

**Part 1 General**

**1.1 REFERENCES**

- .1 Canadian Gas Association (CGA)
  - .1 CAN/CGA-B149.1-05, Natural Gas and Propane Installation Code Handbook.
  - .2 CAN/CGA-B149.2-05, Propane Storage and Handling Code.
- .2 Canadian General Standards Board (CGSB)
  - .1 CGSB 71-GP-24M-77(R1983), Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.
- .3 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
  - .2 CAN/ULC-S704-03, Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.2 ARCA 10-YEAR WARRANTY CERTIFICATE PROGRAM**

- .1 Provide a ARCA 10-YEAR WARRANTY CERTIFICATE, issued jointly between ARCA and the Roofing Subcontractor and in the name of the Her Majesty the Queen in the Right of Canada, stating that the roofing system, including flashing, will remain weather tight for a minimum period of 10 (10) years from date of Interim Acceptance of the Work.
  - .1 Workmanship coverage against leaks, issued for 10 year terms on ARCA accepted Low Slope Roofing Systems installed in Alberta.
  - .2 All roofing systems and materials to be approved by ARCA as detailed in the ARCA Roofing Application Standards Manual.
  - .3 All Work on this project must be under contract to Alberta Roofing Contractors Association contractor members.

**1.3 SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's insulation products and adhesives.
- .2 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions.

#### **1.4 QUALITY ASSURANCE**

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordinate with other building subtrades.
  - .4 Review manufacturer's installation instructions and warranty requirements.

#### **1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

### **Part 2 Products**

#### **2.1 ARCA 10 YEAR WARRANTY CERTIFICATE PROGRAM REQUIRED**

- .1 All components and installations to meet ARCA Warranty Ltd.

#### **2.2 INSULATION**

- .1 Roof Insulation: Rigid Cellular Polyisocyanurate:
  - .1 Long Term Thermal Resistance Values:
    - .1 Minimum: 5.7 R-Value per 25.4mm.
  - .2 In accordance with ARCA Warranty Ltd..
  - .3 Faced: to CAN/ULC C-S704.
    - .1 Polyisocyanurate core: glass fibre reinforced.
    - .2 Surfaces:
      - .1 Facers: inorganic, glass fibre.
    - .3 Shape: flat and tapered.
    - .4 Thickness: as indicated.
    - .5 Edges: shiplapped.
- .2 Roof Insulation Sloped: Expanded polystyrene (EPS): to CAN/ULC-S701.
  - .1 Type: 4.
  - .2 Thickness: as required, 12mm thick minimum.
  - .3 Edges: shiplapped.
  - .4 In accordance with ARCA Warranty Ltd..

## **2.3 ADHESIVE**

- .1 Adhesive (for polystyrene): to CGSB 71-GP-24.
- .1 Adhesive must not contain solvents and must be compatible with insulation.

## **2.4 ACCESSORIES**

- .1 Mechanical fasteners in concrete or concrete masonry unit: use pilot hole-self-tapping screws or masonry anchors of sufficient length to penetrate minimum 25mm into substrate with minimum 25 mm diameter plastic or metal washers.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

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

### **3.2 WORKMANSHIP**

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
- .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN4-S604 type A chimneys and CAN/CGA-B149.1 and CAN/CGA-B149.2 type B and L vents.
- .5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .6 Offset both vertical and horizontal joints in multiple layer applications.
- .7 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

### **3.3 EXAMINATION**

- .1 Examine substrates and immediately inform Departmental Representative in writing of defects.
- .2 Prior to commencement of work ensure:
  - .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

**3.4 ROOF INSTALLATION**

- .1 Refer to Section 07 52 00 - Modified Bituminous Membrane Roofing.

**3.5 CLEANING**

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1        ASTM International
  - .1        ASTM C553-13, Standard Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
- .2        CSA Group
  - .1        CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .3        Underwriters Laboratories of Canada (ULC)
  - .1        CAN/ULC-S702-2012, Standard for Mineral Fibre Insulation for Buildings.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2        Product Data:
  - .1        Submit manufacturer's instructions, printed product literature and data sheets for blanket insulation and include product characteristics, performance criteria, physical size, finish and limitations.
- .3        Certificates:
  - .1        Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4        Test Reports:
  - .1        Submit certified test reports showing compliance with specified performance characteristics and physical properties.

**1.3                DELIVERY, STORAGE AND HANDLING**

- .1        Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2        Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3        Storage and Handling Requirements:
  - .1        Store materials off ground, indoors and in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2        Store and protect specified materials from nicks, scratches, and blemishes.
  - .3        Replace defective or damaged materials with new.

**Part 2 Products**

**2.1 INSULATION**

- .1 Batt and blanket mineral fibre: to CAN/ULC-S702.
  - .1 Type: 1.
  - .2 Thickness: as indicated.

**2.2 ACCESSORIES**

- .1 Insulation clips:
  - .1 Impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.
- .2 Nails: galvanized steel, length to suit insulation plus 25 mm, to CSA B111.
- .3 Staples: 12 mm minimum leg.
- .4 Tape: as recommended by manufacturer.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for blanket insulation application in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

**3.2 INSULATION INSTALLATION**

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces and to ASTM C1320.
- .2 Do not compress insulation to fit into spaces.
- .3 Do not enclose insulation until it has been reviewed and approved by Departmental Representative.

