SECTION  – inverted sbs modified bituminous roofing - torch-torch

1. General
   1. summary
      1. Torch Base Sheet Torch Applied Cap Sheet: Fully adhered inverted roofing system with 2 ply assembly of premanufactured SBS modified bituminous roofing membrane over deck sheathing board on steel deck, as indicated on drawings.
      2. Section Includes:
         1. Preparation of deck surface.
         2. Deck sheathing board.
         3. Vapour retarder.
         4. Roof insulation.
         5. Insulation overlay board.
         6. Base sheet and base sheet flashing.
         7. Cap sheet and cap sheet flashing.
         8. Accessory items.
         9. Sheet metal flashings related to roofing, including parapet and cap flashings.
      3. Related Requirements:
         1. Section 05 50 00 – Metal Fabrications.
         2. Section 06 10 00 – Rough Carpentry.
         3. Section 07 21 13 – Board Insulation.
         4. Section 07 62 00 – Sheet Metal Flashing and Trim.
         5. Section 07 72 33 – Roof Hatches and Accessories.
         6. Section 07 92 00 – Joint Sealants.
   2. reference standards
      1. Roofing and sheet metal work will be performed in conformance with the roofing manufacturer's written recommendations as well as the requirements of the ULC laboratories Class C, and Canadian Roofing Contractor's Association (CRCA).
      2. Canadian General Standards Board (CGSB):
         1. CGSB 37 GP 9Ma, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing or Waterproofing.
         2. CGSB 37 GP 56M, Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing.
         3. CGSB 37 GP 64M, Mat Reinforcing, Fibrous Glass, for Membrane Waterproofing Systems and Built-up Roofing.
         4. CAN/CGSB 37.5 M89, Cutback Asphalt Plastic Cement.
         5. CAN/CGSB 37.28 M89, Reinforced, Mineral Colloid Type, Emulsified Asphalt for Roof Coatings and Waterproofing.
         6. CAN/CGSB-51-26-M86, Thermal Insulation, and Isocyanurate, Board, Faced.
      3. Canadian Standards Association (CSA):
         1. CSA A123.4 04(R2013), Asphalt for Constructing Built up Roof Coverings and Waterproofing Systems.
         2. CSA A231.1-14/A231.2-14, Precast Concrete Paving Slabs / Precast Concrete Pavers.
         3. CSA B111 1974 (R2003), Wires, Nails, Spikes and Staples.
         4. CSA O121 08(R2013), Douglas Fir Plywood.
         5. CSA O151 09(R2014), Canadian Softwood Plywood.
   3. submittals
      1. Provide required information in accordance with Section 01 33 00 – Submittal Procedures.
      2. Action Submittals: Provide the following submittals before starting any work of this Section:
         1. Product Data: Submit copies of membrane manufacturers current technical data sheets describing the physical properties and recommended installation procedures.
         2. Shop Drawings:
            1. Submit sloped insulation manufacturer's proposed roofing diagrams and layouts for review by the Consultant.
            2. Submit membrane manufacturer's standard details that will be used for this project, indicate changes that must be made to make the details project specific for review by the Consultant.
      3. Informational Submittals:
         1. Certificates:
            1. Provide roofing system materials that are compatible with building air and vapour retarders specified under Section 07 27 13 – Modified Bituminous Sheet Air Barriers.
            2. The manufacturer of elastomeric bitumen products will provide proof of ISO 9001 and ISO 14001 Certifications.
   4. QUALITY ASSURANCE
      1. Roofing contractors and sub-contractors must, when tendering or performing work, possess a roofing contractor operating license.
      2. Systems & Workmanship Warranty over 15 Years: Roofing contractors and sub-contractors must be registered with roofing manufacturer and provide the consultant with a roofing manufacturer's certificate to this effect before beginning any roofing work.
      3. Only qualified, certified installers employed by a company with the appropriate equipment may execute the roofing work.
      4. Perform the Work of this Section by a company which is a member in good standing of the Ontario Industrial Roofing Contractors' Association (OIRCA) and which has a minimum of five (5) years of proven satisfactory experience in the Work of this Section.
