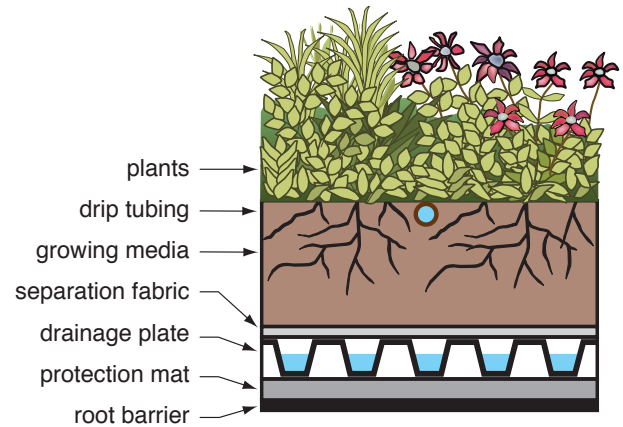
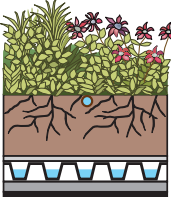

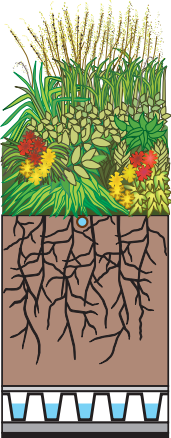



DRAINAGE PLATE SYSTEMS

Drainage Plate Systems are green roof systems underdrained with waffled sem-rigid plastic sheets called *drainage plates*. Water is retained within pockets on the upper sides of the plates while excess water flows through small holes and spills over the edges to be carried off the roof. A separation fabric over the top of the plates retains growing media while allowing water to drain freely. An air gap between the separation fabric and the high water level of the pockets provides additional drainage during heavy rains and prevents root rot. Drainage Plate Systems have very high drainage capacity in all directions which makes them ideal for roofs with slopes less than 1:12 in wet climates or climates with intense rainfall.

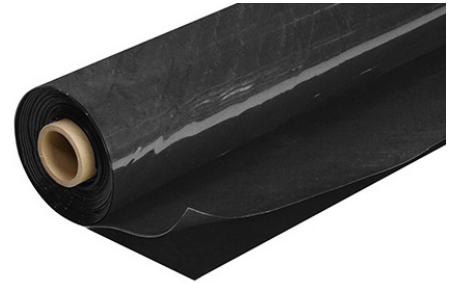


SYSTEM CHARACTERISTICS

Typical Cross-Section				
System Designation	P1	P2	P3	P4
Typical Plants	sedum herbs	sedum herbs perennials	perennials grasses shrubs	grasses shrubs trees
Growing Media	3" extensive	5" extensive	9" semi-intensive	13" intensive
Separation Fabric	6 oz/yd ²	6 oz/yd ²	6 oz/yd ²	6 oz/yd ²
Drainage Plate	1"	1"	1-1/2"	1-1/2"
Protection Mat	16 oz/yd ²	16 oz/yd ²	16 oz/yd ²	16 oz/yd ²
Root Barrier	30 mil	30 mil	30 mil	30 mil
Nominal Thickness	4"	6"	10"	14"
Saturated Weight	22 lbs/ft ²	34 lbs/ft ²	58 lbs/ft ²	82 lbs/ft ²
Annual Water Retention	50%	60%	70%	80%
Slope	level to 1:12	level to 1:12	level to 1:12	level to 1:12

DRAINAGE PLATE SYSTEM COMPONENTS

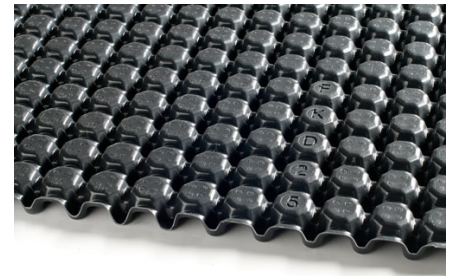
Root Barrier is a 30 mil (0.75mm) thick LLDPE sheet that provides exceptional resistance to root penetration, puncture, and tearing, yet offers good flexibility for ease of installation. It is highly resistant to environmental stresses on green roofs including air pollution, summer heat, and winter cold, 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.



