1.1 **GENERAL**

1.2 **Related SFU Technical Requirements**

   .1 *Section 07 00 10 Building Envelope – General Requirements*

1.3 **Coordination Requirements**

   .1 Coordinate design with BEP.

1.4 **Description**

   .1 Roofing system complete with all related assembly components, fasteners, adhesives, cover boards, underlays, insulation, membranes and all roof related hardware and flashings as appropriate to the building and as specified.

   .1 In addition to the above, and in the case of re-roofing, the assembly shall include wood blocking additions and/or modifications as required to meet the requirements of the new roofing assembly.

1.5 **Design Requirements**

   .1 Roofing is to be designed to meet Guarantee Standards of the Roofing Contractors Association of British Columbia Guarantee Corp. *RoofStar Guarantee* as published in the "RGC Roofing Practices Manual" ("RPM") and requires a minimum 5 (five) year RoofStar Guarantee.

   .2 Roofing is to be designed to *CSA 123.21 Wind Uplift Standards*.

   .3 New and re-roof assemblies shall have a minimum of 2% slope “to drain”. This can be achieved by structural slope, sloped insulation, cricket and back slopes or any combination of these.

   .1 Deviation from this requirement must be obtained from SFU Facilities in writing prior to design. Consideration will only be given where existing building conditions will not allow for excessive tapered insulation elevations, for example, low window sills, low door thresholds or poor drain locations.

   .4 The design service life of low-sloped roofs is to be a minimum of 25-Years.

   .5 *Low Slope Roofs: exposed 2 ply SBS is the minimum requirement. A variance is required for the use of an inverted roof. (See 1.4.16 below)*

   .6 At inverted roofs, a *RoofStar Guarantee* approved leak detection system must be included in the assembly. See 2.2 Prescriptive Requirements, .4 Leak Detection Systems for further details.

   .7 *Monitored leak detection is required in the following situations:*

      .1 All heavy wood roofs, conventional and inverted
      .2 All green roofs over conventional
      .3 All conventional roofs with occupied spaces above (decking, landscaping etc.)
      .4 Anything hardscaped

   .8 *Initial EFVM scan and leak locate system only is required in the following situations:*

      .1 All green roofs over inverted -fully bonded to sloped concrete deck.
9. Monitored leak detection is NOT Required in the following situations:

   1. Conventional roofing over steel deck or vented wood space.
   2. Conventional roofing over concrete deck.

10. Performance Standards for roof insulation to be those set out in Section 07 21 00 Thermal Insulation.

11. The installation of concrete or asphalt topping over 2 ply membrane roofing is not permitted without prior approval and written confirmation from SFU Facilities. (refer to 2.1.2 in Section 07 10 00)

12. For use of hot rubber type membrane refer to Section 07 10 00.

13. Vapour retarders are to be included in all assemblies and shall be fully adhered to the substrate. Products shall be appropriate to the building envelope configuration and be installed so as to wrap and envelop the insulation, compatible for connection to the building envelope air barrier, and be sealed at all penetrations. Laminate Kraft paper and adhesive is not an acceptable vapour retarder.

14. In conventional roof assembly, insulation is to be adhered with two part urethane adhesive. In the case of conventional roof assembly over wood frame decking, screw fasten the first layer and adhere the upper layers (reduces thermal bridging and eliminates washer heads at fasteners from showing through the roofing membrane).

15. Insulation overlay board is to be installed over the insulation and under the roof membrane in all cases despite manufacturers’ minimum standards that do not require it. This requirement would also apply with mineral fiber insulation board which have an integral facer to receive the membrane.

16. Roofing membranes are to be fully adhered, or torched applied 2 ply SBS modified bitumen membrane. Alternative membranes are not permitted without prior approval and written confirmation from SFU Facilities.

   1. In the case of re-roof construction SFU Facilities requires the use of systems and assemblies that do not require the use of hot asphalt, kettles or tankers.

17. Drains

   1. For new construction all drains shall be cast iron and include all appropriate hardware.
   2. Cast iron drains shall be re-used when re-roofing, and complete with drilled and tapped stud holes and new hardware as required to function as originally designed and installed.
   3. At all cast drains, tie-in is to be done with the application of reinforced PMMA stripped into the drain.
   4. All drain baskets, strainers or screens shall be cast iron or aluminum, plastic will not be permitted.
   5. The use of drain inserts will only be considered when dictated by building configurations or circumstance. Written permission is required from SFU Facilities prior to design.
   6. If drain inserts must be used a “U-Flow” or Menzies “Blue Seal” connection seal shall be utilized when a hard plumbing connection is not possible. O-rings are not acceptable.
.7 All drains are to be sumped with sumps turned 45º degree to direction of roofing plies.

.18 Membrane plies are to extend over the top of all parapets and 50 mm down past blocking and lapped over the outside surface of the wall finish. Where nail-able substrates exist the membrane shall be mechanically secured (nailed) on the outside face.

