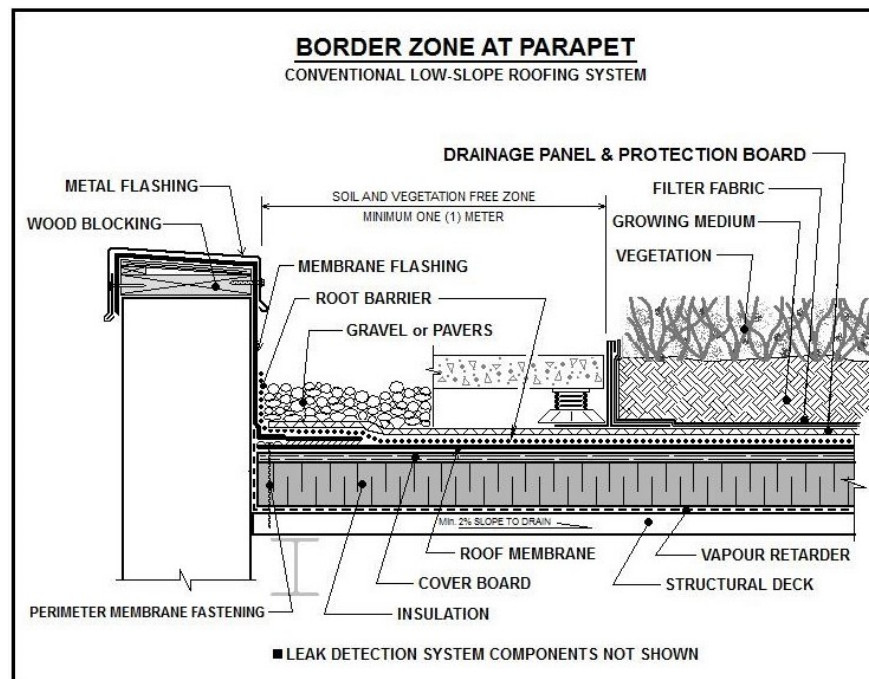


## 11. MB - SECTION 11 – VEGETATIVE (GREEN) ROOFING

### 11.1. General

- 11.1.1. A vegetated roof design is defined as a roof membrane system with a top layer of living plants in an engineered soil blend. Vegetated roofs are categorized based on type of installation; Substrate system, Modular system or Pre-Grown vegetated blanket system.
- 11.1.2. Warranty coverage of this section applies to commercial buildings for leak repairs on extensive vegetated roof systems with soil depths of 200mm (8") or less for five (5) or ten (10) year terms only. The cost to remove and replace the vegetated roof components to facilitate access to the roof membrane for investigation and repair of workmanship related leaks is included however; it is the responsibility of the building owner to cover costs for removal and replacement of items that were not installed by the roofing contractor.
- 11.1.3. Only ARCA Warranty Ltd. approved membranes that are specifically accepted by the membrane manufacturer for use in vegetated roof systems qualify for a Warranty Certificate.
- 11.1.4. The completed roof membrane system shall be tested for water tightness prior to and following the installation of green roof components and membrane protection layer (See item 11.7 Leak Detection System).
- 11.1.5. Roof leaks as the result of membrane damage due to the work of others, maintenance or from root penetration are not covered under the ARCA Warranty Certificate.
- 11.1.6. Roof mounted structures or equipment exceeding 91 kg (200 lbs.) in mass or when roof point loads exceed 5 kPa (105 PSF), shall be supported on structural curbs, structural sleepers, or structural pedestals attached to the structure or decking. Structural supports shall be designed by a structural engineer, shall conform to the Alberta Building Code and to the satisfaction of the authority having jurisdiction.
- 11.1.7. The care or maintenance of the vegetation and growth media including water and/or wind erosion, or the survival or health of the plants is not covered under the ARCA Warranty Certificate.