Protection Mat is a thick, 16 oz/lyd² (540 g/m²), non-woven geotextile made from 100% recycled polyester fiber. Its toughness and puncture-resistance makes it ideal as a base protection layer for green roof systems. With a water storage capacity of 0.08 gal/ft² (3 l/m²) and moderate capillarity, it can retain and distribute water that would otherwise run off the roof. Rolls measure 6' x 67' (1.8m x 20.4m) and are electrically scanned for metal debris. A 6" (15 cm) overlap is recommended). *CT Water Retention Mat* can be substituted for enhanced stormwater runoff mitigation.



Drainage Plates are semi-rigid waffled plastic sheets that retain water within pockets on the upper side and drain water below. An air gap between separation fabric resting on top and the high water level of the pockets provides additional drainage capacity during heavy rains and prevents root rot. Small holes facilitate drainage but also allow air pressure equalization to minimize the potential for wind uplift. Sheets measure 39" x 79" (1m x 2m) and cover approximately 18 ft² (1.7 m²) of roof with a 3" (7.5 cm) overlap plus a minimal allowance for waste. Standard thickness are 1" (25mm), 1-1/2" (40mm), and 2-1/2" (60mm).



Separation Fabric-HD is a 6 oz/lyd² (200 g/m²) porous, non-woven geotextile made from a blend of polypropylene and polyester fibers. Unlike common filter fabrics, it achieves mechanical strength without heat treatment and retains an open, three-dimensional surface structure that is highly resistant to clogging. The internal pore size distribution is carefully controlled to retain green roof planting media without restricting root penetration or water drainage. Rolls measure 6' x 100' (1.8m x 30.5m) and are electrically scanned for metal debris.



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.



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. Standard heights are 3", 4", 6", and 8".



Growing Media is a blend of inorganic and organic components with a saturated, compacted density of 6 to 7 lb/ft² per inch of thickness (12-15 kg/m² 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 ft² one-inch thick per cubic yard (15m² one centimeter thick per cubic meter).



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.



Reinforcing Mesh is a structural plastic mesh typically applied just under the surface of the growing media. It is used to strengthen media exposed to foot traffic, prevent wind uplift, and provide anchorage for irrigation tubing. Large openings do not block plant growth and are sufficiently large for sedum plugs. Rolls measure 6' x 150' (1.8m x 46m).

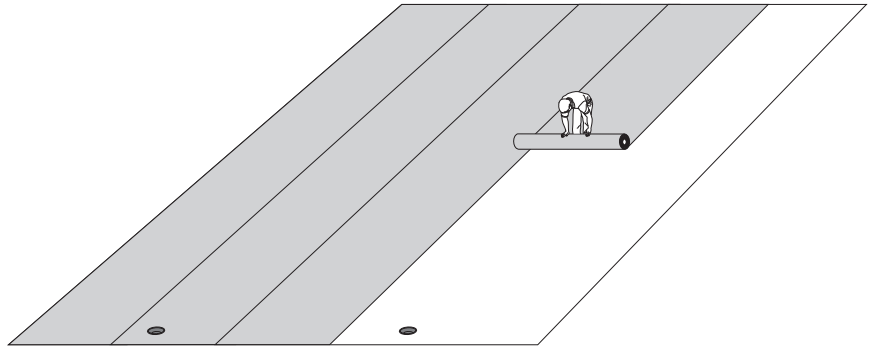


Extensive Roof Fertilizer is an ultra-slow-release micro-fertilizer specifically formulated to meet the nutritional requirement of sedum on extensive green roofs. It should be applied twice yearly beginning the second year, typically in April and July, at the rate of 2500 square feet per 10 lb pail.

