otherwise.

.3 Do priming of surface in accordance with CGSB 37-GP-15M except where specified otherwise.

.4 Apply dampproofing in accordance with applicable CGSB application standard.

Material	Application	
CAN/CGSB-37.2	use	CAN/CGSB-37.3
CGSB 37-GP-6Ma	use	CGSB 37-GP-12M
CAN/CGSB-37.16	use	CGSB 37-GP-36M
CAN/CGSB-37.28	use	CAN/CGSB-37.3
CSA A123.4	use	CGSB 37-GP-37M

3.6 **SCHEDULE**

.1 Apply continuous, uniform coating of dampproofing to exterior faces of all unexcavated area foundation walls.

.2 Apply dampproofing to entire exterior faces of unexcavated area foundation walls from 50 mm below finished grade level to and including tops of foundation wall footings.

.3 Apply two additional coats of dampproofing to vertical corners and construction joints for a minimum width of 230 mm on each side, and all around and for 230 mm along pipes passing through walls.

3.7 **PROTECTION**

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

.2 Repair damage to adjacent materials caused by dampproofing application.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 Comply with requirements of Division 1.

1.2 RELATED SECTIONS

.1 Section 07 11 13: Bituminous Dampproofing.

.2 Section 07 21 00: Building Insulation.

.3 Section 07 27 26: Fluid-Applied Membrane Air Barrier.

.4 Section 31 23 10: Excavating, Trenching and Backfilling.

.5 Section 33 46 16: Subdrainage Piping.

1.3 REFERENCES

.1 CGSB 37-GP-9Ma, Primer, Asphalt, Unfilled, for Asphalt Roofing, Waterproofing.
.2 CAN/CGSB-37.29, Rubber-Asphalt Sealing Compound.
.3 CAN/CGSB-37.50, Hot Applied, Rubberized Asphalt for Roofing and Waterproofing.
.4 CAN/CGSB-37.51, Application for Hot-Applied Rubberized Asphalt, for Roofing and Waterproofing.
.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  .1 Material Safety Data Sheets (MSDS).

1.4 SUBMITTALS

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

.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29 – Health and Safety Requirements.

.3 Submit product data sheets for waterproofing products. Include: product characteristics, performance criteria, application methods and limitations.

.4 Quality assurance submittals: submit following in accordance with Section
01 45 00- Testing and Quality Control.
  .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.
  .2 Manufacturer’s Instructions: submit manufacturer’s installation instructions and special handling criteria, installation sequence and cleaning procedures.
  .3 Manufacturer’s Field Reports: Submit manufacturer’s written reports verifying compliance of Work.

1.5 QUALITY ASSURANCE

.1 Qualifications:
- .1 Applicator: company specializing in performing work of this section with minimum 5 years experience with installation of fluid applied waterproofing systems.
  - .1 Completed installation must be approved by the material manufacturer.

.2 Mock-up:
- .1 Construct mock-up in accordance with Section 01 45 00 – Testing and Quality Control.
- .2 Construct mock-up panel 3.0 m long by 3.0 m wide, incorporating inside and outside building corner conditions and illustrating transition membrane and seals at materials interface.
- .3 Locate where directed by Departmental Representative.
- .4 Mock-up may remain as part of finished work.
- .5 Allow 48 hours for review of mock-up by Departmental Representative before proceeding with waterproofing work.

.3 Perform Work in accordance with the manufacturer's written instructions.

.4 Maintain one copy of manufacturer's written instructions on site.

.5 At the beginning of the Work and at all times during the execution of the Work, allow access to Work site by the air barrier membrane manufacturers' representative and Departmental Representative.

.6 Components used in this Section shall be sourced from one manufacturer, including membrane, sealants, primers, mastics and adhesives.

1.6 PRE-INSTALLATION SITE MEETING

.1 Convene site meeting to review waterproofing application one week prior to commencing Work of this Section. Waterproofing product manufacturer's authorized technical representative shall attend site meeting.

1.7 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 Store materials on supports to prevent deformation.

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

.5 Store materials in accordance with manufacturers written instructions.

.6 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of waterproofing materials, sealing compounds and primers.

1.8 **ENVIRONMENTAL**

.1 Install waterproofing materials on dry substrate, free of frost, snow and ice, use only dry materials and apply only during weather that will not introduce moisture into system. Do not proceed with work during rainy or inclement weather.

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

.3 Provide temporary protection of waterproofing membrane to prevent mechanical damage until permanent protection is provided.

1.9 **WASTE MANAGEMENT AND DISPOSAL**

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

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

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

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Dispose of unused waterproofing materials at official hazardous material collections site approved by Departmental Representative.

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

PART 2 - PRODUCTS

2.1 **COMPATIBILITY**

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

2.2 **MATERIALS**

.1 Waterproofing:

.1 Cold applied, one component, elastomeric, seamless, rubberized asphalt membrane. Acceptable Material for temperatures below 5°C:

.1 "Aqua-Bloc" 770-06 Elastomeric Liquid Membrane by Henry Company.

.2 Colphene 3000 (winter grade) by Soprema Inc.

.3 Equivalent material by Grace Canada, Inc., Hydrotech Membrane Corporation or Tremco Ltd.

.4 or approved equal.

.1 (continued)

.2 Cold applied, one component, elastomeric, seamless, rubberized asphalt membrane. Acceptable Material for temperatures above 5°C:

.1 "Aqua-Bloc" 720-38 Elastomeric Asphalt Emulsion Waterproofing by Henry Company.

.2 Colphene 3000 (summer grade) by Soprema Inc.

.3 Equivalent material by Grace Canada, Inc., Hydrotech Membrane Corporation or Tremco Ltd.

.4 or approved equal.

.2 Primers, sealing compound and reinforcement: as recommended by waterproofing membrane manufacturer.

.3 Protection board: type as recommended by waterproofing membrane manufacturer.

PART 3 - EXECUTION

3.1 SUBSTRATE EXAMINATION

.1 Examine substrates and immediately inform Departmental Representative in writing of defects.

.2 Prior to commencement of work of this Section ensure substrates are firm, straight, smooth, dry, free of snow, ice or frost, contamination and swept clean of dust and debris.

.3 Do not start work until deficiencies have been corrected. Start of work shall imply acceptance of conditions.

3.2 PREPARATION AND PROTECTION

.1 Cover walls, walks and adjacent work where materials used.

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

.3 Clean drips and smears of waterproofing material immediately.

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

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

.6 Free substrates from curing compounds, dust and loose particles, grease, paint, frost form oil and other material detrimental to bond of membrane materials.

.7 Before applying waterproofing seal exterior joints between foundation walls and footings, joints between concrete floor slab and foundation and around penetrations through waterproofing with sealing compound.

.8 Reinforce substrate cracks less than 3 mm wide with layer of hot rubberized asphalt 300 mm wide centred on crack and 150 mm wide fabric reinforcing sheet embedded into it.

.9 Reinforce substrate cracks larger than 3 mm with layer of hot rubberized asphalt 300 mm wide centred over crack and 225 mm wide strip of standard thickness elastomeric reinforcing sheet embedded into it.

.10 At pipe and conduit penetrations, provide standard elastomeric reinforcing sheet around pipes and protrusions through membrane. Set and seal with membrane and clamping ring. Install prefabricated metal sleeves for substrate perforations.

.11 Fill surface honeycomb depressions and voids with latex filler.

.12 Apply primer to dry substrate in accordance with manufacturers' recommendations and CAN/CGSB-37.51.

3.3 APPLICATION WATERPROOFING – COLD APPLIED RUBBERIZED ASPHALT

.1 Apply waterproofing in accordance with manufacturers' recommendations and CAN/CGSB-37.2 except where specified otherwise.

.2 Apply a full and continuous coat of primary waterproofing membrane at 1.5 l/m^2 and embed fabric reinforcement into coating without any fishmouths or wrinkles. Allow membrane to fully cure/dry prior to subsequent application coatings.

.3 Apply second full and continuous coat of primary waterproofing membrane at 1.5 l/m^2 and allow to cure dry.

.4 Apply protection board over areas without perimeter insulation to prevent damage from backfilling. Apply protection board adhesive in 12 mm wide strips spaced at 450 mm o.c. to cured waterproofing membrane and immediately embed protection board and press into adhesive to ensure full contact. Do not backfill until adhesive has cure dried.

3.4 FIELD QUALITY CONTROL

.1 Membrane manufacturer shall provide periodic site inspection and technical assistance to ensure work is properly executed.

.2 Upon completion of membrane installation membrane manufacturer shall issue a report verifying that membrane installation is complete and satisfactory.

.3 The Contractor shall advise the Departmental Representative, and the membrane shall be inspected by the Departmental Representative, prior to covering membrane with other Work.

3.5 **CLEANING**

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

.2 Clean to Departmental Representative's approval, soiled surfaces, spatters, and damage caused by work of this Section.

.3 Remove bituminous markings from finished surfaces.

.4 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.

.5 Repair or replace defaced or disfigured finishes caused by work of this section.

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

3.6 **PROTECTION OF FINISHED WORK**

.1 Protect finished Work under provisions of Section 01 61 00 – Common Product Requirements.

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

.3 Protect waterproofing membrane from exposure to sunlight and climatic conditions.

3.7 **SCHEDULE**

.1 Apply continuous, uniform coating of waterproofing to exterior side of all foundation walls enclosing rooms below finished grade and where indicated on Drawings.

.2 Include exterior portion of interior walls where floors in adjacent rooms are at different elevations.

.3 Apply waterproofing to entire exterior faces of foundation wall from 50mm below finished grade level to top of foundation wall footings and extend waterproofing out along top of footings.

.4 Continue waterproofing 600 mm. past the point where rooms below grade terminate and onto exterior face of unexcavated area foundation walls.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 Comply with requirements of Division 1.

1.2 RELATED WORK

.1 Section 07 26 17: Underslab Gas / Vapour Barrier.
.2 Section 07 92 00: Joint Sealing.
.3 Section 08 44 00: Glazed Aluminum Curtain Wall.
.4 Section 09 21 16: Gypsum Board Assemblies.

1.3 REFERENCES

.1 ASTM C553, Specification for Mineral Fibre blanket Thermal Insulation, for Commercial and Industrial Applications.

.2 ASTM C612, Standard Specification for Mineral Fibre Block and Board Thermal Insulation.

.3 ASTM C665, Specification for Mineral Fibre blanket Thermal Insulation, for Light Frame Construction and Manufactured Housing.

.4 ASTM C1320, Standard Practice for Installation of Mineral Fibre Batt and Blanket Thermal Insulation, for Light Frame Construction.

.5 CAN/ULC-S701, Thermal Insulation, Polystyrene Boards and Pipe Covering.

.6 CAN/ULC-S702, Standard for Thermal Insulation, Mineral Fibre, for Buildings.

.7 CGSB 71-GP-24M, Adhesive, Flexible, for Bonding Cellular Polystyrene Insulations.

1.4 SUBMITTALS

.1 Submit printed product literature, specifications and data sheets for insulation in accordance with Section 01 33 00 – Submittal Procedures.

1.5 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, criteria and physical requirements.

1.6 **PRODUCT DELIVERY, HANDLING AND STORAGE**

.1 Deliver, store and protect materials from sunlight, weather and deleterious materials. Deliver insulation to site in sealed wrappings bearing manufacturer's name, product name and RSI or KSI value.

.2 Store materials in a dry area protected from the elements. Store components off the ground and under cover and in accordance with manufacturers written instructions.

1.7 **PROTECTION**

.1 Temporarily protect installed insulation from damage and action of the elements until it is permanently concealed or protected.

.2 Protect polystyrene insulation from sunlight.

1.8 **WASTE MANAGEMENT AND DISPOSAL**

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

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

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

PART 2 - PRODUCTS

2.1 **INSULATION**

.1 Perimeter and foundation wall insulation (vertical applications): high density extruded polystyrene to CAN/ULC-S701, Type 4, thickness 100 mm, shiplapped edges.

.1 Acceptable material:

.1 Styrofoam Perimate Insulation (210 kPa) by Dow Chemical Canada Inc.

.2 Celfort 300 with drainage channels (210 kPa) by Owens Corning Canada Inc.

.3 GreenGuard Type VI XPS Drainage Channel Board by Green Guard.

.4 or approved equal.

.2 Below slab-on-grade (horizontal applications): high density extruded, polystyrene to CAN/ULC-S701, Type 4, thickness 50 mm for below slab applications, shiplapped edges.

.1 Acceptable material:

.1 High Load-40 (275 kPa) by Dow Chemical Canada Inc.

.2 Foamlular 400 (275 kPa) by Owens Corning Canada Inc.

.3 GreenGuard Type IV 25 PSI Insulation Board by Green Guard.

.4 or approved equal.

.3 Below concrete footing courses (horizontal application): high density extruded polystyrene to CAN/ULC-S701, Type 4, thickness 75 mm unless otherwise noted, shiplapped edges.
- .1 Acceptable material:
  - .1 High Load-60 (415 kPa) by Dow Chemical Canada Inc.
  - .2 Foamlular 600 (415 kPa) by Owens Corning Canada Inc.
  - .3 or approved equal.

.4 Exterior wall insulation - Curtain wall spandrel panel: mineral wool board, type 1, to CAN/ULC-S701, density of 56 kg/m^3 (3.5 lb/cu.ft.), minimum R = 4.2 per 25 mm. thickness.
- .1 Acceptable material:
  - .1 CurtainRock by Roxul Inc.
  - .2 CW 50 by Fibrex Insulations Inc.
  - .3 or approved equal.

.5 Acoustic insulation (interior stud walls): mineral wool semi-rigid board, type 1, class 1 to CAN/ULC-S701, density of 45 kg/m^3 (2.8 lb/cu.ft.), thickness as indicated, friction fit batts where noted.)
- .1 Acceptable materials:
  - .1 Roxul Acoustic Fire Batt (AFB) by Roxul Inc.
  - .2 Thermafibre SAFB Insulation by Thermafibre Inc.
  - .3 MinWool Sound Attenuation Fire Batts by Industrial Insulation Group (IIG) Safety.
  - .3 or approved equal.

2.2 **ACCESSORIES**

.1 Insulation clips: impale type, perforated 50 x 50 mm cold rolled carbon steel 0.80 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.

.2 Impale clip adhesive: as recommended by impale clip manufacturer.

.3 Adhesive (for polystyrene): to CGSB 71-GP-24 as recommended by perimeter insulation manufacturer.

.4 Fastening devices: stainless, cadmium plated or hot dipped galvanized steel.

PART 3 – EXECUTION

3.1 **MANUFACTURER'S INSTRUCTIONS**

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

3.2 **EXAMINATION**

.1 Examine substrates and immediately inform Departmental Representative in writing of defects.

.2 Prior to commencement of work ensure substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust, debris and other foreign substances.

3.3 **PREPARATION**

.1 Clean substrates as required. Remove concrete surface ridges and deposits.

3.4 **INSTALLATION GENERAL**

.1 Install insulation after building substrate materials are dry.

.2 Do not install insulation until air barrier and transition membranes are complete and approved by Departmental Representative.

.3 Provide under this Section all thermal insulation required except where it is specified to be part of other Sections. Where no particular type of insulation is indicated provide rigid fibrous type.

.4 Where insulation is interrupted by construction elements, neatly fit insulation around such elements and pack spaces around elements with same insulation.

.5 Install continuous uniform thermal insulation to maintain continuity of thermal protection to building elements and spaces.

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

.7 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures.

.8 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.

