

Membrane Protection Layers

- g. Geotextile Protection layer

Note to specifier: The protection layer group immediately below is common over modified bitumen, EPDM, and some TPO membranes.

Membrane Protection Layers

- g. Air layer
- h. Geotextile Protection layer

Note to specifier: The protection layer group immediately below is most common over an HRA membrane in an IRMA configuration.

Membrane Protection Layers & Insulation

- f. Insulation (Division 07 "_____")
- g. Root barrier

Membrane

- j. Roofing membrane (Division 07 "_____")

Note to specifier: The profile example below is an EcoCline intensive assembly. List as many or as few profiles as needed.

- 2. Typical Intensive Profile consists of, from top to bottom:

Growth and Retention Assembly

- a. Plants
- c. Growth media (depth varies per drawings)
- d. Filter fabric

Note to specifier: Select one of the two options below. We generally prefer drainage media for intensive assemblies. Coordinate with Part 2.

- e. Drainage media
- e. Composite drainage layer

Note to specifier: The protection layer group immediately below is most common over an HRA membrane in an IRMA configuration. These layers may vary.

Membrane Protection Layers & Insulation

- f. Insulation (Division 07 "_____")
- g. Root barrier

Membrane

- h. Roofing membrane (Division 07 "_____")

Note to specifier: List other accessories that are integral to the green roof.

- C. This Section includes the following vegetated roof covering accessories:

- 1. Edging
- 2. Drainage Accessories
- 3. Gravel Roof Ballast

Note to specifier: Keep 'Rooftop Pavers' or delete in entirety.

- 4. Rooftop Pavers

- D. This Section includes warranty of the Vegetative Roof Covering.

1.03. PERFORMANCE REQUIREMENTS:

Vegetated roof covering system shall:

Note to specifier: Edit the two numbers below based on the EcoCline brochure or EcoCline data sheets for weight and retention. The example below is for an EcoCline 2+2 system.

Consult the project civil engineer.

- 1. Retain at least 1.50 gallons of captured water per square foot.
- 2. Weigh not more than 30 lbs per square foot, fully saturated.

Note to specifier: Use one or both of the two lines below or delete in entirety. If editing, enter the regulatory approval or agency in the blanks. For example, the runoff curve number of 77 is the Maryland Department of the Environment’s rating for an EcoCline +2 system. Consult the project civil engineer.

3. Conform with _____.
3. Be rated for a runoff curve number of 77 or better per _____

Note to specifier: Compliance with wind uplift requires both system design by the specifier and product compliance. Be sure to design to comply.

4. Comply with wind uplift standard ANSP/SPRI RP-14.

Note to specifier: Compliance with fire code requires both system design by the specifier and product compliance. Be sure to design to comply.

5. Comply with ANSI VF-1 and attain a Class A fire rating per ASTM E-108 or UL 790-04.
6. Support a perennial plant landscape.
7. Provide efficient drainage of moisture that is in excess of moisture required for the vigorous growth of the installed vegetation.
8. Protect roofing materials from damage caused by exposure to ultraviolet radiation, physical abuse, and rapid temperature fluctuations.

1.04. DEFINITIONS

A. Standard Definitions

1. Captured Water: Water that is retained within the vegetated roof covering system after new water additions have ceased and that cannot escape the system except through evaporation or plant transpiration.
2. Extensive Green Roof: Vegetated roof covering with a total media thickness of 6 inches or less.
3. Green Roof: Synonymous with vegetated roof covering.
4. Intensive Green Roof: Vegetated roof covering with a total media thickness of 12 inches or more.
5. Semi-Intensive Green Roof: vegetated roof covering with a total media thickness of greater than 6 inches but less than 12 inches.
6. Vegetative Coverage: Coverage of the roof area by any part of living and rooted vegetation, measured as the percentage of media covered by vegetation. Full vegetative coverage is achieved when at least ninety percent (90%) of the media is covered by desirable species of vegetation during the period of greatest growth (typically May and June for extensive roofs), and at least seventy percent (70%) of the media is covered by desirable species of vegetation during periods of dormancy (such as winter or drought).
7. Vegetated Roof Covering: System of living plants, installed in a growing medium with drainage system over a roofing system. Vegetated roof covering system may include a protection layer, a root barrier and/or insulation as required for compatibility with the roofing system. Vegetated roof covering system may also include accessories such as edging, roof gravel, access pavers, drainage access chambers, or wind protection.
8. Vegetated System Installer: Company that installs the vegetated roof covering system. The Vegetated System Installer may be the same company as the Roofing Installer.
9. Vegetated System Manufacturer: Company that provides and warrants the vegetated roof covering system. Company that offers long-term support for the completed vegetated roof covering system.
10. Roofing Installer: Company that installs the building roofing system.
11. Roofing Manufacturer: Company that provides and warrants the building roofing system.

