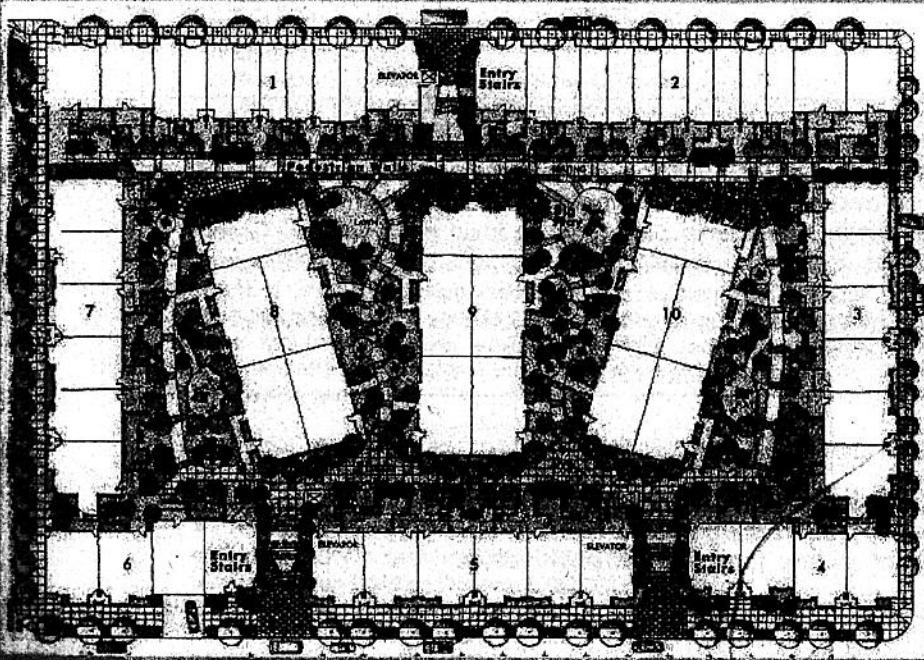


CROSS SECTION

GREEN ROOF



Green Roof Design 101

Introductory Course
Second Edition
Participant's Manual
Presented By

GREEN ROOFS

[Handwritten signature]

Chair of
Architecture

Waterproofing assemblies for green roofs consist of various components that must be designed in concert with one another.

Structural deck

The structural deck is not a part of any roofing or waterproofing assembly but part of the building structure. However, deck type (e.g. concrete, steel, or wood) is a determining factor in waterproofing design, impacting the kind of membrane used and its method of attachment.

Waterproofing membrane

As seen in *Section 5.3.1 Essential: Waterproofing Membranes*, there are many kinds of waterproofing membranes available, each with various pros and cons. When selecting a membrane it is important to specify an appropriate method of leak detection and the instances when it should be employed (e.g. prior to the installation of other green roof components). The membrane should be brought up parapet wall and curbs above the growing medium level to protect from moisture ingress.

Membrane protection

Some form of membrane protection may be required in your green roof design. Protection can take the form of a separate layer or as another component, which then serves two functions (e.g. drainage board). Even if no construction delays occur, it is best to include this component in your design and increase protection in areas that will experience high stress levels.

Insulation

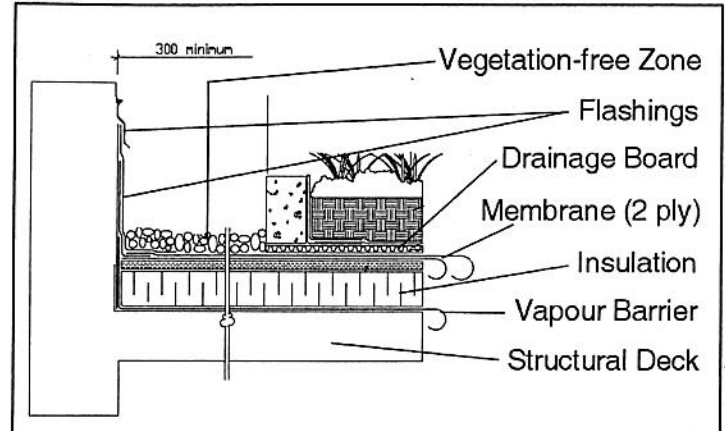
As mentioned in the overview, insulation can be located above or below the membrane level. If it is located above the membrane, its compressive strength must be greater than when it is below since it will have a greater degree of exposure to construction traffic. Furthermore, some means of venting and aeration must be created to prevent moisture ingress into the insulation materials.

