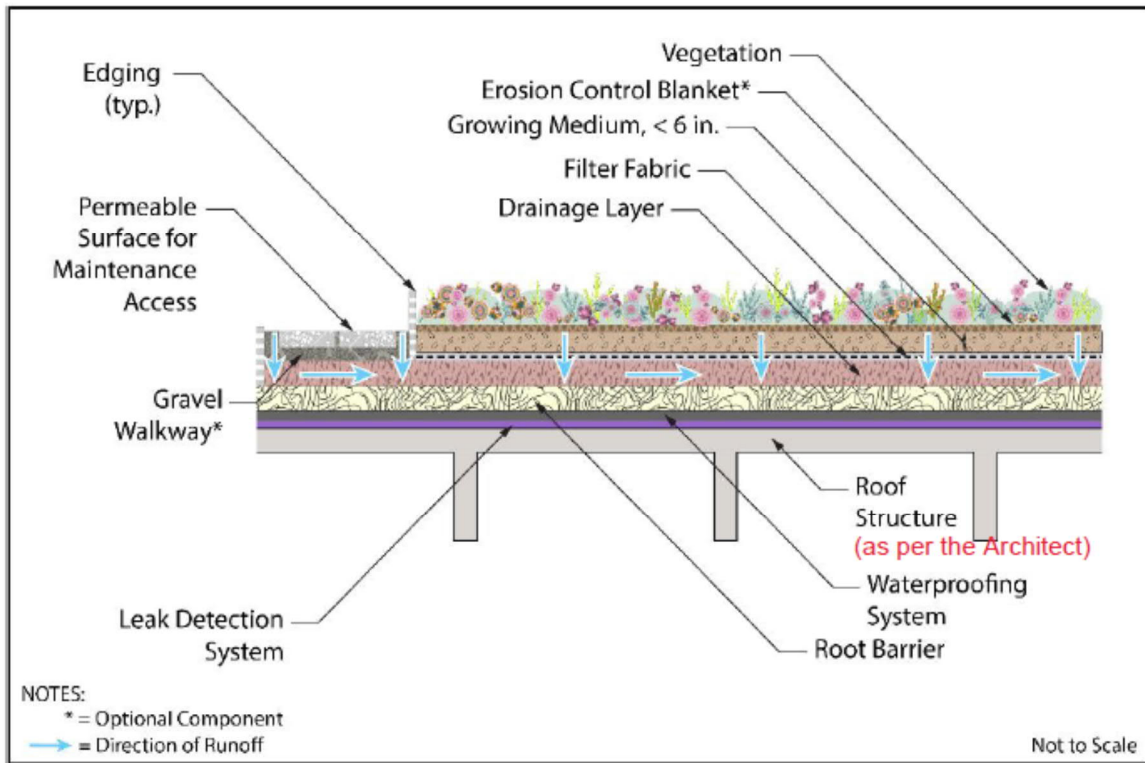


Extensive Green Roof – Cross-Section View:



The recommended product data is based on following consideration:

Local climate conditions, roof slope, function of the roof (e.g. stormwater management, public access and/ or habitat creation), size of the project, budget, degree of accessibility, structural loading and infrastructure located on top of the building.

Type of Roof:

Extensive roofs is selected as they are lighter, have less than 4 inches of planting medium, use drought tolerant vegetation and are able to handle a limited number of people for maintenance concerns.

Vegetation:

Vegetation is selected to rapidly stabilize soil, quickly repair itself from damage, absorb and transpire water despite extreme conditions of heat and cold, wind and drought. In general, as the planting medium's depth increases, so does the list of viable plant species. Sedums and mosses have been successfully used in shallow depth areas, while native grasses and forbs may be used in deeper soils.

Erosion Blanket:

Coconut Coir Bristle (100% biodegradable) – Green Roof Solutions or Approved Equal

Growing Medium:

The growing medium must meet the selected plantings' nutrient, water, oxygen and pH needs. However, the structural load capacity of the building often determines the depth and material of the medium, which ultimately determines the vegetation that can be supported. Following configuration of growing medium is recommended:

- 20% 1-7 mm pumice
- 60% 4-10 mm pumice
- 20% composted pine bark fines

Growing medium depth:	6 inches
Field capacity:	0.349% by volume
Wilting point:	0.118% by volume
Available Water Capacity for Runoff Retention	0.231% by volume

Filter Fabric:

Green roof filter layers (or separation layers) are designed to prevent particles (fine soils and vegetation) debris of growing medium getting washed into the drainage layer and clogging up the system. The main parameters required for the filter layer are to withstand the weight overhead and punching resistance.

A Blend of non-woven recycled synthetic material is recommended typically come in rolles and must be overlapped and secured to one another Roofmaster Cotton Fabric by Roofing Direct or Approved Equal

Drainage Layer:

- The drainage layer shall either be made of a non-carbonate, coarse granular material or a synthetic layer.
- The drainage layer must be resistant to freeze-thaw cycles.
- The hydraulic conductivity of the drainage layer must exceed that of the growing medium.

Drainage is so important in a green roof to effectively deal with large volumes of water while still providing sufficient water for the green roof to thrive. The green roof drainage layer is usually a HDPE membrane. Granular materials, such as pozzolana, pumice, lapillus, expanded clay, expanded perlite, expanded slate, and crushed bricks, characterized by a water permeability greater than 0.3 m/s.

Root Barrier:

The most common root barrier is a high-density polyethylene (HDPE) membrane.

Waterproofing System:

One of the most important aspects of an effective green roof is maintaining a waterproof seal. While there are several types of membranes that can make up the waterproof layer, built-up systems that use bituminous materials are the most common. Another system seals overlapping rolls of synthetic materials, such as poly(vinyl chloride) PVC, rubber (EPDM), hypolan (CSPE) or thermoplastic polyolifins, together in a single-ply membrane. Hot or cold liquid systems can be sprayed or painted onto the roofing deck to create a joint free seal. Overlying soils and vegetation can extend the life of these waterproofing systems by protecting them from damaging ultraviolet light and extreme temperature fluctuations.

Fabric-reinforced, one- or two-component, fluid-applied elastomeric membranes is recommended. Fluid-applied elastomeric waterproofing membranes should not be installed when temperatures are below 40° F. The material cures to form a monolithic waterproof membrane. The recommended product is Hydrotech's Monolithic Membrane 6125 or approved equal.

Leak Detection System:

Roof leaks are a hazard to any roofing system; however, locating damaged waterproofing under several layers of a green roof can prove to be very difficult and costly. Electric field vector mapping (EFVM) is a relatively inexpensive leak detection system that charges the planting medium with electricity and looks for grounds, where moisture contacts the metal or concrete roof deck. Locating the source of the leak is still difficult without a leak detection system.

General Maintenance:

- Green roofs must be inspected at least four times annually and after every storm event exceeding 1 inch of rainfall. Check for and clear debris, sediment, dead vegetation, and check whether the growing medium has eroded or been transported to the drainage gutter or outlets.
- All structural components must be inspected for cracking, subsidence, spalling, erosion, and deterioration at least once annually.
- Disposal of debris, trash, sediment, and other waste material must be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste regulations.
- Access points for maintenance are required on all green roofs; these access points must be clearly identified in the maintenance plan. In addition, any special training required for maintenance personnel to perform specific tasks must be included in the plan.