**3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1       Canadian General Standards Board (CGSB)
  - .1       CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.
  - .2       CAN/CGSB-19.24M-M90, Multi-Component, Chemical Curing Sealing Compound.
  - .3       CGSB 19-GP-14M-84, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.
- .2       Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

**1.2                SUBMITTALS**

- .1       Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
  - .1       Provide drawings of special joint conditions.
- .2       Submit manufacturer's product data sheets in accordance with Section 01 33 00 - Submittal Procedures.
- .3       Submit manufacturer's installation instructions in accordance with Section 01 33 00 - Submittal Procedures.

**1.3                QUALITY ASSURANCE**

- .1       Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials and installation.
- .2       Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.
- .3       Maintain one copy of documents on site.

**1.4                QUALIFICATIONS**

- .1       Applicator: Company specializing in performing work of this section with minimum 3 years documented experience with installation of air/vapour barrier systems. Completed installation must be approved by the material manufacturer.
- .2       Applicator: Company who is currently licensed by National Air Barrier Association or certifying organization must maintain their license throughout the duration of the project.

**1.5                MOCK-UP**

- .1       Construct mock-up in accordance with Section 01 45 00 - Quality Control.



- .2 Construct typical exterior wall panel, complete with tie in to new window and tie in to existing adjacent air/vapour barrier and incorporating, junction with roof system; illustrating materials interface and seals.
- .3 Locate where directed by Departmental Representative.
- .4 Mock-up may remain as part of the Work.
- .5 Allow 24 h for inspection of mock-up by Departmental Representative before proceeding with air/vapour barrier Work.

#### **1.6 PRE- INSTALLATION MEETINGS**

- .1 Convene one week prior to commencing Work of this section.

#### **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .3 Avoid spillage. Immediately notify Departmental Representative if spillage occurs and start clean up procedures.
- .4 Clean spills and leave area as it was prior to spill.

#### **1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal, and with the Waste Reduction Workplan.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

#### **1.9 PROJECT ENVIRONMENTAL REQUIREMENTS**

- .1 Do not install solvent curing sealants or vapour release adhesive materials in enclosed spaces without ventilation.
- .2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
- .3 Maintain temperature and humidity recommended by material manufacturer before, during and after installation.

#### **1.10 SEQUENCING**

- .1 Sequence work to permit installation of materials in conjunction with related materials and seals.

**Part 2            Products**

**2.1                ARCA 10 YEAR WARRANTY CERTIFICATE PROGRAM REQUIRED**

- .1           All components and installations to meet ARCA Warranty Ltd.

**2.2                SHEET MATERIALS**

- .1           Sheet Seal: Self-Adhesive bitumen laminated to high-density polyethylene film, nominal total thickness of 1 mm.
- .2           Sheet Seal (Alternative): Thermofusible elastomeric bitumen membrane reinforced with a non-woven polyester, nominal total thickness of 1 mm.

**2.3                SEALANTS**

- .1           Sealants in accordance with Section 07 92 00 - Joint Sealants.
- .2           Rubber asphalt sealant: Conforming to CAN/CGSB-37.29.
- .3           Primer: bituminous primer, as recommended by the membrane manufacturer.

**2.4                ACCESSORIES**

- .1           Thinner and cleaner: As recommended by sheet material manufacturer.
- .2           Sheet metal membrane support: Z275 designation galvanized sheet metal commercial quality conforming to ASTM A653/A653M, 0.91 mm (20 gauge) thickness.
- .3           Sheet metal air/vapour barrier tie-ins to aluminum windows: as specified in Section 08 50 00.
- .4           Battens: channels formed of 1.2 mm base metal thickness, Z275 designation galvanized sheet steel, commercial quality conforming to ASTM A653/A653M, 19 mm wide with 9.5 mm legs.
- .5           Mechanical Fasteners: galvanized flat head screws, of type and size suitable for securing metal battens to substrate through air/vapour barrier and gypsum sheathing and into exterior wind bearing steel studs or into concrete or concrete block backup minimum 38 mm.

**2.5                FABRICATION/SHEET METAL SUPPORTS**

- .1           Brake form sheet metal to permit installation using self tapping, self-drilling screws or drilled anchors.
- .2           Make provisions in air/vapour barrier design to accommodate movement resulting from thermal change and from structural deflection.
- .3           Form 13 mm hem on sheet metal edges overlapped air/vapour barrier membrane, membrane flashing and waterproof membrane.

- .4 Cut, fit trim and form metal air/vapour barrier supports as required to accommodate conflicting framing connections.

### **Part 3 Execution**

#### **3.1 EXAMINATION**

- .1 Verify that surfaces and conditions are ready to accept work of this section.
- .2 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air/vapour barrier manufacturer's requirements.
- .3 Report any unsatisfactory conditions to the Departmental Representative in writing.
- .4 Do not start work until deficiencies have been corrected.
  - .1 Beginning of Work implies acceptance of conditions.

