PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 02 41 00: Selective Demolition.

.2 Section 07 61 00: Sheet Metal Roofing.

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

.4 Section 07 92 00: Sealants.

1.2 DEFINITIONS

.1 Shingle: tapered slice of wood sawn from block with taper in direction of grain or axial direction.

.2 Shake: split shingle of 9.5 mm thickness with or without taper occurring in direction of grain or axial direction.

1.3 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .2 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.2 CSA International
- .1 CSA A123.3-05(R2010), Asphalt Saturated Organic Roofing Felt.
- .2 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .3 CSA O118.1-08, Western Red Cedar Shakes and Shingles.
- .4 CAN/CSA-Z809-08, Sustainable Forest Management.

.3 Cedar Shake and Shingle Bureau (CSSB)
- .1 CSSB-97, Cedar Shake and Shingle Grading Rules.
- .2 CSSB New Roof Construction Manual for Roof Application Details 2011.
- .3 CSSB Exterior and Interior Wall Manual for Sidewall Application Details 2002.

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

1.4 SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, product literature and data sheets for wood shingles and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Include information on preservation and restoration of wood shingles.

.3 Samples:
.1 Submit duplicate full size shingles shakes, of finish and profile specified.

1.5 **DELIVERY, STORAGE AND HANDLING**

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

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

.3 Storage and Handling Requirements:
.1 Exercise care to avoid damage during unloading and storing.
.2 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.3 Store and protect wood shingles from nicks, scratches, and blemishes.
.4 Replace defective or damaged materials with new.
.5 Remove only in quantities required for same day use.

.4 Develop Construction Waste Management Plan related to Work of this Section in accordance with Section 01 74 22 – Construction / Demolition Waste Management & Disposal.

1.6 **UNUSED MATERIALS**

.1 Unused wood shingles remain property of Departmental Representative.

.2 Return unused wood shingles to Departmental Representative. Retain packaging or rewrap shingles to form complete bundles.

.3 Label packages to identify product, quantity and manufacturer/supplier.

.4 Deliver and store in location designated by Departmental Representative.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Red cedar shingles: to CSA O118.1, 600 mm length, 120 mm width, square pattern, No. 1 Blue Label A (Extra), pressure treated and fire-retardant treated.
.1 CAN/CSA-Z809 or FSC or SFI certified.

.2 Roofing felt: to CSA A123.3, perforated asphalt felt; No.15 unless otherwise specified.

.3 Sheathing paper: to CAN/CGSB-51.32, single ply laminated type perforated.

.4 Polyethylene sheet: to CAN/CGSB-51.34, mm thick.

.5 Nails: to CSA B111 CSA O118.1, Appendix E CSA O118.2, Appendix D.

.6 Pressure preservative treatment: to CSA O118.1, Appendix F CSA O118.2, Appendix E.

.7 Fire-retardant treatment: to CSA O118.1, Appendix G.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable 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 MANUFACTURER'S INSTRUCTIONS

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

3.3 APPLICATION

.1 Do wood shingle work in accordance with NBC CSA O118.1, Appendix C CSA O118.2, Appendix B, except where indicated specified otherwise.

.2 Install wood shingles over dry substrate open strapping.

.3 Space wood shingles from 6 to 10 mm.

.4 Stagger joints minimum of 40 mm in succeeding courses. Ensure that in any 3 courses no two joints are in alignment.

.5 Use two nails per wood shingle. Space nails 20 mm from edge and 40 mm above butt line of following course.

.6 Drive nails flush but do not crush wood shingles.

3.4 WALL SIDING SHINGLES

.1 Underlayment:
- .1 Install over sheathing.
- .2 Install horizontally and fasten to sheathing with nails staples. Lap edges 75 mm.

.2 Install wood shingles using single course method. At external corners alternate overlap.

3.5 **CLEANING**

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

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

.3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 22 – Construction / Demolition Waste Management & Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 **PROTECTION**

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

.2 Repair damage to adjacent materials caused by wood shingles installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 06 10 00: Rough Carpentry.

