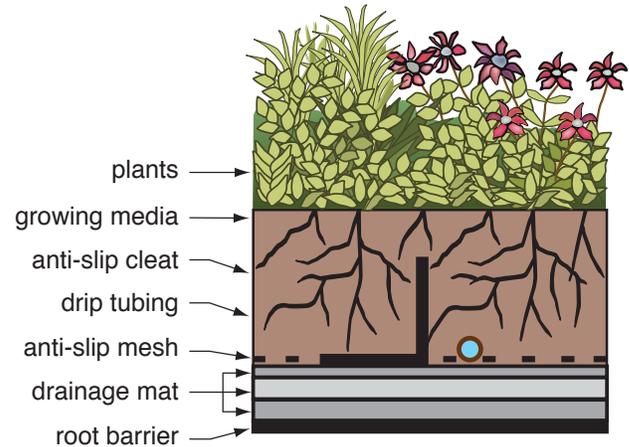
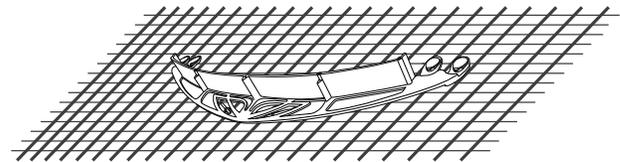


# DRAINAGE MAT SYSTEMS

*Drainage Mat Systems* are green roof systems underlaid with a geotextile composite called *Capillary Drainage Mat* that provides separation, drainage, water storage, and protection functions, eliminating the need for multiple components. The top layer is a separation fabric that retains green roof planting media while allowing unrestricted root penetration and water drainage; the middle layer is a coarse-fiber mat that provides controlled drainage; and the bottom layer is a puncture-resistant capillary mat with exceptional water storage and distribution properties. Drainage Mat Systems are ideal for sloped green roofs that require high water retention with limited drainage. They also provide a simple solution for residential and small commercial green roofs with slopes as low as 1/4:12.

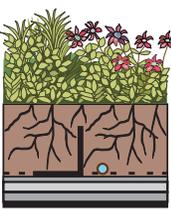


A structural slope-stabilization mesh is recommended when slopes are greater than 1:12; When slopes are greater than 2:12, cleats should be attached to the mesh and the system may require anchoring. Drip irrigation tubing attached to the mesh wets the capillary mat which captures and distributes the water.



stabilization mesh with cleat

## SYSTEM CHARACTERISTICS

Typical Cross-Section		
System Designation	M1	M2
Typical Plants	sedum herbs	sedum herbs perennials
Growing Media	3" extensive	5" extensive
Slope Stabilization Mesh	2" x 2"	2" x 2"
Capillary Drainage Mat	50 oz/yd <sup>2</sup>	50 oz/yd <sup>2</sup>
Root Barrier	30 mil	30 mil
Nominal Thickness	3"	5"
Saturated Weight	22 lbs/ft <sup>2</sup>	34 lbs/ft <sup>2</sup>
Annual Water Retention	50%	60%
Slope	> 1/4:12	> 1/4:12

## DRAINAGE MAT SYSTEM COMPONENTS

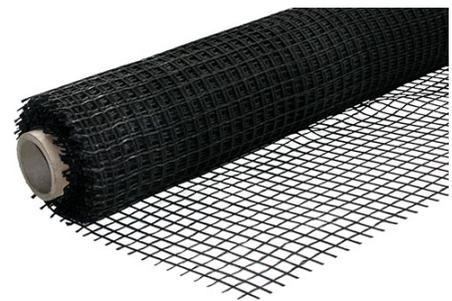
*Root Barrier* is a 30 mil (0.75mm) thick LLDPE sheet that provides exceptional resistance to root penetration, puncture, and tearing, yet offers good flexibility for ease of installation. It is highly resistant to environmental stresses on green roofs including air pollution, summer heat, and winter cold, and does not contain any recycled resins or plasticizers that can lead to premature aging or plant toxicity. Standard sizes are 10, 15, and 20 ft wide by 50 ft or 100 ft long. All sizes are folded so that the roll lengths are less than six feet. Seams should be taped or welded. Root barriers are not recommended when slopes are greater than 1:12 - use root-resistant waterproofing instead.