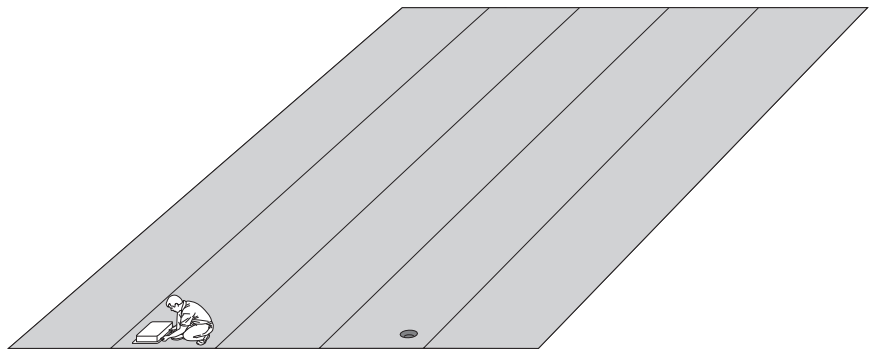


DRAINAGE PLATE SYSTEM INSTALLATION

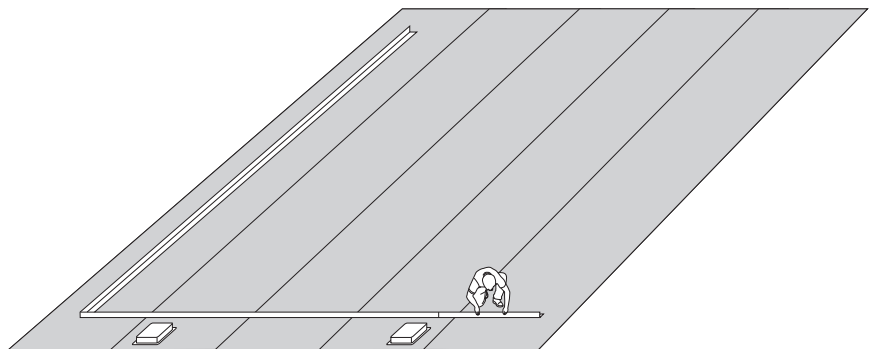
Lay root barrier and protection mat: If the primary roof waterproofing is not root resistant, first apply Root Barrier, either welding or overlapping three feet with sealing tape in the overlap. Then unroll Protection Mat, overlapping adjacent sheets at least six inches. Cut openings in the root barrier and protection mat for each roof drain.



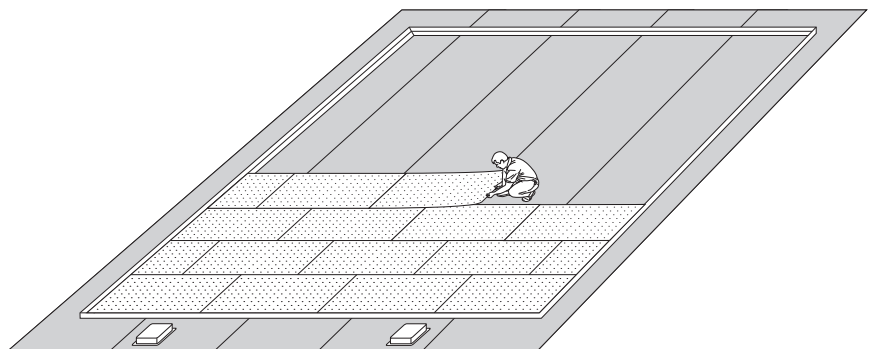
Set Roof Drains: Position Drain Boxes over the drains, adding sidewall elements as needed to match the system thickness.



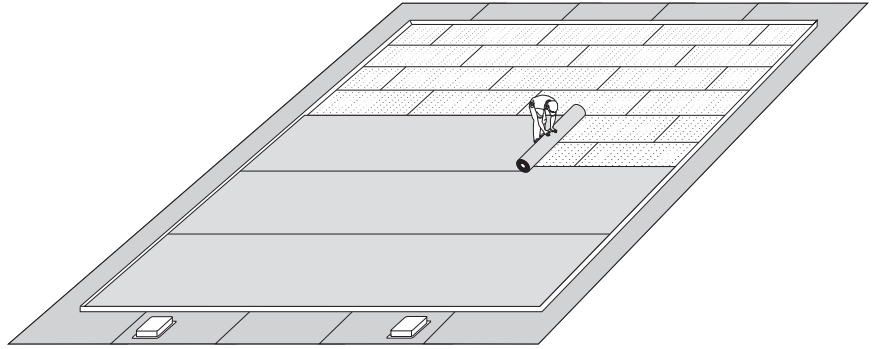
Install Aluminum Edge: Position Aluminum Edge at least 18" from roof edges. If there is a gravel perimeter, the gravel and planting media will exert even pressure so the retaining edge does not need to be attached. If there is no gravel perimeter, the retaining edge should be taped or welded to the waterproofing membrane before the protection mat is installed.