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

.3 Section 07 72 33: Roof Hatch.

.4 Section 07 92 00: Sealants.

1.2 REFERENCES

.1 ASTM International Inc.
- .1 ASTM C1396/C1396M, Standard Specification for Gypsum Board.
- .2 ASTM C1177 / C1177M, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .3 ASTM D41, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
- .4 ASTM D312, Standard Specification for Asphalt Used in Roofing.
- .5 ASTM D2178, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
- .6 ASTM D6162, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
- .7 ASTM D6163, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
- .8 ASTM D6164, 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, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .2 CGSB 37-GP-56M, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

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

.4 Canadian Standards Association (CSA International)
- .1 CSA-A123.3, Asphalt Saturated Organic Roofing Felt.
- .2 CSA-A123.4, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
- .3 CSA A231.1, Precast Concrete Paving Slabs.

.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, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.2 CAN/ULC-S704, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
.3 CAN/ULC-S706, Standard for Wood Fibre Thermal Insulation for Buildings.

1.3 **SUBMITTALS**

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

.2 Product Data:
.1 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 – Testing and 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 Bid documents. Include a copy of submittal in each Maintenance Manual provided to the Owner.

1.4 **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.

1.5 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.

1.6 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.

1.7 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.

1.8 **INDEPENDENT INSPECTION AND TESTING**

.1 Departmental Representative will appoint and pay for independent inspection agency to inspect work of this Section as directed by the Departmental Representative.

1.9 **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.

1.10 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate and recycle waste materials in accordance with Section 01 74 22 – Construction / Demolition Waste Management & 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.

1.11 **GUARANTEE**

.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 a the time of Tender.

.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 1-90 with perimeter 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-S704-01, 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”.
  - .3 or approved equal.
- .2 Alternate Rigid Roof Insulation: Polyisocyanurate/Urethane to CAN/ULC-S704-01, 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”.
  - .5 or approved equal.

.5 Fibreboard: asphalt fibreboard insulation to CAN/ULC-S706-02, 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 or approved equal.
  - .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 or approved equal.

.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.
    - .4 or approved equal.

.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.
- .5 or approved equal.

.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.
    - .4 or approved equal.

.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 Bottom surface:
  - .1 Polyethylene.
  - .2 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 with “Solarflex” White Elastomeric Roof Coating.
    - .5 or approved equal.

.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 Gypsum Sheathing: to ASTM C1177 / 1177M, fiberglass 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.
- .4 Or approved equal.

.15 Gypsum Sheathing: to ASTM C1177 / 1177M, fiberglass 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.
- .5 or approved equal.

.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.
- .4 or approved equal.

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

.18 Pavers: 400 x 400 x 75 mm thick precast concrete pavers to CSA A231.1. Precast concrete pavers to be used with 300 x 300 x 25 mm thick extruded polystyrene roof insulation spacers.

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 with 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. Install 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 wood cants 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 On exterior walls extend membrane flashings up inside face of cant and over top to outside face of wall.

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

3.15 **ROOF DRAINS**

.1 Install roof drains in accordance with Canadian Plumbing Codes, Provincial Codes and local authority having jurisdiction except where specified otherwise and in accordance with manufacturer’s Instructions.

.2 Coat flanges of roof drains with asphalt primer prior to embedding in modified bituminous mastic.

.3 Flash with 2 ply modified bituminous membrane flashings. Extend base sheet ply minimum 225 mm and cap sheet ply 300 mm beyond flange.

3.16 **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.

3.17 **PRECAST CONCRETE PAVERS**

.1 Provide precast concrete pavers where indicated on drawings.

.2 Set precast concrete pavers on top of insulation spacers.

3.18 **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 RELATED SECTIONS

.1 Section 06 10 00: Rough Carpentry.

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

.3 Section 07 92 00: Joint Sealants.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
- .1 ASTM A653/A653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A792/A792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process.
- .3 ASTM B32-08, Standard Specification for Solder Metal.
- .4 ASTM B370-11, Standard Specification for Copper Sheet and Strip for Building Construction.
- .5 ASTM D523-89 (2008), Standard Test Method for Specular Gloss.
- .6 ASTM D822-01 (R2009), 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 (NBCC), 2010 edition.

