

1 ASSEMBLY - GENERAL

- 1.1 The work of this section includes the provision of all design, labour, materials, equipment and services required to fabricate and install roof coverings as required for a complete project. The work includes, but is not necessarily limited to, the items referenced herein:
- 1.1.1 Deck Vapour Retarders, Air Barriers, and Insulation.
 - 1.1.2 Manufactured Roofing.
 - 1.1.3 Membrane Roofing.
 - 1.1.4 Flashing and Sheet Metal.
 - 1.1.5 Roof Specialties and Accessories.
- 1.2 Reference Standards: Do roofing work in accordance with applicable standard in Canadian Roofing Contractors Association (CRCA) Roofing Specifications Manual, Manufacturers Instructions and to Factory Mutual (FM) ULC Roofing Guidelines.

2 ASSEMBLY DESIGN CRITERIA

- 2.1 Consideration should be given for the new pedestrian bridge roof systems and cladding to match existing campus bridges [*connecting building 'J', 'N' and 'P'*]. (Formed aluminum panels to profiles and sizes required with support framing and all concealed fasteners).
- 2.2 Provide and incorporate snow/ice guards and/or other suitable protection for pedestrian and vehicular traffic.
- 2.3 Maintain continuity of thermal vapour, and air barriers. Use a purpose made flexible air barrier membrane between elements. Minimize thermal bridging.
- 2.4 Slopes are to be incorporated in roof structure or through the use of sloped insulation.
- 2.5 Design building roof to allow for thermal movement of component materials caused by ambient temperature range of 110 °C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.
- 2.6 Ensure total absence of condensation on interior surfaces under following minimum condition; [*Interior: 22 ° C, 30% relative humidity (RH), still air; Exterior: minus 30°C, 25 km/h wind*].
- 2.7 Vapour Transmission Resistance: [*0.30 Pa. m2. s/ng*].
- 2.8 Air Leakage:
- 2.8.1 Initial: [*Maximum 0.01 L/m2/s when subjected to a pressure differential of 75Pa*].
 - 2.8.2 Continued: [*Maximum 0.01 L/m2/s when subjected to a pressure differential of 75Pa*]. After having been subjected to a 1/10 hourly wind pressure.

- 2.9 Thermal Resistance: *[Minimum RSI 3.5 min. or to meet CBIP energy standards for this project].*
- 2.10 Fire Resistance: as required by OBC.
- 2.11 Compatibility between components of roofing system is essential. Provide written declaration to Owner stating that materials and components, as assembled in the roof assembly system, meet this requirement.
- 2.12 The following are a preliminary list of roofing systems, which may be considered on this project. The *[Design Builder]* is responsible for ensuring compatibility between components and for providing a complete roofing system suitable to their design requirements.
- 2.12.1 Inverted Built-up 4-ply Roofing Membrane Systems:
- Gravel ballast/concrete pavers
 - Ballast protection fabric
 - Rigid insulation/sloped insulation (R20 min.)
 - Separation sheet
 - Pressure-treated wood cant strips
 - Saturated roofing felts: to CSA 123.4-M1979
 - Fibreglass-faced gypsum sheathing where applicable
- 2.12.2 Conventional S.B.S. Modified Bitumen Membrane Systems:
- Precast concrete pavers
 - 2-ply modified bitumen membrane
 - Asphalt impregnated fibreboard
 - Rigid insulation/sloped insulation (R20 min.)
 - Vapour barrier
 - Fibreglass-faced gypsum sheathing where applicable
- Acceptable materials: *[Bakor Inc. or Soprema Waterproofing Inc.]*
- 2.12.3 Mechanically Fastened P.V.C. Single Ply Membrane:
- Roof membrane and membrane flashings
 - (Walkways of polyester reinforced protection mat)
 - Membrane mechanical fasteners
 - Fibreboard sheathing
 - Rigid insulation / sloped insulation (R20 min.)
 - Vapour barrier
 - Fibreglass-faced gypsum sheathing where applicable

Acceptable materials: *[Sarnafil Canada Ltd.]*

- 2.13 All of the above roof coverings described above are to be modified and applied to suit the design and structural roof substrate proposed by the *[Design Builder]*. Alternative roofing systems may also be proposed by the *[Design Builder]* to suit their design requirements.