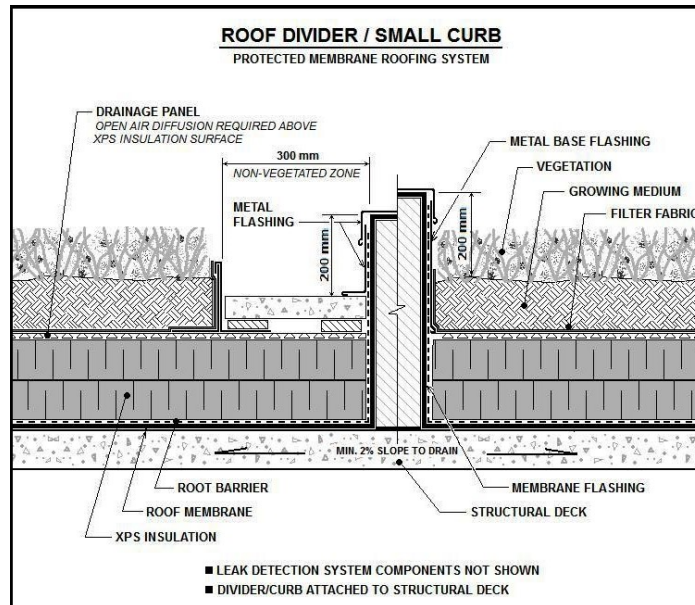


## **11.2. Drainage**

- 11.2.1. The drainage slope of the roofing membrane shall be a minimum 1:50 (2%).
- 11.2.2. The maximum roof slope is restricted to 1:2 (48%).
- 11.2.3. For roof slopes greater than 1:6 (16.7%), suppliers of the proprietary vegetated roof system or the design professional shall determine materials and components necessary to prevent slippage or sheering of the overburden on steep slope applications. ARCA Warranty Ltd. shall provide written approval prior to the mechanical attachment of components through any part of the roof membrane system.
- 11.2.4. Membrane level scuppers shall be provided at the roof perimeter as emergency drainage or in steep slope design may be the primary drainage. Scuppers shall have gravel screens installed.
- 11.2.5. Internal roof drains shall have a vegetation and soil free zone around the drain opening with a minimum dimension of 762mm (30") for inspection and maintenance purposes.
- 11.2.6. Control flow drains are not recommended with a vegetated roof system.

## **11.3. Penetrations and Perimeter Heights**

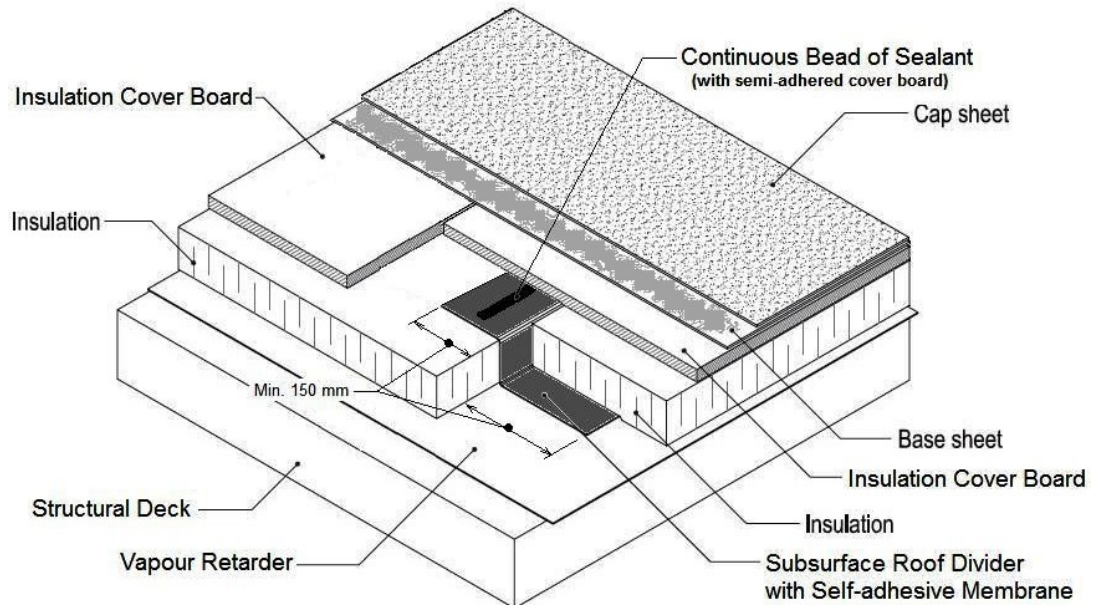
- 11.3.1. Except for roof drain and pedestal fall protection roof anchors, all roof penetrations shall be contained within or supported by a curb secured to the structure or decking.
- 11.3.2. Vegetation and soil free zones adjacent to parapets, curbs, and walls require a non-combustible protective roof covering which remains in place through the entire service life of the roof system.
- 11.3.3. Roof parapets, wall surfaces, curbs for roof penetrations and mechanical units, expansion joints, equipment supports and pedestal fall protection anchors shall extend a minimum distance of 200mm (8") above the surface of the growth medium, gravel ballast, or concrete pavers.
- 11.3.4. Vegetation and soil free zones are required a minimum of 1000mm (39") wide along the roof perimeter, roof/wall junctions, fire separation walls, around mechanical unit curbs, and roof access hatches or doors.
- 11.3.5. Roof area dividers, building expansion joints, and curbs for roof openings require a minimum vegetation and soil free zone width of 300mm (12"). The vegetation free zone may be exempt for support curbs or sleepers for posts or columns that do not penetrate the roof deck. The membrane flashing on the vertical face shall be protected with corrosion resistant sheet metal base flashing beginning 25mm (1") from the top surface of the roof membrane in a conventional membrane system or from the top of the extruded polystyrene insulation layer in a protected membrane system.
- 11.3.6. Placements of non-combustible roof coverings such as concrete pavers, loose gravel, or metal walkway systems shall be elevated from the membrane or insulation surface with a protection mat/drainage board for gravel, or pedestal system for pavers or walkways and shall facilitate drainage.