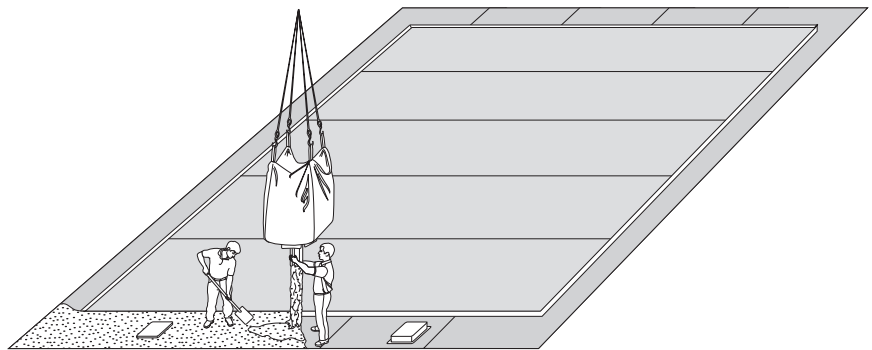
Lay Drainage Plates: Position Drainage Plates in a staggered pattern, overlapping sides and ends by two cups. Multiple layers of plastic plates can be easily cut with a circular saw, or half-sheets can be purchased to speed installation. Carefully place or cut the drainage plates within 1/4" of the interior of CT Retaining Edge.



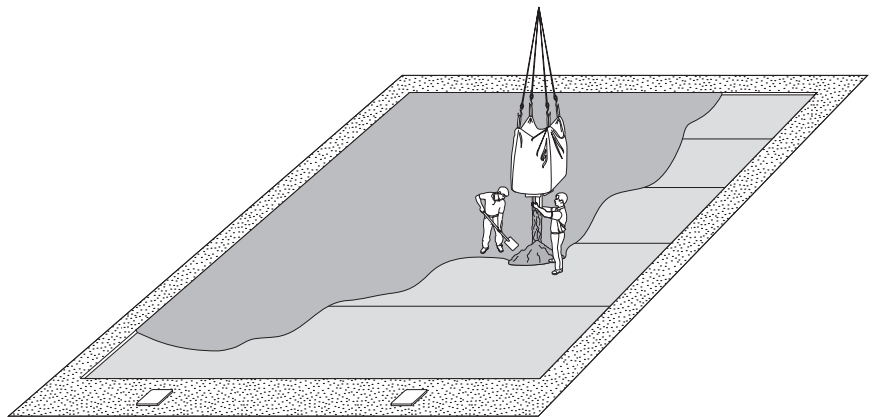
Lay Separation Fabric: Unroll Separation Fabric HD over the drainage plates, overlapping adjacent sheets at least six inches. Cut the fabric to length so that it wraps up the interior of the retaining edge. The underlying drainage plates must be sufficiently close to the retaining edge so that the fabric cannot drop down to block the drainage slots.



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.



Spread Planting Media: Uniformly apply growing media at the rate of one cubic yard per 275 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 and compact using a four foot wide landscape roller weighing 200 to 300 lbs when filled. Add more media if necessary to fill low spots.



Plant: Insert plugs two to three per square foot in a random pattern, broadcast cuttings at the rate of 60 to 100 pounds per 1000 square feet, or place sedum mats. Water thoroughly after installation and as needed to prevent excessive drying until the plants are fully established. Broadcast Extensive Roof Fertilizer twice yearly.