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

.10 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.5 **PERIMETER INSULATION**

.1 Provide perimeter insulation at inside or outside of foundation walls and below slabs on grade and where shown on drawings. Insulation thickness as indicated on drawings.

.2 Extend insulation boards 2400 mm minimum vertically below finished grade or to top of footing whichever is less, installed on exterior face of perimeter foundation walls unless otherwise indicated. Provide 100 mm thick insulation bonded to substrate with spot adhesive application in accordance with manufacturer's recommendations.

.3 Provide rigid board insulation below slabs on grade where indicated on drawings, thickness 50 mm. and as indicated on drawings. Provide rigid board insulation below concrete footing courses, 75 mm. Place insulation board on prepared, level subgrade, with joints tightly butted.

3.6 **EXTERIOR WALL INSULATION – CURTAIN WALL SPANDREL PANELS**

.1 Provide impale clip method acceptable to aluminium curtain wall manufacturer.

.2 Install rigid insulation boards over impale clips. Place insulation against spandrel infill panel, tightly fitted at joints, at perimeter of insulated areas and at other penetrations. Leave no voids or gaps.

.3 Install insulation with impaling clip method. Provide minimum six (6) impale clips, one in each corner and two near centre of each insulation board. Cut off fastener spindle 3 mm. beyond disk.

.4 All butt joints shall be brought into tight contact to ensure a monolithic thermal barrier. Any cutting or fabricating shall be made of the largest module possible of insulation, to reduce the number of joints.

3.7 **BATT INSULATION**

.1 Provide acoustic batt insulation at interior gypsum board partitions as described on Partition Schedule on drawings.

.2 Completely fill spaces with insulation, leaving no gaps or voids. Do not pack insulation tighter than manufactured density of materials.

3.8 **CLEANING**

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

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 Comply with requirements of Division 1.

1.2 RELATED WORK

.1 Section 07 21 00: Building Insulation.

.2 Section 07 27 26: Fluid Applied Membrane Air Barrier.

.3 Section 07 42 43: Composite Metal Wall Panels

.4 Section 07 46 19: Preformed Metal Siding.

.5 Section 07 46 23: Wood Siding.

1.3 REFERENCES

.1 CAN/ULC-S705.1-01 (AM 1 and 2), Standard For Thermal Insulation - Spray-Applied Rigid Polyurethane Foam, Medium Density, Material-Spec.

.2 CAN/ULC-S705.2-05, Standard for Thermal Insulation - Spray-Applied Rigid Polyurethane Foam, Medium Density, Application.

.3 CAN/ULC S770-09, Standard Test Method for Determination of Long-term Thermal Resistance of Closed –Cell Thermal Insulating Foams.

.4 CAN/ULC S774-03, Standard Laboratory Guide for Determination of Volatile Organic Compound Emissions from Polyurethane Foam.

.5 CAN/ULC-S101-07, Fire Endurance Tests of Building Construction and Materials.

.6 CAN/ULC-S102-07, Surface Burning Characteristics of Building Materials and Assemblies.

.7 Canadian Urethane Foam Contractors Association, (CUFCA) “Manual for Installers of Spray Polyurethane Foam Thermal Insulation”.

1.4 QUALITY ASSURANCE

.1 The Subcontractor (Applicator) performing work under this section must be licensed under CUFCA (Canadian Urethane Foam Contractors Association) Quality Assurance Program.

.2 Qualifications:

.1 Installer: company specializing in sprayed foam (SPF) insulation installations with 5 years’ experience approved by manufacturer.

.2 Manufacturer: company with minimum 20 years’ experience in producing of material used for work required for this project, with sufficient production capacity to produce and deliver required units without causing delay in work.

1.5 **SUBMITTALS**

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

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies WHMIS MSDS – Material Safety Data Sheets.
- .3 Quality assurance submittals: submit following in accordance with Section 01 45 00 – Testing and Quality Control.
  - .1 Test reports; submit certified test reports for insulation from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
  - .2 Submit test reports in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.
  - .3 Installers certificate: Submit certification that SPF installer is licensed by the source manufacturer.
  - .4 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.
  - .5 Manufacturer's Field Reports: Submit test reports, verifying qualities of insulation meet or exceed requirements of this specification in accordance with Section 01 45 00 – Testing and Quality Control, if requested by Departmental Representative.

1.6 **PRE-INSTALLATION MEETING**

.1 Pre-Installation Meeting:
- .1 Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.
- .2 Arrange and pay costs for manufacturer's authorized representative as well as SPF installer's representative to attend Pre-Installation meeting.

.2 Mock-up:
- .1 Construct mock-up in accordance with Section 01 45 00 – Testing and Quality Control.
- .2 Construct mock-up 10 m^2 minimum, of sprayed-in-place foam insulation including one inside corner and one outside corner, door and window openings.
- .3 Mock-up may be part of finished work.
- .4 Allow 24 hours for review of mock-up by Departmental Representative before proceeding with sprayed insulation work.

.3 Site Reviews:
.1 Arrange and pay costs for manufacturer's authorized representative to conduct site review during SPF installation period. Arrange for minimum 2 visits during installation period, in addition to the Pre-Installation meeting.

.4 Health and Safety Requirements: worker protection:
.1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations.
.2 Workers must wear gloves, respirators and protective clothing when applying foam insulation.
.3 Workers must not eat, drink or smoke while applying foam insulation.

1.7 DELIVERY, STORAGE AND HANDLING

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

.2 Materials shall be delivered in manufacturers original sealed containers clearly labeled with manufacturer's name, product identification, safety information, net weight of contents and expiration date.

.3 Materials to be stored in a safe manner and where the temperatures are in the limits specified by the material manufacturer.

.4 Remove empty containers from site on a daily basis in accordance with CAN/ULC-S705.2.

1.8 SITE CONDITIONS

.1 Ventilate area in accordance with Section 01 50 00 – Temporary Facilities.

.2 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hours after application to maintain non-toxic, unpolluted, safe working conditions.

.3 Occupancy is only permitted following delivery of minimum of 0.3 air changes per hour for 24 hours following installation, in accordance with CAN/ULC-S774.

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

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

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits and when relative humidity is lower than 80%.

.2 Apply insulation products only after all welding operations have been completed.

.3 Disposal of waste materials are to be removed from site and disposed of in an approved disposal site as authorized by Governmental Authorities. Contractor may be requested to provide certified weigh bills or receipts from authorized disposal sites.

1.10 **WASTE MANAGEMENT AND DISPOSAL**

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

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

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

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Dispose of unused Foamed-In-Place insulation material at official hazardous material collections site approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 **INSULATION**

.1 Insulation spray polyurethane to CAN/ULC-S705.1.
- .1 Acceptable material:
  - .1 “Heatlok Soya" by Demilec Inc., Boisbriand, Que. Phone: (450) 437-0123.
  - .2 “Walltite-Eco” v.2 by BASF Canada.
  - .3 or approved equal.

.2 Primers: in accordance with manufacturer’s recommendations for surface conditions.

.3 Equipment: Comply with CAN/ULC S705.2 and equipment manufacturer’s recommendations for specific type of application.

PART 3 - EXECUTION

3.1 **MANUFACTURER’S INSTRUCTIONS**

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

3.2 **EXAMINATION**

.1 Examine substrates and verify surfaces and conditions are suitable to accept work. Immediately inform Departmental Representative in writing of defects.

.2 Prior to commencement of work ensure substrates are free of oil, grease, rust, dust and dry, free of snow, ice or frost, and clean of other foreign substances which may have an affect on adhesion of insulation.

.3 Do not begin application of foamed-in-place insulation until fluid applied membrane air barrier and transition membranes are in place and reviewed by Departmental Representative.

3.3 **PREPARATION**

.1 Clean substrates as required.

.2 Mask and protect adjacent surfaces from over spray or dusting.

.3 Apply primer in accordance with manufacturer's written instructions.

.4 Prime all metal and non-porous surfaces when required by foam insulation manufacturer's written instructions.

3.4 **APPLICATION**

.1 Apply insulation to clean surfaces in accordance with CAN/ULC-S705.2 and manufacturer's printed instructions. Use primer where recommended by manufacturer.

.2 Apply insulation only when surfaces and environmental conditions are within limits prescribed by the material manufacturer.

.3 Apply sprayed foam insulation to a uniform monolithic density without voids, in consecutive passes no less than 15 mm and no more than 50 mm thick each, to obtain total thickness of 100 mm, RSI = 4.20 (R=24), as indicated on drawings.

.4 Apply insulation, leaving no gaps or voids and free of embedded objects.

.5 Remove masking material and over-spray for adjacent areas immediately after foam surface has hardened.

.6 Do not enclose insulation until it has been reviewed by Departmental Representative.

.7 Repair damaged areas in accordance with SPF manufacturer's written guidelines for application.

3.5 **PROTECTION**

.1 Protect installed work.

.2 Do not allow subsequent construction work to disturb or damage applied insulation.

3.6 **CLEANING**

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

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

END OF SECTION

PART 1 – GENERAL

1.1 GENERAL

.1 Comply with requirements of Division 1.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM E 1745-09, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil Or Granular Fill Under Concrete Slabs.
- .2 ASTM E154 / E154M - 08a(2013)e1, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
- .3 ASTM E96 / E96M – 12, Standard Test Methods for Water Vapor Transmission of Materials.
- .4 ASTM E1643 – 11, Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
  - .1 ASTM D 1434-82 (2009)e1, Standard Test Method for Determining Gas Permeability
    - a. Characteristics of Plastic Film and Sheeting

.2 Radon Diffusion Coefficient K124/02/95

.3 American Concrete Institute (ACI)
1. ACI 302.1R-6 & 7, Section 3.2.3 Vapor Retarder

1.3 SUBMITTALS

.1 Comply with Section 01 33 – Submittal Procedures.

.2 Testing / Specification Submittals:
- .1 Laboratory test results showing compliance with ASTM & ACI Standards.
- .2 Manufacturer's product data and technical information.
- .3 Manufacturer's installation instructions for placement and seaming.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

.2 Store materials in clean, dry area in accordance with manufacturer's instructions.

.3 Protect materials during handling and application to prevent damage or contamination.

1.5 **ENVIRONMENTAL REQUIREMENTS**

.1 Do not apply underslab gas / vapour retarder on frozen ground.

.2 Comply with manufacturer's requirements for environmental conditions during installation period.

PART 2 – PRODUCTS

2.1 **MATERIALS**

.1 Gas Barrier / Vapor Retarder to meet the following requirements:
- .1 ASTM E-1745 Standard for Plastic Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
- .2 Strength: Meet all Class "A" criteria.
- .3 ASTM D 1434 Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting a) Methane Permeance: 1.7×10^{-10} m²/d·atm or 0.32 GTR ml/m²•D•ATM
- .4 K124/02/95 Radon Diffusion Coefficient: $< 1.1 \times 10^{-13}$ m²/s

.2 Acceptable products:
- .1 VaporBlock Plus 20 by Raven Industries.
- .2 Other products meeting the above requirements and accepted by Departmental Representative during tender period.

2.2 **ACCESSORIES**

.1 Seam Tape:
- .1 Gas / vapour retarder tape: high density polyethylene film and rubber-based, pressure sensitive adhesive, specially designed to seal seams and penetrations, 100 mm wide, as recommended by gas barrier / vapor retarder manufacturer.
- .2 Stretchable seal tape: stretchable rubber tape, 50 mm wide as recommended by gas barrier / vapor retarder manufacturer.
- .3 Two-sided adhesive seal tape: 50mm wide double-sided reinforced butyl rubber seaming tape.

.2 Pipe Collars: as recommended by gas/vapour retarder manufacturer.

PART 3 – EXECUTION

3.1 **PREPARATION**

.1 Ensure that subsoil is approved by Departmental Representative.

.2 Prepare surfaces in accordance with manufacturer's written instructions.

.3 Level and tamp or roll aggregate, sand or tamped earth base.

3.2 **INSTALLATION**

.1 Install Gas Barrier / Vapor Retarder:
  .1 Installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
  .2 Do not apply on frozen ground.

.2 Unroll gas / vapour retarder with the longest dimension parallel with the direction of the pour and pull open all folds to full width.

.3 Lap gas / vapour retarder over footings and seal to the vertical foundation walls with two-sided adhesive seal tape.

.4 Overlap joints a minimum of 12 inches and seal in-between overlap with two-sided adhesive seal tape then center the 100 mm wide gas / vapour retarder tape over the seal overlap.

.5 Seal around sewer pipes, support columns or any other penetration with pipe collars or at minimum a combination of gas / vapour retarder and gas / vapour retarder tape or stretchable seal tape, creating a monolithic membrane between the surface of the slab and moisture sources below as well as at the slab perimeter.

.6 Inspect for continuity. Do not proceed with repair work until installation has been reviewed by Departmental Representative.

.7 Repair damaged areas by cutting patches of gas / vapour retarder, overlapping damaged area 300 mm. and taping all four sides with 50 mm stretchable butyl tape or other 100 mm wide gas / vapour retarder tape approved by vapor retarder / gas barrier manufacturer.

.8 Protect installed underslab gas / vapour barrier from damage by work of other trades.

3.3 **CLEANING**

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

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 Comply with requirements of Division 1.

1.2 RELATED SECTIONS

.1 Section 04 05 00: Common Work Results for Masonry.

.2 Section 07 21 19: Foamed-In-Place Insulation.

.3 Section 07 42 43: Composite Metal Wall Panels.

.4 Section 07 46 19: Preformed Metal Wall Cladding.

.5 Section 07 46 23: Wood Siding.

.6 Section 07 92 00: Joint Sealing.

1.3 SUBMITTALS

.1 Submit product date in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies WHMIS MSDS – Material Safety Data Sheets.

.3 Quality assurance submittals: submit following in accordance with Section 01 45 00 – Testing and Quality Control.
- .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.
- .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.
- .3 Manufacturer's Field Reports: Submit manufacturer's written reports verifying compliance of Work.

1.4 QUALITY ASSURANCE

.1 Qualifications:
- 1 Applicator: company specializing in performing work of this section with minimum 5 years' experience with installation of liquid air barrier membrane systems.
  - .1 Completed installation must be approved by the material manufacturer.

.2 Mock-up:
- .1 Construct mock-up in accordance with Section 01 45 00 – Testing and Quality Control.
- .2 Construct typical exterior wall panel 3.0 m long by 3.0 m wide, incorporating window opening, inside and outside building corner conditions and illustrating transition membrane and seals at materials interface.
- .3 Locate where directed by Departmental Representative.
- .4 Mock-up may remain as part of finished work.
- .5 Allow 48 hours for review of mock-up by Departmental Representative before proceeding with membrane air barrier work.

.3 Perform Work in accordance with the manufacturer's written instructions.

.4 Maintain one copy of manufacturer's written instructions on site.

.5 At the beginning of the Work and at all times during the execution of the Work, allow access to Work site by the air barrier membrane manufacturers' representative and Departmental Representative.

.6 Components used in this Section shall be sourced from one manufacturer, including sheet membrane, air barrier sealants, primers, mastics and adhesives.

1.5 **PRE-INSTALLATION SITE MEETING**

.1 Convene site meeting to review air barrier application one week prior to commencing Work of this Section. Air barrier product manufacturer's technical representative shall attend site meeting.

1.6 **ENVIRONMENTAL REQUIREMENTS**

.1 Do not install solvent curing sealants or vapour release adhesive materials in enclosed spaces without ventilation.

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

.3 Apply membrane during dry weather and to dry substrates only.