3 ASSEMBLY COMPONENTS

3.1 Membrane Roofing

3.1.1 General:

- 3.1.1.1 Submittals: Submit shop drawings in accordance with Section 01340 - Shop Drawings. Indicate flashing, control joints, and membrane layout details.
- 3.1.1.2 Quality Assurance: Provide a competent foreman to supervise all work. Use only skilled trades people experienced in type and class of work. Work shall be carried out in accordance with best standard practice of the industry.
- 3.1.1.3 Performance Verification: Submit complete calculated thermal design analysis based on ASHRAE zone method or tests certified by an independent analysis signed and sealed by a qualified professional engineer registered in Province of Ontario.
- 3.1.1.4 Testing/Inspections: Inspection and testing of membrane roofing and associated work will be done by an Independent Consultant appointed by the *[Design Builder]*. The Owner reserves the right to have cut tests made to establish quality of work. Such tests shall be made in the presence of the Owner. Cost of tests and subsequent repairs shall be borne by the *[Design Builder]*. The inspection and testing service does not relieve the *[Design Builder]* of his responsibility for quality control of production and for errors made by him. Cost of inspection and testing shall be paid by the *[Design Builder]*. Carry out inspection and testing of membrane application. Retain inspection agency fully experienced with membrane and installation procedures.
- 3.1.1.5 Warranties: Warranty: The *[Design Builder]* hereby warrants that the roofing membrane and membrane flashings will stay in place and remain leak proof for *[ten (10)]* years. Remedy all defects in the fluid applied membrane roofing and membrane flashings installed hereunder which appear within a period of two years from the date of Final Certificate of Completion. Make all necessary repairs and replacements within 48 hours of receipt of written notification.
- 3.1.1.6 Provide inspection and maintenance schedule for inclusion in Operations and Maintenance Manual in section 01730.

3.1.2 Design

- 3.1.2.1 Design metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details.
- 3.1.2.2 Provide roof walkways from roof access points to roof top equipment and service panels.
- 3.1.3 **Materials / Finishes**
- 3.1.3.1 Fibreglass-faced gypsum board: silicone treated gypsum core and fibreglass matt facing, 12.7mm thick at areas of steel deck. Acceptable product: *[Dens-Deck-Georgia-Pacific Corporation]*.
- 3.1.3.2 Screws for fastening gypsum board or plywood to steel decks: No. 10 flat countersunk head self-tapping screws, Type A, or AB, Phillips, cadmium plated, 19mm long, to *[CSA B35.3-1962]*.
- 3.1.3.3 Primer: Asphalt Primer to *[CGSB 73-GP-9Ma]*.
- 3.1.3.4 The rubberized asphalt shall be filled, one-part, hot applied material suitable for application by squeegee or trowel, meeting or exceeding *[CGSB 37-GP-50M]*. The rubberized asphalt to be packaged and delivered in factory sealed containers to the site. Acceptable materials: *[Hydrotech 6125 or Bakelite/Bakor 790-11]*.
- 3.1.3.5 Reinforcing fabric: Polyester fabric conforming to *[CGSB 37-GP-64M]*. Acceptance material: *[Reemay, Style 2016, as manufactured by DuPont or Bakor Polyfab]*.
- 3.1.3.6 Elastomeric sheet flashing: Synthetic Rubber, Blend of Butyl and EPDM in sheet form, thickness of 1.2mm and/or 1.6mm, depending on manufacturer's recommendation. Tensile strength to 8274 kPa and Elongation at Break of 500% (ASTM - D8 Sub-Committee 18). Flexible to -54EC and Elastic to 50% extension with a 95% recovery after 30 seconds.
- 3.1.3.7 Self-adhering waterproof membrane: comprised of modified asphalt with a consistent layer of adhesive applied to one side. Acceptable material: *[Bithuthene 3000 as manufactured by Grace Construction Products Division or Sopralene Flam 180 stick as manufactured by Soprema Waterproofing Inc. or one component elastomeric waterproofing compound to CAN/CGSB-37.58, Bakor 770-06]*.
- 1.1.1.1 Separation sheets: polyethylene sheet having minimum thickness of 0.10mm.
- 1.1.1.2 Rigid insulation: extruded, expanded foamed polystyrene, conforming to *[CAN-CGSB 51.20-M87]*, Type 4, minimum R-Value of 5.0 per 25mm thickness. To meet the following minimum requirements: Compressive Strength Min. 240kPa, Tensile Strength Min. 415kPa, Flexural Strength Min. 415 kPa and Shear Strength Min. 240kPa. Acceptable material: *[Roofmate, as manufactured by Dow Chemicals Canada Inc.]*
- 1.1.1.3 Fibrous glass batts, friction fit, unfaced, to CSA A101 latest edition.

