

1 GENERAL

1.1. GENERAL CONDITIONS

- 1.1.1. Read and be governed by conditions of the *Contract Documents*, including sections of Division 1.
- 1.1.2. All conditions of Contract and Divisions 0 and 1 apply to this section and to requirements of Canadian Roofing Contractors Association Roofing Manual Specifications as referred to herein.
- 1.1.3. Abide by all Federal, Provincial, Municipal and Local Laws or Codes, rules and regulations that in any way affect work including all amendments up to project date.

1.2. SECTION INCLUDES

- .1 1.1. General Conditions
- .2 1.2. Section Includes
- .3 1.3. Section Summary
- .4 1.4. Administrative & Co-Ordination Requirements
- .5 1.5. Standards
- .6 1.6. Submittals
- .7 1.7. Closeout Submittals
- .8 1.8. System Description
- .9 1.9. Qualifications
- .10 1.10. Quality Control
- .11 1.11. Pre-Start Meeting
- .12 1.12. Delivery, Storage & Handling
- .13 1.13. Field Conditions
- .14 1.14. Warranty
- .15 2.1. Roofing System Manufacturer
- .16 2.2. Performance/Design Requirements – General
- .17 2.3. Performance/Design Requirements – Fire Protection
- .18 2.4. Roofing Materials
- .19 2.5. Accessories
- .20 2.6. Expansion Joints
- .21 3.1. Examination
- .22 3.2. Preparation
- .23 3.3. Method Of Installation
- .24 3.4. Gypsum Boards
- .25 3.5. Vapour Retarder
- .26 3.6. Insulation (Bottom Layers)
- .27 3.7. Tapered Insulation
- .28 3.8. Insulation (Top Layer)
- .29 3.9. Membrane Application – Base Sheet
- .30 3.10. Membrane Application – Cap Sheet
- .31 3.11. Asphalt Application
- .32 3.12. Night Seal
- .33 3.13. Membrane Flashings
- .34 3.14. Scuppers/Mechanical Condensate Pipe/Roof Access
- .35 3.15. Field Quality Control
- .36 3.16. Adjusting And Cleaning
- .37 3.17. Finish

1.3. SECTION SUMMARY

- 1.3.1. Section Includes

- 1.3.1.1. Two-ply styrene-butadiene-styrene (SBS) modified bituminous membrane roofing; as follows:
 - .1 Exposed membrane roofing system.
- 1.3.1.2. Roofing insulation.
- 1.3.1.3. Air and vapour barrier.
- 1.3.1.4. Associated roofing accessories and products.

1.4. ADMINISTRATIVE & CO-ORDINATION REQUIREMENTS

- 1.4.1. Co-ordinate work of this Section with work of:
 - 1.4.1.1. Section 07 05 13 Common Work Results for Roofing.
 - 1.4.1.2. Section 06 10 00 Rough Carpentry.
 - 1.4.1.3. Section 07 62 00 Sheet Metal Flashing and Trim.
 - 1.4.1.4. Section 07 92 00 Joint Sealants.
 - 1.4.1.5. Section 26 31 00 Solar Photovoltaics.
- 1.4.2. Coordinate with installation of air barrier at walls to ensure complete continuity of air barrier system for building. Roofing air barrier membrane to lap by 75 mm (3") minimum and terminate with wall system air barrier membrane.
- 1.4.3. The manufacturer shall meet with the necessary parties at the *Site* to review and discuss project conditions as it relates to the integrity of the roofing assembly.

1.5. STANDARDS

- 1.5.1. CAN/CSA O80 SERIES-08 – Wood Preservation.
- 1.5.2. CAN/CGSB 19.13-M87: Single Compound, One-Component, Elastomeric, Chemical Curing.
- 1.5.3. CSA A123.23: Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
- 1.5.4. CGSB 37-GP-9MA: Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- 1.5.5. CGSB 37-GP-64M: Mat Reinforcing, Fibrous Glass, for Membrane Waterproofing Systems and Built-up Roofing.
- 1.5.6. ASTM C165-12: Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
- 1.5.7. ASTM D6164/D6164M-11: Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
- 1.5.8. ASTM A653/A653M-10: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
- 1.5.9. ASTM E84-12: Standard Test Method for Surface Burning Characteristics of Building Materials
- 1.5.10. UL 790: Standard Test Methods for Fire Tests of Roof Coverings
- 1.5.11. UL 1256: Fire Test of Roof Deck Constructions.

1.6. SUBMITTALS

- 1.6.1. Submit required submittals in accordance with Section 01 33 00.
- 1.6.2. Product data sheets:
 - 1.6.2.1. Submit manufacturer's *Product* data sheets for each type of product indicated.
- 1.6.3. Shop drawings; general details:
 - 1.6.3.1. Include plans, elevations, sections, details, and attachments to other work for the following:
 - .1 Base flashings, cants, and membrane terminations.
 - .2 Tapered insulation, including slopes.
 - .3 Crickets, saddles, and tapered edge strips, including slopes.
 - .4 Insulation fastening patterns.
- 1.6.4. Certificates:

- 1.6.4.1. Installer certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
- 1.6.4.2. Manufacturer certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in Subsection 2.2 "Performance Requirements" below.
 - .1 Submit evidence of compliance with performance requirements.
- 1.6.5. Roofing manufacturer's warranty and design criteria:
 - 1.6.5.1. Submit copy of completed roofing manufacturer's pre-installation notification form at least 10 Working Days prior to commencement of roofing installation.
 - 1.6.5.2. Submit copy of roofing manufacturer's warranty specimen and warranty design criteria for roofing system prior to commencement of roofing installation.
- 1.6.6. Samples:
 - 1.6.6.1. Submit samples complete with manufacturer's labels intact, of materials to be used for work of this Section prior to commencement of work. Allowing ample time for review and acceptance by the *Consultant* and roofing inspection company. Do not proceed with work until samples are accepted.

1.7. CLOSEOUT SUBMITTALS

- 1.7.1. Submit closeout submittals in accordance with Section 01 77 00.
- 1.7.2. Operation and maintenance data:
 - 1.7.2.1. Submit manufacturer's maintenance instructions for incorporation into the operation and maintenance manuals.

1.8. SYSTEM DESCRIPTION

- 1.8.1. 2-Ply Modified Bituminous Roof Areas
 - 1.8.1.1. Modified Bituminous Conventional Roofing System: 1-ply granulated modified bitumen membrane (white cap sheet) torched in place, 1-ply modified bitumen membrane (base sheet) torched in place over stone wool insulation in adhesive, over min. 2% tapered insulation in adhesive, over polyisocyanurate insulation in adhesive over self-adhering vapour retarder adhered over gypsum boards mechanically fastened in place over the metal deck. Membrane flashing to be 2-ply modified bitumen membranes, 1-ply modified bitumen membrane (base sheet) self-adhered in place and 1-ply granulated modified bitumen membrane (white cap sheet) torched in place.