#### **3.2 PREPARATION**

- .1 Remove loose or foreign matter which might impair adhesion of materials.
- .2 Ensure all substrates are clean of oil or excess dust; all masonry joints struck flush, and open joints filled; and all concrete surfaces free of large voids, spalled areas or sharp protrusions.
- .3 Ensure all substrates are free of surface moisture prior to application of self-adhesive membrane and primer.
- .4 Ensure metal closures are free of sharp edges and burrs.
- .5 Prime substrate surfaces to receive adhesive and sealants in accordance with manufacturer's instructions.

#### **3.3 INSTALLATION/METAL AIR/VAPOUR BARRIER BACK-UP**

- .1 Prior to installation, apply a heavy protective coating of alkali resistant bituminous paint or zinc chromate primer, to concealed surfaces of galvanized sheet steel, which come in direct contact with structural steel, dissimilar metals, concrete and masonry.
- .2 Supply and install sheet metal membrane support to all locations where no other substrate occurs to support the membrane. Form return flanges or provide suitable angles, and fasten to adjacent substrates to prevent deflection movement.
- .3 Overlap metal back-up with adjoining substrates and securely attach with fasteners appropriate for the substrate encountered. Where metal back-up is used to span deflection joints or areas where movement is anticipated between dissimilar materials, fasten metal on one side only to allow for movement. Provide continuity of air/vapour barrier with adjacent air/vapour barrier systems.
- .4 Gun apply a continuous 6 mm bead of sealant at all joints and junctions with adjacent construction. Liberally butter screws fastenings with sealant. Attach sheet metal membrane supports with screws at 300 mm oc.

### **3.4           INSTALLATION**

- .1       Install materials in accordance with manufacturer's instructions.
- .2       Prime surfaces using primer recommended by membrane manufacturer.
- .3       Before installing membrane to substrate in final position, allow the membrane to relax. Position membrane without stretching.
- .4       Install self-adhered membrane to manufacturer's directions. Apply a bead of sealant along edge of lower leaf of lap, if temperature or other conditions prevent satisfactory seal to the poly sheet surface.
- .5       Apply heavy pressure to membrane at top and bottom terminations of each sheet, using the back of a utility knife, to assure positive adhesion at the edge. Apply pressure over entire area, using small roller.
- .6       All side laps to be minimum 65 mm and all end laps to be 150 mm minimum.
- .7       Carefully plan the installation in advance to avoid excessive layering of the membrane at laps and change in direction bends that will compromise the proper installation of later materials and components. Offset laps so as not to thicken membrane.
- .8       Completely adhere the entire membrane to the substrate after application of primer, and roll with a weighted roller, in accordance with the manufacturer's instructions. Install membrane to achieve smooth wrinkle free surfaces, completely bonded to the substrate, without air entrapment.
- .9       Ensure complete coverage of (and adhesion to) all substrates to receive air/vapour barrier membrane, including all wall protrusions. Ensure co-operation of other trades to obtain continuity of the membrane.
- .10      Notch at ties, and seal around ties with sealant.
- .11      Apply membrane so the horizontal joints overlap with the upper sheet over the lower sheet, shingle style.
- .12      Inspect membrane thoroughly before covering and immediately make any corrections or modifications required. Misaligned or inadequately lapped seams, punctures, fishmouths or other damage must be repaired with patch of membrane extending minimum 150 mm in all directions from edge of damaged area. Seal all edges of the patch with mastic. Slit fishmouths prior to repair with a membrane patch.
- .13      Where membrane is not otherwise mechanically held in place, fasten membrane to the substrate with vertical battens spaced 600 mm maximum centres. Place additional battens adjacent to openings, edges, and corners.
- .14      Fasten battens through the membrane to the substrate at 300 mm centres, with the legs facing out. Bend up ends of battens and file smooth so that thermal movement will not cause end of batten to dig into membrane. Use battens in lengths not exceeding 1200 mm, and leave 25 mm gaps between ends of battens on the same alignment.

- .15 Dress the membrane around corners. At all inside and outside corners, use 300 mm wide reinforcing piece of membrane strip, centred on corner, prior to installation of membrane. Cut, lap, and weld double return corners and other complicated changes of direction.
- .16 Repair or replace existing air/vapour barrier membrane where existing membrane has been damaged due demolition. Tie new air/vapour barrier membrane to existing overlapping minimum 150 mm or more as may be required to achieve a continuous air/vapour barrier.
- .17 At perimeters, overlap roofing, waterproofing, etc., seal air/vapour barrier membrane to adjacent membranes, including roof vapour retarders. Overlap end joints minimum 100 mm and seal together to achieve a complete air seal.
- .18 Ensure that a complete seal is obtained at overlap situations, and that the work is carried out in accordance with the agreements with other trades, made at the site meeting.
- .19 Position lap seal over firm bearing.
- .20 At junctions between windows and air/vapour barrier, mechanically fasten and continuously seal air/vapour barrier into frame as specified in Section 08 50 50, form a complete and continuous air/vapour seal between the windows and the air/vapour barrier. Coordinate with Section 08 50 50.
- .21 At junctions between air/vapour barrier and hollow metal door frames and louvres, apply a 300 mm wide strip of membrane, sealed to the inside of the frame, prior to application of foam in place insulation. Do not remove release on unadhered portion of strip until the door frame is in place and the adjacent air/vapour barrier membrane is in place and ready to be sealed. Seal to adjacent membranes to achieve a continuous and complete air/vapour barrier.
- .22 At all locations between different material, at edges of each floor slabs and other areas where deflection is anticipated and where concrete frame shrinkage, concrete block or framing shrinkage is anticipated, install air/vapour barrier with a small loop to accommodate minimum 25 mm deflection.
- .23 Inspect air/vapour barrier for continuity. Pay particular attention to change in direction bends, such as at windows head, sill and jamb intersections. Repair tears, punctures, rips, with pieces of membrane.