1.7 **DELIVERY STORAGE AND HANDLING**

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

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

.3 Store air barrier, adhesives and primers at temperatures of 5° C and above to facilitate handling.

.4 Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

.5 Store roll materials on end in original packaging.

.6 Protect rolls from direct sunlight until ready for use.

.7 Keep solvent away from open flame or excessive heat.

.8 Avoid spillage: immediately notify Departmental Representative if spillage occurs and start clean up procedures.

.9 Clean spills in accordance with manufacturer's recommendations and leave area as it was prior to spill.

1.8 **CO-ORDINATION**

.1 Ensure continuity of the air barrier membrane system throughout the scope of this section.

1.9 **WASTE MANAGEMENT AND DISPOSAL**

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

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

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

.4 Place materials defined as hazardous or toxic in designated containers.

.6 Do not dispose of unused membrane air barrier materials into sewer system, onto ground or in other location where it will pose health or environmental hazard.

.7 Dispose of unused membrane air barrier materials at official hazardous material collections site approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Liquid Air Barrier (spray-applied): one component, liquid applied, elastomeric air barrier membrane.

.1 Acceptable manufacturer (spray-applied type):

.1 Air-Bloc 32 by Henry Company Canada (for application temperatures above 5° C).

.2 Air-Bloc 06 by Henry Company Canada (for application temperatures below 5° C).

.3 or approved equal.

.2 Transition membrane and sheet membrane flashing (Self-Adhering): Modified bitumen, pressure/heat sensitive compound, self-adhering, thermofusible type or adhesive applied type, reinforced with polyethylene or glass scrim, nominal total thickness of 40 mils (1 mm).
- .1 Acceptable manufacturer (self adhesive type):
  - .1 Bakor “Blueskin SA” by Henry Company Canada.
  - .2 or approved equal.

.3 Sealant: as recommended by air barrier manufacturer.

.4 Primer, adhesives, mastics: as recommended by air barrier manufacturer.

.5 Substrate Cleaner and Thinner: as recommended by air barrier manufacturer.

PART 3 - EXECUTION

3.1 MANUFACTURER’S INSTRUCTIONS

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

3.2 EXAMINATION

.1 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. Substrates shall be free of frost, grease, oil and other substances which would adversely affect membrane adhesion.

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

.4 Do not start work until deficiencies have been corrected. Start of work shall imply acceptance of conditions.

3.3 PREPARATION

.1 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions. Remove loose or foreign matter which might impair adhesion of materials.

.2 Ensure substrates are free of surface moisture prior to application of membrane, transition membrane and primer.

.3 Clean and prime substrate surfaces to receive air barrier in accordance with manufacturer's instructions.

.4 Remove sharp projections and repair defective areas in substrate.

.5 Fill large open joints with flexible joint backing if recommended by air barrier membrane manufacturer.

.6 Prime substrate surfaces to receive membrane air barrier in accordance with manufacturer's instructions.

.7 Joints in substrates wider than 6 mm wide shall be sealed with transition membrane lapped a minimum of 75 mm on both sides of the joint prior to the application of liquid membrane.

3.4 **INSTALLATION**

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

.2 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 50 mm overlap at all end and side laps. Promptly roll all laps and membrane with a roller to effect continuous air seal.

.3 Tie-in self-adhering transition membrane to window frames, door frames, spandrel panels, roofing system and at the interface of dissimilar materials as indicated in drawings.

.4 Apply liquid air barrier membrane by spray complete and continuous over entire face of exterior face of substrate and where indicated on drawings.

.5 Apply liquid air barrier by spray to a uniform, complete and continuous unbroken wet film thickness of 3.0 mm and a cured dry thickness of 1.5 mm. Overlap transition membrane a minimum of 50 mm. Spray around all projections ensuring a complete and continuous air seal.

3.5 **FIELD QUALITY CONTROL**

.1 Membrane manufacturer shall provide periodic site inspection and technical assistance to ensure work is properly executed.

.2 Upon completion of membrane installation membrane manufacturer shall issue a report verifying that membrane installation is complete and satisfactory.

.3 The Contractor shall advise the Departmental Representative, and the membrane shall be inspected by the Departmental Representative, prior to covering membrane with other Work.

3.6 **CLEANING**

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

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

3.7 **PROTECTION OF FINISHED WORK**

.1 Protect finished Work under provisions of Section 01 61 00 – Common Product Requirements.

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

.3 Protect air barrier membrane and transition strips from exposure to sunlight and climatic conditions.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 Comply with requirements of Division 1.

1.2 RELATED SECTIONS

.1 Section 07 21 19: Foamed-In-Place Insulation.

.2 Section 07 27 26: Fluid Applied Membrane Air Barrier.

.3 Section 07 46 19: Preformed Metal Wall Cladding.

.4 Section 07 46 23: Wood Siding.

.5 Section 07 55 00: Modified Bituminous Membrane Roofing.

.6 Section 07 61 00: Sheet Metal Roofing.

.7 Section 07 62 00: Metal Flashings and Trim.

.8 Section 07 92 00: Joint Sealing.

1.3 REFERENCES

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

.2 American Society for Testing and Materials International, (ASTM).
- .1 ASTM A 653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A 792/A792M, Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .3 ASTM D 523, Test Method for Specular Gloss.
- .4 ASTM D 2832, Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.

.3 Canadian Standards Association (CSA International)
- .1 CSA S136, North American Specification for the Design of Cold-Formed Steel Structural Members.

1.4 PERFORMANCE REQUIREMENTS

.1 Design Requirements:
- .1 Design metal panel wall to provide for thermal movement of component materials without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.
- .2 Design members to withstand dead load and wind loads calculated in accordance with National Building Code and Applicable Laws, to maximum allowable deflection of 1/175 of span at the perimeter and 1/60 of the span anywhere in the panel.

.3 Provide for positive drainage of condensation occurring within wall construction and water entering at joints, to exterior face of wall in accordance with NRC "Rain Screen Principles".

.4 Design wall system to allow for movement of air between exterior and interior side of metal cladding.

.5 Provide an effective air barrier, to prevent infiltration and/or exfiltration of air through wall assembly.

.6 Design metal cladding to allow for thermal movement of component materials caused by variation in ambient temperature range of 80 degrees C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

.7 Maximum deviation from vertical and horizontal alignment of erected panels: 1 to 1000.

1.5 **SUBMITTALS**

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, for cladding system materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit shop drawings stamped and designed by professional engineer experienced in design of this work of the type described in this section and registered or licensed to practice in the Province of Nova Scotia.

.2 Indicate dimensions and thickness of panels, fastening and anchoring methods, detail and location of joints, thermal movement provision, wall openings, head, jamb and still details, materials and finish, flashings, closures and accessories, compliance with design criteria and requirements of related work.

.4 Samples:

.1 Submit duplicate 100 x 100 mm samples of wall and soffit system, representative of materials, finishes and colours.

.5 Quality assurance submittals: submit following in accordance with Section 01 45 00 – Testing and Quality Control.

.1 Certificates: submit certificates signed by manufacturer certifying that composite wall panels comply with specified performance characteristics and physical properties.

.2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.6 **QUALITY CONTROL**

.1 Manufacturer: company specializing in producing composite wall panels with 5 years experience with sufficient capacity to produce and deliver required units without causing delay in work.

.2 Installer: person specializing in composite wall panel installations with 5 years experience, approved by manufacturer.

.3 Mock-ups: construct mock-ups in accordance with Section 01 45 00 – Testing and Quality Control and to requirements supplemented as follows:
- .1 Provide mock-up for evaluation of surface finishes and workmanship.
- .2 Provide initial production units for job-site assembly with other materials for review.
- .3 Co-ordinate type and location of mock-ups with project requirements.
- .4 Accepted units will be used as standard for acceptance of production units.
- .5 Remove and replace units which are not accepted.
- .6 Do not proceed with remaining work until workmanship, colour, and finish are reviewed and approved by Consultant.
- .7 Refinish mock-up area as required to produce acceptable work.
- .8 When accepted, mock-up will demonstrate minimum standard of quality required for this work.
  - .1 Approved mock-up may remain as part of finished work.
  - .2 Remove mock-up and dispose of materials when no longer required and when directed by Consultant.

.4 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section with Contractor's representative and Consultant.
- .1 Verify project requirements.
- .2 Review installation and substrate conditions.
- .3 Co-ordination with other building subtrades.
- .4 Review manufacturer's installation instructions.

1.7 **DELIVERY STORAGE AND HANDLING**

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

.2 Deliver, store and protect material in accordance with panel manufacturer's recommendations.

.3 Do not expose panels with strippable film to direct sunlight or extreme heat.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Aluminum sheet: Coil-coated sheet, ASTM B 209, 1100 alloy, with temper as required to suit forming operations and structural performance required.
- .1 Surface: smooth, flat.
- .2 Exposed finish: anodized, or painted as noted.
- .3 Concealed finish: manufacturer's standard white acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum thickness of 0.013 mm.

.2 Miscellaneous metal framing: to ASTM A 653/A 653M, Z120 hot-dip galvanized.
- .1 Subgirts: C or Z-shaped shaped sections 1.63 mm nominal thickness.
- .2 Clips: Z-shaped, 2.01 mm nominal thickness.
- .3 Base or sill channels: 2.01 mm nominal thickness.

.3 Composite metal building panels: factory formed and assembled, consisting of 0.80 mm thick anodized aluminum sheet facings bonded to non-combustible core, including attachment system components and accessories required for weathertight system.
- .1 Fire-retardant core : non-combustible :
  - .1 Flame-spread index: 25 or less.
  - .2 Smoke-developed index: 450 or less.
  - .2 Panel thickness: 4 mm thick.
  - .3 Exterior finish: anodized finish, or painted as noted.
  - .4 Acceptable material:
    - .1 Alucobond by Alcan Composites USA Inc.
    - .2 Reynobond FR by Alcoa Inc.
    - .3 Alpolic by VicWest
    - .4 Accument 2000 FR by Flynn Canada Ltd.
    - .5 or approved equal.

.4 Attachment system components: formed from extruded aluminum, including manufacturer's standard perimeter extrusions with integral panel stiffeners, clips and anchor channels.

.5 Wall panel accessories: provide components required for a complete composite metal panel assembly including trim, copings, clips, flashings, sealants, fillers, closure strips. Match material and finish of composite wall panels.

.6 Prefinished metal flashings: as specified in Section 07 62 00 – Metal Flashings and Trim.

.7 Sealants and caulking materials: as specified in Section 07 92 00 – Sealants.

.8 Isolation coating: alkali resistant bituminous paint.

2.2 **FABRICATION**

.1 Factory fabricate and finish composite wall panels and accessories to the greatest extent possible as necessary to fulfill indicated performance requirements.

.2 Tolerances:
- .1 Panel bow: maximum 0.8% of panel dimension in width and length.
- .2 Panel dimensions: where final dimensions cannot be established by field measurement before completion of panel manufacturing , make allowance for field adjustments as recommended by manufacturer.
- .3 panel lines, breaks and angles: sharp, true and surface free from warp or buckle.

.3 Fabricate composite wall panels to eliminate condensation on interior side of panel and with joints between panels / building components to form weathertight seals.

.4 Form panel lines, breaks and angles to be sharp and true, with surfaces free from warp and buckle.

.5 Fabricate panels with sharply cut edges, with no displacement of face sheets or protrusion of core material.

.6 Fabricate corner panels with panel stiffeners, as required to comply with deflection limits, attached to back of panels.

.7 Fabricate flashing and trim in accordance with recommendations in SMACNA's "Architectural Sheet Metal Manual".

2.3 **ANODIZED FINISHES**

.1 Finish exposed surfaces of aluminum components in accordance with AA Designations for Aluminum Finishes.
- .1 Colour: Clear anodic finish, designation AA-M12, C22A41, Class 2, Minimum coating thickness of 0.7 mils.

2.4 **PAINTED FINISHES**

.1 Prefinished sheet with factory applied polyvinylidene fluoride (FVDF) finish.

.2 Class: F1S.

.3 Colours:
- .1 Colour "A" to match "BGY Grey".
- .2 Colour "B" to match "Aluminum Grey".
- .3 Colour names and numbers noted above reference Vic-West Alpolic finishes. Confirm colour finish numbers for other listed manufacturers.

.4 Specular gloss: 30 units +/- in accordance with ASTM D523.

.5 Coating thickness: not less than 22 micrometres.

.6 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:
- .1 Outdoor exposure period 2500 hours.
- .2 Humidity resistance exposure period 5000 hours.

PART 3 - EXECUTION

3.1 **MANUFACTURER'S INSTRUCTIONS**

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

3.2 **EXAMINATION**

.1 Before installation examine alignment of substrate and notify Consultant in writing if substrate does not comply with requirements of panel installer.

.2 Do not begin installation of composite panels until air barrier, transition membrane and flashings that will be concealed by panels are installed.

3.3 **INSTALLATION**

.1 Install composite panels in accordance with manufacturer's written instructions and shop drawings.
- .1 Allow for thermal movement.

.2 Maintain following installation tolerances:
- .1 Maximum variation from plane or location shown on shop drawings: 10 mm/10 m of length and up to 20 mm/100 m.
- .2 Maximum deviation for vertical member: 3 mm in an 8.5 m run.
- .3 Maximum deviation for a horizontal member: 3 mm in an 8.5 m run.
- .4 Maximum offset from true alignment between two adjacent members abutting end to end, in line: 0.75 mm.

.3 Install attachment system required to support composite metal building panels, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, furring and other miscellaneous wall panel support members and anchorage in accordance with ASTM C 754 and composite metal building panel manufacturer’s written instructions.

.4 Install accessories with positive anchorage to building, weathetight mounting and provisions for thermal expansion. Install components required for a complete composite panel assembly including trim, copings, corners, flashings, sealants, gaskets and closures.

.5 Attach panel clips to support ends of composite panel joint at locations, spacings and with fasteners recommended by manufacturer. Attach routed and returned flanges of composite panels to panel clips with concealed fasteners. Provide alignment bars, brackets, clips, inserts, shims as required to securely and permanently fasten composite panels to building structure.

.6 Install work true to line and level with watertight and weather resistant laps, joints, and seams. Seal horizontal and vertical joints between panels and building elements to ensure continuity of "pressure equalization" of rain screen principle and drainage to the exterior.

.7 Install formed aluminum sills and flashings where indicted on drawings and not covered in other sections.

.8 Remove strippable coating from panels as they are erected.

3.4 **CLEANING**

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

.2 Upon completion of composite metal building panel installation, clean exposed finished surfaces to remove construction and accumulated environmental dirt as recommended by panel manufacturer. Wash down exposed surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths.

.3 Remove temporary protective coverings and strippable films and clear weep holes and drainage channels of obstructions, dirt and sealant.

.4 Remove excess sealant with recommended solvent.

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

.6 Leave work area's clean, free from grease, finger marks and stains.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL

.1 Comply with requirements of Division 1.

1.2 RELATED WORK

.1 Section 07 21 19: Foamed in Place Insulation.

.2 Section 07 27 26: Fluid Applied Membrane Air Barrier.

.3 Section 07 62 00: Sheet Metal Flashings and Trim.

.4 Section 07 92 00: Joint Sealing.

1.3 REFERENCES

.1 ASTM A606-04, Standard specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot Rolled and Cold Rolled with Improved Atmospheric Corrosion Resistance.

.2 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

.3 ASTM A792/A792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.4 ASTM B32-04, Standard Specification for Solder Metal.