1.9. QUALIFICATIONS

- 1.9.1. Qualifications:
 - 1.9.1.1. Manufacturers: Company specializing in manufacturing the Products specified in this section, with a minimum of 10 years' experience.
 - 1.9.1.2. Installers / applicators / erectors: Provide work of this section, executed by competent installers with minimum 5 years' experience in application of Products, systems and assemblies specified and with approval and training of *Product* manufacturers.
 - .1 Work of this Section shall be installed by a *Subcontractor* that is a member in good standing of the Canadian Roofing Contractors Association (CRCA) and Ontario Industrial Roofing Contractors Association (OIRCA), who has been a member for at least 5 years.
 - .2 Roofing *Subcontractor* must be approved by the membrane manufacturer for the warranty program specified. Submit *Subcontractor's* certification letter prepared by the membrane manufacturer.
- 1.9.2. Execute work of this Section only under full time supervision of qualified *Subcontractor's* site supervisor.
- 1.9.3. Mock-up:

- 1.9.3.1. Prepare a 10 m² (100 ft²) mock-up of the work of this Section. Incorporate materials and methods of fabrication and installation identical with project requirements.
- 1.9.3.2. Install mock-up at roof area location directed by the Consultant. Retain accepted mock-up of sufficient size and scope to show typical pattern of seams, fastening details, edge construction, and workmanship.

1.10. QUALITY CONTROL

- 1.10.1. Quality controls are listed in the GENERAL CONDITIONS under section 01 45 00 QUALITY CONTROL – GOOD ROOFING PRACTICES

1.11. PRE-START MEETING

- 1.11.1. A pre-start meeting is to be scheduled one week prior to any work commencing. The roofing contractor, the consultant, the on-site contact and/or owner's representative should be present. The following items will be discussed at the pre-start meeting:
 - 1.11.1.1. Methods and procedures relating to the roof assembly installation
 - 1.11.1.2. On-site procedures
 - 1.11.1.3. On-site material storage
 - 1.11.1.4. The construction schedules

1.12. DELIVERY, STORAGE & HANDLING

- 1.12.1. Deliver roofing materials to the *Site* in original containers with seals unbroken and labelled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.
- 1.12.2. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- 1.12.3. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.
- 1.12.4. Handle materials carefully to preclude damage. Follow manufacturer's written recommendations.
- 1.12.5. Package materials and identify on attached labels the manufacturer, brand, contents, weight as applicable, and Product and specification numbers.
- 1.12.6. Protect edges of roll goods from damage during handling, and store rolls on end to prevent flattening.
- 1.12.7. Do not store roofing materials on roof. Store them in a dry area protected from inclement weather while roofing installation is not in progress. Store above materials under opaque, breathable and waterproof tarpaulins or in sheds.
- 1.12.8. Prevent compression of insulation panels at any point and breakage of edges and corners. Discard wet, cupped, bowed, or otherwise damaged insulation from *Place of the Work*.
- 1.12.9. Protect edges and corners of precast concrete paving slabs to prevent damage.

1.13. FIELD CONDITIONS

- 1.13.1. Weather limitations:
 - 1.13.1.1. Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.14. WARRANTY

- 1.14.1. *Provide* Ontario Industrial Roofing Contractors Association (OIRCA) 2 year warranty for labour, materials, and workmanship.
- 1.14.2. Warranty work of this section in accordance with Section 01 78 36 for a period of 2 years.

- 1.14.3. In addition, roofing manufacturer shall *Provide* total system warranty including the following:
 - 1.14.3.1. Roofing membrane manufacturer will issue a written document in the *Owner's* name, valid for duration listed below, for the repair of leaks in the roofing membrane to restore the roofing system to dry and watertight condition, to the extent that membrane manufacturing or installation defects caused water infiltration. Include copy of required warranty with close out documentation.
 - 1.14.3.2. Warranty shall cover entire cost of the repair(s) required to maintain dry and watertight roofing system during the full warranty duration.
 - 1.14.3.3. Warranty shall include for labour, materials, and workmanship.
 - 1.14.3.4. Warranty shall be non-prorated with no dollar limit (NDL) for duration of warranty.
 - 1.14.3.5. 10-year warranty duration

2 PRODUCTS

2.1. ROOFING SYSTEM MANUFACTURER

- 2.1.1. General:
 - 2.1.1.1. Single source responsibility: each roofing component to be by one manufacturer.
- 2.1.2. Acceptable roof system manufacturers: Subject to compliance with requirements, *Provide* products by one of the following:
 - 2.1.2.1. Firestone Building Products.
 - 2.1.2.2. GAF Materials Corporation.
 - 2.1.2.3. IKO Industries.
 - 2.1.2.4. Siplast.
 - 2.1.2.5. Soprema.
 - 2.1.2.6. Or equivalent.

2.2. PERFORMANCE/DESIGN REQUIREMENTS – GENERAL

- 2.2.1. Roofing system: The roofing system shall include roofing system materials required to achieve roofing membrane manufacturer's warranty.
- 2.2.2. Roofing materials, components, and assemblies shall resist environmental and wind (uplift) loads, and effects of those loads in accordance with the Ontario Building Code.
- 2.2.3. General performance: Installed roofing system and base flashings shall withstand wind uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing system and base flashings shall remain watertight.
- 2.2.4. Material compatibility: *Provide* roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- 2.2.5. Roofing system: Prevent water from entering building and roofing assembly through roofing membrane.
- 2.2.6. Roofing system design:
 - 2.2.6.1. Roofing system assemblies shall have been successfully tested by a qualified testing agency to resist project roofing uplift pressures in accordance with the Ontario Building Code.
 - 2.2.6.2. Roofing system shall meet roofing system manufacturer's 145 kph (90 mph) wind speed requirements or equivalent FM Class 60 Windstorm Classification for wind uplift pressures, and to cladding design wind loads indicated in wind study report, as applicable.
- 2.2.7. Roof covering classification: Roof assembly shall have a Class C classification as determined in conformance with CAN/ULC S107-10 "Standard Methods of Fire Tests of Roof Coverings".

- 2.2.8. Air barrier system shall accommodate substrate movement, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding the following specified limits and requirements:
 - 2.2.8.1. Air permeance of air barrier material: Maximum 0.02 L/s m² at 75 Pa (0.004 cfm/ft² at 1.57 psf) to ASTM E2178-13.
 - 2.2.8.2. Rate of air leakage of air barrier system: Maximum 0.15 L/s m² at 75 Pa (0.030 cfm/ft² at 1.57 psf) to ASTM E283-04 (2012).
 - 2.2.8.3. Water vapour transmission for air / vapour barriers: Maximum 5.7 ng/Pa.m².s. (0.1 perms).
 - 2.2.8.4. Pull-off strength of liquid or sheet applied membrane and laps: Cohesive or substrate failure permitted when tested to specified wind load. Air barrier system shall transfer wind load to structure and shall resist 100% of design wind load or minimum of 2.15 kPa (45 psf), whichever is greater.
 - 2.2.8.5. Low temperature flexibility: to -30°C (-22°F) to CGSB 37-GP-56M-1985.
- 2.2.9. Air barrier system shall be joined in an airtight and flexible manner to air barrier material of adjacent building envelope air barrier systems, allowing for relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between the following unless otherwise applicable:
 - 2.2.9.1. Walls and openings.
 - 2.2.9.2. Across construction, control, and expansion joints.
 - 2.2.9.3. Penetrations.
- 2.2.10. Solar Reflectance: roof Cap Sheet shall have a minimum SRI of 90.