*Capillary Drainage Mat* is a 50 oz/lyd<sup>2</sup> (1700 g/m<sup>2</sup>) thermally-bonded laminate of three geotextiles. The top layer is Separation Fabric-SD with inter-fiber spaces carefully controlled to retain green roof planting media while allowing unrestricted root penetration and water drainage. The middle layer is a coarse-fiber mat with large inter-fiber spaces that provide controlled lateral water flow. The bottom layer is Capillary Mat with exceptional water storage capacity that can wick water vertically in excess of 6 inches. This composite also provides extraordinary mechanical strength and puncture resistance. Its dense structure assures that it will retain its hydraulic properties under long-term loading. Rolls measure 6' x 33.3' (1.8m x 10.2m) and are electrically scanned for metal debris. A 6" (15 cm) overlap is recommended.



*Slope-Stabilization Mesh* is a structural, coated-polyester mesh applied directly over Capillary Drainage Mat to distribute stresses on the mat, reinforce planting media, and provide anchorage for drip-irrigation tubing. When slopes are greater than 2:12, structural cleats are attached to the mesh to better transfer sliding forces from the media to the mesh. Since the mesh has large openings, water movement from the media to the mat and from the mat to the media is unaffected. The mesh is always unrolled in the direction of slope. Rolls measure 6' x 150' (1.8m x 46m). A 6" (15 cm) overlap is recommended.



*Anti-Slip Cleats* are plastic soil-retaining elements made of black recycled ABS. They are always used in conjunction with Slope-Stabilization Mesh and prevent soil from sliding down sloped green roofs by using the mesh to transfer soil loads to the top of the roof. If the roof is gabled or barrel-shaped, one side of the roof can be used to balance the other; otherwise the mesh must be mechanically fastened at the top of the roof. Rows of cleats are spaced 10" to 50", depending on the roof slope, and each row is offset from the rows above and below in order to equalize stresses on the mesh.



*Drain Boxes* are sturdy plastic roof drain covers made of black recycled ABS. Narrow slots on the sides and small holes on the top permit water to flow freely but retain growing and drainage medias. A wide base flange prevents flotation during repeated wet/dry and freeze/thaw cycling, and a 12" hole in the base provides unobstructed drain access. The standard sidewall height is 4", but heights up to 32" in 4" increments are possible with sidewall extensions.



*Drip Irrigation Tubing* is typically installed just under the surface of the growing media, often tied to a soil-reinforcing mesh. Anti-siphon, pressure-compensating, self-flushing emitters are embedded in the tubing at one foot intervals and the tubing is installed in parallel rows spaced one foot apart. This provides a uniform application rate of 250 gallons per 1000 square feet per hour, allowing the planting media to capture all of the applied water and distribute it uniformly across the roof.



*Aluminum Edge* securely retains green roof planting media at roof edges and separates planting media from gravel, decks, or pavers. Slots in the vertical face provide unrestricted water drainage in the critical first inch off the roof while retaining virtually all green roof planting media without use of separation fabrics that inhibit water flow. Large holes in the base permit penetration-free fastening to underlying waterproofing, root barriers, or geotextiles. Wide bases resist rollover, and optional diagonal braces are available to minimize bending under heavy soil loading. Prefabricated internal and external fittings provide strong, attractive corners. A unique connector also slides into the folds of both the lineals and corners, locking into the vertical slots to provide tight joints that allow thermal movement.



*Growing Media* is a blend of inorganic and organic components with a saturated, compacted density of 6 to 7 lb/ft<sup>2</sup> per inch of thickness (12-15 kg/m<sup>2</sup> per cm of thickness). The inorganic components are typically heat-expanded shale, heat-expanded clay, or natural pumice selected for high water retention, neutral pH, and low salt content. To minimize long-term settling and separation, inorganic particle sizes are uniformly and accurately graded from the several thousandths of an inch (fine sand) to 1/2" (12mm). A small amount of compost is blended with this inorganic base, typically 6% to 12% by weight depending on the plant palette. Coverage is typically 275 ft<sup>2</sup> one-inch thick per cubic yard (15m<sup>2</sup> one centimeter thick per cubic meter).