- 1.1.1.4 Sloping insulation: conforming to *[CGSB 51-GP-31M]*, inorganic glass fiber, bonded to a reinforced kraft cap sheet. Thickness and taper as required.
- 1.1.1.5 The ballast protection sheet: comprised of a black polyolefin fabric which is water permeable, strong enough to withstand traffic abuse and prevent insulation floatation.
- 1.1.1.6 Ballast: crushed gravel, 32mm clear size, free of fines or stones smaller than 25mm or larger than 38mm.
- 1.1.1.7 Sealing compound: conform to *[CGSB 37-GP-29M]*.
- 1.1.1.8 Vent stack flashings: spun aluminum sleeve to fit over the vent stack with sufficient space to insulate. A spun aluminum cap to fit outside the sleeve and inside the vent stack. The cap is not to restrict the vent stack inside diameter.
- 1.1.1.9 Precast concrete paver: to *[CSA A231.1-1972]*, exposed aggregate face, 600mm x 600mm size 50mm thick.
- 1.1.2 **Fabrication / Installation**
 - 1.1.2.1 Do roofing work in accordance with applicable, standard in Canadian Roofing Contractors Association (CRCA) Roofing Specifications Manual and to FM/ULC as applicable.
 - 1.1.2.2 Do work in accordance with membrane manufacturer's printed application instructions.
 - 1.1.2.3 Fabricate and install metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details.
 - 1.1.2.4 Form flashings square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
 - 1.1.2.5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.
 - 1.1.2.6 Provide goosenecks, outlets, strainer baskets and necessary fastenings. Use concealed fastenings.
 - 1.1.2.7 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. 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. Install walkways so as not to interfere with drainage or damage roofing.
 - 1.1.2.8 Install sound absorbing insulation in flutes of acoustical steel roof deck where utilized, where applicable, to deck manufacturer's instructions.
 - 1.1.2.9 Place sloped insulation where required to thickness and layout from approved shop drawings. Ensure positive slope to drains is maintained.
 - 1.1.2.10 Set roof drains to permit proper drainage and not retard water flow.

- 1.1.2.11 Extend sheet up roof perimeter and at all roof curbs a minimum of 300mm and secure in place under the metal counter flashings.
- 1.1.2.12 Spread gravel ballast uniformly over the installed ballast sheet and insulation.
- 1.1.2.13 Install pavers where required and ensure pavers are level after installation.

1.2 Metal Flashing and Trim

1.2.1 **General**

- 1.2.1.1 Submittals: submit shop drawings, product data and/or catalogue illustrations in accordance with Section 01340.
- 1.2.1.2 Submittals: submit duplicate 50 x 50mm samples of each type of sheet metal, colour and finish in accordance with Section 01340.

1.2.2 **Design**

- 1.2.2.1 Proven flashing details should be provided. Roofing membranes should be designed to provide complete waterproof integrity to the roof assembly, without metal flashings. Generally, metal flashings should be regarded as mechanical protection for membrane edges only.

1.2.3 **Materials / Finishes**

- 1.2.3.1 Zinc coated steel sheet: commercial quality to *[ASTM A 526/A 526M-90.]* with Z275 designation zinc coating, .55mm thickness minimum (thickness applies to base metal).
- 1.2.3.2 Finish: factory applied coating to *[CGSB 93-GP-3M]*, coating designation G90, Acceptable materials: *[5000 series by Stelco]*.
- 1.2.3.3 Plastic cement: to *[CAN/CGSB-37.5-M89]*.
- 1.2.3.4 Underlay for flashing: self-adhering membrane.
- 1.2.3.5 Cleats: of same material and temper as sheet metal minimum 50 mm wide. Thickness: same as sheet metal being secured.
- 1.2.3.6 Fasteners: to *[CSA B111]* of same material as sheet metal with length and thickness suitable for application.
- 1.2.3.7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- 1.2.3.8 Touch-up paint: as recommended by metal flashing manufacturer.
- 1.2.3.9 Isolation coatings alkali resistant bituminous paint.

1.2.4 **Fabrication / Installation**

- 1.2.4.1 Fabricate and install metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series specifications and as required.
- 1.2.4.2 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance. Use concealed fastenings throughout.

End of Section