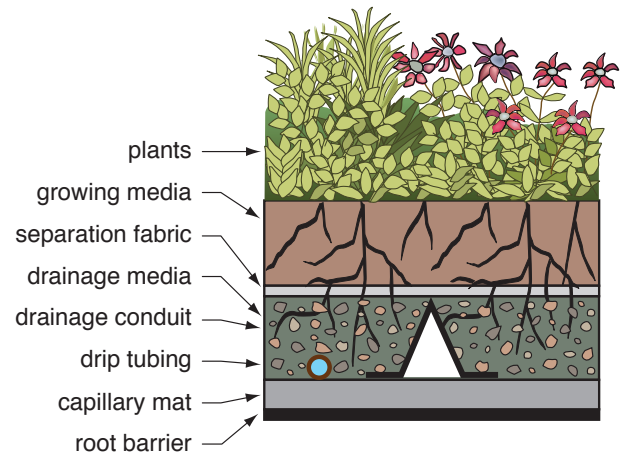
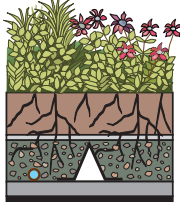

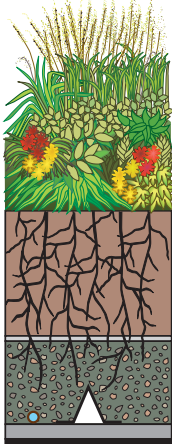



DRAINAGE MEDIA SYSTEMS

Drainage Media Systems are green roof systems underdrained with a layer of uniformly graded, lightweight, inorganic media. A high-performance capillary mat below the media captures and distributes excess water that drains through the media, while a network of slotted plastic drainage conduit above the mat provides supplemental drainage during heavy rainfall. During extended periods of dry weather, optional drip-irrigation lines placed directly over the capillary mat can provide super-efficient, uniform water delivery and encourage deep root growth. Although granular media is heavier than other green roof drainage materials, it provides an optimal environment for plant root growth for roofs with slopes less than 1:12.

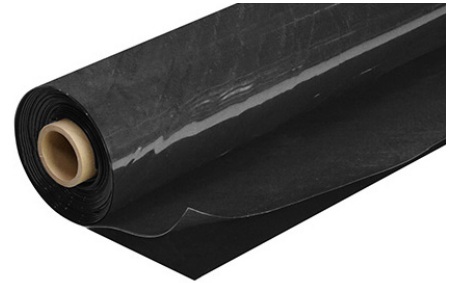


SYSTEM CHARACTERISTICS

Typical Cross-Section				
System Designation	G1	G2	G3	G4
Typical Plants	sedum herbs	sedum herbs perennials	perennials grasses shrubs	grasses shrubs trees
Growing Media	2" extensive	4" extensive	6" semi-intensive	10" intensive
Separation Fabric	4 oz/yd ²	4 oz/yd ²	4 oz/yd ²	4 oz/yd ²
Drainage Media	2"	2"	4"	4"
Capillary Mat	28 oz/yd ²	28 oz/yd ²	28 oz/yd ²	28 oz/yd ²
Root Barrier	30 mil	30 mil	30 mil	30 mil
Nominal Thickness	4"	6"	10"	14"
Saturated Weight	25 lbs/ft ²	37 lbs/ft ²	60 lbs/ft ²	84 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 MEDIA 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.



Capillary Mat is a thick, 28 oz/lyd² (950 g/m²), non-woven geotextile made from 100% polyester fiber. It is non-biodegradable, is highly puncture resistant, has a water storage capacity of 0.1 gal/ft² (4.2 l/m²), and spreads water in all directions including more than six inches vertically. These properties make it ideal for protection, water storage, and water distribution in green roof systems. Rolls measure 6' x 50' (1.8m x 15.3m) and are electrically scanned for metal debris. A 6" (15 cm) overlap is recommended).



Triangular Drainage Conduits are black recycled ABS plastic drainage elements with continuous slotting on each side. They are embedded in Granular Drainage Media to carry excess water to roof drains or scuppers during periods of heavy rainfall. Each element is 40" (1 m) long and 2" (5 cm) tall. The unique triangular cross-section provides optimal surface area and prevents the channel from floating upward during repeated wet/dry and freeze/thaw cycling. Interlocking ends allow rotation, and tees are available to create branched drainage systems.



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. Triangular knockouts in each sidewall panel accept Triangular Drainage Conduit.



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. 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.



Drip Irrigation Tubing is typically installed at the base of a granular drainage system, either directly on the Capillary Mat or over the Granular Drainage Media. Anti-siphon, pressure-compensating, self-flushing emitters embedded in the tubing provide a controlled application rate of only 100 gallons per 1000 square feet per hour. At this rate, the Capillary Mat captures all of the applied water and distribute it uniformly across the roof. Bottom-irrigation encourages deeper root growth than surface or sub-surface irrigation and reduces evaporative losses.