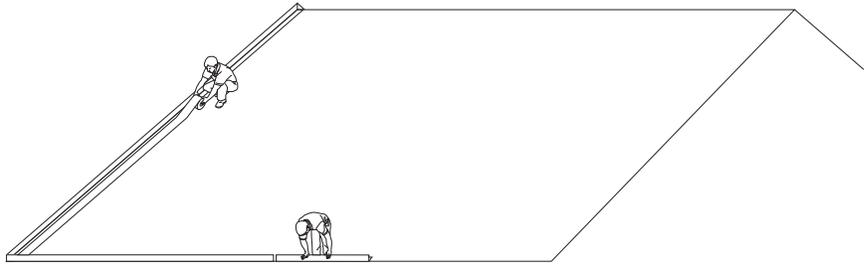


*Extensive Roof Fertilizer* is an ultra-slow-release micro-fertilizer specifically formulated to meet the nutritional requirement of sedum on extensive green roofs. It should be applied twice yearly beginning the second year, typically in April and July, at the rate of 2500 square feet per 10 lb pail.

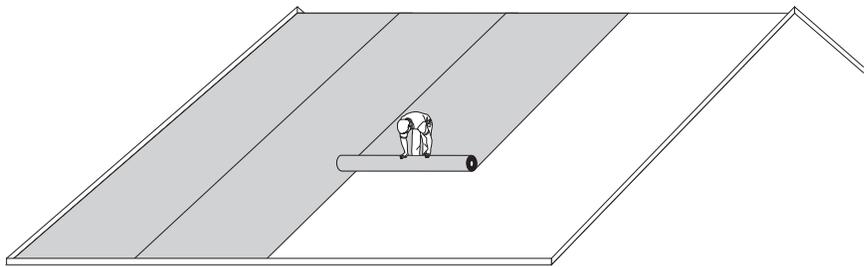


## DRAINAGE MAT SYSTEM INSTALLATION

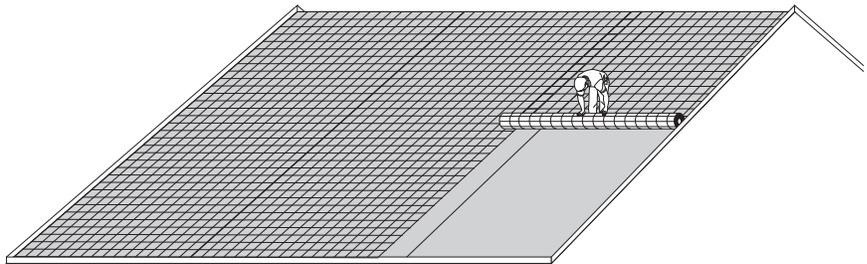
**Install Retaining Edge:** Position CT Retaining Edge near the roof edge and tape or weld it to the waterproofing membrane through the large holes in the base flange. Use fabricated corners for strength and join all parts with locking connectors.



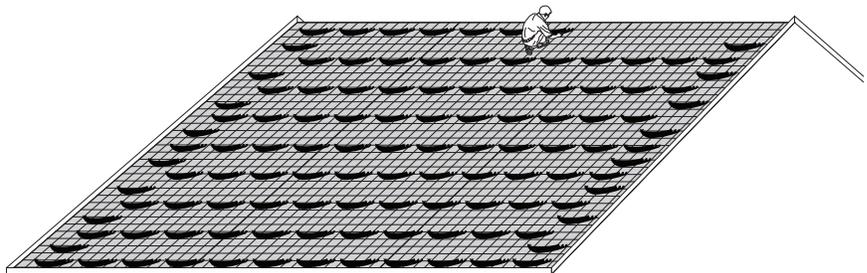
**Lay Drainage Mat:** If the primary roof waterproofing is not root resistant, and if the roof slope is less than 1:12, apply CT Root Barrier, either welding or overlapping three feet with sealing tape in the overlap. Then unroll CT Capillary Drainage Mat, overlapping adjacent sheets at least six inches. The mat should fully cover the base flange of the aluminum edge but should not turn up the vertical legs. (Note: If the slope is greater than 1:12, the primary waterproofing must be root resistant.)



**Unroll Slope Stabilization Mesh:** Slope stabilization mesh is required when slopes are greater than 1:12. Unroll the mesh in the slope direction, overlapping at least six inches. For gable or barrel-vault roofs with equal slopes in opposite directions, it is essential that a single length of mesh runs from one eave to the other so that soil loads on one half of the roof balance the other half. For shed roofs or half vaults, the mesh must be structurally anchored at the high end of the roof with a system approved by a structural engineer.