2.3. PERFORMANCE/DESIGN REQUIREMENTS – FIRE PROTECTION

- 2.3.1. At the end of each *Working Day*, use a heat detector gun or equipment as recommended by membrane manufacturer to spot smouldering or concealed fire. Schedule the Work to ensure workers are still on location at least 2 hours after torch application.
- 2.3.2. Never apply the torch directly to any wood surfaces. Conform with fire safety recommendations of the manufacturer and the CRCA.
- 2.3.3. Throughout roofing installation, maintain the Place of the Work in a clean condition and have one approved ABC fire extinguisher within 6 m of each roofing torch. Torches must never be placed near combustible or flammable Products.

2.4. ROOFING MATERIALS

- 2.4.1. Roofing Membrane and Flashing Sheets
 - 2.4.1.1. Roof Membrane (Modified Bitumen – Cap Sheet):
 - .1 Modified bituminous membranes, white granulated top and thermofusible bottom surfaces, 250gm/sq.m., non-woven polyester composite reinforced, conforming to CGSB 37.56-M and ASTM D-6162
 - .2 Thickness: 4mm
 - 2.4.1.2. Roof Membrane (Modified Bitumen – Base Sheet):
 - .1 Modified Bituminous membranes, thermo-fusible top & bottom surfaces, 180gm/sq.m., non-woven polyester reinforced, conforming to CAN/CGSB-37.56.
 - .2 Thickness: 3mm
 - 2.4.1.3. Flashing Membrane (Modified Bitumen – Cap Sheet):
 - .1 Modified bituminous membranes, white granulated top and thermofusible bottom surfaces, 250gm/sq.m., non-woven polyester reinforced, conforming to CGSB 37.56-M and ASTM D-6162
 - 2.4.1.4. Flashing Membrane (Modified Bitumen – Base Sheet):
 - .1 Modified Bituminous membranes, thermo-fusible top & self-adhering bottom surfaces, 180gm/sq.m., non-woven polyester reinforced, conforming to CAN/CGSB-37.56.
 - 2.4.1.5. Auxiliary Roofing Membrane Materials

- .1 General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing system.
 - .2 Mastic sealant: Polyisobutylene, plain or modified bitumen, non-hardening, non-migrating, non-skinning, and non-drying.
 - .3 Metal flashing sheet: Metal flashing sheet is specified in Section 07 62 00.
 - .4 Miscellaneous accessories: Provide miscellaneous accessories recommended by roofing manufacturer.
 - .5 Aggregate surfacing: gravel with no foreign material, ASTM D1863/D1863M- 05(2011) e1, water washed, dry, free of dirt and dust, hard, dry, clean, and graded in sizes from 9 mm to 12 mm.
- 2.4.2. Roof Insulation
- 2.4.2.1. General:
- .1 Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
- 2.4.2.2. Insulation (Top Layer):
- .1 High density, bitumen-coated stone wool insulation board conforming to ASTM C726
 - (A) Basis of design: Rock Wool TopRock DD Plus
- 2.4.2.3. Tapered Insulation:
- .1 Fully tapered polyisocyanurate insulation to provide a slope of as noted in the Contract Documents per design.
 - .2 Crickets are to be used at all openings and/or mechanical curbs. Flat areas around the drains are not to exceed 50ft². Meeting and exceeding the requirements of CAN/CSA-A247-M86 and CAN/ULC-S706.
- 2.4.2.4. Insulation (Bottom Layer):
- .1 Polyisocyanurate insulation
 - .2 Type: closed cell polyisocyanurate foam roof board insulation with inorganic coated glass facer, meeting the requirements of CAN/ULC S704, Type 2 Class 3 materials and ASTM C1289, Type II, Class 2, Grade 2.
 - .3 Board size:
 - (A) 1220 mm x 1220 mm (4 ft x 4 ft).
- 2.4.2.5. Insulation Sump:
- .1 Polyisocyanurate, pre-manufactured, one-piece drain sump. Meeting the requirements of CAN/ULC S704.
 - .2 Drain sumps to be 2440mm x 2440mm (8'x8')
- 2.4.3. Vapour Retarder:
- 2.4.3.1. Self-adhesive bottom side, and tri-laminated woven polyethylene facer & SBS modified bitumen. Underside covered with silicone release film.
- 2.4.4. Primer (Vapour Retarder):
- 2.4.4.1. As recommended by material manufacturer.
- 2.4.5. Gypsum Fasteners:
- 2.4.5.1. Corrosion resistant plates and fasteners as required and approved by the insulation manufacturer.
- 2.4.6. Substrate Boards
- 2.4.6.1. Coverboards / Protection Board
- .1 Glass/Mineral Fiber Board:
 - (A) Asphalt treated and coated fiberboard to CAN/ULC S706-02,
 - .2 Thickness: 12.7 mm (1/2").
 - .3 Acceptable Products:
 - (A) DensDeck Prime Roof Guard
 - (B) or approved alternate
- 2.4.6.2. Gypsum Boards:

- .1 ASTM C1177/C1177M-08, glass-mat, water-resistant gypsum substrate, factory primed.
 - .2 Thickness:
 - (A) 12.7 mm (1/2").
 - .3 Acceptable Products:
 - (A) Gypsum board 4'x8'. DensDeck Prime/EONIC by Georgia Pacific or approved alternate
- 2.4.7. Self-Adhering Membrane (Perimeter Parapets):
- 2.4.7.1. Self-adhering, self-sealing, composite membrane consisting of a high softening point with SBS rubberized asphalt compound.
- 2.4.8. Self-Adhering Membrane Adhesive (Perimeter Parapets):
- 2.4.8.1. Rubber based adhesive for self adhering membranes.
- 2.4.9. Asphalt Materials
- 2.4.9.1. Asphalt primer: CGSB 37-GP-9Ma-1983.
 - 2.4.9.2. Roofing asphalt: CAN/CSA A123.4-04, Type 2 or Type 3.

2.5. ACCESSORIES

- 2.5.1. General:
- 2.5.1.1. Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with roofing assembly.
- 2.5.2. Fasteners:
- 2.5.2.1. Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate and acceptable to roofing manufacturer.
- 2.5.3. Insulation adhesive:
- 2.5.3.1. Modified asphaltic insulation adhesive: Insulation manufacturer's recommended modified asphaltic, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- 2.5.4. Wood Blocking, Plywood Sheathing:
- 2.5.4.1. Construction grade; free from warping and visible decay; pressure-treated spruce, to CAN/CSA O80 SERIES-08.
- 2.5.5. Cant Strip:
- 2.5.5.1. Insulation cant strips; perlite: ASTM C728-13, perlite insulation board, cut to *Provide* 45 degree transition from horizontal to vertical surfaces
 - 2.5.5.2. Cant Strip Adhesive:
 - .1 solvent free, fastener free, insulation attachment; Fas-n-Free Adhesive by Tremco or approved alternate
- 2.5.6. Metal Flashing:
- 2.5.6.1. 26 gauge pre-painted galvanized; Series 8000 baked enamel finish; colour to match be confirmed by the Owner, to ASTM A653/A653M-10. 24-gauge metal for all cleats and hook strips.
- 2.5.7. Pitch Pan:
- 2.5.7.1. Pre-manufactured type; 16 oz. copper, fully soldered, minimum 152.4 mm (6") high above finished roof level, complete with copper caps and sealant.
- 2.5.8. Pitch Pan Sealant:
- 2.5.8.1. M-1 Structural sealant and 1-part pourable sealer by ChemLink or Joint & Termination Sealant #9600 and Semi-Self Leveling Sealer #4500 by Lucas or approved alternate.
- 2.5.9. Sealant:
- 2.5.9.1. single component; moisture cure; polyurethane sealant conforming to ASTM-C920.
- 2.5.10. Fasteners:
- 2.5.10.1. 25 mm square or round head, ring shanked galvanized or non-ferrous type, length as required to suit application.