         1. Follow Ontario Industrial Roofing Contractors' Association "Good Practice and Minimum Standards Code No. GP-67-1" latest revision when higher application standards are not specified.
   5. MANUFACTURER'S REPRESENTATIVE
      1. The roofing product manufacturer can delegate a representative to visit the Work site at the start of roofing installation.
      2. The Contractor must at all times enable and facilitate access to the Work site by said representative.
   6. PREINSTALLATION MEETING
      1. Arrange a pre-construction meeting in accordance with Section 01 31 19 – Project Meetings.
      2. Include the roofing manufacturer's representative, roofing contractor's representative, the roofing inspector, the Contractor, the Consultant and Owner.
      3. The purpose of this meeting is to review installation conditions particular to this Project and review materials specified in this Section.
      4. The roofing inspector will complete the minutes and prepare a report for this meeting.
   7. STORAGE, DELIVERY, HANDLING AND PROTECTION
      1. Deliver materials to the job site, handle and store in original packages and containers with manufacturer's seals and labels intact. The manufacturer's name, brand, mass, specification number and lot number must be shown on the labels.
      2. Store materials in weatherproof shelters having floors that will protect the materials from moisture. Avoid prolonged exposure of light or heat sensitive materials to sunlight.
      3. Store adhesives and emulsion-based waterproofing mastics at a minimum +5 deg C. Store adhesives and solvent-based mastics at sufficiently high temperatures to ensure ease of application.
      4. Materials delivered in rolls will be carefully stored upright; flashing will be stored to avoid creasing, buckling, scratches or any other possible damage.
      5. Do not store materials on roof in concentrations that exceed design live load.
      6. Place plywood runways over the Work to enable the movement of materials and other traffic during construction of roofing.
      7. Protect surrounding surfaces against damage from roofing work. Where hoisting is necessary, hang tarpaulins to protect walls during delivery of materials from ground to roof.
      8. In the event of materials damage by the elements, improper handling or other causes, such materials will be rejected and will be replaced at no extra cost to the Owner. Remove rejected materials promptly from the site.
      9. During roofing work, exposed surfaces of finished walls must be protected with tarp to prevent damage. Contractor shall assume full responsibility for damage.
   8. fire protection
      1. Respect safety measures described in the roofing manufacturer's manual as well as local roofing association recommendations.
      2. At the end of each workday, use a heat detector gun to spot any smouldering or concealed fire. Job planning must be organised to ensure workers are still on location at least two hours after torch application.
      3. Never apply the torch directly to old and dry wood surfaces. Please read the fire safety recommendations of the manufacturer and the CRCA.
      4. Throughout roofing installation, maintain a clean site and have one approved ABC fire extinguisher within 6m of each roofing torch. Respect all safety measures described in technical data sheets. Torches must never be placed near combustible or flammable products.
   9. WARRANTY
      1. The membrane manufacturer will issue a written document in the owner's name, valid for a twenty 20-year period, stating that they will repair any leaks in the roofing membrane to restore the roofing system to a dry and watertight condition, to the extent that membrane manufacturing or installation defects caused water infiltration.
         1. The warranty must cover for the entire cost of the repair(s) during the entire warranty period. The warranty must be transferable, at no extra cost, to subsequent building owners starting from the date of acceptance. No letter amending the manufacturer's standard warranty will be accepted and the warranty certificate must reflect these requirements.
      2. Workmanship Warranty:
         1. Submit a two (2) year written warranty of the workmanship of this Section against all failures except as the result of structural failure of substrate. The Contractor shall repair any leaks in roofing membrane, flashing membrane and related sheet metal work resulting from faulty workmanship for a period of two (2) years. Ensure warranty is submitted on OIRCA's "standard form of warranty."