### **3.5 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

### **3.6 PROTECTION OF WORK**

- .1 Protect finished Work in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Do not permit adjacent work to damage work of this section.
- .3 Ensure finished Work is protected from climatic conditions.

LRC Dairy & Metabolism Barn Roof Replacement  
Lethbridge, Alberta  
Project No. R.071094.001

Section 07 27 00.01  
AIR/VAPOUR BARRIER  
Page 7

**END OF SECTION**

## **Part 1 General**

### **1.1 REFERENCES**

- .1 Alberta Roofing Contractors Association (ARCA)
  - .1 ARCA Roofing Application Standards Manual-2013.
- .2 ASTM International Inc.
  - .1 ASTM C1396/C1396M-06a, Standard Specification for Gypsum Board.
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
- .4 Canadian Roofing Contractors Association (CRCA)
  - .1 CRCA Roofing Specifications Manual-1997.
- .5 Canadian Standards Association (CSA International)
  - .1 CSA A123.21-04, Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems
  - .2 CSA-A123.3-05, Asphalt Saturated Organic Roofing Felt.
  - .3 CSA-A123.4-04, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
- .6 Factory Mutual (FM Global)
  - .1 FM Approvals - Roofing Products.
- .7 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .8 Underwriters Laboratories' of Canada (ULC)
  - .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .2 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

### **1.2 ARCA 10-YEAR WARRANTY CERTIFICATE PROGRAM**

- .1 Provide a ARCA 10-YEAR WARRANTY CERTIFICATE, issued jointly between ARCA and the Roofing Subcontractor and in the name of the Her Majesty the Queen in the Right of Canada, stating that the roofing system, including flashing, will remain weather tight for a minimum period of 10 (10) years from date of Interim Acceptance of the Work.
  - .1 Workmanship coverage against leaks, issued for 10 year terms on ARCA accepted Low Slope Roofing Systems installed in Alberta.
  - .2 All roofing systems and materials to be approved by ARCA as detailed in the ARCA Roofing Application Standards Manual.
  - .3 All Work on this project must be under contract to Alberta Roofing Contractors Association contractor members.

### **1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Convene pre-installation meeting one week prior to beginning waterproofing Work, with roofing contractor's representative and Departmental Representative in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart to:
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other building subtrades.
  - .4 Review manufacturer's installation instructions and warranty requirements.

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide two copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Provide two copies of WHMIS MSDS in accordance with Section 01 35 43 - Environmental Procedures, and indicate VOC content for:
    - .1 Primers.
    - .2 Asphalt.
    - .3 Sealers.
    - .4 Filter fabric.
- .3 Provide shop drawings:
  - .1 Indicate flashing, control joints, tapered insulation details.
  - .2 Provide layout for tapered insulation.
- .4 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .5 Test and Evaluation Reports: submit laboratory test reports certifying compliance of bitumens and roofing felts and membrane with specification requirements.
- .6 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.
- .7 Manufacturer's field report: in accordance with Section 01 45 00 - Quality Control.
- .8 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

### **1.5 QUALITY ASSURANCE**

- .1 Installer qualifications: company or person specializing in application of modified bituminous roofing systems with 5 years documented experience approved by manufacturer.
- .2 Roofing installation to be certified by Alberta Roofing Contractor Association (ARCA) complete with Certificate of assurance.

### **1.6 FIRE PROTECTION**

- .1 Fire Extinguishers:



- .1 Maintain one cartridge operated type or stored pressure rechargeable type with hose and shut-off nozzle,
- .2 ULC labelled for A, B and C class protection.
- .3 Suitable size on roof per torch applicator, within 6 m of torch applicator.
- .2 Maintain fire watch for 1 hour after each day's roofing operations cease.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
- .2 Storage and Handling Requirements:
  - .1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
  - .2 Provide and maintain dry, off-ground weatherproof storage.
  - .3 Store rolls of felt and membrane in upright position. Store membrane rolls with salvage edge up.
  - .4 Remove only in quantities required for same day use.
  - .5 Place plywood runways over completed Work to enable movement of material and other traffic.
  - .6 Store sealants at +5 degrees C minimum.
  - .7 Store insulation protected from daylight and weather and deleterious materials.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
  - .2 Fold up metal banding, flatten and place in designated area for recycling.

## **1.8 FIELD CONDITIONS**

- .1 Ambient Conditions
  - .1 Do not install roofing when temperature remains below -18 degrees C for torch application, or to manufacturers' recommendations for mop application.
  - .2 Minimum temperature for solvent-based adhesive is -5 degrees C.
- .2 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

## **Part 2 Products**

### **2.1 ARCA 10 YEAR WARRANTY CERTIFICATE PROGRAM REQUIRED**

- .1 All components and installations to meet ARCA Warranty Ltd.