- 11.3.7. Curbs or physical barriers for separation between vegetated and non-vegetated zones shall be made of materials unaffected by moisture, fertilizers or leachate from growing medium and shall facilitate drainage. L-shaped sheet metal up-stands shall be suitably supported opposite the growing medium to prevent leaning. Separation barriers shall not be attached through or penetrate the roof membrane. Joints of up-stand sections are to be fastened to prevent displacement or opening of joints. Curb height shall extend a minimum of 50mm (2") above the surface of compacted growing medium.
- 11.3.8. Roof penetrations for cable, conduit, gas lines, or irrigation lines shall be located in the vegetation free zone. Install a curb or enclosure with a watertight sloped top where the lines run through the vertical face a minimum of 200mm (8") above the ballast or paver. Gum boxes or pitch pans are not permitted.

#### 11.4. Roof System Dividers

- 11.4.1. Roof sections with conventional roof membrane systems that include vegetated areas shall be divided into smaller sections by way of subsurface roof dividers to limit the spread of water in the roof system assembly should a leak occur.
- 11.4.2. For conventional roof designs:
- 11.4.2.1. Subsurface roof dividers are required only below the vegetated roof area when the roof section has less than 50% of vegetated roof cover. A continuous subsurface roof divider shall segregate the perimeter of the vegetated area including the non-combustible roof cover from the rest of the roof section.
- 11.4.2.2. Roof sections with vegetated roof cover of more than 50% require subsurface roof dividers within the entire roof section including non-vegetated zones.
- 11.4.2.3. The roof sections, which include vegetated and non-vegetated zones, shall be divided into sections no larger than 93 m<sup>2</sup> (10 squares). The dividers shall be evenly distributed with a maximum dimension of 15.2 metres (50 ft.) and a minimum dimension of 6.1 metres (20 ft.). The location of subsurface dividers shall be shown on an as-built roof plan drawing which will be included with the warranty documents.



- 11.4.3. Above surface roof dividers or building expansion joints installed with conventional or protected membrane systems shall be constructed in accordance with current standards in the ARCA Roofing Application Standards manual.
- 11.4.4. Subsurface roof dividers are installed with a minimum 40 mil thick self-adhesive membrane adhered onto the vapour retarder membrane, continuously applied along the leading edge of insulation, and lapped a minimum of 150 mm to the top surface of the insulation. (See Figure 3)
- 11.4.5. If the insulation cover board is ribbon or spot adhered, apply a continuous 19.0mm (3/4") wide bead of compatible sealant along the top surface of the membrane divider prior to installing the insulation cover board.