- E. Warranty: Sample warranty. Include with the sample warranty options for the Owner to extend the terms of the warranty, and to transfer the warranty, if available. Include details of warranty phase Stewardship program.
- F. Roofing Certification: Signed by the Roofing Manufacturer, certifying that the proposed vegetated roof covering system is fully compatible with the roofing system and that the roofing system is eligible for a warranty from the Roofing Manufacturer.
- G. LEED Submittals:
 - 1. Product Data for Credit MRc4: For products having recycled content, documentation indicating percentages by weight of post-consumer and pre-consumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Data for Credit MRc5: Documentation of percentages of materials of each product produced within 500 miles of the project site.
- H. Warranty Submittals: Stewardship reports, media tests and other warranty phase submittals per Part 3 of this Section.

1.08. DELIVERY, HANDLING AND STORAGE

- A. Deliver plants to the jobsite in undamaged boxes or pallets that are clearly marked with the project name, contractor name, Vegetative System Manufacturer’s name, and plant species included.
- B. Store plants in a sun-lit but shaded outdoor area. Irrigate as needed and in accordance with directions of the nursery. Install plants within 24 hours of receipt or unpackage and care for before installation.
- C. Each delivery of bulk materials shall be accompanied by a delivery ticket indicating the specific product delivered, weight of delivery, name and address of manufacturer or place of origin, shipper, recipient, date and time of delivery, and project name. Unless installing bulk materials immediately upon receipt, place bulk materials on a tarp or in a container; cover with a tarp to minimize contamination, protect from weed seed infiltration, and maintain in a dry condition.
- D. Maintain rolled and sheet goods in manufacturer's original packaging; store in a safe and secure location until installation.
- E. Palletize and cover pavers and masonry materials; store in a safe and secure location until installation.

1.09. PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit work to be performed when optimum results may be obtained. Apply products during favorable weather conditions according to Vegetated System Manufacturer’s written instructions and warranty requirements. Do not plant herbaceous materials when planting media temperatures are below freezing or when ice or snow is present.

1.10. WARRANTY

Note to specifier: Keep or delete “and Roofing” below. Deleting “and Roofing” will allow separate green roof and membrane warranties without compromising warranty coverage of the underlying membrane. Keeping “and Roofing” below will provide a single warranty for both roofing and green roofing. EcoCline is available with a single source roofing warranty with TPO, PVC, KEE, and HRA membranes.

- A. Provide a Single Source System Warranty, issued by the Vegetated System **and Roofing** Manufacturer direct to the Owner. Warranty shall include all coverages listed below.
- B. Terms: All terms begin immediately upon installation and continue through Substantial Completion. Terms listed below are terms which commence upon Substantial Completion.

Note to specifier: Edit the four numbers as needed. The most common terms are listed below. Plant performance should be coterminous with maintenance (stewardship).

- 1. Workmanship Warranty: Two years
- 2. System Warranty: **Twenty years, coterminous with waterproofing membrane**
- 3. Overburden Warranty: **Twenty years, coterminous with waterproofing membrane**
- 4. Plant Performance: **Five years**

- C. Workmanship Warranty: Vegetated System Manufacturer agrees to repair or replace portions of the vegetated roof covering system that fail in workmanship within specified warranty period.
- D. System Warranty: Vegetated System Manufacturer agrees to repair or replace portions of the vegetated roof covering system that fail in materials within specified warranty period.
1. Failures include but are not limited to:
 - a. Loss of system permeability or drainage capacity
 - b. Development of conditions detrimental to plant growth
 - c. Cracked or disintegration of pavers due to freeze-thaw cycling
 2. Limitations: Term of paver warranty is limited to ten (10) years.
- E. Overburden Removal and Replacement Warranty: Vegetated System Manufacturer agrees to remove and replace portions of vegetated roof covering in order to allow access to the Roofing Membrane in order that leaks may be accessed for repairs.
- F. Plant Performance: Vegetated System Manufacturer shall act as Steward of the vegetated roof covering system as described in Part 3.
1. Vegetative Coverage:

Note to specifier: Edit the numbers below based on initial planting density and project requirements. Allow a minimum of 12 months for cuttings, plugs and/or seed. If using pre-grown Sedum mats, edit “within 24 months” to be “upon”.