- 2.5.11. Drains:
 - 2.5.11.1. boxed copper retro drain with flange, with dome and seals by Platinum Technologies Inc.
- 2.5.12. Control Flow Mechanism:
 - 2.5.12.1. By Platinum Technologies Inc.
- 2.5.13. Vent Stack:
 - 2.5.13.1. insulated aluminum vent stack with factory applied polyurethane foam insulation and vent stack cap. By Platinum Technologies Inc.
- 2.5.14. Tall Cones:
 - 2.5.14.1. all sizes (1.5" – 12"): By Platinum Technologies Inc.
- 2.5.15. Gooseneck Flashing: 30" Stainless Steel Gooseneck 1.9" I.D. and Spun Aluminum Base
- 2.5.16. Termination Bar:
 - 2.5.16.1. 10' Alum Term Bar – Item NO. – Term-10 (#90354) By Platinum Technologies Inc.
- 2.5.17. Gas Line Supports:
 - 2.5.17.1. Plastic gas line support with prefabricated insulation cushion.
- 2.5.18. Foam Gasket:
 - 2.5.18.1. EMSEAL MST Multi-Use Sealant Tape or EMSEAL UST Sealant Tape.
- 2.5.19. NOTE: The contractor must supply all primers, mastics, and membranes from a single source Manufacturer. No alternates will be accepted without written approval from the Consultant.

2.6. EXPANSION JOINTS

- 2.6.1. Description:
 - 2.6.1.1. Manufactured from a proprietary copolymer with internal polyester reinforcement, monolithic seam vulcanization.
 - 2.6.1.2. Movement and fabrication: Tri-directional movement capability, joint waterproofing system shall be factory fabricated in one piece for the entire contiguous expansion joint or where length of joint exceeds manufacturer's shipping and handling guidelines shall be lapped and vulcanized by manufacturer's mechanics on site, repair of damaged materials shall be performed by manufacturer's mechanics.
 - 2.6.1.3. Compatible with adhesives and membranes associated with expansion joint construction in accordance with manufacturer's installation instructions.
 - 2.6.1.4. Warranted by manufacturer to cover full warranty duration specified in this Section.
 - 2.6.1.5. Hydrostatic pressure limit: Working pressure in column of water shall perform under static limit not to exceed 10 m (33 ft).
- 2.6.2. Acceptable Products; to suit type of roofing assembly and movement design requirements:
 - 2.6.2.1. Situra Inc. 'RedLINE'.
 - 2.6.2.2. Situra Inc. 'FlamLINE'.
 - 2.6.2.3. Or equivalent.

3 EXECUTION

3.1. EXAMINATION

- 3.1.1. Examine substrates, areas, and conditions, with roofing installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 3.1.1.1. Verify that roof openings and penetrations are in place and curbs are set and braced.
 - 3.1.1.2. Verify that blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

- 3.1.1.3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 05 31 23.
- 3.1.1.4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. PREPARATION

- 3.2.1. Supply and install perimeter safety warning as prescribed by the Ontario Occupational Health and Safety Code and all local codes before starting any other work.
- 3.2.2. The ground areas around the building are to be protected as much as possible. All disposal boxes must be placed on planks. The interior areas of the building, where the roofing contractor has access, are to be protected.
- 3.2.3. It is the responsibility of the roofing contractor to contact the Owner to mark the exact location of buried utilities.
- 3.2.4. Inspect the structural deck and report any deficiencies to the Owner's Representative. Do not apply any new roofing over deficiencies, other than temporary waterproofing, until all deficiencies have been corrected.
- 3.2.5. Do not install new roofing than can be completely waterproofed in one day.
- 3.2.6. The roofing contractor shall be responsible for all roof leaks at the building once they begin to set-up and load materials onto the roof at the beginning of the project.
- 3.2.7. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing manufacturer's written instructions. Remove sharp projections.

3.3. METHOD OF INSTALLATION

- 3.3.1. Prepare surfaces and complete waterproofing work in conformance with roofing manufacturer's printed installation instructions.
- 3.3.2. Install roofing elements on clean and dry surfaces, in conformance with manufacturer's instructions and recommendations.
- 3.3.3. Roofing work must be completed in a continuous fashion as surfaces are readied and weather conditions permit.
- 3.3.4. Seal seams that are not covered by a cap sheet membrane in the same Day. Do not install cap sheet when moisture is present at/in the base sheet seams.
- 3.3.5. Whenever membranes are torch-applied, a continuous and even bead of molten bitumen must be visible as the membrane is unrolled and torched.
- 3.3.6. Lay roofing membrane free from wrinkles, air pockets, fishmouths, tears, and prominent lap joints. Full bond cap sheet to base sheet. Seams shall be lapped and fully bonded.
- 3.3.7. Prior to installation of base sheet and cap sheet, allow sheet to relax after unrolling. Relax time to be as recommended by manufacturer based on concurrent ambient temperature.
- 3.3.8. Extend roofing to outer edges of roof and up vertical surfaces at least 200 mm (8") above horizontal roofing, and full height beneath counter flashing and top of curb flashing.
- 3.3.9. Complete roofing up to line of termination for each Day's work.

3.4. GYPSUM BOARDS

- 3.4.1. Ensure gypsum boards are mechanically fastened in place over the steel deck. All gypsum board edges and ends are to be butted tight. Gypsum boards are to be staggered.
- 3.4.2. Ensure that all gypsum boards are fully supported. Mechanically fasten the gypsum boards with 10 fasteners per 4'x8' board within the field, 16 fasteners within 12' of perimeters and 32 fasteners within 12' of each corner. It is the roofing contractor's responsibility to confirm the location of any conduits, on the underside of the metal deck, prior to and during the fastening of gypsum boards.
- 3.4.3. Ensure substrate board is immediately protected with membrane.

- 3.4.4. Tape all seams in substrate board prior to the installation of the air / vapour barrier. Use 150 mm (6") wide strips of self adhering base sheet to prevent leakage into the building.
- 3.4.5. Should any conduits be damaged, it will be the roofing contractor's responsibility to repair them at their own costs.

3.5. VAPOUR RETARDER

- 3.5.1. Verify all substrates to receive the vapour retarder primer are clean, dry and free from any contaminants that could affect adhesion of the primer and/or vapour retarder.
- 3.5.2. All substrates to receive vapour retarder are to be primed. The primer is to be applied by brush, roller or sprayer. Allow primer to be dry to touch prior to applying the vapour retarder.
- 3.5.3. Over the clean, dry and primed substrates (metal deck, wood blocking, etc.) apply 1-ply of self adhered vapour retarder membrane fully adhered to the gypsum boards.
- 3.5.4. Roll out the vapour retarder and allow it to relax prior to application. Cut lengths to fit the application. Set in place and pull back the release film 152.4mm to 304.8mm (6" to 12") and place it on the prepared surface. Remove the release film from the remainder of the sheet and apply pressure to ensure proper contact with prepared surface.
- 3.5.5. Overlaps:
 - 3.5.5.1. side laps to be 76.2mm (3") and end laps to be 152.4mm (6")
- 3.5.6. Commence the vapour retarder application at the lowest edge of drain. Proceed up the slope from the lowest point on the roof.
- 3.5.7. At terminations and penetrations, the vapour retarder is to be extended up the vertical surface, above the insulation a minimum of 50.8mm (2"). Where cant strips are to be installed the vapour retarder is to be extended 50.8mm (2") above the top of the cant strip.