.19 Where the top edges of the stripping plies terminate on higher walls the stripping plies are to terminate in such a way as to obtain two seals on the vertical wall face (cap stripping to extend up past base sheet and obtain a separate seal to the substrate.

.1 All stripping plies shall be mechanically terminated to the substrate at least 200 mm above the roof surface.

.2 Top edges of membranes are to be protected by counter flashings.

.3 In new construction, reglets will be installed to allow for the installation of membrane plies and or flashings. Gumlip flashings will not be permitted.

.4 In re-roofing, where reglets cannot be re-used or are not present and gum lip flashings must be used, installation shall be “double gum lip” as per RCABC Guarantee standards RPM detail.

.20 For all landscaping over membranes see requirements for Sub-grade waterproofing system – Section 07 10 00.

.21 See sections on Wall Cladding Systems for other detailing requirements of air/vapour barrier and insulation systems.

1.6 Quality Control and Assurance

.1 Quality Assurance

.1 Meet or exceed the RoofStar Guarantee 5-Year guarantee standards All roofing system products to conform to the RoofStar Guarantee Standards and to the appropriate CSA, CGSB, ULC, CULC, and ASTM Standards for the materials used in the roofing system; products to be listed in the RGC Accepted Materials List of the RoofStar Guarantee Roofing Practices Manual, and to be in conformance with the manufacturers’ published product and performance data.

.2 Quality Control

.1 An Independent Inspection Agency acceptable to RoofStar Guarantee, and assigned by RoofStar Guarantee on acceptance by the Consultant and the SFU Facilities, to conduct field review inspections as per the minimum protocols as set forth by the RoofStar Guarantee for their 5 Guarantee Program. It is understood that in addition to these responsibilities the independent inspection agency will provide re-inspection services at the 2 year anniversary – in the case of the 5 year warranty.

.1 Cost for the warranty and inspections are to be included in the contract sum.

.2 SFU Facilities reserves the right to increase the field review inspection frequency to FULL TIME site inspections while the work is in progress. Extra costs for this to be borne by SFU.
.3 Added inspections just prior to the expiration of the warranty, if required, will be arranged and the costs borne by SFU.

.4 A manufacturer’s representative to also inspect the work as required for the purposes of providing the manufacturer’s labour, material and workmanship warranty upon completion.

### 1.7 Submittals

.1 Manufacturer Product Data, including MSDS data, for each product proposed.

.2 Samples of membrane, flashings, cladding and/or pavers as required for color selection.

.3 Sloped insulation, cricket and/or back slope plan.

.4 Sheet metal flashing shop drawings.

.5 Manufacturer’s leakproof warranty.

.6 Worksafe BC clearance letter.

.7 Manufacturer’s confirmation of training.

.8 Fastening patterns and sheet layout for mechanically attached membrane assemblies.

### 1.8 Warranties

.1 Provide the RoofStar Guarantee Roofing System Record, to include the RoofStar Guarantee standard 5-Year Guarantee, copies of Inspection Reports, listing and literature of all products used, and Roof Maintenance Guide.

.2 Provide a written and signed Membrane Manufacturer’s Warranty in the name of the Owner. The warranty to include for removal and replacement of the defective membrane including labour, for a non-prorated ten-year period. The membrane warranty to not be limited by other components that are only available or manufactured by the membrane manufacturer. Letters modifying the manufacturer’s standard warranty are not acceptable.

.3 Provide the manufacturer’s labour, material and workmanship warranty leakproof warranty for a period of 10 years.

.4 Where adhesive is used in the assembly, include and provide the adhesive manufacturer’s warranty.

.5 All warranties to commence at Date of Substantial Performance.

### 2.1 MATERIALS

### 2.2 Performance Requirements

.1 Life Cycle *Expectation*

.1 Minimum 25-Year service life expectancy
2.3 Prescriptive Requirements

.1 Preferred System at Low-Slope Roofs

.1 2-Ply SBS Bituminous Modified Flexible Membrane Roofing System, exposed, insulated, adhered, generally torch-applied. Refer to RoofStar Guarantee Manual TAB 5.0.2 Section 07535, Outline Specification for this system, from which the following are preferred options.

.2 Thermal barrier/underlay at steel deck to be provided where required by code: shall be minimum 1/2 inch gypsum board.

.3 Vapour retarder is required on all roofing assemblies and shall be SBS modified bitumen sheet.

.1 Steel or wood decks shall receive primer as prescribed by the membrane manufacturer. Membrane shall be peel and stick, self-adhered or adhered appropriate to the membrane manufacturer and the specified roofing assembly. Kraft vapor retarders are not acceptable.

.2 Concrete decks shall receive primer as prescribed by the membrane manufacturer. Preferred membrane application shall be fully adhered and torch applied.

.4 Insulation overlay shall be ¼” inch or ½” inch “Dens Deck” and be adhered or mechanically attached through to the substrate as determined by the substrate and the requirements of the assembly.