## 11.5. Membrane Flashing

- 11.5.1. The minimum height of the membrane flashing at a wall, roof penetration, or curb shall be 200mm (8") above the membrane surface in a conventional design and 200mm (8") above the gravel ballast or concrete paver ballast. The minimum height of membrane flashing at the width of door sills shall be 100mm (4") above the gravel ballast or concrete paver surface measured at the door sill location.
- 11.5.2. Membrane flashings for curbs and parapets shall be in accordance with ARCA application standards except where membrane upgrades are required for specific systems.
- 11.5.3. Membrane flashings for parapets, walls, and curbs shall consist of three (3) plies. The second base ply (middle ply) shall lap a minimum of 150mm (6") onto the vertical and horizontal surfaces. Side laps shall be offset a minimum of 200mm (8") from the side laps of the first ply. The membrane gusset at intersecting inside and outside corners shall be placed over the first base ply.

## **11.6. Roof Membranes**

- 11.6.1. Membranes that provide waterproofing shall be fully adhered to an approved insulation cover board or fully adhered directly to the supporting roof deck. Loose laid, mechanically fastened, or semi-adhered membranes are not permitted.
- 11.6.2. The roof membrane system below the vegetated roof cover shall meet the standards as set up by the authority having jurisdiction.
- 11.6.3. For a conventional roof design the insulation shall be attached to the supporting roof deck and/or vapour retarder membrane either by mechanically fastened, cold adhesive or hot asphalt and in accordance with ARCA Roofing Application Standards. Mechanical fastening is not permitted directly below the roof membrane except where membrane fastening is required at the roof perimeter and within the soil and vegetation free zone.
- 11.6.4. For a protected membrane roof design only Type 4 extruded polystyrene insulation is approved and shall be loose laid over the waterproofing membrane in accordance with ARCA Roofing Application Standards. The dry weight of the vegetated roof cover shall meet the designed ballast weight for wind uplift resistance of the insulation.
- 11.6.5. The completed and tested roof membrane system shall be protected from construction traffic and tools used to install and maintain a vegetated cover. Protection of the finished roof membrane shall be in place during the installation and maintenance of the green roof system and remain in place as a permanent component of the assembly. Protection system components shall be pre-approved by the membrane manufacturer and ARCA Warranty Ltd. prior to installation. (See Figure 1)
- 11.6.6. For a protected membrane design the roof membrane protection shall be Type 4 Extruded Polystyrene insulation loose-laid over the primary membrane.
- 11.6.7. For a conventional membrane design the roof membrane protection may be a combination of a root barrier membrane and drainage mat with suitable compressive. Any damaged drainage mat or boards shall be replaced prior to the application of overburden.
- 11.6.8. When vegetated roof coverage is less than 50% of total roof section area, membrane protection is only required under the vegetated roof cover including a minimum 1000mm (39") wide vegetation free zone adjacent to the separation curb or barrier.
- 11.6.9. Accepted SBS membranes**
- 11.6.9.1. IKO - Any currently accepted ARCA fully adhered two-ply membrane system.
- 11.6.9.2. SOPRMA - Any currently accepted ARCA fully adhered two-ply membrane system.

## **11.7. Leak Detection System**

- 11.7.1. Flood tests are not considered conclusive of system integrity therefore is not an acceptable substitute for a leak detection system.
- 11.7.2. Accepted non-destructive electronic leak detection (ELD) of the roof membrane shall be completed in accordance with ASTM D7877 "Standard Guide for Detecting and Locating Leaks in Waterproof Membranes". A qualified technician shall conduct the leak detection test and provide to the roofing contractor a detailed report with a roof plan showing locations of all detected breaches or sign-off as being watertight.
- 11.7.3. Initial testing of the roof area shall be performed only when the roof membrane system is fully complete including all penetrations. The leak detection testing shall frame only the area with vegetated roof cover including a minimum of one metre outside the vegetated roof separation barrier or up-stand.
- 11.7.4. The required number of leak detection tests under the roofing contractors' scope of work is as follows:

- 11.7.4.1. Prior to the installation of insulation and/or vegetated roof system components above the completed roofing membrane.
- 11.7.4.2. After repair of breaches in the membrane system identified and recorded by the ELD technician if caused by the roofing contractor's work. If the identified damage is caused by others, the cost of repair and subsequent leak detection testing is the responsibility of others.<sup>28</sup>

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<sup>28</sup> MB 11.7 Revised April 1, 2019 (TB-2019-01)