 - a. Achieve full vegetative coverage within 24 months of Substantial Completion.
 - b. Maintain full vegetative coverage for the duration of the warranty period.
Replace or supplement plants in areas that do not achieve the specified coverages within the warranty period. Immediately remove dead plants and replace as soon as growing conditions permit.
 2. Failures include, but are not limited to, death and unsatisfactory growth except for defects resulting from abuse or incidents that are beyond Vegetated System Manufacturer's control.

PART 2: PRODUCTS

2.01. CONTINUOUS VEGETATED ROOF COVERING SYSTEM

Note to specifier: Edit the text below based on whether equivalents are allowed, and if so, which are pre-approved.

- A. Subject to compliance with requirements, provide one of the following:
1. EcoCline by Furbish
 2. Or Approved Equivalent. Any equivalent must comply with the “Performance Requirements” article and other project requirements as determined by the Architect.

2.02. PLANTS

Note to specifier: Edit the list below or delete in entirety. Furbish can provide a customized list with optimal species per profile per climatic/microclimatic zone. If listing species within the specification, either omit species from the drawings or ensure that species listed on the drawings are an exact match. If specific arrangement of species is required, it is preferable to omit species from the specifications and list on the drawings instead.

- A. Species:
1. As shown on drawings for intensive areas and per list below for extensive areas.
 2. For extensive areas, include at least 7 of the following species, and per approved submittals:
 - Allium cernuum
 - Allium schoenoprasum
 - Allium senescens ssp. montanum var. glaucum
 - Delosperma cooperi
 - Delosperma nubigenum
 - Dianthus carthusianorum
 - Phedimus takesimensis 'Golden Carpet'
 - Sedum acre
 - Sedum aizoon 'Euphorbiodes'

- Sedum album
- Sedum album 'Murale'
- Sedum hybridum 'Immergrunchen'
- Sedum kamtschaticum
- Sedum kamtschaticum var floriferum 'Weihenstephaner Gold'
- Sedum pulchellum
- Sedum reflexum 'Blue Spruce'
- Sedum rupestre 'Angelina'
- Sedum sieboldii
- Sedum sexangulare
- Sedum spurium 'Fuldaglut' and other cultivars
- Talinum calycinum

Note to specifier: *Select from the five most common options below. EcoCline is typically planted via a combination of cuttings, plugs, and seed. EcoCline may be planted with pre-grown mats for an additional cost. Bulbs are sometimes used for accent plants, if species such as Crocus are requested. Initial application rates are not listed below, as the specification is written as a performance specification, requiring a certain percentage of coverage within specified timeframes. If EcoCline is installed, Furbish will ensure that application rates and post-installation Stewardship will be performed to meet performance specifications. Plugs may be installed as low as 500 per 1000 SF, but should not be planted more densely than 3 per SF. Cuttings may be installed as low as 25 lbs per 1000 SF, but should be supplemented regularly during Stewardship.*

B. Cuttings:

1. Sedum species or other approved species that develop aerial roots that will rapidly root in-situ into growing media.
2. Length: At least 0.75-inches.
3. Not in bloom.
4. Harvested on-demand.

Note to specifier: *Plugs provide opportunity for the broadest species selection. Specify 50-cell or 32-cell plugs for some non-Sedum plants. Inquire with Furbish for details.*

C. Plugs:

1. Vigorous, well rooted, and established in the plug cells in which they are growing. Tops shall be of good quality. Root system shall be well-established root system and reaching the sides of the container to maintain a firm ball. Plants shall be free of disease.
2. Size: 72-cell trays. Each plug shall measure 1-1/2 inches x 3 inches.

D. Bulbs: Top Size, including corresponding designation of "Jumbo", "Giant" or "Extra Large", per ANSI Z60.1.

E. Seed:

1. Provide clean dry seed with a purity rate over 95%.
2. Mix seeds with fine sand to allow even sowing at a rate of 1/8 oz. of seed per Gallon of sand.
3. Sow seed at a rate of 1 oz. seed per 1000 SF of coverage.