.5 CGSB 93.5-92, Installation of Metal Residential Siding, Soffits and Fascia

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

.1 Appearance: exposed fastening devices not permitted unless approved by the Departmental Representative. Exposed surfaces to be free of distortion, twist, waves and buckles. Neatly and evenly lay out and install components.

.2 Structural loads: resist positive and negative wind pressures expected in this geographical area with a maximum allowable deflection of 1/180 of span. Components shall not vibrate when subjected to the effects of wind.

.3 Moisture control: prevent infiltration of water and snow into wall system. Provide means of draining space between insulation and exterior skin, in accord with NRC Rain Screen Principles.

.4 Thermal movement: accommodate expansion and contraction of component parts without causing buckling, failure of joint seals, undue stress on fasteners and other detrimental effects.

.5 Structural movement: accommodate movement between wall system and building structure caused by structural movement, without permanent distortion, racking of joints, breakage of seals or water penetration.

.6 Compatibility: components shall be compatible with dissimilar metals and materials with which they are in contact or fastened to so as to prevent corrosion, staining and other detrimental effects. If required, treat or separate contact surfaces with inert and non-staining insulation material to achieve compatibility.

.7 Air/Vapour seal: Provide continuous and uninterrupted barrier against water vapour transmission and air movement effectively sealed at laps, penetrations and terminations.

1.5 **ACTION AND INFORMATION SUBMITTALS**

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

.2 Shop Drawings:
- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Indicate dimensions, profiles, attachment methods, wall elevations, trim and closure pieces, soffits and related work.

.3 Samples:
- .1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit duplicate 100 x 100 mm samples of each type of siding material, of colour and profile specified.

1.6 **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 Mock-up:
- .1 Construct mock-up in accordance with Section 01 45 00 – Testing and Quality Control.
- .2 Construct mock-up 10 m^2 minimum, for each type of metal wall cladding.
- .3 Mock-up may be part of finished work.
- .4 Allow minimum 24 hours for review of mock-up by Departmental Representative before proceeding with the work.

1.7 **PRODUCT DELIVERY, HANDLING AND STORAGE**

.1 Deliver, store and handle materials to prevent damage, distortion and corrosion.

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

1.8 **WASTE MANAGEMENT AND DISPOSAL**

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

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

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

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.

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

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Prefinished Steel Sheet: galvanized sheet steel, pretreated, primed and finished with siliconized polyester coating, colours as noted in 2.3 FINISHES, nominal coating thickness of not less than 22 micrometres.

.2 Preformed Metal Wall Cladding – Type 1 (Vertical):
Preformed prefinished steel sheet, minimum 0.76 mm thick (22 Ga.) base metal thickness. Colour: ‘A’.
- .1 Acceptable product:
  - .1 “2 – 2/3” x 7/8” “Corrugated” by VicWest Steel.
  - .2 “ 7/8” Corrugated” by Agway Metals Inc.
  - .3 P - 11 by Flynn Canada Ltd.
  - .4 Standard Corrugated by Roll Form Group.

.3 Soffit Cladding: Preformed prefinished steel sheet, minimum 0.76 mm thick (22 Ga.) base metal thickness. Colour: 'B'.
- .1 Acceptable product:
  - .1 AD-300 SR by VicWest Steel.
  - .2 HF-12NF by Agway Metals.
  - .3 P-12 by Flynn Canada Ltd.
  - .4 "S-12-R" (without rib) by Roll Form Group

.4 Prefinished Metal Accent Trim: custom formed to profiles shown, minimum .76 mm thick (22 Ga.) base metal thickness. Colours, listed in 2.3 – FINISHES, for accent trim to match exposed metal on which they occur and as indicated on drawings.

.5 Galvanized Sheet Steel: Hot dip galvanized, cold rolled with stretcher level degree of flatness to ASTM A526; zinc coating designation Z275.

.6 Subgirts, clips, spacers: minimum 1.2 mm thick formed galvanized steel: ASTM 446 Grade A, zinc coating designation Z275.

.7 Fastening devices: stainless, cadmium plated or galvanized steel; colour to match exposed fasteners with metal on which they occur.

.8 Insulation: as specified in Section 07 21 19 – Foamed in Place Insulation.

.9 Sealants: as specified in Section 07 92 00 – Joint Sealing.

2.2 **FABRICATION**

.1 Siding: unless otherwise indicated or unless required to be thicker by design calculations use minimum 0.76 mm (22 Ga.) base metal thickness, tension levelled for siding.

.2 Prefinished Metal Accent Trim: provide special strips formed to profile indicated, minimum 0.76 mm (22 Ga.) base metal thickness; provide suitable closures as required. Colours as noted in 2.3 – FINISHES.

.3 Spacer or Girt System: galvanized steel girt anchor or clip system designed to meet performance requirements specified. Design system to minimize direct heat transfer; avoid direct metal to metal contact wherever possible.

.4 Flashings, Trim & Closures: fabricate to profiles indicated and as required to meet design and performance requirements. Use preformed corner pieces only. Use same material as exterior skin where exposed. Use galvanized sheet steel in concealed locations. Double back exposed edges.

.5 Hinged soffit access panels: fabricate from same material as soffit. Fabricate hinged access panels in sizes to fit full panels of soffit material, min. 600 mm x 600 mm. Double back exposed metal edges. Soffit access panels to be lockable.

2.3 **FINISHES**

.1 Exposed surfaces: Prefinished steel with factory applied silicone modified polyester.
- .1 Class F2S.
- .2 Specular gloss: 30 units +/-5 to ASTM D523 .
- .3 Coating thickness: not less than 20 25 micrometres.
- .4 Resistance to accelerated weathering for chalk rating of 8 , colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:
  - .1 Outdoor exposure period 1000 hours.
  - .2 Humidity resistance exposure period 1000 hours.
- .5 Wall Cladding Colour 'A': "Stone Grey # QC 16071.
- .6 Soffit Cladding Colour 'B': "Cambridge White" # QC 16161.
- .7 Colour numbers noted above reference Vic-West finishes. Confirm finish colour numbers for other listed manufacturers.

.2 Concealed surfaces: galvanized.

2.4 **ACCESSORIES**

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

2.5 **FASTENERS**

.1 Nails: CSA B111. Screws: ANSI B18.6.4. Purpose made cadmium plated steel.

2.6 **SEALANTS**

.1 Sealants (caulking): in accordance with Section 07 92 10 – Joint Sealing.

PART 3 - EXECUTION

3.1 **PREPARATION**

.1 Prior to start of erection, examine existing work and report to any unsatisfactory conditions. Start of work shall imply acceptance of conditions.

.2 Provide secondary steel framing for support of metal wall system, where such framing is required but not provided by Structural Steel Section.

.3 Install secondary framing in accord with applicable requirements of CAN/CSA-S16.1 and CAN3-S136.

3.2 **ERECTION**

.1 Install metal wall cladding in accordance with CGSB 93.5, and manufacturer's written instructions.

.2 Fasten subgirts/spacers through liner to supporting work. Provide additional framing at terminations, openings and penetrations.

.3 Fill spaces between subgirts with insulation. Tightly butt insulation boards at joints. Accurately fit boards at interruptions, terminations and penetrations; leave no gaps or voids. Secure insulation board with adhesive or adhesive applied insulation clips.

.4 Install exterior wall cladding with joints accurately aligned, with tight fitting, hairline joints and with exposed fasteners aligned with each other and evenly spaced.

.5 Provide all accent panels, metal closures, closure trims, sills and cap flashings and other flashings required at junctions with other building elements as indicated and as required to render work complete and finished in accord with specified requirements.

.6 Provide continuous specially formed “Z”-girt behind accent panels to provide support.

.7 Provide hinged soffit access panels in locations indicated on drawings. Fabricate panels with locking mechanism. Ensure panels open smoothly, without binding or other restrictions.

.8 Unless indicated to be responsibility of another Section, provide all closure trims, sills and cap flashings and other flashings required at junction with other building elements.

.9 Unless otherwise detailed provide metal closures to close off flutes at terminations.

.10 Attach components in manner not restricting thermal movement.

.11 Caulk junctions with adjoining work with sealant. Do work in accordance with Section 07 92 00.

.12 Leave metal wall cladding in clean and neat condition.

3.3 **CLEANING**

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

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

.3 Leave work area’s clean, free from grease, finger marks and stains.

3.4 **PROTECTION**

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

.2 Repair damage to adjacent materials caused by preformed metal siding installation.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 Comply with requirements of Division 1.

1.2 RELATED SECTIONS

.1 Section 06 10 00: Rough Carpentry.

.2 Section 07 27 26: Foamed-in-place Insulation.

.3 Section 07 62 00: Sheet Metal Flashing and Trim.

.4 Section 07 92 00: Joint Sealing.

1.3 REFERENCES

.1 American National Standards Institute (ANSI)
- .1 ANSI A135.6-12, Hardboard Siding Standard.

.2 ASTM International
- .1 ASTM D5116-10, Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.

.3 Canadian General Standard Board (CGSB)
- .1 CAN/CGSB-11.3-M87, Hardboard.
- .2 CAN/CGSB-11.5-M87, Hardboard, Precoated, Factory Finished for Exterior Cladding.
- .3 CAN/CGSB-11.6-M87, Installation of Exterior Hardboard Cladding.
- .4 CAN/CGSB-51.32-M77, Sheathing,Membrane, Breather Type.

.4 Canadian Standards Association (CSA International)
- .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
- .2 CSA O121-08 (R2013), Douglas Fir Plywood.
- .3 CSA O141-05 (R2009), Softwood Lumber.
- .4 CSA O151-09, Canadian Softwood Plywood.
- .5 CAN/CZA-Z809-08 (R2013), Sustainable Forest Management.

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

.6 National Lumber Grading Authority (NLGA)
- .1 NLGA Standard Grading Rules for Canadian Lumber 2010.

1.4 SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for wood siding and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29 – Health and Safety Requirements.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Nova Scotia.

.4 Samples:
- .1 Submit duplicate samples, minimum 200 mm. long, of each profile specified,

1.5 QUALITY ASSURANCE

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

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

.3 Pre-Installation Meeting: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and warranty requirements.

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, and with manufacturer's written instructions.

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

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

1.7 **WASTE MANAGEMENT AND DISPOSAL**

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

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

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

.4 Dispose of unused wood materials from landfill to facility approved by Departmental Representative.

.5 Dispose of unused caulking materials from landfill to facility approved by Departmental Representative. Do not dispose of unused caulking materials into sewers, waterways or where it will pose health or environmental risk.

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

1.8 **WARRANTY**

.1 Submit the warranty according to requirements of Section 01 78 00 Closeout Submittals.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Lumber Siding: to NLGA Standard Grading Rules for Canadian Lumber.

.2 Accessories: exposed trim, closures, cap pieces of manufacturer's standard, prefinished to match siding finish.

.3 Exterior wall sheathing paper: to CAN/CGSB-51.32 single ply, laminated, spunbonded olefin type coated, impregnated, as indicated.

.4 Fasteners: nails to CSA B111, hot galvanuzed steel, aluminium, copper, sized as required, smooth shank, spiral, ring thread, type with oval, flat, finishing head.

.5 Sealants: as specified in Section 07 92 00 – Joint Sealants.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Examine substrates and immediately inform Departmental Representative in writing of defects.

.2 Prior to commencement of work of this Section ensure substrates are firm, straight, smooth, dry, free of snow, ice or frost, contamination and swept clean of dust and debris.

.3 Do not start work until deficiencies have been corrected. Start of work shall imply acceptance of conditions.

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 INSTALLATION

.1 Install wood siding to manufacturer's written instructions.

.2 Install one layer sheathing paper horizontally by stapling, lapping edges minimum 100 mm.

.3 Install sill flashings, wood starter strips, inside corner flashings, edgings and flashings over openings.

.4 Fasten wood siding in straight, aligned lengths to framing and blocking, furring, sheathing, at 400 mm on center maximum using two nails at each fixing location. Intermediate butt joints are not permitted. Stagger butt joints not less than 800 mm and distribute evenly over wall faces. Cut butt joints at 45 degress and for vertical siding slope to outside. Seal cut surfaces.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
  .1 Leave work clean at the end of each day.

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

.3 Waste Management: separate waste material for recycling in accordance with Section 01 74 21 – Construction Waste Management and Disposal.
  .1 Remove containers and bins from site and dispose of materials at appropriate facility.

3.5 **PROTECTION OF FINISHED WORK**

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

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

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL

.1 Comply with requirements of Division 1.

1.2 RELATED SECTIONS

.1 Section 06 10 00: Rough Carpentry.
.2 Section 07 21 00: Building Insulation.
.3 Section 07 21 19: Foamed in Place Insulation.
.4 Section 07 27 26: Fluid Applied Membrane Air Barrier.
.5 Section 07 61 00: Sheet Metal Roofing.
.6 Section 07 62 00: Metal Flashings and Trim.
.7 Section 07 92 00: Joint Sealing.
.8 Section 09 21 16: Gypsum Board Assemblies.

1.3 REFERENCES

.1 ASTM International Inc.
  .1 ASTM C1396/C1396M-06a, Standard Specification for Gypsum Board.
  .2 ASTM C1177/C1177M-13, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  .3 ASTM D41-06a(2013), Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
  .4 ASTM D312-00(2006), Standard Specification for Asphalt Used in Roofing.
  .5 ASTM D2178-04, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
  .6 ASTM D6162-00a(2008), Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
  .7 ASTM D6163-00(2008), Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
  .8 ASTM D6164-11, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

.2 Canadian General Standards Board (CGSB)
  .1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
  .2 CGSB 37-GP-56M-85, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.3 Canadian Roofing Contractors Association (CRCA)
  .1 CRCA Roofing Specifications Manual, current edition.

.4 Canadian Standards Association (CSA International)
  .1 CSA-A123.3-05(R2010), Asphalt Saturated Organic Roofing Felt.
  .2 CSA-A123.4-04(R2008), Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.

.5 Factory Mutual (FM Global)
.1 FM Approvals - Roofing Products.

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

.7 Underwriters Laboratories' of Canada (ULC)
.1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.2 CAN/ULC-S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
.3 CAN/ULC-S706-09, Standard for Wood Fibre Thermal Insulation for Buildings.

1.4 **ACTION AND INFORMATION SUBMITTALS**

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

.2 Product Data: Provide technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations for asphalt, roofing felts, bituminous membranes and insulation.

.3 Manufacturer's Certificate: certify that products meet or exceed specified requirements.

.4 Test and Evaluation Reports: Submit laboratory test reports certifying compliance of bitumens, fibreboard, modified bituminous membranes and insulation with specification requirements in accordance with Section 01 45 00 – Quality Control.

.5 Reports: Submit 3 copies of daily observation reports, photos, letter of conformity and roof overview submitted to the Contractor from the roof observer responsible for reviewing the roofing Work to ensure compliance with Contract Documents. Include a copy of submittal in each Maintenance Manual provided to the Departmental Representative.

1.5 **PRE-INSTALLATION SITE MEETING**

.1 Convene pre-installation meeting one week prior to beginning modified bituminous membrane roofing Work, with roofing sub-contractor's representative, Contractor and Departmental Representative.
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions.

1.6 **DELIVERY, STORAGE AND HANDLING**

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

.2 Indicate on containers or wrappings of and materials:
- .1 Manufacturer's name and brand.
- .2 Compliance with applicable standard.
- .3 Mass where applicable.

.3 Deliver materials in original containers, sealed, with labels intact. Ensure that shelf life of materials has not expired.