1.3 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.

1.4 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

1.5 **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 Submit shop drawings prepared by manufacturer showing specific layout pattern and installation details for snow guards as it pertains to the requirements for this project.

.1 Snow guard shop drawings to be prepared by manufacturer of snow guard system.

.2 Submit design calculations indicating compliance with Code requirements and climatic conditions for Sydney, Nova Scotia.

.3 Submit shop drawings prepared by snow fence manufacturer showing specific layout pattern and installation details for snow fencing as it pertains to the requirements for this project.

.1 Snow fence shop drawings to be prepared by manufacturer of snow fence system.

.2 Submit design calculations indicating compliance with Code requirements and climatic conditions for Sydney, Nova Scotia.

.4 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.

.5 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.

1.6 **QUALITY ASSURANCE**

.1 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.

.2 Mock-up: prepare mock-ups in accordance with Section 01 45 00 – Testing and Quality Control.
- .1 Fabricate 1800 x 1800 mm sample roofing panel using identical project materials and methods to include typical standing seam.
- .2 Include installation of snow guards and snow fence in mock-up.
- .3 Mock-up will be used to judge workmanship, substrate preparation, operation of equipment and material application.
- .4 Locate mock-up where directed by Departmental Representative.
- .5 Allow 48 hours for inspection of mock-up by Departmental Representative before proceeding with work of this Section.
- .6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work.
- .7 Approved mock-up may remain as part of finished Work at the sole discretion of the Departmental Representative.
- .8 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.

.3 At no cost to Owner, remedy and 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.

1.7 **PRE-INSTALLATION SITE MEETING**

.1 Convene site meeting to review standing seam metal roof assembly installation minimum one week prior to commencing Work of this Section. Roofing manufacturer's authorized technical representative shall attend site meeting.

1.8 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 22 - 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 Plywood Sheathing: as specified in Section 06 10 00 – Rough Carpentry.

.2 Water Barrier (underlayment and slip sheet): 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.

.3 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 Roof Fasteners: As specified by manufacturer, to resist wind uplift and sliding snow forces.

.4 Prefinished Roof Sheet (exposed to exterior).
- .1 Profile: standing seam for roof application seams at 500 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 AR-38 by Agway Metals Inc.
  - .2 MRC System by Flynn Canada.
  - .3 Tradition 150 by Vicwest.
  - .4 Or other equivalent product approved by Departmental Representative during tender period.

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 line of premium colours at a later date.

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: Sealants.

.4 Snow guards: purpose made, 38 mm x 127 mm long x 6 mm thick with 60 mm vertical upstand, aluminum snow guards fabricated using # 319 aluminum for casting, minimum tensile strength of 117 MPa (17,000 psi).
- .1 Snow guard securement to metal roof by specially formulated adhesive sealant recommended by snow guard manufacturer.
- .2 Finish: colour to match standing seam metal roof colour.
- .3 Manufacturer to submit shop drawings showing snow guard installation pattern and locations.

2.3 **ACCESSORIES**

.5 Snow fence: purpose made assembly consisting of aluminum-zinc die cast vertical brackets and 38mm O.D. galvalume steel tubes with swagged ends, 2400 mm. in length, stainless steel fasteners; c/w sheet metal “ice dam” centered in middle of panel to prevent sliding ice.
- .1 Finish: enamel painted to match metal roof colour.
- .2 Manufacturer to submit shop drawings showing snow guard installation pattern and locations.

.6 Flexible elastomer stack flashing system by Duraflo Roof Flashings, or approved equal.
- .1 Size pipe sleeve flashings to suit size of vent stack pipe being flashed.
- .2 Acceptable product:
  - .1 “PermOseal” Stretch Fit Pipe Flashing, Model #551224 by Duraflo / Canplas Industries Ltd. Phone: (705) 726-3361.
  - .2 “Flex Flashing”, Model CMIFB by Construction Metals Inc. Phone: 1 (800) 576-9810.
  - .3 or approved equal.