3.6. INSULATION (BOTTOM LAYERS)

- 3.6.1. Ensure vapour retarder is clean, dry, continuous, and ready for insulation application.
- 3.6.2. Install 3-layers of 3.0" polyisocyanurate insulation in adhesive. Insulation is to be placed with all joints staggered a minimum of 609.6mm (2') per row.
- 3.6.3. Verify all substrates to receive insulation are clean, dry and free from contaminants that could affect adhesion of the foamable adhesive and installation of the board.
- 3.6.4. Apply foamable adhesive directly to the vapour retarder or insulation in a ribbon pattern. The ribbons are to be between 12.7mm to 19mm (1/2" to 3/4") wide ribbons. The ribbons are to be spaced 6" continuously across each board within the field, 4" continuously across each board within 12' from a perimeter and 4" continuously across each board within 10' of a corner.
- 3.6.5. As foamable adhesive is applied, embed the insulation immediately. Do not allow the adhesive to skin over.
- 3.6.6. Keep insulation a minimum of 75mm (3") from heat emitting devices and a minimum of 52mm (2") from sidewalls of CAN/ULC S604 Type "A" chimneys and CN/CGA 149.2 Type B & L vents, (commonly called B-Vents or Hot Stacks).
- 3.6.7. Ensure that all insulation boards are fully supported, joints staggered, and all edges are butted tight with no gaps between boards.
- 3.6.8. Do not apply more insulation than can be covered with membranes in the same Workday.
- 3.6.9. Install sloped prefabricated insulation sumps 2438.4mm x 2438.4mm (8'x8') around all roof drains. Adjust the insulation thickness to accommodate the sumps.
- 3.6.10. No damaged or wet insulation will be accepted. All rejected materials will be marked and must be stored on site. They are not to be removed until the Project is completed.

3.7. TAPERED INSULATION

- 3.7.1. Verify all substrates to receive tapered insulation boards are clean, dry and free from contaminants that could affect adhesion of the and installation of the board.
- 3.7.2. Install tapered insulation over the polyisocyanurate insulation in adhesive, as designed.

- 3.7.3. Verify all substrates to receive insulation are clean, dry and free from contaminants that could affect adhesion of the foamable adhesive and installation of the board.
- 3.7.4. Apply foamable adhesive directly to the vapour retarder or insulation in a ribbon pattern. The ribbons are to be between 12.7mm to 19mm (1/2" to 3/4") wide ribbons. The ribbons are to be spaced 6" continuously across each board within the field, 4" continuously across each board within 12' from a perimeter and 4" continuously across each board within 10' of a corner.
- 3.7.5. As foamable adhesive is applied, embed the insulation immediately. Do not allow the adhesive to skin over.
- 3.7.6. Tapered insulation boards are to be butted tight to the next board, outside perimeters, curbs and walls.
- 3.7.7. Ensure that all boards are fully supported, joints staggered, and all edge are butted tight with no gaps between boards.
- 3.7.8. No damaged or wet boards will be accepted. All rejected materials will be marked and must be stored on site. They are not to be removed until the project is completed.

3.8. INSULATION (TOP LAYER)

- 3.8.1. Ensure tapered insulation is clean, dry, continuous, and ready for insulation application.
- 3.8.2. Install 1-layers of 3.0" stone wool insulation in adhesive. Insulation is to be placed with all joints staggered a minimum of 609.6mm (2') per row.
- 3.8.3. Verify all substrates to receive insulation are clean, dry and free from contaminants that could affect adhesion of the foamable adhesive and installation of the board.
- 3.8.4. Apply foamable adhesive directly to the tapered insulation in a ribbon pattern. The ribbons are to be between 12.7mm to 19mm (1/2" to 3/4") wide ribbons. The ribbons are to be spaced 6" continuously across each board within the field, 4" continuously across each board within 12' from a perimeter and 4" continuously across each board within 10' of a corner.
- 3.8.5. As foamable adhesive is applied, embed the insulation immediately. Do not allow the adhesive to skin over.
- 3.8.6. Keep insulation a minimum of 75mm (3") from heat emitting devices and a minimum of 52mm (2") from sidewalls of CAN/ULC S604 Type "A" chimneys and CN/CGA 149.2 Type B & L vents, (commonly called B-Vents or Hot Stacks).
- 3.8.7. Ensure that all insulation boards are fully supported, joints staggered, and all edges are butted tight with no gaps between boards.
- 3.8.8. Do not apply more insulation than can be covered with membranes in the same Workday.
- 3.8.9. No damaged or wet insulation will be accepted. All rejected materials will be marked and must be stored on site. They are not to be removed until the Project is completed.

3.9. MEMBRANE APPLICATION – BASE SHEET

- 3.9.1. Unroll the modified bituminous base sheet membranes and allow them to relax, as per manufacturer's written instructions. Ensure the modified bituminous base membranes are clean and dry.
- 3.9.2. Over the overlay boards, apply 1-ply base sheet membrane fully torched in place
- 3.9.3. Ensure that approximately 6.35mm (1/4") bleed out is achieved at all laps.
- 3.9.4. Ensure the roofing substrates and/or construction elements pose no fire hazards during the use of torch equipment. Do not torch on to wood substrates or at locations that could project flames onto combustible materials.
- 3.9.5. Ensure that the cap sheet membranes lie flat, with no wrinkles, fishmouths, or blisters, and are fully bonded.

3.10. MEMBRANE APPLICATION – CAP SHEET

- 3.10.1. Unroll the granulated modified bituminous cap sheet membranes and allow them to relax, as per manufacturer's written instructions. Ensure the modified bituminous base membranes are clean and dry.

- 3.10.2. Offset all cap sheet membranes 457.2mm (18") from the base sheet membranes.
- 3.10.3. Beginning at the drains, perpendicular to the slope and shingled to shed water, install the modified bituminous cap sheet torched in place to the base sheet. The modified bituminous cap sheet field membranes are to be terminated at the top of the cant strip.
- 3.10.4. Install the modified bituminous cap sheet membrane in parallel courses with the end laps staggered a minimum of 914.4mm (36") from each other and a minimum of 914.4mm (36") from the base sheet membranes. Side laps are to be 76.2mm (3") and end laps are to be 152.4mm (6"). All corners, at end laps are to be cut as per membrane manufacturer's requirements.
- 3.10.5. Ensure that approximately 6.35mm (1/4") bleed out is achieved at all laps.
- 3.10.6. Ensure the roofing substrates and/or construction elements pose no fire hazards during the use of torch equipment. Do not torch on to wood substrates or at locations that could project flames onto combustible materials.
- 3.10.7. Ensure that the cap sheet membranes lie flat, with no wrinkles, fishmouths, or blisters, and are fully bonded.