Note to specifier: *Pre-grown Sedum Mats are generally limited to approximately 12 species. See EcoCline data sheet.*

F. Pre-Grown Sedum Mat:

1. Provide pre-grown mats that are mature and ready to plant, free of weeds, with at least 95% vegetative coverage.

2.03. GROWTH AND RETENTION ASSEMBLY

Note to specifier: *The selection of temporary wind protection may vary greatly depending upon season of initial planting, availability of temporary irrigation water, and site microclimate. Listing options below allows clarification via submittals.*

A. Temporary Wind Protection:

1. Material: Manufacturer's standard organic tackifier, biodegradable jute netting, or temporary shade cloth.

- B. Weed-Suppressing Layer: An engineered aggregate material designed to provide anchorage for plant roots and maintain a high percentage of macropore space which rapidly drains in order to minimize germination of weed seed.

Note to specifier: Choose one of the two options below for extensive profiles. The weed-suppressing layer is the top layer of the EcoCline profile. The first option is EcoCline Media B2. The second option is EcoCline Media R. See EcoCline data sheets.

- 1. Mineral Material: >60% post-industrial or demolition product crushed brick. Maximum particle size: 5/8".
- 1. Mineral Material: Locally quarried or re-used roof ballast. Maximum size: 2-1/2".
- 2. Organic Material: < 5% per volume.

Note to specifier: Always keep the nutrient zone below for any extensive EcoCline profile.

- C. Nutrient Zone Layer: An engineered soil-like material designed to provide anchorage for plant roots, maintain a relatively high CEC for optimal nutrient availability to plants, and maintain a high percentage of micropore space which maintains moisture within the high-CEC zone.

- 1. Mineral Material: >90% post-industrial or demolition product crushed brick. Less than 2% of mass shall contain particle sizes smaller than 0.25 mm.
- 2. Organic Material: 100% post-industrial pine fines. Organic material shall not exceed 20% per volume of combined weed-suppressing and nutrient zone layers.

Note to specifier: Keep or delete the intensive media below.

- D. Intensive Growth Media.

- 1. Primary components: Locally sourced aggregates, post- industrial and post-consumer compost, expanded slate.
- 2. Particle size 90% <= 3/8"
.....(FLL-compliant for intensive sites)
- 3. Maximum Water Retention..... 40-45% ASTM E-2399
- 4. Bulk Density (dry)..... 70-72 lbs/cf
- 5. Bulk Density (wet) 92-97 lbs/cf
- 6. Water permeability 0.08 in/min
- 7. Organic matter5-10% mass
- 8. pH6-8.5
- 9. Soluble salts <= 0.07 mmhos/cm

Note to specifier: Keep the intensive drainage layer below if using intensive media above. Keep one of the two drainage options. Coordinate with Part 1.

- E. Intensive Drainage Layer.

- 1. Locally sourced #57 stone, no fines.
- 1. Manufacturer's standard composite drainage layer.

- D. Filter Fabric (Separation Fabric). Root-permeable, non-woven geotextile which is used to contain granular media layers. Inert to biological degradation and resistant to naturally occurring chemicals, alkalis and acids.

- 1. Material Polypropylene
- 2. Unit Weight: 3-5 oz/yd2 ASTM-D3776
- 3. Grab tensile strength: >= 60 lb ASTM-D4632
- 4. Grab tensile elongation: >= 50% ASTM-D4632
- 5. Trapezoid tear strength >= 50 lb ASTM D4533
- 6. CBR puncture strength..... >= 70 lb ASTM D6241
- 7. Permittivity: >= 0.9 sec-1 ASTM-D4491
- 8. Flow rate >= 100 gpm / ft2 ASTM D4491
- 9. UV Resistance at 500 hours >= 70% ASTM D4355

Note to specifier: Keep the water retention layer below in combination with any EcoCline extensive profile. This is not normally needed for intensive profiles.

- E. Water Retention Layer. A layer of root-permeable synthetic material engineered to retain over 80% of its volume in captured water. UV Resistant. Inert to biological degradation and resistant to naturally occurring chemicals, alkalis and acids. Able to withstand construction impacts and post-construction warranty phase pedestrian impact while retaining at least 95% of its retention capabilities.