## **2.2 PERFORMANCE CRITERIA**

- .1 Compatibility between components of roofing system is essential. Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.
- .2 Roofing System: to CSA A123.21 for wind uplift resistance.

## **2.3 DECK COVERING**

- .1 Gypsum board sheathing: to ASTM C1396/C1396M Standard thickness as indicated.

## **2.4 VAPOUR RETARDER**

- .1 Two-ply bituminous membrane consisting of:
  - .1 No. 15 asphalt saturated organic roofing felts to CAN/CSA A123.3.
  - .2 Type 2 asphalt to CAN/CSA A123.4. Provide EVT, FBT and Flash Point Temperature.

## **2.5 MEMBRANE**

- .1 Base sheet: to CGSB 37-GP-56M.
  - .1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer prefabricated sheet, glass or polyester reinforcement, having nominal weight of 180 g/m<sup>2</sup>.
  - .2 Type 1, fully adhered.
  - .3 Class C - plain surfaced.
  - .4 Grade 1 - standard service.
  - .5 Top and bottom surfaces:
    - .1 Sanded/polyethylene.
- .2 Cap sheet membrane: to CGSB 37-GP-56M.
  - .1 Styrene-Butadiene-Styrene(SBS) elastomeric polymer, prefabricated sheet, glass or polyester reinforcement, having nominal weight of 180 g/m<sup>2</sup>.
  - .2 Type 1, fully adhered.
  - .3 Class A- slate granule surfaced.
    - .1 Colour for granular surface: colour to be as selected by the Departmental Representative from the manufacturer's standard range.
  - .4 Grade 1-standard service.
  - .5 Bottom surface polyethylene.

## **2.6 ADHESIVE**

- .1 Adhesive for securing insulation: asphalt extended vulcanized adhesive, two component unit, consisting of two liquids mixed on site to produce pourable adhesive.

## **2.7 OVERLAY BOARD**

- .1 Overlay Board: 12.7 mm asphalt impregnated fiberboard, 2 layers, staggered joints.
  - .1 Install over insulation to provide torch safe surface.

## **2.8 BITUMEN**

- .1 Asphalt: to CAN/CSA A123.4, Type 3.

**2.9 POLYSTYRENE INSULATION**

- .1 Expanded polystyrene (EPS) insulation to CAN/ULC-S701, Type 2, thickness as indicated, tapered, square edges.

**2.10 POLYISOCYANURATE INSULATION**

- .1 To CAN/ULC-S704, Type 2, facing glass fibre and other facings which are compatible to roofing membrane, flame spread classification: less than 500, thickness as indicated.

**2.11 SEALERS**

- .1 Sealing Compound: rubber asphalt type.

**2.12 CARPENTRY**

- .1 Refer to Section 06 10 00.01 - Rough Carpentry - Short Form.

**2.13 FASTENERS**

- .1 Covering to steel deck: No. 10 flat head, self tapping, Type A or AB, cadmium plated screws. Recommend FM Approved screw and plate assemblies.
- .2 Insulation to deck: coated insulation fasteners and galvanized plates must meet FM Approval for wind uplift and corrosion resistance, as recommended by insulation manufacturer.

**Part 3 Execution**

**3.1 QUALITY OF WORK**

- .1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual, particularly for fire safety precautions, and to FM and ULC guidelines.
- .2 Do priming in accordance with manufacturers written recommendations.
- .3 The interface of the walls and roof assemblies will be fitted with durable rigid material providing connection point for continuity of air barrier.
- .4 Assembly, component and material connections will be made in consideration of appropriate design loads.

**3.2 EXAMINATION OF ROOF DECKS**

- .1 Verification of Conditions:
  - .1 Inspect with Departmental Representative deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.
- .2 Evaluation and Assessment:
  - .1 Prior to beginning of work ensure:
    - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
    - .2 Curbs have been built.

- .3 Roof drains have been installed at proper elevations relative to finished roof surface.
- .4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.
- .3 Do not install roofing materials during rain or snowfall.

### **3.3 PROTECTION OF IN-PLACE CONDITIONS**

- .1 Cover walls, walks and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of Work.
- .3 Clean off drips and smears of bituminous material immediately.
- .4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.
- .5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.
- .6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.
- .7 Metal connectors and decking will be treated with rust proofing or galvanization.

### **3.4 DECK SHEATHING**

- .1 Mechanically fasten to steel deck Gypsum Board Sheathing with screws to steel deck's upper rib surfaces, spaced 400 mm on centre each way.
- .2 Place with long axis of each sheet transverse to steel deck ribs, with end joints staggered and fully supported on ribs.

### **3.5 VAPOUR RETARDER (CONCRETE/GYPSUM BOARD/PLYWOOD DECK)**

- .1 Embed two ply of felts organic in hot bitumen spread at rate of 1 kg/m<sup>2</sup> for organic asphalt.
- .2 Modified bituminous vapour retarder sheet.