3.11. ASPHALT APPLICATION

- 3.11.1. Asphalt Heating:
 - 3.11.1.1. Heat roofing asphalt and apply within plus or minus 14°C (25°F) of equiviscous temperature unless otherwise required by roofing system manufacturer. Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within 14°C (25°F) of flash point. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than 4 hours.
- 3.11.2. Apply asphalt at EVT and do not spread more than 1830 mm (6 ft) of hot asphalt in front of each roll and reduce distance accordingly during cold weather. Ensure hot asphalt in kettle is in constant use and circulation to avoid distillation.
- 3.11.3. Apply asphalt at minimum rate of 1.2 kg/m² (25 lb/100 ft²) and as specified herein for aggregate surfacing flood coat.

3.12. NIGHT SEAL

- 3.12.1. Roofer is responsible to have all roofs closed-in and in a watertight condition at the end of each production day.
- 3.12.2. It is the Foreman's responsibility to thoroughly check this detail at the end of each day before leaving the roof.

3.13. MEMBRANE FLASHINGS

- 3.13.1. Install flashings, including laps, splices, joints, bonding, adhesion and attachment as required and in accordance with manufacturer's written instructions and details.
- 3.13.2. Install flashings to ensure the roof is watertight at the end of each working day.
- 3.13.3. Membrane flashings will be comprised of 1-ply modified bituminous base sheet membrane in self-adhered in place and 1-ply granulated modified bituminous cap sheet membrane torched in place.
- 3.13.4. The contractor is responsible to disconnect and reconnect any electrical conduit, metal railings, ladders, cabling, and/or gas lines which affect the roof installation.
- 3.13.5. Flashing membranes are to be terminated 304.8mm (12") above the base of vertical surfaces at all locations.
- 3.13.6. PERIMETER (OUTSIDE PERIMETERS):
 - 3.13.6.1. After the application of the modified bituminous base sheet field membranes, apply 1- ply modified bituminous base sheet flashing membranes self-adhered in place, extending onto the field of the roof a minimum of 101.6mm (4").

- 3.13.6.2. Once the modified bituminous cap sheet field membranes have been installed, 1-ply modified bituminous granulated cap sheet flashing membranes are to be fully torched in place, extending onto the field of the roof a minimum of 101.6.35mm (4"). Cap sheet flashing membrane to be installed in 1-meter widths with 76.2mm (3") side laps. Cap sheet flashing side laps to be staggered 101.6.35mm (4") from the cap sheet field membrane overlaps.
- 3.13.6.3. Continuously seal the top edge of the granulated modified bituminous cap sheet membrane flashings with elastomeric sealant.
- 3.13.6.4. At high wall locations, a termination bar is to be installed through the flashing membranes, approximately 12.7mm (0.5") below the top of the membrane. It is to be secured 152.4mm (6") on centre.
- 3.13.6.5. Fully cover the membrane flashings with new pre-painted metal flashings.
- 3.13.7. MASONRY WALL (INSIDE PERIMETER):
 - 3.13.7.1. Flashing membranes at masonry walls are to be terminated 304.8mm at the top of the masonry walls. If weep holes are present in the masonry, flashing membranes are to be kept one brick course below the weep holes.
 - 3.13.7.2. Apply one coat of quick dry primer on all surfaces to receive modified bituminous membranes at a rate of 150 sq.ft. per gallon. Ensure that all surfaces are clean and dry before primer application.
 - 3.13.7.3. Unroll the modified bituminous membrane flashings and allow them to relax, as per manufacturer's written instructions. Ensure existing modified bituminous cap sheet membranes are clean and dry.
 - 3.13.7.4. After the application of the base sheet field membranes, install 1-ply modified bituminous base sheet membrane flashings adhered in place extending up the wall and down onto the field of the roof.
 - 3.13.7.5. After the application of the base sheet flashings and cap sheet field membranes, install 1-ply modified bituminous cap sheet membrane flashings torched in place extending up the wall and down onto the field of the roof. Ensure the laps of the new ply does not coincide with the laps of the existing ply.
 - 3.13.7.6. Termination bars are to be installed through the flashing membranes, approximately 12.7mm (1/2") below the top of the membranes. It is to be secured 152.4mm (6") on centre.
 - 3.13.7.7. Fully cover the membrane flashings with new pre-painted metal flashings and apply a continuous bead of sealant between the masonry and new metal flashings.
- 3.13.8. METAL WALL:
 - 3.13.8.1. Where peel & stick membrane is found behind the metal siding, it is to be peeled up and protected during the new membrane flashing installation. Once the new membrane flashings have been installed, the peel & stick membrane is to be shingled over the new membrane flashings. If required, cut existing wall panels to accommodate the new roof height. Install new metal drip edge along the base of the metal panels.
 - 3.13.8.2. Unroll the modified bituminous membrane flashings and allow them to relax, as per manufacturer's written instructions. Ensure existing modified bituminous cap sheet membranes are clean and dry.
 - 3.13.8.3. After the application of the base ply field membranes, install 1-ply modified bituminous base sheet membrane flashings adhered in place extending up the wall and down onto the field of the roof.
 - 3.13.8.4. After the application of the base sheet flashings and cap sheet field membranes, install 1-ply modified bituminous cap sheet membrane flashings torched in place extending up the wall and down onto the field of the roof. Ensure the laps of the new ply does not coincide with the laps of the existing ply.

- 3.13.8.5. Termination bars are to be installed through the flashing membranes, approximately 12.7mm (1/2") below the top of the membranes. It is to be secured 152.4mm (6") on centre.
- 3.13.8.6. Continuously seal the top edge of the membrane flashings with elastomeric sealant.
- 3.13.8.7. Below metal drip edge, install new metal flashings to tie-in the drip closure, as it was existing. Fully cover the membrane flashing with pre-painted metal flashings. Dimensions for the new metal can be taken from the existing flashings.
- 3.13.9. EQUIPMENT CURB FLASHINGS:
 - 3.13.9.1. Ensure all unit curbs are a minimum of 304.8mm (12") above the finished roof level.
 - 3.13.9.2. If required, temporarily disconnect each HVAC/fan unit, completely lift the unit off the curb and set it on the roof while flashing the curb. The curb is to be set on plywood, protecting the roof membrane. Once the curb has been flashed, the unit is to be lifted off the roof and set back on the curb. Then once the unit has been reinstalled and reconnected it is to be tested to ensure it is working properly. The unit work must be performed only by qualified HVAC contractors. Roofing contractor is responsible for these costs in his bid price.
 - 3.13.9.3. Apply one coat of quick dry asphalt primer on all surfaces to receive asphalt at a rate of 150 sq. ft. per gal. Ensure that all surfaces are clean and dry before primer application.
 - 3.13.9.4. After the application of the modified bituminous base sheet field membrane, apply 1 ply of modified bituminous base sheet flashing membrane self-adhered in place, extending over top of the curb, and down onto the field of the roof a minimum of 101.6.35mm (4").
 - 3.13.9.5. After the application of the modified bituminous cap sheet field membrane, apply 1 ply of modified bituminous cap sheet flashing membrane fully torched in place, extending a minimum of 101.6.35mm (4") beyond the 1st ply onto the field of the roof and extending over top of the curb. Ensure that the laps of the 2nd ply do not coincide with the laps of the 1st ply.
 - 3.13.9.6. The cap sheet flashing membrane is to be nailed every 150.8mm (6") o.c. at the top of the curb.
 - 3.13.9.7. Fully cover the membrane flashings with new pre-painted 26-gauge metal.
 - 3.13.9.8. Install new foam gasket over top of the metal flashings prior to reinstalling mechanical equipment. Ensure foam gasket is continuous, creating a permanent seal between the mechanical equipment/skylights and metal flashings.
- 3.13.10. EQUIPMENT SLEEPERS/SEPARATION CURB:
 - 3.13.10.1. Ensure all sleepers/separation curbs a minimum of 304mm (12") above the finished roof level. Wood blocking and cant strip to be pressure treated. Ensure positive drainage between sleepers and under the mechanical equipment.
 - 3.13.10.2. If required temporarily disconnect each HVAC/fan unit, completely lift the unit off the sleepers and set it on the roof while flashing the sleepers. The HVAC/fan unit is to be set on plywood, protecting the roof membrane. Once the sleepers have been flashed, new metal is to be installed, the unit is to be lifted off the roof and set back on the curb. Once the unit has been reinstalled and reconnected, it is to be tested to ensure it is working properly. The unit work must be performed only by qualified HVAC contractors. The roofing contractor is responsible for these costs in his/her bid price.
 - 3.13.10.3. Apply one coat of quick dry primer on all surfaces to receive modified bituminous membranes at a rate of 150 sq.ft. per gallon. Ensure that all surfaces are clean and dry before primer application.