.1 Note that 2 (two) layers of insulation overlay are required when installed over heat sensitive insulations.

.5 Insulation shall achieve a minimum value of $R=25$ for both new and re-roof assemblies. The effective $R$ value is to be measured at 0°C.

.1 Insulation for use in conventional assemblies, the preferred roofing configuration, is polyisocyanurate or mineral fibre.

.2 Type I and II EPS (expanded polystyrene) insulations are permitted however are intended to be used to provide slope to drain in combination with polyisocyanurate insulation.

.3 Type IV XPS (extruded polystyrene) is intended for use only in inverted roofing assemblies and is to be considered only when inverted roofing is unavoidable.

.4 Insulation installed in conventional assemblies shall be installed in two layers with a minimum 12 inch offset and stagger between layers (for example 2 layers of 2 inch as opposed to 1 layer of 4 inch).

.5 Insulations installed in adhered assemblies are to be maximum 4’ X 4’ in size. Insulation installed in mechanically attached assemblies to be a maximum of 4’ X 8’ in size.
.6 Attachment

.1 Fasteners: minimum number of fasteners and stress plates for installation on wood or steel decks to be as specified by the RoofStar Guarantee Manual for 5/10 Year Guarantee standards and/or as required to FM (Factory Mutual) 1-90 whichever is greater.

.2 Adhesives: adhesive application rates when used in adhering insulations and coverboards on concrete decks shall meet or exceed the requirements of the RGC, the manufacturer and FM requirements for 1-90.

.1 The preferred adhesive for all assemblies is a two component polyurethane such as Insta-Stik by Dow Chemical or similar.

.2 Materials

.1 Insulation: refer to Section 07 21 00 Thermal Insulation.

.3 Components

.1 Install walkway pads at all access door and hatches, around all rooftop mechanical and other equipment requiring maintenance, and from there leading to the main roof access stairs, ladders, or roof hatch.

.1 Walkways to be either a reinforced walkway, cap sheet manufactured by the same manufacturer as the roof membrane, or 2'x2'x2" precast plain finish concrete paver slabs on pedestals (no substitutes such as duckboards or poured-in-place concrete).

.2 Install approx. 2" inch apart and away from cants and flashings, in a regular and uniform pattern.

.2 Provide overflow scuppers in accordance with the British Columbia Plumbing Code 2012, section 2.4.10.4. Hydraulic Loads from Roofs or Paved Surfaces.

.3 All penetration hardware to have only on line or cable per flashing installation and shall incorporate a gooseneck hood, heat shrink or uncured EPDM membrane wrap c/w stainless hose clamps. Tape, putty or caulkins are not acceptable.

.1 Multiple lines or cables installed in only one penetration flashing is only acceptable when a purpose made hood or gooseneck is installed and that said lines or cables are slack enough to allow for a significant downward belly in the lines/cables.

.4 Leak Detection Systems

.1 The leak detection system must meet RoofStar Guarantee requirements as laid out in the RCABC Roofing Practices Manual.

.2 The leak detection system must have the capability of issuing email alerts complete with a graphic of the roof indicating the location of the leak and must also be capable of issuing alarms to the BMS system.

.3 The leak detection system can be hard wired or connected via BACnet to the SFU BAS.
3.1 EXECUTION

.1 All materials to be protected from the weather and elements with purpose made tarps and elevated from the ground or deck. Factory wrappings are not acceptable protection from the elements.

.2 Install roofing only when weather conditions permit. Materials that become wet due to inclement weather shall be replaced with no expense to the Owner.

.3 Install only as much material as can be rendered completely watertight by days end include for night seal and tie-ins as required to maintain the integrity of installed components.

.4 In the case of reroofing the replacement roofing and building shall be sealed and rendered watertight by day’s end.

.5 In the case of reroofing all debris is to be disposed of with purpose made chutes. Debris is not to be thrown from the roof at any height.

.6 All areas installed shall be completed to the base sheet and base sheet stripped daily.

.7 Field cap sheet stripping shall follow base sheet installation within 48 hours weather permitting or soon thereafter.

.8 Run roofing membrane up and over the top of the parapet and 2” down the wall. Cover membrane flashing with a metal parapet cap terminating in a 3” downturn and a ¼” drip on both sides of the parapet. This should be mandatory for all roofs, and wall flashings.

.9 Avoid the use of gum pans.

.10 HVAC equipment installation:

.1 Where house keepings pads are provided: HVAC equipment can be bolted down into concrete pad, and pad is to be installed over a 3ply roofing system

.2 Where large HVAC equipment has proprietary frame: starter curb complete with roofing membrane are to be provided and liquid membrane flashing (PMMA) is to then be applied and extend from waterproofed curb to top of HVAC frame. The underside of the HVAC is to receive 3 ply SBS.

***END OF SECTION***