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 500 mm wide to make roofing with standing seams 500 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.

.5 Form valleys of sheets not exceeding 3 m. in length. Lap joints 150 mm indirection of flow.
- .1 Extend valley sheet minimum 150 under roofing sheets.
- .2 At valley line, double fold valley and roofing sheets and secure with cleats spaced 450 mm on centre.

3.5 BUILT-IN GUTTERS

.1 Form built-in box gutter lining in 16 g/m^2 copper sheet conforming to profile of gutters.

.2 Use 1000 mm long sheets if section profile of gutter exceeds 1000 mm. Use 2.4 m or 3 m long sheets if sectional profile is less than 1000 mm.

.3 Longitudinal joints are not acceptable.

.4 Secure gutter lining to substrate with screws, washers and expansion shields spaced maximum 1200 mm on centre along centre of lining.

.5 At roof edges, extend gutter lining under metal roofing 150 mm minimum and terminate in 20 mm folded edge secured by cleats. Hook lower end of roofing into lock strip to form 20 mm wide loose-lock seam.

3.6 FASCIA MOUNTED EAVESTROUGH AND DOWNSPOUTS

.1 Fabricate and install prefinished metal fascia-mounted eavestroughs and downspouts. Locate where indicated on drawings.

3.7 FLEXIBLE ELASTOMER STACK FLASHINGS

.1 Install flexible elastomer stack flashings at roof penetrations where shown on drawings and in accordance with stack jack manufacturer's written instructions on installation.

3.8 SNOW GUARDS

.1 Install cast aluminium snow guard system. Comply with drawings for location and with snow guard manufacturer's shop drawings and written instructions for installation.

3.9 SNOW FENCE

.1 Install anodized aluminium snow fence system. Comply with drawings for location and with snow fence manufacturer's shop drawings and written instructions for assembly, installation and erection.

3.10 CLEAN-UP

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

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

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

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

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 06 10 00: Rough Carpentry.

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

.3 Section 07 61 00: Sheet Metal Roofing.

.4 Section 07 92 00: Sealants.

1.2 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.

1.3 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.

1.4 **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.

1.5 **DELIVERY STORAGE AND HANDLING**

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

1.6 **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.

1.7 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate and recycle waste materials in accordance with Section 01 74 22 – Construction / Demolition Waste Management & 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.

1.8 **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 Formed Anodized Aluminum Sill Flashings: 2.5 mm thick, formed, anodized aluminum as specified in Section 08 44 13 – Aluminum Windows.

.5 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.

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

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

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

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

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

.11 Plastic Cement: to CAN/CGSB 37.5.

2.2 FINISHES

.1 Exposed surfaces: prefinished sheet steel:
- .1 To be selected by Departmental Representative from Manufacturer's full line of premium colours at a later date.

.2 Concealed surfaces: galvanized.

2.3 **FABRICATION GENERAL**

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable 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 25 mm. 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 Lexsuco Corporation (distributed by Cornerstone Construction Products or approved equal.
- .2 Guy wire roof supports: ARS-303 by Thaler Roofing Specialties Products or approved equal.
- .3 Other types where required suitable for purposes intended, as recommended by manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

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

.2 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.

.3 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.

.4 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.

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

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

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

.8 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.

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

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

.11 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 area's clean, free from grease, finger marks and stains.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 05 50 00: Metal Fabrications.

.2 Section 06 10 00: Rough Carpentry.

.3 Section 07 55 00: Modified Bituminous Membrane Roofing

.4 Section 07 62 00: Metal Flashing and Trim.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A506, Specification for Alloy and Structural Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled.
- .2 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.105, Quick-Drying Primer.

.3 Canadian Standards Association (CSA International)
- .1 CSA-B111, Wire Nails, Spikes and Staples.

1.3 DESIGN REQUIREMENTS

.1 Roof hatches are to be designed to withstand temperature range from -35 degrees C to +35 degrees C, to resist site specific roof snow loading, wind loading and wind uplift forces without damage to unit or permanent deformation to seals.