- 3.13.10.4. After the application of the 1-ply base sheet field membranes, apply 1-ply of modified base sheet membrane flashing self-adhered in place extending on the roof surface a minimum of 101.6mm (4") on each side of the sleeper/separation curb.
- 3.13.10.5. After the installation of the 1-ply cap sheet field membrane, apply 1 ply granulated modified bituminous cap sheet torched in place extending a minimum of 101.6mm (4") beyond the base sheet membrane onto the roof surface on each side of the sleeper/separation curb.
- 3.13.10.6. The cap sheet flashings are to be extended a minimum of 203.2mm (8") beyond the toe of the cant strip onto the field of the roof, on both sides of the sleepers.
- 3.13.10.7. Fully cover the membrane flashings with new pre-painted metal.
- 3.13.11. PITCH PANS:
 - 3.13.11.1. Pitch pans must be a minimum of 152.4mm (6") high with a 102mm (4") primed roof flange. The sides of the pan will be a minimum of 52 mm (2") from the projection. Where possible use a gooseneck instead of a pitch pan. Non-flexible pipes will require a pitch pan. Gooseneck flashing to be used with flexible electrical feed lines.
 - 3.13.11.2. Over the new 2-ply roofing membranes, embed the flange of the pitch pan/gooseneck in elastomeric sealant.
 - 3.13.11.3. Install one (1) ply of modified bituminous base sheet membrane self-adhered in place over the flange and applied tight to the upright and extending a minimum of 204mm (8") beyond the flange.
 - 3.13.11.4. Apply one (1) ply of modified bituminous cap sheet membrane self-adhered in place, extending a minimum of 102mm (4") beyond the ply of modified bituminous base sheet membrane onto the roof surface. Elastomeric sealant is to be applied where the modified bituminous membranes meet the pitch pan along the base.
 - 3.13.11.5. Ensure the penetration and the inside walls of the new pitch pans are clean and free from any dirt or debris before applying any sealant.
 - 3.13.11.6. Apply M1 structural sealant around the inside walls and base of the pitch pan. Apply M1 sealant around the roof projection.
 - 3.13.11.7. Fill all pitch pans using 1-part pourable sealant.
 - 3.13.11.8. Install new pitch pans as required at mechanical units and at other roof penetrations/projections. No conduits, satellite cables, or gas lines are to be carried through the curb flashings. The roofing Contractor is responsible for the disconnection and reconnection, where required using a Mechanical / Electrical Sub-Contractor.
- 3.13.12. VENTS/PLUMBING STACKS:
 - 3.13.12.1. All plumbing vent (soil stack) pipes are to be extended to suit, so that the inside portion of the cap is within the plumbing vent pipe. Stacks to be a minimum of 304.8mm (12") above the finished roof surface. All stacks are to be pre-insulated as listed in the Materials section. Mechanically fasten cap with Two (2) self-tapping, stainless steel metal screws.
 - 3.13.12.2. Mechanically fasten a metal cone flashing down to the metal deck. The cone must extend up past the finished roof level a minimum of 52mm (2"). Install the roofing vapour retarder so that it extends above the insulation surface and onto it 152.4mm (6"). The insulation should butt up against the metal cone.
 - 3.13.12.3. Over the new two (2) ply roofing membranes, embed the flange of the soil stack in elastomeric sealant.
 - 3.13.12.4. Install one (1) ply of modified bituminous base sheet membrane self-adhered in place over the flange applied tight to the upright and extending a minimum of 204mm (8") beyond the flange.

- 3.13.12.5. Apply one (1) ply of granulated modified bituminous cap sheet membrane self-adhered in place extending a minimum of 102mm (4") beyond the ply of modified bituminous base sheet membrane onto the roof surface. Elastomeric sealant is to be applied where the modified bituminous membranes meet the stack flashings along the base.
- 3.13.12.6. Stack is to be insulated. Mechanically fasten cap with TWO (2) self-tapping, stainless steel metal screws.
- 3.13.13. FURNACE STACKS:
 - 3.13.13.1. Prime all flanges, paint all furnace stacks using Double "D" aluminum paint.
 - 3.13.13.2. Mechanically fasten a metal tall cone flashing down to the metal deck. The tall cone must extend up past the finished roof level a minimum of 52mm (2"). Install the roofing vapour retarder so that it extends above the insulation surface and onto it 152.4mm (6"). The insulation should butt up against the metal cone.
 - 3.13.13.3. Over the new 2-ply roofing membranes, embed the flange of the tall cone flashing in elastomeric sealant.
 - 3.13.13.4. Install one (1) ply of modified bituminous base sheet membrane self-adhered in place over the flange applied tight to the upright and extending a minimum of 204mm (8") beyond the flange.
 - 3.13.13.5. Apply one (1) ply granulated modified bituminous cap sheet membrane extending a minimum of 102mm (4") beyond the ply of modified bituminous base sheet membrane onto the roof surface. Elastomeric sealant is to be applied where the modified bituminous membranes meet the tall cone stack flashings along the base.
 - 3.13.13.6. Hand insulate with portion of batt insulation after the tall cone is installed over the mechanical pipe.
 - 3.13.13.7. Replace any damaged rain collars and re-caulk all collars.
- 3.13.14. OVERFLOW SCUPPERS:
 - 3.13.14.1. Install new fully soldered stainless-steel scupper drain. The new scupper drains are to have a 152.4mm x 200mm tail piece to accept new 24-gauge pre-painted metal, open faced downpipes.
 - 3.13.14.2. Apply one coat of quick dry primer on all surfaces to receive asphalt and membranes at a rate of 150 sq. ft. per gallon. Ensure that all surfaces are clean and dry before primer application.
 - 3.13.14.3. The field membranes are to be extended directly into the scupper opening fully covering the wood blocking.
 - 3.13.14.4. The new scupper drain is to be primed to accept asphalt and membranes. New scupper is to be set into a full bed of mastic.
 - 3.13.14.5. Install 1-ply modified bituminous base sheet membrane flashing self-adhered in place over the flange. The base sheet flashings are to extend a minimum of 152.4mm(6") beyond the flange of the scupper onto the field of the roof in all directions and be carried into the scupper. The granulated modified bituminous cap sheet field membranes are to be carried into the scupper over the modified bituminous base sheet flashings.
 - 3.13.14.6. .6 New metal flashings are to be installed fully covering the membrane flashings and picture framing the scupper along the outside perimeter of the roof.
- 3.13.15. EXPANSION JOINT:
 - 3.13.15.1. Build up expansion joint with wood blocking in accordance with Section 07 95 13 Expansion Joint Cover Assemblies, and the Detail Drawings.
 - 3.13.15.2. Mechanically fasten 26-gauge metal closure, 609.6mm (2') on centre, over the metal deck as per detail. Metal closure is to span two flutes on each side of the joint.