2. Products
   1. ACCEPTABLE MEMBRANE MANUFACTURERS
      1. Products from the following membrane manufacturers are acceptable for Work of this Section, use only materials from one manufacturer:
         1. Soprema.
         2. Henry Company.
         3. GAF Canada.
   2. primer
      1. Stabilised bituminous emulsion primer used to enhance adhesion of membranes.
         1. Self-adhesive Membranes: ELASTOCOL STICK by SOPREMA.
         2. Heat-welded Membranes: ELASTOCOL 500 by SOPREMA.
   3. ROOF MEMBRANES
      1. Roof Membrane Base Sheet Field and Flashing:
         1. CGSB 37-GP-56M, Type 2 for covered roofing application, Class C, Plain surfaced, Grade 2.
         2. Roofing membrane with a composite of glass and polyester reinforcement and elastomeric bitumen to ASTM D 6162.
            1. Top and Underface: Covered with thermofusible poly film.
         3. Basis of Design Product: SOPRAPLY BASE-520 by SOPREMA.
      2. Roof Membrane Base Sheet Flashing at Combustible Substrates:
         1. CGSB 37-GP-56M, Type 2 for covered roofing application, Class C, Plain surfaced, Grade 2.
         2. Roofing membrane with glass and polyester reinforcement and SBS modified bitumen to ASTM D 6162.
            1. Top face covered with thermofusible poly film, under side self-adhesive. Top face marked with three (3) distinctive blue chalk lines to ensure proper roll alignment.
         3. Basis of Design Product: SOPRALENE FLAM STICK by SOPREMA.
      3. Roofing Membrane Cap Sheet and Cap Sheet Flashing:
         1. CGSB 37-GP-56M, Type 1 for exposed roofing application, Class A, Granule surfaced, Grade 2.
         2. ULC certifications, Class C.
         3. Roofing membrane with a composite of glass and polyester reinforcement and elastomeric bitumen to ASTM D 6162.
            1. Top surface covered with ceramic granules, underface with thermofusible poly film.
         4. Basis of Design Product: SOPRAPLY TRAFFIC CAP 560 by SOPREMA.
   4. INSULATION
      1. Extruded Polyestyrene board to ASTM C 578, Type VI, rigid, closed cell type with integral high-density skin.
      2. Basis of Design Product: SOPRA-XPS 35 by SOPREMA.
   5. filter layer
      1. Filter fabric or partitioning sheet made of non-woven synthetic continuous fibres, evenly distributed and heat welded.
      2. Basis of Design Product: SOPRAFILTER by SOPREMA.
   6. roofing gravel
      1. Clean, hard, sound, dry washed 6mm to 10mm pea gravel conforming to ASTM D 1863.
   7. concrete pavers
      1. Concrete Pavers: High density hydraulic pressed pavers, nominal 600 mm x 600 mm weight not exceeding 45 kg per unit, colours selected by Consultant from standard range, **[having a minimum Solar Reflective Index (SRI) 78]**, and as indicated on Drawings.
      2. Pedestals: High density polyethylene formed into an 8 x 8 grid like structure with integral spacer ribs on upper surface and shims for proper level alignment.
   8. WATERPROOFING OF PENETRATIONS
      1. One component polyurethane/bitumen resin to waterproof roof penetrations and complex details.
      2. Basis of Design Product: Alsan Flashing and Alsan Flashing reinforcement by SOPREMA.
   9. WATERPROOFING MASTICS
      1. Mastic made of synthetic rubbers, plasticized with bitumen and solvents.
      2. Basis of Design Product: SOPRAMASTIC by SOPREMA.
3. Execution
   1. SURFACE EXAMINATION AND PREPARATION
      1. Surface examination and preparation must be completed in conformance with recommendations in the roofing manufacturer's manual, particularly for fire safety precautions.
      2. Do not begin any work before surfaces are smooth, dry, and exempt of ice and debris. Use of calcium or salt is forbidden for ice or snow removal.
      3. No materials will be installed during rain or snowfall.
      4. Provide fire protection during installation.
   2. METHOD OF INSTALLATION
      1. Prepare surfaces and complete waterproofing work in conformance with manufacturer's requirements, and the "Material Installation Guide."
      2. Install roofing elements on clean and dry surfaces, in conformance with manufacturer's instructions and recommendations.