.2 It is the responsibility of the supplier to provide roof hatches that meet all applicable Codes for the site specific conditions.

1.4 SUBMITTALS

.1 Product data:
- .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit two copies of WHMIS MSDS – Material Safety Data Sheets in accordance with Section 01 35 29 – Health and Safety Requirements, indicating VOC's for caulking materials during application and curing.

.2 Shop Drawings:
- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate size and description of components, materials, attachment devices, description of frame and finish, required clearances and construction details.
- .3 Submit manufacturer's printed installation instructions.

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 and criteria and physical requirements.

1.6 **CLOSEOUT SUBMITTALS**

.1 Provide maintenance data for roof hatch complete with pertinent details, spare parts lists and warnings against harmful maintenance materials and practices for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.7 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate and recycle waste materials in accordance with requirements of Section 01 74 22 – Construction / Demolition Waste Management & Disposal.

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

1.8 **DELIVERY, HANDLING AND STORAGE**

.1 Conform to requirements of Section 01 61 00 – Common Product Requirements.

.2 Deliver, store and handle components so as to prevent damage, distortion and corrosion.

1.9 **WARRANTY**

.1 Manufacturer warrants roof access hatch to be free from manufacturing defects in materials and workmanship for a period of five (5) years from the date for final acceptance. Should a product fail to function in normal use within this period, manufacturer will furnish a new part at no charge to Departmental Representative.

PART 2 - PRODUCTS

2.1 **MATERIALS**

.1 Steel sheet: regular quality alloy steel to ASTM A 506.

.2 Galvanized steel sheet: commercial quality to ASTM A 653M, Z275 designation zinc coating.

.3 Gaskets: extruded resilient neoprene with fill recovery after 50% compression.

.4 Fasteners: screws to manufacturer’s standard.

.5 Sealants: as specified under Section 07 92 00 – Sealants.

.6 Prime paint for steel: to CAN/CGSB-1.105.

.7 Isolation coating: alkali resistant bituminous paint or epoxy solution.

2.2 **ROOF HATCH**

.1 Roof Access Hatch:
- .1 Single leaf, pre-assembled, roof hatch with one-hand operation for ladder access.
- .2 Cover: 2.3 mm (11 Ga.), aluminium with a 102 mm beaded flange, full-welded corners and internally reinforced to support a minimum live load of 195 kg/m2.
- .3 Cover Insulation: 50 mm polyisocyanurate insulation, R=12, fully covered and protected by 1.02 mm (18 Ga.) aluminium liner.
- .4 Curb: 2.3 mm (11 Ga.) aluminium, 305 mm high with fully welded corners, formed with a 114 mm mounting flange with 11 mm dia. holes for securing frame to roof curb, integral metal capflashing of same gauge and material as curb, and with 50 mm polyisocyanurate insulation.
- .5 Gasket: heavy extruded EPDM rubber gasket bonded to the cover interior to provide a continuous seal when compressed to the top surface of the curb.
- .6 Hinges: heavy-duty pintle hinges.
- .7 Latch: spring latch with interior turn handle and institutional padlock hasp (no exterior turn handle).
- .8 Lift Mechanism: compression spring operators enclosed in telescopic tubes, automatic hold-open arm with grip handle release.
- .9 Finish: mill finish aluminum.
- .10 Hardware: compression spring tubes of anti-corrosive composite material; all other hardware zinc plated/chromate sealed.
- .11 Acceptable products:
  - .1 Enhanced Performance Type Roof Hatch - Model # S-50T by Bilco; size: 914 mm wide x 762 mm long.
  - .2 or equivalent product by other manufacturers accepted by Departmental Representative during tendering period.