### **3.6 (EXPOSED) CONVENTIONAL MEMBRANE ROOFING (CMR) APPLICATION**

- .1 Insulation: fully adhered, bitumen application:
  - .1 Embed insulation in 1 to 1.5 kg/m<sup>2</sup> mopping of bitumen.
  - .2 Place boards in parallel rows with ends staggered, and in firm contact with one another.
  - .3 Cut end pieces to suit.
- .2 Tapered insulation application:
  - .1 Mop insulation to vapour retarder with hot asphalt at rate of 1 kg/m<sup>2</sup>.
  - .2 Install tapered insulation as first insulation layer, in accordance with shop drawings. Stagger joints between layers 150 mm minimum.
- .3 Overlay Board: adhesive application:
  - .1 Adhere overlay board to insulation with vulcanized adhesive at the rate of one litre per m<sup>2</sup>.

- .2 Place boards in parallel rows with end joints staggered. Cap joints approximately 25 mm.
- .3 Cut ends to suit and apply adhesive in continuous ribbons at 300 mm on centre.
- .4 Base sheet application:
  - .1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
  - .2 Unroll and embed base sheet in uniform coating of asphalt applied at rate of 1.2 kg/m<sup>2</sup>, at 230 degrees C.
  - .3 Unroll and torch base sheet onto substrate taking care not to burn membrane or its reinforcement or substrate.
  - .4 Lap sheets 75 mm minimum for side and 150 mm minimum for end laps.
  - .5 Application to be free of blisters, wrinkles and fishmouths.
- .5 Cap sheet application:
  - .1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
  - .2 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.
  - .3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.
  - .4 Application to be free of blisters, fishmouths and wrinkles.
  - .5 Do membrane application in accordance with manufacturer's recommendations.
- .6 Flashings:
  - .1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.
  - .2 Torch base and cap sheet onto substrate in 1 metre wide strips.
  - .3 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal by mopping or torch welding.
  - .4 Lap flashing cap sheet to membrane cap sheet 250 mm minimum and torch weld.
  - .5 Provide 75 mm minimum side lap and seal.
  - .6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.
  - .7 Do work in accordance with manufacturer's recommendations and Section 07 62 00 - Sheet Metal Flashing and Trim.
- .7 Roof penetrations:
  - .1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

### **3.7 FIELD QUALITY CONTROL**

- .1 Inspections:
  - .1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Departmental Representative.
  - .2 Departmental Representative will pay for tests as specified in Section 01 45 00 - Quality Control.

### **3.8 CLEANING**

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Place materials defined as hazardous or toxic in designated containers.
  - .2 Clearly label location of salvaged material's storage areas and provide barriers and security devices.
  - .3 Ensure emptied containers are sealed and stored safely.
  - .4 Divert unused aggregate materials from landfill to local facility for reuse as reviewed by Departmental Representative.
  - .5 Unused paint material must be disposed of at official hazardous material collections site as reviewed by Departmental Representative.
  - .6 Unused adhesive, sealant and asphalt materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
  - .7 Dispose of unused adhesive material at official hazardous material collections site approved by Departmental Representative.
  - .8 Dispose of unused sealant material at official hazardous material collections site approved by Departmental Representative.
  - .9 Dispose of unused asphalt material at official hazardous material collections site approved by Departmental Representative.
  - .10 Divert unused gypsum materials from landfill to recycling facility as reviewed by Departmental Representative.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A167-99(2004), Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - .2 ASTM A240/A240M-07e1, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  - .3 ASTM A606-04, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
  - .4 ASTM A653/A653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .5 ASTM A792/A792M-06a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - .6 ASTM B32-04, Standard Specification for Solder Metal.
  - .7 ASTM B370-03, Standard Specification for Copper Sheet and Strip for Building Construction.
  - .8 ASTM D523-89(1999), Standard Test Method for Specular Gloss.
  - .9 ASTM D822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .2 Canadian Roofing Contractors Association (CRCA)
  - .1 Roofing Specifications Manual 1997.
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
  - .2 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.
- .4 Canadian Standards Association (CSA International)
  - .1 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt.
  - .2 AAMA/WDMA/CSA 101/I.S.2/A440-2008, Standard/Specification for Windows, Doors, and Unit Skylights.
  - .3 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:

- .1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.
- .3 Samples:
  - .1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours.
- .4 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
  - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
  - .2 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3, FIELD QUALITY CONTROL.

### **1.3 QUALITY ASSURANCE**

- .1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning on-site installation, with Departmental Representative in accordance with Section [01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart to:
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other building subtrades.
  - .4 Review manufacturer's installation instructions and warranty requirements.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **Part 2 Products**

### **2.1 ARCA 10 YEAR WARRANTY CERTIFICATE PROGRAM REQUIRED**

- .1 All components and installations to meet ARCA Warranty Ltd.

### **2.2 SHEET METAL MATERIALS**

- .1 Zinc coated steel sheet: 0.7 mm thickness, commercial quality to ASTM A653/A653M, with Z275 designation zinc coating.



## **2.3 PREFINISHED STEEL SHEET**

- .1 Prefinished steel with factory applied polyvinylidene fluoride.
  - .1 Colour: white, to match existing. As approved by Departmental Representative from manufacturer's standard range.
  - .2 Specular gloss: to match existing.
  - .3 Coating thickness: not less than 22 micrometres.
  - .4 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:
    - .1 Outdoor exposure period 2500 hours.
    - .2 Humidity resistance exposure period 5000 hours.