- 3.13.15.3. All surfaces to receive self-adhering membrane and primer are to be clean and dry. Prime all surfaces to receive self-adhering membrane. Install self-adhering membrane, fully bonded, over metal closure and onto existing membrane 76.2mm (3") on both side of expansion joint.
- 3.13.15.4. Roll out the vapour retarder and allow it to relax prior to application. Cut lengths to fit application. Set in place and pull back the release film 152.4mm to 304.8mm (6" to 12") and place it on the prepared surface. Remove the release film from the remainder of the sheet and apply pressure to ensure proper contact with prepared substrate. Ensure the membranes lie flat, with no wrinkles, fishmouths, or blisters and is well bonded.
- 3.13.15.5. Overlaps: side and end laps to be 76.2mm (3"). Ensure the vapour retarder is properly supported. All end laps are to be staggered.
- 3.13.15.6. Construct wood blocking as per details. Leave a 76.2mm (3") gap, centered over the metal closure. Offset blocking layers 304.8mm (12"). Assemble wood blocking using two staggered rows of nailing. Space nails in any row a maximum of 609.6mm (24") on center. Wood blocking is to be continuous and butted.
- 3.13.15.7. Fill the 76.2mm (3") gap with stone wool batt insulation. The gap is to be filled from the top of the metal closure to the top of the wood blocking. Insulation is to be continuous and butted tight.
- 3.13.15.8. Mechanically fasten 26-gauge metal closure, 609.6mm (2') on center, over the top of the wood blocking as per detail. Metal closure is to span the 76.2mm (3") gap and the wood blocking. metal closure is to be continuous across the joint.
- 3.13.16. BASE SHEET & CAP SHEET FLASHINGS:
 - 3.13.16.1. Apply one coat of quick dry primer on all surfaces to receive modified bituminous membranes at a rate of 150 sq.ft. per gallon. Ensure that all surfaces are clean and dry before primer application.
 - 3.13.16.2. Unroll the modified bituminous membranes and allow them to relax, as per manufacturer's written instructions.
 - 3.13.16.3. Side laps are to be 76.2mm (3") and end laps are to be 152.4mm (6"). End laps are to be staggered a minimum of 304.8mm (12").
 - 3.13.16.4. Base sheet flashing membranes are to be installed in 1-meter widths with 76.2mm (3") side laps. The base sheet flashings are to be extended a minimum of 101.6mm (4") beyond the edge of the self-adhering membrane onto the field of the roof. The base sheet flashing membranes are to be self-adhered in place.
 - 3.13.16.5. Cap sheet flashing membranes are to be installed in 1-meter widths with 76.2mm (3") sides laps and are to be staggered from the base sheet flashing membranes. The cap sheet flashing is to be self-adhered in place and extended 101.6mm (4") beyond the edge of the base sheet flashing membrane onto the field of the roof.
 - 3.13.16.6. Fully cover the expansion joint with new pre-painted metal flashings.
- 3.13.17. ROOF DRAINS:
 - 3.13.17.1. Plug the drains temporarily while working around them.
 - 3.13.17.2. Sump the area around the new drains 12.7mm (0.5") deep and cantered equally over the drain in all directions. 2440mm x 2440mm (8'x8') drain sumps are to be installed.
 - 3.13.17.3. Over the new two (2) ply roofing membranes, install the new drain in a full bed of elastomeric sealant. Check the drainpipes on the underside of the deck to ensure the installation of the proper length of down-pipe. Ensure that the pipe does not impede the flow of water. Plug the drains temporarily while working around them.
 - 3.13.17.4. Apply one (1) coat of primer to the flange of the drain.

- 3.13.17.5. Install one (1) ply of modified bituminous base sheet membrane extending a minimum of 609.6.35mm (24") from the centre of the drain.
- 3.13.17.6. Apply one (1) ply of granulated modified bituminous cap sheet extending a minimum of 102mm (4") beyond the ply of modified bituminous base sheet membrane onto the surface of the roof.
- 3.13.17.7. The new metal strainer and control flow mechanism are to be installed immediately following the installation of the flashing membranes. Therefore, if the roof has ten (10) drains and only two (2) drains have been flashed (that particular day), those two (2) drains are to have the metal strainer and the control flow mechanism installed at the end of that workday.

3.14. SCUPPERS/MECHANICAL CONDENSATE PIPE/ROOF ACCESS

- 3.14.1. Install new concrete patio pavers on 25.4mm (1") extruded polystyrene insulation. The extruded polystyrene insulation is to be cut 50.8mm (2") smaller (all the way around) than the concrete patio pavers. Therefore, if the concrete paver is 609.6mm x 609.6mm (2'x2') the extruded polystyrene insulation should be 508mm x 508mm (1'8"x 1'8").
- 3.14.2. Install four concrete patio pavers pm 25.4mm (1") extruded polystyrene insulation, in a square pattern at roof hatch and all access doors.

3.15. FIELD QUALITY CONTROL

- 3.15.1. Conduct quality control in accordance with Section 01 45 00 and as follows:
 - 3.15.1.1. Inspection and testing:
 - .1 Prior to installation of cap sheet membrane, base sheet membrane installation shall be reviewed by manufacturer and inspection and testing company, who shall each submit field review reports to the Consultant.
 - .2 Independent inspection and testing company shall perform:
 - .1 Inspections and *Provide* inspection reports.
 - .2 Tests and *Provide* test reports:
 - .3 Core cuts (if requested).
 - 3.15.2. Manufacturer's field review to be in accordance with Section 01 45 00.

3.16. ADJUSTING AND CLEANING

- 3.16.1. Remove applicator's equipment and debris as work progresses, and at completion of the work of this Section in accordance with Sections 01 77 00.
- 3.16.2. Remove bituminous markings from finished surfaces.
- 3.16.3. Repair or replace defaced or disfigured finishes caused as a result of the work of this Section.

3.17. FINISH

- 3.17.1. Perform a daily clean up to collect all wrappings, empty containers, and any other debris from the project site.
- 3.17.2. Upon completion, all debris is to be disposed of in a legally acceptable manner.
- 3.17.3. Prior to the final inspection, the Contractor is to perform a pre-inspection to review all work and to verify that all flashings have been completed as well as the application of all caulking.

END OF SECTION