2.3 **LADDER SAFETY POST**

.1 Pre-manufactured Ladder Safety Post: pre-assembled, square tubular steel post with:
- .1 Stainless steel spring balancing mechanism to ensure controlled upward and downward movement.
- .2 Pull up loop at upper end of post to facilitate raising the post.
- .3 Automatic locking when post fully extended.
- .4 Release lever to disengage post and allow it to be returned to it’s lowered position.
- .5 Adjustable mounting brackets and clamp brackets.
- .6 Type 316 stainless steel mounting hardware.
- .7 Finish: “Safety Yellow” powder coat factory applied finish.
- .8 Acceptable products.
  - .1 Type LU-1 Ladder Safety Post by Bilco Company.
  - .2 Or equivalent products by other manufacturer’s accepted by Departmental Representative during tendering period.

2.4 **FABRICATION**

.1 Fabricate components free of twists, bends or visual distortion, and insulated. Weld corners and joints.

.2 Assemble roof hatch components as indicated.

.3 Ensure continuity of weather-tight seals.

.4 Design flashings and trims to collect and lead off accumulated water and condensation.

.5 Install hardware and attachments.

.6 Fabricate frames to profiles and maximum face sizes as indicated.

PART 3 - EXECUTION

3.1 **EXAMINATION**

.1 Examine all applicable drawings to determine architectural details which will affect installation. Examine completed work on which roof hatch installation is dependent.

.2 Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 **MANUFACTURER'S INSTRUCTIONS**

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

3.3 **INSTALLATION**

.1 Install products in strict accordance with manufacturer's instructions and approved submittals

.2 Ensure components are plumb, level and in proper alignment.

.3 Ensure continuity of building envelope air barrier and vapour retarder systems.

.4 Seal and secure prefabricated curb to roof curb.

.5 Adjust and seal assembly with provision for expansion and contraction of components.

.6 Coat aluminum elements in contact with dissimilar materials with isolation coating.

.7 Install ladder safety post according to manufacturer's written instructions.

.8 Adjust all operating components to ensure smooth opening and closing of roof hatch and proper function of ladder safety post. Adjust all operable parts until proper operation and function is achieved.

3.4 **CLEANING**

.1 Upon completion of installation, remove surplus materials. Protect work of this Section from damage by other work.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

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

.2 Section 07 61 00: Sheet Metal Roofing.

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

.4 Section 07 72 33: Roof Hatch.

.5 Section 09 91 00: Painting.

1.2 REFERENCES

.1 CAN/CGSB-19.13, Sealing Compound, One-component, Elastomeric, Moisture Curing.

.2 CAN/CGSB-19.17, One Component Acrylic Emulsion Base Sealing Compound.

.3 CAN/CGSB-19.24, Multi-Component, Chemical Curing Sealing Compound.

.4 CAN/CGSB 19-GP-17M one-component, siliconized acrylic latex.

.5 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 SUBMITTALS

.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 Submit cured samples of exposed sealants for 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 – 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.

1.7 **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.

1.8 **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.

1.9 **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.

1.10 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate and recycle waste materials in accordance with Section 01 74 22– Construction /Demolitions 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 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Departmental Representative.

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

PART 2 - PRODUCTS

2.1 **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 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 wood components 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.
- .3 Apply sealant in continuous beads.
- .4 Apply sealant using gun with proper size nozzle.
- .5 Use sufficient pressure to fill voids and joints solid.
- .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .8 Remove excess compound promptly as work progresses and upon completion.
- .9 Provide caulking between framing members and adjoining work and where required to render work weather tight

.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 **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.

3.8 **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. wood trim and metal flashings) and where indicated on drawings.
- .3 Perimeters of exterior openings where window frames meet exterior façade of building (i.e. wood trim, metal flashings, etc.).
- .4 At penetrations through exterior building elements.
- .5 and where indicated on drawings.

.2 Apply sealant Type “B” at the following exterior locations:
- .1 At all perimeters of metal to metal joints (i.e. metal flashings and sheet metal roofing).
- .2 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 and where indicated on drawings.

.4 Apply acoustical sealant: At head of acoustic partitions and around all penetrations through acoustic partitions disturbed by Work.

.5 Where sealant requires painting use acrylic emulsion type caulking.

END OF SECTION