## **2.4 ACCESSORIES**

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Plastic cement: to CAN/CGSB 37.5.
- .3 Underlay for metal flashing: dry sheathing to CAN/CGSB-51.32.
- .4 Sealants: one component silicone sealant to CAN/CGSB-19.13, Type 2, Class 25, shore A hardness of 25 - 30, non sag, neutral curing.
  - .1 Colour to match existing.
- .5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.
- .6 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
- .7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .8 Solder: to ASTM B32.
- .9 Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.
- .10 Touch-up paint: as recommended by prefinished material manufacturer.

## **2.5 FABRICATION**

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details.
- .2 Fabricate aluminum flashings and other sheet aluminum work in accordance with AAI-Aluminum Sheet Metal Work in Building Construction.
- .3 Form pieces in 2400 mm maximum lengths.
  - .1 Make allowance for expansion at joints.
- .4 Hem exposed edges on underside 12 mm.
  - .1 Mitre and seal corners with sealant.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

- .6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

## **2.6 METAL FLASHINGS**

- .1 Form flashings, copings and fascias to profiles to match existing.

## **2.7 REGLETS AND CAP FLASHINGS**

- .1 Form recessed and surface mounted reglets and metal cap flashing of 0.7 mm base metal thickness sheet metal to be built-in masonry work for base flashings as detailed in accordance with CRCA FL series details, FL. Provide slotted fixing holes and steel/plastic washer fasteners.

## **2.8 SCUPPERS**

- .1 Form scuppers from prefinished sheet metal.
- .2 Sizes and profiles to match existing.
- .3 Provide necessary fastenings.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 INSTALLATION**

- .1 Install sheet metal work CRCA FL series details.
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal.
  - .1 Secure in place and lap joints 100 mm.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
  - .1 Flash joints using S-lock forming tight fit over hook strips.
- .5 Lock end joints and caulk with sealant.
- .6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.
- .7 Insert metal flashing into reglets and under cap flashing to form weather tight junction.
- .8 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.
- .9 Caulk flashing at reglet and cap flashing with sealant.
- .10 Install pans, where shown around items projecting through roof membrane.

### **3.3 SCUPPERS**

- .1 Install scuppers to match existing.

**3.4 FIELD QUALITY CONTROL**

- .1 Manufacturer's Field Services:
  - .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

**3.5 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 ASTM International
  - .1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - .2 ASTM A167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - .3 ASTM A500/A500M-10a, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- .2 CSA International
  - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.
  - .3 CSA W55.3-08, Certification of Companies for Resistance Welding of Steel and Aluminum.
- .3 The Master Painters Institute (MPI)
  - .1 Architectural Painting Specification Manual - current edition.
    - .1 MPI #101, Primer, Epoxy, Anti-Corrosive, for Metal.
- .4 The Society for Protective Coatings (SSPC)
  - .1 SP -2-04, Hand-Tool Cleaning.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for roof anchors and safety restraints and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Alberta, Canada.
    - .1 Indicate component profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
    - .2 Indicate welded connections using standard welding symbols include net weld lengths.
  - .2 Submit design data and calculations.

### **1.3 QUALITY ASSURANCE**

- .1 Design structural support framing components and site inspect installation under direct supervision of Professional Structural Engineer experienced in design of this Work and licensed in the Province of Alberta, Canada.
- .2 Qualifications:
  - .1 Welder's qualifications: welders certification to CSA W55.3
    - .1 Employ qualified and licensed welders possessing certificates for each procedure to be performed.
    - .2 Each welder to possess identification symbol issued by authority having jurisdiction.
  - .2 Welding company certification: certified for fusion welding of steel structures to CSA W47.1
  - .3 Manufacturer Qualifications: company specializing in manufacturing products specified in this section with minimum 3 years documented experience.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect roof anchors and safety restraints from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 SYSTEM DESCRIPTION**

- .1 Landscape Tree Anchors: Steel loops, steel cable, and attachments to resist lateral forces of 3 kN at any point and in all directions, without damage or permanent set.
- .1 "Fixed Eye" Roof Anchors
  - .1 Fall arrest roof anchors: Galvanized forged 1018 steel eye roof anchor to CSA Z91-M90, with: urethane insulated hollow hot dipped galvanized ASTM 500C steel post HSS 6 mm wall thickness x 114 mm dia. x 305 mm high welded to 16 mm x 254 mm x 254 mm 44W base plate; single 25 mm Type 304 s.s. bolt with EPDM weather seal, top nut and washer; galvanized 16 mm x 102 mm x 305 mm core slab plate, lock washer and nut; SJ-34(9), 229 mm high New-Standard Stack Jack flashing of 1.6 mm mill finish 1100-0T alloy aluminum to CSA B272-93, with EPDM Triple Pressure Grommet Seal and EPDM Base Seal and PVC coated deck flange.