.4 Deliver fasteners in boxes or kegs and keep in protective storage until used. Do not oil or grease fasteners.

.5 Remove damaged and/or rejected materials from site.

.6 Storage And Handling Requirements:
- .1 Safety: comply with requirements of Workplace hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
- .2 Provide and maintain dry, off-ground weatherproof storage.
- .3 Store rolls of felt and membrane in an upright position to prevent deformation. Store membrane rolls with selvage edge up.
- .4 Remove only in quantities required for same day use.
- .5 Place plywood runways over Work to enable movement of material and other traffic.
- .6 Store insulation protected from sunlight, weather and deleterious materials.
- .7 Polywrap roofing felts. Roofing felts which have become wet shall not be used.

1.7 **ENVIRONMENTAL REQUIREMENTS**

.1 Do not install roofing when air and substrate temperature remains below 5°C and in accordance with manufacturer's recommendations or when wind chill gives equivalent cooling effect.

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

1.8 **FIRE PROTECTION**

.1 Fire Extinguishers: maintain one cartridge operated type or stored pressure rechargeable type with hose and shut-off nozzle, ULC labeled for A, B and C class protection. Size 9 kg on roof per torch applicator, within 10 m of torch applicator.

.2 Maintain a minimum fire watch for 2 hours after each days roofing operations cease and as according to Hot Works requirement of the Canadian Fire Code (latest edition).
- .1 During work and at completion of days work monitor for hot spots on roofs with heat seeking devices.

1.9 **INDEPENDENT INSPECTION AND TESTING**

.1 Departmental Representative may appoint and pay for independent inspection agency to inspect work of this Section as per Section 01 45 00 – Testing and Quality Control.

1.10 **COMPATIBILITY**

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

1.11 **WASTE MANAGEMENT AND DISPOSAL**

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

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

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

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Dispose of unused roofing materials at official hazardous material collections site approved by Departmental Representative.

.6 Unused wood materials are to be diverted from landfill to a recycling / reuse facility as approved by Departmental Representative.

.7 Fold up metal banding, flatten and place in designated are for recycling.

1.12 **WARRANTY**

.1 Contractor shall guarantee all workmanship related to the installation of the Roofing System and that the roof membrane will remain leakproof for a period of (5) years from date of Interim Certificate of Completion.

.2 At the substantial Completion the Contractor is to provide a written five-year guarantee from the Issuing Guarantor that provided written document.

.3 At no cost to the Departmental Representative, remedy any defects in work, including work of this and other Sections, due to faults in materials or workmanship provided under this Section.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

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

.2 Mechanical fasteners for roof sheathing: to FM 1-60 for field areas; FM 1-90 for perimeter areas and corner securement enhancements.

2.2 MATERIALS

.1 Asphalt primer: to CGSB 37-GP-9Ma.

.2 Bitumen: asphalt to CSA A123.4, Type II or Type III. Provide equiviscous temperature (EVT), finish blowing temperature (FBT) and flash point (FP) temperature.

.3 Roofing Felts and Dry Sheathing:
- .1 Saturated Organic Felts: to CSA A123.3 No. 15, saturant asphalt.
- .2 Saturated Glass Fibre Felts: ASTM D2178, Type IV-ply sheet.

.4 Rigid Roof Insulation:

- .1 Polyisocyanurate/Urethane: to CAN/ULC-S704, shiplapped edge, facing with 13 mm type 1, factory laminated fibreboard to CAN/CSA A247 and kraft paper, CFC free, RSI value of 1.05/25 mm thickness. Acceptable material:
  - .1 Isox Maritime Limited - “IFB”.
  - .2 ModulR TS Inc. - “ProtecF Composite”.
- .2 Alternate Roof Insulation: Polyisocyanurate/Urethane to CAN/ULC-S704, facing to be factory applied kraft paper, CFC free, RSI value of 1.05/25 mm thickness. Acceptable material:
  - .1 Isox Maritime Limited - “ISO MAR - Type 1”.
  - .2 John’s Manville Canada Inc. - “E’NRG’Y 3”.
  - .3 Soprema – ISO.
  - .4 IKO Industries Ltd. - “Ikotherm”.
- .3 Tapered Roof Insulation: Polyisocyanurate/Urethane to CAN/ULC-S704-01, minimum slope 1:100, shiplapped edge with top face 13 mm type 1, factory laminated fibreboard to CAN/CSA A247 and bottom face of fibre-reinforced facer, RSI value of 1.05/25 mm thickness. Acceptable material:
  - .1 Type “IFB” Tapered Roof Insulation Panels – Isox Maritime Limited.
  - .2 “ProtecF Composite” Tapered Panels – ModulR TS Inc.
  - .3 or approved equal.

.4 (continued)

.4 Alternate Tapered Roof Insulation: Polyisocyanurate/Urethane to CAN/ULC-S704-01, minimum slope 1:100, shiplapped edge with fibre-reinforced facer top and bottom, RSI value of 1.05/25 mm thickness. Acceptable material:
- .1 Type 1 Tapered Roof Insulation Panels – Isox Maritime Limited.
- .2 Tapered "E'NRG'Y 3".- John's Manville Canada Inc.
- .3 Tapered ISO – by Soprema.
- .4 Tapered Polyisocyanurate Roof Insulation – Accu-Plane Enterprises Inc.
- .5 or approved equal.

.5 Fibreboard: asphalt fibreboard insulation to CAN/ULC-S706, 12.5 mm or 25 thick roof board, type 2, grade 1, high density wax impregnated, coated top and bottom surfaces (coated 2 sided) or coated 1-side.
- .1 Density to ASTM D-1037: 221 kg/m^2 minimum.
- .2 Water Absorption to ASTM C-209: 3.5 % maximum.
- .3 Transverse load at rupture to ASTM C-209: 60.49 N minimum.
- .4 Acceptable Material:
  - .1 12.5 mm board: Fiberboard Roof Insulation-High Density, as manufactured by Materiaux Cascades Inc. or Esgard High Strength 12.5 mm, 1-side coated High-Density Roof Board as manufactured by BP, Emco Building Products or Structodek as manufactured by Knight-Celotex Fibreboard.
  - .2 25 mm board: Fiberboard Roof Insulation-High Density, shiplapped edge, as manufactured by Materiaux Cascades Inc. or Esgard High Strength 25 mm, High-Density Roof Board as manufactured by BP, Emco Building Products or Structodek as manufactured by Knight-Celotex Fibreboard.

.6 Plastic Cement: asphalt to CAN/CGSB-37.5.

.7 Sealing Compound: to CAN/CGSB-37.29, rubber asphalt type.

.8 Base Sheet Membrane: to CGSB 37-GP-56M, Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, non-woven polyester reinforcement, weight 180 g/m^2, minimum thickness of 2.0 mm +/- 0.2 mm.
- .1 Type 2, Class C, Grade 2,fully adhered.
- .2 Grade heavy duty service.
- .3 Top and bottom surfaces:
  - .1 Polyethylene / sanded.
  - .2 Acceptable material:
    - .1 IKO - Modiflex MP-180-FS-BASE.
    - .2 Soprema - Elastophene 180 PS.
    - .3 Bakor - "Modified Plus" - NP180 P/S.

.9 Fire Seal Membrane: SBS modified bitumen membrane, reinforced, thermofusible plastic film top surface, self-adhering bottom surface with release paper. Provide primer as recommended by manufacturer. Acceptable material:
- .1 Bakor – NP180 Tack Sheet.
- .2 IKO – Armourbond 180.
- .3 IKO – Armourbond Flash
- .4 Soprema – Sopralene Flam Stick.

.10 Base Sheet Flashing: Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, non-woven polyester reinforcement, weight 180 g/m^2, minimum thickness of 3.0 mm +/- 0.2 mm.
- .1 Type 2, Class C, Grade 2,fully adhered.
- .2 Class C – Plain surface.
- .3 Grade heavy duty service.
- .4 Top and bottom surfaces:
  - .1 Polyethylene / polyethylene.
  - .2 Acceptable material:
    - .1 IKO - “Torchflex” TP-180-FF.
    - .2 Soprema – Sopralene FLAM 180.
    - .3 Bakor - “Modified PLUS” - NP180 P/P.

.11 Cap Sheet and Cap Sheet Flashing: to CGSB 37-GP-56M, Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, non-woven polyester reinforcement, weight 250 g/m^2, minimum thickness of 4.0 mm +/- 0.2 mm at selvage edge, maximum width 1000 mm.
- .1 Type 1, fully adhered.
- .2 Class A – granule surfaced.
- .3 Grade heavy duty service.
- .4 Top surface: Polyethylene.
- .5 Acceptable material:
  - .1 Johns Manville - “Glaskap” CR Cool Roof Cap Sheet
  - .2 IKO – “ArmourCool”.
  - .3 Soprema – “Soprastar” FLAM HD GR.
  - .4 Bakor - “Modified Plus” - NP 250 g T4 “Ultra White”.
- .6 Minimum. SRI : 64 (3yr aged SRI 60)
- .7 Reflectance of at least 0.65 and an emissivity of at least 0.9 for a min. of 75% of the roof surface.

.12 Nails: to CSA B111. Large head hot dipped galvanized steel or aluminum roofing nails of sufficient length to penetrate and provide a secure fastening.

.13 Fastening bars: Cold rolled galvanized sheet steel, 2 mm ASTM A526 coating designation G90 commercial, with slotted holes at 25 mm o.c.

.14 Cant strip: polyurethane and isocyanathe foam core to CGSB 51-GP-26M, factory molded to 3.2 mm thick mineral asphaltic core board. Acceptable material:
- .1 Isox Maritime Limited - T.R. Cant.
- .2 ModulR TS Inc. – CantR Composite.

.15 Gypsum Sheathing: to ASTM C1177/C1177M, fibreglass mat faced, moisture resistant, gypsum core roof sheathing 12.7 mm thick, 1220 mm wide x maximum practical length. Acceptable material manufactured by:
- .1 Canadian Gypsum Company.
- .2 CertainTeed Inc.
- .3 G-P Gypsum Corporation.

.16 Fasteners (for gypsum sheathing): 41 mm long, corrosion resistant, fastener with # 3 head and 76 mm x 76 mm galvalum steel hex plate in accordance with FMR standard No. 14 and No. 4470 on corrosion and wind uplift factors. Acceptable product:
- .1 "Deckfast 12" by Construction Fasteners Inc.
- .2 "ASA 3S" by Olympic Manufacturing Group.
- .3 "ITW" by Buildex.

.17 Plywood Sheathing: as specified in Section 06 10 00 – Rough Carpentry.

PART 3 - EXECUTION

3.1 WORKMANSHIP

.1 Do examination, preparation and roofing work in accordance with applicable, standard in Canadian Roofing Contractors Association (CRCA) Roofing Specifications Manual.

.2 Do priming for asphalt in accordance with CGSB 37-GP-15M.

3.2 HEATING OF ASPHALT

.1 Asphalt to be heated in kettle or tanker sufficiently to provide correct EVT range at point of application.

.2 In cold weather insulate hauling equipment and re-circulation lines to minimize heat loss.

.3 Do not heat asphalt above its final blowing temperature (FBT) in tanker.

.4 Heating asphalt above its FBT may be permissible in kettle as long as asphalt is used up within four hours.

.5 Equip kettle and tanker with working thermometers.

.6 Maintain bitumen temperatures within range specified. Kettle temperature shall not exceed flash point of bitumen:
- .1 Maximum kettle temperature: as recommended by asphalt manufacturer and not to exceed FBT.
- .2 Minimum application temperature: within EVR range.
- .3 In cold weather, maximum kettle temperature may be increased if required to facilitate pouring of bitumen. Check with Departmental Representative before raising temperature.

3.3 PLANT AND EQUIPMENT

.1 Use only kettles equipped with thermometers or gauges in good working order.

.2 Maintain supervision while kettles are in operation and provide metal covers for kettles to smother flames in case of fire. Provide suitable fire extinguishers.

.3 Locate kettles in safe place outside of building or, if approved by Departmental Representative, on noncombustible substrate at location to avoid danger of igniting combustible material below. When locating kettles, give consideration to direction of prevailing winds, building fans and air handling units to minimize possibility of smoke and fumes entering surrounding occupied buildings. If wind direction causes smoke and fume problems, relocate kettles on daily basis when directed by Departmental Representative.

.4 Maintain efficiency of kettles and equipment by frequent cleaning. Remove all carbonized bitumen.

.5 Use only fibreglass roofing mops.

3.4 **PROTECTION**

.1 Protect building walls and windows from damage. Cover vertical surfaces, walls, walks and adjacent work with tarpaulins where materials hoisted or used.

.2 Place protective cover over surfaces to be used for material and equipment storage to aide clean-up and to protect surfaces from contamination.

.3 Locate kettles at grade level minimum of 3.0 M from any building, and so as to prevent smoke damage to building.

.4 Use warning signs and barriers. Maintain in good order until completion of Work.

.5 When using open flame in connection with this work, maintain at all times 9 kg dry chemical fire extinguisher fully charged and in operable condition at location where open flames are in use.

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

.7 Install insulation promptly to avoid possibility of condensation beneath vapour retarder.

.8 Protect bitumens and felts against contact with water from any source until applied and fully cured.

.9 Maintain roof drainage while replacement work is in progress.

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

.11 Protect completed portions of roofing and existing roofs scheduled to remain from damage due to traffic and materials handling until completion of Work. Comply with precautions deemed necessary by Departmental Representative.

.12 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. Install cut offs when such stoppages occur and where area of roofing exceeds 200 sq. m.

.13 Maintain fire watch for 2 hours after each days roofing operations cease, particularly where torch application has been used.

3.5 **EXAMINATION OF ROOF DECKS**

.1 Verification of Conditions: Inspect with Departmental Representative roof deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.

.2 Prior to commencement of work ensure:

- .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, loose or adhering materials, free of ridges or fins and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
- .2 Provide cants, curbs dividers and blocking as required and secure using galvanized fasteners.
- .3 Roof drains have been installed at proper elevations relative to finished roof surface. Verify that existing roof drains are at low point of roof elevation. Notify Departmental Representative if drains are not at proper elevation to allow water drainage.
- .4 Plywood and lumber nailer plates have been installed to walls and parapets as indicated.
- .5 Install members true to line, levels and elevations, square and plumb.
- .6 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .7 Countersink bolts where necessary to provide clearance for other work.

.3 Do not install roofing materials during rain or snowfall.

3.6 **DECK (GYPSUM) SHEATHING**

.1 Mechanically fasten gypsum sheathing to steel roof deck with screw fasteners and plates to steel deck’s upper rib surfaces, minimum 12 fasteners for each 1220 x 2440 mm board, in accordance with FM 1-90 with perimeter and corner securement enhancements.

.2 Place sheathing wit long axis of each sheet transverse to steel deck ribs, with end joints staggered and fully supported on ribs. But sheathing boards with no gaps greater than 6 mm.

3.7 **PRIMING DECK**

.1 Apply deck primer to roofing substrate at the rate of 2.5 L per 10 m^2 as recommended by manufacturer.

3.8 **VAPOUR RETARDER**

.1 Embed two piles of organic felts in hot bitumen spread at rate of 1 kg/m^2 for organic asphalt felts and 1.2 kg/ m^2 for glass asphalt felts.

.2 Lap felts 1/2 width of sheet plus 25 mm and end laps of 150 mm.

.3 Vapour retarder shall be continuous and complete in all locations. Seal at penetrations. Extend vapour retarder up vertical surfaces and fold 100 mm over insulating material.