1. Material Mineral Wool or approved equivalent
2. Recycled content >65%
3. In-Plane Flow per 1" width >=0.05 gals/min/ft ASTM D-4716
4. Density Minimum 12 lbs/cubic foot Dry density
5. Binder Phenolic resin

2.04. MEMBRANE PROTECTION LAYERS

Note to specifier: Keep "Air Layer" or delete in entirety. Coordinate with Part 1.

A. Air Layer: Three-dimensional formed sheet with top surface in a single plane. Panel shall create an air space between vegetated roof covering and roofing membrane to allow any water below vegetated roof covering to freely flow to roof drains.

1. Material: Polypropylene
2. Recycled Content >40% post-industrial
3. Flow (hydraulic gradient = 1): >20 g/min/ft ASTM D-4716
4. System Thickness: 0.25 - 0.65 in
5. Compressive strength: >= 15,000 lbs/sf ASTM D-1621

Note to specifier: Keep only one of the protection layer options below and delete the rest in entirety. Coordinate with Part 1.

B. Geotextile Protection Fabric. Layer of non-woven geotextile designed to prevent mechanical damage to underlying layers during or after construction.

1. Material Polypropylene
2. Recycled Content >=90% post-industrial
3. Weight ≥ 12 oz/sy ASTM-D5261
4. CBR Puncture Strength ≥ 500 lbs ASTM-D6241
5. Grab Tensile Strength ≥ 200 lbs ASTM-D4632
6. Trapezoidal Tear Strength ≥ 70 lbs ASTM D4533

B. Root Barrier and Protection Fabric: Layer of root-resistant material at the lowest level of the vegetated roof covering.

1. Material EPDM
2. Thickness 45 mils
3. Seam tape and primer: As approved by Roofing Manufacturer

B. Root Barrier: Layer of root-resistant material at the lowest level of the vegetated roof covering.

1. Material HDPE
2. Thickness 30 mils

Note to specifier: The Roofing Manufacturer might have specific root barrier requirements. Generally, taped, or even just 12-inch overlap, seams are less expensive and are generally acceptable for extensive assemblies. Heat-welded seams are preferred for intensive assemblies if using an HDPE root barrier.

3. Seams: ... Taped as approved by Roofing Manufacturer
3. Seams: Heat-welded as approved by Roofing Mfg.

2.05. ACCESSORIES

Note to specifier: Standard extensive edging is shown below. Edit or replace as needed.

A. Edging

1. Material: Formed Aluminum
2. Mill finish.
3. Recycled Content: >=40%
4. Size: As shown on the drawings
5. Configuration: L-shaped
6. Wall Thickness: minimum 16 gauge (0.050 inches)
7. Provide drainage openings to allow water to freely flow to roof drains.

- B. Gravel Roof Ballast
 - 1. Locally quarried, no deleterious materials
 - 2. Organic Impurities: None
 - 3. Size: #4 or #2 (ASTM D7655 / ASTM D448)

Note to specifier: Standard extensive access chambers are shown below. Edit or replace as needed.

- C. Roof Drain and Scupper Access Chambers: Open-ended box or cylinder that covers drains and/or scuppers and freely admit water at its base, and which has a removable lid to allow access and cleaning but which prevents debris from entering the chamber.
 - 1. Material: 0.125 gauge aluminum
 - 2. Recycled content: >=40%
 - 3. Color: Mill finish
 - 4. Height: Same as profile thickness, plus one inch
 - 5. Length: 15 inches (nominal)
 - 6. Width: 15 inches (nominal)
 - 7. Open area: at least 6 square inches per lineal foot of face

Note to specifier: Drainage conduit is not common. Delete if not using.

- D. Drainage Conduit
 - a. Material: PVC
 - b. Recycled content: >90% combined pre- and post-consumer
 - c. Dimensions: Rectangular 4-inch width x 2.25-inch height
 - c. Dimensions: Rectangular 8-inch width x 1-inch height
 - d. Open area: >=10%
 - e. Perforated on bottom and sides

Note to specifier: Slope stabilization is not common. Delete if not required. Coordinate with Submittals in Part 1. Edit if using.

- E. Slope Stabilization:

2.06. PAVERS

Note to specifier: Edit "Rooftop Pavers" or delete in entirety. The performance specifications below allow Hanover, Sunnybrook, Wausau Tile, or other common brands. Color selection might require a certain brand.