Root barrier

The root barrier, as a part of the membrane or as a separate layer, should be installed over the entire roof's surface, including those areas where there are no plants. It should be brought up above the growing medium level and tied into flashings to ensure that roots cannot compromise the waterproofing membrane. If the root barrier is a separate layer, the FLL recommends a minimum overlap of 5" to prevent root penetration.

There is debate in the waterproofing industry as to the location of a polypropylene root barrier in PMR assemblies. If placed below the insulation, aggressive roots may dislodge the insulation. However, if the root barrier is above the membrane it may restrict the evaporation and effectively trap moisture at the membrane level.

Fig. 6.2.2 Conventional Membrane Assembly Detail



Source: Soprema Canada

Fig 6.2.3 Flashing Detail in a Protected Membrane Assembly

Flashings

As a rule of thumb, improperly installed flashings represent 70% of all roofing problems whether in green roof systems or traditional roofs. Flashings should be integrated into the other elements of the green roof project and the building, and designed to allow for maintenance.

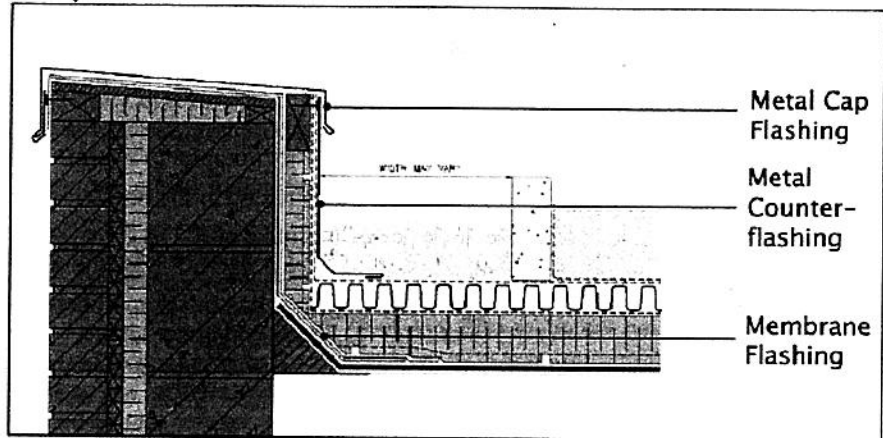


Image Source: Fishburn Building Science Group

- Flashings must be high enough to render them watertight under weather conditions to which they are exposed.
- Membrane flashing terminations should be raised to accommodate the landscaping materials while still protecting the roof from moisture ingress.
- When metal flashings are built into the membrane, copper or stainless steel are suggested to flash roof openings due to their ability to resist corrosion.
- Aluminum counter-flashings are not recommended due to a history of poor performance when exposed to fertilizers.

The details over any drains and around any penetrations need to be identified to maintain the proper vegetation free zones around all roof penetrations.

Design Practices

- Select time proven waterproofing materials in a green roof assembly with an ability to resist water ingress, biological attack, and which can resist uncommonly high levels of traffic on the roof.
- Minimize the number of membrane penetrations and transitions.
- Low points should be leveled to avoid water ponding prior to installation of other layers.
- Insulation located around the drains should be vented to avoid moisture problems if the membrane is damaged.
- The root barrier should be installed over the entire roof surface and carried above the growing medium and vegetation levels.
- A vegetation-free zone should be designed to separate plant life from structural components. This zone will facilitate maintenance and act as a fire and wind-break.
- The entire waterproofing system should be tested and inspected to ensure that it is leak-free before overburden is installed.