.4 Where roofing abuts curbs and other vertical surfaces, extend sheet membrane flashing below wood blocking, lapping 100 mm minimum below rigid insulation and extend up vertical surfaces or over wood cant strip and mechanically secure. Sheet membrane flashing shall be continuous and complete in all locations. Seal laps, terminations and at penetrations with adhesive.

.5 Apply glaze seal coat to vapour retarder if insulation is not applied same day.

3.9 **FIRE SEAL BASE FLASHING**

.1 A self adhering base sheet is to be installed at all exposed wood and combustibles starting at the vapour barrier and covering the entire curb. Ensure wood is not exposed to flame. Prime wood surface with primer as recommended by manufacturer, fasteners maybe used to ensure a good adherence. This self adhered base sheet is an underlay for the standard torch applied base sheet flashing and is to provide a continuous fire seal at wall/curb and roof junctions.

3.10 **INSULATION**

.1 Adhere insulation to vapour retarder in full mopping of hot asphalt or hot bitumen and top layer of insulation to bottom layer of insulation and in strict accord with insulation manufacturer's recommendations. Embed insulation in 1.5 kg/m^2 mopping of bitumen.

.2 Install insulation in two layers, with staggered joints. Stagger joints between layers 150 mm minimum.

.3 Place boards in parallel rows and length parallel with slope, with ends staggered, and in firm contact with one another. Ensure that top surface of insulation is smooth, even and without steps.

.4 Cut end pieces to suit.

.5 Do not install more insulation, than that which can be covered with roof membrane the same day.

.6 Reduce roof insulation thickness by 25 mm for an area of 1.2 m square around each roof drain; install tapered filler pieces to allow for smooth transition.

3.11 **FIBREBOARD APPLICATION**

.1 Over roof insulation apply 12 mm thick layer of fibreboard in full mopping of hot bitumen of min. 1.5 kg/m^2. Use largest size sheet available; stagger joints. If alternate roof insulation used apply 2 layers of 12 mm thick fibreboard insulation and stagger joints.

.2 Place boards in parallel rows with end joints staggered. Stagger fibreboard joints a minimum of 25 mm from insulation joints.

.3 Butt fibreboard tight without gaps.

3.12 **CANTS**

.1 Install cants around roof top equipment curbs and where indicated on drawings.

.2 Install prefabricated torchable cants over fiberboard and wrapped vapour barrier where indicated.

.3 Apply hot bitumen to receiving surface and embed cant firmly by hand.

.4 Angle cut cants to fit tightly on back and bottom where roof to wall angle varies from 90°.

.5 Install wood cants where indicated on drawings.

3.13 **ROOFING MEMBRANE**

.1 Do membrane application in accordance with manufacturer's recommendations. Base and cap sheets shall be by same manufacturer.

.2 Base Sheet Application:

.1 Starting at low point, perpendicular to slope, unroll and reroll approximately half the membrane into a firm roll. Align membrane and embed base sheet in uniform coating of hot asphalt over insulation applied at rate of 1.5 kg/m^2. Minimum asphalt application temperature 230° C at the roll.

.2 Align base sheet onto the deck. Overlap side laps 75 mm and end laps 150 mm.

.3 Limit mopping distance to 1.0 m ahead of unrolling membrane to ensure proper asphalt application temperature is maintained and firmly embed the base sheet.

.4 Apply even pressure on membrane as it is unrolled; do not "kick the roll out". A visible wave of asphalt must precede the roll.

.5 Reroll opposite end and repeat process.

.6 Application to be free of blisters, wrinkles and fishmouths.

.7 Extend sheets up to top of cant strip and cut in neat straight line.

.8 Install water cut-offs at end of day, and remove before resuming work.

.9 Torch seal side and end laps.

.3 Cap Sheet Application:
- .1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, and reroll from both ends. Reroll approximately half the membrane into a firm roll.
- .2 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.
- .3 Stagger side laps minimum 300 mm and end laps 400 mm from underlying base sheet. Lap sides of cap sheet 75 mm and end laps 150 mm. Ensure that all side laps are aligned with the selvage edge of the preceding sheet.
- .4 Carry cap sheet to bottom edge of the cant.
- .5 Embed granules at end laps of torched cap sheets with a heated trowel to push the granules into the bitumen; do not scrape granules away.
- .6 At all corners, out minimum 3.0 m, torch apply cap sheet to newly applied roofing membrane and install as per manufacturer's printed instructions.
- .7 Application to be free of blisters, fishmouths and wrinkles.
- .8 Do membrane application in accordance with manufacturer's recommendations.

.4 Roof Penetrations:
- .1 Cut sheets to fit closely around openings and projections.
- .2 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with the manufacturer's recommendations and details.

3.14 BITUMINOUS MEMBRANE FLASHINGS

.1 Seal roofing system against water penetration where roof terminates and at interruptions, penetrations and protrusions by means of two ply modified bitumen flashings.

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

.3 Do Work in accordance with manufacturer's recommendations.

.4 Base Membrane Flashing:
- .1 Cut membrane in 1.0 m wide by the length required and mop base sheet membrane in hot asphalt mopped to all parapets and over areas where shown on drawings. Install in accordance with manufacturer's printed instructions.
- .2 Apply hot asphalt at the rate of 1.5 kg/m^2.
- .3 Extend membrane base flashing 150 mm minimum onto roof assembly and 200 mm minimum vertically above completed roof assembly surface.
- .4 Stagger side laps in membrane base flashing 75 mm minimum and 100 mm minimum 100 mm from laps of the underlying base sheet membranes.
- .5 Seal ends and laps by mopping.
- .6 Carry base sheet to the top of coping.

.5 Cap Membrane Flashing:

.1 Cut membrane in 1.0 m wide by the length required and torch apply cap sheet to previously applied base sheet. Install in accordance with manufacturer's printed instructions.

.2 Extend membrane cap flashing 200 mm minimum onto roof assembly and 200 mm minimum vertically above completed roof assembly surface. Seal ends and laps by torch weld.

.3 Stagger side laps in membrane cap flashing 300 mm minimum from side and end laps in membrane base flashing and from side and end laps of roof membrane cap sheet.

.6 Where roof meets exterior wall, rising above roof, carry bituminous flashings up wall minimum 200 mm and secure along top edge with fastening bar.

.7 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.

3.15 **ROOF PENETRATIONS**

.1 Install vent stack covers and other roof penetration flashings and seal to membrane in accordance with the manufacturer’s recommendations and as indicated.

3.16 **CLEANING**

.1 Clean to Departmental Representative’s approval, soiled surfaces, spatters, and damage caused by work of this Section.

.2 Remove bituminous markings from finished surfaces.

.3 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.

.4 Repair or replace defaced or disfigured finishes caused by work of this section.

.5 Check drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from site.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL

.1 Comply with requirements of Division 1.

1.2 RELATED SECTIONS

.1 Section 06 10 00: Rough Carpentry.

.2 Section 07 62 00: Sheet Metal Flashings and Trim.

.3 Section 07 92 00: Joint Sealing.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
- .1 ASTM A653/A653M-02a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A792/A792M-02, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process.
- .3 ASTM B32-00e1, Standard Specification for Solder Metal.
- .4 ASTM D523-89(1999), Standard Test Method for Specular Gloss.
- .5 ASTM D822-01, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.2 Canadian Sheet Steel Building Institute (CSSBI).
- .1 CSSBI 10M-08, Standard for Steel Roof Deck
- .2 CSSBI 20M-08, Standard for Sheet Steel Cladding for Architectural, Industrial and Commercial Building Applications.
- .3 CSSBI S8-08, Quality and Performance Specification for Prefinished Sheet Steel Use for Building Products.

.3 Canadian Standards Assocaition (CSA)
- .1 CSA-S136 for Design of Cold Formed Steel Structural Members.

.4 National Building Code of Canada, 2010 edition.

1.4 STANDARDS

.1 Design metal roofing system in accordance with the latest edition of:
- .1 CSA-S136 for the Design of Cold Formed Steel Structural Members.
- .2 Canadian Sheet Steel Building Institute (CSSBI) standards -10M, -20M and –S8.
- .3 National Building Code of Canada, 2010.

1.5 **DESIGN REQUIREMENTS**

.1 Design roof system to resist:
- .1 Snow loads and snow build-up and rain load, expected in this geographical region NBCC climatic data, 50 year probability.
- .2 Wind loads, positive and negative, expected in this geographical region NBCC climatic data, 50 year probability.
- .3 Dead load of roof system.

.2 Deflection of the roof system is not to exceed 1/180th of the span for the specified live loading.

.3 Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, overstressing of components, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.
- .1 Temperature Change (Range): 20 deg C, ambient; 40 deg C, material

1.6 **ACTION AND INFORMATION SUBMITTALS**

.1 Submit action and information submittals in accordance to requirements of 01 33 00 - Submittal Procedures.

.2 Product data: submit manufacturer's printed product literature, specifications and data sheet, including:
- .1 Submit two copies of WHMIS MSDS - Material Safety Data Sheets. Include product characteristics, performance criteria, and limitations.

.3 Shop Drawings:
- .1 Submit shop drawings: to scale roof plan showing all dimensions, profiles, attachment methods, trim and closure pieces, metal furring, and related work including: structural liner, thermal barrier, membrane air/vapour barrier, insulation as part of the roof system.
- .2 Indicate arrangements of pre-finished Roof Sheet, including joint, types and locations of supports, fasteners, flashing, mitres and all metal components related to the roof installation.
- .3 Shop drawings shall be prepared, signed and sealed by a Professional Engineer licensed to practice in the Province of Nova Scotia, attesting to the ability of the metal roof assembly to withstand the specified loads.

.4 Samples: submit review samples from manufacturer’s full range of colours. Submit duplicate 300 x 300 mm samples of material, profile specified, and selected colour.

.5 Manufacturer's Instructions: Submit manufacturer's installation instructions and installation sequence.

.6 Delivery, Handling and Storage:
- .1 Store components and materials in accordance with panel manufacturer’s recommendations and protect from elements.
- .2 Protect prefinished steel during fabrication, transportation, site storage, and erection in accordance with CSSBI Standards.

.7 Closeout Submittals: submit information in accordance with Section 01 78 00 – Closeout Submittals. Provide maintenance data for cleaning and maintenance of panel finishes for inclusion in manual specified in Section 01 78 00 – Closeout Submittals.

.8 Certificates: Submit manufacturer's warranty certificates for inclusion in manual specified in Section 01 78 00 – Closeout Submittals.

1.7 **QUALITY ASSURANCE**

.1 Manufacturer of roof system shall demonstrate experience in projects of similar scope.

.2 Installer of roof system shall be authorized by manufacturer as qualified in installation of this type of roof system and experience in project installation of similar scope.

.3 Mock-up: prepare mock-ups in accordance with Section 01 45 00 - Quality Control.
- .1 Fabricate 1800 x 1800 mm sample roofing panel using identical project materials and methods to include typical standing seam.
- .2 Mock-up will be used to judge workmanship, substrate preparation, operation of equipment and material application.
- .3 Locate mock-up where directed by Departmental Representative.
- .4 Allow 48 hours for inspection of mock-up by Departmental Representative before proceeding with work of this Section.
- .5 When accepted, mock-up will demonstrate minimum standard of quality required for this Work.
- .6 Approved mock-up may remain as part of finished Work at the sole discretion of the Departmental Representative.
- .7 If mock-up is not to be remain as part of the finished work, remove and dispose of mock-up when no longer required and as directed by Departmental Representative.

1.8 **WARRANTY**

.1 Provide a manufacturer's written warranty: Furnish panel manufacturer's written warranty covering failure of factory-applied exterior finish within the warranty period.
- .1 Warranty period for finish: 40 years after the date of Substantial Completion. The values below are based on normal environments and exclude any aggressive atmospheric conditions.
  - .1 Siliconized Polyester (SMP) will not crack, chip, or peel (lose adhesion) for forty years from date of installation (40 yrs from application) - not including minute fracturing that may occur during the normal fabrication process.
  - .2 Siliconized Polyester (SMP) will not chalk in excess of a number six rating, in accordance with ASTM D-4214 method D659 at any time for thirty years from date of installation (30 yrs from application); will not change colour more than eight Hunter ΔE units as determined by ASTM method D-2244.

1.9 **WASTE MANAGEMENT AND DISPOSAL**

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

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

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert used metal cut-offs from landfill by disposal at the nearest metal recycling facility.

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

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

PART 2 - PRODUCTS

2.1 **ROOF SYSTEM COMPONENTS**

.1 Gypsum Sheathing: to ASTM C1177/C1177M, fibreglass mat faced, moisture resistant, gypsum core roof sheathing 12.7 mm thick, 1220 mm wide x maximum practical length. Acceptable material manufactured by:
- .1 Canadian Gypsum Company.
- .2 CertainTeed Inc.
- .3 G-P Gypsum Corporation.

.2 Fasteners for gypsum sheathing: 41mm long, corrosion resistant, fastener with # 3 head and 76 mm x 76 mm galvalum steel hex plate in accordance with FMR standard No. 14 and No. 4470 on corrosion and wind uplift factors. Acceptable product:
- .1 “Deckfast 12” by Construction Fasteners Inc.
- .2 “ASA 3S” by Olympic Manufacturing Group.
- .3 “ITW” by Buildex.

.3 Sheet Vapour Retarder: as specified in Section 07 55 00 – Modified Bituminious Membrane Roofing.

.4 Rigid Roof Insulation: as specified in Section 07 55 00 – Modified Bituminious Membrane Roofing.

.5 Plywood Sheathing: as specified in Section 06 10 00 – Rough Carpentry.

.6 Water barrier roof membrane: high temperature grade, water barrier roof membrane as follows:
- .1 High density, cross laminated polyethylene film coated on one side with a layer of butyl rubber or high temperature asphalt adhesive. Provide primer where recommended by water barrier manufacturer.
- .2 Cold applied, self-adhering membrane.
- .3 Minimum Thickness: 30 mil.
- .4 Tensile Strength: ASTM D 412 (Die C Modified); 250 psi.
- .5 Membrane Elongation: ASTM D412 (Die C Modified); 250%.
- .6 Permeance (Max): ASTM E96; 0.05 Perms.
- .7 Flame spread: Class A.
- .8 Acceptable Products:
  - .1 Ultra, W.R. Grace Company.
  - .2 Blueskin PE 200 HT, Henry.
  - .3 Sharkskin Ultra SA, Kirsch Building Products.
  - .4 CCW MiraDRI WIP 300 High Temperature, Carlisle Coatings and Waterproofing.

.7 Clip and Subgirt System:
- .1 Thermally responsive clips to be fabricated from a minimum of 0.91 mm steel, with minimum Z275 galvanized coating designed to accommodate expansion and contraction of the roof sheet.
- .2 Continuous hat bar and zee clips made from galvanized material, thickness to suit design parameters, to accommodate depth of insulation.
- .3 Roof Fasteners: As specified by manufacturer, to resist wind uplift and sliding snow forces.

.8 Prefinished Roof Sheet (exposed to exterior).
- .1 Profile: standing seam for roof application seams at 400 mm wide coverage spacing.
- .2 Panel: Prefinished steel sheet, Z275 galvanized (zinc coated) sheet steel conforming to ASTM A653M structural quality Grade 230 having a nominal core thickness 0.76mm.
- .3 Acceptable Products:
  - .1 Tradition 100 by Vicwest.
  - .2 AR-38 by Agway Metals Inc.
  - .3 MRC System by Flynn Canada.