- A. Rooftop Pavers: Pavers set within vegetated roof covering or as a border around vegetated roof covering.
 - 1. Material: Hydraulically pressed precast concrete
 - 2. Color: Manufacturer's standard gray
 - 3. Weight: 20-25 lb/sf
 - 4. Face Size: 24-inches by 24-inches (nominal). Bevel top edges 3/16 inch.
 - 5. Thickness: 2 inches (nominal)
 - 6. Absorption: Not greater than 5 percent per ASTM C 140
 - 7. Compressive Strength: >=7,500 psi (52 MPa) minimum when tested according to ASTM C 140
 - 8. No breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.

Note to specifier: Keep one or both of the support options below. Delete both options below if pavers will only be set directly in media.

- B. Low Supports: Manufacturer's standard standard SBR rubber, high-density polyethylene or polyurethane paver support assembly including fixed-height or stackable paver supports and shims.
- C. Pedestals: Manufacturer's standard standard, high-density plastic paver support assembly including adjustable pedestals and shims.

3.01. EXAMINATION

- A. Examine the completed roofing system for compliance with drawings, installation tolerances, and other conditions affecting performance.
- B. Confirm that Roofing Manufacturer has tested roofing system and found it to be free of leaks prior to commencing installation.
- C. Notify the Architect immediately if any conditions are present that may be detrimental to the performance of the Work. Proceed only after unsatisfactory conditions have been corrected.

3.02. GENERAL

- A. Install vegetated roof covering system in accordance with approved submittals and the Contract Documents.
- B. Until the first layer covering the roofing membrane has been installed, limit traffic over the working area to essential personnel, only.
- C. Protect heavily traveled areas (e.g., corridors for transporting media to the working areas) in a manner approved by the Roofing System Manufacturer.
- D. Protect lay down areas using protection fabric, ½-inch plywood or particle board over 1-inch sheets of insulation, or similar protective material approved by the Roofing System Manufacturer.
- E. Protect all loose-laid fabrics from wind damage. Maintain overlaps, folds, turn-ups, and turn-downs by methods which will not damage the roofing system.

3.03. MEMBRANE PROTECTION LAYERS AND ACCESSORY INSTALLATION

Note to specifier: Keep one of the three protection layer options below. Coordinate with Part 1.

- A. Protection Layer: Install in a continuous layer over all horizontal and vertical surfaces to receive vegetated roof covering, including against base flashings and roof penetrations. Overlap seams 4 to 6 inches. Keep underlying surface clean of all debris until protection layer is securely in-place.
- A. Root Barrier and Protection Layer: Overlap 4 to 6 inches at seams. Tape securely.
- A. Root Barrier: Overlap 4 inches at seams. Seal with hot-air welding gun. Check all seams with a probe.

Note to specifier: Keep the air layer if using, or delete in entirety. Coordinate with Part 1.

- B. Air Layer: Starting at low points of the roof, install in a continuous layer. Overlap seams in a shingle formation to direct water within the water retention layer over the air layer toward roof drains, but prevent water in the water retention layer from flowing into the air layer. Ensure that air layer provides unobstructed flow to roof drains in all locations.
 - 1. Install air layer below drain access chambers, scupper access chambers and edging to allow free flow of water to roof drains.

Note to specifier: Keep all three below. Edging, drainage accessories, and gravel are almost always used, even if only around drains.

- C. Edging: Install edging where indicated. Secure until permanently ballasted in place.
- D. Drainage Accessories: Place drain access chambers, scupper access chambers, drainage conduit and other drainage accessories per drawings. Ensure unobstructed flow to roof drains. Secure until permanently ballasted in-place.
- E. Gravel Roof Ballast: Install to thickness shown on drawings. Do not suddenly increase the load to the roof during gravel installation.

Note to specifier: Keep the paver text below if using pavers on pedestals or other supports. Delete in entirety if not using pavers, or if pavers are only being set directly in media.

- F. Pavers on Pedestals or Low Supports: Set pavers on low supports over protection layer as indicated on drawings. Do not suddenly increase load to the roof during paver installation.
 - 1. Tolerances:
 - a. Install pavers to vary not more than 1/16 inch in elevation between adjacent pavers and not more than 1/8 inch from surface plane elevation of individual paver.
 - b. Maintain tolerances of paving installation within 1/4 inch in 10 feet of surface plane in any direction.