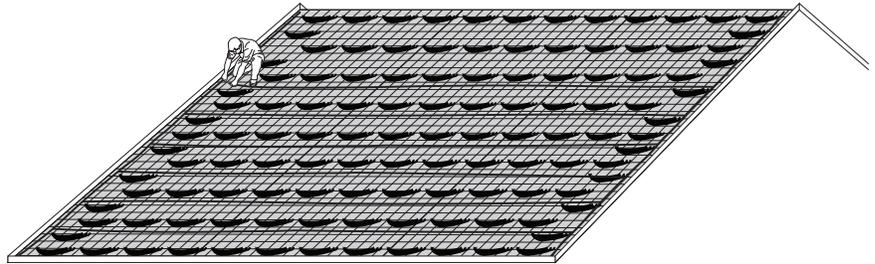


**Attach Slope Stabilization Cleats:** The cleats clip onto the mesh and are required when slopes are greater than 2:12. Conservation Technology will supply a drawing showing the row spacing and location of all cleats. Note that cleats in adjacent rows must be offset one-quarter cleat to distribute the structural load on the mesh.

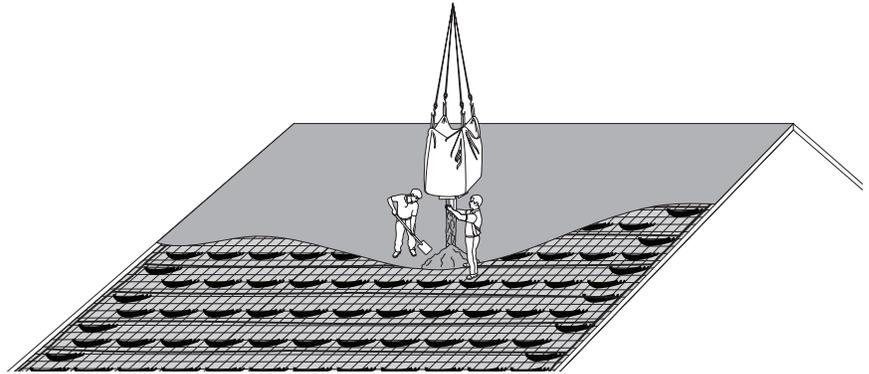


**Fasten Drip Irrigation Tubing:**

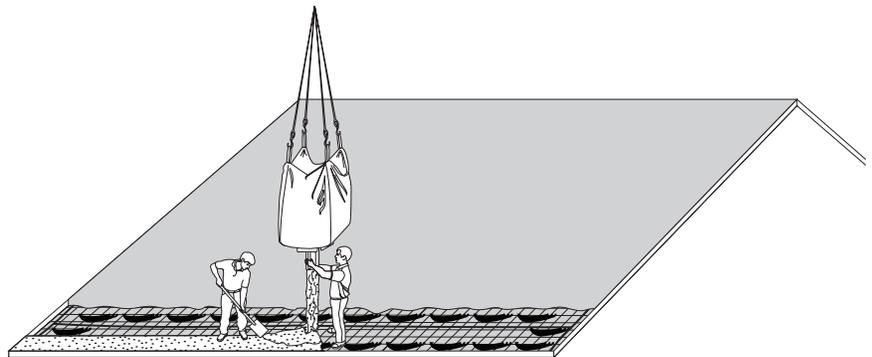
Drip irrigation is recommended for all green roofs with slopes greater than 1:12. Conservation Technology will supply a drawing showing the row spacing and location of all drip lines which can be attached to the slope-stabilization mesh with plastic tie strips.



**Spread Planting Media:** Uniformly apply growing media at the rate of one cubic yard per 300 square feet per inch thickness, taking care not to displace retaining edges or to create concentrated roof loads. Place material at least 15% higher than the desired grade to allow for compaction.



**Spread Gravel Perimeter:** Spread well-washed gravel screened to 3/8" minimum particle size. Be careful not to displace retaining edges or to create concentrated roof loads.



**Plant:** Insert plugs two to three per square foot in a random pattern, broadcast cuttings at the rate of 60-100 pounds per square foot, or place sedum mats. Water thoroughly after installation and as needed to prevent excessive drying until the plants are fully established. Broadcast Optigreen Slow Release Fertilizer twice yearly on extensive roofs.

**Note:** The sequence above is for roofs without parapet walls and with slopes greater than .For roofs with parapet walls, install the aluminum approximately 18" from the parapet and fill the space between with gravel.