2.2 **PANEL FINISHES**

.1 Prefinished steel with factory applied silicone modified polyester.
- .1 Class F2S.
- .2 Specular gloss: 30 units +/-5 to ASTM D523 .
- .3 Coating thickness: not less than 20 25 micrometres.
- .4 Resistance to accelerated weathering for chalk rating of 8 , colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:
  - .1 Outdoor exposure period 1000 hours.
  - .2 Humidity resistance exposure period 1000 hours.
- .5 Colour: to be selected by Departmental Representative from manufacturer’s full range of standard colours.

2.3 **ACCESSORIES**

.1 Flashing: In accordance with Section 07 62 00 – Metal Flashings and Trim.
- .1 Form flashings from same materials as the roof sheet.
- .2 Custom fabricate to suit architectural details.

.2 Closures: Foam and metal closures to suit profiles selected, to manufacturer's recommendations.

.3 Sealants: In accordance with manufacturer's recommendation and as specified in Section 07 92 00: Joint Sealing.

2.4 **FABRICATION**

.1 Fabricate roof components to comply with dimensions, profiles, gauges and details as shown on the shop drawings, including fascia and soffit panels and all companion flashing.

.2 Fabricate all components of the system in the factory, ready for field installation.

.3 Provide roof sheet and all accessories in longest practicable length to minimize field lapping of joints.

PART 3 - EXECUTION

3.1 **EXAMINATION**

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for the Work of this Section in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 **INSTALLATION**

.1 Use concealed fastenings except where approved by Departmental Representative before installation.

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

.3 Apply slip sheet over asphalt felt underlay to prevent bonding between sheet metal and felt. Secure with minimum anchorage and lap joints 50 mm minimum in direction of waterflow.

.4 Install sheet metal roof panels using cleats spaced at 460 mm on centre.

.5 Secure cleats with two fasteners each and cover with cleat tabs.

.6 Align transverse seams in adjacent panels.

.7 Flash roof penetrations with material matching roof panels, and make watertight.

.8 Form seams in direction of water-flow and make watertight.

3.3 WATER BARRIER (UNDERLAYMENT AND SLIP SHEET)

.1 Install water barrier over the entire area of plywood sheathing to receive the sheet metal roofing and flashing, as shown on drawings. Ensure joints lapped in accordance with water barrier manufacturer's recommended installation instructions.

- .1 Install water barrier membrane on clean, dry roof substrate.
- .2 Prime plywood sheathing as recommended by water barrier membrane manufacturer.
- .3 Install membrane in strict accordance with manufacturer's printed application procedures, precautions, and limitations.
- .4 Handle underlayment carefully to prevent tears and punctures and repair with adhesive tape any damaged areas.
- .5 Install underlayment parallel to eaves with the topside up, maintaining consistent tautness. Start application at low points and lap membrane shingle fashion to prevent water penetration.
- .6 Membrane Underlayment: Apply horizontally, head (horizontal) lapping preceding layer not less than 100 mm. End lap membrane not less than 150 mm.
  - .1 Laps shall run with the flow of the water in a shingling manner.
  - .2 Maximize adhesion to substrate by brooming or rolling membrane in place after placement.
- .7 Fasten top edge of each strip with 2.77 mm shank diameter, corrosion-resistant stainless steel nails with a minimum 9.5 mm diameter head. Use sufficient nails to hold underlayment in place until copper roofing is applied.

3.4 STANDING SEAM ROOFING

.1 Use prefinished steel sheets 400 mm wide to make roofing with standing seams 400 mm on centre.

.2 Fold lower end of each pan under 20 mm.

- .1 Slit fold 25 mm away from corner to form tab where pan turns up to make standing seam.
- .2 Fold upper end of each pan over 50 mm.
- .3 Hook 20 mm fold on lower end of upper pan into 50 mm fold on upper end of underlying pan.

.3 Apply sheet metal roofing beginning at eaves. Loose lock pans to valley flashing and edge strips at eaves and gable rakes.

.4 Finish standing seams 12 mm high. Bend up one side edge 40 mm and other 45 mm.

- .1 Make first fold 6 mm wide single fold and second fold 12 mm wide, providing locked portion of standing seam with 5 plies in thickness.
- .2 Fold lower ends of seams at eaves over at 45 degrees angle.
- .3 Terminate standing seams at ridge and hips by turning down in tapered fold.

3.5 **CLEAN-UP**

.1 Clean exposed panel surfaces in accordance with manufacturer's written instructions.

.2 Repair and touch up, with matching colour, minor surface damage, only where permitted by Departmental Representative and to Departmental Representative's satisfaction.

.3 Replace damaged panels and components that, in opinion of the Departmental Representative, cannot be satisfactorily repaired.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 Comply with requirements of Division 1.

1.2 RELATED SECTIONS

.1 Section 04 05 00: Common Work Results For Masonry.

.2 Section 06 10 00: Rough Carpentry.

.3 Section 07 42 43: Composite Metal Wall Panels.

.4 Section 07 46 19: Preformed Metal Wall Cladding

.5 Section 07 55 00: Modified Bituminous Membrane Roofing

.6 Section 07 61 00: Sheet Metal Roofing.

.7 Section 07 92 00: Joint sealing.

1.3 REFERENCES

.1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

.2 ASTM A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.3 CSA A123.3, Asphalt Saturated Roofing Felt.

.4 CSA B111, Wire Nails, Spikes and Staples.

.5 CAN/CGSB-37.5, Cutback Asphalt Plastic Cement.

.6 CAN/CGSB-51.32, Sheathing Membrane, Breather Type.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

.1 Appearance: neatly and evenly lay out and install components.

.2 Effects of wind: resist positive and negative wind pressures without detrimental effects.

.3 Water control: prevent passage of water.

.4 Thermal movement: accommodate expansion and contraction of component parts without buckling, failure of joints, undue stress on fasteners and other detrimental effects.

.5 Compatibility: components shall be compatible with dissimilar metals and materials with which they are in contact or fastened to so as to prevent corrosion, staining and other detrimental effects. If required, treat or separate contact surfaces with inert and non-staining insulation material to achieve compatibility.

1.5 **SUBMITALS**

.1 Submit product date in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit duplicate 100 x 100 mm samples of each type of sheet metal material, finishes and colours specified.

1.6 **DELIVERY STORAGE AND HANDLING**

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

1.7 **JOB CONDITIONS**

.1 Schedule and co-ordinate installation of metal flashing components with work of other Sections where it is integral or contiguous therewith.

.2 Install metal counter and cap flashings immediately after installation and inspection of roofing membrane base flashings.

1.8 **WASTE MANAGEMENT AND DISPOSAL**

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

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

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

.4 Divert unused metal material from landfill to metal recycling facility as approved by Departmental Representative.

.5 Fold up metal banding, flatten and place in designated are for recycling.

1.9 **QUALITY ASSURANCE**

.1 At no cost to Owner, remedy any defects in work, including work of this and other Sections, due to faults in materials and /or workmanship provided under this Section of Specifications appearing within a period of 5 years from date of Substantial Performance.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Prefinished Steel Sheet: galvanized sheet steel, pretreated, primed and finish coated with nominal coating thickness of not less than 22 micrometres; Stelco 8000 series. Acceptable material as manufactured by:
- .1 VicWest Steel.
- .2 Flynn Canada Limited.
- .3 Agway Metals Inc.
- .4 or approved equal.

.2 Galvanized Sheet Steel: Hot dip galvanized, cold rolled with stretcher level degree of flatness to ASTM A653/A653M with zinc coating designation Z275.

.3 Cleats and Edge Strips: of same material and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured and as required to provide rigid support and positive securement for metal flashings.

.4 Fasteners: Non-corrosive, of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for application.

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

.6 Surface fasteners: nylon headed screws of same material as sheet metal. Colour to match metal flashing.

.7 Sealant: as specified in Section 07 92 00 – Sealants.

.8 Isolation Coating: Alkali resistant asphalt based enamel to CAN/CGSB-1.108.

.9 Underlay For Metal Flashing: No. 15 non-perforated asphalt felt to CSA A123.3.

.10 Plastic Cement: to CAN/CGSB 37.5.

2.2 **FINISHES**

.1 Exposed surfaces: prefinished sheet steel, 8000 series by Baycoat Inc. or Colorite HMP by VICWEST:
  .1 To match Wall Cladding Colour 'A': "Stone Grey" QC 16071.
  .2 To match Soffit Cladding Colour 'B': "Cambridge White" QC 16161.

.2 Concealed surfaces: galvanized.

2.3 **FABRICATION GENERAL**

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable MRGNB details, SMACNA Architectural Manual and as indicated.

.2 Shop fabricate metal flashing components to profiles indicated where flashings are required but not detailed follow applicable requirements of SMACNA Architectural Manual. Provide minimum metal gauge of 0.76 mm thickness (22 Ga.) sheet material for all components unless otherwise indicated.

.3 Form pieces in 3.0 m maximum lengths. Make allowance for expansion at joints. Provide slotted fixing holes and steel / plastic washer fasteners.

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

.5 Hem exposed edges on underside minimum 12 mm. Mitre and seal corners with sealant.

.6 Seams: space seams uniformly at maximum 3.0 m o.c. Make allowance for expansion at joints. Unless otherwise indicated, use flat locked seams, lapped 25mm. Make horizontal seams in directions of water flow.

.7 Unless otherwise indicated, counter flashings shall completely cover base flashings.

.8 Furnish everything necessary for complete metal flashing installation, including clips and fastening devices.

.9 Apply isolation coating to metal surfaces in contact with concrete or mortar.

2.4 **SLEEVE FLASHING SYSTEMS**

.1 Aluminum flashing system by Thaler Roofing Specialties Products, or approved equal.

.2 Fabricate sleeve flashings square or circular and of size to suit component being flashed. Unless otherwise indicated fabricate sleeves of 1.5 mm thick sheet metal, 450 mm high.

.3 Inside of jacket base flange and all sides of protection cup shall be coated with bituminous paint.

.4 Where possible size sleeves to allow minimum 25 mm thick insulation between component and sleeve.

.5 Provide the following types where required:
- .1 Stack jack: SJ-27 by Thaler Roofing Specialties Products, "Flash-Tite" standard model (VSC-S) by Lexcor Corporation or approved equal.
- .2 Other types where required suitable for purposes intended, as recommended by manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install sheet metal work in accordance with MRGNB "MBFL" series details, SMACNA Architectural Manual and as indicated.

.2 Provide metal flashings at roof perimeters, penetrations, curbs, copings, and where indicated on drawings. Protect all bituminous membrane flashings with metal counterflashings.

.3 Clean surfaces to be covered with metal flashings of dirt and other foreign matter. Do not apply metal flashings over substrates likely to cause rupture.

.4 Provide underlay under metal flashings installed over masonry, concrete or wood. Lay underlay dry as sheet metal work is installed. Secure in place and lap joints 100 mm.

.5 Surface fasten flashings to supporting building elements with 31 mm long nylon headed screws at 600 o.c. maximum. Provide slotted fixing holes and aluminum / plastic washer fasteners.

.6 Fill and seal seams with sealant; rivet corners.

.7 Where flashing is punctured by bolts, provide sheet lead or neoprene washers, 6 mm larger than bolt hole.

.8 Where flashing is installed around circular components and upper flashing edge is exposed, provide draw band around upper edge of flashing collar.

.9 Counterflash bituminous membrane flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips, as detailed. Make horizontal seams in direction of water flow.

.10 Install sleeve flashing systems at penetrations through roof membrane. Install systems in accordance with manufacturer's directions.

.11 Imperfections in metal flashing work such as holes, dents, creases, or oil-canning will not be accepted.

.12 Lock end joints and caulk with sealant.

3.2 **CLEANING**

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

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

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

END OF SECTION

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

.1 Comply with requirements of Division 1.

1.2 RELATED SECTIONS

.1 Section 07 84 00: Fire Stopping and Smoke Seals.

.2 Section 09 91 00: Painting.

1.3 REFERENCES

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

.2 Underwriter's Laboratories of Canada (ULC)
- .1 CAN-ULC S101, Standard Methods of fire Endurance Tests of Building Construction and Materials.
- .2 CAN-ULC S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.4 PERFORMANCE REQUIREMENTS

.1 Installed sprayed on fireproofing system shall meet fire ratings specified in accordance with applicable ULC requirements or other certified testing agency acceptable to jurisdictional authorities.

.2 Physical Performance Characteristics: Fireproofing material shall meet the following physical performance standards:
- .1 Deflection: material shall not crack or delaminate under deflection when tested in accordance with ASTM E759.
- .2 Bond Impact: material shall not crack or delaminate under impact when tested in accordance with ASTM E760.
- .3 Bond Strength: material shall have a minimum bond strength of 9.6 kPa when tested in accordance with ASTM E736.
- .4 Air Erosion: material shall not be subject to loss by sifting, flaking or dusting in excess of 0.27 g/m^2 when tested in accordance with ASTM E859.
- .5 Compressive Strength: material shall not deform more than 20% when subjected to 35.9 kPa compressive force when tested in accordance with ASTM E761.
- .6 Corrosion Resistance: material shall not attack or corrode steel components when tested in accordance with ASTM E937.

1.5 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit copy of WHMIS MSDS Material Safety Data Sheets in accordance with Section 01 35 29 – Health and Safety Requirements.

.3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 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.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

.4 Manufacturer's Field Reports: submit manufacturer's written reports verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.6 **QUALITY ASSURANCE**

.1 Qualifications:

.1 Installer: Applicator specializing in sprayed on fireproofing with 5 years experience and shall be licensed or approved by manufacturer of fireproofing materials.

.2 Mock ups:

.1 Construct mock up in accordance with Section 01 45 00 – Testing and Quality Control.

.2 Apply fireproofing to approximately 10 m^2 area of surface to be treated.

.3 Mock-up will be used:

.1 To judge workmanship, substrate preparation, operation of equipment and material application.

.4 Locate where directed by Departmental Representative.

.5 Allow 48 hours for inspection of mock up by Departmental Representative before proceeding with fireproofing work.

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

.3 Pre-Installation Meeting:

.1 Convene pre-installation meeting one week prior to beginning work of this Section with contractor's representative, manufacturer's representative and Departmental Representative to:

.1 Verify Project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

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

1.7 **DELIVERY, STORAGE AND HANDLING**

.1 Packing, shipping, handling and unloading:

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

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

.3 Deliver packaged materials in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.2 Storage and Protection:

.1 Store materials indoors in dry location.

.2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Material exposed to water before use or damaged packages will be rejected and are to be removed from the site.

.3 Damaged or opened containers will be rejected.

.4 Packaging to indicate shelf-life and materials to be applied prior to expiration of shelf-life.

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

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

1.8 **AMBIENT CONDITIONS**

.1 At temperatures less than 5 degrees C, ensure that 5 degrees C air and substrate temperature is maintained during and for 24 hours after application. Ensure that natural ventilation to properly dry the fireproofing during and subsequent to its application is provided. In enclosed areas lacking openings for natural ventilation, ensure that interior air is circulated and exhausted to the outside.

.2 Maintain relative humidity within limits recommended fireproofing manufacturer.

.3 Ensure that natural ventilation to properly dry fireproofing during and subsequent to its application is provided.

1.9 **WASTE MANAGEMENT AND DISPOSAL**

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

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

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

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Dispose of unused spray-on-fireproofing materials at official hazardous material collections site approved by Departmental Representative.

1.10 **PROTECTION**

.1 Provide temporary enclosures to prevent spray from contaminating air beyond application area. Where adjacent floors, walls and similar surfaces are schedule to be exposed, provide and maintain masking, drop cloths or polyethylene coverings for such surfaces during spraying operations.