3.04. VEGETATIVE ROOF COVERING INSTALLATION

- A. Water Retention Layer: Install with hand-tight joints. Ensure unobstructed flow of water retention layer to roof drains in all locations.
- B. Filter Fabric: Install in continuous layers directly over water retention layer. Overlap joints at least 6 inches. Turn up filter fabric against edges so that granular media is contained.
- C. Nutrient Zone Layer and Weed Suppressing Layer: Place media to the specified depth allowing for compaction. Do not suddenly increase the load to the roof during media installation. Place media in a single lift and allow to striate into two distinct layers.

Note to specifier: Keep the paver text below if using pavers set directly in media. Delete in entirety if not using pavers, or if pavers are only being set on pedestals.

- D. Pavers in Media Zone: Set pavers directly in compacted media as shown on drawings. Omit water retention layer directly below pavers as indicated on drawings. . Do not suddenly increase load to the roof during paver installation.

3.05. PLANTING

- A. Install plants in accordance with accepted horticultural practice, warranty requirements, the Contract Documents, and approved Submittals.

Note to specifier: Select one or more of the three options below. Delete options not used. Coordinate with Part 1.

- B. Plant plugs at a uniform density to achieve specified coverages and as required per the Drawings.
- C. Supplement plugs with cuttings and seed achieve the specified vegetative coverages. Cuttings and seed will be installed by the Vegetative System Manufacturer during the warranty period, as soon as practical following plug planting and as seasonally appropriate.
- D. Install pre-grown Sedum mats edge-to-edge covering all areas shown.
- E. Install temporary wind protection over the entire planted area.
- F. Water plants and saturate media within one day of planting. Vegetative System Manufacturer will install temporary spray irrigation as needed during the first growing season. Vegetative System Manufacturer will remove irrigation within one year of planting.

3.06. PLANT PERFORMANCE WARRANTY (STEWARDSHIP)

- A. General: During Stewardship period, care for plantings by cultivating, weeding, and performing other operations as required to establish healthy, viable plantings. Maintain continuous vegetative coverage, conforming with Warranty requirements. Use only products and methods acceptable to Roofing Manufacturer.
- B. Facilitate natural adaptation of the plant palette to the unique microclimate of the project site.
 - 1. As volunteer plant species emerge, distinguish between desirable species and weeds.
 - a. Desirable plant species include:
 - i. Plants that contribute toward a low-maintenance, continuous and year-round vegetative cover that is predominantly perennial in nature, but which may accommodate some annual plants.
 - ii. Plants that grow and spread at a pace that does not diminish species diversity and that does not require excessive maintenance.
 - b. Weeds include:
 - i. Plants which are aggressively spreading or very fast-growing that, if not removed would destabilize the plant community to diminish the quality or quantity of desirable species.
 - ii. Plants that are considered noxious or invasive.
 - iii. Plants whose root systems are not suited for long-term growth within the growing media (e.g. tree saplings in a 4-inch depth media) or whose ultimate size or type would pose damage to the roofing membrane.
 - 2. Remove weeds and facilitate growth of desirable species. Supplement desirable species as needed.

3. In areas where the existing plant palette is not performing optimally, determine the reason for poor performance, and suggest planting changes to the Owner. Implement planting changes.
- C. Perform stewardship operations in compliance with Section 317 of the International Building Code, including removal of excess biomass at least twice annually, maintenance of vegetative free zones as required, and providing supplemental irrigation if required to minimize the presence of dry foliage.
- D. Apply treatments as required to keep plants and growing medium free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
- E. Replace growing medium that becomes displaced or eroded because of settling, wind or water scour, or other processes.
- F. Inspect roof drains. Remove debris to ensure roof drains are not obstructed.
- G. Test media annually for nutrient levels, salt levels, pH and other conditions as necessary. Maintain a permanent log of all test results. Include all vegetative roof areas. Ensure that nutrient, salt, organic matter, and pH levels remain within ranges suitable for optimal plant growth while minimizing nutrient runoff. Supplement or flush media as necessary.
- H. Review the Roofing Provider's warranty and assist the Owner in compliance with said warranty. Do not use any materials or perform any work which would compromise any existing warranties.
- I. Submit a written and photographic report to the Owner after each stewardship visit. Include test results, general plant coverage, problem areas or detrimental conditions encountered, and proposed solutions to problems.