      3. Roofing work must be completed in a continuous fashion as surfaces are readied and weather conditions permit.
      4. Ensure watertight conditions for roofs at all times, including protection during installation work by other trades and progressive protection as work is completed (e.g., vents, drains, etc.).
   3. cleaning
      1. The work site must be routinely cleared of rubbish and other materials that may hinder roof installation, performance or present a fire hazard.
   4. EQUIPMENT FOR WORK EXECUTION
      1. Maintain roofing equipment and tools in good working order.
      2. Use torches recommended by manufacturer.
   5. GYPSUM BOARD INSTALLATION ON STEEL DECK
      1. Screw gypsum board levelling surface into the upper rib surfaces at a minimum rate of one (1) fastener per 0.25 m2, 12 screws and washers for each 1220 mm x 2440 mm board.
      2. Increase rate to one (1) fastener per 0.20 m2, 15 screws and washers for each 1220 mm x 2440 mm board, for a distance of 2440 mm around the perimeter of the roof and 45 degrees across the corners at a distance of 3050 mm from the corner of the building.
      3. Cut boards so edges rest on centre of upper ribs. Cut straight lines with adequate tools.
      4. Where slopes change directions, cut boards cleanly. Avoid breaking boards to acquire deck form. Place boards perpendicular to deck ribs for continuous support at extremities.
      5. Board joints must be staggered, in half-lengths, and perfectly butted. Joints must be sealed with heat-resistant tape in both directions to prevent any asphalt leakage into building interior.
   6. APPLICATION OF ASPHALT PRIMER
      1. Roofing substrates of wood, metal, concrete, masonry, or gypsum board surfaces will receive a coat of asphalt primer at a rate of 0.2 to 0.3 l/m2 (none required for factory-painted metals).
      2. All surfaces to be primed must be free of rust, dust or any residue that may hinder adherence. Cover primed surfaces with roofing membrane as soon as possible.
      3. Application temperature limit: -10 deg C.
   7. INSTALLATION OF TORCH-ON BASE SHEET
      1. Install membrane in strict conformance with manufacturer's installation instructions.
      2. Unroll base sheet flashing at drain level with first side lap lined up with drain centre (parallel to roof edge).
      3. Torch base sheet entirely onto prepared substrate. Overlap side laps by 75mm along lines provided to this end and overlap end laps by 150mm. Stagger end joints by a minimum of 300mm.
      4. Torch sufficiently and continuously to avoid wrinkles, air pockets or fishmouths.
         1. In cold weather, adjust welding time to obtain homogenous seam (it may be necessary to slow down in certain cases.)
   8. BASE-SHEET FLASHING INSTALLATION
      1. Apply base sheet flashing only once primer coat is dry.
      2. Install base sheet flashing in one (1) metre widths to cover roofing substrate over 100mm. Overlap side laps by 75mm. Stagger side laps by at least 100mm from base sheet overlaps on roof to avoid excessive layering.
      3. Apply base sheet flashing directly onto substrate by removing siliconed paper cover sheet. Proceed from top to bottom.
      4. Once in place, apply pressure manually in a uniform fashion to obtain homogenous adherence over entire surface. Preferably seal seams with rubber roller. Nail outside edge at 300mm o/c. Burn off plastic film of base sheet before adhering base sheet flashing over it.
      5. Avoid forming wrinkles, air pockets or fishmouths.
   9. ROOFING CAP SHEET INSTALLATION
      1. Once base sheet is applied and no defects are apparent, proceed with cap sheet installation, starting at the roof drains.
      2. Unroll cap sheet at drain. Carefully align first side lap (parallel to roof edge).
      3. Weld cap sheet onto base sheet with torch recommended by membrane manufacturer. During application, simultaneously melt both designated contact surfaces so a bead of bitumen is apparent as cap sheet unrolls.
      4. Avoid overheating.
      5. Unless overlap widths differ between cap and base sheets, make sure joints between the two layers are staggered by at least 300mm.