.2 Horizontal Lifeline Fall Protection System

- .1 Horizontal lifeline system: Horizontal Lifeline fall protection system to CSA-Z91-02 with: 89 mm dia. urethane insulated HSS anchor posts, wall thickness 6 mm, hot dipped galvanized ASTM 500, 305 mm high, welded and bolted to 12 mm x 203 mm x 203 mm 44W base plate, securement to suit substrate; Stainless steel fittings (swaged end, energy absorber, double locking carabiner, shuttles, end tensioner, intermediate brackets, corner pieces); Type 304 s.s. cable 10 mm dia. 7 x 19 structure; 2 full body harnesses with integral shock absorber; SJ-35 330 mm high; New-Standard Stack Jack Flashing of 1.6 mm mill finish 1100-0T alloy aluminum to CSA B272-93, with EPDM Triple Pressure Grommet Top Seal and EPDM Base Seal and PVC coated deck flange.

**2.2 MATERIALS**

- .1 Steel Sections and Plates: CSA G40.20M/G40.21.
- .2 Steel Tubing: ASTM A500/A500M, Grade B.
- .3 Steel Rings: forged steel, ring thickness determined by imposed loads.
- .4 Steel Cable (between post travel restraints): minimum 9 mm diameter, spiral wound multi-strand stainless steel aircraft cable.
- .5 Bolts, Nuts, and Washers for Stainless Steel: stainless steel, matte finish.
- .6 Gaskets Under Anchors: neoprene pads, compatible with roof membrane, cut to size.
- .7 Welding Materials: CSA W47.1 for materials being welded.
- .8 Shop Primer: MPI #101, 2 coats.

**2.3 FABRICATION**

- .1 Fit and shop assemble items in largest practical sections, for delivery to site.
- .2 Fabricate items with joints tightly fitted and secured.
- .3 Continuously seal joined members by intermittent welds and plastic filler.
- .4 Grind exposed joints flush and smooth with adjacent finish surface.
  - .1 Make exposed joints butt tight, flush, and hairline.
  - .2 Ease exposed edges to small uniform radius.
- .5 Exposed Mechanical Fastenings: screws or bolts; consistent with design of component.
- .6 Furnish and install components required for anchorage of fabrications.
- .7 Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

**2.4 FABRICATION TOLERANCES**

- .1 Squareness: 3 mm maximum difference in diagonal measurements.
- .2 Maximum Deviation from Plane: 1.5 mm from 1 m.

## **2.5 FINISHES**

- .1 Prepare uncoated steel (restraint post) surfaces: SSPC-SP 2, no more than 4 hours before applying epoxy primer.
- .2 Concealed steel anchors, clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- .3 Do not prime surfaces in direct contact with concrete or where field welding is required.
- .4 Concealed Structural Components and Anchors: galvanize after fabrication to ASTM A123/A123M to minimum 600 g/sq m galvanized coating.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for roof anchors and safety restraint installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
- .2 Verify dimensions, tolerances, and method of attachment with other work.
- .3 Report to the Contractor in writing, defects of work prepared by other trades and other unsatisfactory site conditions. Verify site dimensions. Commencement of work will imply acceptance of prepared work.
- .4 For roofs employing tapered insulation systems, height adjustments may be necessary i.e. ensure anchor eye is minimum 250mm above roof surface.

### **3.2 FIELD QUALITY CONTROL**

- .1 All anchor work to be inspected by Professional Engineer responsible for stamping and signing shop drawings and Roof Contractor upon completion of work.

### **3.3 PREPARATION**

- .1 Supply and install steel items required to be attached to steel framing and concrete deck as clean uncoated metal, with setting templates to appropriate sections.

### **3.4 ERECTION TOLERANCES**

- .1 Maximum Variation from Plumb: 3 mm.

### **3.5 INSTALLATION**

- .1 Install items plumb and level, accurately fitted, free from distortion or defects.

- .2 Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- .3 Field weld components as indicated on shop drawings.
- .4 Obtain approval from Departmental Representative prior to site cutting or making adjustments not scheduled.
- .5 After erection, apply primer in accordance with MPI Painting Manual to: welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
- .6 Thread aircraft cable through eye-lets at top of post, to linear roof coverage of post restraints; pressure crimp cable ends.
- .7 Install anchors or equipment in accordance with manufacturer's printed instructions, shop drawings and as specified.
- .8 Ensure anchors or equipment is installed under the direct supervision of Professional Engineer responsible for stamping and signing shop drawings and Roofing Consultant.
- .9 Where necessary, provide protection against deterioration due to contact of dissimilar materials.
- .10 Where bolting is used for fastening anchors, no fewer than two threads is to be exposed and the nut is to be positively locked by deforming threads, welding, pinning or equivalent method.
- .11 Ensure work is inspected prior to application of roofing.
- .12 Install roof support flashing in accordance with manufacturer's printed instructions.
- .13 Set deck flange in layer of membrane adhesive and extend single ply up sleeve to highest elevation possible and clamp membrane to stack jack flashing.

### **3.6 ADJUSTING AND FINAL INSPECTION**

- .1 Verify that all manufactured units have been installed in accordance with specifications and details, and will function as intended. Adjust any items where necessary to ensure proper operation.
- .2 Provide necessary documentation certifying system is acceptable for service (Professional Engineer responsible for stamping and signing shop drawings Certificate of Acceptance).

### **3.7 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.



**3.8 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by roof anchors and safety restraint installation.

**END OF SECTION**