Granular Drainage Media is a water-retaining, free-draining, lightweight inorganic media that serves both as a drainage layer and as a root-development zone. It is made from heat-expanded shale, heat-expanded clay, or natural pumice selected for neutral pH and low salt content. Particle sizes are uniformly and accurately graded from 1/8" (3mm) to 1/2" (12mm) to minimize settling and separation. Typical saturated compacted densities are 4 to 5 lb/ft² per inch of thickness (8 to 10 kg/m² per cm of thickness), and coverage is typically 300 ft² one inch thick per cubic yard (16m² one centimeter thick per cubic meter).



Separation Fabric SD is a 4 oz/yd² (135 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.



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).



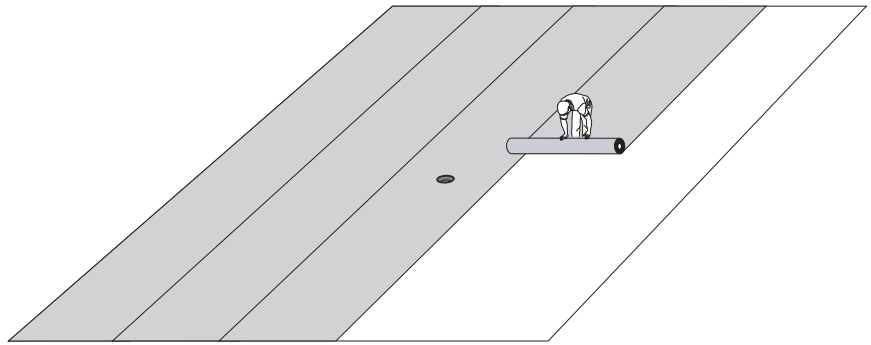
Extensive Roof Fertilizer is an ultra-slow-release micro-fertilizer specifically formulated to meet the nutritional requirement of sedum on extensive green roofs. It should be applied twice yearly beginning the second year, typically in April and July, at the rate of 2500 square feet per 10 lb pail.



DRAINAGE MEDIA SYSTEM INSTALLATION

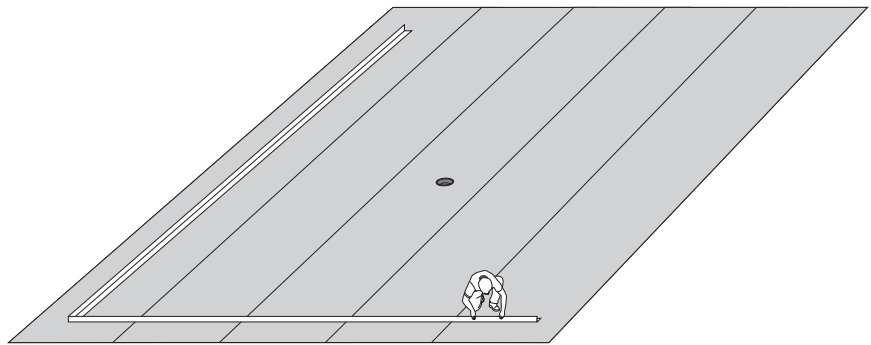
Lay root barrier and capillary mat:

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 Capillary Mat, overlapping adjacent sheets at least six inches. Cut openings in the root barrier and protection mat for each roof drain.



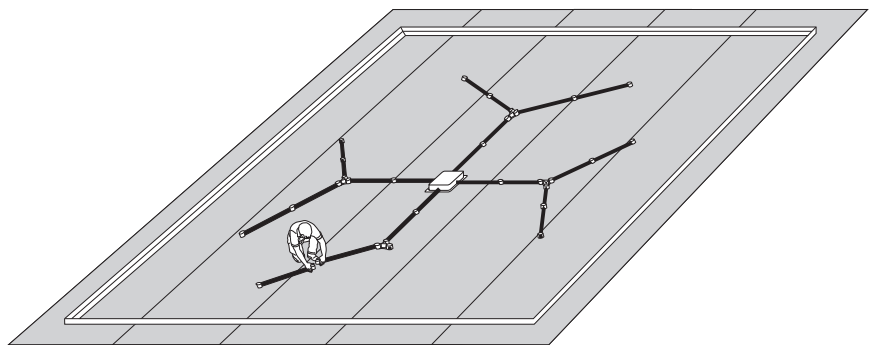
Install Aluminum Edge:

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.