      6. Overlap cap sheet side laps by 75mm and end laps by 150mm.
      7. Cut off corners at end laps to be covered by next roll. All overlap surfaces must be granule-free or degranulated.
      8. Complete perfect welds between two membranes. Leave no zone unwelded. In cold weather, adjust welding time to obtain homogenous seam.
      9. Once cap sheet is installed, carefully check all overlapped joints.
      10. During installation, care should be taken to avoid excessive bitumen bleed-out at joints.
   10. CAP SHEET FLASHING INSTALLATION
       1. Install cap sheet in one (1) metre width. Overlap side laps by 75mm. Stagger base and cap sheet overlaps on roof by at least 100mm to avoid excessive layering. Roof overlaps will be 200mm wide.
       2. Draw parallel chalk line 150mm from upstand or parapet bases.
       3. Sink surface granules into bed of hot bitumen with torch and round-nosed trowel from chalk line on roof to upstand or parapet base as well as over granulated vertical parts to be overlapped.
       4. Torch weld cap sheet directly onto base sheet from top to bottom to soften both membranes and obtain homogenous seal.
       5. During installation, avoid overheating membrane and excessive bitumen bleed-out at joints.
   11. INSULATION INSTALLATION
       1. Firmly set the insulation boards, long joints continuous and short joints staggered. All boards must be evenly and tightly butted together.
       2. Install only as much insulation as can be covered in the same day.
   12. WATERPROOFING FOR VARIOUS DETAILS
       1. Install waterproofing membranes in conformance with various roofing details illustrated in the manufacturer's installation manual and as submitted for review as noted above.
   13. BALLAST INSTALLATION
       1. Once filter layer is installed, spread required amount of gravel in a uniform fashion following insulation manufacturer recommendations. Install to obtain surface mass of at least 75 kg/m2. Increase quantities over 1200-mm width at all roof basin perimeters to obtain surface mass of at least 100 kg/m2.
   14. INSTALLATION OF CONCRETE PAVERS
       1. Install pavers on prefabricated pads in accordance with paver pad manufacturer's written instructions.
       2. Maintain pavers level using manufacturer's shims, where additional height is required, install additional pads. Where height adjustment exceeds 25 mm, adjust height using high density geotechnical insulation.
   15. SHEET METAL FLASHING AND TRIM
       1. Complete flashing work using specified materials described on plans and details, and as described in Section 07 62 00 – Sheet Metal Flashing and Trim.
       2. Nails, staples, screws, bolts, washers, and other metal fasteners will be made of compatible and rust-proof metals, of same colour as surfaces with which they are in contact.
       3. Shaping:
          1. Take special care when shaping sheet metal with a permanent finish.
          2. Bend sheet metal using sheet metal break. When possible, use bench and appropriate tools for shaping, bending and welding work.
          3. Fold back exposed edges by 13 mm to hide and strengthen edges.
          4. Corners, fasteners, angles and joint covers must be of same metal, gauge and finish as metal being shaped.
       4. Installation:
          1. Sheet metal work will conform to details, with plumb profiles free from deformities or defects that may hinder appearance.
          2. Space angles, fasteners, and seams to allow for normal expansion and contraction.
          3. Fasteners will be concealed type unless Consultant approves exposed fasteners in designated locations prior to installation. Metalwork must be fastened, and corners and angles must be perfectly aligned.
          4. Caulk sheet metal joints and junctions with other materials.
          5. At junctions between roof and masonry surfaces, scrape out joints to a 25mm (1") depth, insert flashing, fasten, and seal with specified sealer.
          6. Install appropriate flashing, cap sheet, counter flashing, casings and other accessories to vents, pipes, and other ducts to ensure perfect sealing.
   16. FIELD QUALITY CONTROL
       1. Inspection and testing of roofing application will be carried out by testing laboratory designated by Owner in cooperation with the Consultant.
       2. \*\*\*\*\*\*\*Inspection fees will be paid by the Owner in accordance with Section 01 45 00 – Quality Control, **[from the Cash Allowance on behalf of the Owner in accordance with Section 01 21 00 – Allowances.]**
   17. protection
       1. Protect installed work and materials.

END OF SECTION