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

.3 Protect sprayed applied materials from weather until fully cured.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Sprayed fireproofing: 1 HR fire protection required to underside of structural steel beams. ULC certified cementitious fireproofing qualified for use in ULC Designs specified.
Acceptable materials:
.1 Monokote MK-6 / HY by Grace Construction Products in accordance with ULC Design No. F905.
.2 Cafco 300 by Isolatek International in accordance with UL Design D902.
.3 AD Type 5 by A/D Fire Protection Systems Inc. in accordance with ULC Design No. F906.

.2 Curing compound: type recommended by fireproofing manufacturer, qualified for use in ULC Designs specified.

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

.4 Water: clean, potable and free of any substances as would affect the set of the fireproofing material.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

.1 Substrate shall be free of dust, dirt, grease and other materials, which would impair bond.

.2 Verify that painted substrates are compatible and have suitable bonding characteristics to receive fireproofing. Commencement of work shall imply acceptance of substrate conditions.

.3 Remove incompatible materials.

.4 Ensure that clips, hangers, supports, sleeves and other attachments required to penetrate fireproofing are placed before installation of fireproofing.

.5 Ensure that ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is completed.

.6 Apply fireproofing material only after concrete floor slabs are complete.

3.3 APPLICATION

.1 Mix and apply materials in strict accordance with applicable fire protection design requirements and manufacturer’s written application directions.

.2 Apply bonding adhesive or primer to substrate if recommended by manufacturer.

.3 Apply fireproofing to correspond with tested assemblies, or acceptable calculation procedures to provide the following fire resistant ratings:

- .1 Ground floor assembly (over basement area): 3/4 hour fire resistance rating – apply spray-on-fireproofing to all steel beams.
- .2 Columns supporting roof assemblies – fire resistance rating not required.
- .3 Roof Assembly – fire resistance rating not required.

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

.5 Apply fireproofing directly to beams without use of expanded lath.

.6 Tamp smooth all exposed surfaces.

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

.8 Apply sealer to surface of fireproofing material as required by manufacturer.

3.4 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

.2 Inspection and Site Tests:

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

.2 Departmental Representative will pay costs for testing, as specified in Section 01 45 00 – Testing and Quality Control.

3.5 PATCHING

.1 Patch defective area(s) and damage to fireproofing caused by testing or by other trades before fireproofing is concealed, or if exposed, before final inspection.

3.6 CLEANING

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

.2 Clean surfaces not indicated to receive fireproofing of sprayed material as application proceeds and upon completion of Work. Clean surrounding surfaces of accidental overspray and droppings.

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

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 Comply with requirements of Division 1.

1.2 RELATED WORK

.1 Fire stopping and smoke seals within mechanical assemblies and electrical assemblies.

1.3 REFERENCES

.1 CAN/ULC–S115-11, Fire Tests of Firestop Systems.

1.4 DEFINITIONS

.1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.

.2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.

.3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

.4 Tightly Fitted; (ref: National Building Code Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of non-combustible construction or have "0" annular space in buildings of combustible construction.

.1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.5 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature specifications and datasheet for materials and prefabricated devices. Include product characteristics, performance criteria, physical size, finish and limitations. Provide descriptions sufficient to identify locations or proposed application.

.3 Shop Drawings:
.1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.

4 Samples:
.1 Submit duplicate samples showing actual fire stop material proposed for project.

.5 Quality assurance submittals: submit following in accordance with Section 01 45 00 – Testing and Quality Control.
.1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
.1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.6 **QUALITY ASSURANCE**

.1 One installer shall install all fire-stopping on the project. Each trade shall not firestop their own service penetrations.

.2 Qualifications of Installer: fire stopping under this section to be carried out by an installer specializing in fire stopping installations with 5 years experience approved by manufacturer.

.3 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with Contractor and Departmental Representative to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions.

1.7 **DELIVERY, STORAGE AND HANDLING**

.1 Packing, shipping, handling and unloading:
.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
.3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.2 Storage and Protection:
- .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Replace defective or damaged materials with new.

1.8 **WASTE MANAGEMENT AND DISPOSAL**

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

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

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

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Dispose of unused fire stopping materials at official hazardous material collections site approved by Departmental Representative.

PART 2 – PRODUCTS

2.1 **MATERIALS**

.1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
- .1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended.
- .2 Acceptable materials:
  - .1 3M “Fire Barrier” Protection Products.
  - .2 Double AD “Instant Fire Stop”.
  - .3 Dow Corning “Fire Stop System” Products.
  - .4 Hilti “Fire Stop Systems”.
  - .5 or approved equal
- .3 Firestop system rating: 1 hour where indicated on drawings.

.2 Service penetration assemblies: systems tested to CAN-ULC-5115.

.3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-5115.

.4 Fire-resistance rating of installed fire stopping assembly not less than the fire-resistance rating of surrounding floor and wall assembly and in accordance with National Building Code.

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

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

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

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

.9 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.

.10 Sealants for vertical joints: non-sagging.

PART 3 – EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.

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

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

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

3.3 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's certified tested system listing.

.2 Fire stopping and smoke seal in locations exposed to view to be sealant type. Alternatively, other fire stopping material may be used if covered by a bead of sealant.

.3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

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

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

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

3.4 **INSPECTION**

.1 Notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

.2 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.2 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit to Departmental Representative.

.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.5 **CLEANING**

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

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

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

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

3.6 **SCHEDULE**

.1 Firestop and smoke seal at:

.1 Penetrations through fire-resistance rated masonry, concrete, and other types of interior partitions and walls.
.2 Top of fire-resistance rated masonry partitions.
.3 Intersection of fire-resistance rated masonry partitions.
.4 Control and sway joints in fire-resistance rated masonry partitions and walls.
.5 Penetrations through fire-resistance rated floor slabs and ceilings.
.6 Openings and sleeves installed for future use through fire separations.
.7 Around mechanical and electrical assemblies penetrating fire separations.
.8 Rigid ducts: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 Comply with requirements of Division 1.

1.2 RELATED WORK

.1 Section 04 05 00: Common Work Results for Masonry.
.2 Section 06 40 00: Architectural Woodwork.
.3 Section 07 84 00: Fire Stopping and Smoke Seals.
.4 Section 08 11 00: Hollow Metal Doors and Frames.
.5 Section 08 11 16: Aluminum Doors and Frames.
.6 Section 08 44 13: Glazed Aluminum Curtain Wall
.7 Section 08 51 13: Aluminum Windows.
.8 Section 08 54 13: Fiberglass Windows.
.9 Section 09 91 00: Painting.

1.2 REFERENCES

.1 ASTM C919, Standard Practice for use of Sealants in Acoustical Applications.

.2 CAN/CGSB-19.13, Sealing Compound, One-component, Elastomeric, Moisture Curing.

.3 CAN/CGSB-19.17, One Component Acrylic Emulsion Base Sealing Compound.

.4 CAN/CGSB-19.24, Multi-Component, Chemical Curing Sealing Compound.

.5 CAN/CGSB 19-GP-17M one-component, siliconized acrylic latex.

.6 Material Safety Data Sheets (MSDS) – Health Canada/Workplace Hazardous Materials Information Systems (WHMIS).

1.3 DEFINITION

.1 In this Section “caulking” means sealant.

1.4 SUBMITALS

.1 Submit product date in accordance with Section 01 33 00 – Submittal Procedures.

.2 Manufacturer’s product to describe.
  .1 Caulking compound.
  .2 Primers.
  .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

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

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

.5 Cured samples of exposed sealants fro each colour where required to match adjacent material.

.6 Submit manufacturer's instructions in accordance with Section 01 33 00 – Submittal Procedures.
.1 Instructions to include installation instructions for each product used.

1.5 **MOCK-UP**

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

.2 Construct mock-up to show location, size, shape and depth of joint complete with back-up material, primer, caulking and sealant.

.3 Mock-up will be used:
.1 To judge workmanship, substrate preparation, operation of equipment and material application.

.4 Locate where directed by Departmental Representative.

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

.6 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may not remain as part of finished Work. Remove mock-up and dispose of materials when no longer required and when directed by Departmental Representative.

1.6 **QUALITY ASSURANCE**

.1 Use only sealants which are proven to be compatible with materials they are in contact with. Notify Departmental Representative prior to start of sealant work should any sealant specified be considered unsuitable for the purpose intended.

1.8 **DELIVERY, STORAGE, AND HANDLING**

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

.3 Store materials in a dry area having an ambient temperature within limitations recommended by material manufacturer.

1.9 **ENVIRONMENTAL AND SAFETY REQUIREMENTS**

.1 Comply with requirements of Worklace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling 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 Unless otherwise specified, apply sealants when air temperature is between 10°C and 25°C. When air temperature is above 25°C or below 10°C follow sealant manufacturer's recommendations regarding application.

.4 Ventilate area of Work in accordance with manufacturer's material safety data sheets.

1.10 **PROJECT CONDITIONS**

.1 Environmental Limitations:
  .1 Do not proceed with installation of joint sealants under following conditions:
    .1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.
    .2 When joint substrates are wet.

.2 Joint-Width Conditions:
  .1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
  .1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.11 **WASTE MANAGEMENT AND DISPOSAL**

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

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

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

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

.6 Do not dispose of unused sealant material into sewer system, onto ground or in other location where it will pose health or environmental hazard.

.7 Dispose of unused sealant material at official hazardous material collections site approved by Departmental Representative.

.8 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.

.9 Fold up metal banding, flatten and place in designated are for recycling.

1.12 **WARRANTY**

.1 At no cost to Departmental Representative, remedy any defects in work, including work of this and other Sections, due to faults in materials and /or workmanship provided under this Section appearing within a period of two (2) years from date of Substantial Performance.

PART 2 - PRODUCTS

2.1 **SEALANT MATERIALS**

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

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

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

2.2 **MATERIALS**

.1 Sealants:

.1 Exterior use:

.1 Sealant (Type “A”): one part, moisture curing type to CAN/CGSB-19.13. Acceptable material: # 790 - Silicone Building Sealant by Dow Corning, SikaSil-C990 by Sika Canada Inc., or approved equal.

.2 Sealant (Type “B”): one part, moisture curing type to CAN/CGSB-19.13. Acceptable material: # 795 - Silicone Building Sealant by Dow Corning, SikaSil-C995 by Sika Canada Inc., or approved equal.

.2 Interior use:
- .1 Sealant (Type "C"): one part, air curing, siliconized acrylic latex to CGSB 19-GP-17M. Acceptable material: Tremflex 834 by Tremco, Sonolac by Sonneborn or approved equal.
- .2 Floor Control Joints Sealant (Type "D"): to CAN/CGSB-19.13 two component polyurethane, moisture curing. Acceptable material: TF-100 by Sonneborn, or approved equal.
- .3 Acoustical Sealant: to ASTM C919 as indicated on drawings.

.3 Colours: to be selected by Departmental Representative from manufacturer's standard colours.

.4 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 Primers, thinners: as recommended by sealant manufacturer, non-staining type.

.3 Preformed compressible and non-compressible back-up materials:
- .1 Polyethylene, urethane, neoprene or vinyl foam: extruded closed cell foam backer rod. Size: oversize 30 to 50%.
- .2 Neoprene or butyl rubber: round solid rod, Shore A, hardness 70.
- .3 High density foam: extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m^3 density, or neoprene foam backer, size as recommended by manufacturer.

.4 Bond Breaker: closed cell polyethylene or vinyl foam tape which will not bond to sealant.

.5 Joint cleaner: Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

PART 3 - EXECUTION

3.1 **EXAMINATION**

.1 Examine joints to be caulked and report in writing to the Departmental Representative any defects in work of other Sections which would impair installation, performance and warranty of sealants.

.2 Do not commence installation of sealants until conditions are acceptable.

.3 Start of work implies acceptance of conditions.

3.2 **PROTECTION**

.1 Protect completed work from staining or contamination. Repair any damage caused by sealants.

3.3 **PREPARATION**

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

.2 Clean and prepare 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.

.6 Chemically clean non-porous surfaces such as metal and glass, taking care to wipe solvents dry with clean cloth. Use solvents recommended by sealant manufacturer.

.7 Prepare porous surfaces such as masonry and concrete to sealant manufacturer's specifications.

3.4 **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 recommendations. Apply primer immediately prior to caulking.

3.5 **BACKUP MATERIAL**

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

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

3.6 **APPLICATION**

.1 Sealant:

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.1 (continued)

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

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

.2 Curing:

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup:

.1 Clean adjacent surfaces immediately and leave Work neat and clean

.2 Remove excess and droppings, using recommended cleaners as work progresses.

.3 Remove masking tape after initial set of sealant.

3.7 **SEALANT**

.1 At operable hinged vent units apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.

.2 Provide caulking between framing members and adjoining work and where required to render work weather tight.

.3 Effectively seal window units to adjacent building elements to provide for continuity of air and vapour barrier in all locations.

.4 Fill voids between aluminum window framing and surrounding building elements with foamed-in-place insulation.

3.8 **CLEANING**

.1 Clean adjacent surfaces immediately and leave work neat and clean. Use cleaning method recommended by manufacturer.

.2 Remove excess and droppings, using recommended cleaners as work progresses.

.3 Remove masking tape after initial set of sealant.

3.9 **SCHEDULE**

.1 Apply sealant Type “A” at the following exterior locations:
- .1 Between dissimilar (porous) materials in exposed locations except where specifically indicated otherwise.
- .2 At all perimeters of non-porous to porous materials (i.e. aluminum windows and, concrete block) and where indicated on drawings.
- .3 Perimeters of exterior openings where aluminum window frames meet exterior façade of building (i.e. masonry).
- .4 Control joints in exterior surfaces of poured-in-place concrete walls.
- .5 Control joints in exterior surfaces of concrete block masonry walls.
- .6 At penetrations through exterior building elements.
- .7 Below door thresholds (two beads).
- .8 and where indicated on drawings.

.2 Apply sealant Type “B” at the following exterior locations:
- .1 At all perimeters of metal to metal joints and glass to metal joints (i.e. aluminum windows and preformed metal wall cladding).
- .2 At interior or exterior perimeters of aluminum windows and preformed metal wall cladding (sealant air seal) except those sealed under work of other Sections.
- .3 Perimeters of exterior openings where aluminum windows, entrance frames, aluminum louvres, etc. meet exterior facade of building (i.e. preformed metal wall cladding, etc).
- .4 At perimeter of steel door frames and exterior façade of building.
- .5 and where indicated on drawings.

.3 Apply sealant Type “C” at the following interior locations:
- .1 Between dissimilar materials in exposed locations except where specifically indicated otherwise.
- .2 Perimeter of steel door, screen frames, louvre frames, etc where gap between frame and wall exceeds 1.5 mm or where gap is irregular.
- .3 Control joints in masonry elements and joints between masonry walls.
- .4 Perimeter of cabinets, access panels, and control panels.
- .5 Between walls and hand basins, countertops and between countertops and lavatories.
- .6 Between floors and WC's.
- .7 and where indicated on drawings.

.4 Apply self-levelling polyurethane sealant Type “D” at interior floor control joints in concrete slabs-on-grade

.5 Apply acoustic sealant along all terminations of partitions indicated as acoustic partitions and around all through-wall penetrations at acoustic partitions. Apply acoustic sealant on both sides of acoustic partitions.

.6 Where sealant requires painting use acrylic emulsion type caulking.

END OF SECTION