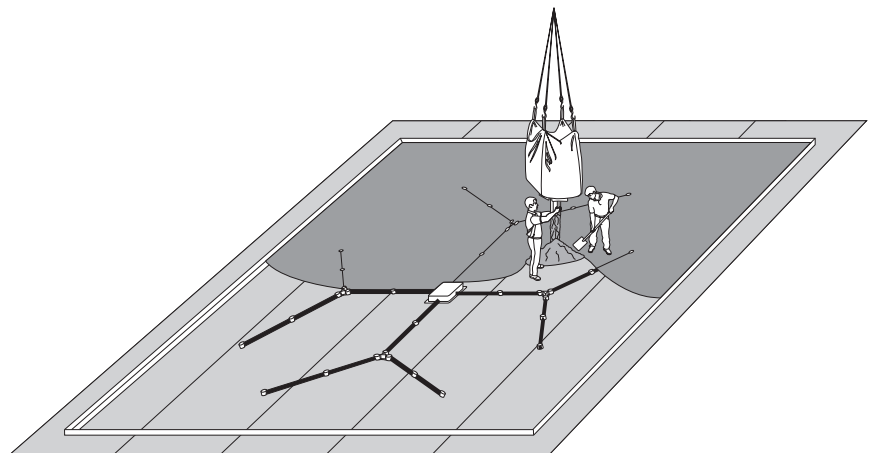
Install Drainage System:

Position Drain Boxes over roof drains, adding sidewall elements as needed to match the system thickness. Construct drainage "trees" using triangular drainage channels and tees so that the "branches" positioned so that every point on the roof is within two channel lengths of the closest point of the drainage tree.

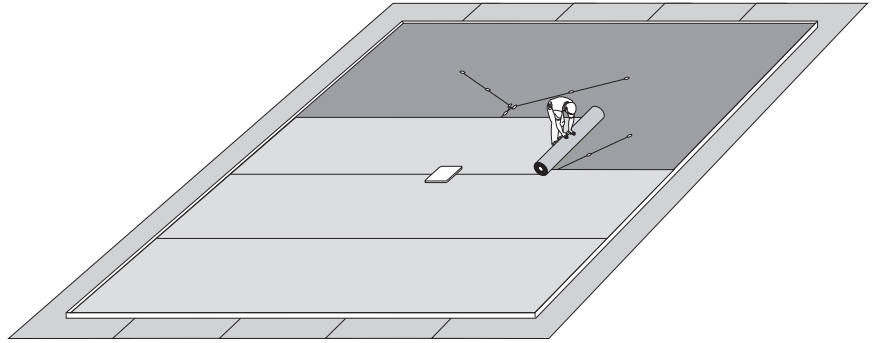


Spread Granular Media:

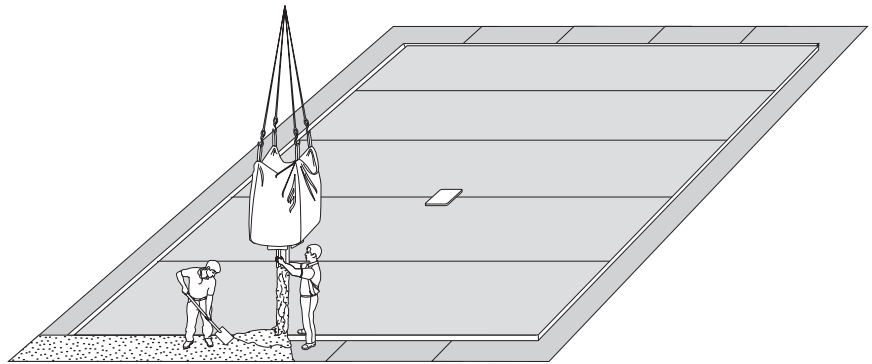
Uniformly apply Granular Drainage Media to the top of the drainage channels, or approximately one cubic yard per 150 square feet. For intensive greenroofs, apply one cubic yard per 75 square feet.



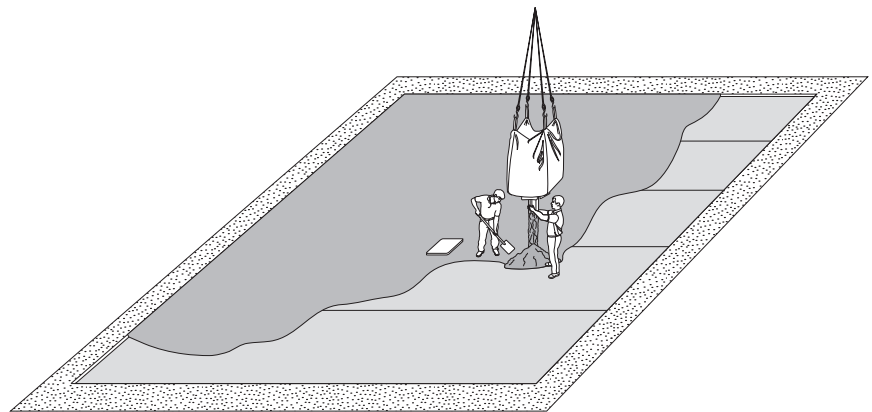
Lay Separation Fabric: Unroll Separation Fabric over the drainage media, overlapping adjacent sheets at least six inches. Cut the fabric to length so that it wraps up the interior of the retaining edge.



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 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 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.

